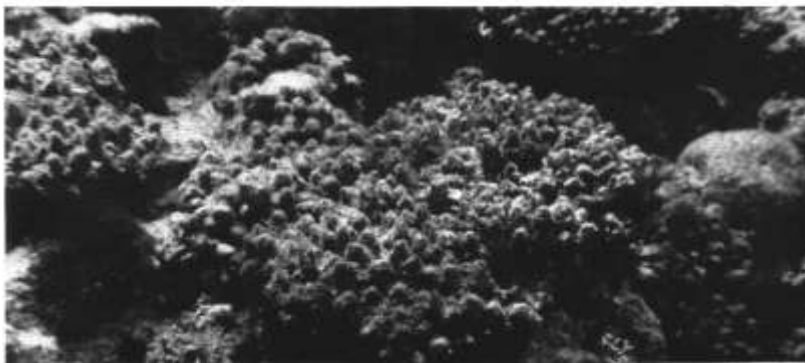
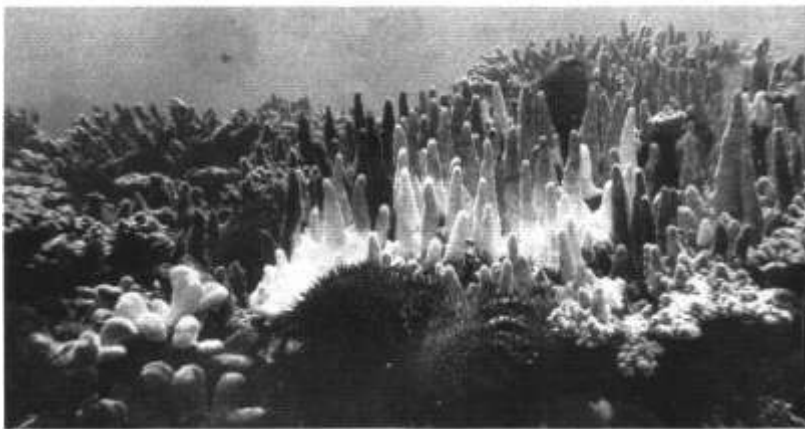
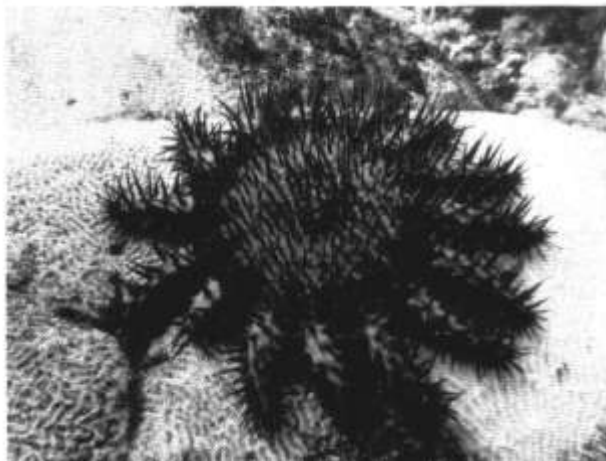


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divers wage war on the **KILLER STAR**

BY RICHARD H. CHESHER, Ph.D.



Pacific divers:

If this sea-star is becoming very common in your area, please write to Dr. Richard Chesher, University of Guam, P.O. Box EK, Agana, Guam 96910. We are interested in knowing just where these areas are and how extensive this problem is becoming. Please include as much information as possible_ on when the spiny sea-star started to become numerous and if shelling or dredging is common or was common a year or so before the infestation began.

Do not attempt to kill the animals by cutting them up. This may not always be fatal to the sea-stars. The best way to kill them is to pick them up and get them out of the water. The spines are venomous and quite painful (but not deadly) so handle them with a knife or spear and be careful to dispose where they cannot injure someone.

The spiny sea star feeds on coral by extending its stomach through its mouth and digesting the living coral. Large adult stars can kill, in a single night, a coral head which required 50 years to grow. The two lower photos at left show a living coral reef with six sea stars munching away ... and a close up of the same area showing the rapid process of destruction.

The radio crackled to life in Joe Campbell's Marianas Diver shop. "The water is clear, calm, everything looks OK."

The dive was on! By 10:30 a.m. December 15th, Navy, Air Force and civilian divers began the Hour-long boat trip along the northwestern shore of Guam to Twin Reefs; the site chosen for the first of many battles in a long war. A war, in Oceania, against a byproduct of man's haphazard treatment of his world. Against an animal, an enigma; once only a rare, curious-looking member of coral communities, now a biological nightmare whose population have exploded beyond that delicate point of equilibrium that balances construction and destruction. The people of the Pacific face a struggle, in the clear, tropical waters, to restore that balance. For the stakes are high: the death of coral reefs; the loss of. staggering amounts of the beautiful and productive coral gardens that thrive in the Pacific.

The destroyer? A spiny, venomous sea-star, *Acanthaster planci*.

Throughout the tropical Pacific, coral reefs play an intricate and vital role in man's economy. Fisheries, tourism, recreation, and even protection from wave assault are a few of the benefits of Oceania's living coral. Indeed, almost ninety percent of the islands of the Pacific are made up of coral reefs which have been uplifted above the surface of the waters. Thousands of years of continuous coral growth has produced the living buttresses which protect these islands. For coral reefs, the balance of nature is delicate, and it may be that man has unwittingly upset this balance and opened the way for destruction in unthinkable proportions.



Not many animals feed on corals and no other animal feeds on corals as efficiently as the 16-armed spiny starfish *Acanthaster planci*. This large sea-star protrudes its fleshy stomach out through its mouth and over the living coral polyps. Digestive juices from the sea-star dissolve the coral animals in their own skeletal cups. One large adult may, in a single night, clean off a coral head that required 50 years to grow.



PHOTOS BY AUTHOR

Australia was the first country to discover this menace as it witnessed large tracts of the Great Barrier Reef vanishing in the wake of thousands upon thousands of sea-stars. Pacific islands are also becoming infested and, in proportion, the danger is much greater to these small isles, which depend so greatly on their living reefs, than to Australia. In Guam, the infestation began about three years ago when large numbers of these creatures began to appear on the luxuriant coral reefs. Today, the numbers of starfish have grown and the destruction they have caused has reached critical proportions. Along the northwest sector of Guam, most of the coral areas have suffered a very heavy mortality. Many once beautiful, living reefs are now desolate, grey-green rocks with only five to ten

percent of the coral still alive. The once numerous assemblage of animals associated with the coral is also vanishing.

There is no question that the sea stars are to blame. Thousands of them still remain on the dead and dying reefs, their stomachs spread over dead rock or stinging coral in a last attempt to find nourishment which their own over balanced population destroyed. In the dead areas the sea-stars are small and normally a grey-green color. On the northern and southern portions of the animal's range, however, there is still living coral and the sea-stars are enormous (some over a foot in diameter) and a bright red and green color.

Guam may be able to control the sea-stars. The infested area is relatively circumscribed with the explosion confined to the northwest sector of the island. Evidence indicates, however, that the starfish are slowly moving both north and south and that control must begin soon or the island will be in danger of losing all of its living coral reefs. The reefs may, of course, grow back. But it would be several hundred years before, and if, they reach the development which now exists.

Biologists of the University of Guam's Department of Marine Studies have organized a research program aimed at control of this sea-star on Pacific islands. As a first step, an island wide sea-star tournament was arranged. Forty-seven divers, U.S. Navy professionals, U.S. Air Force sport divers, and civilian sport divers joined forces on Sunday, December 15th, to open the new Pacific war. The Navy men submerged with twin 90 cubic foot tanks, the sport divers carried an amazing array of equipment including hamburger tongs, forks, and special spears for picking up the venomous creatures. After three hours of battle, we humans won an unqualified victory. The sea-stars were cleaned out of a beautiful (now partly dead) reef on the northern border of the infested zone; a reef which may become a protected underwater park. A total of 885 spiny sea-stars were captured; enough animals to devour over one quarter of a million square feet of living coral in a single year! The inner portion of the Twin Reef lagoon has received a postponement of death for several months. Tagging experiments should provide information on how (and if) the sea-stars reinfest the cleaned area. Other tournaments and other collecting methods are planned to coordinate with a number of biological studies of this menace.

Can the sea-star be controlled? With the numerous, cooperative divers on Guam and the help of the Government of Guam and the U.S. Military the seastars face a formidable foe. If the animals can be stopped here, perhaps we can learn enough to stop them on other Pacific islands as well. If they cannot be stopped, the results will be truly catastrophic.

One important factor in controlling the sea-stars will be to discover why they are undergoing a population explosion in so many Pacific areas. So far, there are three theories. One is that the sea-stars are involved in a natural cyclic population expansion and nothing much is the cause and nothing much can be done. A second theory takes into account that the explosions seem to start (but are not confined to) areas near human populations. It is supposed that removal of large gastropods (sea-shells) which feed on the sea-star has destroyed the balance of nature and that the animals which are normally involved in eating sea-stars are, instead, decorating bookshelves and cabinets.

A third theory is that man has, indeed, killed the major predator of the sea-stars but this is not the gastropods, it is the coral itself. When the sea-stars are very young, they are extremely small animals which swim about in the open sea for about twenty days before settling down in shallow water and changing into a small starfish. In most Pacific areas, shallow waters, suitable for sea-star settlement, are lined with living coral. When the tiny sea-star larvae land on living coral, the tentacled coral polyps snare them and then devour them. Corals, along with other filter feeding animals of the reef are unquestionably the most important predators of the sea-stars. Man has killed much coral via dredging and blasting operations and a variety of other polluting activities. Once an area of reef is killed by man, a settling ground is provided for any swarm of larvae which should attempt to settle there. In this nursery the spiny sea-stars survive and then move out into neighboring, living coral areas. There they kill the coral, extending the areas in which more larvae can settle. In this- rich environment they produce a large crop of new larvae which, if the currents are right, can flood the dead and dying reefs with still more sea-stars. The end result is a population explosion. The fantastic numbers of larvae produced by the steadily rising population might inundate neighboring coral islands with so many young sea-stars that even a normal, living reef may become infested.

Whether or not man is responsible remains to be proven, but guilty or not, man must try to save the coral which is so vital to the way of life of many Pacific islanders. To do this, rapid action is necessary. The present areas of infestation must be accurately defined and steps taken to prevent further expansion. We are hopeful that divers who enjoy the Pacific coral reefs will join together, as have divers of Guam, in efforts to control this menace.