



*Creative thinking by undergraduate professors like Susan Wessler (left) and Scott Strobel is inspiring a new generation of scientists.*

## Twenty More Renaissance Profs

A NEW CLASS OF HHMI PROFESSORS—VISIONARIES IN RESEARCH AND TEACHING—AIMS TO ENERGIZE UNDERGRADUATE SCIENCE EDUCATION.

IMAGINE YOURSELF, as a college junior, exploring a rainforest to bioprospect for medically useful microbes, studying plant genomes to observe evolution in action, or analyzing your own DNA to determine the origins and wanderings of your ancient ancestors. That's just a taste of what the 20 recently chosen HHMI Professors are cooking up to tantalize undergraduates, fire their imaginations and develop their skills, and ultimately enhance the ranks of science.

The awardees—teacher-researchers all—will each receive \$1 million over 4 years to test-drive ideas that depart from traditional curricula, which tend to emphasize fact memorization and laboratory experiments with predetermined “right” answers. Instead, the Professors will engage students in open-ended research projects using the techniques and tools of working scientists.

These 20 represent the A-team in pursuit of teaching innovations, but the talent pool was deep and their selection was not easy. “Every proposal I read gave me new insights and

ideas on improving undergraduate science teaching,” says Sharon R. Long, dean of the School of Humanities and Sciences at Stanford University and chair of the panel that reviewed 150 applications from 100 leading research universities.

New HHMI Professor Susan R. Wessler of the University of Georgia is a pioneer in the study of plant genomes’ transposable elements, which reveal evolutionary history. Wessler will guide her students in computational and genetic analyses of such elements to see evolution in action. It’s all the more important, she says, given that Georgia is enmeshed in controversy over the proposed teaching of “intelligent design” in schools. Scott A. Strobel, a professor of molecular biophysics and biochemistry at Yale University, believes that students can best be inspired by scientific research if they are given “ownership.” He has designed classes so that 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.”

In each of the professorship’s 4 years, Strobel and his father, Gary, a plant pathologist at Montana State University, will lead a dozen undergraduates on a spring-break expedition to one of the world’s rainforests,

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 B<sub>12</sub> 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