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UCSC collaborates in interdisciplinary center to study marine microbes

By [Tim Stephens](#)

UCSC is one of six partner institutions in a new interdisciplinary science and technology center that will focus on the microbial inhabitants of the sea.

Funded by a five-year, \$19 million grant from the National Science Foundation (NSF), the Center for Microbial Oceanography Research and Education (C-MORE) is based at the University of Hawaii at Manoa.

Jonathan Zehr, a professor of ocean sciences who will lead UCSC's participation in the center, is a senior investigator in the marine microbiology initiative of the Gordon and Betty Moore Foundation, which is also providing support for C-MORE.

"The scope of the center is very broad and will allow a synthesis across disciplines that has not been possible before, from the molecular scale of genomes and genetics to the global scale of ocean modeling," Zehr said. "There is real excitement and commitment from people in all these disciplines to work together in this collaborative research."

The director of C-MORE is David Karl, professor of oceanography at UH Manoa, who is also a Moore Foundation investigator and has collaborated with Zehr for many years.

"We are on the verge of a revolution in our understanding of the sea around us, especially the role of microbes in global ecosystem processes," Karl said. "The primary mission of the center will be to increase understanding of the biology, ecology, and biogeochemistry of marine microorganisms, including bacteria, archaea, single-celled plants, and viruses."

Zehr has done pioneering research on microorganisms that "fertilize" the oceans by converting nitrogen gas into a form that other organisms can use (a process called nitrogen fixation). His findings have broad implications in areas ranging from the ecology of the open ocean to the ocean's role in climate change.

C-MORE will bring together knowledgeable teams of individuals who otherwise have little opportunity to interact. In addition to researchers at UCSC and UH, the interdisciplinary team assembled for C-MORE includes scientists, engineers, and educators from the Massachusetts Institute of Technology (MIT), Woods Hole Oceanographic Institution, Oregon State University, and the Monterey Bay Aquarium Research Institute (MBARI), as well as the UH Manoa College of Education and the Hawaii Department of Education.

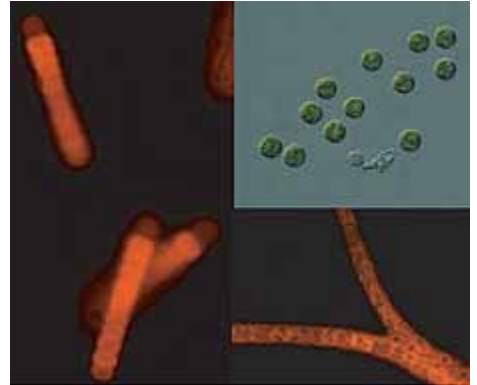
"A central objective of C-MORE will be to increase understanding about how biological diversity detected at the genome level expresses itself at the ecosystem function level, and then to transfer this knowledge to policy makers to assist them in their decision-making process," said C-MORE associate director for research Edward DeLong of MIT. "Marine microorganisms are invisible to the naked eye but their presence enables all multicellular life to exist, including human populations. Novel methods in molecular biology combined with satellite- and sea-based remote-sensing technologies provide an unprecedented opportunity to study microorganisms across broad spatial scales ranging from genes to entire ocean basins."

As part of the collaborative research effort, the center will allow for exchanges of graduate students and postdoctoral researchers between laboratories. The center also has a strong education component, including support for undergraduate and graduate students, teacher-training programs, and outreach efforts to increase the diversity of students pursuing science and engineering degrees. The Agouron Institute has provided additional funding for C-MORE's education programs.

"Being a part of C-MORE will bring new resources and opportunities to students here at UCSC," Zehr said.

UCSC will receive about \$1 million in annual funding from C-MORE to support its role in the program. In 2005, the Moore Foundation gave a \$2.2 million grant to UCSC to establish a marine microbiology research facility, called MEGAMER (Microbial Environmental Genomics Applications: Modeling, Experimentation, and Remote sensing). The MEGAMER facility will play a key role in UCSC's participation in C-MORE, Zehr said.

The NSF Science and Technology Centers Integrative Partnerships program enables innovative research and education projects of national importance that require a center mode of support to achieve the research, education, and knowledge-transfer goals shared by the partners. STCs conduct world-class research in partnerships among academic institutions, national laboratories, industrial organizations, and other entities to create new and meaningful knowledge of significant benefit to society.



Photomicrographs show a variety of recently cultivated cyanobacteria from the Pacific Ocean. Red color shows the natural fluorescence of photosynthetic pigments.

Photo: Elizabeth Mondragon