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Utah State University

Center for Integrated BioSystems

Understanding the molecules of life

NEWS RELEASE

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CIB Director Receives $4.5M DOE Grant

LOGAN, UT – Utah State University microbiologist and Director of USU's Center for Integrated BioSystems (CIB) Bart Weimer has been awarded a grant valued at $4.5 million from the Department of Energy Joint Genome Institute (DOE JGI). The 2009 Community Sequencing Projects will partner with a consortium of researchers to sequence the genomes of microbial communities in Utah's Great Salt Lake.

Researchers believe the lake's harsh environment harbors a wealth of undiscovered biodiversity that may provide new solutions for carbon sequestration and bioremediation, and might even give clues to the nature of life on other planets.

"We believe we're going to find new enzymes and new metabolic routes that have never been seen before," said Weimer, the project's lead investigator. The collaboration also includes Jacob Parnell and Giovanni Rompato from USU, along with researchers at the University of Utah, the U.S. Geological Survey, and the Utah Division of Water Quality.

The Great Salt Lake is the third saltiest body of water on earth, but the saltiest to support life. On average, the lake is about four times saltier than the ocean, and in the North Arm up to 20 times saltier. The lake also contains petroleum seeps, mercury and other heavy metals, and high sulfate concentrations that give the lake a distinctive rotten-egg stink. Despite these compounds, the lake supports five million migrating birds each year and is home to brine shrimp and several kinds of algae including diatoms, as well as an untapped diversity of microbial life.

Because the microbes can survive in such an extreme environment, Weimer believes they may contain unique proteins that enable them to chemically fix sulfur and carbon and to detoxify pollutants. Their biochemistry may suggest new methods for sequestering carbon and reducing acid rain, Weimer said, as well as novel pathways for bioremediation of heavy metals, aromatic hydrocarbons, chlorinated compounds and methylmercury. Microbial life in the Great Salt Lake might also provide a model for life on planets such as Mars, where sulfate and salt concentrations are high.

Since less than 1 percent of the microbes in the lake can be cultured, many of the microorganisms have never been studied before. DOE JGI will sequence DNA from four sites in the lake to provide a baseline picture of microbial diversity. Researchers will combine the DNA data with measurements of microbial metabolites and environmental conditions such as salinity and oxygen to paint a complete picture of the lake's ecology.

"We've done a lot of diversity assessment of the lake in the last two years, and we're not even approaching the limit of microbial diversity," Weimer said. "The services that JGI will provide are going to eclipse anything that we could do in the next five to ten years."

Established in 2005, the Community Sequencing Program provides the scientific community at large with access to high-throughput sequencing at DOE JGI for projects of relevance to DOE missions. Sequencing projects are chosen based on scientific merit—judged through independent peer review—and relevance to issues in bio-energy, global carbon cycling, and bioremediation.

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