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The Identification of Octocorals from the Northern Region of Straits of Malacca

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Abstract: Coral reefs in the northern region of the Straits of Malacca have a diverse group of octocorals growing on its bed. The octocorals identified in this study are from islands along the Straits. In this study, 23 specimens were identified, belonging to 4 sub-orders, which have been subdivided into 8 families. From these 8 families, 15 different genera have been identified. The identification process for this research was conducted based on five important keys; the external form and colouration, polyps or colonial and fundamental structure of colonies, monomorphic or dimorphic, the arrangement of polyps, and the arrangement of sclerites.

Keywords: Octocorals, Taxonomy, Straits of Malacca

INTRODUCTION

Habitat of octocorals ranges from intertidal area up to the open oceans at abyssal zones (Fabricius & Alderslade 2001). Hakim *et al.* (2011) mentioned that soft corals are one of the main groups of marine organisms which occur in many coral reefs across the world, especially in tropical waters at depths between 5 m and 30 m. Among the octocorals, the Alcyonacea group is mostly found in the warmer and shallower water of tropical oceans (Benayahu 2013).

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Octocorals comprise of soft corals, sea fans, and sea pens. Soft corals belong to the phylum Coelenterata, which is made up of invertebrates with tentacles, stinging structure (nematocysts), have radial symmetry, and only one main internal cavity with a single mouth opening. Soft corals can be formed either by solitary polyp or many polyps arranged in a colonial order as building blocks (Fabricius & Alderslade 2001).

Fabricius and Alderslade (2001) classified that the shape and the size of the colony can be broadly different from one species to another. The growth development of a colony is divided into several categories; membranous, encrusting, massive, lobate, digitate, arborescent, fan-shaped, bushy, and unbranched (whip-like).

The study of soft coral taxonomy in Malaysia is progressing, however, it is still very much in its infancy. The study of soft corals is important as there are many implications to the environment, medicine, and pharmaceutical areas. The objective of this paper is to identify and record octocoral species found in the northern part of the Straits of Malacca.

MATERIALS AND METHODS

Study Site

The study was conducted in the northern region of the Straits of Malacca which is approximately 800 km long and 65 km wide (Britanicca-"Strait of Malacca," 2005). The octocorals were sampled from several islands; Pulau Payar, Pulau Segantang, Pulau Songsong, Pulau Bidan, Pulau Kacha, and Pulau Lembu. All samples were collected by SCUBA diving, between depths of 5 m to 20 m. Samples were brought back to the laboratory and preserved in Beatson jars filled with 70% alcohol.

Sclerite Extraction

Octocoral samples were dissected at the mature basal plate and stalk to obtain bigger and clearer sclerites which are found in the octocoral tissue. They were cut into 2–3 mm sections and placed in separately labelled microtubes (1.5 mL centrifuge tubes). A 5.25% sodium hypochlorite solution was used to extract the sclerites by bleaching in microtubes for 12–24 hours. After this process, sclerites were washed several times in distilled water. They were then stored in 70% ethanol (Janes 2008). Around 100–150 sclerites were siphoned out of the microtubes using pipettes and dropped on respectively labelled microscope slides. Slides were mounted using DPX mounting medium (Zaharatul 2014).

Octocorals Identification

In identifying octocorals, firstly, morphological characteristics of the octocorals and gorgonians; such as the colour, size, shape, and form of the sampled specimens were examined and compared. Underwater images are especially important because soft corals emit different colours in the water.

Another key for identification is the examination of the sclerite shape, colour, and size. Extracted sclerites mounted on slides were observed under compound light microscope (model: Olympus CX41; camera: Olympus DP21) under 100× and 400× magnification, as well as under scanning electron microscope (SEM) (model: Leo Supra 50 VP Field Emission SEM). The shape of sclerites (refer to Fig. 1) were captured for identification.

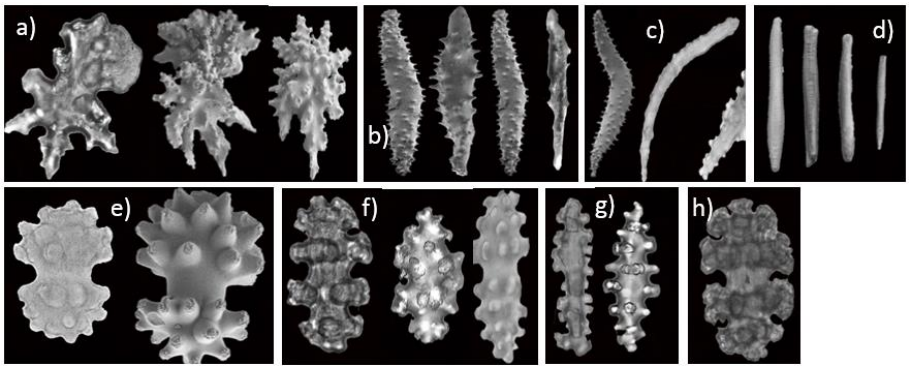

Figure 1: Images from scanning electron microscope of different sclerite shapes: a) thornscale, b) spindle, c) bent spindle, d) rod-shaped, e) double-club head, f) double-cone head, g) girdled spindle and h) eight-radiate.

In order to simplify the identification process, the following sequence of keys was used: (i) the identification of the external form and colouration (the soft corals are polyps or colonial); (ii) fundamental structure of colonies (membranous, encrusting, massive, lobate, digitate, arborescent, fan-shaped, bushy, and unbranched); (iii) the colonies (monomorphic or dimorphic); (iv) the arrangement of polyps; (v) the external form (colour and size of autozooids in expended and contracted conditions including form and colour of tentacles); and (vi) arrangement of sclerites (form, size, colour).

RESULTS

A total of 23 specimens were sampled, yielding 4 sub-orders, 9 families, and 15 genera of octocorals. All specimens collected were identified up to genus level except for one (sample #23) which was classified as unknown as it was hard to identify due to its unique morphology and the absence of sclerites. However, this specimen was the only specimen that changed its colour during the oxidation process. The dark reddish-brown coloured specimen turned gold and shiny. Table 1 depicts the summary of the identified genera and their associated characteristics.

Table 1: Summary of identified genera and their associated characteristics of samples collected from islands in the Northern Straits of Malacca.

Sub-order	Family	Genera	Zooxanthellae	Colour	Sclerite	Polyps	Colony shape	Habitat
Calcaxonia	Ellisellidae	Dichotella	No	Yellowish, white	Club and double star	Monomorphic, contractile, not retractile	Dichotomous, branched, bounty	Tropical coral reef (10–45 m)
Calcaxonia	Ellisellidae	Junceella	No	Yellowish, white	Club and double star	Monomorphic, contractile, not retractile	Unbranched, whip-like	Coral reefs, reef slope
Calcaxonia	Ellisellidae	Viminella	No	White, yellowish, brown, red	Club	Monomorphic, contractile, not retractile	Unbranched, whip-like	Deeper part of reef, warm and cold waters
Calcaxonia	Ellisellidae	Ellisella	No	Orange-yellow, orange-red	Spindle and thornscale	Monomorphic, contractile, not retractile.	Widely branched	Deeper part of reef, warm and cold waters
Scleraxonia	Subergorgiidae	Subergorgia	No	Light brown, reddish brown	Double-cone, eight radiate, girdled spindle	Monomorphic, retractile	Dichotomously branched, tree-like shape	Reef slope, tropical waters
Scleraxonia	Melithaeidae	Acabaria	No	Yellowish-white	Thornscale	No polyps	Dichotomously branched, tree-like, fan-like	Reef slope, tropical waters
Scleraxonia	Melithaeidae	Melithaea	No	Reddish-brown	Thornscale, spindle	No polyps	Tree-like, fan-like	Reef slope, tropical waters

(*continued on next page*)

Table 1: (*continued*)

Sub-order	Family	Genera	Zooxanthellae	Colour	Sclerite	Polyps	Colony shape	Habitat
Scleraxonia	Melithaeidae	Mopsella	No	Yellow, yellowish-white	Thornscale, spindle, bent spindle	No polyps	Heavily-branched, tree-like, fan-like	Reef slope, tropical waters
Scleraxonia	Anthothelidae	Alertigorgia	Yes	Dark-brown, reddish-brown	Girdled spindles, double cone	Monomorphic, retractile	Dichotomously branched, leaf-like branches	Tropical waters, shady region of reef
Alcyoniina	Nidalidae	Siphonogorgia	No	Red, yellow, orange, purple	Double cone, double head	Monomorphic, retractile	Fan-like	Tropical waters, deeper region reef
Alcyoniina	Nidalidae	Nephthyigorgia	No	Pink, red, yellow, purple, white	Spindle, bent spindle	Monomorphic, retractile	Branched, small, lobate, and rigid	Tropical waters, shady region reef
Alcyoniina	Nidalidae	Dendronephthya	No	Red, orange, purple, yellow	Spindle, spiny spindle	Monomorphic, not retractile.	Densely branched, tree-like	Tropical waters, shallow area
Alcyoniina	Alcyoniidae	Sarcophyton	Yes	Brown, beige, yellow, green cream	Spindle, bent spindle	Dimorphic, retractile all the time	Mushroom shape	Shallow waters, tropical waters
Alcyoniina	Nephtheidae	Nephthea	Yes	Brownish-yellow, green, purple	Spindle	Monomorphic, not retractile	Bush-like, tree-like	Shallow waters, refuge areas
Subselliflorae	Pennatulidae	Pteroeides	No	Purple, yellow, red, orange	Rod shaped	Dimorphic	Tree-like, feather-like, bilateral symmetry rachis with one axis	Sandy slope region and reef slopes, deep and shallow waters
Unknown	Unknown	Unknown	No	Dark brown	No sclerites	No polyps	Bushy, tree-like	Tropical, shallow waters

DISCUSSION

Keys to identify soft corals were adapted from Soft Coral and Sea Fans by Fabricius and Alderslade, 2001. The keys were created based on soft corals' morphology and their unique characteristics. These keys are also been confirmed by by Hoeksema and van Ofwegen (n.d.).

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; with the three dominant genera being Sinularia, Dendronepthya, and Sarcophyton. Two of which were also identified in the current study. In a much earlier study done at Cape Ricardo, Port Dickson (also located along the Straits of Malacca) in 1981, Goh and Sasekumar found that hard corals dominated the reefs in the survey area with 35 sclerectinian (hard coral), 1 milliporinid and 5 alcyonaceans (soft corals). The five alcyonaceans identified were three species of Lobophytum, one species of Sinularia and one species of Sarcophyton. These studies show that the pool of soft corals in the region are similar, which shows the distribution of the soft corals in the region.

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