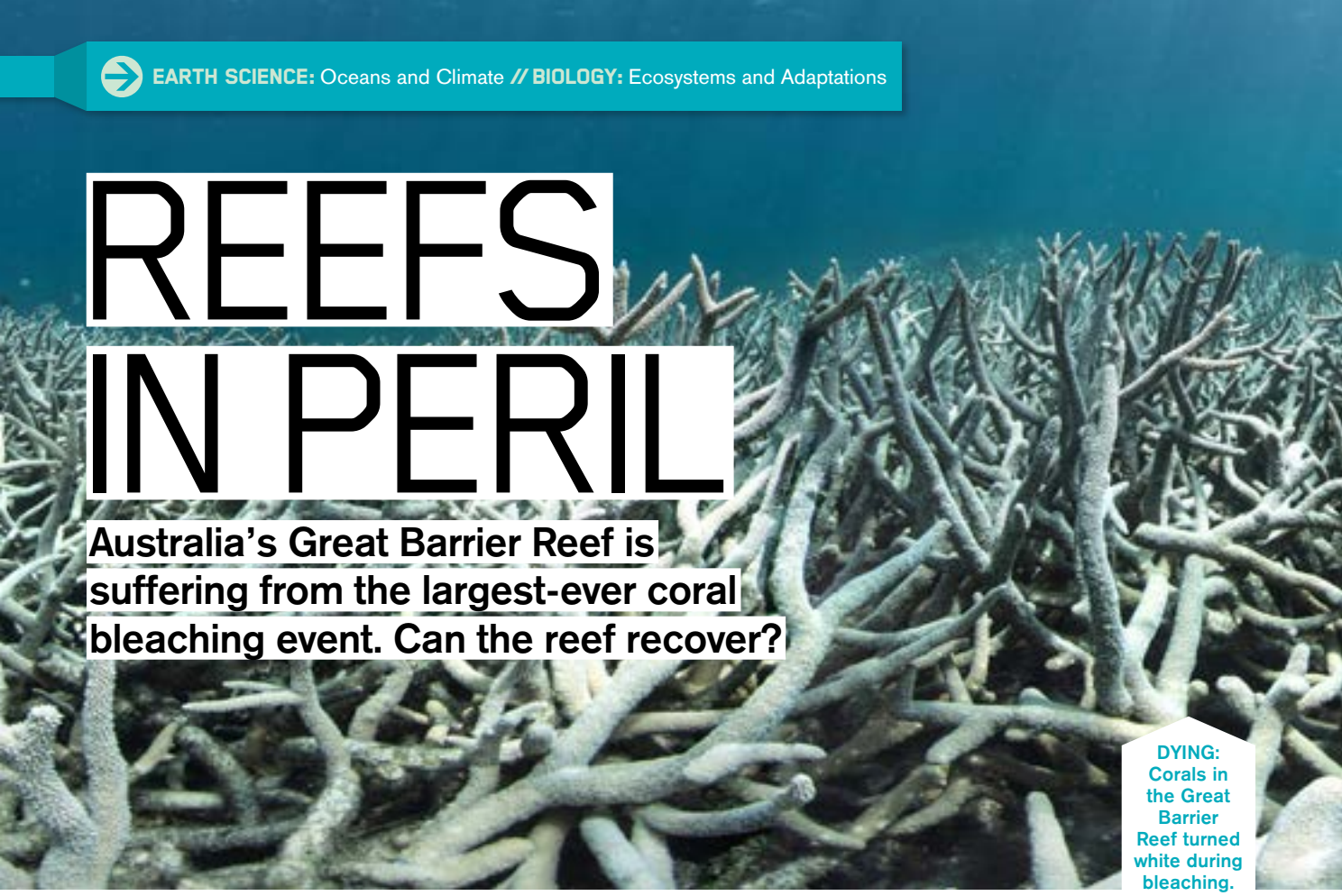
REEFS IN PERIL

Australia's Great Barrier Reef is suffering from the largest-ever coral bleaching event. Can the reef recover?



DYING: Corals in the Great Barrier Reef turned white during bleaching.

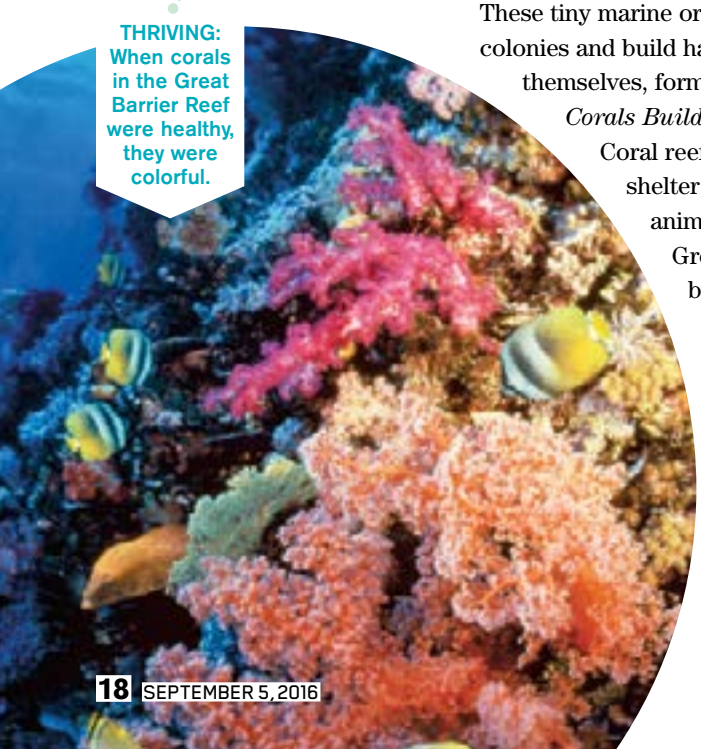
ESSENTIAL QUESTION: How does the health of corals affect reef ecosystems?

Just off Australia's northeastern coast lies the largest living structure in the world—the Great Barrier Reef. It stretches some 2,000 kilometers (1,200 miles) and was built entirely by *coral polyps*. These tiny marine organisms live in colonies and build hard skeletons under themselves, forming reefs (*see How Corals Build Reefs, right*).

Coral reefs provide food and shelter for fish and other animals. Normally, the Great Barrier Reef is bursting with life. But recently, the reef has come under threat—along with others like it around the globe.

This March, biologists made an alarming discovery: They found that 93 percent of the Great Barrier Reef is suffering from *coral bleaching*, when the corals that make up a reef turn white. The scientists think many of the corals won't survive.

"It's the worst bleaching event in history," says Ruth Gates, a marine biologist at the University of Hawaii.



THRIVING: When corals in the Great Barrier Reef were healthy, they were colorful.

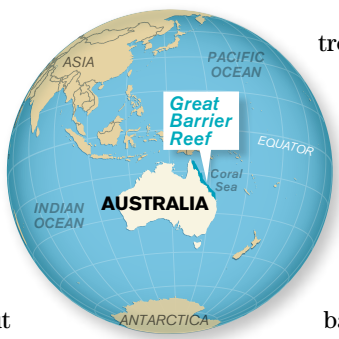
A HEATED PROBLEM

Bleaching happens when corals are exposed to water temperatures that are warmer than usual. Warmer water puts stress on corals. In response, they expel tiny plantlike organisms, called *algae*, that normally live inside their tissues and give them their color.

Corals and algae's relationship is an example of *mutualism*, when two organisms living together benefit from one another. The corals protect the algae, and the algae make food for the corals. Corals also capture prey, but it's estimated that algae provide corals with up to 90 percent of their energy.

JEFF HUNTER/THE IMAGE BANK/GETTY IMAGES (HEALTHY REEF); XL CATLIN SEAVIEW SURVEY (BLEACHED REEF)

When temperatures get too high, the algae living in corals can no longer function. "That makes the corals want to get rid of them," says Gates. "When corals bleach, that's the breakdown of their relationship." Without colorful algae, corals' white skeletons show through their transparent tissues.



Ocean temperatures have been on the rise because of global climate change. This year, an unusually strong *El Niño*, a warm climate pattern that affects the Pacific Ocean every few years, worsened the problem. The combined effects have caused the longest-lasting coral-bleaching event on record. The bleaching started in 2014.

HOPE FOR CORALS

When bleaching happens, the entire reef *ecosystem* suffers. Corals have trouble reproducing and become more vulnerable to disease. They can no longer support the reef inhabitants that rely on them.

But Gates believes corals can make a comeback. She has discovered that some corals seem to withstand bleaching events better than others. Gates and her team are working on breeding these hardier corals, which could be implanted into dying reefs in the future. They're also introducing corals to warmer temperatures in their lab to see if they can adapt.

"We can give corals a leg up," says Gates. "Someday, if we need to, we can put these corals in the ocean to help reefs survive."

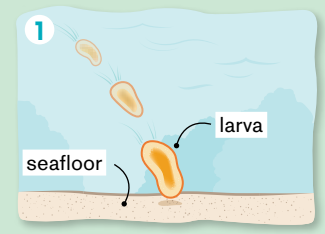
—Amy Barth

CORE QUESTION

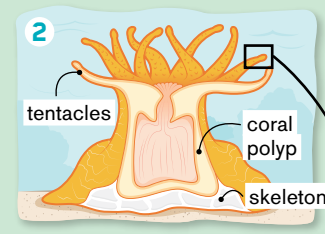
Explain the relationship between coral and algae.

HOW CORALS BUILD REEFS

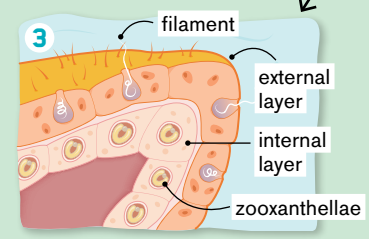
Corals are made up of tiny tentacled animals called *polyps*. They grow and reproduce to build reefs.



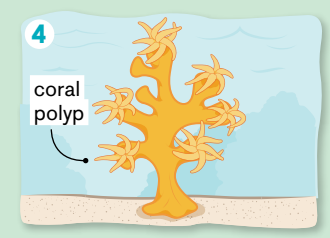
BABY CORAL: Corals spawn by releasing eggs and sperm into the water. When a sperm meets an egg, a coral larva forms. The larva attaches to the seafloor and grows into a coral polyp.



GROWING UP: The polyp builds a hard, cup-shaped skeleton under itself. As the coral grows, it continues to add material to the floor of its home.



LIVING TOGETHER: Corals get most of their energy from algae, called *zooxanthellae*, living within their tissues. Corals also shoot out harpoon-like filaments to catch food.



TINY BUILDERS: Coral larvae build homes on top of other corals to create reefs—a process that can take up to 10,000 years.

KATE FRANCIS (DIAGRAM); JIM MCMAHON/MAPMAN® (MAP)