

## Undergraduates Learn About Science and Life in Labs Overseas

U ntil she spent the summer before her junior year of college working in a parasitology lab in Lima, Peru, 23-year-old Rose Q. Do had always lived in Tucson, Arizona. “I couldn’t even imagine myself in another country,” Do recalls. Then she joined an international research program for undergraduates and spent three months in Peru.

“Living in a Third World country was sobering, but it made me realize that I can do meaningful research with global ramifications,” Do says. Now she’s finishing her first year of medical school and planning a research career in infectious diseases. Do is one of 94 University of Arizona undergraduates who have conducted laboratory research in 23 foreign countries through a program called BRAVO! (Biomedical Research Abroad: Vistas Open!), supported in part by an HHMI grant.

About one-third of the students traveled to developing countries. Oscar K. Serrano, on the other hand, worked in Italy with neuroscientist Giancarlo Pepeu at the University of Florence, where he was impressed by the close interaction between researchers and students. “European scientists take their role as teacher and guide very seriously,” says the University of Arizona senior. “In Florence, it was common to see professors working side by side with their students at the lab bench or computer.”

Serrano also learned about anti-Americanism. Born in Arizona but raised in Mexico until he was 11, he often found himself privy to “America bashing” by Europeans who considered him a Mexican. “I never thought of myself as an American national-

ist until people started criticizing my form of government, my people and my country,” he says.

Living and working in another country is quite different from traveling as a tourist, the students say. They are treated as full-fledged members of their lab families and thereby gain an inside look at a different way of life. Do, for example, accompanied a public health fieldworker up steep, dusty hills to the shantytowns of Lima, where they weighed and measured children and dispensed health advice to parents. “It was amazing to see how public health work is actually done at the local level,” she says.

Of course, not every experience is so serious. Dominic Titone, who worked in a lab in Geelong, Australia, remembers tying up traffic while learning to drive on the “wrong” side of the road. And Do recalls how she was nicknamed “chica de los pescados”—fish girl—after she filled a bro-

ken garbage bag with fish from a laboratory experiment and left it out in the sun, creating a stench that permeated the neighborhood.

After living their foreign adventures, it’s no surprise that students often return home with new goals. Charles A. Hoeffler, Jr., for example, was planning to become a physician when the program took him to the National Institute of Health in Tokyo, Japan, to study apolipoprotein mutations in silkworms. “My experience convinced me not to go to medical school,” says Hoeffler, who is now pursuing a doctorate in molecular and cellular biology at the University of Arizona. “I found out how much I like lab research.”

Couldn’t he and the other students have reached the same conclusions at home? Neurobiologist Leslie Tolbert, a member of the program’s advisory board, doesn’t think so. “So many of the benefits of this program are intangible,” she says, the direct result of being in a new and different environment.





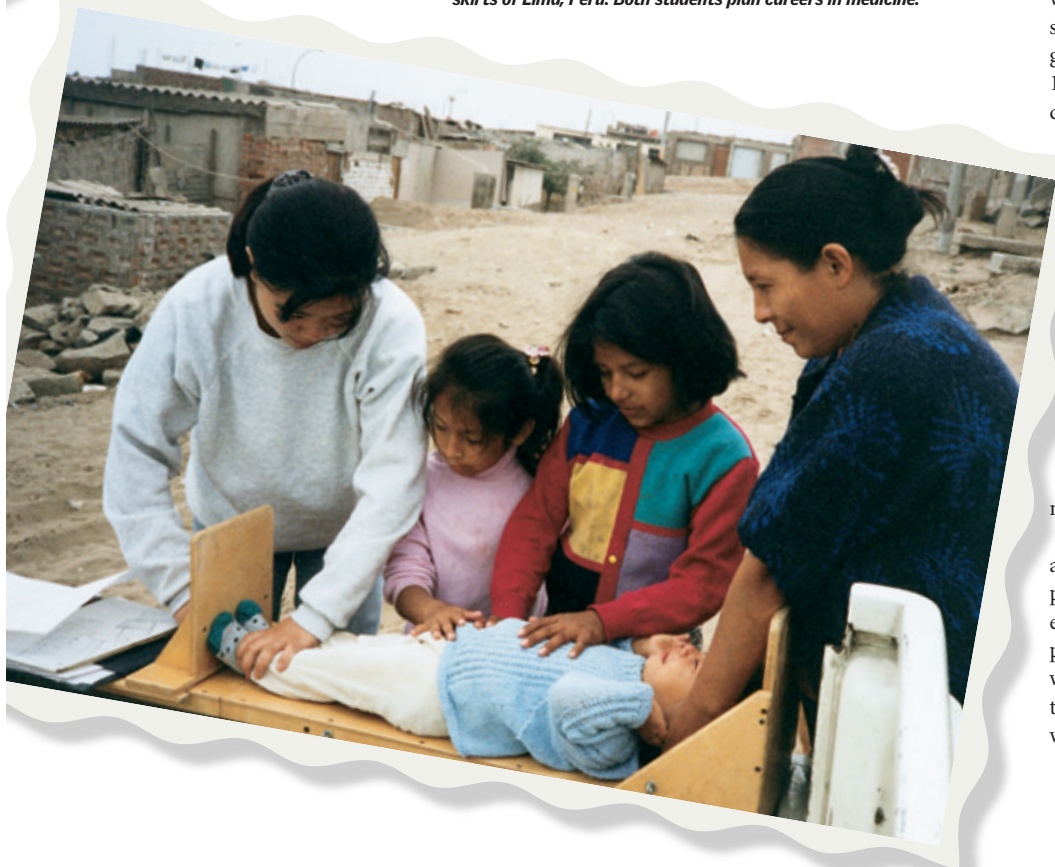
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*University of Arizona undergraduates get a taste of medical research in foreign countries. Oscar Serrano (above, left) talks with his mentor, Giancarlo Pepeu, at the University of Florence in Italy. Concepción "Nina" Roxas (below, left) studied the growth of children who are infected by parasites in the hillside community of Las Pampas, on the outskirts of Lima, Peru. Both students plan careers in medicine.*



"You can't separate the scientific experience from the personal one," Tolbert says, recalling one student whose science was not remarkable but whose foreign mentor "completely changed his outlook on the world and himself. He came back with a self-confidence he'd never had before."

Students also bring home a new appreciation of science as an international enterprise—and of the abundance that Americans take for granted. "When you have to wash and reuse slides and coverslips, you really learn what 'lack of resources' means," says Charles R. Sterling, a University of Arizona professor of veterinary science and microbiology. Do's eye-opening summer was one result of Sterling's connection with a colleague in Peru, with whom he collaborates scientifically and exchanges undergraduates regularly.

Madeleine J. Long, a consultant with the American Association for the Advancement of Science, concurs with Sterling. "What students gain far exceeds knowledge of science and the scientific experience," she says. That reality, however, makes evaluation of the program more difficult—although tangible measures do exist. Of the 94 undergraduates who have participated in overseas research since the program began in 1992, 26 are in graduate school and 3 have received Ph.D.s; 15 are doing research; 17 are medical students; 2 more are applying to medical school and 7 have earned their M.D.s. Two are in

M.D./Ph.D. programs; one is a genetic counselor and two are teaching or preparing to teach. BRAVO! participants have co-authored more than 60 journal articles and presented their research at nearly that many scientific meetings.

"These students have developed the ability to communicate their scientific work, and many have come home committed to pursuing careers that will make them part of the international scientific community," program director Carol Bender says.

"When the idea of sending undergraduates overseas to do research was first proposed, some of us were skeptical," acknowledges Sam Ward, a University of Arizona professor of molecular and cellular biology, who heads the HHMI-supported programs there. "The students have shown us how wrong we were."

—JENNIFER BOETH DONOVAN