

The Crown-of-Thorns Starfish *Acanthaster planci* (Linne') in Ceylon

By

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INTRODUCTION

The Crown-of-Thorns starfish *Acanthaster planci* is a predator of coral and has been responsible for the widespread destruction of coral reefs ranging from the Tuamotos in the Pacific to the Great Barrier Reef in Australia, Indonesia, Thailand, Malaysia and the Red Sea (Endean and Pearson, 1969 ; Endean, 1971 ; Chesher 1969, (1), 1969 (2) ; Talbot, 1971 ; Roads, 1971).

In Ceylon this starfish was first reported by Clarke in 1915. Recently skin-divers reported that *Acanthaster planci* was present in very large numbers in the coastal waters off Trincomalee, especially on the coral formations around Pigeon Island, an island lying about 1½ miles S. E. of Irakkankandy.

It is well known that the multiplication of the starfish to plague proportions is a serious threat to the coral reef formations round the Island. If it were allowed to continue its depredations the entire coral reef belt round the Island might be destroyed in a short time. The monsoon waves would then convert the dead coral to rubble. In the absence of a barrier against the advancing waves during the monsoon it would also lead to serious erosion of the shoreline. The coral reef fish would also disappear with the destruction of the coral formations.

On account of these considerations it was decided to conduct a survey of the Crown-of-Thorns starfish in eastern coastal waters in order to estimate the magnitude of the population of the starfish in these waters.

DESCRIPTION OF THE CROWN-OF-THORNS STARFISH

The Ceylon Crown-of-Thorns starfish is bright bluish-black in background with many arms. The number of arms varies from 13-20, the most frequently occurring number is 17 arms. A bright mauve stripe, about three-quarters of an inch broad, runs along the dorsal surface of each arm. This marked difference in colour makes the animal extremely conspicuous in the water. Bluish-black spines arise from the top surface each nearly an inch in length.

The tips of these spines are sometimes bright red. On the ventral surface are rows of tube-foot pale cream in colour and about three-quarters of an inch in length when fully extended. Each tube-foot has a rimmed suction disc. In the centre on the ventral surface is the large eversible mouth which is also creamy-white in colour. Compared with the Crown-of-Thorns starfish on the Great Barrier Reef of Australia the Ceylon species differs only in colour. In the Australian species greys, green and red predominate.

The population sampled in Trincomalee at the end of 1971 ranged from 9 to 18 inches in diameter. In size also it resembles the Australian species (Fig. 1).

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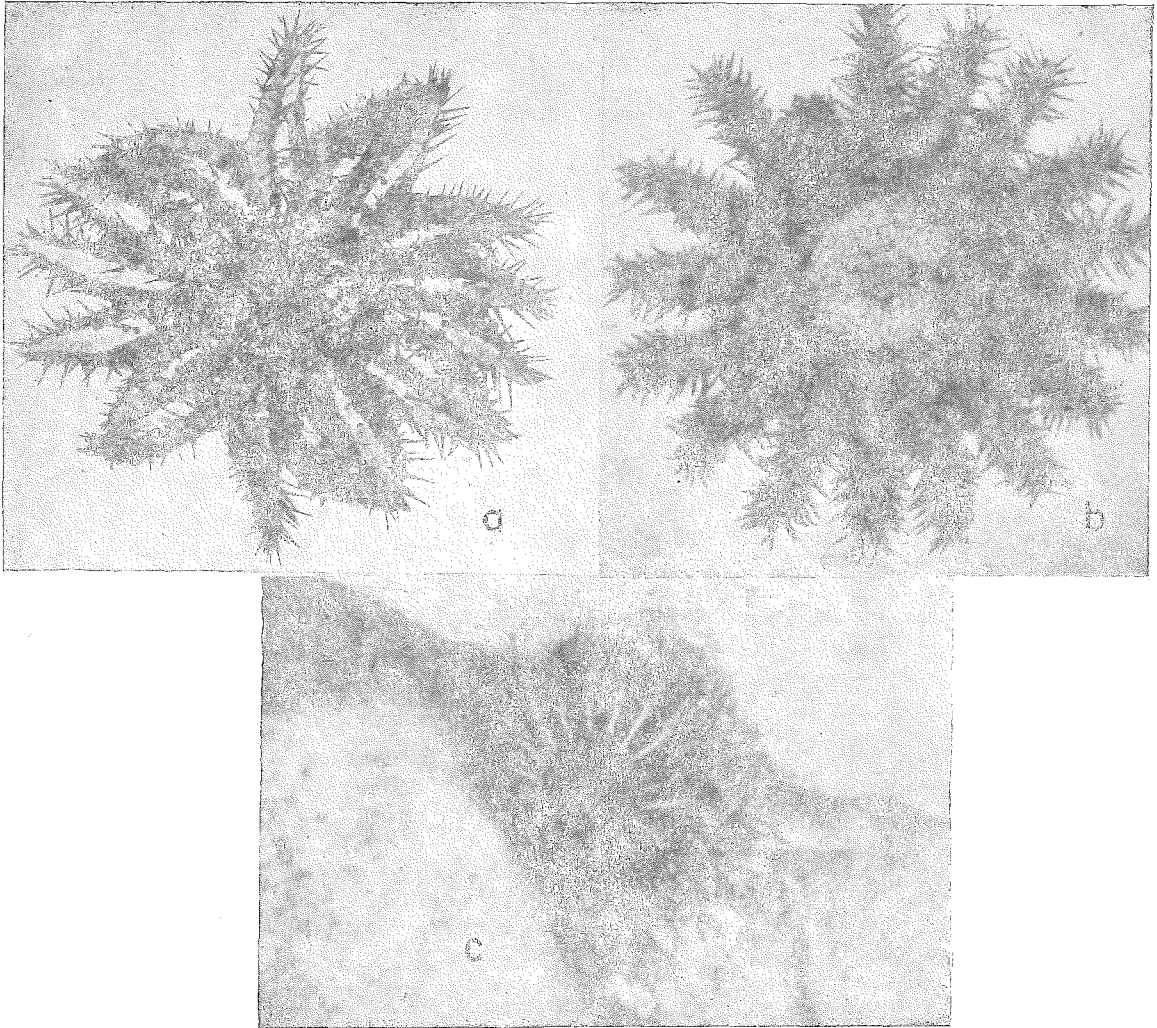


Fig. 1. (a) Dorsal Surface, (b) Ventral Surface and (c) under water photograph of *Acanthaster planci* & shows Acanthaste feeding on coral

DISTRIBUTION OF THE CROWN-OF-THORNS STARFISH ON THE EAST COAST

The reefs and rocky areas lying between Pigeon Island in the North and the Trincomalee Harbour in the South were surveyed over a period of 20 days in order to establish the population density of the starfish in the different areas. This consisted of counting the number of starfish encountered in a 20-minute dive (Endean, 1969).

The starfish was found distributed on coralline reefs lying between Pigeon Island and Coral Cove (Fig. 2). The greatest concentrations were encountered in 4-6 fathoms of water near Dutch Point, Sandy Bay and Rocky Point. Here the starfish were present in plague proportions—over 40 starfish were seen in a 20 minute dive. Although there were many different types of coral present

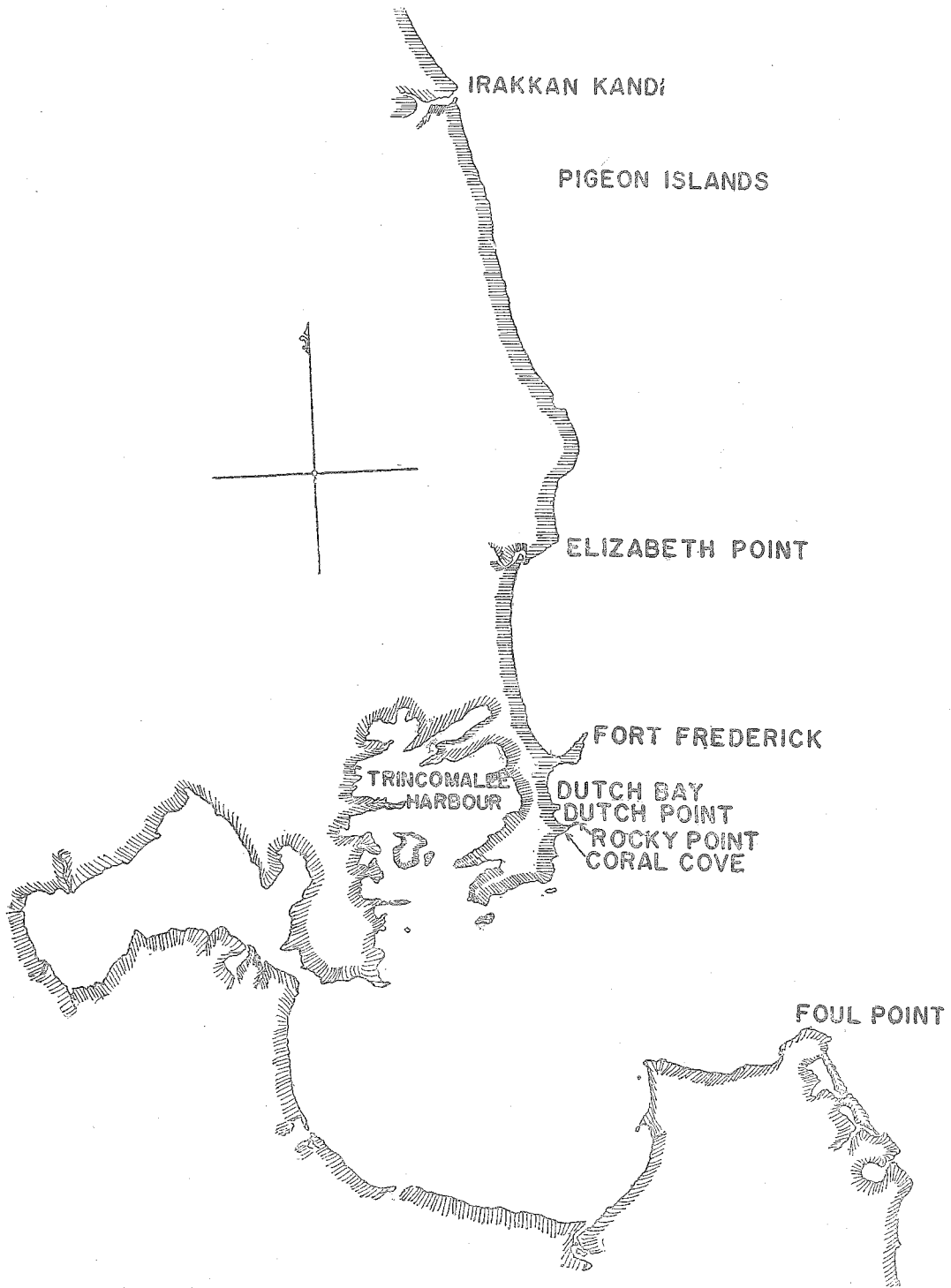


Fig. 2. Areas on the East Coast of Ceylon surveyed for *Acanthaster planci* infestations.

in the areas surveyed, the starfish was found only on a few selected species of *Acropora coral*. These corals are the main reef builders in Ceylon and also are of great importance where coral reef fish are concerned. Other varieties of coral such as *Meandrina*, *Pocillopora* and *Millepora* were not subject to attack by the starfish.

The entire reef of *Acropora* coral opposite the entrance to Fort Fredrick lying in $1\frac{1}{2}$ to 3 fathoms of water had been completely destroyed. Algae had covered the dead coral skeletons and the reef presented the appearance of a drab green mat. The brightly coloured coral fish which were evident in large numbers in previous years had disappeared. A few straggling crown-of-thorns starfish were seen in this area feeding on what remained of the former luxuriant coral reef.

Population Explosion of *Acanthaster planci*

It is well known that generally *Acanthaster planci* is found only in very small numbers on a coral reef in equilibrium. It forms a small, if not unimportant part, in a coral community. Under normal circumstances it would appear that its numbers are kept in control by the plankton-feeding fish and other members of the coral community. Its sudden proliferation is thus due to some change in the coral community itself. In Australia, on the Great Barrier Reef Endean (1969) attributed the sudden explosion of the starfish population to removal of its natural predator—the Triton's Trumpet *Charonia tritonis*.

This large gastropod mollusc was observed to attack and devour the adult starfish. In early days, on the Great Barrier Reef, there were large numbers of this gastropod mollusc but its numbers have been reduced considerably by tourists who treasured the large attractive shell.

However, similar population explosions of the crown-of-thorns starfish have been reported by Roads (1971) in the Red Sea. The Triton's Trumpet is not present in this region. Some other factor has obviously caused the population explosion in the Red Sea. Roads explains that in the last few years the sea close to the affected reefs have been polluted by oil and other waste products from ships which anchor close by. These wastes make life impossible for animals in the sea especially the coral fishes which were living in close association with the coral. Roads believes that the migration or death of coral fishes resulted in the removal or reduction of starfish larval predatory pressure. Endean (1969) has shown some coral fishes feed on the eggs of the starfish as they are released into the water. The reduction in the number of coral fishes could therefore assist in the survival of the starfish larvae to a considerable extent. In the Red Sea the lump-headed wrasse is a predator of the adult starfish and its numbers today have been reduced considerably by local fishermen in the area. Roads, however, believes that reduction in larval predatory pressure rather than reduction in predation of the adult starfish is more conducive to the starfish explosion. Chesher (1969) has pointed out that the population explosion of the starfish is not a cyclical but an episodic event and that pollution may have been one of the causes for its occurrence. The cataclysmic increase in the numbers of starfish on Guam Island, where he worked, was not a cyclical event.

Endean observed that a single female starfish lays as many as 12 to 24 million eggs in a season. If the currents in the sea are favourable and the larvae and eggs are not carried into deep water, they would develop and metamorphose as they settled on the coral reef. Henderson (1969) showed that the larval period was short and lasted a little over three weeks after which settling and metamorphosis took place. She has also shown that the starfish larvae have no substrate preference. They settle and metamorphose on all types of sub-strate-sandstone, coral debris and dead shell.

If they happened to settle on live coral the polyps would sting them to their death and engulf them. The larvae are also subject to the depredations of coral reef fishes which take a heavy toll of the larval population. The removal of large numbers of coral fish would thus assist in the survival of starfish in large numbers.

SUMMARY

The crown-of-thorns starfish *Acanthaster planci* was found distributed on the reefs lying between Pigeon Island and the Trincomalee Harbour. It was present in plague proportions near Pocky Point, Sandy Bay and Dutch Point. It had caused widespread destruction of the reef lying opposite the entrance to Port Frederick, Trincomalee. The starfish had a preference for feeding on *Acropora* coral species.

A noticeable reduction in the coral fish populations was observed in the reefs lying between Pigeon Island and the Trincomalee Harbour. A reduction in larval predatory pressure, due to removal of vast numbers of coral fish, may have caused the population explosion of the crown-of-thorns starfish.

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