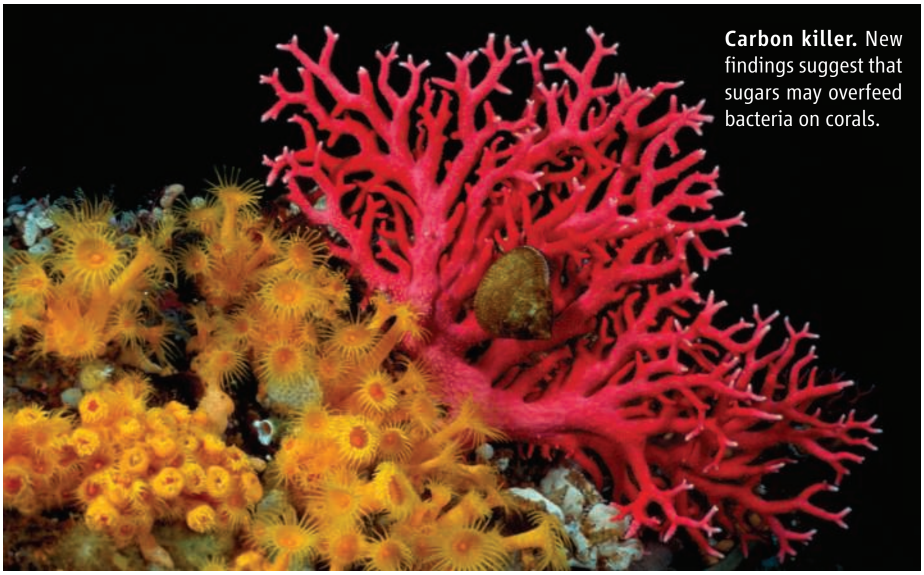


Carbon killer. New findings suggest that sugars may overfeed bacteria on corals.

Don't Sugarcoat Corals

Potentially shaking basic assumptions of marine biologists, the first large-scale ecotoxicity study of coral has identified a new and surprising suspect for what may be killing reefs worldwide: organic carbon in the form of simple sugar molecules.

Coral reefs are under global assault; Caribbean reefs, for example, have lost 80% of their coral cover in the last 3 decades. As coastal populations near reefs have skyrocketed, scientists have fingered phosphates, nitrates, and ammonia as the most likely culprits. They surmised that these pollutants aid the growth of algae that compete with coral for space. The new results, presented at the annual meeting of AAAS (the publisher of *Science*), suggest that carbon-induced bacterial growth may also be a major problem.

In 2003, marine biologist David Kline of the Smithsonian Tropical Research Institute in Balboa, Panama, performed more than 3000 individual monthlong experiments on coral heads sampled from the Panamanian coast. After dosing the corals with solutions of basic chemicals found in sewage and agricultural runoff, he found that, on average, almost 35% of corals exposed to carbon compounds died compared to about 7% of those given nitrate or phosphate.

Separate experiments showed that sugars led to an explosive growth of coral-associated bacteria not caused by other chemicals. If this holds true in the ocean, says Kline, corals already under stress from warmer water temperatures and the loss of fish and urchins that eat algae may succumb directly to the rapid growth of the normally symbiotic bacteria. Or they may be weakened enough that the fleshy algae finally win out. "Carbon-loading disrupts the balance between coral and its associated bacteria, leading to disease," says Kline, who will detail the work in *Marine Ecology Progress Series* next month.

"Retrospectively, it makes sense that the bacteria would benefit from the sugars, but it's not something I would have predicted," says Mary Alice Coffroth, a coral reef biologist at the University at Buffalo, New York. "Sugar has never been looked at like this."

Noting that 7% to 8% of the coral controls in the study died, coral biologist Alina Szmant of the University of North Carolina, Wilmington, cautions that Kline's experimental system may lack the natural water flow that corals use to fight bacteria. The microbes may have an artificial advantage, she says. Forest Rohwer of San Diego State University in California, a co-author of the upcoming paper, counters that most corals survived, indicating that the system was robust.

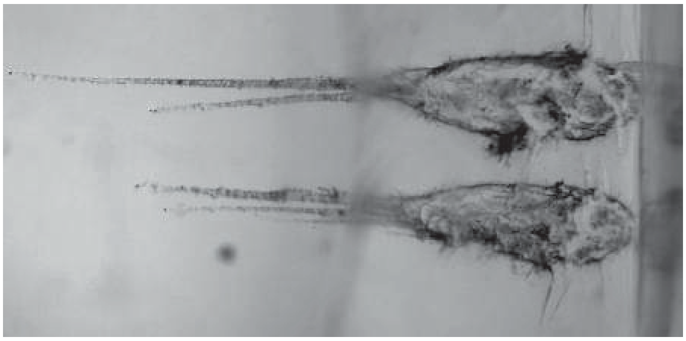
Kline says these new results should motivate coastal officials to utilize basic sewage treatment that would reduce organic carbon levels—only 10% of sewage flowing into the Caribbean is treated—and check organic carbon levels along with other pollutants. "We are not monitoring a critical component of the water in the system," he says. **–ELI KINTISCH**

A First Look at a Comet's Dust

The success of NASA's Stardust mission, which returned material from comet Wild-2, is giving planetary scientists a chance to test theories about the composition and formation of the early solar system. "We're seeing a variety of things we absolutely know came from a comet," says Stardust principal investigator Donald Brownlee of the University of Washington, Seattle, who in St. Louis described the first analyses of microscopic cometary particles trapped in the craft's 132 ice-cube-sized blocks of aerogel.

So far, scientists have identified glassy and crystalline compounds, including iron sulfides. Although sulfides were not unexpected, there had been no spectral evidence that comets contain sulfur, notes Brownlee. Mission scientists have also found hints of organic matter and so-called GEMS (glass embedded with metal and sulfides); the latter are thought to be from stars.

Comets originated at the periphery of the rotating cloud of gas and dust that formed our solar system and likely retain pristine material from that time. After Stardust's 4.6-billion-kilometer, 7-year roundtrip, we now "have exciting samples from the edge of the solar system 4 billion years ago," says Brownlee. Mission scientists have dug out particles at the ends of impact tracks (above) preserved in six aerogel cubes and expect to present much more data at a meeting next month. "I've made all sorts of predictions [about the early solar system], and I figure half of them will be wrong," says Joseph Nuth of NASA Goddard Space Flight Center in Greenbelt, Maryland, with a smile. **–JOHN TRAVIS**



Comet tracks. Two microscopic cometary particles slammed into a block of aerogel, fragmenting and making these tracks.

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