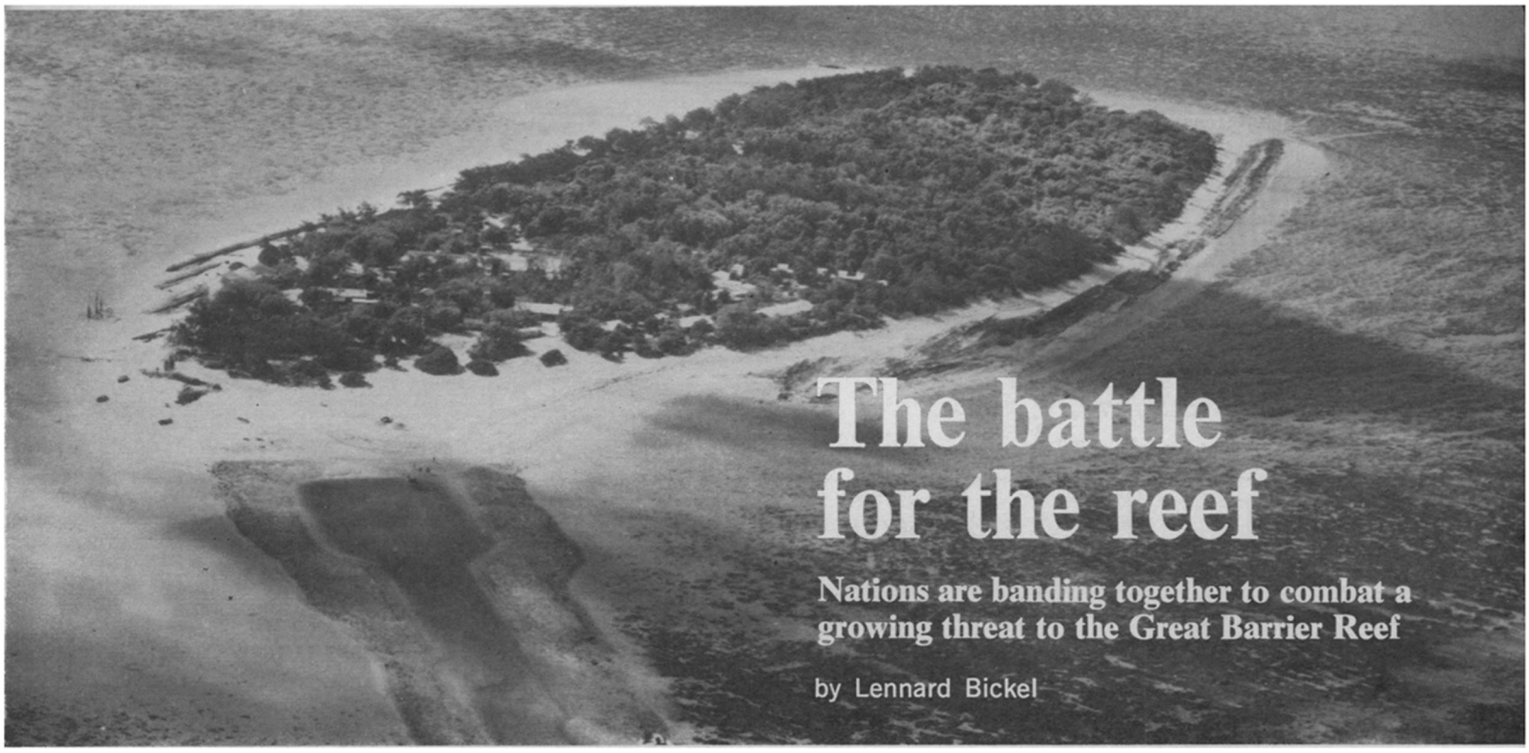
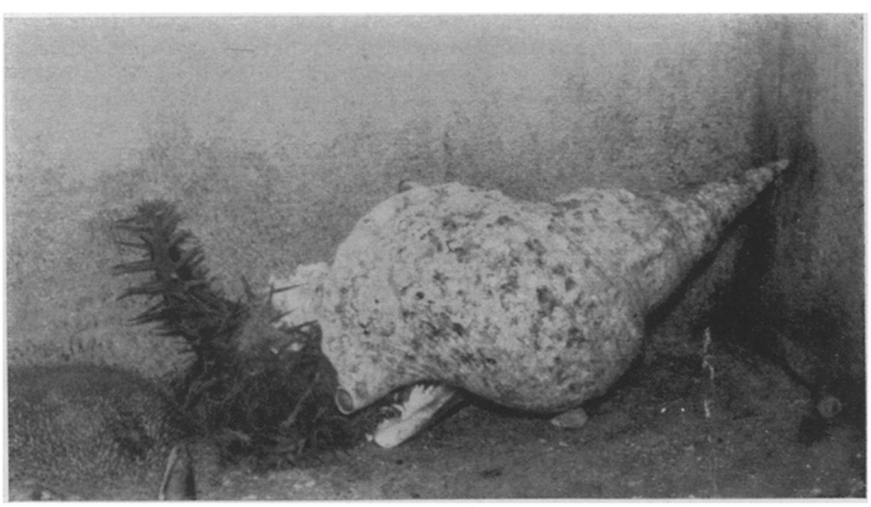


The battle for the reef

Nations are banding together to combat a growing threat to the Great Barrier Reef

by Lennard Bickel



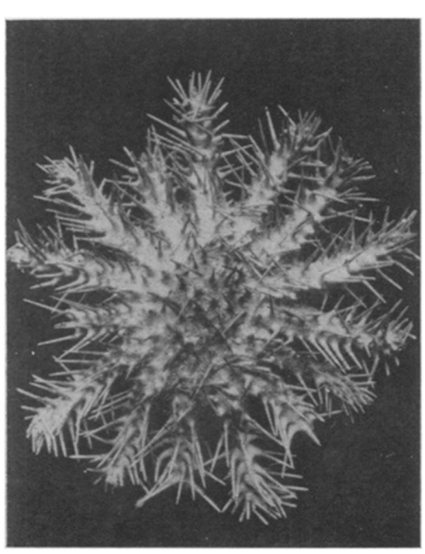
Photos: Australian News & Information Bureau

Triton: Natural enemy of the crown of thorns, a needed friend of the reef.

Conservationists in Australia are sounding new alarms over the rate of devastation on the Great Barrier Reef, the vast coral bastion that stretches for more than 1,200 miles along the northeast coast.

The reef structure runs through about 100,000 square miles of waterway, from just north of Brisbane up to the tropical waters of the Torres Strait. Varying from 10 to 200 miles off the coast and in places 40 miles wide, it follows the edge of the continental shelf for 600 miles with few deepwater openings, all perilous to navigate, as Captain Cook discovered 200 years ago.

Along its vast sweep, 350 different species of coral have so far been identified—more than half the known world-



The crown of thorns (left) is beautiful but deadly, as shown by the fate of living staghorn coral (right) before, during and after its visit.

wide total. They range in color through pink, yellow, green, purple, crimson and blue and in shape from staghorns and fans to broad leaves, petals and the delicate stems of plants.

The colors come from the polyp and from tiny algae, called nullipores, which secrete calcium. These small gelatinous creatures feed on animal and plant matter and surround the soft parts of their organism with the calcium carbonate that becomes the raw structural material of the reef.

Only the top layers of the reef, sometimes several hundred feet thick, are the living portion. And it is these areas, the ones that keep rebuilding the reef against the ceaseless abrasion of the ocean, that are endangered.

A major villain is a beautiful but voracious starfish known as the crown of thorns, which simply devours the living coral (SN: 6/15/68, p. 582). The scope of its destruction was first noted about four years ago, and blamed largely on the decline of one of the creature's natural enemies, a shellfish called the triton that had previously been keeping the crown of thorns in check.

The triton, however, is also a comely creature, and its shell brings as much as $35 from collectors, sometimes lending itself to conversion into lamp shades and other artifacts. As a result, the unrepressed starfish has been running rampant. But it was only recently that a survey conducted from a miniature research submarine revealed the true extent of the devastation.

Peering from the portholes of the Japanese mini-sub Yomiuri, researchers have now found to their dismay that the agile crown of thorns may be moving southward down the reef at a rate of 50 miles a year. In some areas, as much as 90 percent of the living coral has been killed in the starfish's passing, with the voracious invaders sometimes glimpsed as often as one every three feet. The areas they leave behind are stark, white and lifeless, in bitter contrast to the brilliant hues of the living coral.

"The crown of thorns' devastation lies over more than 80 percent of the coral around Green Island," says Dr. Robert Endean of Queensland University, "and the majority of the reefs between Cairns and Townsville have been killed." The coastal city of Townsville is more than halfway down the reef, and the starfish hordes are already working their way south from there. "They will then be at work in the heart of the main tourist area," says Dr. Endean, who is also a member of the self-appointed Great Barrier Reef Committee, composed of individuals concerned about the embattled formation.

Damage to the reef threatens more than the coral structure itself. There are some 600 islands and islets resting atop the reef, as well as a vast proliferation of marine life living and feeding on it. In addition, the reef serves as a breakwater against the Coral Sea and the Pacific for numerous port towns.

The problem, however, extends far beyond Australia. Around Guam, for instance, 90 percent of the living coral on the island's northwest side has reportedly been destroyed, while similar damage has been taking place on numerous other Pacific reefs as well as in parts of the Indian Ocean and Red Sea.

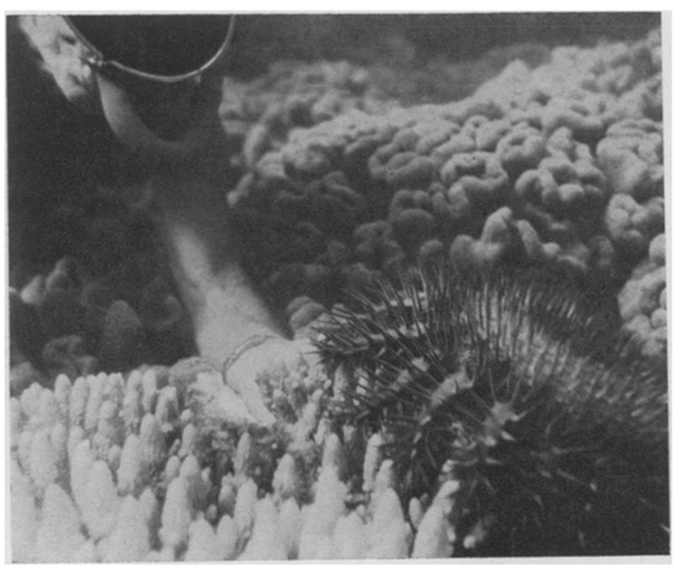
So urgent is the situation on some Pacific islands that a crash investigation program was undertaken, drawing help from wherever it could be found, to learn the true extent of the battle that must be fought. Initiated in June by Dr. Richard H. Chesher of the biosciences department at the University of Guam, the program in barely two weeks managed to assemble a virtual army of highly qualified researchers—10 four-man teams of scientists, every one a specialist in coral, starfish or a related area.

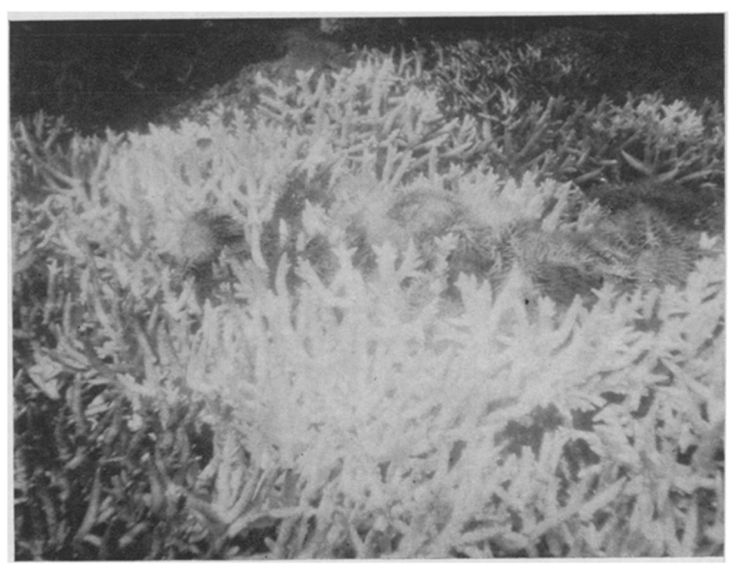
Marshaling such a force in a short time was a herculean job. Recruits came from at least half a dozen U.S. states, including Hawaii, plus Guam, Australia, the West Indies and even Venezuela. When the U.S. Interior Department granted a gratifyingly quick $225,000 that was only half what project officials wanted, aid was hastily obtained from the National Science Foundation (through a Sea Grant), the Office of Naval Research, the University of Hawaii and other sources. Aircraft from the U.S. Navy and the Coast Guard were used to ferry the research teams to 18 different Pacific islands, many which are so barren that a safari outfitter had to be retained to provide food and supplies.

The last of the teams have just made their final reports on Guam, and the consensus is grim. At least eight of the islands are severely infested with starfish, the hardest hit including Guam itself, along with Truk, Rota, Tinian and Saipan.

In many places the creatures are so prolific that they cover wide areas closely enough for their spiny arms to touch. In addition, they seem to be growing larger as well as more numerous, with specimens two feet across not uncommon. Particularly puzzling to the scientists was the discovery that the starfish are feeding voraciously, sometimes apparently eating continuously for 24 hours, at least twice their normal feeding time.

Some researchers feel, however, that, at least in the Pacific atolls, the decline in the triton population is not the major cause of the starfish population explosion. Normally the living coral polyps devour the starfish larvae to keep their





. . . barrier reef

numbers in check. Apparently, the crown of thorns is laying its eggs elsewhere, perhaps on dead coral surfaces exposed by dredging or blasting.

One attempted stopgap has been in use on Guam for almost a year, by divers equipped with a bizarre hypodermic made from a valve of a bicycle tire pump, a hypo the size of a turkey baster and a hot-water bottle full of formalin strapped to one wrist. Five cubic centimeters of formalin seems to kill the starfish without harming other marine life, but the creatures are just too widespread, particularly in the view of one diver who killed 400 in a single day without making an appreciable dent.

A similar approach has been recommended for Australia by Prof. Frank H. Westheimer of Harvard, a member of the President's Science Advisory Committee. He is trying to persuade Australia's Commonwealth Scientific and Industrial Research Organization to undertake the idea, though he predicts that it will take a decade of research to understand the basic nature of the imbalance leading to the proliferation.

In Tokyo, Prof. Yasu Suyehiro has been experimenting with low-voltage, underwater electric fences to stop the starfish's southward invasion, but according to Dr. Endean his success has had serious limitations.

"We are left with a single course of action," Dr. Endean says. "We must breed large numbers of triton shellfish and plant them on the reef. And we must hand-collect the starfish." The very enormity of the structure, however, may well defeat such a plan before it can even make a dent in the ravage.

Some scientists, on the other hand, question whether any such ecological tampering is advisable, or whether the menace of the crown of thorns is merely a high peak in the pendulum history of the reef. They believe that the reef, millions of years in the building, may have faced similar attacks in the past and not only survived but recovered.

"There is danger that we can make errors of judgment through lack of knowledge," says Dr. R. F. H. Talbot, director of the Australian Museum. "We don't know what we are doing or what is happening to the reef. We don't employ enough scientists to find out."

Talks are likely, however, between the Federal and Queensland Governments about setting up a commission, probably international, on the problem. Federal bans have also been placed on mining operations on the reef, as well as on oil and gas exploration and particularly on the gathering of triton shells. ◇