

reports

OF THE NATIONAL CENTER FOR SCIENCE EDUCATION | FALL 2016 | VOLUME 36 | NO 4

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EDITOR

Stephanie Keep

National Center for Science Education
1904 Franklin Street, Suite 600
Oakland CA 94612-2922
phone: (510) 601-7203
e-mail: editor@ncse.com

BOOK REVIEW EDITOR

Glenn Branch

PUBLISHER

Ann Reid

VOL 36, NR 4, FALL 2016

ISSN 1064-2358 ©2016 by the
National Center for Science
Education, Inc, a not-for-profit 501(c)(3)
organization under US law. *Reports
of the National Center for Science
Education (RNCSE)* is published by NCSE
to promote the understanding of
evolutionary and climate science.
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Views expressed are those of their
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RNCSE is published 4 times a year.
Address editorial correspondence
to editor@ncse.com

Write to the publisher regarding
address changes, missing issues,
purchases of back issues, reprint
rights, and related issues.
publisher@ncse.com

IMAGE CREDIT

Cover photograph by Timothy H. Heaton

Dear NCSE members,

First, a hearty “Welcome!” to our new graduate student members, for whom this will be the first issue of *RNCSE*. The one-year free membership offer (“Spotlight,” p. 11; back cover) was launched in July 2016, and in just the first few weeks, nearly four hundred of you signed up. We need you, the next generation of scientists, to help us ensure that evolution and climate change are taught, and taught well. To that end, we will be making every effort to engage you in our work, from recruiting you to serve as a Scientist in the Classroom to encouraging you to volunteer with local Science Booster Clubs. As your success stories are written, please share them so that we can feature them here in *RNCSE* and on our blog.

As a testament to the work we have ahead of us, this issue features (at the risk of inflating his ego further) not one but two pieces on Ken Ham’s new Ark Encounter theme park (“A Visit to Ark Encounter,” p. 3; “Under Kentucky Skies,” p. 5). Lest anyone think that the problems of creationism and climate change denial have been solved, the construction of such a place proves that NCSE’s work is far from finished.

But it’s not all work and no play around here. The NCSE Grand Canyon rafting trip, which I was delighted to be a part of, was a highlight of my summer. What a majestic place, and how fun it was to experience it with a bunch of self-confessed science nerds and NCSE fans! Our two teacher scholars—whose expenses were covered by generous NCSE donors—were an inspiration (“Teachers on a Mission,” p. 10). I am humbled by how hard they work to convey the power, beauty, and joy of science to all of their students, and I am proud that NCSE is stepping up to the challenge of helping *all* science teachers cover evolution and climate change confidently and completely.

Finally, I have some news that is sad for NCSE, but good for the Sierra Club. NCSE’s Minda Berbeco, who played a critical role in incorporating climate change education into NCSE’s mission and who single-handedly launched NCSEteach, has accepted a new challenge. You can read more on page 9.

NCSE is thriving. Our new programs are growing faster than we ever could have dreamed. Of course, I have to say that with more resources, we could do even more, even faster. If you can increase your contributions by even a little bit, we promise to put that money to excellent use.

Thank you so much for your support and encouragement; we are always conscious of, and grateful for, the thousands of members who make our work possible.

Yours sincerely,



Ann Reid is the
executive director of NCSE.
reid@ncse.com



A VISIT TO ARK ENCOUNTER

by Timothy H. Heaton



Photo: Dan Phelps

Ken Ham, president of Answers in Genesis, appears to be on a perpetual quest to outdo himself. After opening the Creation Museum in 2007, he has now built a “life-sized” 150-meter-long replica of Noah’s Ark. My wife and I were eager to check out the new attraction and bought tickets for the opening day. We were interested not only in what kinds of exhibits would be included, but also in what specific apologetic arguments would be employed to support Ham’s assertion that the Genesis account of Noah is a real and global history.

Even as curious skeptics, we could feel the anticipation as we arrived at the parking lot in rural northern Kentucky, the

entrance arch still being assembled by a construction crew. Staff guided us to a parking spot and then to the ticket and bus lines, which moved along smoothly and efficiently. The Ark was looming on a hilltop a kilometer or so away. In line, we overheard a man talking about running into Ken Ham at Disney World a couple of years earlier where “he was obviously casing the place for ideas.” The staff, including a security officer walking a bomb-sniffing dog, seemed jovial and proud to be part of the occasion. Once at the front of the line, we boarded colorful buses with “Creation Museum” on one side and “Ark Encounter” on the other which drove us to a reflecting pool in front of the Ark’s entrance.

Once inside, we waited in yet another line, but were entertained by a humorous video of Noah and his wife trying to accommodate three ancient “paparazzi” who mocked Noah’s dry-dock shipbuilding. Finally, we were led past a photo station into the first interior exhibits, which consisted of a maze of identical cages from which a chorus of animal calls emerged. The exhibits eventually opened up, enabling us to explore at our own pace.

My first impression of the Ark was “Why is it so big when it’s half empty?” Even Noah and his family had spacious quarters that didn’t appear cramped or busy. Some open space was needed to accommodate visitors, of course, but both ends of the Ark were like enormous dark caverns with nothing to fill them. Perhaps the sense of openness was to support Ham’s desire to show the story of Noah as a feasible historic event. Had it been wall-to-wall animals, it might not have seemed as plausible. Indeed, in calculating a census, the “baramin”

Everything from the exhibits to the merchandise for sale in the large gift shop emphasized the message that the Genesis account is plausible as a literal history and that God wants us to believe it.



Exhibit showing how elephant-power could help keep the Ark clean. Photo: Timothy H. Heaton

concept is employed to minimize the number of species needed to repopulate the world. Under this model, only a pair of each broad group of animals was required to reseed the planet after the global flood. Rapid post-Flood divergence created the modern diversity from there. Ironically, the dinosaurs and large mammals exhibited in Ham's Ark are highly specialized species rather than logical, generalized ancestors of their respective groups.

In addition to minimizing the number of required species, the exhibits address the obvious difficulties of sustaining thousands of animals on a ship for a year. The amount of food needed is calculated, and the most entertaining exhibit features a model of an elephant walking on a treadmill that drives a conveyance system to hoist buckets of feces to the top deck to be dumped overboard. No one can accuse Ham of glossing over the tough issues!

The biggest contrast to the drab and serious tone of the Ark is a room with brightly painted cartoonish animal faces and storybooks about Noah and the Flood. While this might entertain youngsters, the exhibit was not meant to delight—but rather, to warn how such depictions trivialize the ark story.

The Ark Encounter is much more focused than Ham's Creation Museum, and it can be toured much more quickly. Everything from the exhibits to the merchandise for sale in the large gift shop emphasized the message that the



Colorful, childish renderings, according to Ham, undermine the seriousness of the ark story.

Genesis account is plausible as a literal history and that God wants us to believe it.

Will Ken Ham's elaborate theme park prove a sustained success? Like the Creation Museum, the Ark Encounter may experience declining numbers as visitors check it off as a one-time vacation trip. The question is whether sequential additions of a pre-Flood walled city, a Tower of Babel, and other planned features will draw back those who agree with the park's message and are anxious to see more. As for me, I'll wait a while before I consider another trip.

Timothy H. Heaton is Professor of Earth Sciences at the University of South Dakota, where he teaches a course called "The Evolution/Creation Debate." Timothy.Heaton@usd.edu



PLACE & TIME

A Gathering of John Scopes's Family and Friends



The 2016 Scopes Trial Play and Festival in Dayton, Tennessee, featured John and Mildred Scopes's friends and family (left to right) Jerry Tompkins, Lisa Rennegarbe, Susan Epperson, Nancy Rose, and Jim Presley. (At the far right is event organizer Randy Moore.) This photo was taken in the courtroom in which the Scopes trial was held. Photo: Dean Wilson

On the third weekend of every July, Dayton, Tennessee, hosts the Scopes Trial Play and Festival. The 2016 festival included several presentations of *Front Page News* (a two-act play about the Scopes trial presented in the courtroom in which the trial was held), concerts featuring songs about the Scopes trial, tours of trial-related sites, an exhibit of rarely seen trial photos and newspaper articles, and vendors selling books, souvenirs, and other trial-related merchandise.

This year's festival also featured a gathering of several people who

knew John Scopes. Among them were Lisa Rennegarbe and Nancy Rose, grandnieces of "Uncle J. T.," who discussed their famous great-uncle, and two long-time friends of Scopes, Jerry Tompkins, who edited *D-Days at Dayton: Reflections on the Scopes Trial* (Louisiana State University Press, 1965) and Jim Presley, who wrote (with Scopes) *Center of the Storm: Memoirs of John T. Scopes* (Holt, Rinehart and Winston, 1967) and was a pallbearer at Scopes's funeral. Susan Epperson was also at the gathering; she was

UNDER KENTUCKY SKIES

by Mark Alsip

The Milky Way helped inspire the author's love of science. Photo: Mark Alsip

The Milky Way was still a silken river of stars in the skies of Kentucky when I received my first telescope at age thirteen. In 1976, light pollution hadn't yet obscured the heavens over rural parts of the Bluegrass State. The scope, a surprise gift from my parents, opened up a new universe to me. Knowing the speed of light in a vacuum to be constant, it quickly dawned on me that the light falling on my eyes had left the overhead stars ages ago. It was awe-inspiring. At the time, I had no idea that my love of science would one day leave me standing in the shadow of a space shuttle, feeling a sense of pride and accomplishment.

But first, I had some serious obstacles to overcome, including the church I attended, where young-earth creationism

held sway and a 6,000-year-old Earth was the order of the day. If the light I saw from distant stars had taken over six thousand years to reach me, then the Bible was wrong about the age of Earth—and the Bible could never be wrong. Scientists must be lying to me about the speed of light, and I was risking my very soul by heeding such foolishness!

If these fantastical views sound familiar, it's because they're precisely what are being preached by creationist Ken Ham in the two so-called science museums his organization, Answers in Genesis (AiG), operates in Kentucky. Now, at age fifty-three, shocked and saddened by my home state being used as a launching pad for a concerted attack on science, I paid a visit to

the plaintiff in *Epperson v. Arkansas* (1968), the case in which the U.S. Supreme Court ruled that laws similar to the Tennessee statute banning the teaching of human evolution (i.e., the law used to prosecute Scopes) are unconstitutional. Epperson had lunch with Scopes in early 1969, and learned that he was still getting about one letter a day about his trial. Sadly, John Scopes Jr., was unable to attend this year's festival, and William Scopes, John and Mildred Scopes's other son, died two days before the festival began.

On the last day of the festival, the Rhea County Historical and Genealogical Society hosted presentations by Presley, Epperson, and Tompkins. Todd Hatton, who produced the radio program *I Am John Scopes* (<http://bit.ly/2chTV1u>), also spoke. Their talks were followed by a question-and-answer session that discussed Scopes's time in Dayton, Scopes's family, the promotion of *D-Days at Dayton*, *Center of the Storm*, and *Inherit the Wind*, Scopes's returns to Dayton in 1960 and 1968, and his last days and funeral in 1970.

Next year's Scopes Trial Play & Festival will be held in Dayton from July 14 to July 16, 2017. You'll find additional information about the festival at <http://scopesfestival.com>.

Randy Moore is author of *A Field Guide to the Scopes Trial* (Rhea County Historical and Genealogical Society, 2016) and co-author (with William McComas) of *Images of America: The Scopes Monkey Trial* (Arcadia Press, 2016). He is the H. T. Morse-Alumni Professor of Biology at the University of Minnesota, Twin Cities. RMoore@umn.edu



the newer of his edifices, Ark Encounter, in order to see how closely it mirrored what I was taught as a child.

The Ark Encounter's first inescapable error is the claim that eight Iron Age craftsmen could have possibly built it. Modern construction equipment still litters the grounds, and the edifice is heavily reinforced to keep it from collapsing. The pseudoscience on display inside is equally baffling. I watched a father and his children pause in front of an exhibit that disingenuously compared the Grand Canyon to a relatively small gouge carved by flooding from the Mount Saint Helens eruption. Apparently not seeing the distinction between a sinuous, 1.5-kilometer-deep, nearly 500-kilometer-long canyon carved in rock and a diminutive, 30-meter-deep, linear gouge sliced by a flash flood through soft mud and volcanic ash, the father patted his son on the back and said, "See, yes, it could happen." No. It couldn't. I wondered if the youngster had learned about the geology of river formation. Would he think to ask his father how Noah's floodwater had surged with enough energy to evaporate all that rock but still slowed down enough to make multiple 180-degree turns, then sped up again, repeat ad nauseam?

If he knew enough to ask, he would have had powerful reason to remain silent: fear. Terror lurks around every corner here on the ark. Walking up the gangplank, I was greeted by Satan in the guise of a slimy, red snake, wrapped around a sign warning of the connection between beliefs in the Flood and beliefs in the afterlife. This is a common theme in Ark Encounter exhibits.

Having effectively quashed dissent from scientifically literate children who might be inclined to point out the errors in his exhibits, Ham doubles down with a very disturbing moral lesson. In an attempt to explain why so many innocent people perished during a flood, patrons are solemnly informed, "We all deserve to die." Having heard such slogans so often on the nightly news in relation to acts of terror, I found this particular claim nauseating.

Young-earth creationists refer to Ark Encounter as a science museum. In my experience, it was a little shop of horrors. I could not be more deeply embarrassed that it was built here in the Bluegrass State.

To be clear, faith in an easily disproven global flood is not just a localized phenomenon. Some polls report that 40% of the United States population believes in this myth. Kentucky is not alone in the fight against scientific illiteracy. But we are arguably on the front lines.

Since taking office last year, Kentucky's governor (a supporter of Ark Encounter) has slashed funding for public education and doubled down on his support for charter schools, which, although receiving taxpayer support, lack much of the oversight of public schools, have relatively lax requirements for teachers, and utilize privately elected boards. Apparently not seeing any problem with mixing religion and public education, the governor placed a devout creationist on the University of Louisville's Board of Trustees and named a proponent of both Ark Encounter and charter schools as secretary of Kentucky's Education and Workforce Development Cabinet. Is education in Kentucky being undermined by the very people charged with protecting it? Will future students have the opportunities I had?

And oh, what opportunities I had! Decades after looking into dark Kentucky skies at that seemingly endless Milky Way, I found myself in the National Air and Space Museum, standing in the shadow of the space shuttle *Enterprise*, looking at a smaller exhibit with the unassuming name "IDEX II." Revolutionary in its day, IDEX streamed digital video from outer space, replacing old-fashioned film canisters that were dropped by satellites in the hope airplanes could catch them as they plummeted to Earth. I helped design the network and write the software that transferred the satellite imagery to earthbound workstations. It was a small thing, but one of which I was immensely proud to have been a part. The very education that Ken Ham and the like would deprive today's children of is what earned me a spot on the team at the forefront of space exploration in the 1980s.

AiG does a great disservice to people of all faiths, including the dedicated science teachers and mentors who taught me astronomy, physics, and other branches of science that helped me better understand the universe. All of my teachers happened to be devout Christians who would have openly scoffed at the thought of humans walking with dinosaurs and a



A sign at the Ark's entrance implies that denying bad science can endanger one's soul. Photo: Mark Alsip

6,000-year-old Earth. Ironically, none of these capable teachers would fit Answers in Genesis's model of true scientists or Christians. How sad.

Most (perhaps even the vast majority of) Christians do not agree with Ken Ham's questionable teachings and many have spoken out. But Answers in Genesis wraps its bad science in the cloak of the Christian faith—a very risky strategy. Faced with authority figures in the church teaching demonstrable falsehoods about science, many of the faithful leave religion forever, just as I did. This, I think, is one of the inevitable outcomes of teaching easily debunked myths such as a global flood.

Just as light pollution has put a damper on the dark night skies I studied as a boy, Ken Ham's propaganda risks washing out science education. Should children who dare to question poor logic be suffocated by fear, ac-

Young-earth creationists refer to Ark Encounter as a science museum. In my experience, it was a little shop of horrors. I could not be more deeply embarrassed that it was built here in the Bluegrass State.

cused of speaking against God, and drowned with threats of eternal damnation? No. Absolutely, undeniably, unequivocally: No!

The dark skies now over Kentucky are not the alluring, light-pollution-free heavens that made possible the astronomical adventures of my childhood. This current darkness is due to gathering storm clouds, brought about by those who believe that scientific literacy and evil are one and the same. If we don't fight back now, the youth who are our future of our country will be the victims, and we will have only ourselves to blame.

Mark Alsip is a skeptic and science advocate who has written for *Forbes* and *Skeptical Inquirer*, and recently co-authored his first book, *The Fear Babe* (Senapath Press, 2015), which exposes quackery in the organic food and personal care industries. He debunks pseudoscience through his blog, *Bad Science Debunked*, and makes his home in Lexington, Kentucky. mark.aaron@alsip.net



news from the membership



NCSE is pleased to congratulate **James Hopson** and **Donald R. Prothero** on their recent awards from the Society of Vertebrate Paleontology. At the SVP's recent meeting in Dallas, Texas, Hopson was presented with the A. S. Romer–G. G. Simpson medal, the society's highest award, granted in recognition of sustained and outstanding scholarly excellence in the discipline of vertebrate paleontology, while Prothero was presented with the Joseph T. Gregory Service Award, honoring outstanding service to the welfare of the SVP.



Michael Mann

Michael Mann of Pennsylvania State University, a member of NCSE's Advisory Council, was elected as a Fellow

of the American Association for the Advancement of Science (AAAS), as was **Watson M. Laetsch** of the University of California, Berkeley. Congratulations to both. (And let the NCSE office know if we overlooked your name on AAAS's list!)



Naomi Oreskes

Naomi Oreskes and **Donald R. Prothero**

were among the ten distinguished scientists, scholars, educators, and investigators from

five countries elected as fellows of the Committee for Skeptical Inquiry. Additionally, **John R. Mashey** was named as a scientific and technical consultant to the Committee.

NCSE is pleased to congratulate **Eugenie C. Scott** on her election to the board of trustees of Americans

United for Separation of Church and State. "Genie Scott is a longtime ally in the fight for church-state separation," said the Reverend **Barry W. Lynn**, executive director of Americans United. "I am extremely pleased that she will be serving on the board. AU will benefit greatly from her expertise and knowledge." "The bonds between NCSE and AU have always been strong," commented NCSE's executive director Ann Reid, "and have helped to keep religiously motivated pseudoscience out of the classroom of the public schools, especially in the landmark case of *Kitzmiller v. Dover*. Now, with NCSE's founding executive director Eugenie C. Scott on AU's board and AU's legal director **Richard B. Katskee** on NCSE's board, the partnership is sure to continue to thrive."

—GLENN BRANCH

UPDATES

ncse.com/updates

Do you want to let us know about threats to effective science education near you? Or do you have any cause for celebration to share? E-mail any member of staff or info@ncse.com.

COLORADO, GOLDEN

A science teacher at Dakota Ridge High School screened the “intelligent design” creationist film *Unlocking the Mysteries of Life* in his honors biology class. Acting on a complaint filed in May 2016 from a concerned parent, the Freedom From Religion Foundation asked the Jeffco Public Schools to investigate. The school officials replied that the video was not on the approved list and therefore “we have taken remedial actions designed to ensure that this video is not shown again.”

KANSAS

The creationist lawsuit seeking to reverse Kansas’s 2013 decision to adopt the Next Generation Science Standards on the grounds that the state thereby “establish[ed] and endorse[d] a non-theistic religious worldview” failed again on April 19, 2016, when the Tenth Circuit Court of Appeals upheld the district court’s dismissal of the case, *COPE et al. v. Kansas State Board of Education et al.* The court’s decision mainly addressed the question of standing, but observed that the addition of “teleological” explanations to the standards would be unconstitutional.

KENTUCKY

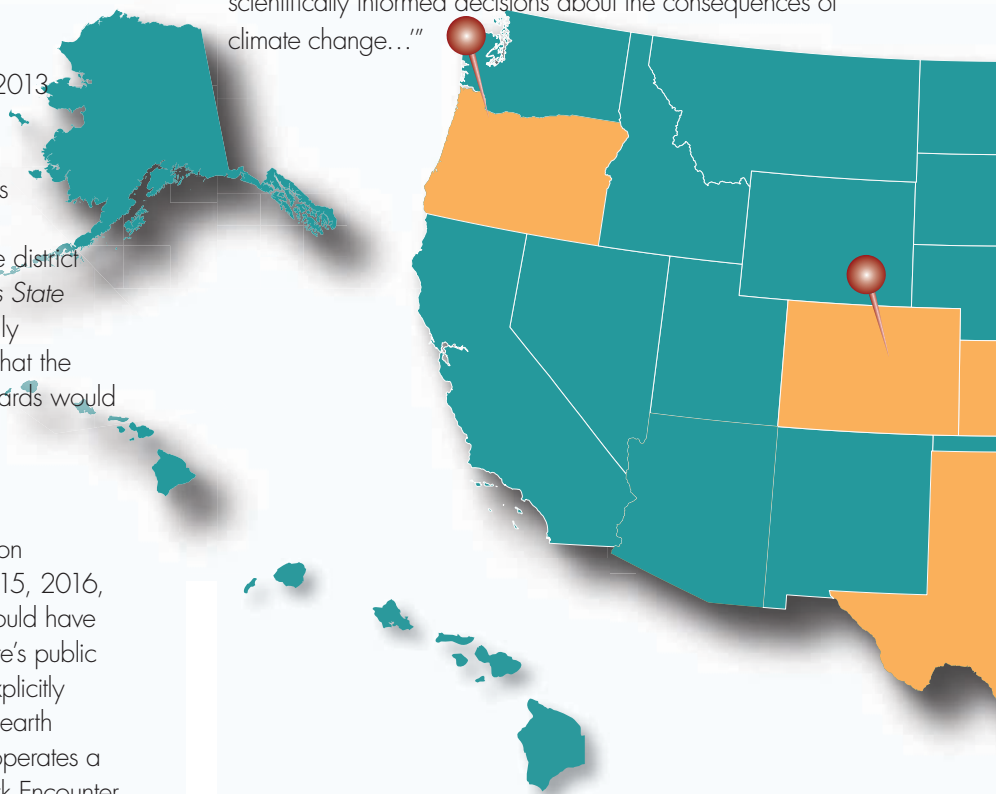
Kentucky’s Senate Bill 50 died in the House Education Committee when the legislature adjourned on April 15, 2016, although it previously passed the Senate. The bill would have extended the duration of summer vacation in the state’s public schools to boost tourism—including, as a sponsor explicitly noted, the newly opened Ark Encounter. The young-earth creationist ministry Answers in Genesis, which also operates a creation “museum” in northern Kentucky, operates Ark Encounter.

KENTUCKY, WILLIAMSTOWN

Ark Encounter, Answers in Genesis’s Noah’s-ark-themed attraction, opened on July 7, 2016, amid continued controversies about its financing, tax incentives from the state, and hiring practices. Like the Creation “Museum” operated by Answers in Genesis, Ark Encounter insists on the accuracy of a highly literalistic reading of Genesis. Asked to comment on the attraction by *The New York Times*, Bill Nye “The Science Guy” (a member of NCSE’s Advisory Council) predicted, “We’re going to raise a generation of kids who are scientifically illiterate.” (See “A Visit to Ark Encounter,” p. 3, and “Under Kentucky Skies,” p. 5, for further thoughts.)

NEW YORK, NEW YORK CITY

The New York City Council adopted Resolution 0375 on April 20, 2016, calling on the New York state department of education to include lessons on climate change in the curriculum of the state’s public K–12 schools. The resolution begins, “Whereas, according to the National Center for Science Education (NCSE), ‘it is important for the science of climate change to be taught, both in formal and informal educational environments, in order for future citizens to be able to make scientifically informed decisions about the consequences of climate change...’”



OHIO, YOUNGSTOWN

A video produced by the Islamic creationist organization that publishes under the name Harun Yahya was discovered on a recommended tenth-grade science curriculum for the Youngstown public schools. The executive director of teaching and learning told a local paper, “We don’t teach creationism,” explained that the video was included before he was hired, and predicted that the school board would vote to remove it. The incident received international attention, in part because of Harun Yahya’s history of Holocaust denial.

OREGON, PORTLAND

On May 17, 2016, the Portland, Oregon, board of education adopted a resolution on climate change education that called for the elimination of instructional material “that is found to express doubt about the severity of the climate crisis or its root in human activities.” NCSE’s Josh Rosenau offered qualified praise for the decision to the *Los Angeles Times*, praising the board’s concern but adding, “I tend to be a bit leery when a single subject is singled out for any reason.”

TEXAS

Mary Lou Bruner, a candidate for the District 9 seat on the Texas state board of education, was defeated by a wide margin in a May 24, 2016, run-off election, after having received a plurality of the vote in a previous primary election. She revealed a host of bizarre

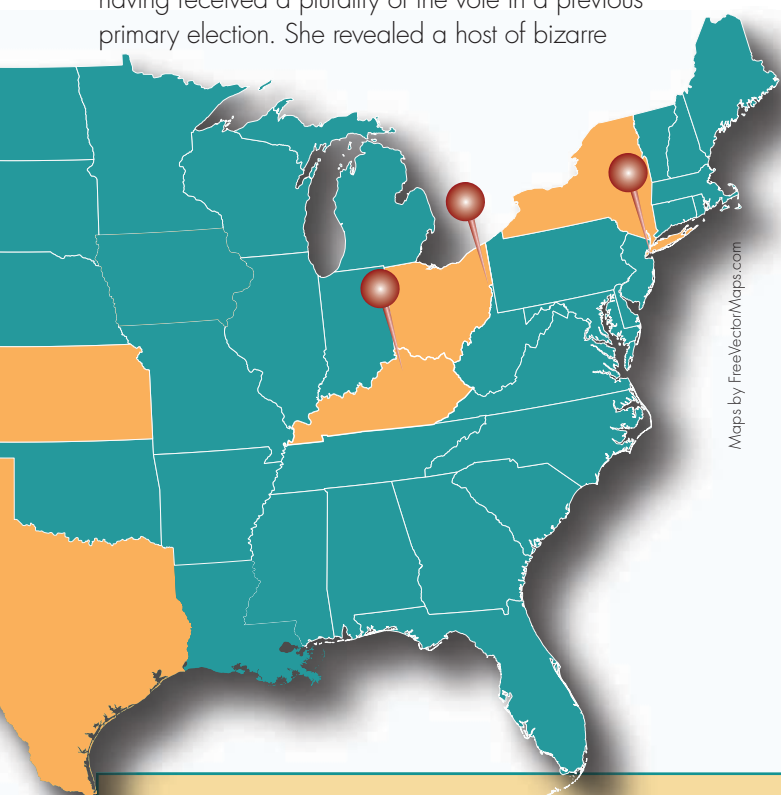
opinions on social media, including climate change denial and young-earth creationism. She was endorsed by former board chair Don McLeroy, who predicted, “I think she’ll be a great asset.”

NATIONAL

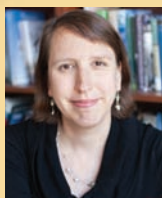
Senate Bill 3074, introduced in the U. S. Senate by Ed Markey (D–Massachusetts) on June 16, 2016, would, if enacted, authorize the National Oceanic and Atmospheric Administration to establish a climate change education program. A similar measure, House Bill 1961, was introduced by Michael Honda (D–California 17) in the U. S. House of Representatives in 2015 and is stalled in committee. NCSE’s Ann Reid praised the bills as trying to help “teachers to present climate change accurately, honestly, and confidently.”

POLAND

According to *Gazeta Wyborcza*, unsolicited copies of a book by Maciej Giertych critical of evolution were sent to the biology teachers in public and private secondary schools across Poland in early 2016. Polish scientists have asked the ministry of education to inform schools that the book is not endorsed by the ministry and to refer teachers to authoritative sources on evolution, which will enable them to rebut the misconceptions and misrepresentations of Giertych’s book. The ministry has yet to respond.



STAFF NEWS



Minda Berbeco

When Minda Berbeco launched NCSEteach in January 2015, we had just 300 educators in our database.

Now we have nearly 6,000. In addition to developing ties to these educators (who come from every state), Minda has also forged connections for NCSE with dozens of climate change education

advocates and kept an eagle eye on state climate change standards and textbooks over her four-year tenure. This fall, Minda is leaving NCSE to become director of the Sierra Club’s San Francisco Bay chapter, and we wish her all the best in her new position! Filling in for Minda to keep NCSEteach running will be Claire Adrian-Tucci, who has been working with Emily Schoerning and the Iowa City Science Booster Club, where she has earned Emily’s



Claire Adrian-Tucci

endorsement: “Claire’s excellent organizational skills, her ability to connect with people on a warm and human level, and her persistence in problem-solving will make her a valuable contributor to our work at NCSE.” Please join us in welcoming Claire to the NCSE staff, and expect to see updates from her in the near future.

—ANN REID



news from the teacher network

Teachers on a Mission ... and a Raft

Did you ever wish your favorite science teacher would volunteer for the dunk tank? A splash of punishment for all those Punnett squares? A pitch for every Petri dish? You aren't alone, and luckily NCSE has found a steady supply of teachers volunteering for the biggest, muddiest dunk tank imaginable: rafting the Grand Canyon.

Every summer since 1999, NCSE has run a chartered raft trip down the river for members and friends. For the last few years, we have had the pleasure of guiding the rafters over their eight-day journey. Along the way, we dash through rapids, hike to Native American ruins, immerse ourselves in the deep history of life and our planet, and lay hands on the Great Unconformity, occasionally engaging in some lighthearted exploration of creationist accounts of that same geology.

Thanks to the generosity of NCSE members, we have been able to offer two teacher scholarships for the second time this summer. It was our pleasure once again to read through dozens of inspiring and worthy applications on our way to winnowing the stack down to those of the lucky rafters: Brandon Haught, who teaches biology and environmental science in Orange City, Florida, and Crystal Davis, who teaches biology, environmental science, and anatomy and physiology in Hawthorne, California.

Both Haught and Davis are exceptional teachers, and came to the Canyon with experience overcoming the full gamut of challenges facing science education. Haught was a leader in the grassroots Florida Citizens for Science before becoming a teacher, battling creationist science standards and legislation and fighting for accurate standards and textbooks. His experience in those battles led him to write a history of creationism in Florida, and to take courses to shift from his media work for a sheriff's department to become a science teacher.

Many of Davis's low-income students—7 in 10—have never been even to the nearby beaches of Los Angeles, let alone a national park. "Many students do not even go to the park because their parents do not believe it to be safe for them to play there," she explained in her application. So she developed a field trip-intensive class that would expose her students to the natural world around them.



Scholarship winners Brandon Haught and Crystal Davis pose after hiking up a 180-meter cliff to Ancestral Puebloan granaries. Our boats are (barely) visible on the river by Haught's elbow.

Photo: Joshua Rosenau

Like all of our rafters, Haught and Davis discovered something new in the canyon. It was a quartz geode, her namesake crystal, that caught Davis's eye, glinting from a cracked stone next to our hiking path. In the tamarisk flanking the river, Haught saw reminders of invasive species in his home state, and lessons in the perils of asking science to give definitive answers to policy questions. The teachers were also struck by the river's constant changes. From Flagstaff, where the bus picks us up, to the point where the boats pull out, we move from evergreen forests to desert, watching new plants emerge by the river as we move from the cold Great Basin desert into the Sonoran desert. They saw how dramatic desert rainstorms turn into ephemeral streams of mud, slowly carving out the river's side canyons. And they felt sudden changes in temperature as the winds brought cold air down from a shady side canyon or baking air down from the rim. And just when the heat started to get to them, we'd be inundated by a rapid.

The teachers also came away with new friends and allies among their fellow rafters. Suddenly they were fast friends with scientists of every stripe—sedimentologists and molecular biologists, physiologists and entomologists, aquatic ecologists and oceanographers—not to mention other teachers from across the country, a network of experts to draw on in their classrooms.

In interviews after the trip, both teachers independently mentioned that the trip deepened their commitment to getting kids out of classrooms to experience science. Haught observed, when we chatted after the trip, students often

Spotlight on Graduate Students

NCSE has rolled out a new initiative to offer free memberships to graduate students, whom we see as invaluable collaborators and ambassadors, and necessary to furthering the causes NCSE



Laura Bankers and one of the campers at the first-ever Booster Club science camp, July 2016. Photo: Reagan Boese

fight for every day. Based on my brief exchange with NCSE intern and University of Iowa graduate student Laura Bankers, it's clear she agrees.

Why is NCSE important to you?

As part of NCSE, I feel that I am helping to make real, measurable differences in how people in my

community feel about science, how they perceive scientists, and increasing public interest in science education. NCSE has influenced how I teach evolution and think about how best to get my message across to the students in the classes that I help to teach and the people I encounter while doing science outreach.

Why do you think it's important for graduate students to know about NCSE and its work?

As scientists, we are likely to encounter people who are resistant to or uncomfortable with certain aspects of science (such as climate change and evolution) or mistrusting of scientists themselves. NCSE has incredible resources to help us effectively navigate such encounters and turn them into educational opportunities. NCSE is also a great resource for graduate student teaching fellows who may find themselves addressing resistance and doubt in the classroom.

So should all graduate students accept our offer of a free membership?

Of course!

You heard her! To sign up, visit NCSE.com/freegrad.

—STEPHANIE KEEP

"expect science to be hands on and fun, but all too often, the experience is dry, and the focus is on getting ready for tests. So what I'm hoping to change the way that I'm teaching and incorporate knowledge that I got from being in the field and doing stuff, and bringing it into the classroom." Davis noted that students "can't protect anything that they haven't seen. They have to understand it and how it works to want to protect it." But since so few of her students have visited a local part let along a national park, she is worried that they will never fully understand the importance of conservation on a large scale. "And that's really sad because they're the ones who need to protect places like this," she lamented. But thanks to the trip, her commitment to get her students out of the classroom and into nature, she says, has been renewed.

NCSE's Grand Canyon scholarship gave these teachers a chance to explore one of the great marvels of our natural world, and to bring that experience back to their students and their fellow teachers. Both Davis and Haught have com-

mitted to developing a lesson plan based on their experiences (a condition of the scholarship), and these will be made available on NCSE's website for other teachers to use.

It's a start, but we hope to do more. As Haught observed: "But we're only two teachers out of how many thousands and thousands of teachers out there who could benefit from an experience like this? I would encourage NCSE at minimum to keep this going, and if there's any way at all to somehow expand the program ... do it."

You can be part of this expansion by donating to NCSE's Grand Canyon teacher scholarship. Or join our next trip, June 30–July 7, 2017, and meet the next round of scholarship winners (details at ncse.com/about/excursions/gcfaq).

Josh Rosenau and **Steve Newton** are both Programs and Policy Directors at NCSE. They have led the NCSE Grand Canyon trip together for the last three years. rosenau@ncse.com





news from the booster clubs

Summer Success and Autumn Growth with the Science Booster Clubs

We've been making this summer count with the Science Booster Clubs. NCSE's first-ever summer camp was a big success, and we had an incredible time at the Iowa State Fair! We made contact with thousands of people, did valuable survey work, and planted the seeds for a statewide expansion of the project.

Creationist Campers?

This summer, the Science Booster Club Project was awarded enough grant money from local funders to put on a completely free, week-long summer day camp for fifty rural, low-income students going into fifth and sixth grades. Our partners, including Integrated DNA Technologies, the ACT Corporation, and the European Society for Evolutionary Biology, were so generous that in addition to tuition, we were able to provide our campers supplies and good, healthy lunches and snacks at no cost. The camp was a really fun opportunity for everybody involved, but more importantly it gave kids a place to learn and talk about evolution.

About ten percent of our campers expressed creationist views when we asked them to write a journal entry about evolution on the first day of camp. Our staff worked hard to create an environment in which kids felt included and able to express themselves, but we refused to compromise on the science. Using our strategy of encouraging questions and prioritizing respectful listening over engagement really worked. By the last day of camp, there was no evidence of creationist views in the children's journal-



Our campers! Photo: Emily Schoening

ing exercises. Get the whole story on the blog! ("NCSE Runs a Camp," parts 1–5, can be found at <https://ncse.com/blog>.)

The Science Booster Clubs' friendly, open approach helps to change people's minds by showing them science is not something done by others and then forced upon everyone else—science is done by everyone and for everyone. In this way, we make people feel like insiders to the scientific world.

Iowa State Fair: Nothing Compared!



NCSE interns Jorge Moreno and Laura Bankers engaging with visitors to the NCSE/Ulowa booth. Photo: Emily Schoening

We worked hard to refine our "insider" approach at the Iowa State Fair where we exhibited all day on August 19, 2016, with our partner organization, the University of Iowa. Tiffany Adrain, the paleontologist who curates the famous Ulowa fossil collection, worked with us to develop a dynamite exhibit: *The Evolution of Iowa*. It featured images of Iowa ecosystems throughout geologic time alongside exquisite fossils found in Iowa. By emphasizing the rich history of our state, and how all of Iowa has contributed to our understanding of our rich geologic and evolutionary history, we were able to help hundreds of people who were leery of evolution instead feel included, invested, and interested in evolution.

We made contact with an uncountable number of people. Over 100,000 people visited the Iowa State Fair the day we were exhibiting. We weren't able to personally engage with everyone who came by, but we definitely spoke with thousands of visitors, many of whom filled out

We made contact with an uncountable number of people. Over 100,000 people visited the Iowa State Fair the day we were exhibiting. We weren't able to personally engage with everyone who came by, but we definitely spoke with thousands of visitors, many of whom filled out

DINNER PARTY 101:

Thanksgiving Edition



© Paula Spence

our short survey on evidence and belief and picked up information on how to start Science Booster Clubs in their own communities.

Exhibiting at the Iowa State Fair gave us another important opportunity: seeing what we're up against. Nearby in the exhibition hall was a large, obviously well-funded, creationist display. This collaboration between the United Southern Baptists and Answers in Genesis provided the public with a shocking degree of misinformation. The individuals staffing the exhibit were ready and willing to provide absolutely bonkers, completely factually false points about everything from basic chemistry to the fundamentals of genetics.

I'm pleased to report that our booth attracted much denser crowds throughout the day—and we weren't even passing out fake million dollar bills. People want access to actual science. If we hadn't been there, I'm sad to say that no one else was there to stand up for science. With funding tight everywhere, the Science Booster Clubs can provide an essential voice for science in the public eye.

Autumn Planting, Spring Harvest

This autumn, we're planting seeds for Science Booster Clubs all over the state of Iowa by helping interested individuals start organizing clubs in their communities. Our handbook is ready to help everyone get started to see how they can make a difference where they live. Independent clubs are already springing up outside of Iowa, with NCSE member Brad Hoot in Tennessee beginning to organize the first Science Booster Club in his state. If he can do it in Tennessee, you can do it where you live!

As we've grown in Iowa, we've encountered less controversy and less pushback than anyone could have guessed. People are excited about opportunities to learn about science in public, engaging environments. I look forward to seeing what new connections I will make this fall. If you want to help out, please get in touch!

Emily Schoernig is the NCSE Director of Community Organizing and Research. schoernig@ncse.com



Ah, Thanksgiving. Every year, we hear from people dreading the arguments and acrimony that get in the way of serious overeating. Do you have a relative who rejects evolution or climate change? Relax, Dinner Party 101 is here to help.

If you're an NCSE member, you already know that most people who reject evolution or climate change are not stupid, or even, necessarily, ignorant. Instead, the implications of climate change or evolution come into such sharp conflict with their most deeply held values that they feel they have to choose: God or evolution? Liberty or climate change? And given those choices, the science loses.

To help ensure your stuffing is free of stress, and your turkey served without trouble, I give you some guidelines of engagement (much abbreviated here) laid out by NCSE program director Josh Rosenau last year on the NCSE blog:

1. **Ask questions and listen respectfully.** Empathy will help you address concerns without triggering anger or fear.
2. **Be personal.** In talking to a climate change denier, start by explaining the evidence you find most compelling. If you decide to debunk some claim, keep it on that personal level: "I thought about that, too, but then I learned that..."
3. **Come at the science sideways.** Ask if people realize that the Thanksgiving dinner has a giant dinosaur at its core. If people take the bait, you've got a chance to talk about some of the evidence for evolution.
4. **Don't try to "win."** The goal is to make a crack in the wall by demonstrating how people like you and people like them can talk productively and without animosity.
5. **Remember your audience.** Just because you don't convince the person vociferously denying science doesn't mean you won't reach someone sitting quietly nearby. And you're setting an example for other folks at the table who agree with you.

Congratulations, you did it. You had a civil conversation about science with someone you disagree with. Have another piece of pie; you deserve it!

—ANN REID



THE RNCSE REVIEW

How to Change Minds About Our Changing Climate

authors: Seth B. Darling and Douglas L. Sisterson

publisher: The Experiment, 2014

reviewed by Kim Trenbath

How to Change Minds About Our Changing Climate offers the reader a synopsis of climate science, highlighting the major drivers of climate change, emphasizing the scientific consensus, and describing the areas of most active research. What makes it distinctive is that its authors are explicitly offering not only the facts but advice about how to communicate them effectively.

Darling and Sisterson are both scientists committed to communicating the facts for the greater good. As researchers at a national laboratory, they are accustomed to ensuring that scientific explanations are backed by rigorous analysis, but they know that facts and data alone are not sufficient if your hope is to address climate doubt and denial. The book therefore not only directly addresses incorrect claims about climate change, but also presents scientific evidence why such claims are invalid.

To make the book engaging, a main character is a hypothetical fellow—Brad—who uses many unscientific arguments in his attempt to argue that the scientific consensus on climate change is bogus. His arguments progress from “climate

change isn't happening” through “it's not caused by humans” to “okay, it is; but there is nothing we can do about it.” Brad deploys familiar unscientific statements, such as climate change is caused by natural phenomena (e.g., solar

How to Change Minds About Our Changing Climate ... is perfect for providing individuals who are new to the combative nature of the field with brief and succinct descriptions that debunk the arguments of doubters and deniers.

variations or Earth's orbital changes), climate is too complex to model or predict, and Earth is entering an ice age so global warming does not matter. Darling and Sisterson address each of these, and more. In so doing, they explain the evidence for human activity's influence on the climate, how scientists are able to develop and rigorously test models of Earth's processes, and that the next ice age isn't expected for another 18,000 years. Through the lens of these climate arguments, the reader will learn basic principles of climate science and general points of Earth science, including the greenhouse effect, paleoclimate, extreme weather, climate feedbacks, and phenomena such as volcanoes and El Niño.

How to Change Minds About Our Changing Climate will help readers to converse with others about climate change, address climate doubters and deniers, and increase their general knowledge. It is perfect for anyone who wants a basic understanding of the science behind climate change, although those with little science background may find some parts too technical and difficult to understand. Because climate science involves multiple scientific disciplines, even simplified explanations will tend to involve thinking through scientific principles from a variety of fields. For those interested in understanding why climate skeptics' arguments are incorrect, the brief and succinct descriptions that debunk the arguments will be a highlight.

The book also provides opportunities for educators. High school teachers and college professors will find the book helpful for their own reading and even as a supplemental text in their classrooms. Darling and Sistrone help teachers plan their instruction by highlighting the major points of the science and addressing common inaccurate ideas. Teachers can select a theme such as ocean acidification, pseudoscience, or the greenhouse effect, and design lessons around the theme using the book's supporting content. One caveat is that while assigning readings to students directly might help them to overcome their inaccurate ideas about climate change, it'd be unfair to expect students to learn the details

of climate science as a result of reading the book, since, again, it just highlights the main scientific points.

I recommend *How to Change Minds About Our Changing Climate* to readers who are interested in learning the basics of climate change, those who want to understand and resist the arguments of doubters and deniers, and to those who need a big-picture view of climate change to understand how all aspects of the science fit together.

Kim Trenbath earned her Ph.D. in Atmospheric and Oceanic Science at the University of Colorado. She now works at the National Renewable Energy Laboratory. c/o_editor@ncse.com



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BEST OF THE BLOG

ncse.com/blog



The NCSE blog covers everything from history and politics to popular science and common misconceptions about evolution and climate change. Here are a few highlights from the last quarter.

- Science denial and gun violence? In **Science Denial Kills**, Josh Rosenau reveals the chilling connection. [<http://bit.ly/2baeCKi>]
- **America's Unwillingness to Accept Evolution En Masse is ... Complicated.** Stephanie Keep and five other experts in evolution education talk about the roots of evolution denial. [<http://bit.ly/2aXdDcA>]
- **Polar Bears on the Ark?** And how do you keep them cool in San Diego? Minda Berbeco knows. [<http://bit.ly/2aXcG44>]
- Can science education heal our economy and produce better-prepared workers? Steve Newton dissects **Science Education, Millennial Workers, and the Mad Skillz Gap**. [<http://bit.ly/2b26EBs>]
- It's been unfairly saddled with a checkered history, but **The Peppered Moth** is the real evolutionary deal, says Stephanie Keep. "We know the gene responsible for determining peppered moth color ... but how did it come to be?" [<http://bit.ly/2boIqRe>]
- If you're dealing with science deniers, our Emily Schoerning knows **How to Engage Without Arguing**. [<http://bit.ly/2boMLnD>]
- **Statistical Testing of Common Ancestry: Something To Be Embarrassed About?** Biologist David Baum confronts an unexpected sociological issue. [<http://bit.ly/2b29syC>]
- **Kind of Well Said ... At Least in Places: The Washington Post on Apes and Humans.** Stephanie Keep challenges the press to get the science right! [<http://bit.ly/2bc35tf>]
- Where do we come from and why should we care? Evolutionary anthropologist Lauren Saville on the **Importance of Teaching Human Evolution**. [<http://bit.ly/29Z3rQK>]
- **Basic Science Saves Lives?** Oh yes, says Ann Reid. "Curiosity-driven science can have surprisingly practical applications—like stopping Zika!" [<http://bit.ly/2bykaPV>]

—ROBERT LUHN

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