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HHMI Selects 12 Institutions to Launch Nationwide Science Education Experiment

The Howard Hughes Medical Institute (HHMI) has selected 12 colleges and universities to participate in a nationwide genomics course that will involve first-year college students in authentic research. The new course is the first major initiative from HHMI's Science Education Alliance, which seeks to enhance the teaching of science and inspire new generations of scientists.

In Fall 2008, first-year students at the six undergraduate institutions and six research-intensive institutions will take part in a year-long research course — the Phage Genomics Research Initiative - which is being developed by the Science Education Alliance (SEA).

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— **Tuajuanda C. Jordan**

The SEA, headquartered at HHMI's Janelia Farm Research Campus in Northern Virginia, will foster the development of a national network of scientists and educators who work collaboratively to develop and distribute new materials and methods to the education community. HHMI has built the SEA using the knowledge and experience it has gained from supporting science education advances in the United States over the last 20 years.

The phage genomics course is the beginning of the transformation that the Science Education Alliance hopes to bring to science education, said Tuajuanda C. Jordan, a biochemist and director of the SEA. The institutions that we have chosen really see the long-term impact that the program can have on their students and their institutions. The participating faculty have support at all levels for implementing and expanding on the program.

The SEA is a new direction for HHMI, which for two decades has funded science education programs run by faculty and teachers at institutions across the United States. By creating the SEA, HHMI is taking a more active role in catalyzing change in science education. The Institute is staffing the SEA

program with its own employees, who are building the alliance with the help of HHMI's extensive network of grantees and educators. HHMI is committing a total of \$4 million over the first four years of the program.

The initial institutions we have selected represent a broad sampling of high quality higher education, said Peter J. Bruns, vice president for grants and special programs at HHMI. Although diverse in size and location, all participating schools share a desire to bring authentic discovery to freshman instruction. I am impressed by their commitment to the project and eagerly wait to see what a working alliance of such a diverse, yet commonly committed community, will yield.

Approximately 20 students at each institution will participate in the two-semester phage genomics research course, in which they will be taught to use sophisticated research techniques. Students will isolate bacterial viruses (phages) from their local soil, prepare the viral DNA for sequencing, and annotate and compare the sequenced genome. The goal is to immerse students in the process of doing science, and equip them with the critical thinking and communication skills necessary for successful research careers. We also hope their work will make a significant contribution to the field of genomics, said Jordan.

For faculty who will teach the phage genomics course, joining the SEA will help move the science curriculum at their institutions beyond cookbook style laboratory experiments and bring hands-on research to a larger group of students. I've become increasingly dissatisfied with the way we teach the science of biology. It is mostly fact learning rather than inquiry learning, and that's just a tragedy. It's not the way we should teach science, said Kit J. Pogliano, a professor of biology at the University of California, San Diego, who will teach the phage genomics course with her husband and fellow faculty member, Joseph A. Pogliano.

We've been seeking ways to engage more of our students in research and inquiry-directed learning experiences, said Pogliano. This sort of an experiment - having a big group of students doing research over the course of a year in a formalized lab course, rather than in individual faculty labs — is something we've thought about doing. But like many state schools, we just didn't have the finances to put together a big project like that ourselves. This was a great way to jump-start the process.

At the University of Louisiana at Monroe (ULM), biology professor Ann M. Findley said her institution serves students of diverse backgrounds with varying levels of preparedness and extremely limited prior exposure to experimental science.

ULM's participation in the HHMI-SEA initiative will not only furnish our students with an exciting introduction to the process of doing science, it will also provide us with the opportunity to demonstrate that, when presented with a challenging laboratory environment and a committed support system, all engaged students can effectively transcend their high school preparation to become contributing members of this exciting national experiment, said

Findley.

Earlier this Fall, HHMI invited all four-year institutions to apply to participate in the Phage Genomics Research Initiative. HHMI received 44 applications and selected 12 institutions.

Each institution will receive up to three years of support from HHMI to assist with faculty training, reagents, computing support, and DNA sequencing services for the course. Faculty from participating institutions will attend three training workshops at Janelia Farm before teaching the phage genomics course.

Twelve more institutions will join the program in the fall of 2009, and another 12 in the fall of 2010. When the Phage Genomics Research Initiative is running at capacity, 36 institutions and approximately 720 students will be participating. After three years of initial support by SEA, institutions wishing to continue offering the course must provide their own financial resources to cover reagents, sequencing, and computing costs.

Participants in the 2008-2009 course will benefit from a pilot phage genomics course currently running at the University of Pittsburgh. SEA staff will use student and faculty experiences in the pilot course to refine the curriculum and develop additional resources for professors and students.

The institutions that will participate in the SEA phage genomics research initiative in academic year 2008-2009 are:

Carnegie Mellon UniversityPittsburgh, Pennsylvania **The College of William and Mary**Williamsburg, Virginia **Hope College**Holland, Michigan **James Madison University**Harrisonburg, Virginia **Oregon State University**Corvallis, Oregon **Spelman College**Atlanta, Georgia **University of California, San Diego**San Diego, California **University of California, Santa Cruz**Santa Cruz, California **University of Louisiana at Monroe**Monroe, Louisiana **University of Mary Washington**Fredericksburg, Virginia **University of Maryland-Baltimore County**Baltimore, Maryland **Washington University in St. Louis**St. Louis, Missouri