SCIENTIFIC COLLABORATION

Latin America's Elite Looks North for Scientific Partners

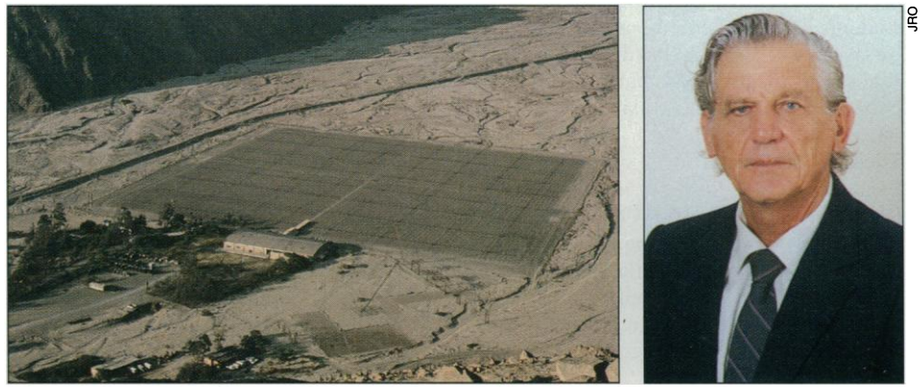
A few years back, Mexico's College of the Southern Frontier, ECOSUR, learned a hard lesson about collaborating with foreign scientists. Nestled in the Chiapas highlands near the country's border with Guatemala, this research institute, which focuses on health and biodiversity problems, is at the heart of a region that is rich in flora, fauna, and the indigenous Mayan culture. Until recently the population also had a high rate of onchocerciasis, a debilitating disease widely known by its African name, river blindness. So in the early 1980s, ECOSUR scientists who specialized in onchocerciasis teamed up with foreign colleagues to test an experimental drug for the disease. It seemed like a perfect match. But as ECOSUR head Pablo Farías sees it, the "collaboration" was nothing of the sort.

Farías, a Harvard University–trained medical anthropologist who took over ECOSUR (then known as the Center of Ecological Investigation of the Southeast) in 1992, describes the project as "*maquiladora* research," a reference to the *maquiladora* factories in Mexico, foreign-owned businesses that take advantage of cheap Mexican labor and export the products. Not only did the ECOSUR researchers have no say in the design of the drug trial, says Farías, they also had no access to the data they helped collect. "It was incredible," he says. This eventually led to "a dependency on outside researchers for the definition of goals and access to resources," he contends, "and ultimately, the collapse of the [onchocerciasis] program."

Yet ECOSUR has not given up on collaborations with foreign researchers. Although the institute is now wary of the kinds of arrangements it gets into, collaborative ventures continue to be common and even encouraged. ECOSUR is not alone in looking abroad for scientific connections. From Mexico all the way down to Chile, collaborating with foreign scientists is critical for Latin American researchers who want to make an impact in their field.

In addition to infusing a dose of research funds into countries that have little to spare for science, the collaborations offer Latin American scientists access to the latest information, the brainpower of colleagues whose research interests closely match their own, and opportunities for their students. "It's not only the money," says Jacinto Convit of the Institute of Biomedicine in Caracas, Venezuela, who is one of the world's leading developers of vaccines against leprosy and leishmaniasis. What Convit really values in his long-standing collaboration with Barry Bloom, a Howard Hughes Medical Investigator at New York's Albert Einstein College of Medicine, is "the stimulus we get from these people."

As the experience at ECOSUR illustrates, collaborations have their pitfalls, and it often takes careful maneuvering to avoid them. There is no such thing as a typical collaboration; the exact complexion of each arrangement depends on the country, the field of research, and the people taking part. But in the best cases, collaborations offer Latin American scientists not only resources but a chance to play an equal role at the forefront of a field, while the foreign partners gain much more than raw data—they gain valuable scientific partners.



JRO

Joint venture. A field of radar antennas at Jicamarca, Peru, probes the upper atmosphere. Peruvian geophysicist Ronald Woodman directs the installation, which is funded by the United States.

Money talks

Still, what leads many Latin American researchers into collaborations in the first place is a shortage of research funds at home, as Ronald Woodman, a Peruvian atmospheric physicist who heads the Jicamarca Radar Observatory (JRO) outside Lima, knows well. "Collaborations are the only way I can do science in my country," says Woodman, a second-generation Peruvian. Indeed, he adds, "when you look around, only the scientists who have support from abroad are the ones who work."

JRO, a massive radar observatory used to study the upper atmosphere, was built by the U.S. government in 1960 and then donated to Peru in 1969. Yet Peru contributes next to nothing to operating the facility. Its budget, explains Woodman, comes from the U.S. National Science Foundation, which funds JRO through a grant to Cornell University. "There is almost no science financed by Peru," says Woodman, "and there's not even a consciousness that nothing's being done."

Woodman says JRO's dependence on outside funds ultimately dictates the direction of the research, which has a decidedly international focus. "We end up doing science that's important for other countries," he says. "If there were more money, we could look at practical applications for Peru." For example, Woodman notes that the equatorial ionosphere above Peru has an electrojet, a stream of current that allows radio waves to travel beyond the horizon. JRO, he suggests, could investigate exploiting this for the benefit of Peruvians. But it's not happening, and he doesn't think it will until Peru foots the bill, which he doesn't see on JRO's financial horizon. "We've made efforts in the past to get money from our government, but I've given up," says Woodman.

Other scientists agree about the need for outside funds but emphasize that collaborations offer them something else as well: access to a scientific community they can't find at home. Astronomer Hernán Quintana, head of the astrophysics department at Chile's Catholic University, notes that besides providing "access to much larger funding," foreign collaborations allow him to transcend Chile's tiny astronomy community. All told, he says, there are only two dozen Chilean astronomers in the country. "No one is working in my area," says Quintana, who studies clusters and superclusters of galaxies. To find mathematical modelers who can analyze the distribution of galaxies in the clusters he maps, Quintana has to look abroad, to France and the United States.

Often, Latin American scientists form collaborations that end up benefiting their students' careers as much as their own. Francisco de la Cruz, a physicist at Argentina's Centro Atómico Bariloche who studies superconductivity, has a long-standing collaboration with David Bishop from AT&T Bell Laboratories in New Jersey. When he

first visited Bariloche, Bishop was impressed not only that it was what he calls "a world-class scientific institution," but that de la Cruz's students were so sharp. "I went down there and said, 'Holy mackerel, there's a group of really smart kids,' " recalls Bishop. De la Cruz says Bishop made him an offer he couldn't refuse: Send us your students, and when they return, they'll bring new techniques back to your lab.

Both sides of the collaboration are thrilled with the results. "It's been very important for us," says de la Cruz. In addition to transferring technology from north to south and keeping his lab informed about the latest developments, de la Cruz says, the collaboration has enriched his students' understanding of the scientific culture. "For a student coming from an underdeveloped country and working on a Ph.D., I think it's essential that they feel what science is in a country where science is part of the culture," says de la Cruz. For Bishop, meanwhile, taking in the students has been "enormously productive," he says. "I feel good that I'm doing something that's intrinsically good, but my science is better as a result of this collaboration."

Tricks of the trade

Even at their best, however, north-south collaborations face difficulties. One of the toughest is simply communicating. "It's a horrible thing for a person who works for the phone company to admit, but studies have shown that people's ability to communicate falls off exponentially with distance," says Bishop. "We have to work at staying in touch."

Chile's Quintana says the problem is partly one of money. "When you're in the United States or Europe, you just pick up and call anywhere," he explains. "Here, we have to pay for our telephone costs through our grants." What is more, he says, when it comes time to publish, he and his collaborators often need a face-to-face meeting—an expensive, time-consuming undertaking—to hash out the details of figures and legends or a paper's revisions.

Electronic mail, say Quintana and many other Latin American researchers, is improving communications with foreign collaborators tremendously. "However, it's not the same as being there," says Quintana. He offers the example of a collaborator who falls ill for several weeks. "If the guy's next door and ill for a month, when he comes back you say the first day, 'Let's look at this,' " Quintana says. But if that collaborator lives thousands of miles away, he says, the person has "24 things to do" before catching up with a distant colleague. "Long distance does slow things down," says Quintana. "It's a fact of life."

Aside from difficulties in sharing and discussing results with foreign collaborators, Latin American researchers also routinely face logistical problems that their counterparts in more developed countries can barely conceive of. Manuel Peimbert, Mexico's foremost astronomer, notes that economic instability in Latin American countries—such as Mexico's current devaluation of the peso—makes life unpredictable for scientists, a profound difficulty when they are paying their own way in a collaboration. "In Japan or the United States, you can plan for 5 or 10 years," says Peimbert, who studies the chemical composition of interstellar matter at the National Autonomous University of Mexico (UNAM) in Mexico City. "Here, you can't."

Patricio Gariglio, a cancer researcher at the Center for Research and Advanced Studies in Mexico City, notes other practical difficulties. "It's very difficult to obtain reagents. And if something breaks down and it gets fixed in 2 to 3 months, you're lucky." As a result of seemingly trivial obstacles, says Gariglio, Latin Americans often have a hard time keeping pace with better equipped collaborators. "For us, the problem is the velocity," he says. "It's hard to do science here."

But such obstacles are easier to surmount than the ones that undermined the river blindness collaboration: arrangements that, to the Latin Americans at least, seem to be collaborations on paper only. ECOSUR, once burned, is determined not to get into such an agreement again. Since the collapse of its onchocerciasis program, it has changed the ground rules to require that collaborations clearly benefit the Mexican researchers. What's more, the new rules require that when the research involves indigenous populations, there must be something in it for them, too. "What we try to avoid is simply doing things because there's money there," says Farías, who is now collaborating with U.S. researchers to study how the Maya classify and treat schizophrenia.

Some leading Mexican scientists worry, however, that last year's passage of the North American Free Trade Agreement could open the way to more "paper collaborations" with unwary Mexican institutions. NAFTA lifts trade barriers between the United States, Mexico, and Canada, making joint ventures—which could involve lucrative patents—more attractive. José Sarukhán, a prominent population ecologist who heads UNAM, says this has led to "a flood of universities coming to us from the United States looking to collaborate." But Mexico, Sarukhán says, is not as desperate for research funds as other Latin American countries may be, and he approaches these offers cautiously. He is interested only in collaborating "with people who can offer something scientific, rather than if he or she has money." He adds that these types of solid collaborations improve his sprawling university system as a whole by broadening the academic base.

In time, however, as ever more Latin American scientists move to the forefront of their fields, Sarukhán and his fellow researchers in Latin America won't have to be so wary of token partnerships. The benefits of collaborating on an equal footing will be apparent to all.

–Jon Cohen

HOWARD HUGHES INTERNATIONAL SCHOLARS IN MEXICO

Researcher	Institution	Research Project
Carlos F. Arias	National Autonomous University of Mexico (UNAM), Cuernavaca	Molecular biology and epidemiology for the control of rotavirus diarrhea.
Edmundo Calva	UNAM, Cuernavaca	Molecular biology of *Salmonella typhi ompC* and *Campylobacter jejuni ent* genes
Gabriel Cota	National Polytechnic Institute, Mexico City	Calcium channels and hormone secretion in pituitary cells
Alberto Darszon	UNAM, Cuernavaca	Involvement of ion channels in sperm function
Gabriel Guarneros-Peña	National Polytechnic Institute, Mexico City	Control of bacterial protein synthesis by a lambda phage directed transcript
Luis R. Herrera-Estrella	National Polytechnic Institute, Irapuato	Molecular studies of two key enzymes involved in carbon assimilation in plants
Paul M. Lizardi	UNAM, Cuernavaca	Simple and sensitive assays for the detection of human pathogens
Esther Orozco	National Polytechnic Institute, Mexico City	*Entamoeba histolytica*: molecules involved in adherence and damage to target cell
Lourival D. Possani	UNAM, Cuernavaca	Chemical and functional characterization of scorpion toxins
Ranulfo Romo	UNAM, Mexico City	Representations and transformations of tactile signals in somatic and frontal motor cortices of primates

Another kind of collaboration. The Howard Hughes Medical Institute awards 5-year grants to outstanding researchers in Mexico.