

“TAXONOMY OF GORGONIDS”

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CONTENTS

Sl: No.	TITLE	PAGE No:
1.	ABSTRACT	1
2.	INTRODUCTION	2 - 5
3.	REVIEW OF LITERATURE	6- 9
4.	METHODOLOGY	10-11
5.	OBSERVATION AND RESUT	12 - 23
6.	DISCUSSION	24
7.	CONCLUSION	25
8.	BIBLIOGRAPHY	26

ABSTRACT

Taxonomic identification is the recognition of identity or essential character of an organism. They are organized as written descriptions of characteristics of similar species with their pictures to identify unknown organisms. This project work is on the taxonomic identification of 10 species of gorgonids coming under phylum colenterata, class anthozoa along with their cleaning and neat labelling and arrangement according to the classifications. This work is capable of providing detailed information of museum specimens coming under phylum coelenterata, class anthozoa for future use.

INTRODUCTION

Corals are marine invertebrates in the class anthozoa phylum cnideria. They typically live in compact colonies of many identical individual polyps. The group includes the important reef builders that inhabit Tropical Ocean and secrete calcium carbonate to form a hard skeleton. A coral "group" is a colony of myriad genetically identical polyps. Each polyp is a sac-like animal typically only a few millimeters in diameter and a few centimeters in length. A set of tentacles surround a central mouth opening. An exoskeleton is excreted near the base. Over many generations, the colony thus creates a large skeleton characteristic of the species. Individual heads grow by asexual reproduction of polyps. Corals also breed sexually by spawning.

SOFT CORALS

Soft corals' chief difference from hard corals is structural. While hard corals secrete calcium-based skeletons, soft corals do not. Instead, soft corals contain structures within their tissues called spiracles that support their bodies. Additionally, soft corals have eight fuzzy tentacles for feeding.

SPECIMEN:

Specimen may refer to sample material, a limited quantity of something which is intended to be similar to and represent a larger amount of those things.

IDENTIFICATION:

Identification in biology is the process of assigning a pre-existing taxon name to an individual organism. Identification of organisms to individual scientific names may be based on individualistic natural body features. Experimentally created individual markers (e.g., colour dot patterns), or natural individualistic molecular markers. Individual identification is used in ecology, conservation and environmental studies. The more common form of identification is the identification of organisms to common name or scientific name. By necessity this is based on inherited features ("characters") of the sexual organisms, the inheritance forming the basis of defining a class. The features may, e. g., be morphological, anatomical, physiological, behavioral, or molecular.

IMPORTANCE OF IDENTIFICATION:

Now a days there is a need to identify the species, this helps in the easy classification of them into different taxon so that it will be very easy to know more about a particular kind of species, its genus, family etc. It also helps to find out the common characters that are present in the species.

Identification is an important characteristic of the systematics that helps to classify and tag the unknown organism by observing its visible characters that are common to the particular group of similar organisms. The morphological characteristics are taken into consideration. The morphology of the different species is different.

GORGONIANS:

Gorgonians are sessile colonial cnidarians found throughout the oceans of the world, especially in the tropics and subtropics. Gorgonians are also known as **sea fans** and **sea whips** and are similar to the sea pens or as soft coral. Gorgonians are closely related to corals. Individual tiny polyps form colonies that are normally erect, flattened, branching, and reminiscent of a fan. Others may be whip like, bushy, or even encrusting. A colony can be several feet high and across but only a few inches thick. They may be brightly colored, often purple, red, or yellow. Photosynthetic gorgonians can also be seen. it is having ecological importance

Gorgonians are classified in the Phylum: cnidarian class; anthozoa, alongside the orders Alcyonacea (soft corals) and sea pens. There are about 500 different species of gorgonians found in the oceans of the world, but they are particularly abundant in the shallow waters of the western Atlantic, including Florida, Bermuda, and the West Indies.

The colorful gorgonians (sea fans) are marine sessile cnidarians with mated colonial skeleton and living polyps. Most of the animals grow in a reticulate pattern and the branches divide in one plane giving the shape of a fan. Gorgonians are distributed from near shore to great depths of the oceans.

As per the wildlife (protection) Act, there is ban on collecting gorgonids directly from conserved areas, so a further study on gorgonids cannot be done directly . So by identifying, classifying, the specimens available at our museum help to study more about their unique characteristics whenever possible. Thus studying more about their classification helps to know and understand more about the diversity of gorgonids and their importance to nature

REVIEW OF LITERATURE

The gorgonians popularly called as sea fans and sea whips are marine sessile coelenterates with colonial skeleton and living polyps. They are exceptionally productive and valuable natural asset. Most of the animals grow in a reticulate pattern and the branches divide in one plane giving the shape of a fan. The gorgonian skeleton is composed of two parts, an outer cortex containing loosely arranged calcareous sclerites and an inner medulla with a solid axis made of calcareous or horny matter with or without the addition of calcareous sclerites. Based on arrangement of the skeleton, the order Gorgonacea is divided into three suborders Calcaxonia, Holaxonia and Scleraxonia. Gorgonians act as refuge habitats for many small invertebrates such as crabs, snails and brittle stars and also provide shelter for a variety of commercially important fishes and serve as good feeding and nursery ground in a marine ecosystem. In India 59 species belonging to 27 genera, 7 families and 3 sub orders have been reported. (Venkataraman, 2014).

A study revealed the diversity of shallow water soft coral octocorallia (Helioporacea, Alcyonacea, Pennatulacea, Gorgonacea) in Nicobar group of Islands. The sampling made at 11 study sites with help of SCUBA diving to the depth of 5 to 30 m. A total 27 species were found in Nicobar Island. Of which the Alcyonacea was dominant group followed by Gorgonacea, Helioporacea and Pennatulacea at all the study sites which is contributed with result obtained based on Principal Component analysis, De-Treneded analysis and Ternary plot. Bray-

Curtis cluster analysis resulted 75% similarity between the study sites in Nicobar Islands. 2018, National Institute of Science Communication and Information Resources (NISCAIR). (Yogesh *et.al*,2018).

An expedition research and the subsequent completion of a monograph describing the gorgonian corals throughout the Islands of Pohnpei (Pohnpei Island, Ant and Pakin Atolls) and outcomes of this project being four-fold: exploratory, systematic, and experimental, leading to unexpected ecosystem management opportunities through local community collaboration (Rowely, 2016)

A checklist provides 171 species belonging to 36 genera, 12 families of gorgonian reported from Indian waters based on through literature compilation. In addition, the morphological feature of newly recorded *Melithaea variabilis* (Hickson, 1905) from Andaman and Nicobar Islands has been presented (Yogesh *et.al.*, 2015).

A total of 260 octocoral species, including 144 gorgonians, 80 alcyonaceans, and 36 pennatulaceans have been recorded in the literature at Sagami Bay, Japan. Fifteen of the octocoral species were newly recorded at littoral to bathyal depths (13 gorgonians, one alcyonacean, and one pennatulacean). Thirty families of octocorals were recorded between the depth of 100-200 m (deep littoral) and 23% of all recorded species and 37% of newly recorded species were obtained at this depth. A total of 114 species of octocoral is endemic to Japan and adjacent waters, while 74 of these octocorals are only found in or around Sagami Bay. These results reconfirmed the high biodiversity of octocoral fauna in Sagami Bay, and suggest there are two main explanations for these high levels of biodiversity in this bay and in this area. One explanation appears to be that the recorded species represent a

faunal boundary which is formed by converging elements of temperate, subtropical, and sub-arctic regions. Another explanation may be that the 100-200 m depth range may be a benthic/pelagic ecotone, a transitional zone between two ecosystems, which results in a high degree of biodiversity due to benthic-pelagic coupling (Matsumoto *et.al*, 2007).

Gorgonian-associated fauna from Singapore are listed, represented by seven phyla, 17 families, 23 genera and 23 identified and seven unidentified species. Museum reference numbers, method of collection, locality, depth (where available), host, collector, and date collected (where available) are presented for each specimen collected. The associated animal is also classified in terms of the frequency of occurrence on host species (common, occasional, rare), persistence of the relationship (persistent or intermittent occurrence on host), category of association (scavenger, predator, parasite, commensal, mutualist), location in the host (endo- or ecto-symbiont), dependence on host (obligate or facultative), and specificity to particular host species or genera. At least 16 of the 31 known gorgonian species in Singapore host associated fauna.(Nigel *et.al* ,1999)

The community structure and zonation of gorgonian fauna were studied to determine whether it represented the traditional zonation pattern of the reef as influenced by scleractinian fauna and topographic relief. Seeking to avoid the effect of local variability, a large reef area was quantitatively sampled on the east coast of the Yucatan Peninsula. Species abundances in line transects on four reef sections, spanning 42 km of the Yucatan reef tract, were obtained. Quadrat sampling was used to obtain size data for the dominant species. Over 11,000 gor-

gorgonian colonies were sampled in more than 140 20-m line transects. The gorgonian fauna reflected the zonation pattern of the reef on large spatial scales, but was less sensitive to the environmental factors that determine the community structure of scleractinian corals. On large spatial scales (such as whole reef zones), availability of substrata and strength of surge action are the more important factors affecting the gorgonian community structure. At smaller spatial scales, however, a high degree of variability was observed in the gorgonian community of apparently homogeneous habitats. Data analysis suggests that different recruitment conditions and subsequent biological interactions may produce patchy gorgonian species distributions in suitable habitats of low substrata diversity, even though no signs of previous disturbances produced by natural catastrophic events, such as hurricanes, are found (Jordan, 1989)

METHODOLOGY

PROCEDURE

The selected species of the soft corals were identified and named on the basis of the systematics and were grouped into various taxon's by a famous professor K.Venkataraman (former director of ZSI).

On the basis of morphological features, specimen identified and classified into different phylum. First of all the specimens were taken out of the museum. Then their external features were observed and scientific measurement were made. Specimens were cleaned by dusting with the help of paint brush and tooth brush. A platform /base was prepared for the specimens to present them in upright posture by using plaster of paris and water in moulding cup. Finally labels were tagged on each specimen which contain information of their kingdom, phylum, class, order, family, genus, and species.

MATERIALS REQUIRED

- Plaster of Paris: it is a material that is made up with Gypsum. it dissolves well with water and hardens on cooling. This is used for modeling and it has medicinal applications.
- Water: water is used for the cleaning purposes. It is a good cleaning agent with cleansing action.
- Paint brush and tooth brush: A set of camel hair paint brush and tooth brushes are used to clean the selected specimens of gorgonians. (soft corals)

- Molding cups: These are the simple paper cups that are used to mold the plaster of paris to make the base of the specimens.

OBSERVATIONS AND RESULTS

1. CUPRESSOPATHES ABIES

KINGDOM: ANIMALIA

PHYLUM: CNIDERIA

CLASS: ANTHOZOA

ORDER: ANTIPATHARIA

FAMILY: MYRIOPATHIDAE

GENUS: CUPRESSOPATHES

SPECIES: ABIES



Description: Colonies columnar; monopodial or very sparsely branched. Irregularly pinnulate. Spines conical to horn-shaped, longer on the polyp side of the axis. Surface of spines usually smooth. Polyps 0.6-0.8mm in transverse diameter.

Distribution: Tropical Indo-pacific region

Habitat: Primarily reef

2. SUBERGORGIA SUBEROSA

KINGDOM: ANIMALIA

PHYLUM: CNIDERIA

CLASS: ANTHOZOA

ORDER: ALCYONACEA

FAMILY: SUBERGORGIIDAE

GENUS: SUBERGORGIA

SPECIES: SUBEROSA



Description: Colonies branched in one plane or irregularly and divide dichotomously but rarely fuse. Cortex thin and polyps retractile full when dry. Cortical spicules 0.012×0.068 mm and medullar spicules are of two types -sinuous and tuberculated. Colour light brown when alive

Distribution: Widely distributed in the litoral areas of Indo-Pacific region

3. SUBERGORGIA RUBERA

KINGDOM: ANIMALIA

PHYLUM: CNIDERIA

CLASS: ANTHOZOA

ORDER: ALCYONACEA

FAMILY: SUBERGORGIIDAE

GENUS: SUBERGORGIA

SPECIES: RUBERA



Description: Colonies arborescent, forming fans or bushes. Colour of colonies orange, brown or red. In some species there is a narrow furrow visible on the branches. Surface layer and internal layer with tuberculate spindles. Axis is made up of smooth, branched, anastomosing sclerites that are embedded in a gorgonian matrix. Zooxanthellae absent

Distribution: Tropical Indo-Pacific

Habitat: On slopes and deeper parts of the reef.

4. ANNELLA RETICULATA

KINGDOM: ANIMALIA

PHYLUM: CNIDERIA

CLASS: ANTHOZOA

ORDER: ALCYONACEA

FAMILY: SUBERGORGIIIDAE

GENUS: ANNELLA

SPECIES: RETICULATA



Description: Colonies arborescent, mostly in one plane, branches with anastomoses forming netlike fans. Colour of colonies yellow, orange, red. Surface layer with double heads or double discs, internal layer with tuberculate spindles. Axis is made up of smooth, branched, anastomosing sclerites that are embedded in a gorgonium matrix

Distribution :Tropical Indo-PacificHabitat:

On slopes and deeper part of the reef .

5. ANNELLA MOLLIS

KINGDOM: ANIMALIA

PHYLUM: CNIDERIA

CLASS: ANTHOZOA

ORDER: ALCYONACEA

FAMILY: SUBERGORGIIDAE

GENUS: ANNELLA

SPECIES: MOLLIS



Description: Colonies arborescent, mostly in one plane, branches with anastomose forming net like fans. Colour of colonies yellow, orange red. Surface layer with double heads or double discs, internal layer with tuberculate spindles. Axis is made up of smooth, branched, anastomosing sclerites that are embedded in a gorgonin matrix.

Distribution: Tropical Indo-Pacific

Habitat: On slopes and deeper parts of the reef

6. ANNELLA Sp.

KINGDOM: ANIMALIA

PHYLUM: CNIDERIA

CLASS: ANTHOZOA

ORDER: ALCYONACEA

FAMILY: SUBERGORGIIIDAE

GENUS: ANNELLA



Description: Colonies arborescent, mostly in one plane, branches with anastomose forming net like fans. Colour of colonies yellow, orange red. Surface layer with double heads or double discs, internal layer with tuberculate spindles. Axis is made up of smooth, branched, anastomosing sclerites that are embedded in a gorgonin matrix.

Distribution: On slopes and deeper parts of the reef.

Habitat: Tropical Indo-Pacific

7. ECHINOGORGIA Sp.

KINGDOM: ANIMLIA

PHYLUM: CNIDERIA

CLASS: ANTHOZOA

ORDER: ALCYONACEA

FAMILY: PLEXAURIDAE

GENUS: ECHINOGORGIA



Description: Colonies reticulate, branches originating from the stalk, traceable upto the middle of the colony and divided to form the main expanse of the lamella.

Main branches slightly compressed and tips are club-shaped. Spicules are of leaf clubs with tuberculated root like structures

Distribution: Widely distributed in the littoral region of Indo-Australian archipelago

8. MURICELLA COMPLANATA

KINGDOM: ANIMALIA

PHYLUM: CNIDERIA

CLASS: ANTHOZOA

ORDER: ALCYONACEA

FAMILY: ACANTHOGORGIIDAE

GENUS: MURICELLA

SPECIES: COMPLANATA



Description: Colonies flabellate, often divide in one plane; branches free and the terminal portion devoid of polyps. Spicules are all spindles of different sizes, to which quadriradiates or multi radiates may be added. Larger spicules are common in the coenchyme. Larger spindles are irregular and warty. Colour may vary from pink to cream. Axis light violet, large spindles pink, smaller spindles yellow and quadriradiates often colourless.

Distribution: Indo-Pacific

9. MURICELLA Sp.

KINGDOM: ANIMALIA

PHYLUM: CNIDERIA

CLASS: ANTHOZOA

ORDER: ALCYONACEA

FAMILY: ACANTHOGORGIDAE

GENUS: MURICELLA



Description: Colonies forming fans with many anastomoses. Polyps dome shaped, contractile but not retractile. In order fans the twigs may grow out perpendicular to the fan. Main branches are flattened at right angle to the plane of the fan. Colour of colonies white with red tentacles, brown, red, etc. Sclerites of coenchyme are spindles with densely crowded thick tubercles, and small capstans.

Distribution: Tropical indo-pacific

Habitat: Reef slope

10.MENELLA SPS.

KINGDOM: ANIMALIA

PHYLUM: CNIDERIA

CLASS: ANTHOZOA

ORDER: ALCYONACEA

FAMILY: PLEXAURIDAE

GENUS: MANELLA

SPECIES: SPS



Description: Colonies forming sparsely branched fans or bushes with long cylindrical upright branches. Polyps arranged all around the branches. Colour of colonies red, yellow, purple. Surface of the coenchyme with sclerites with vertically placed leaves. Mostly, these leaves are flat and thin. Interior with spindles and irregular sclerites. Zooxanthelle absent

Distribution: Tropical Indo-pacific

Habitat: Reef slope

DISCUSSION

Gorgonians are sessile colonial cnidarians found throughout the oceans of the world, especially in the tropics and subtropics. Gorgonians are also known as **sea fans** and **sea whips** and are similar to the sea pens or as soft coral. Gorgonians are closely related to corals. Individual tiny polyps form colonies that are normally erect, flattened, branching, and reminiscent of a fan. Others may be whip like, bushy, or even encrusting. A colony can be several feet high and across but only a few inches thick. They may be brightly colored, often purple, red, or yellow. Photosynthetic gorgonians can also be seen. it is having ecological importance.

I studied the taxonomy of Gorgonids. Species of Gorgonids observed in the museum are usually distributed in Tropical Indo-Pacific regions and mostly inhabit slopes and deeper regions of reefs. Most of the specimens observed come under the order Alcyonacea. 10 gorgonids can be placed under 10 species, 6 genera, 4 families, 2 orders, class Anthozoa of phylum Cnidaria.

Alcyoniidae is a dominant family of soft corals found in this study. A few locations in the Indo-Pacific such as the Great Barrier Reef (Fabricius & De'ath 2001), South Africa (Schleyer & Celliers 2003), southern Taiwan (Dai 1991; Benayahu et al. 2004) and Thailand (Chanmethaku et al. 2010) were reported to have a high diversity of Alcyoniidae family. Correspondingly, identified octocorals from the study region had some similarities with those found in a survey done by Chanmethaku et al. (2010). Their survey covered both the Andaman Sea and the Gulf of Thailand. Nineteen genera of octocorals were found in the Andaman Sea; In my study found that the order Alcyonacea is the dominating order. Among 10 species about 9 species come under the order Alcyonacea

CONCLUSION

Taxonomic keys are used for the taxonomic identification where they provide the unique characteristics of species with written descriptions and pictures. They are also capable of conveying natural variation on neither morphology of species nor the small, yet characteristic morphological features of a species. Taxonomic identification is less time consuming and as they help students by providing necessary information on Gorgonids without referring any internet or book sources. Species of Gorgonids observed in the museum are usually distributed in Tropical Indo-Pacific regions and mostly inhabit slopes and deeper regions of reefs .Most of the specimens observed come under the order Alcyonacea. 10 gorgonids can be placed under 10 species, 6 genera, 4 families, 2 orders, class Anthozoa of phylum Cnidaria.

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