

# Occurrence of hard coral (Genus *Montipora*) common in Elphinstone Island and its adjacent areas of Myeik Archipelago, Myanmar

## Abstract

A total 7 species of *Montipora* of the Family Acroporidae were recorded as dominated corals population in the present study area. The highest number of coral species (4 species) was found at Taung Pan Gyi Station. *Montipora digitata* and *M patula* are occurred at only Sha Aw. Moreover, *M. floweri* was also occurred at only The Hnit Tan.

**Keywords:** hard coral, *Acroporidae*, *Montipora*, identification, species composition

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## Introduction

Corals are primitive animals belonging to the Phylum Coelenterata or Cnidaria, occurring anywhere in the world ocean at depth ranging from the low tide mark to abyssal down to 6000m.<sup>1</sup> Corals provide a habitat for a variety of organisms that humans use for food, including fishes, sea urchins, mollusks, crustaceans and others. Corals can also be classified by into two distinct types; (1) Hermartypic corals which contain zooxanthellae and are responsible for the construction of coral reefs in tropical seas and (2) Ahermartypic corals which have no zooxanthellae and do not form coral reefs. They mostly live in deep water. The northern tropical shallow water areas have the greatest diversity and abundance of hermatypic corals, with the shallow water corals being restricted to the atolls and islands of the Coral Sea (Castro and Huber, 2007). During low spring tides, corals living near the surface may be exposed to strong sunlight which can be deadly. Coral reefs are usually divided into three main categories; (1) Fringing reefs, (2) Barrier reefs and (3) Atolls. The objectives of this research are (a) to know the various types of *Montipora* species found in present study areas and (b) to study species composition of *Montipora* in study areas.

## Materials and methods

The present study selected the Genus *Montipora*; the hard corals which inhabited the Myeik Archipelago water to observe. The living coral samples were collected from five selected stations at Thayawthadangyi Kyun; (1) Taung Pan Gyi (Lat. 12° 25'N and Long. 98° 09'E), (2) Maw Shin (Lat. 12° 24'N and Long. 98° 06'E), (3) Sha Aw (Lat. 12° 15'N and Long. 98° 05'E) and (4) The Hnit Tan (Lat. 12° 17'N and Long. 97°57'E). The living coral samples were collected once two months during the spring tide. The coral samples were mainly collected by snorkeling in the shallow water and with the help of local divers who were supplied with air-compressor in deeper water. Besides diving the samples were also collected by hand in the intertidal zone during low tide. The detail morphological characters of all collected specimens were identified under the binocular microscope and followed the methods of Veron and Wallace (1984) and Veron (2000) (Figure 1).



**Figure 1** Map showing the study area.

## Results

### Morphological descriptions of Genus *Montipora* occurring in the study area

Phylum- Cnidaria  
 Class- Anthozoa  
 Sub-class- Zoantharia  
 Order- Scleractinia  
 Family- Acroporidae  
 Genus- *Montipora*

Artificial Key to the species of *Montipora* occurring in the present study area.

- 1a. Colony dominated by branching growth form..... 2
- 1b. Colony dominated by laminar growth form .....3
- 2a. Corallites not in pitted .....*Montipora digitata*
- 2b. Corallites deeply in pitted .....*M. porites*
- 3a. Colonies are not encrusting .....*M. patula*
- 3b. Colonies are encrusting ..... 4
- 4a. Corallites indistinct .....*M. flabellate*
- 4b. Corallites distinct .....5
- 5a. Corallites are exsert to immersed.....*M. aequituberculata*
- 5b. Corallites are immersed .....6
- 6a. Corallites are immersed, distinguishable theca.....*M. floweri*
- 6b. Corallites are immersed, no theca .....*M. foliosa*

*Montipora aequituberculata* Bernard, 1897(Figure 2A-2D)

References: Veron and Wallace, 1984: 114, fig. 300-311; Veron; 2000:76.

Type locality: Albany Passage and Great Barrier Reef (Veron and Wallace 1984)

Synonymy: *Montipora amplexans* Benard, 1897; *Montipora ellisi* Bernard, 1897; *Montipora erythraea* Marenzeller; Crossland, 1952; Stephenson and Wells, 1955; Umbgrove, 1939; Marenzeller, 1907; *Montipora composita* Crossland, 1952; Wells, 1954; Pillai, 1967b; Scheer and Pillai, 1974 (as cited in Veron and Wallace 1984).

**Diagnostic characters:** Colonies are foliose, composed of thin, expanding, and flat to contorted laminae, usually with a side attachment and oblique overlapping whorls. The epitheca is inconspicuous or absent. Calices are 0.5-0.8mm in diameter. Corallites are small, exert to immersed and are surrounded by thecal papillae.

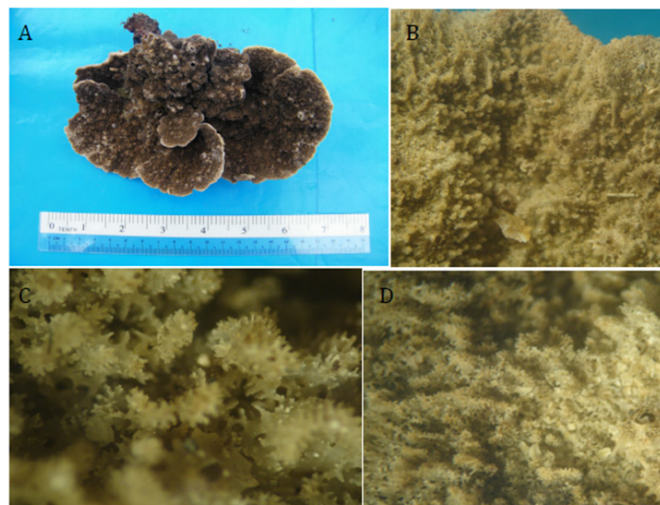
Septa consist of non-tapered spines. Primary septa are up to 2/3R and secondary septa are less than 1/2R or often are reduced. Living colonies are dark brown and margins are pale in color.

**Materials examined:** Taung Pan Gyi (KK0029-0031); The Hnit Tan (KK0032-0034)

**Local distribution:** Taung Pan Gyi, The Hnit Tan

**Geographical distribution:** East African Coast, Persian Gulf, Indian Ocean Region, Red Sea, Indo-West Pacific, North Australia

(Veron 2000). From the Red Sea to the Tuamotu Archipelago (Veron and Wallace, 1984)



**Figure 2A-2D** *Montipora aequituberculata* Bernard: A) Corallum; B) Margin of Corallum; C) Septa and, D) Pappillae.

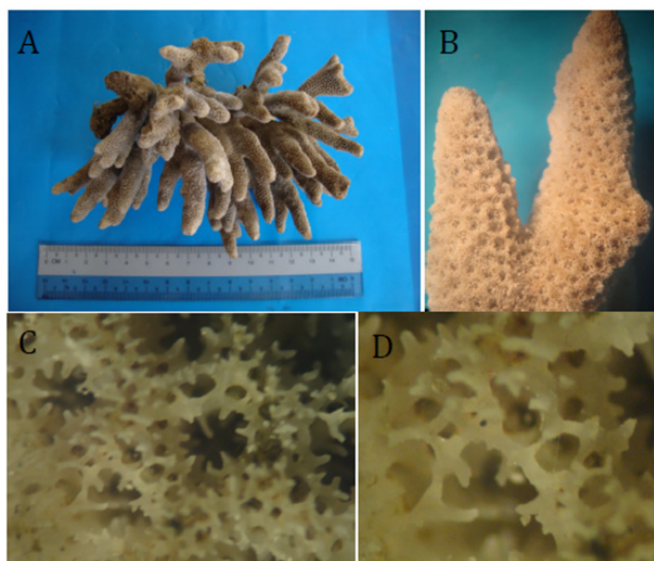
***Montipora digitata* Dana, 1846.**(Figure 3A-3D)

**References:** Veron and Wallace, 1984: 77, fig. 194-206; Veron, 2000:154.

**Type locality:** Fiji (Veron and Wallace 1984)

**Synonymy:** *Manopora digitata* Dana, 1846; *Manopora tortuosa* Dana, 1846; *Montipora tortuosa* Dana, 1846; Studer, 1880; Bernard, 1897; Vaughan, 1918; Eguchi, 1938; *Montipora rubra* (Quoy and Gaimard); Quelch, 1886; Bernard, 1897; Nemenzo, 1967; *Montipora poritifomis* Verrille, 1869; Bruggemann, 1879a; *Montipora divaricata* Bruggemann, 1879a; Bernard, 1897; Stephenson and Wells, 1955; *Montipora levis* Quelch, 1886; Bernard, 1897; Vaughan, 1918; Matthai, 1923; *Montipora irregularis* Quelch, 1886; Bernard, 1897; Faustino, 1927; Nemenzo, 1967; *Montipora fruticosa* Bernard, 1897; Crossland, 1952; Seark, 1956; Nemenzo, 1967; Zou, 1975; *Montipora marenzelleri* Bernard, 1897; Nemenzo, 1967; *Montipora indentata* Bernard, 1897; Matthai, 1923; *Montipora nana* Bernard, 1897; *Montipora spicata* Bernard, 1897; *Montipora alcornis* Bernard, 1897; Nemenzo, 1967; *Montipora bolsii* Bernard, 1897; *Montipora spatula* Bernard, 1897; *Montipora spongilla* Bernard, 1900; *Montipora ramose* Bernard, 1900; Vaughan, 1918; Matthai, 1923; Thiel, 1932; Eguchi, 1938; Crossland, 1952; Ma, 1959; Veron et al., 1974; *Montipora compressa* Esper; Bernard, 1897; Faustino, 1927; Nemenzo, 1967; *Montipora superficialis* Bruggemann; Bernard, 1897; *Montipora palmata* Dana; Bernard, 1897; not Dana, 1896 (as cited in Veron and Wallace, 1984).

**Diagnostic characters:** Corallum becomes digitate to arborescent with irregularly anastomosing upright branches. Branches are some times fused into plates. Corallites are small and immersed. They are similar in size and shape. The first septal cycle is complete up to 2/3R and second septal cycle is incomplete up to less than 1/3R. But some corallites are separated by reticulum ridges. The reticulum is fine with spinules having elaborated tips. Reticulum ridges are weakly developed or absent. The coenosteum is smooth. Living colonies are brown in colour.



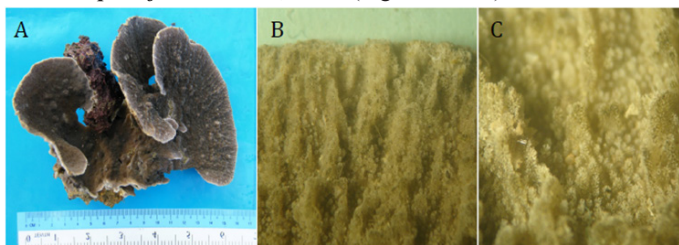
**Figure 3A-3D** *Montipora digitata* Dana: A) Corallum; B) Corallite; C) Septa and, D) Coenosteum.

**Material examined:** Sha Aw (KK0045-0048)

**Local distribution:** Sha Aw

**Geographical distribution:** East African Coast, Indo-West Pacific Region, Red Sea and Indian Ocean Regions (Veron 2000). Throughout the tropical Indo-Pacific, from the western Indian Ocean east to Fiji (Veron and Wallace 1984).

***Montipora foliosa* Pallas, 1766.** (Figure 4A-4C)



**Figure 4A-4C** *Montipora foliosa* Pallas: A) Corallum; B) Margin of Corallum; and, C) Pappillae.

**References:** Veron and Wallace, 1984: 110, fig. 290-299; Veron, 2000:66.

**Type locality** - Unknown.

**Synonymy:** *Madrepora foliosa* Pallas, 1766; Ellis and Solander, 1786; *Agaricia lima* Lamark, 1816; *Manopora lima* Lamark, 1816; Dana, 1846; *Montipora exesa* Verrill, 1869; Quelch, 1886; *Montipora lichenoides* Verrill, 1869; *Montipora* Lamarck, 1816; Bruggemann, 1879b; Quelch, 1886; *Montipora prolifera* Bruggemann, 1879b;

Bernard, 1897; Eguchi, 1938; Crossland, 1952; Seark, 1956; Ma, 1959; Nemenzo, 1967; *Montipora minuta* Bernard, 1897; Wells, 1954; Stephenson and Wells, 1955; Ma, 1959; *Montipora pulcherrina* Bernard, 1897; Yabe and Sugiyama, 1935; Ma, 1959; *Montipora tubifera* Bernard, 1897; *Montipora bifrontalis* Bernard, 1897;

*Montipora circinata* Bernard, 1897; *Montipora variabilis* Bernard, 1897; Ma, 1959; *Montipora scutata*

Bernard, 1897; *Montipora undans* Crossland, 1952; *Montipora sulcata* Crossland, 1952; *Montipora rus* Bernard, 1897 (as cited in Veron and Wallace 1984).

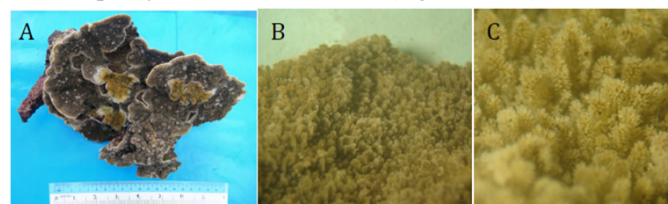
**Diagnostic characters:** Corallum is mostly encrusting with horizontal laminae and margins are rounded. Horizontal laminae may be unifacial but epitheca covers most of udersurface, widely-spaced corallites. Corallites are arranged in rows between coenosteum ridges which are conspicuous. Corallites are obviously inclined towards the perimeter on laminate corolla. Corallites are immersed with no the cal development or exsert. Septa are composed of rows of terete spines. The primary septa are up to 1/4R or complete and secondary septa sub-equal to absent. The coenosteum is medium-coarse and spongy except for that of the papillae which is fine and has spinules with elaborated tips. Living colonies are brown in color.

**Material examined:** Taung Pan Gyi (KK0049-0050); Maw Shin(KK0051-0052)

**Local distribution:** Taung Pan Gyi, Maw Shin

**Geographical distribution:** East Africa Coast, Indian Ocean Region, Red Sea, Persian Gulf and Indo-West Pacific(Veron2000). In the tropical Indo-Pacific, from the Red Sea east to the New Hebrides and Fiji (Veron and Wallace1984).

***Montipora flabellata* Studer, 1901.** (Figure 5A-5C)



**Figure 5A-5C** *Montipora flabellata* Studer: A) Corallum; B) Margin of Corallum; and, C) Pappillae.

**References:** Veron, 2000: 99.

**Type locality:** Hawaii (Veron and Wallace 1984)

**Diagnostic characters:** Corallum is encrusting with irregular lobes. Papillae cover the colony surface and are sometimes fused into ridges. Corallites are small and indistinct. Septa are poorly developed. Colonies are brown or purple.

**Materials examined:** Taung Pan Gyi (KK0053); Thel Hnit Tan(KK0054-0056)

**Local distribution:** Taung Pan Gyi, The Hnit Tan

**Geographical distribution:** Central Pacific and Hawaii Island. (Veron 2000)

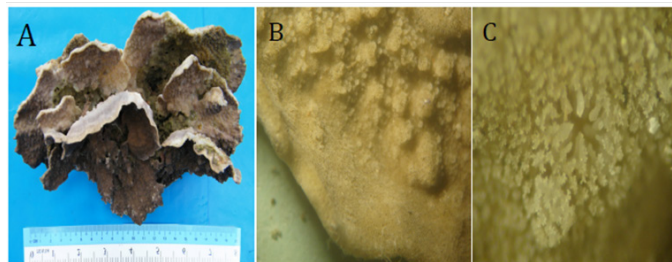
***Montipora patula* Verrill, 1864.** (Figure 6A-6C)

**References:** Veron, 2000: 106

**Type locality:** Hawaii (Veron and Wallace 1984)

**Diagnostic characters:** Colonies are thick tiered plates. Plates usually have free edges. Corallites very small, exsert, irregularly spaced and irregular in height. Irregular length of coenosteum papillae are concentrated around the corallites. Septa are very prominent. Colonies are pale tan colour.

**Materials examined:** Taung Pan Gyi (KK0060-0061); Maw Shin (KK0062-0065)

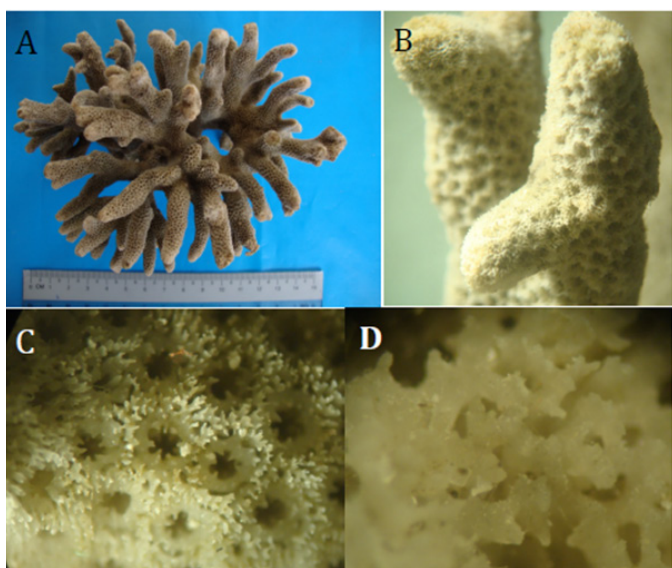


**Figure 6A-6C** *Montipora patula* Verrill: A) Corallum; B) Margin of Corallum; and, C) Septa.

**Local distribution:** Taung Pan Gyi, Maw Shin

**Geographical distribution:** Central Pacific Ocean, Hawaii Is. (Veron 2000)<sup>2-4</sup>

***Montipora porites* Veron, 2000.** (Figure 7 A7-D)



**Figure 7A-7D** *Montipora porites* Veron: A) Corallum; B) Corallite; C) Septa and, D) Coenosteum.

**References:** Veron, 2000: 162

**Type locality:** Unknown

**Diagnostic characters:** Colonies are encrusting bases and irregular branches which seldom fuse. Branching may be open or compact. Corallites are deeply embedded between the ridges. The skeletal structure of corallites is porites like, with every elongate septa which occasionally fused. Coenosteum ridges are very prominent and form a sinuous pattern over branches surfaces. Grey or green with pale coenosteum ridges.

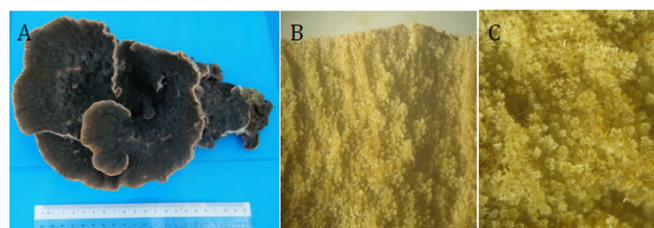
**Material examined:** Sha Aw (KK0057-0059)

**Local distribution:** Sha Aw

**Geographical distribution:** Indo-China Region, Japan (Veron 2000).

***Montipora floweri* Wells, 1954.**(Figure 8 A-8C)

**References:** Veron and Wallace, 1984: 24, fig. 29-34; Veron, 2000:



**Figure 8A-8C** *Montipora floweri* Wells: A) Corallum; B) Margin of Corallum; and, C) Pappillae.

**Type locality:** Marshall Is. (Veron and Wallace 1984)

**Daignostic characters:** The corallum consist of sub-massive corollas which have their surfaces covered with irregular fused tuberculate. Septa are in two complete cycles of non-tapered spines, up to 3/4R and

1/2R. Primary septa may become thickened in some corallites. The reticulum is medium-coarse and is covered with spinules which may be highly elaborated.

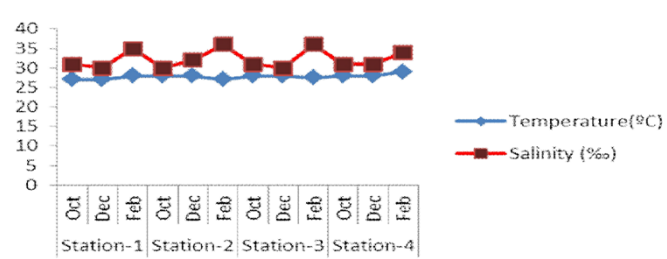
**Material examined:** The Hnit Tan (KK0231-0235)

**Local distribution:** The Hnit Tan

**Geographical distribution:** Marshall Islands (Veron and Wallace 1984) (Table 1) (Figure 9).

**Table 1** The composition of corals species of the Genus *Montipora* occurred from four stations during the present study

Sr. No.	Species Name	Station 1	Station 2	Station 3	Station 4
1	<i>Montipora aequituberculata</i>	+	-	-	+
2	<i>Montipora digitata</i>	-	-	+	-
3	<i>Montipora foliosa</i>	+	+	-	-
4	<i>Montipora flabellate</i>	+	-	-	+
5	<i>Montipora patula</i>	-	-	+	-
6	<i>Montipora porites</i>	+	+	-	-
7	<i>Montipora floweri</i>	-	-	-	+
	Total	4	2	2	3



**Figure 9** Bimonthly measurements of temperature and salinity from four stations during the present study periods

## Discussion

The present study was conducted at four stations of Myeik Coastal Waters (Thayawthadangi Kyun and its adjacent islands). Seven coral species of *Montipora* of the family Acroporidae under Scleractinia were recorded in the present study area. The occurrence of corals species differed insignificantly from one station to each other. *M. digitata*, *M. patula* and *M. floweri* were recorded to be rare throughout the

study period. A comparison of the environmental parameters such as temperature, salinity and transparency showed different at each station throughout the field study. According to the study, the temperature, salinity and transparency ranged from 27-29°C, 30-36‰ and 4.8-5.6m respectively. War War Soe<sup>5</sup> and War War Soe and Htay Aung<sup>6</sup> observed 3 species of *Montipora* from Thayawthadangyi Kyun where temperature range was 27.5-30.5°C and salinity range was 30-34‰. In the present study, 7 species were recorded. The temperature range was 27-29°C and salinity range was 30-36‰. The environmental parameter was insignificantly different. So, the species composition insignificantly differed between the present study and the previous study. Similarity, Cherry Aung<sup>7</sup> described 3 species of *Montipora* from Myanmar Coastal Regions especially Rakhine, Ayeyarwaddy and Tanintharyi Coastal Region. Moreover, Cherry Aung<sup>8</sup> also described forty-five species of *Montipora*, under Family Acroporidae recorded from 24 islands of Myeik Archipelago Waters. In the present study, only seven species recorded from Thayawthadangyi Kyun and its adjacent islands. The coral growth occurs optimally when water temperature are 25°C to 29°C and can only tolerate a few degrees less than this range. And corals also need water salinity high, especially 35‰ and they prefer water of 40‰ salinity such as occurs in the Red Sea (Robin, Petron and Rives, 1987). In the present study, temperature range 27-29°C and salinity range 30-36‰ were also found similarly. According to the field study period, *Montipora* was recorded to be less than other coral species especially *Acropora*, *Favia*, *Favites* etc.<sup>9</sup>

## Conclusion

According to present study, some *Montipora* species occurred in Myeik Coastal Region. Corals help many marine species for nursery ground and shelters from many natural damage and local people. So, if coral species were existed long term, many marine species were abundantly in the future. These results will be benefit for marine fisheries, economic and health for the local populations in the future. It is expected that the present study will be valuable to be used as based line data for future studies.

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## Conflicts of interest

Author does not have any conflicts of interest.

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