# Shared

**Mexican and U.S. scholars are working collaboratively to solve problems on both sides of the border.**

BY DAVID TOBENKIN

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# Solutions

**SCORPIONS ARE NOT STOPPED BY THE U.S.-MEXICAN BORDER.** Neither are the many U.S. and Mexican academics who collaborate to study those venomous creatures and many other issues that the two countries share.

Tens of thousands of individuals are stung by scorpions on both sides of the border each year. If they are lucky, they are saved from severe illness or possible death by injection of an effective antivenom in time.

In 1999 University of Arizona Associate Professor of Pediatrics and Pathology Leslie Boyer, then pregnant with her daughter, was invited by the National Geographic Society to tag along on a National Geographic expedition with a film crew in Mexico, hot on the trail of a Mexican antivenom that was saving lives in Mexico, yet was unknown in the United States.

The expedition wrapped up in Cuernavaca, in the laboratory of scientists at the Universidad Nacional Autónoma de Mexico (UNAM). There Boyer witnessed an apparent miracle: as a mouse lay rigid, dying from scorpion venom, Boyer watched with amazement as one of the scientists injected the mouse with antivenom. Miraculously, within minutes, it was well on the way to full recovery.

Later, Boyer began speaking with one of the scientists, Alejandro Alagón Cano, a professor at the Biotechnology Institute of the Department of Molecular Medicine and Bioprocesses at UNAM. They began to realize that by combining their respective skills, they could yield results neither could on his or her own.

Alagón, who had won the 2005 Mexican National Prize for Arts and Sciences, the highest distinction awarded by the Mexican government, knew how to produce the Mexican antivenom in a very pure form and had connections to manufacturers in Mexico. Alagón could rapidly test, develop, and guide the manufacture of antivenoms.

Boyer was a Harvard Medical School-trained doctor and clinical researcher with connections to the U.S. health regulatory bureaucracy and who was also director of the University of Arizona's Venom Immunochemistry, Pharmacology, and Emergency Response (VIPER) Institute. She could help supervise top-tier clinical trials of drugs in the United States and guide them through federal regulatory hurdles there.

After initially publishing research findings in the *New England Journal of Medicine*, they realized a remarkable opportunity presented itself: what if they could obtain the most rigorous regulatory acceptance

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**Leslie Boyer, associate professor of pediatrics and pathology at the University of Arizona, who has had a longtime research partnership with Alejandro Alagón Cano, a professor at the Biotechnology Institute of the Department of Molecular Medicine and Bioprocesses at the Universidad Nacional Autónoma de Mexico, with a vial containing their latest experimental antivenom. In this photo, the glass vial is not completely empty: it contains a fine layer of snowy white dust at the bottom. Boyer says: "Alejandro brought it to impress me because it just might be the purest antivenom ever made, requiring only a minuscule dose for full potency. I am having trouble containing my mirth because the specimen is so tiny that the vial contains mostly air."**

for the antivenom, which would be called Anascorp®, in the United States. If so, the drug would receive recognition as a world leader.

In August 2011 Anascorp® became the first Mexican drug to be approved by the Food and Drug Administration, one manufactured at Instituto Bioclon in Mexico City. It has stimulated a collaboration between Boyer and Alagón that continues to the present and has expanded to other venomous animals research.

"They had something we wanted and we had something they wanted," Boyer explains. "It's hard to be a brilliant Mexican professor and get attention in the world. They don't have a process that is highly regulated so you can't tell how good they are. So they had the technology and science. And we had the media attention and the bureaucracy, which is one of America's biggest assets. We have an FDA with an international reputation as having the highest standards on earth, the highest hurdle they could jump. If they could jump through that hoop and be approved under the FDA's regulations, it would be the first time they had had that type of recognition."

***Interactions between the United States and Mexican academics are particularly strong in areas shared by the two regions: desertification, water shortages, common ecosystems, solar energy, astronomy due to clear skies, certain rare diseases, public health and epidemiology, North American politics, economics, and Pacific Rim issues.***

"I think that this collaboration has been very interesting," Alagón says. "As a basic researcher, I am always trying to answer a question. Many basic researchers try to find significant questions to answer. Sometimes the question a basic researcher asks doesn't have practical application and is meaningless in terms of immediate impact of society at the time doing research, which still can be good. But with my interaction with the University of Arizona, I now don't have to invent the questions. Instead, the questions come from the real world. Because the main objective of my research is to improve the antivenom, it is important to know what is going on the venom side so I can improve the antivenom."

## Ties and Challenges

Joined by a common border and shared intellectual interests, such collaborations between academics in the United States and Mexico occur more frequently than some might think. Mexico, for example, is the 15th largest source of international scholars in the United States in 2012, with 1,390 scholars, up 3.1 percent from 2011, according to the Institute of International Education's *Open Doors* data.

But such ties are also challenged by economic disparities between the two sides, visa and immigration issues, the problem of Mexican organized crime, and, many times, unfair perceptions.

"People do not want to believe this antivenom is from Mexico," Boyer says of Anascorp®. "I've had anonymous reviewers in grant applications say in their responses that I shouldn't use a Mexican lab for scientific collaborations. But this antivenom *is* from Mexico. Alejandro and his colleagues at UNAM are brilliant and some of the best colleagues I've ever had. I visited their lab and believed in them. I'm so lucky—why should little ol' me have the opportunity to work with the winners of the Mexican National Prize. You don't get a higher honor than that. I feel honored to be able to test their products, yet most of my colleagues didn't know they existed. The proof is in the patients that got well with this antivenom."

Numerous universities, particularly those in the southern half of the United States and the north of Mexico are working assiduously to strengthen ties between the two countries. Some of the larger U.S. institutions maintain international offices in Mexico to coordinate their activities there. Angela McCracken, director of the University of Southern California's regional office in Mexico, says that the University of Southern California set up her Mexico City-based office in 2005 to expand relations with institutions in Mexico. "We have a mission to increase academic and scientific collaboration between our institutions and institutions in Latin America. USC has 17 professional schools and the Dornsife College of Letters, Arts, and Science, and when schools or faculty members are interested in making connections in Mexico, or Mexican institutions are interested in USC, I make the connections."

An example, she says is the [Mexican] National Institute for Statistics and Geography (INEGI), which has scheduled a conference on geography and climate change in September 2013 and contacted her in January 2013 for help lining up speakers. "I said, 'here are

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the experts at USC that publish and research on geography and climate change.' Faculty from USC and UNAM, the National Autonomous University of Mexico, are trying to find ways for UNAM faculty to spend their sabbaticals at USC. One institution [the National Autonomous University of Mexico] has faculty members in biomedical engineering, and they would like their faculty members to do sabbaticals at USC."

Interactions between the United States and Mexican academics are particularly strong in areas shared by the two regions: desertification, water shortages, common ecosystems, solar energy, astronomy due to clear skies, certain rare diseases, public health and epidemiology, North American politics, economics, and Pacific Rim issues.

## Studying a Shared Concern: Illegal Drug Trafficking

The illicit drug trade is another area that spans the border and is being studied in many collaborative efforts by academics on both sides of the Rio Grande River. USC School of Social Work Professor Avelardo Valdez, supported by grants from the National Institute of Health's National Institute on Drug Abuse, is studying the growing epidemic of crack cocaine abuse in Mexico City in collaboration with the Mexican Instituto Nacional de Psiquiatría in an effort that features field work in highly disadvantaged areas of that city.

"We started studying the diffusion and emergence of crack cocaine in Mexico about one-and-a-half years ago and are in the process of finishing collecting data in the three districts of Mexico City that have the highest rates of poverty, unemployment, and crime," says Valdez. "Because so little is known about the issue of crack cocaine in Mexico, we decided to do a more qualitative study of the issue, which we will hopefully parlay into a larger study of crack cocaine in Mexico as a whole. Instituto Nacional de Psiquiatría conducts large national household surveys on substance abuse in Mexico. Guillermina Natera Rey, of the Instituto Nacional de Psiquiatría, and I are the principal investigators of this study, and [USC School of Social Work Assistant Professor] Alice Cepeda is a coprincipal investigator on this grant. Other staff include three field workers and three transcribers at the Institute Nacional de Psiquiatría. One of the field

workers is a full-time employee and the other two are graduate students at the [Mexico City-based] Instituto Nacional de Antropología e Historia (INAH)."

Valdez says the growing recognition that drug use is a bilateral problem has led to more funding opportunity for research on this topic. "I think there is a trend over the last 10 years toward there being more resources and subsequently more collaboration among U.S. and Mexican scholars than in the past," Valdez says. "Many institutions, such as the NIH, the State Department, and the Institute of Psychiatry and other health research entities in Mexico are engaging in more cooperating efforts trying to solve the problem. They recognize that the only way to get a handle on this as a public health issue is working collaboratively."

"Both sides bring strengths to the table and both can learn from each other," Valdez says. "The Mexicans have a very strong theoretical background, while the Americans bring a stronger methodological approach. It's a win-win situation for both sets of researchers. Both bring benefits to each other."

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## Collaboration Is Scalable

Some U.S.-Mexican collaborations are large scale. One large U.S.-Mexican academic collaboration, between the University of Arizona and UNAM, the "Binational Consortium on Shared Arid Lands," started two years ago and now boasts 20 U.S. and 20 Mexican academics, says José Lever, the University of Arizona's Mexico Office coordinator. "Within the broader context of collaborative research, there are high profile projects involving the environment, climate change in the shared dry lands between U.S. and Mexico," Lever says. "This research consortium looks in a comprehensive way at earth science, atmospheric science, life science, and public policy to yield recommendations in areas like water and energy in a binational way. In the U.S. Southwest and Mexico, we will encounter the same types of issues, from water to energy, to how to deal with crops and population."

Another large collaboration is the Puentes Consortium, which is a group of five higher education institutions: Rice University and the University of Arizona in the United States, and the Universidad de Monterrey (UDEM), the Tecnológico de Monterrey (ITESM), and the Universidad de las Américas Puebla (UDLAP) in Mexico. The consortium focuses on producing high-quality, multidisciplinary research on issues of importance to relations between Mexico and the United States and to the well-being of their inhabitants. The current call for papers invites researchers to address public health issues in the U.S.-Mexico border.

## Key Connections

Several organizations facilitate linkages between academics and institutions in the countries. "The Consortium for North American Higher Education Collaboration's (CONAHEC) primary function is to help people find partners for international collaboration projects and to broker relationships between them," says Sean Manley-Casimir, interim executive director of CONAHEC, based at the University of Arizona.

One of CONAHEC's newest programs is its Faculty Mobility Program. "This program permits CONAHEC member institutions to identify programs and departments in which they would be interested in receiving a visiting faculty member," says Manley-Casimir. "They then determine the start date, duration, research duties, and/or teaching load and other position-specific information which is advertised through the CONAHEC network. Faculty at other CONAHEC member institutions meeting the position requirements are then able to apply. This is an opportunity for faculty to go work at another CONAHEC member institution in a different country and cultural context, contributing in their own area of specialization while gaining valuable international experiences and connections."

Mexico's National Council of Science and Technology (CONACYT), a Mexican federal agency, is a leading center of funding for research, including international collaborative projects, in Mexico. "It's not the only channel of relations between academics in the United States and Mexico, but CONACYT is the most important," says Luis Mier y Terán, associate

director of planning and international cooperation at CONACYT. "We provide scholarships to more than 4,000 people [in 2012] in different countries, 1,101 of them are in the United States, most in PhD or master's programs or some specializations. We also have specific agreements with important U.S. universities for different purposes."

Of the 4,000 students with scholarships, the United States, with its share of 28 percent of those, represented the largest destination of recipients, followed by the United Kingdom's 22 percent. Mexican researchers produced 5,981 research papers with the United States, or 21 percent of the total, in 2009–11, more than double of the number of the second-ranked country, Spain with 2,789, Mier y Terán says.

Symposia exploring relationships between the countries also exist. In February [2013] the Association of Independent California Colleges and Universities (AICCU) held a one-day symposium in Sacramento on Strengthening California and Mexican University Partnerships and on California-Mexico higher education collaboration.

A number of programs seek to link individual U.S. and Mexican states and municipal governments through university-led efforts. "We have been working for nearly 10 years on a binational project related to global and binational policies in which we identify Mexican state or municipal governments, especially the new elected officials, and invite them to go and work with their counterparts in the U.S. and to talk about their strategic plans, strategic projects, and whether they would like to work together," says Guillermo Hernández Duque, director of the global development department at Merida, Mexico-based Universidad Anáhuac Mayab, who was one of the speakers at the AICCU symposium.

## Border Crossings Still Problematic

Yet such ties are not immune from the larger socioeconomic and political challenges and tensions between the countries. Actual organized crime and the larger perception of the same have devastated student exchange programs. While the effect on professorial and graduate student exchanges has not been as great, it is present.

"Relations over the past decade have been terrible," Boyer says. "We are constantly having to overcome barriers other parts of societies have placed between the academics. The Arizona law [against undocumented immigrants, S.B. 1070] meant the Arizona brand suffered greatly in Mexico. I had to prove to


Guillermo Hernández Duque, director of the global development department at Merida, Mexico-based Universidad Anáhuac Mayab with the university's academic director, Narciso Acuña Gonzalez, at NASA's Johnson Space Center in Houston, working with the center on new opportunities for economic, social, and human development.

COURTESY OF GUILLERMO HERNÁNDEZ DUQUE

the Mexicans that I was an individual worth collaborating with. Student exchanges were cancelled. Some Mexican towns posted warnings that it was too difficult to travel to the U.S."

Unlike European colleagues, who can easily cross the border into each other's labs, Mexican graduate students and researchers are often thoroughly grilled and their cargo thoroughly scrutinized at the U.S.-Mexican border. Boyer says there are often significant challenges to obtaining short visas for Mexican academics and graduate students to conduct research.

"I have enough incidents involving crossing the border and carrying specimens, with colleagues or students treated like criminals, to write a book," Boyer says. "Some of the specimens have to remain frozen solid for the whole trip. If they are in quarantine and the dry ice goes bad, the experiment is over. I have also had scorpions die waiting to cross—scorpions gathered at great risk to the people collecting them. And when you are crossing the border and have to say you have drugs with you, 'drugs' is not a good word."

On the other hand, strides in telecommunications have helped allow interaction when physical visits are not possible. Internet telephony applications like Skype are godsends that allow face-to-face contact and reduce expenses. Such sharing is hindered by the fact that the Mexican side often does not have access to the same level of equipment.

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## Different Tools, Shared Solutions

That is part of a larger general disparity between the resources available to academics in the two countries. Outside Mexico City and some of the larger Mexican urban centers, investment in basic research and the level of physical resources at research institutions is often dramatically less than in the United States, says Boyer.

"Mexican universities don't have as much money as has historically gone into lab development in the United States," Boyer says. "You can find the same tech in Mexico but it is not as abundant. In Mexican labs today, that places a premium on hands-on cleverness that was once the domain of American scientists. They don't have as many machines. The work in Mexico is more likely to be thoughtfully tailored to the question and less likely to involve high volume attempts to try everything that you can. I find my collaboration with Mexican partners to be very stimulating and exciting because you have to solve problems in a way that engages the brain differently. I was working on a new model once and didn't have the equipment I needed to collect a specimen. A U.S. colleague said, 'if I were in my lab, I'd have exactly the thing I need.' A Mexican colleague who was there brought over some tubing that was there for another purpose, reassembled it and invented a tool that we could use in 15 minutes."

The disparity in academic resources and the sometimes problematic linkages between the two countries actually ties into the research of some academics, such as University of South Carolina Associate Professor of International Business Gerald A. McDermott's comparative research into regional integration regimes. "[The North America Free Trade Agreement] is about opening up incentives, and the European Union, another integration project, attempts to develop linkages in different realms," McDermott says. "The EU also does it with research: there is a fair amount of support for research for Western professors to build projects with Eastern European professors. There is some here [between the United States and Mexico], but it's not as strong as you would think. At least in Europe there is a venue, a direction, to build these ties. The idea is not only increased professional integration but also the upgrading of professionals and their skills. As applied to education, the big issue in terms of U.S.-Mexican education are developments that over the past few years have stymied educational exchanges with Mexico. U.S. universities are basically reducing their exchanges at the undergraduate level with Mexican institutions because of perceived and real security risks. That's a really big problem. We know that cross-border integration depends a lot on social and educational integration, especially when looking at what happened in Europe. What risk factors do is delay development of these relationships at best. If people don't start to see each other as neighbors and as a place to go, then there is not much desire to build common institutions or help the development process in Mexico itself."

Such trends directly feed into U.S.-Mexican academic research patterns, McDermott says. "It becomes a Catch-22," he says. "Research is an indirect thing: universities don't direct research. When you develop an alliance it can be thick or thin. If you have a good alliance and partners, it's up to the professors to develop ties. If there is not as much back and forth, you don't get spillover from new people and new partners. Things that could come about, such as if you are sent to teach you could start researching, don't happen."

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McDermott is working on collaborative research with Belén Avendaño Ruiz, a professor of economy at the School of Economics and International Relations at Universidad Autonoma de Baja California in Mexico.

"Her specialty is development economics and agricultural economics, and we are working together on a project on how Mexico's transforming its food safety regulatory system and how NAFTA has shaped that and the food industry," McDermott says. "In her case, she has detailed local knowledge and contacts, knows the story of Mexico in detail, and where the data is. She is a very competent agricultural economist. I offer a broader theoretical portfolio and more of a comparative perspective. I'm more familiar with

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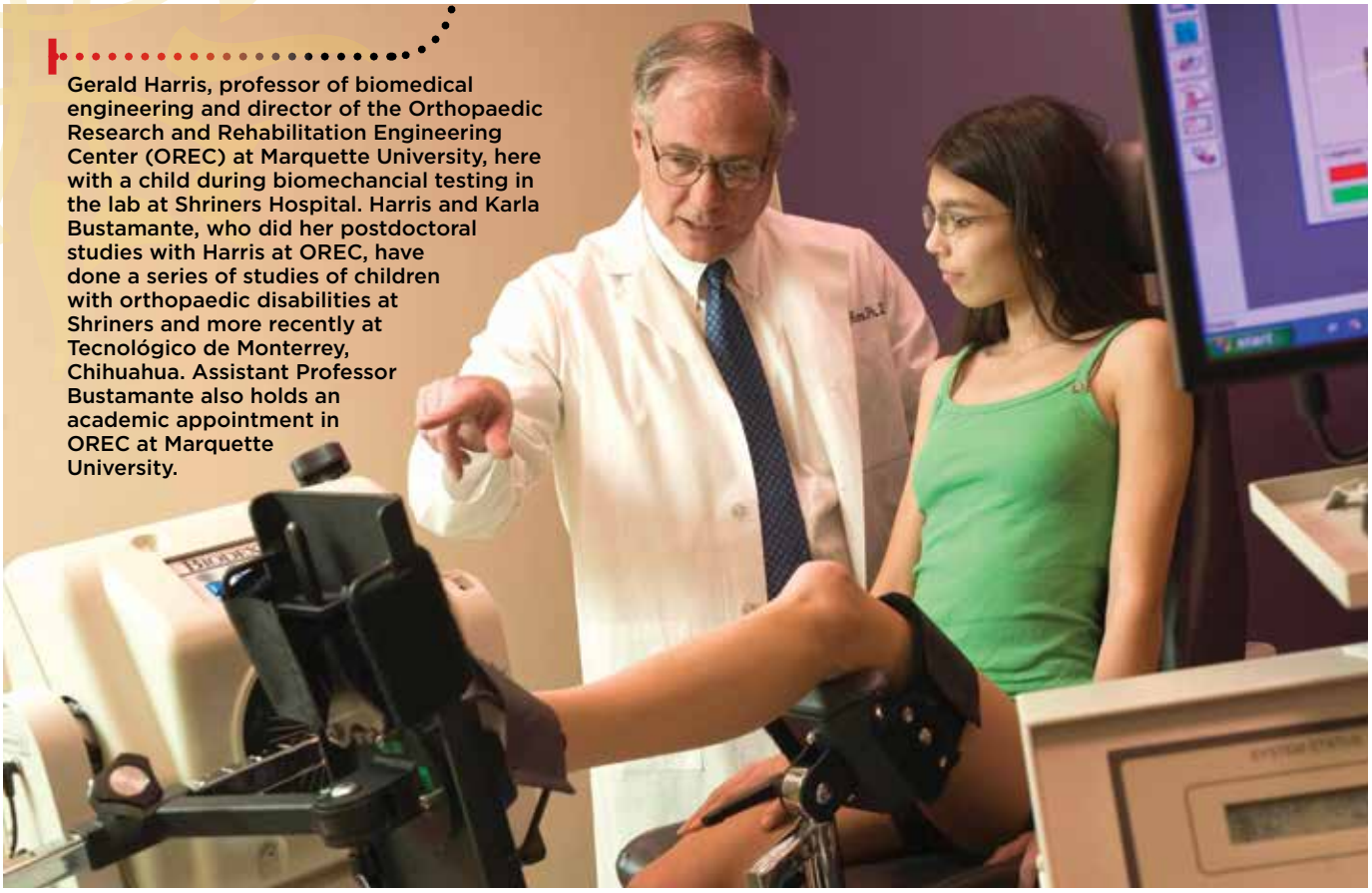

Gerald Harris, professor of biomedical engineering and director of the Orthopaedic Research and Rehabilitation Engineering Center (OREC) at Marquette University, here with a child during biomechancial testing in the lab at Shriners Hospital. Harris and Karla Bustamante, who did her postdoctoral studies with Harris at OREC, have done a series of studies of children with orthopaedic disabilities at Shriners and more recently at Tecnológico de Monterrey, Chihuahua. Assistant Professor Bustamante also holds an academic appointment in OREC at Marquette University.

COURTESY OF GERALD HARRIS

different types of analysis on these institutions and how they have emerged in other regions. I ask her questions and she gives me things to read, and we work on research design together. We've done field work together in various parts of Mexico like Guadalajara and Mexico City. A lot of this is conducting field interviews together with regulators and firms. We hope to have two papers out in 2013."

McDermott says that one aspect of working with Mexican colleagues is recognizing the challenges they face. "The biggest thing is that in many emerging markets, including Mexico, institutional support for high level academics is limited," McDermott says. "For instance, they don't have the same financial resources. Here, in the U.S., at a research university, the number one thing is research and you also teach. In places like Mexico, they don't have a lot of research resources nor time to do research. They are paid to teach and run programs instead. Often the training isn't as advanced, including knowledge of disciplines and methods though that's only on average. They also don't have the same feeder system of graduate students. It's hard to find good research assistants who are competent and trained."

Jonathan Samet, director of the USC Institute for Global Health at the USC Keck School of Medicine and, earlier, a professor at the Johns Hopkins Bloomberg School of Public Health, says that good collaborations arise from both sides following through on commitments. Samet has had a two-decade collaboration with Mauricio Hernández-Ávila, the director of the National Institute for Public Health in Mexico and previously the Mexican Undersecretary of Health. They have joined on collaborative work on studies of tobacco smoking, including a study of smoking-attributable deaths and diseases in Mexico and the associated costs of smoking-related diseases in Mexico. They also collaborated in the establishment of a center for tobacco control at the National Institute for Public Health with funding from NIH, a center that has had an important role in the strengthening of tobacco control in Mexico through research and policy analysis. The collaboration also led to the establishment of a training program in epidemiology and public health that occurs annually during the summer at the National Institute for Public Health.

"It's important to find a similar good counterpart to work with, to build a relationship with trust, and to do things that work," Samet says. "And you must look for something that each partner has to offer the other. When we started the program, we had expertise in the teaching of methodology that was not as

strong at [Hernández-Ávila's] institution at the time. With all of these collaborations, the most critical thing is, if you say you are going to do something, to do it. There may be a need for an institutional commitment or to search for funding. The tangible is not always money but often is."

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## Helping Children in Chihuahua

Some collaborations have led to the establishment of permanent institutions. Marquette University's Department of Biomedical Engineering in the College of Engineering now has an ongoing relationship with the Tecnológico de Monterrey, Chihuahua university (ITESM) as a result of a U.S. Department of Education FIPSE grant and a former postdoctoral fellowship. Karla Bustamante, who is now an assistant professor at ITESM, completed her postdoctoral fellowship under the mentorship of Gerald Harris, a professor in the Department of Biomedical Engineering at Marquette in 2009. Their working relationship continues.

"What was impressive about Karla is that despite the fact that she could make more money in U.S., she wanted to go back to Mexico and start a program in Chihuahua, where she was from," Harris says. "We [at Marquette University] decided to do everything we could to help facilitate that. While on the postdoctoral fellowship, she was building the ability to write journal articles and grant proposals and how to do human motion analysis in our clinic here. There was a big application to help children in Chihuahua with cerebral palsy but no one was trained to provide the service. She now works for the dean of the medical school down there and has started a biomedical engineering

Troy Murphy, a professor in the Department of Biology at San Antonio, Texas-based Trinity University, has collaborated with Professor Marcela Osorio Beristain at Universidad Autónoma del Estado de Morelos in Mexico (UAEM) since 2005, yielding research on birds that has led to multiple student-led journal articles published in peer-reviewed journals. Here they are with two students.

program. We had a workshop at Shriners Hospital in Chicago and invited faculty from ITESM to visit, as well as orthopedic surgeons from there, to show them what a great job she'd done to educate engineers, and regarding the great opportunity to increase clinical care there. The objective is to build an infrastructure where ultimately everything is Mexican. We also helped her set up a sister laboratory there to increase her credibility and supported her through research proposals. She is also an assistant research professor at Marquette University in orthopedics at our Orthopedic and Rehabilitation Engineering Center (OREC)."

"I think it's a hard decision as to whether to stay in the United States that many people I met have to make," Bustamante says. "Many in postdoc programs stayed [in the United States], but I can make more difference in Chihuahua. There are tons of people doing research [in the United States]. There are not many from where I am. There also was a big desire to be close to my family. What is frustrating is that we do not have much grant money. I don't have master's or PhD students, so I am very limited. Even with those limitations, with Dr. Harris and Dr. Michelle Johnson [a research assistant professor of biomedical engineering in Marquette University's College of Engineering], we are trying to institute a new culture and a new knowledge that hopefully can make a difference."

A Trinity University student studies a bird; she is contributing to research collaboration between her professor Troy Murphy and his academic collaborator, professor Marcela Osorio Beristain, who teaches at the Universidad Autónoma del Estado de Morelos in Mexico.

Bustamante continues to work with Harris as part of a large research grant developing medical solutions for children with orthopedic problems, particularly the postural stability of children with cerebral palsy, work started while Bustamante was in the postdoc program and that has been expanded to look at children with spinal deformities.

While Harris says he views the relationship with Bustamante as being as much about public service as research, he says that the relationship also benefits Marquette's academic efforts. "The grant environment is very competitive, and as a next step we are expanding our research at our center in the United States to bring in sister labs in underserved communities in other countries," Harris says. "There are global funding groups that could be interested in some of the things we do that might provide additional support, such as the Gates Foundation or United Nations Global Perspectives, and having relationships elsewhere helps us compete for that. It gives us an international presence in large scale research efforts where we can have access to larger patient populations and pathologies unique to underserved areas. That provides opportunities to contribute to research that's unique. Another advantage of doing research in Mexico is that the cost of living is lower. If you get funding, it goes farther."

COURTESY OF TROY MURPHY

## Some Collaborations Are for the Birds

Troy Murphy, a professor in the Department of Biology at San Antonio, Texas-based Trinity University, has collaborated with Professor Marcela Osorio Beristain at Universidad Autónoma del Estado de Morelos in Mexico (UAEM) since 2005, yielding research on birds that has led to multiple student-led journal articles published in peer-reviewed journals.

"We have worked together focusing on the evolution of behavior, including the evolution of female beauty," Murphy says. Unlike much of the avian world, where males are more highly ornamented than females, Murphy notes that in the tropics, female birds also have beautiful plumage. "We wanted to test what evolutionary forces were responsible for both sexes being highly ornamented," Murphy says, noting the collaboration led to many multi-month field studies in Mexico. "Based on our research, we found that bright colors in females evolve to communicate a female's fighting ability, or 'toughness,' and that these ornamental females use bright colors to communicate their relative dominance. Our research indicates that when territorial birds detect intruders on their territory with brighter plumage, they perceive them as greater threats. This research is very exciting because very little is know about why females evolve elaborate communication signals"

*"My students actually drive the discoveries made in my research lab, and I could not imagine doing research without their creativity and enthusiasm."*

Murphy says the relationship started when, while working on a study of orioles, a colleague recommended that Murphy contact Beristain. "I did, and the relationship has blossomed," Murphy says. "We share the same theoretical interests that makes a collaboration productive. We assess and build on each others' ideas in very creative ways. In addition, she provides knowledge of the lay of land, insight on how to work with tropical species, and she knows where to find the birds. And like me, Marcela puts a lot of emphasis on student involvement. Together, we recruited students from both from UAEM, and from UNAM in Mexico City. These students were interested in gaining research experience, and many of them joined the project for months at a time. Some went on to complete their undergraduate theses under our supervision.

Murphy says that he first started working with Beristain while he was an international postdoctoral fellow,

COURTESY OF TROY MURPHY

**Troy Murphy, a biology professor at Trinity University, who collaborates Marcela Osorio Beristain at Universidad Autónoma del Estado de Morelos in Mexico (UAEM) on bird research.**

and that he learned quite a bit by working so closely with a researcher in another country. "One of the big differences between undergraduate students in the United States and Mexico is that the latter often performed more independent work that led to publishable research," Murphy says. "Mexican students provided my first exposure to the idea that undergraduates could do cutting-edge and top-notch research; the project was theirs and they showed ownership of it, from conception all the way through data collection, writing, and analysis. It opened my eyes to how undergraduates could play a vital role as part of a larger project. For example, we had one undergraduate student from UNAM, Laila Yunes Jiménez, who studied female song in orioles. She figured out a way to systematically study the songs of a little-studied bird, and she did an outstanding job with her research. Her thesis project yielded a publication in a highly respected ornithological journal that demonstrated that females sing six times more often than males. This female-bias in song production was unheard of before Laila's research, and this finding represents a fantastic discovery, and really opens the door to more research on the evolution of female ornamentation."

Murphy now works extensively with undergraduate scientists. "Undergraduate researchers are now an essential component of my research program," he says. Actually, that is an understatement: my students actually drive the discoveries made in my research lab, and I could not imagine doing research without their creativity and enthusiasm." **IE**

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