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HHMI Awards \$79 Million for Science Education to Research Universities, Top Scientists

The Howard Hughes Medical Institute (HHMI) today announced new grants totaling \$79 million that will help universities strengthen undergraduate and precollege science education nationwide. The resources will let faculty at research universities pursue some of their most creative ideas by developing new ways to teach and inspire students about science and research.

HHMI is making the awards through its Precollege and Undergraduate Science Education Program and the HHMI Professors Program—two complementary initiatives that are transforming science education in the United States.

Fifty research universities in 30 states and the District of Columbia will be awarded a total of \$70 million through the undergraduate program. The schools will use the grants, which range from \$800,000 to \$2 million over four years, to develop creative, research-based courses and curricula; to give more students vital experience working in the lab; and to improve science teaching from elementary school through college.

The HHMI Professors Program supports a small group of leading research scientists who are committed to making science more engaging to undergraduates. Thirteen HHMI professors will receive a total of \$9 million over four years to focus on solving important problems facing science education, such as how best to bring research into the classroom, teach large introductory science courses, and encourage students from diverse backgrounds to become scientists.

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"HHMI is committed to funding education programs that excite students' interest in science," says HHMI President Robert Tjian. "We hope that these programs will shape the way students look at the world—whether those students ultimately choose to pursue a career in science or not."

HHMI, the nation's largest private funder of science education, has spent \$1.6 billion since 1985 to reform life sciences education from elementary through graduate school. At the undergraduate level, HHMI's strategy leverages the advantages of working both with institutions and individual professors, explains Peter J. Bruns, HHMI's vice president for grants and special programs.

The grants allow large research universities to tackle projects that affect hundreds or even thousands of students, both inside the university and at local K-12 schools, Bruns says. Individual scientists in the professors program can develop innovative ideas for the classroom using the same creativity and adaptability as they do in the research laboratory.

"By funding both initiatives, we are assured that both research universities and individual professors will make important contributions to science education," Bruns says. "We want to inspire scientists to think as hard about improving science education as they do about their research."

Research University Grants

HHMI invited 197 research-focused universities to apply for grants to improve science education at the undergraduate and K-12 levels; 165 schools submitted applications last year. A panel of distinguished scientists and science educators reviewed the proposals, and HHMI selected 50 institutions. HHMI held a separate competition in 2008 to award science education grants to 48 liberal arts colleges and other primarily undergraduate-serving institutions.

"By selecting these 50 grantees, we highlight areas and approaches that we think are particularly powerful," says David Asai, director of HHMI's

precollege and undergraduate programs. “We hope that universities across the country—even those that are not HHMI grantees—will turn to these programs when they think about improving science education.”

Of the newly selected universities, five are getting an award for the first time—Florida International University, Northwestern University, the University of North Texas, Virginia Polytechnic Institute and State University, and Western Michigan University. Another 13 of the 50 universities are receiving funding after a hiatus.

The universities submitted proposals that outlined how they would tackle a range of problems facing science students and scientist educators on their campuses and in their local communities. For some, the proposed solutions involve making long-needed changes to dated curriculum or trying out innovative approaches that could change how undergraduates view science. For others, it means starting or continuing programs for science teachers and students in cash-strapped local school districts. A few themes emerged from the applications:

Community colleges: Community college is quickly becoming an important stepping stone for students as they transition to a four-year university. Recognizing that many students take their first university-level science classes at community colleges, Georgetown University and the University of California, Davis, are among several schools working to offer research opportunities to community college students and improve introductory courses there.

Training future teachers: Western Michigan University, Pennsylvania State University, and several other institutions will use part of their funds to provide a better scientific foundation for future K-12 science teachers. Some of these newly funded programs focus on providing research experiences to students who plan to become teachers so that they can understand how science is done and convey that knowledge to students later.

Student research: Some large universities, such as the University of California, Los Angeles, and Northwestern University, will use part of their grant to make research experiences available to more students and those from a more diverse array of backgrounds. Several will also attempt to get the students involved in research early in their college career, sometimes even as freshmen.

Diversity: Several grantees, including the University of Maryland, Baltimore County, and Montana State University, will focus on increasing diversity in the sciences. The proposed programs range from outreach for middle and high school students to extensive mentoring and expanded research experiences for undergraduates.

HHMI Professors

The HHMI Professors Program, created in 2002, assists top research scientists in putting their innovative ideas for science education into practice. The program reflects the Institute's long-time commitment to finding and funding talented scientists, then giving them the freedom to follow their instincts. HHMI held two previous competitions in 2002 and 2006, and awarded grants to a total of 40 HHMI professors. "The higher education community typically doesn't apply either the resources or rewards for creative thinking about teaching the way it does for research," Bruns says. "We are trying to change that."

Last year, the HHMI professors were invited to apply for four years of additional funding; 30 submitted applications. After a review by top scientists, 13 HHMI professors with successful science education programs were awarded a total of \$9 million over the next four years. The individual grants range from \$600,000 to \$800,000. The professors will be working on a wide variety of projects that fall into several broad categories:

Research in the classroom: Several HHMI professors have transformed their own research interests into classes or projects that can be used in the classroom. For example, Baldomero Olivera at the University of Utah has developed projects to teach third and fourth graders about chemistry and biodiversity. And Sarah Elgin at Washington University in St. Louis has developed a nationwide research network that is getting undergraduate students involved in genomics research.

Student mentoring: Many of the professors' projects focus on improving student mentoring, in hopes of increasing the number of interested students who stay in science. Many of those projects, such as the one proposed by Isiah Warner at Louisiana State University, nurture students from groups traditionally underrepresented in the science. Warner has developed a "mentoring ladder" to support minority students as they enter different stages of their scientific career.

Improving science teaching: Several HHMI professors are developing programs to improve teaching of undergraduates, especially in large introductory classes. For example, Diane O'Dowd has created "garage demos" that can bring to life complicated chemistry topics. And Jo Handelsman has created training programs for current faculty members and graduate students to help them understand the best ways to teach so students are actively engaged in learning.

The 13 professors will use part of their new funding to share their knowledge with the wider science community. "We would like the HHMI professors to become a national resource for science education," Asai says. "We want them to disseminate what they've learned. That will send a strong message to scientists nationwide that there are ways of approaching science education more creatively. Here are top research scientists who are doing it."

The Howard Hughes Medical Institute plays a powerful role in advancing scientific research and education in the United States. Its scientists, located across the country and around the world, have made important discoveries that advance both human health and our fundamental understanding of biology. The Institute also aims to transform science education into a creative, interdisciplinary endeavor that reflects the excitement of real research. For more information, visit www.hhmi.org