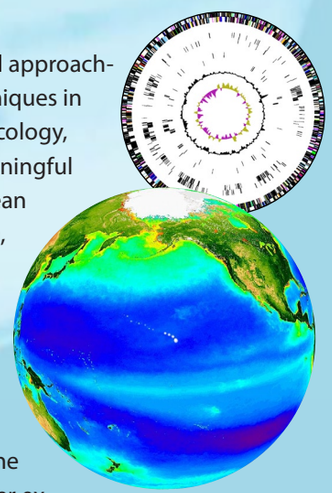
The **Center for Microbial Oceanography: Research and Education** (C-MORE), established in August 2006, is an NSFsponsored Science and Technology Center designed to facilitate a more comprehensive understanding of the diverse assemblages of marine microorganisms. Areas of research range from the genetic basis of marine microbial biogeochemistry, including the metabolic regulation and environmental controls of gene expression, to the processes that underpin the fluxes of carbon, related bioelements, and energy. C-MORE's primary mission is: ***Linking Genomes to Biomes***.

We believe that the time is right to address several major, long-standing questions in microbial oceanography. Recent advances in the application of molecular techniques have provided an unprecedented view of the structure, diversity, and possible function of sea microbes.



By combining these and other novel approaches with more well-established techniques in microbiology, oceanography, and ecology, it may be possible to develop a meaningful predictive understanding of the ocean with respect to energy transduction, carbon sequestration, bioelement cycling, and the probable response of marine ecosystems to global environmental variability and climate change.

The strength of C-MORE resides in the synergy created by bringing together experts who traditionally have not worked together. This, in turn, will facilitate the creation and dissemination of new knowledge on the role of marine microbes in global habitability.

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The Center's activities will take place at five Partner Institutions:

- Massachusetts Institute of Technology,
- Woods Hole Oceanographic Institute,
- Monterey Bay Aquarium Research Institute,
- University of California at Santa Cruz and
- Oregon State University

and at the University of Hawai'i at Manoa, which also serves as the coordinating institution.

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C·more

center for microbial oceanography: research and education

linking genomes to biomes

Center for Microbial Oceanography: Research and Education (C-MORE)

Marine Microbiology Initiative

Gordon and Betty MOORE FOUNDATION

NSF

SCHOOL OF OCEAN AND EARTH SCIENCE AND TECHNOLOGY
UNIVERSITY OF HAWAI'I AT MĀNOA

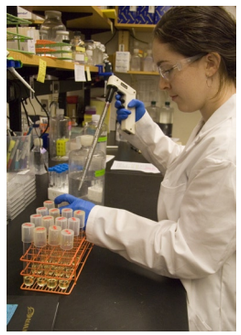
AGOURON INSTITUTE

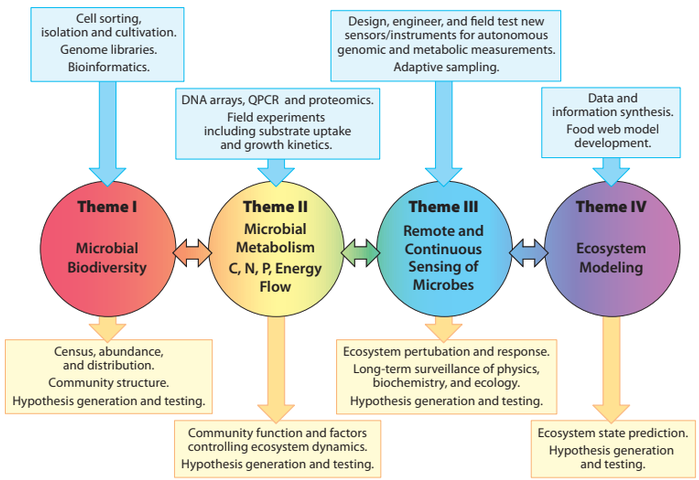
center for microbial oceanography: research and education

C·more *linking genomes to biomes*

The Center will bring together teams of scientists, educators and community members who otherwise do not have an opportunity to interact. Center **Research Programs** will be organized around four interconnected themes: (**I**) microbial biodiversity, (**II**) metabolism and C-N-P-energy flow, (**III**) remote and continuous sensing and links to climate variability, and (**IV**) ecosystem modeling, simulation and prediction.

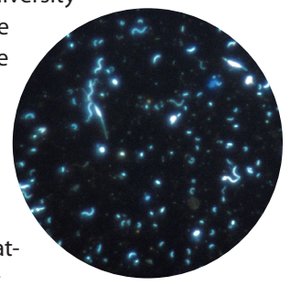
Center **Education Programs** will include pre-college curriculum enhancements and outreach, teacher training, and formal undergraduate, graduate, and post-doctoral programs to prepare the next generation of microbial oceanographers. The Center will establish and maintain creative outreach programs to help infuse the new knowledge gained into society at large including policymakers.





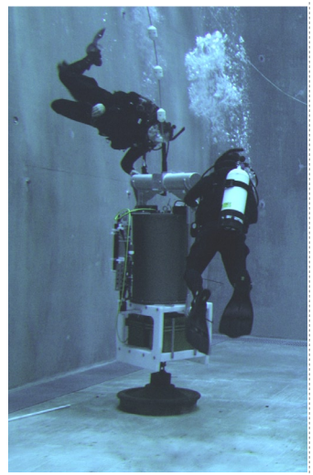
Research Programs will be organized around four interconnected themes: (**Theme I**) microbial biodiversity, (**Theme II**) metabolism and C-N-P-energy flow, (**Theme III**) remote and continuous sensing and links to climate variability, and (**Theme IV**) ecosystem modeling, simulation and prediction.

Theme I is focused on all aspects of microbial diversity found in marine plankton. Life has its origins in the sea, and its primordial form was microbial in nature. The diversity of marine microbes is immense in scope and is expressed in all aspects of marine microbial life: organismal, genomic, physiological and ecological. C-MORE's Theme I centers on cataloguing, categorizing, archiving and interpreting microbial diversity in the living ocean system and is necessarily tightly integrated with C-MORE's other central Themes.



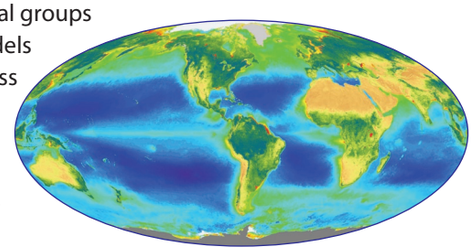
Theme II embodies the activities of microorganisms, interactions among microorganisms including viral interactions, gene exchanges, symbiosis, formation and consumption of organic matter, predation and the roles of microorganisms in elemental transformations and fluxes within the oceanic realm and between the atmosphere and the ocean. Theme II objectives are tightly linked to discoveries of genes and organisms and the use of model organisms isolated in cultivation efforts. Theme II is critical for identifying and quantifying key microbiological functions and chemical transformations that need to be monitored routinely in the oceans and that can be incorporated in predictive models of the ocean's roles in the biosphere.

Theme III goals are to develop and apply new autonomous sensor systems, as well as utilize existing systems, so that C-MORE investigators can remotely and in a sustained fashion assess bulk biological, chemical and physical properties of study sites; conduct whole community metabolic rate measurements; utilize molecular biological techniques to detect specific genes and gene products; couple observations and models to generate hypotheses; and develop the capability for testing hypotheses *in situ*. Existing sensors range from highly developed, commercially available and



in use on a range of platforms from satellites to ships, while others represent maturing technologies that are appropriate for some but not all platforms. Finally, emergent technologies are under active development but are not yet proven.

Theme IV involves a hierarchy of models that link information and knowledge among research thrusts to provide an understanding of the role of microbes in the ocean ecosystem. It is expected that information and understanding derived from the study of model organisms will provide much of the basis for developing the model thrust from gene sequencing through autecology. Combining the understanding of autecology with the information and understanding derived from C-MORE efforts will provide the input for the synthesis and modeling component. One of the central hypotheses of C-MORE is that inclusion of a more representative collection of functional microbial groups within food web models will allow us to address fundamental issues in marine science that have not been resolvable with existing models.



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