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.

![Sclerite Shapes](image)

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 expanded 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.

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

(continued on next page)
Table 1: (continued)

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


