REPORTS OF THE NATIONAL CENTER FOR SCIENCE EDUCATION

DEFENDING THE TEACHING OF EVOLUTION AND CLIMATE SCIENCE

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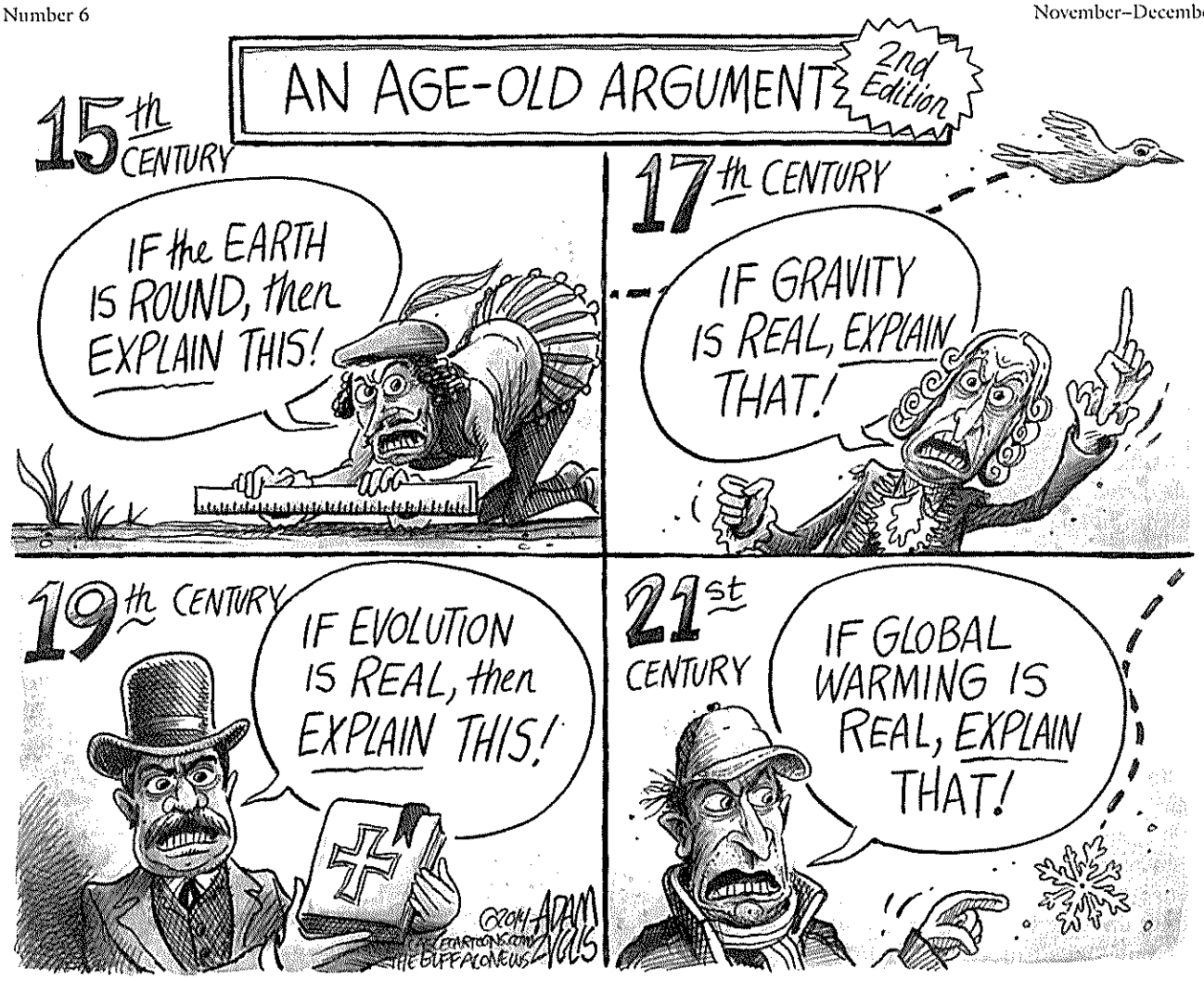

Adam Zyglis *The Buffalo News* (http://adamzyglis.buffalonews.com)

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UPDATES News from the Field

Controversies over evolution and climate science education always seem to be happening somewhere. Here is a sampling of recent news.

North Carolina, Fuquay-Varina: Evolution was among the reasons that a public school teacher urged the readers of a Christian magazine to withdraw their students from public education. Writing in the September–October 2014 issue of *No Greater Joy*, Ray Fournier, a science teacher at Fuquay-Varina High School (outside Raleigh, North Carolina) and self-described "public school missionary," complained, "The idea that public school curriculum is religiously neutral is a lie. Evolution[-]based science classes discredit the reliability of the Bible and get rid of God as Creator." The article was locally controversial, especially because of its lead: "Walking through the gates of the public high-school where I teach feels as if I were walking into a concentration camp dedicated to the spiritual death of those imprisoned behind these walls." Fournier later apologized for the inflammatory analogy, according to the *Raleigh News and Observer* (2014 Sep 8), but some students and parents are calling for him to be disciplined, and the district is investigating.

Ohio: On October 6, 2014, the Supreme Court of the United States declined, without comment, to hear John Freshwater's appeal of the Ohio Supreme Court's decision to uphold his termination as a middle school teacher. The decision brings the long and complicated controversy over Freshwater's behavior in the classroom—including teaching creationism and misrepresenting evolution as scientifically controversial—to a final conclusion.

The case began in 2008, when a local family accused Freshwater, then a Mount Vernon, Ohio, middle school science teacher, of engaging in inappropriate religious activity and sued Freshwater and the district. Based on the results of an independent investigation, the Mount Vernon City School Board voted to begin proceedings to terminate his employment. After thorough administrative hearings that proceeded over two years and involved more than eighty witnesses, the presiding referee issued his recommendation that the board terminate Freshwater's employment with the district, and the board voted to do so in January 2011. (The family's lawsuit against Freshwater was settled in the meantime.)

Freshwater challenged his termination in the Knox County Court of Common Pleas in February 2011. When the challenge was unsuccessful, he appealed the decision to Ohio's Fifth District Court of Appeals in December 2011. NCSE filed a friend-of-the-court brief with the appellate court, arguing that Freshwater's materials and methods concerning evolution "have no basis in science and serve no pedagogical purpose." In March 2012, the Fifth District Court of Appeals upheld the lower court's rejection of Freshwater's challenge. Freshwater then appealed to the Ohio Supreme Court in April 2012, and when his appeal was accepted, NCSE filed a friend-of-the-court brief again.

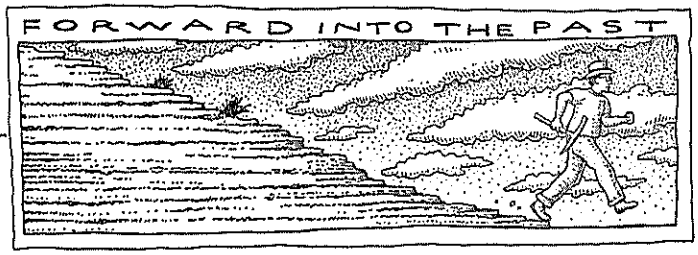
In a 4–3 decision issued in November 2013, the Ohio Supreme Court upheld Freshwater's termination. The decision refrained from assessing the constitutionality of Freshwater's teaching of creationism, writing, "Here, we need not decide whether Freshwater acted with a permissible or impermissible intent because we hold that he was insubordinate, and his termination can be justified on that basis alone." The dissenters, however, in effect endorsed Freshwater's claims on appeal, apparently accepting Freshwater's contention "I do not teach ID or creationism" despite the ample evidence in the record to the contrary. In early 2014, Freshwater unsuccessfully asked the court to reconsider its decision.

On April 22, 2014, Freshwater filed a petition for a writ of certiorari with the Supreme Court, arguing that the case should be heard to address questions about the extent to which the First Amendment and academic freedom apply to teachers while they are at work, as well as "to correct the grievous injustice that Freshwater has suffered." In its brief of opposition, the Mount Vernon City School Board argued that, since the Ohio Supreme Court determined that Freshwater's termination was permissible under state law, the Supreme Court lacked jurisdiction. The Board also argued in detail against Freshwater's claims about the First Amendment, academic freedom, and the facts of the case.

Documents relevant to Freshwater's termination and the subsequent court case are available on NCSE's website (http://ncse.com/creationism/legal/freshwater-termination-hearing). Extensive blog coverage of the Freshwater saga, including Richard B Hoppe's day-by-day account of Freshwater's termination hearing, is available at The Panda's Thumb blog (http://pandasthumb.org/); search for "Freshwater." Hoppe also contributed "Dover Comes to Ohio"—a detailed account from a local observer of the whole fracas, from the precipitating incident to Freshwater's appeal—to *RNCSE* 2012;32(1).

Texas: The Texas state board of education voted to adopt a slate of social studies textbooks on November 21, 2014. Among the books approved for use in the state were several textbooks that, after criticism from NCSE and its allies in the scientific, educational, and civil liberties communities, were revised by their publishers (including Pearson and McGraw-Hill) to eliminate misrepresentations of climate science.

A number of problematic claims were present in the textbooks as submitted for approval, including



a statement that fossil fuel emissions have caused a hole in the ozone layer over Antarctica, a claim that scientists "disagree about what is causing climate change," and a quotation from a notorious climate change denial organization presented in rebuttal of the Intergovernmental Panel on Climate Change (IPCC).

NCSE, together with the Texas Freedom Network (TFN), drew attention to these claims in a press release and analysis issued on September 15, 2014. The analysis (available at http://ncse.com/files/Texas-social-studies-report-2014.pdf) received wide coverage in the press, including the *National Journal* and Ars Technica (both 2014 Sep 15), as well as the *Houston Press*, Texas Public Radio, the *Guardian*, *Newsweek*, and *Mother Jones* (all 2014 Sep 16).

The analysis was issued in time for a preliminary hearing on the textbooks, on September 16, 2014, during which Charles Jackson, a research scientist at the University of Texas's Institute for Geophysics, criticized "inaccurate textbook coverage casting doubt on the overwhelming scientific consensus that climate change is a serious and growing threat," according to TFN's live-blog of the hearing (2014 Sep 16).

Later, NCSE's Josh Rosenau and Mark McCaffrey were invited by the *Houston Chronicle* (2014 Sep 30) to discuss the controversy. "Today, climate change isn't just a scientific issue," they explained: "critical debates about our response to climate change belong in textbooks covering civics, economics, history and geography, rooted in the social and political context while always informed by accurate science."

"Unfortunately, many of the social studies textbooks under consideration simply ignore climate change," they continued. "But there's a problem that publishers and the board can solve today: the factual errors in the books that cover climate change. Most egregiously, several of these books claim that there is active dispute among scientists about the primary cause of climate change. That's simply wrong."

They concluded, "Tomorrow's Texans will have big decisions to make—in deciding how to confront rising seas and declining freshwater, in choosing between the fuels of the future and those of the past, in creating new businesses and new kinds of jobs in the new world ahead. Social studies classrooms and textbooks are the perfect place to explore those questions and to prepare our students to build the future they deserve."

Meanwhile, NCSE, TFN, and Climate Parents organized a petition calling on the state board of education to require the corrections of the textbooks. Signed by over 24 000 Texans, the petitions were delivered to the board and the publishers on October 20, 2014. In a press release, Rosenau explained, "These petitions show that parents, teachers, students, and voters across Texas will make sure the board doesn't let these errors slip into their classrooms."

Additional organizations separately urging the state board of education to require the publishers to fix these errors included the American Association for the Advancement of Science, the American Geophysical Union, the American Meteorological Society and the American Association of Physics Teachers, the Ecological Society of America, the Geological Society of America, and the National Resources Defense Council.

As the time of the board's final vote approached, Camille Parmesan and Alan I Leshner, writing in the *Austin American-Statesman* (2014 Nov 6), called on the Texas state board of education to insist on the correction of the textbooks: "Texas educators should reject the new textbooks unless they are edited to address the serious concerns outlined by the National Center for Science Education."

"Children cannot compete in the global marketplace of the future unless they achieve science literacy," they concluded. "Students deserve to know the true scientific facts about human-caused climate change." Parmesan is a professor of integrative biology at the University of Texas, Austin; Leshner is the chief executive officer of the American Association for the Advancement of Science.

In a press conference on November 12, 2014, NCSE, TFN, and Climate Parents charged that textbooks published by McGraw-Hill and Pearson were still problematic. Speaking to the *Austin Chronicle* (2014 Nov 12), NCSE's Josh Rosenau observed that science textbooks from the same publishers manage to represent the scientific consensus on climate change correctly and described the social studies textbooks as "irresponsible" in contrast, adding that it's "hard to understand how the social studies books went so far [a]field."

Also released was a letter urging the publishers to "correct all factual errors regarding climate change in draft textbooks for K–12 students in Texas." Signing the letter, besides NCSE, TFN, and Climate Parents, were the American Association for the Advancement of Science, the Alliance for Climate Education, the National Resources Defense Council, Bill Nye, Sojourners, and the Union of Concerned Scientists.

Subsequently, Pearson revised a passage in its fifth-grade social studies textbook that initially claimed, "Some scientists believe that this carbon dioxide could lead to a slow heating of Earth's overall climate. This temperature change is known as global warming or

VICTOR STENGER DIES

The physicist and popular science writer Victor J Stenger died on August 27, 2014, at the age of 79, according to the Friendly Atheist blog (2014 Aug 29). Toward the end of his long career as a research scientist, Stenger began devoting his efforts toward popular writing. He continued explaining physics and arguing for atheism long after retiring from his academic career. Among his works (all published by Prometheus Books) were *Not by Design* (1988), *Physics and Psychics* (1990), *The Unconscious Quantum* (1995), *Timeless Reality* (2000), *Has Science Found God?* (2003), *The Comprehensible Cosmos* (2006), *God: The Failed Hypothesis* (2007), *Quantum Gods* (2009), *The New Atheism* (2009), *The Fallacy of Fine-Tuning* (2011), *God and the Folly of Faith* (2012), and *God and the Atom* (2013). A final book, *God and the Multiverse*, is forthcoming in 2014.

Stenger was a consistent and vehement opponent of creationism in all of its forms. In his "Physics, cosmology, and the new creationism," a contribution to Andrew J Petto and Laurie R Godfrey's *Scientists Confront Creationism: Intelligent Design and Beyond* (2007), for example, he contended, "Modern variations of the ancient argument from design form the basis of the new creationism—so-called 'intelligent design' theory. These arguments amount to nothing really new and are just restatements—in ostensibly more sophisticated language of the common-sense view—that the universe and life appear to be too complex to have happened without supernatural intervention. However, the new creationism *poses* as science. Despite their pretense of scientific legitimacy, several of the claims of this new 'science' are provably wrong" (emphasis in original).

Stenger was born in Bayonne, New Jersey, on January 29, 1935. He received a BS in electrical engineering from Newark College of Engineering in 1956, followed by a MS in 1958 and a PhD in physics in 1963 from the University of California, Los Angeles. He was a member of the Department of Physics at the University of Hawaii from 1963 to 2000, with stints visiting at the University of Heidelberg, Oxford University, and the Istituto Nazionale di Fisica Nucleare in Italy. After he retired from the University of Hawaii, he was adjunct professor of philosophy at the University of Colorado. A Fellow of the Center for Inquiry and the Committee for Skeptical Inquiry, he served as president of the Hawaii Humanists from 1990 to 1994 (and was named the Hawaii Humanist of the Year in 1992) and as president of Colorado Citizens for Science from 2002 to 2006.

climate change. Scientists disagree about what is causing climate change." As revised, the passage reads, "Carbon dioxide, which occurs both naturally and through human activities, is called a greenhouse gas, because it traps heat. As the amounts of carbon dioxide and other greenhouse gases increase, the Earth warms. Scientists warn that climate change, caused by this warming, will pose challenges to society."

"I couldn't be more pleased," Rosenau told the *National Journal* (2014 Nov 13). "The revised textbook [from Pearson] provides students with the reliable science they need to understand the social debates surrounding climate change and does so without manufacturing a scientific debate." He also criticized McGraw-Hill, whose sixth-grade social studies textbook remained flawed.

But shortly thereafter, McGraw-Hill confirmed that it would remove the deeply problematic lesson that equated unsupported arguments from a special interest-funded political advocacy group, the Heartland Institute, with data-backed material from the IPCC, a Nobel-winning organization of scientists from around the world, from its textbook.

Rosenau praised the publishers for their decision, telling the *National Journal* (2014 Nov 17), "Pearson, McGraw-Hill and the other publishers did the right thing by making these changes. They listened to us and the nation's leading scientific and educational societies, ensuring that students will learn the truth about the greatest challenge they'll confront as citizens of the 21st century."

There were expressions of discontent at the board's November 18, 2014, meeting that "the other side" of the debate over climate change was not presented in the textbooks, as the TFN noted on its blog (2014 Nov 18). Nevertheless, the board approved a set of books for use, including the revised versions of Pearson's and McGraw-Hill's, on November 21, 2014, with a 10–5 vote.

Iraq and Syria: According to a report from the Associated Press (2014 Sep 15), the extremist group known as the Islamic State, which controls areas of Iraq and Syria, is targeting education—including evolution. "It recently imposed a curriculum in schools in its Syrian stronghold, Raqqa, scrapping subjects such as philosophy and chemistry, and fine-tuning the sciences to fit with its ideology," while in Mosul, Iraq, "[t]he new curriculum even went so far as to explicitly ban Charles Darwin's theory of evolution—although it was not previously taught in Iraqi schools." The *Telegraph* (2014 Sep 16) added, "Teachers, and others, who disobey the new instructions will be subject to unspecified 'punishment.'" ■

NCSENEWS News from the Membership

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

J David Archibald's *Aristotle's Ladder, Darwin's Tree: The Evolution of Visual Metaphors for Biological Order* (New York: Columbia University Press, 2014) was published. According to the publisher,

> Leading paleontologist J David Archibald explores the rich history of visual metaphors for biological order from ancient times to the present and their influence on humans' perception of their place in nature, offering uncommon insight into how we went from standing on the top rung of the biological ladder to embodying just one tiny twig on the tree of life. ... Throughout Archibald's far-reaching study, and with the use of many figures, the evolution of "tree of life" iconography becomes entwined with our changing perception of the world and ourselves.

Archibald is professor emeritus of biology at San Diego State University.

Adolf Seilacher and **Alan D Gishlick**'s *Morphodynamics* (Boca Raton [FL]: CRC Press, 2014) was published. According to the publisher,

> Morphodynamics is defined as the unique interaction among environment, functional morphology, developmental constraints, phylogeny, and time—all of which shape the evolution of life. These fabricational patterns and similarities owe their regularity not to a detailed genetic program, but to extrinsic factors, which may be mechanical, chemical, or biological in nature. These self-organizing mechanisms are the focus of *Morphodynamics*. ... Summarizing seventy years of research into the interactions of form, function, and evolution, the book ... provides a framework for readers to pose their own questions and sharpen their interpretive skills on this fascinating topic.

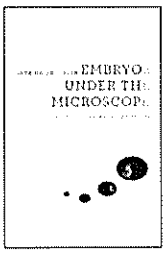
Gishlick was a postdoctoral fellow at NCSE; he met Seilacher as a graduate student and began collaborating with him on morphodynamics in 2009.

Al Kuelling wrote to the *Fort Wayne News-Sentinel* to draw the newspaper's readers' attention to a recent comparison, due to retired rear admiral David Titley writing in the July 25, 2014, issue of *Science*, of

> today's climate change deniers to the European rulers at the start of WWI a hundred years ago this year. ... Both the European leaders of 1914 and the climate change deniers of today "reflected political policies pursued for short-term gains and benefits," writes Titley. Both had/have personal and "institutional hubris." Both had/have a failure or an unwillingness "to imagine and understand the risks involved."

Kuelling concluded, "It would be [im]moral for anyone in the Fort Wayne area to not support judicious, practical, and science-based changes needed to reduce climate change." His letter appeared in the August 28, 2014, issue of the *News-Sentinel*; a version of his letter also appeared in the *Fort Wayne Journal Gazette* on August 31, 2014.

Jane Maienschein's *Embryos under the Microscope: The Diverging Meanings of Life* (Cambridge [MA]: Harvard University Press, 2014) was published. According to the publisher,



> Too tiny to see with the naked eye, the human embryo was just a hypothesis until the microscope made observation of embryonic development possible. This changed forever our view of the minuscule cluster of cells that looms large in questions about the meaning of life. *Embryos under the Microscope* examines how our scientific understanding of the embryo has evolved from the earliest speculations of natural philosophers to today's biological engineering, with its many prospects for life-enhancing therapies. Jane Maienschein shows that research on embryos has always revealed possibilities that appear promising to some but deeply frightening to others, and she makes a persuasive case that public understanding must be informed by up-to-date scientific findings.... Showing how we have learned what we now know about the biology of embryos, Maienschein changes our view of what it means to be alive.

Maienschein is Regents' Professor, President's Professor, and Parents Association Professor at the School of Life Sciences and Director of the Center for Biology and Society at Arizona State University.

Bill Nye "The Science Guy" appeared on the cover of the September 2014 issue of *Popular Science*. The accompanying story discussed what precipitated his debate with Answers in Genesis's Ken Ham on the question "Is creation a viable model of origins in today's modern, scientific era?" on February 4, 2014:

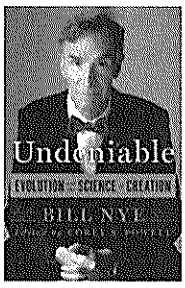
> What kicked off the debate at the Creation Museum was simple. The whole business started in New York a few years ago. His publicist had scheduled a bunch of interviews, and Nye, up since 2 a.m.,

WOLFHART PANNENBERG DIES

The distinguished theologian Wolfhart Pannenberg died on September 5, 2014, at the age of 85, according to his former student Philip Clayton, posting at the Theoblogy blog (2014 Sep 7). Often described, as Clayton says, as "the greatest theologian of the second half of the 20th century," Pannenberg's wide interests included the relationship of science and religion. His writings on the topic include *Wissenschaftstheorie und Theologie* (1973; translated as *Theology and the Philosophy of Science*, 1976) and the papers collected in *Toward a Theology of Nature: Essays on Science and Faith* (1993)—named as a central text of the discipline by the International Society for Science and Religion—and *Historicity of Nature: Essays on Science and Theology* (2007).

To the extent that Pannenberg was interested in the creationism/evolution controversy in the United States, he was dismissive of both the scientific and the theological legitimacy of creationism. In "Human life: Creation versus evolution?" (1998), for example, he wrote, "the theory of evolution still provides the most plausible interpretation of what is known about the history of organic life on this planet." Acknowledging that "the modern picture of nature ... is ... at variance with the image in the first chapter of Genesis that the whole order of creation was produced in six days and continues to exist unchanged," he insisted that the Bible also represents creation as a continuing process. "Such a conception of continuous creation does not have difficulties with a doctrine of evolution, according to which the different species of animals emerge successively in the long process of life's history on earth." Similarly, in a 2001 interview, Pannenberg recommended, "In criticizing the doctrine of evolution, our creationist friends among Christian theologians should read their Bibles more closely." In the same interview, he described himself, not as a theistic evolutionist, but as a Trinitarian evolutionist.

Pannenberg was born in Stettin, Germany (now Szczecin, Poland), on October 2, 1928. He attended the Universities of Berlin, Göttingen, Basel (where he studied under Karl Barth), and Heidelberg from 1947 to 1953, receiving his ThD from the University of Heidelberg in 1953. He served as professor of systematic theology at the University of Heidelberg from 1955 to 1958, at the Kirchliche Hochschule Wuppertal from 1958 to 1961, the University of Mainz from 1961 to 1967, and the University of Munich from 1967 until his retirement in 1993. He was a visiting professor at the University of Chicago, Harvard University, and the Claremont School of Theology. He received honorary degrees from the Universities of Glasgow, Manchester, and Dublin.



arrived at the last one, for a website called Big Think, in late morning. He was jet-lagged, tired. You can see it in the video—the way his head bobs, struggling to stay aloft. You can hear it, too. His voice comes from way back in his throat, all gravelly. The interviewer asked him about Pluto and dark matter, and then about creationism. Bill sighed and said, "When you have a portion of the population that believes in that, it holds everybody back." The guy on screen looked so different from the funny, warm Science Guy known to a generation. He wasn't at all funny, for starters. And his exasperation struck a chord. To date, the Big Think video has nearly 7 million views, and it prompted Ham to ask for a debate.

A member of NCSE's Advisory Council, Nye recently wrote *Undeniable: Evolution and the Science of Creation* (New York: St Martin's Press, 2014), which NCSE's **Eugenie C Scott** describes as "[w]ritten from the heart—but science always comes from the heart with Bill Nye."

A Festschrift for **Michael Ruse**—*Evolutionary Biology: Conceptual, Ethical, and Religious Issues*, edited by R Paul Thompson and Denis M Walsh (Cambridge: Cambridge University Press, 2014)—was published. In their introduction, the editors explain, "Given his formative role in the development of the philosophy of biology, his contributions to research and scholarship, his broader social contributions, his mentoring of generations of scholars and researchers, and his impressive publication record and influence, it is fitting that this volume of original articles by internationally renowned philosophers of biology should be dedicated to him." Among those articles are **Francisco J Ayala**'s "Human evolution: whence and whither?" (13–28), **Elliott Sober**'s "Evolutionary theory, causal completeness, and theism: The case of 'guided' mutation" (31–44), **Philip Kitcher**'s "Religion, truth, and progress" (45–61), and **Jane Maienschein** and **Manfred Laublicher**'s "Exploring development and evolution on the tangled bank" (151–171). Ruse is the Lucyle T Werkmeister Professor of Philosophy at Florida State University, and, like Ayala, Sober, and Kitcher, a member of NCSE's Advisory Council.

from THE STAFF

News from NCSE Headquarters

ANN REID writes: By the time you read this, I will have been at NCSE for almost a year. It seems like an opportune moment to give you a little sense of what it's been like. First of all, I wish you all could meet the NCSE staff in person—they're extraordinary and so dedicated. We've embarked together on a strategic planning adventure and they are full of great ideas and lots of enthusiasm. We'll be reporting on the resultant new initiatives as they emerge.

One of the most fun things I've gotten to do since I arrived is travel around the country with Genie Scott to a series of "meet and greets" so that long-time NCSE friends and supporters can say farewell to Genie, kick the tires of the new director, and meet some of the people I've worked with over the years. For example, in January, we had a reception in Washington DC, attended by many long-time NCSE members, including Maxine Singer, Warren Friedman, and Bernard Wood. Also in attendance were a gratifying number of colleagues from the National Academies, where I worked for five years, including the president, Ralph Cicerone; the executive director of the Division of Earth and Life Studies, Gregory Symmes; and the director of the Board on Agriculture and Natural Resources, Robin Schoen. This was a great opportunity for the scientists who've benefited from NCSE's work on the front lines to meet and thank the people who've supported NCSE through the years.

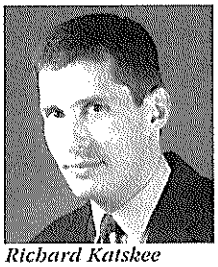
Subsequent meet and greets—two in southern California (one in Los Angeles and one in Orange County); one in New York City, and two in the Bay area (one in San Francisco and one in Berkeley)—were similarly diverse and fascinating. I got to meet NCSE volunteers (like Paula Spence, an artist at the Cartoon Network, who drew the staff likenesses that accompany our blog), NCSE legends (like Jack Friedman, the father of Warren Friedman mentioned above, in whose house NCSE held its early board meetings) former board president Kevin Padian, many members of NCSE's legal advisory committee, high school teachers, science fans, civil libertarians, humanists, skeptics, academic scientists, physicians, and many many others. Friends and colleagues of mine who accepted the invitation to check out my new gig were so impressed with the passion and commitment of NCSE's supporters that many of them have joined themselves! The inescapable conclusion is that keeping ideology out of the science classroom matters to a lot of people, and the efforts of NCSE under Genie's leadership are deeply appreciated.

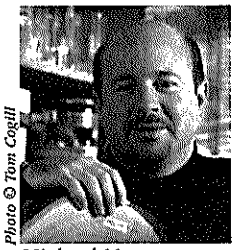
Another wonderful opportunity for an "up close and personal" encounter with NCSE's history was provided by this year's NCSE awards dinner. The 2014 "Friend of Darwin" and "Friend of the Planet" awards were presented on April 26, 2014, in Philadelphia. It was a thrill to meet the awardees—this year's friends of Darwin were Eric Rothschild, Stephen G Harvey, Witold Walczak, and Richard B Katskee (all members of the legal team that successfully defended evolution in the *Kitzmiller v Dover* trial in 2005) and Faye Flam (a journalist whose *Philadelphia Inquirer* column "Planet of the Apes," which ran from 2011 to 2012, was exclusively devoted to covering evolution). This year's Friends of the Planet—a new award presented to people who have notably helped to defend the teaching of climate science—were climate scientists Michael Mann and Richard Alley, whose scientific firepower is matched only by their talent for explaining their science to a wide audience. It was thrilling to meet these distinguished people. But perhaps even more moving, I got to meet several of the plaintiffs in the *Kitzmiller* case. To meet these courageous individuals—each of whom was willing to risk conflict with their neighbors to stand up for science education—was truly inspiring. And it was humbling to have one of them say to me "I was at the end of my rope; I felt so alone. Until NCSE called and said you would help. I will never forget that phone call." Wow. What we do matters. And we couldn't do it without your support. I'm proud to be a part of it. ■


Richard Alley


Faye Flam


Stephen G Harvey


Richard Katskee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NCSE Thanks You for Your Generous Support

The NCSE Board of Directors and staff would like to acknowledge and extend their warm gratitude to all individuals, organizations, and firms that donated to NCSE. We also extend special thanks for their much-appreciated support to the following people who donated $100 or more during the second half of 2013 (acknowledgements for the first half of 2014 will appear in the next issue). Those in the Patrons' Circle donated $1000 or more—a level of support that we consider heroic and that gives us a firm foundation for our efforts. (An asterisk (*) indicates a member of the NCSE Board of Directors or Advisory Council.)

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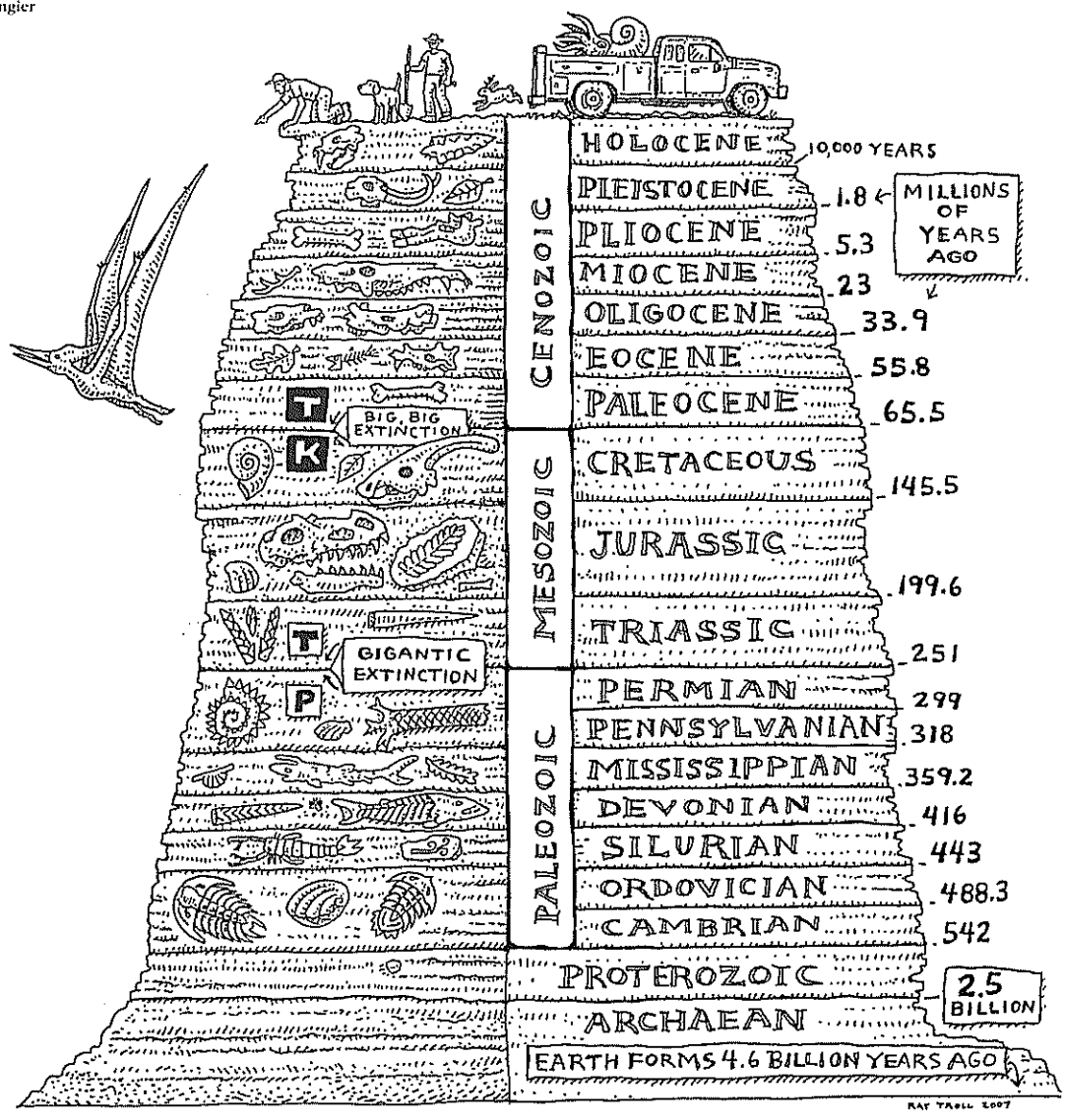

Science and Society: Evolution and Student Voting Patterns

Sehoya H Cotner, D Christopher Brooks, and Randy Moore

In a recent poll, 58% of Republicans agreed that God created humans in their present form within the last 10 000 years, a belief shared by 39% of Independents and 40% of Democrats (Newport 2012). Of those agreeing that humans evolved and God had no part, 5% are Republicans, 19% are Independents, and 19% are Democrats.

These data, along with GOP platforms and some notable presidential statements on the subject suggest that religiosity correlates with (a) one's tendency to vote Republican, and (b) one's likelihood to reject evolution.

However, there are no such data examining whether religiosity and political affiliation influence (or are influenced by) an understanding of the basic tenets of evolution. As part of previous work (in 2009, immediately after Barack Obama's first victory), we tested both the acceptance of and knowledge of evolution by college students prior to taking introductory biology (Cotner and others 2010). We hypothesized that a student's acceptance of evolutionary theory, rather than his or her conceptual understanding of evolution, would affect political affiliation.

In spring 2009, we asked 400 college students enrolled in a non-majors introductory biology course to complete a survey on their background, perspectives, and knowledge of evolutionary theory. Students (n=232) completed the twenty-item Measure of Acceptance of the Theory of Evolution (MATE), developed and validated by Rutledge and Sadler (2007) and a ten-item, multiple-choice Knowledge of Evolution Exam (KEE) that we developed. We also asked students about their political backgrounds, current political affiliation, political ideology, and the presidential candidate for whom they voted (or would have voted) in fall 2008. When the survey was administered, students were informed that their participation was voluntary, that they could choose to omit any or all of the questions from consideration, that results would be anonymous, and that the survey met conditions established by the university's Institutional Review Board.

We found that a student's knowledge of evolutionary theory does not predict voting preference. Conversely, students' responses to half of the MATE items were statistically significant predictors of their votes. This dichotomy suggests that one's empirical knowledge does not predict one's beliefs. The issue is complicated by our earlier work that was unable to correlate selected MATE items (specifically related to the age of the Earth) to overall score on the KEE (Cotner and others 2010). The study did not, however, find a correlation between political views in general and knowledge of evolution, which is consistent with the results documented here. These findings indicate that one's willingness (or unwillingness) to accept the tenets of evolutionary theory serves as a religious proxy that strongly predicts political ideology—or at least political behavior.

What our students know about evolution does not affect their vote, but their values and beliefs do. Student value systems are difficult to override and attempting to do so is ethically suspect. We can, however, influence what they know about biology, and that is our job. And while we are unlikely to override core beliefs with a barrage of facts (no matter how effectively these facts are presented), an awareness of students' perceptions, as those perceptions affect their acceptance of evolution, may be a key to making productive changes in students' understanding of science.

Students'—and the voting public's—unwillingness to accept core scientific tenets has real-world implications, from education policy to the campaign trail and ultimately our elected officials. Lacking a firm grasp of science, including evolutionary biology, we risk electing officials who may contribute to a societal erosion of scientific understanding and, consequently, a diminished commitment to science education.

References

Cotner S, Brooks DC, Moore R. 2010. Is the age of the Earth one of our sorest troubles? Students' perceptions about deep time affect their acceptance of evolutionary theory. *Evolution* 64(3):858– 864

Rutledge ML, Sadler KC. 2007. Reliability of the measure of acceptance of the theory of evolution (MATE) instrument with university students. *The American Biology Teacher* 69(6):332–335.

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Continued Global Warming in the Midst of Natural Climate Fluctuations

John Abraham, John Fasullo, and Greg Laden

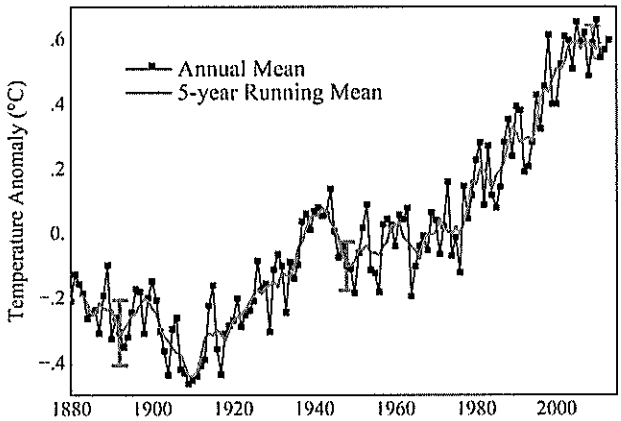
Humans have caused significant changes to the atmosphere and land surfaces that have consequences for the climate. The release of greenhouse gases through the combustion of fossil fuels, agricultural practices, deforestation, and other activities has caused a significant increase in the primary heat-trapping gases, including carbon dioxide, methane, nitrous oxide, and ozone.

Coincident with a developing appreciation of the human influence on climate are the continued improvements in Earth-climate measurements. Perhaps the most important measurements deal with quantification of the changes in energy contained within Earth's large thermal reservoirs, including the atmosphere, continents, and land and sea ice. The largest reservoir by far, however, covering about 70% of Earth's surface, is the ocean. As a consequence of its extent and its large thermal inertia, the ocean is able to absorb significant amounts of heat yet only express a moderate temperature increase.

Despite the fact that Earth's human-induced energy imbalance affects all of these reservoirs, the public discussion has focused on changes to surface temperatures (temperatures in the lower atmosphere), which, as we show, can lead to an incomplete picture of global climate changes. A representative dataset of globally averaged annual near-ground temperatures is shown in the figure, where a 5-year running mean is superimposed on annual averaged temperatures (dotted line).

A cursory view of the data suggests that there has been slowdown in the rate of global surface warming in the past 10–15 years, as the 5-year running mean has been more or less constant over this time. This trend has attracted a great deal of public attention, even on occasion being cited as scientific evidence that global warming has slowed down or even stopped. In this paper, we show that a thorough analysis of available data do not support this conclusion.

Instead, what the data do show is that while there has been a notable slowdown recently in energy gain within the upper 300 meters of the ocean, the deeper ocean has been warming over this time. When the entire ocean depth is considered and incorporated into climate models, it is clear that the warming of the global climate has continued unabated over the past 15 years at a rate of 0.5 to 1.0 Watt per square meter of Earth surface area (Balmaseda and others 2013a, 2013b). This conforms to expectations based on relatively simple atmospheric physics, given the addition of important greenhouse gases to the atmosphere and positive feedbacks reinforcing the effects of this change.



Representative land-ocean near-surface temperatures from 1880 to present (NASA/GISTEMP).

As we explain in this paper, the increase in deep-water heat storage is likely to have been driven by changes in wind patterns in the Pacific Ocean, which bring cool water to the ocean surface while burying surface waters to intermediate depths. In terms of the implications for surface temperatures, studies that have accounted for the impact of short-term natural changes, the solar cycle, and changes in atmospheric aerosols and particulates show remarkable agreement in quantifying both the persistence and intensity of the long-term warming trend.

In short: Earth is still warming—there simply is no data to support any other conclusion.

References

Balmaseda MA, Mogensen K, Weaver A. 2013a. Evaluation of the ECMWF Ocean Reanalysis System ORAS4. *Quarterly Journal of the Royal Meteorological Society* 139(674):1132–1161.

Balmaseda MA, Trenberth KE, Kallen E. 2013b. Distinctive climate signals in reanalysis of global ocean heat content. *Geophysical Research Letters* 40(9):1754–1759.

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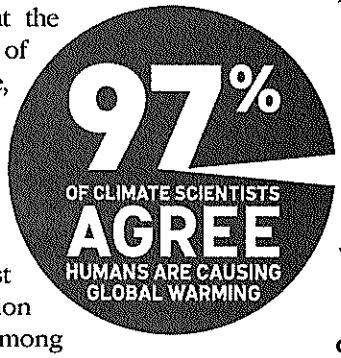
Scientists are from Mars, Laypeople are from Venus: An Evidence-Based Rationale for Communicating the Consensus on Climate

John Cook and Peter Jacobs

While many factors influence how people think about climate change, an increasing body of evidence indicates that correct understanding of the high level of scientific agreement that humans are causing global warming is an important "gateway belief" that influences a number of other beliefs and attitudes about climate change (for example, van der Linden and others 2014). The most comprehensive analysis of peer-reviewed climate research to date found that 97.1% of scientists agree that human activities are the primary drivers of climate change (Cook and others 2013). However, numerous surveys indicate the public in many countries believe that there is significant disagreement on climate change causes among scientists (for example, Comres 2014). Thus, there is a significant gap between actual scientific agreement and public perception, a discrepancy termed the "consensus gap" (Cook 2013).

The consensus gap creates an opportunity for communicators. While scientists face major challenges in communicating complex climate concepts, such as the greenhouse effect and the carbon cycle, consensus messaging about climate is as simple and memorable as a single number: 97%.

Experiments have shown that the most effective expression of consensus is "Based on the evidence, 97% of climate scientists have concluded that human-caused climate change is happening" (Maibach and others 2013). The pie chart shown here has been found to be one of the most effective visual communication methods, especially among conservatives (van der Linden and others 2014), for whom experiments have shown consensus messaging to be particularly effective in increasing perceived consensus (Kotcher and others 2014).



For various reasons, some scientists question the value of communicating the scientific consensus. However, these arguments overlook the fact that laypeople use expert opinion as a heuristic to guide their beliefs about complicated scientific issues. Furthermore, perceived consensus—not actual consensus—is one of the strongest predictors of public support for climate action, making it a key "dragon of inaction" (Gifford 2011).

Scientists who discourage the mention of consensus fail to address a key issue which is particularly important given its status as a gateway belief about climate change: How do we close the consensus gap without communicating consensus? By muzzling themselves, scientists are surrendering the territory of perceived consensus for others to fill. This creates an opportunity for parties to fill the void and mislead the public, thereby maintaining the consensus gap and further delaying public support for climate action.

References

Comres. 2014. ECIU climate change poll August 2014. ComRes; [accessed 2014 Oct 24]. http://www.comres.co.uk/polls/ECIU_Final_Tables_8_August_2014.pdf.

Cook J. 2013. The consensus gap. *Skeptical Science*; [accessed 2014 Oct 30]. http://www.skepticalscience.com/graphics.php?g=78.

Cook J, Nuccitelli D, Green SA, Richardson M, Winkler B, Painting R, Way R, Jacobs P, Skuce A. 2013. Quantifying the consensus on anthropogenic global warming in the scientific literature. *Environmental Research Letters* 8(2):024024.

Gifford R. 2011. The dragons of inaction: Psychological barriers that limit climate change mitigation and adaptation. *American Psychologist* 66(4):290–302.

Kotcher J, Meyers T, Maibach E, Leiserowitz A. 2014. Correcting misperceptions about the scientific consensus on climate change: Exploring the role of providing an explanation for the erroneous belief. Paper accepted for presentation at: Communication and the Good Life. Inernational Communication Association; Seattle.

Maibach E, Leiserowitz A, Gould R. 2013. A campaign to convey the scientific consensus about human-caused climate change: Rationale, formative research, and campaign overview. Paper presented at: American Geophysical Union Annual Meeting; San Francisco.

van der Linden SL, Leiserowitz AA, Feinberg GD, Maibach EW. 2014. How to communicate the scientific consensus on climate change: Plain facts, pie charts or metaphors? *Climatic Change* 126:255–262.

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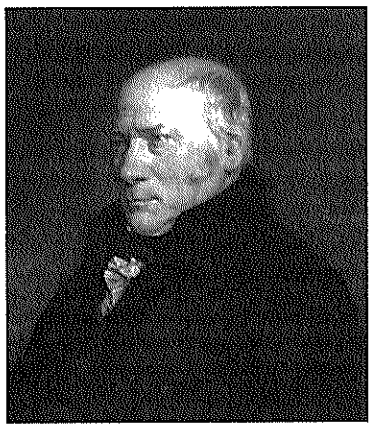
Summary of *RNCSE* 2014;34(6):3.1–3.10; the full text is available from: http://reports.ncse.com/index.php/rncse/article/view/347/599

William Smith
(1769–1839)

Randy Moore



William Smith, the founder of the science of stratigraphy. Portrait by Hugues Fourau circa 1835 (image via Wikimedia Commons).

William Smith was born on March 23, 1769, in Churchill, England. Although Smith received little formal education, he was fascinated by fossils and rocks, and spent much of his time collecting them as a child. He studied mapping and eventually became a surveyor and self-taught engineer. In the 1790s, Smith spent six years supervising the digging of the Somerset canal in southwestern England.

It was while working on the canal that Smith made several observations: rock sections on one side of England matched those on the other side, rock strata were arranged in the same relative positions, each stratum could be identified by the fossils it contained, and certain kinds of fossils always seemed to occur—even at distant locations—in a consistent sequence relative to other fossils (Winchester 2001:74). Smith's conclusion that fossils occur in rocks in a definite and orderly sequence became known as the *Principle of Faunal Succession.*

Smith's discoveries were important because they showed that (1) sedimentary rocks formed during specific geologic times could be recognized by the fossils they contained, (2) each layer of rock represents a different stage of geological history, and (3) life had evolved.

The first two of these discoveries enabled biologists to arrange fossils chronologically and led to the development of relative dating techniques and the refinement of geological time. As to the third discovery, Smith, as if to emphasize that faunal succession was based neither on evolution nor creationism, noted that "my observations on this and other branches of the subject are entirely original, and unencumbered with theory, for I have none to support" (Smith 1817:iv–vi).

In 1799, Smith published the first-ever geological map—a circular map of the geology around Bath. In 1801, Smith sketched what later became known as "The Map that Changed the World"—the first geological map of an entire country. Smith named his now-famous map *General Map of Strata in England and Wales.* In 1815, Smith published a more elaborate version entitled *A Delineation of the Strata of England and Wales with Part of Scotland.*

Smith's *Strata Identified by Organized Fossils, Containing Prints on Coloured Paper of the Most Characteristic Specimens in Each Stratum,* which was published in four parts between 1816 and 1819, illustrated his principle of faunal succession beautifully, showing that fossils are not distributed randomly, as in a flood, but instead are arranged in a definite, predictable order.

When George Greenough (1778–1855), the president of the Geological Society of London, began selling copies of Smith's maps and keeping the profits for himself, Smith ran out of money, lost his remaining assets, and, in 1819, was sentenced to debtors' prison.

Although never elected a member of the Geological Society of London, Smith received its highest honor in 1831, the Wollaston Medal—the first one ever awarded. The society's then-president, Adam Sedgwick, proclaimed Smith to be "The Father of English Geology."

Smith died on August 28, 1839, in Northampton, England. Each year, the Geological Society of London sponsors a lecture in Smith's honor and awards the William Smith Medal "for excellence in contributions to applied and economic aspects of science."

Smith donated his geological map of Bath to the Geological Society of London in 1831. Only 43 of the original 400 copies of Smith's *A Delineation of The Strata of England and Wales, with part of Scotland* remain in existence. William Smith's work elevated the importance of fossils from random relics to bookmarks on the pages of life's history.

References

Smith W. 1817. *Stratigraphical System of Organized Fossils.* London: E Williams.

Winchester S. 2001. *The Map that Changed the World: William Smith and the Birth of Modern Geology.* New York: HarperCollins.

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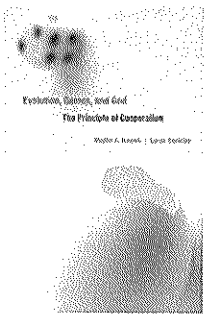
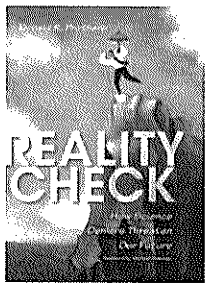
Summary of *RNCSE* 2014;34(6):4.1–4.4; the full text is available from: http://reports.ncse.com/index.php/rncse/article/view/334/582

SUMMARIES OF BOOK REVIEWS



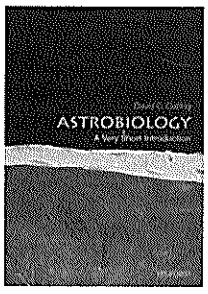
Evolution, Games, and God: The Principle of Cooperation, edited by Martin A Nowak and Sarah Coakley (Cambridge [MA]: Harvard University Press, 2013; 400 pages). Nowak and Coakley's book should have been entitled *Economics, Games, and Christianity: Perspectives on Altruism*, reviewer **Douglas Allchin** suggests, as the contributions "explore the human and theological meaning of ... models of cooperation" researched by Nowak with little reference to evolution. While there is much of interest in the book, "[t]he editors' bold claim that the mathematical models of cooperation foster a 'revolution in evolutionary thinking' ... able even to transform theological arguments, seems irresponsibly overstated."

Summary of *RNCSE* 2014;34(6):5.1–5.4; the full text is available from: http://reports.ncse.com/index.php/rncse/article/view/243/577



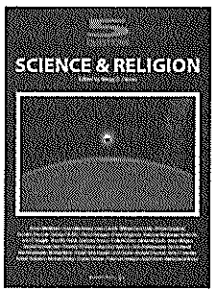
Reality Check: How Science Deniers Threaten our Future by Donald R Prothero (Bloomington [IN]: Indiana University Press, 2013; 369 pages). "*Reality Check* sets out to address ... those who deny key scientific realities," reviewer **David Dobson** writes. "Prothero devotes much of his text to discussing both global warming and creationism, but along the way, he also addresses anti-vaccination activists, AIDS deniers, astrologers, homeopaths, chiropractors, peak oil scoffs, and cornucopians." Dobson faults Prothero somewhat for political partisanship, noting "it might be hard for any Republican to make it through this book and hear its message," but overall recommends it as "an entertaining, thought-provoking, and informative read."

Summary of *RNCSE* 2014;34(6):6.1–6.3; the full text is available from: http://reports.ncse.com/index.php/rncse/article/view/288/578



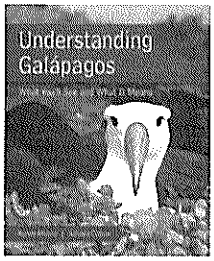
Astrobiology: A Very Short Introduction by David C Catling (Oxford: Oxford University Press, 2013; 142 pages). "David Catling's book provides a concise introduction to the field, aimed at a science-literate audience," according to reviewer **David Morrison**. "It has no color illustrations, is small enough to fit in your pocket, and is less than 150 pages long ... But don't be fooled by its appearance: the type is small and the information content is large." Praising the writing as "clear, compact, and elegant," he adds that the book "is not an easy read ... It is a book to be savored, not skimmed."

Summary of *RNCSE* 2014;34(6):7.1–7.3; the full text is available from: http://reports.ncse.com/index.php/rncse/article/view/303/579



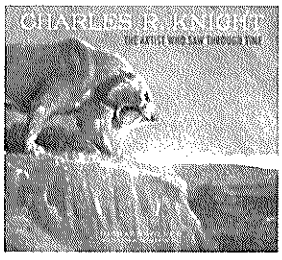
Science and Religion: 5 Questions edited by Gregg D Caruso (Copenhagen, Denmark: Automatic Press, 2014; 278 pages). The same five questions about science and religion were posed to thirty-three scholars, and *Science and Religion* consists of their answers. Reviewer **David A Rintoul** was overall unimpressed with the questions and with the answers, remarking, "The basic problem with the format of the book is that it allows individual respondents to say things that go unrebutted by the other respondents. ... The lack of dialogue that is a necessity of this format makes reading many of these chapters quite frustrating."

Summary of *RNCSE* 2014;34(6):8.1–8.3; the full text is available from http://reports.ncse.com/index.php/rncse/article/view/315/542



Understanding Galápagos: What You'll See and What It Means by Randy Moore and Sehoya Cotner (New York: McGraw-Hill, 2014; 425 pages). Reviewer **Kenneth Saladin** writes, "for true insight and delightful reading while cruising from one island to the next, you can't do better than Moore and Cotner. This is clearly the most biologically intelligent guidebook to the Galápagos for those who want more than just a species description, location, and a bit of behavior and natural history of each species. ... its evolutionary insightfulness and up-to-date information amply repay the investment."

Summary of *RNCSE* 2014;34(6):9.1–9.4; the full text is available from http://reports.ncse.com/index.php/rncse/article/view/302/580



Charles R Knight: The Artist Who Saw Through Time by Richard Milner (New York: Abrams, 2012; 180 pages). "Even as new discoveries about dinosaurs, prehistoric mammals, and other creatures make some of Knight's illustrations seem dated, his paintings still carry the reflection of someone who joyfully reveled in the story of life," writes reviewer **Brian Switek**. "Milner's bound galley is a fitting sampling of Knight's life and work, itself a time capsule that records scenes of history, science, and art from some of the most epochal moments of American paleontology."

Summary of *RNCSE* 2014;34(6):10.1–10.3; the full text is available from: http://reports.ncse.com/index.php/rncse/article/view/220/581

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