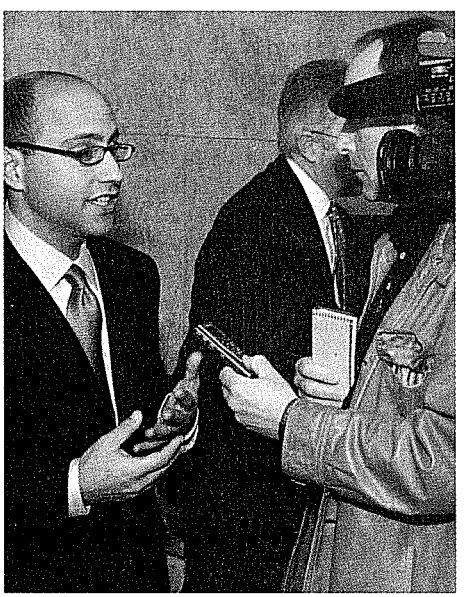
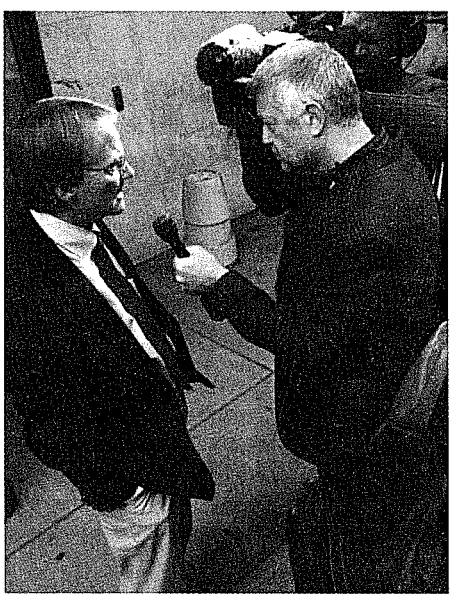
REPORTS OF THE NATIONAL CENTER FOR SCIENCE EDUCATION

DEFENDING THE TEACHING OF EVOLUTION IN THE PUBLIC SCHOOLS

Volume 26, Numbers 1-2 JAN-APR, 2006

CONTINUES *NCSE REPORTS & CREATION/EVOLUTION*





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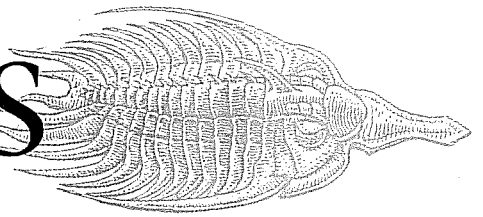

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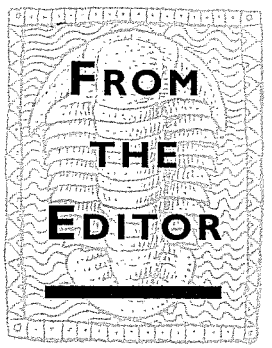


The much-anticipated court case over "intelligent design" was decided on December 20, 2005. As most *RNCSE* readers know, the case was a disaster for "intelligent design" and its proponents, as Judge John E Jones III characterized the policy and rationale of the Dover Area School Board with the unambiguous phrase "breathtaking inanity". In this issue, we present a number of news and feature articles focused on the trial, its preparation, and its aftermath. In this issue, readers will be able to see the involvement of NCSE in this case, and how our resources and expertise helped the plaintiffs to prevail.

We begin with excerpts from Judge Jones's decision, so readers can see how Jones rendered the opinion (the complete decision is available on-line). In this special section of Dover news, we also include the closing arguments from Eric Rothschild of Pepper Hamilton LLP, a member of the legal team that represented the plaintiffs.

NCSE's Nick Matzke provides an overview of the development of the case, beginning with an ordinary day at the office fielding complaints about a local school board's pushing creationist ideas. Nick writes that there was nothing much about the original "flare-up" that had "trial of the century" qualities about it, but things sure changed quickly. This article shows how NCSE helped the plaintiffs, the legal team, the press, and the expert witnesses to identify the key issues at stake in the trial and to convey those accurately, completely, and concisely.

NCSE's Wesley R Elsberry writes in more detail about the roles of expert witnesses in this case. One of the more remarkable series of events was the depletion of the expert-witness roster for the defendants, as one "intelligent design" luminary after another declined to be deposed or testify in court.

Three members of NCSE's board of directors were among the team of expert witnesses for the plaintiffs. Barbara Forrest, Kevin Padian, and Brian Alters provide their own perspectives on their roles in the trial and their experiences and impressions over the six weeks of testimony.

Of course, NCSE members and staff were not the only people paying attention to Dover. Look at the first page of our centerfold to read excerpts from editorials in major newspapers around the country in response to Jones's decision. We also have included references to and excerpts from a number of other articles throughout the issue.

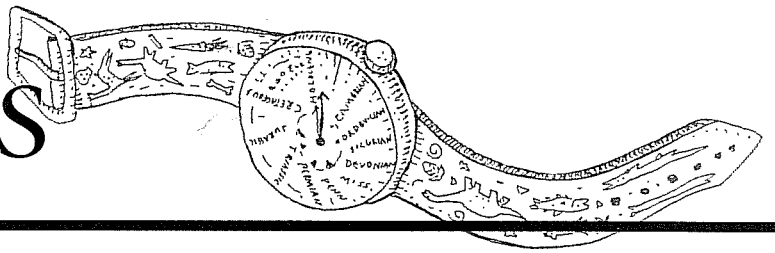
One remarkable outcome was the publication of a book by fellows and staff of the Discovery Institute responding to the Dover decision. Tim Beazley reviews this book for us, and his conclusion is that the book continues in the "intelligent design" movement's tradition of deficient scholarship, quote mining, poorly supported arguments, and weak inference. It is a prime example of desperate argumentation in the face of the complete and utter rejection at trial of all the legal, scientific, and educational arguments presented on behalf of "intelligent design" by its proponents.

... AND THAT'S NOT ALL

Although Dover has been on our minds and dominating the resources and talent of NCSE and others who support evolution around the nation, there are dozens of other flare-ups and actions still going on. In many of these, our members are instrumental in providing advice and resources as a first line of defense in local communities where evolution is under attack. A few of them were thanked with NCSE's "Friend of Darwin" award for 2004, as Glenn Branch reports.

RNCSE 26 (1-2) was printed in August 2006.

NEWS



UPDATES

Alabama: When the Alabama legislature adjourned on April 18, 2006, House Bill 106 and Senate Bill 45 died. These identical bills (see *RNCSE* 2005 Sep-Dec; 25 [5-6]: 9-13) purported to protect the right of teachers to "present scientific information pertaining to the full range of scientific views in any curricula or course of learning" and the right of a student not to be "penalized in any way because he or she may subscribe to a particular position on any views." In language reminiscent of the Santorum language removed from the No Child Left Behind Act, they specified that "[t]he rights and privileges contained in this act apply when topics are taught that may generate controversy, such as biological or chemical origins." HB 106 and SB 45 closely resembled previous anti-evolution bills in Alabama — three bills introduced in 2005 (HB 352, SB 240, and HB 716) and two bills introduced in 2004 (HB 391 and SB 336) — all of which failed.

California: A lawsuit challenging the Understanding Evolution website on constitutional grounds was dismissed in the United States District Court for the Northern District of California on March 13, 2006. Understanding Evolution, a collaborative project of the University of California Museum of Paleontology and the National Center for Science Education, was originally intended as a resource for teachers; it subsequently expanded to serve everyone interested in learning about evolution.

Among the resources for teachers is a brief discussion of the idea, labeled as a misconception, that evolution and religion are incompatible. The website notes, "Of course, some religious beliefs explicitly contradict science (e.g., the belief that the world and all life on it was created in six literal days); however, most religious groups have no conflict with the theory of evolution or other scientific findings," and provides a link to NCSE's publication *Voices for Evolution*.

A California parent, Jeanne E Caldwell, subsequently filed suit, complaining that by this language the Understanding Evolution website endorses a number of religious doctrines, thereby violating the Establishment Clause of the First Amendment by favoring certain religious groups over others. Caldwell is the wife of Larry Caldwell, who also filed a suit against the Roseville Joint Union High School District after it declined to implement his proposals for evolution education (see *RNCSE* 2004 Nov/Dec; 24 [6]: 15-20).

In granting the motion to dismiss in *Caldwell v Caldwell et al* — the first defendant was Roy Caldwell, the director of UCMP — Judge Phyllis J Hamilton held that the plaintiff failed to allege that she had federal taxpayer standing, failed to sufficiently allege state taxpayer standing, and failed to establish that she suffered a concrete "injury in fact." Since those considerations sufficed for dismissal, Hamilton did not consider the merits of the Establishment Clause claim.

Georgia: During the oral arguments in the appeal of *Selman v Cobb County* — the case in which the trial court determined that the evolution warning labels affixed to textbooks in Cobb County, Georgia, schools violated the First Amendment's Establishment Clause — Judge Ed Carnes took issue with the claim that a petition organized by a local creationist parent, Marjorie Rogers, affected the school board's decision to require the stickers, contending that the petition was dated six months after the decision. Carnes, one of the three judges on the panel considering the school board's appeal of the trial court's decision, went so far as to suggest that the ACLU's lawyer Jeffrey Bramlett might have misled the court about the petition.

According to the *Atlanta Journal-Constitution* (2006 Jan 5), in a December 22, 2005, letter to the court, Bramlett apologized for a miscitation in the appellate brief and conceded that the March 2002 version of Rogers's petition was not in fact submitted into evidence during the trial. But he noted that two people — the superintendent of the Cobb County schools and Rogers herself — testified that the board was given the petition in March 2002, before it adopted the evolution disclaimers. The *Journal-Constitution* added that it published contemporaneous stories indicating that the petition was in play in March 2002 and that a reporter from the newspaper examined the petition at the offices of the school system.

In a ruling issued on January 4, 2006, the court took the unusual step of exonerating the lawyers on both sides for the confusion about the date of the petition, writing, "The attorneys on both sides might have been more careful in their advocacy relating to this issue, which would have assisted the Court. The Court, however, does not find that counsel misled it or attempted to do so. We issue this order to remove any implication that either counsel did." The ruling emphasized that it took no position "whether any findings by the district court about the timing of the petition were clearly erroneous, which is the governing standard of review; the time and place for announcing any decisions about that will be in the opinion this Court issues."

There are indications that the questions surrounding the petition may continue to play a role in the case, however. Despite the trial testimony and press reports, Linwood Gunn, the lawyer representing the

Cobb County school board, told the *Journal-Constitution* that "I have my doubts" about the existence of the March 2002 version of the petition, and the court's interim ruling pointedly commented, "Parts of the trial record concerning the petition are puzzling." The *Fulton County Daily Report*, a legal newspaper, reported (2006 Jan 5) that both Bramlett and Gunn "allowed that such a tendentious wrangle, in appeals, over basic facts of a case was unusual."

Indiana: House Bill 1388, which, if enacted, would have provided that "the state board shall not adopt a textbook if the state board knows the textbook contains information, descriptions, conclusions, or pictures that are false," died quietly in the Indiana House of Representatives when the deadline for action by the full House passed in early February 2006. Introduced on January 12, 2006, and referred to the House Committee on Education, the bill was sponsored by Representative Bruce A Borders (R-Jasonville), who previously declared his intention to require the teaching of "intelligent design" in Indiana's public schools; he acknowledged that his change in strategy was due to the December 2005 decision in *Kitzmiller v Dover*. For background, see *RNCSE* 2005 Sep-Dec; 25 [5-6]: 9-13.

Kansas: The Kansas Association of Teachers of Science (KATS) issued a response to the state science standards adopted in November 2005 by the state board of education, the *Lawrence Journal-World* (2006 Feb 14) reported. "By redefining science in the Kansas Science Education Standards," the statement reads in part, "the KBOE is promoting intelligent design tenets that purport supernatural explanations as valid scientific theories. ... [T]he KATS Board of Directors adamantly opposes turning Kansas science classrooms into theaters of political and religious turmoil blurring the Constitutional ideals of separation of Church and State."

Rejecting the standards on both scientific and pedagogical grounds, the statement included the following points:

- Kansas teachers of science should continue to teach science as it is practiced throughout the world, and not attribute natural phenomena to supernatural causation;
- Kansas teachers of science should explore with their students the extensive evidence for evolutionary theory and actively refute the so-called evidence against evolution, as outlined in the new science standards;
- The Kansas Association of Teachers of Science recognizes that the KBOE is exhibiting educational irresponsibility in ignoring mainstream scientific understandings by substituting its own religiously-motivated agenda;
- State assessments should not include items related to the disputed portions of the 2005 Standards, as these statements do not reflect the global view of the science community;
- The KBOE should reconsider the inclusion of non-scientific ideas about the origins and development of life in order not to damage the prospects for student admission to high quality colleges and universities;
- The KBOE should be aware that [its] anti-science actions are in direct conflict with the recent Kansas Bioscience Initiative.

KATS also recommended that the 2001 version of the standards be used for curriculum development and assessment.

KATS is the Kansas state affiliate of the National Science Teachers Association and describes itself as the largest organization in Kansas representing teachers of science. In condemning the standards, KATS joins the NSTA as well as the National Academy of Sciences, the American Association for the Advancement of Science, and the committee that wrote the original standards. Bill Wagnon, a member of the state board of education who voted against the adoption of the standards, commended KATS for taking a stand in defense of evolution education, telling the *Journal-World*, "They are being professionally responsible."

Kansas, Manhattan: The Manhattan-Ogden school district (USD 383) became the first local school district in Kansas to reject the state science standards adopted by the Kansas state board of education in November 2005. At its meeting on February 15, 2006, the USD 383 board of education voted 6-0 to adopt a resolution that endorses the original writing committee's description of science as "a human activity of systematically seeking natural explanations for what we observe in the world around us."

The resolution continues, "The Science Standards that use this definition will be used in science curricula in all appropriate USD 383 K-12 science courses. USD 383 does not support the redefinition of science included in the Science Standards passed by the Kansas State Board of Education on November 8, 2005; this document changed the definition of science to allow non-natural (including supernatural) explanations of natural phenomena."

In rejecting the standards, USD 383 joins a host of critics, including a group of 38 Nobel laureates, the National Science Teachers Association, the National Academy of Sciences, the American Association for the Advancement of Science, the American Institute for Biological Sciences, the committee that wrote the original standards, and the Kansas Association of Teachers of Science (see above).

The resolution was originally proposed to the board on February 1, 2006, by over 150 science, mathematics, and engineering faculty and staff at Kansas State University, who argued that adopting the redefinition of science contained in the adopted version of the state science standards would not only affect the quality of science education in USD 383 but also threaten the efforts of the university and of local business to recruit highly qualified professionals.

In addition, the proponents of the resolution argued, "The changes made to the science standards are based on the utterly false

belief that evolutionary science, and the scientific method itself, [are] based on an atheistic philosophy. Promoting this false conflict between science and faith erects unnecessary barriers to student learning, discourages many students from pursuing careers in the sciences, and perpetuates public misunderstandings of the nature and conclusions of science."

USD 383 superintendent Bob Shannon told the *Kansas State Collegian* (2006 Feb 16) that it is unlikely that the adoption of the resolution will have any financial or legal ramifications for the district. Board member Beth Tatarko added that in fact accepting the state standards might be financially and legally precarious, citing the outcome of *Kitzmiller v Dover*: "If we had someone in our district teaching Intelligent Design right now, those costs would come back to us."

Mike Herman, a Kansas State University biology professor who originally presented the board with the resolution, told the *Collegian*, "The board made a bold move tonight by accepting and approving the resolution." Expressing his hope that other school districts across Kansas will follow in the steps of USD 383, he added, "It's important for the students of Manhattan, and it could be important for the state of Kansas in the end."

Maryland: Two anti-evolution bills were introduced in the Maryland legislature during 2006. House Bill 1228, introduced in the Maryland House of Delegates on February 10, 2006, would, if enacted, have required the state board of education to "prohibit the teaching or the discussion of the theory of intelligent design" in science classes and prohibit it from "requiring the teaching or discussion of the theory of intelligent design in any class." But there was a catch: HB 1228 would also have required the board to "permit the teaching or discussion of the theory of intelligent design in humanities or philosophy classes" and moreover to develop and disseminate instructional materials for that purpose.

"While there is arguably a place for 'intelligent design' to be discussed in public school classrooms," commented NCSE executive director Eugenie C Scott, "Marylanders would do well to be wary of the bill. Teaching 'intelligent design' as if it were scientifically credible is pedagogically inappropriate and constitutionally problematic, whether it's in a science class, a philosophy class, or a home ec class." Scott cited the recent case *Hurst v Newman*, in which parents in Lebec, California, challenged the teaching of a four-week elective course on "Philosophy of Design".

In Lebec, a teacher sought to teach creationism as well as scientifically unwarranted criticisms of evolution under the rubric of philosophy. It was not until a lawsuit was actually filed by Americans United for Separation of Church and State that the school district conceded that the class was inappropriate, agreeing to end the class and never to offer it again. Scott, who provided an expert witness declaration in *Hurst v Newman*, warned that, if enacted, HB 1228 would be likely to spawn cases like Lebec throughout Maryland.

The lead sponsor of HB 1228 was Delegate Emmett C Burns Jr (D-District 10), who subsequently introduced HB 1531 in the Maryland House of Delegates on February 16, 2006. If enacted, HB 1531 would have provided that teachers in Maryland's public schools and faculty members in Maryland's public institutions of higher education "shall have the affirmative right and freedom to present scientific information to [sic] the full range of scientific views in any curricula or course of learning"; the phrase "the full range of scientific views" is evidently taken from the so-called Santorum language, which was in fact stripped from the federal No Child Left Behind act. A subsequent provision repeated the phrase "the full range of scientific views," while adding, "including intelligent design."

A number of provisions attempted to immunize the bill from the charge that it would allow the teaching of religious doctrines and discredited science: the bill forbade instructors to "stress any particular denomination, sectarian, or religious doctrine or belief" while providing "support-

POLLS: ANTI-EVOLUTIONISM STILL ABOUT 50%

PollingReport.com, a web site that compiles results of public opinion polls, recently reported how the US public feels about a number of issues in the sciences, including stem-cell research, cloning, genetically modified foods, and evolution (<http://www.pollingreport.com/science.htm>). In addition to the most recent re-issue of the classic poll on evolution that Gallup has conducted for over 20 years, the site reports similar results from polls conducted by Fox News, Harris, CBS News, CNN, the *New York Times*, and NBC News. In most cases, the report on the website shows the results of one or more previous polls that used the same questions or polls taken at the same time that presented the questions differently.

The percentage replying that God created humans in their present form and/or within the last 10 000 years ranges from 44% to 57%. Because the questions asked in each poll were somewhat different, it is difficult to make a precise comparison, but the proportion of respondents explicitly rejecting an evolutionary model persists in this range. Furthermore, as many as 65% of respondents in the Harris poll agree that humans (and other species) did not evolve from earlier forms of life.

The polling answers reveal a stunning lack of progress in promoting evolution literacy, but the polling questions may be worse. For example, in many of the polls, the questions use the word "development" as a synonym for "evolution". However, on the brighter side, none of the poll questions refers misleadingly to creationism or "intelligent design" as a *scientific* theory.

ing evidence on the theory of intelligent design," for example, and insisted that it is not to be construed as protecting the teaching of "a view that lacks published or empirical or observational support." HB 1531 resembled the two anti-evolution bills (House Bill 106 and Senate Bill 45; see above) introduced in the Alabama legislature in 2006, although it treated K-12 teachers and college instructors separately.

After its first reading, HB 1531 was referred to the House Rules and Executive Nominations Committee and then referred back to the Ways and Means Committee, where it received a hearing on March 23, 2006, and then an unfavorable report on March 27. Similarly, after its first reading, HB 1228 was referred to the Ways and Means Committee, where it received a hearing on March 7, 2006, and then an unfavorable report on April 10. Both bills died when the Maryland General Assembly adjourned on April 10, 2006. Coverage of these bills in the Maryland media was scant, with the exception of Ben McIlwain's op-ed for the University of Maryland's *The Diamondback* (2006 Mar 28), which described them as "nothing more than the latest in a series of attempts to attack science education and illegally insert religious teachings into the curriculum."

Michigan: Anti-evolution language was removed from a Michigan education bill before it was passed. As introduced, House Bill 5606 would have amended the state's school code to establish requirements for high school graduation, including by requiring the Michigan Department of Education to adopt course content expectations for science that "include using the scientific method to critically evaluate scientific theories and using relevant scientific data to assess the validity of those theories and formulate arguments for and against those theories." Although evolution was not mentioned specifically, the quoted language was taken verbatim from HB 5251, which specifically targeted "the theories of global warming and evolution" for attention (see *RNCSE* 2005 May-Aug; 25 [3-4]: 15-17).

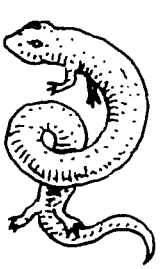
The sponsor of HB 5606, Brian Palmer (R-District 36), disclaimed any intention to promote "intelligent design" with the bill. But Palmer was a cosponsor of HB 5251, as well as of 2003's HB 4946, which would have amended the state science standards to refer to "the theory that life is the result of the purposeful, intelligent design of a Creator." Moreover, the primary sponsor of HB 5251, John Moolenaar (R-District 98), was reported by the *Detroit Free Press* (2006 Jan 28) as saying that HB 5606 would allow, though not require, the teaching of "intelligent design" and suggesting that it would require the teaching of "possible weaknesses" of evolution. A *Free Press* (2006 Feb 8) editorial commented, "The bill's broader goal of raising academic standards must not be jeopardized by sloppy writing at best, sneaky politics at worst."

HB 5606 was introduced on January 24, 2006, and referred to the House Committee on Education, which accepted a slightly amended version of it. The House of Representatives then passed the bill by a vote of 70-31 on March 2, 2006. Still containing the language from HB 5251 (although the words "at least" were inserted between "include" and "using"), HB 5606 proceeded to the Senate. But the Senate had ideas of its own about requirements for high school graduation, and substituted its own version of the bill, lacking the language from HB 5251, for HB 5606. The Senate passed its version of HB 5606 by a vote of 36-1 on March 23, but then on the same day the House voted against accepting it by a vote of 93-13.

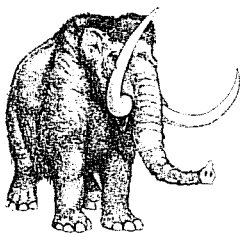
It was thus necessary for a conference committee to reconcile the two versions of HB 5606, as well as Senate Bill 1124, which also sought to establish requirements for high school graduation. The conference committee's version of the bill, lacking the language from HB 5251, was passed by the House by a vote of 97-9 on March 29 and by the Senate by a vote of 37-0 on March 30, and then signed into law by Governor Jennifer Granholm (D) on April 20. Meanwhile, HB 5251 — the original source of the anti-evolution language that was stripped from HB 5606 — still lingers in the House Education Committee; the Michigan legislative website reports no action on it since it was referred there on September 29, 2005.

Minnesota: Just before the omnibus education bill, Senate File 2994, was approved by the Minnesota state senate by a 39-27 vote on May 15, 2006, it was amended to provide, "Notwithstanding any law to the contrary, the Department of Education, a charter school, and a school district are prohibited from utilizing a nonscientifically based curriculum, such as intelligent design, to meet the required science academic standards under this section." The amendment was proposed by Senator Lawrence J Pogemiller (DFL-District 59). On May 20, however, the House of Representatives substituted its own version of the bill without Pogemiller's provision and approved it by a vote of 131-1, with the Senate following suit with a vote of 66-0. The legislature adjourned sine die on May 21. SF 2994 was the second bill that would have banned the teaching of "intelligent design" to be introduced in a state legislature during 2006; the other, Wisconsin's Assembly Bill 1143 (see below), died in committee on May 4, 2006.

Mississippi: Although the two anti-evolution bills in Mississippi, Senate Bill 2427 and House Bill 953, died in committee in early 2006 (see *RNCSE* 2005 Sep-Dec; 25 [5-6]: 9-13), a bill with a disturbing vestige of anti-evolution language was enacted nevertheless. House Bill 214 was signed into law by the governor of Mississippi, Haley Barbour (R), on April 20, 2006. Although originally unrelated to evolution education, the bill was amended to include a section providing, "No local school board, school superintendent or school principal shall prohibit a public school classroom teacher from discussing and answering questions from individual students on the origin of life."



Although the wording of that section is innocuous on its face, the legislative history of the bill suggests that this section of the bill is intended to allow or encourage anti-evolution teaching in science classes in Mississippi's public schools. When



HB 214 was first introduced, it concerned only curriculum requirements for high school students not planning to go on to college. The bill was passed in its original form by the House of Representatives on January 18, 2006, and by the Senate on March 1.

Meanwhile, Senate Bill 2427, which provided, "No local school board, school superintendent or school principal shall prohibit a public school classroom teacher from discussing and answering questions from individual students on the issue of flaws or problems which may exist in Charles Darwin's Theory of Evolution and the existence of other theories of evolution, including, but not limited to, the Intelligent Design explanation of the origin of life," was passed on February 6 and referred to the House Education Committee, where it died on February 28, when a legislative deadline passed.

But on March 1, after HB 214 was passed in its original form by the Senate, it was "reconsidered" and amended through a standard parliamentary procedure. The amendment, proposed by Senator Charles Ross (R-District 20), the original sponsor of SB 2427, consisted of adding the text of SB 2427 to HB 214.The Senate then accepted the amended bill and sent it back to the House. Because the House refused to accept the Senate amendment, the bill was referred to a conference committee to work out a compromise version. The committee removed the language about "flaws or problems" with evolution and the mention of "other theories of evolution, including, but not limited to, the Intelligent Design explanation." The final version of HB 214 refers only to the origin of life.

On the surface it might seem that there would be little need for this section of HB 214 in its final form. Don't teachers already have the ability to talk about and answer questions about the origin of life? Have any teachers in Mississippi ever been prohibited from doing so? However, the language of SB 2427 clearly marks it as intended to promote or protect religiously based opposition to evolution education, and it is SB 2427's language that appears, in muted form, in HB 214. The implications of HB 214 have not escaped the notice of school administrators in the state. Mike Halford, a school superintendent in Lowndes County, was quoted by the *Commercial Dispatch* of Columbus, Mississippi, as saying, "That's probably something that's going to be contested. It is very vague" (2006 Apr 22). "We're starting to see lawsuits pop up from this," Halford added. "It's just a problem we don't need."

Missouri: "A new tack for trying to introduce supernatural explanations for the origin of life into Missouri's public school science classes appears dead this year," the *Kansas City Star* reported (2006 Apr 2). The newspaper was referring to House Bill 1266, the so-called Missouri Science Education Act, which if enacted would have provided, "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." The chief sponsor of HB 1266 was Representative Robert Wayne Cooper (R-District 155), who in 2003 introduced two bills (HB 911; HB 1722) calling for "intelligent design" to be taught in the Missouri public schools. Although HB 2006 was passed by a 7-6 vote by the House Elementary and Secondary Education Committee on March 16, 2006, the *Star* reported the committee's chairwoman (who voted for the bill) as saying that she simply lacked room for HB 1266: committees are permitted to submit only a limited number of bills to the floor. The *Star* also reported, "The bill was opposed by a wide range of teacher groups and school organizations, and several faith-based groups" and quoted the chief lobbyist for the Missouri affiliate of the National Education Association as expressing concern about the possible economic consequences of HB 1266: "We need to be doing our utmost to increase science literacy so our kids can compete." The *Star*'s prediction was correct: HB 1266 died when the legislative session ended on May 12, 2006.

Nevada: A petition to amend the Nevada constitution to require the teaching of the "strengths and weaknesses" of evolution was filed with the secretary of state's office on February 24, 2006.The "Truth in Science" initiative calls for students to be informed that "although most scientists agree that Darwin's theory of evolution is well supported, a small minority of scientists do not agree," listing five specific "areas of disagreement" to be discussed.

The initiative petition was introduced by Steve Brown, whom the *Las Vegas Review-Journal* (2006 Mar 1) described as "a masonry contractor who has lived in Las Vegas for more than 30 years." Brown told the newspaper, "I've looked at a middle school textbook that says that all elements of evolutionary theory are proven science. That's not so. ... Evolution has occurred, there's no way to argue that," he said. "Some parts have been proven, but some is just theory."

In order for the initiative to reach the November 2006 ballot, Brown must collect 83 184 signatures by June 20, 2006. Brown acknowledged that he lacks financial and organizational support for a signature drive, but expressed a willingness to make common cause with Christian conservatives. The chairman of Nevada Concerned Citizens told the *Review-Journal*, "I am curious to see what he has to say ... But there are other issues we're working on."

Even if the initiative wins a spot on the ballot, it would have to be approved not only in November 2006 but also in 2008 in order to take effect. But it may have already had its effect: state senator Maurice Washington (R-District 2) told the Associated Press (2006 Mar 5), that while he disagrees with Brown's strategy, he is now thinking about introducing legislation allowing "intelligent design" to be taught as an elective in Nevada's public schools.

In its editorial about the initiative (2006 Mar 1), the *Review-Journal* was critical, arguing, "we must teach science as best we know it, in order to train succeeding generations of chemists, doctors and engineers. And despite the word games that allow a fundamentalist minority to insist that 'evolution is just a theory,' it is a scientific 'theory' that has been vetted and refined over more than a century."

New York: Assembly Bill 8036 is back. Originally introduced on May 3, 2005, the bill would have

required that "all pupils in grades kindergarten through twelve in all public schools in the state ... receive instruction in both theories of intelligent design and evolution." It also charged New York's commissioner of education to assist in developing curricula and local boards of education to provide "appropriate training and curriculum materials ... to ensure that all aspects of the theories, along with any supportive data, are fully examined through such course of study."

NCSE previously reported (*RNCSE* 2005 Jan-Apr; 25 [1-2]: 12-6) that the bill died in committee when the New York State Assembly's legislative session ended on June 24, 2005. But apparently not: on January 4, 2006, the bill was again referred to the House Committee on Education, where, after two amendments, it remains. The main difference is that the bill now would require pupils to receive instruction in "all aspects of the controversy surrounding evolution and the origins of man," including but not limited to "intelligent design and information effectively challenging the theory of evolution."

As before, the bill is generally considered unlikely to progress; its sponsor, Assemblyman Daniel L Hooker (R-District 127), was reported as explaining that his intention was more to spark discussion than to pass the bill, and acknowledging that this bill (and another that he introduced to permit the posting of the Ten Commandments on public buildings and grounds) was "religion-based". Moreover, Hooker is not planning on seeking a third term in the Assembly due to his military commitments: he is expected to be on active duty with the Marine Corps until at least early 2007, according to the *Daily Star* of Oneonta, New York (2006 May 11).

Oklahoma: House Concurrent Resolution 1043, introduced in the Oklahoma legislature on February 7, 2006, would, if enacted, encourage "the State Board of Education and local boards of education to revise the recommended academic curriculum content standards in science to ensure that, upon graduation, all students can accomplish the following: 1. Use of [*sic*] the scientific method to critically evaluate scientific theories including, but not limited to, the theory of evolution; and 2. Use relevant scientific data to assess the validity of those theories and to formulate arguments for and against those theories." HCR 1043 is the fourth anti-evolution bill to be introduced in the current legislative session. The other three are HB 2107 (encouraging the presentation of "the full range of scientific views" with regard to "biological or chemical origins of life"), HB 2526 (authorizing school districts to teach "intelligent design"), and SB 1959 (encouraging the presentation of "the full range of scientific views"). (For details, see *RNCSE* 2005 Sep-Dec; 25 [5-6]: 9-13.) HCR 1043's authors are listed as Representatives Paul Wesselhoft (R-District 54), Thad Balkman (R-District 45), and Sally Kern (R-District 55), and Senator Randy Brogdon (R-District 34). HCR 1043 was not assigned to a committee, and Oklahomans for Excellence in Science Education considers it to be effectively dead.

Oklahoma: House Bill 2107, one of four anti-evolution bills in the Oklahoma legislature (see above), was passed by the Common Education Committee by a vote of 8-5 on February 13, 2006. Representatives Odilia Dank (R-District 85), Abe Deutschendorf (D-District 62), and Paul Wesselhoft, as well as Senator Randy Brogdon, were added as coauthors with its initial sponsor, Sally Kern. HB 2107 was then passed by the Oklahoma House of Representatives by a vote of 77-10 on March 2, 2006. It was referred on March 15 to the Senate Committee on Appropriations, and then on March 21 to the Appropriations Subcommittee on Education, where it remains. The bill finds that "existing law does not expressly protect the right of teachers identified by the United States Supreme Court in *Edwards v Aguillard* to present scientific critiques of prevailing scientific theories" and encourages the presentation of "the full range of scientific views" with regard to "biological or chemical origins of life."

When the House passed the bill, the Associated Press (2006 Mar 2) quoted its lead sponsor, Representative Sally Kern (R-District 55), as saying, "This bill is not about a belief in God. It is not about religion. It is about science. ... I'm not asking for Sunday

Conservatives Against Intelligent Design

Nikhil Rao, a board member of Oklahomans for Excellence in Science Education, has launched a new coalition, Conservatives Against Intelligent Design (CAID). The group strongly rejects anti-evolutionism, especially in the guise of "intelligent design", and encourages political conservatives (Republicans, conservative independents, libertarians, and so on) to sign up in support of the effort. The hope is that the Republican leadership will be more likely to respond to the opinions of 30% of conservatives than to those of 100% of liberals.

From the CAID mission statement

Conservatives Against Intelligent Design (CAID) was founded to give a voice to Republicans, Independent Conservatives, and Libertarians across the country who stand opposed to the teaching of "intelligent design" and other forms of creationism in the classroom. In recent years Republican legislators at all levels of government have authored, sponsored, and voted for various anti-evolution bills with perceived immunity, confident that those who vote for them are creationists like themselves. CAID is intended as a wake-up call to these legislators, to remind them that the teaching of evolution is not a partisan issue. ...

Darwinian evolution has continued to gain empirical and theoretical support in the nearly 150 years since the original publication of *Origin of Species*. Although scientists continue to debate the specifics of evolutionary pattern and process, these represent attempts to refine and clarify extant theory rather than supplant or disprove either evolution or natural selection as the dominant mechanism of change.

Because ecological, biochemical, genetic, and paleontological finds have failed to provide support for any competing theory; and because current alternative theories are fundamentally not scientific, it would be irresponsible and disingenuous to teach any theory other than Darwinian evolution in science courses in our nation's public schools.

Visit CAID's website at <http://www.caidweb.org>.

school to be in a science class." Her colleague Tad Jones (R-District 9), however, expressed his support for the bill by saying, "Do you think you come from a monkeyman? ... Did we come from slimy algae 4.5 billion years ago or are we a unique creation of God? I think it's going to be exciting for students to discuss these issues."

A subsequent editorial in *The Oklahoman* (2006 Mar 7) argued, "This proposed law is unnecessary. Teachers are free to have discussions with their students, to help them think critically about important issues." Adopting a more caustic tone, the *Tablequah Daily Press* (2006 Mar 22) referred to the decision in *Kitzmiller v Dover*, warning, "Kern may not want to educate herself on the intricacies of evolutionary theory, but she ought to at least bone up on the First Amendment. Especially the part about Congress making no law respecting an establishment of religion."

Community opposition to HB 2107 was expressed at a press conference sponsored by the Tulsa Interfaith Alliance on March 22, the *Tulsa World* reported (2006 Mar 23). Professors from the University of Tulsa argued that the bill would adversely affect science education; the president of the Tulsa school board explained that the bill was unnecessary; a partner in a local oil company noted that businesses are concerned about the quality of science education; and a professor of law at the University of Tulsa commented that the state might incur legal fees exceeding $1 million, as in *Kitzmiller*, should the bill be passed and successfully challenged.

Wisconsin: Assembly Bill 1143 died in the Wisconsin State Assembly on May 4, 2006, the last day of the last general-business floor period. Announced at a press conference on March 7 and introduced and referred to the House Committee on Education on March 21, AB 1143 would, if enacted, have directed the school board to "ensure that any material presented as science within the school curriculum complies with all of the following: (1) The material is testable as a scientific hypothesis and describes only natural processes. (2) The material is consistent with any description or definition of science adopted by the National Academy of Sciences." (For details, see *RNCSE* 2005 Sep-Dec; 25 [5-6]: 4-5.)

Although neither creation science nor "intelligent design" was explicitly mentioned in the bill itself, they appeared to be its primary targets. Its main sponsor, state representative Terese Berceau (D-District 76), told Madison's *Capital Times* (February 7, 2006) that her bill was intended to counteract recent attempts to undermine evolution education around the country and within the state, and Michael Cox and Alan Attie, both professors of biochemistry at the University of Wisconsin, Madison, reportedly applauded the prospect of preventing any incursion of the "intelligent design" movement in Wisconsin.

The bill was described by the *Capital Times* as "a first-of-its-kind proposal," a characterization that appears to be accurate. In the last five years, at any rate, only three other anticreationism bills seem to have emerged: Minnesota's Senate File 2994 (see above), Montana's Senate Joint Resolution 8, introduced by Senator Ken Toole on January 7, 2005, and Pennsylvania's Senate Resolution 70, introduced by Senator Connie Williams on April 13, 2005. As resolutions, neither of the latter two would have directly affected curriculum and instruction. The resolution in Montana died in committee on March 1, 2005 (see *RNCSE* 2004 Nov/Dec; 24 [6]: 15-20); its counterpart in Pennsylvania seems to have died in committee.

In a recent article in the *Journal of Clinical Investigation* (2006 May; 116: 1134-8; available on-line at <http://www.jci.org/cgi/content/full/116/5/1134>), a number of AB 1143's supporters, including Attie, Berceau, Cox, the philosopher of science (and NCSE Supporter) Elliott Sober, and the historian of creationism Ronald L Numbers, explain the origin of the bill — ultimately prompted by a protracted controversy over evolution education in Grantsburg, Wisconsin (see *RNCSE* 2004 Nov/Dec; 24 [6]: 9-11) — and its objectives. In addition, the article reviews the history of the anti-evolution movement from *Epperson* to *Kitzmiller*, describes and refutes a few common misrepresentations used by the proponents of "intelligent design," and suggests a number of ways for scientists to defend the teaching of evolution.

National: Creationism emerged as a subsidiary theme as allegations of political interference with climate science at NASA were in the news. In a story in *The New York Times* (2006 Jan 29), Andrew Revkin described climate scientist James E Hansen's allegations that "officials at NASA headquarters had ordered the public affairs staff to review his coming lectures, papers, postings on the Goddard Web site and requests for interviews from journalists." In passing, Revkin mentioned a recently appointed public affairs officer at NASA headquarters named George Deutsch, who reportedly rejected a request from a producer at National Public Radio to interview Hansen on the grounds that NPR was "the most liberal" media outlet in the country and that his job was "to make the president look good."

In a subsequent story in the *Times* (2006 Feb 4), Revkin reported, "Other National Aeronautics and Space Administration scientists and public-affairs employees came forward this week to say that beyond Dr Hansen's case, there were several other instances in which political appointees had sought to control the flow of scientific information from the agency." Among these appointees was Deutsch, described by the *Times* as "a 24-year-old presidential appointee in the press office at NASA headquarters whose résumé says he was an intern in the 'war room' of the 2004 Bush-Cheney re-election campaign." Deutsch "told a Web designer working for the agency to add the word 'theory' after every mention of the Big Bang, according to an e-mail message from Mr Deutsch that another NASA employee forwarded to the *Times*."

In his e-mail message, Deutsch wrote that the Big Bang is "not proven fact; it is opinion," adding, "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. ...This is more than a science issue, it is a religious issue. And I would hate to think that young people would only be getting one-half of this debate from NASA. That would mean we had failed to properly educate the very people who rely on us for factual information the most." Revkin added, "The Deutsch memo was provided by an official at NASA headquarters who said he was upset with the effort to justify changes to descriptions of science by referring to politically charged issues like 'intelligent design'. Senior NASA officials did not dispute the message's authenticity."

Deutsch resigned from NASA on February 7, 2006, the same day that Texas A&M University, where he claimed to have received a degree in journalism, confirmed that he in fact did not graduate.The question of Deutsch's lack of a degree was apparently first investigated by Nick Anthis, a recent graduate of Texas A&M who runs The Scientific Activist blog (<http://scienceblogs.com/scientificactivist>); Anthis told the *Times* (2006 Feb 8), "It seemed like political figures had really overstepped the line. I was just going to write some commentary on this when somebody tipped me off that George Deutsch might not have graduated." Hansen, for his part, suggested that Deutsch represented only the tip of the iceberg of the administration's political interference with science: "The problem is much broader and much deeper and it goes across agencies. That's what I'm really concerned about."

United Kingdom: The Archbishop of Canterbury, Rowan Williams, told the *Guardian* (2006 Mar 21) that creationism should not be taught in science classrooms. The Archbishop of Canterbury is the leader ex officio of the 70-million-member Anglican Communion, often identified as the third largest Christian religious body in the world. The following is excerpted from the Guardian's transcript of Alan Rusbridge's (AR) interview with the Archbishop of Canterbury (AC).

AR: Are you comfortable with teaching creationism?

AC: Ahh, not very. Not very. I think creationism is, in a sense, a kind of category mistake, as if the Bible were a theory like other theories. Whatever the biblical account of creation is, it's not a theory alongside theories. It's not as if the writer of Genesis or whatever sat down and said well, how am I going to explain all this. ... I know, In the beginning God created the heavens and the earth. And for most of the history of Christianity, and I think this is fair enough, most of the history of the Christianity there's been an awareness that a belief that everything depends on the creative act of God, is quite compatible with a degree of uncertainty or latitude about how precisely that unfolds in creative time. You find someone like St Augustine, absolutely clear God created everything, he takes Genesis fairly literally. But he then says well, what is it that provides the potentiality of change in the world? Well, hence, we have to think, he says, of — as when developing structures in the world, the seeds of potential in the world that drive processes of change. And some Christians responding to Darwin in the 19th Century said well, that sounds a bit like what St Augustine said of the seeds of processes. So if creationism is presented as a stark alternative theory alongside other theories, I think there's — there's just been a jar of categories, it's not what it's about. And it — it reinforces the sense that ...

AR: So it shouldn't be taught?

AC: I don't think it should, actually. No, no. And that's different from saying — different from discussing, teaching about what creation means. For that matter, it's not even the same as saying that Darwinism is — is the only thing that ought to be taught. My worry is creationism can end up reducing the doctrine of creation rather than enhancing it.

Gallup Sees Decline in Literalism

Results of a Gallup poll released on May 22, 2006, show a decline in biblical literalism in the US since the organization began studying this issue in 1976. In the first polls, nearly 40% of respondents replied that the Bible was the "actual word of God" and to be taken literally, but in the most recent poll slightly under 30% choose that answer. Other choices were that the Bible is inspired by God, but not to be taken literally, and that the Bible is an ancient book of "fables, legends, history, and moral precepts," but recorded by humans. According to the Gallup Organization's news release, the 10% decline in the proportion choosing the literalist response was matched with about a 6% increase in both the "inspired" and the "fables" responses, and a 2% decrease in those responding "No opinion". The margin of error in this study was reported as 3%.

The survey also examined socioeconomic and cultural variables to explore their effects on attitudes toward the Bible. Gallup reported that biblical literalism is highest among older Americans, those with the lowest levels of education, those living in the South, Republicans, and Protestants and other non-Catholic Christians.

Some caution is warranted in interpreting these results, as shown by Duncan and Geist's recent discussion of the General Social Survey ("The creationists: How many, who, and where?" *RNCSE* 2004 Sep/Oct; 24 [5]: 26-33).

[Thanks to Molleen Matsumura. More details can be found on-line at <http://poll.gallup.com/content/?ci=22885>.]

NCSE NEWS

News from the Membership

Glenn Branch, NCSE Deputy Director

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

Tim Beazley replied to a creationist's plea, "I may have a false belief ... but I wish someone would at least show me why," in a letter to the editor of the *San Diego Union-Tribune*, recommending the decision in *Kitzmiller v Dover* as well as the transcripts of the trial, all of which (as Beazley pointedly commented) are freely available on the internet. "Finally and perhaps most importantly," he added, "the *Kitzmiller* decision also explains why Norton's implied question — why is ID wrong? — is simply misguided. As the judge explains, the proper question initially is not whether ID is right or wrong, but whether it is science. If ID proponents don't know how to ask the right questions, they are not likely to discover the right answers." Beazley's letter appeared on February 27, 2006.

Gary L Bennett wrote to *Seed* after NCSE deputy director **Glenn Branch**'s article on the "teach the controversy" slogan appeared (*Seed* 2004 Spring; 9: 19–21), suggesting, "let's extend the creationist argument to all fields of study," citing "controversies" over the shape of the earth, whether the earth orbits the sun or vice versa, the existence of unicorns, and the value of pi. "Yes, by all means, 'teach the controversy,'" Bennett concluded, "so that American students will be skilled enough to flip hamburgers for the better-educated visitors from other countries!" His letter appeared in the October/November 2005 issue of *Seed*. A letter from Bennett also appeared in the January 21, 2006,

NCSE Honors "Friends of Darwin" for 2004

Glenn Branch
NCSE Deputy Director

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. Here, finally, are the Friends of Darwin for 2004.

Bruce Alberts is Professor of Biochemistry and Biophysics at the University of California, San Francisco, and a principal author of the standard textbook *Molecular Biology of the Cell*. As the president of the National Academy of Sciences from 1993 to 2005, Alberts oversaw and encouraged the NAS's efforts to promote science and mathematics education, including the National Science Education Standards project, the National Academies' Center for Education, and more than 190 publications on education, including *Teaching about Evolution and the Nature of Science* (1998) and the second edition of *Science and Creationism* (1999). At the NAS, he frequently spoke and wrote on behalf of the teaching of evolution, and helped on numerous occasions to mobilize its members to monitor and counter anti-evolution activities in their own communities.

Brian Alters is the Tomlinson Chair in Science Education, Sir William Dawson Scholar, Director of the Tomlinson University Science Education Project, and Director of the Evolution Education Research Centre at McGill University. A recognized expert on evolution education, he is the author of *Teaching Biological Evolution in Higher Education* and the coauthor with Sandra Alters of the textbook *Biology: Understanding Life* and the invaluable *Defending Evolution: A Guide to the Creation/Evolution Controversy*, which the late Ernst Mayr said "should be in the hands of every educator dealing with the subject of evolution." He also testified for the plaintiffs in *Kitzmiller v Dover*, where he argued that the evolution disclaimer was pedagogically, as well as scientifically, problematic. Alters joined NCSE's board of directors in March 2005.

Randy Moore is Professor of Biology at the University of Minnesota, Twin Cities. He is the author of over 200 articles and books, including *Evolution in the Courtroom: A Reference Guide*, and, with Janice Moore, the forthcoming *Evolution 101*. In 2005, he received the Honorary Member award from the National Association of Biology Teachers, in part because of his nineteen-year tenure as editor-in-chief of its journal, *The American Biology Teacher*. Wayne Carley of the NABT wrote to Moore, "Not only did you shape the journal into the best in the field, in a very real sense you shaped biology education at the same time. ...Your own writings, in books, editorials and articles, have always challenged us to think in new ways and re-examine old beliefs."

Randy Moore

Finally, a Friend of Darwin award was given to a group: the **Ravalli County Citizens for Science**. When the small town of Darby, Montana, became a flashpoint in the perennial creationism/evolution controversy in early 2004 (see *RNCSE* 2004 Mar/Apr; 24

edition of *The Economist*, in which he mildly scolded the author of "The story of man" (*The Economist* 2005 Dec 20) for describing Darwinism, Marxism, and Freudianism as "the three great secular faiths born in the 19th century": "Darwinism," Bennett wrote, "is the theory of evolution, with a number of variants, that is based on much peer-reviewed scientific evidence. That is not faith."

William T Bridgman gave two talks on "Dealing with Creationism in Astronomy". The first was at the Clemson University Department of Physics and Astronomy — where Bridgman received his PhD — on September 7, 2005; the second was for the University of Maryland Observatory Open House on February 5, 2006. In both presentations, he offered ways to address creationist claims at the introductory astronomy and physics class level, including arguments and exercises. He also presented a poster on the topic at the 207th American Astronomical Society meeting in Washington DC on January 10, 2006, and reports finding "a lot of interest" by teachers in college classrooms. Bridgman runs the "Dealing with Creationism in Astronomy" website at <http://homepage.mac.com/cygnusx1/index.html>.

The indefatigable **Jim Bullion** wrote to the editor of the *Bellingham Herald* to explain once again, "Public school science classes are for teaching science; evolution is scientific, and creationism (including 'intelligent design'), for which there is no scientific evidence [and] which relies on supernatural beliefs outside the domain of science, is not scientific, therefore, evolution is taught in such classes and creationism is not." His letter appeared on January 24, 2006.

NCSE was well represented at the 2006 Wisconsin Society of Science Teachers annual meeting. NCSE Supporter **Sean Carroll** was the keynote speaker and held the capacity crowd in rapt attention. **Karen Mesmer** conducted a morning session on "Evolution for Middle School Teachers", and *RNCSE* editor **Andrew Petto** reprised a session developed with **Robert Cooper** on understanding biological relationships among organisms and lineages, "Beyond Classification: Exploring Biological

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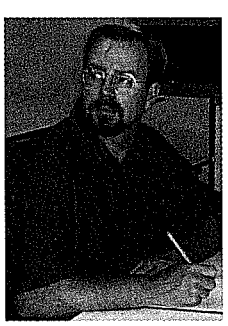
[2]: 4–12), concerned citizens quickly formed Ravalli County Citizens for Science, which became a model of effective advocacy on behalf of evolution education. Through letters and op-eds in the local press, testimony before the school board and communications with the media, and a public presentation on the importance of evolution in science education, RCCS was able to sway public opinion decisively against the proposed "objective origins" policy: in the May 4, 2004, school board election, two candidates who opposed the policy were elected by almost a 2–1 margin, shifting the balance of power on the board.



Rod Miner of Ravalli County Citizens for Science

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

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NCSE Affiliate Programs: MBNA Credit Card Tie-in Discontinued

John R Cole

NCSE has learned that the MBNA credit card affiliate program, which returned to NCSE a percentage of the value of members' purchases to NCSE, has been discontinued. If you like the card, of course, do not cancel on our account, but please be aware that your purchases on this card no longer produce any benefit for NCSE. When a new company bought the card issuer, it decided to eliminate small-fry affiliate programs such as the one with NCSE. So the card and accounts are still valid, but the connection to NCSE no longer exists.

If you order books or other products from Amazon.com, NCSE receives a small amount —but *only* if you do so via NCSE's website (<http://www.ncseweb.org/store.asp>). Although it may seem like very little, one percent of a large number of sales can add up, so please do consider this option for your online book-buying.

Finally, NCSE members should be aware of another website that pays NCSE a percentage of sales if you designate NCSE as the recipient: iGive.com (<http://www.igive.com>) lists a wide range of retailers, shifting from month to month, from book dealers to Lands' End to Harry and David, and so on. The companies vary from time to time. If you want to order from any of these businesses, consider doing it via this site and designating NCSE as your nonprofit designee. Prices appear to be the same for designated and undesignated sales, and choosing NCSE means that a few dollars from each order goes to NCSE.

And don't forget, of course, that making donations directly to NCSE can't be beat — and that is tax deductible! In addition to the usual checks and credit cards, you might also consider a donation of stock or securities, or even a bequest in your will. For advice and information about donating to NCSE, contact NCSE's Director of Operations, Philip Spieth (spieth@ncseweb.org).

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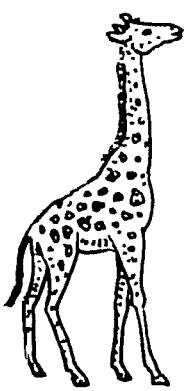
Relationships". Mesmer and Petto also have contributed chapters to the National Science Teachers Association's *Exemplary Science* monograph series: Mesmer's chapter appears in *Exemplary Science in Grades 5-8: Standards-Based Success Stories* and Petto's appears in *Exemplary Science: Best Practices in Professional Development.*

Along with representatives of the Washington Area Secular Humanists, American Atheists, Alliance for Science, and Americans United for Separation of Church and State, as well as a Catholic priest, **Daryl Domning** participated in a Darwin Day panel discussion at McLean High School in northern Virginia. He comments, "At least we showed them that evolution is compatible with a wide spectrum of belief and nonbelief!" Domning is a paleontologist at Howard University specializing in sirenian evolution; his book *Original Selfishness: Original Sin and Evil in the Light of Evolution* (written with the late Monika K Hellwig) was published by Ashgate in 2006.



Taner Edis's *Science and Nonbelief* was published as part of the Greenwood Guides to Science and Religion series (Westport [CT]: Greenwood Press, 2005). The publisher writes, "Can science and religious belief co-exist? Many people — including many practicing scientists — insist that one can simultaneously follow the principles of the scientific method and believe in a particular spiritual tradition. But throughout history there have been people for whom science challenges the very validity of religious belief. Whether called atheists, agnostics, skeptics, or 'infidels,' these individuals use the naturalism of modern science to deny the existence of any supernatural power. *Science and Nonbelief* chronicles, in a balanced and accessible way, the long history of the battle between adherents of religious doctrines and the nonbelievers who adhere to the naturalism of modern science." Edis teaches physics at Truman State University, is the associate editor of RNCSE for physics, and is the author of *The Ghost in the Universe* (Amherst [NY]: Prometheus Books, 2002; reviewed in *RNCSE* 2003 Jan/Feb; 23 [1]: 29-30), which won the Morris D Forkosch award for the best secular humanist book of 2002.

Steve Ewbank wrote to the editor of the *Kokomo Tribune* (2005 Dec 24) to praise the decision in *Kitzmiller v Dover*. "As a member of the Interfaith Alliance of Kokomo," he wrote, "I would like to express my support for the ruling of Judge John E Jones III in the recent trial over injecting 'intelligent design' concepts into public school science classes," explaining that public schools ought both to be religiously neutral and to teach "the best scientific knowledge we have at a given time" — including evolution, "which is the theory overwhelmingly accepted by the scientific community."

Larry Flammer's article "The evolution solution: Teaching evolution without conflict" appeared in the on-line edition of *The American Biology Teacher* (2006 Mar; available on-line at <http://www.nabt.org/sub/pdf/068-03-0001.pdf>). In it, he presents "[a] strategy for teaching high school biology that opens with an intensive nature-of-science unit followed by question-raising topics, leading directly to evolution as a solution and a unifying theme. This special sequence — using specially designed student-centered lessons — is compelling and non-threatening for students." A retired high school science teacher, Flammer is the webmaster for the ENSI (Evolution and the Nature of Science Institutes) website, <http://www.indiana.edu/~ensiweb/home.html>.

Barbara Forrest appeared on *Talk of the Nation* "Science Friday" on December 23, 2005, to discuss the decision in *Kitzmiller v Dover*. Forrest, who testified on the history of the "intelligent design" movement on behalf of the plaintiffs, told the show's host Ira Flatow, "I'm very happy about the judge's ruling. I'm not totally surprised because I noticed that all along the way, whenever he would issue rulings in response to motions, they were very thoughtful, very carefully done. And so ... along the way, very early, [I] developed a lot of respect for the way this judge was proceeding. I certainly did not try to second-guess him as to what the ultimate decision would be, but I think it really sets a benchmark for judicial excellence and integrity, especially with respect to this issue." Responding to a question about the influence of the *Kitzmiller* decision, Forrest said, "You have to hope that it sends a very strong message, and I think undoubtedly it will to some school boards and maybe even most of them." But, she added, "one of the things that we know from the history of creationism and the religious right in general is that they tend not to pay attention to court rulings. ... The good thing about Judge Jones's ruling, though, is that it didn't leave the 'intelligent design'/creationists much room to morph. What creationists usually do ... in response to their losses in court is that they change themselves into something a little bit different, but I don't think they have much room to do that after Judge Jones's ruling." Asked by Flatow whether she would be testifying in future court cases, Forrest replied, "Oh, I would expect so. I guess right now, you know, I'm looking to the next occasion when I might have to put, you know, what I have learned to use. And I expect that this will not be the last time." Ohio, Kansas, and Gull Lake, Michigan, were all mentioned as possibilities. Ending the segment, Flatow wished Forrest a good holiday season, to which she answered, mischievously, "And as we say now, Merry Kitzmas." Forrest is Professor of Philosophy at Southeastern Louisiana University and a member of NCSE's board of directors; with Paul R Gross she wrote *Creationism's Trojan Horse: The Wedge of Intelligent Design* (New York: Oxford University Press, 2004).

Barbara Forrest, **Keith B Miller**, Massimo Pigliucci, and **Taner Edis** all participated in a symposium on "Teaching evolution and the challenge of intelligent design" at the 66th annual meeting of the Southeastern Society of Biologists, held at the University of North Alabama on April 16, 2005. They subsequently contributed essays based on their presentations there to the *Georgia Journal of Science* (2005; 63 [3]): Forrest, "Inside creationism's Trojan horse:

A closer look at intelligent design" (153-66); Pigliucci (with a number of collaborators), "The alleged fallacies of evolutionary theory" (167-74); Miller, "Countering public misconceptions about the nature of evolutionary science" (175-89); Edis, "Why intelligent design is more interesting than old-fashioned creationism" (190-7). Preceding them was John V Aliff's introduction "Teaching evolution and the challenge of intelligent design: A symposium" (144-52). The issue is available as a PDF online at <http://www.gpc.edu/~jaliff/GAJSci63-3.pdf>.

Sheldon Gottlieb's book *The Naked Mind* (Flagstaff [AZ]: Best Publishing, 2003) received a positive review from Tim Madigan, writing in *Free Inquiry* (2005 Feb/Mar; 25 [2]: 56-7). Madigan highlights Gottlieb's experiences as a professor of biology in Mobile, Alabama, where "he learned firsthand the difficulties of teaching evolutionary theory in a climate soaked in fundamentalist religiosity," adding, "The opening chapter, 'The Difficulty of Teaching Biology in the Deep South: Or, the Deadly Influence of Belief on Education', gives a masterful summary of how one man, patiently explaining day after day to his students why the worldview they so unthinkingly accepted simply wasn't true, was able to make a difference in many of their lives." Evolution education is not the only topic of *The Naked Mind;* Madigan notes that among the other topics addressed by Gottlieb are "war, inquisitions, pogroms, the burning of books, and the burning of bodies."

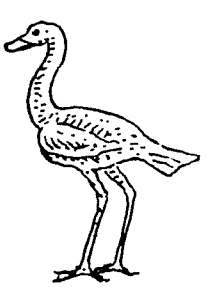
Art Hobson, Professor Emeritus of Physics at the University of Arkansas, was named the 2006 winner of the Robert A Millikan Award, given by the American Association of Physics Teachers to members who have made notable and creative contributions to the teaching of physics. Hobson received a $7500 award, an inscribed medal, a certificate, and travel expenses to the AAPT's summer meeting July 22-26 at Syracuse University, where he presented a lecture. In a press release from the University of Arkansas dated February 16, 2006, Hobson explained the importance of scientific literacy and of effective science education at the university level: "The reason is simple: ... Citizens vote on issues such as nuclear power, energy resources and pseudoscience issues such as creationism. Thus, the University of Arkansas and other research-oriented campuses should place greater emphasis on teaching in decisions about hiring, tenure and promotions. The faculty should spend more time and effort on teaching undergraduate students. In the sciences, more effort needs to be devoted to teaching non-scientists." Hobson contributed a report on Arkansas's science standards to *RNCSE* (2001 Jan-Apr; 21 [1-2]: 6).

Victor H Hutchison responded to a previous letter to the editor and a previous column in the *Norman Transcript* with a column of his own, arguing that the authors offered only "regurgitations of old and invalid arguments, all repeatedly made by those wishing to place religion into public school science courses." The letter (published November 19, 2005), from Oklahoma Representative Thad Balman (R-District 45), announced plans to introduce "teach the controversy" legislation in the state; Hutchison commented, "There is no controversy among the overwhelming number of scientists that evolution is the best explanation of biodiversity," and explained that the "teach the controversy" slogan is rooted in a religiously motivated rejection of evolution. The column (published December 17, 2005) from Edward F Blick, a retired professor of engineering at the University of Oklahoma, sought to justify Balman's proposed bill by quoting a number of scientists supposedly skeptical about evolution; Hutchison replied by exposing the quotations as misleading, out-of-context, and fabricated, adding that such tactics "are typical of the creationist movements, whether those movements are based on a strict reading of Genesis (as in Blick's case) or based on the latest costume change, ID." Hutchison is George Lynn Cross Professor of Zoology Emeritus at the University of Oklahoma; his column was published on December 20, 2005.

Gale Kerbaugh celebrated the verdict in *Kitzmiller v Dover* by writing a letter to the editor of *The* (Raleigh, North Carolina) *News & Observer* (2005 Dec 24), noting, "Even though this ruling is not legally binding outside that Pennsylvania district, the ruling's thorough detail and broad consequences should make any school board think twice before considering such an ill-advised move. The ruling reminds all school board members that they cannot act so irresponsibly with complete impunity." She added, "School boards must not redefine science for religious or political reasons. Science curricula should be determined by those who fully understand the definition of science and who respect the power of the scientific method. Doing any less is cheating the students of scientific knowledge and certainly proved to be quite embarrassing and expensive for those in Dover."

John Kricher's *Galápagos: A Natural History* (Washington DC: Smithsonian Institute Press, 2002) was re-issued in paperback (Princeton [NJ]: Princeton University Press, 2006). "This is an excellent book for the many ecotourists visiting the Galápagos who want an intelligent and stimulating account of the islands and their animals and plants," writes Princeton University's Peter R Grant, the author of *Ecology and Evolution of Darwin's Finches*: "It is written in a clear, accessible, interesting, and yet scholarly style." Kricher is Meneely Professor of Biology at Wheaton College in Norton, Massachusetts.

After Tom Vail, the compiler of the young-earth creationist book *Grand Canyon: A Different View* (see *RNCSE* 2004 Jan/Feb; 24 [1]: 4-5, 33-6), spoke in Grand Canyon, Arizona, **Allyson Mathis** wrote a long letter to the editor of the *Grand Canyon News*, noting, "His 'different view' is in complete opposition to all geological evidence ... Like the 'creation scientists' he emulates, Vail is highly selective (even to the point of making false statements) about the 'evidence' he uses to substantiate his claims." After explaining a few of Vail's errors and obfuscations, Mathis added, "To me, what is of



even greater concern ... is the way he establishes a false conflict between science and religion ... Accepting and understanding science does not make one an atheist, and believing in God doesn't mean that you cannot appreciate the validity of scientific findings." Her letter was published on March 22, 2006.

In a letter to the editor of the *Southwest Times Record* of Fort Smith, Arkansas, **Robert W McKinney** challenged the author of a previous letter to substantiate his claims that Darwin changed his mind about evolution and that Einstein thought that "the different creatures came into being at once." He also corrected misuses of the terms "theory" and "missing link". And he explained that revisions to the scientific account of human evolution, of which the previous correspondent complained, are only to be expected: "That is part of the scientific process. As new evidence is discovered and analyzed, the hypothesis is modified to incorporate the new data." McKinney's letter appeared on December 16, 2005.

Keith B Miller moderated a panel discussion on "Evolution in Action: Facts and Fantasies," sponsored by Sigma Xi, at Kansas State University on February 15, 2006. The panelists were David Rintoul, Associate Professor of Biology at KSU; **Brad Williamson**, master teacher of biology at Olathe East High School; Albert Frisby, master teacher of biology at Liberty High School; Srinivas Kambhampati, Professor of Entomology at KSU; and **Larry Scharmann**, Professor and Chair of Secondary Education at KSU. Miller is Research Assistant Professor of Geology at KSU, editor of *Perspectives on an Evolving Creation* (Grand Rapids [MI]: Eerdmans, 2003), and a Supporter of NCSE.

Writing to the editor of the *Idaho Statesman*, **Robert W Miller** recommended a course of reading for a creationist correspondent, including NCSE's website <http://www.ncseweb.org>, **Kenneth R Miller**'s *Finding Darwin's God*, and **Barbara Forrest** and **Paul R Gross**'s *Creationism's Trojan Horse*, commenting, "Both books document the 'lies and half-truths' of 'intelligent design'." His letter appeared on April 10, 2006. [*Thanks to Gary L Bennett for the news.*]

Ronald Mirman's *Our Almost Impossible Universe: Why the Laws of Nature Make the Existence of Humans Extraordinarily Unlikely* (Lincoln [NE]: iUniverse, 2006) appeared. The publisher writes, "The universe is amazingly fine-tuned, for existence, structure, life. More amazing it can be. While this is somewhat known, the book, by gathering and adding to the huge set of facts, shows how astonishing this is. Religious people will take it as proof that God created the universe, and for us (!). The book analyzes this proving that it is not wrong, but meaningless, empty words (language is strongly emphasized). To counter the religious onslaught that the book may add to it is essential to know how our understanding of nature proves this amazing fine tuning, and why explanations of it are not possible. Neither God nor such creation can have meaning. Only words, concepts, morals based on nature can, as the book rigorously proves."

Brian Myres and Marlene Myres submitted a letter to the editor of the Louisville, Kentucky, *Courier Journal*, responding to a previous letter from a creationist, who, they wrote, "showed that he has little knowledge of science when he said, 'The majority opinion is often wrong.'" They explained, "Science does not work on opinion, but on data; and the preponderance of data is what has put evolutionary theory at the very center of modern biology," adding, "today there are more than 200 000 evolutionary scientists, and to think that all of them are mistaken is preposterous." Their letter appeared on February 6, 2006.

Stephen C Nodvin delivered a sermon on "Intelligent design and evolution" for the Unitarian Universalist Church of Nashua, New Hampshire, on January 8, 2006. In his sermon (available online at <http://www.uunashua.org/sermons/intelligentdesign.shtml> and, in MP3 audio format, at <http://www.nodvin.net/blog/wp-content/podcasts/Intelligent%20Design%20and%20Evolution.mp3>), Nodvin described evolution and "intelligent design" before turning to Darwin's own conflicted religious views, commenting, "I find it interesting that Darwin's struggles with religion and science are reflected in the discussions that we have today on evolution. On the one side, some religious conservatives continue to see the theory of evolution as a threat against their beliefs and therefore propose this duel between evolution and 'intelligent design'. On the other hand, some notable scientists and science historians have stated that Darwin's theories of evolution have made it easier for people to accept atheism in their religious or philosophical beliefs. Yet Darwin rightfully concluded that science could neither prove nor disprove the existence of a God or a designer." He concluded with the thought, "'Intelligent design' proponents have only resurrected a false conflict between subjects that will forever lie within two distinct realms: one, evolution, that has its place in the science lab and classroom and the other, '*the mystery of the beginning of all things*,' that has its place in peoples' hearts and their churches" (emphasis in original). Nodvin is Director of the School of Arts and Sciences at Mount Ida College, and also happens to be Steve #658 of NCSE's Project Steve.

Deborah Painter's article "Heritage in bronze" appeared in *Fossil News: Journal of Avocational Paleontology* (2005 Dec; 11 [12]: 3–4). Her article discusses a statue in a Louisville, Kentucky, park of York, a slave who helped Lewis and Clark on their voyage to the Pacific coast. The statue stands on shale loaded with Paleozoic fossils, and Painter celebrates the resulting fusion of culture and paleontology.

Lisa E Park contributed a "Spotlight" column to *Palaios*, published by SEPM, the Society for Sedimentary Geology, entitled "It's not about evolution: The debate about 'intelligent design'" (2006 Apr; 21 [2]: 111–3). After reviewing a number of recent assaults on evolution education and delineating the similarities and differences between "intelligent design" and previous forms of creationism, Park sketches the history of the anti-evolutionist movement and its roots in fundamentalism, writing

"scientists must understand the context in which the assaults on evolution occur before they can counter these attacks effectively." Calling for scientists to become increasingly vocal, she warns that "intelligent design" "will not go away. It will be modified and changed into something new. The stakes are too high to the people advocating its underlying principles. Therefore, it is our responsibility as scientists to understand this problem and do what we can in the classroom and in the community to advocate for scientific integrity and education standards." Park teaches geology at the University of Akron.

Anthropology News — the official newspaper of the American Anthropological Association — ran no fewer than five commentaries about "intelligent design" in its December 2005 issue (46 [9]), leading with **Andrew J Petto**'s "Nature and Design". Describing "intelligent design" as "the most recent IKS [indigenous knowledge system] 'alternative to evolution' claiming *scientific* status," he suggested that anthropologists are in a position to help: "understanding anti-evolutionism in its IKS context is the first step," he suggested, adding that "acknowledging the IKS context of anti-evolutionism may indeed improve general scientific literacy." Petto is a member of NCSE's board of directors and editor of *Reports of the NCSE*. Also commenting were Chris Toumey of the University of South Carolina, (the author of *God's Own Scientists*), David Griffith of East Carolina University, Emile Schepers, and David Houston of the University of Vermont. Petto also recently conducted an invited half-day workshop for the science teachers at the West Bend, Wisconsin, school district. The workshop focused on areas of the curriculum singled out by recent anti-evolution petitions presented by parents to the school district on issues of the nature of scientific inquiry (including "critical analysis"), the generation of complexity using simple processes, and visualizing evolutionary relationships.

Colin Purrington contributed "The conservation of evolution education in zoos" to the *Journal of the International Association of Zoo Educators* (2005; 41: 16-19). While conservation issues are steadily emphasized in the educational materials provided at zoos, Purrington remarked, evolution seems to be slighted. After noting a few plausible reasons, he suggests that "there is an additional fact that contributes to the shrinkage of evolutionary content in zoos: the pressure brought by religious fundamentalists," citing incidents at zoos in St Louis, Missouri; Tulsa, Oklahoma (see *RNCSE* 2005 Jan-Apr; 25 [1-2]: 12-16); and Knoxville, Tennessee. "[A] zoo is often the only place where children can come and witness the diverse end-points of hundreds of millions of years of speciation and marvel at the often bizarre effects that natural selection and sexual selection have had on morphological and behavioral traits," he laments. "And of all places, the local zoo is the site where young minds might begin to appreciate ... that humans are just a minute tip on one branch of an enormous tree of life whose roots began billions of years ago as single cells." Purrington ends his article by urging zoo staff and directors to include evolution in their educational efforts: "Because evolution is the foundation for all other facts about morphology, physiology, and behavior, zoos should treat it as their primary educational theme. At the very least, evolution should not be completely ignored."

Jason Rosenhouse and NCSE deputy director **Glenn Branch** collaborated on "Media coverage of 'intelligent design'", which appeared in *BioScience* (2006 Mar; 56 [3]: 247-52). In the abstract of their article, Rosenhouse and Branch write, "News media coverage of the controversy surrounding recent attempts to insert creationism into public school science curricula — this time in the form of 'intelligent design' — has generated miles of copy and hours of television footage. The quality of that reporting varies widely, depending on the media outlet. Often, reporters with no scientific training are assigned to report on evolution-creationism controversies, which inevitably leads to distortions of the relevant science. A misconceived concern for balance frequently results in equal time being accorded to biologists and creationists, creating the illusion of scientific equivalence. At other times, a clear bias toward creationism is revealed, especially on cable television. Focusing mainly on recent treatments, this article analyzes and critiques specific stories, as well as trends and patterns in coverage in newspapers, magazines, and television; it concludes with suggestions of ways in which scientists can be more effective in dealing with the media." Rosenhouse teaches mathematics at James Madison University, and also blogs on the creationism/evolution controversy at <http://scienceblogs.com/evolutionblog>.

TO Shanavas's *Creation and/or Evolution: An Islamic Perspective* (Philadelphia: Xlibris, 2005) was published. According to the publisher, Shanavas "describes an Islamic theory of creation that is not incompatible with evolution. He accomplishes this by weaving together insights from modern science, the Qur'an, and pre-Renaissance Muslim history. He proposes that evolution is an intelligent design created by a higher power to manifest His omniscience, supremacy, and grace in a universe constructed with creatures with limited free will. This book is an important contribution to the ongoing debate between creationism and evolution." Shanavas told *The Daily Telegram* of Adrian, Michigan (2005 Sep 3), "I think the average person should read my book because nowadays, there is a big push to include 'intelligent design' in the science classes. There's a major push for it all across the nation as if there is only one kind of intelligent design that exists, nothing else. In a country like ours, there's many other types of intelligent design. What I describe is also an intelligent design, but at the same time, I don't see any problem with evolution." On April 7, 2006, Shanavas gave a talk on "Did Adam and Eve have belly buttons? An Islamic perspective on evolution" at the University of Kentucky, Lexington.

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Frances S Vandervoort
Paul J Vidmar
Stewart A Vining

Spike Wadsworth
Scott Waichler
David Wake
James A Wakefield
Bettine & Lawrence Wallin
James G Wallis
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Bruce A Warren
Kenneth M Warren Jr
Ron Waszczak
James D Watson
Allen Watson III
Marcia D Weber
Nathan Weed
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Helene H Weis
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MEMORIALS

Jean Gerard, in memory of
William H Shrawder

Harriet Welsh, in memory
of Gordon Welsh

Whether ID is Science

EXCERPT FROM THE MEMORANDUM OPINION IN *KITZMILLER V DOVER*

Judge John E Jones III

After a searching review of the record and applicable case law, we find that while ID ["intelligent design"] arguments may be true, a proposition on which the Court takes no position, ID is not science. We find that ID fails on three different levels, any one of which is sufficient to preclude a determination that ID is science. They are: (1) ID violates the centuries-old ground rules of science by invoking and permitting supernatural causation; (2) the argument of irreducible complexity, central to ID, employs the same flawed and illogical contrived dualism that doomed creation science in the 1980s; and (3) ID's negative attacks on evolution have been refuted by the scientific community. As we will discuss in more detail below, it is additionally important to note that ID has failed to gain acceptance in the scientific community, it has not generated peer-reviewed publications, nor has it been the subject of testing and research.

Expert testimony reveals that since the scientific revolution of the 16th and 17th centuries, science has been limited to the search for natural causes to explain natural phenomena. This revolution entailed the rejection of the appeal to authority, and by extension, revelation, in favor of empirical evidence. Since that time period, science has been a discipline in which testability, rather than any ecclesiastical authority or philosophical coherence, has been the measure of a scientific idea's worth. In deliberately omitting theological or "ultimate" explanations for the existence or characteristics of the natural world, science does not consider issues of "meaning" and "purpose" in the world. While supernatural explanations may be important and have merit, they are not part of science. This self-imposed convention of science, which limits inquiry to testable, natural explanations about the natural world, is referred to by philosophers as "methodological naturalism" and is sometimes known as the scientific method. Methodological naturalism is a "ground rule" of science today which requires scientists to seek explanations in the world around us based upon what we can observe, test, replicate, and verify.

As the National Academy of Sciences (hereinafter "NAS") was recognized by experts for both parties as the "most prestigious" scientific association in this country, we will accordingly cite to its opinion where appropriate. NAS is in agreement that science is limited to empirical, observable and ultimately testable data: "Science is a particular way of knowing about the world. In science, explanations are restricted to those that can be inferred from the confirmable data — the results obtained through observations and experiments that can be substantiated by other scientists. Anything that can be observed or measured is amenable to scientific investigation. Explanations that cannot be based upon empirical evidence are not part of science."

This rigorous attachment to "natural" explanations is an essential attribute to science by definition and by convention. We are in agreement with Plaintiffs' lead expert Dr [Kenneth R] Miller, that from a practical perspective, attributing unsolved problems about nature to causes and forces that lie outside the natural world is a "science stopper." As Dr Miller explained, once you attribute a cause to an untestable supernatural force, a proposition that cannot be disproven, there is no reason to continue seeking natural explanations as we have our answer.

ID is predicated on supernatural causation, as we previously explained and as various expert testimony revealed. ID takes a natural phenomenon and, instead of accepting or seeking a natural explanation, argues that the explanation is supernatural. Further support for the conclusion that ID is predicated on supernatural causation is found in the ID reference book to which ninth grade biology students are directed, [*Of Pandas and People*]. *Pandas* states, in pertinent part, as follows:

> Darwinists object to the view of intelligent design *because it does not give a natural cause explanation* of how the various forms of life started in the first place. Intelligent design means that various forms of life began abruptly, through an intelligent agency, with their distinctive features already intact — fish with fins and scales, birds with feathers, beaks, and wings, etc.

Stated another way, ID posits that animals did not evolve naturally through evolutionary means but were created abruptly by a non-natural; or supernatural, designer. Defendants' own expert witnesses acknowledged this point.

It is notable that defense experts' own mission, which mirrors that of the IDM ["intelligent design" movement] itself, is to change the ground rules of science to allow supernatural causation of the natural world, which the Supreme Court in [*Edwards v Aguillard*] and the court in [*McLean v Arkansas*] correctly recognized as an inherently religious concept. First, defense expert Professor [Steve] Fuller agreed that ID aspires to "change the ground rules" of science and lead defense expert Professor

[Michael J] Behe admitted that his broadened definition of science, which encompasses ID, would also embrace astrology. Moreover, defense expert Professor [Scott] Minnich acknowledged that for ID to be considered science, the ground rules of science have to be broadened to allow consideration of supernatural forces.

Prominent IDM leaders are in agreement with the opinions expressed by defense expert witnesses that the ground rules of science must be changed for ID to take hold and prosper. William Dembski, for instance, an IDM leader, proclaims that science is ruled by methodological naturalism and argues that this rule must be overturned if ID is to prosper.

The Discovery Institute, the think tank promoting ID whose CRSC [Center for the Renewal of Science and Culture] developed the Wedge Document, acknowledges as "Governing Goals" to "defeat scientific materialism and its destructive moral, cultural and political legacies" and "replace materialistic explanations with the theistic understanding that nature and human beings are created by God." In addition, and as previously noted, the Wedge Document states in its "Five Year Strategic Plan Summary" that the IDM's goal is to replace science as currently practiced with "theistic and Christian science." The IDM accordingly seeks nothing less than a complete scientific revolution in which ID will supplant evolutionary theory.

Notably, every major scientific association that has taken a position on the issue of whether ID is science has concluded that ID is not, and cannot be considered as such. Initially, we note that NAS, the "most prestigious" scientific association in this country, views ID as follows:

> Creationism, intelligent design, and other claims of supernatural intervention in the origin of life or of species are not science because they are not testable by the methods of science. These claims subordinate observed data to statements based on authority, revelation, or religious belief. Documentation offered in support of these claims is typically limited to the special publications of their advocates. These publications do not offer hypotheses subject to change in light of new data, new interpretations, or demonstration of error. This contrasts with science, where any hypothesis or theory always remains subject to the possibility of rejection or modification in the light of new knowledge.

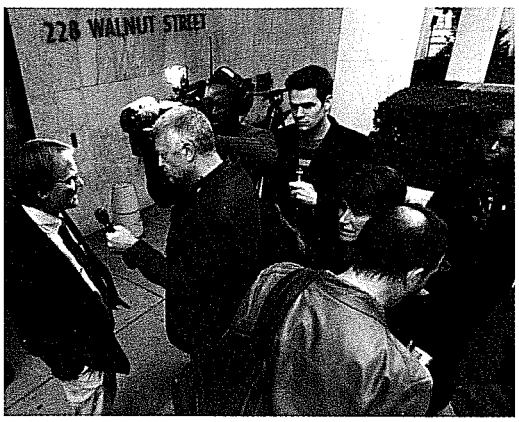
Additionally, the American Association for the Advancement of Science (hereinafter "AAAS"), the largest organization of scientists in this country, has taken a similar position on ID, namely, that it "has not proposed a scientific means of testing its claims" and that "the lack of scientific warrant for so-called 'intelligent design theory' makes it improper to include as part of science education ..." Not a single expert witness over the course of the six week trial identified one major scientific association, society[,] or organization that endorsed ID as science. What is more, defense experts concede that ID is not a theory as that term is defined by the NAS and admit that ID is at best "fringe science" which has achieved no acceptance in the scientific community.

It is therefore readily apparent to the Court that ID fails to meet the essential ground rules that limit science to testable, natural explanations. Science cannot be defined differently for Dover students than it is defined in the scientific community as an affirmative action program, as advocated by Professor Fuller, for a view that has been unable to gain a foothold within the scientific establishment. Although ID's failure to meet the ground rules of science is sufficient for the Court to conclude that it is not science, out of an abundance of caution and in the exercise of completeness, we will analyze additional arguments advanced regarding the concepts of ID and science.

ID is at bottom premised upon a false dichotomy, namely, that to the extent evolutionary theory is discredited, ID is confirmed. This argument is not brought to this Court anew, and in fact, the same argument, termed "contrived dualism" in *McLean*, was employed by creationists in the 1980s to support "creation science". The court in *McLean* noted the "fallacious pedagogy of the two-model approach" and that "[i]n efforts to establish 'evidence' in support of creation science, the defendants relied upon the same false premise as the two-model approach ... all evidence which criticized evolutionary theory was proof in support of creation science." We do not find this false dichotomy any more availing to justify ID today than it was to justify creation science two decades ago.

ID proponents primarily argue for design through negative arguments against evolution, as illustrated by Professor Behe's argument that "irreducibly complex" systems cannot be produced through Darwinian, or any natural, mechanisms. However, we believe that arguments against evolution are not arguments for design. Expert testimony revealed that just because scientists cannot explain today how biological systems evolved does not mean that they cannot, and will not, be able to explain them tomorrow. As Dr [Kevin] Padian aptly noted, "absence of evidence is not evidence of absence." To that end, expert testimony from Drs Miller and Padian provided multiple examples where *Pandas* asserted that no natural explanations exist, and in some cases that none could

Matthew Chapman, a great-great-grandson of Charles Darwin, interviews young-earth creationist Robert Gentry, while NCSE's Nick Matzke waits his turn.



Defense expert witness Scott Minnich talks to the press.

exist, and yet natural explanations have been identified in the intervening years. It also bears mentioning that as Dr Miller stated, just because scientists cannot explain every evolutionary detail does not undermine its validity as a scientific theory as no theory in science is fully understood.

As referenced, the concept of irreducible complexity is ID's alleged scientific centerpiece. Irreducible complexity is a negative argument against evolution, not proof of design, a point conceded by defense expert Professor Minnich. Irreducible complexity additionally fails to make a positive scientific case for ID, as will be elaborated upon below.

We initially note that irreducible complexity as defined by Professor Behe in his book *Darwin's Black Box* and subsequently modified in his 2001 article entitled "Reply to My Critics," appears as follows:

> By irreducibly complex I mean a single system which is composed of several well-matched, interacting parts that contribute to the basic function, wherein the removal of any one of the parts causes the system to effectively cease functioning. An irreducibly complex system cannot be produced directly by slight, successive modifications of a precursor system, because any precursor to an irreducibly complex system that is missing a part is by definition nonfunctional ... Since natural selection can only choose systems that are already working, then if a biological system cannot be produced gradually it would have to arise as an integrated unit, in one fell swoop, for natural selection to have anything to act on.

Professor Behe admitted in "Reply to My Critics" that there was a defect in his view of irreducible complexity because, while it purports to be a challenge to natural selection, it does not actually address "the task facing natural selection." Professor Behe specifically explained that "[t]he current definition puts the focus on removing a part from an already-functioning system," but "[t]he difficult task facing Darwinian evolution, however, would not be to remove parts from sophisticated pre-existing systems; it would be to bring together components to make a new system in the first place." In that article, Professor Behe wrote that he hoped to "repair this defect in future work"; however, he has failed to do so even four years after elucidating his defect.

In addition to Professor Behe's admitted failure to properly address the very phenomenon that irreducible complexity purports to place at issue, natural selection, Drs Miller and Padian testified that Professor Behe's concept of irreducible complexity depends on ignoring ways in which evolution is known to occur. Although Professor Behe is adamant in his definition of irreducible complexity when he says a precursor "missing a part is by definition nonfunctional," what he obviously means is that it will not function in the same way the system functions when all the parts are present. For example in the case of the bacterial flagellum, removal of a part may prevent it from acting as a rotary motor. However, Professor Behe excludes, by definition, the possibility that a precursor to the bacterial flagellum functioned not as a rotary motor, but in some other way, for example as a secretory system.

As expert testimony revealed, the qualification on what is meant by "irreducible complexity" renders it meaningless as a criticism of evolution. In fact, the theory of evolution proffers exaptation as a well-recognized, well-documented explanation for how systems with multiple parts could have evolved through natural means. Exaptation means that some precursor of the subject system had a different, selectable function before experiencing the change or addition that resulted in the subject system with its present function. For instance, Dr Padian identified the evolution of the mammalian middle ear bones from what had been jawbones as an example of this process. By defining irreducible complexity in the way that he has, Professor Behe attempts to exclude the phenomenon of exaptation by definitional fiat, ignoring as he does so abundant evidence which refutes his argument.

Notably, the NAS has rejected Professor Behe's claim for irreducible complexity by using the following cogent reasoning:

> [S]tructures and processes that are claimed to be 'irreducibly' complex typically are not on closer inspection. For example, it is incorrect to assume that a complex structure or biochemical process can function only if all its components are present and functioning as we see them today. Complex biochemical systems can be built up from simpler systems through natural selection. Thus, the 'history' of a protein can be traced through simpler organisms ... The evolution of complex molecular systems can occur in several ways. Natural selection can bring together parts of a system for one function at one time and then, at a later time, recombine those parts with other systems of components to produce a system that has a different function. Genes can be duplicated, altered, and then amplified through natural selection. The complex biochemical cascade resulting in blood clotting has been explained in this fashion.

As irreducible complexity is only a negative argument against evolution, it is refutable and accordingly testable, unlike ID, by showing that

there are intermediate structures with selectable functions that could have evolved into the allegedly irreducibly complex systems. Importantly, however, the fact that the negative argument of irreducible complexity is testable does not make testable the argument for ID. Professor Behe has applied the concept of irreducible complexity to only a few select systems: (1) the bacterial flagellum; (2) the blood-clotting cascade; and (3) the immune system. Contrary to Professor Behe's assertions with respect to these few biochemical systems among the myriad existing in nature, however, Dr Miller presented evidence, based upon peer-reviewed studies, that they are not in fact irreducibly complex.

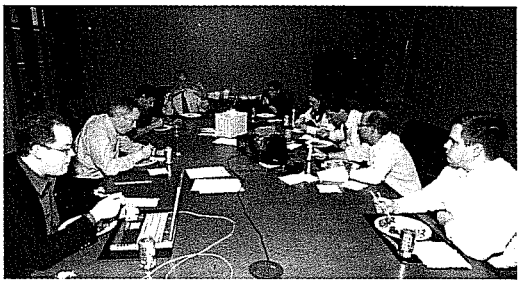
First, with regard to the bacterial flagellum, Dr Miller pointed to peer-reviewed studies that identified a possible precursor to the bacterial flagellum, a subsystem that was fully functional, namely the Type-III Secretory System. Moreover, defense expert Professor Minnich admitted that there is serious scientific research on the question of whether the bacterial flagellum evolved into the Type-III [Secretory] System, the Type-III Secretory System into the bacterial flagellum, or whether they both evolved from a common ancestor. None of this research or thinking involves ID. In fact, Professor Minnich testified about his research as follows: "we're looking at the function of these systems and how they could have been derived one from the other. And it's a legitimate scientific inquiry."

Second, with regard to the blood-clotting cascade, Dr Miller demonstrated that the alleged irreducible complexity of the blood-clotting cascade has been disproven by peer-reviewed studies dating back to 1969, which show that dolphins' and whales' blood clots despite missing a part of the cascade, a study that was confirmed by molecular testing in 1998. Additionally and more recently, scientists published studies showing that in puffer fish, blood clots despite the cascade missing not only one, but three parts. Accordingly, scientists in peer-reviewed publications have refuted Professor Behe's predication about the alleged irreducible complexity of the blood-clotting cascade. Moreover, cross-examination revealed that Professor Behe's redefinition of the blood-clotting system was likely designed to avoid peer-reviewed scientific evidence that falsifies his argument, as it was not a scientifically warranted redefinition.

The immune system is the third system to which Professor Behe has applied the definition of irreducible complexity. Although in *Darwin's Black Box*, Professor Behe wrote that not only were there no natural explanations for the immune system at the time, but that natural explanations were impossible regarding its origin. However, Dr Miller presented peer-reviewed studies refuting Professor Behe's claim that the immune system was irreducibly complex. Between 1996 and 2002, various studies confirmed each element of the evolutionary hypothesis explaining the origin of the immune system. In fact, on cross-examination, Professor Behe was questioned concerning his 1996 claim that science would never find an evolutionary explanation for the immune system. He was presented with fifty-eight peer-reviewed publications, nine books, and several immunology textbook chapters about the evolution of the immune system; however, he simply insisted that this was still not sufficient evidence of evolution, and that it was not "good enough".

We find that such evidence demonstrates that the ID argument is dependent upon setting a scientifically unreasonable burden of proof for the theory of evolution. As a further example, the test for ID proposed by both Professors Behe and Minnich is to grow the bacterial flagellum in the laboratory; however, no one inside or outside of the IDM, including those who propose the test, has conducted it. Professor Behe conceded that the proposed test could not approximate real world conditions and even if it could, Professor Minnich admitted that it would merely be a test of evolution, not design.

We therefore find that Professor Behe's claim for irreducible complexity has been refuted in peer-reviewed research papers and has been rejected by the scientific community at large. Additionally, even if irreducible complexity had not been rejected, it still does not support ID as it is merely a test for evolution, not design.



The plaintiffs' legal team at a working meal. From left, Nick Matzke, Steve Harvey, Vic Walczak, Tom Schmidt, Hedya Aryani, Kate Henson, Richard Katskee, Eric Rothschild, Matt McElvenny.

We will now consider the purportedly "positive argument" for design encompassed in the phrase used numerous times by Professors Behe and Minnich throughout their expert testimony, which is the "purposeful arrangement of parts". Professor Behe summarized the argument as follows:

> We infer design when we see parts that appear to be arranged for a purpose. The strength of the inference is quantitative; the more parts that are arranged, the more intricately they interact, the stronger is our confidence in design. The appearance of design in aspects of biology is overwhelming. Since nothing other than an intelligent cause has been demonstrated to be able to yield such a strong appearance of design, Darwinian claims notwithstanding, the conclusion that the design seen in life is real design is rationally justified.

As previously indicated, this argument is merely a restatement of the Reverend William Paley's argument applied at the cell level. Minnich, Behe, and Paley reach the same conclusion, that complex organisms must have been designed using the same reasoning, except that Professors Behe and Minnich refuse to identify the

Dueling keyboards: NCSE's Nick Matzke and Eugenie C Scott at work. In background: Matt McElvenny of Trial Technologies, who expertly coordinated the presentation of evidence for the plaintiffs' legal team.

designer, whereas Paley inferred from the presence of design that it was God. Expert testimony revealed that this inductive argument is not scientific and, as admitted by Professor Behe, can never be ruled out.

Indeed, the assertion that design of biological systems can be inferred from the "purposeful arrangement of parts" is based upon an analogy to human design. Because we are able to recognize design of artifacts and objects, according to Professor Behe, that same reasoning can be employed to determine biological design. Professor Behe testified that the strength of the analogy depends upon the degree of similarity entailed in the two propositions; however, if this is the test, ID completely fails.

Unlike biological systems, human artifacts do not live and reproduce over time. They are non-replicable, they do not undergo genetic recombination, and they are not driven by natural selection. For human artifacts, we know the designer's identity, human, and the mechanism of design, as we have experience based upon empirical evidence that humans can make such things, as well as many other attributes including the designer's abilities, needs, and desires. With ID, proponents assert that they refuse to propose hypotheses on the designer's identity, do not propose a mechanism, and the designer, he/she/it/they, has never been seen. In that vein, defense expert Professor Minnich agreed that in the case of human artifacts and objects, we know the identity and capacities of the human designer, but we do not know any of those attributes for the designer of biological life. In addition, Professor Behe agreed that for the design of human artifacts, we know the designer and its attributes and we have a baseline for human design that does not exist for design of biological systems. Professor Behe's only response to these seemingly insurmountable points of disanalogy was that the inference still works in science fiction movies.

It is readily apparent to the Court that the only attribute of design that biological systems appear to share with human artifacts is their complex appearance, [that is], if it looks complex or designed, it must have been designed. This inference to design based upon the appearance of a "purposeful arrangement of parts" is a completely subjective proposition, determined in the eye of each beholder and his/her viewpoint concerning the complexity of a system. Although both Professors Behe and Minnich assert that there is a quantitative aspect to the inference, on cross-examination they admitted that there is no quantitative criteria for determining the degree of complexity or number of parts that bespeak design, rather than a natural process. As Plaintiffs aptly submit to the Court, throughout the entire trial only one piece of evidence generated by Defendants addressed the strength of the ID inference: the argument is less plausible to those for whom God's existence is in question, and is much less plausible for those who deny God's existence.

Accordingly, the purported positive argument for ID does not satisfy the ground rules of science which require testable hypotheses based upon natural explanations. ID is reliant upon forces acting outside of the natural world, forces that we cannot see, replicate, control or test, which have produced changes in this world. While we take no position on whether such forces exist, they are simply not testable by scientific means and therefore cannot qualify as part of the scientific process or as a scientific theory.

It is appropriate at this juncture to address ID's claims against evolution. ID proponents support their assertion that evolutionary theory cannot account for life's complexity by pointing to real gaps in scientific knowledge, which indisputably exist in all scientific theories, but also by misrepresenting well-established scientific propositions.

Before discussing Defendants' claims about evolution, we initially note that an overwhelming number of scientists, as reflected by every scientific association that has spoken on the matter, have rejected the ID proponents' challenge to evolution. Moreover, Plaintiffs' expert in biology, Dr Miller, a widely-recognized biology professor at Brown University who has written university-level and high-school biology textbooks used prominently throughout the nation, provided unrebutted testimony that evolution, including common descent and natural selection, is "overwhelmingly accepted" by the scientific community and that every major scientific association agrees. As the court in [*Selman v Cobb County*] explained, "evolution is more than a *theory* of origin in the context of science. To the contrary, evolution is the dominant *scientific* theory of origin accepted by the majority of scientists." Despite the scientific community's overwhelming support for evolution, Defendants and ID proponents insist that evolution is unsupported by empirical evidence. Plaintiffs' science experts, Drs Miller and Padian, clearly explained how ID proponents generally[,] and *Pandas* specifically, distort and misrepresent scientific knowledge in making their anti-evolution argument.

In analyzing such distortion, we turn again to *Pandas*, the book to which students are expressly referred in the disclaimer. Defendants hold out *Pandas* as representative of ID and Plaintiffs' experts agree in that regard. A series of arguments against evolutionary theory found in *Pandas* involve paleontology, which studies the life of the past and the fossil record. Plaintiffs' expert

Professor Padian was the only testifying expert witness with any expertise in paleontology. His testimony therefore remains unrebutted. Dr Padian's demonstrative slides, prepared on the basis of [peer-reviewed] scientific literature, illustrate how *Pandas* systematically distorts and misrepresents established, important evolutionary principles.

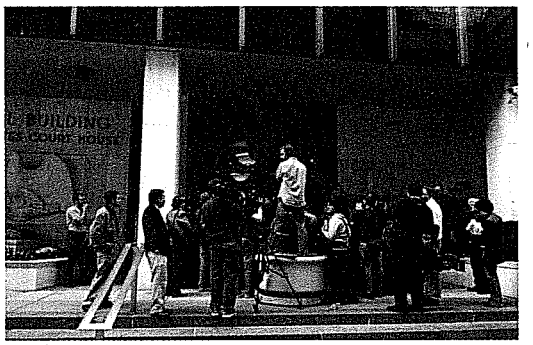
We will provide several representative examples of this distortion. First, *Pandas* misrepresents the "dominant form of understanding relationships" between organisms, namely, the tree of life, represented by classification determined via the method of cladistics. Second, *Pandas* misrepresents "homology," the "central concept of comparative biology," that allowed scientists to evaluate comparable parts among organisms for classification purposes for hundreds of years. Third, *Pandas* fails to address the well-established biological concept of exaptation, which involves a structure changing function, such as fish fins evolving fingers and bones to become legs for weight-bearing land animals. Dr Padian testified that ID proponents fail to address exaptation because they deny that organisms change function, which is a view necessary to support abrupt-appearance. Finally, Dr Padian's unrebutted testimony demonstrates that *Pandas* distorts and misrepresents evidence in the fossil record about pre-Cambrian-era fossils, the evolution of fish to amphibians, the evolution of small carnivorous dinosaurs into birds, the evolution of the mammalian middle ear, and the evolution of whales from land animals.

In addition to Dr Padian, Dr Miller also testified that *Pandas* presents discredited science. Dr Miller testified that *Pandas*' treatment of biochemical similarities between organisms is "inaccurate and downright false" and explained how *Pandas* misrepresents basic molecular biology concepts to advance design theory through a series of demonstrative slides. Consider, for example, that he testified as to how *Pandas* misinforms readers on the standard evolutionary relationships between different types of animals, a distortion which Professor Behe, a "critical reviewer" of *Pandas* who wrote a section within the book, affirmed. In addition, Dr Miller refuted *Pandas*' claim that evolution cannot account for new genetic information and pointed to more than three dozen peer-reviewed scientific publications showing the origin of new genetic information by evolutionary processes. In summary, Dr Miller testified that *Pandas* misrepresents molecular biology and genetic principles, as well as the current state of scientific knowledge in those areas in order to teach readers that common descent and natural selection are not scientifically sound.

Accordingly, the one textbook to which the Dover ID Policy directs students contains outdated concepts and badly flawed science, as recognized by even the defense experts in this case.

A final indicator of how ID has failed to demonstrate scientific warrant is the complete absence of peer-reviewed publications supporting the theory. Expert testimony revealed that the peer review process is "exquisitely important" in the scientific process. It is a way for scientists to write up their empirical research and to share the work with fellow experts in the field, opening up the hypotheses to study, testing, and criticism. In fact, defense expert Professor Behe recognizes the importance of the peer review process and has written that science must "publish or perish." Peer review helps to ensure that research papers are scientifically accurately, meet the standards of the scientific method, and are relevant to other scientists in the field. Moreover, peer review involves scientists submitting a manuscript to a scientific journal in the field, journal editors soliciting critical reviews from other experts in the field and deciding whether the scientist has followed proper research procedures, employed up-to-date methods, considered and cited relevant literature and generally, whether the researcher has employed sound science.

The evidence presented in this case demonstrates that ID is not supported by any peer-reviewed research, data or publications. Both



Press scrum outside the federal courthouse in Harrisburg.

Drs Padian and [Barbara] Forrest testified that recent literature reviews of scientific and medical electronic databases disclosed no studies supporting a biological concept of ID. On cross-examination, Professor Behe admitted that: "There are no peer reviewed articles by anyone advocating for intelligent design supported by pertinent experiments or calculations which provide detailed rigorous accounts of how intelligent design of any biological system occurred." Additionally, Professor Behe conceded that there are no peer-reviewed papers supporting his claims that complex molecular systems, like the bacterial flagellum, the blood-clotting cascade, and the immune system, were intelligently designed. In that regard, there are no peer-reviewed articles supporting Professor Behe's argument that certain complex molecular structures are "irreducibly complex." In addition to failing to produce papers in peer-reviewed journals, ID also features no scientific research or testing.

After this searching and careful review of ID as espoused by its proponents, as elaborated upon in submissions to the Court, and as scrutinized over a six-week trial, we find that ID 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. ID, as noted, is grounded in theology, not science. Accepting for the sake of argument its proponents', as well as Defendants'[,] argument that to introduce ID to students will

Closing Statement for the Plaintiffs in *Kitzmiller v Dover*

Eric Rothschild, Pepper Hamilton LLP

"What am I supposed to tolerate? A small encroachment on my First Amendment rights? Well, I'm not going to. I think this is clear what these people have done, and it outrages me." That's a statement of one citizen of Dover, Fred Callahan, standing up to the wedge that has been driven into his community and his daughter's high school by the Dover School Board's anti-evolution, pro-"intelligent design" policy.

The strategy that the Discovery Institute announced in its "Wedge document" for promoting theistic and Christian science and addressing cultural conditions that it disagrees with is to denigrate evolution and promote supernatural "intelligent design" as a competing theory.

This is the Discovery Institute that advised both William Buckingham and Alan Bonsell before the board voted to change the biology curriculum. This is the Discovery Institute the defendants' experts Michael Behe and Scott Minnich proudly associate with, along with intelligent design leaders William Dembski, Paul Nelson, Jonathan Wells, Stephen Meyer, Nancy Pearcey, and Phillip Johnson.

This group's strategy of Christian apologetics and cultural renewal includes the integration of "intelligent design" into public school science curriculum, which is now on trial in this courtroom. Dover is now the thin edge of the wedge.

Let's review how we got here. Beginning with Alan Bonsell's election to the Dover Area School Board in the end of 2001, the teaching of evolution in biology class became a target of the board, and teaching creationism was suggested as an alternative.

As Mr Gillen told the Court in his opening statement, Mr Bonsell "had an interest in creationism. He wondered whether it could be discussed in the classroom." He didn't just wonder to himself, he wondered out loud about teaching creationism at two board retreats. He made his opposition to the teaching of evolution known to Mr Baksa and the science teachers.

In 2004, Mr Bonsell became the president of the board and chose Bill Buckingham to head the curriculum committee. When the teachers and members of the community tried to get a new biology book approved, members of the board, including particularly Mr Buckingham, but also Mr Bonsell, insisted in public board meetings that any new biology book include creationism.

There is no evidence that any of the board members that eventually voted to change the biology curriculum objected to this idea. Heather Geesey emphatically endorsed it in her letter to the *York Sunday News*.

At the same meetings in June where he discussed creationism, Mr Buckingham also made the unforgettable statement that, "2000 years ago a man died on a Cross, can't we take a stand for Him now?"; and after one meeting said to a reporter that "We are not a nation founded on Muslim ideas or evolution, but on Christianity, and our children should be taught as such."

Around the time of those June meetings, Mr Buckingham received materials and guidance from the Discovery Institute, the sponsors of theistic Christian science. After that, "intelligent design" became the label for the board's desire to present creationism.

At this trial, plaintiffs have submitted overwhelming evidence that "intelligent design" is just a new name for creationism discarding a few of traditional creationism

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encourage critical thinking, it still has utterly no place in a science curriculum. Moreover, ID's backers have sought to avoid the scientific scrutiny which we have now determined that it cannot withstand by advocating that the *controversy*, but not ID itself, should be taught in science class. This tactic is at best disingenuous, and at worst a canard. The goal of the IDM is not to encourage critical thought, but to foment a revolution which would supplant evolutionary theory with ID.

To conclude and reiterate, we express no opinion on the ultimate veracity of ID as a supernatural explanation. However, we commend to the attention of those who are inclined to superficially consider ID to be a true "scientific" alternative to evolution without a true understanding of the concept the foregoing detailed analysis. It is our view that a reasonable, objective observer would, after reviewing both the voluminous record in this case, and our narrative, reach the inescapable conclusion that ID is an interesting theological argument, but that it is not science.

[For the sake of readability, notes and citations were removed, and a few corrections and amplifications were inserted in square brackets. For the original memorandum opinion from which the preceding was excerpted, visit <http://www.pamd.uscourts.gov/kitzmiller/kitzmiller_342.pdf>.]

tenets, such as direct reference to God or the Bible and a specific commitment to a young earth, but maintaining essential aspects, particularly the special creation of kinds by a supernatural actor.

Make no mistake, the leading sponsors on the board for the change to the biology curriculum and Administrators Nilsen and Baksa knew that "intelligent design" was a form of creationism when they added it to the curriculum.

[Consider] the views on the origins of the universe chart that both Casey Brown and Jennifer Miller testified that Assistant Superintendent Baksa circulated to members of the board curriculum committee and faculty. Mrs Harkins testified that she had this document as early as June of 2004.

The second column of this chart provided to members of the board curriculum committee and administration demonstrates clearly that "intelligent design" is a form of progressive creation or old-earth creation. At the bottom of the chart of that column, the second column, under Progressive Creation and Old-Earth Creation, you see the words, "Intelligent Design" Movement, Phillip Johnson, and Michael Behe.

Mr Baksa testified in response to questions from his lawyer that he researched "intelligent design" and [*Of Pandas and People*] before the board adopted both into the district's curriculum and that his research included this order form from the Institute for Creation Research, which promotes *Pandas*, describing it as a book that contains interpretations of classic evidences in harmony with the creation model.

Board President Bonsell and Superintendent Nilsen testified that they understood the definition of "intelligent design" found on pages 99 to 100 of *Pandas* to be a tenet of creationism.

The district solicitor, Stephen Russell, sent this e-mail to Richard Nilsen advising Dr Nilsen and eventually the board members who received this e-mail that, quote, Thomas More refers to the creationism issue as "intelligent design".

Board members Jeff and Casey Brown and the science teachers also warned the board that *Pandas* and "intelligent design" are creationism or too close for comfort, and there could be legal consequences for teaching it.

This information, equating "intelligent design" with creationism, did not deter the school board at all. It emboldened them. They rushed the curriculum change to a vote, discarding all past practices on curriculum adoption, such as placing the item on a planning meeting agenda before bringing it to a vote, involving the citizens' curriculum advisory committee with a meeting, or showing deference to the district's experts on the curriculum item, the school science teachers.

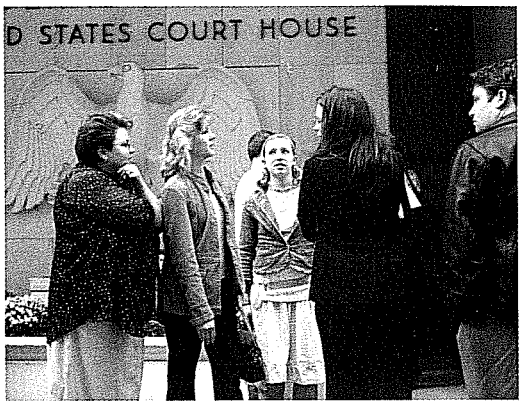
The record is overwhelming that board members were discussing creationism at the meetings in June of 2004. Two separate newspaper reporters, Heidi Bernhard-Bubb and Joe Maldonado, reported this in articles about the meeting which they confirmed in sworn testimony in this court. Former board members Casey and Jeff Brown and Plaintiffs Barrie Callahan and Christy and Bryan Rehm also testified to these facts.

Finally, at the end of this trial, Assistant Superintendent Mike Baksa, an agent of the defendant Dover Area School District in this case, admitted that Bill Buckingham discussed creationism at the June board meetings when discussing the biology curriculum. After a year of denying that fact, forcing reporters to testify, the truth was confirmed by defendants' own witness.

And, of course, we saw Mr Buckingham talk about creationism on the tape of the Fox 43 interview using language almost identical to the words attributed to him by newspaper reporters covering the June 2004 board meetings.

His explanation that he misspoke the word "creationism" because it was being used in news articles, which he had just previously testified he had not read, was, frankly, incredible. We all watched that tape. And per Mr Linker's suggestion that all the kids like movies, I'd like to show it one more time. [Tape played.] That was no deer in the headlights. That deer was wearing shades and was totally at ease.

Testimony from many witnesses called by the plaintiffs and the same newspaper reports established that Bill Buckingham made the statement "2000 years ago" when discussing the biology textbook in June.



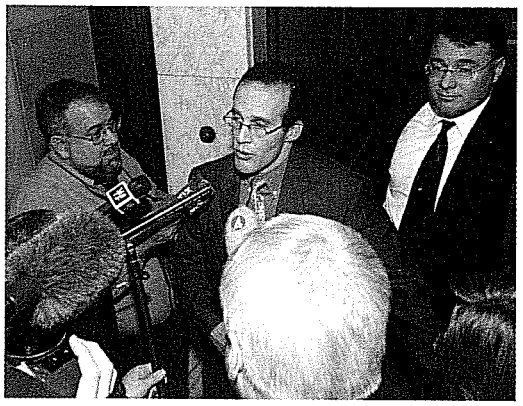
Lead plaintiff Tammy Kitzmiller (second from left) and others outside the federal courthouse in Harrisburg.

After preparing together for their January, 2004 depositions, four witnesses for the defense — Richard Nilsen, Bill Buckingham, Alan Bonsell, and Sheila Harkins — all testified that Buckingham, Mr Buckingham, did not make that statement at that meeting, but rather only at a different meeting in November when the Pledge of Allegiance was discussed.

But every plaintiff, teacher, reporter, and dissenting board member who testified at trial about the June 14th meeting knows this is not true, and defendants' witnesses Harkins and Baksa conceded that the statement could have been made in June as the contemporaneous, unchallenged news reports suggest.

What I am about to say is not easy to say, and there's no way to say it subtly. Many of the witnesses for the defendants did not tell the truth. They did not tell the truth at their depositions, and they have not told the truth in this courtroom.

They are not telling the truth when they assert that only "intelligent design" and not creationism was discussed at the June 2004 board meetings. They are not telling the truth when they placed the "2000 years ago" statement at the meeting discussing the pledge and not at the June 14, 2004, meet-



Patrick Gillen of the Thomas More Law Center talks to the press outside the courthouse. Upper right: Fellow TMLC attorney Ed White.

ing discussing the biology textbook. They did not tell the truth in their depositions or, for that matter, to the citizens of Dover about how the donation of the Pandas books came about.

Truth is not the only victim here. In misrepresenting what occurred in the run-up to the change to the biology curriculum, there were human casualties. Two hard-working freelance reporters had their integrity impugned and were dragged into a legal case solely because the board members would not own up to what they had said. They could have just asked Mike Baksa. He knew.

Trudy Peterman, the former principal, has not testified in this case, but we know she was negatively evaluated for what she reported in her April 2003 memo about her conversation with Bertha Spahr. And Superintendent Nilsen continued to question her truthfulness in this court, but he never asked Mrs Spahr what she told Dr Peterman on the subject of creationism.

Had he asked her, he would have heard exactly what you heard from Mrs Spahr in this courtroom. Mr Baksa did tell her that Board Member Bonsell expressed his desire to have creationism taught 50/50 or in equal time with evolution.

And, of course, you've heard from board members who were at that meeting, including Casey Brown and Barrie Callahan, that Mr Bonsell did say he wanted creationism taught 50/50 with evolution. In fact, Mrs Callahan had contemporaneous notes recording Mr Bonsell saying just that. And Dr Nilsen also had contemporaneous notes showing that Mr Bonsell talked about creationism at the March 2003 board retreat.

Confronted with Dr Nilsen's notes, Mr Bonsell finally admitted he talked about creationism, at least then. The Defendants' smear of Dr Peterman is unpersuasive and inexcusable.

There are consequences for not telling the truth. The board members and administrators who testified untruthfully for the defendants are entitled to no credibility, none. In every instance where this Court is confronted with a disputed set of facts as between the plaintiffs' witnesses and defendants' witnesses that the Court deems to have been untruthful, the plaintiffs' witnesses account should be credited.

And furthermore, and perhaps more importantly, this Court should infer from their false statements that defendants are trying to conceal an improper purpose for the policy they approved and implemented, namely an explicitly religious purpose.

The board's behavior mimics the "intelligent design" movement at large. The Dover board discussed teaching creationism, switched to the term "intelligent design" to carry out the same objective, and then pretended they had never talked about creationism.

As we learned from Dr Forrest's testimony, the "intelligent design" movement used the same sleight of hand in creating the *Pandas* textbook. They wrote it as a creationist book and then, after the *Edwards* decision outlawed teaching creationism, simply inserted the term "intelligent design" where "creationism" had been before.

Dean Kenyon wrote the book at the same time that he was advocating creation science to the Supreme Court in *Edwards* as the sole scientific alternative to the theory of evolution. But now, like the Dover board, the "intelligent design" movement now pretends that it never was talking about creationism.

I want to make a very important point here. In this case, we have abundant evidence of the religious purpose of the Dover School Board that supports a finding that its policy is unconstitutional. However, if the board had been more circumspect about its objectives or better at covering its tracks, it would not make the policy it passed any less unconstitutional.

Your Honor, you have presided over a six-week trial. Both parties have had a fair opportunity to present their cases about what happened in the Dover community and about the nature of "intelligent design". Leading experts from both sides of the issue have given extensive testimony on the subject.

This trial has established that "intelligent design" is unconstitutional because it is an inherently religious proposition, a modern form of creationism. It is not just a product of religious people, it does not just have religious implications, it is, in its essence, religious. Its central religious nature does not change whether it is called creation science or "intelligent design" or sudden emergence theory. The shell game has to stop.

If there's any doubt about the religious nature of "intelligent design", listen to these exemplary descriptions of "intelligent design" by its leading proponents, which are in evidence in this case:

Phillip Johnson said, "'Intelligent design' means that we affirm that God is objectively real as Creator and that the reality of God is tangibly recorded in evidence accessible to science, particularly in biology."

William Dembski: "In its relation to Christianity, 'intelligent design' should be viewed as a ground-clearing operation that gets rid of the intellectual rubbish that for generations has kept Christianity from receiving serious consideration." William Dembski again, "Intelligent design is just the *Logos* theology of John's Gospel restated in the idiom of information theory."

Michael Behe told this Court that "intelligent design" is not a religious proposition, but he told the readers of *The New York Times* the question "intelligent design" poses is whether science can make room for religion. He acknowledges that the more one believes in God, the more persuasive "intelligent design" is. The religious nature of "intelligent design" is also pro-

claimed loudly and repeatedly in the "Wedge document".

The other indisputable fact that marks "intelligent design" as a religious proposition that cannot be taught in public schools is that it argues that a supernatural actor designed and created biological life. Supernatural creation is the religious proposition that the Supreme Court said in *Edwards* cannot be taught in public schools.

And it's obvious why this has to be the case. When we talk about an actor outside nature with the skills to design and create and build biological life, we are talking about God.

The experts that testified at this trial admit that in their view, the intelligent designer is God. The Discovery Institute's "Wedge document"'s first paragraph bemoans the fact that the proposition that human beings are created in the image of God has been undermined by the theory of evolution. Professor Behe admitted that his argument for "intelligent design" was essentially the same as William Paley's, which is a classic argument for the existence of God.

Who else could it be? Michael Behe suggests candidates like aliens or time travelers with a wink and a nod, not seriously.

"Intelligent design" hides behind an official position that it does not name the designer, but as Dr Minnich acknowledged this morning, all of its advocates believe that the designer is God. "Intelligent design" could not come closer to naming the designer if it was spotted with the letters G and O.

The case for "intelligent design" as a religious proposition is overwhelming. The case for it as a scientific proposition, by contrast, is nonexistent. It has been unanimously rejected by the National Academy of Science, the American Association for the Advancement of Science, and every other major scientific and science education organization that has considered the issue, including, we learned this morning, the American Society of Soil Scientists.

The fact that it invokes the supernatural is, by itself, disqualifying. As William Dembski stated, unless the ground rules of science are changed to allow the supernatural, "intelligent design" has "no chance in Hades".

In this courtroom, Steve Fuller confirmed that changing the ground rules of science is "intelligent design"'s fundamental project, and if defendants get their way, those ground rules get changed first in Dover High School.

There's a reason that science does not consider the supernatural. It has no way of measuring or testing supernatural activity. As Professor Behe testified, you can never rule out "intelligent design".

Defendants' comparisons to the big bang or Newton's work make no sense, for those, as with many scientific propositions, we may have at one time attributed natural phenomena to supernatural or divine action before working out the natural explanations that fall under the heading "science".

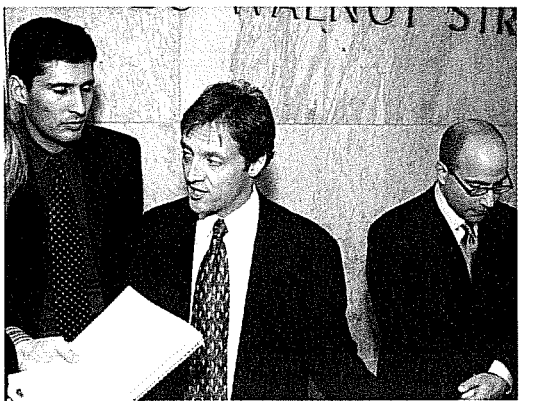
"Intelligent design" is moving in the opposite direction, replacing a well-developed natural explanation for the development of biological life with a supernatural one which it has no evidence to support.

The positive case for "intelligent design" described by plaintiffs' experts Michael Behe, the leading light of the "intelligent design" movement, and Scott Minnich over the last couple of days is a meager little analogy that collapses immediately upon inspection.

Professor Behe and Professor Minnich's argument, summed up by the amorphous phrase "purposeful arrangement of parts", is that if we can tell that a watch or keys or a mousetrap or a cell phone was designed, we can make the same inference about the design of a biological system by an intelligent designer. This is, as both experts acknowledge, the same argument that Paley made, the argument that Paley made for the existence of God.

Plaintiffs' witnesses Robert Pennock and Kenneth Miller explained and under cross-examination defendants' expert Professor Behe admitted that the difference between inferences to design of artifacts and objects and to design of biological systems overwhelms any purported similarity.

Biological systems can replicate and reproduce and have had millions or billions of years to develop in that fashion, providing opportunities for change that the keys, watches, stone tools, and statues designed by humans do not have.



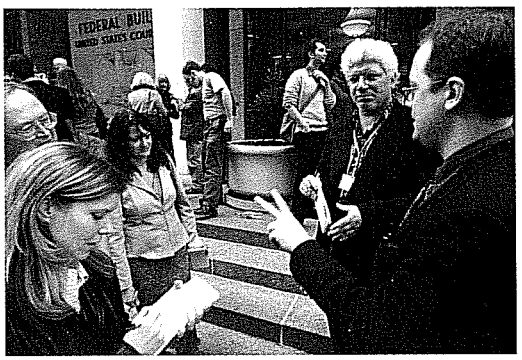
Vic Walczak of the Pennsylvania ACLU, flanked by Richard Katskee of Americans United for Separation of Church and State and Eric Rothschild of Pepper Hamilton, speaks to a reporter.

And, of course, those objects and artifacts we recognize as design in our day-to-day life are all the product of human design. We know the designer. In the case of "intelligent design" of biological life, however, that crucial information is, to use Professor Behe's own phrase, a black box.

Because we know that humans are the designers of the various inanimate objects and artifacts discussed by Professor Behe, we also know many other useful pieces of information, what the designer's needs, motives, abilities, and limitations are. Because we are that designer, we can actually re-create the designer's act of creation.

Professor Behe admitted that none of this information is available for the inference to "intelligent design" of biological systems. In fact, the only piece of information that is available to support that inference is appearance. If it looks designed, it must be designed. But if that explanation makes sense, then the natural sciences must be retired. Almost everything we see in our marvelous universe — biological, chemical, physical — could be subsumed in this description.

Other than this meager analogy,



NCSE's Nick Matzke speaking to a group of reporters (including from left, York Daily Record *reporters Michelle Starr, Lauri Lebo, and Mike Argento, sporting an end-of-trial suit) outside the courthouse.*

"intelligent design" is nothing but a negative argument against evolution, and a poor one at that. This was made strikingly clear when Professor Behe was asked about his statement that "intelligent design"'s only claim is about the proposed mechanism for complex biological systems, and he admitted that "intelligent design" proposes no mechanism for the development of biological systems, only a negative argument against one of the mechanisms proposed by the theory of evolution.

And, of course, Professor Behe also had to admit, reluctantly, that "intelligent design", as explained in *Pandas*, goes far beyond the argument about mechanism to attack another core proposition of the theory of evolution, common descent. In page after page of *Pandas*, the authors argue against common descent in favor of the creationist biblical argument for the abrupt appearance of created kind, birds with beaks, fish with fins, and so on.

The arguments in *Pandas* are based on wholesale misrepresentations of scientific knowledge, much of which has been known for years or even decades before *Pandas* was published and some of which has been developed after its last publication, demonstrating that science marches on while "intelligent design" stands still.

Kevin Padian was the only evolutionary biologist who testified in this trial. He described massive and pervasive misrepresentations of the fossil record and other scientific knowledge in *Pandas*. His testimony went completely unrebutted by any qualified expert.

The board members cannot claim ignorance about the flaws in *Pandas*. Dr Nilsen and Mr Baksa testified that the science teachers warned them that *Pandas* had faulty science, was outdated, and beyond the reading level of ninth-graders.

The board members had no contrary information. They have no meaningful scientific expertise or background and did not even read *Pandas* thoroughly. Their only outside input in favor of *Pandas* was a recommendation from Mr Thompson of the Thomas More Law Center, a law firm with no known scientific expertise. What these board members are doing then, knowingly, is requiring administrators or teachers to tell the students, go read that book with the faulty science.

It's not just *Pandas* that's faulty, it's the entire "intelligent design" project. They call it a scientific theory, but they have done nothing, they have produced nothing. Professor Behe wrote in *Darwin's Black Box* that if a scientific theory is not published, it must perish. That is the history of "intelligent design".

As Professor Behe testified, there are no peer-reviewed articles in science journals reporting original research or data that argue for "intelligent design". By contrast, Kevin Padian, by himself, has written more than a hundred peer-reviewed scientific articles.

Professor Behe's only response to the "intelligent design" movement's lack of production was repeated references to his own book, *Darwin's Black Box*. He was surprised to find out that one of his purported peer-reviewers wrote an article that revealed he had not even read the book.

But putting that embarrassing episode aside, consider the following facts: Professor Behe admitted in his article "Reply to My Critics" that his central challenge to natural selection, irreducible complexity, is flawed because it doesn't really match up with the claim made for evolution. It works backwards from the completed organism rather than forward. But he hasn't bothered to correct that flaw. He also admits that there is no original research reported in *Darwin's Black Box*, and in the almost ten years since its publication, it has not inspired research by other scientists.

Professor Behe's testimony and his book *Darwin's Black Box* is really one extended insult to hard-working scientists and the scientific enterprise. For example, Professor Behe asserts in *Darwin's Black Box*, "The scientific literature has no answers to the question of the origin of the immune system," and "The complexity of the system dooms all Darwinian explanations to frustration."

I showed Professor Behe more than 50 articles, as well as books, on the evolution of the immune system. He had not read most of them, but he confidently, contemptuously dismissed them as inadequate. He testified that it's a waste of time to look for answers about how the immune system evolved.

Thankfully, there are scientists who do search for answers to the question of the origin of the immune system. It's the immune system. It's our defense against debilitating and fatal diseases. The scientists who wrote those books and articles toil in obscurity, without book royalties or speaking engagements. Their efforts help us combat and cure serious medical conditions. By contrast, Professor Behe and the entire "intelligent design" movement are doing nothing to advance scientific or medical knowledge and are telling future generations of scientists, don't bother.

Not only does "intelligent design" not present its argument in the peer-reviewed journals, it does not test its claims. You heard plaintiffs' experts Pennock, Padian, and Miller testify that scientific propositions have to be testable. Defendants' expert [Steve] Fuller agreed that for "intelligent design" to be science, it must be tested, but he admitted that so far, "intelligent design" had not done so.

Of course, there's an obvious reason that "intelligent design" hasn't been tested. It can't be. The proposition that a supernatural intelligent designer created a biological system is not testable and can never be ruled out.

Continued on page 35

Praise from the Press

After it was issued on December 20, 2005, the decision in *Kitzmiller v Dover* was lauded in editorial columns across the country. Here is a sampling.

Cutting Through the Fog

Federal Judge John E Jones III restored faith both in rational thinking and in the independent judiciary yesterday when he struck down a Pennsylvania school board's requirement that "intelligent design" be taught in public school science classes as "breathtaking inanity." We hope the decision will stop the damaging movement to present creationism as an equal "alternative" to Darwin's magisterial theory of evolution and help restore science to its proper place in the national canon.

Jones, a lifetime Republican who was appointed to the federal bench by President [George W] Bush in 2002, neatly cut through the fog of ambiguity conjured by proponents to declare that "intelligent design" is not science and "cannot uncouple itself from its creationist, and thus religious, antecedents." In a detailed 139-page ruling, he concluded that requiring "intelligent design" to be taught in public schools is an unconstitutional violation of the Establishment Clause forbidding the state from promoting religion.

—*Boston Globe*, December 21, 2005

Lessons for Cobb County

A federal judge ruled Tuesday against a Pennsylvania school board, which had tried to sneak religion into the classroom under the guise of "intelligent design."

His ruling ought to be required reading in Cobb County, where similarly motivated school board members have also attempted to turn biology class into Bible study. The decision by US District Judge John E Jones III should also be studied by the 11th US Circuit Court of Appeals judges, who are now weighing whether Cobb's evolution disclaimer stickers on high school science texts improperly endorse religion. ...

Like their counterparts in Dover, the Cobb board members are guilty of "breathtaking inanity", as Judge Jones so aptly described it. "The students, parents and teachers of the Dover Area School District deserved better than to be dragged into this legal maelstrom, with its resulting utter waste of monetary and personal resources," Jones said.

So do the students, parents and teachers of Cobb County.

— *Atlanta Journal-Constitution*, December 22, 2005

"Intelligent Design" on the Ropes

In coming out strongly against teaching "intelligent design" in Dover, Pennsylvania, schools, federal district judge John E Jones III delivered a significant setback to efforts across the nation to pass off this new form of creationism as worthy of discussion in science classes. While the decision is not likely to end the debate, it sends an important signal to school boards that evolution is alive and well, but that "intelligent design" is on the ropes. ...

Judge Jones was convinced that the Dover school board had not served its constituent schoolchildren well in adopting the policy, calling attention to the hidden religious agendas of some members. Dover voters had already come to that conclusion last month when they rejected for re-election all of the board members who had voted for the policy. The new school board members don't need to appeal this victory, so the reach of this ruling as precedent is unclear.

But we hope that "intelligent design" proponents in other parts of the country suffer the same fate as those in Dover — trounced at the polls and in court.

— *Baltimore Sun*, December 21, 2005

Victory for Common Sense

In his 139-page ruling, Jones said the "citizens of the Dover area were poorly served by the members of the board who voted for the ID policy."

The judge was being too kind by several degrees. In violating the Establishment Clause of the US Constitution, the board members — especially those who lied on the witness stand in a pathetic attempt to defend their insistence on teaching creationism along with valid science — threw their oaths as public servants to uphold the law out the window.

The lesson for the Dover Area School District is not yet complete, as the court has yet to set damages in the case.

But the victory for common sense and the good sense of the Founding Fathers should be celebrated — the judge's ruling permanently bars the use of "intelligent design" policy in "any school" within the district.

— *York Dispatch*, December 21, 2005

Not the End of it, Alas

The Dover, Pennsylvania, school board made it easy for US District Judge John E Jones III to rule against it and what he called its "breathtaking inanity" in the first court test on "intelligent design", which posits that life is so intricate that it must have been created by a higher intelligence. The board's self-contradictions and what the judge termed "outright lies" made it clear that members were looking to insert creationism, or as close to it as they could get, into high school science courses.

It would be nice if that were the end of it. But like life on this planet, the movement to bring the teaching of religious beliefs — largely, Christian religious beliefs — to the public schools hasn't gone extinct. It has evolved, and it will continue to do so. ...

No doubt other school board members elsewhere will make the same mistakes, raising legal troubles instead of academic standards. But perhaps Jones's sweeping and sometimes acerbic ruling will dissuade a few of the smarter ones from trying.

— *Los Angeles Times*, December 22, 2005

A Striking Repudiation of "Intelligent Design"

Judge Jones's decision was a striking repudiation of "intelligent design" ... .

The judge found that "intelligent design" violated the centuries-old ground rules of science by invoking supernatural causation and by making assertions that could not be tested or proved wrong. Moreover, "intelligent design" has not gained acceptance in the scientific community, has not been supported by peer-reviewed research, and has not generated a research and testing program of its own. The core argument for "intelligent design" — the supposedly irreducible complexity of key biological systems — has clear theological overtones. ...

No one believes that this thoroughgoing repudiation of "intelligent design" will end the incessant warfare over evolution. But any community that is worried about the ability of its students to compete in a global economy would be wise to keep supernatural explanations out of its science classes.

— *The New York Times*, December 22, 2005

Darwin, Evolution, and Literature

Between the early exciting adventures on board the *Beagle* and the later intellectual ferment at home in Down House, Darwin's life reads like a novel. Thus it is no wonder that Darwin is a perennial favorite subject not only for biography but also for fiction. And since, as Darwin remarked of evolution, "there is grandeur in this view of life," it is no wonder that evolution is also a popular theme in modern fiction. Literary critics, too, are beginning to attend to evolutionary biology: not only to examine the rhetoric, narrative, and literary influence of its seminal works such as the *Origin of Species* but also to cast light on the literary enterprise itself. So for novels about Darwin, novels about evolution, and literary criticism about or employing evolution, check out the following books, all of which are now available through the NCSE website: <http://www.ncseweb.org/bookstore.asp> — look in the "In the latest *RNCSE*" section. And remember, every purchase through the website benefits NCSE!

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

Fiction about Darwin

The Darwin Conspiracy
by John Darnton
The publisher writes, "Darnton's richly dramatic narrative ... unfolds through three vivid points of view: Darwin's own as he sails around the world aboard the *Beagle;* his daughter Lizzie's as she strives to understand the guilt and fear that struck her father at the height of his fame; and that of present-day anthropologist Hugh Kellem and Darwin scholar Beth Dulcimer, whose obsession with Darwin (and with each other) drives them beyond the accepted boundaries of scholarly research. What Hugh and Beth discover ... is a maze of bitter rivalries, petty deceptions, and jealously guarded secrets, at the heart of which lies the birth of the theory of evolution."

The Sandwalk Adventures
by Jay Hosler
A delightful graphic novel, in which Charles Darwin himself explains the rudiments of deep time, common ancestry, and natural selection to Mara, a winsome befreckled adolescent who just happens to live in Darwin's left eyebrow — she is, after all, a follicle mite. Reviewing *The Sandwalk Adventures* for *BioScience*, NCSE deputy director Glenn Branch praised it for its "engaging art and snappy dialogue" as well as its pedagogical sophistication: "Hosler obviously is aware of the likely misconceptions that his readership will have about evolution." Also the author/illustrator of the equally delightful *Clan Apis*, a graphic novel about honeybees, Hosler teaches biology at Juniata College.

Mr Darwin's Shooter
by Roger McDonald
In *Mr Darwin's Shooter*, Roger McDonald — one of Australia's most acclaimed novelists — tells the story of Syms Covington, the sixteen-year-old sailor, fiddler, and odd-job man on the *Beagle* who became Darwin's full-time assistant, helping him collect and preserve the specimens on which the theory of evolution was based. Much later, living in rural Australia, Covington is awaiting the publication of the *Origin of Species*, dreading its implications for his devout religious faith but also wondering what of him will be reflected in Darwin's work. The reviewer for *The New York Times* described *Mr Darwin's Shooter* as "[a] high-spirited, adventuresome, idiosyncratic ramble through the history of science."

The Origin
by Irving Stone
Known for his popular biographical novels of the famous, including Vincent van Gogh (*Lust for Life*), Michelangelo (*The Agony and the Ecstasy*), and Clarence Darrow (*For the Defense*), Irving Stone spent five years working on *The Origin*, living in or near Darwin's abodes in Shropshire, Shrewsbury, and London, and even traveling to the Galápagos. His efforts were rewarded with a place on the best-seller list and a review in *The New York Times* describing *The Origin* as "a work of vast research, much pleasure and modest insights. It lacks literary elegance and psychological subtlety. But it is overwhelming in detail and overpowering as narrative."

Evolution Fiction

The Evolution Man
by Roy Lewis
Originally published in 1960 as *What We Did to Father*, *The Evolution Man* follows the adventures of the primal horde, led by their inventive genius of a father. Familiar themes of paleoanthropological fiction are treated, although not in the sort of diction that is familiar in the genre: "Good

gracious! ...While I have been talking to you, and not even thinking about it, I have made a most important invention: the heavy-duty hunting spear with the fire-hardened point!" "Artfully told and laugh-out-loud funny," writes the reviewer for the *Los Angeles Times Book Review*.

The Evolution of Jane
by Cathleen Schine
From the publisher: "[T]he Galápagos Islands are home to diverse species of exotic wildlife — and tourists of every stripe and feather. It is here that Jane Barlow Schwartz embarks on a quest as urgent as Charles Darwin's one hundred and fifty years before: to find out why her childhood friendship with her cousin and soul-mate Martha ended; and what unknown event, family feud, or unintended slight caused the happiest part of her life to become extinct. Along the way ... Jane ponders the origin of her own colorful and peculiar heritage, a secret history of natural selection, and the flawed and fascinating evolutionary process that makes us all who we are."

The Dechronization of Sam Magruder
by George Gaylord Simpson
Paleontologist and architect of the modern synthesis, George Gaylord Simpson also ventured into fiction with *The Dechronization of Sam Magruder*, in which a physicist working on a quantum theory of time is catapulted back to the Cretaceous, which Simpson describes in loving detail. With a preface by Arthur C Clarke and an afterword by Stephen Jay Gould. Yves Barbero, writing in *Creation/Evolution* (1996 Summer; 16 [1], nr 38: 32), remarked, "Simpson's novel is a terrific read on many levels. ... The book is a full evening's pleasure."

Last and First Men
by Olaf Stapledon
First published in 1930, *Last and First Men* stretches over two billion years to describe the career of no fewer than eighteen species of human beings, beginning with the First Men, *Homo sapiens*. John Maynard Smith writes, "A book which probably had a bigger influence on me than anything I've ever read was written in 1933 [*sic*] by a man called Olaf Stapledon and called *Last and First Men*. It's quite an extraordinary book. ...This book completely blew my mind when I read it at the age of 15 or so. It made me fascinated in genetics, fascinated in evolution, and I suppose it's as much as anything else responsible for where I am standing today."

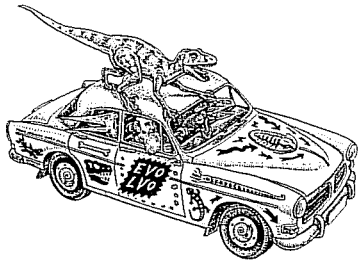
Evolution and Literary Theory

Madame Bovary's Ovaries: A Darwinian Look at Literature
by David Barash and
Nanelle Barash
"[L]iterature is life written down," contend the authors of *Madam Bovary's Ovaries*, a psychologist, specializing in evolutionary psychology, at the University of Washington and his daughter, currently studying literature and biology at Swarthmore College. "Accordingly, literary critics — and, more important, garden-variety readers — should profit by adding the cardinal principle of the life sciences to their armamentarium." Taking on the canon from Homer to Saul Bellow, they offer what the reviewer for *Publishers Weekly* describes as "a surprisingly lighthearted romp through both literature and the animal kingdom, aimed at a casual reader who's interested in either or both."

Darwin's Plots, second edition
by Gillian Beer
Subtitled "Evolutionary narrative in Darwin, George Eliot and nineteenth-century fiction," Beer's classic work of literary criticism (first published in 1983) begins with a discussion of the literary influences on Darwin, manifest in his use of language and his narrative language strategy in the *Origin*, and then proceeds to consider Darwin's influence on nineteenth-century fiction, particularly the novels of George Eliot and Thomas Hardy. The reviewer for the *New Statesman* commented, "The only problem with this book is deciding what to praise first." The second edition (published in 2000) contains a new preface by the author and a foreword by George Levine.

Literary Darwinism: Evolution, Human Nature, and Literature
by Joseph Carroll
Joseph Carroll is the leading light of the emerging movement of literary Darwinism, and *Literary Darwinism* collects his essays on such topics as evolution and literary theory, biology and poststructuralism, and the deep structure of literary representations, as well as discussions of authors as diverse as Jane Austen and Charlotte Brontë, Matthew Arnold and Thomas Hardy, and Steven Pinker and Stephen Jay Gould. EO Wilson describes *Literary Darwinism* as "[a] brilliant exposition of a new paradigm in literary criticism which, because it is among the first to bridge modern biology and the humanities, has a feel of permanence to it."

The Literary Animal: Evolution and the Nature of Narrative
edited by Jonathan Gottschall and
David Sloan Wilson
From the publisher: "The volume brings together scholars from the forefront of the new field of evolutionary literary analysis — both literary analysts who have made evolution their explanatory framework and evolutionist scientists who have taken a serious interest in literature — to show how the human propensity for literature and art can be properly framed as a true evolutionary problem. Their work is an important step toward the long-prophesied synthesis of the humanities and what Steven Pinker calls 'the new sciences of human nature.'" With dual forewords by the literary critic Frederick Crews and the evolutionary biologist EO Wilson.



NCSE on the Road

A Calendar of Special Events, Presentations, and Lectures

Date September 7, 2006
City Madison WI
Presenter Andrew Petto
Title Dover? It Ain't Over!
Time 12 noon
Event UW Madison Evolution Seminar Series
Location UW Genetics-Biotech Building, Room 1360
Contact Mara McDonald, mamcdona@wisc.edu

Date October 11–14, 2006
City Albuquerque NM
Presenter NCSE staff
Title (Booth in the exhibit hall)
Time TBA
Event National Association of Biology Teachers Annual Meeting
Location Albuquerque Convention Center
Contact Nick Matzke, matzke@ncseweb.org

Date October 19–21, 2006
City San Francisco CA
Presenter NCSE staff
Title (Booth in the exhibit hall)
Time TBA
Event California Science Education Conference
Location Bill Graham Civic Auditorium
Contact Nick Matzke, matzke@ncseweb.org

Date October 21, 2006
City San Francisco CA
Presenter Eugenie C Scott
Title Recent Legal Decisions Concerning Teaching Evolution
Time 2:00 PM
Event California Science Education Conference
Location Bill Graham Civic Auditorium
Contact Eugenie C Scott, scott@ncseweb.org

Date November 16, 2006
City Lawrence KS
Presenter Eugenie C Scott
Title Faith, Reason, and Assumption in Understanding the Natural World
Event Series: Difficult Dialogues at The Commons
Time 7:00 PM
Location University of Kansas
Contact Victor Bailey, vbailey@ku.edu

Love Evolution, Will Travel

To find a speaker from NCSE for your event, call the NCSE office at 1-800-290-6006, or visit our website at: <www.ncseweb.org/ourstaff.asp>

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

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continued from page 30

"Intelligent design" does not even test its narrower negative claims. As plaintiffs' experts explained and again Dr Fuller agreed, arguments like irreducible complexity, even if correct, only negate aspects of the theory of evolution. They do not demonstrate "intelligent design". It does not logically follow. But "intelligent design" does not even test this negative argument.

Professor Behe and Professor Minnich articulated the test of irreducible complexity. Grow a bacterial flagellum in the laboratory. The test is, as I think Dr Minnich acknowledged this morning, somewhat ridiculous. [That evolution] doesn't occur over two or five or ten years in a laboratory population doesn't rule out evolution over billions of years.

But if Professor Behe and Professor Minnich think this is a valid test of their design hypothesis, they or their fellow "intelligent design" adherents should be running it, but they haven't. Their model of science is, we've brought an idea, sit back, do no research, and challenge evolutionists to shoot it down. That's not how science works. Sponsors of a scientific proposition offer hypotheses, and then they test [them].

Consider the amazing example that Ken Miller gave. Evolutionary biologists were confronted with the fact that we humans have two fewer chromosomes than chimpanzees, the creatures hypothesized to be our closest living ancestors based on molecular evidence and homology. Evolutionary biologists didn't sit back and tell creationists to figure out this problem. They rolled up their sleeves, tackled it themselves, and they figured it out. That's real science.

And, in fact, the common ancestry of chimpanzees and humans is real science. It's the real science that William Buckingham and Alan Bonsell and all their fellow board members who voted for the change to the curriculum made sure that the students of Dover would never hear.

Make no mistake about it, William Buckingham was determined that Dover students would not be taught anything that conflicts with the special creation of humans, no mural, no monkeys to man, no Darwin's descent of man, his wife's sermon from Genesis. This was all focused on protecting the biblical proposition that man was specially created by God.

Similarly, Alan Bonsell ensured that the entire biology curriculum was molded around his religious beliefs. He testified in this courtroom that it is his personal religious belief that the individual kinds of animals — birds, fish, humans — were formed as they currently exist and do not share common ancestors with each other.

Macroevolution is inconsistent with his religious beliefs. The only aspect of the theory of evolution that conforms to his religious beliefs is microevolution, change within a species. He also believes in a young earth, thousands, not billions of years old.

Sure enough, in the fall of 2003, as the older of his two children prepare to take biology, Mr Bonsell sought assurances the teachers only taught microevolution and not what the board members call origins of life, macroevolution, speciation, common ancestry, including common ancestry of humans, all the things that contradict his personal religious beliefs.

He received the assurances he was looking for that most of evolution wasn't being taught. On October 18, this practice of depriving students of the thorough teaching of the theory of evolution, in the minds of the board members, became board policy.

Now, in fairness to the teachers, they weren't really short-changing the students to the extent Mr Bonsell hoped. Mrs Miller testified that she does teach speciation with Darwin's finches, her attempt to teach evolutionary theory as nonconfrontationally as possible.

Mr Buckingham and Mr Bonsell also wanted to make sure that the teachers pointed out gaps and problems with the parts of the theory of evolution they did teach. None of the board members cared whether students knew about gaps and problems in the theory of plate tectonics or germ theory or atomic theory. But for evolution, it was essential that the students see all the purported warts.

The resource the board relied upon for information about problems with evolution was not from any of the mainstream scientific organizations, but rather the Discovery Institute, the think-tank pursuing theistic science.

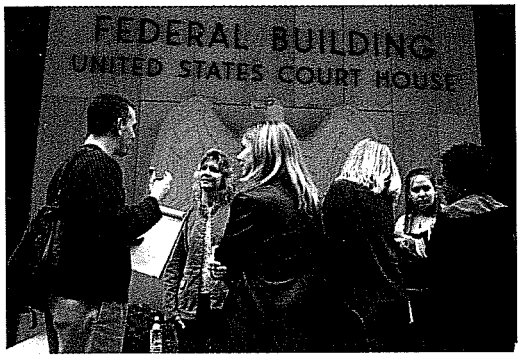
The press descends: Laurie Goodstein of The New York Times *and Margaret Talbot of* The New Yorker.

For Mr Bonsell, however, making sure that the teaching of evolution didn't contradict his religious beliefs wasn't enough. He then joined Mr Buckingham in promoting an idea that affirmatively supported his religious beliefs. "Intelligent design" asserts that birds are formed with beaks, feathers, and wings and fish with fins and scales, created kinds just like Mr Bonsell believes. And "intelligent design" accommodates Mr Bonsell's belief in young earth creationism. He is welcome in "intelligent design"'s big tent.

And if there was any doubt that the board wanted to trash evolution and not teach it, it was confirmed by the development of the statement read to the students. There was nothing administration or faculty could do about "intelligent design" because that's what the board wanted.

But the language they developed about evolution was actually quite honest and reasonable. "Darwin's theory of evolution continues to be the dominant scientific explanation of the origin of species. Because Darwin's theory is a theory, there is a significant amount of evidence that supports the theory, although it is still being tested as new evidence is discovered. Gaps in the theory exist for which there is yet no evidence."

If this language had made it into



Lead plaintiff Tammy Kitzmiller speaking to a group of reporters outside the courthouse.

the version read to the students, it would not have cured the harm caused by promoting the religious argument for "intelligent design" and directing students to the deeply flawed *Pandas* book, but at least it would have conveyed to students that the theory of evolution is well accepted and supported by substantial evidence.

The board would have none of it. The only things that the board wanted the students to hear about evolution were negative things. There are gaps, it's a theory, not a fact — language that the defendants' own expert, Steve Fuller, admitted is misleading and denigrates the theory of evolution. As Dr Fuller and plaintiffs' expert Brian Alters agreed, the board's message was, we're teaching evolution because we have to.

As if their views weren't clear enough, the board issued a newsletter which accused the scientific community of using different meanings of the word "evolution" to their advantage as if scientists were trying to trick people into believing something that there isn't evidence to support.

Your Honor, you may remember Cindy Sneath's testimony about her 7-year-old son Griffin who is fascinated by science. This board is telling Griffin and children like him that scientists are just tricking you. It's telling students like Griffin the same thing Mr Buckingham told Max Pell, don't go off to college or you'll just be brainwashed, don't research the theory of evolution.

The board is delivering Michael Behe's message. Don't bother studying the development of the immune system, you're just doomed to failure. In science class, they are promoting the unchanging certainty of religion in place of the adventure of open-ended scientific discovery that Jack Haught described.

How dare they. How dare they stifle these children's education, how dare they restrict their opportunities, how dare they place a ceiling on their aspirations and on their dreams. Griffin Sneath can become anything right now. He could become a science teacher like Bert Spahr or Jen Miller or Bryan Rehm or Steven Stough turning students on to the wonders of the natural world and the satisfaction of scientific discovery, perhaps in Dover or perhaps some other lucky community.

He could become a college professor and renowned scientist like Ken Miller or Kevin Padian. He might solve mysteries about the immune system because he refused to quit. He might even figure out something that changes the whole world like Charles Darwin.

This board did not act to improve science education. It took one area of the science curriculum that has historically been the object of religiously motivated opposition and molded it to their particular religious viewpoints.

You heard five board members testify in this court. I focus today on Mr Buckingham and Mr Bonsell who are most explicit about their creationist objectives and who worked hardest to browbeat administrators and teachers to their will. But Mrs Geesey's letter to the editor establishes her creationist position. Her testimony and Mrs Cleaver's also demonstrates that they abdicated their decision-making responsibility to Mr Bonsell and Mr Buckingham.

In Mrs Harkins's case, it's hard to discern what her motives were beyond depriving students of the book their teachers said they needed while supplying them with books describing a concept "intelligent design" that to this day she candidly admits she does not understand.

The board never discussed what "intelligent design" is or how it could improve science education. Clearly no valid secular purpose can be derived from those facts. All that remains is the religious objectives represented in Mr Bonsell and Mr Buckingham's statements about teaching creationism and Christian values, the same values that animate the entire Wedge strategy.

Mr Buckingham said that separation of church and state is a myth, and then he acted that way. Mr Buckingham and his fellow board members wanted religion in the public schools as an assertion of their rights as Christians. But Christianity and all religious exercise have thrived in this country precisely because of the ingenious system erected by our founders which protects religious belief from intervention by government.

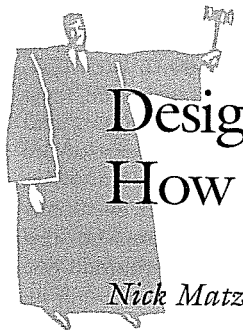
The law requires that government not impose its religious beliefs on citizens, not because religion is disfavored or unimportant, because it is so important to so many of us and because we hold a wide variety of religious beliefs, not just one.

The Supreme Court explained in *McCreary* that one of the major concerns that prompted adoption of the religion clauses was that the framers and the citizens of their time intended to guard against the civil divisiveness that follows when the government weighs in on one side of a religious debate.

We've seen that divisiveness in Dover: School board member pitted against school board member. Administrators and board members no longer on common ground with the schoolteachers. Julie Smith's daughter asking "what kind of Christian are you?" because her mother believes in evolution. Casey Brown and Bryan Rehm being called atheists.

It even spilled over into this courtroom where Jack Haught, a prominent theologian and practicing Catholic, had his religious beliefs questioned, not as they relate to the subject of evolution, but on basic Christian tenets like the virgin birth of Christ. That was impeachment by the defendants' lawyers in this case.

It's ironic that this case is being decided in Pennsylvania in a case brought by a plaintiff named Kitzmiller, a good Pennsylvania Dutch name. This colony was founded on religious liberty. For



Design on Trial: How NCSE Helped Win the *Kitzmiller* Case

Nick Matzke, NCSE Public Information Director

JUST ANOTHER FLARE-UP

Kitzmiller v Dover is now famous as the first test case on the constitutionality of teaching "intelligent design" (ID) in public schools, involving a six-week trial in Harrisburg, Pennsylvania, dozens of lawyers and witnesses, nine expert witnesses, 342 filed legal documents, 400 exhibits, national and international media, subpoenas, depositions, lies, videotape, bacterial flagella, the Constitution, civil rights, education, science, religion, history, evolution, the meaning of life, divine intervention, and one recently appointed federal judge. However, it began as just another "flare-up" for the NCSE staff.

A major part of the day-to-day work at NCSE consists of monitoring flare-ups around the country. In 2004, this included about a dozen anti-evolution bills proposed in state legislatures, several battles over evolution in science standards, and 50 or more local level flare-ups, usually school-board controversies over teaching evolution.

When I first became aware of the Dover situation, I had only been working at NCSE for five months. On June 8 and 9, 2004, news articles from the *York Daily Record* and *York Dispatch* appeared on my computer screen, reporting on a controversy at a June 7 meeting of the Dover Area School Board (DASB). The controversy was over whether or not the school district would purchase a new edition of the mainstream textbook *Biology*, by Ken Miller and Joe Levine. A school board member named William Buckingham claimed that *Biology* was "laced with Darwinism," that "[i]t's inexcusable to teach from a book that says man descended from apes and monkeys," and "[w]e want a book that gives balance to education." Buckingham and another board member, Alan Bonsell, both expressed support for finding a book that would teach both creationism and evolution. Addressing Max Pell, a recent graduate of Dover Area High School who noted during the public comment period that teaching creationism would violate the separation of church and state, Buckingham asked, "Have you ever heard of brainwashing?" and declared, "If students are taught only evolution, it stops becoming theory and becomes fact." Buckingham said that the separation of church and state was "a myth." Apparently to emphasize the point, Buckingham claimed, "This country wasn't founded on Muslim beliefs or evolution," adding "This country was founded on Christianity, and our students should be taught as such."

The June 9 article in the *York Dispatch* contained an accurate summary of the legal situation, noting that a 1987 Supreme Court decision (*Edwards v Aguillard*) had barred teaching creationism in public school science classrooms.

Nick Matzke is Public Information Project Director at NCSE and thus often the first to know at NCSE when a "flare-up" occurs. He spent most of 2005 working on the Kitzmiller *case and spent all six weeks of the trial in Pennsylvania working with the plaintiffs' legal team.*

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much of the 18th century, Pennsylvania was the only place under British rule where Catholics could legally worship in public.

In his declaration of rights, William Penn stated, "All men have a natural and indefeasible right to worship Almighty God according to the dictates of their own consciences. No man can of right be compelled to attend, erect, or support any place of worship or to maintain any ministry against his consent. No human authority can, in any case whatever, control or interfere with the rights of conscience, and no preference shall ever be given by law to any religious establishment or modes of worship."

In defiance of these principles which have served this state and this country so well, this board imposed their religious views on the students in Dover High School and the Dover community. You have met the parents who have brought this lawsuit. The love and respect they have for their children spilled out of that witness stand and filled this courtroom.

They don't need Alan Bonsell, William Buckingham, Heather Geesey, Jane Cleaver, and Sheila Harkins to teach their children right from wrong. They did not agree that this board could commandeer the religious education of their children, and the Constitutions of this country and this Commonwealth do not permit it.

[The preceding is a lightly edited version of Eric Rothschild's closing argument in Kitzmiller v Dover, *delivered in Harrisburg, Pennsylvania, on November 4, 2005. For the official transcript of the day's proceedings, visit <http://www2.ncseweb.org/kvd/trans/2005_1104_day21_pm.pdf>.]*

It's a party: Chub Wilcox of Pepper Hamilton talks with NCSE's Eugenie C Scott, while Richard Katskee of Americans United for Separation of Church and State adjusts his camera.

The article also quoted Rob Boston, a spokesperson for the civil liberties group Americans United for Separation of Church and State, who stated the obvious: "Creationism isn't a science, it's religion, and any attempts to introduce creationism into public school science classes would most likely spark a lawsuit." He added, "The district would almost certainly lose a lawsuit like that. It's not even worth wasting the time and energy to consider."

In retrospect, all of these statements are highly significant, and sometimes prophetic, but at the time they did not seem particularly remarkable. It may sound surprising, but such news stories are not uncommon at the NCSE office. Demagogic politicians issuing blustery uninformed anti-evolution rhetoric are a dime a dozen. The fact that "intelligent design" was not even a part of the discussion early on indicated that the anti-evolutionism in Dover was of a fairly crude and unreconstructed sort. Talk of "monkeys" and "balance" — echoes, respectively, of the Scopes Monkey Trial and the creation scientists' "Balanced Treatment" legislation in the 1980s — only confirmed this impression.

Because the *Edwards* decision makes the law clear in this area, proposals to teach "creationism" typically fade away when the proponents learn that the Supreme Court settled the issue in 1987. The Dover situation simmered along throughout the summer and fall of 2004, but the opposition to the anti-evolutionists appeared to be strong, and the legal situation appeared to be deterring rash action. The Miller and Levine textbook was adopted after an acrimonious board meeting, and although the ID textbook *Of Pandas and People* was donated to the school a few weeks later, the newspapers seemed to indicate that a reasonable compromise had been reached. In October 2004, I was about to close the file on Dover. But on October 18, the DASB voted 6–3 to pass a policy inserting "intelligent design" into Dover's biology curriculum, using *Pandas* as a reference. On the morning of October 19, the front page of the *York Daily Record* screamed, in big bold type, "'Intelligent Design' voted in." Someone immediately faxed the headline to the NCSE office.

I distinctly recall walking into the office that morning. Genie Scott was already on the phone with someone about Dover, and she waved the newspaper headline at me as I walked past her office. In a true Homer Simpson moment, I slapped my forehead in shock. Evidently the DASB was bound and determined to bring a test case on the constitutionality of "intelligent design".

Set-up

Little did we know that fights over evolution had been going on behind the scenes in Dover for years before outsiders learned about it. We also did not know that the Thomas More Law Center had been seeking a test case on "intelligent design" for at least five years, and that it was TMLC that had encouraged the board to adopt the "intelligent design" terminology and the ID textbook *Of Pandas and People* as a recommended text, on the understanding that they would represent the school district when the inevitable court challenge came. Because of these behind-the-scenes facts, Dover was destined to develop into the famous case that attracted attention around the world, and by virtue of having been assigned the Dover flare-up at the NCSE office, I was put right in the middle of it.

The Dover ID policy and the initial steps in the *Kitzmiller* case, filed on December 14, 2004, were described in a previous article, "Design on trial" (*RNCSE* 2005 Sep/Oct; 24 [5]: 4–9). In late 2004, NCSE joined the plaintiffs' legal team as a *pro bono* consultant and was included as a core part of the team from the start. Over a dozen lawyers and legal staffers eventually participated in the case. The lead attorneys were Eric Rothschild and Steve Harvey of Pepper Hamilton, Vic Walczak of the Pennsylvania ACLU, and Richard Katskee of Americans United for Separation of Church and State. The lawyers were superb in every way, but it is worth noting that NCSE also made some early contributions to the language of the initial complaint, and to the philosophy of the case, that in retrospect proved very important.

Everyone knew that this case would be about "intelligent design". However, NCSE staff repeatedly emphasized the bigger picture, which was that language reflecting the "evidence against evolution" approach (the "gaps/problems" and "theory, not fact" wording in the Dover policy) also needed to be addressed in order to minimize problems associated with dealing with this argument in the future. We argued that because ID is easier to defeat than "evidence against evolution" language, we should try to discredit the latter by linking it with the former. We pointed out that the legal team should take advantage of the link in the Dover policy between the "gaps/problems" and "intelligent design" language since we might not again have the opportunity to connect them in some future lawsuit.

A supporting point we made was that ID itself, as exemplified in *Pandas* and other ID literature, consists almost entirely of "evidence against evolution", with only a vague argument from analogy presented as the positive explanation for biological complexity. These points became themes in the trial, and were emphasized in the plaintiffs' Proposed Findings of Fact and Conclusions of Law. Judge Jones accepted this reasoning, issuing a massive and devastating 139-page opinion that ruled broadly against ID and the various anti-evolution euphemisms in the Dover policy. The ruling was hailed internationally, and the aftershocks are still being

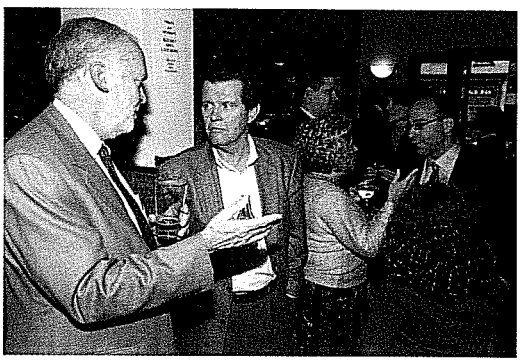
felt. For example, the *Kitzmiller* ruling clearly contributed to the overturning of Ohio's "critical analysis of evolution" lesson plan in February 2006 (details to follow in the next issue of *RNCSE*). Various other aftershocks may yet come.

How was this amazing result achieved? It was clearly the result of coordinated action on the part of many involved people and organizations. I will concentrate here on my own work in this case, which made up perhaps 5% of the total. Much of the other 95% I only learned about while sitting through the trial, and some of it I am still learning about as I review the case history and legal filings. Imagine an artistic masterpiece such as a famous painting or symphony, the culmination of a lifetime of training and practice. Then imagine getting twenty such masterpieces from lawyers, academics, and creationism nerds and somehow putting it together seamlessly into a court case. Melodramatic this may be, but it gives you some idea of how the *Kitzmiller* decision came about.

Experts

In the spring of 2005, I was given two main assignments: helping to prepare the plaintiffs' expert witnesses and helping to prepare the lawyers to cross-examine the defense experts. After the *Kitzmiller* case was filed, Judge Jones put the case on an expedited schedule, setting the trial for the coming fall. The discovery period of the case, when each side may gather evidence through document requests, subpoenas, depositions, and so on, ran through June 15. Expert witnesses would have to be declared on March 1, and expert reports stating the content of their trial testimony would have to be produced on April 1. Rebuttal experts, if any, would be declared by April 15. Sworn depositions would be conducted in May and June.

NCSE suggested the experts for the plaintiffs, whom the legal team discussed. The lawyers chose Kenneth Miller (biology), Robert Pennock (philosophy of science), Jack Haught (theology), Brian Alters (education), Barbara Forrest (history of ID), and Kevin Padian (paleontology). Jeffrey Shallit (mathematics and probability) was added later as a rebuttal expert. Alters and Forrest, of course, are on the NCSE board of directors, and Kevin Padian is president of the board. The ID expert list originally consisted of the A-team: Michael Behe (biochemistry), Scott Minnich (microbiology), William Dembski (philosophy and mathematics), John Angus Campbell (rhetoric of science), Warren Nord (religion in education), Dick Carpenter (education), with Stephen Meyer (philosophy of science) and Steve Fuller (philosophy of science) added as rebuttal experts. This list included five Discovery Institute fellows and most of the "heavy hitters" in the ID movement.



Tom Schmidt of Pepper Hamilton talks with plaintiff Fred Callahan. Matt McElvenny, Barrie Callahan, and Eric Rothschild in background right.

The story of the drafts

Starting with the plaintiffs' experts, I primarily worked with Barbara Forrest, on the history of ID, and with Kenneth Miller, our anti-Behe expert. Eric Rothschild and I knew that defense expert Michael Behe was the scientific centerpoint of

Immunology in *Kitzmiller*

The scientific discipline of immunology played a major role in the *Kitzmiller v Dover* trial in which the unconstitutionality of teaching "intelligent design" in the public schools was established, as Andrea Bottaro, Matt Inlay, and NCSE's Nicholas J Matzke explain in their commentary "Immunology in the spotlight at the Dover 'Intelligent Design' trial," published in *Nature Immunology* (2006; 7: 433–5; available on-line at <http://www.nature.com/ni/journal/v7/n5/pdf/ni0506-433.pdf>), one of the most prestigious scientific journals in its field.

They write, "In his 1996 book *Darwin's Black Box*, a commonly cited example of ID-based 'science', [Michael] Behe devotes an entire chapter to the immune system, pointing to several of its features as being particularly refractory to evolutionary explanations. ... In fact, Behe confidently declares that the complexity of the immune system 'dooms all Darwinian explanations to frustration'. About the scientific literature, Behe claims it has 'no answers' as to how the adaptive immune system may have originated."

At the trial, however, Behe was presented with "a thick file of publications on immune system evolution, dating from 1971 to 2006, plus several books and textbook chapters. Asked for his response, Behe admitted he had not read many of the publications presented (a small fraction of all the literature on evolutionary immunology of the past 35 years), but summarily rejected them as unsatisfactory and dismissed the idea of doing research on the topic as 'unfruitful'." The significance of the exchange was not lost on Judge Jones (see the excerpt from his decision on p 20).

Bottaro, Inlay, and Matzke conclude with the thought that "the Dover case shows that no scientific field is too remote from the hotly debated topics of the day and that no community is too small and removed from the great urban and scientific centers to be relevant. Immunologists must engage their communities and society at large in events related to public perceptions about science. Now more than ever, the participation of scientists is essential for the crafting of rational policies on scientific research and science education."

Plaintiffs Tammy Kitzmiller (left), Christy Rehm (right), and Bryan Rehm (right) at the end-of-trial party.

the whole case — if Behe was found to be credible, then the defense had at least a chance of prevailing. But if we could debunk Behe and the "irreducible complexity" argument — the best argument that ID had — then the defense's positive case would be sunk. Kenneth Miller prepared an excellent expert witness report, but I suggested that he reference a number of recent papers that had been published on the evolution of new genes, the flagellum, blood-clotting, and particularly the immune system. Since expert testimony is technically limited to the contents of the expert report, it was important include every topic that might be important to discuss. When we got to trial, Miller included segments on each of these topics, all of which were used in Jones's opinion as refuting the arguments of the ID movement and of Behe specifically.

Barbara Forrest was the expert who would have to make the connection between the ID movement and creationism. She had, of course, co-authored *Creationism's Trojan Horse*, on the origins and history of the Discovery Institute, the "Wedge document", and the leaders of the ID movement. However, the Discovery Institute only established the Center for the Renewal of Science and Culture in 1996. *Of Pandas and People*, which is the first book to use the terms "intelligent design" and "design proponents" systematically, and which presents all of the modern ID arguments, was published in 1989. The creationist origin of *Pandas* and the "intelligent design" phraseology was not covered in detail in previous works on the history of ID, so my job was to dig up everything we could possibly find on the origin of *Pandas* and "intelligent design". The NCSE archives contain several files on *Pandas* and on the publisher of the book, the Foundation for Thought and Ethics (FTE).

Because Frank Sonleitner and John Thomas had done significant work analyzing the book and tracking FTE's activities in the 1980s and 1990s (see <http://www.ncseweb.org/article.asp?category=21>), I gathered advice and old files from both of them. I also rummaged through the relevant files in NCSE's archives and looked up various books and articles published by the *Pandas* authors, working through NCSE's collection of old creationist magazines and newspapers. Finally, I examined three recent books that give histories of the ID movement — Larry Witham's *By Design* and *Where Darwin Meets the Bible*, and Thomas Woodward's *Doubts About Darwin: A History of Intelligent Design*. Although the role of *Pandas* in the ID movement is minimized in these sources, they nevertheless contained various useful tidbits from interviews with the "academic editor" of *Pandas,* Charles Thaxton, and other early players in the ID movement.

Examination of all of these sources together — apparently something that no one had taken the time and trouble to do before — revealed some interesting facts about the history of *Pandas*: (1) Thaxton and the book's authors were working on *Pandas* for about a decade before it was actually published in 1989; (2) in early references to the *Pandas* project in the 1980s, Thaxton and FTE's president Jon Buell described themselves and their work as "creationist" and about "creation" — not "intelligent design"; and (3) the label "intelligent design" was chosen for *Pandas* very late in the evolution of the book, almost as the last change made before publication. This all built a nice circumstantial case that ID developed from creationism, and this case is made in Barbara Forrest's first expert report, filed on April 1, 2005.

On about April 8, NCSE's then archivist Jessica Moran came across another document in a file in the NCSE archives: a prospectus for a book entitled *Biology and Origins*, sent to a textbook publisher in 1987. Somehow this ended up in the files of the late Thomas Jukes, a prominent molecular biologist and longtime NCSE supporter. In 1995, Jukes sent the page to NCSE with the handwritten note "I found this in an old file, but it is certainly fascinating!" The prospectus document indicated that *Biology and Origins* existed in draft form in 1987, and furthermore had been sent to school districts for testing as well as to prospective publishers. The existence of unpublished drafts of *Pandas* should have been obvious from the evidence mentioned in the previous paragraph, and references to *Biology and Origins* were known, but we thought of it as just a working title for *Pandas*. The prospectus document made it clear that *Biology and Origins* was an actual draft that was widely reproduced and sent out to publishers and reviewers, and also explicitly indicated that the book would "give students the scientific rationale for creation from the study of biology."

This discovery shed light on a rather important historical fact that had somehow been omitted from all previous histories of the origin of the "intelligent design"

INTERVIEW WITH DOVER TEACHER

Dover science teacher Jennifer Miller was interviewed about the "intelligent design" controversy in her school on WNYC radio's The Leonard Lopate show on April 17, 2006. To download the show in MP3 format or to listen on-line, visit <http://www.wnyc.org/shows.lopate/episodes/2006/04/17> and scroll down to "Controversy in the Classroom."

movement. It has always been obvious that ID arguments derived from creationist sources, but never in the wildest dreams of creationism watchers had it occurred to anyone that the phrase "intelligent design" had quite literally originated as a switch in terminology in an actual physical draft of an explicitly creationist textbook.

I summarized the situation, as I understood it at the time, to the legal team as follows, in a discussion of Dembski's expert report:

> Dembski doesn't mention the "version 0" of *Pandas, Biology and Origins*, which is mentioned in some of the 1980s FTE fundraising letters and other material. I am reasonably sure that the word "creation" would be substituted for "design" or "intelligent design" at many points within that manuscript. This would prove our point in many ways. We have a couple written sources indicating that picking the words "intelligent design" was one of the very last things that Charles Thaxton did during the development of *Pandas*.
>
> We don't know:
>
> (a) Whether any copies of *Biology and Origins* still exist, e.g. at FTE in Texas or in the files of Thaxton, Davis or Kenyon;
>
> (b) Whether Dembski has seen them (based on the expert report, Dembski either doesn't know the prehistory of *Pandas*, or is leaving that out).

At the time, it was far from clear that creationist drafts of *Pandas* still existed. But Eric Rothschild knew what to do. He immediately issued a subpoena to the Foundation for Thought and Ethics for any documents relating to the origin and development of *Biology and Origins* and *Of Pandas and People*.

After a failed attempt to quash the subpoena, FTE coughed up the documents in early July. To our amazement, five major drafts were uncovered, and we were able to trace the switch in terminology from creationism to "intelligent design" to just after the Supreme Court's *Edwards v Aguillard* decision in 1987. Barbara Forrest included all of this in a supplementary expert report and in her testimony at trial, and it became a key piece of Judge Jones's opinion.

Although the *Pandas* drafts were obviously important in the *Kitzmiller* case, it is only slowly dawning on everyone just how significant they are. The drafts are nothing less than the smoking gun that proves exactly when and how "intelligent design" originated. This was probably the biggest discovery in creationism research since the finding that the Coso Artifact was actually a 1920s sparkplug (see *RNCSE* 2004 Mar/Apr; 24 [2]: 26–30). They prove that the cynical view of ID was exactly right: ID really is just creationism relabeled, and anyone who thought otherwise was either naively misinformed or engaging in wishful thinking.

Irreducible Complexity on Trial

The other half of the expert case was the cross-examination of the defense experts. NCSE staff divided up the defense experts to prepare our legal team for their depositions and cross-examination. I took Michael Behe and Scott Minnich, the two biology/irreducible complexity witnesses, and attended their depositions in May.

Three Defense expert witnesses — Discovery Institute fellows William Dembski, Stephen Meyer, and John Angus Campbell — dropped out of the case and therefore did not testify, much to the disappointment of the NCSE staff assigned to their depositions (and presumably to the dismay of the defense). The reasons for this remain mysterious, although apparently the last news that Dembski received before withdrawing from his deposition was that Wesley Elsberry and Jeff Shallit planned to attend and pass questions to the lawyer (see "Can I keep a witness?" p 45).

When Eric Rothschild flew out to Berkeley for Kevin Padian's deposition, we discussed how to deal with Behe. One key result was convincing Rothschild that Behe's biggest weakness was the evolution of the immune system. This developed into the "immune system episode" of the Behe cross-examination at trial, where we stacked up books and articles on the evolution of the immune system on Behe's witness stand, and he dismissed them all with a wave of his hand. This clearly made a negative impression on Judge Jones, who mentioned the episode in his opinion. The details of this episode are reviewed in an essay I recently co-authored in *Nature Immunology* (2006; 7: 433–5; available on-line at <http://www.nature.com/ni/journal/v7/n5/pdf/ni0506-433.pdf>).

Kate Henson and Eric Rothschild of Pepper Hamilton share a joke with Jessica Kitzmiller.

The Train Ride

Everyone knows that the trial did not go well for the defense, and that the judge's decision was devastating, but what is not well known is that the case was actually lost between January and September 2005. A real trial, in front of the judge and the media, is like a train ride — by the time the trial gets going, it is too late to change course, find new evidence, or bring new passengers on the ride. In desperate circumstances, people can be thrown off the train (such as when the defense dropped two more expert witnesses, Warren Nord and Richard Carpenter), but that is about it.

The trial began on September 26, 2005, and lasted for six weeks. My role was to observe the trial, work with the lawyers in the evenings and weekends, and prepare for the next day. I also spent a fair amount of time talking to the media, being careful not to provide

NCSE's Nick Matzke with Hedya Aryani and Kate Henson of Pepper Hamilton.

details that would harm the case. However, few details were needed, because the daily events were so amazing and so damning for the defense and the ID movement that very little "spin" was needed.

It was clear throughout the trial that things were going badly for the defense. Whether the witness was an expert or fact witness, whether the topic was biochemistry or school board votes, ID was taking hits every time a plaintiffs' attorney was asking the questions — and sometimes when the defense attorneys were asking questions also. The plaintiffs' experts all gave the performances of their careers, bringing to bear years of actual experience and research on exactly the topics the ID movement loves to yammer on about: fossils, irreducible complexity, philosophy of science, and so on. Every scientific point was documented with scientific articles, usually from *Science* or *Nature*, and each article was put on the screen for everyone to see, and then entered into evidence as an exhibit. *Of Pandas and People* took fire from all directions as just another poorly informed anti-evolution polemic with some last-minute editing to introduce the "intelligent design" terminology. Barbara Forrest made a massively documented case that ID really was — as her book had said long before the *Pandas* drafts were discovered — "creationism's Trojan horse." On cross-examination, the plaintiffs' experts if anything outdid themselves. The Thomas More Law Center lawyers would try the usual ID talking points, but our experts had heard every single one dozens of times before, and would reply with a thorough analysis of the claim and the evidence against it.

The fact side of the case was equally impressive. For some reason, the defense insisted that every single one of the 11 Dover parents who were plaintiffs testify in court. As a result, all of them took the stand and explained exactly why they had joined the suit. Each had a powerful reason — protecting their children's education and their right to teach their children religion themselves. Outsiders might naively think that Dover's one-minute ID statement was not a big deal, but the impact on the Dover community was enormous, precisely because the core issue was that the government was getting involved in promoting particular religious beliefs. The community was torn apart over the issue, and plaintiffs and their children were accused of being atheists and unpatriotic.

After three weeks of continuous bombardment, the defense finally got its chance to attempt a reply, leading off with their star witness, Michael Behe. Due to the withdrawal of the other leading ID experts, it was up to Behe to make the entirety of the case for ID, and apparently he saw his testimony as his chance to prove all of his critics wrong once and for all. The result was a confused mishmash of standard ID talking points and graphics, continuations of old arguments with his numerous critics, argument-by-quote-mine, and soporific bits of biochemistry that I am pretty sure made sense to no one in the court room. One thing Behe did not present was any empirical research testing the ID claims — something that the plaintiffs had repeatedly emphasized as important in their direct case, presenting examples where evolutionary models had been tested and the results published in the research literature. Complaints about your opponents do not a scientific case make. And unfortunately for Behe, "complaining" really describes his testimony rather well. Unlike the cheerful plaintiffs' experts, Behe came across as embittered and downright angry at the scientific community at large — particularly the National Academy of Sciences — for not taking his objections to evolution seriously.

Behe's direct testimony went on for nearly two full days. By the time he got to talking about how Kenneth Miller had wronged him in a debate about the *lac* operon back in 1999, the courtroom was asleep. Then the cross-examination began.

Unbeknown to Behe, Eric Rothschild had been plotting his cross-examination for months, with help from Kenneth Miller, Kevin Padian, me, and numerous others, including random members of the public offering unsolicited e-mail suggestions ("When you get Behe on the stand, you *have* to ask him this ..."). Rothschild had assembled several dozen lines of questioning that would dissect the irreducible complexity argument, its various supporting examples, and perhaps more importantly the indignant rhetoric that Behe uses to give the impression of an impressive scientific case. Rothschild showed numerous contradictions between Behe's statements and the published evidence (for example, the immune system episode), and between different statements made by Behe. A particularly impressive example of the latter involved blood-clotting.

Rothschild noticed something that I had not in the 1993 edition of *Pandas*: in 1993, Behe (who wrote the blood-clotting section on p 141-6 of the 1993 *Pandas*, although he is not listed as an author) defined the irreducibly complex blood-clotting system *differently* than he did in his 1996 *Darwin's Black Box*. In 1993, Behe said that if an organism had only the four core components of the blood-clotting system ("Stuart factor and his friends," as Rothschild put it), it would have a nonfunctioning system and would die. However, in 1996, Behe, presumably having become aware of the fact that there is a fair bit of variability in vertebrate blood-clotting systems, said that those four proteins *constituted* "the system", and furthermore at trial, Behe criticized Ken Miller for ignoring this definition. Rothschild, with mock innocence and a big grin, pointed

out the discrepancy, and then let Behe attempt to invent a rationale on the fly. Behe ended up coming up with yet another definition of "the system", but the point was made — Behe protected his irreducible complexity argument from what would otherwise be a clear falsification by redefining the "irreducibly complex system" at will. Contradictory evidence was dodged with word games, rather than accepted. Rothschild set up example after example of this sort of thing, and each time Behe would exercise his substantial powers of rationalization to paper over the problem, or define it away, or provide some excuse about why evolution had produced the scientific goods and ID had not.

Although the pretrial preparation work was the bulk of my contribution to the case, I was able to provide a little more help on the scene. For example, during his direct testimony, Behe claimed vehemently that *Darwin's Black Box* had received *more* peer-review than the typical journal article. He even named the reviewers. One was Michael Atchison, a veterinary professor at the University of Pennsylvania. However, I remembered reading an on-line article written by Atchison that told a different story. I gave the Atchison article to Rothschild, who read it to Behe during cross. In short, Atchison never read Behe's book; instead, he spent ten minutes on the phone with Behe's publisher in 1994. According to Atchison, "It sounded like this Behe fellow might have some good ideas, although I could not be certain since I had never seen the manuscript" (see <http://www.leaderu.com/real/ri9902/atchison.html>). The implication of this and numerous other vignettes in Rothschild's cross was not that Behe was dishonest, but rather that he viewed the evolution debate through a set of filters so thick that no contradictory evidence could ever convince him he was wrong.

After the downfall of the mighty Michael Behe, the defense case was probably hopeless, but they gamely staggered on. Unfortunately every day just dug the hole deeper. The defendants — the pro-ID members of the Dover Area School Board — were shown to be either ignorant, liars, or in some cases, bigoted liars. Although the expert side of the case was important, the real heart of the case turned out to be William Buckingham and Alan Bonsell versus the beleaguered Dover science teachers. Cross-examination of the defense witnesses revealed step-by-step how the DASB had applied the screws to the teachers to attempt to get them to stop teaching evolution, despite the fact that teaching evolution was the teachers' job as mandated by the Pennsylvania science education standards. This, not any of the expert testimony, was the most important part of the case: for once, the outright intimidation of biology teachers — by far the most common, though rarely reported, anti-evolution problem in the US — was exposed in all its ugly glory, in open court for everyone to see.

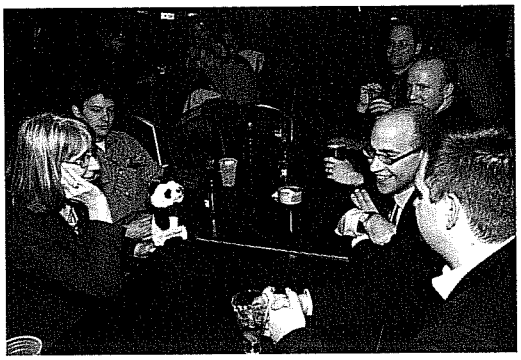
Steve Harvey of Pepper Hamilton cross-examined Buckingham. Harvey is the nicest man you could ever meet, but somewhere deep down there is a bit of the classic movie lawyer — think of Tom Cruise in *A Few Good Men*. It was the movie lawyer who conducted the cross-examination of Buckingham. It turned out that Buckingham, who had said at his deposition that he didn't know who had donated the money to buy the *Pandas* books for the Dover school, had actually stood up in front of his church and taken up a collection to purchase the books. Harvey confronted Buckingham with a copy of the check that Buckingham had written, saying, "Mr Buckingham, you lied to me at your deposition on January 3rd, 2005. Isn't that true?" After a few minutes of Buckingham's quivering on the stand under such questions, Judge Jones had seen enough, saying "Mr Harvey ... I get the point, and you've made the point very effectively."

Alan Bonsell, also caught lying by Harvey, did not experience a tonguelashing from Harvey, because in this case Judge Jones was so annoyed he stepped in and interrogated Bonsell himself. When a witness lies in court, the integrity of the entire justice system is compromised, and Jones raised his voice for the only time in the entire six-week trial to point this out personally to Bonsell, who was reduced from confident gum-chewing to meek apologies.

Steve Harvey of Pepper Hamilton, flanked by plaintiffs Beth Eveland and Barrie Callahan.

Against this backdrop, the testimony of the two surviving defense experts, though genuine, had an air of unreality about it. Steve Fuller, a prolific professor from the United Kingdom who studies the sociology of science and who is a fellow traveler with the ID movement, attempted to make the case that it was those in the scientific establishment who were the "meanies" — a bizarre argument in light of the events in Dover. Fuller did not help the Defense case much when he conceded that, yes, ID was creationism, nor when he stated that he believed science needed to have "an affirmative action strategy with regard to disadvantaged theories".

In the last week of the case, everyone began to realize that they were living through and participating in a piece of history. Analogies to the Scopes trial and the *McLean v Arkansas* trial were a regular feature of discussions. The presence of national media and several documentary filmmakers added to this feeling (one of the journalists/documentarians was Matthew Chapman, a great-great-grandson of Charles Darwin himself — and frankly looking a bit like the pre-beard Darwin in his 50s — who regularly sat at the front end of the jury box, glowering at the ID witnesses as if the very spirit of Darwin had showed up to observe the proceedings). As if that weren't enough, Robert Gentry, the final creation-science



NCSE's Eugenie C Scott and Pepper Hamilton's Eric Rothschild share a laugh.

witness in *McLean*, pitched up in Harrisburg to watch the last few days of the *Kitzmiller* trial. He even held a press conference in the nearby state capitol building, giving the same old lines about how polonium halos proved a young earth and how the judge and Brent Dalrymple snubbed him back in 1981.

Scott Minnich, the final witness, probably performed the best of any of the defense witnesses, mostly through his reasonable demeanor and much shorter presentation. However, he had nothing new to add beyond what Behe said and was much less adept at dancing away from contradictory evidence than was Behe. The most memorable episode on cross came with Harvey's first questions, in which Harvey put up young-earth creationist articles (another NCSE contribution), showing that they used the bacterial flagellum in exactly the same way that Behe did, years and even decades before Behe's 1996 book. The ID jig was clearly up at this point in the case and the plaintiffs were just running up the score. This is probably why little attention was paid when Minnich gave away the store yet again. In response to a question from Harvey about evil designs in nature — such as the Type III secretion system, which the bubonic plague bacterium uses to inject toxins into human cells, and which Minnich studies for a living — Minnich replied that such issues were questions of "theodicy". Theodicy is the part of theology that deals with defending the benevolence and omnipotence of God in the face of suffering and evil; Minnich's remark thus bolstered the plaintiffs' case that ID was all about God after all.

On Friday afternoon of the sixth week, Rothschild and Gillen gave closing arguments for each side. Rothschild masterfully wove together all of the threads of the case, putting special emphasis on the eerie parallels between the local situation in Dover, where the school board had adopted ID and denied they wanted to teach creationism, despite abundant written evidence to the contrary, and the national ID movement, which had performed exactly the same operation on a grand scale after the 1987 *Edwards* decision (see p 26). Gillen's closing argument was not particularly memorable, but he redeemed himself just as the judge was about to close the proceedings:

> **THE COURT:** Counsel, do you have anything further before we adjourn these proceedings? From the plaintiffs?
>
> **MR. ROTHSCHILD:** No, Your Honor. Thank you.
>
> **THE COURT:** From the defendants?
>
> **MR. GILLEN:** Your Honor, I have one question, and that's this: By my reckoning, this is the 40th day since the trial began and tonight will be the 40th night, and I would like to know if you did that on purpose.
>
> **THE COURT:** Mr. Gillen, that is an interesting coincidence, but it was not by design.
>
> (Laughter and applause.)
>
> With that, I declare the trial portion of this extended case adjourned.

Everyone in the fully-packed courtroom stood up, clapping, as the judge walked out. At this point I halfway expected a movie director to emerge and shout, "Cut it, print it!" This was one of those moments where real life and fiction merged.

A long press conference followed outside the courthouse, where the plaintiffs and their legal team finally felt that they could speak freely to the press without "giving away" any elements of the case. Then followed the post-trial party in downtown Harrisburg where the ACLU handed out little stuffed monkey dolls.

Post-trial

After the trial was finished we still had several weeks of work as the lawyers assembled the Proposed Findings of Fact and Conclusions of Law, a massive task in a six-week case. Primarily I helped the lawyers with the science aspects of these documents (I recall clarifying for one lawyer that organisms and organs are not the same — your NCSE dollars at work!). Once all of this was done, we had a few weeks where we could attempt to catch up with other business. On December 20, 2005, the decision came down, a grand slam home run. I was particularly gratified to see the science section of the case, which contains an amazingly erudite discussion of the science of evolution and the scientific problems with the ID arguments. I imagine that *Kitzmiller* is the only decision in existence where "exaptation" makes an appearance. December 20 was certainly the biggest media day in NCSE history, with the phone ringing off the hook from 8 AM until the evening. Staff participated in several television interviews that week as well as many radio shows.

As I mentioned at the beginning, the aftershocks to *Kitzmiller* continue. The case was for "intelligent design" exactly what *McLean* was for "creation science" — the beginning of the end. It is hard to say if there will be an *Edwards*-like Supreme Court case for ID. The current situation in Kansas could potentially end up there, but first creationist members of the Kansas board of education have to survive the 2006 elections. Regardless, history shows that anti-evolutionism does not disappear after defeat in the courts: it merely evolves. But when it does, NCSE will be there to keep an eye on it.

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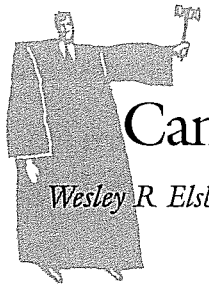

Can I Keep a Witness?

Wesley R Elsberry, NCSE Information Project Director

In the *Kitzmiller v Dover Area School District* (*Kitzmiller*) case, the defense went to trial with a fraction of the expert witnesses that the Thomas More Law Center (TMLC) originally named to help make its case. The story of how this came about and what it meant for the case reflects events similar to those in *McLean v Arkansas*.

NCSE Public Information Director Susan Spath spent most of two months in early 2005 on analysis of the works of John Angus Campbell, a professor of rhetoric at the University of Memphis. TMLC named Campbell as an expert witness for the defense in *Kitzmiller*. Campbell, a Fellow of the Discovery Institute Center for Science and Culture (CSC), wrote an expert report. It was Spath's job to dig through the report and Campbell's writings to provide the plaintiff's legal team, and especially Pepper Hamilton attorney Thomas Schmidt III, with items of interest to ask Campbell about at his deposition.

This was a standard procedure for all the named expert witnesses in the case: look at the expert report to see what arguments were being put on the table, see what other things had been claimed by the expert elsewhere, and find out how best to use the defense witnesses to advance the plaintiffs' case. A designated NCSE staffer was assigned to each defense expert to aid the attorney on the plaintiffs' team who would question the witness at the deposition. In the case of William A Dembski, the plaintiffs had also named a rebuttal expert, Jeffrey O Shallit of the University of Waterloo.

NCSE's Spath had the assistance of activists who helped contribute to a Wiki page of criticisms and possible questions for Campbell's deposition that was scheduled for June 2, 2006. At 9 AM on that day, plaintiffs' attorney Schmidt and legal assistant Kate Henslow were on hand in Memphis, Tennessee, to take Campbell's deposition. Campbell, TMLC attorney Pat Gillen, and an unidentified lawyer from the Discovery Institute arrived, and Gillen made an announcement: John Angus Campbell was withdrawn as an expert witness. There would be no deposition.

Disappearing Experts

Campbell was merely the first defense expert to withdraw from the case. On June 10, CSC Senior Fellow William A Dembski was withdrawn under circumstances that remain ambiguous to this day. CSC Director Stephen C Meyer's withdrawal followed on June 13. Philosophy professor Warren Nord of the University of North Carolina, Chapel Hill, and Richard M Carpenter, an education professor at the University of Colorado, Colorado Springs, and a commentator for Focus on the Family, were withdrawn between the beginning of the trial itself and when they would have testified. The only expert witnesses left to the defense in the trial were CSC Senior Fellow Michael J Behe, CSC Fellow Scott A Minnich, and Steve Fuller, a sociologist of science at the University of Warwick.

Anti-evolution watchers will recall the *McLean v Arkansas* case and how some defense experts also failed to deliver testimony there. Most notably, San Francisco State University professor Dean Kenyon was originally slated to testify, was deposed, and even was in Little Rock, Arkansas, during part of the trial, but never went on the stand. In both *McLean* and *Kitzmiller*, the experts testifying for the plaintiffs did deliver their testimony as planned.

The common explanation attached to expert witness withdrawals in the *Kitzmiller* case was that the DI expert witnesses wanted to have their own legal representation during depositions, and not be represented only by TMLC attorneys. This does not explain the eventual testimony of Behe and Minnich, or the withdrawal of Nord and Carpenter, who were not officially affiliated with the DI. In the case of Dembski's withdrawal, TMLC issued a statement shortly after his withdrawal citing Dembski's request for independent legal representation and TMLC's unwillingness to permit such, though they would allow it for Stephen Meyer. Later, TMLC entered a brief in support of a motion to dismiss the case in which they cited Dembski's withdrawal as being premised upon his desire to protect his affiliates at the Foundation for Thought and Ethics (FTE), which published the "intelligent design" textbook at the center of the case. (TMLC also suggested that it was an indication of the pervasive negative influence of "Darwinism" that Dembski should be compelled to take that step.) As Ed Brayton noted in his weblog (<http://scienceblogs.com/dispatches/2005/06/conflicting_explanations_for_w.php>), these two constructions of events are not reconcilable.

It is clear that there were behind-the-scenes problems between the Thomas More Law Center as attorneys for the Dover school district and the Discovery Institute as the source of most of the expert witnesses for the defense. These hidden tensions

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briefly became very public during a televised panel discussion hosted by the American Enterprise Institute during the trial phase of the case. The DI representative, Mark Ryland, asserted that the DI had never endorsed policies requiring the teaching of "intelligent design" in science classes. TMLC attorney Richard Thompson contradicted Ryland, citing the various legal briefs and other promotional materials produced by the DI for the apparent purpose of encouraging school boards to insert ID into their curricula.

Discovery Institute analyst Seth Cooper sent an e-mail to the Dover Area School Board in late 2004 stating that its proposed policy was likely to lead to a lawsuit and that it would be better to withdraw this policy and construct a new one that would meet with DI approval. The DI apparently was concerned enough about the Dover case that it felt that there was a considerable risk of a loss in court that could produce a legal decision that could damage the DI's ability to promote ID as science. TMLC's intent to use the Dover policy as a test case ignored the cautionary note that the DI had given.

The withdrawals of the expert witnesses began after depositions by Michael Behe and Scott Minnich were completed. It cannot be ruled out that the DI realized just how well prepared the plaintiffs' legal team was in each of these and concluded that exposing more of the CSC fellows to that level of scrutiny was not in its best interests.

Where's the controversy?

We may never know with certainty why the five defense expert witnesses were withdrawn from the roster. What is clear is the effect this had on the topics addressed at the trial. TMLC argued that ID should be taught because ID was science, and this provided the secular purpose that would set aside the Establishment Clause claims being made by the plaintiffs. To this end, TMLC put a biochemist, a microbiologist, and a sociologist of science on the witness stand. They had no philosopher of science to rebut plaintiffs' experts Robert Pennock and Barbara Forrest. They had no educator to rebut Brian Alters. They had no theologian to rebut John Haught. They had no paleontologist to rebut Kevin Padian. In fact, the only plaintiffs' expert whose testimony the remaining TMLC experts might speak to was that of Ken Miller, who testified on both science and science education, as a cell biologist and co-author of the high school textbook used in the Dover school system.

This is not to say that the coverage that might have been provided by the missing experts would have been perfect. Even if all the originally named experts had testified, TMLC would have fielded no theologians with experience comparable to John Haught. The defense experts who were to speak to issues of science education, Campbell, Nord, and Carpenter, did not have the sort of professional recognition in the field that plaintiffs' expert Brian Alters brought to the case. In opposition to Kevin Padian, the defense would have called upon philosopher of science Stephen C Meyer, whose claim to expertise in paleontology rested upon the publication of a single review paper that was later repudiated by the publishing journal and his earlier career as a petroleum geologist. The gaps in coverage of defense expert testimony were noted at various points in Judge Jones's decision, as he would write of statements given by plaintiffs' experts Miller and Padian, their arguments were made in unrebutted testimony.

The tale of the disappearing witnesses in the *Kitzmiller* case reflects the earlier experience of the *McLean* case. While it is unknown exactly why the witnesses were withdrawn, their absence made an appreciable difference in the case. As in the *McLean* case, the missing witnesses left much of the case made by the experts for the plaintiffs unanswered, giving the strong — and accurate — impression that the defense *had* no case to make, and contributing to the forcefulness of the decisions handed down in each case.

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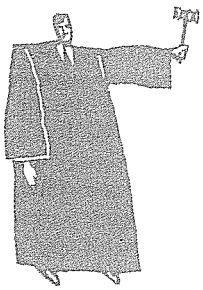
More Praise from the Press

Creationism Masked in Scientific Lingo

The decision this week by US District Judge John E Jones III declaring unconstitutional the Dover, Pennsylvania, school board's advocacy of "intelligent design" is not binding on any other jurisdiction. In practical terms it doesn't matter even in Dover, where voters recently tossed out all but one of the school board members responsible for ensuring that high school biology students get advised of this "alternative" to classical evolutionary theory. It is nonetheless an important decision, both because it exhaustively documents how the theory of "intelligent design" is not science but cleverly repackaged creationism and because it rightly insists that such a religion-infused idea has no place in public schools. It therefore represents a model for judicial consideration of the proliferating effort to use "intelligent design" to undermine the teaching of biology. ...

The separation of church and state does not tolerate the promulgation of religion in public schools. Case law has clarified that this restriction prevents jurisdictions both from prohibiting the teaching of evolution and from requiring the teaching of creationism as science alongside it. Judge Jones has taken an important additional step, holding that it also forbids the teaching of creationism masked in scientific lingo, even without overt references to God. If a school district adopts a policy of promoting a religious cosmology, however couched, in an effort to undermine science and thereby instill religious values, that policy must fall. As other jurisdictions contemplate similar acts of what Judge Jones calls "breathtaking inanity", this is a good principle for courts to follow.

—*Washington Post*,
December 22, 2005



My Role in *Kitzmiller v Dover*

Barbara Forrest, Southeastern Louisiana University

Philosophers expect to be in classrooms, not courtrooms. Yet in October 2005 I found myself in federal court as an expert witness for the plaintiffs in *Kitzmiller et al v Dover Area School District*. As the co-author of *Creationism's Trojan Horse*, which documents that "intelligent design" (ID) is both a religious belief and an extension of traditional creationism, I was called to demonstrate this to Judge John E Jones III, who presided over this first ID legal case. While writing the book, my co-author Paul Gross and I knew that creationists at the Discovery Institute's Center for Science and Culture (CSC) had worked for almost a decade to foment a legal test case. This is part of their plan to undermine the teaching of evolution and to "renew" American culture by restoring what they believe is the country's properly religious foundation. We had therefore taken care to solidify our argument with the best evidence available: the words of ID creationists themselves. This evidence proved invaluable in my testimony as a *Kitzmiller* expert witness.

The *Kitzmiller* case was the result of the CSC's relentless execution of its Wedge Strategy, a well-financed PR campaign aimed at the media, the public, and educational policymakers. CSC creationists have outlined their tactics and goals in "The Wedge Strategy", informally called the "Wedge Document" (various versions of this document are available online, including <http://www.antievolution.org/features/wedge.html>). Preparing for an eventual lawsuit, they broadcast their legal arguments in a 2000 *Utah Law Review* article. Earlier, in *Intelligent Design in Public School Science Curricula: A Legal Guidebook*, a 1999 publication aimed at school officials, they explicitly argued that teaching ID is legal. Their long-sought opportunity to use these arguments came in fall 2004 in the form of the Dover Area School Board's policy requiring teachers to read a statement endorsing ID as an alternative scientific theory. Yet the Discovery Institute wanted no part of this policy. Despite its Wedge strategy goal to achieve "nothing less than the overthrow of materialism and its cultural legacies," their legal bravado melted away like a snowball in August. What happened?

What happened is that the efforts of pro-science activists, with NCSE's assistance, have taken their toll. Pushing back against the CSC's attempts to get ID into their science curricula, concerned citizens in Kansas, Ohio, and elsewhere fought to thwart ID creationists' plans to hijack their schools. In *Kitzmiller*, they were joined by eleven courageous parents in tiny Dover, Pennsylvania. Scholars and scientists exposed ID as a creationist sham in books and essays. Consequently, CSC creationists now disavow their own terminology, running like scared rabbits from proposals to teach "intelligent design". They urge supporters to disguise pro-ID policy proposals with code words such as teaching "evidence against evolution". After more than a decade promoting "intelligent design", ID creationists now consider this term a legal liability. But when the Dover board, supported by the Thomas More Law Center (TMLC), refused to play its linguistic game, the CSC had to face the unpleasant reality that it had lost control of its own agenda. However much it wanted to forestall the Dover trial, it was powerless to do so.

THE SMOKING GUN

I had two responsibilities as a witness: (1) to present and analyze empirical data that would demonstrate to Judge Jones that ID is merely a new strain of creationism and, as such, a religious belief; and (2) to show that *Of Pandas and People* is a creationist textbook. These tasks were not difficult; ID creationists had provided me with excellent resources such as the Wedge strategy. Walking the judge through this document, I explained its major points, which establish that ID is not merely religion in a general sense, but sectarian Christian apologetics. I quoted relevant statements such as this one: "Alongside a focus on influential opinion makers, we [ID creationists at the CSC] also seek to build up a popular base of support [for ID] among our natural constituency, namely Christians. We will do this primarily through apologetics seminars." I produced evidence showing that ID leaders themselves understand ID as both creationism and sectarian religion. Phillip Johnson, who developed the Wedge Strategy, defines ID as "theistic realism" or "mere creation". William Dembski, one of the strategy's chief executors, defines it as "the *Logos* theology of John's Gospel restated in the idiom of information theory."

But the "smoking gun" — as NCSE's Nick Matzke put it — was *Pandas*. The NCSE archivist's discovery in a 1981 creationist news-

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paper of an ad by the Foundation for Thought and Ethics (FTE) seeking authors for a textbook that would be "sensitively written to present both evolution and creation" was an auspicious find. Interpreting the ad as a tip that FTE, publisher of *Pandas*, might have kept early drafts, plaintiffs' attorneys subpoenaed all documents related to the book. Among the thousands of pages FTE produced were a 1983 and a 1986 draft, and two 1987 drafts, all written in blatantly creationist language. Beginning with the 1986 draft, "creation" was defined using the classic creationist concept of "abrupt appearance": "Creation means that the various forms of life began abruptly through the agency of an intelligent creator with their distinctive features already intact — fish with fins and scales, birds with feathers, beaks, and wings, etc." The 1989 and 1993 published versions preserve this definition verbatim, except that "intelligent design" and "agency" are substituted for "creation" and "creator", respectively.

My analysis of the drafts brought a memorable "Eureka" moment. Working late one night, I discovered a crucial difference between the two 1987 drafts: one was written before the Supreme Court's 1987 *Edwards v Aguillard* decision outlawing creationism in public schools, and the other was obviously written afterwards. The first version contained blatant creationist terminology. In the second, creationist terminology had been deleted and replaced by "intelligent design" and other ID terms. A new footnote in the latter version referenced the *Edwards* decision, indicating a conscious attempt to circumvent the *Edwards* ruling in the revised manuscript that would become *Pandas*. The "search and replace" operation must have been done in a hurry: in the post-*Edwards* manuscript, "creationists" was not completely deleted by whoever tried to replace it with "design proponents". The hybrid term "cdesign proponentsists" now stands as a "missing link" between the blatantly creationist earlier drafts and the post-*Edwards* versions of *Pandas*.

Knowing that my testimony would make all of this information part of the legal record, the TMLC tried to have me excluded from the case. When they failed, the saviors of modern science at the Discovery Institute tried to discredit me with ridicule by posting on their website a fake interview of Dr "Barking" Forrest by a fictitious radio host. When I saw this unbelievable silliness prior to departing for the trial, I could only hope that Judge Jones was also consulting DI's website in his preparation for the case.

Strong community roots

A great deal was at stake in the *Kitzmiller* case. "Intelligent design" creationism is the Discovery Institute's logistical contribution to the Religious Right's decades-long attack on public education and on church and state separation. Our last line of defense, the federal courts, is also in their crosshairs. The *Kitzmiller* team — NCSE staff, the plaintiffs' attorneys, and the expert witnesses — understand well the importance of what we did in that courtroom. But we also know that the people most crucial to our success remain in Pennsylvania, doing their jobs as before. Without eleven parents who objected to their children's education being sacrificed to someone else's religious crusade, our expertise would have been useless. Without Dover's science teachers who faced down a school board that tried to use their students in the service of an unconstitutional agenda, we would not have had such courage to inspire us. Without a judge who recognized the truth when we presented it to him and had the integrity to act accordingly, we would not be celebrating the December 2005 ruling for public education and the Constitution that has given our efforts a newly strengthened legal foundation. This is the kind of support we will need to sustain what promises to be a long commitment.

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More Praise from the Press

Stating the Obvious

In a Harrisburg courtroom this week, US District Judge John E Jones stated the obvious in finding for a group of parents who had objected to the teaching of "intelligent design" in public-school biology classes. Because the religious motivation of its backers was so plain, the only surprise was the judge's uncompromising language.

Judge Jones, a Republican appointed to the bench by President [George W] Bush, did more than find that "intelligent design", the theory that living organisms are too complex to have developed without the aid of a designer, was not science but another form of biblical creationism. He also noted the "breathtaking inanity" of the Dover Area School Board policy and said several board members had lied to conceal their true religious motive.

His stern, clear ruling, while not binding across the nation, offers clear guidance for other school districts and state education boards contemplating similar policies. In a word: Don't. Religion posing as science violates the constitutional separation of church and state.

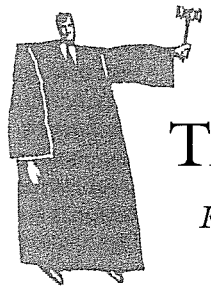
—*Pittsburgh Post-Gazette*,
December 23, 2005

Unequivocal Legal Thrashing

An attempt by a Pennsylvania school district to package religion as science education was briskly smacked down by a federal judge. Students everywhere are better for it.

Maybe this quick, unequivocal legal thrashing will blunt the nationwide effort to replace Darwin's theory of evolution with the what-if concept of "intelligent design".

—*Seattle Times*,
December 23, 2005



The Dover Victory

Kevin Padian, NCSE President

On the morning of December 20, 2005, we were sitting in the law offices of Pepper Hamilton in Harrisburg, waiting for the judge to deliver his verdict in the Dover trial. It was expected to come sometime that day, or maybe the next day; no one could be completely sure. We had heard that the decision was a long one. An office pool had been started, and the bets were in on what time the verdict would be announced. The waiting was getting unbearable. Finally, at about 10:30, the e-mailed attachment began showing up on the office computers. Immediately, people started to download it and print it out. And then, one by one, the whoops and hollers began to be heard from offices all over the floor.

The attorneys, being used to this sort of thing, immediately flipped to the back pages to learn the formal points of the ruling. What they read astounded them. The judge had given us everything we asked for. It was clear that he had carefully read all the testimony, and that he had bowed to no political pressure in rendering his decision. As we began to compare notes on the different passages of the verdict, the exhilaration quickly grew, and the sports metaphors started to come out. This was a grand slam, a shut-out, a slam-dunk. It was like winning the Super Bowl.

The judge agreed with the findings of fact that our side proposed: "intelligent design" was not science, but religion; the Dover school board had acted with a religious purpose; and bogus "evidence against evolution" could not be presented in classrooms as legitimate science. Going into the trial, it seemed that the second point was a sure thing. We felt confident that we could demonstrate the first point, but we did not know how the judge would react. We decided to go for the third point because we knew that if we didn't, we would be doing this all over again in six months.

My role in the case, as the only full-time evolutionary biologist, was to explain the principles and methods of the field, and to show how the "intelligent design" proponents misrepresented and distorted them. We decided to focus on the *Pandas* book, because it embodies the teachings of the "intelligent design" movement, and because it was the specific text that the school board placed in the library for students to consult on "intelligent design".

Like many others in the case, I had never been a witness before, let alone an expert witness. In the months since the trial, people have often asked me if I was nervous testifying in a big trial like this. Quite the contrary: I had been waiting all of my professional life to do this. For decades, creationists had maintained that scientists are either deluded or are deluding the public, including their students. Creationists, including the "intelligent design" proponents, had boasted for years that their science was legitimate, that they were victims of discrimination, and that they would win if they ever got their day in court. Well, they got their day in court.

For me, to be able at last to explain in a public forum, *under oath*, what our science is really about, was the greatest opportunity that someone in my position could ever have. Winding up the case for the plaintiffs was like coming out in the ninth inning to shut down the ballgame. And this game took place on a level playing field, where you had to answer direct questions, even if you didn't like them. The opposition found out that they couldn't run and they couldn't hide. They were questioned relentlessly about the very things they have tried so hard to hide from the public for over a decade: "Intelligent design" is religion, not science. That is now a finding of fact in federal court.

Bringing Science to the Public

I have been a scientist and an educator for over 30 years. I've taught middle school, high school, and university students. And so, in my testimony I was able to explain the science as well as to describe the effects on students of having bogus alternatives to that science taught in their classrooms. I focused on three major kinds of specific problems with the *Pandas* text. There are of course the general issues that science as a process and as a philosophy is completely misrepresented in this book. There is the further problem that no authors of *Pandas* are experts in the sciences that have to do with evolution, particularly those that I deal with. This was made clear by the judge in his decision, when he noted that my testimony went completely unrebutted by the other side, and when he accepted my testimony that there are no "intelligent design" proponents who are recognized authorities in any fields related to evolution.

The three major kinds of problems I dealt with were classification, macroevolution, and homolo-

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gy. Classification is based on ancestry, as Darwin showed. But "intelligent design" proponents, like other creationists, do not accept common ancestry of living things, so it is impossible for them to explain classification accurately to students. They also cannot explain macroevolution, because they do not accept that either. They just think it is impossible. They cannot describe it as the patterns and processes of evolution above the species level, because they do not even accept speciation. But the concept of homology was the truly puzzling one in the mix of ID daffynitions. The criteria of homology include relative position, development, and composition of tissues and elements; these were established well before Darwin. Darwin showed that common ancestry explains why the patterns of homology make sense. But the authors of *Pandas* even managed to distort a concept that is pre-Darwinian. And, perhaps emblematically, they could not even get the anatomy of the panda's thumb right.

Most of my testimony was spent dissecting the major contentions of *Pandas* that related to macroevolution. One major implication of "irreducible complexity," as the ID proponents would have it, is that major adaptations cannot be assembled through natural processes of evolution. This is why they distort and misrepresent scientific knowledge on the subjects as they do. In fact, our evidence for many major transitions, including most of the ones discussed in *Pandas,* is very good. It was easy to show the scientific evidence that the Cambrian Explosion was not instantaneous, but was drawn out over 70 million years. It was a privilege and a pleasure to show the judge all the fossil animals with features transitional between living in water and living on land; between dinosaurs and birds; between mammal relatives who used two bones to articulate the jaws and other relatives who used the same bones to link to the middle ear; and between land-living relatives of whales and the familiar marine behemoths of today.

The legacy of pseudoscience

It is bad enough that "intelligent design" proponents distort and misrepresent legitimate science as they do. More disturbing are the consequences of treating a religious proposition as if it were scientific. To maintain that it is scientific to search for an ultimate designer implies that scientists can ask questions about who the "designer" is and what his attributes are, even though the ID proponents will do anything to avoid this. That will not stop students from asking such questions. They will ask why a designer could not make biological processes capable of giving a flagellum to a bacterium. They will want to know, if a designer is capable of intervening in the affairs of life, why this "agency" does not do so more often to relieve pain and suffering. They will wonder of what use is prayer. These are not hypothetical questions. My students have already raised them. For the ID crowd not to have ready answers to these questions, but to abrogate the responsibility to deal with them even as they demand that teachers do so, is, I believe, criminally negligent.

In the end, to teach "intelligent design" is to mislead students about scientific evidence and concepts, and to lead them toward an outmoded and poorly conceived theology as a replacement for empirical knowledge. To teach that "intelligent design" is science, as I said in the trial, is to make people stupid. This kind of stupidity is worse than ignorance, because people who are ignorant have simply not learned yet; whereas to be misled about common understanding is to be made stupid. It is difficult to imagine a bigger waste of time or tax dollars, or to imagine a more grievous assault on the integrity of science and science education.

This victory is due to the teachers and plaintiffs of Dover, Pennsylvania; to our crack legal team; to our NCSE staff, without whom the plaintiffs could not have prepared the scientific and historical case; to our expert witnesses; and to the supporters of NCSE. This victory is for all of us, and especially for the students who will receive a decent science education.

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Seventh-Day Adventists on Dover

A recent issue of *Liberty* magazine (2006 May/Jun; 101 [3]), a "magazine of religious freedom" published by the Seventh-Day Adventist Church, contains a range of responses to the decision in *Kitzmiller v Dover*.

Timothy Standish, who works for the SDA's Geoscience Research Institute, complained about the decision: <http://www.libertymagazine.org/article/articleview/565/1/90/>.

K Hollyn Hollman, general counsel of the Baptist Joint Committee for Religious Liberty, prasied the decision: <http://www.libertymagazine.org/article/articleview/566/1/90/>.

Elijah Muundura, a freelance writer, suggested that creationists miss the point of what the Bible says about creation: <http://www.libertymagazine.org/article/articleview/567/1/90/>.

Jonathan Gallagher, SDA representative to the United Nations, expressed his displeasure with the decision: <http://www.libertymagazine.org/article/articleview/568/1/90/>.

Lincoln E Steed, the editor of *Liberty*, seemed to be at least somewhat suspicious about "intelligent design": <http://www.libertymagazine.org/article/articleview/569/1/90/>.

"Ties" to Canada

Brian Alters, McGill University

It was the morning of the trial and I was in my hotel room trying to decide which of two neckties I should wear. It's funny how such a seemingly trifling thing can become notable. One of the ties was traditionally sedate, the type no one would think twice about. The other was a tie I wore often and never thought that it might be considered inappropriate. It was purchased in a museum; the tag stated it was "Designed for Dr Richard Leakey and the National Museums of Kenya." The tie depicts skulls of *Homo erectus*, *Homo habilis*, and *Australopithecus boisei*. I brought this tie along merely because I have numerous such natural history ties, enjoy them, and wear them often. So between the two ties I brought on the trip, I chose to wear this tie for my testimony.

When I arrived that morning in the legal office heads turned and eyes focused on my tie. Immediately the attorneys in the room had a brief quiet discussion among themselves — probably discussing the pros and cons of their witness wearing such a tie. In any case, I thought if the tie were inappropriate, then the attorneys would certainly tell me so — and quickly exchange my tie for one of their more jurisprudently appropriate neckwear. Maybe they were thinking they would have to enter my tie as an exhibit in the trial. Whatever their verdict, no further mention was made of my tie that day by anyone — until after my testimony. Outside the courtroom door, a reporter from *Rolling Stone* magazine asked if he might interview me and take some pictures. He immediately instructed his photographer to make sure the details of the tie would show up in the photograph. The photograph was never used in the article.

So that day the tie was discussed among constitutional attorneys and photographed by *Rolling Stone*. But alas, other than briefly being mentioned in the *Rolling Stone* article, nothing really ever came of it. And of course nothing should have; after all, it's just natural history depicted on neckwear. However, in a trial such as this, it appears that even a tie draws attention. I still think about the trial every time I wear it, something that certainly wouldn't happen if I had worn that traditional sedate tie. I wonder what would have happened if the defendants' expert witnesses wore "intelligent design" ties. Are there such things?

Meanwhile, back home in Canada (although a US citizen, I live and work in beautiful Montréal), the Canadians found one media article of the trial to be the most attention-getting and humorous for understandable reasons (having nothing to do with neckwear): "Dover Statement Bombs, Even in Canada" authored by Mike Argento, the HL Mencken of the trial. Even though Argento is a US columnist, this column was talked about across Canada. Argento wrote: "And speaking of hurt feelings, you had to feel bad for Dover Superintendent Richard Nielsen and the rest of the defendants, sitting in the gallery — on the defendant side of the courtroom No 2 — when Brian Alters, a professor of science education and expert in teaching evolution, started talking. It got ugly. The defendants appeared to be relieved when Alters took the stand and said he taught at McGill University. McGill is in Montréal. That's Canada. You could almost sense the relief among the defendants. Canada? How bad could it get? And then, the good doctor started testifying and in so many words, accused the school board and administrators, essentially, of child abuse. And he was right. Teaching 'intelligent design' creationism in science class wasn't just a bad idea, he said. It wasn't just bad teaching. It was 'probably the worst thing I've heard of in science education.' And it got worse. ... it went on and on."

ID Closer to Home?

Through this, many Canadians felt that they got a chance for some "one-upsmanship" over their southern neighbors in an academic dispute in a high-profile federal case. After all, *Canada* certainly doesn't have problems like "intelligent design" pseudoscience being seriously considered on the same footing with evolutionary science, especially not involving any federal level adjudication. Really?!

Thinking there are no "intelligent design" problems in Canada — as do most Canadians I talk with — is very wrong. I find Canadians are less smug about the "American ID problems" when they learn there are ID problems in their own country. More surprisingly, the most recent Canadian ID upheaval has never even occurred in the US. Less than three months after Judge Jones released his ruling, one of the three major Canadian federal funding agencies for academic research issued a shocking funding-denial letter (to a science education proposal), stating what

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The Termination of Baylor's Michael Polanyi Center:

Richard Gelwick, University of New England

The founding of the Michael Polanyi Center at Baylor University in early 2000 seemed to be a great coup for "intelligent design" proponents (see *RNCSE* 2000 Jan-Apr; [1-2]: 13-4). Its brief, controversial life ended shortly thereafter in a debacle (Forrest and Gross 2004). The demise of the Baylor ID project is explained by its basic flaw: naming the ID center "The Michael Polanyi Center" was a misappropriation of Polanyi's fame and a misrepresentation of his thought.

Soon after the Center was established, Baylor faculty complained about "creeping creationism". The Baylor administration agreed, under pressure, to look into it by appointing an external review committee. The committee report issued in October 2000 recommended a number of changes (ERCP 2000). One was that research on "the design inference" not be associated with Michael Polanyi's name. Another was that the study of "intelligent design" be done in Baylor's Institute for Faith and Learning as a part of discussions of the relation between science and religion. In sum, by following the committee's recommendation, Baylor University upheld the basic principles of academic inquiry and the integrity of the scientific disciplines regarding what counts as science. Research on "the logical structure of mathematical arguments for 'intelligent design'" was placed in the Institute for Faith and Learning, and the name "Michael Polanyi Center" was dropped.

Even though the case at Baylor is settled, the Baylor experience has continuing significance as ID proponents continue their quest for scientific legitimacy. They do so, however, not in the spirit of promoting and conducting scientific research, but by misleading a credulous public and misrepresenting

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appears to be ID-sympathetic rationales. By the way, the author of that proposal was me!

The proposal title was "Detrimental effects of popularizing anti-evolution's 'intelligent design theory' on Canadian students, teachers, parents, administrators, and policymakers." The proposal stated: "The purpose of this study is to measure the extent to which the recent large-scale popularization of 'intelligent design' is detrimentally affecting Canadians' teaching and learning of biological evolution at high school, university, and educational administration." The impetus of the proposal was the immense publicity that the Dover trial was garnering in Canadian (and international) media.

The reply letter from the federal funding agency, the Social Sciences and Humanities Research Council of Canada (SSHRC), states, "The decision rests upon the recommendation of the multidisciplinary adjudication committee which studied your application." The adjudication committee wrote: "The proposal did not adequately substantiate the premise that the popularizing of Intelligent Design Theory had detrimental effects on Canadian students, teachers, parents and policymakers. Nor did the committee consider that there was adequate justification for the assumption in the proposal that the theory of Evolution, and not Intelligent Design theory, was correct. It [the adjudication committee] was not convinced, therefore, that research based on these assumptions would yield objective results."

Within days, the highly prestigious scientific journal *Nature* broke the story online and in print worldwide. International media followed and carried the story in print, radio, and television — including MTV. This followed with a barrage of stinging open letters of condemnation from major scientific organizations from the American Institute of Biological Sciences (AIBS), the American Sociological Association (ASA), the Canadian Society for the Study of Ecology and Evolution (CSEE), and others. Hundreds of scientists have authored communications denouncing the stance of SSHRC.

After monumental pressure, the SSHRC did finally officially state that evolution is one of the pillars of modern science; however, to date, it has neither retracted nor officially commented on any of the ID-sympathetic language in its letter. SSHRC is the major governmental funding source for science education research in Canada.

Dover may have been a US embarrassment that provided amusement for many Canadians, but I know many Americans who find amusement in this "intelligent design" affair at the Canadian federal level.

Judge Jones wrote about the "breathtaking inanity" of the Dover school board's actions concerning implementing their ID policy. Whether it be ties to wear in court, or a common border that ties our two countries together, we need to realize that all the breathtaking inanity concerning ID does not reside south of the US-Canadian border, eh?

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Why "Intelligent Design" Contradicts Polanyi's Philosophy

the work of legitimate scientists, like Michael Polanyi. The contrast between Polanyi's actual views and the ID project is a prime example of this strategy in action. A look at Polanyi's thought will show that he was (1) a scientist and philosopher defending the freedom and autonomy of science, (2) a thinker keenly aware of the difference between science and religion, yet valuing the contributions of both to society, and (3) a defender of evolution as open-ended rather than predetermined or supernaturally designed. In other words, Polanyi touched on issues raised by the ID project, but his philosophy is in opposition to it.

Polanyi Defended the Autonomy of Science

Michael Polanyi was one of the great polymaths of the 20th century. His intellectual powers included professional achievements in medicine, physical chemistry, economics and social thought, and philosophy (Wigner and Hodgkin 1977). From science to philosophy, he saw the proper value of the various disciplines and fields of research. Each one provides an area of free inquiry and investigation guided by its professional standards. Members of each discipline and specialties mutually evaluate each other's work and decide what is of value — a practice that led Polanyi to call science a "republic" (Polanyi 1962).

As a republic, science is an organization that governs itself, operating by the mutual coordination and assessment of the efforts of its members. Qualified by their training and practice, members share a common tradition and store of knowledge. Advances in scientific knowledge are guided not by specific authority but by the general authority of the scientific community's members — an authority exercised through checking each other's work. A scientist advancing new claims must produce evidence according to the standards of the field in order to convince her or his colleagues who comprise this general authority. The independence of each scientist in proposing new discoveries is highly valued, yet the scientific investigator has to persuade the other members using established scientific standards and accurate scientific terminology. Only then will new claims succeed in winning acceptance for a new scientific discovery as a worthy addition to the field.

For Polanyi, scientific merit is not simply a matter of making impressive observations about nature. He noted that astrologers report striking fulfillment of their predictions with a consistency that "would be hard to rival in science." Even so, scientists pay no attention to these claims because they are not coherent with scientific methods and knowledge and do not meet the fundamental standards of science.

One of the gravest dangers to science that concerned Polanyi was the attempt by proponents of non-scientific ideology to interfere in the workings of the republic of science. The danger of such ideology was part of Polanyi's own scientific experience (Polanyi 1951). He was a physical chemist in Germany during the rise of Nazism, visited Soviet scientists compelled to make research fit communist theory, and later worked in England during a movement led by Irish scientist and Marxist JD Bernal advocating government control of scientific research (Bernal 1939). These movements all promoted the idea of making scientific research support the government's policies. Polanyi saw in these movements a corruption of both scientific criteria and the scientist's independence to choose the most promising projects and to assess their scientific merit. The danger of government interference in science for ideological purposes was that it undermined scientific standards and judgment by dictating which scientific research should be done and judging what kind of scientific research had value. So in 1941, Polanyi became a co-founder with John R Baker and others of the Society for the Freedom of Science in England. This society held that any outside attempt to direct the research of science actually hinders the advancement of science.

The need to defend and preserve the autonomy of science was a major cause of Polanyi's movement from physical chemistry to philosophy (Gelwick 2005; Apczynski 2005; Gulick 2005). He saw the intrusion of outside ideology trying to shape science for its own ends as destructive of scientific truth, which had to be found by the processes and standards of science itself. From his experiences in physical science and social science, he developed a

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philosophical explanation of how the various intellectual disciplines function.

Polanyi showed that science is not just a set of facts or observations, but a way of knowing that consists of the practices and facts of a specialized community of inquirers. He later called this scientific know-how "connoisseurship" (Polanyi 1958). It has taken centuries to cultivate the standards of science, which are learned not just through the dead letter of textbooks, but also by apprenticeship to scientific masters and research groups. Anyone who wants to have her or his work regarded as science has to meet the proven standards of expert knowledge and make the fine discriminations about terms, relations, causes, calculations, and theories that are recognized by the community of scientists.

In relation to the "intelligent design" project, Polanyi's standards would require ID to meet the standards of the community of biological scientists. When scientific controversy arises from a new scientific claim, the advocate for change has to show how the new claim meets the standards of the scientific tradition in a way that is truer to the scientific tradition than the current state of knowledge. The problem with ID, of course, is that its proponents have gone beyond both the field and the standards of science into the theological interpretation of science. The ID movement's Baylor project completely contradicted Polanyi's understanding of the autonomy of science by covertly bringing theology into science itself.

Polanyi Distinguished Science From Religion

Polanyi's philosophy has had great impact on philosophers and theologians who think about the nature and meaning of science and of religion (Gelwick 2004). Polanyi distinguished science from religion, yet found common ground between them. On this common ground, however, Polanyi did not conflate religion and science or bring religion into the work of science. He did not seek religion or morality that was anti-science nor science that was hostile to all religious or moral questions. For Polanyi, both science and religion have distinct and important roles to play in human life, and each can play its proper role through the discovery not only of their common ground but also of the differences in the way practitioners of the various fields of inquiry achieve their distinctive knowledge. Using Polanyi's name to support the Baylor project exposes ID proponents' basic failure to understand both Polanyi's thought and the subsequent scholarship about his work on the relation between science and religion (Gelwick 2005; Apczynski 2005; Gulick 2005).

Polanyi saw the commonality between science and religion, but he also saw the distinguishing factor between science and religion as a difference in the way knowers relate to their subjects of inquiry. To make this clearer, we need to see what Polanyi means by the common ground shared by science and religion. Then we can see how Polanyi distinguishes science and religion so that they can both do their specific tasks. This first step — Polanyi's epistemology (the theory of all knowledge that knowers claim is true) — is about how we achieve our intellectual understandings in the sciences, humanities, and religion. Once we understand Polanyi's idea of a common ground in all knowing, then we can go on to see how this common ground branches into distinct fields, allowing science and religion to assume their distinctive roles.

After Polanyi gave up his scientific career to establish the grounds for freedom of scientific inquiry, he spent a major part of his philosophical career studying the question of how we can know anything. He called the outcome of his philosophical investigations "tacit knowing" (Polanyi 1966). In its simplest form, tacit knowing means that when you tell something you know, "you know more than you can tell." This simple observation is profoundly revolutionary as elaborated by Polanyi. The implication of tacit knowing is that no knowledge, including the most exact knowledge of science, is strictly impersonal or detached from the knower. The findings of science that are published and checked by other scientists appear to be independent, standing apart from the knowing subjects who produced them. But they are not. All of our statements, assertions, and discoveries are dependent on a vast background and network of what Polanyi called "personal acceptances":

> This conception of knowledge as personal knowing departs in two closely related respects from the ideal of a strictly justifiable knowledge. It accredits man's capacity to acquire knowledge even though he cannot specify the grounds of his knowing, and it accepts the fact that his knowing is exercised within an accidentally given framework that is largely unspecifiable. These two acceptances are correlated within the effort of integration which achieves knowing. For this effort subsidiarily relies on the one hand on stimuli coming from outside, from all parts of our body and from tools or instruments assimilated to our body, and on the other hand on a wide range of linguistic pointers which bring to bear our pre-conceptions — based on past experiences — on the interpretation of our subject matter. The structure of knowing, revealed by the limits of specifiability, thus fuses our subsidiary awareness of the particulars belonging to our subject matter, with the cultural background of our knowing. (Polanyi 1961)

According to Polanyi, we unavoidably depend on our bodies, our cultures, our training, and our beliefs to engage in any form of knowing. The configuration of these factors is unique to each knower. The tacit proportion of our knowing, compared to what we are able to articulate, is like the submerged part of an iceberg. Most of what each person knows is unavoidably personal or tacit. What we can tell is only the top of the iceberg.

Tacit knowing, simply illustrated here, means that each of us

relies on an extensive, unspoken background of personal coefficients (acceptances) in order to carry out our task of knowing anything. The "textbook" scientific method — often described as making observations, asking questions, forming hypotheses, making predictions based on hypotheses, testing the hypotheses by making additional observations, and then constructing a theory — is supported by a huge tacit background of experience and training that are brought to bear on a specific target of inquiry. This common structure of reliance on such a background while attending to focused targets of inquiry leads to the second major point of Polanyi's work on knowing.

This second major point is that practitioners of science and religion first rely on a common culture that prepares and shapes their outlook through language, values, and concepts; what they rely on at *later* stages of development and learning depends on the particularities of advanced stages of more specialized knowing. What they attend to or study makes for a major difference between the knowledge of science and the knowledge of religion. The subjects are on the explicit side of knowing. These targets arising out of our background are the things that we try to make explicit by articulation with descriptions and metaphors.

In the modern and postmodern world, science is generally accepted as a specialized discipline with many fields. Scientists focus their attention on understanding discrete elements of nature by relying on a background that has taught them how to approach and to verify the results of careful study. In this respect, science differs from religion even though both are attending to their special subjects from learned and internalized backgrounds that are tacit. Verification in science requires the application of standards of definition, experiment, observation, and measurement that are repeatable by other scientists. But religious believers do not take charge of and control their subject the way scientists do. Nevertheless, religion makes a claim on its members such that for them, it also speaks compellingly about something that is true — which Polanyi calls "validation" (Polanyi 1958; Polanyi and Prosch 1975).

Validation marks a major difference between religion and science, as well as between science and the arts and humanities. Polanyi notes that in science, the focus of knowing is an object that is controlled as much as possible in order to explain to others how nature works. In religion, the focus of knowing is not controlled but experienced and then followed. Religion involves knowing that invites a self-giving that "carries us away" (Polanyi and Prosch 1975). Religious experience pulls us outside of ourselves, away from knowing that is about the natural to knowing that is transnatural.

In examples from the arts and religion, Polanyi illustrated this movement away from control centered in ourselves, as in science, to self-giving. One example is listening to a symphony. To enjoy music, we have to attend to it as a whole, as a unity of sound, pitch and rhythm. The enjoyment of music takes us to a different experience than does the controlled observation and analysis of the sound, pitch, and rhythm. To enjoy music, we have to let it move us.

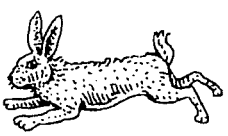
In religion, we move to themes that place us in transforming experiences and perspectives by means of grand stories and rituals. These narratives move us from ordinary observations to visionary images of how everything ties together in an extraordinary way. One example is the Book of Genesis with its picture of primal beginnings created through an orderly and meaningful process. These themes are poetic. They do not convey exact information or facts but a large framework that brings together views on fundamental questions of the meaning of human life. Because they are poetic and mythical, they are misunderstood if read literally.

These meanings in art, music, drama, literature, poetry, and religion establish their validity by what they do to us. They do not come to us as objects we experience by regulating them. After their apprehension, we can examine these meanings for their rationality and accuracy compared to our scientific knowledge. Yet religious meanings are compelling because they lead us beyond being centered on our own control to meanings that concern and satisfy us about questions beyond our control.

"Intelligent design" introduces a supernatural entity traditionally understood as a supreme being. But in this response, scientific verification is abandoned. In Polanyi's terms, ID confuses religion with science by confusing religious validation with scientific verification. In theology and philosophy, we may reflect systematically on religion by taking up information from science into the grand views they offer, but when we think about the grand and ultimate meaning of science, including evolution, we remain in the realm of theology and philosophy.

Polanyi on Evolution and Complexity

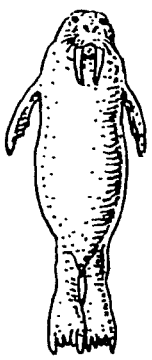
Polanyi took evolution very seriously, but his purpose was not to introduce religion into science. His expertise as a physical chemist and his understanding of physiology as a medical doctor equipped him with the technical background to examine the nature of evolutionary science and its influence. He saw evolution as revealing how human life faced the perilous task of survival in an environment shaped not only by physical and biological forces but by cultural ones as well. Evolution has shaped humans as organisms who live not only by automatic responses and instincts but also by standards that they have developed for themselves. Our answers to the questions about what these standards are and which should be followed will decide our human future.



What does evolutionary science contribute to facing this challenge of survival? Polanyi sees two major things. One is that scientific evidence shows that the world in which evolution has occurred displays both surprising novelty and order. On one hand, although the emergence via natural processes of living cells from inanimate matter would seem unlikely, Polanyi was convinced that life did begin

through natural processes. Having crossed this threshold, it stabilized, and this new level of existence has continued. So evolution shows both randomness and order working together.

Second, the advantages of reproductive success and adaptation to environment are part of naturally emerging innovation. From the first living cells to ourselves, this process of generating novelty has continued in ways discovered and described by biological science. For Polanyi, this unpredictable novelty is an indication that all life, including our own, has arisen in a surprising world that is always developing without predetermined design. We cannot predict the course of evolution because, in addition to being a long-range process requiring immense spans of time, it brings into being actualities that at a given time are only potential. For example, no one could have foreseen that an earthworm with an elementary nerve center in its head would be a part of a web of life that includes animals with complex brains.



How did the Baylor ID proponents come to think that Polanyi would support their claims that the complexity of evolution shows the influence of an intelligent designer? They probably misunderstood Polanyi's notion of ordering principles that emerge from random events. For Polanyi, these emergent new levels of evolution are the products of nature, not the handiwork of an external supreme being intervening to bring them about. The Baylor external review committee pointed out what Polanyi himself had said: "No new creative agent, therefore, need be said to enter an emergent system at consecutive new stages of being. Novel forms of existence take control of the system by a process of maturation" (Polanyi 1958).

Conclusion

Michael Polanyi is significant in the history of recent thought because he was a scientist who also assumed the responsibility of reflecting philosophically on the evolution of human life and knowing. He claimed that although all knowing shares a basic tacit structure, science and religion are different kinds of knowing that can complement each other. He did not find in science a nature that is pre-designed for a specific future outcome or a nature guided at critical points by an external divine agency, because he found nature to be open-ended and creative. He did see that we confuse science and religion when we misunderstand the proper task of each.

Teachers and educational leaders can see in the Baylor Center a lesson on how *not* to do either science or religious education. They can see in Polanyi's thought a basis of respect for and independence of both fields. Polanyi wanted to foster a constructive dialog between science and religion. His work fits most closely into the "science and religion movement" described by Eugenie Scott: "[T]he 'science and religion' movement, consisting primarily of theists who already accept evolution and who have a healthy respect for science, is not a challenge and may be beneficial to the public understanding of science and evolution" (Scott 1998). Polanyi left us the challenge of using our brief span of intelligent life on our planet to learn how to survive in a universe with an open future. To do this, Polanyi saw that we need not only the work of science but also the arts, humanities and religion.

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"Intelligent Design": The New Vitalism

Finn Pond and Jean Pond, Whitworth College

Introduction

"Intelligent design" (ID) argues that natural mechanisms cannot explain the origins of biological information and complexity. ID advocates believe that these characteristics could only have arisen as the result of intentional, purposeful design by an intelligent agent. In dismissing the currently proposed naturalistic mechanisms for the origin of biological complexity, and in abandoning the search for such mechanisms, ID advocates have distanced themselves from the scientific community.

Uncertainty at the frontiers of science should not be taken as reason to abandon the search for naturalistic explanations. We argue that giving up this search has not proven to be a useful approach in the past and is never warranted in science. There are valid questions regarding the evolution of information and complexity in biological systems, but the answer given by ID — that an "intelligent agent" has designed at least some aspects of living systems — does nothing to advance our understanding of the natural world.

Hans Driesch and Naturalistic Explanations: A Cautionary Tale

The story of Hans Driesch illustrates the danger in asserting that a naturalistic explanation for a particular biological phenomenon is impossible. At the end of the 19th century and into the early 20th, Driesch was a recognized leader in experimental embryology. He began his research as a practitioner of *Entwicklungsmechanik*, or developmental mechanics (Maienschein 1991). The goal of Driesch and others was to explain embryonic development in terms of physics and chemistry.

Driesch separated cells of the early two-cell sea urchin embryo and found that the individual cells were capable of developing into normal larvae (Driesch 1929: 38–43 summarizes his experimental results; see also Moore 1993: 452–4.). When the two cells remain connected, they develop to form complementary halves, but when isolated, each cell develops into a whole embryo. These results were troublesome. How could half an egg develop in the same way as a whole egg? Driesch expected that each cell (half embryo) would develop into an abnormal larva or fail to develop at all.

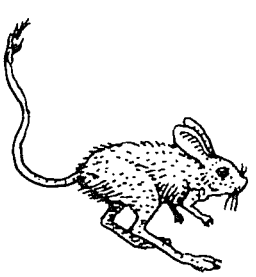
Driesch understood, as we do today, that the cell nucleus contains the physical basis of heredity. In the 1890s, however, it was not known what the chemical units of heredity were, nor was it known how those genetic determinants controlled development. It was thought that when the material of inheritance was partitioned into daughter cells during cell division, each cell received a subset of the hereditary material. In other words, cell differentiation was tied to the physical partitioning of nuclear contents during cell division.

How then could Driesch explain his results? The separated daughter cells of the sea urchin embryo should not have contained all the appropriate materials to generate the entire larval form. Somehow the half embryo had reconstructed what was missing.

Driesch continued his work with sea urchin embryos for a number of years, but could not resolve this difficulty. He was unable to explain, in mechanistic terms, the fate of the different cells of an embryo. There appeared to be an internal "force" or an intelligence guiding development.

Driesch eventually concluded that the development of an embryo could not be reduced to physicochemical laws. He was convinced that his experiments on sea urchin development had demonstrated the existence of a purposeful intelligence, or *entelechy*, responsible for an organism's development. In 1909, he took a position as professor of natural philosophy and, for the remainder of his career, advocated a form of vitalism, the idea that life cannot be explained in purely mechanistic terms.

> Life, at least morphogenesis, is not a specialized arrangement of inorganic events; biology, therefore, is not applied physics and chemistry: life is something apart, and biology is an independent science. (Driesch 1929: 105)



> We shall not hesitate to call by its proper name what we believe we have proved about morphogenetic phenomena. What we have proved to be true has always been called *vitalism*, and so it may be called in our days again. (Driesch 1929: 105)

Driesch believed that no combination of physical or chemical processes could account for the development of organisms.

> There cannot be any sort of machine in the cell from which the individual originates, because this cell, including both its protoplasm and its nucleus, has undergone a long series of divisions, all resulting in equal products, and because a machine cannot be divided and in spite of that remain what it was. There cannot be, on the other hand, any sort of machine as the real founda-

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> tion of the whole of an harmonious system, including many cells and many nuclei, because the development of this system goes on normally, even if its parts are rearranged or partly removed, and because a machine would never remain what it had been in such cases. (Driesch 1929: 155)

Driesch reached his conclusions after studying embryonic development and amphibian regeneration for years. He claimed that his vitalism was "based upon a careful analysis of certain facts about the distribution of morphogenetic potencies in two classes of morphogenetic systems, and upon nothing else" (Driesch 1929: 155). It was, he said, scientific.

At the time Driesch was working, there was no satisfactory, naturalistic explanation for the sea urchin problem. Others in the scientific community recognized this as well. For example, Thomas Hunt Morgan, the famous geneticist and a sometime colleague of Driesch, acknowledged in his 1927 text on embryology that developmental mechanics had become entangled in a philosophical discussion about vitalism versus mechanism. He described the issue thus:

> This phenomenon [that a piece of an egg is capable of developing as does the whole egg] has been singled out as furnishing crucial evidence that the egg, and even the organism, is not a machine; and the further inference made that the essence of the developmental process is not mechanistic or at least that the mechanism is always under a central guiding purposeful principle, which Driesch, who is the foremost advocate of that philosophy, has called entelechy. If this is conceded, there is really a central problem for development for, even though the means by which development takes place is conceded to be mechanistic, it is directed by something superior to mechanism residing in it, or brooding over it, that directs the machinery in such a way as to lead to a specific end-product. (Morgan 1927: 4)

A century ago, no one was able to explain to Driesch's satisfaction how half an embryo could grow into an entire organism. But is this a problem for biologists today? Pick up any current developmental biology textbook and you will find perfectly good mechanistic explanations to account for the observations that Driesch found so troubling. The entire genome is transmitted to daughter cells, which then express only portions of the genomic information. In many species, if cells are separated early enough in development, each cell retains the ability to form an entire organism (this, for example, is the basis of cloning). Certainly there are still unanswered questions in the field, but our understanding of the complexities of gene expression in development improves daily.

At the Edge of Understanding: Crisis or Challenge?

Philosophers, theologians and scientists search for answers in different ways, and what passes as a satisfactory answer will vary. Scientists have no less desire for certainty than theologians or philosophers, but recognize the limitations of the scientific approach. The scientist does not expect that today's theories and explanations will never change.

The explanations that scientists construct carry different levels of certainty and breadth. Some explanations are working hypotheses and are held tentatively. They may be narrow, applying only to very specific observations. Others explanations are much broader, tying together a great many and varied observations and held with greater confidence. These later explanations are theories. Theories provide a framework for understanding the world, and guide future scientific research.

The theory of biological evolution, which implies a common ancestry for all life forms, is based upon a great wealth of data and is held with great confidence by the scientific community. This is not to say that there are no questions left to answer or controversies left to resolve. As we explore the natural world new questions arise. As we struggle to answer those questions and make sense of new data, concepts are refined and theories are expanded.

At the frontiers of science there inevitably will be disagreements and controversy. At the frontiers, researchers are trying to make sense of limited or ambiguous data. They ask how new observations relate to an established body of knowledge. They question whether what has been assumed in the past is valid. They test new ideas and attempt to shine light on the mysteries of nature. Sometimes these explorations into the unknown refine old knowledge and increase certainty about previous explanations. Occasionally, old explanations are shattered, and new theories emerge.

Evolutionary theory has advanced tremendously since Darwin and the neo-Darwinian synthesis, but questions remain. What molecular mechanisms operate in nature to generate novel DNA sequences? What have been the roles of mobile DNA, lateral gene transfer, and endosymbiosis in evolutionary events? How have altered patterns of gene expression during embryonic development contributed to evolution? How fast can speciation occur? How did life arise from non-life?

In a time of such creative ferment in evolution theory, it should be no surprise that some biologists question whether the gradualism of classic neo-Darwinist explanations is sufficient to account for novelty and complexity in living systems. Questioning Darwin is nothing new, even among biologists. In the early 20th century, evolution was generally accepted, but the mechanism by which it occurred was hotly debated. Of particular note is the 1907 book *Darwinism To-Day* by Vernon Kellogg. While dismissing pamphlets and sermons proclaiming that Darwinism was on its deathbed, he recognized that there were valid questions about Darwinian mechanisms.

> Much more worth consideration than any clerical pam-

phlets or dissertations, under this title ["Vom Sterbelager des Darwinismus"] — the title alone proving prejudice or lack of judgment or of knowledge — are the numerous books and papers which, with less sensational headlines but infinitely more important contents, are appearing now in such numbers and from such a variety of reputable sources as to reveal the existence among biologists and philosophers of a widespread belief in the marked weakening, at least, if not serious indisposition, of Darwinism. A few of these books and papers from scientific sources even suggest that their writers see shadows of a death-bed. (Kellogg 1907: 1)

The problem for the Darwinists of Kellogg's day was how to account for the heritable variations upon which natural selection could act. Those problems were eventually solved. The "great synthesis" linked population genetics with natural selection, and neo-Darwinism emerged as the dominant paradigm in the 1920s and 1930s. Darwinism rose from its death-bed more vigorous than before.

Today, biologists are wrestling with different questions. In recent decades, new ideas about patterns of evolutionary change, evolutionary processes, and origins have surfaced. This is the nature of scientific inquiry, which does not shy away from addressing difficult problems.

Indeed, it welcomes them. The scientist's job is to answer questions about the natural world by studying the natural world; we seek natural explanations for natural phenomena. In fact, nearly all scientists argue that scientific explanations must rely *only* upon natural mechanisms. It is here that the ID movement parts company with science. Where science sees a challenge, ID sees a crisis.

Unquestioned answers: The dogma of "Intelligent Design"

ID proponents argue that objective analysis of data provides evidence that living systems could not have come about by natural processes and chance events. The approach of ID proponents, despite their denials, is merely a more sophisticated version of the "God-of-the-gaps" argument that has characterized critiques of evolution since the time of Darwin. *Deus ex machina* explanations have generally not appealed to scientists. But Dembski argues that sometimes a gap in our understanding is really a gap in the chain of natural causes.

> But must the modality question [by what means did an object or event come about] always be answered without appealing to gaps in the chain of natural causes? Leaving room for such explanation is vital to scientific inquiry, for without the freedom to seriously entertain gaps in the causal nexus of nature, we place naturalism in a privileged position. There is no compelling reason why, in answering the modality question, we should in every instance be able, even in principle, to tell a gapless naturalistic narrative. Nor is it the case that the god-of-the-gaps always constitutes a fallacy. Indeed the fallacy arises only if an ordinary explanation suffices where an extraordinary explanation was previously invoked. But that ordinary explanations should *always* have this capacity cannot be justified. Whether an extraordinary explanation is appropriate depends on the event that needs to be explained and the circumstances surrounding the event. (Dembski 1999: 241)

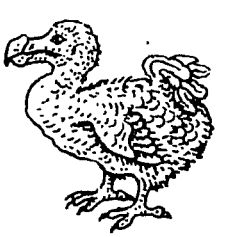
The ID approach is to call attention to ongoing controversies from the frontier of research and raise doubts regarding the ability of science to ever explain evolution in detail. It is in the realm of the frontier — the current gaps in scientific understanding — that ID flourishes. The proponents of ID claim that the gaps are real and intractable to any natural mechanism and leave us with an unquestioned answer — the designer did it.

Scientific inquiry and methodological naturalism

The scientific response to a gap in our knowledge is to treat the difficulty as a challenge and a problem to be solved. How, for example, how did genetic information originate? We proceed with the assumption that a rational and naturalistic explanation is possible. ID sees such problems as fixed gaps, and argues that to continue trying to bridge those gaps by natural mechanisms is fruitless.

Proponents of ID have criticized the established scientific community for its insistence on methodological naturalism, claiming that it represents an unwarranted bias.

> Intelligent Design entails that naturalism in all forms be rejected. Metaphysical naturalism, the view that undirected natural causes wholly govern the world, is to be rejected because it is false. Methodological naturalism, the view that for the sake of science, scientific explanation ought never exceed undirected natural causes, is to be rejected because it stifles inquiry. Nothing is gained by pretending science can get along without intelligent causes. Rather, because intelligent causes are empirically detectable, science must ever remain open to evidence of their activity. (Dembski 1998)



Does adherence to a methodological naturalism really straitjacket science? For most practicing scientists, methodological naturalism means nothing more than wanting explanations that are expressed in terms of matter and energy, and cause and effect; explanations that are understandable without reference to unknown or unknowable supernatural forces. Science does not balk at design or at a creative, conscious intelligence *per se*; rather, science balks at the unpredictable, untestable, and uncontrollable.

Limiting science to a naturalis-

tic perspective is not equivalent to claiming that the natural, physical universe is all that exists or matters (although this belief is held by some). Limiting scientific inquiry is simply an attempt to keep our explanations about nature aligned with the reality of nature. (For further discussion of the legitimacy of naturalism in science, see Pennock 1999 and Thorson 2002.)

Proponents of ID point out that archaeologist routinely make inferences about human-designed objects. Why, they ask, are biologists reluctant to attribute biological structures to the action of an intelligent designer? The answer relates to predictability, testability, and controllability. These qualities allow scientists to check their reasoning. In the case of archeology, for example, we can test and evaluate hypotheses about the design and manufacture of objects because we can study what it is possible for humans to accomplish using particular tools. What would be an equivalent test for the action of a designer not bound by the limits of natural laws and processes?

Living with uncertainty: A scientific mindset

Living organisms exhibit integrated system complexity. Component parts interact with one another, giving rise to systems that function as a whole. According to ID advocates, natural processes cannot have generated this type of complexity. Therefore, they say, it is time to look to other explanations.

According to Dembski we should not abandon the search for natural, mechanistic answers too quickly, but only after making a "diligent search".

> How long are we to continue a search before we have a right to give up the search and declare not only that continuing the search is vain but also that the very object of the search is nonexistent? There are times that searches must be continued against extreme odds. There are other times when searches are best given up (Dembski 1999: 244).

> There is no precise line of demarcation for deciding when a search is to be given up and when the object of a search is to be denied existence. Nevertheless I would offer a necessary condition. The failure in practice to discover a thing is good reason to doubt the thing's existence only if a diligent search for the thing has been performed. A full and efficient use of our empirical and theoretical resources for discovery should be made before we accept a proscriptive generalization. But once this has been done, to suppose that all gaps in extraordinary explanations must be fillable by natural causes cannot be justified. Nor is it the case that one is necessarily blocking the path of inquiry by putting forward a proscriptive generalization which asserts that natural causes are incapable of filling a certain gap. Not all gaps are created equal. To assume that they are is to presuppose the very thing that is in question, namely, naturalism (Dembski 1999: 245).

But what is a "diligent search"? Does science ever accept the possibility of giving up on naturalistic explanations? ID proponents seem to have forgotten the basics of the history of science, which teaches us that problems that looked impossible for one generation of researchers were eventually solved by the next. For Hans Driesch the problem was sea urchin development, but he was not the only scientist who faced similar difficulties.

For immunologists forty years ago, the Drieschian impasse was how to account for the tremendous antibody diversity observed in vertebrate systems. There simply is not enough genetic information in humans to code independently for the myriad different antibodies that we produce. And how is it possible that we can produce specific antibodies to recently synthesized chemicals not previously found in nature? Accounting for the generation of diversity in vertebrate antibodies seemed so difficult that it was sometimes referred to as the "g-o-d" problem.

The solution to the g-o-d problem came when it was shown that the vast diversity of antibodies were generated from only several hundred genetic elements. These genetic elements could be spliced together in various combinations in a modular fashion, contradicting the previously accepted view that one gene equaled one protein.

Difficult and seemingly insurmountable problems in science are nothing new, but the history of science teaches us to look for naturalistic explanations to natural phenomena. Science continues to push back the limits of what can be explained in nature. New technologies open the door to new sets of data. Microscopes, for example, revealed the existence of an unanticipated microscopic world, leading us to a naturalistic explanation for infectious diseases.

What are the criteria for performing a diligent search? When can we know that our empirical and theoretical resources are exhausted? New data appear daily. New technologies and experimental approaches are always being developed. A scientific mindset challenges assumptions, questions dogma, rigorously tests hypotheses, and continually seeks a deeper understanding of the natural world. An objective look at the history of science reveals that this has been a successful approach in the past. A perusal of the scientific literature reveals that it continues to be a successful approach today.

Conclusion

There are legitimate questions that evolutionary theories must address. The biggest questions undoubtedly involve the origin of the first living systems. How did a self-replicating system of encoded information come about? How did complex, integrated molecular and biochemical systems arise?

The ID movement dismisses the current thinking of modern biologists regarding the origin of life and the modification of organisms through time. They offer numerous examples of the "failures" of science to convincingly explain the details of macroevolutionary changes, but have not offered a more credible or useful theory. One of ID's strategies appears to be to undermine the validity of the scientific evidence for evolution by undermining the science itself,

BOOKREVIEW

Traipsing into Evolution: Intelligent Design and the Kitzmiller v Dover Decision

by David K DeWolf, John G West, Casey Luskin, and Jonathan Witt. Seattle (WA): Discovery Institute Press, 2006; 123 pages.

Reviewed by Tim Beazley

When Judge Jones ruled that the Dover (Pennsylvania) Area School Board had violated the First Amendment's Establishment Clause by mandating a brief statement in biology class about "intelligent design" (ID), he characterized Dover's action as "breathtaking inanity" (*Kitzmiller v Dover*, p 138 of the memorandum opinion). *Traipsing* purports to rebut Jones's opinion, but virtually every page contains serious factual, legal, or analytical errors; out-of-context quotes; or inconsistent, irrelevant, or trivial arguments — so the rebuttal is very weak.

For example, the introduction accuses Jones of judicial overreach, partly because Jones ruled Dover's action unconstitutional for two reasons: 1) it had no legitimate secular purpose; and 2) its primary effect would be religious, since ID has no scientific merit. The authors argue that the first reason was sufficient by itself to invalidate Dover's policy; therefore it was overreaching for Jones to embarrass ID by adding the second reason (p 10–1). That accusation is groundless. When there are

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calling into question the methodology and the analysis and interpretation of data.

ID advocates mistake uncertainty at the frontier of science as evidence of crisis. They sift through the scientific literature for items of controversy or critiques of current evolutionary theory, then claim evidence of serious unrest or anomalies in the reigning paradigm, apparently unconcerned or unaware that the frontiers of science are by definition arenas where scientists are wrestling with new data and new approaches to make sense of that data. At the frontier, hypotheses are disputed and old ideas are challenged — this is the nature of science.

The ID movement breaks away from what has come to be recognized as a productive, highly successful approach for describing and explaining the true nature of the physical reality and physical processes operating in the world in which we live. We do not yet know enough about natural processes to explain with confidence all aspects of biological evolution. Nevertheless, few biologists would agree that we have exhausted the search for naturalistic explanations. We reject the ID approach to as impotent, unsatisfying, and incomplete.

Our contention is that ID proponents are making the same error made by Driesch, assuming that a currently intractable problem necessarily implies a permanently insurmountable chasm. In 1929, Edwin Conklin, commenting upon Driesch's abandoning the search for a mechanistic explanation of embryological development, said: "But this may mean no more than that the living machine is more complex than any that Driesch had in mind" (quoted in Gilbert 1996). Conklin's statement applies to ID proponents as well. Thomas Hunt Morgan's comments 75 years ago are equally pertinent today.

> . . . it may be pointed out that, as long as the evidence or "proof" of vitalism rests its case on our inability to explain, at the present time, all of the phenomena of development, it seems worth while to continue our experiments in the attempt to push back the obstacle erected by the vitalist which may turn out to be purely visionary. So long as our work continues to yield new information, it seems preferable to occupy our time in dispelling a part of our gross, objective ignorance concerning living material, rather than to spend the time in discussions of a logical dilemma, especially when the alternative to a mechanistic interpretation offered by the vitalist seems as difficult to understand as the phenomena that he pretends to "explain". (Morgan 1927: 4–5)

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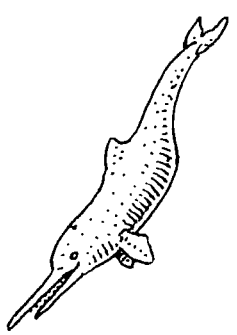

several possible justifications for a particular decision, it is common practice for judges to rule on each one. That way, even if appellate courts reject one justification, they might still sustain one of the alternative justifications. It is inexplicable that the authors, two of whom are attorneys, seem to be unaware of such a routine practice.

Chapter 1 says that Jones's view of ID's history was partisan, partly because he relied on "polemical ID critics" such as Barbara Forrest (p 20), who testified about ID proponents' religious statements and creationist connections (Forrest 2005: 133-9 is a typical example). The authors label her testimony "*ad hominem* attacks" (p 68), which creates the impression that it was improper. Forrest's testimony, however, merely showed that IDproponents might be biased. Introducing evidence of bias is entirely legitimate, even according to ID's own "intellectual godfather" Phillip Johnson (Johnson 1997: 40-1), and occurs in countless thousands of trials. It is unfortunate that the authors used such a prejudicial term for another routine practice.

Chapter 2 attacks Jones's rejection of ID as science. Seemingly oblivious to the importance of context in interpreting precedents, the authors cite *Daubert v Merrell Dow Pharmaceuticals* for the proposition that Jones placed too much emphasis on ID's lack of peer-review (p 54-6); but every lawyer knows (or should know) that rules announced in one context do not necessarily apply in others. *Daubert* involved a medical malpractice case, not public school education; two private parties, not the government; the interpretation of a procedural rule of evidence, not the constitutionality of a biology curriculum; a jury of adults, not a class of young students; and scientific evidence which was genuinely new, not a theory which, according to the authors, dates back to Socrates, Plato, and Aristotle (p 17). Where exactly is the similarity of context that makes the authors think *Daubert* applied to *Kitzmiller*? Complaining that Jones did not follow *Daubert* makes about as much sense as complaining that Steven Spielberg did not put any sharks in *Schindler's List*.

Michael Behe's essay at the end of the book (Appendix A; p 79-92) also attacks Jones's rejection of ID as science. Jones ruled that ID's negative arguments, in which alleged evidence against evolution is taken as evidence for ID, are illogical, because they are based on a contrived dualism or "false dichotomy" (*Kitzmiller*, p 64, 71). Behe responds by describing a theoretically valid dichotomy, the essential features of which are that it has two causes, natural and intelligent, which theoretically are cumulatively exhaustive (no other causes exist) and mutually exclusive (the two causes never interact) (p 80).The problem is that the essential features of Behe's theoretical dichotomy are missing from the negative arguments that IDproponents — including Behe himself — actually use. Behe seems not to understand that valid dichotomies are like sensible diets: they do not work if we do not follow them.

Jones also rejected ID's arguments comparing biochemical systems to man-made machines, partly because some of the essential features relevant to the comparison were so dissimilar (*Kitzmiller*, p 79-82). Since Behe relies so heavily on such comparisons, one might expect his rebuttal here to be sharply focused. Instead, he resorts to frivolous word-games. Jones called the comparisons "analogies" or "inductions" at various times. Behe seizes on that, claims (without explanation) that there is a crucial difference between the two words, and accuses Jones of inconsistency (p 89). Some authorities, however, view analogies as a type of induction (Moore and Parker 2001: 392). Under that view, Jones's alleged "inconsistency" disappears, making Behe's argument appear not only frivolous, but wrong. Furthermore, although Behe denies that ID's argument is an analogy (p 89), he repeatedly used that word himself, explicitly or implicitly, both in his testimony (Behe 2005a: 28, 74, 75; 2005b: 93; 2005c: 59) and in his book *Darwin's Black Box*."I liberally use analogies to familiar, everyday objects to get the ideas across" (Behe 1996: xii). Hair-splitting semantics aside, the point here is that playing word-games on important issues does not help Behe's credibility.

Behe has his own problems with consistency. He originally indicated that irreducibly complex systems met the standard established by Darwin's phrase: "could not possibly have been formed by numerous, successive, slight modifications" (Behe 1996: 39). Under that standard, merely plausible evolutionary explanations would be effective rebuttals; but whenever evolutionists offer such explanations, Behe arbitrarily changes the standard to "rigorous, detailed explanations" (p 86). Moving the goalposts like that destroys the rigor of Behe's argument.

Chapter 3 addresses religious issues. Claiming that ID's religious implications are only indirect religious effects, the authors complain that Jones did not follow the precedent of *Agostini v Felton*, which held that an otherwise religiously neutral policy is not rendered unconstitutional merely because it has indirect religious effects (p 63-4). But *Agostini* explicitly emphasized that the challenged action — public school teachers leading remedial classes in sectarian schools — had no impact on curriculum content; while teaching ID obviously does. Given *Agostini's* context, its support for ID seems highly dubious, even without considering the issue of whether ID is in fact religiously neutral.

The authors also take Jones's seemingly innocuous statement that evolution is compatible with belief in God and interpret it as an

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Tim Beazley attended Catholic schools and universities, from grade school in York, Pennsylvania (about ten miles from Dover High School) through graduate and law school, receiving a standard education in mainstream earth science and biology. "It never occurred to me that young-earth creationism was still a widespread belief, until one day in 1972, browsing through the library, I found a book about the controversy. Idle curiosity turned into fascination, and I've continued studying it ever since, especially its legal and rhetorical aspects."

unconstitutional endorsement of religion (p 68–70). Following that logic, ruling that Copernican theory is compatible with belief in God would also be unconstitutional. I doubt any court would accept such a strained interpretation.

Chapter 4 says Jones's decision has limited precedential value, partly because district court decisions bind only the parties involved (p 73). Well, the *McLean* case was also a district level case, and yet it was essentially the death knell of creation science. Judge Overton's decision there, following a full trial, exposed creation science's flaws so effectively, that other courts, including the Supreme Court, subsequently disposed of similar cases by way of summary judgment, without wasting time on another full trial. That's an ominous precedent indeed.

As for the rest of the book, the conclusion is a call to arms to protect academic freedom. Appendix A is Behe's defense of ID as science. Appendix B contains a very short list of peer-reviewed publications allegedly supporting ID. Appendix C is a supporting brief from 85 scientists. Much of that is irrelevant; some of it contradicts arguments in other sections; none of it is very persuasive.

The fact that *Traipsing*, written by some of ID's leading advocates, contains so many serious errors does not inspire confidence in ID's scientific or constitutional vitality; rather it tends to confirm Judge Jones's characterization: "breathtaking inanity."

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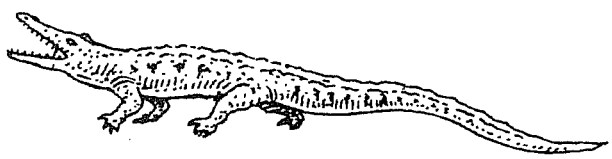

Letter to the Editor

I was invited recently by my employer, a devout, conservative Christian, to a presentation delivered by Dave and Mary Jo Nutting, the founders of the Alpha Omega Institute. The presentation was, as I expected, quotes taken out of context, old data, appeals to emotion, and poor logic, all used to convince an audience of already believing Christians.

At the end of the presentation, questions were welcomed, of which I had many. I asked the standard questions; they gave the standard answers. The rest of the audience only gave testimony as to how the presentation agreed with their convictions and experiences. No one questioned the point or the truth of the presentation.

What caught my attention at the presentation was a short comment on Humanism. Having read many articles from *RNCSE* and other sources, I understood that the latest direction of the creation science proponents was that their beliefs were just as scientific as those who believe in evolution, that is, the scientific community. The Nuttings told their audience that the US Supreme Court had ruled that Humanism was a religion, and since Humanism "believed in" evolution, therefore, those who believe in evolution are all Humanists; and that makes evolution a religious belief.

I see this point as a potential response to the defeat at Dover, Pennsylvania. Anti-evolutionists cannot win on the merits of their scientific proposals, so the next step is resurrect claims that evolution is *also* a religion. Then, the challenge becomes a conflict between two religious views and an argument about excluding the expression of some religious views in favor of others in the classroom. At the end of the presentation I asked if the biblical version of the origin of life were taught in public schools, and in light of the Constitutional guarantees of freedom of religious belief and expression, then why should not the creation stories of other religions be taught alongside the biblical ones? I got a very ambiguous answer to that question. Mary Jo basically said that they might have to look into that. My impression was that they would not look into it very deeply.

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