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Claire Cleveland, a doctoral student in the Department of Geosciences at Penn State, helps a Gray's Woods Elementary School fifth-grader sort debris in search of teeth and other fossils during the 2017 "Shake, Rattle & Rocks" event in the College of Earth and Mineral Sciences.

Image: Penn State

Graduate student using NSF fellowship to enhance science outreach

Liam Jackson
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UNIVERSITY PARK, Pa. — As a child, Claire Cleveland was enamored by Carl Sagan, the scientist who hosted the popular education television show "Cosmos: A Personal Voyage."

"He's kind of a hero to me," says Cleveland, a geosciences doctoral student at Penn State. "Being able to reduce science down to its simplest terms is an elegant art form. It's something to aspire to, and it means that you truly understand what you're trying to describe."

Now, with support from a recently awarded National Science Foundation (NSF) Fellowship, Cleveland will try to replicate some of Sagan's communication artistry. She plans to leverage the support from her fellowship to create more science-based outreach opportunities geared toward the general public.

Sagan wasn't the only source of scientific inspiration for Cleveland. She recalls spending many days with her father, an electrical engineer,

"exploring the natural mysteries of the Great Swamp National Wildlife Refuge" in New Jersey.

"He explained to me how little bubbles formed under mats of algae and how the swamp was transitioning into a forest. The natural wonder and curiosity this instilled in me have served me well ever since," she says.

Cleveland attended Smith College in the early 90s, where she received a bachelor's degree in chemistry. After college, she worked in a variety of jobs, thriving on "the exploration required to articulate a challenge and then working with multiple departments to resolve the challenge," she said. In 2007, she had worked her way up to become an assistant general manager of a resort in Brian Head, Utah.

After garnering two decades of experience in business and management, however, Cleveland realized she wasn't completely satisfied with her career path. While taking regular hiking trips in the backcountry of Utah, Cleveland was filled with wonder and wanted to know more about the natural world she saw around her. Therefore, in 2011, she decided to go back to school for another bachelor's degree. She double majored in geology and biology at Southern Utah University (SUU).

Claire Cleveland gives a lecture in Death Valley to fellow geology students at Southern Utah University.
Image: Claire Cleveland

After graduating, she came to Penn State to pursue her doctorate in the Department of Geosciences, which has many renowned researchers studying the natural world and its past. Working with Mark Patzkowsky, professor of geosciences, and Russell Graham, professor of geosciences and director of the EMS Museum and Art Gallery, Cleveland will be digging into how species diversity has responded to change in the Earth's past.

But making an impact through outreach and scientific communication is just as important to Cleveland as conducting research.

"Solving complex environmental issues in today's changing climate requires communication of scientific information with the general public and policymakers," she says.

One project Cleveland will be focusing on is one she initiated with SUU,

Science Made Accessible and Relevant Through Stories (SMARTS), which she plans to continue working on as a Penn State doctoral student.

"SMARTS is a workshop for grade sixth through ninth teachers. We wanted to be able to provide tools and resources to educators to make science more accessible and less intimidating to students," Cleveland said.

In addition to planning outreach activities designed to help children and youth, Cleveland is working on ways to target students at and beyond Penn State's University Park campus. She blogs about the importance of science and she helped to create one of the most recent exhibits, on ocean acidification, in the EMS Museum and Art Gallery. She is also collaborating with the Penn State chapter of the Association of Women Geoscientists, of which she is a member, as well as the Science Policy Society student organization on this initiative.

"Penn State University Park has a greater ability than some other schools to bring speakers and different minds together and create dialogues. When Penn State organizes these things, we can provide this science to a broader audience at a relatively low cost," said Cleveland, who is researching ways to deliver scientific symposia and colloquia to people who live or study at a distance.

Cleveland has already learned some new techniques at Penn State that are aiding her in her mission of conveying scientific concepts to the public — for example, pairing a photo with a brief statement of evidence, known as the Assertion-Evidence Approach. Assertion refers to the statement, which is supported by the image, which is the evidence.

This technique is an effective tool to help her realize her vision because, she says, "it's a way to tell a story using science." It's also an example of reducing scientific information to its simplest terms — the same approach that brought fame to Cleveland's idol, Sagan. She's hoping to use these and other approaches to continue Sagan's mission of broadcasting science to the public to equip people with knowledge.

"Learning to tell science's stories is a way that nonscientists can relate to the science and can start to think critically about the science," she said.

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