



REPORTS

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NATIONAL CENTER FOR SCIENCE EDUCATION

DEFENDING THE TEACHING OF EVOLUTION AND CLIMATE SCIENCE

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TABLE OF CONTENTS

UPDATES

News from the Field. page 2

NCSE NEWS

News from the Membership. page 6

FROM THE STAFF

News from NCSE Headquarters. page 8

ARTICLE SUMMARIES

Biological Evolution in Canadian Science Curricula
by Anila Asghar, Sarah Bean,
Wendi O'Neill, Brian Alters.
page 10

Leaving the Fold: Darwin's Doubt and the Evolution of Protein Folds
by Michael Buratovich. page 11

FEATURE SUMMARIES

Yes, We Were There
by Antoine Bret. page 12

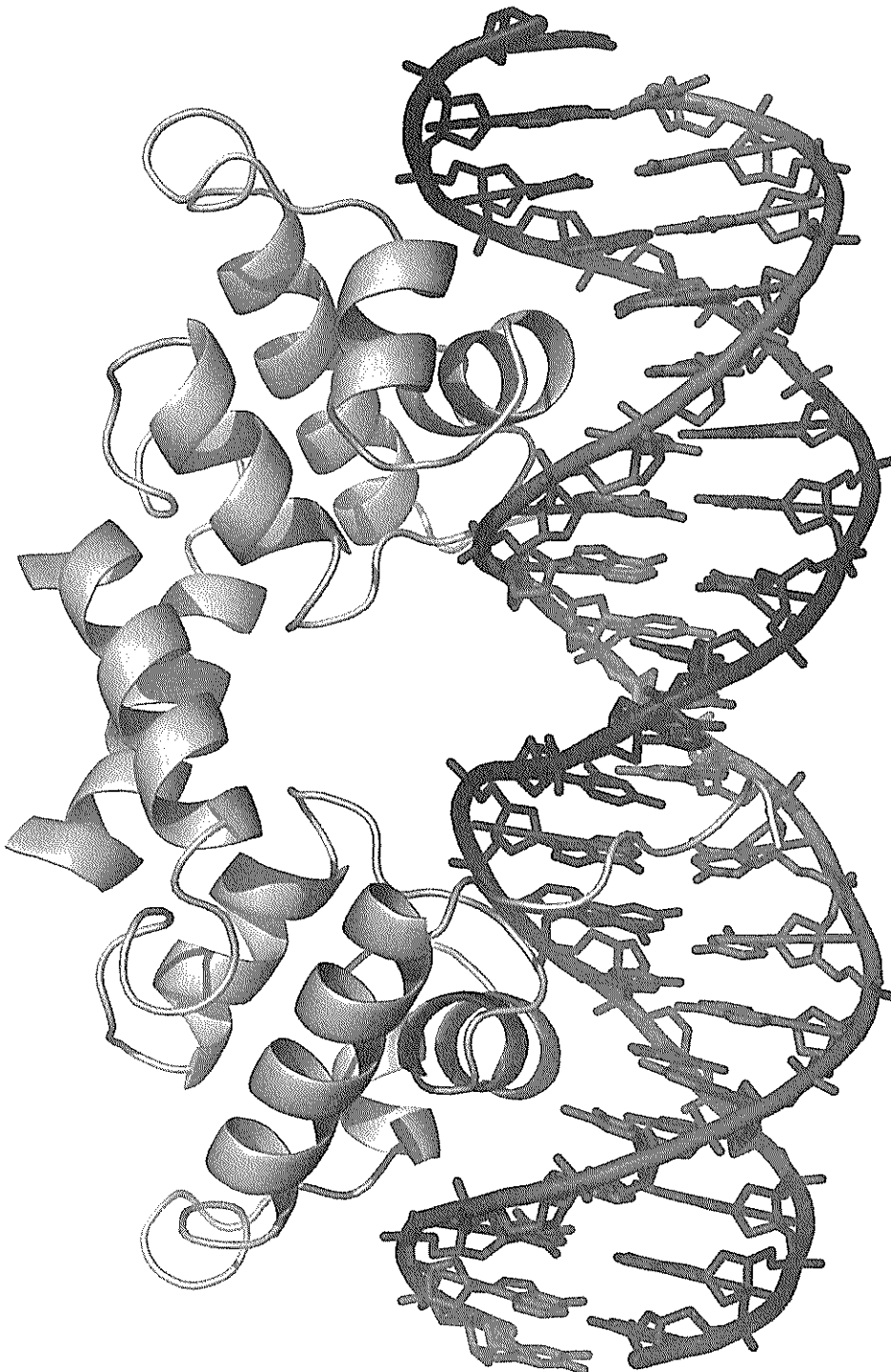
FE Robinson
by Randy Moore. page 13

RECAPITULATIONS

page 14

SUMMARIES OF BOOK REVIEWS

page 15



Lambda repressor protein bound to a lambda operator DNA sequence.

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UPDATES

News from the Field

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

Alabama: Alabama's House Bill 592 died in committee in the Alabama House of Representatives on June 4, 2015, when the legislative session ended. The bill would have encouraged teachers and students to "debate the strengths and weaknesses of the theory of evolution in public schools across Alabama," reported the *Anniston Star* (2015 May 7).

As NCSE previously reported, the bill identified "biological evolution, the chemical origins of life, and human cloning" as topics likely to "cause debate and disputation," and in effect would have allowed teachers to present whatever they pleased about such topics—while preventing educational authorities from intervening.

But judging from a statement of the bill's lead sponsor, Mack Butler (R–District 30), evolution was the primary target of HB 592. Raw Story (2015 May 7) noted that Butler explained on his Facebook page that his bill would "encourage debate if a student has a problem learning he came from a monkey rather than an intelligent design!"

A columnist for the *Montgomery Advertiser* (2015 May 8) argued, "The goal of Butler's bill ... was to make it OK for some two-bit religious zealot posing as a biology teacher to fill kids' heads with debunked and ridiculous ideas. ... [T]his bill, should it pass, will open the door to giving religious ideas the same standing in a classroom as scientific theory."

Alabama's House Bill 592 was the most recent antiscience bill introduced in a state legislature in 2015, following Indiana's Senate Bill 562, Iowa's House File 272, Missouri's House Bill 486, Montana's House Bill 321, Oklahoma's Senate Bill 665, and South Dakota's Senate Bill 114. All seven bills are now dead.

Illinois, Elgin: New science curricula for the school district U-46 in Elgin, a suburb of Chicago, were approved, despite the complaint of a new board member, according to the *Chicago Tribune* (2015 Jul 21). Contending that the district's policies oblige it to "present opposing sides of controversial issues to encourage critical analysis," Jeanette Ward complained that the materials proposed for Advanced Placement biology classes failed to mention "intelligent design."

Iowa: The Iowa Board of Education voted unanimously to adopt the Next Generation Science Standards at its August 6, 2015, meeting. Iowa thus became the fifteenth state to adopt the NGSS, joining Arkansas (so far only for middle school), California, Delaware, Kansas, Kentucky, Illinois, Maryland, Nevada, New Jersey, Oregon, Rhode Island, Vermont, Washington, and West Virginia, as well as the District of Columbia.

Earlier in 2015, a bill in the Iowa House of Representatives would have prevented Iowa from adopting the NGSS. As NCSE previously reported, the sponsor of House File 272 objected to the fact that the standards were not written in Iowa, but was also concerned that the standards "present evolution as scientific fact and shine a negative light on human impacts on climate change." The bill died in committee on March 6, 2015.

During public review of the standards, a small number of comments "negatively referenced biological evolution as a science standard" and urged the elimination of disciplinary core ideas about climate change, according to the science standards review team. A petition signed by 307 people urging the retention of the climate science material was also received. No changes to the standards were made in response to these comments.

Kansas: "Kansas education officials deny standards they adopted for teaching of science in public schools endorse what critics say is ... 'a non-theistic religious Worldview,'" reports the *Topeka Capital-Journal* (2015 Jun 8), discussing a brief submitted by the defendants-appellees in *COPE et al v Kansas State Board of Education et al.*

As NCSE previously reported, after the Kansas state board of education voted to adopt the Next Generation Science Standards in June 2013, a lawsuit attempting to undo the decision was filed, alleging that the NGSS "will have the effect of causing Kansas public schools to establish and endorse a non-theistic religious worldview."

The lead plaintiff was COPE, Citizens for Objective Public Education, a relatively new creationist organization founded in 2012. But its leaders and attorneys include people familiar from previous attacks on evolution education across the country, such as John H Calvert of the Intelligent Design Network.

In December 2014, the lawsuit was dismissed, largely because the plaintiffs lacked standing to assert any of their claims, failing to establish any of the three relevant requirements for standing: injury, causation, and addressability. But COPE swiftly appealed the dismissal to the United States Court of Appeals for the Tenth Circuit.

In its appeal, filed on March 20, 2015, COPE argued that the dismissal was erroneous because it failed to take into consideration all alleged injuries, to recognize that the injuries were particularized, concrete, and imminent, and to comport with controlling legal precedents from the Tenth Circuit and the Supreme Court.

In their brief, filed on June 8, 2015, the defendants-appellees primarily focused on the issues of standing, but pointedly insisted, "Contrary to Plaintiffs' claims, the Science Standards do not address religious questions such as the existence of a god or gods ... Plaintiff's description of the Science Standards as 'atheistic' is a gross mischaracterization."

Documents from the case are available on NCSE's website at <http://ncse.com/legal/cope-v-kansas-state-boe>.

Kentucky: Will Kentucky extend the duration of summer vacation in order to enable students to attend a creationist attraction? Two state senators plan to file a bill that would “prevent schools from starting earlier than the first Monday closest to Aug. 26,” according to the *Grant County News* (2015 Aug 12), in the hope of boosting tourist spending. Damon Thayer (R–District 17), the prospective sponsor of the bill along with Chris Girdler (R–District 15), told the newspaper, “Grant County is set to become a major tourist destination due to the presence of the Ark.”

Thayer was referring to Ark Encounter, a Noah's-ark-themed attraction under construction by the young-earth creationist ministry Answers in Genesis, which also operates a “museum” in Kentucky. In 2011, the Kentucky Tourism Development Finance Authority voted to grant tax incentives—in the form of retained sales taxes—to the Ark Encounter project, but that decision was reversed in 2014, as NCSE previously reported. Answers in Genesis and its allies are currently suing the state in federal court over the reversal: the case is *Ark Encounter, LLC et al v Stewart et al*.

Educators in Kentucky have reportedly been cool to the idea of the state requiring local schools to start later in the year, citing both the ideal of local control of education and the danger of impairing student learning. Chris Brady, a member of the Jefferson County School Board, told *Insider Louisville* (2015 Aug 14), “Tourism is important to the state, but it's not as important as education. And these decisions are made with the kids' best education interest in mind. I'm sensitive to the fact that we want to boost our tourism, but not at the expense of our kids' education.”

Simon Brown of Americans United for Separation of Church and State commented on the organization's blog (2015 Aug 18), “It is long past time for Kentucky's lawmakers to stop assisting the Ark Park in every way possible because it is a First Amendment issue when government props up a project with a clear religious mission. And if Ham's attraction will be as popular as he claims, he won't need any help from taxpayers. But if politicians like Thayer and Girdler insist on keeping the Ark Park afloat, they will find themselves embroiled in more controversy.”

Louisiana: “We will read in Genesis and then [sic] some supplemental material debunking various aspects of evolution from which the student will present.” So wrote a Louisiana science teacher to her principal, as quoted by Zack Kopplin, writing in *Slate* (2015 Jun 2).

In his article, Kopplin continued his presentation of evidence that the teaching of creationism is prevalent in Louisiana's public schools. As in his earlier article for *Slate* (2015 Apr 21), he relied on material obtained from various Louisiana school districts via public records requests.

NCSE's Josh Rosenau commented, “We know that

one in eight high school biology teachers advocate for creationism, even though it's unconstitutional,” but also suggested that the so-called Louisiana Science Education Act may have encouraged Louisiana's teachers to do so.

“Louisiana politicians have supported the Science Education Act because they intended it to allow creationism in the classroom,” Kopplin observed, noting that the proponents of the bill in the legislature as well as the governor have conceded as much.

Welcoming the prospect of a lawsuit over the revelations produced by his public records requests, Kopplin concluded, “But for the moment, because Louisiana politicians refuse to take action, Louisiana students are reading Genesis in science class.”

National: Climate change education was suddenly under discussion in the United States Senate, the *National Journal* (2015 Jul 9) reported, with the introduction of dueling amendments to a bill to reauthorize the Elementary and Secondary Education Act of 1965.

A proposed amendment (SA 2144) from Roger Wicker (R–Mississippi) would have directed the administrators of EPA and NOAA to provide state and local educational agencies with “balanced, objective resources on climate theory,” including material on “the natural causes and cycles of climate change ... the uncertainties inherent in climate modeling ... and ... the myriad factors that influence the climate of the Earth.”

Wicker was the sole dissenter to a sense-of-the-Senate amendment “that climate change is real and not a hoax” that was before the Senate in 2015, as National Public Radio (2015 Jan 23) reported, and among dozens of senators that dissented from a similar amendment that acknowledged human influence on climate change. Human influence was conspicuously unmentioned in SA 2144, the new amendment.

“It would be marvelous for educational materials from these agencies to be more widely used in our schools, because those materials of course reflect the scientific consensus that humans are largely responsible for recent climate change,” commented NCSE's executive director Ann Reid at the time. “But I'm concerned that Senator Wicker's amendment is intended to hijack the federal government's scientific expertise in the service of climate denial.”

Ed Markey (D–Massachusetts) introduced two amendments seemingly to counter Wicker's. The first (SA 2175) was a sense-of-the-Senate amendment that referred to the scientific evidence for human-induced climate change as “overwhelming and undeniable” and held that “instruction in climate science is important for all students and should not be prohibited by any unit of State or local government.”

The second of Markey's proposed amendments (SA 2176) would have established the Climate Change Education Act. Acknowledging the importance of education about climate change “to ensure the future generation of leaders is well-informed about the

challenges facing our planet,” the amendment would have instituted a competitive grant program aimed in part at developing and improving educational material and teacher training on the topic of climate change.

NCSE’s Reid applauded both amendments. “Senator Markey’s sense-of-the-Senate amendment puts the Senate in line with the best science available, which is laudable, and his Climate Change Education Act is simply splendid. It puts the federal government’s money where its mouth is—and where, in a time when the effects of human-induced climate change are becoming more visible and more disruptive, it ought to be.”

SA 2176 was debated on the Senate floor on July 15, 2015. Markey was quoted by the *Washington Post* (2015 Jul 15) as saying, “The children of our country deserve the best scientific education they can get on this topic ... They are the future leaders of this country and the world. They must be equipped.”

Lamar Alexander (R-Tennessee), however, argued against the federal government’s involvement in curriculum and instruction, warning, “Just imagine what the curriculum on climate change would be if we shifted from President Obama to President Cruz and then back to President Sanders and then to President Trump.”

Ultimately, SA 2176 was rejected on a 44–53 vote on July 15, 2015. Wicker’s amendment calling for “balanced, objective resources on climate theory,” SA 2144, was withdrawn without a vote, and Markey’s resolution affirming the importance of climate science education, SA 2175, never reached the Senate floor.

Turkey: When the Justice and Development Party (AKP) lost its parliamentary majority in the June 7,

2015, election, scientists in Turkey were “euphoric,” according to *Nature* (2015 Jun 16), hoping that the next parliament will “reverse the creeping restrictions on academic freedom and the seeping away of scientific standards that have been a feature of the AKP’s 12 years of political domination”—including the party’s support for creationism.

As NCSE previously reported, there is a long-standing concern about the state of evolution education in Turkey at both the pre-college and the university level. A useful review by Zehra Sayers and Zuhul Özcan, writing in *APS News* (June 2013), concluded, “Turkey is raising a generation of biologists/scientists whose grasp of scientific thinking is flawed and whose ability to participate in modern biology is correspondingly compromised.”

The effects of antievolution activity are felt beyond the classroom as well. In 2013, for example, the Science and Technological Research Council of Turkey (TÜBİTAK), the main funder of scientific research in Turkey, denied a funding application for a summer workshop on evolutionary biology in Turkey on the grounds that “evolution is a controversial subject,” according to *Science Insider* (2013 Jul 5).

In a Pew Research Center survey of Muslims in Turkey asking, “Thinking about evolution, which comes closer to your view? Humans and other living things have evolved over time [or] Humans and other living things have existed in their present form since the beginning of time,” 49% of respondents preferred the former and 35% preferred the latter. In a survey in the United States in 2014, 65% of respondents preferred the former and 31% preferred the latter. ■

JOHN HOLLAND DIES

The computer scientist John Holland died on August 9, 2015, at the age of 86, according to a memorial notice from the Santa Fe Institute (2015 Aug 10). Holland, in the words of the memorial notice, was “a pioneer in the study of complex adaptive systems and the leading figure in what became known as genetic algorithms.” His books included *Adaptation in Natural and Artificial Systems* (1975), *Hidden Order: How Adaptation Builds Complexity* (1995), *Emergence: From Chaos to Order* (1998), *Signals and Boundaries: Building Blocks for Complex Adaptive Systems* (2012), and *Complexity: A Very Short Introduction* (2014).

Holland’s work was inspired by the work of the evolutionary biologist RA Fisher. According to Kevin Kelly’s *Out of Control* (2009), he regarded Fisher’s *The Genetical Theory of*

Natural Selection (1930) as opening “a new world of human knowledge by subjugating nature’s most potent force—evolution—with humankind’s most potent tool—mathematics,” and accordingly “began the job of trying to code evolution into a machine.” The interaction between evolution and computation in Holland’s work was bidirectional. In the Santa Fe Institute’s memorial notice, David Krakauer, the president of the institute, commented that Holland was “unique in that he took ideas from evolutionary biology in order to transform search and optimization in computer science, and then he took what he discovered in computer science and allowed us to rethink evolutionary dynamics.” In a 2007 Q&A session with NOVA, Holland noted that complex behavior emerges naturally from genetic

algorithms that model evolution, adding, “Such concrete illustrations of emergence give little comfort to those advocating intelligent design.”

Holland was born in Fort Wayne, Indiana, on February 2, 1929. He attended the Massachusetts Institute of Technology, where he received his BS in physics in 1950, and the University of Michigan, where he received his MA in mathematics in 1954 and his PhD in communication sciences in 1959. At the University of Michigan, he was a professor of computer science and engineering from 1967 onward and a professor of psychology from 1988 onward. He was also a professor and member of the executive committee of the board of trustees at the Santa Fe Institute. His honors included a MacArthur “genius” fellowship in 1992.

WILLIAM B PROVINE DIES

The historian of science William B Provine died on September 1, 2015, at the age of 73, according to a Facebook post from his wife. A specialist in the history of population genetics, his books included *The Origins of Theoretical Population Genetics* (1971), *Sewall Wright and Evolutionary Biology* (1986), and a collection of Sewall Wright's papers (1986) with his own explanatory introductions. In a memoir published in *Isis* in 1999, he explained that in his view, a student working on the history of biology "should be as familiar with the science as any doctoral student"; for his own part, he added, "I am very happy to move between history and science."

Provine was a vocal and persistent opponent of creationism. He wrote thoughtfully on evolution and creationism, for example in his essay on "Evolution, Religion, and Science" in *The Oxford Handbook of Religion and*

Science (2006), but he was perhaps most famous for his views on the connection between evolution and atheism. He once asserted, "As the creationists claim, belief in modern evolution makes atheists of people"—a consequence that he welcomed. His views were formed in graduate school, where, he related in his memoir, "[a]fter reading [Theodosius] Dobzhansky several times and listening to [Lynn] Throckmorton, my belief in purposive nature disappeared for good." He was eager to share his views. Starting in 1986, he taught a class at Cornell University where students were exposed to creationism along with evolution, and he was often willing to debate creationists, including his regular opponent the "intelligent design" proponent Phillip Johnson. As a result of his prominence, he was often cited by creationists eager to portray his views on the connection between evolution and atheism, or a caricature

thereof, as representative of scientists in general. He was among the scholars interviewed, under false pretenses, for the creationist propaganda film *Expelled* (2008).

Provine was born on February 19, 1942, in Nashville, Tennessee. He attended the University of Chicago, where he received his BS in mathematics in 1962, his MA in the history of science in 1965, and his PhD in the history of science in 1970. His academic career was mainly spent at Cornell University, where he became a professor of history and of biology. His honors included fellowship in the American Association for the Advancement of Science, a Guggenheim Fellowship in 1985, and the inaugural David L Hull Prize from the International Society for History, Philosophy, and Social Studies of Biology in 2011.

ERIC DAVIDSON DIES

The eminent developmental biologist Eric Davidson died on September 1, 2015, at the age of 78, according to a September 2, 2015, notice from Caltech. Davidson was famous for his work on the role of gene regulation in evolution, helping to launch the idea of gene regulatory networks, which control the development of organisms from embryos to adults, and for leading the drive to sequence the genome of the purple sea urchin (*Strongylocentrotus purpuratus*), a significant model organism in developmental biology. His books included *Gene Activity in Early Development* (1968, second edition 1976, third edition 1986), *The Regulatory Genome: Gene Regulatory Networks In Development and Evolution* (2006), and, with Isabelle S Peter, *Genomic Control Process: Development and Evolution* (2015).

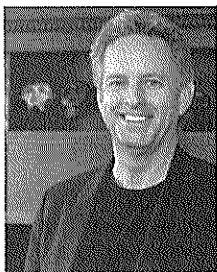
Sadly, Davidson's pioneering work was routinely mischaracterized by creationists. In 2012, he told Jerry Coyne, "I admire your willingness to take on creationists in public; I find their views so antediluvian that I can only

ignore them." Thirteen years earlier, however, he was forced to take on creationists when he attended a 1999 conference in China, on "The Origins of Animal Body Plans and Their Fossil Records." Unknown to the scientists in attendance, the conference was organized in part in order to promote "intelligent design" creationism. According to Barbara Forrest and Paul R Gross's *Creationism's Trojan Horse* (2004), "Eric Davidson dissected [Jonathan] Wells's and [Paul] Nelson's presentations during the sessions, identifying their errors"; Nigel C Hughes, who was in attendance, referred to the "egregious errors" of Wells, Nelson, and Michael Denton, which were "candidly dispatched by Eric Davidson." After a misleading report about the conference appeared in the *Boston Globe*, quoting Davidson as saying, "Neo-Darwinism is dead," Davidson and the paleontologist David J Bottjer wrote to the newspaper to protest that the report was "strewn with fabrication and fabricated comments and [was] written by a

biblical creationist posing as a science writer who has nothing more than an axe to grind." The *Globe* declined to print their letter, which was later published in *Reports of the National Center for Science Education*.

Davidson was born on April 13, 1937, in New York City. As a teenager, he conducted research at the Marine Biological Laboratory, publishing his first paper at the age of 16. He earned his BA in biology at the University of Pennsylvania in 1958 and his PhD at Rockefeller University in 1963. He stayed at Rockefeller University as a research associate and then an assistant professor until 1971, when he moved to the California Institute of Technology, where he spent the rest of his career, as the Norman Chandler Professor of Cell Biology from 1981 onward. He was elected as a member of the National Academy of Sciences and as a Fellow of the American Association for the Advancement of Science, and he received the Society for Developmental Biology's Lifetime Achievement Award in 2007.

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!



Brian Alters was presented with a Valerie Scudder award—his second—at the Chapman University Faculty Honors Convocation on May 15, 2015. The award is conferred in recognition of outstanding achievement in teaching, scholarly/creative activity, and service to the community. The recipients for the

award are chosen by their peers for their exceptional contributions, and receive a \$10 000 honorarium; their names are also engraved on a plaque exhibited in the Doy and Dee Henley Reading Room of the Leatherby Libraries of Chapman University. Alters is Professor of Education at Chapman University as well as president of NCSE's board of directors.



NCSE congratulates **Francisco J Ayala** for winning the 2015 Stephen Jay Gould Prize from the Society for the Study of Evolution (SSE). A member of NCSE's board of directors and of its Advisory Council, Ayala is University Professor, the Donald Bren Professor of Biological Sciences, and Professor of Philosophy at the

University of California, Irvine. Ayala received the Gould Prize and presented a public lecture on “Copernicus and Darwin: Two revolutions” on June 26, 2015, at the Evolution 2015 conference in Guarujá, Brazil.

Ayala received the National Medal for Science, the nation's highest award for lifetime achievement in scientific research, in 2001, and the Templeton Prize in 2010, as well as honorary degrees from twenty-one universities worldwide. He testified for the plaintiffs in *McLean v Arkansas*, a 1982 case challenging the constitutionality of a law requiring equal time for creation science in the public schools, and was the lead author of *Science, Evolution, and Creationism* (National Academies Press, 2008).

The Stephen Jay Gould Prize is awarded annually by the SSE “to recognize individuals whose sustained and exemplary efforts have advanced public understanding of evolutionary science and its importance in biology, education, and everyday life in the spirit of Stephen Jay Gould.” NCSE's **Eugenie C Scott** was the recipient of the first Gould Prize, in 2009, followed by **Sean B Carroll** in 2010, **Kenneth R Miller** in 2011, **David Quammen** in 2012, **Judy Scotchmoor** in 2013, and **Steve Jones** in 2014.

Jeffrey Bada responded at length to a climate change denier's letter to the editor of the *Lakeland Times*, published in Minocqua, Wisconsin. Debunking a variety of “false or fabricated claims” in detail, Bada concluded,

In the long run it will not make any difference what Boyd, me, scientists, politicians, bloggers, etc. feel about the potential for global warming associated with increasing atmospheric carbon dioxide produced by human activities. The Earth's system will adjust in response to our carbon dioxide release “experiment.” We will have to accept the consequences whether they are good, bad, or ugly.

Bada is Distinguished Research Professor of Marine Chemistry at the Scripps Institution of Oceanography, University of California at San Diego. His letter appeared on August 11, 2015.

Alexander Harcourt's *Humankind: How Biology and Geography Shape Human Diversity* (New York: Penguin, 2015) was published. The publisher writes:



What effects have other species had on the distribution of humans around the world, and we, in turn, on their distribution? And how have human populations affected each other's geography, even existence? For the first time in a single book, Alexander Harcourt brings these topics together to help us understand why we are, what we are, where we are.

It turns out that when one looks at humanity's expansion around the world, and in the biological explanations for our geographic diversity, we humans are often just another primate. Humanity's distribution around the world and the type of organism we are today has been shaped by the same biogeographical forces that shape other species.

Harcourt is Professor Emeritus in the Anthropology Department at the University of California, Davis.

David M Hillis was profiled in *The New York Times* (2015 Jul 7) as a “Texas Scientist With a Thing for Longhorns.” After buying a ranch outside Austin, Texas, Hillis took up the hobby of researching the evolutionary history of the Texas longhorn. “We used genetic testing and historic documentation, here and in Europe, to confirm that Texas longhorns appear to be directly descended from Iberian cattle brought to the New World by Spanish explorers,” he told the *Times*. “In the early 1500s, the Spanish introduced them into Mexico, where they broke free of captivity and eventually formed feral herds. It was those that migrated into what would later

become the American Southwest and that lived in the wild for hundreds of years.” In the interview, Hillis also highlighted the practical applications of evolutionary biology, saying, “In my lifetime, the applications have exploded.” Hillis is Alfred W Roark Centennial Professor in Natural Sciences at the University of Texas, Austin, and a recipient of NCSE’s Friend of Darwin award.

After Iowa adopted the evolution-friendly Next Generation Science Standards in August 2016, **Sid Machalek** wrote to the *Quad City Times*, published in Davenport, Iowa, to applaud: “Science should be taught in science class. So-called creation science or so-called intelligent design theory can be taught in church or a private school, because they are religion masquerading as science.” His letter appeared in the August 16, 2015, issue of the newspaper.

David Morrison was featured in *Newsweek*’s cover story “Asteroids: They can be stopped but someone has to pay” for June 11, 2015. “Morrison was one of the first researchers to suggest that, unlike the dinosaurs made extinct by an asteroid impact, we might be able to defend ourselves,” the story explained, referring to his book with Clark R Chapman, *Cosmic Catastrophes* (New York: Plenum Press, 1989). “Thirty years ago, there was no research on near-Earth objects,” he told *Newsweek*. “There weren’t that many known and hardly anything to study.” A member of NCSE’s Advisory Council, Morrison is director of the Carl Sagan Center for Study of Life in the Universe at the SETI Institute.

After a particularly strident creationist wrote to the editor of the *Charleston Gazette* (2015 May 20) to complain about the newly adopted West Virginia science standards (and to denounce NCSE as “an enforcer of evolutionism propaganda”), **PA Nichols** responded that the letter “was thoroughly insulting to me and anyone who treasures the benefits of a quality education.” She added, “Don’t make West Virginia, my ancestral home, a laughing stock. ... Support quality science education for your children’s sake.” Her letter appeared in the June 1, 2015, issue of the newspaper.

Andrew J Petto contributed “Evolution, creationism, and intelligent design” to *Basics in Human Evolution*, edited by Michael P Muehlenbein (London: Academic Press, 2015). The synopsis of his essay:

The last half of the twentieth century saw an increased attention to science education, including the study of evolution, in public schools. As a result, a powerful creationist movement sought first to prevent teaching evolution, then to require teaching creationism in the public schools. After several defeats in federal courts, creationism, with its overt emphasis on conservative Christian views of the Bible, was replaced by intelligent design (ID). ID still held that life, or at least certain aspects of it,

was the result of a purposeful action of an intelligent agent, and that this action could be detected by scientific study. In the early twenty-first century, ID still follows the trail of opposition to evolution blazed by the creationists: pointing out unanswered questions and disagreements among scientists about details of their studies and methods, arguing that things we do not know now are unknowable, calling up laws of thermodynamics and probability to prove the impossibility of evolution, drawing out credentialed dissenters and skeptics, focusing on sociopolitical organization rather than scientific research, and calling for fairness and openness in science education. In the end, their concerns echo the cultural understanding that life should have a purpose and meaning, and they object that natural scientists do not seem to concern themselves with this important issue.

Petto is Senior Lecturer in Anatomy and Physiology at the University of Wisconsin, Milwaukee; he is a former member of NCSE’s board of directors and a former editor of *Reports of the NCSE*. Also featured in the same volume is **Douglas J Futuyma**’s “Basic evolutionary theory” and **Michael A Little**’s “Hunter-gatherers” (coauthored with Mark A Blumler) and “Pastoralism.”

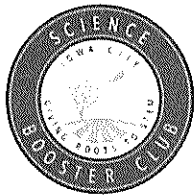
Dan Phelps wrote to the editor of the *Grant County News*, published in the county where Answers in Genesis is building its Ark Encounter Project, to note the changes in the project. “When the Ark Encounter (aka the Ark Park) was first announced in 2010, Kentucky, Grant County, and Williamstown were promised more than 900 jobs and that there would be no discrimination in hiring,” he explained. “It is apparent that Ark Encounter cannot or will not keep its word regarding its benefits. Ark Encounter wants to require potential employees sign a statement of faith ... that excludes all but extreme fundamentalist Christians from employment. ... Since Ark Encounter has reneged on its word not to discriminate in hiring, it could do the ethical thing and return the money and land obtained under false pretenses. Such an action does not seem likely.” His letter appeared in the June 4, 2015, issue of the newspaper.

Donald R Prothero reviewed **Jason Rosenhouse**’s *Among the Creationists* (New York: Oxford University Press, 2012) for *Skeptic* 2015;20(2):60–61, describing it as “a very insightful book that allows the skeptic and scientist alike to better appreciate the forces that we are up against in the United States,” adding, “I highly recommend it to anyone interested in the creation-evolution wars as a valuable resource for dealing [with] the never-ending battle with the forces that deny science.” Prothero is the author of more than thirty books, including *Evolution: What the Fossils Say and Why it Matters* (New York: Columbia University Press, 2007). ■

from THE STAFF

News from NCSE Headquarters

EMILY SCHOERNING WRITES:

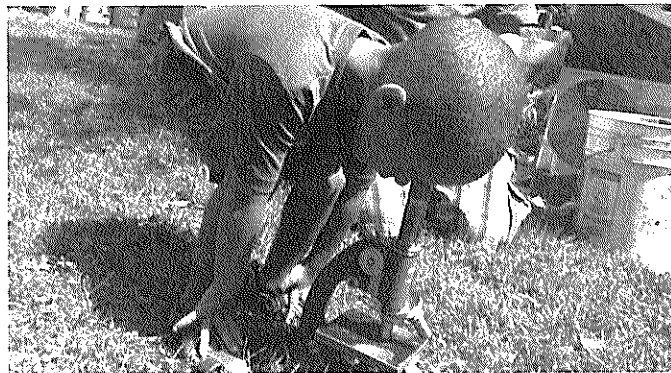


“A science booster club? What on Earth is a science booster club?” That’s the sentiment, if not the exact words, that I’ve been hearing from people in and around Iowa City a lot over the last five months. But once I explain the idea, then what I hear is “A science booster club? What a great idea!” So let me explain it to you, too.

Throughout 2015, we’ve been working on a new initiative at NCSE: the Science Booster Club Project. Our plan is to build a network of grassroots organizations that support science education at the local level. Like booster clubs for football teams or marching bands, Science Booster Clubs will serve not only to bring together and empower the science-loving members of a community, but also to raise money and provide resources to support local science teachers.

Right now, our work on Science Booster Clubs is based out of our pilot site: Iowa City, Iowa. When we started NCSE’s first Science Booster Club here in April 2015, we knew that there was a niche for this kind of citizen science organization, but we’ve learned a lot of things we didn’t expect. Iowa City is a very pleasant place to live, named one of the best towns in America in 2015 by *Outside* magazine. The populace is educated, crime is low, and the city wasn’t hit as badly by the recession as many parts of America were. We had thought that when we offered financial support to teachers, we would get icing-on-the-cake-type requests, such as support for an extra field trip or some fancy equipment upgrade. But as it turns out, we found that even here, in this pleasant, stable corner of America, there are tremendous unmet needs related to science education. The number one request we received from local teachers was for perhaps the most basic piece of lab equipment: tables with chemical-resistant surfaces.

It isn’t just in Iowa City, of course. Teachers and school districts all over America are still struggling with funding. With an increasing number of states signing on to the Next Generation Science Standards (NGSS), science teachers are being asked to change their classroom practices significantly, including by providing a lot more hands-on experiences for their students. Most states that have adopted the NGSS have not devoted significant additional resources to teachers’ professional development, meaning that science educators are facing significant logistical challenges as they try to implement these new standards. Hopefully, the Science Booster Club Project will help them to overcome these obstacles



Photographs: Nick Ferty

as NCSE works to support teachers to keep sound science in our schools.

The pilot project here in Iowa City is definitely demonstrating the existence of both support and desire for community-based science organizations. We have almost three hundred members now (mid-September 2015), and we continue to gain more every week. Our first fundraiser, held in 2015, attracted about three hundred community members. We threw a public science party in the park, at which kids and adults could see and learn to use real scientific equipment in the context of climate science education. The people who attended had a great time! You can see from the photographs how involved and interested in the activities the participating children became.

But we were pleased to see that many adults also learned a lot. My volunteers and I were surprised by how many adults simply did not know about the greenhouse effect, let alone about greenhouse gases. Many were astonished to find that they could measure carbon dioxide and oxygen levels in the air, and that they could see these levels change in real time. We think that Science Booster Clubs could play an important role in many communities—not just through supporting teachers, but also in providing networking and educational opportunities for adults. It’s rare for adults to find low-pressure opportunities to learn science in fun, engaging environments, and such continuing community education is badly needed in our society.

We want our model of providing these types of opportunities to adults and children alike to be as strong as it can be. That’s why we’ve partnered with the University of Iowa. Before we expand the Science Booster Club Project to three new test sites in the fall of 2015, we are getting approval through the University of Iowa to conduct this project in accordance with the highest academic research standards. We will be surveying club members and performing statistical analyses on a variety of factors to determine what variables lead to club success, and what kind of meaningful changes a

MEET THE INTERNS

Assisting Emily Schoerning with the Science Booster Club Project pilot in Iowa City are three graduate students in the Department of Biology at the University of Iowa. Here's what they had to say about their experience so far.



Laura Bankers writes: Working as an education and outreach intern with NCSE has been an incredible and unique experience. I am very passionate about teaching and have had the opportunity to help teach introductory biology courses and upper level evolution courses. NCSE's Science Booster Club has provided me with much

broader teaching experience. I have learned a lot about how to teach science to the general public, help foster public interest in the scientific community, and organize community support for local science teachers. This internship is a wonderful experience, and a very unique addition to my graduate education.



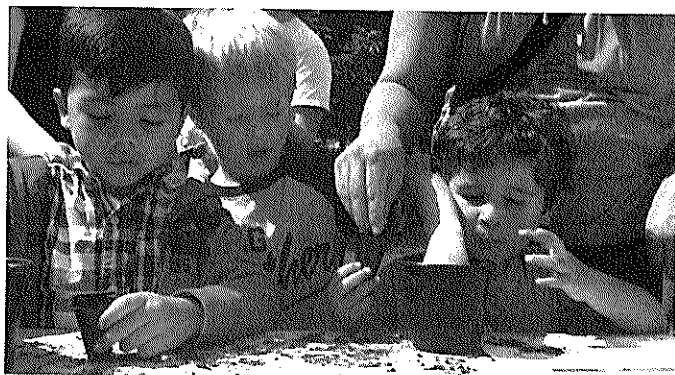
Kyle McElroy writes: My experience this summer as an intern for NCSE has helped me to see a broader role I can have as a scientist. I have always been interested in science advocacy but had not before been involved with community outreach for science to the extent I was this summer. My experience working

with the Science Booster Club Project has helped me realize my potential to engage with the public to promote science. I feel confident now that I can be part of the bridge between scientists and the public throughout my professional career.



Elizabeth Stroebele writes:

As a graduate student I have participated in many science outreach activities. I have found that even the simplest of scientific activities, like looking at a fruit fly under the microscope, can inspire a student's interest in science. My internship with NCSE has given me an opportunity to develop skills in event planning, social media content writing, and curriculum development. This has especially helped me to develop my public writing skills. These skills, while not a traditional part of a graduate training program, will help me communicate effectively with the public as a scientist.



Science Booster Club can make in a community. As well as measuring what kinds of support the club generates for local teachers, we'll also study whether and how the club changes people's attitudes about science, including topics such as evolution and climate change, their basic level of science literacy, and their personal level of community engagement.

This type of data collection and analysis will be important as the Science Booster Club Project continues to expand. We're also collecting data specifically from teachers to make sure that we understand what they want and need from us, as well as their potential concerns. With the input of teachers and members of the community, we expect to be able to develop a club model that can be adopted nationwide. The goal is to prepare a handbook and starter kit that will allow interested community members to start up their own local Science Booster Clubs, following a blueprint with proven success.

Do you want to hear more about Iowa City's Science Booster Club? I'll keep you up to date on stories in future issues of RNCSE and on NCSE's blog, the Science League of America (<http://ncse.com/blog>). One thing to look forward to is coverage of Iowa City's next Science Booster Club event: Climate Change Horror. Under local leadership, the club will be partnering with the University of Iowa's popular Creepy Campus Crawl, an annual event that generally draws around a thousand visitors. Club members will develop exhibits and activities that educate about accurate and horrifying climate science findings and predictions—a theme that is unfortunately perfect for Halloween. Video footage will be taken and edited by local high school students and posted to NCSE's YouTube channel (<https://www.youtube.com/user/NatCen4ScienceEd>), so soon we'll be able to show you this new way NCSE is supporting education on climate change in our communities.

And, of course, if you want to discuss the possibility of starting a Science Booster Club in your community, get in touch with me at schoerning@ncse.com!

Biological Evolution in Canadian Science Curricula

Anila Asghar, Sarah Bean, Wendi O'Neill, Brian Alters

The social controversy around biological evolution and creationism continues to persist throughout North America. This fierce debate has been quite visible in the United States, but seems to be relatively muted in Canada, which may lead many to believe that the dispute does not exist north of the border, despite the powerful presence of such controversies there (Wiles and others 2005).

A 2012 Angus Reid poll showed striking differences between Canadians and Americans in response to evolution. While approximately 61% of Canadians thought that human beings evolved from less advanced life forms over millions of years, this view was shared by only 30% of their American neighbors. Similarly, 51% of American respondents believed that "God created human beings in their present form within the last 10 000 years," compared to only 22% of Canadians.

While these data may suggest that public scientific literacy in Canada is more advanced than the US, 22% of Canadians still held creationist beliefs and 16% were not sure about evolution. A close look at relevant Canadian literature suggests a creationist movement led by several local and international creationist/anti-evolution organizations. Besides actively contesting evolution through media and on-line propaganda machines, many of these organizations engage in outreach activities in the form of presentations in schools and other community education forums. How creationist activities are specifically shaping the attitudes of academic and broader publics in Canada is still uncharted territory, which needs to be investigated in future studies.

Studies on evolution education in general, however, abound—at least as presented in American schools and universities. However, it is hard to find any research on evolution understanding and instruction in Canadian schools. Wiles (2006a:135) points out that Canadians are generally not aware of the coverage of evolution in the science curriculum. Furthermore, they generally tend to think that Canada is somehow beyond this controversy and there are no issues regarding the teaching and acceptance of evolution in Canada.

Surprisingly, no comprehensive study has been carried out to examine the treatment of biological evolution in Canadian science curricula. Furthermore, some scholars report, based on anecdotal exchanges, that many teachers across various provinces in Canada "confess that evolution in never actually taught in their schools" (Wiles 2006b:39). This study looks at the coverage and treatment of biological evolution in K–12 science education frameworks from all the Canadian provinces and territories.

To understand how evolution is covered in the Canadian Common Framework, we analyzed the learning outcomes related to evolutionary concepts. In the first

phase of the research, we focused on the concepts for grades K–10 to gain a sense of what all Canadian students are expected to learn, since science courses are compulsory up to grades 9 or 10. More precisely, we focused on the standards related to fossils and deep time, natural selection, and human evolution. The analysis of the Canadian Common Framework helped in developing a template with key evolutionary ideas, principles, and mechanisms included in the Common Framework. In the second phase, we used this template as an analytical tool to examine the provincial/territorial science and biology education benchmarks/curricula. The template was useful in identifying the similarities and differences between the Common Framework and individual curricula across all the provinces/territories.

This study can only illuminate the treatment of evolutionary concepts and processes in Canadian science curricula. What is actually taught about evolution in science classes is not known, and this raises a number of questions that need to be investigated in future studies. For example, how do teachers approach evolution in required general science and more specialized biology courses? How do teachers address opposition to evolution? How do school administrators perceive the treatment and teaching of evolution? What are students' views about learning evolution? This study attempts to provide a context for asking these and other questions about the enactment of evolutionary standards in actual Canadian classrooms.

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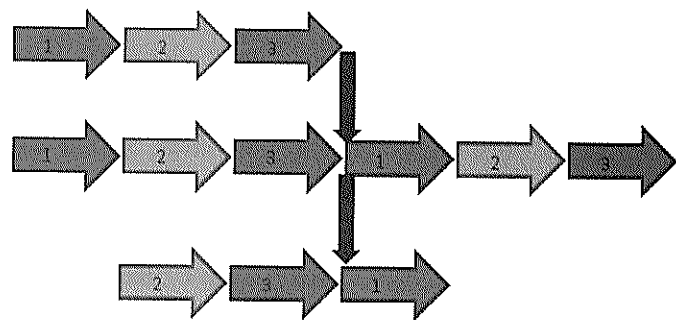
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Summary of *RNCSE* 2015;35(5):1.1–1.22; the full text is available from: <http://reports.ncse.com/index.php/rncse/article/view/376/749>

Leaving the Fold: *Darwin's Doubt* and the Evolution of Protein Folds

Michael Buratovich



One way a gene or parts of genes can evolve is via tandem duplication followed by deletion. This process can reorder particular protein folds and produce proteins that have many of the same components, but in a different arrangement. In this example, a gene that encodes three different protein domains (1-2-3) is duplicated to form 1-2-3-1-2-3. Subsequently, a start codon is introduced before the first domain 2 and a stop codon after the second domain 1, which effectively deletes the redundant sections and results in a gene with protein domains 2-3-1.

In an earlier article (Buratovich 2015), I examined one of the main arguments promulgated by Discovery Institute philosopher of science, Stephen Meyer, in his book *Darwin's Doubt* (2013). Meyer maintains that the rapid diversification of animal life during the Cambrian “explosion” required the swift evolution of new genes that provide animals with the genetic information needed to form new cell types. In that article, I showed that not only does the fossil record show evidence of complex multicellular life well before the Cambrian explosion, but also sequenced genomes of modern sponges and cnidarians (corals, *Hydra*, and sea anemones) possess the genes necessary to build more complex animals, strongly suggesting that the ancestors of these creatures had all the genes necessary for the Cambrian explosion. Thus, it can be concluded that the increase in novel animal forms was due to innovative regulation of these genes during animal development rather than the evolution of new genes themselves.

This argument, however, has a potential drawback. The genes that encode the protein components of the signaling pathways used by animals during development had to originate from somewhere. In *Darwin's Doubt*, Meyer uses the experiments of protein chemist Douglas Axe (2004) to argue that the “probability of any given mutational trial generating (or ‘finding’) a specific functional protein among all the possible 150 residue amino-acid sequences is 1 chance in 10^{77} ” (Meyer 2013:200).

Thus, if the evolution of protein folds (miniature, three-dimensional structures that are compacted together to form proteins) is so improbable, how do we account for all of the protein variation present in early animals, without which their varied final body forms would not have been possible?

Although Meyer’s argument may seem logical on the surface, manipulations of protein structure, examinations of protein diversity, and protein engineering studies have shown that the argument is terribly flawed. As it turns out, biologists have successfully evolved new protein folds in the laboratory, and the chances of new protein folds evolving naturally are not nearly as improbable as Meyer posits.

Protein evolution is a rather well-documented event, and the evolution of new protein function and new protein folds has been observed in real time, in a number of ways (see figure for one example). First, single amino acid changes can drive proteins to form new protein folds. Second, these transitions from one protein fold to another can occur either through intermediate bridge structures or smoothly. Third, gene duplications, which are well-documented events in molecular evolution, can create larger protein folds from smaller ones. Finally, insertion/deletion events can subject already-existing genes to extensive rearrangements that can produce novel proteins with new combinations of proteins folds. Such events are not probabilistically unfeasible, and to label them as such is to defy experimental reality. Protein evolution remains a field of intense research and will continue to be so for some time. Although many questions remain, it is a very fast-moving field in which progress is continually made.

Thus, if we ask the question, “Where did new protein folds come from?” we can answer with some confidence, “They evolved.”

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Yes, We Were There

Antoine Bret

Many believe that to inform us about the past, science depends on an assumption of uniformitarianism: that the laws of nature have never changed, and thus operated long ago exactly as they operate today. Creationist literature often argues that faith in this “stability principle” is misplaced. For example, the starlight argument, observing that light arriving from stars farther than 6000 light-years must have been created more than 6000 years ago, is attacked this way. Creationists will reason that the argument is only sound if light has always been traveling at its current speed. But if light traveled faster in the past, objects farther than 6000 light-years away could have been created only 6000 years ago and yet still be able to send us light. Barry Setterfield became famous in creationist circles in 1981 by “scientifically” exploring the idea (Setterfield 1981).

Radioactive dating methods used to determine the age of Earth, or of the universe, are attacked from the same angle. The uranium–lead dating technique, for example, is instrumental in dating our planet. It relies on the stability of the decay rates involved in the uranium–lead decay chain. How can we be sure these rates have been the same in the past? Can we observe the past? Doubts in clearing up these issues lead to Ken Ham’s rhetorical question “Were you there?” While none of us have blown out 4.6 billion birthday candles, it turns out that we can directly observe the past to determine how nature was behaving back then.

Billions of objects exist in the universe at distances greater than 6000 light-years from Earth. If light has always travelled at the same speed, they must be older than 6000 years. But how do we prove that the speed of light has not changed? Every element and molecule emits a unique and specific set of wavelengths when heated. These spectra can be computed from the laws of electromagnetism and quantum mechanics. The speed of light is a parameter of these laws.

When we look at the Sun, we detect the spectra for elements such as hydrogen, helium, carbon, and calcium. This is how we know what the Sun is made of. This is also how we can be sure the laws of electromagnetism and quantum mechanics are the same on the Sun as here on Earth. In fact, all the astronomically observed spectra, which include spectra of objects 30 000 light-years away, are exactly the same as they are on Earth. (The farthest objects which distance has been measured by the purely geometric parallax method are about 30 000 light years away. Of course, the universe is much larger than that.) This means the speed of light and the laws of electromagnetism and quantum mechanics have been the same for

at least the last 30 000 years. This is not an assumption. It is a conclusion based on empirical evidence.

As for nuclear decay rates, these depend on the laws of nuclear physics. How do we know that these laws haven’t changed in a very long time—if ever? One source of evidence comes from supernovae, which are exploding stars that can be detected very far away. Among the many kinds of supernovae, the so-called Type Ia supernovae (SN) do something pretty interesting when they explode—they release a very large amount of nickel-56 into space. Nickel-56 is radioactive and decays to cobalt-56 with a half-life of 6 days. Cobalt-56 is also radioactive and decays to iron-56 with a half-life of 77 days. Iron-56 is stable.

One of the closest Type Ia SNs, called SN 2011fe is 21 million light-years away. If the laws of nuclear physics had been different 21 million years ago, when SN 2011FE exploded, the observed decay rates would be different from what’s expected—but they’re not. There are other astronomical phenomena allowing for a test of the laws of nuclear physics in the past, and together they leave us no doubts: the laws of nuclear physics, and with them all the decay rates we know of, have not changed over a time span very much larger than 6000 years.

We physicists do not hold that the laws of physics haven’t changed over the last 30 000+ years because of a uniformitarian prejudice. We hold it because we have made trillions of observations of stars farther away from Earth than 6000 light years. We do not simply suspect the universe is more than 6000 years old. We know it is more than 13.8 billion years old based on observations by people who, regardless of their age, culture or religion, all come to the same conclusion. And yes, Ken Ham, for all practical purposes, “we were there” to see it.

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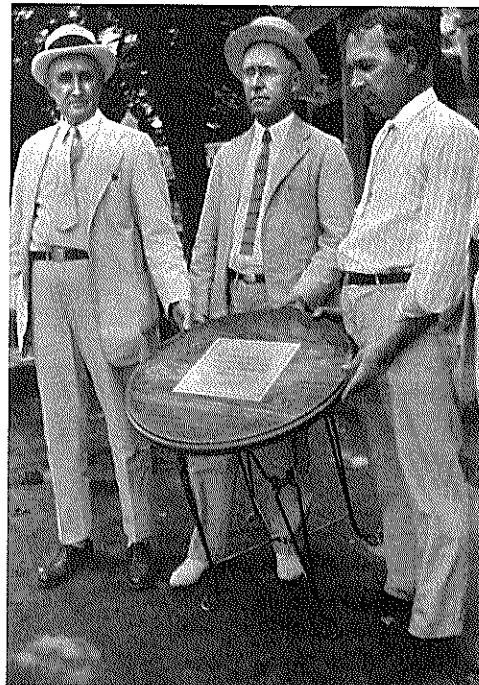
Summary of *RNCSE* 2015;35(5):3.1–3.5; the full text is available from: <http://reports.ncse.com/index.php/rncse/article/view/388/747>

FE Robinson

(1881–1957)

Randy Moore

Rhea County school board chairperson Frank Earle Robinson (right) posing with local residents in front of Robinson's Drug Store in Dayton, Tennessee, in July 1925. On the table they're holding is a sign noting "At This Table the Scopes Evolution Case Was Started May 5, 1925." Today, this table can be seen in the Scopes Trial Museum in the basement of the Rhea County Courthouse in Dayton, Tennessee.



Smithsonian Institution. Image 2009-21072



At the time of the Scopes Trial, Frank Earle “Doc” Robinson (often misidentified as “Fred” Robinson) headed the Rhea County School Board and owned Robinson’s Drug Store in Dayton, Tennessee. At his store, Robinson sold George Hunter’s *Civic Biology*—the state-approved textbook used by John Scopes when he allegedly taught evolution in Dayton. In 1925, when the ACLU placed an advertisement in the *Chattanooga Daily Times* searching for a teacher to test the newly passed Butler Act banning the teaching of human evolution in Tennessee’s public schools, George Rappleyea and other local businessmen met at Robinson’s Drug Store to discuss how a test of the law could benefit Dayton’s struggling economy (Larson 1997). After an editorial in the *St Louis Post-Dispatch* ridiculed the Scopes Trial and its location, Robinson and WE Morgan coauthored a 28-page booklet titled *Why Dayton—of All Places?* that used the upcoming Scopes Trial to promote Dayton and the surrounding area. During the trial, Robinson attracted customers with a banner bragging that his drugstore was “Where It Started.”

In the days leading up to Scopes’s famous trial, Robinson—often with Scopes and others—posed at the table at which local businessmen decided to test the Butler Act. At Scopes’s trial, Robinson testified that he, Scopes, and Rappleyea had discussed the Butler Act in Robinson’s Drug Store, adding that Scopes had said that he could not teach biology without including evolution. Robinson also admitted that he sold the offending textbook. After Robinson’s testimony, the prosecution rested. During the trial, there was a festive atmosphere in Dayton as thousands came to stay for the trial. Robinson arranged for a trained chimpanzee named Joe Mendi to greet visitors at his store during the trial, and Robinson’s

wife fed many of the visiting journalists, except for HL Mencken—who was not welcome owing to his unfavorable reporting of Dayton and its occupants.

After the trial, Robinson offered to let Scopes continue to teach at Rhea County High School, provided Scopes would adhere “to the spirit of the evolution law.” Scopes declined Robinson’s offer, and instead went to Chicago to attend graduate school. Robinson continued to serve as Chairman of the Rhea County School Board and promoted himself as “the Hustling Druggist” while operating his famous drug store and cultural center in which the initial discussions that produced the Scopes Trial were held. Robinson served as chairman of the Bryan College Board of Trustees during the school’s first twenty-six years; in the earliest of those years, Robinson often paid bills and teachers’ salaries with personal funds. He died in 1957 and was buried in Buttram Cemetery in Dayton, Tennessee.

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Summary of *RNCSE* 2015;35(5):4.1–4.3; the full text is available from: <http://reports.ncse.com/index.php/rncse/article/view/353/771>

Is Theism a Scientific Hypothesis? Reply to Maarten Boudry *Kelly James Clark*

In his recent review of my *Religion and the Sciences of Origins* (Clark 2014), Maarten Boudry insists that God (better, theism) is a scientific hypothesis, one “that has failed to garner empirical support, or has even been decisively refuted” (Boudry 2015). Is God really a scientific hypothesis?

A scientific hypothesis is one that achieves warrant by way of explanation and, in most cases, prediction. The warrant for scientific ideas comes from their surprising and illuminating ability to explain and predict. Most of our beliefs, though, do not receive their warrant by way of explanation and prediction. I believe that I exist, that I am typing right now, that there is an external world and a past, and that there are other people in the room. Such non-scientific beliefs are warranted when one’s properly functioning cognitive faculties are in the right relationship to the “cause” of the belief. Most of our beliefs are warranted in this way.

Belief in God would be justified if there is a set of cognitive faculties which makes people aware of God and if there is a God who is the ultimate cause of that belief. Belief in God is not, as Boudry insists, license to be “intransigent and dogmatic.” Like most beliefs produced by our cognitive faculties, belief in God is defeasible. Some religious beliefs—in a young earth, say, or in the special creation of humans—are in conflict with science and so should be rejected.

Boudry’s essay and my response raise some important questions: Is there truth outside of science? I think (and I think that you should think, too) that there are lots and lots of truths outside of science. Is the claim that science refutes theism a claim that lies outside of science? I think this claim itself (and its denial) is a philosophical or metaphysical claim, not a scientific claim. I also think that versions of theism, those which impinge upon well-established science, need to be reexamined and, in some cases, even rejected.

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The Sin of Scientism: Response to Clark *Maarten Boudry*

Kelly James Clark’s reply (left) to my review-essay (Boudry 2015) of his book *Religion and the Sciences of Origins* (Clark 2014) accuses me of a sin called “scientism.” Clark never quite explains what I’m guilty of. There is no agreed-upon definition of the concept of “scientism,” except that it is a term of abuse meaning something like “pushing science too far.”

The issue of scientism is a diversion. My argument was that religion encroaches upon the territory of “science” (meaning, among others, evolutionary biology, ancient history, cosmology), by making factual claims about reality. Nothing in this argument commits me to the view that “science”—however construed—is the only acceptable or valid or rational mode of discourse. Clark tries to make space for religion by pointing to other truths that “lie outside the domain of science” (mathematics, logic, literary criticism, and so on), but none of these conflicts with science in the way that religion does.

In his book, Clark argues that theism is “not a scientific hypothesis” because it was not arrived at by way of controlled observation and careful hypothesizing. Rather, it arises out of experience with the divine. But this is really no better than saying that homeopathy is not in conflict with science because Samuel Hahnemann did not use randomized double-blind trials and relied exclusively on anecdotal evidence. The parallel is exact: like homeopathy, theism may have originated from and may be sustained by wholly unscientific sources, but it has empirical consequences nonetheless that put it on a collision course with science.

At the end of his response, Clark assures us that he “enthusiastically endorse[s] contemporary science.” Good; we’re on the same side, then. After that, he adds that “versions of theism, those which impinge upon well-established science, need to be reexamined and, in some cases, even rejected.” Perfect. But if Clark were serious about reexamining religious views in the light of science, wouldn’t the whole of theism end up on the scrapheap?

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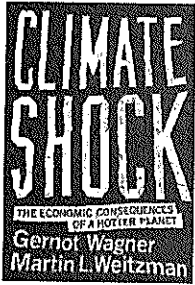
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Summary of *RNCSE* 2015;35(5):6.1–6.3; the full text is available from: <http://reports.ncse.com/index.php/rncse/article/view/398/744>

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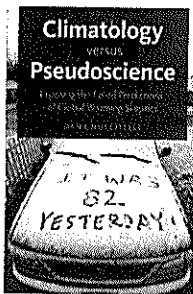
SUMMARIES OF BOOK REVIEWS



Climate Shock: The Economic Consequences of a Hotter Planet by Gernot Wagner and Martin L. Weitzman (Princeton [NJ]: Princeton University Press, 2015; 264 pages). “[A] layperson’s survey of climate economics, a field that includes cost-benefit analysis and other economic research on climate change impacts and climate change policies,”

Climate Shock is also “an unconventional book that takes risks in an effort to connect with audiences who might otherwise turn away,” writes reviewer **Yoram Bauman**. “The book provides an accessible look into the thinking of an economist ... who has devoted a major share of his life’s work to climate change.”

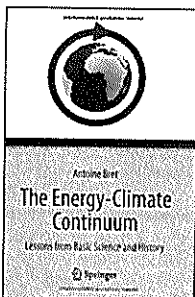
Summary of *RNCSE* 2015;35(5):7.1–7.3; the full text is available from: <http://reports.ncse.com/index.php/rncse/article/view/386/740>



Climatology vs Pseudoscience: Exposing the Failed Predictions of the Global Warming Skeptics by Dana Nuccitelli (Santa Barbara [CA]: Praeger, 2015; 212 pages). “Nuccitelli’s core argument is that the projections of mainstream climate science have provided a far better match to reality than those of the contrarians,”

according to reviewer **Jonathan Cole**, although the book also discusses the “consensus gap” and economic solutions. “The primary audience for this book is likely to be ... climate educators, communicators, and interested citizens looking for solid, well-reasoned arguments against some of the most contrarian claims. For them, this book will stand as a well-written and invaluable resource.”

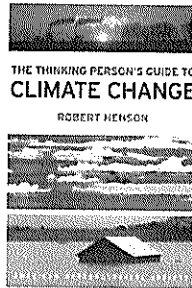
Summary of *RNCSE* 2015;35(5):8.1–8.3; the full text is available from: <http://reports.ncse.com/index.php/rncse/article/view/396/748>



The Energy-Climate Continuum: Lessons from Basic Science and History by Antoine Bret (Cham [Switzerland]: Springer, 2014; 169 pages). Reviewer **Cynthia Howell** writes, “This book is a thoughtfully laid-out guide to help the reader grasp the immensity and intimacy of the energy and climate connection: a conversation starter and igniter. Whether you are a high

school or university student, a professor, a behavioral and/or environmental scientist, or simply a concerned or curious citizen, you will be invited to draw your own conclusions about the issues presented as you gain basic insight into the energy and climate relationship.”

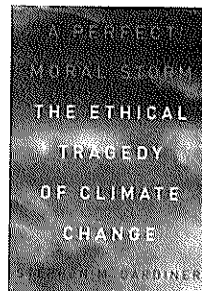
Summary of *RNCSE* 2015;35(5):9.1–9.2; the full text is available from: <http://reports.ncse.com/index.php/rncse/article/view/383/752>



The Thinking Person’s Guide to Climate Change by Robert Henson (Boston: American Meteorological Society, 2014; 516 pages). “Robert Henson has written a complete and powerful climate change science book,” according to reviewer **Scott Mandia**. “Too often, climate books focus just on the science and either ignore or give short shrift to the

reasons for public confusion on this important topic. ... A more successful strategy requires the communicator to understand motivated reasoning driven by cultural and political worldviews. Furthermore, it is critical to communicate the available solutions to address climate change. Henson delivers on both fronts.”

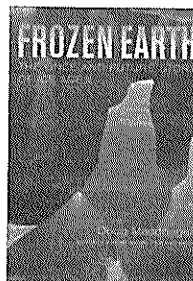
Summary of *RNCSE* 2015;35(5):10.1–10.3; the full text is available from: <http://reports.ncse.com/index.php/rncse/article/view/365/746>



A Perfect Moral Storm: The Ethical Tragedy of Climate Change by Stephen M. Gardiner (Oxford: Oxford University Press, 2011; 512 pages) and *Reason in a Dark Time: Why the Struggle Against Climate Change Failed—And What It Means for Our Future* by Dale Jamieson (Oxford: Oxford University Press, 2014; 288 pages). Reviewer **Mark McCaffrey**

praises both Gardiner’s and Jamieson’s investigations of “the philosophical challenges inherent in the topic of human impact of the climate system,” regarding them as “complements rather than competitors”; he expresses regret, though, that “neither author comments on the role of education in our current dilemma.”

Summary of *RNCSE* 2015;35(5):11.1–11.4; the full text is available from: <http://reports.ncse.com/index.php/rncse/article/view/316/745>



Frozen Earth: The Once and Future Story of Ice Ages by Doug MacDougall (Berkeley [CA]: University of California Press, 2013; 278 pages). *Frozen Earth* (published originally in 2004 and reissued with a new preface in 2013), writes reviewer **Steven Newton**, “traces the history of the thinking about climate and ice ages from its

early roots with Louis Agassiz through the orbital calculations of James Croll and Milutin Milankovitch and up to modern measurements. ... This book will be a good resource for those needing an introduction to what we know about past climate and how we know it.”

Summary of *RNCSE* 2015;35(5):12.1–12.3; the full text is available from: <http://reports.ncse.com/index.php/rncse/article/view/358/730>

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