

ROLE Models AND Mentors

*Scientists with disabilities discuss their work
and how they give back* BY LESLIE GROSS KLAFF

When Gallaudet University biology professor Dr. Caroline Solomon wants to show her deaf and hard-of-hearing students why their disability should never get in the way of their success, three inspiring role models quickly come to mind. Vint Cerf, known as “father of the internet,” played an integral part in such technological inventions as email and the internet. Annie Jump Cannon was an American astronomer who developed the Harvard classification system for stars. And the Gallaudet 11 was a group of men researched by NASA to learn how to send astronauts to space safely. They all contributed greatly to modern science, and they all are or were deaf during their lives.

“Science benefits from diverse perspectives and diverse beings,” says Solomon, who is also deaf.

In the United States, more than half a million people in STEM fields have some form of disability, but as a group they remain underrepresented. Here are the stories of six perseverant scientists with disabilities who refuse to let their physical limitations define them. In many cases, the obstacles they face drive them to tackle problems in unique ways, making them even better scientists. Their journeys haven’t been easy, but they succeeded with the help of supportive parents, mentors, hard work and with the help of assistive technology. They are making a difference with their contributions to science and by helping others with disabilities break down barriers and pursue STEM fields.







DR. CAROLINE SOLOMON

Ushering more scientists with disabilities into STEM is a goal Dr. Caroline Solomon works toward every day at Gallaudet, a university for the deaf in Washington, D.C.

An accomplished professor and researcher, she can be found engaging her students both in the classroom and along the Anacostia River, where she studies nutrient dynamics and their influence on the microbial community.

“Role models are very important, and more deaf people doing science will lead to more deaf people *wanting* to do science,” says Solomon, who has a bachelor’s degree in environmental science and public policy from Harvard University, a master’s in biological oceanography from the University of Washington, and a Ph.D. in biological oceanography from the University of Maryland.

Solomon has designed databases to help students and teachers network with organizations and interpreters familiar with educational bridges for students who are deaf or hard of hearing. With colleagues from the University of Washington, she developed a database that formalizes the lexicon of signs used for scientific and technological terms in American Sign Language.

Solomon has helped host national workshops to increase participation and mentoring opportunities of students who are deaf and hard of hearing in STEM fields. It was her mentors, she says, who helped her overcome her toughest challenge — society’s attitude toward deaf people.

“My mentors showed me to look past my deafness to see the person and scientist I am,” says Solomon, who also is an adjunct at the University of Maryland Center for Environmental Science. “I teach my students that they will face those challenges and how to encounter them in ways that are productive and to break down barriers.”

Solomon, who became deaf after contracting spinal meningitis when she was 15 months old, became interested in science as a teenager, when she couldn’t swim in the creek near her home because it was too polluted. She never forgot that creek. Her research focuses on the ecological effects that occur when algae, bacteria, and viruses interact with nitrogen byproducts from agricultural production and other human activity, and prevention measures.

Swimming has always been a passion for Solomon, who has accumulated more than two dozen medals in international deaf swimming competitions. In 2020, she was inducted into the Deaflympics Hall of Fame.



▲ Dr. Caroline Solomon conducts environmental research with the Smithsonian.

DR. GEERAT VERMEIJ

Paleobiologist Dr. Geerat Vermeij started collecting shells at 10 years old in the Netherlands. That passion led to a lifelong study of shells, and Vermeij is recognized worldwide for his work, most notably his research chronicling the arms race among long-extinct mollusks and their predators.

But Vermeij, who is blind, has never seen a shell.

For decades he has been studying shells by touch, using his fingertips to feel the ridges, chips and curves, like a detective searching for clues. Vermeij views shells as a way of approaching large questions of evolution, ecology and human history.

“I have always been a careful observer, someone who notices things and thinks while he notices,” says Vermeij, a distinguished professor in the Department of Earth and Planetary Sciences at the University of California at Davis. “A somewhat neglected, but very important aspect of doing science, is to make good observations, to discover puzzles and things that we don’t understand. And the senses play an essential role.”

Vermeij was born with poor vision and after many surgeries, lost his sight at 3 years old from childhood glaucoma. Always curious about the outside world, his parents let him touch just about everything, sparking his interests in biology, geology and conchology. “It was the diversity of shapes and textures that I loved more than anything else,” says Vermeij, who has more than 200 publications, including five books. “I was very attracted to their scientific names and the places that they came from.”

Vermeij thrived in school, both in Holland and New Jersey after his family immigrated to the United States, with the help of a reader and a teacher who taught him English, English Braille and how to type Braille. He earned a bachelor’s degree in biology in three years from Princeton University and then a Ph.D. in biology from Yale University in three years, traveling worldwide to do it. He credits his parents’ support for not letting his blindness hinder his success.

“My parents always said, ‘You’re smart enough, you can accomplish things ... there is no reason in the world why you couldn’t have a career,’” he says.

Vermeij has served as editor for *Evolution*, the field’s foremost journal. In 2000, he was awarded the Daniel Giraud Elliot Medal from the National Academy of Sciences.

Vermeij’s world-class shell collection is housed at his office at UC Davis. It’s hard to say that his blindness hasn’t played a part in his attraction to shells.

“I kind of think shells chose me as well,” he says.



Dr. Geerat Vermeij

KELLY GILKEY

As a teen with congenital bilateral profound hearing loss, when Kelly Gilkey read an article about astronauts who wore eyeglasses, she wondered if someone with imperfect hearing could also go into space. On a whim, she emailed astronaut Pamela Melroy that very question.

“To my astonishment, she actually responded!” remembers Gilkey. “She said as technology continues to progress, who’s to say that someday there couldn’t be an astronaut who had other physical limitations.”

Melroy’s response set Gilkey on a mission to work for NASA one day. Now a biomedical engineer, she just reached her 20-year anniversary at NASA Glenn Research Center in Cleveland. As project manager for the Human Research Program, Gilkey’s work focuses on the health and performance of astronauts on their missions.

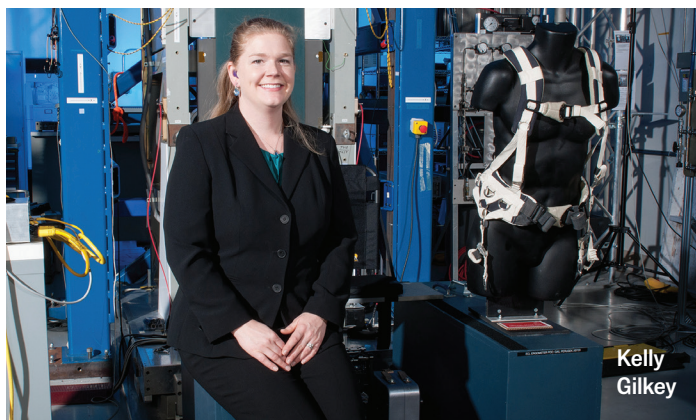
“We want our astronauts to be healthy because ultimately we want them to be able to perform whatever mission they’re doing, whether it’s science experiments or exploring the surface of the moon,” says Gilkey, who earned a bachelor’s degree in biomedical engineering from Case Western Reserve University.

Using computational modeling, her team analyzes the risk of certain medical events happening during a mission and prioritizes what supplies to send. “The bottom line is we’re not flying an emergency room,” Gilkey says. “We’re flying a first-aid kit.”

Previously at Glenn, Gilkey worked on exercise devices to keep astronauts healthy and studied the effects of microgravity on fluids. Her first experience working for NASA was as a participant in Entry Point!, the American Association for the Advancement of Science’s internship program for undergraduate and graduate students with disabilities. She worked at NASA Johnson Space Center in Houston.

Her work would be much more difficult without technology that assists people with hearing loss, she says. Gilkey previously wore hearing aids and now has cochlear implants, which improve her hearing greatly, but not perfectly. Connecting her phone to Bluetooth allows the caller’s voice to travel directly to her brain, and using a computer-assisted transliteration service during conference calls helps her follow the discussion by reading real-time captions.

“I wake up every morning thankful that I live in a time when this technology is accessible and available,” she says.



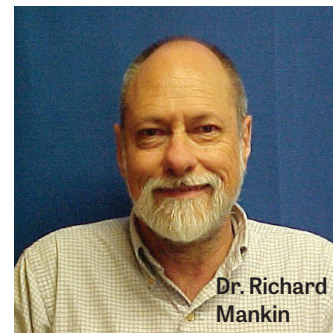
PHOTOS: LEFT COURTESY OF KELLY GILKEY/NASA; RIGHT COURTESY OF RICHARD MANKIN

DR. RICHARD MANKIN

When research entomologist Dr. Richard Mankin looks back on his 48 years working at the U.S. Department of Agriculture, he credits his success to having a mentor and working doubly hard to disprove others’ misperceptions because he is disabled.

Throughout his career at the USDA’s Agricultural Research Service, he has shared that advice with dozens of young scientists by being a mentor himself, giving them experience in his lab.

“I always suffered from the problem of people assuming that I wasn’t mentally competent because I couldn’t walk on my own,” says Mankin, who was born missing several muscles in his legs and wears braces and uses crutches to move around. “I had a boss



back in the ’80s who recognized that I had potential. You have to be productive and catch someone’s eyes. It helps to have a champion, and I’ve tried to do that with several people.”

Mankin’s research focuses on detecting and controlling hidden insect infestations. Using specialized sound equipment, he listens to the chomping sounds that bugs make in wood, soil or stored products as a way of detecting and monitoring pest problems. His research involves the development and use of acoustic tools to help control these problems by using sound to alter bug and insect behaviors.

“I have limited mobility but enough to do a lot of research,” Mankin says. “I really enjoy doing fieldwork, to look at what the insects are doing.”

He started working in an insect research lab at the USDA in 1973 while in graduate school at the University of Florida in Gainesville. Since then, Mankin has mentored almost 40 students, some with disabilities, and serves as president of the Foundation for Science and Disability, a nonprofit that promotes the representation of scientists with disabilities by removing barriers, improving the workplace environment, and boosting employment opportunities. The foundation plans educational programs and offers a student grant fund.

He got involved with the foundation to be around other scientists. “Scientists learn from others and train others constantly,” says Mankin, whose work has taken him across the United States and to other countries. “Mentoring others is a form of networking, and it’s also a way to give back to society.”

Mankin earned a bachelor’s degree in physics and math from New Mexico State University. The sheer numbers of different insects fascinated him, as well as using physics to understand their behaviors, such as flight.

“I saw the insects and the birds doing their thing and wishing I could fly,” he says. “And now there’s drones. So now I’ve got my own drone to fly.”



MAUREEN HAYDEN

Texas A&M University graduate student Maureen Hayden, who is legally blind, always wanted to pursue marine biology, but her work as a researcher just recently came into focus.

Thanks to a new pair of high-tech electronic glasses called Acesight, challenging tasks such as labeling small test tubes and weighing reagents are now much clearer. The glasses have two full HD display screens in front of each eye and a tracking autofocus lens that captures everything Hayden looks at, magnified up to 15 times the normal size.

Hayden, who's investigating the impacts of plastic pollution on Texas beaches and marine life for her doctorate, says tools like Acesight and learning to problem solve have allowed her to pursue her goals — whether that's being a scientist, teaching assistant, scuba diver or a trombone player in the marching band.

"Blindness will always be a part of my identity as much as being a female, being a daughter, and being a marine biologist is," Hayden says. "I show people how cool (blindness) can be and the neat tools that we use for navigating the world."

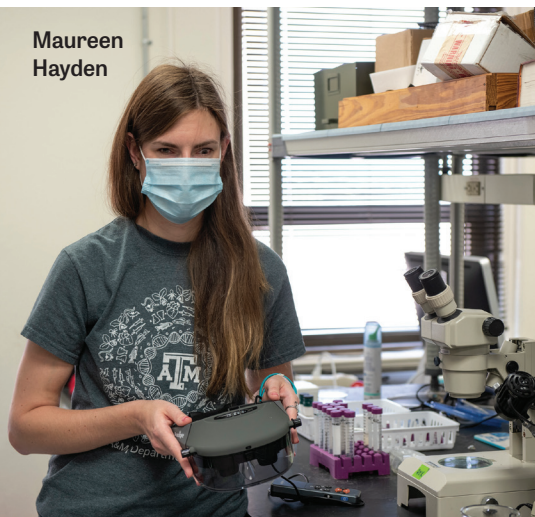
Hayden was born with retinopathy of prematurity, an eye disorder that primarily affects premature infants. Her vision is blurred, so she uses clues like the way her friends walk or the color of their shoes to identify them.

"I think persons with disabilities or different abilities have a lot to offer science and a way of viewing the world," Hayden says. "Inherently, you've had to learn to problem-solve because unfortunately society does not always cater to persons with disabilities. By using those skills, I think you open up areas of your brain and have this expansive thinking that carries over to other situations."

While earning her bachelor's degree in marine biology from the University of Rhode Island and her master's in biology from Walla Walla University, Hayden benefitted from peer note-taking, interactive PDFs and a microscope that had a camera attached to the ocular lens with an output to a computer screen. Growing up, Hayden's parents taught her to advocate for herself.

"I rarely ever heard, 'You can't do this,'" Hayden says. "Once I got to college, learning how to appropriately and effectively ask for what I needed was a really important skill."

Hayden is passing that along as a mentor for Learning Ally College Success, a national program that pairs blind and low vision undergraduate and graduate students with professionals in similar fields.



NADMIONOR CASIANO-BERRIOS

When it comes to overcoming obstacles, aerospace engineering graduate Nadmionor Casiano-Berrios — who is deaf — has made history.

When Casiano-Berrios left Puerto Rico to attend college in the United States, she needed to learn English *and* American Sign Language (Puerto Rican Sign Language is different), all while tackling complicated engineering courses. When she graduated from San Diego State University in 2018, she became the first deaf Puerto Rican woman to graduate in her field.

"When I graduated, I felt like I couldn't believe it," says Casiano-Berrios, whose hearing loss was caused by an infection as a baby. "All of my challenges, I felt that they were really worth it."

When she struggled with reading in second grade, her teacher punished her verbally and physically. She moved to a better school, but with no sign language interpreters, she learned to read lips. She became fascinated with space at age 8, after learning about the planets.

She thrived in school, yet her guidance counselor discouraged her from studying aerospace engineering. She studied mechanical engineering at Polytechnic University of Puerto Rico then transferred to a community college, and then to San Diego State University.

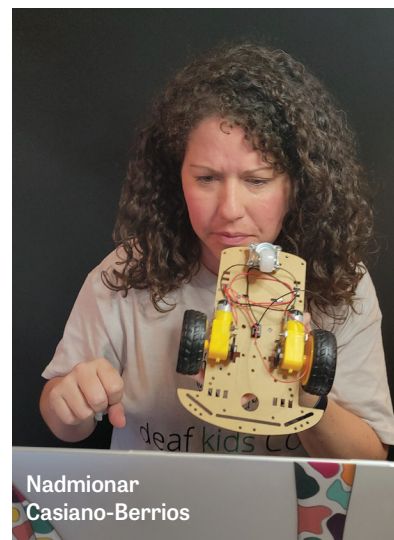
"I was one of three women in the program," she says. "The competition in the classes was pretty stiff. And I wasn't made to feel welcome being a woman and being deaf."

Working with interpreters has been invaluable but finding one familiar with signing for engineering terminology was difficult. "My interpreters work very hard and actually learn with me in some cases," she says.

While she looks for an engineering job, Casiano-Berrios is working as a program lead for Deaf Kids Code, an organization that promotes technology, computer science and design thinking skills to empower students who are deaf or hard of hearing. In this role, she travels to cities throughout the U.S. teaching deaf and hard-of-hearing students in a variety of STEM subjects.

A motivational speaker, she shares her story nationwide, inspiring children with disabilities to pursue STEM. In her spare time, Casiano-Berrios takes flying lessons. "I show my students pictures of me flying and they say 'No, that's impossible,'" she says. "That's how they've been trained growing up. They've learned that things are impossible, but then I can show them anything is possible.

One million told me no BUT I did it! ■



TOP ILLUSTRATION © WASEEM ALI KHAN; BOTTOM LEFT COURTESY OF MAUREEN HAYDEN; TOP RIGHT COURTESY OF NADMIONOR CASIANO-BERRIOS