Frontiers in Integrative Biological Research (FIBR) 2003 awards

"Do Species Matter in Microbial Communities?"

September 2003

Sometimes it's hard to tell which is hotter, the debate over the concept of microbial species or Yellowstone's thermal springs, from which hail some bacteria central to the discussion.

Species are considered the fundamental units in plant and animal communities. But microbes have several asexual mechanisms for exchanging genetic material, and if this "horizontal gene transfer" is rampant and promiscuous, it might be necessary to rethink the species notion among microbes.

Led by David Ward of Montana State University, an NSF Frontiers in Integrative Biological Research project will gather and analyze DNA from the microbial mats in Yellowstone's heated pools to try and create a complete picture of the bacterial genomes there. The cataloging and comparing of DNA extracted from an environment, a technique called metagenomics, allows researchers to get a sense of whether or not genomes of individual organisms in a community of diverse organisms are organized into species-like populations.

"Resolving this question is one of the greatest challenges in all of science, made possible by a new era of environmental metagenomics methods," said Matt Kane, director of NSF's Microbial Observatories Program. "And where better to conduct this study than Yellowstone? The variety of environmental gradients and habitats probably harbors more microbial diversity than any other single site on our planet."

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Thermal pools, home to an abundance of microbes, steam near Twin Buttes Vista in Yellowstone.
Credit: Debra Naylor, Naylor Design, Inc.
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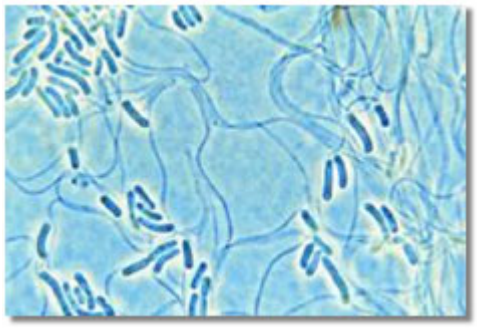

Sausage-shaped cells are unicellular cyanobacteria (*Synechococcus*) and filaments are green nonsulfur bacteria resembling *Chloroflexus* and *Roseiflexus*.
Credit: Richard W. Castenholz, University of Oregon
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Note About Images

Participating institutions:

- Montana State University (Ward)
- Stanford University/Carnegie Institution of Washington (Devaki Bhaya, Seung Yon Rhee, Arthur Grossman, Jeff Shrager, Samuel Karlin)
- Wesleyan University (Frederick Cohan)
- The Institute for Genomic Research (John Heidelberg)
- University of Copenhagen (Michael Kuhl)
- Lockheed Martin/NASA Astrobiology Institute (Catherine Tsairides)

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Helpful web sites:
FIBR site at Montana State: http://landresources.montana.edu/FIBR
Montana State University news releases:
http://www.montana.edu/commserv/csnews/nwarchive.php
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