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Edgcomb Laboratory: Welcome to the Edgcomb Lab, Marine Microbial Ecology

Marine micro-oxic (severely depleted but still detectable oxygen) to sulfidic environments are sites of intensive biogeochemical cycling and elemental sequestration, where marine microbes are major driving forces mediating carbon, nitrogen, sulfur, phosphorus, and metal cycles. Thus, micro-oxic and sulfide-enriched habitats are important from both biogeochemical and evolutionary perspectives. Microbial eukaryotes are pivotal members of aquatic microbial communities. Through grazing on bacterial, archaeal, and other eukaryotic prey, they regenerate nutrients and modify or re-mineralize organic matter. In addition, they are known to affect the population dynamics, activity and physiological state of their prey. The magnitude of the under-sampled 'protistan gap' in the eukaryotic tree of life has been highlighted by molecular studies of diversity based primarily on amplification of small subunit ribosomal RNA genes. Next generation sequencing methods are opening exciting windows into this under-described diversity.

Enlarge Image

Shark Bay, Australia

In the Edgcomb laboratory, we study the diversity and evolution of protists, and their distribution and community structure, particularly in marine micro-oxic and anoxic/sulfidic environments. We also investigate the relationships between these populations and the biochemical transformations they mediate in the environment using a variety of methods, including DNA- and RNA-based molecular approaches, functional genomics, culturing, microscopy, and bioinformatics.

Our study sites include hypersaline anoxic basins in the Eastern Mediterranean Sea, anoxic water columns and sediments in the Cariaco Basin, Venezuela and Santa Barbara Basin, CA, Delaware Bay and other points along the Atlantic coast of the USA. In addition, we are investigating eukaryotic life in marine subsurface core samples from around the world, and the role that microbial eukaryotes play in biodegradation of hydrocarbons in marine sediments. In many of these environments we observe intriguing symbioses between protists and bacteria and archaea. These symbioses may have significant implications for marine biogeochemical cycles.

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