

CORALS

Q. 5. Give a brief account of corals and their organisation.

Corals are formed of exoskeleton secreted by the polyps of some colonial hydrozoans and anthozoans. These may be solid and massive or branched like trees.

1. Hydrozoan Corals

A few colonial hydrozoan polyps of order Hydrocorallina secrete massive calcareous exoskeleton and form corals. These are *Millepora*, *Stylaster* and *Disticholopora*. The skeleton is formed of calcium carbonate and is secreted by modified epidermis called **calicoblastic layer**. Polyps in a colony are of two types—

- (i) Large **gastrozooids** or the nutritive zooids; and are surrounded by **dactylozooids**.
- (ii) Small **dactylozooids** or the protective zooids.

The hydrozoan corals are found in the coral reef; along with other corals.

2. Anthozoan Corals

Anthozoan corals are of the following types :

- (i) **Soft corals**—These belong to subclass **Octocorallia** and order **Alcyonacea**. These are colonies of polyps having endoskeleton of separate spicules, embedded in a massive mesogloea or **coenenchyme**. The endoskeleton is common to the whole colony. *Alcyonium* (dead man's fingers) is soft coral.
- (ii) **Horny corals**—These belong to subclass **Octocorallia** and order **Gorgonacea**. The colony is branched and tree-like. Its skeleton is formed of horny proteinaceous material along with calcareous spicules, which are arranged around the polyps. Example is *Gorgonia*.
- (iii) **Blue corals**—These belong to subclass **Octocorallia** and order **Coenothecalia**. The skeleton of colony is secreted by the polyps in the form of calcareous spicules. These form a massive skeleton or corallium. The large cavities on the surface of skeleton contain polyps. Example is *Heliopora*.
- (iv) **Stony corals**—These belong to subclass **Octocorallia** and order **Stolonifera**. The skeleton is made up of calcareous spicules stained red due to the presence of iron salts. These form vertical tubes connected by horizontal lateral platforms.
- (v) **True corals**—The members of the subclass **Hexacorallia** and order **Madreporaria** form true corals or stony corals. Majority of them are colonial. The colonies assume different forms. These are principal builders of the **coral reefs**.

Organisation of Corals

1. Coral Skeleton

The coral organisms are minute anthozoan polyps without pedal disc. The oral disc is surrounded by a circlet of six tentacles. The exoskeleton secreted by the individual polyps is called **corallite**. It is secreted by the epidermis and is formed of calcium carbonate. In a colonial coral, the corallite of individual polyps fuse together to form a massive skeleton, called **corallium**.

Each corallite is cup-shaped with a **basal plate** and a **cup wall** or **theca**. The cavity of the cup contains vertical radiating ridges or **septa**. These are called **sclerosepta**. The inner ends of sclerosepta are fused to form irregular central mass, called **columella**.

Coelenterata - Polymorphism and Coral Reefs

2. Coral Polyps

The coral polyps are about 1 cm. long. These are cylindrical and without pedal disc. The oral disc is surrounded by a circle of six tentacles. The pharynx is without siphonoglyphs and mesenteries are restricted to the upper part of the body. The muscles are poorly developed.

CORAL REEFS

Q. 7. What are coral reefs ? Explain how they are formed and indicate their geographical distribution. (Purvanchal 1997)

Write an essay on coral and coral reefs. (Meerut 1991)

Describe the coral formation and explain the difference between an atoll, a coral reef and a fringing reef. (Bhopal 1992; Mysore 1994)

What are the conditions influencing the formation of coral reefs ? Describe the different types of coral reefs. (Mysore 1996)

What do you mean by coral reefs ? How are they formed ? Describe the distribution of coral reef and its ecological requirement. (Burdwan 1992, 96)

Describe the different types of coral reefs. How are these formed ? What is their economic importance ? (Meerut 1990; Kanpur 96; Avadh 95)

Definition

Coral reefs are the ridges or mounds of calcium carbonate in the sea formed by the remains of skeletons and shells of animals commonly known as stony corals. These belong to phylum Coelenterata and class Actinozoa.

Distribution

The coral reefs are formed in tropical waters, although they can be found growing in temperate seas as well, because the coral animals cannot survive in waters, having temperatures less than 70°F and have their luxuriant growth in shallow water having a depth less than 150 feet. The coral reef islands are, therefore, found in Maldivian islands of the Indian Ocean, Wake Islands, Marshall Island, Fiji islands of Pacific Ocean, Whitesunday Island, Bahoem Island regions and the famous Great Barrier Reefs of Australia.

Types

There are three kinds of coral reefs :

1. Fringing reefs
2. Barrier reefs
3. Atolls

1. **The fringing reef**—The fringing reef extends out from the coast of some volcanic islands or of some continents as a bunch or platform enclosing a distance from a few feet to 1/4 mile in between. It consists of a **seaward slope** on which corals grow down to 20 fathoms, a **reef edge** or front, which may be considered as a narrow belt where is waged a perpetual struggle between the destructive force of breakers and the constructive growth of organisms, and a **reef flat** slightly lower than the reefs edge, a more or less flat surface between the front and the shore composed largely of corals and mud, dead corals and other animals and usually giving a scarlet to brown green hue. The outer single beach of the island may get merged into the seaward flat of the reef or there may be a varying area of boulder zone in between. Some times, the island is further back and then between it and the boulder zone may be enclosed an **inner flat** which is hollowed out to give rise to shallow lake or channel suitable only for small boats.

2. **The barrier reef**—The barrier reef is similar to the fringing reef but is separated from the shore of the island with a stretch of water with depth suitable

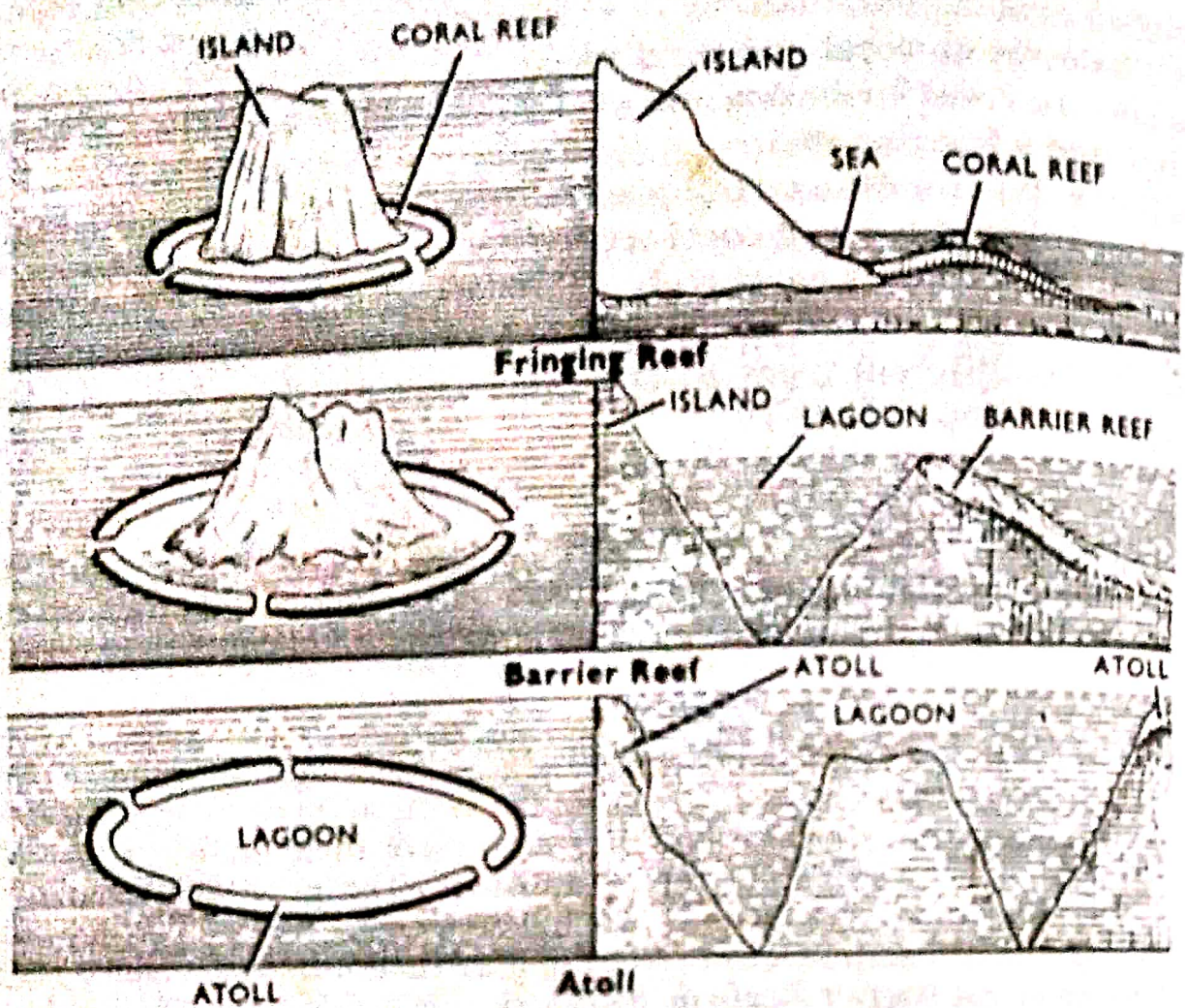


Fig. 12. Diagrams to represent different types of reefs, entire as well as in cross-section.

for navigation of the largest ship. This stretch of water is termed as the 'lagoon' and is 60 to 1,000 ft. deep and 1/2 to 10 miles or more in width. The most noted barrier reef is the **Great Barrier Reef** on the north-east coast of Australia extending for over 1,200 miles.

3. Atoll—An atoll is an irregular, more or less circular ring-like or horse-shoe shaped reef not enclosing any inland but a lagoon. The term atoll is derived from the language of Maldives, where each government district of that Sultanate is termed as 'atolu' and the governor the 'atoluveri'. His province is a circular reef broken by many channels. The enclosing reefs of an atoll consist of a series of linearly extending islets with passage between them giving entrance to the lagoon, which varies from less than a mile to 40-50 miles.

Theories of Reefs Formation

Since the reef building corals are littoral in their habit and cannot grow below 150 feet, it is difficult to explain the great vertical thickness often attained by the coral reefs. Several theories have been put forward by many scientists from time to time. A few important ones are as follows :

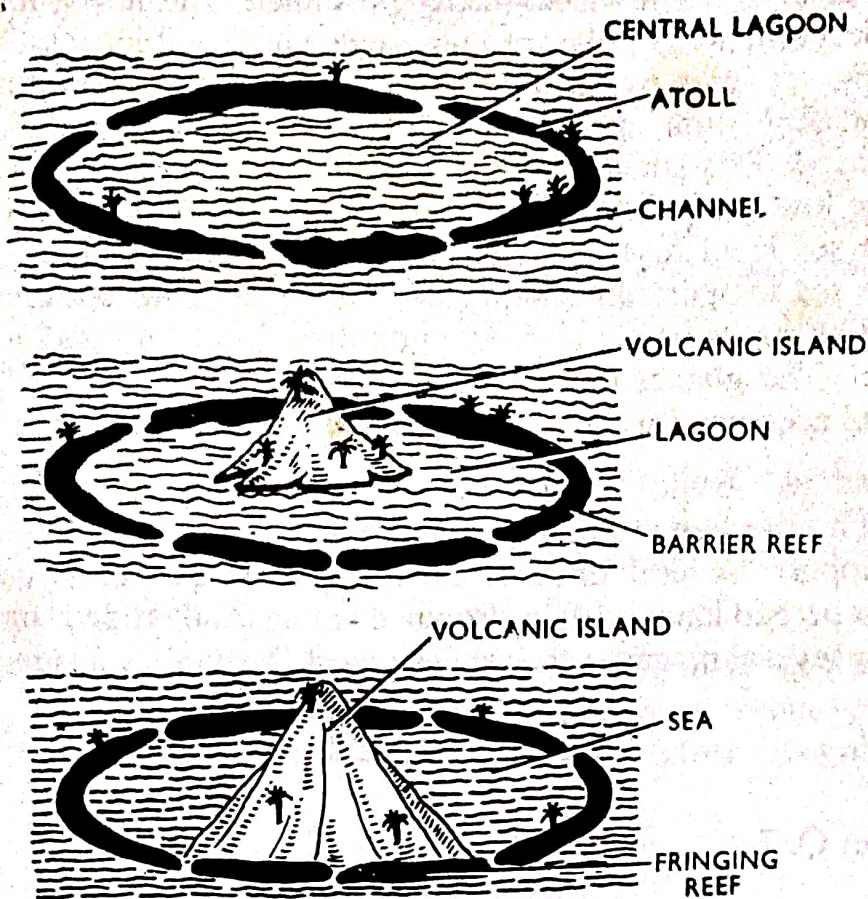


Fig. 13. Diagrammatic representation of Darwin-Dana theory of subsidence for the formation of different types of coral reefs.

1. Darwin-Dana theory of subsidence—During his expedition in 1831, Darwin noticed that in the regions where coral reefs are found now, a sinking of land had taken place in past. He, therefore, assumed that the corals started their growth as fringing reef around the sloping shores of an island in shallow tropical sea. By subsidence of the shore of that island they became barrier reefs with a lagoon in between. The rate of subsidence ought to have been equal to the rate of coral growth so that they have kept the surface of the reef in level with that of the ocean. The sinking island became smaller and smaller and finally disappeared leaving its ring-shaped contour marked in an atoll.

Darwin assumed a general sinking of the entire Pacific floor which appears to be incredible. The modern concept is viewed by supposing an independent sinking of each land mass.

2. Super-Murray solution theory—Sir John Murray proposed that mounds are built upon the sea bottom by sedimentation and the limestone skeletons of many animals (such as molluscs and star-fish shells, foraminifera ooze and the deep sea corals). When they have reached about 50 fathoms suitable for reef-building corals, the corals grow on them and reach the water surface. A barrier reef results from the better growth of corals at the outer edge and an atoll is produced by the dissolution of the inner coral rocks. The mound may get flattened like a plateau.

3. Submerged bank theory—According to recent scientists the corals grow to form reefs on flat pre-existing surfaces during or after their submergence. This submergence is brought about by the erosion and denudation of an island both above and below water. On complete replacement of the island by a submerged plateau, the builders will produce an atoll.

4. Daly glacial control theory—Daly presumed that during the last glacial period, the widely extending polar ice-caps, over a mile in thickness, were formed. This lowered the sea-level by atleast 150 feet and exposed several flat platforms of sand and mud deposition, and cut out by the action of waves and currents during inter-glacial period. This island although suitable for corals but their growth was inhibited by the low temperature. In the succeeding interglacial period, when the ice melted, the sea level rose and more and more waters gradually covered the platform. The sea temperature having risen to over 50° F became suitable for coral growth. The corals began to grow upon these platforms and kept pace with rising sea-level. The glacial theory is based on accurate knowledge and close calculations and accounts for the very uniform depth of coral lagoons.

The submerged bank theory and Daly's glacial control theory which supplement each other are at present most favoured although Darwin's idea still finds much support. Several lines of evidence attest that most coral reefs are growing on submerged lands, cliff's, drowned valleys and eroded surfaces. Boring experiments, at several places in the reefs support Darwin's subsidence theory.
