Coral and coral reefs

Introduction

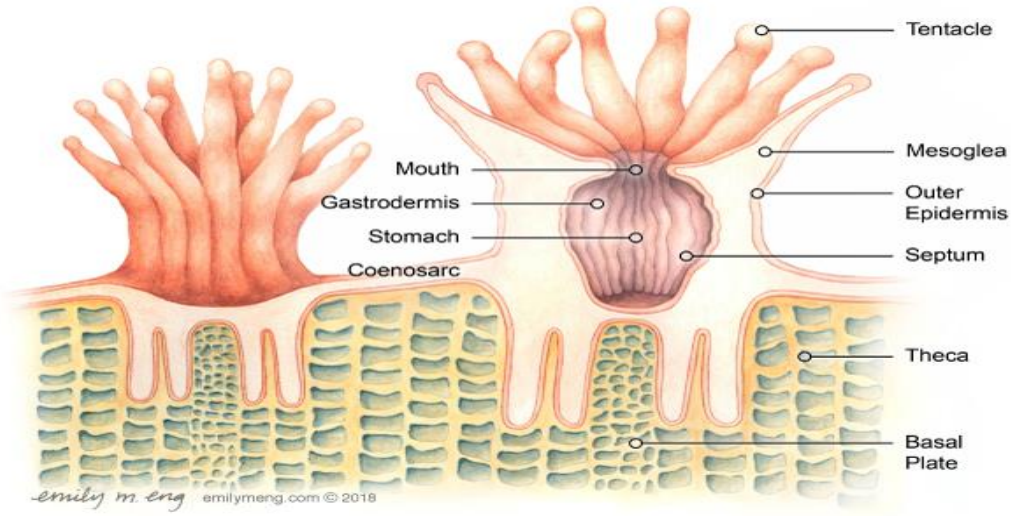
The coral animals are marine, colonial polypoid Coelenterates. They look like the miniature sea anemones living in the skeleton secreted by them. The calcareous (Calcium carbonate) and horny skeleton secreted by the coral animals is commonly called as coral. They specially live in compact colonies of many identical individual polyps. Each polyp is a sac like animal typically a few mm.in diameter and a few centimetre in length, its central mouth remains surrounded by a set of tentacles,

Some of the corals grow into massive, solid structures and few other form large and branched colonies. These coral animals belong to the class Anthozoa and also few species of the class Hydrozoan are also known to form corals.

Structure of a coral polyp:

A typical coral polyp is a small organism of about 10mm long and 1-3 mm in diameter. Few solitary polyps also reach to a diameter of 25 cm. Basal disc is absent in these coral polyps as the basal region is surrounded by calcareous exoskeleton.

The oral disc bears numerous tentacles in several rows around the oval or circular mouth. Pharynx is short with no siphonoglyphs. Mesenteries are restricted only to the upper part of the polyp. The mesenterial filaments have glandular lobe bearing nematocysts. Muscles are not well developed. Living polyps are found only on the surface layers of the coral mass. Feeding type is both raptorial and suspension.



Structure of Coral skeleton: The skeleton of a solitary coral is known as corallite. This skeleton is a calcareous structure secreted by the epidermis. In a colonial coral, corallites

are the individual polyps which fuse with one another to form a skeletal mass called corallum.

Each corallite is stony cup with a basal plate. The cup wall is called as theca. The cavity of the cup consists of a number of vertically radiating ridges called sclerosepta. The sclerosepta proceeds from theca towards the centre of the cup. The inner ends of sclerosepta are fused to form irregular central skeletal mass or columella.

Formation of coral skeleton:

In all the coral polyps the sexual reproduction takes place by the fusion of gametes. Zygote develops into a free-swimming ciliated planula larva which after a short spell of swim gets attached to a substratum. This settled planula larva metamorphoses into a young coral polyp. There is no medusa stage in corals. By the method of asexual budding the single parent becomes the parent of all the other members of the colony.

This coral polyp begins to secrete a skeletal rudiment called prototheca by the ectoderm. After this secretion, radial folds develop which in turn secrete sclerosepta. At the same time a rim is built at the thecal wall around the polyp. In the meantime, further skeletal material is added into the gaps existing between the sclerosepta of the skeleton.

By the budding of the new polyps, the coral colony grows in size continuously along the margins and on the surface. The structural differences and variations in the coral colony is the result of the patterns of the budding.

KINDS AND FORMATION OF CORAL REEFS

The continuous budding of the coral polyps makes them grow enormously and form massive structures called as coral reefs. According to Wayland Vaughan, an American geologist and oceanographer, a coral reef is a ridge of limestone, the upper surface of which is near the surface of the sea. The coral reefs are formed of calcium carbonate secreted by the coral polyps. The main contribution to the coral reef formation is by stony corals. Also, coralline algae and foraminiferans (Protozoan) take part in the formation of the coral reefs.

Corals belongs to the class Anthozoa which includes sea anemones and jellyfish. Coral reefs first appeared 485 million years ago.

Distribution of coral reefs:

For the activity of coral building the corals need warm shallow waters at the temperature above 20oC. Hence the corals are found only at Indo-Pacific, Central-Western Pacific and Caribbean regions.

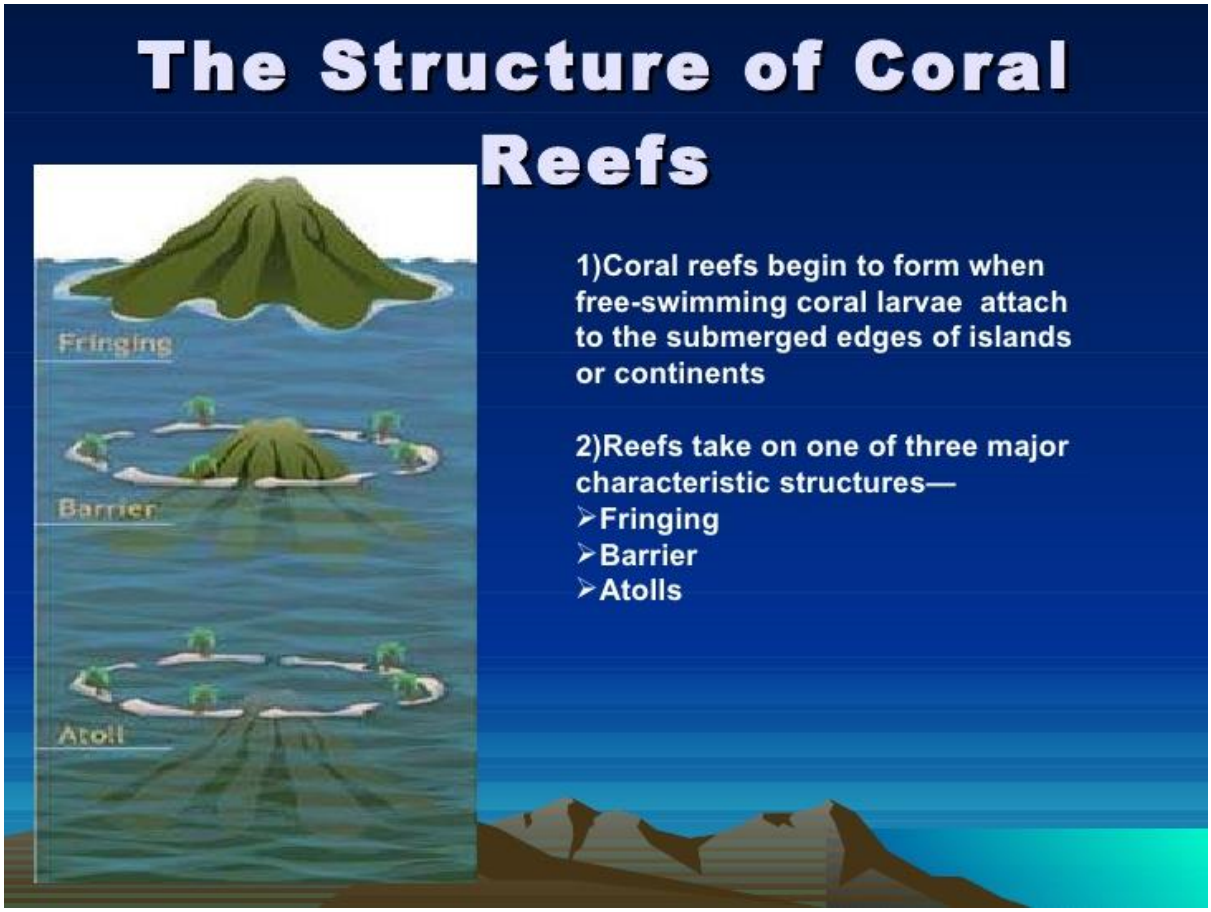
Kinds of Coral reefs:

Depending on their formation, coral reefs are of three kinds.

1.fringing reef

2.barrier reef

3.atoll



Fringing reefs-

The coral reefs situated close to the shores of some volcanic islands or part of some continent are called as fringing reefs. A typical fringing reef may extent to a distance of quarter mile from the shore with the most active zone of the coral growth facing the sea. This sea ward zone is called as the edge or the front. A shallow water channel of about 50-100 meters width lies between the reef edge and the shore. During the low tide, the water channel recedes exposing a flat bottom surface called reef flat. The reef flat is composed of sand, mud, dead and living coral colonies and other animals too.

Barrier reefs-

Though similar to fringing reefs, barrier reefs are situated at some distance away from the shore. The stretch of water, separating the barrier reef from land, may be half a mile to 10 miles. This stretch is called lagoon. The lagoons are 10-50 fathoms deep and are best suited

for navigation. This is the largest of the three, extends as a broken irregular ring around the cost of an island running almost parallel to it. A barrier reef is characterised by distant location of other reef from the cost with a broader and deeper lagoon, which is sometimes joined with the sea water through one or more water channels cutting across the barrier reef. The Great Barrier Reef of the north-eastern Australia is the most famous barrier reef.

Atolls-

These atolls are also known as coral islands or lagoon islands. They are ring-like or horseshoe-shaped reefs which encircle a lagoon. The lagoon may be complete or broken by a number of channels of which only a few are navigable. Outer side of the reef slopes off into the depth of the ocean. The lagoon has a depth of 80-150 meters and may be joined with sea water through a no of channels cutting across the reef.

The atoll of Biking is a coral reef in the Marshall island which is famous for hydrogen and atomic bomb tests is situated in the Pacific Ocean

Formation of Coral reefs:

Many theories have been put forth to explain the formation of the coral reefs but only few have been satisfactory. The following are the theories which satisfactorily explain the formation of the coral reefs.

Subsidence Theory- This theory is put forth by Darwin. According to this theory, all known coral reefs are found in regions where subsidence of land has taken place. He reasons that, initially the corals grew as fringing reef on the sloping shores of an island in a shallow tropical sea. Subsidence of the islands commenced so that the fringing reef turned into barrier reef, separated from the island by a wide, deep water channel or the lagoon. The island, while sinking became smaller and smaller and finally disappeared entirely beneath the surface of the ocean.

Theory of sea bottom rise: Sir John Murray advanced the view that the corals grow on the highest peaks of the ocean bottom. The deposition of sediments brings them to an optimum level for coral growth. The barrier reefs and atolls are produced by the better growth of the corals on the edges of the coral deposition and through solution of inner coral rock.

Glaciation control Theory:

The theory was propounded by Albrecht Penck and Reginald Daly. They advocated that during glacial period formation of ice-caps lowered the level of ocean by 60-70 m. At that time extreme cold temperature prevailed. Subsequently ice melted and the temperature rose. The corals began to grow on the flat platform of the ocean bottom and kept pace with rising levels of the ocean forming gigantic reefs.

Importance of coral reefs

1. Corals are the highly favourable sites for the accumulation of petroleum deposits. So, they are very important to oil industry.
2. Coral reefs are sometimes nicknamed the ‘rainforests of the oceans' because of their staggeringly rich biodiversity.
3. The coral reefs serve as the home to many varieties of plants and animals like sponges, molluscs, echinoderms, fishes etc. Some coral reefs are also inhabited by humans.
4. Corals also have decorative value and such corals are costly. Corallium rubrum is considered to be a precious and auspicious stone in India and china.
5. Corals also have medicinal value. The red coral and organ pipe coral are used in some indigenous medicine systems in south India. Coral reef organisms are already being used in treatments for diseases like cancer and HIV.
6. Chunks of coral skeleton belonging to species of Porites are used as building material. Coral skeleton also serves as raw material for preparation of lime, mortar and cement as they are comprised of calcium carbonate and magnesium carbonate.
7. Ecologically coral skeletons act as natural barriers against waves, hurricanes, typhoons, tsunamis, flooding, sea erosion and cyclonic storms.
8. Coral reefs are vital to the world’s fisheries. They serve as a good nursery ground for commercial fishes. Reef fishes are more colourful than the other fishes.
9. The beauty and diversity of coral reefs make them important tourist attractions which help to generate income and create jobs for local communities.

Keywords:

- **Sclerosepta:** Calcareous rods of corals projecting from the basal plate in a fan like shape between the mesenteries of the polyp.
- Siphanoglypha: A ciliated groove at one or both ends of the mouth of sea anemones and some corals.
- **Corallum:** The skeleton of a colonial coral, made up from individual skeleton, each secreted by one polyp.
- **Corallite:** The cup like skeleton of a single coral polyp.
- **Coenosarc:** The tubular tissue connecting the polyps of a hydroid colony. It is the living tissue overlying the stony skeletal material of the coral/
- **Prototheca:** A cup shaped basal skeletal plate which is formed at the start of the development of the colony (in a stony coral)
- **Mesoglea:** A gelatinous substance between the endoderm and ectoderm of s Sponges and Cnidarians.