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FLORIDA

## Can probiotics cure Florida's ailing coral reefs? Tests show it works on devastating disease

BY ALEX HARRIS

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Technician Yesmarie De La Flor prepares a culture of probiotic bacteria in the Smithsonian Marine Station's microbiology laboratory in Fort Pierce, Florida. These probiotics were used for further testing on diseased corals. *Michelle Donahue*



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On a coral reef, white is the color of death.

So when researchers see a flash of bone white amid the riot of colorful corals, fish and sea creatures, they know something is wrong. If it's all white, the coral likely bleached to death in the steamy hot seas. But if it's a patch of white surrounded by the raggedy brown edges of living coral tissue, they know the most devastating coral disease in the Caribbean has likely struck.

Stony coral tissue loss disease is a new and deadly disease affecting reefs throughout the Caribbean. Unlike other coral diseases, it affects more than 20 species, and it kills fast — sometimes within a matter of days.

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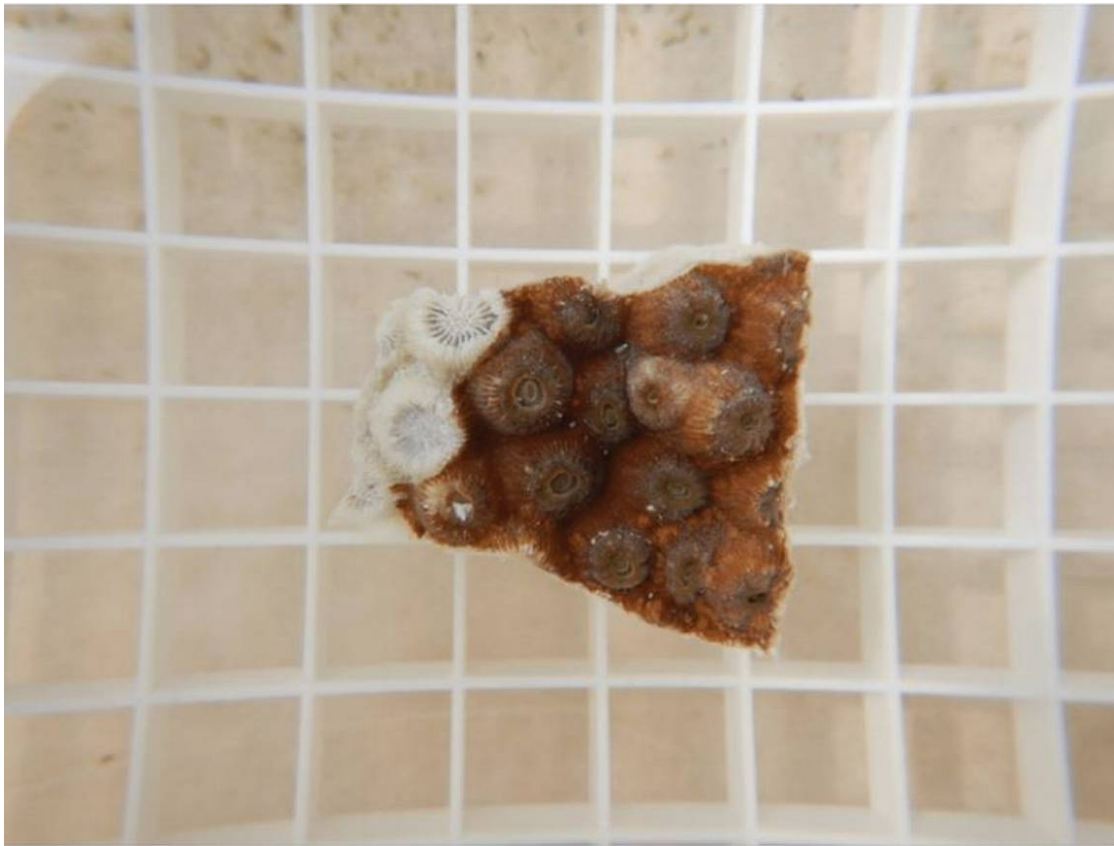


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But after nearly a decade of devastating losses, scientists finally have some good news. They have found at least one way to fight back, and they're already testing it on Florida's reefs.

A new paper published in the [journal Communications Biology](#) found that applying probiotic bacteria — yes, similar to the kind in your yogurt — to corals could prevent the disease, or even reverse some of its symptoms.

“We think about probiotics for our food, but this is probiotics for the reef,” said Julie Meyer, an assistant professor at the University of Florida's department of soil, water and ecosystem sciences and one of the authors of the study, published Thursday.



A close look at a piece of diseased great star coral (*Montastraea cavernosa*) that is cut and ready for testing and treatment in an aquarium. The white coral skeleton on the left shows where two coral polyps have already died from stony coral tissue loss disease. *Kelly Pitts*

### **ONE HEALTHY CORAL LEADS TO MORE**

Scientists first discovered the beneficial bacteria a few years back during an experiment where researchers tried to infect healthy corals with the disease to understand how it spread. But one coral just wouldn't get sick.

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Bacteria cultured off of that one coral eventually turned into whole tanks of bacteria, which scientists turned into a paste and started smearing on sick corals. It worked.

Next up were field trials in corals off the coast of Fort Lauderdale and Marathon, in the Keys. Scientists used two methods, sticking the paste on individual corals or dropping a big weighted bag over the colony, pumping in liquid bacterial cultures, and letting the whole thing marinate for a few hours.

Both methods worked, Meyer said, just not as well as they did in the lab.

“In the lab, it’s very effective. In the environment, it’s harder to say because there’s so many variables going on,” she said.

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This treatment could be used to help protect the new and upcoming crop of replanted corals, part of Florida’s multiple reef restoration efforts.

Valerie Paul, head scientist at the Smithsonian Marine Station at Fort Pierce and lead author of the study, said the probiotic may even spur more growth and breeding of wild corals.

“We are also testing this strain as a settlement cue for coral larvae because it produces tetrabromopyrrole, a compound known to induce metamorphosis of coral larvae, and it is showing positive results in laboratory experiments,” she said.

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However, scaling up this solution may prove difficult. Florida has hundreds of miles of reef tract, spotted with tens of thousands of sick corals. Tending to each one with a tub of paste, or even the weighted bag, is slow work.

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"It's manpower limitation. It's a lot of work to go out there and hand-apply this stuff," she said.

Still, Meyer said her research team is excited at the possibilities shown in this research. For nearly a decade, researchers have been throwing everything they could at these corals — even, she said, essential oils.

So far, the most promising advance has come from antibiotics. Scientists have been successfully using amoxicillin (the same stuff humans get for bacterial infections) to treat sick corals for a few years.



The remaining live tissue on this great star coral colony (*Montastraea cavernosa*) in Florida is being destroyed by stony coral tissue loss disease. The bright white margin surrounding the dark brown, living coral tissue is where the coral is bleaching and dying due to the disease. *Kelly Pitts*

But scientists are worried that using too many antibiotics could create an antibiotic-resistant strain of the disease, and they're trying to move away from using medicines that humans rely on.

"We don't want to build that resistance when we need to use it ourselves," Meyer said.

## **BORN IN MIAMI**

While much about the disease is still a mystery, scientists are sure of a few things.

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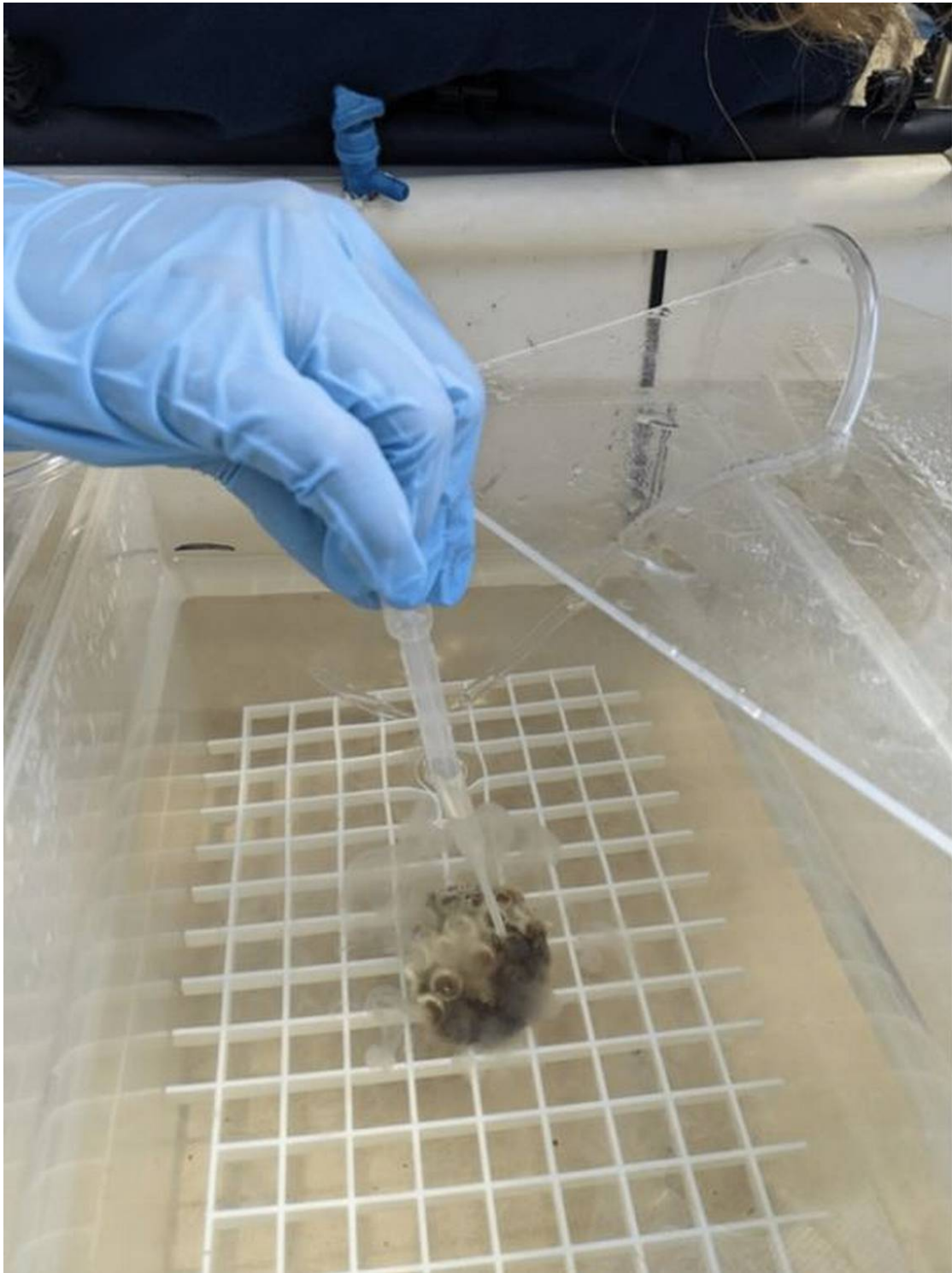
They know it was first spotted off Virginia Key in 2014 and quickly raced around the Caribbean. It was devastating. Research from Nova Southeastern University found that at least four species of coral in Florida [lost 98% or more](#) of their living tissue to the disease.

Die-off from this disease peaked in Florida around 2016, but it's still on the move.

In 2021, stony coral tissue loss disease reached the final untouched pocket of Florida: the Dry Tortugas in the Keys. And just this week, scientists recorded a sighting of a sick coral all the way across the Caribbean, [in Curacao](#).

In Florida, new flare-ups are still appearing, but Paul said she thinks "the worst is over."

"Now the disease is endemic in Florida and unfortunately it has not gone away," she said. "We still see corals showing signs of the disease on the reef, but not as many as a few years ago."



A researcher applies a solution of seawater mixed with probiotic bacteria to a piece of coral in a lab tank to test its effectiveness against stony coral tissue loss disease. *Kelly Pitts*

While research hasn't fingered a specific culprit for the spread of the disease, one of the leading theories is contaminated ballast water from cruise and cargo ships. Miami is the busiest cruise port in the world, and the spread of the disease throughout the Caribbean reflects popular cruising routes.

“When it arrives in a new location it’s around the port areas, and it doesn’t follow ocean currents or anything,” Meyer said.

But so far, no government has asked cruise or cargo ships to alter their behavior to potentially slow the spread of the disease.

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And while this new research represents some success in the fight against the spread of stony coral tissue loss disease, researchers said that saving Florida’s beleaguered coral reefs requires hitting all of the problems they’re facing at once, like coral bleaching, ocean acidification and wastewater spills, which are all worsened by climate change.

That’s because each of those factors makes coral weaker and more stressed out, Meyer said, and more susceptible to disease.

“In general, we kind of have to diminish all the stresses on corals in Florida,” she said.