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Researchers: Algae, growths threaten reefs

By MAX DIBLE West Hawaii Today | Saturday, December 8, 2018, 12:05 a.m.

Francois Seneca collects samples of abnormal coral growths off the coast of Oahu. (Photo courtesy of Monaco Explorations and Centre Scientifique de Monaco).

KAILUA-KONA — Perils for Hawaii's marine environments manifest in myriad forms.

A record stretch of global coral bleaching between 2014-17, primarily linked to rising ocean temperatures, ravaged reefs off of the Hawaiian Islands in record proportions.

Now, researchers from University of Hawaii at Manoa to Centre Scientifique de Monaco are studying more specific threats to the state's corals, some of which they believe are also linked to warming ocean waters. With the National Weather Service forecasting an 80 percent chance of an El Nino developing this winter, all threats must be taken seriously.

Testing for tumors

Scientists from the Principality of Monaco are working in Kaneohe Bay off Oahu, gathering samples of what they describe as "abnormal growths" on certain types of coral, specifically *Porites evermanni*.

Their research is two-fold. Not only are researchers attempting to understand the causality of the growths and how corals defend against them, but they're hoping to relate that work to aid cancer research in humans.

Francois Seneca, senior scientist at Centre Scientifique de Monaco, believes the coral growths are related to bacteria or viruses of some type(s). Humans are host to trillions of microbial cells, or microbiota, which include various viruses and bacteria.

Much of human microbiota resides in the "gut," and their health often correlates with the health of the human host. Seneca said gene sequencing technology has proven corals use similar genes as humans to combat bacterial incursion.

Thus, studying like interactions between coral and bacteria is illuminating similarities to what's already medically understood about the relationship between bacteria and humans. Seneca believes gaining a deeper understanding may prove valuable to both coral and human health.

"We have things to learn from the corals," said Seneca, adding they've been evolving for half a billion years while humans only have 65 million years of evolution under our collective belt. "(Corals) have the tools to deal with these bacteria, defend themselves and communicate with them, and that's what we're trying to get."

The growths Seneca is studying aren't new phenomena. He said scientists in Hawaii have been paying attention to them since at least the early 1990s. But still, little is known about why they occur and what that means for coral biology.

One thing Seneca is sure of, however, is that once a growth reaches a certain size on *Porites evermanni*, it presents as a disease and substantial coral cover is lost.

Another coral species, *Montipora capitata*, more prevalent on reefs off Hawaii Island, is effected similarly. Seneca said a group out of the University of Hawaii at Hilo has conducted research similar to his on that species. Dr. Misaki Takabayashi, a coral reef molecular ecologist affiliated with UH-Hilo's work, was unavailable for comment.

A second element of the growths Seneca believes strongly and is hoping to prove is a correlation with rising ocean temperatures. When the coral is fighting off whatever invasion causes the growths, it produces a bright pink pigment. Seneca said in June, when the waters were warmer than December, the pigmentation was considerably more obvious, indicating a relationship with ocean temperature.

"We know bacterial growth is extremely sensitive to temperature, so … it's possible that the temperature increasing favors some type of bacteria that would cause the tumor," Seneca said. "It looks like when the water conditions are changing, then the bacteria are changing, and it causes trouble for the corals so they catch more disease."

Mudweed

The UH-Manoa Department of Botany reported in a press release last week its researchers have discovered a new species of leather mudweed, which it described as a widespread algae that can threaten marine environments.

Researchers like Rachael Wade, a doctoral student working as part of the group, said discerning between particular species of mudweed will require more genetic testing. However, researchers believe it to be *Avrainvillea erecta*.

Avrainvillea amadelpha, a related species, has in the past, "overgrown shallow reefs in Maunalua Bay in East Honolulu and outcompeted seagrass meadows," according to the release. The effects of *A. erecta*, the suspected type of new algae, remain unknown, but researchers believe it may have a similar impact on coral reefs as its predecessor.

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"We are concerned that this species poses a serious threat because of the challenges that *Avrainvillea amadelpha* has posed for the past 30 years," Wade wrote in an email to West Hawaii Today. "We know that *A. amadelpha* can displace native species and speculate that it can smother coral reefs due to its ability to collect an incredible amount sediment in its root-like tissues. Having a sister species arrive makes that threat even more concerning."

How the algae was introduced also remains unclear, though because of its locations near Honolulu and Pearl Harbor, boat traffic is a prime suspect. The release also notes the 2011 Tohoku earthquake and the tsunami that followed could have carried the algae with it across the sea.

As to whether the algae has or will find its way reefs of West Hawaii shores, Wade said that's a difficult question to answer.

"My off the cuff answer is no," said Wade, adding another study included in her research didn't find samples of either type of algae at sites off West Hawaii.

"However, the targeted sites were shallow and not necessarily near any major ports," she continued. "And because *A. erecta* was discovered quite deep at one site and is persisting near major ports on Oahu, it is possible that it could be spread to other ports … like the Kona Cruise Port, for example."

Wade said the group has not discovered evidence linking the arrival or proliferation of mudweed to rising ocean temperatures.