

BIOCOMPLEXITY

PROBLEM



How does the genome relate to the organism? In parallel, how does the organism relate to its ecological function? The Biocomplexity Research Theme brings together a team of microbiologists, geologists, physicists, and engineers to explore these questions, among the main challenges now facing biology. Researchers hope that answers will result in a complete description of biological organization spanning scales of space, time and complexity.

Because an organism's genes reflect the series of selection pressures it has undergone during its evolution, the genome is not only the instruction manual for the organism, but also a fossil record of its environment. A comprehensive understanding of any organism must therefore include both evolutionary and ecological contexts.

RESEARCH



The theme's research will focus primarily on microbes, because they constitute well over half the Earth's biomass and form the foundation for all known ecosystems. Microbes are also unique in being relatively unaffected by extinction events, thus their genomes contain a fossil record of the entire history of life on this planet.

The theme will carry out research on a variety of specific model systems, seeking general principles and methodologies:

- the role of microbial activity in creating geological patterns at Yellowstone's geothermal hot springs
- the ecology of the gut
- the dynamics of intracellular networks
- water quality processes and environmental microbiology
- the ecology of soil microbes
- the dynamics of plankton blooms
- the dynamics of genome evolution in microbes

BENEFITS

The ecological issues addressed in the Biocomplexity Research Theme could have an impact in areas such as bioremediation of toxic waste, energy production, and soil improvement and stabilization, while the biomedical implications of this research may include new drug therapies and an improved response to antibiotic resistance.

THEME LEADER

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