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IMAGE CREDITS
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Robert Stephens photo: Sena Havasy
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Dear NCSE members,

I *guess* it would be okay if every student left high school accepting the scientific consensus about both evolution and climate change. I mean, I wouldn't complain. But wouldn't it be better if every student left high school having dug deeply into the evidence for climate change and evolution and not only "accepted" the science but had personally experienced the "aha!" of discovery—that moment when evidence falls into place and the world suddenly makes more sense? Wouldn't that be cool?

And while we're at it, why not give that experience not just to students but also to the millions of people who are currently distrustful of, alienated from, or indifferent to science? Now we're talking!

That's the big dream that we have at NCSE. We believe passionately that the thrill and power of science belongs to everyone, not just scientists. Everyone should know they can "science" just like they know they can read and write. It's a way to observe the world, ask questions, share information, and reach conclusions that no one should pretend can only be practiced by professionals.

Sharing the thrill of science also means standing up for its rules and values. Science requires rigor, integrity, and a ruthless determination to challenge one's own assumptions and biases. It's like any other pursuit—you don't get to win a basketball game if you're double-dribbling, you won't make it to Carnegie Hall without mastering your scales and arpeggios, and you don't get to participate in science without learning and respecting the difference between legitimate examination of and debate about the evidence and illegitimate cherry-picking of evidence that supports your preconceived notion.

And that's why NCSE's issues—evolution and climate change—are such perfect vehicles for introducing people to the both the joy and power of science. First of all, both topics are tremendously relatable and engaging. *Where did I come from?* and *Where is our planet going?* are some of the biggest questions out there and evolution and climate science help to answer them. (Nothing against the periodic table, but it's hard to get people fired up about it.) Second, there is a vast pool of evidence, from multiple lines of inquiry, on which you can draw and use to engage with anyone, of any age, anywhere. And finally, because the topics are (unfortunately) so societally controversial, few people reach their teenage years without having formed an opinion about them, often a passionate one.

Your support makes all our work possible. Here's hoping that you experience an "aha!" moment today. With your help, we will continue to strive to make that experience a universal one.

Gratefully,

Ann Reid is the executive director of NCSE.
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Trust Me, I'm A Scientist:

BRIDGING THE SCIENCE COMMUNICATION GAP

by Katherine Wu

Wu participating in her first science storytelling show with the Story Collider at Brain Week Rhode Island in March 2018.
Photo: Chris Anderson, AS220

Improving science communication is more urgent than ever. Politics has increasingly invaded the discourse of science, and public trust of scientists and their work is uncharacteristically low in a few key areas. This has no doubt contributed to the significant gaps between scientists and non-scientists regarding many important scientific issues. According to the Pew Research Center, 98% of scientists agree with the statement "humans have evolved over time" whereas only 65% of the general public agrees. When it comes to climate change, 87% of scientists (and 97% of climate scientists) acknowledge the phenomenon and its human-driven causes, while only 50% of the general public shares these views. The existence of these all-too-wide gaps probably isn't news to you, but it should still alarm you.

We will come back to those dispiriting gaps, but I want to begin by focusing on the phrase, "general public." I first consciously divorced myself from "the general public" when I came to graduate school and began the noble pursuit of Science with a capital S. As I entered the hallowed halls of academia, I felt as though I had transitioned out of the common masses and joined the ranks of the fabled Jedi. That assumption certainly wasn't my first mistake in life—but it was one of my greatest.

The minute I started "othering" the general public, I compromised my ability to be an effective science communicator. When scientists are juxtaposed against "the general public," it implies that the two are separate, mutually exclusive entities. This attitude, held by people that identify with either group, makes scientists and non-scientists feel culturally inaccessible to each other. But of course scientists are, just like everyone else, a subset of the general public. My lack of expertise in millions of topics from parenting to art history to physics makes me a member of the general public far more often than I am an expert.

So how do we overcome this perceived gap between scientists and the public? By disabusing ourselves of three key assumptions, each of them false.

FALSE ASSUMPTION #1: The gap between scientists and non-scientists is about knowledge.

Yes, scientists are experts on scientific issues. But if the divergence between scientists and the general public with regard to evolution were just about knowledge, or a deficit thereof, then it would be hard to understand why scientists (with the aid of science teachers) haven't made more progress in closing the gap since the Scopes era. Clearly there's more to the equation. The rift between scientists and the general public is not just about knowledge. It's also about trust. Unfortunately, history has given the public several reasons to doubt the correlation between science and progress. A few notable examples include the eugenics movement, fraudulent claims publicized by tobacco companies, and the baseless work on vaccine safety put forth by Andrew Wakefield.

Compounding this issue is the fact that most scientists are trained to talk only to other scientists. As we ascend through the ranks of academia, we acquire skill sets and

vocabularies that allow us to specialize, and the category of "other scientists" with whom we can communicate dwindles until it consists of only those in our typically very narrow subfield.

If we hope to communicate beyond these limited circles, we need to acknowledge that communication occurs most effectively when we're listening to someone we're already inclined to believe, whether that's because we share a political party or a religious view or even a certain ethnicity. We listen to people who look like us, act like us, and feel like us.

The moral for scientists seeking to communicate with the public is clear. We can flood people with scientific facts, but they may still struggle to understand, or even misinterpret those facts, if we don't pay attention to how we present the information. If we fail to acknowledge people's core beliefs when we tell them they are wrong, they feel as though we are attacking not just their knowledge base but also the values they hold most dear. We must learn to be respectful of and receptive to the perspectives and concerns of the general public, for we can spew out all the facts we want, but none of it will do any good if no one is willing to listen.

FALSE ASSUMPTION #2:
There is finality and certainty in science.

Scientists often assume that having "normal" conversations requires us to speak in oversimplified terms or, worse, absolutes. On the one hand, there are facts for which so much evidence exists that we consider them incontrovertible: the idea that life evolves, for instance, or the link between increasing accumulation of greenhouse gases in our atmosphere and human industrialization. However, science is not composed only of such clear truths: it's a spectrum in which the strength of the conclusion is directly proportional to the strength of the evidence behind it. Accordingly, the process of science is almost never clear-cut or final—all data requires interpretation, which is subject to bias, and all results are preliminary. But hypotheses and tentative conclusions don't make for good headlines.

When I earn my PhD, I might be able to say, "We think we may have come across something that explains a miniscule portion of a complex pathway that might be correlated with a slightly elevated risk of contracting this disease—but our findings are pretty specific to this one population studied at this point in time under these conditions." Meanwhile, headlines from even reputable media sources are more along the lines of, "Smelling farts might prevent cancer!"

We can't compete with sensationalized headlines, but with some work, we can reduce their allure.

It's hard for science to compete with sensationalized misinformation. And in the shadow of such misleading science "news," I'm often sorely tempted to overstate the implications of my own results. But doing so is a slippery slope, and even the slightest exaggeration can spin out of control. The way to combat the misrepresentation of science is not to fight fire with fire. Instead, scientists should publicize their methods in addition to their results. Rather than using misleading adjectives and phrasing to describe my work, I take the time to explain to friends outside the lab how I collected my data and why it's important. Rebuilding rapport between scientists and non-scientists means opening new lines of communication and increasing transparency about not only the conclusions we come to, but also how we arrive at them—and the inevitable errors and stumbling blocks we encounter on the way. The ability of science to question, revise, and self-correct is not a liability, but an asset to be celebrated.

FALSE ASSUMPTION #3:
Effective communication is easy.

The journalist William H. Whyte once said, "The single biggest problem in communication is the illusion that it has taken place." As scientists, we often assume that once we put information out there, our job is done (or worse, that communication is still occurring in our absence). But this isn't the case. Science is conducted for the greater good of the community—so why aren't we engaging with the beneficiaries of our work?

The problem is painfully obvious when we consider how scientists are educated in this country. In graduate school, students are trained to be scientists—at least, where the definition of "scientist" encompasses handling data and interpreting and producing scientific literature. But not much attention is given to the responsibility to engage with the public. In my own case, for example, except for extracurricular activities I independently pursued, I received no formal training in science communication or education. Given that science has now become embroiled in political controversy, this is a mas-

sive oversight. As we continue to train new generations of scientists in this way, the gap between science and society simply widens further.

There is no point to doing science if it can't be shared with others. Yes, scientists already publish their data and encourage other scientists to replicate, criticize, and build upon their work. But most scientific articles remain quarantined behind a paywall; even when accessed, they are cluttered with field-specific jargon and technical details that create headaches for even our colleagues. We should not consider communication accomplished upon publication, because we have not yet reached the most important audience of all. Going forward, graduate and professional science programs should include more comprehensive training in outreach and public engagement. The job of a scientist certainly involves acquiring information, but it also involves disseminating that information beyond our labs and even beyond our field. If we ignore or skimp on the latter task, the potential impact of the former will be diminished and we will have failed at half our job.

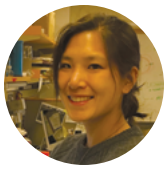
The ability of science to question, revise, and self-correct is not a liability, but an asset to be celebrated.

THE BIG PICTURE

I chose a career in science because it was the only profession that would allow me to be a student for the rest of my life—to continually have my beliefs challenged and my perspectives widened. Eventually, I realized that becoming a scientist wasn't about leaving the general public behind—it was about learning a new way of communicating with those around me. Issues like climate change don't affect only scientists, and scientists cannot achieve progress alone.

As a scientist, I am determined to remain grounded in the world I systematically examine, stop "othering," and remain an engaged member of society. My work in the lab may or may not generate tangible benefits in my lifetime, but the greater cause I pursue is every bit as real: giving science the accessibility it deserves.

Katherine Wu is a fourth-year graduate student at Harvard University, studying infectious disease, and a 2018 AAAS Mass Media Fellow at *Smithsonian* magazine. From 2016 to 2018, she served as co-director of the science communication organization Science in the News. wu.katherine.j@gmail.com



WHAT WE'RE UP AGAINST

Creationists in the Galápagos

A center for creationist research is about to begin construction on the island of Santa Cruz, one of the largest and most populous of the islands in the Galápagos archipelago. According to a report from the Adventist News Network, in addition to research facilities, administrative space, and a headquarters for the Central Adventist Church, the center will also have a display "to explain the creationist model to visitors." The island attracts about nine hundred visitors daily, about fifteen percent of whom are particularly interested in science, according to the island's vice mayor. The report commented, "This is the kind of public that Church leaders want to attract with the Creation Center, ironically placed on Charles Darwin Avenue, a symbolic route through which the famous naturalist who systematized the evolutionary theory passed in 1835." Santa Cruz is also the home to the Charles Darwin Foundation, founded in 1959, and its main research station.

Photo: Elizabeth Crapo, National Oceanic and Atmospheric Administration/Department of Commerce

—GLENN BRANCH

2018 Friend of Darwin and Friend of the Planet Awards

NCSE is pleased to announce the winners of the Friend of Darwin Award for 2018:

Tiffany Adrain, the collections manager at the University of Iowa Paleontology Repository and a supporter of NCSE's Science Booster Clubs in Iowa, and **Robert Stephens,** a cell and molecular biologist who proposed the idea of Darwin Day in 1993 and cofounded the Darwin Day Program to coordinate and encourage the celebrations of the great naturalist's life and work.

"The continued vitality of Darwin Day celebrations across the country—and around the world—is in large part due to Bob Stephens's success in establishing the Darwin Day program," commented NCSE's executive director Ann Reid, "while it would be hard to overstate how generous Tiffany Adrain was, both with her time and with the specimens that she curates, to the then-fledgling Science Booster Clubs that NCSE piloted in eastern Iowa."

NCSE is also pleased to announce the winners of the Friend of the Planet award for 2018:

CLIMATE CENTRAL

Climate Central, a group of scientists and journalists providing a reliable and accurate source of information about climate change, especially through its website and its book *Global Weirdness* (2013), and **Kerry Emanuel,** Professor of Atmospheric Science at the Massachusetts Institute of Technology and the author of *What We Know About Climate Change* (2007).

"Kerry Emanuel is not only a pre-eminent climate scientist but also a highly skilled climate communicator," Reid explained. "As his colleague Ben Santer says, when Emanuel speaks about human effects on climate, people listen." She added, "Likewise, Climate Central's efforts to translate the complexities of scientific research on climate change into plain English for a general public have been both indefatigable and invaluable: a true model of science communication."

The Friend of Darwin and Friend of the Planet awards are presented annually to a select few whose efforts to support NCSE and advance its goal of defending the teaching of evolution and climate science have been truly outstanding. Previous recipients of the Friend of Darwin award include Brian Alters, Brandon Haught, Ronald L. Numbers, and Judy Scotchmoor. Previous recipients of the Friend of the Planet Award include Michael E. Mann, Naomi Oreskes, and Skeptical Science.

PLACE & TIME
The Cardiff Giant

The Cardiff Giant was a carving 3.2-meters long with a mass of 1350 kilograms (ten feet; 2,990 pounds). It was conceived of and commissioned by New York tobacconist George Hull in 1868. Hull buried the statue behind the barn of his cousin William "Stub" Newell outside Cardiff, New York, and on October 16, 1869, Henry Nichols and Gideon Emmons "discovered" it while digging a well.

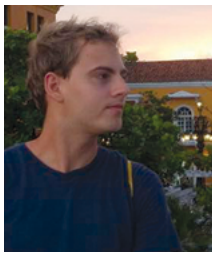
Public reactions were mixed. Some simply thought the carving was an ancient statue, but others speculated that it was the petrified remains of a man belonging to an extinct species of giant humans that once roamed upper New York. Some biblical literalists claimed that it confirmed the claim in Genesis 6:4 that "there were giants in the Earth in those days."

A Syracuse newspaper hailed the gypsum giant as "Taller than Goliath whom David Slew," and Hull and Newell set up a small museum that charged visitors 25 cents (raised to 50 cents two days later) to see the giant. Although the paleontologist O. C. Marsh denounced the giant as "remarkable—a remarkable fake," more than 2,300 people came to see it during the first week of public disply, and far more came afterward.

The Cardiff Giant, "America's Greatest Hoax," near its site of excavation in Cardiff, New York.
Photo: Wikimedia Commons

news from the **membership**

Kenneth R. Miller, president of NCSE's board of directors and professor of biology at Brown University, was featured in a ten-minute documentary about current threats to evolution education, produced by Retro Report and hosted at *The New York Times* at https://nyti.ms/2LagYJ1. Also appearing was activist **Zack Kopplin,** a recipient of NCSE's Friend of Darwin award for his work toward repealing the so-called Louisiana Science Education Act of 2008. In the documentary, Miller discussed the Louisiana law's attempt to circumvent the case law on the teaching of creationism, observing, "the First Amendment protects you against imposition of religious ideas in the public schools—it doesn't protect you against the introduction of stupid ideas." He expressed concern that Louisiana's students are learning "the scientific method and the scientific community [are] not to be trusted."



Described as an "award-winning scholar and champion of science," NCSE's founding executive director **Eugenie C. Scott** received an honorary degree from Transylvania University in Lexington, Kentucky. The honor was bestowed at the university's Academic Convocation on September 15, 2017. Scott delivered an address on the importance of a liberal arts education, using the *Kitzmiller v. Dover* trial of 2005 as a source of examples and anecdotes. The honorary degree was Scott's tenth. She was previously honored with honorary degrees from McGill University in 2003, the Ohio State University in 2005, Mount Holyoke College and the University of Wisconsin, Milwaukee, in 2006; Rutgers University in 2007; the University of New Mexico in 2008, the University of Missouri, Columbia, and Colorado College in 2010; and Chapman University in 2013.

NCSE is pleased to congratulate **Bertha Vazquez** on receiving the Evolution Education Award for 2017 from the National Association of Biology Teachers. Vazquez received the award at the NABT's recent conference in St. Louis, Missouri. The NABT award, sponsored by BEACON and BSCS, "recognizes innovative classroom teachers and their efforts to promote the accurate understanding of biological evolution with the larger community." A member of NCSE and a guest contributor to NCSE's blog, Vazquez teaches at G. W. Carver Middle School in Miami. and directs the Richard Dawkins Foundation's Teacher Institute for Evolutionary Science.

—GLENN BRANCH

A group of businessmen bought a majority interest in the statue for $37,500 and moved it to Syracuse, where it was displayed even more prominently. Special trains brought visitors to see the giant, and showman P. T. Barnum offered $50,000 to lease the giant for 90 days. When Hull refused Barnum's offer, Barnum made an unauthorized copy of the giant that he displayed in Brooklyn, telling people that his was the real giant and that the Cardiff Giant was the hoax. Hull then sued Barnum, and reporters began to investigate.

In Iowa, they discovered Hull's purchase of a five-ton piece of gypsum, and in Chicago they found the giant's sculptors. When both giants appeared in the same town, Hull confessed that his giant was fake, which cleared Barnum of forgery (after all, he could not be prosecuted for showing a fake of a fake). By the time the giants were revealed as fakes, Hull and Newell made more than $30,000 from their fraud, and Barnum more than $150,000 from his. It was not clear whether Hull intended to use the giant to cheat people out of money or, as he later claimed, to expose theologians who insisted on the literal truth of the Bible.

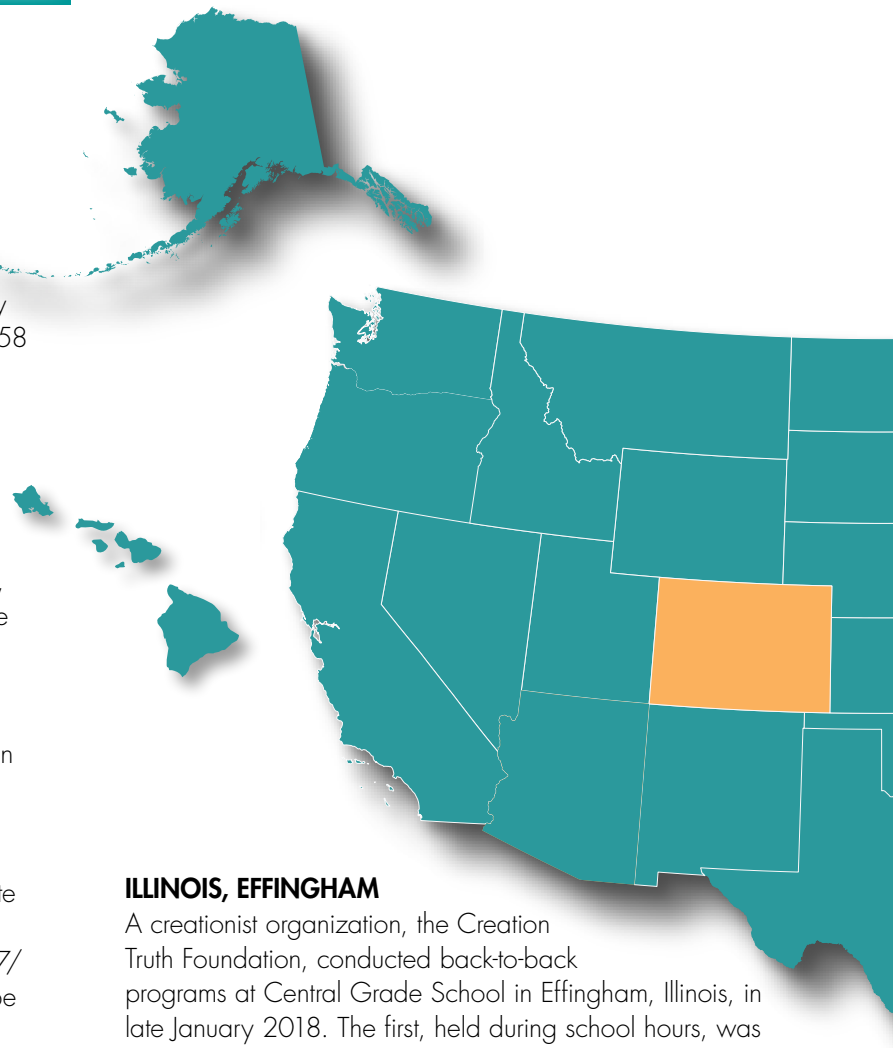
Hull's giant eventually ended up in Des Moines, Iowa, after which the New York Historical Association purchased it for $30,000. Today, the Cardiff Giant is displayed as "America's Greatest Hoax" at the Farmers' Museum in Cooperstown, New York, not far from the National Baseball Hall of Fame and Museum. Barnum's replica of Hull's hoax is displayed—along with hundreds of curious coin-operated machines—at Marvin's Marvelous Mechanical Museum just outside of Detroit.

Randy Moore is the H. T. Morse– Alumni Professor of Biology at the University of Minnesota, Twin Cities. His most recent book is *The Grand Canyon: An Encyclopedia of Geography, History, and Culture,* coauthored with Kara Felicia Witt (ABC-CLIO, 2018). Rmoore@umn.edu

UPDATES

ncse.com/updates

Are there threats to effective science education near you? Do you have a story of success or cause for celebration to share? E-mail any member of staff or info@ncse.com.



ALABAMA

Alabama's House Bill 258, introduced in January 2018, would have allowed teachers to present "the theory of creation as presented in the Bible" in any class discussing evolution. Creationist students would not be penalized for answering examination questions in a way reflecting their adherence to creationism, "provided the response is correct according to the instruction received." The bill was evidently modeled on a 1976 Kentucky law still on the books. HB 258 died when the legislature adjourned in March 2018.

COLORADO

When a proposed set of new state science standards was presented to the Colorado state board of education in January 2018, one board member objected to the inclusion of climate change. According to Chalkbeat, Steve Durham complained, "You want a scientifically literate citizen that accepts without question your little statement on page 121 here about climate change." The standards, not yet adopted as of May 2018, acknowledge that human activities are "major factors in the current rise in Earth's mean surface temperature."

FLORIDA, CLAY COUNTY

New K–12 science textbooks were approved on a 3–2 vote by the Clay County School Board in early February 2018, amid complaints from "many parents," according to CBS 47/Fox 30. "Some said evolution has flaws, and they should be acknowledged in the classroom. Others said their children should have the opportunity to learn about other theories." The district superintendent reportedly attempted to assuage their concerns by saying that evolution was taught as a scientific theory, not a fact.

LOUISIANA, BOSSIER PARISH

A lawsuit filed in the United States District Court for the Western District of Louisiana on February 7, 2018, *Does 1–4 v. Bossier Parish School Board,* alleges that "school officials throughout the Bossier Parish School System coerce students into religious practices and subject them to unwelcome religious messages and indoctrination." Some teachers "reportedly … prais[e] creationism in class and attempt … to discredit the scientific theory of evolution." The plaintiffs are represented by Americans United for Separation of Church and State.

ILLINOIS, EFFINGHAM

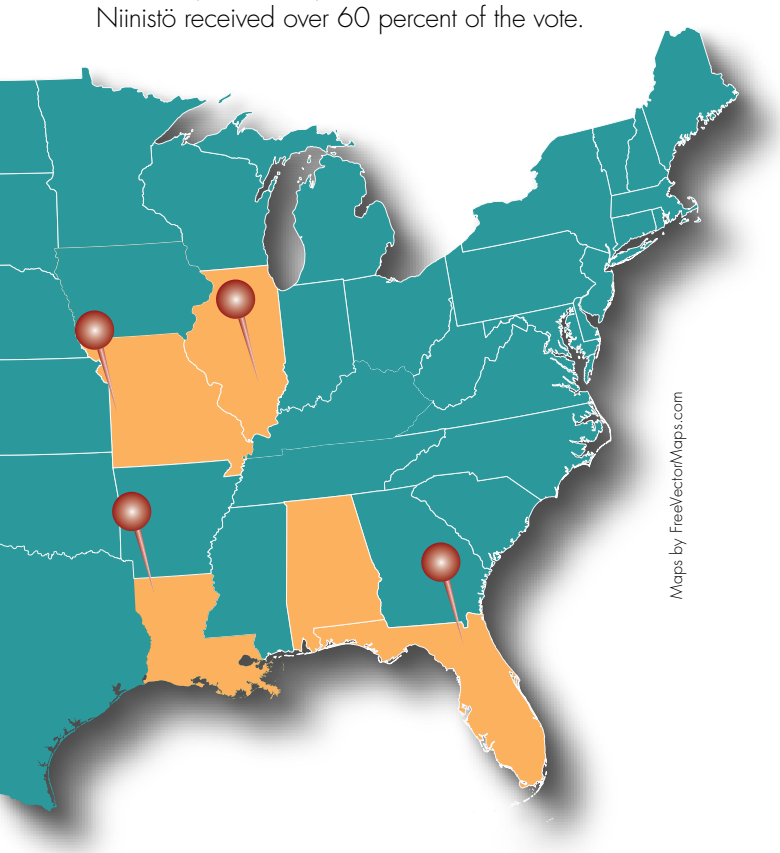
A creationist organization, the Creation Truth Foundation, conducted back-to-back programs at Central Grade School in Effingham, Illinois, in late January 2018. The first, held during school hours, was nominally secular and scientific, but flyers were distributed there advertising the second, which was held at the school on a Saturday and was explicitly religious—a fact reportedly not clear from the flyers. The programs were coordinated by the president of the school board, who is also the pastor of a local church.

MISSOURI, KANSAS CITY

A seventh-grade science teacher at Smith-Hale Middle School in the Hickman Mills C-1 School District was reportedly teaching creationism, including questions intended to cast doubt upon evolution and the scientifically established age of Earth on his examinations, according to the Freedom from Religion Foundation. In a January 2018 reply to a letter from the Foundation, the district superintendent replied that the questions were not aligned with the state science standards "and consequently are not acceptable and will not be utilized in our schools."

FINLAND

In the presidential campaigning culminating in the January 2018 election, Laura Huhtasaari, the populist and nationalist Finns Party candidate for president, was widely alleged to be a creationist. In 2015, she reportedly posted comments on social media rejecting the common ancestry of humans and monkeys, adding, "Even if I did not believe in God, I would not believe in Darwin." She received just over 6 percent of the vote, while incumbent Sauli Niinistö received over 60 percent of the vote.



Maps by FreeVectorMaps.com

INDIA

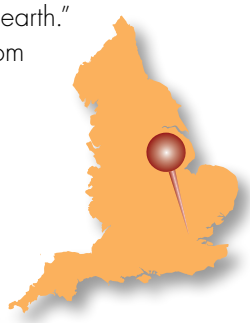
Controversy ensued in January 2018 after Satyapal Singh, the Minister of State for Human Resource Development, described the theory of evolution as "scientifically wrong," at least as applied to humans, in a public address, and urged its removal from science curricula. The national secretary of the ruling Bharatiya Janata Party, Ram Madhav, subsequently endorsed his views—and provided links to the "intelligent design"–promoting Discovery Institute's website—on Twitter, while scientists and scientific organizations across the country expressed their opposition.

TURKEY

Adnan Oktar, who runs the Islamic creationist organization that publishes antievolution screeds under the name Harun Yahya, was "slammed" by the head of Turkey's Directorate of Religious Affairs, Ali Erbas, in February 2018, according to *Newsweek*. "Over the years, Oktar has been a vocal supporter of Turkey's pious President Recep Tayyip Erdogan and it was rumored that the two men maintained friendly relations. But Oktar now appears to have gotten on the bad side of the country's religious authorities."

UNITED KINGDOM, LONDON

Kings Kids Christian School, a small establishment in New Cross, east London, was slammed in a February 2018 report by Ofsted (the Office for Standards in Education, Children's Services, and Skills) in part because "[t]he creation story is taught in science and there is no evidence that pupils learn scientific theories about the origin of the earth." The school uses instructional materials from the controversial Accelerated Christian Education program to serve twenty-five students between the age of three and eleven.



In an interview Michael E. Mann gave to RNCSE *in 2016, he said, "If my science is going to be used as a proxy for the validity of the science of climate change, then I'm willing to fight." His most recent foray onto the battlefield has come in an unusual form—a children's book. Mann, a climate scientist at Penn State, has teamed up with Australian illustrator and writer Megan Herbert to develop the charming and powerful book* The Tantrum that Saved the World, *which is reviewed on page 14. After receiving my own copy and reading it to my daughters, I just had to ask the authors some questions. Let's pick their brains!*

Stephanie Keep: What was your goal in writing this story?

Megan Herbert: When people feel overwhelmed by the enormity of the climate change issue, they tend to shut off their empathy valves. "This isn't happening to me; it's too big a problem; I'm powerless to help." My goal, in writing this book, was to help people—both children and adults—to reengage with their empathy. Because when we feel empathy, we are moved to act.

Michael E. Mann: Climate change has unfortunately become a partisan political issue in this country, and that means that conventional approaches to communicating the science and its implications are not always effective. I'm always looking for novel approaches and collaborations to help get the word out.

SK: How did you pick the seven climate refugees featured in your book?

MEM: Considerations of diversity—both with respect to our animals and our people—were critical. Each is threatened by climate change in a different yet interconnected way. The theme of the interconnectedness of all living things is a critical one in the book. We all depend on each other and our planet. Earth is the only planet we know of in the universe that supports life. Let's take care of it. That's the ultimate message here.

MH: With the humans affected, I thought it was important to highlight the different sorts of problems we'll face as a result of climate change—job loss is explored with the plight of the fishers, the i-Kiribati's forced migration due to rising seas, and the onset of civil war that we see coming from highly volatile regions such as Syria. Of course, I had to couch the last one carefully, not wanting to frighten young readers. But I did want them to think about how dried-up farmland in a distant place can have drastic knock-on effects for everyone. I wanted to remove the idea of "us" and "them" so kids (and adults) can experience empathy for what people in other parts of the world are going through.

SK: What is your favorite line or illustration from the book?

MH: It's when Sophia (the heroine) goes through her big emotional transformation. She is about to give up, but then rallies when her new friends comfort her and tell her their stories. It's at that moment that she knows she has to persist: "Sophia thought deeply and then made her choice… She had to give those who'd been silenced a voice." I'm (only slightly) embarrassed to admit that I cry every time I read this line.

MEM: It would be the final image of Sophia with the polar bear, as she asks for "The President's office, please." It is empowering, something I feel is particularly important for young girls, but for boys as well.

SK: Okay, one silly question: At the end of the story, Sophia is seen giving the polar bear an ice-bath. It looks like he's moved in. If you had to have one of your non-human animal climate refugees stay in your house indefinitely, which one would it be and why?

MEM: The polar bear would be hard to feed and take care of, my daughter is scared of bees, I don't think my two housecats would welcome a tiger, I couldn't provide a sea turtle with a suitable habitat ... so, by process of elimination, I guess it'd be the flamingo!

MH: As a beginner gardener, and someone fond of a drop of honey in my tea, I'll definitely take the bees!

SK: What would you say to a critic who suggests that the book's ending, with Sophia's tantrum saving the world, is wishful thinking?

MH: Pessimists are rarely world-saving heroes! A hopeful ending is essential if we want to inspire kids (and the adults in their lives) to act.

MEM: Wishes don't come true without wishful thinking.

—STEPHANIE KEEP

Much Ado about Evolution

No pun intended, but there's a lot of energy in climate change education these days. Numerous groups are recognizing and addressing the need to increase public awareness and to prepare teachers to teach climate science effectively. NCSE is part of this, working with our partners to develop the Turning Misconceptions into Educational Opportunities (TMEO) workshop, which I discussed in my column in the spring 2018 issue of *RNCSE*.

Challenges to the teaching of climate change have been mounted in numerous state legislatures, and the TMEO project has, serendipitously, helped to repel them. In Idaho, for example, our TMEO participant Erin Stutzman, a high school science teacher in Boise, was involved in helping fend off changes that the House Education Committee sought to make to a proposed (and long-delayed) new set of science standards. The standards were finally adopted without the committee's edits, and Stutzman (and her students) are partly to thank.

Artwork © Ray Troll 2018 www.trollart.com

In these struggles for the integrity of climate science education, phrases such as "evidence for and evidence against," "teach the controversy," and "critical analysis of all theories" have popped up again and again. Do they sound familiar to you? They do to us. For such slogans have figured in attempts, a few even successful, to compromise the teaching of evolution for decades. Whether the opponents of climate change education are taking their cues from the opponents of evolution education or independently reinventing the same rhetorical tactics, they apparently see these slogans as a way of encouraging teachers to reinforce or instill scientific misconceptions in their students.

Our goals are quite the opposite: to encourage teachers to help their students recognize and overcome their misconceptions. In my spring column, I discussed the development of five lessons to teach climate change and solutions. I'm pleased to be able to tell you now about NCSEteach's next major objective: to offer a similar workshop for evolution.

Generously funded by the eminent biologist Francisco J. Ayala, a past president of NCSE's board of directors, our first evolution-focused workshop will be held in the summer of 2018 and led by Stephanie Keep and me from NCSE and Amanda Glaze from Georgia Southern University. The workshop will use materials and resources from the University of California Museum of Paleontology and its well-known (and invaluable) Understanding Evolution website.

The purpose of the workshop is to encourage teachers who are not confident about teaching evolution, in part by equipping them with the knowledge and knowhow to resist community pressures they might encounter. Unfortunately, there is a large proportion of teachers—about six in ten—who hedge, skip, or skim when teaching evolution.

To maximize the effect of the workshop, the participants have agreed to be Teacher Ambassadors, learning not only how to teach evolution with more accuracy and confidence but also how to help their colleagues to do so, in a second round of professional development in their home schools or districts.

A particularly innovative feature of the workshops is the inclusion of administrators. Administrators from each Teacher Ambassador's school or district have agreed to participate virtually in the workshop and then help with the delivery of the second round of localized professional development. The hope is that they will be able to anticipate and circumvent any local obstacles to the acceptance of the new lessons.

As you can tell, this is not intended as a flash-in-the-pan effort. NCSE is in it for the long haul. We are looking to change the culture of how evolution is taught, and NCSE Teacher Ambassadors will be at the vanguard of this effort.

Brad Hoge is NCSE's Director of Teacher Support.
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New Projects, New People

In the last issue of *RNCSE*, I let you know that NCSE's Science Booster Club program had recently won a major grant with our partners at the University of Iowa. The grant fully funds a three-year expansion into two new communities. Two graduate students, one for each new community, will work year-round on the project, developing deep relationships with local stakeholders as Outreach Assistants (OAs).

If you're familiar with graduate education, you've probably heard of graduate students working as Teaching Assistants (TAs) or Research Assistants (RAs) to pay the bills. Formal funding for an official OA line is rare, even though outreach and engagement work is of growing importance to both higher education and science communication. The development of the University of Iowa's OA line has been a really interesting outgrowth of the SBC program. Three years ago, who would have thought that a program designed to bring grassroots education to communities would end up funding new PhDs in evolutionary biology? Not me—but I am thrilled about the development, and I hope that the idea gains momentum and spreads to other institutions, providing graduate students opportunities to balance academic research with community outreach. Both of our new OAs are studying evolutionary biology with Andrew Forbes and will spend half the time working on their dissertation research, and half the time in the field, doing work for the SBC program. Without further ado, let's meet them.

Photo: Allaine Hippee

Anna Ward

For Anna Ward, the connection between outreach and the lab is immediate and practical, but not in the way you might think. She studies the relationships between parasitic wasps and abnormal outgrowths on oak trees called galls. As she travels to our new communities, which are fairly isolated from informal educational opportunities, she will pass through many landscapes, including three major forested areas and wilderness preserves. The chance to collect galls across a wide region of the state, rear their parasitoid wasps, and thus better study the diversity and variation in the population, will advance Ward's research while she makes important contributions to outreach and engagement. Fieldwork while out in the field sounds like a good combination!.

Photo: Anna Ward

Alaine Hippee

Alaine Hippee will be able to use her outreach opportunity to build connections with industry. She hopes that this will help her prepare for a variety of possible career pathways after earning her PhD; she's not yet sure where she wants to end up professionally, but she wants to have plenty of options. Hippee is the research renegade of the Forbes lab. Forbes and his students (including Anna Ward) study parasitoid wasps and their host interactions. Hippee, however, casts her research gaze down a trophic level as she studies the effects of host-wasp interactions on other plants in the ecosystem. This topic has direct applications to agriculture. One of our research communities is an important place for several major agricultural companies, including John Deere. Hippee is looking forward to networking with industry partners through her outreach work, and building relationships that will strengthen her club as well as her professional network.

We look forward to hearing lots of great stories from Ward and Hippee over the next three years. I'm especially glad that as they help the SBC program learn and grow, the SBC program will be helping them to learn and grow, too.

Emily Schoerning is the NCSE Director of Community Organizing and Research. schoerning@ncse.com

Connor and some students in the garden. Inset of garden Photos: Claire Adrian-Tucci

SBC Teacher Grants—10,000 Students Later

As you know, NCSE's Science Booster Clubs work to bring climate change and evolution activities to community events. We hope that by having a presence in the community, we can provide support to science teachers, which is crucial in the face of social controversy around these topics.

Equally crucial to these teachers is having the tools necessary to teach effectively. Shamefully, science educators are often in need of funding for the most basic of supplies, from copy paper to essential lab glassware. We realized that with just $300, teachers would be able to improve their abilities to bring hands-on, exciting, lessons about climate change and evolution to their classrooms. So, in the spring of 2016, we started the SBC microgrant program and have been soliciting applications twice per year ever since.

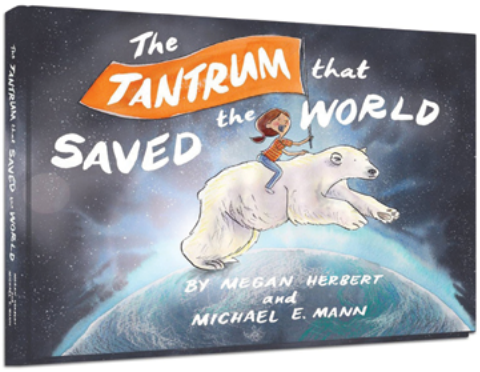
Through these grants, science teachers have been able to purchase durable equipment that has affected the educations of 10,000 students! We have funded a wide variety of materials: microscopes, books, even sets of plastic turtles for understanding dichotomous keys. (We couldn't get over how adorable the turtles are, and so developed an activity about phylogenies based on them [featured in the spring 2018 issue of *RNCSE*], which gave us an excuse to order lots of turtle sets and to send them out to our national clubs!)

Here I want to highlight just one project that our grants have facilitated. In the fall of 2017, we awarded a grant from Amy Connor, a chemistry teacher in Maryland. She applied for the funding to enable her environmental club to restore their school garden, which was not much more than a small plot of dirt and a few invasive plants. I had the pleasure of visiting the garden in May 2018, and I can attest that it is now in full, glorious bloom. Students are signed up to volunteer over the summer to water the plants, a testament to their dedication. The students also have a goal of fundraising to install a new path through the garden. "We want our garden space to be accessible for everyone," a student told me.

Connor noted that making the garden a reality would not have been possible without the SBC grant. "This is a project that we had been thinking about for a long time, but we needed materials to get started. The SBC grant gave us the extra boost of energy that we needed."

The environmental club's garden is just one example of how $300 grants from the NCSE Science Booster Club program help teachers to help improve the education of their students. After seeing the garden's impact on Connor's students, it is exhilarating to consider the tremendous effects these grants have had nationwide.

Claire Adrian-Tucci is the manager of the NCSE Science Booster Club Program and Regional SBC Organizer. adrian-tucci@ncse.com



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The Tantrum that Saved the World

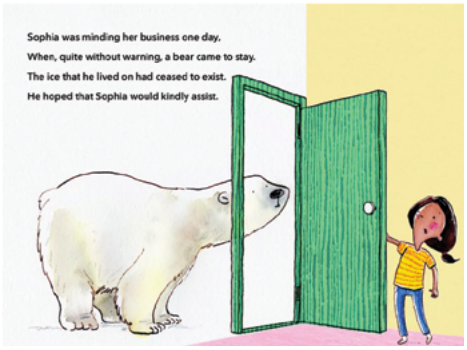
authors: **Megan Herbert and Michael E. Mann**

publisher: **World Saving Books, 2017**

reviewed by: **Kottie Christie-Blick and her fifth-grade students**

When I was asked to review *The Tantrum that Saved the World,* I readily accepted. As a teacher and a parent, I know there are few children's books available that address the most important global issue of our time—climate change. It's an adult-sized issue, for sure, but sometimes it takes young voices that haven't been muzzled by politics and special interests just to remind us to do what's right. And besides, I could get help from twenty-one experts on children's books—my fifth-grade students.

When we read the book together aloud in our classroom, we all found it delightful and encouraging. The story focuses on Sophia, who appears to be somewhere around nine to eleven years old, a peer to my mostly ten-year-old students. She's visited by an assortment of animals and people from around the world who have been displaced by the effects of climate change, such as lost habitat due to rising sea or food scarcity due to extended drought. Her first reaction is to hide in her room, angered by the imposition of these uninvited problems that have been thrust into her life. She soon realizes, however, that these people and animals really need her support and help: "Good will costs nothing, and does nothing but good." Sadly, when she tries to get adults to help her and her new friends, she's ignored. That's when she has a tantrum, making a loud fuss and taking a multitude of actions to "save the whole world." While the reader is left to speculate if all of Sophia's actions will indeed help slow down climate change, we're left hopeful that they will. The seed has been planted in our minds that we all need to make a fuss and encourage people to work together to mitigate climate change, so the most vulnerable can be hopeful about their future.



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My students and I loved Sophia's gumption and compassion, even though her first reaction was to avoid the situation and those complaining about it. My students said that they liked the main character and found the story fun to listen to and interesting to think about. One noted, "This book uses fun characters to explain a serious topic, so even young kids can understand." (Okay, full disclosure: I asked them to write an essay about their opinion after the read-aloud. I couldn't help it! I'm their language arts teacher, as well as their science teacher.) They also liked that it's written in Dr. Seuss-style poetic verse. They're familiar with Dr. Seuss's famous environmental story, *The Lorax,* and enjoyed guessing the rhyming word that was about to be read aloud at the end of each line. They also liked discussing the parallels between the two stories and their main characters.

This book is an appropriate read-aloud for children ages 7–11. There are quite a few difficult words for young readers, such as "condescension" and "conviction," but when they experience the book as a read-aloud, supplemented with a bit of explanation, children will get the drift. The delightful pictures also provide good support to help children understand the story line. My students especially liked the two-page picture of Sophia yelling to the world to take action about climate change. Instead of words we

see all the colors of nature streaming forth from her wide-open mouth, as the narrator tells us, "It rumbled down streets, into towns of all lands. It echoed in forests, on glaciers and sands. People and creatures alike felt its force. They ditched their distractions and looked for the source."

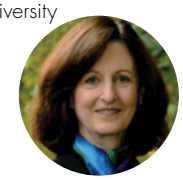
Some may be concerned that in the book fantasy is used to explain a scientific phenomenon. However, with a caring adult's guidance, even young children will have no trouble understanding the difference between the cute story line created to engage, and the powerful message that we need to work together to take care of the environment. Since Aesop's time, fictional tales have long been used to teach important lessons.

The Tantrum that Saved the World also includes nonfictional information at the end. It briefly explains climate change and how it's already begun to affect people and animals around the world, and it provides background information that's best read by adults and paraphrased for children. And if you're left wondering what can be done to help slow down climate change, there's a "World Saving Action Plan" poster tucked into the back of the book to get you started.

You … will want to read this book to your favorite children to inspire and empower, as we work together to help them to have a bright future.

According to the dedication page, the authors wrote this book for their children, mindful that they will be dealing with the changing climate created by adults. You too will want to read this book to your favorite children to inspire and empower, as we work together to help them to have a bright future.

Kottie Christie-Blick teaches at Cottage Lane Elementary School in New York. She also is an on-line course instructor for the University of San Diego and an educational consultant working to get climate change taught in classrooms around the world. @KottieCB or kchristieblick@socsd.org



COMINGS AND GOINGS AT NCSE

NCSE bids farewell to **Robert Luhn,** who joined NCSE as its first Director of Communications in 2008. Bringing his decades of expertise as a technology and environmental journalist to the job, Luhn was instrumental in raising NCSE's profile among traditional and new media and in connecting journalists with NCSE staff. He also oversaw NCSE's expansion to social media platforms, starting NCSE's Facebook page and Twitter feed, and converting vast amounts of video for posting on NCSE's YouTube channel. Much of his work was behind the scenes, and only occasionally was his wry sense of humor on public display, as in NCSE's "Don't Diss Darwin" video—produced in reaction to a creationist campaign in 2009 to give away a misleadingly edited version of *On the Origin of Species*—which he wrote, produced, and starred in. All of us at NCSE wish him the best in his new endeavors.

Replacing Luhn is **Paul Oh,** who started as NCSE's Director of Communications in May 2018. Oh comes to NCSE after stints at a variety of non-profits specifically concerned with education, including the Teaching Channel, where he was a senior director overseeing editorial content and leading social media, and

the National Writing Project, where he managed projects involving interest-based learning. Even earlier, he was a classroom teacher and a prize-winning reporter at a local newspaper. "I believe that NCSE's mission is critical to ensuring that our young people have the scientific tools, knowledge, and skills they need to understand the world and improve it," he commented. "I am looking forward to the opportunity to use my journalistic, teaching, and editorial experience to amplify NCSE's message and champion its advocacy." Oh may be reached at oh@ncse.com.

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