UC SANTA BARBARA

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UC Santa Barbara leads $1.3-million research project on coral regeneration

It takes a strong constitution to be a coral researcher these days. These vibrant underwater ecosystems are beset by all manner of challenges in the 21st century, from bleaching events and pollution to storm surges and overfishing. But there's good news on the way for coral conservation.

UC Santa Barbara has received $1.3 million from the W. M. Keck Foundation to fund a multi-campus collaboration on coral regeneration. The three-year grant will support researchers as they investigate how corals heal from damage and withstand environmental threats, particularly those associated with climate change.

The team is enthusiastic about the opportunity. "I'm profoundly grateful for the support from the Keck Foundation," said Adrian Stier, lead researcher and professor in the Department of Ecology, Evolution, and Marine Biology. "And I'm optimistic that the research will offer hope for the restoration of coral reefs in the face of climate change."

"I congratulate Adrian Stier and his lab on this significant grant from the W.M. Keck Foundation, which will open new research possibilities for the regeneration of some of our most crucial and threatened coral reef ecosystems," said Shelly Gable, interim

dean of Mathematical, Life, and Physical Sciences. “This investment from the Keck Foundation shows a commitment to ensuring that our fragile oceans remain resilient in the face of rapid change.”

Coral reefs harbor a diverse array of marine life, protect shorelines from erosion and bolster economies through fisheries and tourism. The survival of these ecosystems hinges on the corals’ ability to recover from injuries inflicted by storms, predators and human activities.

With half of the world’s coral reefs lost since 1950, this timely project aims to uncover the mechanisms that enable corals to heal and withstand escalating environmental threats. “Our primary goal is to develop a comprehensive model that links coral tissue damage and regeneration with overall colony growth, reproduction, survival and response to thermal stress,” said Stier. “We hypothesize that local tissue damage triggers a cascade of responses throughout the coral colony, affecting gene expression, polyp regeneration and energy allocation.”

Coral biologists have long assumed that energy moves from healthy parts of a coral colony to help heal damaged tissue. “We aim to reexamine this assumption by tracking damage signals at a molecular level,” said Ashley Seifert, a professor at University of Kentucky (UKY) and part of the research team. “By integrating temperature into our experiments, we hope to better model cellular resilience in corals and identify key factors that facilitate regeneration.”

The research team, comprising experts in regenerative biology and coral ecology from UCSB, UKY, UC Davis and University of Georgia will use the resilient coral species *Porites lobata* as a model organism. Controlled experiments will measure the effects of various wound types and intensities on coral colonies.

“We’ll employ molecular assays and respirometry to track how signals of tissue damage propagate across the coral colony,” explained Rachael Bay, associate professor at UC Davis. “Understanding these molecular pathways is crucial for identifying the key factors that enable corals to heal and recover.”

The team will also investigate how thermal stress affects coral regeneration. Experiments conducted at different temperatures will reveal whether the same corals that tolerate heat stress also boast enhanced regenerative capabilities.

The Keck Foundation’s funding is a milestone in the global effort to save coral reefs. By deciphering how corals heal and withstand stress, scientists can develop more effective strategies to protect and restore these essential ecosystems.

“As the world grapples with the impacts of climate change, our research offers a beacon of hope for the survival of coral reefs and the myriad forms of life they support,” Stier said.

Tags
Ocean and Beaches

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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.