

where they will explore the ecosystem and collect biological samples. Then, in a summer laboratory course, the students will isolate, characterize, test, and potentially even name and patent the products of those rainforest organisms.

Winston A. Anderson, a professor of biology at historically black Howard University, in Washington, D.C., is creating an ambitious research-oriented academic program to give undergraduates a “competitive edge” for entering biomedical science careers. Active researchers will mentor the students in laboratory courses on genomics, proteomics, and metabolomics. Anderson is also planning summer exchange programs that will take undergraduates to African countries such as Ghana, Ethiopia, Mali, and Nigeria to learn about infectious tropical diseases and ethnopharmacology—the study of indigenous plants used for medicinal and other purposes.

Jasper Rine, professor of genetics and development at the University of California, Berkeley, wants to remodel introductory biology labs to “create a real interface between chemistry, math, computing, and biology.” One area his students will explore is personal genetic information—often discussed in lectures as a societal issue, he says, but rarely addressed in laboratory curricula. Rine plans to have students’ distinctive mitochondrial DNA sequenced commercially, whereupon they will each use computational tools to construct a “tree” of their heredity.

The 2006 Professors are successors to the original group of 20 selected in 2002 to show that productive scientists can also be committed, innovative teachers of undergraduates—a skill often undervalued at high-powered research universities. This goal was well met, says Stanford’s Long, as the 2002 Professors “stimulated and transformed entire institutions, and have even facilitated new nationwide conversations on science teaching and mentoring.” ■

—RICHARD SALTUS

“[Instead of being] minor technical players in the big science of a typical laboratory, students will be completely vested in an original project in which they have full autonomy.”

SCOTT STROBEL



Undergraduates Abroad

WORKING WITH RESEARCHERS IN OTHER COUNTRIES ENRICHES STUDENTS’ SCIENTIFIC AND CULTURAL OUTLOOK.

Zebras, hippos, and wildebeests; frenetic minibus rides through Johannesburg; Swaziland women doing the graceful, rhythmic Reed Dance—for Rokhsanna Sadeghi last summer, just leaving her dorm each morning brought a new adventure. Every day, she explored the tangled but beautiful web of science and culture in South Africa.

WITH WORLD-CLASS SCIENCE now being practiced on a truly worldwide basis, American scientists often spend time doing research in foreign lands. This is not the case for most students—especially undergrads—who rarely have the necessary resources or credentials. But for the past 5 years, an HHMI program has been pairing undergraduate students for summer research with the Institute’s international research scholars. More than 40 students have been placed so far, from Mexico to India, and at least 20 more will have their chance

this summer. Here, three undergraduates who participated during the summer of 2005 share their experiences of science and culture abroad.

When searching for an international research opportunity, Rokhsanna Sadeghi, a senior at Rensselaer Polytechnic Institute, in Troy, New York, looked for a location and a project that would allow her to learn laboratory-based biochemistry and directly connect her research to health issues in the local community. Working with Valerie Mizrahi in her lab at the University of the Witwatersrand and the National Health Laboratory Service in Johannesburg, South Africa, Sadeghi came to better understand how vitamin B₁₂ regulates the production of methionine—an essential amino acid—which in turn affects the growth and virulence of bacterial strains that cause tuberculosis, a disease that wreaks havoc among HIV/AIDS patients in that region.

In her free time, Sadeghi sought out South African students and church groups

“ [Combining research and community service] renewed my faith that these are things I want to do and can do. ”

ROKHSANNA SADEGHI

who brought food and medical care to homeless people. Accompanying them, sometimes to burned-out buildings on bitterly cold evenings, she helped medical students take patient histories and arrange for medical referrals among the people that her laboratory research might ultimately benefit. This combination of research and community service invigorated and inspired her, Sadeghi says. “It renewed my faith that these are things I want to do and can do.”

Another student opted for an assignment north of the border in Canada, just 400 miles from his home base at Michigan’s Kalamazoo College. Michael Glista, a senior, immersed himself in Alzheimer’s disease research by spending his summer at Peter St George-Hyslop’s University of Toronto lab. Throughout the summer, postdoc Hiroshi Hasegawa mentored Glista as they worked with recombinant proteins in an effort to reconstruct the molecular puzzle pieces that interact as cells produce the disease’s telltale β -amyloid plaques in the brain. His experience, Glista says, resulted in a published paper and a direction to pursue in his intended career as a researcher and clinician.

Although he didn’t journey far for his research project, Glista says the international mix of colleagues in the St George-Hyslop lab—from Japan, China, Poland, and Canada—and their passionate commitment to their work left a strong impression.

Her summer in Ranulfo Romo’s lab at Mexico City’s National Autonomous University of Mexico allowed Egle Cekanaviciute, a junior at Harvard University, to explore neuroscience research with animals. She trained a rhesus monkey to respond differently when two distinct vibration frequencies were applied to its hands; then she watched her colleagues implant electrodes to understand how the monkey’s brain distinguished between those

stimuli. Sifting through detailed statistical analyses of the resulting data, she helped dispel the widely assumed notion that monkeys’ brains sort and compare tactile information based on repeating patterns of stimulation.

Cekanaviciute also learned to appreciate working with these higher animals, especially compared with her previous efforts—with cell cultures. “Cells are not cute, they’re not fluffy, and they’re not smart,” she says. “You don’t get attached to them; you don’t name them.” Working with animals requires patience and

emotional stamina, she says. “You are dependent on this whole set of circumstances: how smart the monkey is, how much it wants to be trained, and whether it stays healthy.”

Overwhelmingly, her summer experience has deepened her love of Latin-American culture. In her free time, Cekanaviciute’s growing fluency in Spanish allowed her to explore. She hiked through jungles and climbed pyramids in the Yucatan peninsula. She learned about the struggles of guerillas in the state of Chiapas and the poverty of young children selling flowers on the streets.

After she graduates next year, Cekanaviciute plans to spend a year south of the border, perhaps in Mexico or Peru, before pursuing graduate work. “It’s very important to travel,” she advises future participants. “It’s a must to go and see everything you can.” ■ — SARAH WEBB



Making It Relevant to Human Health

A NEW HHMI PROGRAM AIMS TO INCREASE THE NUMBER OF BASIC RESEARCHERS WHO ARE CLINICALLY LITERATE.

IT ALL COMES DOWN TO A FRAME of mind. The best physician-scientists have it. Their laboratory research is aimed directly at benefiting human health.

A new HHMI program aims to instill that sensibility in Ph.D. students to expand the pool of investigators steeped in rigorous scientific techniques but also familiar with clinical practice. HHMI’s Med into Grad Initiative recently awarded \$10 million over the next 4 years to 13 innovative graduate-training programs that combine medical knowledge with basic science.

“The goal is to integrate clinical science and medical information so the students are trained to think about the relevance of what they do to health or disease, and to emphasize an understanding of how things work in the human body,” says Martha K. Cathcart, a cell biologist and director of one of the new training programs at the Cleveland Clinic Lerner College of Medicine of Case Western Reserve University. (continued on next page)