

Identity of *Montipora angulata* (Lamarck, 1816) (Scleractinia, Acroporidae)

Keiichi Nomura*¹, Andrew H. Baird², and Go Suzuki³

¹Sabiura Marine Park Research Station, 1157 Arita, Kushimoto, Wakayama 649–3514, Japan

²College of Science and Engineering, James Cook University, 1 University Drive, Townsville, Queensland, 4811, Australia

³Yaeyama Station, Fisheries Technology Research Institute, 148 Fukaiota, Ishigaki City, Okinawa 907–0451, Japan

* Corresponding author: K. Nomura E-mail: alpheus.nomura@nifty.com

Communicated by Frederic Sinniger (Associate Editors-in-Chief)

Received: 8 March 2024, Accepted: 20 August 2024

Published online: 12 December 2024

Abstract *Montipora angulata* (Lamarck, 1816) is one of the oldest known species in the genus, but the original description is very brief and not illustrated, so the identity of this species remains uncertain. Here, we clarify the morphological features and variation of *M. angulata* by redescribing the species from the type material and specimens collected from Japan. Furthermore, we review the taxonomic status of related species in the previous literature and conclude that *Montipora rigida* Verrill, 1866, *Montipora contorta* Nemenzo & Montecillo, 1981 and *Montipora porites* Veron, 2000 are junior synonyms of *M. angulata*. *M. angulata sensu* Veron & Wallace (1984) is reidentified as *Montipora mollis* Bernard, 1897 and *Montipora venosa sensu* Shirai & Sano (1985), *Montipora digitata sensu* Uchida & Fukuda (1989) and Kameda et al. (2013) and *Montipora altasepta sensu* Nishihira & Veron (1995) and Veron (2000) are reidentified as *M. angulata*. In addition, *Montipora ramosa* Bernard, 1897, *Montipora libera* Bernard, 1897, *Montipora rotunda* Bernard, 1897, *Montipora cocosensis* Vaughan, 1918 and *Montipora fossae* Crossland, 1952, which were considered to be junior synonyms of *M. angulata* by Veron and Wallace (1984), are here considered different species from *M. angulata*.

Keywords *Montipora angulata*, Scleractinia, Acroporidae, species identity

Introduction

Montipora angulata (Lamarck, 1816) is one of the oldest known species in the genus, but the original description is very brief and not illustrated. Incidentally, the original description in Latin reads as follows: *P. ramis contortis, lobatis, compressis, angulatis; stellis in fossulis immersis: margine denticulis scabro*. Bernard (1897) redescribed *M. angulata* based on the type specimen and focused on the following distinctive features: a corallum composed of short explanate leaves with flattened base, both leaves and base have angular margins; corallite walls and/or collines are well-developed and sharply raised between the corallites. However, no illustrations were provided with this redescription and only the type specimen was examined. Therefore, even after more than 100 years, considerable uncertainty remains about the

morphological characters that define this species. For example, specimens identified as *M. angulata* by Veron & Wallace (1984) do not match the original description of Lamarck (1816) or the redescription of Bernard (1897). In particular, the branches are neither flattened nor angular on their margins and the collines are not distinct. Similarly, specimens identified as *M. angulata* by Nishihira & Veron (1995) and Veron (2000) differ from Lamarck's or Bernard's definition of the species in that they lack flattened branches. Furthermore, it is difficult to find essential morphological differences between *Montipora rigida* Verrill, 1866, *Montipora porites* Veron, 2000 and *M. angulata*. In this study, we reexamined the type material of *M. angulata* and redescribed the species using numerous Japanese specimens, to clarify the morphological boundaries of the species. We also review the taxonomic

positions of species related to *M. angulata* in previously published literature.

In addition, this study is based on morphological analysis. However, we understand that the taxonomy of the *Montipora* cannot be resolved by traditional morphological classification alone. Therefore, we also have attempted molecular analysis of the genus, but have so far obtained unsatisfactory results (see also van Oppen et al. 2004). Hence, we plan to revisit the taxonomic position of *M. angulata* when sufficient molecular data are available.

Material and method

According to Bernard (1897), the name-bearing type material of *Montipora angulata* is composed of five fragments. He assumes that the fragment numbered 256a was referred to by Lamarck (1816) in his original description. We were able to ascertain the existence of two fragments including 256a at the Museum National d'Histoire Naturelle, and here designate 256a as the lectotype for the purpose of fixing the type. Then we redescribed the species based on the lectotype and specimens collected from various localities in Japan. We also examined previously published literature and the following type specimens related to *M. angulata* to clarify the taxonomic position of each species: *Montipora rigida* Verrill, 1866, *Montipora ramosa* Bernard, 1897, *Montipora libera* Bernard, 1897, *Montipora rotunda* Bernard, 1897, *Montipora mollis* Bernard, 1897, *Montipora cocosensis* Vaughan, 1918 and *Montipora fossae* Crossland, 1952.

The abbreviations of institutions depositing specimens are as follows: British Museum Natural History, United Kingdom (BMNH: now Natural History Museum), Museum National d'Histoire Naturelle, France (MNHN), Sabiura Marine Park Research Station, Japan (SMP), United States National Museum, United States of America (USNM: now National Museum of Natural History). The terminology for *Montipora* morphology is based on Nomura (2021) and Nomura et al. (2023). Measurements for each part are as follows: calice diameter is the maximum distance between inner walls of the calice measured through the center of the calice, and approximately 10 calices of the largest size-class in the specimen were selected for measurement (excluding abnormally

large individuals produced during intra-tentacular budding). Directive septa were treated separately from other primary septa. The length of the septa was expressed as a ratio of the calice radius (R) and the longest septa near the calice opening. The size of the mesh (circular or oval hole) on the surface of the coenosteum was expressed in terms of its short diameter. The length of the spinules was measured by selecting the 5 longest spinules on the specimen.

Taxonomic account

Family Acroporidae Verrill, 1901

Genus *Montipora* Blainville, 1830

***Montipora angulata* (Lamarck, 1816)**

[Japanese name: Kubomi-komonsango]

(Figs. 1–3)

Porites angulata Lamarck, 1816: 271 [Océan austral (Southern Ocean)].

Montipora rigida Verrill, 1866: 26 [Bonin (Ogasawara) Islands].

Montipora angulata: Bernard 1897: 63; Nishihira & Veron 1995: 63, 1 skeleton fig.; Veron 2000: vol. 1, 127, fig. 4, 1 skeleton fig.

Montipora contorta Nemenzo & Montecillo, 1981: 120, figs. 1, 2 [Arangasa Islet, Surigao del Sur Province, Philippines].

Montipora venosa: Shirai & Sano 1985: 216, fig. 25.

Montipora digitata: Uchida & Fukuda 1989: 201, 2 figs.; Kameda, Mezaki & Sugihara 2013: 68, 2 figs.

Montipora altasepta: Nishihira & Veron 1995: 65 (part), lower fig; Veron 2000: 153 (part), fig. 4; Kameda, Mezaki & Sugihara 2013: 67, 2 figs.

Montipora porites Veron, 2000: vol. 1, 162, figs. 1–4, 1 skeleton fig. [not designated]; 2002: 27, figs. 42–46; Nomura 2017: 114, fig. 1 (10), A–F; Nomura & Suzuki 2017: 30, fig. 86; Yokochi et al. 2019: 43; Kajiwara et al. 2020: 77

not *Montipora angulata*: Veron & Wallace 1984: 75, figs. 185–193 (= *Montipora mollis* Bernard, 1897).

Material examined

Type material. Lectotype, MNHN-IK-2014-1560 (256a), Southern Ocean.

Other materials. SMP-HC 1953, Nanatsuyama

(29°50'34"N, 129°53'53"E), Nakanoshima Island, Tokara Islands, northern Ryukyus, Japan, depth 10 m, 5 July 2010. SMP-HC 2570, Ueno (24°42'59"N, 125°19'53"E), Miyakojima Island, Miyako Islands, southern Ryukyus, Japan, depth 5 m, 5 March 2014. SMP-HC 2783, 2785, South of Ifu (24°59'41"N, 125°15'11"E), Yabiji Reef, Miyako Islands, Japan, depth 2 m, 26 Oct. 2014. SMP-HC 2662, Sabazaki (24°20'51"N, 123°41'14"E), Amitori Bay, Iriomotejima Island, Yaeyama Islands, southern Ryukyus, Japan, depth 15 m, 2 July 2014. SMP-HC 2883, Nagura Bay (24°24'38"N, 124°06'23"E), Ishigakijima Island, Yaeyama Islands, depth 3–5 m, 25 May 2015. SMP-HC 2056, 2058, Shimobishi (24°18'10"N, 124°02'07"E), Sekisei Lagoon, Yaeyama Islands, depth 3 m, 30 Oct. 1998. SMP-HC 2057, Urabishi (24°16'05"N, 124°01'37"E), north-east of Kuroshima Island, Yaeyama Islands, depth 5 m, 26 March 1999. SMP-HC 2058, front of light house (24°13'01"N, 124°00'26"E), Kuroshima Island, moat, depth 5 m, 27 Oct. 1998. SMP-HC 2050H, Nakamoto (24°13'46"N, 123°59'51"E), Kuroshima Island, moat, depth 2 m, Apr. 1999. SMP-HC 3385, 3387, 3388, 3389, Obana Bay (27°67'96"N, 142°12'79"E), Mukojima Island, Mukojima Group, Ogasawara Islands, Japan, depth 5–6 m, 24 Sep. 2016. SMP-HC 3425, 3427, Miyasohama (27°06'19"N, 142°11'41"E), Chichijima Island, Ogasawara Islands, Japan, depth 3–4 m, 08 Feb. 2017. SMP-HC 3124, Wakihama (26°38'11"N, 142°05'28"E), Hahajima Island, Hahajima Group, Ogasawara Islands, Japan, depth 2 m, 15 Feb. 2016.

Comparative specimens. *Montipora rigida* Verrill, 1866: holotype, USNM 386, Bonin Islands, Japan. *Montipora ramosa* Bernard, 1897: holotype, BMNH 1888-11-25-5, Gulf of Manaar, Indian Ocean. *Montipora rotunda* Bernard, 1897: holotype, BMNH 1892-12-1-9, Palm Island, Great Barrier Reef. *Montipora libera* Bernard, 1897: holotype, BMNH 1897-3-9-201, Torres Straits, off northern Australia. *Montipora mollis* Bernard, 1897: syntype, BMNH 1892-12-1-4, Palm Island, Great Barrier Reef; syntype, BMNH 1892-12-1-257, Warrior Island, Great Barrier Reef. *Montipora turgescens* Bernard, 1897: syntype, BMNH 1892-12-1-2, Green Island, Great Barrier Reef; syntype, BMNH 1992-12-1-272, Capricorn Island, Great Barrier Reef. *Montipora*

fossae Crossland, 1952: syntype, BMNH, 1934-5-14-195, Great Barrier Reef; syntype, BMNH, 1934-5-14-282, Great Barrier Reef. *Montipora porites* Veron, 2000: lectotype, MSI-3010-CO, Palawan Islands, Philippines.

Redescription

Colonies arborescent, usually bush-shaped with encrusting or short plate base (Figs. 2AG). Base often absent or hardly developed secondary (Figs. 2F, 3AFG). Branching up to tertiary, main and side branches fused irregularly, branches often developed in fan shape (Figs. 2FG, 3E). Main and side branches flattened (Figs. 1AE, 2BCFGH) or cylindrical (Fig. 3ACFG), flattened branches formed by fused cylindrical branches. Terminal branches usually short and vary in shape, tapered or truncated, rounded or flattened (Figs. 1AE, 2BCFG, 3ACFG). Maximum size of colony up to 80 cm in major axis, 40 cm in height. Branches up to 20 cm in length and 5 cm in basal width. Terminal branches average 10 mm in length and 5 mm in width.

Coenostial surface of corallum without papillae. Most corallites with distinct corallite walls, but sometimes incomplete and height uneven (Figs. 1BF, 2BD, 3BDH). Degree of development of corallite walls variable depending on corallites or corallum (Figs. 1AE, 2BCH, 3ACG). Small tubercles (Fig. 2DE) and verrucae also formed during formation of corallite walls, but verrucae rarer than small tubercles. Corallite walls often fused together to forming collines, which usually short and irregular (Figs. 2D, 3BH), but sometimes formed longitudinal lines and angular margins on lateral sides of branch (Figs. 1B, 2H). Small tubercles average 0.6 mm in short diameter and 0.8 mm in height. Collines average 0.7 mm in width and 1.1 mm in height.

Corallites distributed in one or several lines within valleys circumscribed by collines (Figs. 1BCGH, 2BDH, 3BDH). Corallites rather densely distributed with interval of approximately one corallite (Figs. 1BH, 2BDH, 3BDH). Corallites usually immersed in coenosteum, basically directed vertically (Figs. 1BC, 2BDH, 3BDH), but often slightly inclined toward branch tip on terminal branches rarely with lower lip-shaped corallite wall (Fig. 1H). Calices diameter average 0.9 (range 0.6–1.0) mm, corallite size medium within the genus. Degree of septal

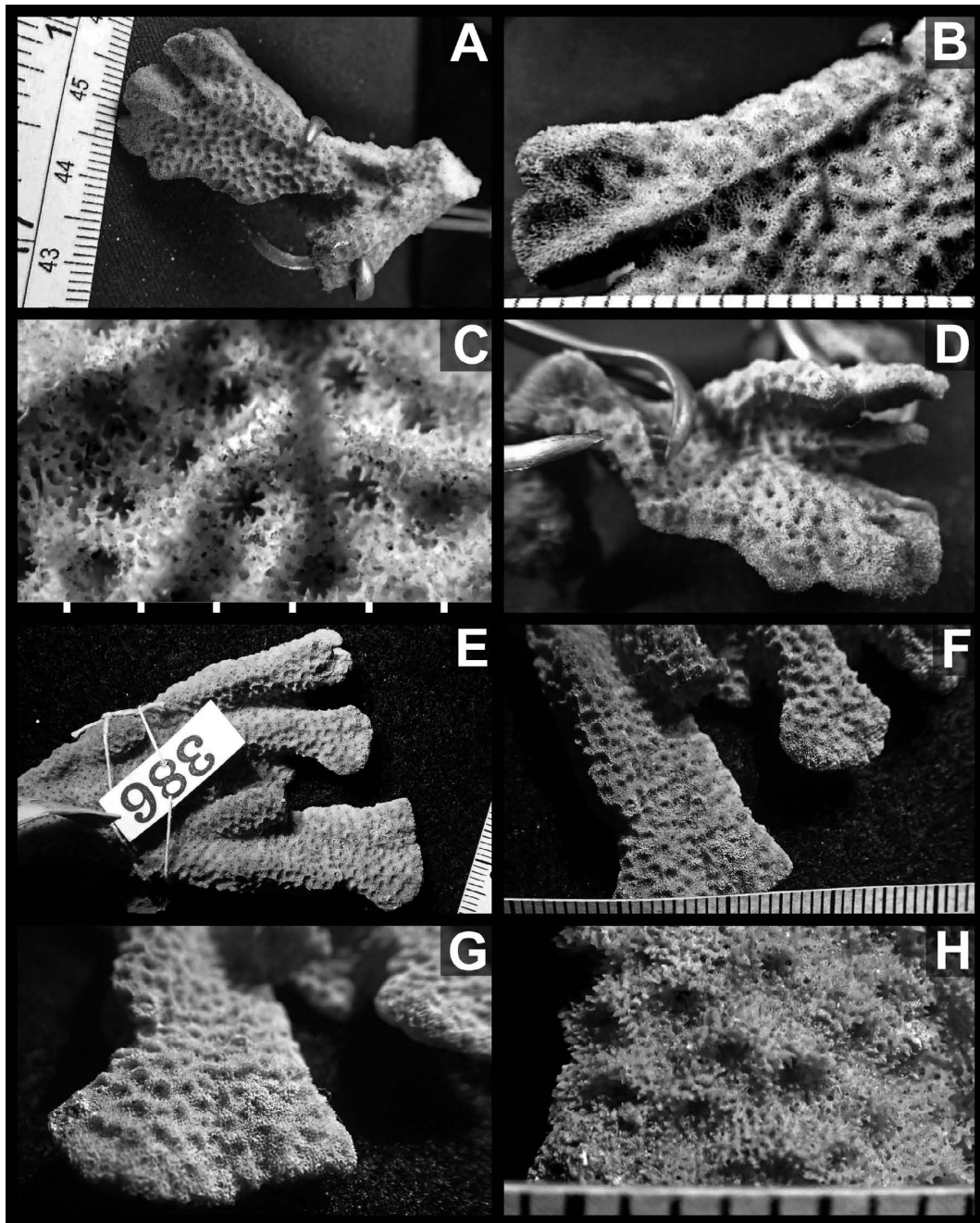


Fig. 1 *Montipora angulata* (Lamarck, 1816).

A–D, syntype of *M. angulata*, MNHN-IK-2014-1560 (256a), southern Ocean: A, B, corallum, front view; C, same, corallites and surroundings; D, corallum, side view. E–H, holotype of *Montipora rigida* Verrill, 1866, USNM 386, Bonin Islands, Japan: E–G, corallum, front view; H, same, corallites and surroundings. Scale marks: 1 mm.

development variable depending on corallites or corallum, usually irregular and incomplete (Figs. 1C, 2D, 3BDH), vertically aligned, columellae weakly developed. Directives plate or semi-plate shaped, exserted above calice opening, average 0.8 (range 0.5–1.0) R long. Primaries serrated or semi-plate shaped, slightly exserted,

average 0.6 (range 0.4–0.8) R long. Secondaries sometimes absent or rudimentary, average 0.3 R long. Theca distinct, rather broad ring shaped, usually not exserted above coenosteum surface (Figs. 1C, 2DE, 3BDH). Coenosteum surface porous, sometimes reticulate, and consisting of meshes and frames (Fig. 3E). Meshes circu-

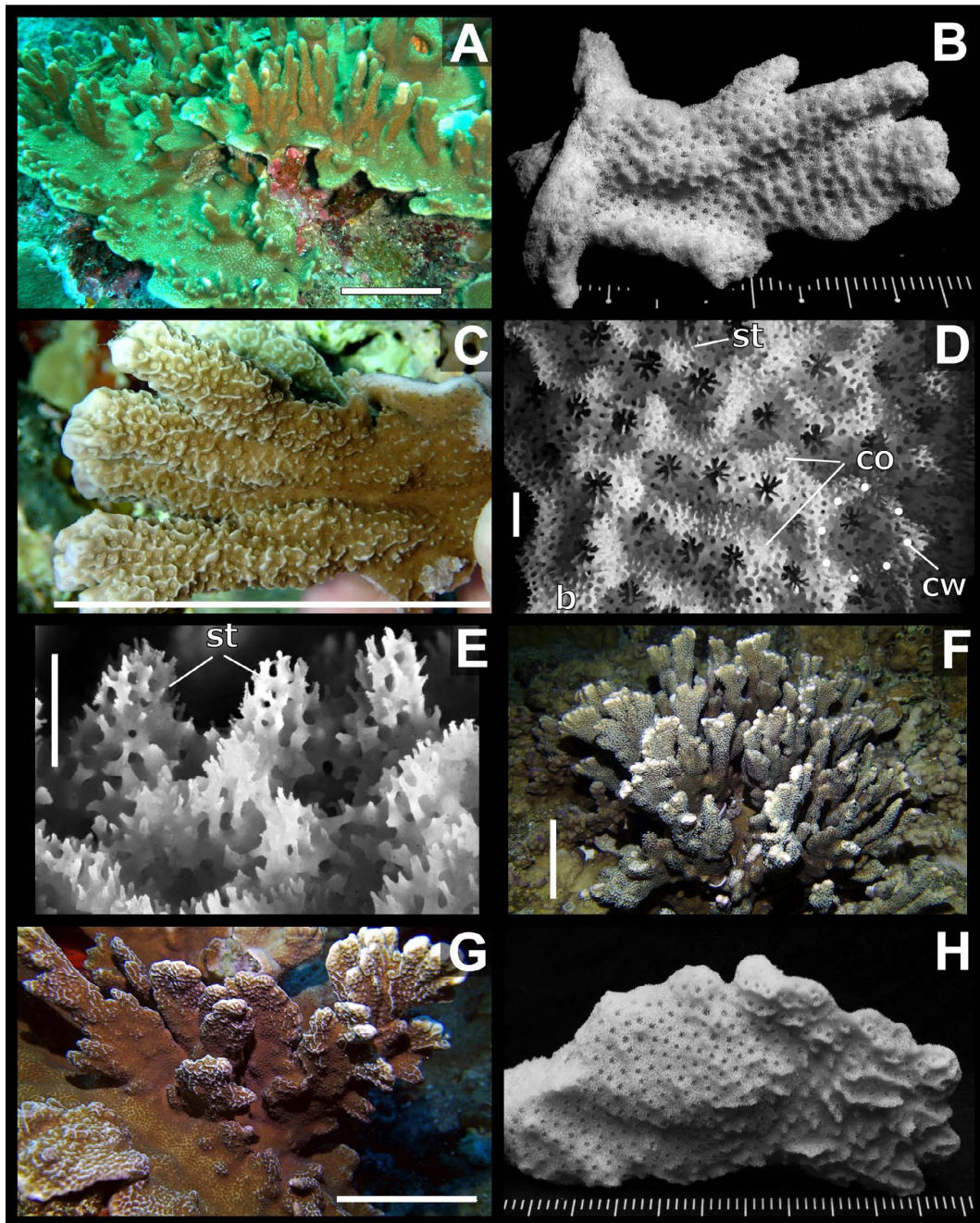


Fig. 2 *Montipora angulata* (Lamarck, 1816). Flattened branch type.

A, B, SMP-HC 1953, Nakanoshima Island, Tokara Islands, depth 10 m: A, colony; B, corallum (branch). C-E, SMP-HC 2783, Yabiji Reef, Miyako Islands, depth 2 m: C, colony (branch); D, corallum (branch), corallites and surroundings, small tubercule (st), corallite wall (cw), colline (co); E, same, small tubercule (st). F, SMP-HC 3385, colony, Mukojima Island, Ogasawara Islands, depth 6 m. G, H, SMP-HC 3389, Mukojima Island, depth 6 m: G, colony; H, corallum (branch). Scale marks: 1 mm. Scale bars: A, C, F, G, 5 cm; D, E, 1 mm.

lar or elliptical, average 0.15 mm in short diameter, narrower or wider than frames (Figs. 1C, 2DE, 3BDEH). Spinules short within corallite walls, long on corallite walls and collines with approximately 0.25 mm long, needle or rod shaped with blunt tip, weakly or not granu-

lated (Figs. 1C, 2DE, 3BDEH). Corallum under plate base with weakly developed epitheca. Coenosteum without small projections, surfaces smooth, corallites rather sparsely distributed, small, calice diameter average 0.6 mm.

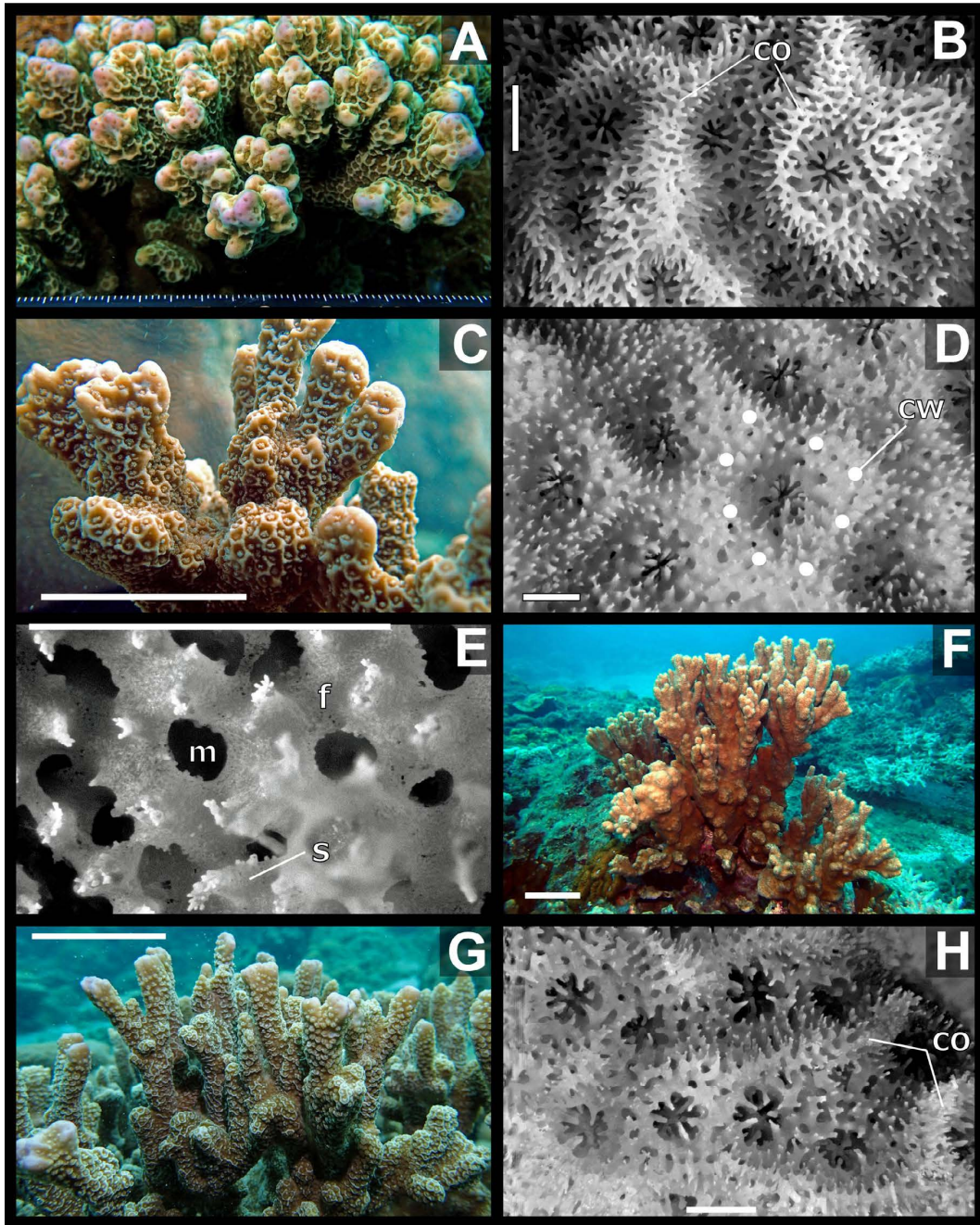


Fig. 3 *Montipora angulata* (Lamarck, 1816). Cylindrical branch type.

A, B, SMP-HC 2570, Miyakojima Island, Miyako Islands, depth 5 m: A, colony; B, corallum (branch), corallites and surroundings, colline (co). C-E, SMP-HC 3124, Hahajima Island, Ogasawara Islands, depth 2 m: C, colony; D, corallum (branch), corallites and surroundings, corallite wall (cw); E, same, surface of coenosteum, frame (f), mesh (m), spinule (s). F, SMP-HC 3388, colony, Mukojima Island, Ogasawara Islands, depth 6 m. G, H, SMP-HC 3425, Chichijima Island, Ogasawara Islands, depth 4 m: F, colony; G, corallum (branch), corallites and surroundings, colline (co). Scale marks: 1 mm. Scale bars: C, F, G, 5 cm; B, D, E, H, 1 mm.

Color in life

Coenosarc brown, pale brown, pale yellowish brown or pale greenish brown, usually upper margins of small projections and branch tips brightly colored (Figs.

2ACFG, 3ACFG).

Distribution

This species is known from Tokara Islands, Miyako

Islands, Yaeyama Islands, and Ogasawara Islands in Japan, Indonesia, Papua New Guinea, Philippines and French Polynesia in the Indo-Pacific. The type locality is recorded as “l’Ocean austral” (Southern Ocean), however, Lamarck (1816) states that the specimen was collected by Péron et le Sueur which means it was collected on the Baudin Expedition to the Indian Ocean, most probably in north-Western Australia (see discussion in Juskiewicz et al. 2022).

Remarks

The detailed morphology and morphological variations of *Montipora angulata* were elaborated using the type material and abundant specimens collected from Japan. In particular, the flat and angular branches which were regarded as the most significant characters of *M. angulata* were confirmed as one of many morphotypes of this species, however, they are not very useful for defining the species. This species is distinguished from other species of the same genus by the following characteristics: colonies are mainly arborescent, branches are cylindrical (circular or oval in cross section) or flattened (almost square in cross section); coenosteum lacks papillae but has distinct corallite walls and collines; corallites immersed, distributed within corallite walls or between collines, one to several line up within them.

Considering these characteristics, we reexamined the taxonomic position of related species to *M. angulata* in the previously published literature. *Montipora rigida* Verrill, 1866 was described as a new species from the Ogasawara Islands in Japan. The description was brief and lacked an illustration, and the location of the holotype was unknown (it was not in the National Museum of Natural History where most of the samples of the US Exploring expedition are stored). Veron and Wallace (1984) include *M. rigida* in a list of the nominal species in the genus, however, they made no decision on its taxonomic status and it is currently listed as *taxon inquirendum* at WoRMS (Hoeksema & Cairns 2024). We located the holotype of *M. rigida* (Fig. 1E–H) at Yale University and compared it with the type material and Japanese specimens of *M. angulata*. These Japanese specimens includes specimens from the Ogasawara Islands, which is the type locality of *M. rigida*. The holotype of

M. rigida is a part of the branch of the corallum with 7.5 cm long, both the lateral and terminal branches are flat, the sides are slightly angular and somewhat twisted, corallite walls and collines are well developed (Fig. 1E–H). These features are well within the range of variation of our redescription of *M. angulata*. Therefore, *M. rigida* is formally assessed as a junior synonym of *M. angulata*.

Montipora contorta Nemenzo & Montecillo, 1981 was described from the Philippines, the original description and figures showed no essential difference when compared to *M. angulata*. Therefore, *M. contorta* is formally assessed as a junior synonym of *M. angulata*. Veron and Hodgson (1989) regarded *M. contorta* as a junior synonym of *Montipora confusa* Nemenzo, 1967. However, *M. angulata* and *M. confusa* are different species, because *M. confusa* has more developed longitudinal collines than *M. angulata*, and the corallite walls are almost incomplete.

Montipora porites, which was described as a new species by Veron (2000), did not have a type designated in the original description, rather a holotype was later designated by Veron (2002). However, the holotype can only be designated in the original description (ICZN 1999: Article 72.3). The nominal taxa established by Veron (2000) have been validated under the Third Edition of the International Code of Zoological Nomenclature (ICZN 2011), but the type has remained not designated. The original description of *M. porites* is based on multiple specimens, including a sketch of one skeleton and field images of colonies from three different localities (Veron 2000). In other words, these specimens can be considered syntypes. Therefore, for the purpose of fixing the type, the specimen (MSI-3010-CO), Palawan Islands, Philippines for which Veron (2002) attempted the holotype designation is designated as the lectotype in this study. The lectotype of *M. porites* is a part of the branch of a corallum which is 8.3 cm long, both the lateral and terminal branches are cylindrical, the sides are not angular, corallite walls and collines are well developed. These characteristics are within the range of morphological variation of the above redescription of *M. angulata*. Therefore, *M. porites* is formally assessed as a junior synonym of *M. angulata*.

Veron and Wallace (1984) considered the following

species to be junior synonyms of *M. angulata*; *Montipora ramosa* Bernard, 1897, *Montipora libera* Bernard, 1897, *Montipora rotunda* Bernard, 1897, *Montipora cocosensis* Vaughan, 1918 and *Montipora fossae* Crossland, 1952. As a result of comparing these type specimens or illustrations of the original description with the above-mentioned redescription of *M. angulata*, it is concluded that these type specimens are all different to *M. angulata* because collines are lacking or poorly developed. Incidentally, *M. ramosa*, *M. rotunda* and *M. fossae* are very similar to *Montipora digitata* (Dana, 1846), and *M. libera* and *M. cocosensis* to *Montipora turgescens* Bernard, 1897.

Montipora angulata of Nishihira and Veron (1995) and Veron (2000) has distinct corallite walls and collines but lacks neither flattened branches nor angular margins, however, these characteristics are within the range of variation of the redescription of *M. angulata*. On the other hand, *M. angulata* identified by Veron and Wallace (1984) and part of *M. angulata* (0246_BW02) by Veron et al. (2024) are reidentified as *M. mollis* because they lack distinct corallite walls and collines of characteristic of *M. angulata*. *Montipora venosa* of Shirai & Sano (1985), *M. digitata* of Uchida & Fukuda (1989) and Kameda et al. (2013) and *M. altasepta* of Nishihira and Veron (1995: lower fig.) and Veron (2000: lower 2 figs.) were reidentified as *M. angulata* on the basis of their distinct corallite walls and collines.

Acknowledgements

We would like to thank Andrew Cabrinovic and Miranda Lowe at the Natural History Museum in London, Francesca Benzoni, Magalie Castellin and Pierre Lozuet at the Museum National d'Histoire Naturelle and Eric Lazo-Wasem at the Yale University for access to the type materials. We also thank Kenji Kajiwara, Tadashi Kimura, Tetsuro Sasaki and Hiroyuki Yokochi for their cooperation in collecting the samples, Bert Hoeksema for his advance in synonymy and Teruaki Nishikawa for his advice in construing the International Code of Zoological Nomenclature. We sincerely thank Frederic Sinniger and the two reviewers for the qualified corrections and helpful comments.

Compliance

Specimens were collected under special permissions from each Prefecture in Japan, the details are follows: the Yaeyama Islands in 1998–1999, conducted by the Yaeyama Marine Park Research Station with permission from Okinawa Prefecture (No. 10–13, 11–13); the Tokara Islands in 2011, conducted by the Japanese Society for Coral Taxonomy with permission from Kagoshima Prefecture (No. 42–4); the Yaeyama Islands in 2014, conducted by the Japanese Society for Coral Taxonomy with permission from Okinawa Prefecture (No. 26–30); the Miyako Islands in 2014–2015, conducted by the Miyakojima City Board of Education with permission from Okinawa Prefecture (No. 25–54, 26–30); the Ogasawara Islands in 2016–2017, conducted by the Tokyo Ogasawara Branch Office with permission from Tokyo Metropolitan Government (No. 27–45, 28–37, 28–52).

References

- Bernard HM (1897) The genus *Montipora*, The genus *Anacropora*. Catalogue of the Madreporarian Corals in the British Museum (Natural History) 3: 1–192
- Crossland C (1952) Madreporaria, Hydrocorallinae, *Heliopora* and *Tubipora*. Scientific Report Great Barrier Reef Expedition 1928–29, VI (3), 85–257
- Dana JD (1846–1849) Zoophytes. United States Exploring Expedition during the years 1838–1842. Lea and Blanchard, Philadelphia 7, pp 1–740
- Hoeksema BW, Cairns S (2024) World List of Scleractinia. *Montipora angulata* (Lamarck, 1816). Accessed through: World Register of Marine Species at: <https://www.marinespecies.org/aphia.php?p=taxdetails&id=287691> on 2024–08–16
- ICZN, International Commission on Zoological Nomenclature (1999) International Code of Zoological Nomenclature. Fourth Edition. Adopted by the International Union of Biological Sciences. The International Trust for Zoological Nomenclature, in association with The Natural History Museum, London
- ICZN (2011) Coral taxon names published in ‘Corals of the world’ by J.E.N. Veron (2000): potential availability confirmed under Article 86.1.2. Bull Zool Nomencl 68: 162–166
- Juszkiewicz DJ, White NE, Stolarski J, Benzoni F, Arrigoni R, Hoeksema BW, Wilson NG, Bunce M, Richards ZT

- (2022) Phylogeography of recent *Plesiastrea* (Scleractinia: Plesiastreidae) based on an integrated taxonomic approach. *Mol Phylogenet Evol* 172: 107469
- Kajiwara K, Kitano Y, Kimura T, Zayasu Y, Shimada G, Shimoike K, Sugihara K, Suzuki G, Tachikawa H, Dewa N, Nomura K, Matsumoto H, Yamamoto H, Yokochi H (2020) List of reef-building corals in the Miyako Islands. In: Miyakojima City History Compilation Committee, (ed). *Miyakojima City History 3, Nature Edition 1, nature in the Miyakojima Islands, supplement: 73–91*. Miyakojima City Board of Education (in Japanese)
- Kameda K, Mezaki T, Sugihara K (2013) Catalog of the reef-building corals deposited in the Kuroshima Research Station. Second edition. Kuroshima Research Station, Japan (in Japanese) http://www.kuroshima.org/_src/411/catalog_of_corals_in_kuroshima_ii.pdf?v=1651899119047
- Lamarck JB de (1816) *Histoire naturelle des animaux sans vertèbres*. Tome second. Paris. Verdière
- Nemenzo F, Montecillo E (1981) Four new Scleractinia species from Arangas Islet (Surigao del Sur Province, Philippines). *The Philippine Scientist* 22: 157–167
- Nishihira M & Veron JEN (1995) *Hermatypic corals of Japan*. Kaiyusha, Tokyo (in Japanese). pp 1–439
- Nomura K (2017) Zooxanthellate scleractinian corals of Ogasawara Islands. Report on the 2016 Ogasawara Islands Marine Ecological Survey, pp 95–179. Tokyo Ogasawara Branch Office (in Japanese)
- Nomura K, Baird AH, Suzuki G (2023) First record in 135 years since the original description of a zooxanthellate scleractinian coral, *Montipora stalagmites* Ortmann, 1888 collected from Minami-Daitojima Island (Okinawa, Japan), and the *Montipora* fauna of this Island. *Fauna Ryukyuna* 68: 41–51
- Nomura K, Suzuki G (2017) Identification of *Montipora* (39). Introduction of the Japanese species 27. Arborescent type *Montipora* without papillae 2. *Marine Pavilion* 46: 30–31 (in Japanese) <http://www.kushimoto.co.jp/marinepavilion/data/46-4.pdf>
- Shirai S, Sano Y (1985) The report of investigations on the coral reefs around the sea of Ishigaki Island, Okinawa, Japan. Institute for Development of Pacific Natural Resources (in Japanese)
- Uchida H, Fukuda T (1989) Corals. In: Marine Parks Center, (ed). *Field guide to marine organism in Okinawa 9: 1–240*. Southern Press, Okinawa (in Japanese)
- van Oppen MJH, Koolmees EM, Veron JEN (2004) Patterns of evolution in the scleractinian coral genus *Montipora* (Acroporidae). *Mar Biol* 144: 9–18
- Vaughan TW (1918) Some shallow-water corals from Murray Island (Australia), Cocos-Keeling Island, and Fanning Island. *Papers from the Department of Marine Biology of the Carnegie Institution of Washington* 9 (213): 49–234
- Veron C, Stafford-Smith M, De Vantier L, Turak E (2024). *Montipora angulata* (Lamarck, 1816). Accessed through: Corals of the World at: http://www.coralsoftheworld.org/species_factsheets/species_factsheet_summary/montipora-angulata/ on 2024-08-16
- Veron JEN (2000) *Corals of the World*. Volume 1. Australian Institute of Marine Science and CRR, Queensland, Townsville, Australia
- Veron JEN (2002) New species described in Corals of the World. Australian Institute of Marine Science Monograph Series 11: 1–209. Townsville, Australia
- Veron JEN, Hodgson G (1989) Annotated checklist of the hermatypic corals of the Philippines. *Pac Sci* 43: 234–287
- Veron JEN, Wallace CC (1984) Scleractinia of Eastern Australia, Part V. Family Acroporidae. Australian Institute of Marine Science Monograph Series 6: 1–485
- Verrill AE (1866) Synopsis of the polyps and corals of the North Pacific Exploring Expedition, under Commodore C. Ringgold and Capt. John Rodgers, U.S.N., from 1853 to 1856. Collected by Dr. Wm. Stimpson, Naturalist to the Expedition. With descriptions of some additional species from the west coast of North America. Part III. Madreporaria. *Communications of the Essex Institute, Salem*. 5 (3): 17–50
- Yokochi H, Shimoike K, Kajiwara K, Nomura K, Kitano Y, Matsumoto H, Shimada G, Sugihara K, Suzuki G, Tachikawa H, Yamamoto H, Zayasu Y, Kimura T, Kono H (2019) A preliminary report on hermatypic corals of Amitori Bay, Iriomote-jima, Ryukyu Islands, Japan. Study review of Iriomote Island 2018, ORRC, Tokai University, pp 36–69 (in Japanese)