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UVI and UTA Scientists Uncover New Insights on Stony Coral Disease Affecting U.S. Virgin Islands and Puerto Rico

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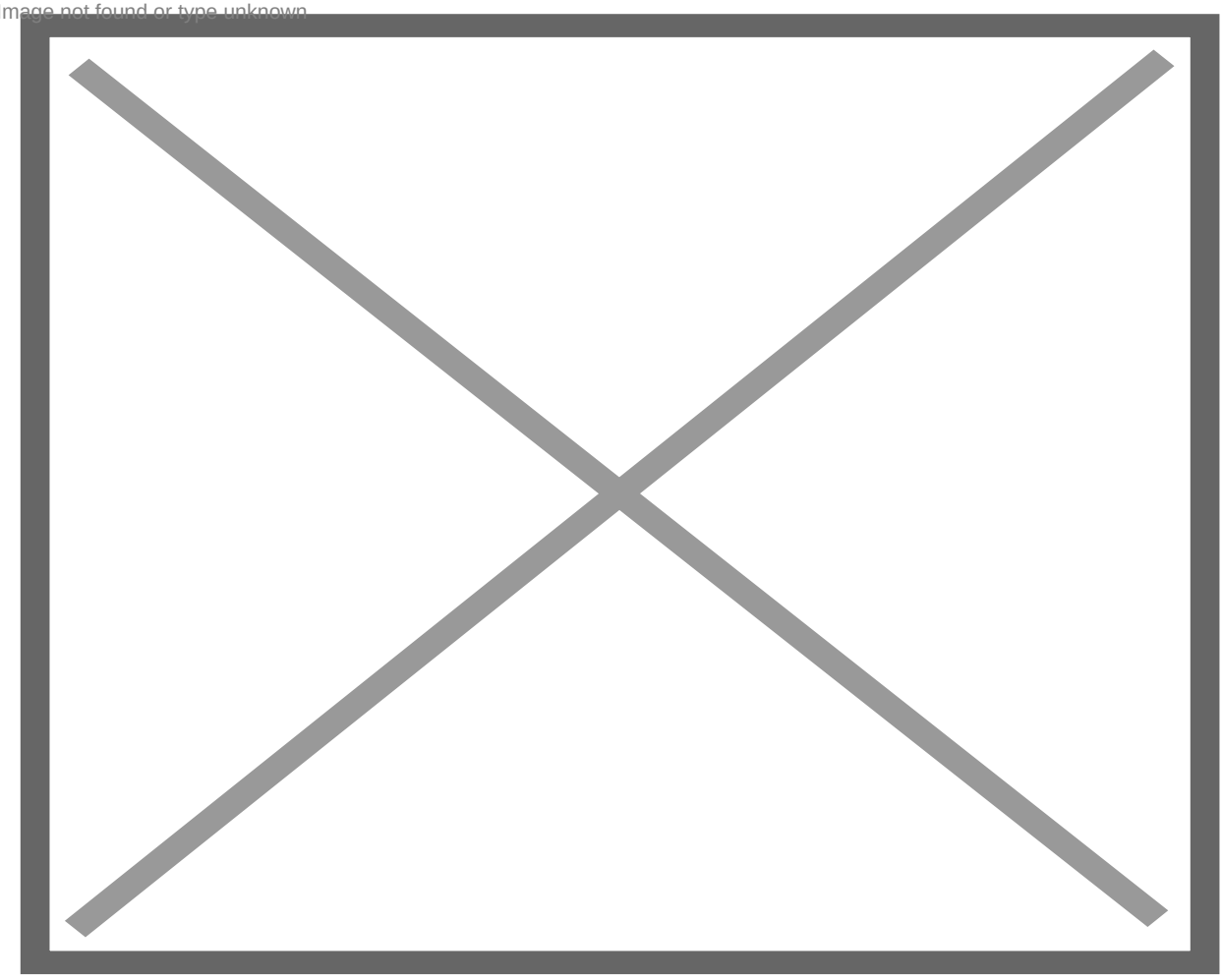

Corals with stony coral tissue loss disease.

A collaborative study conducted by scientists at the University of the Virgin Islands and The University of Texas at Arlington has shed new light on the stony coral tissue loss disease (SCTLD), a deadly ailment affecting different coral species.

The team's findings, published in the May 22 edition of Nature Communications, may have major implications for tackling the devastating disease.

The research, led by UVI Research Professor of Marine Science, Dr. Marilyn Brandt, and UTA Professor of Biology, Dr. Laura Mydlarz, investigated SCTLD's impact on various coral species, examining which were more susceptible. The disease, first noted in Florida's waters around 2014, has since spread across 22 Caribbean countries and territories, including the U.S. Virgin Islands and Puerto Rico. It's characterized by rapid tissue loss and high mortality rates in corals.

"SCTLD is deadly to over 20 different coral species, and we are yet to identify its pathogen. We compared the species' reactions to the disease, looking for common responses that might help us understand the disease better, possibly leading to the identification of a pathogenic agent," explained Dr. Brandt.

The team discovered a potential new mechanism of the disease. They found that the coral might be expelling its own symbionts. "The symbionts provide the food and energy for the coral, and we observed differences in species susceptibility that provided an amazing framework for gene expression," Dr. Mydlarz stated.

Symbionts, organisms living in a mutually beneficial relationship with another organism, are crucial in this scenario. For coral, the symbiont is Symbiodiniaceae, a type of algae that lives inside it. The coral offers a secure habitat for the symbiont, which uses sunlight to generate food for the coral.

In the course of SCTLD infection, the team noted an increased expression of the gene rab7, associated with a process called symbiophagy where coral digest dead or dysfunctional symbionts. "This is the first disease where we've found that the coral may actually be mounting a response against this symbiont instead of just a general immune response," said Kelsey Beavers, the lead author of the study and a Ph.D. student in Dr. Mydlarz's lab.

The symbiotic relationship between the coral and the algae is essential for coral reefs' growth and survival. The new findings indicate that the disease may be targeting the symbionts, a suggestion that had been floating around without solid evidence until now. The discovery can potentially redirect scientific research towards identifying a pathogen and formulating better interventions against the disease.

Moreover, data gathered during the study showed that, in addition to trying to eliminate their own symbionts, the corals also displayed signs of starvation. This could be due to the symbionts experiencing stress in their photosynthesis, resulting in a disrupted or entirely halted food supply for the corals.

Dr. Mydlarz emphasized that the extremely high mortality rates among corals have led scientists to take drastic measures such as removing healthy corals from reefs and transporting them to safer environments like aquariums, zoos, or other facilities. Some corals from Florida have even found their way to the Fort Worth Zoo.

The research project, which was funded by two grants from the National Science Foundation, involved the joint efforts of scientists from Mote Marine Laboratory, Woods Hole Oceanographic Institution, Louisiana State University, and Rice University.