

them to quickly change their proteins to bind to different cell receptors. The researchers, who encountered this genetic property while working on an unrelated project, believe that this discovery could lead to the use of genetically engineered phages to treat bacterial infections that have become resistant to antibiotics.

The discovery was made by researchers at the University of California, Los Angeles led by Jeffery F. Miller, PhD, professor and chair of microbiol-

ogy, immunology, and molecular genetics. Dr. Miller's team found that the genome of the phage that infects *Bordetella bronchiseptica*, a relative of the bacterium that causes whooping cough, contains a series of genes that change the part of the virus that binds to the bacterial cell. These genes allow the phage to rapidly evolve new variants that can recognize and attack bacteria that may have become resistant to the previous phage.

Dr. Miller's team is continuing to

study this genetic mechanism to learn more about its biochemical properties and to determine whether higher forms of life have similar classes of genes. He believes that, in time, they will be able to use the knowledge gleaned from this discovery to generate proteins in the laboratory that will bind to almost any molecule of interest.

HHMI, NIBIB/NIH to Invest up to \$35 Million in Interdisciplinary PhD Programs

As biomedical science becomes more interdisciplinary, research progress will depend on contributions from life scientists who are familiar with the tools and ideas of the physical and computational sciences and engineering. The Howard Hughes Medical Institute (HHMI) and the National Institute of Biomedical Imaging and Bioengineering (NIBIB) of the National Institutes of Health (NIH) are joining forces to provide both start-up funds and sustaining support for graduate training programs that integrate the biomedical sciences with the physical sciences and engineering. HHMI will award up to 10 3-year grants of as much as \$1 million each to support the development and early phases of the interdisciplinary programs. NIBIB, a new NIH institute with broad, interdisciplinary goals, will provide 5 addi-

tional years of support to the HHMI grantees through peer-reviewed institutional training grants.

Building on work begun by the Whitaker Foundation, the National Science Foundation, and the Burroughs Wellcome Fund, HHMI and NIBIB together have created a new model to support the initiation, development, and maintenance of new graduate programs to provide upcoming biomedical scientists with the cross-disciplinary knowledge and skills they will need.

In October 2004, HHMI will open a competition for up to 10 grants to educational institutions, totaling as much as \$1 million each. The grants will be awarded in November 2005. All US institutions that grant PhD degrees in the biologic sciences will be eligible for the 3-year awards.

The HHMI-NIBIB partnership will capitalize on the different strengths of each organization. The new NIH Roadmap and recent reports from the National Academies Convocation on Facilitating Interdisciplinary Research and the Association of American Medical Colleges' Graduate Research, Education and Training Group emphasize the need for a new kind of graduate education that will prepare scientists to work across disciplinary lines to solve complex biomedical problems.

The new graduate training program parallels HHMI's commitment to bring together biologists, computer scientists, engineers, physicists, chemists, and mathematicians to conduct collaborative research at Janelia Farm, HHMI's new research campus now under construction in Loudoun County, Virginia.

First NIH Director's Pioneer Award Recipients Named

The National Institutes of Health (NIH) has selected the first recipients of the NIH Director's Pioneer Award, a program designed to support individual scientists and thinkers with highly innovative ideas and approaches to contemporary challenges in biomedical research. A central component of the NIH Roadmap for Medical Research,

the Director's Pioneer Award was established in January 2004 to encourage exceptional researchers and thinkers from multiple disciplines to conduct high-risk, high-impact research related to the improvement of human health.

To inaugurate this new program, the NIH will provide \$500,000 in direct costs per year for 5 years to each Pio-

neer Award recipient, allowing them the time and resources to test far-ranging ideas with the potential to make extraordinary contributions to medical research:

- Laurence F. Abbott, PhD, Brandeis University, Waltham, Massachusetts. Dr. Abbott is the Brandeis Professor