

reports

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Dear NCSE Supporters,

How quickly the first 100 days as executive director here at NCSE has passed! We were very busy the past few months planning our course of action for this year while also looking beyond 2024. To share more with our supporters about what is happening at NCSE under my leadership, our Director of Development, Deb Janes, and I sat down to talk about these first 100 days. You can find that conversation on YouTube in this issue!

As a part of that planning process, the staff and I spent time together in January to celebrate the successes of 2023, examine any unfinished business from the year, and look at what each of us wants to accomplish moving forward. From those conversations, we developed a shared vision for NCSE, which I am pleased to present to you all here:

Our vision at NCSE is that one day, students of all ages will be scientifically literate, teachers will be prepared and empowered to teach accurate science, and scientific thinking and decision-making will ensure that all life can thrive and overcome challenges to our shared future.

As you can see, we dream big at NCSE and are not afraid to face the issues facing science education head-on! While continuing to work in our three main areas of focus—engaging teachers, conducting research to support our efforts, and mobilizing science education advocates around the nation—we are looking at new ways of doing so.

Of course, NCSE's traditional mission of defending the integrity of science education continues. In Texas, we recently were involved on both the climate change and evolution fronts, when new textbooks in the state were under attack by members of the state board of education. Deputy Director Glenn Branch explains the recent textbook review process and outcomes in Texas and what that means for science classrooms, teachers, and students in that state (page 5).

I am happy to share that this year's Darwin Day event co-hosted by NCSE and the National Association of Biology Teachers was our best-attended virtual event yet, exceeding our previous year's attendance by more than 100 registrants! We were joined this year by author Riley Black, who discussed her book *The Last Days of the Dinosaurs*. Teachers and students from around the world joined us to learn about mass extinctions and celebrate the life of Charles Darwin, as Blake Touchet and Lin Andrews describe (page 11).

I also urge you to learn about one of the recent recipients of our Friend of the Planet award, Susan Joy Hassol, who graciously sat down with Paul Oh to discuss her work and the importance of climate communication (page 12).

As always, thank you for your support. Our work could not happen without you.



Amanda L. Townley

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100 DAYS WITH AMANDA L. TOWNLEY

Now three months into her position, NCSE Executive Director Amanda L. Townley sat down with Director of Development Deb Janes to discuss how she's been acclimating to her

new role, the work that she's undertaken so far, and the road ahead as NCSE continues to defend and support accurate climate change and evolution education.



Deb Jones, NCSE Director of Development, interviews NCSE Executive Director Amanda L. Townley

“As a group, we came up with this beautiful shared vision statement ... that our vision here at NCSE is that one day students of all ages will be scientifically literate, that teachers will be prepared and empowered to teach accurate science, and that scientific thinking and decision-making will ensure that all life cannot just survive but thrive and that we can overcome the challenges to our shared future.



“We really want to focus on ensuring that we’re getting into every region in the country every year so we’re actually able to ramp up the work that we’re doing, and we’re doing that with strategic partnerships with university faculty and partnering organizations.

“For example, we’re coming to Alabama for the first time.

This year we’re going to be doing a climate workshop that targets the coastline of Georgia, Florida, North Carolina, and South Carolina. These are huge areas where we know there are a lot of misconceptions and misinformation campaigns.



“We are making incredible progress each and every day. But the battle is still on.

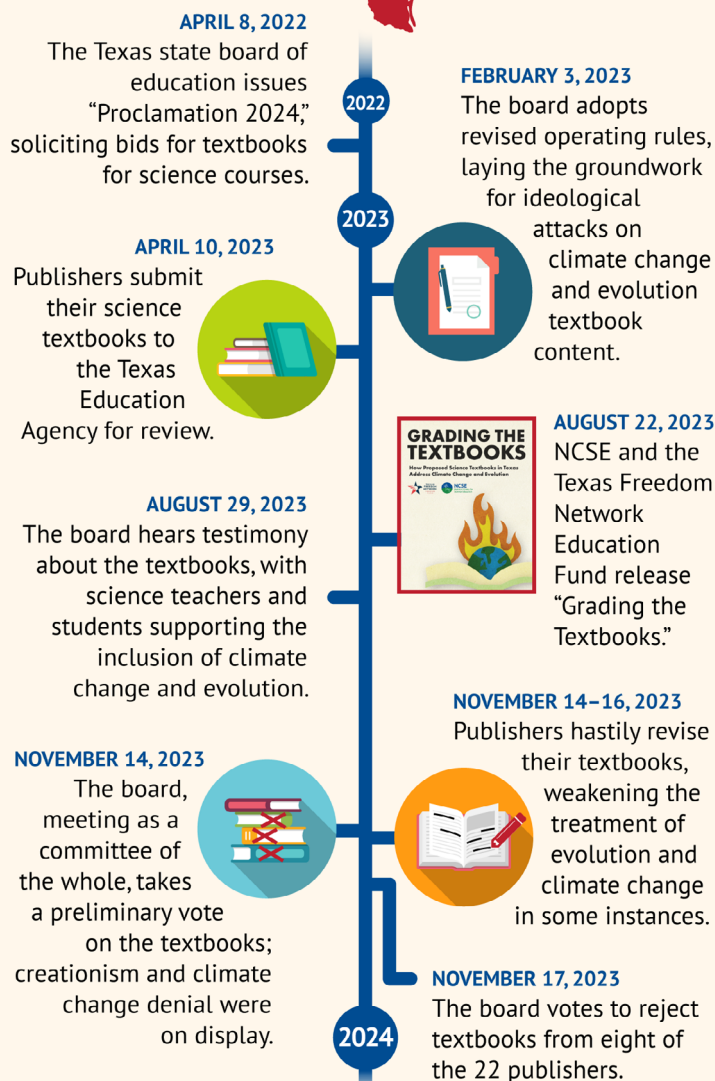
EVERYTHING'S BIGGER IN TEXAS, INCLUDING IDEOLOGICAL ATTACKS ON SCIENCE TEXTBOOKS

With over 5.5 million students enrolled in its public schools, Texas is a huge market for science textbooks. But the textbook adoption process, conducted at the state level, tends to be highly contentious, thanks to a powerful faction on the elected, and highly politicized, state board of education. In the most recent round of textbook adoption, in 2023, textbooks were attacked on account of their treatment of both climate change and evolution—with results that unfortunately help to undermine the integrity of science education in the Lone Star State.

LAYING THE GROUNDWORK

Members of the board began to lay the groundwork for the attack in February 2023, when they adopted changes to its operating rules. Among these were a requirement that instructional materials “present positive aspects of the United States and its heritage and abundant natural resources.” Pat Hardy, a member of the board, [told](#) E&E News, “If they’re going to tout how wonderful the alternative climate change stuff is, then they need to also say all the things that are not good about it and not just hit on the fossil fuel industry.” She added, “Our schools are paid for by the fossil fuel industry for the most part.”

TEXAS TEXTBOOK TIMELINE



Also included in the changes were a requirement of the recognition of “the ongoing process of scientific discovery and change over time in the natural world,” and language requiring instructional materials to “present factual information, avoid bias, and encourage discussion.” While ostensibly neutral, it seemed likely that these would be deployed selectively against areas of science doubted by the board. As if to provide evidence, at a meeting of the board, Hardy specifically endorsed teaching “both sides” of climate science in order to “avoid bias.”

As for the source of the changes, Hardy told E&E News “that she worked on the changes with the Texas Energy Council, a coalition of oil and gas companies, as well as newly elected board member Aaron Kinsey, CEO of

American Patrols, an aviation oil-field services company. The goal of the group was to eliminate ‘textbooks written by people not from Texas who have a negative view of fossil fuels and a positive view of electric cars.’” A further connection between the fossil fuel industry and the board is provided by board member Will Hickman, a lawyer for Shell Oil.

ANTICIPATING THE CRITICS

Anticipating a flood of specious criticisms of the textbooks from the board, NCSE and the Texas Freedom Network Education Fund assembled a panel of scientists and educators to evaluate the textbooks submitted for state adoption especially with regard to their treatment of evolution and climate change. “[Grading the Textbooks: How Proposed Science Textbooks in Texas Address Climate Change and Evolution](#),” a report of the study, was released in August 2023, receiving coverage in the Texas press, including the [San Antonio Express-News](#) and the [Texas Tribune](#).

The executive summary of “Grading the Textbooks” explained, “[R]eviews by a panel of experts show that the treatment of climate change and evolution in nearly all of these materials conforms to the state science standards and rules adopted by the board. Where the reviews reveal weaknesses in coverage of the two topics, those deficiencies appear to be largely a consequence of inadequate state standards.” “Grading the Textbooks” observed that Texas’s standards received the grade of F in “[Making the Grade?](#)” for their treatment of climate change and for their treatment of evolution in different studies.

“Grading the Textbooks” concluded, “In short, the findings in this report argue against the rejection of nearly all of these textbooks based on false claims that they fail to meet state standards or other rules set out by the state board (such as requiring factual accuracy, avoidance of bias, and encouragement of inquiry) on the topics of climate change and evolution. Texas parents and other residents who want our children to learn science accurately, honestly, and thoroughly should be wary of objections to textbooks for teaching the truth on these two important topics.”

A HEARING ON THE TEXTBOOKS, AND THE LOBBYISTS MOBILIZE

On August 29, 2023, the board heard testimony on the textbooks, with members of the board reiterating their positions. Will Hickman “indicated that he’d advocate for instructional materials that do not include climate change solutions in science courses,” [according](#) to the Texas Tribune, and asked one testifier if textbooks should include “the benefits we get from burning carbon.” His colleague Marisa Perez-Diaz, however, told the Texas Tribune, “We absolutely should say humans do impact climate change,” adding, “It doesn’t have to be political—it is just fact.”

In the wake of the hearing, climate change deniers mobilized to lobby the board. August Pfluger, a Republican

member of Congress representing District 11, in the oilfield-rich Permian Basin of Texas, [complained](#) on Facebook that “We cannot allow the radical climate lobby to infiltrate Texas middle schools and brainwash our children.” Among the commenters on his post was LJ Francis, a member of the board. Later, Texas Railroad Commissioner Wayne Christian sent the board a letter [expressing](#) his concern about “potential textbooks that could promote a radical environmentalist agenda.”

Creationists followed. In early November 2023, Texas Values issued a press release [explaining](#), “When it comes to Science classes and instructional materials, Texas Values has traditionally fought to make sure that Creationism ... is given just as much attention as the theories of Evolution, and the Big Bang Theory,” and criticizing textbooks for presenting evolution and the Big Bang without any mention of supposed alternatives. Of particular concern was “the theory of *humans evolving from monkeys*” (emphasis in original)—which of course none of the textbooks present as scientifically credible.

THE COMMITTEE OF THE WHOLE

Despite the findings of “Grading the Textbooks,” journalist Katie Worth’s analysis (see box, page 7), and the state’s own review, the textbooks submitted for adoption met with a hostile reception at a committee of the whole meeting held on November 14, 2023. Creationism and climate change denial were on display as various members of the board criticized the textbooks for not including alternative views on the Big Bang, the origin of life, evolution (to which creationism was explicitly mentioned as a supposed alternative, though it is unconstitutional to teach creationism in the public schools), and climate change.

The committee voted to remove textbooks from Accelerated Learning, Discovery Education, EduSmart, Green Ninja, and McGraw-Hill from the list of approved textbooks after discussions in which evolution and/or climate change was misrepresented as scientifically controversial. Similarly targeted, but surviving the committee’s vote, were two textbooks from Savvas. The committee also voted to remove textbooks from seven other publishers from the list of approved textbooks without registering any explicit objections to their treatment of evolution and/or climate change.

NCSE’s Deputy Director Glenn Branch was [quoted](#) by the *Guardian* as saying, “Members of the board are clearly motivated to take some of these textbooks off of the approved list because of their personal and ideological

beliefs regarding evolution and climate change.” Evidently agreeing with Branch’s diagnosis, the National Science Teaching Association urged members of the board, in a letter sent before its November 17 meeting, not to “allow misguided objections to evolution and climate change impede the adoption of science textbooks in Texas,” as the Associated Press [reported](#).

THE BOARD’S FINAL VOTE

The board finalized the list of science textbooks approved for use in the state’s public schools at its November 17, 2023, meeting. By then the majority of textbooks had been hastily revised in response to the criticisms from members of the board, sometimes in such a way as to elicit concern. McGraw-Hill removed a number of diagrams illustrating the evolutionary lineage of humans from its high school biology textbook, for example, while Discovery Education removed a reference to fossil fuel use contributing to the greenhouse effect in its Grade 6 textbook.

Citing the revisions by the publishers, the board reversed the committee of the whole’s previous decisions with respect to the Accelerated Learning and McGraw-Hill Biology textbooks. Motions to restore the Discovery Education, EduSmart, and Green Ninja textbooks to the approved list were defeated, however, with evolution and/or climate change again misrepresented by members of the board as scientifically controversial. Ultimately, textbooks from eight of the 22 publishers submitting textbooks for approval were rejected.

Reaction was harsh. “An embarrassment-free approval of science textbooks would have been nice, but the real tragedy will come when our kids open those censored textbooks. We owe them a better education and a brighter future,” [lamented](#) a columnist for the *Houston Chronicle*, while the *San Antonio Express-News* [editorialized](#), “Hyper-partisanship that interferes with the education of Texas students, and their understanding of the world, was again on display last week ... It’s painfully obvious that the SBOE’s opposition to seven of the 12 proposed [grade 8] science textbooks was due to politics and religion.”

IMPACT ON STUDENTS

Selection of textbooks is in the hands of local districts, but as a result of the board’s decisions, which were neither scientifically nor pedagogically warranted, their choices are now more limited than they should have been, and the education of the students they serve may suffer as a result. “It’s certainly still possible for Texas[s] students to get a sound scientific education in general and in regard to [evolution] and climate [change],” NCSE’s Branch [told](#) the *Austin American-Statesman*. “It’s just going to be [in spite] of the Texas State Board of Education.”

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WORTH WEIGHS IN

The journalist Katie Worth, the author of *Mis-education: How Climate Change Is Taught in America* (2021), conducted her own analysis of the grade 8 science textbooks submitted by the three largest publishers. Writing in *Scientific American* in October 2023, she [reported](#) that

“the proposed new textbooks include much more robust information about the climate crisis than their earlier editions did. In some cases, however, the books appear to cloud the human causes of the crisis.” Gratifyingly, Worth’s article quoted NCSE staff and cited NCSE’s research.

See all of NCSE’s [coverage](#) of events in Texas.

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.ngo.

FLORIDA

"Florida's Department of Education has approved the classroom use of material from the Prager University Foundation, a conservative group that produces videos that distort science, history, gender and other topics," reported E&E News (August 7, 2023). Although the videos have been approved for use only in social studies classrooms for younger students, there is concern that climate-change-denial videos may harm climate change education in the state.

"Climate scientists long ago determined that fossil fuel use is driving rapid global warming and pushing the planet toward dangerous tipping points. Most states center their climate change curriculum around that consensus," E&E News explained. "Only a small number of researchers with legitimate academic credentials doubt the consensus science, and PragerU videos feature many of them."

NCSE Deputy Director Glenn Branch told E&E News that the state's approval in effect publicizes the availability of the climate-change-denial videos to sympathetic teachers. Moreover, he added, even teachers who want to teach climate change accurately could feel coerced to do otherwise: with the state's imprimatur of the PragerU videos, there's a risk that "people are going to be pressuring [teachers] into using them."

NEW YORK, NEW YORK CITY

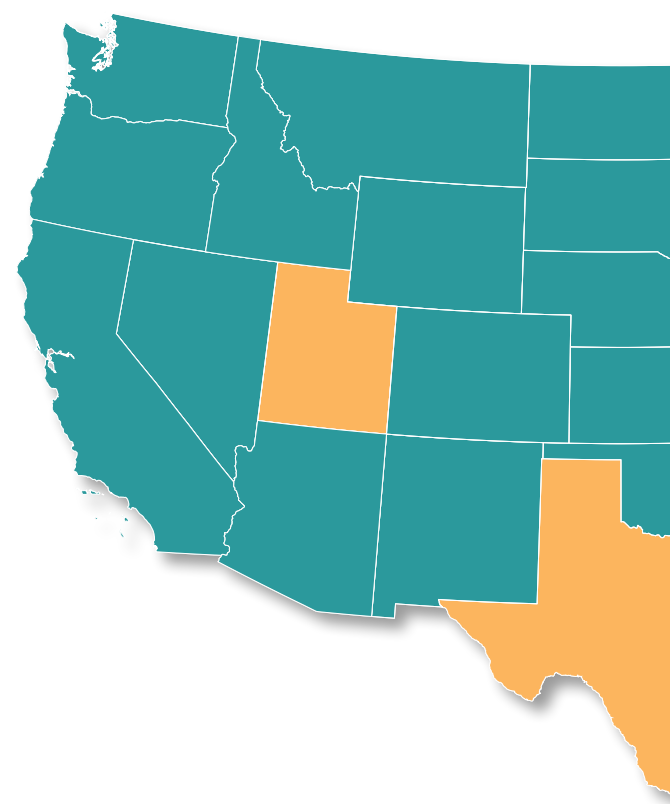
"PlaNYC: Getting Sustainability Done," a long-term strategic climate plan for New York City released on April 20, 2023, includes a recognition of the importance of climate education and a commitment to improving climate change education in the city's public schools. "Education plays a key role in building climate literacy and encouraging sustainable behaviors," the plan observes, adding, "We will create new opportunities where climate education is part of the solution in helping the City meet our decarbonization, resilience, and just transition goals." Of particular interest was the goal that "[a] new teacher leadership team comprising up to 50 teacher-leaders across different schools will provide up to 1,000 educators with professional development through climate education trainings, workshops, and programs."

RHODE ISLAND

When the Rhode Island legislature adjourned on June 15, 2023, two pairs of climate change education bills, [House Bill 6105](#) (PDF) and the identical [Senate Bill 551](#) (PDF), and [House Bill 6106](#) (PDF) and the identical [Senate Bill 558](#) (PDF), died in committee.

Seeking to establish the Rhode Island Climate Change and Ocean Protection Education Program, the bills would, if enacted, have appropriated "no less than" \$500,000 per fiscal year to support "climate change and/or ocean protection programs." The funds would have been disbursed by the department of labor and training to state and local educational agencies, institutions of higher education, professional associations, and youth development and non-profit organizations engaging in such programs. Professional development for teachers would have been a priority.

The similar but not quite identical House bills were held for further study by the House Finance Committee, while the similar but not quite identical Senate bills were held for further study by the Senate Finance Committee.



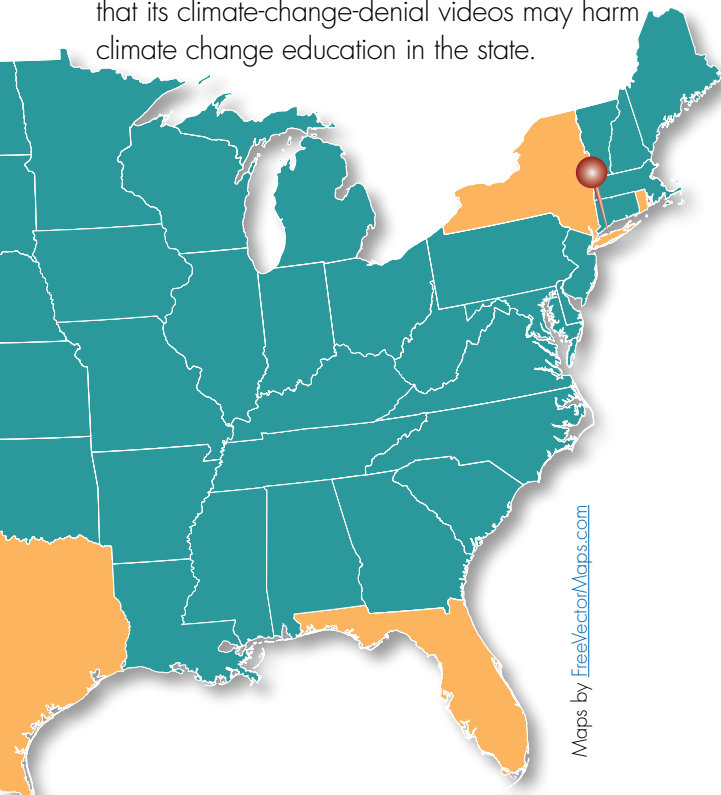
TEXAS

“An announcement this week from PragerU, a conservative media company that counts K–12 education as one of its priorities, left some public education advocates and state leaders puzzled after the company said it was coming to Texas,” [reported](#) the *Austin American-Statesman* (August 23, 2023).

Although the announcement claimed that PragerU is an approved education vendor in the state of Texas and featured praise from Julie Pickren, a member of the Texas state board of education, the chair of the board, Ken Ellis, told the *American-Statesman* that he had no knowledge of PragerU’s having submitted any content for the board’s approval.

PragerU’s videos and their unsubstantiated claims about them were criticized by the Texas Freedom Network, which in a press release (August 22, 2023) [observed](#), “This vendor’s materials blatantly embrace the radical right’s agenda,” citing its “lessons that lie about fossil fuels’ contribution to climate change” in particular.

The use of PragerU’s videos was recently approved in Florida’s classrooms, as NCSE previously [reported](#). Although its videos have been approved there for use only in social studies classrooms for younger students, there is concern that its climate-change-denial videos may harm climate change education in the state.



UTAH

At its June 1, 2023, meeting, the Utah State Board of Education voted to adopt a number of [changes](#) (PDF) to science standards for high school supplementary science classes that weakened the scientific integrity of the standards with regard to climate change and evolution.

In particular, a marine biology standard that stated “The earliest life on earth originates from the ocean” was revised to begin “Scientific theories state that”; a marine biology standard that referred to “how human activities affect marine ecosystems” was revised to read “how human activities may affect marine ecosystems”; and a meteorology standard that directed teachers to “[e]mphasize the role of the greenhouse effect” was revised to direct them to “[e]mphasize the role of the greenhouse effect on supporting life.” (On the other hand, a meteorology standard that listed greenhouse gases as a possible example of a factor that produces changes in global climate was revised to direct teachers to emphasize greenhouse gases as such a factor.)

Before the meeting, a member of the Utah House of Representatives, Joel Briscoe (D–District 24), wrote to the board to criticize the lack of opportunity for the public to consider the proposed changes, which were included in a 2795-page packet issued only shortly beforehand. In his letter, shared with KUTV (May 31, 2023), Briscoe also expressed concern about the plethora of proposed amendments to the draft standards, [wondering](#) “whether the State School Board staff will be able to rely on some of the best teachers in their subjects in the future being willing to serve on curriculum standards committees. Why should they spend months or years on a project to see 150 amendments brought to their work?”

In a previous 8–7 vote, the board decided not to amend the meteorology standards to remove a standard that “called for students to be taught how to evaluate proposed designed solutions intended to reduce the impacts of climate change,” as NCSE previously [reported](#).



Supporters in the SPOTLIGHT

The National Association of Geoscience Teachers recently selected one of NCSE's teacher ambassadors, **Andy Epton**, as the Michigan state winner of the Outstanding Earth Science Teacher 2023 award. The awards committee specifically cited Epton's work as an [NCSE teacher ambassador](#) developing climate change lessons and sharing them with teachers across the country as one of the primary reasons for being selected for this award. "Being a part of NCSE has really been a life-changing opportunity for me," Epton said. "I am so thankful to be a part of this group." Epton is a high school science teacher at the Henry Ford Academy in Dearborn, Michigan. He currently teaches earth science, environmental science, and astronomy. As a teacher ambassador for NCSE, he helped to write multiple lessons on climate change and the nature of science that are freely available to teachers across the country and has hosted webinars and workshops to share his knowledge of and approach to teaching about climate change.:

Ursula Goodenough was elected to the National Academy of Sciences in 2023 in recognition of her distinguished and continuing achievements in original research. Professor Emerita of Biology at Washington University in St. Louis, Goodenough is the author of *The Sacred Depths of Nature: How Life Has Emerged and Evolved*, which recently was published in a second edition (Oxford University Press, 2023).

A World Without Soil: The Past, Present, and Precarious Future of the Earth Beneath Our Feet (Yale University Press, 2021), by **Jo Handelsman**, a member of NCSE's board of directors, was longlisted for the AAAS/Subaru 2023 Young Adult Science Book Award (which was ultimately awarded to Riley Black's *The Last Days of the Dinosaurs* [St. Martin's Press, 2022]—Black gave a talk on her book for NCSE [see page 11]). Handelsman is the director of the Wisconsin Institute for Discovery and a Vilas Research Professor and Howard Hughes Medical Institute Professor in the Department of Plant Pathology at the University of Wisconsin, Madison.

Nick Matzke's phylogeny of antievolution bills, published in *Science* in 2016, was the topic of Massimo Pigliucci's "The Philosopher's Corner" [column](#) in the July/August 2023 issue of *Skeptical Inquirer*. "What Matzke did was use phylogenetic reconstruction methods applied to the wording of a large number of anti-evolution bills largely proposed after *Kitzmiller v. Dover* with the goal of reconstructing their 'phylogeny'—that is, to understand how the bills are related to each other by the cultural equivalents of mutation, recombination, and common descent," Pigliucci explained, adding, "Setting aside

the delicious irony that allows scientists to use evolutionary analysis tools to track creationist efforts, the lesson here is that this particular culture war is waged over the very long run, and therefore constant vigilance on the part of skeptics is required." A staff member at NCSE during the *Kitzmiller* trial, Matzke is Senior Lecturer in the School of Biological Sciences at the University of Auckland.

NCSE is pleased to congratulate **Kenneth R. Miller**, the president of NCSE's board of directors and Professor Emeritus of Molecular Biology, Cell Biology and Biochemistry at Brown University, on winning Sigma Xi's 2023 John P. McGovern Science and Society Award, bestowed to a scientist or engineer who serves as "a highly visible and prominent spokesperson for the public understanding and appreciation of science." "Through his writing, speaking, and advocacy, including testifying in the landmark *Kitzmiller* trial, Kenneth R. Miller has made unrivaled contributions to the public understanding and appreciation of evolution," commented NCSE's executive director at the time, **Ann Reid**. "I'm delighted that Sigma Xi is recognizing what the National Center for Science Education has known for decades: that Ken is a national treasure." Miller delivered a lecture at Sigma Xi's International Forum on Research Excellence, held in Long Beach, California, November 10–12, 2023, where he also received a commemorative medal and a \$5000 honorarium. Previous recipients of the McGovern Award include Gerald Holton, J. Michael Bishop, Philip Morrison, Rush D. Holt, Norman E. Borlaug, Alan Lightman, Peter H. Raven, and May Berenbaum.

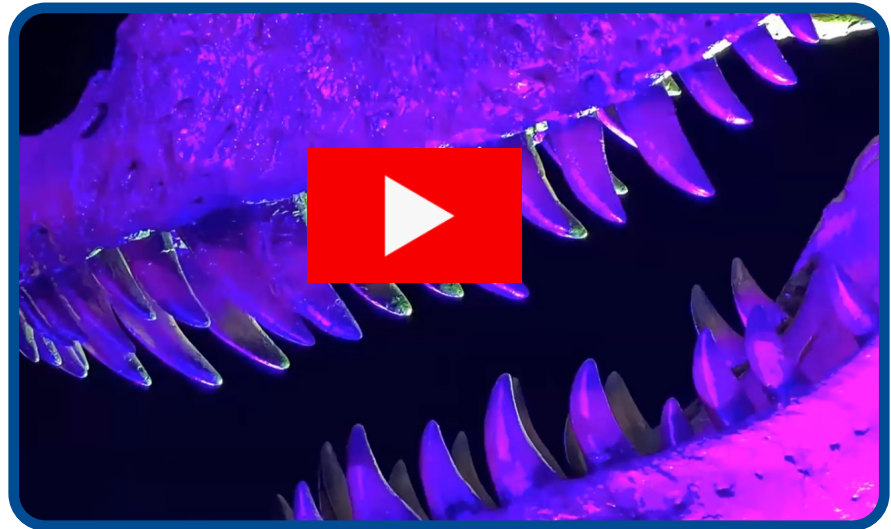
Bill Nye "The Science Guy"—a long-time ally of NCSE—was the subject of a ceremonial resolution adopted by the Council of the District of Columbia on March 7, 2023, honoring him "for his scientific contributions and creative approach to increase education, curiosity, and awareness in the areas of science, technology, engineering, and mathematics." Nye was born and attended school in the District of Columbia.

Elliott Sober was presented with the inaugural Philosophy in Biology and Medicine Award. Accepting the award and a prize of €5,000 at the University of Bordeaux in June 2023, he gave a lecture on "Darwin on Group Selection and Phylogenetic Inference—Simpson's Paradox and the Law of Likelihood." Sober is the now emeritus Hans Reichenbach Professor and William F. Vilas Research Professor in the Department of Philosophy at the University of Wisconsin, Madison.

—GLENN BRANCH

The Road to Extinction

What was it like in the hours, days, and years directly after that fateful meteor strike that contributed to Earth's most recent mass extinction event? The answer to this question was the basis for science writer and communicator Riley Black's [Darwin Day webinar](#). Sponsored by the National Center for Science Education and the National Association of Biology Teachers (NABT), "The Road to Extinction" was held on February 8, 2024, to celebrate the 215th birthday of naturalist Charles Darwin.



Riley Black share her unique storytelling style, which made her recent book, *The Last Days of the Dinosaurs*, such a riveting tale of extinction and evolution. A prolific author, Black has written for publications such as *Wired*, *National Geographic*, and *Scientific American* for over a decade.

possible solutions to mitigate what some scientists are considering the sixth mass extinction event resulting from human activity.

The lesson shared by Andrews at the webinar was a small sampling of a more in-depth learning experience that took place at the NABT Evolution Symposium this past November. At the symposium, teachers were led through the lesson's activities by Teacher Ambassador [Chandler Tawney](#) and NCSE Science Education Specialist Blake Touchet. Additionally, Tawney shared data, pictures, and anecdotes from her experiences field-testing the lesson set with her students.

Facilitating events such as the NABT Evolution Symposium and Darwin Day webinar is one of the ways NCSE works to support the continuing education and success of science teachers. You can find all our [past Darwin Day webinars](#) on the NCSE YouTube channel. And, as always, we encourage everyone to check out NCSE's [classroom resources](#) designed to resolve student misconceptions.



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Riley Black

NABT/NCSE Darwin Day
Guest Speaker

This is the fourth consecutive year that NCSE has collaborated with NABT to bring an expert in the scientific field to share their research or work with teachers at NABT's annual November conference, then reprised the experience for a wider audience the following February via an online webinar. This year, NCSE was thrilled to have

Coupled with Black's presentation, Director of Teacher Support Lin Andrews shared one of NCSE's lesson sets, [The Road to Extinction](#). This lesson set allows students to explore the relationships between extinction, evolution, and biodiversity. Students do so by investigating the major mass extinctions of the past as well as



Susan Joy Hassol is the director of [Climate Communication](#) and has spent her career devoted to advancing public understanding of climate change science and solutions. For over 30 years she’s helped scientists communicate more effectively and provided clear information to policymakers and journalists. She’s written and edited high-level reports including the first three U.S. National Climate Assessments, testified before the U.S. Senate, written an HBO documentary, and she speaks and [publishes widely](#). Hassol is a Fellow of the American Association for the Advancement of Science and the American Geophysical Union (AGU). In 2021, Hassol received the AGU Ambassador Award for her tireless efforts to improve the quality of climate change communication, and in 2023 she received NCSE’s [Friend of the Planet award](#).

Paul Oh: As a newly minted NCSE Friend of the Planet, you reminded us during the award ceremony that “words matter” when it comes to climate action—and inaction. Can you explain why?

Susan Joy Hassol: Words matter because they affect how we think, feel, and act. They can trigger gut reactions based on deeply held ideology. For example, words like “regulate,” “control,” and “tax” can cause some conservatives to reject the reality of climate change because they are averse to what they perceive to be the solutions. Words can also trigger psychological responses; phrases like “we’re to blame” and “it’s our fault” make some people recoil and reject the science of human-caused climate change because it makes them feel guilty. Terms like “cause” and “responsibility” can be more effective.

Many scientific terms can make the climate crisis seem abstract and distant, while other words make it feel up-close and personal. Words like “inevitable” can make us feel hopeless, which doesn’t inspire action. Perceptions can be influenced by word choice. For example, “natural” commonly refers to things occurring in nature, not influenced by humans. So “natural disasters” is not a good choice for the extreme weather events we’re experiencing that are greatly exacerbated by climate disruption. And people

associate the term “natural gas” with “clean” while they associate “methane” with pollution, although natural gas is almost entirely methane.

PO: You have a long history engaging in climate communication. What motivated you to get started in this work?

SJH: I’ve always had a knack for digesting large amounts of complex information and boiling it down and expressing it in ways that are clear, concise, and compelling. About four decades ago, when I was embarking on my career, the issue of human-caused climate change was just beginning to rear its head. It quickly became clear to me that it would be the critical challenge of our time, and I wanted to use my talent to help humanity tackle this great challenge.

I started out working with climate scientists to help them communicate in ways the public and policymakers could understand. I pointed out that many terms scientists use mean completely different things to the public, so I suggested better alternatives. I’ve also worked with journalists to help them report effectively on climate change as an issue for every beat (not just a science or environmental story). Along the way it became clear that the challenge of communicating on climate is about much more than explaining the science more effectively. It’s about making it personal, connecting with people

on values, finding common ground, and appealing to their priorities.

PO: What are the critical messages you're trying to convey about climate change?

SJH: The critical messages are on the themes of choice, urgency, agency, and love.

Climate change, caused primarily by the burning of coal, oil and gas, is already having devastating impacts on communities around the globe, including ours. We face a choice between a future with a little more warming that we can adapt to and live with, and one with a lot more warming that becomes a global catastrophe. The future is in our hands.

There is an urgency to climate action. Every day we delay, we're committing to greater climate disruption and associated impacts. Every action counts because every fraction of a degree counts. We have to act now. Later is too late.

We have the tools we need to tackle the climate challenge. The technologies are abundant and affordable; we know what policies work. We're not starting from scratch; we're already on our way. We just need to do more, faster.

The climate crisis is putting our children's future at risk. It's our responsibility to leave a world that's safe and livable for future generations. We have to save what we love for who we love.

PO: How do you help the public get past climate denialism or just plain climate apathy?

SJH: This is very much audience-dependent. For the 10% or so of Americans who outright dismiss the reality of human-caused climate change, I have learned that banging my head on a locked front door just gives me a headache. For those people, I find a side door, like focusing on the many advantages of clean energy: it saves us money and gives us cleaner air and water, it gives us greater energy independence and security, and allows us to compete with other countries who are currently winning the clean energy race.

For those who are apathetic, show them how climate change is affecting things they value, whether that's fishing, skiing, snowmobiling, birding, their health, or having clean water and good food. Talk about it in ways that are personal, local, and immediate, not far away or projected for decades from now. Let them know that it's not too late to avoid the worst impacts, if we act now.

PO: What are some of your proudest achievements as a science communicator?

SJH: When I first started out in this field, it was very unusual to see climate change in the headlines or hear people talking about it.

I worked with my scientist colleagues to help change that. For example, when we produced the Arctic Climate Impact Assessment, I worked with hundreds of scientists from eight countries over four years to communicate the science in a way that would sing. We integrated storytelling and other techniques of good communication right from the start. We included beautiful photographs and designed graphics for non-scientists. When we released the report in 2004 at the National Press Club, climate change was the top story on the network news and on the front page of the papers. It was paradigm-shifting.

I'm also gratified to see many scientists I've worked with become such excellent climate science communicators. I've led workshops—too many to count—to help scientists learn to speak without jargon, to use metaphors, to become better storytellers, and to talk about solutions as well as the problem. In addition to their primary roles as top scientists, I've helped them to also excel at a very different role than they trained for when they got their PhDs. It's such a pleasure to hear them saying the most important thing there is to say in the most effective way there is to say it.



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THE RNCSE REVIEW

How to Teach Grown-Ups About Climate Change

author: Patricia Daniels

publisher: What on Earth Books

reviewed by: Glenn Branch

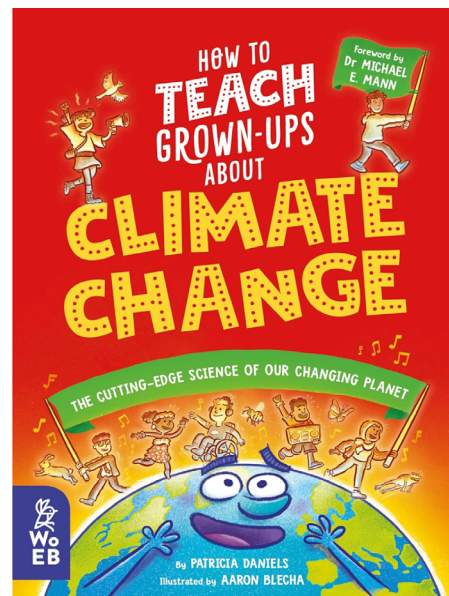
“Children can foster climate change concern among their parents.” That was the title of a 2019 [paper](#) in *Nature Climate Change*, one of a number of studies that provide evidence for the effectiveness of inter-generational climate change education. Patricia Daniels’s *How to Teach Grown-Ups about Climate Change*, aimed at readers between 8 and 12 years old, takes the ball and runs with it.

Daniels’s book adeptly uses humor to engage the attention of its readers: black-and-white-and-green cartoons, often featuring talking animals; references to bodily functions (cow farts, cow burps, and—in a bit of a triumph—dinosaur farts); and jokey asides and digressions. Half a dozen attractive infographics on topics such as “Our Climate: A History” and “Mammals, by Biomass” occupy two-page spreads.

The scientific content of the book, presented at a level suitable for the readership, is accurate, as might be expected from a book with a foreword by Michael E. Mann, a distinguished climate scientist and member of NCSE’s board of directors. The history of climate change science is briefly sketched, with Eunice Foote, John Tyndall, and Svante Arrhenius, but there is no discussion of later developments.

Particularly impressive is the treatment of carbon footprints. Kids are invited to consider their own carbon footprints as part of taking action on climate change, but then immediately reminded, “It’s not just individual people who have these footprints. Companies and governments also have carbon footprints ... Don’t let them tell you that it’s just up to you to solve climate change” (page 55).

A gap in the book’s generally admirable treatment of climate action is education. Its readers will be spending the next decade or so of their lives in formal education, so why not discuss what they could do to engage their school communities in taking action on climate

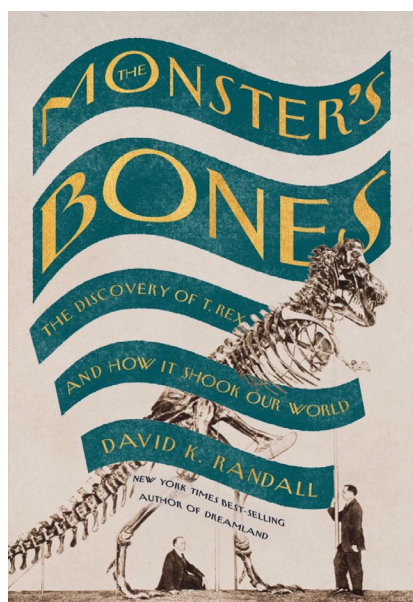


change, including supporting efforts to improve curriculum and instruction?

Climate change denial propaganda campaigns aimed at schoolchildren are not new, but in 2023, no fewer than four—from the Heartland Institute, the CO2 Coalition, EverBright Media’s Kids Guides, and PragerU Kids—were [in the headlines](#). *How to Teach Grown-Ups about Climate Change* is a welcome, and needed, corrective.



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The Monster’s Bones: The Discovery of T. rex and How It Shook Our World

author: David K. Randall publisher: W. W. Norton reviewed by: Andy Epton

Tyrannosaurus rex. It’s probably the first binomial scientific name anybody learns, and for good reason. This dinosaur has shaped our world like no other prehistoric creature before or since its discovery and display. *T. rex*. The name commands respect (*rex* means “king”) while its size and its teeth ensure that it gets that respect. In *The Monster’s Bones*, journalist David K. Randall tells the story of how *T. rex* attained its iconic status.

The “king of the tyrant lizards” is the star of the book, as it is the dinosaurian star of our modern lives. From children’s books to blockbuster movies, the prehistoric protagonist of choice is the mighty *T. rex*. Randall makes the case that the world before the discovery of *T. rex* was lacking—lacking a common horror, but also lacking a common source of wonder and awe. *T. rex* gave us these things and more. It frightened young and

old alike. It inspired generations to learn about the past. It provided us with the perfect cinematic villain and, later, anti-hero. Without *T. rex*, we would have no King Kong, nor would we have Barney. This one dinosaur above so many others sparked a cascade of imagination that still pervades our culture today.

The book bills itself as telling the story of discovering *T. rex* by focusing on its discoverer, Barnum Brown. However, the book is, in a sense, a four-part biography, as it weaves together the histories of *T. rex*, Brown, Henry Fairfield Osborn, and the American Museum of Natural History. Barnum Brown stands out, of course, but he needed an employer or a benefactor or both. He also needed a place to send and display his discoveries. These four icons of American paleontology simply would not be what they are today without one another.

Amid this notable lineup, Randall highlights the dynamic nature of paleontology in the nineteenth century. We learn of the “Bone Wars” waged between Othniel C. Marsh and Edward Drinker Cope. Though not the main subject of the book, this conflict is used to illustrate the colorful character of early paleontology. The author admirably stays neutral in the descriptions of both sides, leaving the reader wanting to know more about them. Randall also informs the reader

about England’s precursor to the American “Bone Wars” when country doctor Gideon Mantell went up against the establishment figure Sir Richard Owen. It was Owen who gave us the term “dinosaur” and described many of the early British species. But it was Mantell who discovered the first herbivorous dinosaur in *Iguanodon*.

With the discovery and display of T. rex, the way dinosaurs were mounted changed, the way the public viewed dinosaurs changed, and the way we viewed Earth’s past changed.

T. rex was at the center of a third feud. Henry Fairfield Osborn of the American Museum of Natural History in New York had a long-running rivalry with Andrew Carnegie of the Carnegie Museum in Pittsburgh. Osborn wanted a relevant museum that could rival and perhaps even surpass the Carnegie Museum. After all, the AMNH is in cosmopolitan New York while the Carnegie Museum is located amid the smoke-choked hills

of Pittsburgh. Yet it was Osborn who was playing catch-up. Carnegie had money and spent lavishly to get the best materials and the biggest dinosaurs. Osborn wanted something no one could ignore. To supply it, he called upon Barnum Brown.

Brown was indefatigable in the field and could weather the heat, dust, cold, flies, storms, and anything else the western frontier and badlands could muster. On an expedition to find a *Triceratops* skull for the AMNH in the Hell Creek Formation in Montana, Brown found his, and Osborn’s, legacy. It took weeks to remove, months to prepare, and years to place on display. Once it was on display, however, the world was never the same. For decades, the only place in the world to see *T. rex* was in New York City at the AMNH.

“Every child that attends a natural history museum on a field trip has Barnum Brown—and the *T. rex*—to thank,” writes Randall (page 235). With the discovery and display of *T. rex*, the way dinosaurs were mounted changed, the way the public viewed dinosaurs changed, and the way we viewed Earth’s past changed. *T. rex* gave us a cultural and scientific icon for the ages. Barnum Brown gave us *Tyrannosaurus rex*.

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Paul Braterman

WHAT WE’RE UP AGAINST Everything But the Kitchen Sink

A solicitation from the Cornwall Alliance—a fundamentalist organization specializing in climate change denial—offered to arm its recipients “against the dangers of science so called” (alluding to 1 Timothy 6:20) by describing the rubric “anti-science” as “itself anti-science.” The missive added, “it arises not just about climate change. From good old Darwinism (goo to you by way of the zoo) and Malthusianism (population growth inexorably exceeds food production and causes a sudden die-off), to the Obama

Administration’s insistence that employers must provide insurance coverage for contraception and abortion regardless of their religious conscience, and COVID-19 mask, social distancing, travel, church worship, and vaccine policies. People in America and around the world are in danger of becoming slaves of scientism and scientocracy.” If nothing else, the Cornwall Alliance’s parade of horrors provided Paul Braterman, a supporter of NCSE, with fodder for a [column](#) at Three Quarks Daily (February 12, 2023).

—GLENN BRANCH

NCSE SUPPORTS “Climate of HOPE”



More than 400 Chicago-area science teachers gathered in early March to improve their climate change instruction.

NCSE Teacher Ambassador

Jeff Grant organized the

event and Executive Director

Amanda L. Townley was one

of the keynote speakers.



Photos courtesy of Climate of HOPE