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Energy Department awards $92 million

WASHINGTON, D.C. -- The Department of Energy today announced research awards totaling $92 million for six projects to better understand microbes and microbial communities. The microbial world and biotechnology promise solutions to major Energy Department challenges in: energy, including the production of ethanol and hydrogen; cleanup of pollution at former nuclear weapons production sites; and minimizing global warming by controlling the cycling of atmospheric carbon dioxide.

"Unique microbial biochemistries amassed over eons in every niche on the planet now offer a virtually limitless resource that can be applied to develop biology-based solutions to these challenges," said Dr. Raymond L. Orbach, Director of DOE's Office of Science.

The six projects involve 75 senior scientists at 21 institutions: four DOE national laboratories, 15 universities or research institutes, one federal laboratory and one private company.

The grants are part of the Office of Science's Genomics: GTL research program. "The GTL program's goal is to understand microbes so well that their diverse capabilities can be harnessed for DOE and other national energy and environmental needs," Orbach said.

DOE investments in genomics research over the past 20 years now help allow scientists rapidly decode and interpret the complete DNA sequence of any organism. Because genomics reveals the blueprint for life, it is the starting point to understand biological functions as well as a link between biological research and the development of biotechnology solutions. With genomics data as a starting point, the GTL program uses a "systems biology" approach to transform the way scientists conduct biological investigations and describe living systems.

In systems biology, researchers study the interaction and relationship between various parts of a biological system ¡V for example, a cell or an organism -- in order to develop a model of the whole system. A key GTL research challenge is to understand how microbes and communities of microbes carry out their diverse and useful functions. Researchers need to understand living microbial systems, not just DNA sequences or proteins or cell by-products. Thus, GTL program researchers are studying critical microbial properties and processes on three systems levels ¡V molecular, cellular and community.

Over the next five years, the six new research projects will:

- help scientists understand how microbial communities function in their natural habitats and respond to changes in their environments. This information is essential to be able to take advantage of the diverse capabilities of microbes and microbial communities;
- develop new approaches to identify and characterize the proteins being produced within a complex microbial community;
- develop new strategies to look inside microbes at the molecular machines they use to carry out their functions, to isolate those machines and to understand their functions. These capabilities are needed to be able to use or modify microbial molecular machines to address DOE energy and environmental mission needs; and
- develop new computational tools to allow scientists to better find, organize and use the complex and rapidly growing types and amounts of information generated in the GTL program.

The six projects, their funding, lead institutions, lead investigators and collaborating institutions are:

Genome-Based Models to Optimize In Situ Bioremediation of Uranium and Harvesting Electrical Energy from Waste Organic Matter ($21.8 million over five years). University of Massachussetts, Amherst. Derek Lovley, Principal Investigator. Collaborating institutions: The Institute for Genomic Research, Rockville, Md.; University of Tennessee, Memphis, Tenn.; University of Indiana, Bloomington, Ind.; University of California at San Diego; Genomatica, San Diego, Calif.; Argonne National Laboratory, Argonne, Ill.

Proteogenomic Approaches for the Molecular Characterization of Natural Microbial Communities

($10.5 million over five years). University of California, Berkeley. Jillian Banfield, Principal Investigator. Collaborating institutions: Oak Ridge National Laboratory, Oak Ridge, Tenn.; Lawrence Livermore National Laboratory, Livermore, Calif.; U.S. Geological Survey, Boulder, Colo.

Dynamic Spatial Organization of Multi-Protein Complexes Controlling Microbial Polar Organization, Chromosome Replication, and Cytokinesis ($17.9 million over five years). Stanford University. Harley McAdams, Principal Investigator. Collaborating institutions: Case Western Reserve University, Cleveland, Ohio; Princeton University, Princeton, N.J.; University of California at San Diego; University of California at San Francisco; Lawrence Berkeley National Laboratory, Berkeley, CA.

High Throughput Identification and Structural Characterization of Multi-Protein Complexes During Stress Response in Desulfovibrio vulgaris. ($25.8 million over five years). Lawrence Berkeley National Laboratory. Mark Biggin, Principal Investigator. Collaborating institutions: University of California at Berkeley; University of Missouri, Columbia, Mo.; University of California at San Francisco.

Molecular Assemblies, Genes, and Genomics Integrated Efficiently ($12.9 million over five years). Lawrence Berkeley National Laboratory. John Tainer, Principal Investigator. Collaborating institutions: The Scripps Research Institute, La Jolla, Calif.; University of California at Berkeley; The Institute for Systems Biology, Seattle, Wash.; University of Georgia, Athens, Ga.; The Burnham Institute, La Jolla, Calif.

An Integrated Knowledge Resource for the Shewanella Federation ($3 million over three years). Oak Ridge National Laboratory. Edward Uberbacher, Principal Investigator.

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