Science is a collaborative activity, whether it’s sharing resources, filling in the expertise gap, benefiting from the comradery of colleagues and getting another—perhaps foreign—perspective on a project, or training the next generation of researchers. Students, particularly those from underrepresented groups, also benefit from these interactions—by gaining new skill sets, by enhancing their resumes, and especially by seeing scientists who look like them and following in their footsteps. Faculty awards given to the Louis Stokes Regional National Science Foundation (NSF) Center of Excellence (LSAMP-NICE) aim to make that happen by bringing the world to both faculty and their underrepresented science, technology, engineering, and mathematics (STEM) students.

Many picture scientists bound to their bench doing labwork. Yet even STEM scientists are more mobile than is typically thought—often traveling to colleagues’ research institutions and even engaging in field work.

Associate professor of earth sciences William Gilhooly has some long-term collaborations, including those with geologists from the University of Campinas and the University of São Paulo (USP) in the State of São Paulo, Brazil. He has hosted a couple of Brazilian researchers—a graduate student and a postdoc—in his Indiana University-Purdue University Indianapolis (IUPUI) lab and was awarded a CAPES-PrInt international (Coordination of Improvement of Higher Education Personnel Program for Institutional Internationalization) exchange fellowship through the Brazilian Ministry of Education to teach a graduate course at USP.

“As far as the student experience, I am a big believer in the opportunities [afforded by] doing international research. One of the things that I really like about my profession, my career, is getting to work with international colleagues from all over the world, especially when you actually get to go and work in other countries,” Gilhooly says.

“Whether it’s at universities or going to remote field locations, you can really experience life in the culture in ways you wouldn’t if you [just] went to all the big cities as a tourist.” It’s an amazing opportunity for students from different cultures to be able to meet and connect with other young people at a similar stage, age, and academic range as themselves, but with a different life experience growing up in a different country, he adds.

Gilhooly is currently working with an IUPUI environmental science student with Hispanic heritage, Giannina Ramirez, who was looking for more opportunities to work with the lab. He applied for, and was awarded, an LSAMP-NICE faculty award that will

LSAMP-NICE faculty awards let STEM students benefit from international research

Environmental Science major Giannina Ramirez in William Gilhooly’s laboratory at Indiana University-Purdue University Indianapolis (IUPUI).
allow his student to do some scientific research overseas while enabling him to kickstart a more formal student exchange between universities in the two countries.

**Faculty award is for the students**

Gilhooly's award “is a faculty award, but the application and portfolio [that] the faculty submits are based on the work they do with students, as a part of training the students to do scientific research,” says Denise Yates, a senior research scientist at the University of Texas at El Paso and a co-principal investigator (co-PI) on the LSAMP-NICE NSF grant. <<see sidebar on next page>>

The application materials put it this way: “An awarded faculty mentor would receive $8,000 to support the development and advancement of international research experiences for students.”

Important as that is, it’s not just about the scientific research. The “international” and “experience” aspects play at least as important a role.

“We want the faculty to take advantage of their (sometimes) existing collaborations with international faculty, and to highlight this for their student mentees,” Yates says. At the same time, they want to give underrepresented minorities in STEM the chance “not only to participate in the experience, but to find firsthand why it’s important that they be provided an opportunity to expand their horizons and to enrich their portfolios,” she adds.

And the benefits go far beyond just those for students who want to travel, especially for those who are who are black, indigenous, or people of color (BIPOC). Higher education is still a largely white institution, at least in the STEM fields. There are very few BIPOC in faculty positions to serve as role models, explains Gilhooly.

“That makes it really difficult to recruit or retain people, because there are very few people who look like them.”

“I think about these faculty awards as representative of the types of activity we are sponsoring through the NSF International Center of Excellence,” says Zakiya S. Wilson-Kennedy, assistant dean for diversity and inclusion in the College of Science at Louisiana State University, and an LSAMP-NICE co-PI.

Researchers working internationally often have collaborators nearby their research sites, or in some cases (as will be seen below) functioning as integral partners at those sites. Exposing students to these relationships is fundamental to the LSAMP-NICE mission.

(Not) All I got were some rocks

Gilhooly’s lab looks for signs of chemical signals contained in rock, likely created by biological reactions, and uses these biosignatures to better understand what Earth and life on it was like a long time ago. Analyzing ancient photosynthetic activity and oxygen production may offer clues to the evolution of animal life.

For the LSAMP-NICE
project, he and his mentee will go down to Brazil and collect 2-billion-year-old rock samples in the field with a colleague from USP and her students. They will do some initial analyses at USP before returning to Indiana, where they will continue analyzing splits of the same subsets of the samples. The researchers will keep each other updated regularly through virtual meetings and “then ultimately move toward getting a publication,” he explains.

“One of the big things the faculty award will do is to help further strengthen my professional and personal ties to researchers in Brazil,” Gilhooly adds. “And so, one of the big goals of this faculty award is to establish the beginnings of a bidirectional student exchange. There are a lot of analytical resources at both of those universities, and a lot of incredibly talented expertise.”

**Representation matters**

Jessica L. Black, director of the Center for Indigenous Health, Culture, & the Environment at Heritage University (HU) in Toppenish, Washington, is steeped in introducing a STEM education to underrepresented minorities. HU, where she is a professor of environmental science and studies and chair of the Science Department, is a Native American-Serving Nontribal and Hispanic-Serving Institution located on the traditional lands of the Yakama nation, and a long-standing partner of the All Nations LSAMP (ANLSAMP).

Black was given charge of the ANLSAMP Costa Rica International Research Experience (CRIRE) by Steve Dupuis, a native scholar and PI for LSAMP-NICE who was running CRIRE at the time. As she already had a partnership with the Ngäbe and Buglé people nearby in Panama, she asked her colleague Celestino Mariano Gallardo (now president of their traditional government, the Congreso General Ngäbe Buglé) if he and other indigenous experts would come to Costa Rica to work with the visiting Native American students and their mentors in order to guide them in their research projects, “sharing their traditional ecological knowledge in a global indigenous exchange,” she explained.

CRIRE is “very much classic scientific research in tropical ecology—[such as] investigating different species of butterflies, or investigating an invasive flower that’s popping up in the forests,” she says. “The Native American students from the United States all indicated the most impactful part of the program was learning about the natural world from the local indigenous experts. And the Ngäbe really enjoyed it, because they got to see what our students were learning and saw the potential for their own students. They got to experience what scientific research can be. It became clear to them how much they had to offer.”

**Listening rather than telling**

Given the success of CRIRE, Black wanted to assess the potential for a similar—but different—program in Panama: It would be more along the lines of “applied community-
based research with an indigenous community partner.”

Wary of what she saw as a history of “extractive science,” Black wanted to “create and implement programs that are built in partnership and reciprocity with indigenous communities.” She also wanted programs that will help engage, retain, and enhance the next generation of scholars underrepresented in the STEM fields.

Black had been working with the Ngäbe through their traditional government and several years ago did a series of “listening sessions” to assess what they felt were their needs and concerns—a reversal of a traditional power dynamic of telling community partners what they needed. “One of the strongest themes to emerge was access to water and concerns about changes in the hydrology they were observing.”

This seems like “a great training opportunity for our students as well as members of the communities we work with,” Black says.

Testing protocols have to be established; sources of contamination have to be investigated if any are found. And locals have to be trained to carry out monthly testing while the international exchange program is not in session.

“We want to build a program that is sustainable. There are many Ngäbe undergraduate students in Panama whom we feel would be very interested, and the Panamanian universities themselves are very interested in this kind of partnership,” she notes.

So Black applied for, and was granted, an LSAMP-NICE faculty award, in part to facilitate a formal CRIRE-like exchange—which included establishing or renewing memoranda of understanding with Panamanian universities and community groups, and providing for an HU student mentee to accompany Black to Panama. “And there’s funding for me to pay for the water-quality sampling for the partner communities.”

### Ambassadors for science

“Most of our students are first-generation college students, many are from bilingual households, and very few have had the opportunity to travel much outside of our valley,” says Black. “We’re taking these students into a whole different world—one where their ability to speak Spanish is highly valued and critical to the success of the program. We want them to understand how strong they are, how valuable their skill sets and their leadership qualities are.”

Black says she is “focused on diversifying the professoriate by building programs to transform the system so it’s more responsive to the far more diverse set of students we have today, and to enhance the next generation of STEM scholars.”

“The faculty award shows how much this work is valued, and that it’s worthwhile investing in,” she explains. “My hope is that I can use this as a pilot to secure additional funds and keep doing this work.”