

SOUVENIR
20th Anniversary
Central Marine Fisheries Research Institute
(Government of India)



ISSUED BY
THE ORGANISING COMMITTEE C. M. F. R. I. RECREATION CLUB
MANDAPAM CAMP

Corals

BY C. S. GOPINATHA PILLAI

Central Marine Fisheries Research Institute

Corals are objects of beauty and utility. They are found only in the sea, mainly in tropical and subtropical regions. Only very few, other than students of biology know that they are sedentary animals possessing a hard internal or external skeleton. They have attracted the attention of the biologists only recently and several problems related to them are still not explained to our fullest satisfaction. Earlier naturalists regarded them as marine plants, probably due to their sedentary habit and plant-like growth form. It was only in the latter half of the eighteenth century Peyssonnel proved the animal nature of corals. But even middle nineteenth century students of natural history assigned them a place only between animals and plants and were accordingly called 'zoophytes'.

Broadly speaking, corals fall into two groups, namely, the 'false corals' and the true or 'stony corals'. The false corals are again a heterogeneous grouping. They include the hydrocorals, *Milliporina* and *Stylasterina* with their calcareous skeleton; the blue coral (*Heliopora*) with a blue skeleton and several Gorgonaceans popularly called sea-fans, sea-whips, and sea-feathers with a skeleton in the form of scattered horny or calcareous spicules or a solid axial structure embedded in a fleshy coenenchyme. The arborescent, black or thorny corals (*Antipatharia*) with a central axial horny skeleton also belong to this category. The fleshy *Alcyonium* and its related genera *Sarcophytum* and *Lobophytum* are commonly called soft corals. The true corals (*Scleractinia*) possess an external calcareous skeleton, secreted by the outer epidermal calicoblast cells of the polyps, from dissolved materials obtained from the sea water. They are the commonest and most abundant of all kinds of existing corals. Those scleractinian corals that flourish in shallow areas and help in the formation of reefs are known as hermatypic corals. Ahermatypic corals are insignificant as reef-builders and they often flourish in deeper waters.

The stony corals were believed to have originated about 190 million years ago. Ever since their origin, they were actively engaged in the herculean task of building reefs; fighting successfully with several adverse conditions. A coral-reef is the net gain of the activity of very many million minute coral polyps, over several thousand years. The annual rate of growth of corals is very slow. Generally they may increase in size from a few millimeters to four or five centimeters, depending on the nature of the corallum and the prevailing environmental conditions. A coral-reef made of *Porites* alone, having a thickness of 150 feet, would have taken about 3000 years to attain so much thickness. Coral-reefs are restricted to the warmer seas, where they are scattered over an area of 190,000,000 square kilometers, as a belt around the globe, on either side of the equator between latitudes 35° 10' N and 32° S. In the seas around India, we have all the three major types of reefs,

namely the fringing, barrier and the Atoll. Barrier reefs and Atolls are seen in the Laccadives and the Maldives. At the south eastern end of the Indian Peninsula, there is a chain of well developed fringing reefs, starting from the Rameswaram Island and extending beyond Tuticorin. Fringing reefs also occur in the Gulf of Kutch at the western coast of India. Except these two coral formations, the coastal waters of India is devoid of any coral reefs, due to the large quantity of fresh water and mud brought by the great rivers. Ceylon has fringing reefs at its northern and southern sides. The reefs of Taprobane and the Great and Little Basses Reefs are seen respectively at the south-west and south-east of Ceylon. The Bay of Bengal is practically barren of any reef, but for the fringing reefs around the Andamans and the Nicobar Islands.

Stony corals exhibit bewildering variations in the form, size and mode of growth of their skeleton. (Pls. I and II). They may be either solitary as in *Fungia* with a single corallite (part of a corallum formed by a single polyp) or generally will be colonial with several corallites united together as in *Acropora*, *Montipora* and *Porites*. In size a coral skeleton may range from 1 to 2 mm in diameter, to enormous colonies several centimeters in width and height. A solitary corallum may be conical (turbinate), cylindrical, patellate cupulate or flabellate (fan-shaped); and may be attached or secondarily free. A colonial coral is said to be encrusting when it is closely adhering to its substratum. Rounded, undulate or hillocky masses with heavy skeleton as in *Porites* is called massive. Some possess a branching tree-like skeleton as in *Acropora*. In *Montipora foliosa* and *Echinopora lamellosa* the corallum is composed of several thin fronds arranged in the form of petals in a flower. A few generalities in growth forms are only stated above, but several other kinds may be recognised in a collection. The various corallites may remain independent of each other at the surface as in *Favia* or *Galaxea*, each with a definite circumscribing wall, or the adjacent ones may run together for a considerable length forming ridges and valleys as in the Indo-Pacific *Platygyra*, *Leptoria* and *Symphylia*. In *Hydnophora* the ridges (collines) may further break up into conical elevations called monticules.

In living condition, the polyps protrude outside from their cavities with their tentacles extended (in some species tentacles are absent). Coral polyps are generally believed to be fully expanded only during night when they feed on zooplankton. But a good many species may be fully or partly expanded during day on a reef. The writer has noticed several corals with comparatively large polyps, like *Favia*, *Favites*, *Platygyra lamellina* and *Symphylia* during day time with their polyps expanded, on the reefs of Gulf of Mannar and Palk Bay along the Indian coast. At several instances the small-polyped *Montipora foliosa* was also found with its blue or pinkish polyps expanded. Probably the best example of the coral polyps that expand under sunlight is met with in *Goniopora stokesi*. Under bright sunlight at a depth of a metre or so, this coral was noticed with polyps protruding four or five centimeters above the level of the corallum, completely concealing the latter from view.

In nature corals are highly coloured, the common colours being blue, pink, lilac, violet, eosine red or tan. But bleached and dried stony corals preserved in museums often appear white or in light hues of yellow or brown. Various parts of the same colony may

sometimes have different colours. With a rich and varied assemblage of corals, along with several other brilliantly coloured animals such as sponges, molluscs and fishes, inhabiting in close association with the corals; a coral reef is an under water garden of bewitching beauty and a visit to one of them is an unforgettable event.

The sting from the nematocysts (stinging cells) of several coelenterates related to corals such as the Portuguese Man-O'-war (*Physalia*) and the Cubomedusa *Chironex fleckeri* of the Australian waters, are poisonous and lethal to man. Among the corals *Millipora* is known to cause agonising pain to man. The stony corals in this respect are harmless, since their nematocysts are not large enough to pierce the human skin. But the hard skeleton can cause minor cuts, if one steps on to it, bare footed. The septal teeth of *Symphylia* are large and sturdy enough to inflict small wounds.

Man has found various uses for corals even from the very ancient time. They are still prized for their decorative value. At the corridors of the ancient Rameswaram temple in South India they are offered for sale, after being beautifully painted. The precious coral (*Corallum rubrum*) of the Mediterranean is a valuable marine product of commerce and in the Orient it is even classed among the precious stones. There are evidences of having trade of this coral with India and China even at the beginning of the Christian era and people exchanged emeralds, rubies and pearls for this, since it was believed to be a mysterious object "endowed with sacred properties". The Romans used to hang branches of corals around the neck of their children to safeguard them from danger. Even to modern times, it is worn in Italy as a preservative from the evil eye, and as a cure for sterility by ladies; though the belief is apparently ridiculous to modern thinking. The red-coral is used in medicine from ancient times and even now, the organpipe-coral (*Tubipora*) has a place in certain indigenous system of medicines in South India, probably as a substitute for the 'precious coral'. Ornaments made out of the axial skeleton of the black-coral is believed to be a remedy for rheumatism, by the people of Malay Archipelago and Japan.

The skeleton of stony-corals is of several use. In South India, living, dead and semi-fossilised *Porites* (mainly *P. solida* and *P. somaliensis*) is exploited in large scale for various economic purposes. A labourer engaged in such work may earn four to six rupees a day at present. This 'coral-stone' is transported to different places where it is used as building blocks or to metal roads as a substitute for granite. *Porites* is also said to be used in Red Sea coasts for building purposes. Since it is made up of calcium carbonate, it can be used as a raw material for the preparation of lime, mortar and cement. In South India it is at present used in the manufacture of calcium carbide.

Corals play a very significant role in the formation of islands. Wherever a suitable platform is available, coral planulae will settle and begin to colonize. Their activity in the long run, will result in the formation of a reef, that grow upwards. They will be greatly assisted in their task by calcareous algae, Foraminifera, molluscs and by the remainings of several other marine animals. Later, the top portion of such reef may be exposed above the water, either by a fall in the sea-level or by upheaval of the sea-bottom

by an earth tremor. The rain, wind and other natural agencies, later cause the disintegration of the solid limestone and formation of the sand. Sand and broken coral pieces may be piled up from the lagoon by the wind and wave action which help in the formation of land. Seeds deposited by the sea currents or dropped by sea birds by way of castings may germinate and form vegetation. It is interesting to note that several islands among the Laccadive-Maldive and the Chagos chain of Archipelagoes in the Indian Ocean and a number of oceanic islands in the Pacific are shaped out of coral reefs.

Finally, coral-reefs are believed to act as natural barriers against sea-erosion, by permitting themselves to have the mighty breakers to break on them. It has been noted that at Nicobar Islands, in spite of the existence of the reef, there was clear indications of sea erosion. Another such instance is seen at the Palk Bay side of Mandapam in South India, where there is a well developed fringing reef, on an average 500 metres away from the shore, lying almost parallel to it. But the sandy shore is not completely free from the grip of erosion. It appears that protection from a reef against sea erosion is not absolute but only comparative. However, more work in this field is necessary to arrive at a definite conclusion.

EXPLANATION TO PLATES

PLATE I.

1. *Acropora formosa* (Dana), with arborescent corallum and small corallites from Mandapam (Palk Bay) x $\frac{2}{3}$. 2. *Favia velenciennesi* (Milne Edwards and Haime), with large polygonal corallites from Port Blair (Andamans) x $1\frac{1}{2}$. 3. *Porites compressa* Dana, a small calicled coral from Krusadai Island (Gulf of Mannar) x 6. 4. *Galaxea fascicularis* (Linnaeus), with large projecting corallites from Chetlat Island (Arabian Sea) x 1. 5. *Fungia horrida* Dana, a solitary coral, from Andamans x $\frac{2}{3}$. 6. *Dendrophyllia aurea* (Quoy and Gaimard), an ahermatypic colonial coral, Eosine red in living condition from Manauli Island (Gulf of Mannar) x 2.

PLATE II

1. *Porites somaliensis* Gravier, with massive corallum and small corallites from Manauli Island x $\frac{1}{2}$. 2. *Hydnophora microconos* (Lamarck), surface with several monticules from Chetlat Island x 1. 3. *Favia favius* (Forsk), a massive coral with large, very little projecting corallites from Mandapam (Palk Bay) x 1. 4. *Symphyllia radians* (Milne Edwards and Haime), surface with thick collines and deep valleys from Mandapam (Palk Bay) x $\frac{1}{2}$. 5. *Euphyllia glabrescens* (Chamisso and Esyehardt), a branching type with large deep corallites from Minicoy x 1. 6. *Platygyra lamellina* (Ehrenberg), massive coral with thin collines and valleys from Mandapam (Palk Bay) x 1. (Photographs by Mr. Satyaprakash Ganshani).

PLATE I

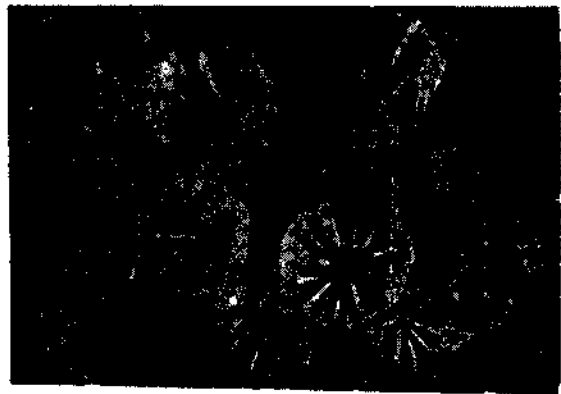
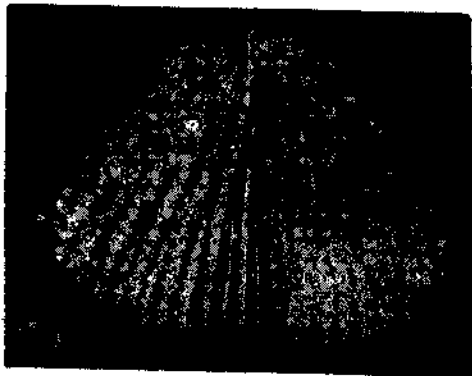
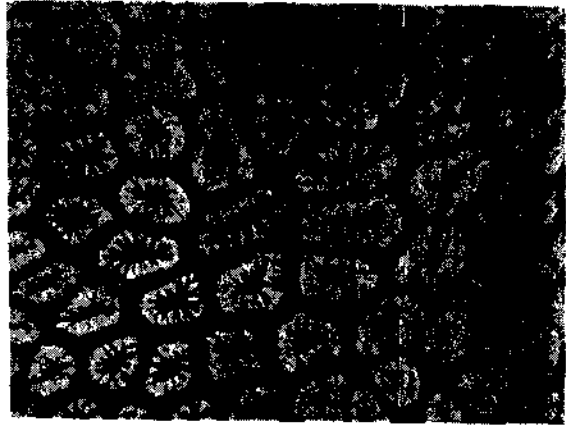
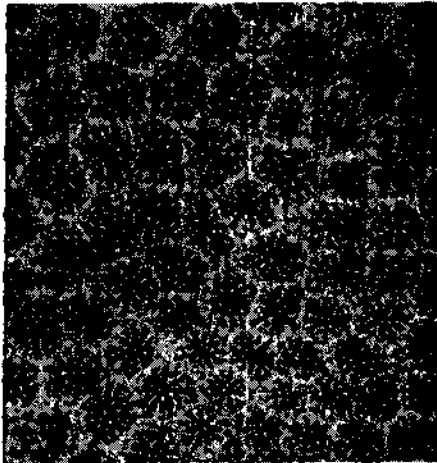
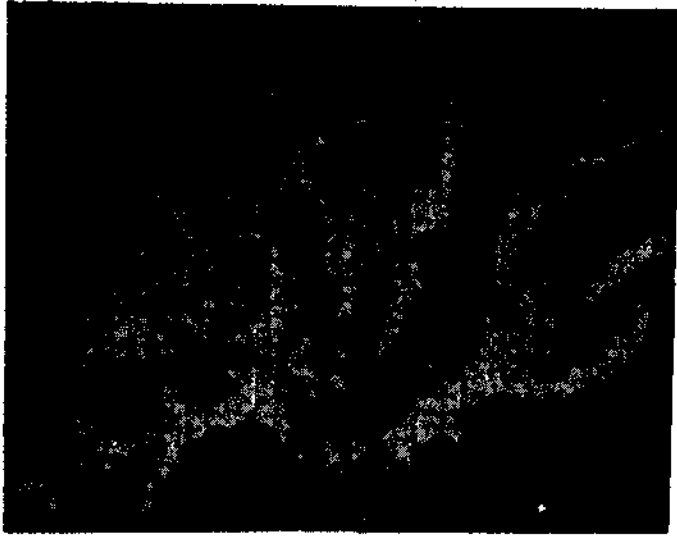


PLATE II

