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Perspective

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Overview of Coral Reefs

Frank William Arnold*

Introduction

Corals consist of narrow layers or plates of calcium carbonate, also known as calcite or limestone. It is secreted by many soft-bodied animals known as Coral Polyps. Polyps have different size ranges; they may vary from a pinhead to a foot in length. Each polyp has a symbiotic relationship in which a host called zooxanthellae that gives coral its color. Zooxanthellae follow normal photosynthesis process and thus take in carbon dioxide and release oxygen and other essential nutrients which are used by the host polyp. The corals must be exposed to a sufficient amount of sunlight for their proper growth.

In a nutshell, Coral Polyps may be defined as tiny, soft-bodied organisms that are related to jellyfish and sea anemones. Their base is composed of a hard and protective limestone skeleton known as calicle, which is responsible for the basic structure of coral reefs. When a polyp affixes itself to a rock on the seafloor, the formation of reefs begins which then divides into thousands of clones, thereby creating a colony that acts as a single organism. As colonies expand over the years, they join with other colonies and become reefs. Most of the coral reefs are made from stony corals, whose Polyps cluster in groups.

Coral is a member of phylum *Cnidaria* and belongs to the class *Anthozoa*. They also secrete hard carbonate exoskeletons that support and protect them. Most of them grow best in warm, clear, and shallow water. Coral reefs, known as rainforests of the sea, are one of the most biologically diverse ecosystems on earth. The abundance and diversity of organisms on a reef vary as they compete with each other for resources such as food, space, and sunlight. The different components of coral reefs are interconnected and fluctuations in the abundance of one species can drastically change the diversity and abundance of others.

For instance, overfishing of herbivorous fish results in increased growth of algae and seagrasses which leads to an increase in other herbivorous marine life, such as sea urchins.

Structure of Coral Reef

Coral reefs are made of calcium carbonate skeletons of corals-small immobile animals closely related to jellyfish. Though individual corals can be quite small, they live with millions of other individuals, and over the years, they build enormous reefs. The reef structure on coral reefs is created by biological processes-the growth and death of reef-building corals, sponges, and other marine animals. The coral species that build reefs are called hermatypic, meaning "hard," corals because they extract calcite from seawater which creates a hard and durable exoskeleton which helps to protect their soft, sac-like bodies. “Soft” corals are usually flexible organisms that resemble plants and trees and also include species like sea fans and sea whips. Coral reef gradually grows one tiny exoskeleton at a time and after some years, they become massive features of the marine environment. The agglomeration of carbonate sand provides a habitat for seagrasses and mangroves and blue-green algal mats. These plants trap and stabilize sediment, and their accumulations lead to the whole reef complex.

Types of Coral Reefs

Coral reefs are mainly categorized into four types: Fringing reef, Barrier reef, Atoll, "Bank or Platform reef" .

1. Fringing reefs: They are also known as shore reef and composed of flat reef areas that border with a non-reef island, generally volcanic or a mainland mass. It is one of the most common reefs. Initially, they are formed on the shore at low water level and then further expand seawards when they grow in size. Their final width depends on the steepness drop of the sea bed. However, the surface of the fringe reef usually remains just below the waterline

2. Barrier reefs: They are separated from the mainland by a deep channel and are similar to the later stages of the fringing reef, but they differ from them in terms of size and origin. Barrier reefs are formed in open water rather than next to the shoreline. Their formation takes considerably longer than a fringing reef and they are much rare as compared to fringing reefs. Some barrier-reefs are less circular, surrounding an island, but larger barrier reefs, are complex linear features consists of chains of reef patches which makes their structure complex

3. Atolls: Atolls or atoll reefs are continuous barrier reef which extends around a lagoon without a central island. Atolls are somewhat similar to circular barrier reefs but without their central landmass. They are generally formed from fringing reefs around volcanic islands. With time, the island corrodes and sinks below sea level. They are also formed by the rising of the sea level or sinking of the seabed. Atolls are generally found in the South Pacific and the Indian Ocean

4. Platform or patch reefs: Platform reefs, also known as the bank or table reefs, can be formed anywhere where the seabed rises, generally on the continental shelf and in the open ocean. To enable the growth of zooxanthemic, they are also formed close enough to the surface of the ocean. Their size varies from a few hundred meters to many kilometers. Their shape range from oval to elongated. The barrier and fringing reefs extend only seaward, whereas the platform reefs grow in all directions. They can also form fringing reefs when they reach surface and form sandbanks and small islands. A lagoon can also form in the middle of a platform reef

If platform reefs are found within atolls, then they are called patch reefs as they grow only a few dozen meters in diameter. These reefs form a linear arrangement. In some older platform reefs, the inner part may be so heavily eroded that it can lead to the formation of a pseudo-atoll. Some platform reefs are U-shaped, due to wind and water flow. They have irregular table like features, such as smaller patches that occur inside atoll lagoons and larger patches occur as isolated parts of larger developments of any of the other three reef categories.

***Corresponding author:** Frank William Arnold, Department of Marine Biology, University of Bergen, Germany, E-mail: frank_william@hotmail.com

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Author Affiliation Top

Department of Marine Biology, University of Bergen, Germany