

THE *Current*

February 22, 2012

[Andrea Estrada](#)

UCSB Biologist Receives \$453,000 NSF Grant for Research on Diatoms

Jeffrey Krause, an assistant research biologist with the Marine Science Institute at UC Santa Barbara, has received a \$453,487 award from the National Science Foundation for his research on "Group-Specific Diatom Silica Production in a Coastal Upwelling System."

Diatoms are microscopic single-cell phytoplankton persisting in aquatic environments, and, according to Krause, their contribution to global photosynthesis rivals -- and may exceed -- that of terrestrial rainforests. Diatoms are the only significant phytoplankton group requiring high amounts of silicon, which they use to produce a shell of silica -- i.e., glass. This requirement, coupled with their importance in the global photosynthesis, means the production of diatom silica in the ocean plays a fundamental role in the biological processes regulating the exchange of carbon dioxide between the ocean and atmosphere.

Diatoms actively acquire silicon from the seawater in which they live, and must produce a new shell for cell division. For decades, scientists have measured the rate at which diatoms produce their silica shells in the environment, but the primary methodology yields a rate for the entire diatom assemblage, and reveals no information about which diatom species grow the fastest or have the highest contribution to the assemblage rate.

"The award will allow us to refine methodology, which will be used in the field to enable the first quantitative measurements of the contribution of individual diatom species to assemblage silica production," said Krause. "It will open up analysis of diversity within a field of assemblage that current methods cannot examine, and also allow for growth rates of individual diatom species or groups to be estimated in the field."

Actively growing "large" diatom species support shorter food chains by transferring more energy from the base of the food chain to higher animals, such as krill and small fish, which can feed on diatoms directly, Krause continued. Understanding processes at the species or group level will allow a more accurate assessment of material flow through ocean food webs, and will identify key diatom species for inclusion in ecosystem models. Krause noted that the ability to measure physiological rates for individual diatom groups might eventually bridge knowledge gaps between gene diversity and ecological function by coupling this methodology with other state-of-the-art methods.

[\[RETURN TO TOP\]](#)

† Bottom image: Visualization of two different diatoms (indicated by the arrows) from a field sample. They are shown in both light-field (top) and blue-light fluorescence (bottom) conditions. In the bottom panel, the blue/green color are the areas of each diatom where new silica has been deposited during incubation; red is the chlorophyll, the primary photosynthetic pigment.

Credit: Mark Demarest, University of North Texas

About UC Santa Barbara

The University of California, Santa Barbara is a leading research institution that also provides a comprehensive liberal arts learning experience. Our academic community of faculty, students, and staff is characterized by a culture of interdisciplinary collaboration that is responsive to the needs of our multicultural and global society. All of this takes place within a living and learning environment like no other, as we draw inspiration from the beauty and resources of our extraordinary location at the edge of the Pacific Ocean.