NCSE

REPORTS OF THE NATIONAL CENTER FOR SCIENCE EDUCATION

DEFENDING THE TEACHING OF EVOLUTION IN THE PUBLIC SCHOOLS

Volume 30, Number 1-2 JAN-APR, 2010

CONTINUES *NCSE REPORTS & CREATION/EVOLUTION*

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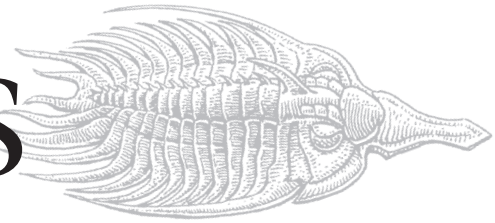

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Cover: Sy Bayman, manager of Curatolo Banana Corp, in the refrigerator with rows of stored bananas. World Telegram & Sun photo by Dick De Marsico, 1962. Courtesy of the Library of Congress, LC-DIG-ppmsca-12760.

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For more information on Ray's work explore his website at <www.trollart.com>.

So many books, so little time! This phrase attributed to Frank Zappa defines our current issue.

First, we look at one of the most important books in modern biology: Darwin's *On the Origin of Species*. It seems that even creationists wanted to use the 150th anniversary of its publication to make a point, and Ray Comfort created an abridge version of *Origin* with a rather peculiar introduction. In a move similar to that of Harun Yahya several months ago, Comfort targeted university students for a giveaway of his version of Darwin's classic. NCSE's Steve Newton gives an overview of Comfort's efforts and of NCSE's response (or in some cases, *pre*sponse!).

In the last issue, we reported on the initial exchange between Comfort and NCSE Executive Director Eugenie C Scott on the *US New & World Report's* God and Country blog. In this issue, we reprint Scott's original comments and her response to Comfort's rejoinder. In addition to the inaccuracies and omissions, it turns out that some of Comfort's text was not his own.

Our cover is a tribute to Comfort's most infamous gaffe: that the banana was perfectly designed for the human hand. Centuries of cultivation were required before the fruit acquired its current form; more evidence for biologic change over time!

BOOK REVIEWS

Most of the rest of this issue is devoted to catching up on our reading. Our book reviewers have been very, *very* busy, and we have not had room in the past year to print all of them. In this issue we were able to include *almost* all of them. We will print the rest — reviews of fiction and children's literature about evolution — in the next issue. But for now, enjoy this rich array of possibilities to read more about evolution.

Our first set of reviews examines books with historical or cultural perspectives. In many cases, these books are giving deserved attention to individuals who figured prominently in our modern understanding of evolution or of science, but who were eclipsed by other figures in the history of science. Other books take a second look — with a different perspective — at Haeckel, Owen, Spencer, and even Darwin himself.

The next section features books that explore the big issues of evolution: phylogeny, taxonomy, adaptation, natural selection, and human evolution. Our third section of reviews examines claims by various anti-evolutionists, including biblical literalist and "intelligent design" proponents. And we end with reviews of books that explore the possibilities and realities of interdisciplinary dialogs — science and religion, to be sure, but science and a number of other disciplines, as well.

PEOPLE & PLACES

In his regular column on the people and places of evolution, Randy Moore provides a profile of William Bell Riley, a Baptist preacher in Minnesota who exerted enormous pressure on his state's legislature and university and almost succeeded in producing anti-evolution legislation in that northern state. Moore also reports that Riley was instrumental in convincing William Jennings Bryan to join the case for the prosecution in the Scopes Trial (and may have been inadvertently responsible for Clarence Darrow's decision to join the defense). Finally, Riley handed over his administrative duties at his Bible College and its affiliated institutions to a young Baptist preacher named Billy Graham. Riley certainly does seem to have earned the sobriquet, "Grand Old Man of Fundamentalism".

IN THE NEWS

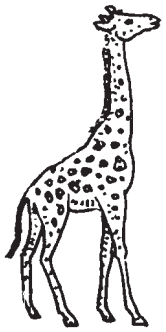
In California they make movies, and, it seems, law suits. We report on three cases in which creationists have claimed they are being discriminated against.

NCSE was among several organizations to urge Louisiana's Board of Elementary and Secondary Education to modify its policies regarding challenges to materials in the science classroom. Read Director Scott's comments to the BESE.

And a new legislative year means a new crop of anti-evolution legislation. Mississippi was first in line. In Washington, a citizen's initiative campaign against evolution failed to collect enough signatures to proceed.

RNCSE 30(1–2) was printed in March 2010

UPDATES



California: In a January 12, 2010, ruling, the Ninth Circuit Court of Appeals affirmed a federal district court's summary judgment in favor of the University of California System in *ACSI et al v Stearns et al.* The case, originally filed in federal court in Los Angeles on August 25, 2005, centered on the University of California System's policies and statements relevant to evaluating the qualifications of applicants for admission. The plaintiffs — the Association of Christian Schools International, the Calvary Chapel Christian School in Murrieta, California, and a handful of students at the school — charged that the university system violated the constitutional rights of applicants from Christian schools whose high school coursework is deemed inadequate preparation for college.

Creationism was not the only issue in the case. The plaintiffs also objected to the university system's policy of rejecting high school biology courses that use textbooks published by Bob Jones University Press and A Beka Books — *Biology: God's Living Creation* and *Biology for Christian Schools* — as "inconsistent with the viewpoints and knowledge generally accepted in the scientific community." Michael Behe, a proponent of "intelligent design" creationism, defended the textbooks, while Donald Kennedy and Francisco J Ayala (a Supporter of NCSE) contended that they were inappropriate for use as the principal text in a college preparatory biology course. The trial judge was unpersuaded by Behe's defense.

After the trial judge granted the defendants' motion for summary judgment on August 8, 2008, the plaintiffs promptly appealed, asserting, among other things, that the University of California's policy on high school biology courses "constitutes viewpoint discrimination, content discrimination, and content-based regulation, which conflict with the First Amendment." Of particular interest in the preparation from the appeal was the California Council of Science and Technology's *amicus curiae* brief. Coauthored by attorneys from Pepper Hamilton LLP who were part of the legal team representing the plaintiffs in *Kitzmiller v Dover*, the 2005 case over "intelligent design" creationism, the brief argued, "Students educated with these textbooks will not be adequately prepared for science courses."

The Ninth Circuit affirmed the trial court's ruling that the University of California's policy was constitutional on its face and as applied, writing,

> The plaintiffs have not alleged facts showing any risk that UC's policy will lead to the suppression of speech. ... the plaintiffs fail to allege facts showing that this policy is discriminatory in any way. ...The district court correctly determined that UC's rejections of the Calvary [Baptist School] courses [including a biology class that used *Biology: God's Living Creation*] were reasonable and did not constitute viewpoint discrimination. ... The plaintiffs assert a myriad of legal arguments attacking the district court's decision, all of which lack merit.

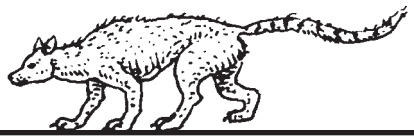
Documents from the case are available on NCSE's website, in a special section devoted to *ACSI v Stearns*: <http://ncse.com/creationism/legal/acsi-v-stearns>.

California, Los Angeles: The *Los Angeles Times* (2009 Dec 29) reported on a lawsuit charging that the California Science Center (CSC) violated both the First Amendment and a contract to rent its Imax Theater when it canceled a screening of *Darwin's Dilemma*. The lawsuit was filed by the American Freedom Alliance, a Los Angeles-based organization that describes itself as "a movement of concerned Americans advancing the values and ideals of Western civilization," in Los Angeles Superior Court on October 14, 2009. The *Times* added, "The AFA seeks punitive damages and compensation for financial losses, as well as a declaration from the court that the center violated the Constitution and cannot refuse the group the right to rent its facilities for future events."

The AFA had arranged to screen *Darwin's Dilemma* — "a feature-length documentary that criticizes Darwin and promotes intelligent design" according to the *Times* — along with the 11-minute film *We Are Born of Stars* at the CSC on October 25, 2009, as part of a series of events "offering compelling arguments and insights from both sides of the divide between evolutionary theory and intelligent design." The AFA's president Ari Davis told the *Times* that "his group has no position on Darwinism and intelligent design but is concerned that debate is being stifled by the scientific establishment," although on the AFA's website evolution is described as teeming with "gaps" and "holes" and acceptance of evolution is accused of undermining civilization.

Helping to promote the event was the Discovery Institute, which issued a press release touting the premiere of *Darwin's Dilemma* at the CSC, which it described as "the Smithsonian Institution's west coast affiliate" (It is one of twenty). The director of the Smithsonian Institution's affiliate program asked the CSC to correct the error, perhaps mindful of the 2005 incident in which the Discovery Institute arranged for a screening of *The Privileged Planet* at the Smithsonian's National Museum of Natural History. After the screening was touted as evidence that the NMNH was "warming" to "intelligent design", the museum withdrew its nominal cosponsorship of the screening, and refunded the Discovery Institute's $16 000 fee, although the film was nonetheless screened there.

Shortly after the complaint from the Smithsonian Institution,



the CSC canceled the AFA's screening on the grounds that the Discovery Institute's press release violated the terms of the rental contract, which provides that all promotional materials for events must be submitted to the CSC before they are disseminated. In its lawsuit, the AFA argues that it is unfair to hold it responsible for the actions of a third party, contends that the contract issue was a "false pretext" for cancellation of the screening of *Darwin's Dilemma*, and claims that "a broad network of Darwin advocates," including the Smithsonian Institution (which is not a defendant in the case and which declined to comment to the *Times*), "jointly conspired" with the CSC to cancel the screening.

"The first ruling in the case came Oct 14, when Superior Court Judge James C Chalfant denied the AFA's initial request that he order the science center to permit the Oct 25 screening," the *Times* reported. "But the suit for damages is moving forward, with a pretrial hearing scheduled Jan 26." NCSE is providing important documents in the case, *AFA v CSC et al*, on its website at <http://ncse.com/creationism/legal/american-freedom-alliance-v-california-science-center-et-al>. In a separate lawsuit against the CSC, the Discovery Institute is complaining that the CSC failed to comply fully with its request under the California Public Records Act for documents and e-mails about the decision to cancel the screening. The complaint in the case, *Discovery Institute v CSC*, is also available on the NCSE website at <http://ncse.com/creationism/legal/discovery-institute-v-california-science-center>.

California, Mission Viejo: Both parties to *CF et al v Capistrano Unified School District et al* are appealing the verdict, in which James Corbett, a veteran teacher, was held to have violated the Establishment Clause by describing creationism as "superstitious nonsense" (for background, see *RNCSE* 2009 May/Jun; 29 [3]: 15–22, 27–9; 2009 Sep/Oct; 29 [5]: 8–13); 2009 Nov/Dec; 29 [6]: 6–9). Corbett is being represented on appeal by a team of four lawyers, including the noted constitutional law scholar Erwin Chemerinsky of the University of California, Irvine School of Law, according to the *Orange County Register* (2009 Oct 27). Meanwhile, lawyers for the student who filed sued against Corbett are arguing that the trial court "should have found Corbett liable for more than just the [c]reationism comment; the original lawsuit presented 22 statements attributed to Corbett that were purported First Amendment violations." NCSE's collection of documents from the case is available on-line at <http://ncse.com/creationism/legal/c-f-v-capistrano-usd>.

Florida: On November 2, 2009, the United States Supreme Court decided, without comment, not to hear Kent Hovind's appeal of his conviction. Exactly three years before, on November 2, 2006, Hovind was found guilty of 58 charges — including making threats against IRS investigators, failing to pay almost half a million dollars in payroll taxes, and structuring his financial transactions in order to evade federal reporting requirements — in a federal court (see *RNCSE* 2006 Jul/Aug; 26 [4]: 12–3). He was then sentenced to ten years in prison (see *RNCSE* 2007 Jan–Apr; 27 [1–2]: 4–9), which he is currently serving in a medium security facility in Edgefield, South Carolina. The 11th Circuit Court of Appeals denied his initial appeal on December 30, 2008 (see *RNCSE* 2009 Mar/Apr; 29 [2]: 14–20). On his blog, Hovind encouraged his followers to call their congressional representatives and the President "to let them know you are interested in the outcome of this case, and that you would like them to rule in my favor and release me" (<http://www.cseblogs.com/?p=277>). His post was dated November 30 and posted on December 8, however, making it less than timely. Subsequently, Hovind asked the Supreme Court to reconsider its decision, arguing that a rehearing of his case was necessary "to resolve a Circuit split and to clarify a matter of law" (<http://www.cseblogs.com/?p=286>); the Court rejected his petition on January 11, 2010.

Louisiana: In a letter to the Louisiana Board of Elementary and Secondary Education (see p 6), NCSE's executive director Eugenie C Scott explained the problems with a proposed policy governing supplementary materials in the state's classrooms and urged the board to adopt the original version of the policy as drafted by the state department of education. Her letter was submitted during the public comment period for a policy designated as Bulletin 741, §2304 Science Education, Part E, which is intended to implement part of the controversial Louisiana Science Education Act, widely regarded as opening the door for creationism in the Pelican State.

Enacted in June 2008 over the protests of scientists and educators across the state and around the country, the LSEA (enacted as Louisiana Revised Statutes 17:285.1) provides that

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

At issue now is the question of how to handle complaints about inappropriate supplementary materials. In September 2009, the *Baton Rouge Advocate* (September 17, 2009) reported, "The department [of education]

recommended that any complaints undergo an initial review by a three-member panel named by the agency, then go to the state board for a final decision." But a BESE committee revised the procedure so that "two reviewers will be named by the department to review the science materials in question as well as one reviewer each named by the challenger, the school and the publisher" of the challenged materials.

The review procedure proposed by the committee "is biased against the scientific and constitutional concerns of parents, and we ask that the policy be revised," Scott wrote in her letter.

> The policy creates an onerous process for individual parents when simpler options are available. The policy allows inappropriate and constitutionally suspect material to remain in classrooms longer than necessary. It disregards the professional expertise of Department of Education staff in favor of an adversarial system in which defenders of suspect materials are given more of a voice than concerned parents and citizens.

Also critical of the proposed procedure were the Louisiana Coalition for Science, which complained, "In short, as BESE's complaint procedure is now drafted, DOE's expert reviewers will be in the minority, and DOE staff will not be allowed to independently assess the reviewers' reports but must instead transfer the reports directly to BESE for evaluation" (<http://lasciencecoalition.org/2009/09/30/creationists-dictate-bese-policy/>), and Americans United for Separation of Church and State, which in a letter sent to BESE warned, "The proposed procedure for reviewing challenged supplemental material is unnecessarily complicated and appears designed to provide a forum for promoting creationism" (<http://www. au.org/media/press-releases/archives/2010/01/au-warns-louisiana-education. html>).

Mississippi: A bill in Mississippi was apparently the first anti-evolution bill of 2010. House Bill 586, introduced on January 12, 2010, and referred to the House

NCSE's letter to Louisiana's BESE

January 7, 2010

Nina A Ford
State Board of Elementary and Secondary Education
PO Box 94064
Capitol Station
Baton Rouge LA 70804-9064

Dear Ms Ford,

The National Center for Science Education is a nonprofit organization affiliated with the American Association for the Advancement of Science and dedicated to ensuring that science, especially evolution, is taught accurately and honestly in the public schools. We are concerned about Bulletin 741, §2304 Science Education, Part E, implementing Act 473, the Louisiana Science Education Act.

We have previously expressed our concern that the Act and policies implementing it approved by the Board of Elementary and Secondary Education are written so loosely as to allow creationism and other religious concepts to be taught in classrooms, miseducating students and violating students' and parents' constitutional rights. In order to provide an accurate science education, protect the civil liberties of students, and shield local educational authorities from costly litigation, BESE's policy implementing this act must close any loopholes that might allow creationism or other non-science into science classrooms. NCSE and many scientific societies have commented on these policies throughout the process, and we write now to reiterate our concerns, and to apply them to a policy currently open for public comment, Part E, which describes how challenged supplementary materials will be reviewed.

The process for review created in Part E is biased against the scientific and constitutional concerns of parents, and we ask that the policy be revised. The policy creates an onerous process for individual parents when simpler options are available. The policy allows inappropriate and constitutionally suspect material to remain in classrooms longer than necessary. It disregards the professional expertise of Department of Education staff in favor of an adversarial system in which defenders of suspect materials are given more of a voice than concerned parents and citizens. We ask that BESE revise Part E to reflect recommendations that were considered by the Student/School Performance and Support Committee of BESE at its September 16, 2009, meeting. Though imperfect, these recommended revisions are far less troubling than those published in the Louisiana Register in November 2009. Not only do the original recommendations represent a better policy, but the changes BESE has made to these recommendations in the proposed revisions published in April needlessly put the quality of Louisiana's public education at risk and create concerns about the constitutionality of the entire process.

Supplemental materials can serve a useful role in promoting critical thinking, but such materials must be chosen carefully. The Louisiana Content Standards make clear that the goal of science education is not just narrow subject competence, but to "prepare students to become informed citizens" and "for all students to become scientifically literate and reflective of the inherent nature of scientific knowledge, methods, and processes" (Louisiana Content Standards, Benchmarks, and Grade Level Expectations for Science §101.A). The standards add that "[t]he goal of science is to describe, explain, and predict natural phenomena and processes" (Louisiana Content Standards, Benchmarks, and Grade Level Expectations for Science §301.A, emphasis added).

The selection or rejection of supplementary materials must in all cases accurately reflect the nature of science; to do otherwise would misinform students about the nature of science itself, not to mention the specific subject matter at hand. The professional staff at the Louisiana Department of Education understand these standards and are recognized as pedagogical experts. Their assessment of supplementary materials should be of the foremost importance to BESE's review of challenged supplements.

Given the value of supplemental materials for teaching and the dangers from inappropriate materials, it is fitting that Act 473 gives BESE the power to forbid certain supplements. Unfortunately, the process for challenging supplemental material laid out in Part E is unclear, ill-conceived, and onerous. This process unnecessarily complicates what should be a straightforward decision based on the professional expertise of Department of Education staff and BESE. In considering citizen input concerning supplementary materials, the process should not require a "meeting" at which "any interested party" could "present their arguments." Such a meeting places a needless burden on the finances and time of concerned parents, teachers, and staff. It would be better to employ the extant system of public comment on textbooks for adoption, which allows written comments to be submitted by a set deadline. In the absence of any clear deadline for resolution of a challenge, it is likely that inappropriate material would remain in a classroom indefinitely after a challenge.

Such a swift procedure could be ensured by allowing LDoE to conduct a summary review of challenged material, reviewing written comments by citizens, teachers, publishers, and other interested parties, with recommendations sent to BESE shortly after a challenge is issued. That rapid assessment could subsequently be challenged, but questionable material would remain out of the classroom while the disagreements were addressed. Furthermore, BESE could instruct LDoE to generate a list of clearly inappropriate material based on their expertise and experience as educators, and provide that list to BESE for approval. Citizen challenges to those materials would be automatically sustained, while challenges to other material should be reviewed by LDoE staff based on a timely process involving written public comment and peer review by recognized experts in science and science education. Such a process would ensure that good materials could be used freely in classrooms while inappropriate material would not undermine science education and expose schools to lawsuits — and would not impose a burden on public participation.

Instead of such a timely and straightforward process, Part E gives the experts at LDoE a severely limited role in the review of materials, and permits the defenders of challenged content two voices on a review panel (one reviewer appointed by the school, one by the publisher), compared to only one reviewer named by the challenging parent. There is no timeline specified for review, and no requirement that experts named be experts in both science pedagogy and the specific content under discussion, nor is any provision made for ensuring parity in terms of the availability of experts. Will travel funds be available for reviewers? Will reviewers be compensated for their time? Failing to provide such compensation further burdens the citizen issuing a challenge, since the publisher and school district will be better positioned to compensate reviewers for their time and effort. Absent any requirement that the reviewers be experts in relevant fields, the review process could transform into a public relations war, rather than a substantive evaluation of the merits of a challenged supplement. Part E compounds these inadequacies by forbidding LDoE from editing or independently assessing the comments by appointed reviewers, and by limiting the ability of LDoE to appoint its own independent reviewers. At a minimum, LDoE should be required, rather than merely permitted, to appoint its own reviewers.

It would be far better to avoid the adversarial process created by allowing challenger and defenders to appoint three reviewers, and simply adopt the proposal discussed in September 2009, in which LDoE would appoint three independent reviewers and forward their recommendations to BESE.

Most of the challenges likely to be faced by BESE will be straightforward, and the lengthy and complex process created by Part E will be excessive. Many inappropriate supplements will fall into categories that have been ruled unconstitutional — advocating creationism, for instance. No elaborate external review is needed for such materials, nor for content that is not grade-level appropriate or that has been judged scientifically inaccurate by reviewers in the scientific and educational literature. Allowing lengthy review of such inappropriate content simply prolongs the violation of students' and parents' rights — and the harm to students' education.

On behalf of our members — scientists, parents, teachers, clergy, and students — the National Center for Science Education strongly recommends that BESE revise §2304, Part E in accordance with the recommendations considered by the Student/School Performance and Support Committee of BESE at its September 16, 2009, meeting. These recommendations would create a better policy, would improve science education, and would help BESE and Louisiana LEAs to avoid unconstitutionally advancing religion.

Thank you for your consideration and your efforts to improve science education in Louisiana.

Sincerely,
Eugenie C Scott, PhD, Executive Director

Education Committee, would, if enacted, require local school boards to include a lesson on human evolution at the beginning of their high school biology classes. The catch: "The lesson provided to students ... shall have proportionately equal instruction from educational materials that present scientifically sound arguments by protagonists and antagonists of the theory of evolution."

The bill also would amend a section of existing state law that provides,

> 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

by adding, apparently unnecessarily,

> except that any discussion of the evolution of humanity shall be required to be given by a biology teacher, as required by Section 1 of this act.

The legislative history of that section of state law suggests that it was intended to allow or encourage the presentation of anti-evolution material in science classes, as NCSE previously reported.

The sponsor of HB 586, Gary Chism (R–District 37), introduced HB 25 in 2009. The bill, if enacted, would have required biology textbooks in the state to include a hybrid of two previous versions of the Alabama evolution disclaimer. Speaking to the *Northeast Mississippi Daily Journal* (2009 Jan 24), Chism was candid about his motivations for the bill, explaining, "Either you believe in the Genesis story, or you believe that a fish walked on the ground," adding, "All these molecules didn't come into existence by themselves." HB 25 died in committee on February 3, 2009.

Missouri: House Bill 1651, introduced in the Missouri House of Representatives on January 13, 2010, and not yet referred to a committee, is apparently the second anti-evolution bill of 2010. The bill would, if enacted, call on state and local education administrators to

> endeavor to create an environment within public elementary and secondary schools that encourages students to explore scientific questions, learn about scientific evidence, develop critical thinking skills, and respond appropriately and respectfully to differences of opinion about controversial issues, including biological and chemical evolution

and to "endeavor to assist teachers to find more effective ways to present the science curriculum where it addresses scientific controversies." "Toward this end," the bill continues,

> teachers shall be permitted to help students understand, analyze, critique, and review in an objective manner the scientific strengths and scientific weaknesses of the theory of biological and hypotheses of chemical evolution.

The chief sponsor of HB 1651 is Robert Wayne Cooper (R–District 155), joined by ten co-sponsors. Cooper was the sponsor of numerous failed anti-evolution bills in the past in Missouri. In 2009, he introduced HB 656, which is identical to 2010's HB 1651. In 2008, he introduced the similar HB 2554. In 2006, he introduced HB 1266, which if enacted would have required that "If a theory or hypothesis of biological origins is taught, a critical analysis of such theory or hypothesis shall be taught in a substantive amount." In 2004, he introduced two bills, HB 911 and HB 1722, that called for equal time for "intelligent design" in Missouri's public schools. HB 911 moreover contained idiosyncratic definitions of various scientific and philosophical terms as well as the draconian provision, "Willful neglect of any elementary or secondary school superintendent, principal, or teacher to observe and carry out the requirements of this section shall be cause for termination of his or her contract."

Ohio, Mount Vernon: The controversy over John Freshwater, a Mount Vernon, Ohio, middle school science teacher accused of inappropriate religious activity in the classroom, reached the pages of *The New York Times* (2010 Jan 19), just as the lengthy administrative hearing on his termination is finally nearing its end. In June 2008, a complaint filed in federal court, *Doe v Mount Vernon*, accused Freshwater of inappropriately bringing his religion into school — including by posting posters with the Ten Commandments and Bible verses in his classroom, branding crosses into the arms of his students with a high-voltage electrical device, and teaching creationism. Shortly thereafter, the Mount Vernon City School District Board of Education unanimously voted to begin proceedings to terminate his employment in the district.

As the *Times* reported, Freshwater, who is currently suspended without pay from his job, "asked for a pre-termination hearing, which has lasted more than a year and has cost the school board more than a half million dollars." Creationism, while not the only issue at the hearing, was conspicuous throughout. "Freshwater's supporters want to make this into a new and reverse version of the Scopes trial," David Millstone, the lawyer for the Mount Vernon Board of Education, told the *Times*, adding, "We see this as a basic issue about students having a constitutional right to be free from religious indoctrination in the public schools." Detailed reports on the hearings by Richard B Hoppe are available on The Panda's Thumb blog (<http://www.pandasthumb.org>, search for "Freshwater").

In August 2009, a partial settlement in *Doe v Mount Vernon* was reached, in which, according to *The Mount Vernon News* (2009 Aug 27), "the board's insurance company has agreed to pay $115 500 toward the plaintiffs' legal fees, $5 500 to one of the plaintiffs as compensation and the sum of $1 each to two other individuals." Not covered by the settlement agreement was Freshwater himself, so the case remains open. Complicating the legal situation, Freshwater filed a counterclaim in *Doe v Mount Vernon* in 2008 and his own lawsuit, *Freshwater v Mount Vernon City School District Board of Education et al*, against the board and a number of district administrators in 2009, alleging religious discrimination, defamation, conspiracy, and breach of contract.

Washington: Initiative 1047, intended to

> prohibit state use of public money or lands for anything that denies or attempts to refute the existence of a supreme ruler of the universe, including textbooks, instruction or research

was not on the ballot for the November 2009 general election, apparently because its proponents failed to collect the necessary signatures. Kimberlie Struiksma, who introduced both this and a predecessor, Initiative 1040, which she subsequently withdrew, told the *Bellingham Herald* (2009 Feb 19) that she was motivated by opposition to the teaching of evolution. (For background, see *RNCSE* 2009 May/Jun; 29 [3]: 15–22, 27–9.)

National: During the 2008 presidential campaign, it was widely debated whether Sarah Palin, then the governor of Alaska and the Republican candidate for vice president, was a creationist. When she was running for governor in 2006, she said in a debate,

> Teach both. You know, don't be afraid of information. Healthy debate is so important, and it's so valuable in our schools. I am a proponent of teaching both,

She subsequently told the *Anchorage Daily News* (2006 Oct 27), "I don't think there should be a prohibition against debate if it comes up in class. It doesn't have to be part of the curriculum," and disclaimed any intention to revise the curriculum to add creationism. She would not comment on whether she personally accepted evolution, saying, "I'm not going to pretend I know how all this came to be." With the publication of her memoir *Going Rogue* (New York: HarperCollins, 2009), the situation is still murky. On page 227, she recounts a conversation between her and McCain aides Mark Salter and Steve Schmidt:

> [Schmidt] knew my position: I believed in the evidence for microevolution — that geologic and species change occurs incrementally over time. But I didn't believe in the theory that human beings — thinking, loving beings — originated from fish that sprouted legs and crawled out of the sea. Or that human beings began as single-celled organisms that developed into monkeys who eventually swung down from trees; I believed we came about through a random process, but were created by God.
>
> "But your dad's a science teacher," Schmidt objected.
>
> "Yes."
>
> "Then you know that science proves evolution," added Schmidt.
>
> "Parts of evolution," I said.
>
> "But I believe that God created us and also that He can create an evolutionary process that allows species to change and adapt."
>
> Schmidt winced and raised his eyebrows. In the dim light, his sunglasses shifted atop his head. I had just dared to mention the C-word: creationism. But I felt I was on solid factual ground.

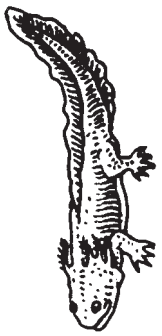
But Americans United for Separation of Church and State's Rob Boston, in a November 24, 2009, blog post (<http://blog.au.org/2009/11/24/palintology-have-former-alaska-governors-views-on-creationism-evolved/>), noticed that her account of the conversation conflicts with the account of Shushannah Walshe and Scott Conroy's *Sarah from Alaska: The Sudden Rise and Brutal Education of a New Conservative Superstar* (New York: Public Affairs, 2009). Boston reports:

> In their book, Walshe and Conroy report that it was Palin who first brought up her science teacher father. When challenged about evolution by Schmidt, she replied, "I'm the daughter of a science teacher. My father showed me fossils. I know about evolution, and I accept evolution. That doesn't mean that God didn't set everything in motion."
>
> The two report that Schmidt was satisfied with the answer and didn't wince. ... Walshe and Conroy say Palin never told Schmidt she backs creationism.

"It may seem like a minor incident," Boston observes, "but it's interesting because it raises the possibility that Palin was so eager to get on the ticket that she threw creationism under the bus and endorsed evolution."

National: A recent Harris poll included questions on evolution and creationism, with unsurprising results. According to Harris's report (available on-line at <http://www.harrisinteractive.com/harris_poll/pubs/Harris_Poll_2009_12_15.pdf>), those surveyed were given a list of topics — including God, miracles, heaven, Jesus as God or the son of God, angels, survival of the soul after death, the resurrection of Jesus, Hell, the virgin birth, the Devil, "Darwin's theory of evolution," ghosts, creationism, UFOs, astrology, witches, and reincarnation — and asked, "Please indicate for each one if you believe in it, or not." For evolution, 45% of respondents indicated that they believed in it, 32% indicated that they don't believe in it, and 22% indicated that they were not sure. For creationism, 40% of respondents indicated that they believed in it, 30% indicated that they don't believe in it, and 30% indicated that they were not sure.

The results varied by religion: 51% of Catholics, 32% of Protestants, 80% of Jews, and 16% of born-again Christians believed in Darwin's theory of evolution, while 37% of Catholics, 56% of Protestants, 20% of Jews, and 68% of born-again Christians believed in creationism. Overall, the results were basically unchanged from 2007, when 42% of respondents believed in evolution and 39% of respondents believed in creationism. The poll was conducted on-line on November 2 and 11, 2009, among 2303 adults in the United States; figures were weighted to reflect the composition of the adult population. "Because the sample is based on those who agreed to participate in the Harris Interactive panel," the report explains, "no estimates of theoretical sampling error can be calculated."



Australia, Queensland: "Bowen State High School invited a Seventh Day Adventist church pastor and creationist to address a Year

NCSE NEWS

News from the Membership *Glenn Branch*

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

Among those elected as Fellows of the American Association for the Advancement of Science in 2009 were **David B Allison** of the University of Alabama, Birmingham; **Philip C Bevilacqua** of Pennsylvania State University; **W Zacheus Cande** of the University of California, Berkeley; **Daniel C Dennett** of Tufts University; **John J Flynn** of the American Museum of Natural History; **Mark S Hafner** of Louisiana State University; **S Blair Hedges** of Pennsylvania State University; **Manfred Laubichler** of Arizona State University; **Catherine Manduca** of Carleton College; **Jo Ellen Roseman** of AAAS's Project 2061; **Judith Scotchmoor** of the University of California Museum of Paleontology; and **Sarah Grey Thomason** of the University of Michigan. Congratulations to all. Let the NCSE office know if we overlooked your name on AAAS's list!

Derek P Brereton's *Campsteading: Family, Place, and Experience at Squam Lake, New Hampshire* (New York: Routledge, 2010) was published. According to the publisher, "This book is the first detailed account of campsteading, the first application of critical realism in anthropology, and the first anthropological use of John Dewey's evolutionary model of experience"; Brereton adds, by e-mail,

> The relevance to NCSE's mission is threefold: (1) I ground in evolutionary theory the place attachment campsteaders experience, particularly via the human exploratory imperative as evolved in the environment of evolutionary adaptedness; (2) I explicate and build upon John Dewey's sadly neglected, but very important, evolutionary model of experience which he laid out in his magnum opus, *Experience and Nature*; (3) My monograph is sociocultural anthropology — the identification and explication of campsteading as an important American institution linking experience to the frontier — grounded in evolutionary theory.

Brereton teaches anthropology, sociology, and evolutionary psychology at Adrian College.

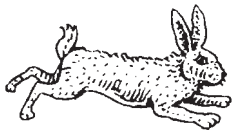
George C Cunningham's *Decoding the Language of God: Can a Scientist Really Be a Believer?* (Amherst [NY]: Prometheus Books, 2010) was published. A rebuttal of Francis Collins's *The Language of God*, Cunningham's book "critically reviews and respectfully responds to Collins's claims, demonstrating that the latter's arguments and his evidence are worn-out, disproved explanations, some of which have been circulating for centuries," in the words of the jacket copy. Cunningham has no quarrel with Collins's rejection of creationism, however, writing, "While I believe there are more and better arguments to use, Collins does a respectable job" (p 170). Now retired, Cunningham is the former chief of the Genetic Disease Branch of the California Department of Health Services.

Replying to a creationist letter to the editor of the *Spokane Spokesman-Review* complaining that evolution relies on luck, **Jack DeBaun** explained,

> Biological evolution occurs as a consequence of genetic variation working together with natural selection. Natural selection is the antithesis of lucky chance. It is a selective filtering process that gives preference to attributes that contribute to enhanced survival. That is how favorable changes are passed from generation to generation and amplified through evolutionary processes.

He concluded, "The theory of evolution is taught in science class because it is based on the best scientific evidence available. Teaching creationism would be as logical as teaching the biblical 'demon possession theory' of disease." His letter appeared on October 23, 2009.

Barbara Forrest contributed "Wedge strategy update: Intelligent design creationism since the Dover trial" to *Skeptical Inquirer* (2010 Jan/Feb; 34 [1]: 40–5), reviewing the controversy around Chris Comer's forced resignation from the Texas Education Agency (see *RNCSE* 2008 Jan/Feb; 28 [1]: 4–7) and the passage of the so-called Louisiana Science



11 biology class about the religious-based theory of 'intelligent design'," according to the Australian Broadcasting Corporation (2009 Nov 11), but was directed by Education Queensland to cancel the address; a spokesperson told ABC that it was inappropriate to use the science classroom for such a purpose, though no complaint was filed. Bowen is a town of about 7500 on Australia's northeast coast.

Italy: Italy's National Research Council (Consiglio Nazionale delle Ricerche, or CNR) became embroiled in the creationism/evolution controversy after it helped to fund and promote a creationist anthology compiled by its vice president, reports *Science* (2009; 326 [5960]: 1597). Roberto de Mattei, a historian of Christianity at the European University of Rome, organized a conference on creationism under CNR's auspices in February 2009, and then published its proceedings in November 2009 as *Evolutionism: The decline of an hypothesis*, with 9000 euros of the expenses of the publication defrayed by CNR. *Science* quoted Nicola Cabibbo, president of the Vatican's Pontifical Academy of Sciences, as calling it ironic that "while the Church has devoted many conferences to the topic [of evolution] this year, the vice president of CNR organized conferences in favor of creationism."

United Kingdom: The protest of the exclusion of evolution from a proposed revision of the primary school curriculum in the United

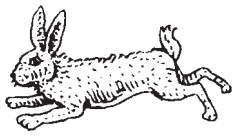
Education Act (see *RNCSE* 2008 Jul/Aug; 28 [4]: 4–10). "Creationists are welcome in the public schools of the Pelican State," she concludes. "The Discovery Institute wedged open the door." A member of NCSE's Board of Directors, Forrest is Professor of Philosophy at Southeastern Louisiana University. Also of interest in the same issue of *Skeptical Inquirer* is Benjamin Radford's report of a supposed chupacabra at a creationist museum in Texas (p 7) and **Dave Thomas**'s report on the Committee for Skeptical Inquiry's recent conference on UFOs (p 8–11).

Lawrence S Lerner lauded the second edition of **Eugenie C Scott**'s *Evolution vs Creationism: An Introduction* (Westport [CT]: Greenwood Press, 2009; Berkeley [CA]: University of California Press, 2009), writing, "*Evolution vs Creationism* is a superb introductory guide through the tangle, whether the reader wishes simply to get a clear basic picture of what is going on and what one might expect in the future, or plans to dig further into the subject." "Scott writes with crystal clarity and punctilious fairness," Lerner added in his review, published in the American Physical Society's *Forum on Physics & Society* newsletter (January 2010; 39 [1]; available on-line at <http://www.aps.org/units/fps/newsletters/201001/lerner.cfm>).

> She never gets bogged down in excessive detail and yet never sacrifices accuracy to brevity. She is the long-time Executive Director of the National Center for Science Education, the national clearinghouse for teaching good science (and especially evolution). Hence she has, and skillfully conveys, a bird's-eye view of the world of creationism.

Also reviewed is the updated edition of *But Is It Science?* (Prometheus, 2009), edited by **Robert T Pennock** and **Michael Ruse**. "[T]hey have assembled essays that provide a fine historical, scientific, religious, and legal background," Lerner wrote. Especially praised was **Nick Matzke**'s contribution, which "shows in painstaking detail that for all its claims, ["intelligent design" creationism] is nothing more than a rephrasing of creationism with some changes of emphasis." Lerner is Professor Emeritus in the College of Natural Sciences and Mathematics at California State University, Long Beach. He is a nationally recognized expert on state science standards, having reviewed them regularly for the Fordham Foundation. A frequent contributor to *RNCSE*, most recently with "Whither 'Intelligent Design Creationism?" (*RNCSE* 2009 Jul/Aug; 29 [4]; 18, 23–24), Lerner received NCSE's Friend of Darwin award in 2003.

John M Lynch contributed "Some thoughts on historians and



NCSE's Scott to be honored by National Academy

The National Academy of Sciences is to honor NCSE's executive director Eugenie C Scott with its most prestigious award, the Public Welfare Medal. According to a January 11, 2010, press release, "the medal is presented annually to honor extraordinary use of science for the public good"; Scott was chosen "for championing the teaching of evolution in the United States and for providing leadership to the National Center for Science Education." The medal was scheduled to be awarded on April 25, 2010, during the Academy's 147th annual meeting.

The president of the National Academy of Sciences, Ralph J Cicerone, commented, "Eugenie Scott has worked tirelessly and very effectively to improve public understanding of both the nature of science and the science of evolution," and the chair of the Public Welfare Medal selection committee, John Brauman, added, "We honor her for many years of organizing coalitions of scientists, parents, teachers, business people, clergy, and others to defend the teaching of evolution."

"I am profoundly honored by the National Academy's choice of me to receive the Public Welfare Medal," Scott said. "Really, it honors not just my work, and not just the work of the National Center for Science Education. Rather, it honors the work of a host of dedicated, thoughtful, and passionate people who have labored in defense of the teaching of evolution in the public schools. I have been privileged to work with them over the years, and I am proud to accept the award on their behalf."

Previous recipients of the medal include Neal Lane, Norman Borlaug, William T Golden, Maxine F Singer, C Everett Koop, and Carl Sagan. The National Academy of Sciences is a private, nonprofit institution that was established under a congressional charter signed by President Abraham Lincoln in 1863. It recognizes achievement in science by election to membership, and provides science, technology, and health policy advice to the federal government and other organizations.

Kingdom (see *RNCSE* 2009 Sep/Oct; 29 [5]: 8–13) was apparently successful. The *Guardian* (2009 Nov 8) quoted Diana Johnson, the minister for schools, as saying,

> Learning about evolution is an important part of science education, and pupils already learn about it at secondary school. The draft primary curriculum was designed to cover evolution as an implicit part of the new programme of learning for science and technology. After a public consultation on the plans — which took in the views of parents, teachers, the public, subject experts and other interested parties — it is expected that evolution will be covered explicitly in the new primary curriculum.

The British Humanist Association's Andrew Copson commented, in a *Guardian* op-ed (2009 Nov 9),

> The new primary curriculum, together with the 2007 government guidance that prohibits the teaching of creationism and intelligent design in science lessons, should put English schools in the forefront of education about evolution. Coming in the month which marks the 150th anniversary of *On the Origin of Species*, and at a point when good science education is a matter of urgency, it could not be more timely.

contemporary anti-evolutionism" to the *Newsletter of the History of Science Society* (2009 Oct; 38 [4]; available on-line at Lynch's blog at <http://blog.jmlynch.org/2009/11/06/some-thoughts-on-historians-and-contemporary-anti-evolutionism>). After discussing a number of ways in which the history of science is periodically abused by creationists, Lynch called upon historians of science to increase their level of public engagement, concluding,

> if the past few years are any indicator, it is highly likely that the future will see further creationist manipulation of history within the public sphere, and the only way to combat that trend is active engagement. Public engagement with those communities who seek to misuse history will be frustrating and not without dangers. Yet it also offers us an opportunity to enlighten the public about the nature of historical enquiry and the fertile area that the history of science represents.

A zoologist and historian of science, Lynch is Honors Faculty Fellow at Barrett, the Honors College at Arizona State University.

NCSE Supporters **Kenneth R Miller** and **James Randi** were among the sixteen new fellows elected to the Committee for Skeptical Inquiry, publishers of *Skeptical Inquirer*, according to a January 12, 2010, press release. The fellows were chosen for their distinguished achievement in science and skepticism; all have made major contributions to science and reason, critical inquiry, and public education. For Randi, it was a return to the fold: one of the original founders of the CSICOP (as the Committee for Skeptical Inquiry was originally known), he felt it necessary to resign for legal and personal reasons in the early 1990s when he and CSICOP were being sued by self-styled psychics. "We are ecstatic to be able to count Randi as a CSI Fellow once again," said CSI Executive Director Barry Karr. "And we are pleased to add so many distinguished scholars, scientists, authors, and science popularizers to the already stellar list of CSI Fellows. They will no doubt prove to be sterling assets to the CSI brain trust as we move forward in the next century defending science, reason, and common sense against the purveyors of superstition, quackery, and irrationality."

Learning that creationist Robert Gentry was speaking in the area, **Howie Neufeld** wrote to the editor of the *Watauga Democrat* to explain, "... Dr Gentry is on the fringes (even of creationism!), and his claims of a young earth are not accepted by the larger community of scientists." He added,

> Gentry may ridicule mainstream scientists for not showing up to debate him, as Duane Gish, another creationist and master debater often does. Well, the reason we don't show up is simple. If we do, we give Gentry an instant credibility he doesn't deserve, even if we win the debate, since he can claim to be on the same stage with reputable scientists, and therefore claim some legitimacy. But Gentry is espousing junk science and it would be a waste of our time to 'debate' him.

His letter, published on November 13, 2009, elicited a reaction from

Celebrating the *Origin* Sesquicentennial

When the *Green Bay Press-Gazette* printed a batch of articles and op-ed pieces on the sesquicentennial of the publication of Darwin's *On the Origin of Species*, **Steve I Dutch** offered his view: "Shamefully, many people who claim to be devoted to truth have resorted to a campaign of deception against evolution." Recounting a "practically endless" list of "the lies told by the opponents of evolution," he reported, "I have read more anti-evolution literature than just about anyone in this area, and I have done something most other readers have not — check it against real science. I can tell you flatly it is all junk." He concluded, "The anti-evolution movement is a scandal and a reproach to Christianity. It is time for it to stop." His op-ed appeared on November 15, 2009. Dutch is Professor of Natural and Applied Sciences at the University of Wisconsin, Green Bay.

Mark Farmer, writing in the *Athens Banner-Herald* (2009 Nov 24), compared Darwin to Copernicus, concluding,

> Rather than challenging mankind's place in the universe, these two ideas liberate and enable us to move on to an ever greater understanding of the universe and our place in it. Through our genes we are connected to every living thing. Through our chemistry we are connected to the earth. Through our very atoms we are connected to the stars and the universe. Big ideas indeed, and ones that challenge us to consider our place in the cosmos. These are ideas that should be embraced, not rejected: ideas that should fill us with wonder and joy, not fear.

Professor of Cellular Biology at the University of Georgia, Farmer also serves on the media advisory panel of Georgia Citizens for Integrity in Science Education.

Richard Firenze, writing in the *Binghamton Press and Sun-Bulletin* (2009 Nov 24), discussed the theological impact of the *Origin*, which he described as arguably "the most influential nonfiction work ever written in the English language." He explained, "What Darwin offered, much to the chagrin of many, was a way to explain this apparent design without a designer. It should be noted that Darwin did not say there was no designer, only that one was not necessary to scientifically explain life's complexity." Lamenting the "controversy that distracts from our collective appreciation of the splendor of the mysteries of our natural world that so inspired Darwin throughout his life," Firenze urged that "we ... put aside our differences and make this a day of celebration." A recipient of NCSE's Friend of Darwin award, Firenze is Professor of Biology at Broome Community College.

Marc-André Lachance reports, "With the help of Katie Marshall, a graduate student in biology, and of BUGS, the Biology UnderGraduate Society, we organized a celebration of the 150th anniversary of the *Origin* for the University of Western

local creationists and from Gentry himself, so Neufeld responded in a further letter, published on November 23, 2009, to a number of misrepresentations and misunderstandings of his original letter. He concluded, "Lastly, Gentry's letter is such a hopeless mishmash of nonsense and poor writing that it doesn't deserve more than this single dismissive sentence." Neufeld is Professor of Biology at Appalachian State University.

Alexander Nussbaum contributed "Attitudes of educated Orthodox Jews toward science: A survey" to *Free Inquiry* (2009 Dec/Jan 2010; 30 [1]: 24–9), concluding,

> Orthodox Jewish scientists, always suspect in their community, feel increasing pressure — if they wish to remain in that community — to exploit their degrees to promote prescientific beliefs. The role and influence of the increasingly traditionalist Orthodox Jewish community as a reservoir of such beliefs and as an ally of other anti-evolution constituencies should not be underestimated.

Nussbaum's previous publications on Orthodox Judaism and science include "Creationism and geocentrism among Orthodox Jewish scientists" (*RNCSE* 2002 Jan–Apr; 22 [1]: 38–43). Also of interest in the same issue of *Free Inquiry* is "The fact of evolution" (20–3), adapted from Richard Dawkins's *The Greatest Show on Earth: The Evidence for Evolution* (New York: Free Press, 2009).

Serving as the chair of the Year of Science committee at New Mexico State University, **David Richman** got into the act by portraying the elderly Darwin in two seminar talks in the Department of Entomology, Plant Pathology, and Weed Science and in a public lecture at the university's library. "Those who attended the presentations were very complimentary about the accuracy of the portrayals and information presented," Richman writes. "We hope that we were able to convey Darwin's persona and to give our audience a feel for him as a human being, as well as a great scientist. So far I have received no complaints about the presentations from creationists." Richman is College Professor and Curator of the Arthropod Museum at New Mexico State University.

Lois Schadewald was interviewed about *Worlds of their Own* (Philadelphia: Xlibris, 2008), a posthumous collection of articles by her brother **Robert J Schadewald**, a former president of NCSE's board of directors, for Skepticality, the official podcast of *Skeptic* magazine. The podcast's editor comments,

> "The Universe does not bend itself to our ignorance." This simple truism is just one of the many observations made by author, skeptic and former president of the National Center for Science Education Robert J Schadewald, who died of cancer on March 12th, 2000. This week on Skepticality, Swoopy talks with his sister Lois Schadewald, who compiled and published a humorous, insightful volume of her brother's articles, essays and interviews in 2008.

To download the podcast, visit <http://www.skepticality.com/p_listentopast.php> and look for show #119.

Ontario. The event included a kiosk at the University Community Centre, where educational fliers were handed out, and an evening lecture (by me) entitled 'The Origin of Two Big Ideas', where the concepts of natural selection and common descent were illustrated. About 100 people attended." He adds that he and a colleague visited UWO's Weldon Library Archives and got our library's copy of the first edition of the *Origin* to be exhibited for the week. I got to see, with my own eyes, the book, the title page, and the only figure, which is a generic phylogenetic tree." Lachance is Professor of Biology at the University of Western Ontario.

NCSE Supporter **Patricia Kelley**, Professor of Geology at the University of North Carolina, Wilmington, writes, "UNCW concluded our multiyear commemoration of the Darwin anniversaries [highlighted in *RNCSE* 2009 Jan/Feb; 29 [1]: 22–3] with an evening of faculty talks on current research at UNCW on the origin and adaptive radiation of species. The evening also included a slideshow of faculty and student travel to the Galápagos in May. The multiyear commemoration had been in the planning since 2005 as part of UNCW's Evolution Learning Community."

Howie Neufeld and his colleagues at Appalachian State University celebrated by hosting the final event in their year-long celebration of the Darwin anniversaries with a panel discussion on November 19 of the impact of the *Origin*, featuring James T Costa, the author of *The Annotated* Origin (Cambridge [MA]: Harvard University Press, 20009). Neufeld writes, "It was a fitting end to the year-long Darwin Celebration, which saw ASU bring in fourteen distinguished speakers over two semesters, in one of the largest lecture series on Darwin in the country. Those events attracted an average of 600 attendees per talk, with some reaching nearly 1000, and was therefore considered a huge success." Neufeld is Professor of Biology at Appalachian State University and chair of its Darwin Bicentennial Celebration Committee.

Steven Schafersman, posting on the Houston Chronicle's Evo.Sphere blog (2009 Nov 24), reviewed the scientific reception of the *Origin*. "Darwin's book presented evidence that the diversity of life arose through a branching pattern of evolution across millions of years of time, and that all living organism[s], including humans, were the product of this long history of genetic and morphological change," and the scientific community was swiftly convinced. Darwin's proposed mechanism for evolution, natural selection, was not as fortunate, of course, but today "Darwin's concept of evolutionary adaptation through natural selection became central to modern evolutionary theory and is now the unifying concept of the life sciences." A recipient of NCSE's Friend of Darwin award, Schafersman is president of Texas Citizens for Science.

Responding to Ray: How NCSE Dealt with the Creationist Giveaway of Darwin's *Origin*

Steven Newton

In September 2009, creationist Ray Comfort announced his intention to give away thousands of free copies of Darwin's *On the Origin of Species* at university campuses across the United States and Canada. This event was to occur on November 19, 2009, just five days before the 150th anniversary of *Origin's* original publication. The free book came with a catch: each copy of Comfort's version of Darwin's book contained a special introduction written by Comfort. This introduction attempted to argue that Darwin was a misogynistic racist whose science was not only bunk but also inspiration for Hitler and the Holocaust.

Comfort, a former surf shop owner turned evangelist, unveiled his "Origin into Schools" book giveaway project with a YouTube video featuring his frequent collaborator, former child actor Kirk Cameron, most famous for his role on the television situation comedy *Growing Pains*. Comfort and Cameron are best known for their television show *The Way of the Master*. During one notorious episode of this series, Comfort announced that bananas were "the atheists' nightmare," because bananas were evidence of "intelligent design", and were created by God to fit into human hands for easy consumption. Comfort was apparently unaware that modern Cavendish bananas — like maize — are quite different from their wild ancestors, and are the result of long cultivation and extensive modification by humans.

As the Cameron video circulated, the story was picked up by online news sources WorldNetDaily and The Huffington Post. Popular Romanian video blogger ZOMGitsCriss created a YouTube video mocking Comfort and Cameron. PZ Myers wrote about Comfort on his Pharyngula blog and linked to ZOMGitsCriss's video, pushing it over a million views. Richard Dawkins expressed outrage that Darwin's classic was being mutilated by a creationist "introduction", and suggested ripping Comfort's introduction out of each book.

As the science world became aware of Comfort's plan, NCSE considered how to respond. One option was simply to do nothing, mirroring NCSE's normal policy of not engaging creationists in debates. An advantage to doing nothing would be that NCSE would not in any way draw attention to Comfort's cynical publicity stunt.

Meanwhile, a number of students from around the country began calling or e-mailing NCSE, alarmed that Comfort had publicly named their schools as sites of *Origin* distribution and asking for information and advice about the Comfort giveaway. We developed a few *ad hoc* recommendations for such students: don't rip out the introduction or mutilate the book, since this would only play to Comfort's inevitable claims of censorship; don't be rude or aggressive to the creationists when they came to campus; emphasize the positive arguments for evolution in the face of the vacant scientific arguments for creationism; organize screenings of pro-science documentaries, such as NOVA's *Judgment Day* or Randy Olson's *Flock of Dodos*.

As the number of students contacting us rose, it became clear that an organized response was in order. NCSE decided to address Comfort's disrespectful treatment of the *Origin* with a multi-pronged response that would utilize humor and parody while promoting good science. We registered the domain name DontDissDarwin.com as an information clearinghouse and one-stop shop for activists wishing to respond to Comfort's minions coming to their campuses.

The first public volley of our campaign involved a debate on a *US News & World Report* blog through late October and early November 2009, which NCSE's director of communications Robert Luhn arranged after the blogger Dan Gilgoff posted a piece reporting on Comfort's project without providing any critical perspective.

In the debate, NCSE's executive director Eugenie C Scott urged students to accept the free copy of the *Origin*, but not to waste time reading Comfort's introduction — especially the middle section. "[It's] a hopeless mess of long-ago-refuted creationist arguments," she observed, "teeming with misinformation about the science of evolution, populated by legions of strawmen, and exhibiting what can be charitably described as muddled thinking." (See p 16 and 18 for her side of the debate.)

Scott also noted that the copy of Comfort's version of the *Origin* she was sent by the publisher was missing four chapters as well as Darwin's introduction. In his response, Comfort claimed that the next edition included the missing material: "Not one word will be omitted." This was not quite true — Scott observed, "It's still missing a crucial diagram from Chapter 4 as well as the epigraphs from Bacon and Whewell, which Darwin chose with care."

More perplexing was the rationale that Comfort provided for the change. Scott noted, "Elsewhere he wrote that it was 'abridged because it was too many pages (too expensive) for a giveaway.' But now he's going to try to give away

Steven Newton is Public Information Project Director at NCSE.

even more copies of this more complete version?" (It would later become clearer how the distribution of the *Origin* was handled financially.)

Meanwhile, NCSE was hard at work throughout October 2009 developing materials for activists. We envisioned that pro-science supporters would like to have a one-page flyer refuting Comfort's introduction to hand out to people who took Comfort's book. We created this one-page flyer as a pdf available for printing from DontDissDarwin.com. (Brown University's Kenneth R Miller, a Supporter of NCSE, independently came up with the same idea, and we hosted his flyer on our site as well.) We also realized that activists would need more information about Comfort's introduction, so we wrote a detailed, point-by-point debunking of Comfort's claims, and posted it on DontDissDarwin.com.

What about Comfort's books? We considered a variety of responses here, keeping in mind the way that Comfort capitalized on Dawkins's suggestion that students rip the introduction out, spinning it effectively as censorship and even going so far as to use the phrase "book burning". Indeed, late on the day of the giveaway, Comfort's Living Waters website posted a number of high-resolution, press-ready pictures of students ripping out the introduction; Comfort seemed to have planned to capture these images and make them available to the media. What could activists do to visually register their contempt for the book without providing further grist for Comfort's mill?

NCSE's David Almandsmith came up with the idea of making a bookmark that could be used to separate Comfort's introduction from Darwin's text. Hence, the NCSE Safety Bookmark was born. The Safety Bookmark featured a bright color image of a banana, in reference to Comfort's banana escapade, and instructions that if inserted at page 59, at the end of Comfort's introduction; the bookmark would divide science from "bananas". Our bookmark also included links to pro-science resources, such as Berkeley's Understanding Evolution website <http://evolution.berkeley.edu>. NCSE printed and distributed these bookmarks to our activists on campuses throughout North America. We also sent some of our activists pro-evolution t-shirts donated by NCSE member Len Eisenberg (whose Evolutionary Genealogy website sells them, and provides information about evolution, at <www.evogeneao.com>).

The most ambitious part of our response, however, was the brainchild of NCSE's communications director Robert Luhn. If Kirk Cameron and Ray Comfort could make a YouTube video advertising their book giveaway, surely we could create our own video promoting our response. To accomplish this, we mobilized NCSE supporters to volunteer their time and talent. Graphic artist Paula Spence designed a wax-seal image for our Don't Diss Darwin Institute. Director Matt McKenna handled the cinematography and video editing, with David Pene as his key grip. Photographer David Bishop made his studio and lighting expertise available to us. Our video concluded with a Monty Python-esque animation created by Steve Shapiro.

A great deal of work went into creating our video. We were pleasantly surprised by how many talented people were willing to donate their time and energy into this project, which was accomplished quickly on a tight budget. The strong response from our membership is an encouraging sign for what we can accomplish in the future with these kinds of volunteer efforts.

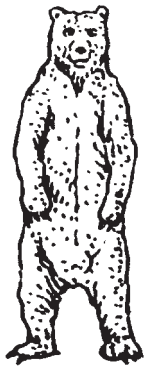
A week before the scheduled book giveaway, we posted our video to YouTube and began a coordinated ramping-up of activities to remind our supporters about Comfort's stunt. Everything seemed on track to have activists on campuses across the country meet Comfort's minions on November 19.

In the days leading up to that date, we heard of a handful of instances in which Comfort's books were being distributed on campuses, but these appeared to be isolated cases of jumping the gun. On the morning of November 18, however, it became clear that this day was going to be the actual day of the distribution.

Comfort had hoped to avoid responses to his giveaway by moving the date up one day. What he did not understand, however, is that in this age of Twitter and Facebook and text messaging, having well-wired college students respond quickly to changing conditions has become trivial. In almost every instance, our activists were easily able to adjust their schedules and meet those distributing Comfort's book.

Comfort also miscalculated by choosing the 18th for his distribution, because this was a day of mass strikes and protests surrounding the unprecedented fee increases at University of California campuses. In fact, the UC Regents were meeting at UCLA on the 18th, when Comfort and Cameron visited the campus, and their presence was overshadowed by protests in which police used tasers against students.

Comfort had claimed in his original YouTube video that he would be working with the college student group Campus Crusade for Christ to distribute his book. However, what we discovered was that most of the people distributing Comfort's book were not college students affiliated with CCC, but older non-students who had, in some cases, driven considerable distances to be on campus.



At many public campuses, policies allow the distribution of materials by non-students. UC Berkeley, for example, has a liberal policy allowing anyone to distribute, so long as the distribution is peaceful. However, some private campuses — such as Emory University — require prior permits for on-campus events by non-students. For this reason, the Comfort distributors at Emory were asked by security to leave the campus. Although Comfort's supporters may not appreciate the irony, it was thus at the campus perhaps most antagonistic to the religious right — UC Berkeley — that Comfort's ideas found an open forum.

Another surprise was that, although Comfort's book was handed out to students for free, in

True Darwin but False Comfort

Eugenie C Scott

Ray Comfort and I agree that "science is a wonderful discipline, to which we are deeply indebted." We agree that it would be nice for students to get a free copy of Darwin's best-known book, *On the Origin of Species*. I'll even go further than he might: The *Origin* — like Shakespeare and the Bible — should be on every educated person's bookshelf. If you do not understand evolution, you cannot be considered scientifically literate. And we agree that students should read the *Origin* thoroughly.

Unfortunately, thoroughly reading the version that Comfort will be distributing on college campuses in November will be difficult. The copy his publisher sent me is missing no fewer than four crucial chapters, as well as Darwin's introduction. Two of the omitted chapters, Chapters 11 and 12, showcase biogeography, some of Darwin's strongest evidence for evolution. Which is a better explanation for the distribution of plants and animals around the planet: common ancestry or special creation? Which better explains why island species are more similar to species on the mainland closest to them, rather than to more distant species that share a similar environment? The answer clearly is common ancestry. Today, scientists continue to develop the science of biogeography, confirming, refining, and extending Darwin's conclusions.

Likewise missing from Comfort's bowdlerized version of the *Origin* is Chapter 13, where Darwin explained how evolution makes sense of classification, morphology, and embryology. To take a simple example, why do all land vertebrates (amphibians, mammals, and reptiles and birds) have four limbs? Not because four limbs are necessarily a superior design for land locomotion: insects have six, arachnids have eight, and millipedes have, well, lots. It is because all land vertebrates descended with modification from a four-legged ("tetrapod") ancestor. Since Darwin's era, scientists have repeatedly confirmed that the more recently two species have shared a common ancestor, the more similar are their anatomy, their biochemistry, their embryology, and their genetics.

"Nothing in biology makes sense except in the light of evolution," as a famous geneticist said. That is why evolution is taught matter-of-factly in the biology and geology departments of every respected university in the country, secular or sectarian, from Berkeley to Brigham Young. That is why the National Academy of Sciences and the American Association for the Advancement of Science wholeheartedly endorse the teaching of evolution in the public schools. That's why thousands of papers applying, extending, or refining evolution are published in the scientific research literature every year.

But there is no reason for students to refuse Comfort's free — albeit suspiciously abridged — copy of the *Origin*. Read the first eight pages of the introduction, which is a reasonably accurate, if derivative, sketch of Darwin's life. The last 10 pages or so are devoted to some rather heavy-handed evangelism, which doesn't really have anything to do with the history or content of the evolutionary sciences; read it or not as you please. But do not waste

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some cases those distributing the book purchased the books directly from Comfort. At one UC campus, for example, we learned that the couple distributing Comfort's book had paid about $3500 for their 720 books, a cost of nearly $5 per book. (Comfort's book retails at Amazon.com for $4.99.) Comfort's Living Waters Ministry website also allowed supporters to donate a box of books for $70. Thus, while at first it appeared Comfort's ministry was spending a great deal of money on this giveaway, that cost was defrayed by charging the supporters doing the distribution.

There was a small number of distributions the following day, November 19. While US schools went on Thanksgiving break the following week, distributions occurred at a small number of Canadian colleges. Comfort has hinted that there may be additional mass distributions of his book in the future, but has not specified a date.

NCSE learned a number of things from the experience of responding to the distribution of Comfort's version of *Origin*. We learned that the pro-science community has a deep reserve of talent for volunteer projects. We learned that activists are able to respond nimbly to changing conditions on the ground. We also learned that media-savvy creationists such as Ray Comfort are able to exploit unguarded comments and on-scene photos to create a false impression of censorship. Moreover, evangelists such as Comfort are able to muster not only their own financial resources, but also the money and time of committed supporters. These are all lessons worth noting for future creationist attacks on evolution and science.

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your time with the middle section of the introduction, a hopeless mess of long-ago-refuted creationist arguments, teeming with misinformation about the science of evolution, populated by legions of strawmen, and exhibiting what can be charitably described as muddled thinking.

For example, Comfort's treatment of the human fossil record is painfully superficial, out of date, and erroneous. Piltdown Man and Nebraska Man — one a forgery, the other a misidentification, and *both* rejected by science more than 50 years ago — are trotted out for scorn, as if they somehow negate the remaining huge volume of human fossils. There are more specimens of "Ardi" (the newly described *Ardipithecus ramidus*) than there are of *Tyrannosaurus* — and any 8-year-old aspiring paleontologist will be delighted to tell you how much we know about the *T rex*!

But you would not learn any of this from reading Comfort's introduction. He says, "Java Man [a *Homo erectus*], found in the early 20th century, was nothing more than a piece of skull, a fragment of a thigh bone, and three molar teeth." Well, that was from a single site — excavated in the 1890s. What about the dozens of other sites where fossils of *H erectus* are found, from China to Kenya to the Republic of Georgia? Another whopper: "Java Man is now regarded as fully human." Trust me, if one sat down next to you on the bus, you would know the difference.

In fact, the fossil record for the human lineage is impressive, providing the evidence on which our understanding of the big events of human evolution is based. We and modern chimpanzees shared a common ancestor millions of years ago; the main feature separating us from our chimpanzee cousins is bipedalism, followed by toolmaking, and then brain expansion, and then the substantial elaboration of behavior we call human culture. More fossils will provide more details, but this outline of human evolution is not in serious doubt among scientists.

It is not just human evolution that Comfort misrepresents. His main gripe is the old creationist standby, the supposed lack of transitional forms in the fossil record. (Darwin addressed the objection in Chapter 9 of the *Origin,* interestingly one of the chapters *not* included in Comfort's version.) Comfort sneers at the fossil evidence for the terrestrial ancestry of whales and the dinosaurian ancestry of birds. Too bad for him that he has a knack for picking bad examples: There are splendid fossils of dinosaurs that have feathers and of whales that have legs — and even feet. Faced with ignorance like this, I am reminded of a jeremiad: "Oh foolish people, and without understanding; which have eyes, and see not; which have ears, and hear not."

But if you are willing to use your ears to listen to what paleontologists say about transitional features and use your eyes to look at the evidence described in the scientific literature (as well as displayed in many museums and science centers around the country), you will find transitional fossils galore. There are clear transitional series from aquatic vertebrates to land vertebrates, from primitive land vertebrates to mammals, from dinosaurs to birds, from land vertebrates to whales, and of course a wonderful series of fossils leading to *Homo sapiens.* A good place to begin is a marvelous website dismissively mentioned (and erroneously described) in Comfort's introduction, the University of California Museum of Paleontology's Understanding Evolution (<http://www.evolution.berkeley.edu/>).

This year marks the 200th anniversary of Darwin's birth and the 150th anniversary of the publication of *On the Origin of Species*, both occasions worth celebrating by anyone who cares about our understanding of the natural world. So it is no surprise that creationists are trying to piggyback on the festivities with cynical publicity stunts like Comfort's. But I have faith that college students are sharp enough to realize that Comfort's take on Darwin and evolution is simply bananas.

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Ray Comfort, Plagiarist?

Did Ray Comfort plagiarize part of his "special introduction" to the *Origin of Species*? That was the charge of Stan Guffey, a lecturer in biology at the University of Tennessee, Knoxville, who told the Knoxville *Metro Pulse* (2009 Dec 2),

> The introduction begins with a nice, sweet little biography, then degenerates into intellectually lame, lazy distortions, selective reading of the literature, picking and choosing of facts, and misreadings of the historical record.

He added that Comfort

> gently moves folks into the notion that they don't want to read what comes after the introduction. He just wants his 50 pages read, 47 of which are anti-intellectual, dishonest drivel, the first three of which are pretty good because I wrote them.

The *Metro Pulse* observed, "A few sentences were chopped or shortened, and a paragraph on Darwin's youth was rearranged and reworded, but most of the passage appears taken directly from Guffey." Alert bloggers detected the apparent plagiarism months ago and confronted both Comfort and the publisher about it, but Guffey was never asked for permission to use his biography of Darwin, which he originally prepared for a Darwin Day event. When copies of the book were distributed on the campus his university, Guffey offered, "Would you like me to autograph this?" The *Metro Pulse* reported, "Guffey is preparing a cease-and-desist letter through an attorney to prevent further distribution of the book and is contemplating further legal action."

Interviewed on a blog in December 2009 (<http://www.ziztur.com/2009/12/interview-with-ray-comfort.html>), Comfort was asked, "Can you comment on the claim that part of your introduction to the 150th anniversary edition of *Origin of Species* was plagiarized?" and replied tersely, "No." To compare Guffey's biography with Comfort's introduction, visit <http://eeb.bio.utk.edu/darwin/images/Handout_History_Darwin.pdf> and <http://assets.livingwaters.com/pdf/OriginofSpecies. pdf>, p 1–3. In addition to the apparent plagiarism from Guffey's biography, four sentences in Comfort's introduction were apparently borrowed from Brian Regal's introduction to his edition of Darwin's autobiography; see p 19 for Regal's reaction.

There You Go Again

Eugenie C Scott

I am delighted that Ray Comfort has decided to provide a near-unabridged version in his next giveaway of *On the Origin of Species*. It is still missing a crucial diagram from Chapter 4 as well as the epigraphs from Bacon and Whewell, which Darwin chose with care, but it is *more* complete than the first version, which was also missing four chapters and Darwin's original introduction.

In his response to my post (available on-line at <http://www.usnews.com/blogs/god-and-country/2009/11/2/ray-comfort-responds-to-genie-scott-on-creationist-origin-of-species.html>), Comfort strangely failed to explain why he expurgated that material from the first version. Elsewhere he wrote that it was "abridged because it was too many pages (too expensive) for a giveaway." But now he is going to try to give away even more copies of this more complete version? I am glad that I am not his accountant.

Anyhow, now I am even more enthusiastic about encouraging students to accept a free copy of Darwin's valuable book. But I stick by my advice: Students who are interested in learning about science can skip Comfort's introduction, which, despite a few cosmetic revisions, remains a hopeless mess of long-ago-refuted creationist arguments.

Consider Comfort's view on the evolution of sex: "No one even goes near explaining how and why each species managed to reproduce (during the millions of years the female was supposedly evolving to maturity) without the right reproductive machinery." Of course not. That is because no biologist thinks males and females evolved separately!

Birds do it; bees do it; even educated fleas do it: but so do the majority of plants and even certain single-celled organisms. But they do it in radically different ways. A male bee has no father and cannot have sons, for example, while there are animals, even vertebrates — bonnethead sharks and Komodo dragons — in which virgin birth occurs. So it is not just for the obvious reason that sex is a fun topic for biologists.

The myriad ways in which organisms reproduce, sexually and asexually, have fascinated biologists for decades and have been examined, in a thoroughly evolutionary context, since Charles Darwin and August Weismann. But none of them have thought that lonely males waited patiently for millions of years for the first females. And anyone who, like Comfort, tells you otherwise is ignorant — or worse.

Comfort complains that I did not provide enough detail in my brief essay about those fossil whales. You want a list of fossil whales showing the transitional features marking the evolutionary transition from land animal to marine, such as changes in the ears, nostrils, and limbs? *Indohyus, Ichthyolestes, Pakicetus, Nalacetus, Remingtonocetus, Ambulocetus* . . . . Never mind. Start with "From land to water: The origin of whales, dolphins, and porpoises" (*Evolution: Education and Outreach* 2009; 2 [2]: 272–88, available on-line at <http://www.springerlink.com/content/whn1654v74t64301/fulltext.pdf>), for a nontechnical review by a team of whale paleontologists.

Comfort trots out the old creationist warhorse that because scientists revise their theories in the light of new information, science is untrustworthy. Far from it. The ability to revise explanations in the light of new information is a strength of science, not a weakness. It is why we have learned so much about the natural world over the last few hundred years and why we have longer life spans, more reliable food supplies, fewer women dying in childbirth, and many other advantages of modern life.

Because science is a practical endeavor, when a theory is revised, the change is usually to the periphery rather than to the core. For example, the early fossil *Ardipithecus* ("Ardi") changed our understanding of the details of human evolution, but it did *not* cause us to reject the common ancestry of humans and chimps. The common ancestor of two descendant species is not expected to be identical to either of them. With *Ardipithecus* and other fossils, we are closer to knowing what that common ancestor of humans and chimps looked like.

Darwin himself knew that scientists need to change their minds when presented with new evidence. When he mentioned his "cold shudder," he was not — as Comfort misleadingly suggests — expressing serious doubts about his research. Rather, he was praising his friend the great geologist Charles Lyell for his eventual acceptance of evolution:

> I rejoice profoundly that you intend admitting the doctrine of modification in your new edition; nothing, I am convinced, could be more important for its success. I honour you most sincerely. To have maintained in the position of a master, one side of a question for thirty years, and then deliberately give it up, is a fact to which I much doubt whether the records of science offer a parallel. For myself, also, I rejoice profoundly; for, thinking of so many cases of men pursuing an illusion for years and often a cold shudder has run through me, and I have asked myself whether I may not have devoted my life to a phantasy. Now I look at it as morally impossible that investigators of truth, like you and [Joseph] Hooker, can be wholly wrong, and therefore I rest in peace.

Whenever a creationist quotes Darwin, check for yourself to see if the original context reflects the creationist's claim. It is easy to do

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so at The Complete Works of Charles Darwin Online (<http://darwin-online.org.uk/>).

I close with another quote. Todd C Wood is a young-earth creationist — indeed, the Director of the Center for Origins Research at Bryan College, founded in honor of the creationist hero William Jennings Bryan — who rejects evolution for biblical reasons, just like Comfort. Wood insists, "The Bible reveals true information about the history of the earth that is fundamentally incompatible with evolution."

But unlike Comfort, Wood is a trained scientist. And as such, he recognizes that the scientific basis of evolution is strong:

> Evolution is **not** a theory in crisis. It is **not** teetering on the verge of collapse. It has **not** failed as a scientific explanation. There **is** evidence for evolution, gobs and gobs of it. It is **not** just speculation or a faith choice or an assumption or a religion. It **is** a productive framework for lots of biological research, and it has amazing explanatory power. There is **no** conspiracy to hide the truth about the failure of evolution. There has really been **no** failure of evolution as a scientific theory. It works, and it works well. (<http://toddcwood.blogspot.com/2009/09/truth-about-evolution.html>, emphasis in original)

Anyone who honestly examines the data supporting evolution — even a young-earth creationist — concludes that the science is strong. If you reject evolution, you are doing it for religious reasons. You're entitled to your religious opinions — but not to your own scientific facts.

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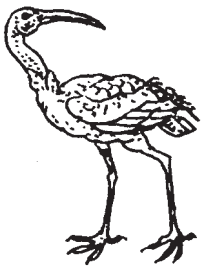
Stealing Down the Road to Perdition

Brian Regal

In grammar school the nuns made a point of telling us that stealing constituted a terrible sin. Taking what belonged to others and claiming it belonged to you was distinctly frowned upon, would upset Jesus, would get you smacked with a ruler, and could start you down the road to Hell. I learned these lessons in the context of a religious tradition that Comfort would deny has any validity; and yet his "true" religious tradition did not seem to deter him from this unethical — some might say sinful — behavior.

As an historian of science whose work focuses on the history of evolutionary thought and its influences on popular culture, religion and politics, I read Comfort's introduction to Charles Darwin's *On the Origin of Species* on-line last spring. I had reviewed Comfort's preposterously silly board game *Intelligent Design versus Evolution* for the British magazine *Endeavour* the summer before so I looked forward to more whacky hijinks. As I read I could not help but get a sense of *déjà vu* and the feeling that the writing was a bit too good. Making my way further into the text I encountered the type of ham-handed and clumsy syntax, pseudo-literary flourishes, convoluted logic, and superficial attempts at sounding intelligent more in line with what I expected. While most of it was drivel, the beginning of Comfort's text sounded suspiciously like the introduction for the Barnes & Noble edition of *The Autobiography of Charles Darwin* that I wrote in 2005. Other duties occupied my time so I could not go through it carefully. It was the end of the semester and I was preparing to go to the United Kingdom for a round of conferences as well as the big Darwinopalooza at Cambridge, so I put Comfort aside, planning on returning to him when I wasn't doing something more important like staring at the ceiling. Throughout the summer, however, I began receiving e-mails from eagle-eyed readers who also noticed that I had been plagiarized. Others pointed out that Stan Guffey of the University of Tennessee as well as the Darwin Foundation had their work pilfered and insulted too. And now Comfort and his pal in blinkered intellectual vandalism and strange views on fruit, Kirk Cameron, planned on giving away free copies of this thing.

While the plagiarism is telling, what is more so, I think, is the sources Comfort choose to steal from. Along with so many other things, Comfort's introduction shows simple laziness in that he went on-line and grabbed the first few easy sites he found for his sources. He engaged in the same kind of research tactics common among eight graders, but for which I would fail one of my university students. Guffey's short biography of Darwin and my own piece for the *Autobiography* are, with all due respect, not exactly deeply analytic or penetrating scholarly works. They are meant for audiences new to the material, which has been digested and simplified. Had Comfort been serious in his intent to engage in a discourse on the impact of Darwin's work he should have stolen from Adrian Desmond and James Moore's *Darwin's Sacred Cause*, or Peter Bowler's *The Eclipse of Darwinism*, John Van Whye, or a host of other world-class Darwin



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scholars rather than from me. He could have stolen bits from my *Human Evolution: A Guide to the Debates*; if nothing else I'd get some royalties. Had he done a little actual research and thoughtful reading, he would have seen that there is a vast literature tackling tough questions on Darwin's life and work as well as the role played by science in Nazi ideology. This in turn would have shown Comfort that far from Darwin, the work that most profoundly inspired Hitler came from eugenicists, political conservatives, and Christian fundamentalists, none of whom accepted Darwin's actual writings. He would have seen that Hitler's belief that he was divinely anointed and that God had destined the German people and the Nazi party for greatness made his vision of the world far closer to today's "intelligent design" theory than natural selection. Comfort could at least have corrected the misspelling of Alfred Russel Wallace's name. (I am also waiting for Ray Comfort or Kirk Cameron or any of their ilk to explain why if evolution causes so much death and destruction, the most violent and hate-filled groups in America, like the KKK, Neo-Nazis, and religious cults, all reject evolution and claim to embrace Christ and why a guy has never walked into a restaurant and shot up the place, saying Darwin made him do it? They always blame it on Jesus). But that level of subtle analysis is beyond Comfort's abilities. Besides we wouldn't want him to behave like one of those so-called scholars he and others like him detest: the ones who "professing themselves to be wise become fools." So he went for the kid's versions instead of the ones for grown-ups with all the big words and the complex ideas.

Even without the plagiarism, Ray Comfort's work shows an astonishing lack of knowledge of basic history or science, his attitude toward other religions is intolerant, and his sophomoric pontificating never rises above the level of a bumper sticker. He thus insults genuinely religious people as well as those he loves to call atheists: which is anyone who doesn't believe exactly as he does. He seems confused by the "intelligent design" theory he embraces so warmly failing to see how it undermines the young-earth creationism his followers take as a rigid core belief. His now legendary discourse on banana morphology and his references to child murder in the *Origin*'s introduction are creepy and humorous for all the wrong reasons. His fast-talking flim-flam sounds more like that of a used car salesman than someone who speaks for the Lord.

Like all demagogues, Comfort uses self-conscious underdog rhetoric designed to elicit donations from followers and denunciations from opponents which he uses to generate more donations (although I wonder how anyone can be on *God's* team and still be an underdog). This formula ensures that Comfort will continue his antics, get rich, and gather followers. He delights in explicating the horrors that await sinners, exhorts them to atone for their sins, and claims to know what God wants and does it with the giddy self-assuredness of the self-righteous. Ironically, as an added bonus he includes a little flying rubber band toy with the signed copies of the *Origin* he has given out. On it are printed the questions "Have you kept His Commandments? Ever lied? Stolen?"

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Regal and Comfort

The following quotations are from Brian Regal's introduction to *The Autobiography of Charles Darwin* (New York: Barnes and Noble, 2005) and from Ray Comfort's "special introduction" to his edition of *On the Origin of Species* (Alachua [FL]: Bridge Logos Foundation, 2009).

Regal	Comfort
Darwin's **father and grandfather were both doctors**; his mother belonged to the **Wedgwood** family **of pottery fame**.	His **father and grandfather were both doctors**, and his mother was the daughter of Josiah **Wedgwood, of pottery fame**.
Darwin's parents **expected him to go into medicine, and although he entered Edinburgh University to pursue a medical degree**, *for various reasons, including squeamishness, he left without graduating.*	**Darwin's** father **expected him to go into medicine, and although he entered Edinburgh University to pursue a medical degree**, *he found he couldn't stand the sight of blood and left after two years.*
As a clergyman, he would have the free time to follow his real intellectual love: natural history.	**As a clergyman, he would have the free time to follow his real intellectual love: natural history.**
Darwin was a passionate student of nature, and while still in school he had amassed a considerable beetle collection as well as other specimens.	**Darwin was a passionate student of nature, and while in school he amassed a considerable beetle collection as well as other specimens.**

There are two important issues in investigating plagiarism. One is whether phrases or sentences are simply copied without attribution from one source to another. This is the case in the boldface text in the table above.

The second has to do with how the reference material is used. It is considered plagiarism if an author uses the original sentence structure from the reference. For example, the change from "parents" in Regal's original piece to "father" in Comfort's introduction would be unacceptable usage. Another example is the description of why Darwin did not complete his medical degree.

Using phrases or expressions that are unique to the original author is also considered plagiarism. In this example, phrases such as "of pottery fame", and "to pursue a medical degree" would satisfy the criteria for plagiarism.

An extended discussion of plagiarism with examples of appropriate and inappropriate usage can be found at <http://www.usp.edu/writing/plagrsm.shtml>.

The Grand Old Man of Fundamentalism

Randy Moore, University of Minnesota

William Bell Riley, an anti-evolution crusader who was responsible for William Jennings Bryan's involvement in the Scopes Trial.

> *Pardon me if I am not scared when the Herr Professor shoots his little paper wad of science at my theological form.*
>
> – William Bell Riley, *The Menace of Modernism*

The legend of the Scopes Trial can be traced to a single event: the decision by three-time Democratic presidential candidate William Jennings "The Commoner" Bryan to help Tennessee prosecute Scopes. By 1925, Bryan had become the *de facto* leader of the anti-evolution movement, and the addition of his name to the prosecution team added instant recognition and credibility that no other name could provide. Only after Bryan agreed to participate in the trial did Clarence Darrow offer to volunteer to defend Scopes (Larson 1997).

Bryan's involvement in the Scopes Trial, and therefore the legend of the Scopes Trial, resulted from the work of a fundamentalist leader and anti-evolution crusader named William Bell Riley (Fig 1; Levine 1965). Unlike other anti-evolution crusaders such as William "Billy" Sunday and J Frank Norris who worked in the South, Riley was based in Minneapolis. Under his leadership, the First Baptist Church grew between 1897 to when he retired in 1942 from 585 members to over 3550 — a number estimated to be equal to 10% of all Baptists in Minnesota (Szasz 1969).

In the early 1920s Riley had used his considerable political and religious influence to convince the Tennessee legislature to pass the Butler Law, which was used to prosecute John Scopes. Concerned that local prosecutors in tiny Dayton, Tennessee could not be trusted to prosecute Scopes and defend the state's anti-evolution law, Riley sent Bryan a telegram on May 13, 1925 asking him to represent the World's Christian Fundamentals Association (WCFA) at the Scopes trial "to secure equity and justice, and to conserve the righteous law of the Commonwealth of Tennessee." Bryan "agreed immediately" to Riley's request and the rest, as they say, is history (Larson 1997; Trollinger 1990).

Riley's Crusades

Although time has dimmed his notoriety, Riley — "The Grand Old Man of Fundamentalism" — espoused a strident, articulate "orthodoxy plus" that attacked the evils of booze, theatre, gambling, dancing, movies, and revealing clothes. Like most other fundamentalists, Riley branded evolutionists as atheists, and rationalized his intolerance as simple honesty. In Riley's world, truth often required militancy. This was especially true for evolution, which Riley believed was immoral, destroyed society, and promoted anarchy and atheism.

Riley opposed modernism, and he also knew that universities gave legitimacy to modernism, and especially to evolution. To combat this, Riley wrote *The Menace of Modernism*, in which he lamented the rapid spread of modernism in America, and warned that schools had been infiltrated with atheists and antichrists who taught students that the Bible contained errors, that Jesus was not God in the flesh, and that social work was more important than salvation. Riley concluded his influential book with a plea for a "confederacy" of conservative evangelicals. World War I, the urbanization of America, rising crime-rates, and the flowering of fundamentalism made people receptive to Riley's fundamentalist message. So, the ambitious Riley garnered a large following, and insisted that First Baptist Church give him four months per year for traveling evangelism to spread his message (Archives, First Baptist Church, Minneapolis).

Riley's first series of anti-evolution conferences was held in 1921 in Kentucky, which was considering legislation to ban the teaching of evolution in its public schools. Riley's debates often drew large crowds and much media coverage. In those debates, Riley ignored the scientific evidence, instead focusing on the social implications of evolution. Riley later challenged Scopes defender Clarence Darrow to several debates, but Darrow declined (Szasz 1969).

By 1923, Riley had focused almost all of his efforts on driving evolution out of public schools. He knew that the public was interested in his crusade; as he wrote to William Jennings Bryan that year, "The whole country is seething on the evolution question." Riley believed that most Americans did not want evolution to be taught in

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Charles Darwin, whatever else might be said of him, was a deeply honest man. He knew what he knew, he recognized what he didn't know, and he was admirably candid with his readers about where the line between those two zones fell. It's a shame that Ray Comfort doesn't embrace the same ethic of intellectual honesty. Comfort's confused polemic, disguised as an informational "Introduction" but full of mistakes, half truths, untruths, muddled logic, old creationist arguments, misleadingly excerpted quotations, and ill-framed analogies — plus a good dose of fire and brimstone at the end — will do a severe disservice to anyone who takes it for an entryway to Darwin's great book. Prefacing an edition of the *Origin* with this screed is a sly gambit, clumsily executed. My advice: Read the true Darwin; skip the false Comfort.

— David Quammen

public schools. He made his position clear; as he proclaimed in a sermon titled "Evolution vs Creation or Darwin vs The Divine Word":

> Let it be understood, fundamentalists propose a war of extermination. We have met some defeats; never yet a fair one. We have won some victories, but whether we meet defeat or victory, we are in the fight to stay until this atheistic religion is forced out of every public school on the American continent.

In typical Riley fashion that reduced all conflicts to extremes and recognized no shades of opinion, Riley and the WCFA claimed that evolution was speculative, un-Christian, and socially destructive.

In 1923, Riley used a conference at First Baptist Church to form the Minnesota Anti-Evolution League "to force the teaching of the evolutionary hypothesis from the public schools," and soon thereafter used the Presbyterian Ministers Association of Minneapolis to demand that University of Minnesota president Lotus D Coffman remove from campus all books of "irreligious quality". When Coffman inquired about one of the textbooks that Riley questioned, he learned that the objectionable part had been quoted out of context and that no one in the class in which the book was used had complained about the book. Refusing to investigate any other books, Coffman used an open letter to Minnesota newspapers to tell the Presbyterian ministers:

> The university exists to orient the students in the world of human thought, as well as in the world of natural fact, and to ignore completely controversial questions would emasculate all instruction in the humanities and to some extent the natural sciences as well. (Szasz 1969)

Riley and his followers responded to Coffman's reply with a declaration of war on the university and a re-energized campaign to eradicate evolution from Minnesota's public schools.

Riley's Anti-Evolution Crusade in Minnesota

Riley began 1926 with a renewed zeal for banning the teaching of evolution in public schools. Since there were no follow-up trials to the Scopes Trial, Riley focused his efforts on passing an anti-evolution law in his home state of Minnesota. On March 3, 1926, the university reluctantly agreed to let Riley give an on-campus lecture entitled "Evolution is a Fallacy and Should Not be Taught in Our Public Schools and Colleges". However, when university administrators discovered that Riley had submitted an advertisement to the *Minnesota Daily* stating the subject of the talk, they responded by abruptly canceling Riley's speech. Riley claimed that the university was conspiring to silence him and, in retaliation, rented the Municipal Armory (Kenwood Armory) for a speech on March 7, 1926 that was attended by a full-house of 5500 (plus another 2200 listeners outside). Riley's speech, which was reported by the *Star-Tribune* headline "Riley Assails 'U' as Fostering State Atheism," blasted the university's "atheistic" professors and textbooks. Riley, continuing Bryan's majoritarian message, told listeners that he was fighting "for the God-believing, God-fearing Minnesota majority" by demanding that students be taught both sides of the evolution story. After an impassioned plea for money to support his floundering Anti-Evolution League, Riley closed the service with a singing of *America*. The League's linkage of fundamentalism with patriotism was made explicit with its sponsorship of the a nationwide "Bible-Christ-and-Constitution campaign against Evolution in Tax-Supported Schools" (Moore 2002).

Riley followed the speech with sermons at First Baptist Church on 10 consecutive Sundays that were devoted to evolution. Riley continued to preach about the evils of evolution long after the country and his congregation grew tired of the controversy. His continued agitation about evolution led Curtis Akenson (pastor of First Baptist Church from 1946–1974) to comment that "Riley's early preaching about evolution filled the church. Riley's later preaching about evolution emptied the church."

Encouraged by overflow crowds at each sermon, Riley gave four lectures in November, 1926 at the university that were titled "Fundamentalism and the Scopes Trial", "The Bible — Is It an Evolution or a Revelation?", "Civilization — Is It a Product of Evolution or of Religion?", and "Man — Is He a Natural Evolution or a Divine Creation?" Riley's lectures, which were attended by hundred to thousands of students, claimed that the teaching of evolution had increased the population of non-Christian students at the university from 15 to 45%. When the *Minnesota Daily* reported that most students were disappointed with Riley's lectures, the paper's managing editor (Howard Haycraft) joined the list of Riley's many targets.

Early in 1927 Riley began the climactic part of his plan to ban the teaching of evolution in Minnesota. On January 7, and with the aid of fellow fundamentalist Gerald B Winrod of Kansas, Riley announced at First Baptist Church that he had drafted legislation to ban the teaching of evolution in Minnesota's public schools. Despite protests from the universi-

ty that Riley should direct his concerns about the university to the university's board of regents instead of the state legislature, Riley moved ahead, and on February 25 state Senator KK Solberg of Clarkfield introduced Riley's legislation

> to prohibit the teaching that mankind either descended or ascended from a lower order of animals and the adoption or use of textbooks which teach that mankind either descended or ascended from a lower order of animals, in all the public schools, colleges, State Teacher's Colleges, and University of Minnesota, supported in whole or in part by the public education funds of the State of Minnesota.

A similar bill was introduced in the Minnesota House of Representatives a few days later by Hemming S Nelson of Lake Lillian and 16 co-sponsors. Some of the bill's co-sponsors later asked that their names be removed from the legislation (Szasz 1969).

Riley had a flair for publicity, and as a vote on the legislation drew near, stories about Riley and his crusade appeared on the front pages of virtually all Minnesota newspapers. The university responded with a counterattack. For example, on March 8, 1927, classes were dismissed early so students could attend a rally against Riley's proposed legislation. The rally, which was attended by 5000 of the university's 9600 students, was described by the *Daily* as "one of the greatest undergraduate protests against a legislative measure ever felt at the University." Coffman claimed that Riley's bill would "stifle learning, cripple research, destroy intellectual integrity, [and] doom the University to mediocrity or less," adding that any alleged errors regarding evolution could only be corrected by additional research rather than by the votes of a majority or the complaints of a minority.

Riley's speech at the hearing was uncharacteristically ineffective and closed with a claim that students at the university supported his proposed ban. To his dismay, Riley's claim was negated when Haycraft produced a petition signed by 6500 students denouncing Riley's proposed ban on teaching evolution. The next morning, the Minnesota Senate voted 55–7 to kill Riley's bill. Although Riley claimed the next week that voters would "in the course of time, reverse the decision," he was wrong. No additional bills to ban the teaching of evolution were considered by the state legislature (Szasz 1969). Despite the defeat of Riley's bill, Minnesota came closer than any northern state to passing a ban on the teaching of evolution.

After the embarrassing defeat in his home state, Riley returned his attention to Northwestern Bible and Missionary Training School (today known as Northwestern College), which he had founded in 1902 to train rural pastors. By the time Riley retired as its president in 1947, Northwestern had produced more than 2000 graduates (called "Riley's Boys") who were employed in 75% of Minnesota's 125 Baptist churches.

In the End...

Riley began his career as a liberal who denounced class distinctions, corporate wealth, low wages, and "pew rentals" while democratizing an aristocratic congregation and opening First Baptist Church to servants, factory workers, and other common folks. When Riley arrived at First Baptist Church, the rich and affluent (having names such as Pillsbury, Reynolds, and Dunwoody) paid the church to reserve for themselves the best pews. Riley abolished these so-called "pew rentals" almost immediately after arriving in Minneapolis (Trollinger 1990).

However, in his later years, Riley became a vehement conservative. Facing Roosevelt's New Deal (which he considered communistic) and the continued growth of modernism, Riley needed a scapegoat to blame for his failures. Borrowing from the prevailing culture, Riley became anti-Semitic, and by the 1930s was obsessed with an alleged international Jewish conspiracy. Only with the start of World War II did Riley stop defending Hitler's policies toward Jews. However, Riley never apologized for his pro-Nazi statements (Kenney 1999).

In 1947 and near death, Riley split from the Northern Baptist Convention and put the Northwestern Schools [Northwestern Bible and Missionary Training Schools (founded to train rural pastors), Northwestern College (founded to provide a liberal arts undergraduate program), and Northwestern Theological Seminary (founded to train urban pastors)] under the care of an unknown, young preacher named Billy Graham, who served as the schools' president from 1948–1952 (Kenney 1999; Russell 1972).

When Riley died at his home in Golden Valley, MN on December 5, 1947, his funeral was officiated by Billy Graham. Today, Riley rests Lakewood Cemetery in Minneapolis (Fig 2).

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BOOK REVIEWS

EVOLUTION IN HISTORIC AND CULTURAL PERSPECTIVE

OWEN'S APE AND DARWIN'S BULLDOG

by Christopher E Cosans
Bloomington (IN): Indiana University Press, 2009. 192 pages

Reviewed by Ron Amundson

Christopher Cosans's *Owen's Ape and Darwin's Bulldog* shares many of my own historical prejudices about Richard Owen and TH Huxley. Huxley is traditionally regarded as a scientific hero (Darwin's earliest and most aggressive supporter), and Owen a scientific villain (an early critic of the *Origin of Species*). Cosans and I agree that Owen was much more important than his recent reputation would indicate. He articulated several concepts that were crucial to evolutionary thought, including the homology/analogy distinction. He interpreted the work of continental anatomists in a way that made them acceptable to British thinkers, which provided Darwin with some of his best evidence for the fact of evolution. He believed in some form of evolution himself, although he was reluctant to spell it out. And Huxley is mostly to blame for Owen's poor reputation.

Owen and Huxley developed a deep mutual personal animosity in the early 1850s. Huxley badmouthed Owen, in print and privately to Darwin, for the rest of his life. Owen did the same, but because Huxley was on the winning side (and lived longer) his calumny was more damaging than Owen's calumny. I was pleased to see that a pro-Owen history of the debates of this period was being published. I was less pleased with the results.

Owen's pre-*Origin* comments about evolution occurred in the 1840s, embedded in important anatomical reports that gave Darwin some of his best anatomical evidence. Owen's evolutionary comments were so vague and cautious that very few people recognized them for what they were. Those who did (unfortunately) were conservatives who scolded him for his impiety. This seemed to have chastened Owen. He didn't write about evolution again until after Darwin had scooped him on the concept in the 1859 *Origin of Species*. During the 1850s Owen turned to topics that were more pleasing to conservatives, such as arguments that human beings are extremely different from apes. He claimed that humans shared a taxonomic class with other mammals (Mammalia), but they were in a subclass all their own, separate from every other mammalian species. Cosans provides a reproduction of Owen's classification scheme for mammals, but he doesn't point out what a remarkable claim this was. It implies that chimpanzees are more closely related to lions, cows, and whales than they are to humans. Huxley and the Darwinians, of course, considered the great apes to be the closest living relatives of humans, a judgment that persists today.

This brings us to the centerpiece of Cosans's book. Owen had argued for the extreme difference of humans in part on the basis of a small detail of brain anatomy, the hippocampus minor. Owen claimed that humans had the organ but chimpanzees did not. In anatomical terms, chimps had no *homolog* to the human hippocampus minor. Huxley did his own dissections and claimed that chimps did, indeed, have a homolog to the hippocampus minor. For anatomical purposes, to have a homolog to a hippocampus minor is to *have* a hippocampus minor. This was one of the crucial evolutionary principles that we owe to Owen himself — he defined homology as *the same organ in different species under every variety of form and function*. Owen's choice of the hippocampus minor to prove human uniqueness was unfortunate. Huxley was able to show that something in the chimp's brain corresponded to (was homologous to?) the human hippocampus minor. Owen squirmed a bit on the subject by admitting that chimps had a *rudiment* that corresponded to the hippocampus minor, but claimed that it was not *homologous* to the hippocampus minor. So the argument for human uniqueness came to hinge rhetorically on whether a tiny brain-part was a rudiment or a homolog.

Cosans's book offers us a number of valuable reproductions of graphics from the period, along with photographs of Cosans's own dissections of chimp and human brains. Cosans's conclusion is that "there is some ambiguity over whether one should interpret chimpanzees as having a non-rudimentary or a rudimentary hippocampus minor. What is not ambiguous, however, is that humans have much larger brains than chimpanzees" (p 102). This is quite a letdown, given the strength of Cosans's defense of Owen. He

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seems to be admitting that Owen had only the flimsiest of anatomical grounds on which to classify humans as taxonomically unique among mammals.

If not the homology of the hippocampus minor, what motivated Owen's apparently absurd taxonomic claim? Cosans claims that Owen's position was influenced by moral factors, not merely observational facts. The use of moral factors to justify a scientific conclusion was based on a methodology allegedly derived from Kant, according to which morality is not a separate factor that precedes or postdates empirical scientific judgment, but a factor within the judgment itself. Huxley and the Darwinians adhered to Hume's "is-ought" distinction, and so concluded that chimps are taxonomically closer to humans than to cows or whales.

Which exact moral judgments influenced Owen's scientific conclusions? According to Cosans, it was the opposition to slavery. There is an important point to be made here. Traditional histories of science tend to leave out (for many reasons, including ideological ones) details that we might today find important. In this case, many of the supposed villains of the Darwinian hagiography were important members of the anti-slavery movement in England (even Bishop Samuel Wilberforce, another villain of the Huxleyan history of the Darwinian Revolution). In addition, a number of evolutionists, including Huxley, were openly racist, claiming that non-white races were intermediate between humans and apes. Cosans exploits this underappreciated fact. He claims that Owen's anti-slavery beliefs were the foundation of his peculiar taxonomic claims, and that Owen's opponents were racists.

There are two major problems with this core argument. The first is that Cosans does not convincingly show that Owen's peculiar taxonomy was motivated by anti-racism rather than any number of other possible moral motives. Cosans documents Owen's anti-slavery views, but there is a large gap between his anti-slavery and his peculiar taxonomic views. Many other moral concerns might equally well have motivated his arguments for human uniqueness. One is a desire to preserve the existing social structure. (Cosans rejects this motive but does not refute it.) Another is the worry that allowing the general public to know that humans are related to "beasts" would destroy people's commitment to genuine morality (a view that can be documented in Owen's conservative correspondents, and persists today). Having opened the door to morality, Cosans cannot allow only anti-racism to enter.

The second problem is that the book gives only the sketchiest account of philosophy of science. Cosans's favored methodology, humanistic realism, mixes scientific with moral judgment. (He fails to note either that Darwin was *also* opposed to slavery, or that Kant, the alleged father of humanistic realism, was arguably the father of scientific racism.) Cosans offers two alternatives to humanistic realism. One is scientific materialism (the view that the world is made up of matter), which Cosans claims implies radical empiricism. This is simply false — no opinion about the constituents of the universe (matter) implies anything at all about how knowledge is obtained (sensory experience). The second is social constructionism, which according to Cosans implies that scientific beliefs are dictated by class interest and economic self-regard. Again mistaken; the social construction of scientific beliefs can be controlled by many sources of influence, not only economic ones. Religion can equally well construct scientific belief.

I will mention one other problem regarding the educational use of Cosans's book; Cosans's treatment of Darwin is no fairer than Huxley's treatment of Owen. The first half of his chapter on Darwin is a standard analysis of natural selection. But the second half is hard to see as anything but nit-picking about minor features of the *Origin of Species*. The most egregious example relates to the point, late in the *Origin*, at which Darwin explicates the fact that his theory is not about the origin of life, but about life's evolution subsequent to the origin. In describing the origin of life, Darwin metaphorically states that life had originally been "breathed into" non-living forms. Cosans argues that the religious implications of this metaphor are crucial to the scientific legitimacy of the entire book. Ignoring the *Origin*'s entire argument for the fact of evolution (the part for which Owen deserves high credit), Cosans claims that without the religious implications of breathing life into life-forms, natural selection lacks scientific legitimacy.

Very few modern evolutionary scientists would take this view. Should we claim that Newton's law of gravity is illegitimate because Newton could not explain the origin of matter? The importance of the *Origin,* as seen in modern biology, is independent of any explanation (religious or naturalistic) of the origin of life. Cosans simply denies this fact with no convincing argument for why so many contemporary scientists are wrong. One is led to wonder what school of thought in the present day asserts that natural selection is scientifically impotent in the absence of a theory of the origin of life.

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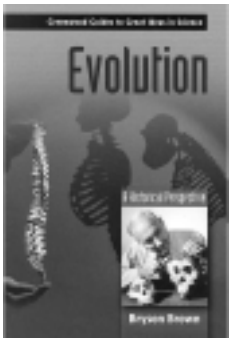

Evolution: A Historical Perspective

by Bryson Brown
Westport (CT): Greenwood Press, 2007. 195 pages

Reviewed by Tim M Berra

In the introduction to his *Evolution: A Historical Perspective*, Bryson Brown, a philosopher at the University of Lethbridge, explains that science is common sense extended whereas creationism defies common

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sense and relies on radical skepticism — the view that we can't know anything about the past because it wasn't witnessed. Brown explains that we need knowledge of the past to judge claims about it. This leads to a discussion of dating techniques.

Chapter 1 summarizes the views of Aristotle, Linnaeus, Leonardo da Vinci, Redi, and Steno and explains the development of thinking about fossils and superposition. The contributions of Werner (Neptunism), Hutton (cycles), and Smith (stratigraphy) are discussed. The section on geological time and index fossils hits the biological highlights of the eras, periods, and epochs, and ends with a brief review of the human fossil record. Text boxes deal with the coelacanth and the difficulty of naming human species.

Chapter 2 is a summary of the creationist and proto-evolutionary views of the pre-Darwinians such as Paley, Cuvier, Agassiz, Lyell, Erasmus Darwin, Lamarck, Geoffroy, Owen, and von Baer. We learn how the catastrophism of Cuvier was supplanted by the uniformitarianism of Lyell. Black-and-white illustrations of several scientists decorate the chapter.

Chapter 3 briefly summarizes the *Beagle* voyage and how the experiences and observations affected Darwin's thinking. A few errors have crept in at this point. It was not Darwin's maternal grandfather, Josiah Wedgwood I (1730–1795), who persuaded Charles's father to allow him to go on the *Beagle* voyage. It was Charles's uncle Josiah Wedgwood II (1769–1843), his mother's brother. The author consistently misspells Wedgwood with an "e" in the middle. And it is not a beetle that carries Chagas disease, but a true bug (Hemiptera), *Triatoma infestans*.

In chapter 4, Brown recounts the Darwin/Wallace interaction, but consistently misspells Alfred Russel Wallace's name by placing an erroneous additional "l" at the end of "Russel". Brown here gives an overview of *On the Origin of Species*, emphasizing why design-based arguments fail to account for vestigial structures, and explaining the stepwise origin of complexity. In discussing hybrid sterility, Brown confuses mules and hinnies (for a review of the distinction, see Savory 1970). Darwin's thoughts on biogeography and embryology are discussed, followed by a brief account of the impact of the *Origin*. This chapter contains several boxes on Darwin's Originality, Proof in Science, True Causes, and the Creativity of Natural Selection. It is in discussing these philosophical concepts that the author, a philosopher, is strongest.

Chapter 5 deals with Mendel's genetics and how it defeated the notion of blending inheritance, and its rediscovery by Hugo de Vries, who coined the word "mutation". Mendelian genetics combined with mathematical population genetics and natural selection to form the Modern Synthesis of evolutionary theory. Along the way to the Modern Synthesis, we meet *Drosophila* geneticist Thomas Hunt Morgan, Ronald Fisher, who restored natural selection to its creative dominance over mutation, JBS Haldane, Sewall Wright, and Theodosius Dobzhansky (who defined evolution as a "change in gene frequency" within a population). Ernst Mayr and his biological species concept are rightly given the largest space among the architects and ideas of the Modern Synthesis. The difficulty of arriving at an airtight definition of species is discussed. Because evolution is a continuum and a process, it is unlikely that a perfect species definition that applies without exception for all organisms can be formulated. Darwin's own species views are not discussed here, but he considered varieties to be incipient species and emphasized the stages leading to the formation of species (Mallet 2008). Paleontologist George Gaylord Simpson's introduction of the branching model of (horse) evolution as a replacement for the linear view completes the tour of the history of the Modern Synthesis. There is a boxed account of the anti-Mendelian views of Lysenko and how he damaged Soviet biology and agriculture under Stalin.

Chapter 6 deals with biochemistry, DNA, and evolutionary development. The Watson-Crick model of DNA explains how inheritance can be encoded in a molecule. Brown confounds adenosine with adenine on p 108, but gets it right on p 109. He also refers to mRNA as "memory" rather than the usual "messenger". The polymerase chain reaction is explained as a technique for amplifying DNA. Shared mutations in pseudogenes of human and chimps are cited as strong evidence of recent common ancestry. The tinkering nature of natural selection whereby a pre-existing structure or biochemical pathway is modified to a different end is shown to be an effective refutation of "intelligent design" creationism.

Biological evolution begins with the appearance of the first cell. The origin of life is the province of chemical evolution, and that is the subject of chapter 7. Spontaneous generation is discussed, and we are introduced to Redi, Spallanzani, Pasteur, and Tyndall. Abiogenesis is explored through the experiments of Oparin, Haldane, and Miller/Urey and then through Sidney Fox's proteinoid microspheres, Cairns-Smith's clay particles, the RNA world, and Günter Wächtershäuser's reverse Krebs cycle metabolism-first approach, illustrating that understanding how life originated is a fertile research program and a work in progress.

Brown's unique contribution is in the last chapter, where he deals with evolution's philosophical implications. He shows how the methodological naturalism of science arrives at an understanding of how the universe operates and why supernaturalism explains nothing. Filling gaps in scientific knowledge with miracles is an exercise in futility, with no utility for prediction and testing. The theory of evolution does not invoke goal, purpose, or progress. It works simply because differential reproduction preserves inheritable adaptive variations and eliminates maladaptive ones. This sometimes gives the illusion of purpose or progress, but it is the mindless unfolding of natural laws.

This thoughtful, philosophical end of Brown's book saves it from being an ordinary historical review. (There are other sources to which I'd turn for a history of evolution [Bowler 1984; Larson 2004] which, oddly, are not cited.) I rec-

ommend this last chapter to biologists, teachers, and concerned parents of school-age children. Also helpful, in the back matter, are a chronology of biological developments, glossary, and bibliography.

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The Young Charles Darwin

by Keith Thomson
New Haven (CT): Yale University Press, 2009. 276 pages

Reviewed by Léo F Laporte

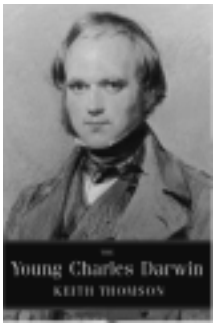
Using Darwin's *Autobiography* (written in old age), his notebooks (both those written during the five-year *Beagle* voyage and those kept during the post-voyage decade), his voluminous correspondence, family reminiscences, his and other students' course notes, and the secondary literature created by the Darwin industry, biologist and science historian Keith Thomson carefully and economically dispels the apparent paradox of "an ordinary boy, rather below the common standard of intellect" becoming the young genius in his thirties formulating the outlines of his revolutionary theory.

Thomson traces this intellectual trajectory in a thoughtful way, using all the documented evidence and, by delving within it, making his own compelling inferences about its interpretation. For example, in the *Autobiography* Darwin portrays Edinburgh professor Robert Jameson's lectures on geology and zoology as "incredibly dull," discouraging him from ever reading a book on geology or studying the science in any way. Yet, in a chapter devoted to Jameson, Thomson shows how, on the contrary, Darwin benefited greatly from this polymath, who was "intense and brilliant … a collector of specimens and information." Thomson emphasizes that Darwin "attended Jameson's lectures regularly and … compulsory sessions in [his] museum" of natural history." Darwin, who in his own words "was prepared for a philosophical treatment of the subject," was also introduced to the debates on the origin of the great classes of rocks: whether all primordially water laid (as the "Neptunists" held) or included significant amounts of lava periodically generated by the earth's internal heat (as the "Vulcanists" held). Jameson is reported even to finish up "with lectures on the origins of the species of Animals." Was Darwin perhaps a victim of the common disability of hazy recall in old age, or was Darwin, as Thomson suggests, distancing himself from Jameson to claim his future successes in geology and zoology as his own?

Thomson gives a full account of the role of other Darwin mentors when he was later at Cambridge including John Stevens Henslow (botanist and mineralogist) and Adam Sedgwick (geologist), both of whom found Darwin enough of an engaging young man to include him in their own natural history undertakings: with Henslow, collecting beetles in the local fens, and with Sedgwick, geologizing in north Wales. Because both were Anglican clergymen, they also served as role models for the vocation Darwin was preparing for, however desultorily.

It's often said that "evolution was in the air," and Thomson describes well the pro-and-con positions on Lamarckianism, William Paley's influence on Darwin's appreciation of fine-tuned adaptations, Georges Cuvier's views on animal extinction, and other similar debates. At the same time, Darwin was reading widely out of curiosity and for his final college examinations: including Hume and Locke, Homer and Virgil, Euclid and geometry, and Whewell's *History of the Inductive Sciences.*

Thomson thus makes a strong case that Darwin was a serious student with deep intellectual interests and that owing to his likeable personality he was able to befriend a broad range of men — usually older and more experienced — from whom he gained, like a composite protégé, a sound scientific education that would form the context for his own later scientific efforts. Darwin himself remarked in his *Autobiography* that "there must have been something in me a little superior to the common run of youths, otherwise [these] men, so much older and higher in academical position, would never have allowed me to associate with them."



Thomson argues that Darwin's selection as the *Beagle*'s naturalist was therefore justified scientifically, and not just because Darwin was suitable as a "gentleman companion" for Captain FitzRoy. Henslow told Darwin that while he was not "a *finished* naturalist," nevertheless he was "amply qualified for collecting, observing, & noting anything worthy to be noted in Natural History." Thomson indicates how throughout the five-year voyage, Darwin continued to keep in touch with the current science from the publications he solicited from his family (especially volumes 2 and 3 of the geologist Charles Lyell) and from the advice of Henslow, his Cambridge mentor.

Thomson describes how "[as] the voyage unfolded, Darwin would encounter situation after situation that challenged or changed his world view, both in terms of science and of human affairs." The voyage can thus be likened to Darwin's "graduate education," where he started out as a somewhat green ingénue and ended as a fully fledged competent scientist. Thomson points out that Darwin, soon referred to by the crew as "Philos," had the necessary social skills, too, to win over the captain and other officers who willingly cooperated in his

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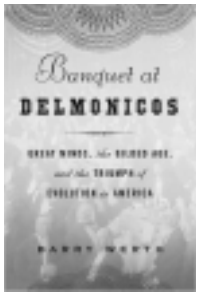

onboard and offshore science. Only after the voyage, when FitzRoy's religious persuasion turned fundamentalist, was there a falling out between the two men.

Upon his return to England from the voyage, Darwin was received by his colleagues as a firmly established member of their scientific circle. This reception was made possible by the flood of specimens — animal, vegetable, and mineral — Darwin sent back to England as well as Henslow's sharing (in some cases through publication) of many of his letters with their colleagues. Darwin had full entrée to this exciting, sometimes contentious, world of natural history research and debate.

Before long, after being overwhelmed by all this attention and marrying his cousin Emma Wedgwood, Darwin retreated to the country in Downe, Kent, where he spent the rest of his life in semi-isolation, surrounded by an ever enlarging family. But, of course, he didn't in any sense retire. On the contrary, through the half-dozen years in London and the next few years at Down House, Darwin wrestled with the "species question" that had been stimulated by his time at Edinburgh and Cambridge and became more pressing from his voyage experiences. Using the extensive notebooks that Darwin kept during this period, from 1836 to 1844, Thomson traces the irregular path Darwin followed in eventually developing the outlines of his theory of organic change. He comments that "reading the notebooks shows the vast range of intellectual debts that Darwin owed to others as he developed his theory — a useful counterpoint to the impressions he gives in the *Autobiography*."

In summary, in this well-written and interesting book, Thomson works out and demonstrates in detail the education of Charles Darwin. He removes that apparent discrepancy between the "ordinary boy" and the man buried in Westminster Abbey nearby that other English genius, Isaac Newton.

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Banquet at Delmonico's: Great Minds, the Gilded Age, and the Triumph of Evolution in America

by Barry Werth
New York: Random House, 2009.
400 pages

Reviewed by Jeffrey P Moran

Although the title's reference to "the Triumph of Evolution in America" is a little over-optimistic, Barry Werth nevertheless succeeds in portraying the power evolutionary thought held for a number of elite scientists, ministers, and even industrialists in the late nineteenth century. The story of Darwinism's gradual acceptance in America — the great struggles between Darwin's staunchest American supporter, Asa Gray, and his powerful antagonist, the prominent naturalist Louis Agassiz — has been told many times, and Werth generally sidesteps their battles. Instead, Werth focuses on the development of what came to be called "social Darwinism," or the theory that the "survival of the fittest" applies to human society as well as to animal populations.

In Werth's narrative, Charles Darwin pops up occasionally, but Werth's real protagonist is Herbert Spencer, the English polymath who coined the phrase "survival of the fittest" in 1864, after reading Darwin. Spencer's career as an evolutionist of sorts, however, preceded *On the Origin of Species* by several years. From his early conception that evolution was a universal law, Spencer spent the latter half of the nineteenth century applying this insight to society, government, religion, and psychology. Although "social Darwinism" was to become shorthand for laissez-faire government and a willingness to allow society to "excrete" the weak, Spencer attached these mechanisms to a more benign vision, a kind of social Darwinism with a smiling face. Spencer and most of his disciples saw evolution as progressive process. Societies evolved from primitive states to a higher level in which violence and poverty were unknown; human intelligence evolved from stupidity to rationality; and even theology was to evolve from superstition to a recognition that humanity need not depend on fairy tales and superstition. As a Lamarckian, Spencer rejected Darwin's seemingly random mechanism of natural selection; the universal law pointed onward and upward.

After a slow start, Spencer's ideas became hugely influential by the 1870s, especially in the United States. His popularity was apotheosized at the "Banquet" of the book's title, which refers to the night in 1882 that two hundred men from the highest strata of society gathered at Delmonico's, New York City's grandest dining hall, to fete Spencer over truffles, tongue, oysters, chateaubriand, rare wines, and a host of other delicacies. To them, Spencer's conclusion that the natural law of the universe pushed the "fittest" men to positions of eminence made a great deal of sense.

Werth develops his entertaining narrative of Spencerism's path from obscurity to gluttonous victory by interweaving shorthand stories of Spencer's allies, such as his publicist, EY Youmans, who founded *Popular Science Monthly* in part to spread the gospel of Spencerism; the tycoon Andrew Carnegie, the minister Henry Ward Beecher; and a handful of other Americans whose stolid features belied their colorful lives.

They put social Darwinism to a variety of uses. William Graham Sumner derived from Spencer an utterly uncompromising rejection of state intervention and charitable works, for they interfered with the natural working of the universe. Sumner also precipitated a notorious battle for academic freedom when he ran afoul of his superiors at Yale for assigning one of Spencer's textbooks in a course on sociology. For a school still closely tied to its religious moorings, Spencer's irreligiousness was a direct threat, and that was exactly how Sumner and many others wanted it. On the other hand, Spencerian evolution also appealed greatly to Henry Ward Beecher, the most famous and elo-

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quent minister of the day — possibly "the most famous man in America," as many called him. After an early career preaching charity and good works, Beecher read Spencer and converted to Sumner's brand of brutal laissez-faire, telling his wealthy parishioners that the poor could very well subsist on "bread and water" if they were unwilling to pick themselves up. After a nationally notorious trial over his adulterous affair with a church member, Beecher increasingly and publicly rejected orthodox Christianity in favor of the hopeful side of Spencer's progressivism. Naturally, Spencer also interacted with specialists in biological evolution. In addition to knowing Darwin, Spencer was an ally of the Harvard botanist Asa Gray, and Yale's premier dinosaur-hunter, OC Marsh, among others. Drawing on letters, memoirs, and published accounts, Werth tells a story that is at once a "good read" and a revealing account of evolution's development.

And what of the book's protagonist? As a physical organism, Spencer fell rather short in Darwinian terms. He spent much of his life debilitated by unruly nerves, insomnia, overwork, and hard-earned hypochondria. More damning for the survival of the fittest, Spencer never reproduced, and died, Werth surmises, a virgin.

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The Tragic Sense of Life: Ernst Haeckel and the Struggle over Evolutionary Thought

by Robert J Richards
Chicago: University of Chicago Press, 2008. 551 pages

Reviewed by Lennart Olsson

Even before the Darwin anniversaries in 2009, the publications on Charles Darwin's life and science were so numerous that the label "Darwin industry" emerged to describe this scholarly output. Curiously, the German zoologist Ernst Haeckel (1834–1919), whose books and pamphlets were much more widely read in continental Europe (and Scandinavia) than Darwin's books in the late 19th century, and whose life was much more dramatic than Darwin's, has received much less attention. The only recent treatment in English was a scholarly biography (Di Gregorio 2005). Now Robert Richards, whose book on German romantic biology (Richards 2002) was well received despite its attempt at making Darwin a German Romantic, has written a marvelous biography of Haeckel.

In this book, Richards places Haeckel firmly in the tradition of German Romantic biology. He shows how Haeckel used the inspiration from Darwin's and Huxley's work to concoct, in his first, programmatic work *Generelle Morphologie der Organismen* (1866), his own synthesis of evolutionary biology with more traditional (idealistic) comparative biology and with his teacher Carl Gegenbaur's methodological approach. The effort that went into producing this enormous work — a book of almost 1000 pages, published in two volumes — was connected with his reaction to the death of his first wife, Anna Sethe, from puerperal fever shortly after having delivered a daughter. On the day Richards interprets as the most important in Haeckel's life, February 16, 1864, he turned 30, received a prize for his scientific work (the Cothenius medal), and lost his wife. After this, Haeckel went into a frenzy of work, and completed the *Generelle Morphologie* within a year. Although he remarried, and took several lovers, nothing and no one could replace his beloved Anna.

In 1868, Haeckel published his first popular science book, *Natürliche Schöpfungsgeschichte*, based on lectures held in Jena. Unlike *Generelle Morphologie*, this book reached a wide audience and was translated into several languages. It was published in English in 1874 as *The History of Creation*.

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Together with another popular science book, *Anthropogenie*, on human evolution and published in 1874, *The History of Creation* is the book for which Haeckel is perhaps most well known. However, he also published important scholarly works on marine organisms such as radiolarians, jellyfish, and poriferans that helped establish Haeckel as a leading invertebrate zoologist and embryologist. Unlike Darwin, Haeckel was a university professor and students flocked to hear him lecture on evolution. In the later stages of his career, Haeckel turned more and more into a champion of "monism", a materialist world view that brought him into confrontation with organized religion.

Haeckel is known for his idea that ontogeny recapitulates phylogeny. To illustrate this so-called Biogenetic Law, he published drawings of embryos from different species of vertebrates. He is notorious for having drawn these embryos so that they look more alike than they in reality are, as can be seen by comparing Haeckel's drawings with photographs of the embryos. The most embarrassing incident was in the first edition of *Natürliche Schöpfungsgeschichte*, where Haeckel had replicated the same woodcut three times to illustrate the embryos of a chicken, a turtle, and a dog. This illustration, and another in which Haeckel also used the same woodcut three times, to illustrate the eggs of a human, an ape, and a dog, was criticized by Haeckel's contemporaries as a fraud. Haeckel also changed these illustrations (using the woodcuts only once) in later editions. Richards argues that Haeckel was just trying to make a didactic point, and that the book was put together from lectures and was a pedagogical rather than a scientific work. However, the damage was already done, and the accusations of forgery would follow Haeckel throughout his career.

Another aspect covered in detail in Richards's rich and entertaining book, which might be of interest to the readers of *Reports of the NCSE*, is the rather bizarre idea that Haeckel was a "proto-Nazi", whose ideas led directly to Nazi racism and anti-semitism. Richards shows convincingly that Haeckel was not more racist (and was in fact less anti-

semitic) than what was normal at the time. Importantly, he points out that the Nazis actually did not use Haeckel's work as an inspiration for their ideas. Haeckel's books are not mentioned in the Nazi literature other than critically; indeed they were banned (by the Saxon ministry for bookstores and libraries) for advocating "a primitive Darwinism and monism" (Anonymous 1935).

In this review, I was able to pick out only a few aspects of Haeckel's life and work from this splendidly written biography, which can be recommended to anyone interested in the history of evolutionary biology. Very few academics write as well as Richards, and this makes the book a truly rewarding experience to read. I even enjoyed reading passages where I disagree with the author, largely because of his skill in deftly glossing over difficult patches in his arguments and in disputing the interpretations of scholars with whom he disagrees. The appeal of the book is not only in its writing: Richards's book is profusely illustrated with beautiful drawings and paintings by Haeckel, certainly an added value of the book. (Haeckel was a very good artist, and as a young man travelling in Italy with his artist friend Hermann Allmers, he wrote to his father about wanting to become a painter. Shocked by such folly, Haeckel's father ordered him to return to Germany and finish his studies of medicine, and that was the end of this dream.) Ernst Haeckel, both as a scientist and as a human being, is infused with life in this magnificent work, which truly deserves a wide readership.

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Stephen Jay Gould: Reflections on His View of Life

Edited by Warren D Allmon, Patricia H Kelley, and Robert M Ross
Oxford: Oxford University Press, 2008. 416 pages

Reviewed by Kevin Padian

At scientific meetings, Steve Gould was usually as mobbed as he was at his public lectures. Everyone had something to discuss with him — a point, a quibble, an idea, a request for help. Whenever we spoke, usually after the throng had dispersed, we would talk about Darwin, dinosaurs, Owen, punctuation, homology, species, and adaptation. But first, we would talk about baseball. As diehard American League fans, we had the endless vicissitudes of pitching, hitting, strategies, and injuries to rehash. Steve was a very public person, and his observers have often been puzzled by his fascination with baseball — as with cathedrals, choral music, and antiquarian books. But the answer is obvious, really, encapsulated in the T-shirt motto: "Baseball is Life." The players have different ecological roles, for which they are selected, but few players are good at everything. There are constraints of the rules of the game, contingencies of the consequences of a fielding error or an unintentional fat pitch hit for a homer. The dynamics change with every hesitation before the next ball is thrown; and just when you think nothing is happening, that's often when the most is happening.

Structure, contingency, and history were three major evolutionary themes that also resonated in Steve's non-scientific preoccupations. None of the authors in this tremendously informative and accessible volume talks much about baseball or Steve's other passions, though. That's interesting, because he saw much of evolution — although in strictly analogical terms — through the lenses of his favorite pursuits. But the essays in this indispensable book are less about style than substance, and they comprise a collection of lasting value for any evolutionist.

Do the authors, many of whom are Gould's former students, come to praise him or to appraise him? The latter, although it is difficult not to celebrate the man who was not only the most publicly visible and influential paleontologist of the last half of the 20th century, but also the most publicly visible and influential evolutionary biologist. The only scientist who even came close was Henry Fairfield Osborn, who died in 1936 but used the American Museum of Natural History and a slew of books and articles to keep interest focused on the history of life (Rainger 1991, Regal 2002). Osborn's notions about evolutionary progress, vitalism, and teleology are long dustbinned. Will Gould's ideas about punctuated equilibria, species selection, exaptation, and the hierarchy of evolutionary levels meet the same fate?

The authors of this collection don't think so, on balance, although they are clear-eyed about the reception of Gould's ideas in various corners of the field of evolution. The perspectives of a cadre of leaders in paleobiology, all of whom grew up hearing Gould's ideas straight from the source, trying to test and elaborate upon them, are invaluable as an historical record of one of the most original evolutionary theorists of the century. Yes, Gould had his quirks, his inadequacies, and his blind spots, like any scientist. But how many scientists would merit this kind of theoretical analysis?

At the heart of most assessments of Gould's work is punctuated equilibria, which he originated with Niles Eldredge. Several authors (Allmon, Geary, Kitcher, Lieberman) discuss it with great insight. In particular, they note that the critical issues of PE are whether stasis in evolutionary lineages is predominant, and what causes morphological stasis? These are not only central to PE but to all of evolutionary biology. If stasis really is predominant in evolutionary lineages, then most of what we have been taught about population genetic models of tempo and mode, and the tracking

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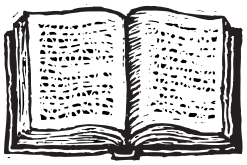

The worth of a book is to be measured by what you can carry away from it.

— James Bryce

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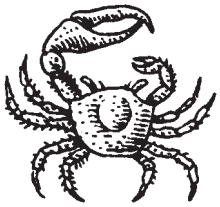
Meet the mammals

"Mammals are among the most successful animals on earth," Kenneth D Rose explains in his *The Beginning of the Age of Mammals*. "They occupy every major habitat from the equator to the poles, on land, underground, in the trees, in the air, and in both fresh and marine waters. They have invaded diverse ... niches, and range in size from now longer than a bumblebee ... to the largest animal that ever evolved ...." Plus, he might have added, they received their own tribute from the musical group They Might Be Giants, which includes the taxonomically memorable verse "Placental the sister of her brother Marsupial / Their cousin called Monotreme / Dead uncle Allotheria"! To learn more about the evolution of the mammals, and of favorite groups such as horses and humans, consult the following books, now available through the NCSE web site: <http://ncse.com/store> — look in the "In the latest *RNCSE*" section. And remember, every purchase benefits NCSE!

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

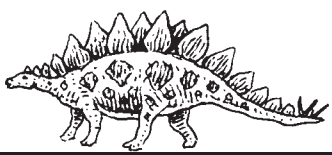
The rise of the mammals

Mammoths, Sabertooths, and Hominids: 65 Million Years of Mammalian Evolution in Europe
by Jordi Agustí and Mauricio Antón
From the publisher: "*Mammoths, Sabertooths, and Hominids* takes us on a journey through 65 million years, from the aftermath of the extinction of the dinosaurs to the glacial climax of the Pleistocene epoch; from the rain forests of the Paleocene and the Eocene, with their lemur-like primates, to the harsh landscape of the Pleistocene Steppes, home to the woolly mammoth. ... Finally, it is a journey through the complexity of mammalian evolution, a review of the changes and adaptations that have allowed mammals to flourish and become the dominant land vertebrates on Earth."



The Origin and Evolution of Mammals
by TS Kemp
"These are exciting times to be a palaeomammalogist!" TS Kemp exclaims in his introduction to his textbook, which updates and extends his *Mammal-like Reptiles and the Origin of Mammals* (1982). The reviewer for the *Journal of Mammalian Evolution* comments, "The readership targeted consists mostly of university students and paleontologists, but some of the broader topics will be of interest to evolutionary biologists and most scientists with a natural history background. The amateur or layperson attempting to tackle this book will face a steep learning curve, but if successfully completed much will be learned, and it will have proven the doggedness of his/her interest."

After the Dinosaurs: The Age of Mammals
by Donald R Prothero
Donald R Prothero offers a comprehensive look at the diversification of the mammals throughout the Cenozoic Era, suitable for the specialist and the general reader alike. Reviewing *After the Dinosaurs* for *RNCSE*, Kevin Padian wrote, "this book is unusually good in showing how a great many lines of evidence — from chemistry, physics, astronomy, geology, botany, and climatology — contribute to a unified picture of the history of life that accompanies the fossils in the rock record." Author also of *Evolution: What the Fossils Say and Why it Matters*, Prothero is Professor of Geology at Occidental College and Lecturer in Geobiology at the California Institute of Technology.



The Beginning of the Age of Mammals
by Kenneth D Rose
The Beginning of the Age of Mammals provides a magisterial (and marvelously illustrated) survey of the evolution of mammals, beginning with their origin in the Mesozoic and continuing through the early Cenozoic. "The first comprehensive synthesis of mammal evolution in more than 20 years," writes the reviewer for the *Quarterly Review of Biology*: "It is arguably the most significant contribution to the field since George Simpson's classic work Principles of Classification and a Classification of Mammals." Rose is a professor at the Center for Functional Anatomy and Evolution at the Johns Hopkins University School of Medicine.

The Rise of Placental Mammals: Origins and Relationships of the Major Extant Clades
edited by Kenneth D Rose and J David Archibald
Rose and Archibald preside over a detailed summary of both the consensus and significant minority viewpoints on the initial radiation and ordinal relationships of placental mammals. In their preface, the editors explain that they asked the contributors "to summarize objectively the current state of knowledge and views about the origin and relationships of placental clades," and add, "Although we are

<http://www.ncse.com/store>

certainly not unbiased ourselves, we feel that the authors have admirably fulfilled our request."The reviewer for *Science* wrote, "The volume should be welcome bedside reading for all mammal systematicists and anyone interested in the evolution of mammals."

Beasts of Eden: Walking Whales, Dawn Horses, and Other Enigmas of Mammal Evolution
by David Rains Wallace
From the publisher: "In this literate and entertaining book, eminent naturalist David Rains Wallace brings the saga of ancient mammals to a general audience for the first time. Using artist Rudolph Zallinger's majestic *The Age of Mammals* mural at the Peabody Museum as a frame for his narrative, Wallace deftly moves over varied terrain — drawing from history, science, evolutionary theory, and art history — to present a lively account of fossil discoveries and an overview of what those discoveries have revealed about early mammals and their evolution." "*Beasts of Eden* is a true delight," according to Donald Johanson.

Horses and whales and dogs

Marine Mammals: Evolutionary Biology, second edition
by Annalisa Berta, James L Sumich, and Kit M Kovacs
Writing in the *Quarterly Review of Biology*, Philip Gingerich described *Marine Mammals: Evolutionary Biology* as an "excellent introduction to the whole spectrum of marine mammal evolution, anatomy, behavior, ecology, and life history" and as "well-organized and very readable." "Our motivation for writing this book was the lack of a comprehensive text on marine mammal biology, particularly one that employs a comparative, phylogenetic approach," the authors explain. "We have attempted, where possible, to demonstrate that hypotheses of the evolutionary relationships of marine mammals provide a powerful approach for tracing the evolution of their morphology, behavior, and ecology."

Fossil Horses: Systematics, Paleobiology, and Evolution of the Family Equidae
by Bruce J MacFadden
From the publisher: "The family Equidae have an extensive fossil record spanning the last 58 million years, and the evolution of the horse has frequently been used as a classic example of long-term evolution. In recent years, however, there have been many important discoveries of fossil horses, and these, in conjunction with such new methods as cladistics, and techniques like precise geochronology, have allowed us to achieve a much greater understanding of the evolution and biology of this important group. This book synthesizes the large body of data and research relevant to an understanding of fossil horses from several disciplines including biology, geology and palaeontology."

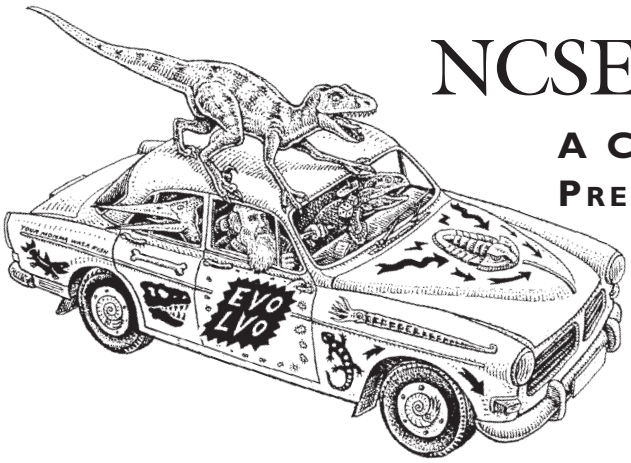
Dogs: Their Fossil Relatives and Evolutionary History
by Xiaoming Wang and Richard H Tedford
Wang and Tedford present a detailed portrait of the evolution of canids over the past 40 million years, with chapters on methods of study and the place of dogs in nature, the origin of canids and other doglike carnivorous mammals, diversity: who is who in the dog family, anatomy and function: how the parts work, hunting and social activity, changing environments and canid evolution, going places: braving new worlds, and domestic dogs. John J Flynn of the American Museum of Natural History praises *Dogs* as "[a] breezy and highly engaging romp through the rich history of the Canidae ... a compelling picture of this fascinating group of carnivores."

Human evolution

From Lucy to Language, revised edition
by Donald Johanson and Blake Edgar
Donald Johanson and Blake Edgar discuss human prehistory — from the appearance of bipedal walking to the origin of language — in a volume lavishly illustrated with original (and often life-size) photographs of fossils and artifacts. The first part of the book concentrates on the interpretation of the paleoanthropological evidence, considering such topics as migration, diversity, anatomy, society, bipedalism, tools, customs, and "imponderables" (such as clothing and the problem of consciousness). The second part comprehensively summarizes the evidence on which our knowledge of human prehistory is based. A revised, updated, and expanded edition, which *Scientific American*'s reviewer described as "even more awe-inspiring than the earlier version."

The Human Career, third edition
by Richard G Klein
Simply the single best reference and advanced introduction to paleoanthropology — the subject of human biological and cultural evolution, the area where physical anthropology and prehistoric archeology overlap. A previous edition was described by Henry McHenry as "by far the best book of its kind" and by RA Foley as "the best introduction to the problems and data of modern palaeoanthropology yet published." Unmatched for breadth, range, and reliability, with more than 1000 pages, *The Human Career* is indispensable for any serious student of human evolution. Richard G Klein is Anne T and Robert M Bass Professor in Humanities and Sciences at Stanford University.

Smithsonian Intimate Guide to Human Origins
by Carl Zimmer
A beautifully illustrated and elegantly concise guide to human origins, the *Smithsonian Intimate Guide to Human Origins* explains the latest research on human evolution. "Despite recent insights into our origins, there is much we still don't know. ... While scientists will never recover a perfect picture of human evolution," Zimmer writes, "their success in recent years makes it a safe bet that they will continue to make astonishing new discoveries for years to come." One of the country's leading science journalists, Zimmer is also the author of *Evolution: The Triumph of an Idea* and *The Tangled Bank: An Introduction to Evolution.*



NCSE on the Road

A Calendar of Special Events, Presentations, and Lectures

Date Apr 17, 2010
City Albuquerque NM
Event Annual Teachers' Workshop at the Annual Meeting of the American Association of Physical Anthropologists
Presenter Andrew J Petto
Title Primate Clues to Human Behavior
Time 8:00 AM – 2:00 PM
Location Hotel Albuquerque at Old Town
Contact Martin Nickels, mnickels@ilstu.edu

Date Jun 4, 2010
City San Jose CA
Event American Humanist Association
Presenter Joshua Rosenau and Steven Newton
Title Creationism Since Dover: Current Crises in Curricula Across the Country
Time 3:00 – 4:30 PM
Location Doubletree Hotel
Contact Steve Newton, newton@ncse.com

Visit the Grand Canyon with Scott and Gish!

Featuring NCSE's Executive Director, Eugenie C Scott and Professor Alan D Gishlick

Dates July 01, 2010 – July 09, 2010

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

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

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

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

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

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continued from page 30

of small-scale environmental change by selection, might just be wrong — or at least due for a revision, as Gould suggested in 1980 and explored at length in *The Structure of Evolutionary Theory* (2002).

The authors in this compilation seem to accept Gould (and Eldredge's) contention that PE is a hypothesis about the deployment of speciation through time. But is it? All that the fossil record shows is morphology; speciation has to be inferred. That would be easy if one lineage clearly divided into two through time, but does it usually? In the classic formulations of PE, including coordinated stasis (Brett and Baird 1995) of many lineages simultaneously, no clear splitting is found. Rather, in classic PE form, one rather stable, vacillating lineage swiftly gives way to another. Is this speciation (cladogenesis) or simply rapid anagenesis? If the former, then competitive replacement of one lineage by another must be geologically instantaneous. In either case, how will diversity increase, as it clearly has through the Phanerozoic Era?

There are many perceptive and useful essays in this collection, and anyone interested in the development of 20th-century evolutionary thought will be fascinated by their insights. They explore the implications of Gould's theories for mass extinction (Kendrick), systematics (Yacobucci), creationism and evolution (Kelley), and ecology (Allmon and others, with the conclusion that Gould never cared about it anyway), among other subjects. Dick Bambach contributes a very useful historical chronology of Gould's ideas, which has the effect of limning clearly the various phases in his intellectual development. Philip Kitcher provides a fascinating and well argued essay on the logic of Gould's major ideas. Lewontin and Levins explore Gould's status as a "radical," by which they mean one who returns to the roots of the field (missing only his "radical" emphasis on original historical literature to dispel the myths of evolutionary history). And Warren Allmon contributes both a sweeping perspective of Gould's contributions to the field and an exhaustive (can it be complete?) bibliography of Gould's work (it runs to 44 pages). The elegant final essay by Robert Dorit, on how the promise of evolutionary developmental genetics has (and hasn't) borne out Gould's perennial theme of the importance of ontogeny to evolution, is a masterpiece not only of content but of writing.

The only thing really missing from this book, apart from assessments by Niles Eldredge, Elisabeth Vrba, David Raup, and other close co-authors of Gould, is an appraisal of his debates with the principal critics of his later years, such as Daniel Dennett, Richard Dawkins, and John Maynard Smith. There will be other essays, tribute volumes, and biographies that assess Gould's work historiographically and scientifically, but as a survey of Gould's contributions to the field, this volume is an instructive and indispensable beginning.

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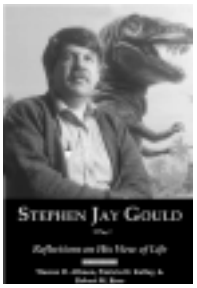
Monkey Trials and Gorilla Sermons: Evolution and Christianity from Darwin to Intelligent Design

by Peter J Bowler
Cambridge (MA): Harvard University Press, 2007. 256 pages

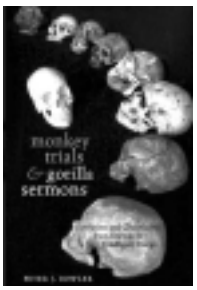
Reviewed by George E Webb

For nearly forty years, Peter J Bowler has been contributing significantly to our understanding of the development of evolutionary thought. His published works have included such studies as the elegant survey *Evolution: The History of an Idea* (originally published in 1983 and now in its third edition), *Charles Darwin: The Man and His Influence* (1990), and the insightful *The Eclipse of Darwinism: Anti-Darwinian Evolution Theories in the Decades around 1900* (1983), the last of which fundamentally changed the way historians looked at the "Darwinian Revolution". His latest effort to provide a more complete understanding of the evolution controversy will not disappoint those who have come to expect well-written and thought-provoking books from this author.



As has been the case with Bowler's earlier contributions, the current volume is primarily concerned with correcting some of the mythological aspects of the evolution controversy. In this case, he attempts to break down the long-held view of two diametrically opposed perspectives on the evolution debate, one defined as "science" and the other defined as "religion". This polarity has been a commonly accepted one for decades, as currently witnessed by the anti-evolutionism practiced by evangelicals and the evolutionism preached by avowed atheists such as Richard Dawkins. Bowler's great contribution in the current volume is to show that this dichotomy is largely an artificial one and that, in fact, these two perspectives represent merely the two extremes of the long-standing discussion. There is a vast center in this debate, populated by figures who are neither evangelical nor atheist.

Bowler focuses on the "liberal" religious perspective of the late 19th and early 20th century, which in fact represented mainstream religious thought of the time. This perspective largely accepted evolutionary ideas because the concept of "progress" underlay their theological view. The acceptance of organic change paralleled the liberals' progressive mindset, but



George E Webb is a historian of science at Tennessee Tech University and the author of The Evolution Controversy in America *(Lexington [KY]: University Press of Kentucky, 1994). He served as president of the Tennessee Academy of Science in 2007.*

the Darwinian emphasis on random variation posed a significant problem. Without a directed goal, evolution could not be perceived as God's way of doing things. Fortunately for the liberal perspective, evolutionary concepts of the period increasingly emphasized non-Darwinian explanations, the most successful of which was the neo-Lamarckian explanation that stressed the inheritance of acquired characteristics and the innate tendency of an organism to change. It required little imagination to define the source of that innate tendency in divine terms, thus preventing a theological clash with evolutionary concepts.

Bowler also points out, however, that the liberals' focus on evolution as progress led to a significant change in their theological perspective as well. Religion was no longer defined in terms of the innate evil in humanity (the concept of "original sin") that required salvation through Christ's sacrifice. Now, human progress was the key to religion. Intriguingly, evangelical opponents of evolution (especially Darwinism) saw this new view of sin and redemption as a danger from the beginning. If the new system focusing on progress were accepted, they asked, where would the concept of original sin and the need for salvation fit?

By the early 1920s, mainstream churches had largely accepted a new perspective known as "Modernism." The modernists maintained the liberals' progressivist perspective and also wanted religion to be more in tune with modern science, continuing their predecessors' acceptance of evolutionary concepts and reinforcing the idea that certain theological concepts (for example, original sin) would have to be modified. The modernist perspective was dramatically shown by a series of sermons given in Westminster Abbey by future bishop Ernest William Barnes, soon described by the press as "gorilla sermons". Barnes argued that religionists must accept modern science, including the ape ancestry of humans and the idea that God operated through law, not miracles. He specifically noted that the concept of original sin must be rejected and that Christ was a great teacher who showed humanity what it could become. The rejection of modernism by American fundamentalists is well documented and is rightly viewed as central to the famous Scopes trial. Here, too, Bowler provides additional insight, stressing that William Jennings Bryan and his colleagues might well have railed against Darwinism, but they were actually reacting against the non-Darwinian evolutionary concepts based on innate progress.

The carefully crafted and largely successful liberal view of evolution and faith collapsed in the 1940s, however, as the evolutionary concepts known as the Modern Synthesis re-established Darwinian random variation as the foundation for organic change. Without a guarantee of progress, the liberal perspective could no longer argue that evolution was merely God's way of doing things. As a result, biblical literalism increased during the post-World War II years, with young-earth creationism becoming the focal point of anti-evolutionism. The rest of the story is well known. That much of the current debate is still couched in terms of science versus religion is a result of a polarization that Bowler's work clearly shows is neither intellectually nor historically legitimate. Rejecting the extremism of anti-evolutionists and atheists, Bowler argues that a middle position that recognizes both scientific knowledge and the cultural importance of religion might remain the most profitable course of action.

Bowler's study does suggest a possible escape mechanism from the current clash between two divergent world views, but many of us probably question his optimism. In a troubling coincidence, the mail that brought my review copy of *Monkey Trials and Gorilla Sermons* also contained the fall 2008 issue of *National Forum*, the quarterly journal of the interdisciplinary honor society Phi Kappa Phi. The editor published four letters from readers in response to an earlier essay supporting the teaching of evolution in public school science classes. All four readers objected to the exclusive teaching of evolution in these classes, insisting that "intelligent design" or creationism be taught alongside evolution to foster the free exchange of ideas that marks true education. If this is the attitude of supposedly well educated individuals, Bowler's solution may not have much chance of success.

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Evolution: A Little History of a Great Idea

by Gerard Cheshire
New York: Walker and Company, 2008. 58 pages

Reviewed by Mark Terry

I wanted very much to like this book, part of a series published by Walker and Company. It's roughly 6 inches square, just under 60 pages, and profusely illustrated. Dense text occupies each left-hand page, facing a full page of illustrations on the right, often with minute, lengthy captions. All is in black and white, and production values are excellent, suiting well the centuries-old engravings that constitute most of the illustrations. It all gives the reader a sense of superabundance of detail and information in a compact, attractive package.

But the book is brimming with errors. The frequent typos are annoying, but a close read reveals worse: much of the evolution and biology is at best misleading, and at worst both incorrect and a potential source of creationist sound bites.

It's *not* a history — historical references occupy only the first 15 or so pages. (Note that there is a fine

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Mark Terry is Chair of the Science Department at The Northwest School in Seattle. His article "One nation, under the designer" was a cover story in Phi Delta Kappan *(2004; 86 [4]: 264–70, available on-line at <http://www.pdkintl.org/kappan/k_v86/k0412ter.htm>).*

small history, *Darwin and the Science of Evolution* by Patrick Tort, a French work, translated by Paul G Bahn [New York: Harry N Abrams, 2001]. Same price, even smaller, also profusely illustrated.) Instead, Cheshire launches a Cook's tour of evolution topics, and problems crop up at every turn.

Take the page on epigenetics. This amazingly complex and productive area of inquiry is reduced to DNA methylation and blithely tagged as "Lamarckian". Methylation is but one of several epigenetic mechanisms, each of which has different potential relationships with inheritance and evolution. Without more explanation, this is seriously misleading. Meanwhile, the exciting research exploring the relationship of epigenetics to evo-devo (the science of evolutionary developmental biology), where real evolutionary significance lies, is not even mentioned. Instead, we're left with the ridiculously overstated line: "… you really can affect the *expression* of your DNA simply by thinking about things!"

Cheshire presents four artistically engaging phylogenetic trees, each with enough detail to appear to be authoritative. But a close look reveals bizarre errors on the "Animals" tree: lions and tigers are joined on one branch, cats and dogs "etc." on another, while seals and walruses are off on yet another that includes rhinos and camels! Thus the Families of the Order Carnivora are broken up and redistributed among themselves and other Orders. Sharks and rays are off on their own stem from the Invertebrates, while far back along the trunk, Vertebrates head off in a different direction. *Opposite* the Vertebrates there's a branch mysteriously labeled "Notocordal" that leads *only* to the coelacanth! How odd to have emphasized a key characteristic (the notocord) that ties all vertebrates (including the coelacanth) and sharks together, while dispersing them on different branches with various invertebrates between.

In several sections, Cheshire speculates about behavioral and social evolution, which might be excusable if he established a solid foundation in natural selection anywhere in the book, but he doe not. The two-page spread devoted to "Memes" doesn't help an audience trying to get a handle on evolution, especially when it features a paragraph devoted to Rupert Sheldrake's pseudoscientific theory of "morphic resonance" and the concluding line, "Memes could be traveling between minds as quantum synchronicities in a holographic universe" (p 42).

Creationist fodder abounds. Dealing with the origin of life: "nucleic acids must have been conjured from a primal ooze…" On the possibility of extraterrestrial life: "Other types of nucleic acid structures could have conjured themselves into cells…" These lines will be seized on by creationists with, "And just Who did the conjuring?"

There's also a teleological cast to much of the writing, despite the historical note that Darwin moved scientists' thinking away from teleology. Images of progress to perfection are scattered throughout. The (incorrect) phylogeny of animals mentioned above puts the radiation of primates at the top left corner of the tree, occupying more space than is given to all the other mammals combined, and guess who is at the very top? In a section titled "Phylogeny of Life", Cheshire presents a reverse timeline of divergence, fully half of which is given over to the primates, which appear to lead inexorably to *Homo sapiens*, while the other half sweeps past *all* other organisms. As if the implications of such an approach weren't clear enough, another two-page spread is given over to "the cosmological anthropic principle," according to which "[t]he physical constraints that underlie the structure of space and matter are incredibly finely tuned to maximize the likelihood of fish, trees, and things like us…" (p 48).

Cheshire's imprecision is well captured in the little twenty-word glossary found at the very end of the book (p 58). Some excerpts: "*Adaptation.* The process of change by which an organism or species becomes better suited to its environment." When explaining the core concepts of evolution by means of natural selection there can be no casual reference to an *organism* changing during its lifetime. Adaptation is a *population-based* phenomenon. "*Gene.* A stretch of DNA which codes for a protein." Genes haven't been defined that simply or strictly for decades. "*Lamarckism.* A theory that some acquired characteristics can be inherited by later generations. Operates via epigenetics." This definition doesn't do justice to historical Lamarckism, which had at least as much to say about how the characteristics were acquired. And the assertion that Lamarckism, already poorly defined, simply "operates via epigenetics" is wildly off base. My favorite is: "*Niches*. Describe (species) gaps in an ecosystem." A recent PhD in ecology and evolutionary biology from the University of Chicago studied this sentence with me for several minutes. It rendered him speechless.

Cheshire tried to do too much in too little space, and he wasn't careful. In what may have been an attempt to be comprehensive, he explored fringe areas to the exclusion of better treatment of natural selection, speciation, genetic mechanisms, evo-devo. Instead of a little gem of clarity, we are left with a misleading and confusing little treatment of a great idea. Though pleasant to look at, this book is better left unread.

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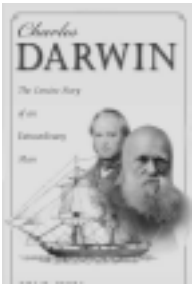
Charles Darwin: The Concise Story of an Extraordinary Man



by Tim M Berra
Baltimore: The Johns Hopkins University Press, 2008. 144 pages.

Reviewed by
Charles F Urbanowicz

Charles Darwin: The Concise Story of an Extraordinary Man is an excellent and well-written book. Had I not received a copy for review, I would have immediately purchased it to add to my own col-

lection of Darwin and Darwin-related items. Tim Berra, a professor emeritus of evolution, ecology, and organismal biology at the Ohio State University at Mansfield, was too modest when he wrote that his book is "not original Darwin scholarship, but a synthesis of existing essential information." That is the equivalent of writing, "this review consists of letters and words from the English alphabet and has nothing original to add for the readers." Truly, it is all in how one strings the information together, and Berra has done masterful work, providing a lively and succinct account of Darwin's life that will provide an excellent introduction for the new reader who is interested in Darwin as well as a helpful review for knowledgeable Darwin enthusiasts!

The Concise Story developed out of a series of lectures Berra gave on Darwin (after his book entitled *Evolution and the Myth of Creationism* [Stanford (CA): Stanford University Press] was published in 1990), and although *The Concise Story* is a slim volume (only fourteen chapters, and several chapters are but two pages), it is a volume rich with detailed information and excellent photographs (some in color). Just as this reviewer has been both to Down House and the Galápagos Islands and has taken extensive photographs, Berra has included some of his own first-hand photographs of these seminal locations in Darwin's life. *The Concise Story* also contains several color plates of paintings from locations in the United Kingdom, such as a portrait of Erasmus Darwin (grandfather of Charles Darwin), as well as the earliest portrait of a seven-year-old Charles Darwin with his sister Catherine, and a portrait of Robert FitzRoy (of HMS *Beagle* fame). Berra has also included numerous black-and-white illustrations from the time of Darwin, including a photograph of Darwin's funeral ticket from April 26, 1882.

While Darwin enthusiasts may have already seen some of the illustrations that are reproduced in *The Concise Story* and be familiar with Darwin's history (from his early years and travels to his marriage to his cousin Emma Wedgwood and finally to his death in 1882), Berra has woven the most important events and personalities involved in Charles Darwin's life into an excellent story teeming with information; the diminutive volume (complete with four appendices, 118 references, and index) is an outstanding publication. (Several of the references are also identified by Berra as recommended reading.) The Appendices are Books, Chronology, Darwin Online, and Dates. "Dates" provides the years that various individuals mentioned in the text were born and died, and "Chronology" traces events in Darwin's life from his birth of February 12, 1809, until his death on April 18, 1882, and his eventual burial in Westminster Abbey on the 26th of that month. The four items listed in "Darwin Online" are but a fraction of the Darwin information available on the World Wide Web, but an important fraction, as Berra provides the address for the Complete Works of Charles Darwin Online (<http://darwin-online.org.uk/>).

The "Books" Appendix consists of an annotated bibliography of eighteen of Darwin's publications. Although Berra does point out that Darwin's celebrated *Origin* (first published in 1859) was revised and re-published in five subsequent editions (through 1872) and that "the 1876 printing of the sixth edition is considered the first issue of the definitive text," this reviewer always points out that a significant change that Darwin made was between the first edition of 1859 and the second edition of 1860. In that second edition, Darwin's closing words were:

> Thus, from the war of nature, from famine and death, the most exalted object which we are capable of conceiving, namely, the production of the higher animals, directly follows. *There is a grandeur in this view of life, with its several powers, having been originally breathed by the Creator* [emphasis added] into a few forms or into one; and that, whilst this planet has gone cycling on according to the fixed law of gravity, from so simple a beginning endless forms most beautiful and most wonderful have been, and are being evolved.

I believe that the significance of this 1860 paragraph stems from the fact that in the first edition of 1859 Darwin did not have "by the Creator" in this paragraph. I also believe that this is important for an understanding of Darwin since Darwin retained that paragraph in all of the subsequent editions that were published in his lifetime. Although there is an ongoing controversy as to which particular edition of *Origin* is the "best" one to read, the reader of this review should consider the fact that Darwin did not remove the word "Creator" in the third, fourth, fifth, and sixth editions published in his lifetime. What paperback or hardback edition of Darwin is the reader of this review most familiar with? Which is the "real" Darwin that you think you know and lecture about?

Early in the book, Berra explains, "The aim is to show not only that Charles Darwin was one of the most important men who ever lived but also that he was a good man — a decent human being who had a wonderful family life" (p x). Certainly I have always shared Berra's esteem for Darwin both as a scientist and as a human being, and I needed no convincing on that score. But I am glad to have had the benefit of his concise and lucid biography, which amply accomplishes its aim.

If you wish to read but one book to develop your own understanding of Darwin, or if you wish to give someone a book to learn about Darwin, this concise story by Tim Berra *is* the book!

Charles F Urbanowicz is Professor Emeritus of Anthropology at California State University, Chico. His interest in Darwin resulted in a series of videos in which he portrays Darwin; further information about "The Darwin Project" is available online at <http://www.csuchico.edu/~curbanowicz/CELTOctober2004Darwin.html>.

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Every Living Thing: Man's Obsessive Quest to Catalog Life, from Nanobacteria to New Monkeys

by Rob Dunn
New York: HarperCollins, 2008.
288 pages

Reviewed by Mark Isaak

On May 12, 1732, Carl Linnaeus set out from Uppsala on a collecting trip through northern Sweden, a trip which would prove arduous, even life-threatening, but very successful. When he returned with his many specimens, Linnaeus was not content merely to add his lists of plants, animals, and rocks to other haphazard lists from other biologists; he wanted to organize them as well. He hit upon a system of short Latin names and groupings based on plants' sexuality. Other botanists found his system licentious, unnatural — and useful. When Linnaeus began his system, there were perhaps a few thousand known species, and the job of cataloging every living thing probably appeared achievable in a lifetime. But a long age of biological discovery was just beginning, and new life would appear in quantities, locations, and forms that Linnaeus could not have imagined. Rob Dunn, in *Every Living Thing*, takes us on a tour of these discoveries and the scientists who made them, from Linnaeus (and earlier) to still disputed discoveries of recent years.

Dunn, writing for the general reader, divides his book into fourteen chapters in four parts. The first part, "Beginnings," starts with a personal account of his time among the Cavineño in a remote town in Bolivia, using them as a model of what we would have known of biodiversity early in history. Chapter 2 gives a brief biography of Linnaeus. Chapter 3 tells how microscopy opened the world of the very small to discovery. It begins with the work of Jan Swammerdam, who pioneered biological microscopy in the 1660s and then gave it up for a religious conversion, leaving Antonie van Leeuwenhoek to pioneer it again and, eventually, to convince England's Royal Society that one really can see little animals in a drop of water.

The next section deals with the systematic search for macroscopic land species. Chapter 4 gives brief accounts of some early explorers, including Linnaeus's students, Henry Bates (whom Darwin credits with collecting 14 712 species, 8000 of them new to science), and Alfred Russel Wallace (who collected extensively in South America, lost all his specimens in a shipwreck, and went to further collecting and theorizing in Malaysia). A large part of the chapter tells about Terry Erwin, his pioneering work in fogging forest canopies to capture the arthropod diversity therein, and his controversial estimate of 30 million tropical arthropod species worldwide. Chapter 5 tells of Dan Janzen and his attempts to spearhead an exhaustive biological inventory, first of Costa Rica, then of the Guanacaste reserve in Costa Rica, and finally of the Great Smoky Mountains in the United States. Only the last project has had any success, and the work there is far from finished. Dunn finishes the section with a chapter of his own search, in Costa Rica with Carl Rittenmeyer, for a particular species of beetle which lives with army ants. Though this chapter added little to the book's overall theme of biodiversity, it was effective for giving an accurate overall impression of tropical ecology and fieldwork and for how elusive one species can be.

The first chapter of part three tells about Lynn Margulis and her theory of symbiotic origins of cellular organelles. This chapter initially seemed off-topic, as it dealt not with discovering new life but with learning more about the life we are familiar with. However, it fits well with another theme running consistently through Dunn's book — the tenacity and persistence a biologist needs to have an unexpected new idea accepted. (It also relates somewhat to later topics.) The next chapter, about Carl Woese and his defining a new domain of life, the Archaea, on the basis of ribosomal RNA, also emphasizes the reluctance of other scientists to accept it. Chapter 9 returns to the discovery of new life, giving a brief history of the exploration of the oceans, once thought to be lifeless below the uppermost waters, and the repeated surprises found as people actually looked.

The final section focuses on the quest for life beyond earth, covering such topics as canals on Mars, the Drake equation for estimating how many extrasolar planets have intelligent life, and the Search for Extraterrestrial Intelligence. A discussion of Martian meteorite ALH84001 (though Dunn calls it simply 84001) and some indications of possible Martian life found on it leads into the topic of nanobacteria, controversial objects smaller than any bacterium should be, which may or may not be life. Another chapter follows the discovery of bacteria living in rock miles below the surface of the earth, which demonstrates the possibility of life living beneath the surface of Mars.

Dunn shows a sense of humor and of wonder throughout, although he does not quite capture the sense of awe that I felt the first time I encountered the diversity of a tropical forest. As mentioned above, the book is full of stories of scientists proposing theories which seemed wild at the time but which, with more data and the persistence of the scientists, became generally accepted. There are so many of these stories that the book might encourage people to hastily accept new wild theories. Dunn makes clear that some of the newer theories are generally doubted, but his sympathies still seem to be with the mavericks. In one welcome exception, he relates the story of Percival Lowell on the canals on Mars, where the scientist was persistent and still wrong.

With a title as ambitious as *Every Living Thing*, it is probably inevitable that the book covers some areas less than I think they deserve.

Mark Isaak is the author of The Counter-Creationism Handbook *(Berkeley [CA]: University of California Press, 2007).*

Dunn does not discuss the international codes for zoological, botanical, and prokaryote nomenclature which the Linnaean system has grown into today. He says nothing about diversity over geological time. He scarcely mentions modern extinctions or wildlife conservation. An interesting new method for seeking microbial biodiversity is whole-genome shotgun sequencing, where one analyzes the DNA of a mixed sample, such as from a termite gut or bucket of ocean water (for example, Venter and others 2004). This method gets mentioned only once in passing. Still, the book covers all the areas I would consider most important, including some I had not thought of myself. Just as important, it considers many unanswered questions and leaves them unanswered. *Every Living Thing* does an admirable job of showing how the biosphere, or rather our understanding of it, has increased radically in diversity and extent, and it leaves one with the promise that there is a great deal more yet to be discovered.

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In the Light of Evolution, Vol 1: Adaptation and Complex Design

edited by John C Avise and Francisco J Ayala
Washington (DC): National Academies Press, 2007. 380 pages

Reviewed by Armin P Moczek

In the Light of Evolution, vol 1: Adaptation and Complex Design is the first of a series of edited volumes published by the National Academy of Sciences based on colloquia organized by the Academy and presented under the auspices of the Sackler colloquium series, named after Arthur M Sackler, a major benefactor of the arts and sciences. This first volume is edited by John Avise and Francisco Ayala, the academic grandson and son, respectively, of Theodosius Dobzhansky, who famously argued that "Nothing in biology makes sense except in the light of evolution" — a statement that has basically acquired mantra status among many evolutionary biologists. Apart from two prefaces and an introductory essay, the volume contains 13 contributed scientific papers, and concludes with an essay by Eugenie Scott and Nicholas Matzke on "Biological design in science classrooms". Collectively, all chapters examine various aspects of biological design and the origins of complex traits, with an emphasis on the role of adaptive evolution and natural selection in shaping why organisms look, behave, and function the way they do.

The volume opens with an introductory essay by Francisco Ayala, titled "Darwin's greatest discovery: Design without designer". This chapter is well worth reading, well-written and accessible to non-experts. Among its main points is the notion that Darwin follows a line of scientific revolutions due to Copernicus, Kepler, Galileo, Newton, and others that show that the physical world, from universes to living things, is governed by natural laws. The chapter falls a bit short on a discussion of complexity and novelty and why the evolution of both has posed such challenges for evolutionary biologists and hence provided easy attack points for creationists and "intelligent design" (ID) advocates. Also missing is the notion of natural selection as resulting in what one might call unintelligent design — traits that have obvious weaknesses or weirdnesses — resulting from the phylogenetic and developmental constraints imposed on their evolution that even natural selection could not overcome, or didn't have to. But what I missed the most in this opening chapter was a more active reaching out to those readers who feel themselves caught in a real or perceived conflict between the science of evolution and the faith of religion. It would not have hurt to acknowledge that religion and faith provide important avenues for us to make sense of the world around us, and that they address important, critical questions regarding our life on this planet that science cannot answer, primarily because it lacks a framework for asking them in the first place. Instead I was left with a list of discoveries, from astronomy to evolutionary biology, that illustrate how science gets it right while other attempts to make sense of the world come up short. To be clear, I don't sense bad intentions in the writing — instead it is genuine enthusiasm for the explanatory power and scope of evolutionary biology — but it comes at the expense of reaching out to those less familiar with, and less certain about, the domains of science and faith.

The volume then transitions to the first of three major parts, each represented by four or five chapters. The part following the introduction examines different ways to assess what constitutes complexity, how to measure it, and how and why it might originate. The chapters here are challenging for the non-experts, and while they cover a lot of ground and present many interesting ideas, they are often not easy to penetrate. Somewhat of an exception, and the chapter I found among the most engaging of the volume, is Michael Lynch's chapter on the "Frailty of adaptive hypotheses for the origins of organismal complexity". In it, Lynch argues that evolutionary biology has lost sight of the other mechanisms that promote evolutionary change (drift, recombination, mutation) and that non-adaptive explanation of evolutionary changes are often ignored, favoring adaptive processes where chance will do. Again, some of this will be inaccessible to non-specialists, and some arguments are overstated. However, it remains a critical chapter, specifically because unlike some of the other chapters it contains a fair

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amount of actual evidence and quantitative evaluations of the hypotheses put forward, and more generally because it serves as an excellent example of the health of the discipline: there is much constructive disagreement and discourse within evolutionary biology which is constantly expanding and refining the explanatory boundaries of the field.

The second part features four contributions and explores the nature and origins of complexity on different levels of biological organization. It begins with a chapter by Benjamin Prud'homme and his colleagues on the evolution of gene regulation and its contributions to organismal diversification. This chapter is well written and largely accessible to non-specialists. It is followed by a somewhat dense chapter by Richard Michod on the origins of individuality (a central and perennial question in evolutionary biology) and a very engaging chapter by Joan Strassmann and David Queller on the evolution of social behavior in insect societies.

In the latter, Strassmann and Queller further develop the idea of insect societies as superorganisms, arguing that while cells of an individual all have a common purpose, groups of individuals generally do not and much conflict predominates in their interactions. Social insects are the big exception, and one wonders why there is, for the most part, such remarkable cooperation among individuals that make up the colonies of ants, bees, or wasps? Starting from this, the authors dissect how kin selection theory has been highly successful at allowing a better understanding of the evolution of insect societies, why they function the way they do, why there are limits to the functioning and under what circumstances these limits should be most apparent.

Lastly, Nancy Moran discusses the contributions of symbiosis and horizontal gene transfer as sources of complexity. Specifically, this chapter introduces an important notion thus far not mentioned, namely that transmission of genetic information not only occurs vertically (that is, from ancestors to descendants), but that horizontal gene transfer (from one species to another) can provide great opportunities for lineages to acquire new functions without having to first evolve all component parts. Similarly, novel functions can be acquired through symbiont acquisition, which can then become heritable, as illustrated richly by plant-fluid feeding insects and their diverse symbionts.

The last major part of this volume features five case studies on complex phenotypes, this time with an emphasis on how scientists dissect the relative contributions of ecology, development and genetics, and the interactions between them, to organismal complexity. Francesca Frentiu and her colleagues examine the evolution of color vision in butterflies in a very interesting chapter, though non-experts will find challenging. It is followed by a chapter by Jeffrey Ross-Ibarra and his colleagues on plant domestication and what we can learn from it about the genetic and genomic basis of adaptive evolution.

Albert Bennett and Richard Lenski then present an empirical test of evolutionary trade-offs during temperature adaptations, using experimental evolution trials in *E coli*. This is an important chapter for at least two reasons. First, it introduces experimental evolution as a tool to study evolutionary processes and their consequences. In *E coli* ancestors can be frozen and reawakened for comparisons, providing experimenters with a critical tool not available in almost all other organisms. Second, the examination of evolutionary trade-offs introduces an important concept: does becoming good at one thing automatically mean becoming bad at another. The experimental answer to this question, at least from *E coli* populations, is that in most cases, trade-offs exist. For example, bacteria that adapt to one temperature condition become inferior competitors at others. But it also turns out that this is not always true, suggesting that initial conditions in starting populations and chance events matter in the exact outcomes of evolutionary trajectories.

The next chapter by Cynthia Beall partly reiterates this notion, focusing on a very different beast: humans. In this very engaging chapter Beall reminds us that adaptation and natural selection have also shaped human evolution, and in some cases continue to do so. The chapter also underscores another important aspect, namely the interplay between randomness on the level of mutations found within natural populations, and the directionality induced by selection. Case in point are two high-altitude human populations which have existed at their present locations for 11 000 years (Andean plateau) and 25 000 years (Tibetan plateau), which show signs of having responded to the same environmental stressor, hypoxia, by evolving physiological mechanisms that allow them to function better under these conditions. While the general responses were thus similar, the details appear to differ, as both populations appear to have achieved the same adaptive response by different genetic means. This part of the volume ends with a well-written and richly illustrated chapter by Douglas Emlen and colleagues on the origin and diversification of beetles horns and horned beetles, a group of organisms that has undergone one of the most amazing morphological radiations in the animal kingdom.

The volume ends in a closing essay by Eugenie Scott and Nicholas Matzke on "Biological design in science classrooms". In this chapter, the authors provide a comprehensive summary and historical account of the "intelligent design" movement and its origins from within creationist thinking. It also gives a flavor of both the sophistication and lack thereof in some of the tactics and arguments employed by ID advocates. Those of us who debate ID arguments in the classroom or in public unfortunately will need additional ammunition, but this chapter provides a good entry-point for those readers who want a good introduction to the most important issues.

In summary, this volume is a celebration of natural selection and adaptive evolution as explanations for organismal complexity and diversity. Two overarching themes emerge from this book. The first is a demonstration of how diverse and vibrant a discipline modern evolutionary biology really is. It illustrates how far the field has

come in empirically evaluating much of Darwin's conceptual framework as well as opening up additional dimensions such as the significance of horizontal gene transfer and symbiosis or the contributions of non-adaptive processes to organismal complexity. The second theme then is a demonstration of the strength and health of the discipline, both in terms of taking on long-standing, fundamental questions such as the origins of multicellularity, individuality, or social behavior, but also in terms of questioning itself and its own assumptions. It will be a valuable resource for evolutionary biologists wanting to learn more about corners of their discipline that they are less familiar with, and many of the contributed chapters will also be useful to non-specialists as starting points for further exploration. Volume II of this series, focusing on biodiversity and extinction, was published in 2008, and Volume III, entitled "Two centuries of Darwin", came out in January 2009.

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Creatures of Accident: The Rise of the Animal Kingdom

by Wallace Arthur
New York: Hill and Wang, 2006.
272 pages

Reviewed by Christopher Nedin

Warning: This book will leave you wanting more (and that's a good thing).

If to you, like me, the term "evo-devo" conjures up vague memories of a late '70s "new wave" band more than it does a fruitful discipline for studying evolution, then this book is for you. Evolutionary developmental biology, or evo-devo for short, uses the discipline of developmental biology to provide new insights to, and increases the scientific evidence for, evolution. Especially important in evo-devo is the evolution of complexity — here described as the number of types of parts that make up a creature.

Arthur's intent is to provide an introduction to evo-devo and how it can help explain the evolution of complex organisms. By showing us an unaided pathway to complexity, he neatly skewers some of the "intelligent design" claims that complexity cannot evolve without outside assistance.

The book begins with a discussion of bringing preconceived notions of "higher, or more complex, equals better" to evo-devo, and how this philosophical "baggage" can cloud our thinking on the issue. And very timely it is too. Arthur discusses the inadequacies of metaphors such as lawns and ladders for complexity and evolution, which lend themselves to such notions of upward striving and downward looking. After pointing out these inadequacies, Arthur then decides on a "biased middle way" somewhere between ladders and lawns. This is disappointing, because the ladder and lawn metaphors are not merely inadequate, they are wrong. In fact they are worse than wrong, because they perpetuate the false idea that evolution in general, and complexity in particular, is striving upward, and that upper equals higher equals better.

This is the very baggage that we are encouraged to leave behind. Indeed, having a discussion of such baggage makes Arthur's slippage back into such notions stand out: "ascents in complexity", "rise of advanced creatures from simple beginnings", "ascent of life's ladder","climbed life's ladder","others have climbed ladders that have led to greater complexity", "evolving upward in average body size".

We need to jettison completely the old metaphoric baggage and develop new, better analogies for complexity and evolution. Complexity could be better described as a series of concentric circles, in which increasing complexity is founded on and encompasses previous complexity and expands outward, not upward. This would allow for contracting complexity as progressive evolutionary step (and not a devolutionary step as it would appear on any ladder analogy).

A better analogy for evolution in general has to be based on morphospace, and space (apart from being the final frontier) is three-dimensional. Indeed, Arthur acknowledges the three-dimensional requirements for any graphical representations of evolution by raising a three-dimensional room analogy toward the end of the chapter on ladders and lawns, but the room analogy still leads to ideas of greater and lesser.

The central question in developing a better analogy for evolution is, How important is complexity? Obviously it is important to us (and probably to such organisms as *Escherichia coli* and dicyemids, albeit for different reasons). But in reality, complexity is just another region of morphospace accessible through the processes of evolution. It is neither higher nor lower, neither greater nor lesser, neither better nor worse, than any other region of morphospace, and hence any other evolutionary pathway.

Indeed, to *E coli,* complexity represents needless, resource-intensive, trappings around the core function, which limits where complex organisms can live, and how fast they can reproduce. It is also important to realize that the fact that a group has not embraced complexity doesn't mean it has not evolved, is less evolved, is a "stick-in-the-mud", or even has "evolved downward". The *E coli* in our gut is as evolved as we are; we have just gone down different evolutionary pathways.

How that difference in complexity between *E coli* and us occurred is what *Creatures of Accident* is about.

Having dealt with philosophical baggage and a chapter on identifying what is life, the book then provides a glimpse into the development of biology before providing a case for complexity through development, differentiation, and diversification. We are guided through

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dancing genes and the interactive three-step among genes, cells and proteins that result in differentiation and pattern development. This leads to duplication and the diversification of parts that provides the source material for expanding complexity.

Having provided this background, a number of particular evolutionary events are then covered, including the development of the brain.

How this "dance" delivers complexity is accessibly and engagingly laid out. Arthur manages to convey information in a conversational manner and manages to inform and entertain at the same time. The descriptions of genetics, cell duplication and diversification, and embryology, and how these interact to produce complexity, are presented without the reader requiring a detailed background in developmental biology. Arthur explains how small developmental changes can result in major evolutionary changes without requiring large numbers of new genes, but simple tweaks of the developmental process with the genes we have.

This is not new, of course. Stephen Jay Gould and Richard Lewontin in their seminal paper "The spandrels of San Marco and the Panglossian paradigm" (*Proceedings of the Royal Society of London*, series B, 1979; 205 [1161]: 581–98) pointed out that the pathways of development are more important as engines of change than adaptation. But recent advances in evo-devo have provided new insights into how this works in practice.

This is an area of biology that is becoming more important in terms of evolution, but introductions to the topic for the general public are few. There is of course the excellent *Endless Forms Most Beautiful* by Sean Carroll (New York: WW Norton, 2005), or, if you require a more immediate hit, there is the Pharyngula blog (<http://www.scienceblogs.com/pharyngula> by PZ Myers. *Creatures of Accident* then fills a gap in providing an accessible, readable introduction to the ideas of how complexity can be produced through natural processes.

Where this book succeeds is in conveying the author's genuine excitement at the power of evo-devo to provide new information on evolution. By explaining the basics and infecting the reader with Arthur's enthusiasm for the subject, it allows the evo-devo novice, such as me, a foot in the door. It leaves you (as every good introductory text should) wanting more.

So be warned, if you read this book (and you should), be sure to have a copy of *Endless Forms Most Beautiful* at hand, or at least access to *Pharyngula*, because you are going to want to read them next.

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The Timetree of Life

Edited by S Blair Hedges and Sudhir Kumar
Oxford: Oxford University Press, 2009. 551 pages

Reviewed by Kevin Padian

Over a hundred authors, including molecular phylogeneticists, systematists, and paleontologists, contributed to *The Timetree of Life*, which its editors say is the first volume to publish calibrated divergence times against phylogenies for all major groups of living things. The results are truly impressive reviews of the histories and current knowledge of molecular and other determinations of when the major groups of living things diverged from each other.

In assembling this book, the authors submitted to certain conventions. Alternate phylogenies are not considered. Only timetrees based on molecules are used. The editors say that only one kind of molecule needs to be used, and that it doesn't have to be independently validated by other (including non-molecular) lines of evidence. If different molecules give different divergence estimates, the estimates are to be averaged. (This strikes me as strange, inasmuch as it equally values or doubts all studies, rather than asking questions about the reliability of certain molecules or studies over others.) In fact, the editors in particular seem to be glossing over a lot of legitimate debate and cognitive dissonance, which seems odd for a scientific book.

For example, in their opening chapter the editors reject fossil evidence as reliable for estimating divergence times. Instead, they advocate "associated geological dates," an approach first proposed by Charles Sibley in the 1970s and quickly discredited. (What is the "date" of the opening of the Atlantic Ocean?) They give the emergence of islands as good events by which to calibrate divergence times. But what major groups of organisms first diverged on islands? The editors actually don't give a single example of a reliable "geologic event" that can calibrate molecular phylogenies.

The editors state that "fossil calibrations are always minimum times of divergence," which would be true if one simply used the first recorded appearance of a member of a stem or node group. More reliable is the assessment of the timing of appearances of characters that are diagnostic of that group. Let's say that node-group A shares derived features 1–5, and that its immediate relatives can be recognized because they have progressive subsets of 1–5 (for example, one critter has 1, another has 1 & 2, and so on). Knowing when these immediate relatives lived provides very strong control on divergence dates based on fossils. Of course, the fossil record may not be good enough to decide these questions in the great majority of cases. On the other hand, unconstrained extrapolations from molecular differentiation rates, with no independent lines of evidence to test them, are technologically impressive but empirically unsatisfactory.

It is interesting that the other introductory chapters disagree with the editors' methods. John Avise forthrightly extols the use of fossils to calibrate divergence

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times. Gradstein and Ogg lay out the geologic time scale and the important certainties and uncertainties in its calibration. Benton, Donoghue, and Asher, all paleontologists, in a particularly impressive review (with over 500 references) show how using both fossils and molecules in tandem can produce reliable results for much of the phylogeny of Metazoa.

So the editors seem to be broad-minded in including eclectic approaches to assembling the timetrees of life. It is too bad, then, that the prescriptions of Benton and others are not followed throughout the book. Some entries induce head-scratching. Van Tuinen (p 409), for example, says that the two major groups of living birds (paleognaths and neognaths) separated about 120 Ma, whereas Benton and his coauthors list it at about 66 Ma ("soft maximum" dates are often ridiculously old and can generally be disregarded). Here is an example of where a character-based approach to fossils may help constrain molecular estimates. If one examines the fossil record of birds about 120 Ma, and even later in the Cretaceous, what do we find? Well, the fossil birds found in the Jehol Biota of China (Early Cretaceous, about 125 Ma), where the famous "feathered dinosaurs" are also found, include things like *Confuciusornis* that are hardly advanced beyond *Archaeopteryx*. Through the Cretaceous we find thousands of bird fossils, but they are all of primitive toothed groups and Enantiornithines, none of which is regarded as close to Neornithes. More importantly, the morphological features that are in any way similar to those of living birds do not appear until the latest Cretaceous (66–70 Ma). To accept the molecular view of life, molecules are doing the diverging, but this is very seldom reflected in morphology.

Is this a reasonable view of life? Space prohibits a review of the editors' strange take on rates of diversification of taxa, especially where we have an actual fossil record that is pretty reliable. Suffice it to say that there is forty years of literature on Phanerozoic diversity that cannot be reduced to the unsatisfactory alternatives of "dampened exponential curve" or the "exponential model". This book will be a fabulous basis for advanced interdisciplinary seminars, but I put the accent on "interdisciplinary".

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Natural Selections: Selfish Altruists, Honest Liars, and Other Realities of Evolution

by David P Barash
New York: Bellevue Literary Press, 2007. 192 pages

Reviewed by J Michael Plavcan

I have my homepage set to *The New York Times*, and when I opened my browser one day I noticed a headline about the scientific study of the benefits of religion to health and well-being. How oddly this positions science — recalling the Marxist view of the "opiate of the masses". The article implied that religion is good for you, and you should take it like a drug because it makes you healthy and happy. Of course, none of it is necessarily true at all, and the interesting side-effect is that it makes the patient want to ban the teaching and practice of the doctor.

Enter the evolution of human consciousness and behavior. It is a rich irony that we may have evolved proclivities to the very behaviors that make us oppose the fact of evolution. One of the most difficult barriers to teaching first-year college students about human evolution is the concept that human thought, emotions, and behavior might have a genetic basis. Students are skeptical — the old "nature versus nurture" debate is very much alive in our culture. Many have been taught that humans are unique, and that our behavior is entirely a product of our upbringing and our free will. I always like to ask students, who taught them how to be sexually attracted to the opposite sex? It seems to shock them into the concept that common and powerful behaviors and urges might indeed have a genetic foundation. But this is still anathema to the common tenet that all human behavior is governed by free will, and therefore that all of us are responsible for *all* of our thoughts and actions. It is an odd view when you think about it, because it leads to demonstrably false conclusions such as "homosexuality is a curable lifestyle choice" and "if we tell kids not to have sex, they won't." Right. And if we tell them to abstain from food, they won't eat.

David Barash is a professor of psychology at the University of Washington, and is a prolific proponent of the concept that behavior is genetically based, and therefore evolves. Let's be clear here before the arguments begin — he does not accept the idea that behaviors are fixed, particulate Mendelian states, and clearly says that human behavior (like morphology) is in its final form a reaction that is guided by tendencies. It is the product of the interaction between many genes, and the environment, creating a neural structure that reacts in certain ways to the environment. We have evolved proclivities and tendencies, along with a capacity for free will and self-control.

Barash's 21-chapter book is a gentle introduction to this very delicate subject. It owes a great deal to Richard Dawkins's *The Selfish Gene* (Dawkins's praise is quoted right on the front, which should surprise no one). It is well-written and elegant, and serves as a pleasant application of the "selfish gene" to understanding human behavior.

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The book is organized as a slow progression toward a discussion about the evolutionary basis of behavior, and I would not be surprised if it were based on a series of class lectures. It begins with an assault on common misperceptions about behavior. The first chapter targets the tendency for humans to see meaning and purpose on random events; to force sense out of things that simply happen. It then turns to an attempt to dispel critiques of evolution — a chapter devoted to examples of bad anatomical design in humans, and another to common misperceptions about evolution. The fourth chapter is about the fallacy of discontinuity. He targets the idea that life begins at conception, and the purpose seems to be to establish humans as part of the natural world.

In chapter 5 Barash begins to work with behavior, introducing the concept that some aspects of behavior are genetically determined. He then provides an interesting "homage" to BF Skinner, whose work is the embodiment of the "nurture" half of the old nature/nurture debate, by praising the scientific commonality of their approaches.

The next three chapters discuss the evolutionary basis of intelligence, consciousness, and reason. These discuss the continuity of these quintessentially human features with the natural world, and offer a discussion of ideas for how they may have evolved.

At this point, the book gets interesting. His discussion of existentialism provides a substantive basis for understanding the interface between genetics and free will. After all, while behavior may have a genetic basis, evolution has provided us with the mental and behavioral plasticity to fashion our existence, and to find meaning and purpose beyond simply interacting with the environment and each other. This is topped with a reminder that the fact of evolution does not thereby alter our morality — all that is natural is not necessarily good, and we are free to mold ourselves as best we can to improve our lot.

Several chapters are devoted to explaining and discussing altruism. The portion of the book is tightly tied to Dawkins's *The Selfish Gene*, and serves as a review placed in the context of the topic at hand, with special attention given to understanding, among other things, xenophobia and nepotism. The book becomes overtly political as Barash takes pot-shots at libertarian and Randian free-market economics and social views. His point is that game theory and evolutionary models demonstrate clearly that left to themselves, individuals do not necessarily work for the greater good, and that our reason allows us to regulate our uglier and more dire tendencies and thereby create a better world for ourselves.

Barash ends the book with several entertaining chapters dealing with the nature and basis of human violence, sex differences in behavior, an evolutionary perspective on lying, how the concept of "dystopia" underscores the need for humans to fit into the natural matrix of behavior, and finally a discussion of the evolution of culture. Culture is not to be viewed as a pure, artificial human construct. Rather it can be viewed as a social medium that serves a biological function, but whose manifestation is arbitrary and itself evolves.

On the whole, Barash's book is an entertaining read and gives the general audience a well-grounded introduction to the evolution of human behavior. On the weak side, the treatment of topics is sometimes superficial and leaves the reader wondering if there was supposed to be more. But counter to this is his unapologetically direct engagement of the social implications of the evolution of human behavior. One of the final themes is that human behavior, despite its genetic basis, has evolved a responsiveness and plasticity that allows us to rise above genetic determinism to shape our selves and our society. But it is only through an honest understanding of our genetic predispositions that we can effectively counter our more destructive, selfish, and amoral tendencies.

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Darwin's Legacy: Scenarios in Human Evolution

by Sue Taylor Parker and
Karin Enstam Jaffe
Lantham (MD): AltaMira Press,
2008. 250 pages

Reviewed by John H Relethford

An interest in human origins and evolution typically revolves around the list of questions that journalism students are instructed to observe — who, what, where, when, why, and how. When considering human evolution, the fossil record has provided us with at least a broad outline of the answers to the first four questions. Although many details of the "who, what, where, and when" of human evolution remain to be learned (and perhaps always will be), the overall trends in our biological history are clear and supported by an overwhelming amount of data. Students and others are often surprised by the clarity and completeness of the evidence for human evolution, and the many transitional forms that link modern humans to earlier, more ape-like ancestors. Yet, even as we answer these basic questions, our interest remains in the last two questions on the journalist's list — why and how. These questions most often capture our imaginations and are, in my view, the harder questions to answer. We can easily see the evolutionary uniqueness of the human species relative to living apes, and with the help of data from fossils, archaeology, and genetics, we can often identify where and when such changes occurred. The big questions that remain are *why* and *how* these traits evolved. For example, why did our ancestors walk upright? Why did we lose the large

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canine teeth found in other primates? Why are we relatively hairless? These and other questions are for many the most interesting.

This short book by Parker and Jaffe examines a number of different models of human evolution, looking at the evidence, for and against each. Although short, the book is generally complete and very well referenced, allowing readers to track down easily more complete discussions of arguments and counterarguments. More importantly, the book provides a nice discussion of *how* different evolutionary models are tested. In science, it is not enough to be able to provide simply a hypothesis; we must also be able to test it, thus separating the pursuit of scientific truth from mere speculation.

The book is divided into two parts. The first part consists of three chapters that provide some basic background in the process of testing scientific models of human evolution, including discussion of how anthropologists build evolutionary trees and use information to reconstruct the biology and behavior of earlier ancestors, going back to the last common ancestor shared with the African apes. The authors note how information from living nonhuman primates is invaluable in this regard, along with data from the fossil and archaeological records. This section of the book also provides a brief but useful chapter outlining the fossil record of different stages of human evolution.

The bulk of the book is found in the seven chapters of the second part, each of which deals with scientific models for the emergence of specific human biological or cultural human adaptations. Each chapter provides a brief review of the evidence for and against competing evolutionary models, including a number of sidebars that cover certain of them in more detail. The authors also provide their assessment of their conclusions. These seven chapters cover the emergence of unique aspects of human biology and behavior that have appeared during the course of human evolution. The first chapter in this section starts with the origin of human diet, including hunting, followed by a chapter on the origin of our oldest unique adaptation, upright walking (bipedalism). The next chapter looks at the origin of changes in life history (including patterns of reproduction, growth and maturation, and life expectancy), followed by a chapter on the origin of body displays (including unique human sexual characteristics, such as large breasts and large penises). The last three chapters examine the origins of language, intelligence, and culture. The book includes an appendix that outlines the author's decision to use the chimpanzee as a model of our last common ancestor rather than the bonobo, another African ape that is equally related to us.

The book covers a lot of ground in a short amount of space. Consequently, I often found it *too* brief, particularly for topics with which I had less familiarity. I was disappointed by the exclusion of certain models in the chapter on the origin of bipedalism. Although some of these models did appear briefly in other chapters, such as Lovejoy's model of the evolution of human bipedality in the life history chapter, there was not as much a comprehensive treatment of this topic as I would have liked — including the argument (and counterarguments) that the evolution of bipedality can be linked to increased energy efficiency (for example, Rodman and McHenry 1980). In addition, although I can understand the authors' adaptationist perspective, I would have liked to see more attention to other views. For example, in the discussion on the evolution of large breasts in females, the authors focus on models of sexual selection, but do not discuss the possibility that larger breast size might simply be a byproduct of selection for increased fat reserves (for example, Mascia-Lees and others 1986).

On the other hand, it is difficult to cover so much ground on so many topics in a short amount of space, and perhaps a future edition could provide further expansion. In the meantime, this should not be viewed as the only resource on models of human evolution. It is, however, a nice introduction to the general subject of testing evolutionary models, and a handy bibliographic reference for further reading and discussion. As such, it will be useful, as the authors hope, as a book to be used in a seminar on the history of ideas of human origins.

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But Is It Science? The Philosophical Question in the Creation Evolution Controversy

Edited by Robert T Pennock and Michael Ruse
Amherst (NY): Prometheus Books, 2009. 577 pages

Reviewed by David B Resnik

The controversy concerning the teaching of evolution or creationism in public schools has simmered in the US ever since the trial of John Scopes in 1925 for violating Tennessee's law forbidding the teaching of any theory, such as evolution, that contradicts the biblical account of creation in any state-funded educational establishment. Though the US Supreme Court's decision in *Epperson v Arkansas* (1968) invalidated state laws that make it illegal to teach evolution in public schools, the creationism/

David B Resnik is a philosopher and attorney; among his publications is "A pragmatic approach to the demarcation problem," Studies In History and Philosophy of Science Part A *2000; 31 (2): 249–67. This book review represents his personal views and opinions, and does not represent the policies, research or conclusions of any group, organization, or agency with which he is associated.*

evolution debate continues to have an impact on American politics, education, and the courts. Moreover, the controversy is not likely to end soon. A Gallup poll conducted in February 2009 showed that 25% of Americans do not believe in evolution, 39% do believe, and 36% have no opinion either way (Gallup 2009).

But Is It Science?, edited by Robert T Pennock and Michael Ruse, is a useful and informative contribution to the literature on the creationism/evolution controversy. The book is an updated version of a volume published in 1988, and includes a great deal of new material. The editors have assembled an excellent compilation of historical and contemporary works that scholarly and lay readers will find helpful in understanding the legal, scientific, religious and philosophical aspects of this debate, including original and republished essays, expert testimony, book excerpts, and judicial opinions. Pennock and Ruse, who both are world-renowned authorities on creationism/evolution controversy, have provided expert testimony in important legal cases — Pennock in *Kitzmiller et al v Dover Area School District* (2005), and Ruse in *McLean v Arkansas Board of Education* (1982).

The book is divided into three parts. Part One provides historical, philosophical, and scientific background to the issues and includes writings from evolutionist Charles Darwin, theologian William Paley, Darwinian critic Adam Sedgwick, Darwinian proponent Thomas Huxley, philosopher Karl Popper, the Bible, and contemporary biologists Francisco Ayala and Richard Dawkins. Part Two focuses on the *McLean* case and includes Judge William Overton's opinion, Ruse's expert testimony, and essays from Larry Laudan, Barry Gross, Ronald Numbers, Duane Gish, and Ruse. Part Three addresses the *Kitzmiller* case and includes Judge John Jones's opinion, expert testimony from Michael Behe, an expert report by Pennock, and essays by Steve Fuller, Phillip Johnson, Nick Matzke, Elliott Sober, and Matthew Brauer, Steven Gey, and Barbara Forrest, who provided key testimony in the case.

The question of the scientific status of creationism has been a central issue in prominent legal cases. The First Amendment to the US Constitution forbids the government from endorsing any particular religion. In the *Epperson* case, the Supreme Court determined that the First Amendment makes it illegal for the state to forbid the teaching of evolution in public schools, because this would constitute an endorsement of religion. In response, creationists developed other tactics to undermine the teaching of evolution in public schools, such as requiring that schools give a balanced treatment to evolution and creationism — which was the focus of the *McLean* case — or requiring that students be read a statement declaring that evolution is a theory, not a fact, and that "intelligent design" is credible alternative to Darwinian evolution — which was the focus of the *Kitzmiller* case. In both cases, courts heard testimony concerning the nature of scientific explanation and methodology and determined that creationism (and its more recent incarnation, "intelligent design") constituted a religious doctrine, not a scientific theory, and that teaching creationism in public schools would be an endorsement of religion.

One of the more interesting themes in the book is the tension between philosophical debates about the definition of science (otherwise known as the demarcation problem) and legal applications of philosophical insights. In the mid-20th century, philosopher Karl Popper developed one of the most influential approaches to the demarcation problem. To be scientific, a theory or hypothesis must be falsifiable, that is, susceptible to be proven false by an observation or test. Popper's approach has been subjected to rigorous criticism over the years, and today most philosophers agree that it is not an adequate account of the nature of scientific theories, because there are numerous unscientific theories that are testable (such as astrology or alchemy) and there are some scientific theories (or hypotheses and principles) that are difficult or impossible to test (such as super-string theory or the conservation of mass-energy). Philosophers, historians, and sociologists of science have developed alternative approaches to the demarcation problem, but so far, no approach has been able to answer all objections and counterexamples.

Even though there is no definition of science that philosophers can all agree upon, courts have needed to use definitions of science to make rulings and render opinions. Philosopher Larry Laudan criticized Judge Overton's opinion in the *McLean* case for relying on Popper's testability criterion to distinguish between science and religion. Laudan argued that the victory for evolutionists in the *McLean* case was hollow because it perpetuated false stereotypes of science, and that the demarcation problem is an uninteresting, intractable, pseudo-problem.

Creationists have seized upon Laudan's ruminations about the demarcation problem and have used his ideas as fodder for their arguments. If there is no satisfactory distinction between science and religion, then the claim that creationism is not science (but evolution is science) is unfounded. Teaching creationism in public schools is just as constitutional as teaching evolution. Barry Gross and Robert Pennock admonish Laudan for failing to understand the practical implications of his philosophy. Gross argues that Laudan does not appreciate the difference between philosophical and legal reasoning, as well as the practical issues involved. Legal arguments do not need to meet the same standards of evidence and proof as philosophical ones, because the law is designed to settle disputes between people in real time, not to answer metaphysical questions that scholars and scientists have pondering for thousands of years. According to Gross, "Laudan has confused the outlines of a constitutional conflict with a colloquium in philosophy" (p 351).

Though I agree with Gross and Pennock that there is a difference between philosophical and legal perspectives on the demarcation problem, these two disciplines do often interact in important ways. Judges and attorneys have used —

and will continue to use — philosophical ideas and theories in the courtroom. The $64,000 question is how to apply philosophy to the law in a way that respects the distinct goals and methods of these different endeavors. Though none of the authors in *But Is It Science?* answer this question directly, many of them confront it in one way or another.

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Evolution: The First Four Billion Years

Edited by Michael Ruse and Joseph Travis
Cambridge (MA): The Belknap Press of Harvard University Press, 2009.
979 pages

Reviewed by Stanley A Rice

Michael Ruse and Joseph Travis have produced an amazing book, with 111 contributors, plus the editors, many of whom are immediately recognizable as world authorities and excellent writers. A small sampling of contributors includes: Francisco J Ayala, Michael Benton, the Charlesworths, Simon Conway Morris, James F Crow, Daniel Dennett, Adrian Desmond, Donald C Johanson, David N Livingstone, Lynn Margulis, Ronald L Numbers, Tom Ray, J William Schopf, Eugenie C Scott, David Sepkoski, Daniel Simberloff, and David Sloan Wilson. This accomplishment is on the order of Mark Pagel's encyclopedia (Pagel 2002). As one of the contributors to a forthcoming encyclopedia, I have seen firsthand how difficult it is to coordinate the work of even a small number of authors. What patience Ruse and Travis must have had to herd 111 cats!

Many of the entries are delightfully written and bear the recognizable stamp of the author. Ruse's opening essay about history of evolutionary thought, and several other entries by him, have the broad sweep and punchy judgments that we all like from his books, such as "No doubt Whewell would happily have helped God to make the right decision" (p 913). As in his other writings, Simon Conway Morris is clear and enthusiastic. In his entry on the Burgess Shale fauna, Conway Morris commendably uses his own work as an example of error and correction. Adrian Desmond has an unmistakable and lively style.

It is inevitable, however, that a book with so many authors will be a little uneven. The editors intended the book for "readers who are not professional scholars," but not every contributor accomplished this. Jeffrey L Bada and Antonio Lazcano used some Gibbs free energy formulas, and Henry McHenry left bone names unexplained in their otherwise excellent contributions. But the editors had to take what they got from their contributors. As a result, the coverage of evolutionary topics, people, and books sometimes did not make sense, and some topics got missed. For example, there was almost as much about Bergson as about birds; there were entries on insects and crustaceans but not arthropods in general, and neither spiders nor arachnids nor chelicerates were even in the index; Darwin's biography was about the same length as that of Jens Clausen and shorter than the one for Whewell; the entry for a book by Dov Ospovat was as long as the one for the *Descent of Man*; there was less about the *Origin of Species* than *On Growth and Form*. The only alphabetical entries about human evolution were about Lucy, the hobbits, and the Neandertals (see below). But this is the inevitable price of having so many contributors, all with their own ideas about what the encyclopedia should accomplish.

I got some new insights from this book. I'd never thought about Robert Chambers's *Vestiges* paving the way for acceptance of Darwin's *Origin* by simply leaving people weary from arguing, as Ruse claimed. And there were entries about lots of Russian evolutionary scientists about whom I, reflecting my Anglo-American bias, had not read much before. The reader will encounter examples of healthy disagreement among scientists, such as when Bada and Lazcano reject Precambrian microfossils that Schopf considers beyond dispute.

Sometimes contributors got in a hurry and made mistakes. In the insect entry, for example, the breathing tubes are called "sphericles"; actually the tubes are tracheae and the openings are spiracles. For a thousand-page book, such errors were strikingly rare.

The only major problem with the book was due to a contributor who, while an expert, represents a viewpoint that was overwhelmed by contrary evidence 45 years ago. The entry on Neandertals by C Loring Brace has a figure that claims to show "*how* Neandertal craniofacial form *was converted* into the modern state" (emphasis mine). By superimposing outlines of Neandertal and modern human skulls, he implies that this transition must have occurred. He virtually ignores all of the recent and still accumulating evidence that Neandertals were a separate lineage from modern humans, springing from a recent common ancestor (perhaps *Homo heidelbergensis*). He disregards the possibility that the evolution of modern humans occurred in Africa. Brace also dismisses the DNA evidence. He admits that Neandertal DNA is outside of the range of modern humans. But he says, "The distinction between Neandertals and living humans, however, is not as great as the mtDNA differences between populations of chimpanzees or even the differences within populations of chimpanzees" (p 764). This does not

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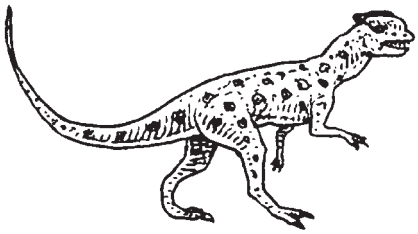

prove his point; it is a statement consistent with both his viewpoint and with the prevailing "Out of Africa" viewpoint.

Brace's arguments are unchanged from those he used in a book he wrote 44 years ago (Brace and Montagu 1965). Then as now, Brace simply defined Neandertals as a worldwide transitional stage (p 244). In support of his views, Brace only cites his own writings; a PhD thesis by Eugène Morin at Brace's own institution (University of Michigan); and a 1993 book. It is puzzling that Brace cited a book by Trinkaus and Shipman (1993) in which the authors had the same complaint about Brace as I have now. They considered Brace's skeletal arguments, as presented in a 1964 paper, unconvincing: "Downplaying the evidence from the rest of the skeleton, and neglecting the changes in the *shape* of the face, Brace declared that reducing the *size* of the face and teeth was not such an unreasonable task for evolution to accomplish" (1993: 331, emphasis in original).

Brace also wrote the Piltdown man entry, which appears to be accurate — but he apparently had to slip in some jabs at those who do not accept the Neandertal ancestry of modern humans: "This view was clearly at odds with evolutionary biology, but then a Darwinian outlook was never accepted in French biology" and "Insofar as French science accepts the idea of evolution at all, it tends to be a Bergsonian and not a Darwinian version" (p 812). While Brace was here referring to events in the early twentieth century, he uses the present tense when he makes these two statements, which must be quite a surprise to all the scientists in France.

The contributions of C Loring Brace to this encyclopedia considerably mar its quality. Brace's position has been so notorious for so long that the editors should have known not to request his contribution. Brace's entry on Neandertals is quite misleading to anyone who would use this encyclopedia to find out about human evolutionary history, or even about the process of science: although Brace is a competent scientist, he implies that you can prove something by drawing a picture and by ridiculing your opponents. (In a review of a book by Ian Tattersall [Brace 2002], Brace referred to anyone who accepts the African origin of *Homo sapiens* as embracing "crypto-creationism.")

With only a few bad pages out of almost a thousand, I must conclude that this complex project had a very enviable success rate. I learned a lot, and truly enjoyed most of the essays and entries. It is a job well done.

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Intelligent Design: William A Dembski & Michael Ruse in Dialogue

Edited by Robert B Stewart
Minneapolis (MN): Fortress Press, 2007. 257 pages

Reviewed by Evan B Hazard

Intelligent Design: William A Dembski & Michael Ruse in Dialogue began with a New Orleans Baptist Theological Seminary forum on faith and culture held in a Baptist church in Georgia. The forum comprised remarks by Dembski and Ruse, dialog between them, and comments and questions from four panelists: Francis Beckwith, William Lane Craig, NCSE's Wesley Elsberry, and Martinez Hewlett. Robert B Stewart chaired the forum, and wrote the introduction to the book that resulted; chapter 1 consists of versions of the presentations in the forum.

Most *RNCSE* readers have encountered Dembski's and Ruse's positions already. The two spar, Ruse more effectively. Dembski says the "design inference" cannot tell us the nature of ID's "intelligence". This is misleading: As is clear from many ID statements, here and elsewhere, it is the Christian God. By arguing that scientific evidence proves a creator, ID diminishes God, reducing him to a scientific object (Pennock 1999; Hazard 2001)

In addition to the forum presentations, each panelist contributed an essay (NCSE's Nicholas Matzke coauthored chapter 4 with Elsberry). Write-in authors contributed additional essays, in this order: Alister McGrath, JP Moreland, Hal Ostrander, Nancey Murphy, John Polkinghorne, John Lennox, Ken Keathley, and Wolfhart Pannenberg. Stewart indicates no rationale for that order, and leaves us wondering: Did the writers see a forum transcript or

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the panelists' essays? When were the chapters written? (Ostrander's is an edited extract from his doctoral thesis.) How were additional authors chosen? Did any potential authors decline? Robert Pennock could have provided better philosophical balance.

After chapter 1, the scientific aspects of evolution are mostly confined to Hewlett's (chapter 2) and Elsberry and Matzke's (chapter 4) contributions. Therefore, this essay reviews a mostly theological anthology. The dozen essays are too detailed for comprehensive review. A natural way to sort them is into the essays that support ID and those that oppose ID, although not all of the contributions are easily so classified. McGrath's essay, for example, ignores ID, but nicely refutes Dawkins's claim that science requires atheism. He does this more thoroughly elsewhere (McGrath 2005, which I reviewed in *RNCSE* 2006 Nov–Dec; 26 [6]: 43–4).

Craig, Beckwith, and Lennox support ID, but with differing arguments. Craig discusses Dembski's classification of "naturalisms", concluding that scientists need not be even methodological naturalists and that ID is "*not* an inference to theism but merely to some sort of intelligent agency" (p 70). Phillip Johnson's acknowledgment that "[o]ur strategy has been to change the subject a bit so that we can get the issue of intelligent design, *which really means the reality of God*, before the academic world and into the schools" (quoted in Gropp 2003, emphasis added), belies this.

Beckwith faults Federal Judge John E Jones Jr's finding in *Kitzmiller* that ID is "stealth creationism", claiming that in constitutional law, "creationism" means the claim that Genesis 1–13 is factual. This is nonsense: Creationists have interpreted "creationism" more variously for generations. (Dembski similarly insists on a too restrictive definition of creationism.) Beckwith identifies a "knowledge class" ... "in our most influential cultural-shaping institutions such as academia, the mainstream media, and the federal judiciary" who hold to metaphysical "naturalist" presuppositions (p 229). To him, allowable "scientific critiques" of evolution could include "a nonnaturalist view of origins" if only the presuppositions of the "knowledge class" could be overcome.

Lennox claims that ID has become "freighted" with the connotations that it is stealth creationism and that it is "antiscience in spirit". Well, its history shows that it started that way (Anonymous 1998; Gropp 2003). He also notes "Wegener's work on plate tectonics". Wegener advocated continental drift, but died decades before plate tectonics was proposed. Lennox says that it is surprising "how few [miracles] are claimed in the Bible as a whole" (p 189). Wrong: For starters, God has "knit" each of us in the womb (Psalms 139:13) and not a sparrow falls against God's will (Matthew 10:29). That's more than a few.

As for the opponents of ID, four essays by committed Christians (Hewlett, Murphy, Polkinghorne, and Pannenberg) reject ID but propose various versions of theistic evolution (TE). Murphy understands how biological science operates better than do most theologians represented here. She labels ID as a form of "progressive creationism". Relatively open nonbelievers might profit by reading her chapter.

Polkinghorne's and Pannenberg's essays are thoughtful. Polkinghorne notes that acts of Providence "will never be demonstrable by experiment" (p 174). He also says ID bears the burden of proof for its claims, and has not discharged that burden. Pannenberg discusses the biblical understanding of creation in relation to modern scientific understanding (which he accepts), but says little about ID. Like other theologians represented here, he seems to think the goal of creation (thus far) is "finally, the human race".

Hewlett's is one of two essays by biologists. He is also a believer who supports TE; it does not get in the way of his science. He writes that ID, despite "its pretenses to science, is really an ideology ... an ill-conceived attempt to counter the ideological overlays that have plagued" (p 155) Darwinism since its origin.

The other essay by biologists (Elsberry and Matzke) discusses the Dover trial, from which some originally scheduled defense witnesses (including Dembski) fled. After reviewing the history of creationism and "creation science" in the schools, they analyze the defense's claims that ID is scientifically legitimate, and its claims that ID is neither religious nor creationism. Paying scant attention to the battle on the ground, most of the ID supporters in the book act as if ID were a detached scholarly effort. Elsberry and Matzke thus provide a welcome dose of realism. Their essay is chapter 4, among the other panelists' essays. It should have been the last because it effectively refutes the lofty pretensions of the pro-ID essayists.

The ID text *Pandas and People* (Davis and Young 1993: 99–100) says, "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." As Elsberry and Matzke point out, earlier *Pandas* drafts started out, "Creation means ..." followed by the same definition. At hearings and school board meetings I've attended, ID advocates have been the same folks and groups that pushed "creation science" earlier. Michael Behe, allowing that the overall evolutionary tree probably occurred (but with "intelligent" guidance), is a maverick among IDers. Except for some young-earth creationists and even fewer nonbelievers, the ID movement comprises religious old-earth creationists, who accept neither evolution's occurrence nor its major mechanism. To claim otherwise is either ignorance or hypocrisy.

A *Christian Century* advertisement (16 October 2007) for *Intelligent Design* says that it provides a "fair and balanced case ... for both perspectives." Wrong: Only the panel was split evenly (Beckwith and Craig favor ID, Elsberry and Hewlett don't). ID fans are disproportionately represented among the write-in contributors. All of the contributors favoring ID are explicitly Christian, casting doubt on the claim that they're not committed to any view of the designer's identity.

The index is inadequate and inaccurate: it fails to cite some items and, like the text, contains many typos. It indexes Conway Morris, Simon; Maynard Smith,

John; and Teilhard de Chardin, Pierre under M, S, and C, respectively. With no bibliography, citations must be tracked, when possible, in the endnotes.

Except for collectors of arcane (and sometimes irrelevant) theological minutiae, there is little to recommend in this so-called dialog. All the good material, both scientific and theological, is available elsewhere.

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The Evolution Controversy: A Survey of Competing Theories

by Thomas B Fowler and Daniel Kuebler
Grand Rapids (MI): Baker Academic, 2007. 382 pages

Reviewed by Jim Hofmann

The Evolution Controversy describes itself as an "objective" discussion of "the scientific merits of four major schools of thought regarding evolution": the neo-Darwinian, the creationist, the "intelligent design", and the meta-Darwinian. Theistic evolution is relegated to a few footnotes, the justification being that this is a religious commitment that requires a prior assessment of the available scientific schools of thought.

As defined by Fowler and Kuebler, both creationism and "intelligent design" require supernatural intervention. (Although some ID proponents deny that their position requires such intervention, the majority believes that some form of divine action has taken place at various points in the history of life.) But they say that ID is distinguished from creationism by the acceptance of "common descent from [a] single progenitor." This is problematic, since some prominent advocates of ID are also young-earth creationists who reject common descent. These categories thus are not mutually exclusive, as the authors admit.

Before discussing the four schools of thought, Fowler and Kuebler devote a chapter to a brief history of evolutionary theory and another to a review of relevant evidence. The history chapter is fairly accurate, although there are flaws. An inaccurate summary of Haeckel's famous embryological illustrations includes a misleadingly cursory dismissal: "Unfortunately, it was all faked" (p 58). Kettlewell's research with peppered moths is discussed briefly as a good example of natural selection. Unfortunately, the authors claim that flaws in Kettlewell's work are "thoroughly documented in Judith Hooper, *Of Moths and Men.*" Hooper's scholarship has been discredited by all the experts in the field, including the late Michael Majerus.

In chapter 3, the authors commence to "set down the raw evidence that must be explained." They correctly observe, "Confusing inferences with facts is a major source of the acrimony in the debate", but they mishandle an analogy to planetary motion and Newton's theory of gravitation. Chapter 3 also includes an incorrect definition of vestigial organs as "functionless". Vestigial organs actually may function even though reduced or rudimentary compared to the same structures in other organisms. As such, regardless of their present function or lack thereof, vestigial organs provide evidence of possible ancestors.

Chapter 4 addresses "The Principal Points in Dispute". Methodological naturalism is defined fairly clearly, but "naturalism" or materialism is ascribed to both neo-Darwinists and meta-Darwinists. This would make it impossible for theistic evolutionists such as Kenneth Miller or Francis Collins to be either neo-Darwinists or meta-Darwinists. It would have been more accurate to say that the neo-Darwinian and meta-Darwinian schools accept methodological naturalism. Some proponents of these schools also accept the philosophy of naturalism while others do not. The authors acknowledge this fact, but not explicitly till near the end of the book.

Chapter 5 is devoted to the neo-Darwinian school. Considerable attention is given to discussing the need for neo-Darwinian mechanisms to produce the wide variety of DNA-based information responsible for the evolution of life. The authors contend, "the efficacy of random mutation for the generation of new biological information is the most crucial issue for the evolution debate" (p 117).

The authors initially distinguished common descent from "strong Darwinian Evolution", the neo-Darwinian theory that is intended to explain how and why common descent has taken place. However, in chapter 5, common descent is called an "essential hypothesis" of the neo-Darwinian school and a "postulate" of the theory. On the other hand, the neo-Darwinian school is later said to be based on just random mutation and natural selection, but not common descent. In the book's glossary, common descent is referred to as a "theory". Readers will surely be left wondering what exactly the status of common descent is for the neo-Darwinian school according to Fowler and Kuebler.

Chapter 5 also addresses the fossil record in detail, emphasizing transitional forms. Oddly, the authors claim that a "true" transitional form must not only have characteristics of two temporally separated taxa but also be known to be on the lineage that connects them. For example, *Archaeopteryx* is ruled out as a transitional fossil because it is not found in the "proper historical sequence." This is not the usual understanding of

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what a transitional form is. The point of using "transitional form" rather than the misleading "missing link" is that direct lineage can never be established with certainty from the fossil record.

Chapter 6 is devoted to the creationist school; the age of the earth is emphasized as the most important issue. The authors cite Kurt Wise's estimate that only 1% of young-earth creationists (YECs) have relevant scientific training and are actually exploring testable scientific models. These stalwarts are the subject of this chapter rather than "crusaders" such as Kent Hovind or Ken Ham. Brief descriptions of the major YEC organizations are provided, and Russell Humphreys, Barry Setterfield, Walt Brown, Steve Austin, John Baumgardner, Guy Berthault, Andrew Snelling, and Carl Wieland are the most frequently cited authors. More attention is given to Walt Brown's hydroplate theory than to John Baumgardner's catastrophic plate tectonic model, even though Baumgardner's model appears to have a greater following among YECs at present. Robert Gentet's Creation/Curse/Catastrophe (CCC) geologic model is also highlighted as the most integrated attempt to provide a YEC alternative to the conventional historical interpretation of the geological and fossil records. The RATE group's work on decay rates is mentioned briefly. They are cited as acknowledging that there is evidence of a great deal of nuclear decay in the past and this requires a period of accelerated rate of decay at some point.

The authors go to great lengths not to be critical of the creationist models they describe. Their concluding remark on Baumgardner is typical: "A very brief period for the tectonics, instead of hundreds of millions of years, must result in significant differences in some observable area leading to testable predictions" (p 215). The reader is left to ponder what these predictions might be. The general impression given is that more scientific research is required to test creationist models. Most scientists would respond that insofar as they are testable, these models have been tested and have been refuted.

Chapter 7 is a discussion of the "intelligent design" school, in which ID is carefully distinguished from young-earth creationism. Notoriously ambivalent or even silent about the age of the earth and common descent, ID is characterized here as a rejection of neo-Darwinism as a full explanation of biological complexity as well as a rejection of naturalism or materialism. Some ID advocates may object that the rejection of naturalism is a consequence of what they see as the failure of neo-Darwinism. However, rejection of naturalism is so thoroughly documented in ID literature that it seems fair to include it in a general characterization of the school.

Dembski's concept of specified complexity and Behe's irreducible complexity are explained accurately. The authors call attention to the difficulties of applying Dembski's concepts to biological structures. They also accurately describe the most common response to ID claims about irreducible complexity: that irreducibly complex systems may result from the cooption of parts that previously served other functions. The authors conclude that the open-ended nature of the ID movement will result in its longevity. Evolutionary explanations of complex systems will always have limitations and critics will always be able to claim that only invocation of a designing intelligence can provide a full explanation.

Chapter 8 is dedicated to what Fowler and Kuebler label the meta-Darwinian school, which sees a need to invoke natural mechanisms above and beyond natural selection and random mutation in explaining evolution. Some may question whether this school can be sharply distinguished from the neo-Darwinians. Punctuated equilibria, exaptation, hierarchical selection, evo-devo, complexity theory, and endosymbiosis can be seen as supplementing neo-Darwinism rather than as competing with it.

In chapters 9 and 10, Fowler and Kuebler address what they call the "public policy implications" of the evolution controversy and briefly state their own assessment. Here they raise questions concerning science funding, the role of the courts in the controversy, and the science curriculum appropriate for public schools. Perhaps most controversially, they conclude that in addition to neo-Darwinism, the other schools of thought should be discussed "to a limited extent" and unsolved problems for neo-Darwinism should be addressed in the public schools. In this respect, they seem to be sympathetic to a "teach the controversy" approach.

Although I have concentrated on what I see as problematic in this book, it provides a great deal of accurate information and is well organized. Many of the objections I have raised could be rectified quite easily with more careful attention to definitions and reliance upon more accurate sources. Could I use this book in my university-level evolution-and-creation class? I could, but only with reservations.

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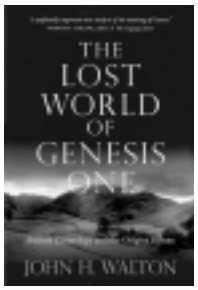

The Lost World of Genesis One: Ancient Cosmology and the Origins Debate

by John H Walton
Downers Grove (IL):
IVP Academic, 2009

Reviewed by James F McGrath

The Lost World of Genesis One is divided into a series of 18 "propositions" plus an introduction, conclusion, and FAQ. The chapters are short, each focusing on a key point Walton wishes to make. Most provide ancient Near Eastern background material as well as recommendations for further reading. Walton emphasizes the importance of understanding ancient cultures and creation accounts if one wishes

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to understand the biblical creation narratives. It is not that ancient Israel's authors "borrowed from" or were "influenced by" ancient cultural currents. They *inhabited* an ancient cultural context and shared many points in common with other peoples and languages located in their vicinity in time and space. Even when certain differences are highlighted by such a comparison (for example, Israel's emphasis on one God alone as creator), in the process it also becomes clear that the "Israelites received no revelation to update or modify their 'scientific' understanding of the cosmos" (p 16).

According to Walton, statements in the Bible about the nature of the creation should be treated as part of the *assumptions* of the biblical author, not the *teaching* of Scripture. If one does not do so, one will find oneself not only arguing without good reason about the age of the earth or evolution, but also compelled to defend the existence of the dome that Genesis says was made to hold up the waters above, and into which the lights are placed (see p 56–8, 94–5). For that is the literal, plain meaning of the Hebrew term used in Genesis 1:6–8, and Walton further emphasizes that no one ought to be discussing the literal meaning of the Bible based on reading it in English translation. The literal meaning can only be the meaning of the texts in the original languages.

Walton reinforces his point by highlighting another component of the biblical authors' worldview: their location of thought and emotion in organs where we cannot literally locate them, and in some cases would not even do so metaphorically (biblical references to "bowels" being a case in point). Such language was assumed to be literally, factually accurate among ancient peoples in this part of the world, and the biblical text does not reveal an alternative understanding of human physiology. Just as no one argues on the basis of the Bible that we think with our entrails, likewise there should be no attempt to defend the Bible's statements about material origins as an alternative to modern scientific understandings thereof (p 18–9).

Walton's most distinctive argument is that the days of Genesis 1 depict the organization of the cosmos so as to *function*, rather than focusing on its material origins. This argument is supported by both a careful analysis of key terms from Genesis 1, as well as comparison with other creation accounts from antiquity. Walton argues that Genesis 1 is better understood as a depiction of the inauguration of the cosmos to serve as God's temple. Against this background the idea of the deity resting in the completed temple becomes central, rather than the final day being something of an anticlimax as in most modern readings of the English text. Walton reiterates his point that "science cannot offer an unbiblical view of material origins, because there is no biblical view of material origins aside from the very general idea that whatever happened, whenever it happened, and however it happened, God did it" (p 113). Although the latter point has been made by others, few have made the case in such a detailed fashion in a way so well suited to an evangelical readership.

Many who subscribe to *RNCSE* will be troubled by Walton's noncommittal view of evolution, but this may in fact be a strength when one considers the intended primary audience of his book. Walton writes as professor of Old Testament at Wheaton College, and he thus is approaching a question of biblical interpretation for the benefit of a conservative evangelical primary readership. What he has to say about the creation narrative in Genesis 1 is extremely valuable and highly relevant to those concerned about science education. For the main point of the book is that Genesis 1 is not intended to be an account of material origins, and so Christians should neither oppose nor promote science's best current understanding on the basis of Genesis. Nevertheless, Walton at times seems to place the ancient understanding of the cosmos on a par with the modern scientific understanding of the universe. While there is *some* truth in his statement that science is constantly revising its understanding in light of new evidence, it would seem that sufficient evidence has amassed and sufficient investigation occurred that it is more accurate to view science's understanding of the natural world as constantly *improving* rather than merely *changing*. And it would seem that there is no better that one can do, unless perhaps one is a researcher engaging in pioneering research in the natural sciences, than accept the consensus of the scientific community as it currently stands. Yet when one considers that Walton is making a case against an understanding of Genesis 1 often used to oppose quality science education, and that his intended audience has been indoctrinated with a bias against evolution, it is perhaps for the best that Walton does not connect his arguments about the Bible directly to questions of science. Walton makes a case about Genesis 1 as a biblical scholar, and does so in a way that undermines and challenges many arguments made about the Bible by proponents of pseudoscience. It remains for others to address matters of science in a manner appropriate to that same audience, for which Walton helpfully clears the ground.

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For the Rock Record: Geologists on Intelligent Design

Edited by Jill S Schneiderman and Warren D Allmon
Berkeley (CA): University of California Press, 2009. 261 pages

Reviewed by Mark A Wilson

When the repackaged version of "scientific creationism" emerged in the 1990s as "intelligent design", it notably did not include physical geology in its central arguments about a grand designer. It was obvious to all that the entity supposedly responsible for all that irreducible complexity in life also created the entire physical universe, but the proponents of ID confined their arguments to biological issues and political "fairness" in public education. Geology, with the prominent exception of

paleontology, was a source of conflict within the creationist camp and was thus virtually ignored to promote unity under this new banner of anti-evolutionism.

I saw this geologically-induced tension in 2002 after the godfather of ID, Phillip E Johnson, gave a rousing speech in Cleveland presenting his usual case for a "reasonable" science. During the question session, one of my students asked about his views on the age of the earth: Is it 6000 years old, 4.6 billion years old, or somewhere in the middle? In a sudden flash of anger, the normally avuncular Johnson denounced the question as "irrelevant" and moved on to the next, providing not even a hint of his views on the earth's antiquity. It was a wedge question of its own which would split the young-earth and old-earth creationists apart in the shaky ID confederacy. As such, it showed a fundamental weakness in the arguments of ID proponents, and the power of geology to make a hash of their agenda.

The editors of this multi-authored volume, then, faced a dilemma when they collected essays to include. Ever since Hutton and Lyell, the geological sciences have provided devastating critiques of creationism in the broad sense. The specific incarnation of "intelligent design", though, has for the most part avoided geological arguments. One author (Timothy Heaton) says it directly: "Very little attention is paid to geology in ID publications, and this may be because ID proponents have unwittingly selected examples lacking a fossil history in their search for 'gaps' in structural development" (p 31). (I disagree only with the word "unwittingly".) How then can the force of geological evidence be applied to the debate over ID? Ten authors, all geologists, give it a try in this book.

One approach, unfortunately deployed in the first chapter, is to caricature the ID position and force it into a geological argument. The author (Jill Schneiderman) describes a complex cross-section across the Hudson River and then writes, "An intelligent design creationist might well summon the mighty hands of a creator to have upended some rocks while having squeezed and consequently bent the hardest among them, the gneiss and schist, with one hand while using the fingers of the other hand to gouge a channel along which the Hudson River now flows" (p 14–5). Even the crudest of the young-earthers at Answers in Genesis would not make such an anthropomorphic argument, much less an advocate of ID.

Most of the other authors (with the exception of the paleontologists, who have some ID material to work with) solve the dilemma by addressing creationism in general. Much of the book, then, is not specifically geological but consists of geologists discussing metaphysical issues informed by their experiences as successful earth scientists. A better subtitle for the book would have been "Geologists on Creationism", which would include but not be limited to ID.

The most practically useful chapter in this book is "Missing links found" by paleontologist Donald Prothero. In a relatively few pages, Prothero efficiently devastates creationist arguments about the evidence for evolution in the fossil record, and he shows why ID advocates try very hard to ignore paleontological evidence. This chapter should convince anyone who hasn't already to read Prothero's excellent book, *Evolution: What the Fossils Say and Why It Matters* (New York: Columbia University Press, 2007). Allison Tumarkin-Deratzian's contribution on "Dino-Birds" is very good as an introduction to cladistic methodology as well as the most common arguments concerning the extraordinary evidence connecting birds with their dinosaur ancestors. She also shows how creationists are often confused by mosaic character-states when it comes to sorting out lineages. Charlie Mitchell manages successfully to blend a metaphysical discussion of origin accounts with details of graptolite evolution.

Most of the other chapters sort out philosophical, political, and religious issues in the debates about "intelligent design". They are written by working geologists, and their content is informed by geological experience and knowledge, but they do not have many specifically geological arguments in them. Keith Miller discusses various ID misconceptions and misrepresentations of methodological naturalism by the ID crowd. David Goldsmith has an interesting essay on the intellectual construction of Darwin's seminal work and why the ID movement is not even close to understanding it. Tricia Kelley has a short chapter on her attempts to reconcile her religious faith as a Christian with her life as an evolutionary paleobiologist. Warren Allmon ends the book with a long chapter on how scientists approach the religion–science debates, using an interesting "God spectrum" table to pin down otherwise slippery definitions of the deity (at least in a Western sense). He managed to get some geologists to speak candidly about their belief systems, and he effectively presents the issue as one of fundamental importance to humanity.

Despite the awkward packaging as a text in which geologists specifically take on "intelligent design", and the occasional argumentative misstep, this eclectic book is a valuable contribution to the literature on creationism and the earth sciences. Several of the essays will especially interest geologists and students of geology in large part because they are written by colleagues with the courage to enter one of the most contentious and complicated debates in intellectual history.

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Scientists Confront Intelligent Design and Creationism

edited by Andrew J Petto and Laurie R Godfrey
New York: WW Norton, 2007.
463 pages

Reviewed by Joel Cracraft

The first thing I wondered when opening the pages of this fine book was why in the hell — almost a decade into the 21st century, supposedly in the most tech-

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nologically and scientifically advanced country on earth — why is it that this book is even necessary? Have we utterly failed in promoting rational thinking about the world around us, an effort that should penetrate beyond the walls of academia? I'm not sure that any chapter in this book answers my question satisfactorily, but without books like this, what hope is there?

In their preface, the editors note a quiescent period in creationist activity following *McLean v Arkansas* (1982), brought about by Judge William Overton's penetrating opinion. But a few short years later, none other than Justice Antonin Scalia stated in his dissent to *Edwards v Aguillard* (1987),

> The people of Louisiana, including those who are Christian Fundamentalists, are quite entitled, as a secular matter, to have whatever scientific evidence there may be against evolution presented in their schools.

Scalia's "whatever scientific evidence" eventually took on the moniker of "intelligent design".

This book is an update of a 1983 book — *Scientists Confront Creationism* — edited by Laurie Godfrey that was published in an effort to thwart the creationism of the '80s. A few of the participants in that volume are here again (disclosure: I was one of the original culprits), but numerous other experts have been added to create a volume more relevant to today's brand of creationism. Like the 1983 book, this book is also caught in an interregnum of court cases, following as it does the *Kitzmiller v Dover* trial (2005) that put a large nail in the coffin of "intelligent design". Yet although we are in somewhat of a quiescent period once again, hardly a week goes by without pernicious activity in one state legislature or another. Which is why this new volume will have a readership for some time.

There is a lot packaged into this book. It comes with an introduction by Massimo Pigliucci and is followed by fifteen chapters. In part 1, "Creationism and Intelligent Design," there are three chapters by Ronald L Numbers (the history of creationism and "intelligent design"), Eugenie C Scott ("intelligent design" as the new anti-evolutionism), and John R Cole (on how the "wedge" strategy has empowered "intelligent design" creationism). In the seven chapters of part 2, "Scientific Perspectives," Victor Stenger writes about physics and cosmology, G Brent Dalrymple writes about earth science, Antonio Lazcano treats the origin of life, Kevin Padian and Kenneth Angielczyk discuss transitional forms, Robert Dorit holds forth on biological complexity, Wesley Elsberry dissects the smoke and mirrors of Dembski's so-called "design inference," and C Loring Brace focuses on human origins. Finally, part 3 contains five chapters on "Understanding Science": Robert T Pennock dissects "intelligent design" arguments from his broad philosophical perspective, Norman A Johnson discusses the nature of theory in evolutionary biology, J Michael Plavcan examines the logic of creation science, Alice B Kehoe writes about why evolution is being targeted by creationists, and finally the editors explain why we should be teaching evolution.

A lot of familiar names are here and I salute them for their uniformly excellent chapters. There is a lot of information in these pages that will be of use to a wide audience —professional biologists and educators, teachers at all levels, the general public, and even public officials and school boards who need to understand the issues better before making decisions that might dumb down science, or worse, introduce religion into the classroom masquerading as science. The contributors avoid polemics for the most part, which should facilitate its impact with its audience.

The book contains much pointed refutation of creationism, especially its "intelligent design" form. Thus, readers will learn why "intelligent design" is vacuous for philosophical (Pennock, Plavcan) as well as scientific reasons (all the chapters in part 2), and multiple authors trace the history and sociology of creationist movements as they have mutated over the years in an attempt to keep ahead of the constitutional noose that always seems to dance around them (Numbers, Scott, Kehoe). In his chapter, Numbers argues that these debates will continue as long as our constitutional democracy allows both religious fundamentalism and science to give vent to their respective points of view. So cycles of controversy and culture wars will continue. This is a depressing future indeed.

What is not discussed much in this book is how the cycle might be broken (the exception is the chapter by Petto and Godfrey on teaching evolution). Science has often carried a chip on its shoulder, conveying the impression that scientists know how to think and explain the natural world but, by and large, nonscientists/laypersons don't. Scientists are held in high esteem by the public, because the latter relies on science to reveal and interpret new knowledge, and to look after its welfare with discoveries and innovations. But science is largely the codification of rationalism in the context of learned, special knowledge. Laypeople need to understand that they too are "scientists" because they also largely understand phenomena and events around them through the use of evidence and reasoning. The growth of knowledge, whether within the sciences or not, accrues via this approach. Thus, whether people realize it or not, they are "scientists" much of their lives.

Recent polls indicate people are tired of the culture wars. They seem to be responding to a new American administration that promotes science, evidence, and transparency in decision-making. I take this as evidence of a latent reservoir of rational thinking. One should not get overly optimistic, however, given all the miracle-mon-

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gering in the media and everyday life. But now is the time to expand scientific thinking. Some evolutionists have not always been helpful, I think, by belaboring the theme that science and religion are compatible. In the sense that a person can be both religious and a scientist, there's truth in this, and often it is an expedient way to gain some acceptance for evolution. But it is incomplete: merely pointing out that there are people of faith who accept evolution doesn't itself help educate the public about the nature of science. So let's focus instead on teaching how we come to have knowledge, whether in everyday life or in the science lab.

A book like this could not hope to cover all the new and exciting aspects of the science or explain in detail the role of evolution in making people's lives better, but it succeeds in showing the merits of evolution and the bankruptcy of "intelligent design"," in juxtaposition and thus is an important contribution. Now we have to get it into the hands of people who matter.

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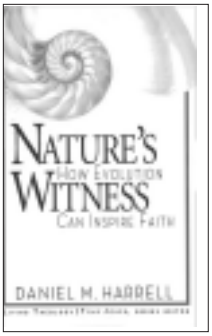
EVOLUTION IN DIALOG



Nature's Witness: How Evolution Can Inspire Faith

by Daniel M Harrell
Nashville (TN): Abingdon Press, 2008. 165 pages

Reviewed by Robert Cornwall

There's an assumption that's held by many, both religious and nonreligious, that science and religion are hopelessly at odds, perhaps even at war. To those partisans who hold this view, whether Richard Dawkins or Phillip Johnson, there's no way that one can reconcile religious faith, especially as it's laid out in the Bible, and the scientific evidence for evolution. Therefore, one must choose.

Ever since the *Origin of Species* was first published, there has been another way, one that seeks to reconcile faith and evolutionary science. *Nature's Witness,* a book written by the pastor of a prominent Boston evangelical church, picks up the mantle of reconciliation and argues that if all truth is God's truth, then it must include science as well as theology. There is no use in pursuing an "alternative 'science'" — one that refuses to admit that the preponderance of evidence supports the theory of evolution. One can deny its factualness, but that denial, no matter how firmly felt on religious grounds, won't make evolution any less true.

Daniel Harrell is a pastor and not a scientist. He doesn't claim expertise in matters of biology or geology. If one were seeking such a voice, then the books of a Davis Young or a Francis Collins might be a better choice. Harrell's purpose in writing this book, however, is not to marshal evidence to prove or disprove evolution. He explores evolution and its implications in some detail, but his audience isn't the scientific community nor is it the skeptical lay person. His audience is the evangelical Christian community, many members of which believe that evolution is not only godless, it's ultimately destructive to one's faith. His is, therefore, a pastoral concern. He's concerned about the effect that a denial of evolution has on Christian faith. If evolution is true, as he suspects it is, then to deny its truthfulness is to deny God's handiwork.

His approach is, at times at least, folksy. He brings in his Aunt Bernice and other characters to raise the questions that face evangelical Christians as they wrestle with the spiritual implications of evolutionary science. For his part, he seeks to root his response in a distinctly evangelical faith that holds to a very high view of scripture — it is for him the revelation of God.

It's from this evangelical perspective that Harrell seeks to reconcile theology and evolutionary science. He assumes that "God is the maker of heaven and earth," and if this is true, "then the heavens and earth, as science describes them, [must] have something to say about God." He understands that randomness and death are part of the process. He also believes that that "natural selection," which is the engine of evolutionary development, "need not imply *godless* selection" (p ix, emphasis in original.) He understands that science, as a discipline, must be pursued in naturalistic terms, but that doesn't rule out a theological interpretation of the process. He also recognizes that the process raises significant theological questions — such as the existence of the soul, theodicy, and even ethics. Indeed, he's concerned that by demonizing the modern scientific method, evangelical Christians have removed themselves from important ethical debates, debates that could profit from a theological perspective (on the ethics of human cloning, for example).

Theologically, the problem many have with evolution is that it explains the universe without recourse to God. As noted earlier, science, as a discipline, seeks natural explanations for natural phenomena. To insert God into the equation is to short-circuit the search for answers. Evolutionary biology teaches that the human race is a product of random variation and natural selection, the latter determining which variations will be passed on. The key to this process is time, and geology seems to provide the necessary context for the process to move forward. The faithful can deny this reality, or it can adapt itself, adjusting the interpretation of the faith to make sense of the scientific testimony. In the end, "authentic faith strives to believe in *what is* rather than what we wish was" (p 63, emphasis in original).

While science presents significant challenges, especially to a faith rooted in an authoritative text, there's the possibility of a partnership. Affirming one truth doesn't rule out another. Therefore, while God's hand might be invisible, a theological portrayal of reality can offer insight into the "who" and the "why", while science tells us "how." Although his presentation has ele-

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ments of a design argument — he speaks of fine-tuning, fruitfulness, and the anthropic principle — he also recognizes that evolution involves randomness and requires an open future. At the same time, evolution suggests freedom and offers explanations for disease and death. In some ways evolution explains reality in ways theology is unable to do.

One of the primary issues that Harrell wrestles with is the reality of death. Genesis suggests that death is the result of the fall of Adam and Eve, but evolution would suggest that death precedes the dawn of humanity, that death is a natural part of life. Indeed, it is an evolutionary necessity. But death becomes easier to understand theologically if natural selection is seen as a positive force. That is, "the negativity of death is redeemed for the sake of new life" (p 108).

Those not inclined to Harrell's evangelicalism, including those who come from a more theologically liberal perspective, might find some of what he says a bit literalistic and off-putting, but one must remember his audience — fellow evangelicals who are struggling to make sense of evolutionary science. That audience is a different one from the audience of this journal. Readers here need to understand that his greatest concern is for those who would reject the very God they seek to defend by rejecting evolution — that is, if God has chosen evolution as the means of bringing the universe into existence.

This may not be a perfect book, but it's a hopeful one, especially for those who fear that science could be adversely affected by religious voices. In many respects this is a bridge between nervous parties — one can chose to burn that bridge or cross it.

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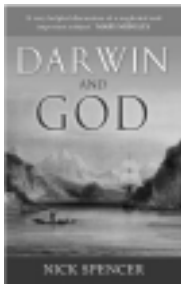

Darwin and God

by Nick Spencer. London: SPCK, 2009. 160 pages

Reviewed by John F Haught

The question of Darwin's religious beliefs and why he eventually abandoned his Christian faith continues to fascinate biographers, scientists, theologians, and educators. Nick Spencer's brief study of Darwin's drift toward agnosticism after returning from his famous five-year sea odyssey is a significant contribution to the contemporary discussion not only of Darwin's own religious ideas but also of the larger question of God and evolution.

It is hardly illuminating simply to record the fact that Darwin became disillusioned with theism and the idea of "special creation" after discovering a whole new story of origins that seemed to contradict the biblical accounts. Nor is it enough to record the fact that Darwin's sensitivity to the excessive suffering of living beings over millions of years led him to question both the power and beneficence of Christianity's God. Even Darwin's devastation at the death of his daughter Annie, an event that shattered decisively any prospect of his ever again taking comfort in the idea of divine providence, is not enough to explain why he eventually abandoned Christianity. There is no doubt that Darwin gradually lost his Christian faith, of course, but according to Spencer it is essential to observe that the faith he lost was of a particular sort. What Darwin lost was a species of faith that many other Christians would hardly recognize as Christian at all.

The particular set of beliefs that Darwin eventually abandoned, the author convincingly argues, was "a series of arguments, rather than the experience of God" (p 43). It was the "propositional," syllogistic, rationalistic, design-obsessed natural theology of his own time, as epitomized in the work of Archdeacon William Paley, that Darwin found irreconcilable with both his science and his sensibilities. It is no wonder that Darwin wanted nothing to do with such an emaciated set of theological constructs. The faith Darwin gave up could not have meant much to him, religiously speaking, in the first place. There was little space in it, Spencer observes, for the idea of a crucified God or for John Wesley's "heart strangely warmed" (p 114). In short, it was a faith that could scarcely be called Christian in any substantive sense.

Why is it, though, that Christian faith in the nineteenth century had come to be identified with propositions, syllogisms, design arguments, and "natural theology" in the first place? Turning to the Jesuit theologian and historian Michael Buckley, Spencer offers at least part of an explanation. The slaughter in the name of religion that people had witnessed during the Thirty Years' War had left them, in Buckley's words, "deeply scandalized and disgusted by confessional religion," so that "religious warfare irrevocably discredited confessional primacy in the growing secularized sensitivity of much European culture." Starting in the seventeenth century, a growing disillusionment with confessional religion had led thoughtful people to distrust both revelation and religious "experience." So they began to look more philosophically to *nature* rather than revelation for a universal order and beneficence to ground their sense of God.

As a consequence, natural theology began to prosper so that by Darwin's day the experiential, biblical sources of Christian faith had been — in great measure at least — supplanted by the propositional formulations of authors such as John Pearson and John Bird Sumner, whose writings Darwin devoured. Spencer says of these works that they expressed "not so much a personal commitment to the person and work of Christ, still less an affecting encounter with

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the Holy Spirit." Rather, this brand of Christian reflection, which during Darwin's years at Cambridge was combined with an enthusiasm for the writings of William Paley, "was a series of propositions to be accepted, a hypothesis to be satisfactorily established, an argument to be won" p (12).

Such a bland, untroubled propositional theology was no match for the ragged picture of life that Darwin was later to unearth. Already during his journey on the *Beagle*, long before the idea of natural selection had supplanted his Paleyan interpretation of adaptive design, the benign natural theology that Darwin had picked up as a student began to unravel, according to Spencer, especially as a result of two rough awakenings. The first was his abrupt exposure to the apparent indifference of nature as manifested in natural disasters. One of these was a volcanic eruption he witnessed off the coast of Chile, the other a massively destructive earthquake that took place in the city of Concepcion at the time of Darwin's visit to Chile. Such live events, along with his growing familiarity with Charles Lyell's *Principles of Geology,* greatly transformed Darwin's sense of nature and nature's God. The notion of a general divine providence governing nature became less and less credible to him.

The second shock to Darwin's Paleyan frame of mind was his direct experience of the resistance to religious conversion by three native Fuegians that the *Beagle*'s captain FitzRoy conveyed back to their home in Tierra del Fuego after they had been taken hostage and taken to England. Natural theologians had generally assumed that all people share a universal religious sensibility that inclines them monotheistically toward the God of Christianity. But as Darwin was to remark much later in *The Descent of Man*: "There is no evidence that man was aboriginally endowed with the ennobling belief in the existence of an Omnipotent God." On the contrary, as the Fuegian experiment demonstrated, "numerous races have existed and still exist, who have no idea of one or more gods, and who have no words in their languages to express such an idea" (as quoted by Spencer, p 29).

Thus, two main pillars of natural theology — the alleged kindliness of nature and the apparent universality of a religious tendency toward monotheism — had already collapsed in Darwin's mind by the time his sea journey was over and he had begun to question the ideas of special creation and divine design. Consequently, the idea that blind and impersonal natural selection could be the agent of descent, diversity, and "design" in the life-story settled into Darwin's increasingly skeptical mind without the theological torment that many others would experience.

In the author's opinion, however, Darwin's abandonment of belief in special creation and divine design is not enough to demonstrate any inherent incompatibility between evolutionary science and a genuinely Christian faith. Spencer's carefully researched and well written book will be illuminating to teachers, students, and any others interested in the question of God and evolution.

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Galileo Goes to Jail and other Myths about Science and Religion

Edited by Ronald L Numbers
Cambridge (MA): Harvard University Press, 2009. 232 pages

Reviewed by Richard G Olson

This book is ideally suited for those whose ideas about science and religion have been shaped by the conflict model articulated by William Draper and Andrew Dickson White in the late nineteenth century. Their views persist in the popular literature today in spite of rigorous scholarship indicating the existence of complex and often mutually supportive interactions. Twenty-five widely believed myths about science and religion interactions are tackled by experts in the field in short (less than ten pages long), tightly focused essays. With a very few exceptions, the essays reflect widely accepted consensus among contemporary scholars.

"Myth" is used as in everyday conversation, "to designate a claim that is false" (p 7). Although a couple of the myths discussed here were created by identifiable individuals with a conscious intent to mislead or manipulate, most contain a kernel of truth surrounded by embellishments that fundamentally distort the meaning of events. Moreover, as the authors acknowledge, the myths were often propagated not because of any intent to deceive, but because they fit so well with ideological preconceptions.

Readers of *RNCSE* are likely to be most interested in myths 15–20, 23, and 24, which focus on central issues connected with evolution, so I will concentrate my attention on them. In Myth 15, "That the theory of organic evolution is based on circular reasoning," Nicolaas Rupke deals with the frequent creationist claim that both the placing of fossils in the geological column and the use of homologous structures to place organisms within the taxonomic order presupposes evolution and thus cannot be used as evidence for evolution. Rupke demonstrates compellingly that both the geological column and the use of homologies for taxonomic purposes were well-established long before Darwin's *Origin of Species* and independent of any evolutionary or proto-evolutionary ideas, undermining the claims of circularity.

In Myth 16, James Moore challenges the claims that evolution destroyed Darwin's faith in Christianity and that he reconvert-

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ed on his death bed. While it is true that Darwin often said that the study of natural history undermined his acceptance of Paley's argument for the existence of God from the beneficent design of the natural world, he also argued that evolution was consistent with theism, and he consistently opposed those, like Ludwig Büchner, who claimed that evolution by natural selection implied materialism. Moore argues that it was the deaths of his father and of his daughter Annie that brought on Darwin's loss of faith. Moreover, he locates the claim that Darwin recanted on his deathbed in a 1915 story by Lady Hope, an associate of the evangelist DL Moody, who Moore convincingly argues was tapping "the huge voyeur's market" (p 149) for stories of deathbed conversions.

David Livingstone, in Myth 17, explores the claim that TH Huxley defeated the anti-intellectual Bishop Samuel Wilberforce in their 1860 Oxford debate. Livingstone argues that there is very little contemporary evidence about what went on at the meeting and that the most extensive contemporary reports contain no reference to the famous exchange about having apes as ancestors. William Irvine's colorful account in *Apes, Angels, and Victorians* (New York: McGraw-Hill, 1955) was based largely on the recollection of Isabel Sidgwick, first presented some thirty years after the event (p 155). Moreover, there is independent evidence that Wilberforce was far from being anti-intellectual and that his written criticisms of evolution were based on sound contemporary scientific arguments acknowledged by Darwin as "highlighting real 'difficulties'" (p 157).

Jon Roberts demonstrates in Myth 18 that a strong tradition of natural theology survived after the *Origin*, though he acknowledges that the growing influence of such German theologians as Friedrich Schleiermacher and Albert Ritschl, who focused on feeling rather than reason as the most important foundations of Christianity, reduced interest in natural theology during the first two-thirds of the twentieth century.

Robert Richards's discussion of Myth 19, "That Darwin and Haeckel were complicit in Nazi biology," is directed at a common argument of anti-evolutionists and one that plays a central role in the movie *Expelled* (*see* RNCSE *2008 Sep-Dec; 28 [5–6]*). Yet it is the one essay that represents only one side in a current scholarly debate. Richards holds that Darwin's version of evolution by natural selection and Ernst Haeckel's were essentially identical and that neither played a significant role in the development of Nazi ideology. Daniel Gasman, on the other hand, has argued, beginning with his *Scientific Origins of National Socialism* (New York: Science History Publications, 1971), that Haeckel's presentation of evolution, unlike Darwin's, incorporated a strong romantic German nationalist element, and that it played an important role in the development of Nazi ideology. Both scholars thus deny that Darwin's version of evolution played an important role in Nazism, but each draws very selectively from Haeckel's published and unpublished writings to support his views. Since I am sympathetic to some of Gasman's arguments and fear that at least some opposition to his views is motivated by a desire to avoid an unpleasant truth about how almost any idea can be appropriated and linked to undesirable social movements, I wish that this important issue would have been addressed by someone who could have assessed the strengths and weaknesses of both sides in the ongoing debate.

Ed Larson's discussion of myth 20, "That the Scopes trial ended in defeat for anti-evolutionism," points out that while media treatment of the trial by HL Mencken and other journalists may have suggested that evolutionary ideas triumphed, and the 1960 movie *Inherit the Wind* portrayed the residents of Dayton, Tennessee, as ignorant Bible-thumpers, neither view is accurate. The trial upheld the proscription against teaching evolution, and the verdict probably encouraged other states to implement laws against the teaching of evolution. The trial was set up by Dayton's business leaders to promote interest in the town, and though Larson does not mention it, the publishers of *Civic Biology* and other high school textbooks eliminated mention of evolution in order to maintain sales in states where fundamentalists had significant strength.

Michael Ruse demonstrates in Myth 23 that "intelligent design" is not scientific according to any dominant understandings of the notion of science, all of which demand that there be no appeal to supernatural entities — that is, entities that cannot be directly or indirectly sensed. Finally, Ronald Numbers in Myth 24 puts to rest the idea that creationism is uniquely American. He emphasizes its recent rapid growth in Australia, New Zealand, Korea, and Europe as well as the spectacular growth in Islam as the result of the movement associated with Harun Yahya.

Get the book and use it when you hear people making many of the familiar but wrong claims about science and religion interactions.

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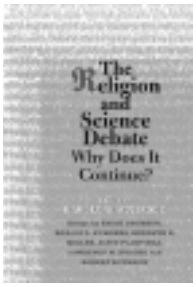
Superstition: Belief in the Age of Science

by Robert Park
Princeton (NJ): Princeton
University Press, 2008. 240 pages

Reviewed by Adrian L Melott

Bob Park was saved by a miracle. He's not at all young. It's God's will that he is alive at all. A big tree fell on him as he passed by, and after a long spell in the hospital he returned from the dead. God brought him back so he could write eloquently to tell us all what a bunch of crap this kind of thinking is.

I could end the review here, but I suppose many would find that somehow lacking, so I will go on. Park is a distinguished physicist who devotes himself to writing, mostly about the nonsense he sees in the world. He has a brief weekly topical news-editorial e-mail (available on-line at <http://www.bobpark.org/>) which applies his acerbic wit to all kinds of things from perpetual motion cons to the space station to energy policy



and population issues. The book I review here is written in much the same style, with much of the same kind of appeal.

The book shows no particular respect for its targets, one of which is religion. Thus targets of his attack include not only the fundamentalists who attack evolution, but also the Templeton Foundation which seeks to find and promote commonality between science and religion, and the physicists who promote fine-tuning arguments and the anthropic principle and are financially rewarded for it with funding in excess of the Nobel Prize. Other targets include alternative medicine and closely related New Age beliefs, quantum consciousness mysticism, recovered memories, the medical efficacy of intercessory prayer, the alleged religious base of morality, environmental problems, overreaching technological optimism, and more. However, he does show some respect for certain individuals with whom he disagrees, symbolized by a pair of Catholic priests named David and Shaun who reappear throughout the book.

The book is written in the same style as his weekly column, which I would describe as "deceptively simple". It has none of the literary elegance or complexity we associate with some of the best science writers, but it is of equally high quality. If I were to look for a model in fiction, it would be Kurt Vonnegut. Thus, the writing is broadly accessible without insulting one's intelligence, which is extremely valuable in this sort of book.

I have some disagreements with Park. Like Richard Dawkins, Steven Weinberg, and many others, he equates religion with "believing things". He rightly notes the absurd and/or damaging beliefs associated with many of the world's religions. This is a very Western-centric interpretation of religion. There exist major religious groups for whom following some set of laws is what matters; there are others that emphasize meditational practices or simply love. He is right that most religions devolve to cult-like or magical practice, but this is not universal.

In his discussion of alternative medical research, he emphasizes the avoidance of double-blind, placebo-controlled, statistically significant research. While it is admittedly not superstition and therefore off-topic, he nevertheless fails to do more than note in passing the extent to which funding by the pharmaceutical industry corrupts research in mainstream medicine. We all know the stories of side effects which were suppressed in early studies and then emerge to injure thousands of people. This is a form of cherry-picking results, which he does discuss in the context of parapsychology, for example, so it would be fair game and would contribute to a balanced discussion.

The longest chapter deals with the attempts by some in the religious community to repress the teaching of evolution, told mostly from a historical perspective. It is condensed (as a single chapter must be) but tells the essentials from the days of Thomas Huxley, through the Scopes Trial, the evolution of creationism into "creation science", the mutation of "intelligent design" which allowed the movement to speciate and enter a new ecological niche in the United States middle class, pioneer species such as Jonathan Wells, and the Dover trial. It brings out all the important points and can be highly recommended. It is valuable in that the issue is put into a broader perspective.

There's something here to offend almost everyone. My New Age friends who support the teaching of evolution will be upset by the attack on their herbs. If they can get past that, they will enjoy this book, learn from it, and most importantly allow it to clarify their thinking. It worked for me.

Opinions are the author's and not necessarily shared by NCSE, but they should be.

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The Religion and Science Debate: Why Does it Continue?

Edited by Harold W Attridge
New Haven (CT): Yale University Press, 2009. 240 pages

Reviewed by David A Rintoul

"Theology made no provision for evolution."

— EO Wilson, *Consilience: The Unity of Knowledge* (New York: Alfred A Knopf, 1998), p 6.

The Religion and Science Debate is an attempt, by six authors, to "provide new insights into the contemporary dialogue as well as some perspective suggestions for delineating the responsibilities of both the scientific and religious spheres." The authors (Keith Thomsen, Ronald Numbers, Kenneth Miller, Lawrence Krauss, Alvin Plantinga and Robert Wuthnow) represent a spectrum of disciplines, each with a different focus on the controversy. As is the case with all multi-authored texts, the success of each author in shining their particular light on the topic varies.

As one can imagine, the broad arena of the book's title is actually much overstated. There is little debate between much of science and most religious traditions. However, there is a fierce debate between evolutionary biology (and to a lesser extent geology) and a fundamentalist Christian tradition found almost exclusively in the United States. Other branches of science and other religious traditions are apparently quite compatible with each other. So it is somewhat jarring, throughout the book, to see the broad terms "science" and "religion" used as synonyms for "evolutionary biology" and "fundamentalist Christianity". Perhaps a more appropriate title for the book was rejected, but this usage only serves to inflate the importance of the religious arguments while ignoring the vast fields of science that are accepted by nearly everyone.

Thomson, a professor emeritus of natural history at Oxford University,

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gives a brief introduction to the controversy that sets the historical stage. He attempts to summarize and contrast the arguments of the other authors, and logically concludes that "the real enemy is ignorance". As part of an ongoing attempt to dispel that ignorance, then, the other authors weigh in.

Numbers lays out an excellent historical timeline, beginning with natural philosophy in the pre-Darwin era, and ending with Dembski's and Dawkins's scuffles over "intelligent design" (ID). This is a valuable preparation for the later chapters, because it clearly dispels the notion that the current "controversy" has been with us since Darwin. Even before Darwin, Christian theologians were attempting to reconcile the new discoveries of science with the old interpretations of Scripture. These attempts at "harmonization" continued in the latter half of the nineteenth century and into the twentieth. The post-Sputnik science education renaissance, with its flood of evolution-containing textbooks, triggered the controversy that continues in the US today, although there are still attempts at harmonization (including some of the chapters in this book).

Miller uses the next chapter to discuss the demise of ID in the *Kitzmiller v Dover* decision. He dismantles the icons of ID (irreducible complexity as epitomized by the bacterial flagella or the human immune system) just as thoroughly as he did during the trial itself. He shines a bright light on the creationist roots of ID as well, pointing out the well-documented mutations that morphed *Of Pandas and People* from a creationist text to an ID text overnight. Talk about your hopeful monsters! He ends with an analysis of why science is not the enemy of religion in any global sense, and shows how Christians, in particular, need to better understand evolutionary biology in order to accommodate scientific reality into their beliefs about their deity.

Plantinga, the sole ID advocate in this book, predictably sets up the usual strawmen and knocks them over. Methodological naturalism is a constraint on proper science? No, it *is* proper science. He attacks evolution and seems to assume that a successful attack would provide evidence for ID. The argument from incredulity is deployed multiple times, unconvincingly. Plantinga argues that the aspect of evolutionary biology that is most vexing to Christians is that it seems to be unguided, but his skepticism about this and his belief in a guided process are never buttressed with any evidence *for* a guided process. Most amusingly, on page 106, this philosopher of ID concedes that young-earth creationists are the recruits in the ID brigades, giving the lie to the oft-repeated complaints from the Discovery Institute that it is unfair to equate creationism and ID. In other words, there's not much new here.

Krauss starts his chapter with a quote from physicist Stephen Weinberg — "Science doesn't make it impossible to believe in God. It just makes it possible to not believe in God." This epigram sums up the chapter quite well. He also makes the excellent point that the current US debate about evolution is a colossal waste of time; we should be spending our time and energy teaching science more effectively, rather than discussing old, tired, and unscientific notions. Regarding the Discovery Institute's latest ploy, "teach the controversy", he provides the best sound bite of the entire book when he writes, on page 142, "the purpose of education is not to validate ignorance, but to overcome it." He ends the chapter by reiterating what Thomson said in the introduction; neither science nor faith is the enemy; the enemy is ignorance. Education is the way out of this debate.

The final chapter, by Wuthnow (a sociologist) covers ground that is covered in more detail by other authors in a recent book (John Bellamy Foster, Brett Clark, and Richard York's *Critique of Intelligent Design*, New York: Monthly Review Press 2008). Sociologists have been relatively late to the discussion of this debate, but there is plenty of fertile ground for them here. The compartmentalization of science and faith into different spheres is difficult; the ragged boundary between them provides opportunities for conflict and commentary. Wuthnow ends with an interesting insight, asking why the conflict is not worse. The answer is, as noted above, that this conflict involves one branch of science and one sect of religionists, none of whom seem to see any conflict in benefitting from scientific advances in computer technology, medicine, or agriculture.

In summary, the book is a useful primer on this debate, giving historical and philosophical perspective as well as scientific evidence. It provides yet another small step toward a future when science education focuses on science, and miracles are not invoked as explanations.

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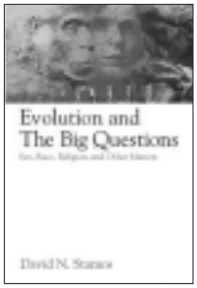
Evolution and the Big Questions: Sex, Race, Religion, and Other Matters



by David N Stamos
Malden (MA): Blackwell Publishing, 2008. 275 pages

Reviewed by
David Livingstone Smith

David Stamos is a philosopher of biology. However, this is not a book on the philosophy of biology, at least in the narrow sense of the term. Philosophers of biology use the methods of philosophy to think about conceptual issues in biology. Instead, *Evolution and the Big Questions* used evolutionary biology to address broader intellectual and social concerns. The subtitle of the book might lead one to think that it is focused entirely on hot-button issues like sex, race, and religion, but in fact Stamos casts a much wider net, and includes discussions of knowledge, consciousness, language, and feminism as well.

Many people have a vague idea that evolutionary biology is relevant to age-old problems usually addressed by the humanities and social sciences. Some disapprove of such efforts on the grounds that evolutionary theory underwrites racism, sexism, and the social status quo, while others castigate it for undermining

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traditional ethical values and religious beliefs. What people of all of these persuasions often have in common is that they are unable to clearly articulate their reasons for thinking that evolutionary biology has these particular ramifications. To do this, one must have a good knowledge of evolutionary science and the philosophical skill to tease out and critically evaluate the relevant arguments. Stamos succeeds admirably at this task. He strikes an excellent balance between philosophical sophistication and accessibility, and carefully deconstructs some of the misleading caricatures of evolutionary approaches to human nature that have been put about by critics with an axe to grind. In fact this is one of those rare books that will be of interest both the educated general reader who is curious about the wider implications of evolutionary science and the specialist who is looking for a panoramic view of how Darwinian thinking is being applied outside the domain of biology proper.

Human beings are organisms whose characteristics are the outcome of a long evolutionary history, and it is tempting to assume that because we are organisms, biology must throw light on fundamental human concerns. But this reasoning is fallacious. After all, human beings are made from elementary particles, but this does not entail that particle physics will therefore cast light on fundamental human concerns. Because *everything* is made from elementary particles, particle physics tells us only about those attributes that we share with all other physical objects. By the same token, some have argued that evolutionary biology tells us only about those features that we share with all other organisms, and therefore that it cannot tell us about our distinctively human characteristics. But this is a misguided approach. Evolutionary biology is — as the philosopher Ruth Millikan puts it — a *historical* science. All species are distinctive, and evolutionary biology gives an account of how and why their distinctive characteristics came about. However, this does not entail, as some enthusiasts seem to assume, that the evolutionary story can tell us *everything* of importance that there is to know about ourselves. Stamos makes no such crude presumption. In fact, he specifically informs us that "the purpose of this book is to question *whether and to what extent* evolutionary biology shines light on the big questions in the humanities and social sciences, questions that concern us all" (p 3, emphasis added).

Throughout the book, Stamos emphasizes the tension between the Standard Social Science Model (a term coined by John Tooby and Leda Cosmides and popularized by Steven Pinker in *The Blank Slate*) and the evolutionary approach. The Standard Social Science Model explains human behavior and experience almost entirely in terms of acquired traits, whereas the evolutionary approach understands it in terms of a set of biological dispositions (including the dispositions to learn and imitate) interacting with environmental forces. Stamos comes down firmly, though not uncritically, on the side of evolution by carefully and, I think, fairly weighing up the major arguments pro and con. However, he does not simply present and adjudicate between arguments in the existent literature — he also includes some innovative arguments of his own, which gives one the impression of an author who is seriously engaged with his subject matter. Stamos is not just going through the scholarly motions: he means business.

One of the most noteworthy features of this book is its range: Stamos touches upon a remarkably broad assortment of topics. Of course, this has its downside. A book that covers so much territory must, to some extent, sacrifice depth for breadth. Stamos is at times uncritical of certain mainstream sociobiological positions (as in his discussion of Westermarck's theory of incest avoidance) and he does not always give the reader a sense of the degree of philosophical disagreement surrounding certain claims (as in his discussion of naturalistic approaches to ethics). Notwithstanding this, given the introductory character of this book, the trade-off between depth and breadth is a good one. After reading it, one knows where to go to find more information about the topics covered and, most importantly, one has a clear idea about what is at stake in each of the controversies that the author discusses. In conclusion, I recommend this book very highly. I learned a great deal from reading it, and I plan to adopt it for some of the undergraduate courses that I teach. In my opinion, the combination of informativeness, originality, and readability makes *Evolution and the Big Questions* the best introductory text available on this fascinating and deeply significant area of inquiry.

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Evolution and Religion: A Dialogue

by Michael Ruse
Lanham (MD): Rowman & Littlefield, 2008. 136 pages

Reviewed by David N Stamos

Evolution and Religion is the perfect entrée into the evolution versus creationism debate, especially for American classrooms. Part of the reason is the format of the book, which is that of a fictional dialog from a PBS-style television show entitled "Science and Religion: Who Is Winning?"

A fictional dialog on this topic immediately brings to mind David Hume's classic, *Dialogues Concerning Natural Religion*, first published in 1779. Ruse's book shares some important features with this masterpiece, not the least of which is the question of whether design in nature is compatible with Western theology and religion. A further feature is stylistic, in that Ruse, much like Hume, made a serious effort at balancing opposing views, rather than, as Hume put it, have it read as "author and reader" or, what is worse, "pedagogue and pupil." Moreover still, Ruse's *Dialogue*, much like Hume's *Dialogues*, is

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exceptionally well written: the characters come alive and seem real, reasons are often mixed with emotions, and the sprinkling of wit and humor is nothing short of delicious (vintage Ruse, one might say; for example, he has one of his characters say, on the topic of gay marriage, that "I just can't call it gay marriage because it just seems to me to be so sad").

There are, of course, as to be expected, profound differences between the two works. For one, Hume's motive for writing his book is still pretty much of a puzzle to Hume scholars. They cannot even come to a consensus on what Hume's own position was. Ruse, on the other hand, gives us a subtle but sufficient clue in the preface for which character most closely resembles his own view. And then we have his other writings in which he makes his own position very clear (basically, an evolutionist who is a skeptic with regard to God and life after death, but one who is generously tolerant of theistic interpretations of evolution).

But perhaps the biggest difference, aside from the fact that the debate is modernized, is that Ruse's book was not written for fellow scholars and intellectuals, let alone for literary fame. Instead, he wrote it for students, and not just a particular group of students but students with a variety of background beliefs, whether they be atheistic, agnostic, liberal theistic, or hard-core evangelical. Accordingly the style is very readable, not only in the sense that the characters come alive, but that core ideas are explained exceptionally well given the conversational style.

So who are the characters? First of all, there is the moderator of the show, who aside from moderating contributes basically nothing to the debate. Then there are the four guests. One is an atheistic professional biologist very much in the style of Richard Dawkins (although he is a Popperian, while Dawkins most certainly is not). This character sees the relation between religion and science as a war, with the science side having won and the religion side remaining in a denial that is both deeply deluded and dangerous. He also serves to summarize the evidence for evolution as well as its basic causes, which of course includes natural selection. Another guest is a professional philosopher and historian of science (this is the one who speaks mostly for Ruse). He is an agnostic/skeptic on religion who defends the view that science and religion should be kept separate (though not in Gould's sense). He also serves to correct the historical inaccuracies in the views of the others — such as the Galileo affair, the burning of Bruno by the Inquisition, and the relation between Darwin and Hitler — and to clarify the nature of science, including why evolutionary biology is a genuine science. Another guest is a lesbian Episcopalian priest and adjunct professor at a seminary college. Her role mainly is to represent the "good works" side of Christianity as well as its liberal side, including, in her case, process theology and its solution to the problem of evil. The fourth guest is the head pastor of a very large Southern Baptist church. He is not anti-science *per se* (after all, his church has many members who are doctors and science teachers and he himself has a master's degree in nuclear engineering), except when it conflicts with his faith, which means that he is not just anti-evolution (macro-evolution) but is also a young-earth creationist.

These latter four characters do not merely represent four possible views on the relation between evolution and religion. Ruse does much more than that. He uses them to explain and debate a wide variety of topics and issues, among which are: the nature of science, reductionism, holism, the origin of life, self-organization, punctuated equilibria, form versus function, evo-devo, the Gaia hypothesis, Mitochondrial Eve, "just-so" stories, selfish genes, human races, human sociobiology, evolutionary psychology, evolutionary ethics, homosexuality, genetic determinism, consciousness, information, free will, souls, the plurality of relations between evolution and religion, different God concepts, the argument from design, the anthropic principle(s), the problem of evil, biblical literalism, "intelligent design" theory, miracles, Augustine, Darwin, Dawkins, Gould, Behe, and so much more. (My biggest complaint, aside from the shameful Dawkins bashing: the book needs an index.)

In short, the dialogical character of *Evolution and Religion* is likely to expand the perspectives of students. It is designed to get students to see and appreciate, from the inside out, views on the topic of evolution and religion that are different from their own, even radically different. It helps those who view evolution as the enemy to see that the evolution-versus-religion dichotomy might be a false one after all, that evolution and religion might be combined. Similarly, it helps aficionados of evolution to see that their way might not be the only way, that the materialistic interpretation of evolution might not be the only legitimate one. And it does all of this in a very pleasant, enjoyable way, combining, in the words of Hume, "the two greatest and purest pleasures of human life, study and society."

In all of this, make no mistake: this book is not an exercise in postmodernism. Evolution is not presented as just a theory, but as a scientific fact, a fact containing competing theories about the details, and hence a healthy science, but also a fact with competing theories superimposed on the science, such as atheistic evolution and theistic evolution. Scholars such as myself can and will quibble about whether Ruse has fairly represented their own favored view, about whether, for example, he has done justice to the problem of evil for theistic evolution (it seems to me that, no matter what the version, it requires a God that is seemingly infinitely callous, and hence not worthy of belief let alone worship, and it also means that the final good of evolution — free will, God-worshipping souls, or whatever — cannot really be good given the cost, namely, the mind-boggling enormity of animal pain, suffering, and horror over hundreds of millions of years of evolutionary history).

But to focus on such matters would be to miss entirely the point of the book. It is to get students thinking, really thinking, not only to appreciate evolutionary biology as the dynamic, exciting, and evidence-driven science that it is (that is a big one), but also to appreciate different interpretations of evolution and, most of all, to do further thinking and research on the topic. For this purpose one can do no better than Ruse's *Evolution and Religion*.

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