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Annotated checklist of *Scleractinia* specimens collection from Marine Ecosystem Research Centre (EKOMAR) Repository, Universiti Kebangsaan Malaysia

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ABSTRACT

There is a significant lack of current information on Scleractinian species diversity in the waters of Peninsular Malaysia, as the last species checklist was published over a decade ago. This study provides an extensive checklist of Scleractinian species found on twelve islands of Sultan Iskandar Marine Park (SIMP), Malaysia. From the survey, a total of 67 species, 34 genera, and 14 families of Scleractinian species have been sampled and recorded from off the coast of Mersing, Peninsular Malaysia. Altogether, this collection produced twelve distributional records, of which over 200 Scleractinian fragments were obtained by digitizing original data reports and 102 are based on physical repository vouchers curated by the Marine Ecosystem Research Centre (EKOMAR) in Mersing, Johor. Detailed information on species, habitat, localities, images of the specimens, distribution records and bibliographical references are provided for each species. The Family Acroporidae were recorded as the most dominant in SIMP followed by Merulinidae and Fungiidae. *Acropora*, *Isopora* and *Montipora* are the three highest genera found in SIMP.

Keyword: new Scleractinian, Sultan Iskandar Marine Park, Acroporidae, Johor, Malaysia

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INTRODUCTION

Reef-building scleractininan corals deposit calcium carbonate skeletons and play an important functional role in reef-building (Gattuso *et al*., 2014). The reefs they build perform important socio-economic roles such as coastal protection, fisheries but also in economic and pharmaceutical supplies (Pendleton *et al*., 2016). Coral reefs have been providing their services to more than 200 million of people in the Coral Triangle Initiative (CTI) area, and it is identified by scientists that this particular area recorded the highest marine biodiversity (Lee *et al*., 2022; Daud and Mushidi, 2015; Cros *et al*., 2014). The Coral Triangle Initiative (CTI) area is located in South-east Asia and Pacific which include Malaysia (East–Sabah region), the Philippines, Indonesia, Timor Leste, Papua New Guinea, and the Solomon Islands (Lee *et al*., 2022; Cros *et al*., 2014). It is also acknowledged that coral diversity is highest in East Malaysia (Sabah and Sarawak) with more than 612 species and over 480 species in Peninsular Malaysia (Daud and Mushidi, 2015). There are around 398 Scleractinian species recorded on east coast of Peninsular Malaysia and 248 species in the west coast of Sabah (Khodzori *et al*., 2019). Scleractinian is the superlative dominant reef builder (Shah, 2021). However, an initial inventory of coral species in this region is still lacking. This new dataset presents occurrence data for Scleractinia collected in the Sultan Iskandar Marine Park (SIMP), and it is curated at the Marine Ecosystem Research Centre (EKOMAR-UKM) Repository (Mersing, Johor).

Located at the north-east coast of Johor, Sultan Iskandar Marine Park (SIMP) covers an area of 765.65 km^2 with 13 main islands, namely Pulau Tinggi, Pulau Harimau, Pulau Mensirip, Pulau Besar, Pulau Gual, Pulau Tengah, Pulau Rawa, Pulau Sibu, Pulau Sibu Hujung Pulau Mentigi, Pulau Aur, Pulau Pemanggil, and Pulau Hujung (Figure 1) are adorned by sandy shores, coral reefs, mangroves, mudflats to seagrass, and also open water habitats (Lim *et al*., 2019). The aim of this work was to update the knowledge of Scleratinian inhabits the area of Sultan Iskandar Marine Park (SIMP). The study of reef building corals in the SIMP represented one of the earliest scientific efforts, and the study targeted the first marine biodiversity expeditions of EKOMAR, which started in 2017. One of the primary objectives for this effort was the fact that, at the time of sampling, there was a general paucity of comprehensive and easily accessible coral literature for the region. Therefore, specific sampling efforts were planned to describe the coral reef community structure and establish a baseline for comparability with future research findings.

MATERIAL AND METHODS

The material was collected mainly from Sultan Iskandar Marine Parks (SIMP) that include Pulau Aur, Pulau Besar, Pulau Rawa, Pulau Gual, Pulau Harimau and Pulau Tinggi. The dataset presented here was compiled from vouchers gathered over numerous scientific expeditions conducted in 2017 that had multiple scientific goals and used a variety of sampling methods to examine the physical aspects and also the marine biodiversity of the area (Figure 2).

Since there was practically no previous information on SIMP, EKOMAR initiated line of research on marine biodiversity of SIMP starting from 2007, engaging multiple researchers,

pursued the development of a first characterization of the community structure, on the taxonomic, spatial and ecological aspects for the region. This current research extended the past substantial contributions on the biodiversity of SIMP and its surroundings, notably by Othman and Azman (2007); Lim *et al*. (2010); Gan *et al.* (2010); Azman and Melvin (2011); Lim *et al*. (2012); Azman and Othman (2013); Chew *et al*. (2014); Tan *et al*. (2014, 2015); Lim *et al*. (2015); Chew *et al*. (2016); Lim *et al*. (2017); Tan and Azman (2017, 2018); and Lim *et al*. (2019) on marine crustaceans.

The localities of all studied area were comprised of small bays and islands (Table 1). The coral identification was made based on gross colony morphology, other skeletal, and tissue features based on the information provided by Veron (2000) with reference to Coral Finder Third Edition by Kelley (2021); Al Tawaha *et al*. (2019); Wallace and Wolstenholme, 1998; and Wallace *et al*. (1984, 2001). Nomenclature was updated according to the World Register of Marine Species (WoRMS) 2024). For all 69 species present in the EKOMAR Repository collections, the scleractinian fragments were mounted on gypsum plaster casts with complete label. With regard to the collection, each individual specimen was identified, photographed and catalogued. In addition to the labels, R codes have been included with the collection to facilitate browsing on the coral of the world website. The IUCN conservation status of each identified hard coral species was determined based on information available from the IUCN Red List of Threatened Species (www.iucnredlist.org).

Table 1. List of coordinates of the studied locations.

Localities	Coordinates	Collectors	Depths	Dates
Pulau Aur				
1. Teluk Jawa, Pulau Dayang	2°28.723'N, 104°30.300'E	Wan Lotfi, W.M., Shamsul, B., Norhanim, M.Z.	7.7 m	26 July 2016
2. Teluk Teluran	2° 27.670'N, 104°31.626' E	Wan Lotfi, W.M., Shamsul, B., Norhanim, M.Z.	8.5 m	26 July 2016
3. Teluk Sebukang	2°26.343'N, 104°30.300'E	Wan Lotfi, W.M., Shamsul,B.	8.7 m	27 July 2016
4. Pulau Lang	2° 27.597'N, 104° 29.363'E	Wan Lotfi, W.M., Shamsul,B.	8.7 m	27 July 2016
5. Pulau Pinang	2°26'21.7"N 104°33'00.8"	Wan Lotfi, W.M., Shamsul, B., Norhanim, M.Z	9–14 m	28 July 2016
6. Pulau Besar	2°28.804'N, 103°57.789'E	Azman, B.A.R., Wan Lotfi, W.M., Shamsul, B., Norhanim, M.Z.	8.9 m	26 October 2016
7. Pulau Rawa	2°30'57.5"N 103°58'33.7"E	Azman, B.A.R., Wan Lotfi, W.M., Shamsul, B., Asamuddin A.H.	7–9 m	4 April 2017

8. Pulau Gual	2°32’05.1”N 103°58’12.4”E	Azman, B.A.R., Wan Lotfi, W.M., Shamsul, B., Asamuddin A.H	15.2 m	4 April 2017
9. Pulau Harimau	2°33’28.0”N 103°56’41.0”E	Azman, B.A.R., Wan Lotfi, W.M., Shamsul, B., Asamuddin A.H.	9–15 m	4 April 2017
Pulau Tinggi				
10. Buloh Kasap	2°19.162’N, 104°6.886’E	Azman, B.A.R., Wan Lotfi, W.M., Shamsul, B., Norhanim, M.Z.	14.9 m	1 September 2016
11. Sebirah Kechil	2°18.750’N, 104°05.138’E	Azman, B.A.R., Wan Lotfi, W.M., Shamsul, B., Norhanim, M.Z	5–10m	30 September 2016
12. *Pulau Mentigi*	2°16’19.1”N 104°06’56.7”E	Asamuddin, A.H.	9.4 m	11 August 2017

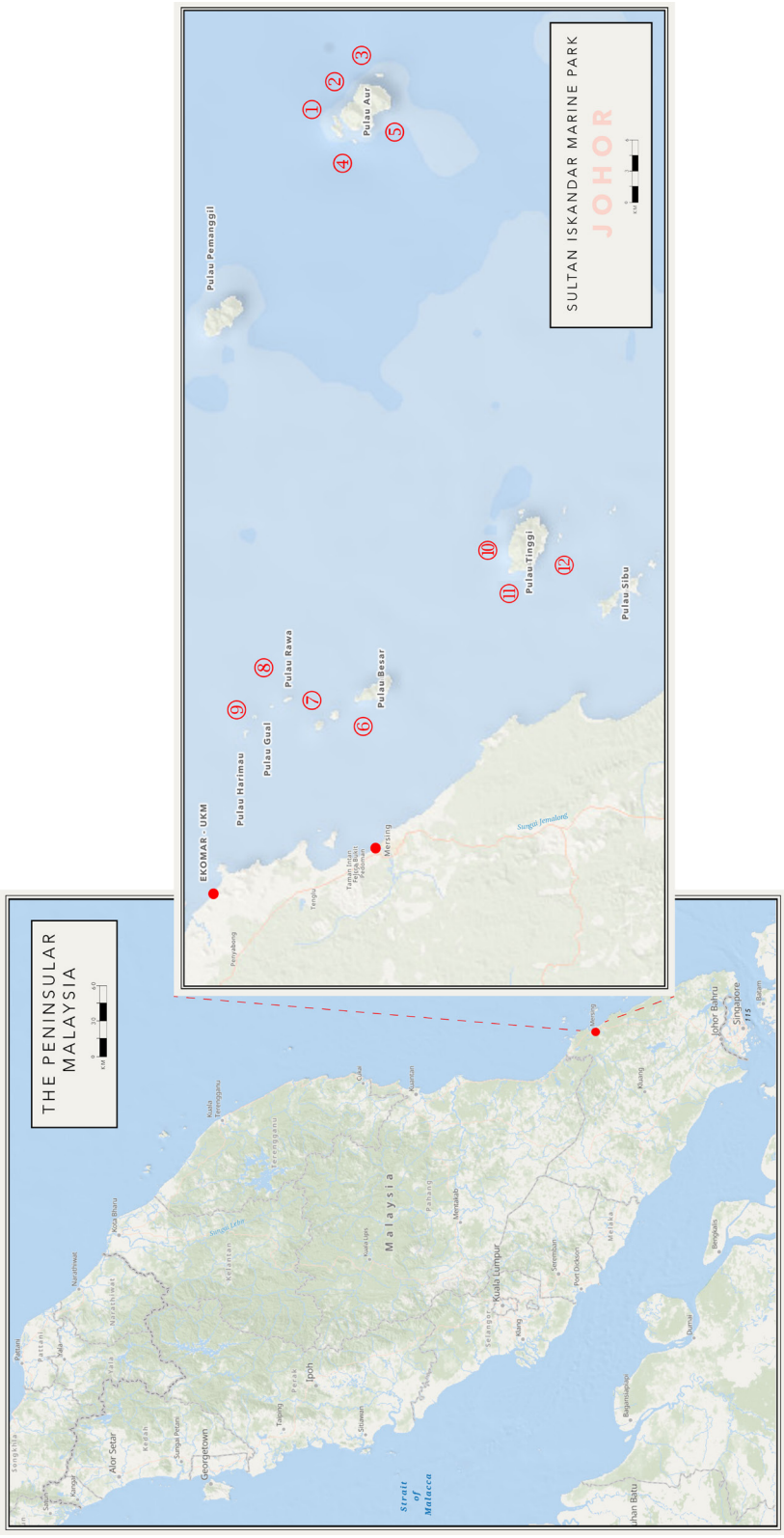

Figure 1. Map of Sultan Iskandar Marine Park (SIMP).

Figure 2. Illustrations of field collection and specimens curation. A) Careful removal of representative hard corals. B) Photos of hard corals were taken along the transect line. C) Scleractinian fragments were mounted on gypsum plaster casts and catalogued. D) Some of the hard coral specimens, which are now stored in the Gallery Room of the EKOMAR-UKM Repository.

RESULTS

Family Acroporidae Verrill, 1902
Genus *Acropora* Oken, 1815

1. *Acropora abrotano*ides (Lamarck, 1816) (Figure 3A–C)

IUCN Red List Status: Endangered (EN).
WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=207083
Island: Pulau Mentigi; Country: Malaysia; State Province: Johor.
UKM ID No.: UKMMZ-113CRLPT.

2. *Acropora aculeus* (Dana, 1846) (Figure 3D–F)

IUCN Red List Status: Endangered (EN).
WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=206991
Island: Pulau Rawa; Country: Malaysia; State Province: Johor.
UKM ID No.: UKMMZ-105CRLPR.

3. *Acropora acuminata* (Verrill, 1864) (Figure 3G–I)

IUCN Red List Status: Endangered (EN).
WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=207020
Island: Pulau Mentigi; Country: Malaysia; State Province: Johor.
UKM ID No.: UKMMZ-114CRLPT.

4. *Acropora cerealis* (Dana, 1846) (Figure 4A–C)

IUCN Red List Status: Endangered (EN).
WoRMS: https://marinespecies.org/aphia.php?p=taxdetails&id=207016
Island: Teluk Sebukang, Pulau Aur and Pulau Mentigi; Country: Malaysia; State Province: Johor.
UKM ID No.: UKMMZ-113CRLPA & UKMMZ-115CRLPT.

5. *Acropora divaricata* (Dana, 1846) (Figure 4D–F)

IUCN Red List Status: Endangered (EN).
WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=207106
Island: Sebirah Kechil, Pulau Tinggi; Country: Malaysia; State Province: Johor.
UKM ID No.: UKMMZ-116CRLPT.

6. *Acropora florida* (Dana, 1846) (Figure 4G–I)

IUCN Red List Status: Endangered (EN).

WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=207058

Island: Pulau Besar; Country: Malaysia; State Province: Johor.

UKM ID No.: UKMMZ-110CRLPB.

7. *Acropora horrida* (Dana, 1846) (Figure 5A–C)

IUCN Red List Status: Endangered (EN).

WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=207006

Island: Teluk Jawa, Pulau Dayang; Country: Malaysia; State Province: Johor.

UKM ID No.: UKMMZ-115CRLPA.

8. *Acropora hyacinthus* (Dana, 1846) (Figure 5D–F)

IUCN Red List Status: Endangered (EN).

WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=207044

Island: Pulau Rawa; Country: Malaysia; State Province: Johor.

UKM ID No.: UKMMZ-108CRLPR.

9. *Acropora latistella* (Brook, 1892) (Figure 5G–I)

IUCN Red List Status: Endangered (EN).

WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=207039

Island: Teluk Jawa, Pulau Dayang; Country: Malaysia; State Province: Johor.

UKM ID No.: UKMMZ-116CRLPA.

10. *Acropora millepora* (Ehrenberg, 1834) (Figure 6A–C)

IUCN Red List Status: Endangered (EN).

WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=207023

Island: Pulau Rawa; Country: Malaysia; State Province: Johor.

UKM ID No.: UKMMZ-120CRLPR.

11. *Acropora muricata* (Linnaeus, 1758) (Figure 6D–F)

IUCN Red List Status: Endangered (EN).

WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=207007

Island: Pulau Lang, Sebirah Kechil Pulau Mentigi; Country: Malaysia; State Province: Johor.

UKM ID No.: UKMMZ-117CRLPA, UKMMZ-118CRLPT, UKMMZ-119CRLP.

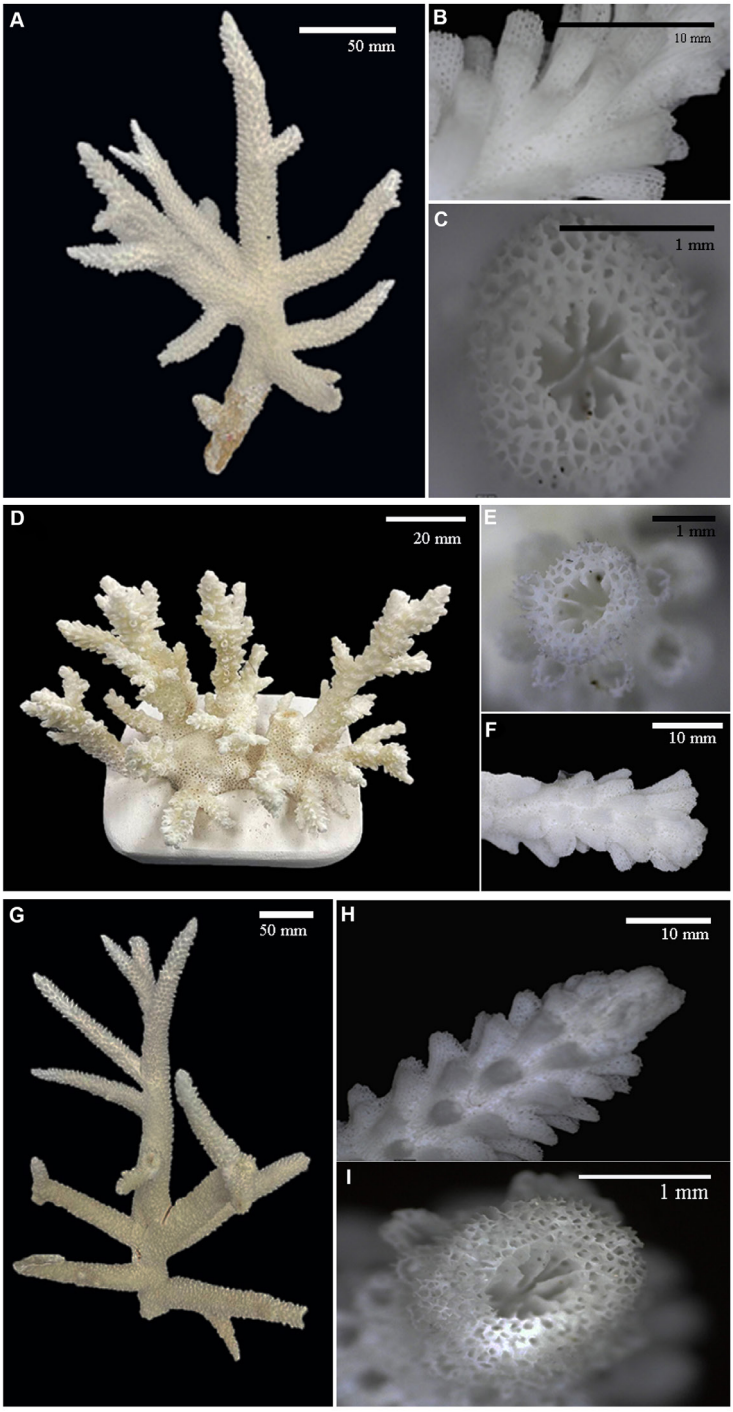

Figure 3. A–C, *Acropora abrotanoides* (Lamarck, 1816); D–F, *Acropora aculeus* (Dana, 1846); G–I, *Acropora acuminata* (Verrill, 1864). A, D, G, Colony fragment; B, E, H, radial corallite; C, F, I, axial corallite.

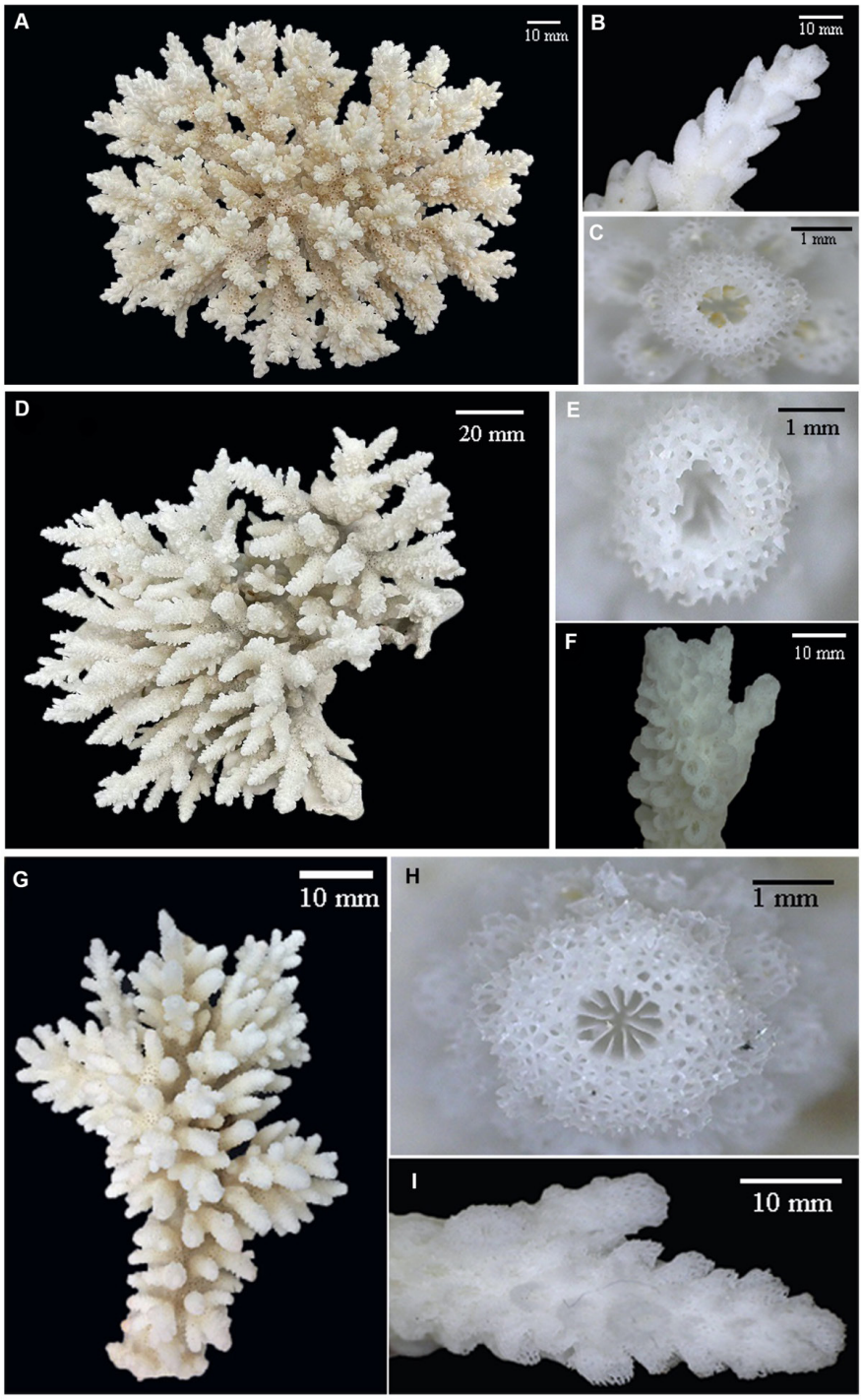

Figure 4. A–C, *Acropora cerealis* (Dana, 1846); D–F, *Acropora divaricata* (Dana, 1846***)***; G–I, *Acropora florida* (Dana, 1846) A, D, G, Colony fragment; B, F, I, Radial corallite; C, E, H; axial corallite.

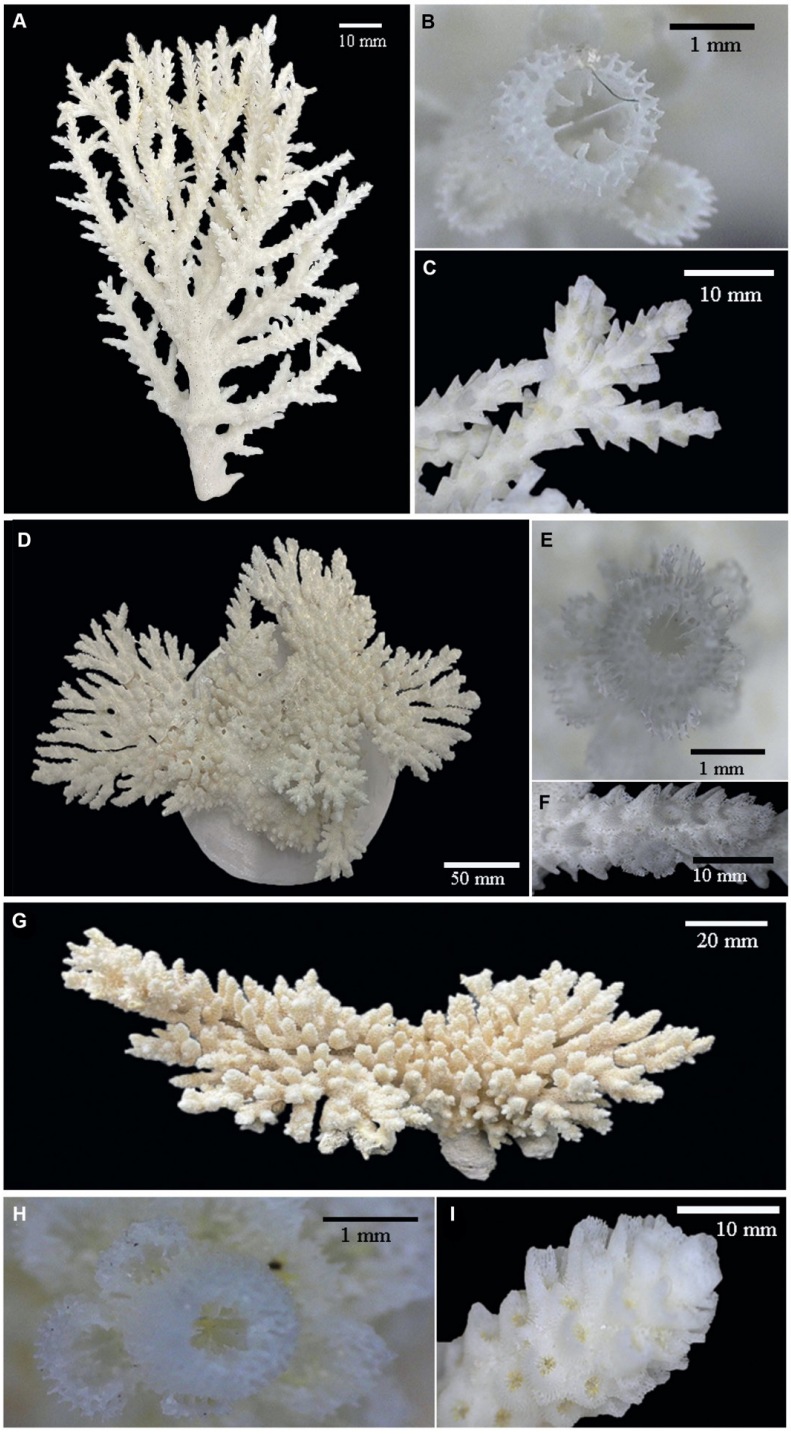

Figure 5. A–C, *Acropora horrida* (Dana, 1846); D–F *Acropora hyacinthus* (Dana, 1846); G–I, *Acropora latistella* (Brook, 1892). A, D, G, colony fragment; B, E, H, axial corallite; C,F,I, radial corallite.

12. ***Acropora nasuta*** **(Dana, 1846)** (Figure 6G–I)

IUCN Red List Status: Endangered (EN).
WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=288217
Island: Pulau Mentigi; Country: Malaysia; State Province: Johor.
UKM ID No.: UKMMZ-120CRLPT.

13. ***Acropora polystoma*** **(Brook,1891)** (Figure 7A–C)

IUCN Red List Status: Endangered (EN).
WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=207050
Island: Pulau Rawa; Country: Malaysia; State Province: Johor.
UKM ID No.: UKMMZ-107CRLPR.

14. ***Acropora robusta*** **(Dana, 1846*)*** (Figure 7D–F)

IUCN Red List Status: Endangered (EN).
WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=207000
Island: Pulau Rawa & Pulau Besar; Country: Malaysia; State Province: Johor.
UKM ID No.: UKMMZ-106CRLPR & UKMMZ-111CRLPB.

15. ***Acropora rudis*** **(Rehberg, 1892)** (Figure 7G–I)

IUCN Red List Status: Endangered (EN).
WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=288241
Island: Teluk Teluran, Pulau Aur; Country: Malaysia; State Province: Johor.
UKM ID No.: UKMMZ-114CRLPA.

16. ***Acropora secale*** **(Studer, 1878)** (Figure 8A–C)

IUCN Red List Status: Endangered (EN).
WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=207080
Island: Buloh Kasap, Pulau Tinggi, Johor; Country: Malaysia; State Province: Johor.
UKM ID No.: UKMMZ-121CRLPT.

17. ***Acropora selago*** **(Studer, 1878)** (Figure 8D–F)

IUCN Red List Status: Endangered (EN).
WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=207040
Island: Pulau Mentigi; Country: Malaysia; State Province: Johor.
UKM ID No.: UKMMZ-117CRLPT.

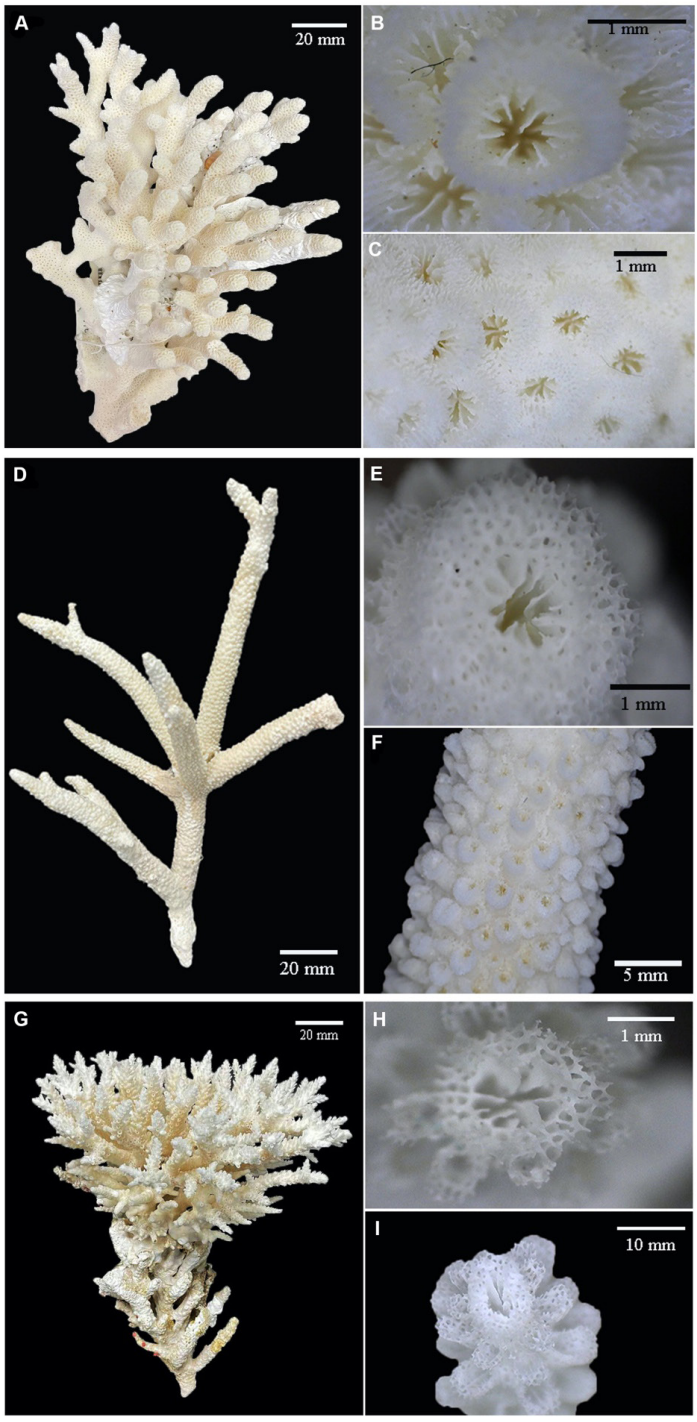

Figure 6. A–C, *Acropora millepora* (Ehrenberg, 1834); D–F, *Acropora muricata* (Linnaeus, 1758); G–I, *Acropora nasuta* (Dana, 1846). A, D, G, colony fragment; B, E, H, axial corallite; C, F, I, radial corallite.

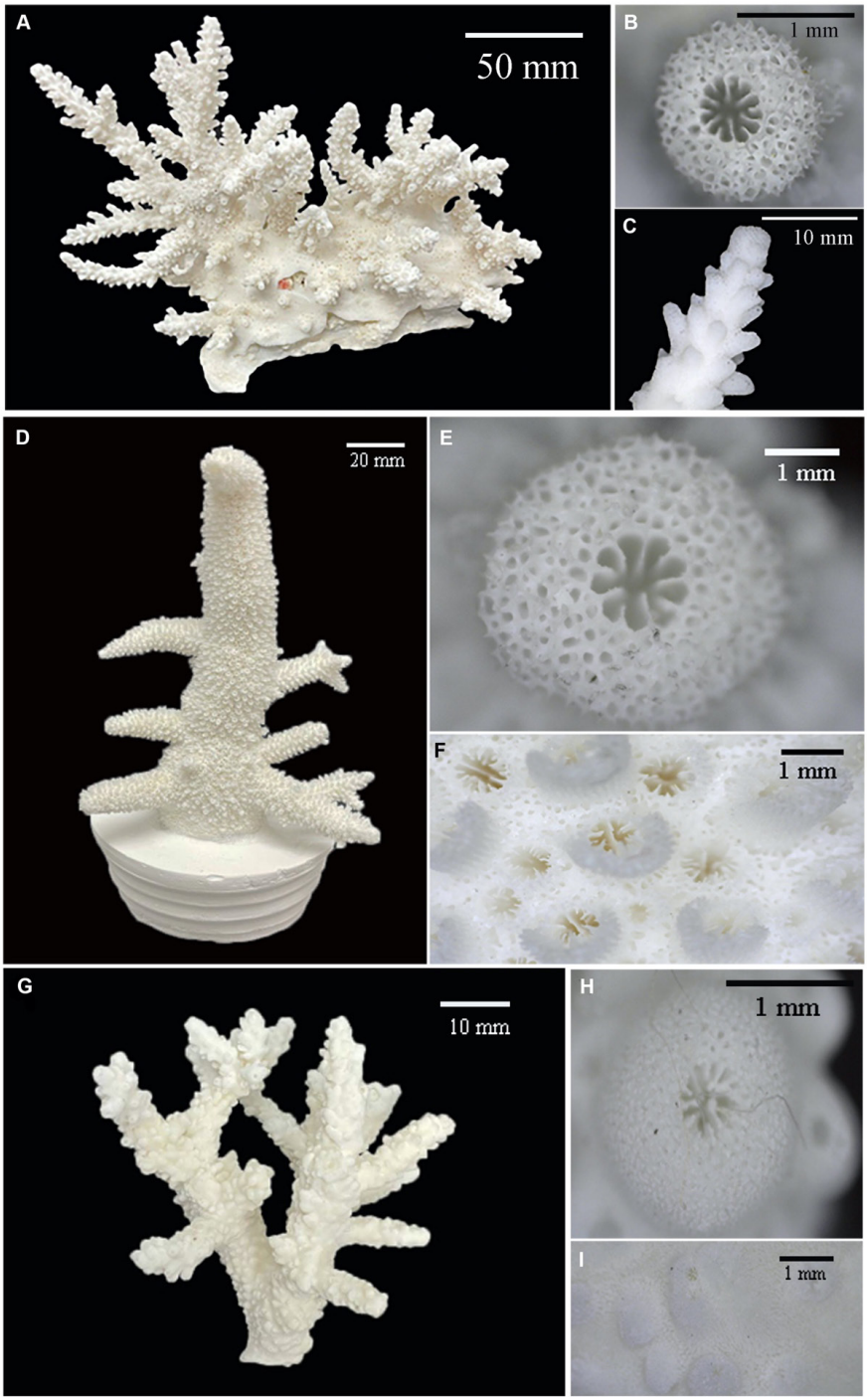

Figure 7. A–C, *Acropora polystoma* (Brook,1891); D–F, *Acropora robusta* (Dana, 1846); G–I, *Acropora rudis* (Rehberg, 1892). A, D, G, colony fragment; B, E, H, axial corallite; C, F, I, radial corallite.

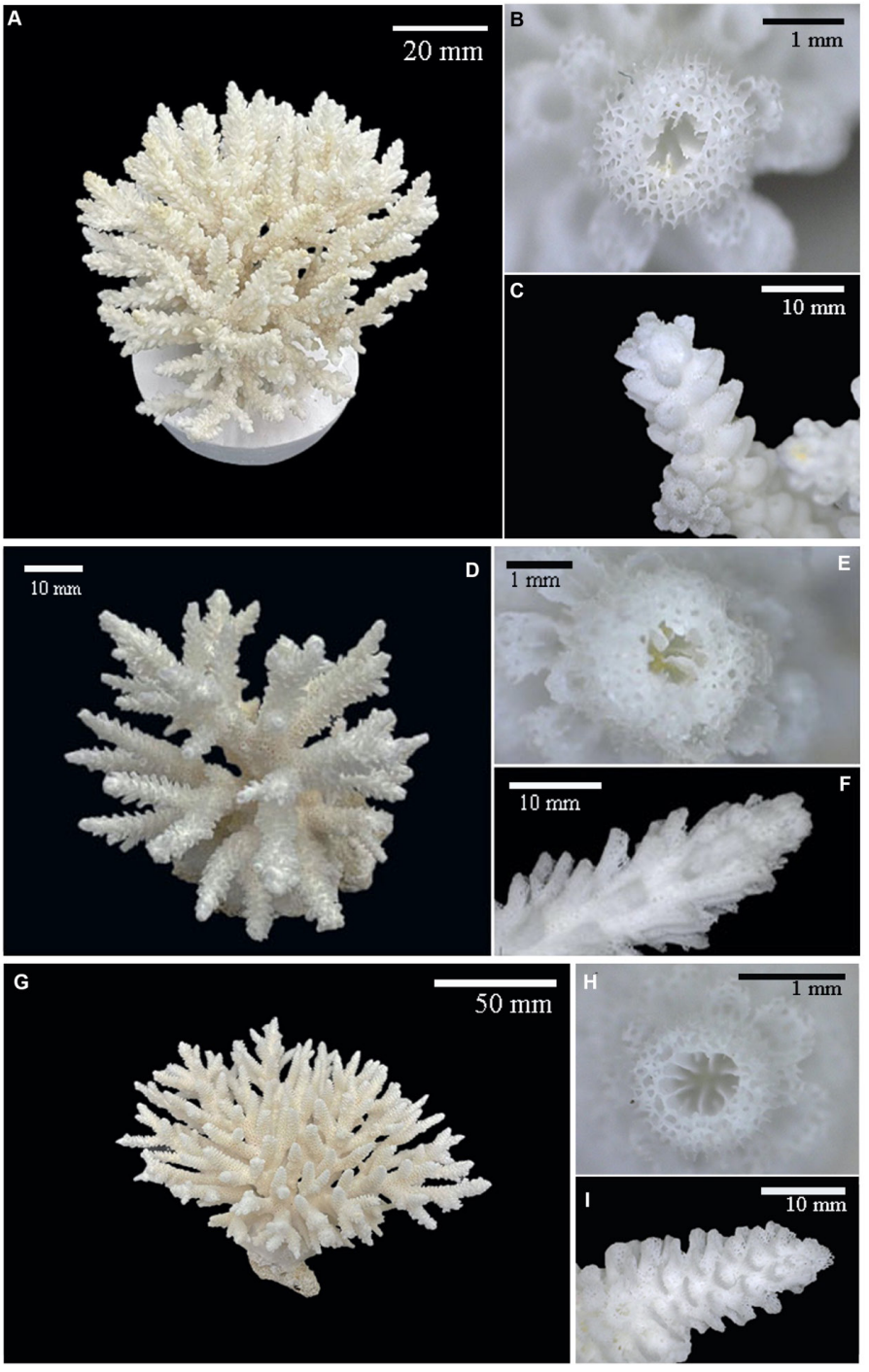

Figure 8. A–C, *Acropora secale* (Studer, 1878); D–F, *Acropora selago* (Studer, 1878); G–I, *Acropora tenuis* (Dana, 1846). A, D, G, colony fragment; B, E, H, axial corallite; C, F, I, radial corallite.

18. *Acropora tenuis* (Dana, 1846) (Figure 8G–I)

IUCN Red List Status: Endangered (EN).

WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=207105

Island: Pulau Mentigi; Country: Malaysia; State Province: Johor.

UKM ID No.: UKMMZ-122CRLPT.

19. *Acropora vermiculata* (Dana, 1846) (Figure 9A–C)

IUCN Red List Status: Endangered (EN).

WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=872426

Island: Pulau Besar; Country: Malaysia; State Province: Johor.

UKM ID No.: UKMMZ-112CRLPB.

Genus *Isopora* Studer, 1878

20. *Isopora palifera* (Lamarck, 1816) (Figure 9D–F)

IUCN Red List Status: Nearly Threatened (NT).

WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=730686

Island: Teluk Jawa, Pulau Dayang; Country: Malaysia; State Province: Johor.

UKM ID No.: UKMMZ-118CRLPA.

Genus *Montipora* Quoy and Gaimard, 1830

21. *Montipora foliosa* (Pallas,1766) (Figure 10A–C)

IUCN Red List Status: Endangered (EN).

WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=207182

Island: Buloh Kasap, Pulau Tinggi; Country: Malaysia; State Province: Johor.

UKM ID No.: UKMMZ-123CRLPT.

22. *Montipora hispida* (Dana, 1846) (Figure 10D–G)

IUCN Red List Status: Endangered (EN).

WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=207164

Island: Pulau Lang, Sebirah Kechil, Pulau Tinggi and Pulau Besar; Country: Malaysia; State Province: Johor.

UKM ID No.: UKMMZ-119CRLPA, UKMMZ-124CRLPT, UKMMZ-113CRLPB.

23. *Montipora turtlensis* Veron and Wallace, 1984 (Figure 10H–J)

IUCN Red List Status: Endangered (EN).

WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=287731

Island: Sebirah Kechil, Pulau Tinggi; Country: Malaysia; State Province: Johor.

UKM ID No.: UKMMZ-125CRLPT.

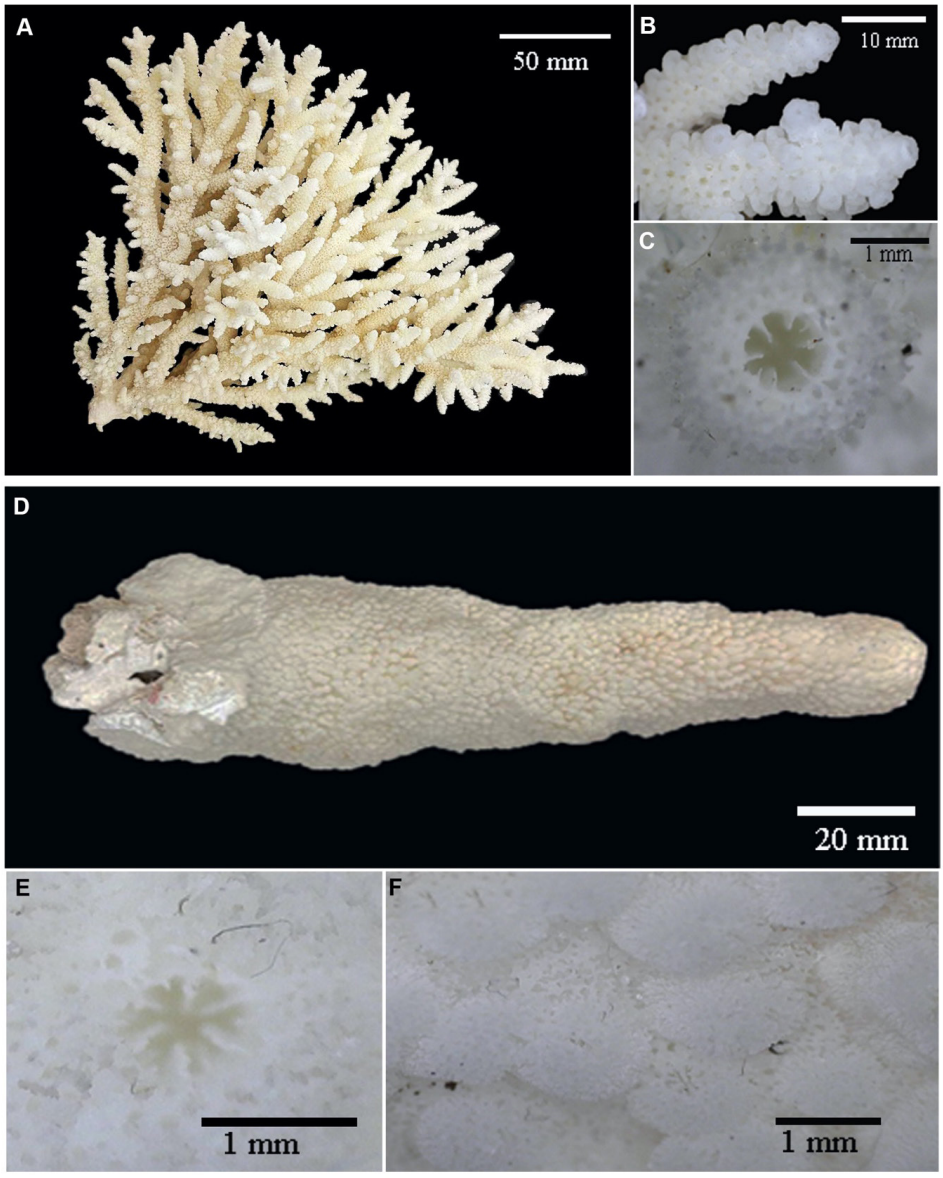

Figure 9. A–C, *Acropora vermiculata* (Dana, 1846); D–F, *Isopora palifera* (Lamarck, 1816). A, D, colony fragment; B, E, axial corallite; C, F, radial corallite.

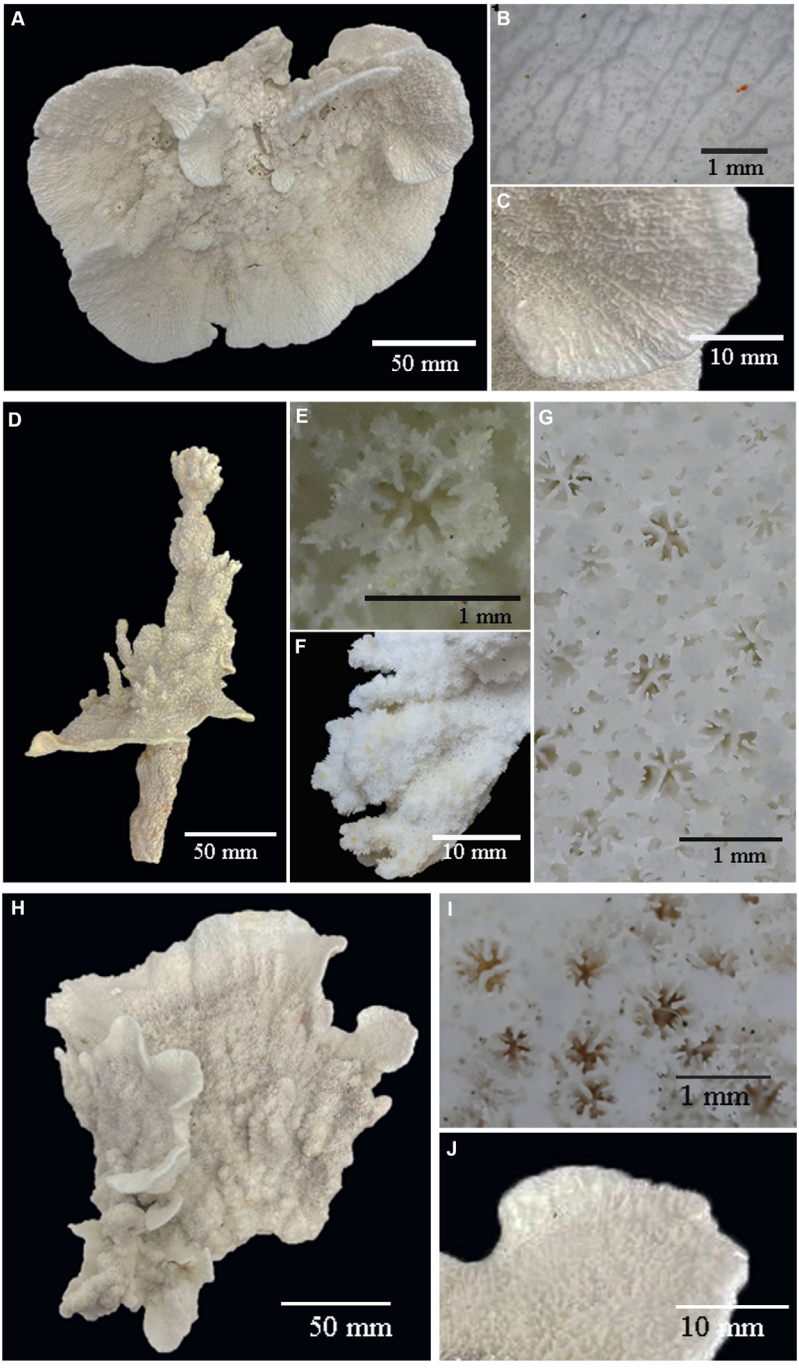

Figure 10. A–C, *Montipora foliosa* (Pallas,1766; D–G, *Montipora hispida* (Dana, 1846); H–J, *Montipora turtlensis* Veron and Wallace, 1984. A, D, H, colony fragment; B, C, E. coenosteum and corallite; E, G, I, corallite; F, branch; J, plate.

Family Agariciidae Gray, 1847
Genus *Pavona* Lamarck, 1801

24. *Pavona bipartita* Dana 1846 (Figure 11A–C)
IUCN Red List Status: Least Concern (LC).
WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=289199
https://www.marinespecies.org/aphia.php?p=taxdetails&id=206614&allchildren=1
Island: Pulau Mentigi; Country: Malaysia; State Province: Johor.
UKM ID No.: UKMMZ-126CRLPT.

25. *Pavona decussata* Dana 1846 (Figure 11D–F)
IUCN Red List Status: Least Concern (LC).
WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=207320
Island: Pulau Rawa; Country: Malaysia; State Province: Johor.
UKM ID No.: UKMMZ-109CRLPR.

Family Coscinaraeidae Benzoni, Arrigoni, Stefani & Stolarski, 2012
Genus *Coscinaraea* Milne Edwards and Haime, 1848

26. *Coscinaraea columna* (Dana, 1846) (Figure 11G–I)
IUCN Red List Status: Least Concern (LC).
WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=207256
Island: Teluk Sebukang, Pulau Aur; Country: Malaysia; State Province: Johor.
UKM ID No.: UKMMZ-120CRLPA.

Family Dendrophyllidae Gray, 1847
Genus *Duncanopsammia* Wells, 1936

27. *Duncanopsammia peltata* (Esper, 1790) (Figure 12A–C)
IUCN Red List Status: Least Concern (LC).
WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=1469809
Island: Buloh Kasap, Pulau Tinggi & Pulau Rawa; Country: Malaysia; State Province: Johor.
UKM ID No.: UKMMZ-127CRLPT & UKMMZ-110CRLPR.

Genus *Turbinaria* Oken, 1815

28. *Turbinaria mesenterina* (Lamarck, 1816) (Figure 12D–F)

IUCN Red List Status: Least Concern (LC).

WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=207511

Island: Buloh Kasap, Pulau Tinggi; Country: Malaysia; State Province: Johor.

UKM ID No.: UKMMZ-128CRLPT.

29. *Turbinaria reniformis* Bernard, 1896 (Figure 12G–I)

IUCN Red List Status: Least Concerned (LC).

WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=207507

Island: Pulau Gual; Country: Malaysia; State Province: Johor.

UKM ID No.: UKMMZ-111CRLPR.

Family Diploastraeidae Chevalier & Beauvais, 1987

Genus *Diploastrea* Matthai, 1914

30. *Diploastrea heliopora* (Lamarck, 1816) (Figure 13A–C)

IUCN Red List Status: Least Concern (LC).

WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=207417

Island: Buloh Kasap, Pulau Tinggi; Country: Malaysia; State Province: Johor.

UKM ID No.: UKMMZ-129CRLPT.

Family Euphyllidae Milne Edwards & Haime, 1857

***Fimbriaphyllia* Veron & Pichon, 1980**

31. *Fimbriaphyllia ancora* (Veron and Pichon, 1980) (Figure 13D–F)

IUCN Red List Status: Vulnerable (VU).

WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=1048073

Island: Pulau Rawa; Country: Malaysia; State Province: Johor.

UKM ID No.: UKMMZ-112CRLPR.

Genus *Galaxea* Oken, 1815

32. *Galaxea astreata* (Lamarck, 1816) (Figure 13G–H)

IUCN Red List Status: Least Concern (LC).

WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=207368

Island: Sebirah Kechil, Pulau Tinggi1& Pulau Mentigi; Country: Malaysia; State Province: Johor.

UKM ID No.: UKMMZ-130CRLPT, UKMMZ-131CRLPT.

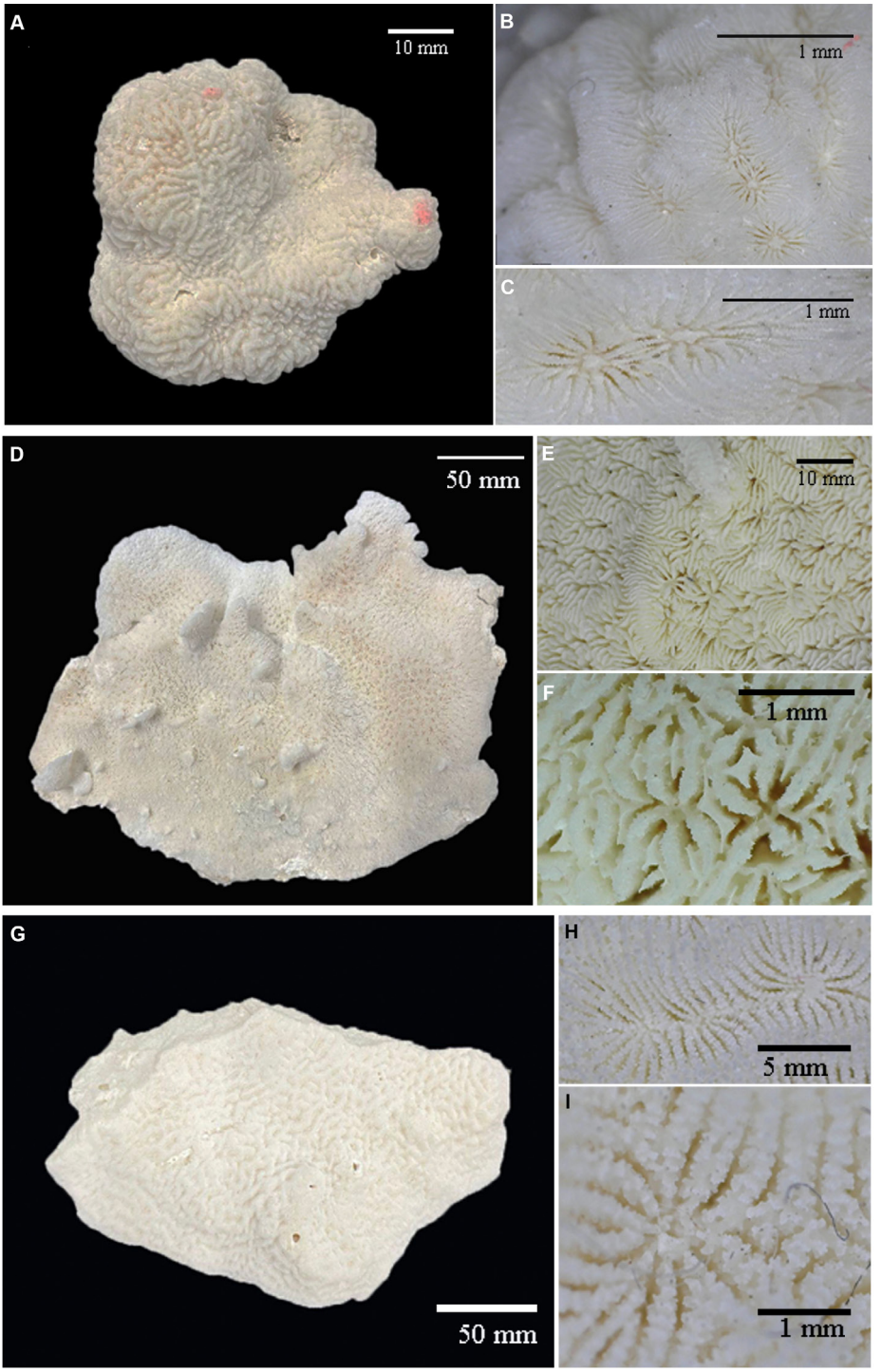

Figure 11. A–C, *Pavona bipartita* Dana 1846; D–F *Pavona decussata* Dana 1846. G–I *Coscinaraea columna* (Dana, 1846). A, D, G, colony fragment; B, C, E, F, H, I, septa–costa between corallite.

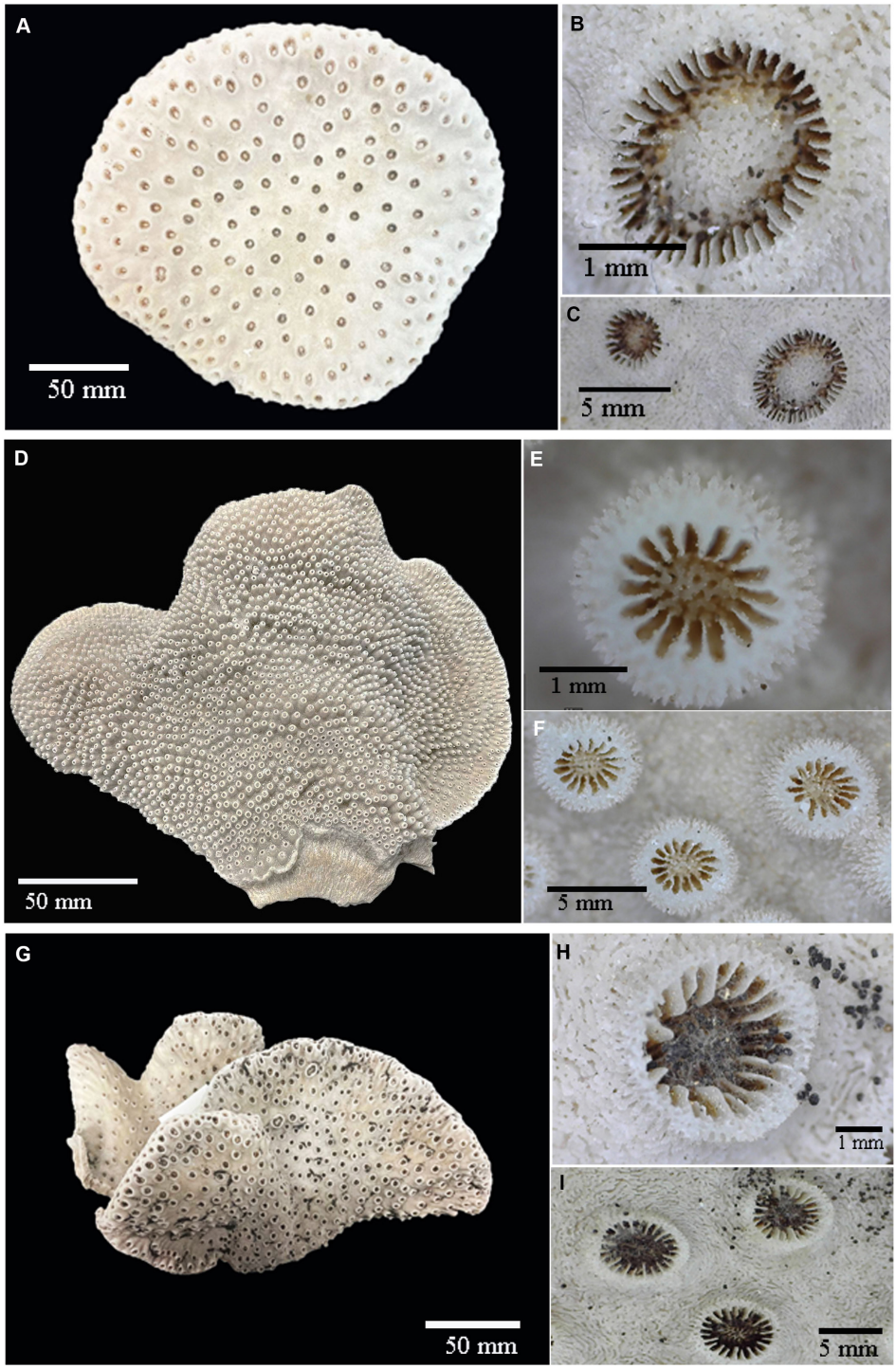

Figure 12. A–C, *Duncanopsammia peltata* (Esper, 1790); D–F, *Turbinaria mesenterina* (Lamarck, 1816); G–I, *Turbinaria reniformis* Bernard, 1896. A, D, G, colony fragment; B, C, E, F, H, I, septa and corallite.

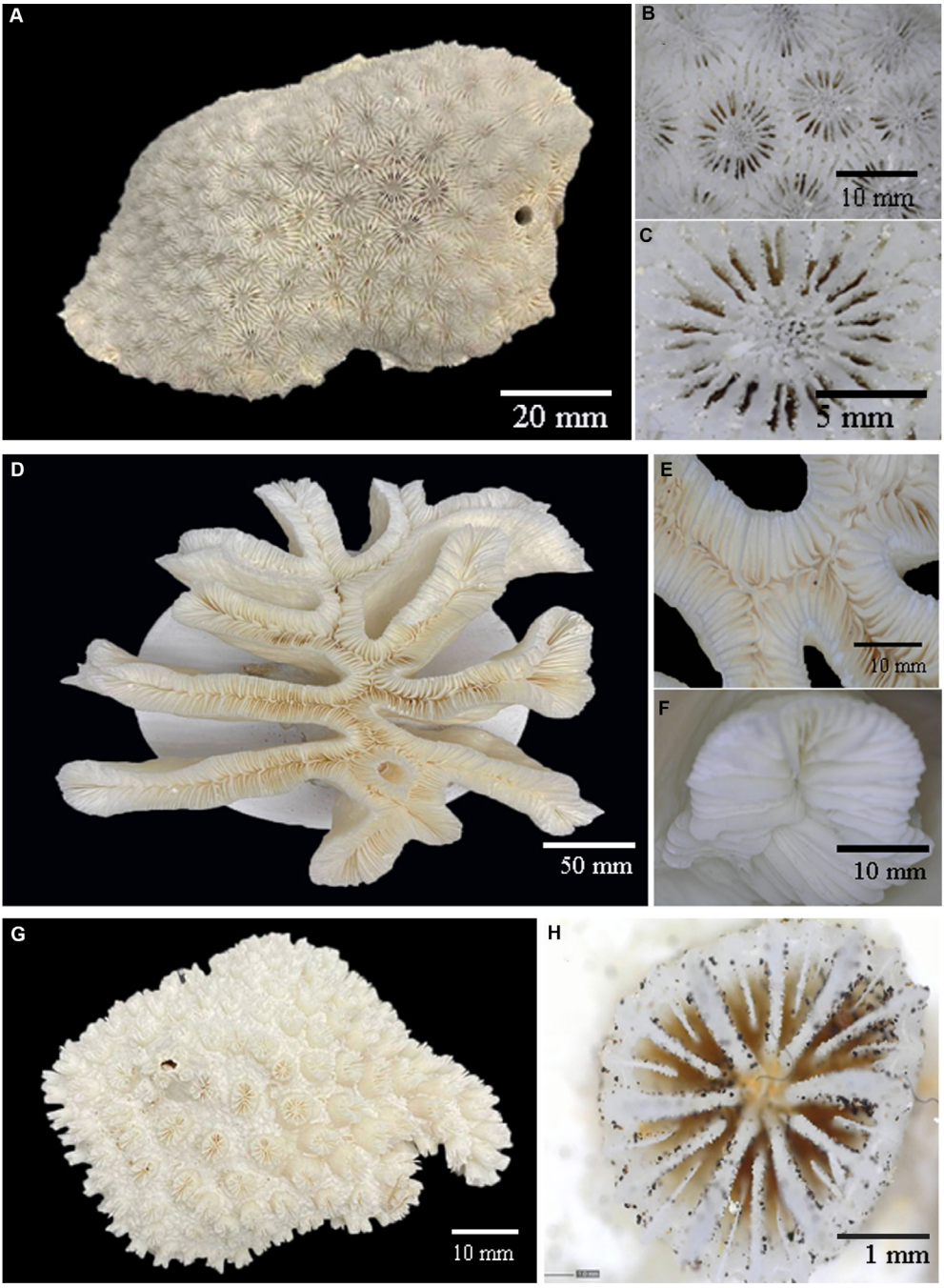

Figure 13. A–C, *Diploastrea heliopora* (Lamarck, 1816); D–F, *Fimbriaphyllia ancora* (Veron and Pichon, 1980); G–H, *Galaxea astreata* (Lamarck, 1816). A, D, G, colony fragment; B, C, E, F, H, septa and corallite.

Family Fungiidae Dana, 1846

Genus *Ctenactis* Verrill, 1864

33. *Ctenactis echinata* (Pallas, 1766) (Figure 14A–C)

IUCN Red List Status: Least Concerned (LC).

WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=216132

Island: Pulau Besar; Country: Malaysia; State Province: Johor.

UKM ID No.: UKMMZ-102CRLPB, UKMMZ-108CRLPB, UKMMZ-114CRLPB.

Genus *Fungia* Lamarck, 1801

34. *Fungia fungites* (Linnaeus, 1758) (Figure 14D–G)

IUCN Red List Status: Least Concern (LC).

WoRMS: https://marinespecies.org/aphia.php?p=taxdetails&id=207350

Island: Sebirah Kechil, Pulau Tinggi & Pulau Mentigi; Country: Malaysia; State Province: Johor.

UKM ID No.: UKMMZ-133CRLPT & UKMMZ-134CRLPT.

Genus *Danafungia* Wells, 1966

35. *Danafungia horrida* (Dana, 1846) (Figure 14H–J)

IUCN Red List Status: Least Concern (LC).

WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=716608

Island: Sebirah Kechil, Pulau Tinggi & Pulau Besar; Country: Malaysia; State Province: Johor.

UKM ID No.: UKMMZ-135CRLPT & UKMMZ-115CRLPB.

Genus *Polyphyllia* Quoy and Gaimard, 1830

36. *Polyphyllia talpina* (Lamarck, 1801) (Figure 15A–F)

IUCN Red List Status: Least Concerned (LC).

WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=211418

Island: Pulau Rawa, Pulau Besar; Country: Malaysia; State Province: Johor.

UKM ID No.: UKMMZ-114CRLPR, UKMMZ-116CRLPB.

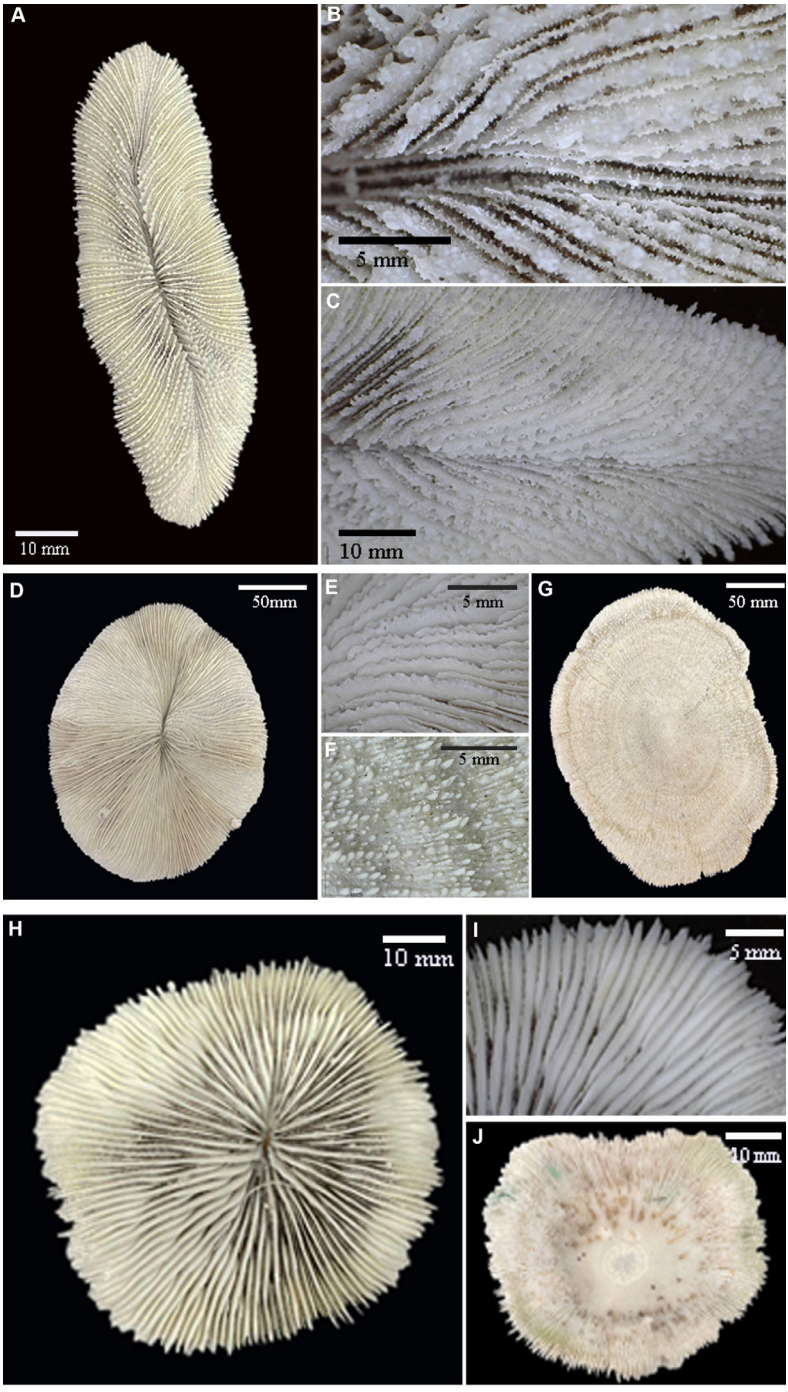

Figure 14. A–C *Ctenactis echinata* (Pallas, 1766), D–G, *Fungia fungites* (Linnaeus, 1758); H–J, *Galaxea astreata* (Lamarck, 1816). A, D, H, colony fragment; B, middle groove to mouth; C, E, I, septa tooth; F, spina; G, ventral view; J, lower part.

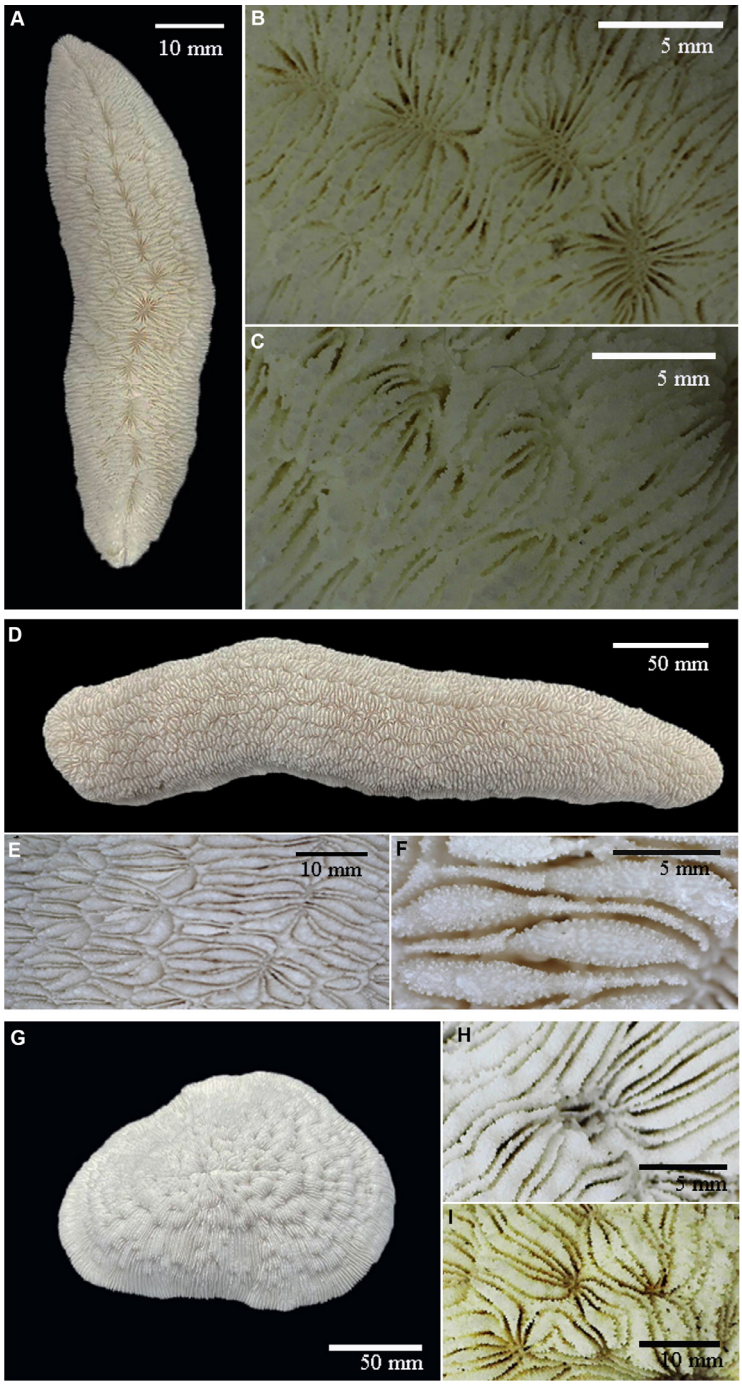

Figure 15. A–F, *Herpolitha limax* (Esper, 1792), G–I, *Sandalolitha robusta* (Quelch, 1886). A, B, D, G, colony fragment; E, F, septa and axial valley; C, costa between corallite; E, F, H, I, septa between corallite.

Genus *Sandalolitha* Quelch, 1884

37. *Sandalolitha robusta* (Quelch, 1886) (Figure 15G–I)

IUCN Red List Status: Least Concerned (LC).
WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=291010
Island: Pulau Pinang, Pulau Aur & Pulau Besar; Country: Malaysia; State Province: Johor.
UKM ID No.: UKMMZ-123CRLPA & UKMMZ-117CRLPB.

Genus *Lithophyllon* Lamarck, 1801

38. *Lithophyllon concinna* (Verrill, 1864) (Figure 16A–C)

IUCN Red List Status: Endangered (EN).
WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=716645
Island: Sebirah Kechil, Pulau Tinggi; Country: Malaysia; State Province: Johor.
UKM ID No.: UKMMZ-136CRLPT.

39. *Lithophyllon undulatum* Rehberg, 1892 (Figure 16D–F)

IUCN Red List Status: Least Concern (LC).
WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=764602
Island: Pulau Besar & Pulau Rawa; Country: Malaysia; State Province: Johor.
UKM ID No.: UKMMZ-118CRLPB & UKMMZ-115CRLPR.

Family Lobophylliidae Dai & Horng, 2009
Genus *Lobophyllia* de Blainville, 1830

40. *Lobophyllia hataii* Yabe, Sugiyama & Eguchi, 1936 (Figure 16G–I)

IUCN Red List Status: Least Concerned (LC).
WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=207390
Island: Buloh Kasap, Pulau Tinggi; Country: Malaysia; State Province: Johor.
UKM ID No.: UKMMZ-138CRLPT.

41. *Lobophyllia hemprichii* (Ehrenberg, 1834) (Figure 17A–C)

IUCN Red List Status: Endangered (EN).
WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=207392
Island: Pulau Lang; Country: Malaysia; State Province: Johor.
UKM ID No. UKMMZ-124CRLPA.

42. *Lobophyllia radians* (Milne Edwards & Haime, 1849) (Figure 17D–F)

IUCN Red List Status: Least Concerned (LC).
WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=207401
Island: Teluk Jawa, Pulau Dayang; Country: Malaysia; State Province: Johor.
UKM ID No. UKMMZ-125CRLPA.

Family Merulinidae Verrill, 1865
Genus *Astraeosmilia* Ortmann, 1892

43. *Caulastrea curvata* Wijsman-Best, 1972 (Figure 17G–I)

IUCN Red List Status: Least Concerned (LC).
WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=207412
Island: Sebirah kechil, Pulau Tinggi; Country: Malaysia; State Province: Johor.
UKM ID No. UKMMZ-139CRLPT.

Genus *Causlastrea* Dana, 1746

44. *Caulastrea echinulata* (Milne Edwards and Haime, 1848) (Figure 18A–B)

IUCN Red List Status: Endangared (NT).
WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=207411
Island: Sebirah Kechill, Pulau Tinggi; Country: Malaysia; State Province: Johor
UKM ID No. UKMMZ-140CRLPT

Genus *Dipsastraea* Blainville, 1830

45. *Dipsastraea matthaii* (Vaughan, 1918) (Figure 18C–D)

IUCN Red List Status: Least Concern (LC).
WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=207437
Island: Teluk Jawa, Pulau Dayang; Country: Malaysia; State Province: Johor.
UKM ID No.: UKMMZ-121CRLPA.

46. *Dipsastraea speciosa* (Dana, 1846) (Figure 18E–F)

IUCN Red List Status: Least Concern (LC).
WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=207425
Island: Pulau Lang; Country: Malaysia; State Province: Johor.
UKM ID No.: UKMMZ-122CRLPA.

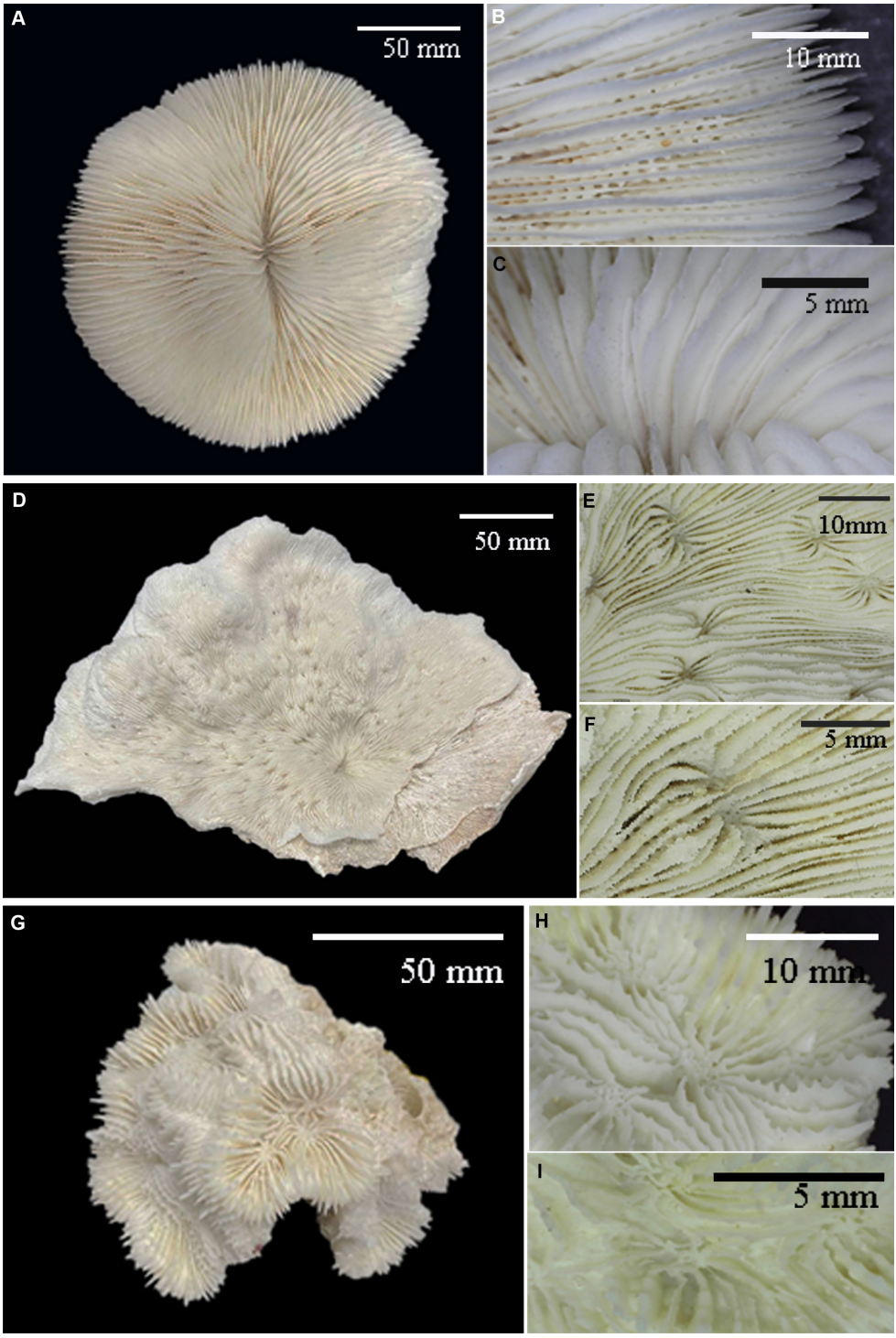

Figure 16. A–C, *Litophyllon concinna* (Verrill, 1864), D–F, *Lithophyllon undulatum* Rehberg, 1892; G–I, *Lobophyllia hataii* Yabe, Sugiyama & Eguchi, 1936. A, D, G, colony fragment; B, septa teeth; C, mouth; E, F, septa along corallite; H, I, septa combined with corallite.

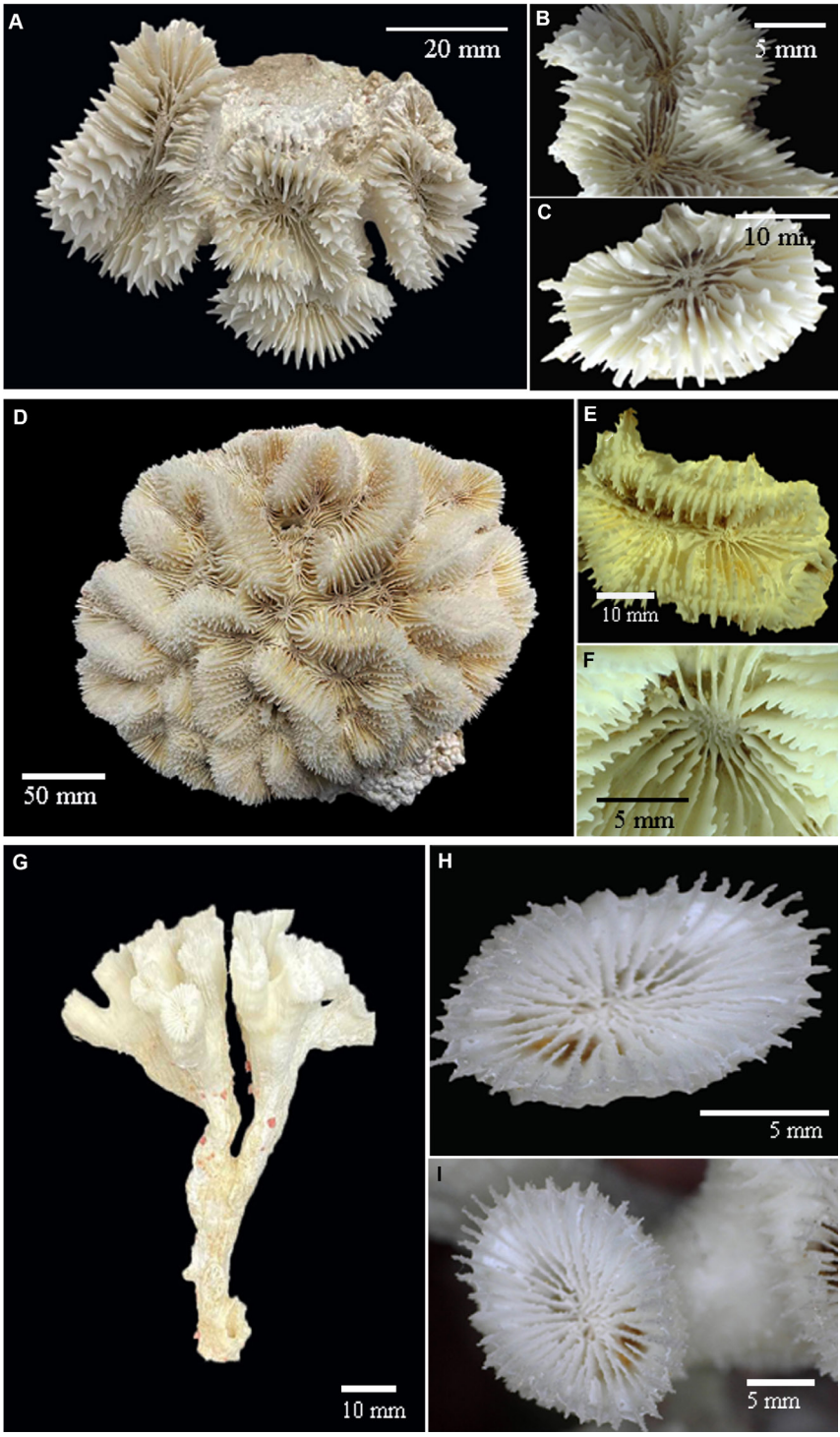

Figure 17. A–C, *Lobophyllia hemprichii* (Ehrenberg, 1834); D–F, *Lobophyllia radians* (Milne Edwards & Haime, 1849); G–I, *Caulastrea curvata* Wijsman–Best, 1972. A, D, G, colony fragment; B, C, E, F, septa combined with corallite; H, I, corallite and septa–costa.

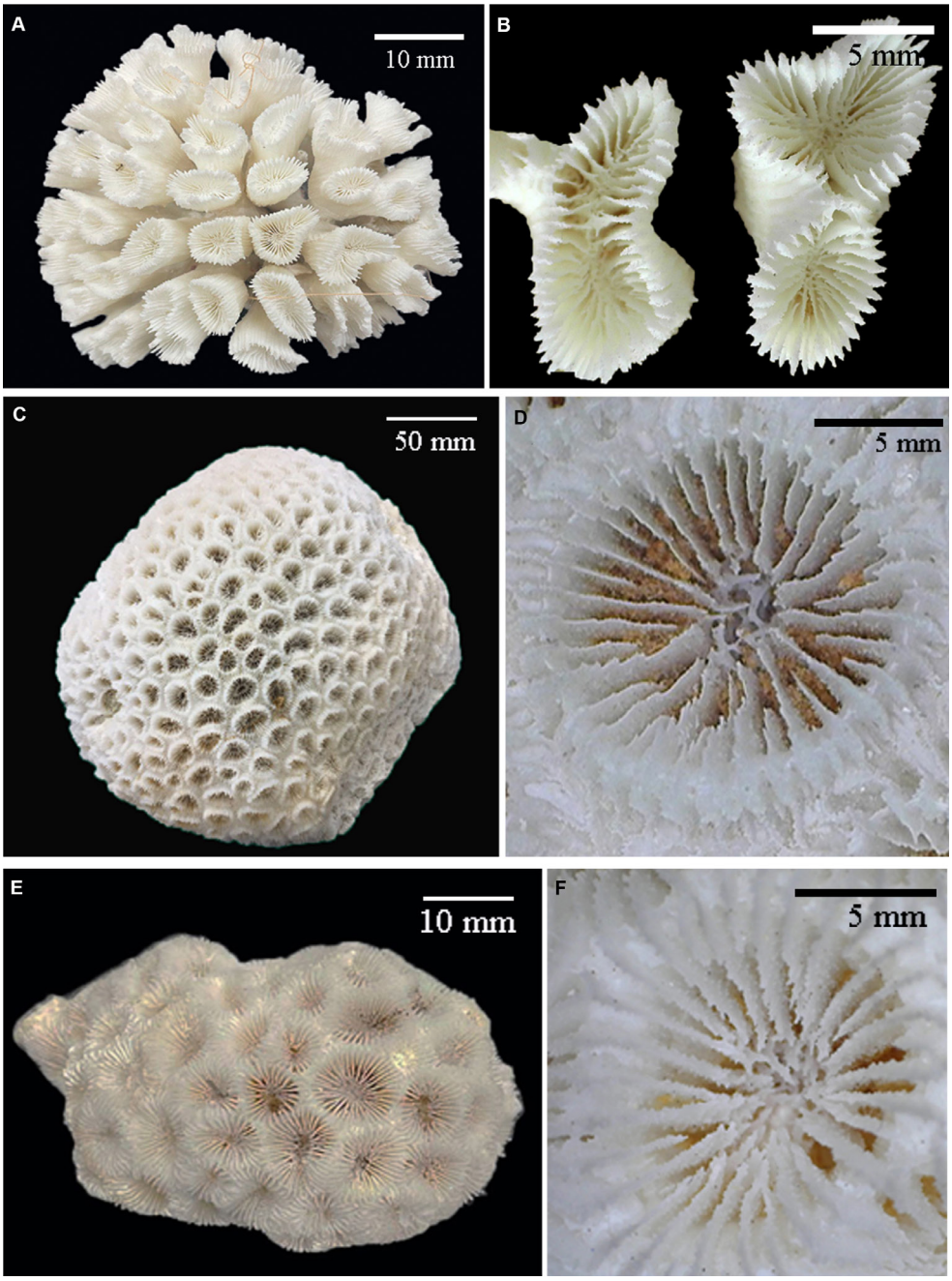

Figure 18. A–B, *Caulastrea echinulata* (Milne Edwards and Haime, 1848); C–D, *Dipsastraea matthaii* (Vaughan, 1918); E–F, *Dipsastraea speciosa* (Dana, 1846). A, C, E, colony fragment; B, D, F, septa and corallite.

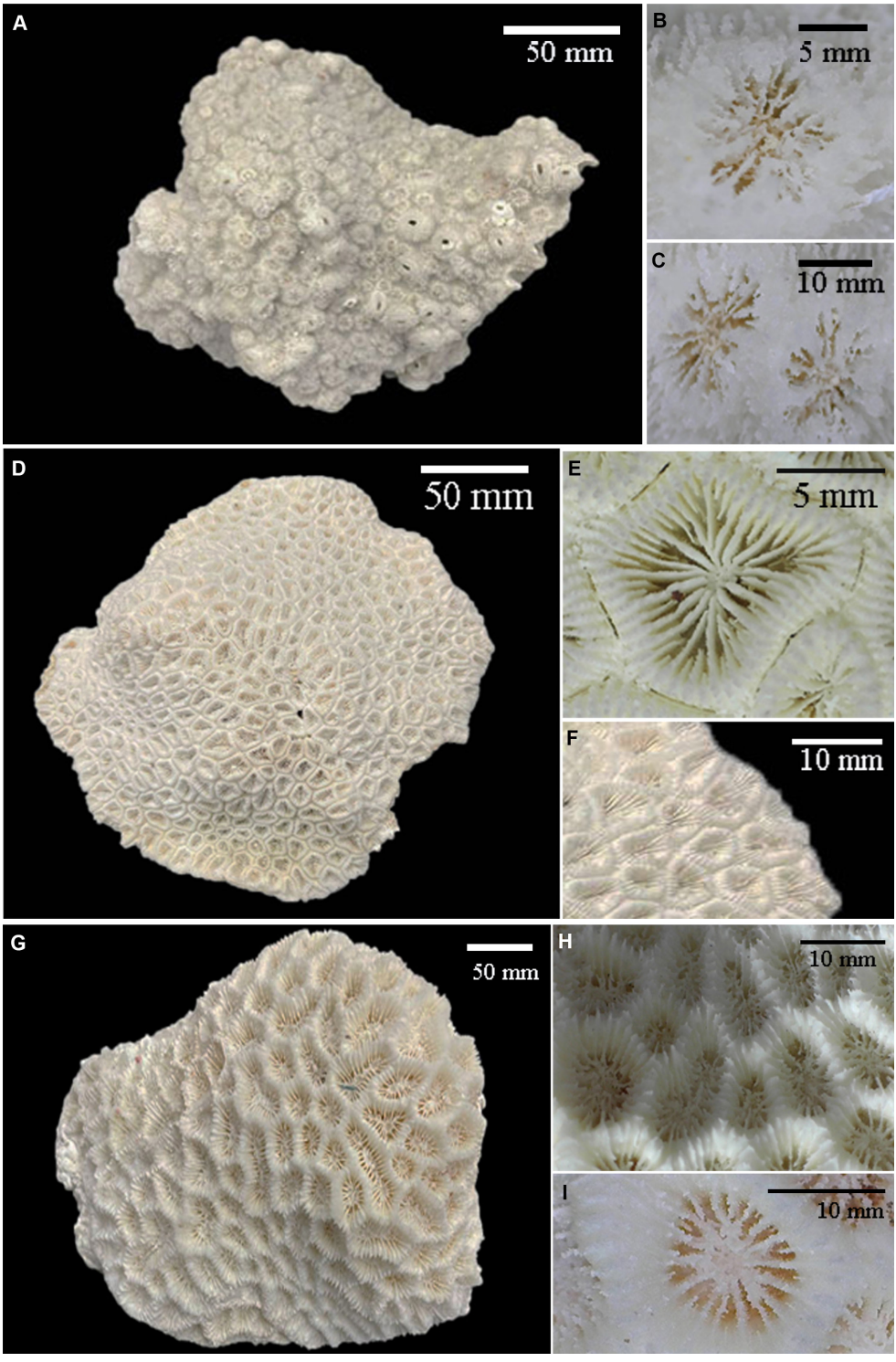

Figure 19. A–C, *Echinopora hirsutissima* Milne Edwards and Haime; D–F, *Favites valenciennesi* (Milne Edwards & Haime, 1849); G–I, *Goniastrea favulus* (Dana, 1846). A, D, G, colony fragment; B, I, corallite; C, costa between corallite; E, F, H, septa between corallite.

Genus *Echinopora* Lamarck, 1816

47. *Echinopora hirsutissima* Milne Edwards and Haime, 1849 (Figure 19A–C)

IUCN Red List Status: Least Concerned (LC).
WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=207420
Island: Pulau Besar; Country: Malaysia; State Province: Johor.
UKM ID No. UKMMZ-119CRLPB.

Genus *Favites* Link, 1807

48. *Favites valenciennesi* (Milne Edwards & Haime, 1849) (Figure 19D–F)

IUCN Red List Status: Least Concern (LC).
WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=763525
Island: Pulau Besar, Johor Country: Malaysia; State Province: Johor.
UKM ID No. UKMMZ-120CRLPB.

Genus *Goniastrea* Milne Edwards & Haime, 1848

49. *Goniastrea favulus* (Dana, 1846) (Figure 19G–I)

IUCN Red List Status: Least Concern (LC).
WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=288026
Island: Buloh Kasap, Pulau Tinggi; Country: Malaysia; State Province: Johor.
UKM ID No. UKMMZ-128CRLPA & UKMMZ-144CRLPT.

Genus *Hydnophora* Fischer de Waldheim, 1807

50. *Hydnophora exesa* (Pallas, 1766) (Figure 20A–C)

IUCN Red List Status: Least Concerned (LC).
WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=207403
Island: Teluk Sebukang, Pulau Aur; Country: Malaysia; State Province: Johor.
UKM ID No. UKMMZ-126CRLPA.

51. *Hydnophora microconos* (Lamarck, 1816) (Figure 20D–F)

IUCN Red List Status: Least Concern (LC).
WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=207402
Island: Pulau Besar; Country: Malaysia; State Province: Johor.
UKM ID No. UKMMZ-121CRLPB.

52. *Hydnophora rigida* (Dana, 1846) (Figure 20G–I)

IUCN Red List Status: Least Concerned (LC).
WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=207406
Island: Pulau Besar & Pulau Harimau; Country: Malaysia; State Province: Johor.
UKM ID No.: UKMMZ-122CRLPB & UKMMZ-116CRLPR.

Genus *Merulina* Ehrenberg, 1834

53. *Merulina scabricula* Dana, 1846 (Figure 21A–C)

IUCN Red List Status: Endangered (EN).
WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=289198
Island: Sebirah Kechil, Pulau Tinggi; Country: Malaysia; State Province: Johor.
Habitat: Various reef environments, especially lagoons and upper slopes.
UKM ID No. UKMMZ-142CRLPT.

Genus *Pectinia* Blainville, 1825

54. *Pectinia paeonia* Dana, 1846) (Figure 21D–F)

IUCN Red List Status: Least Concern (LC).
WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=207377
Island: Teluk Sebukang, Pulau Aur, Sebirah Kechil, Pulau Tinggi & Pulau Besar Country: Malaysia; State Province: Johor.
UKM ID No. UKMMZ-127CRLPA, UKMMZ-143CRLPT, UKMMZ-124CRLPB.

***Genus Platygyra* Ehrenberg, 1834**

55 *Platygyra pini* Chevalier, 1975 (Figure 21G–H)

IUCN Red List Status: Least Concerned (LC).
WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=207446
Island: Buloh Kasap, Pulau Tinggi; Country: Malaysia; State Province: Johor.
UKM ID No. UKMMZ-141CRLPT.

56 *Platygyra sinensis* (Milne Edwards and Haime, 1849) (Figure 22A–C)

IUCN Red List Status: Least Concern (LC).
WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=207486
Island: Pulau Besar; Country: Malaysia; State Province: Johor.
UKM ID No.: UKMMZ-123CRLPB.

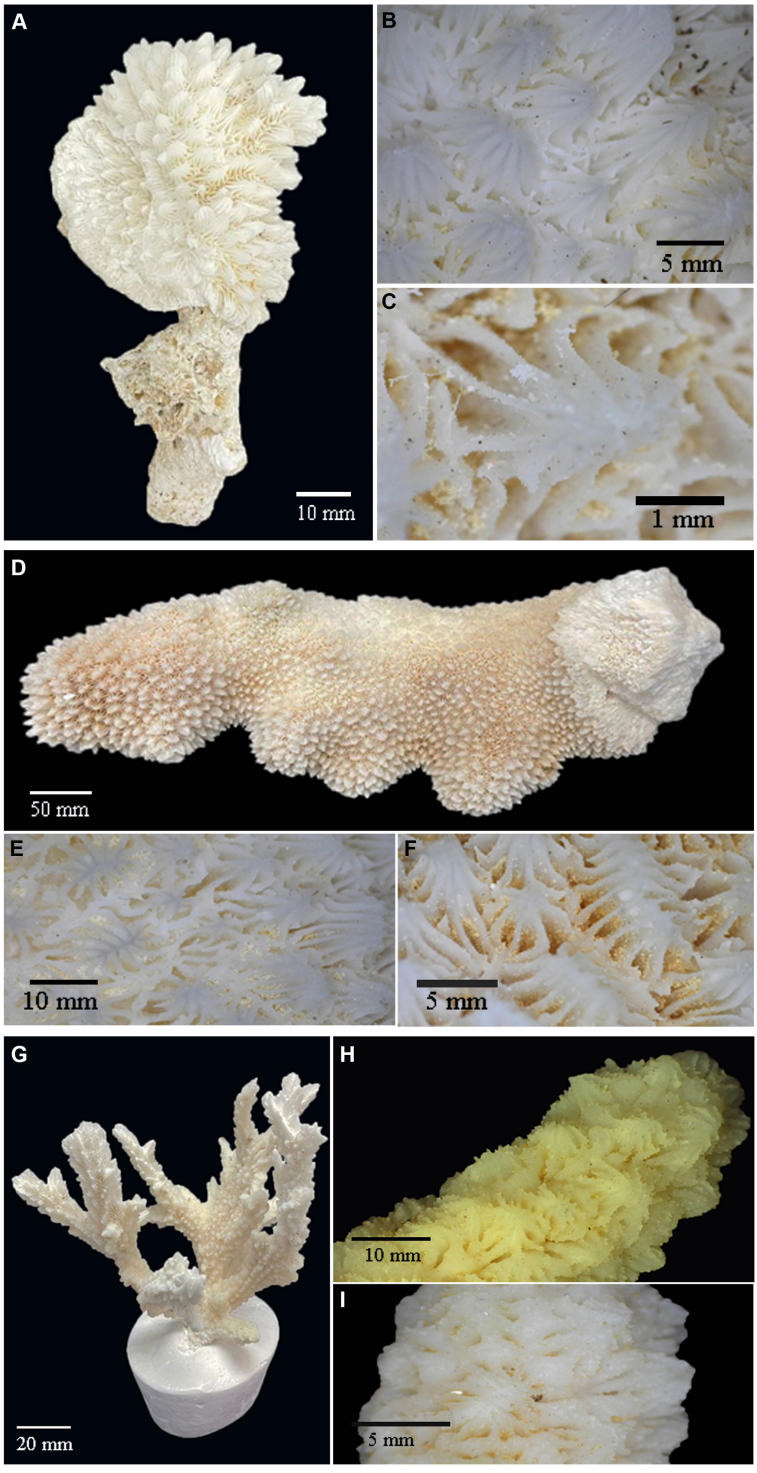

Figure 20. A–C, *Hydnophora exesa* (Pallas, 1766); D–F, *Hydnophora microconos* (Lamarck, 1816) ; G–I, *Hydnophora rigida* (Dana, 1846). A, D, G, colony fragment; B, C, E, F, H, I, corallite between monticles.

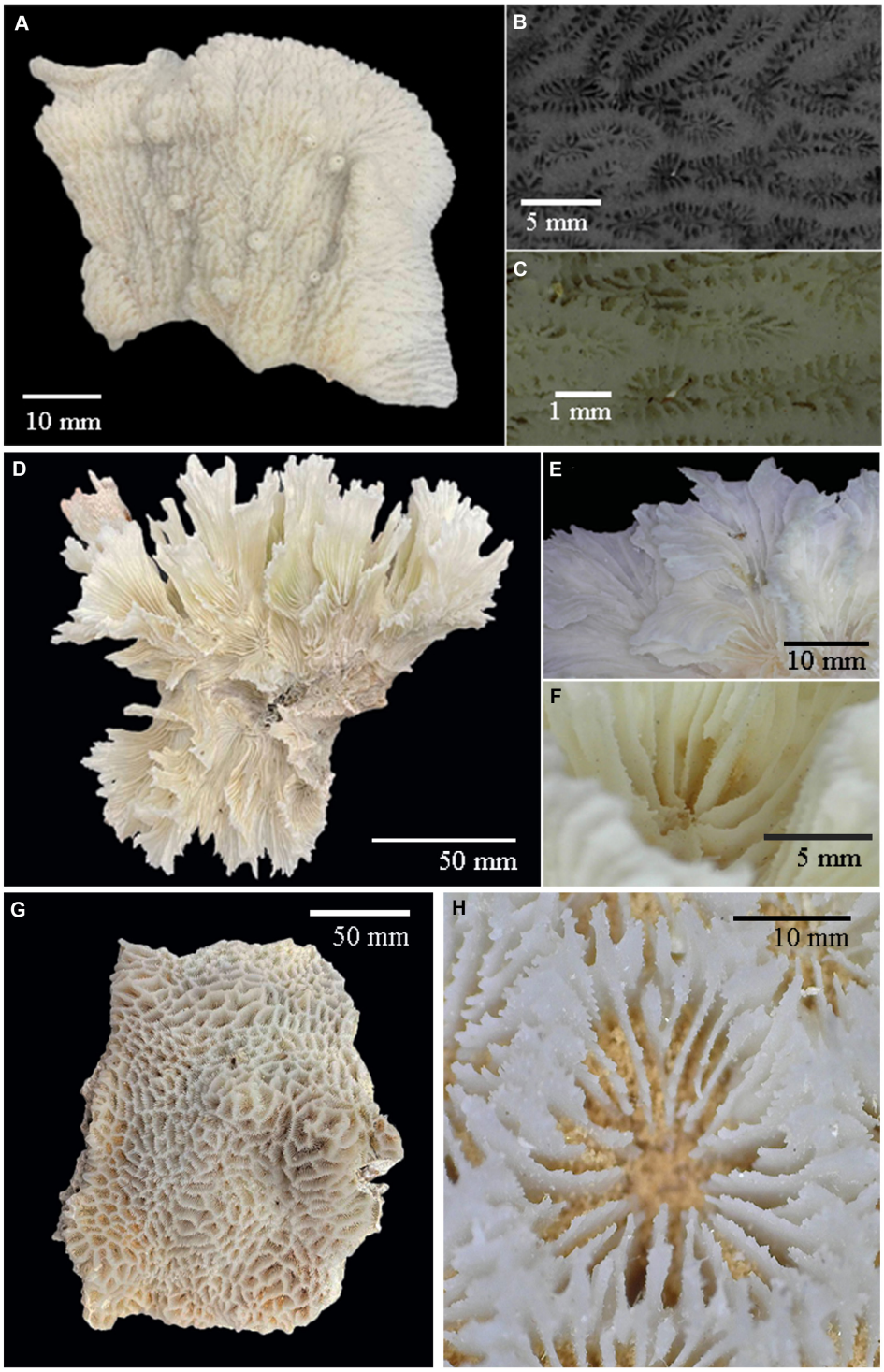

Figure 21. A–C, *Merulina scabricula* Dana, 1846; D–F, *Pectinia paeonia* (Dana, 1846); G–H, *Platygyra pini* Chevalier, 1975. A, D, G, colony fragment; B, C, E, F, septa between ridge; H, septa between corallite

Genus *Oulophyllia* Milne Edwards and Haime, 1848

57. *Oulophyllia crispa* (Lamarck, 1816) (Figure 22D–F)

IUCN Red List Status: Endangered (EN).
WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=207485
Island: Pulau Mentigi; Country: Malaysia; State Province: Johor.
UKM ID No.: UKMMZ-132CRLPT.

Family Pachyseridae Benzoni & Hoeksema, 2023
Genus *Pachyceris* Milne Edwards and HIlme, 1849

58. *Pachyseris gemmae* Nemenzo, 1955 (Figure 22G–I)

IUCN Red List Status: Vulnerable (VU).
WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=288721
Island: Pulau Rawa; Country: Malaysia; State Province: Johor.
UKM ID No.: UKMMZ-113CRLP.

Family Plerogyridae Rowlett, 2020
Genus *Plerogyra* Milne Edwards & Haime, 1848

59. *Plerogyra sinuosa* (Dana, 1846) (Figure 23A–C)

IUCN Red List Status: Least Concern (LC).
WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=207497
Island: Pulau Lang & Pulau Rawa; Country: Malaysia; State Province: Johor.
UKM ID No.: UKMMZ-130CRLPA & UKMMZ-119CRLPR.

Family Pocilloporidae Gray, 1842
Genus *Pocilopora* Lamarck, 1816

60. *Pocillopora aliciae* Schmidt-Roach, Miller and Andreakis, 2013 (Figure 23D–F)

IUCN Red List Status: Endangered (EN).
WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=742669
Island: Pulau Mentigi; Country: Malaysia; State Province: Johor.
UKM ID No. UKMMZ-145CRLPT.

61. *Pocillopora damicornis* (Linnaeus, 1758) (Figure 23G–I)

IUCN Red List Status: Endangered (EN).
WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=206953
Island: Pulau Lang; Country: Malaysia; State Province: Johor.
UKM ID No. UKMMZ-129CLRPA.

62. *Pocillopora verrucosa* (Ellis & Solandar, 1786) (Figure 24A–C)

IUCN Red List Status: Endangered (EN).

WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=206954

Island: Pulau Lang; Country: Malaysia; State Province: Johor.

UKM ID No. UKMMZ-130CLRPA.

Genus *Stylophora* Schweigger, 1820

63. *Stylophora pistillata* (Esper, 1792) (Figure 24D–F)

IUCN Red List Status: Nearly Threatened (NT).

WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=206982

Island: Pulau Rawa; Country: Malaysia; State Province: Johor.

UKM ID No. UKMMZ-117CRLPR.

64. *Stylophora subseriata* (Ehrenberg, 1834) (Figure 24G–I)

IUCN Red List Status: Endangered (EN).

WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=206980

Island: Buloh Kasap, Pulau Tinggi; Country: Malaysia; State Province: Johor.

UKM ID No. UKMMZ-111CRLPT.

Famili Poritidae Gray, 1840

Genus *Goniopora* de Blainville, 1830

65. *Goniopora djiboutiensis* Vaughan, 1907 (Figure 25A–B)

IUCN Red List Status: Least Concern (LC).

WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=207210

Island: Pulau Mentigi; Country: Malaysia; State Province: Johor.

UKM ID No. UKMMZ-146CRLPT.

Genus *Porites* Link, 1807

66. *Porites rus* (Forskal, 1775) (Figure 25C–E)

IUCN Red List Status: Least Concerned (LC).

WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=207231

Island: Teluk Teluran, Pulau Aur1 & Pulau Rawa2; Country: Malaysia; State Province: Johor.

UKM ID No.: UKMMZ-105CRLPA & UKMMZ-118CRLPR.

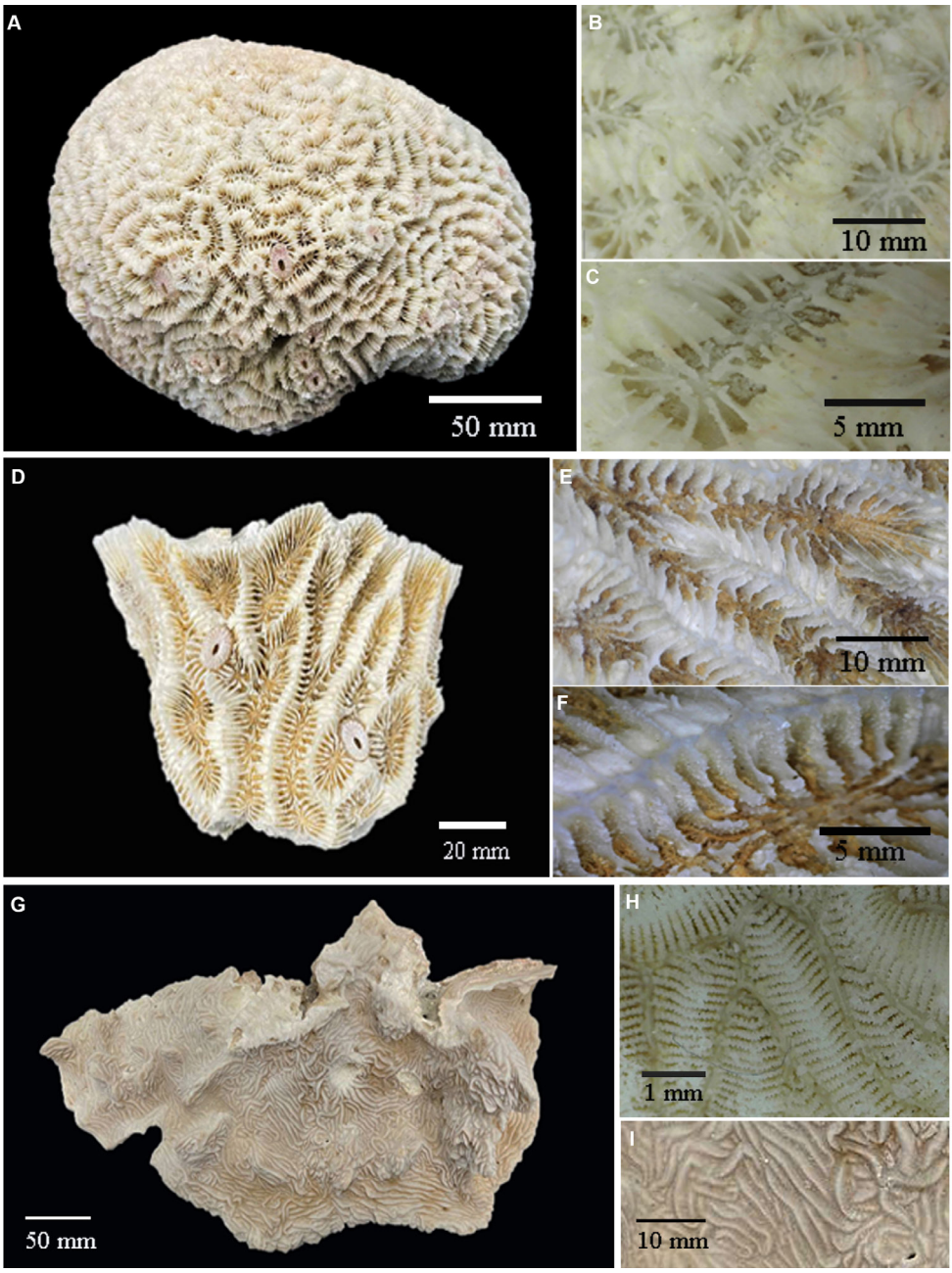

Figure 22. A–C, *Platygyra sinensis* (Milne Edwards and Haime, 1849; D–F, *Oulophyllia crispa* (Lamarck, 1816); G–I, *Pachyseris gemmae* Nemenzo, 1955. A, D, G, colony fragment; B, ridge; C, E, F, septa valley and corallite; H, septa between ridge; I, valley with parallel septa.

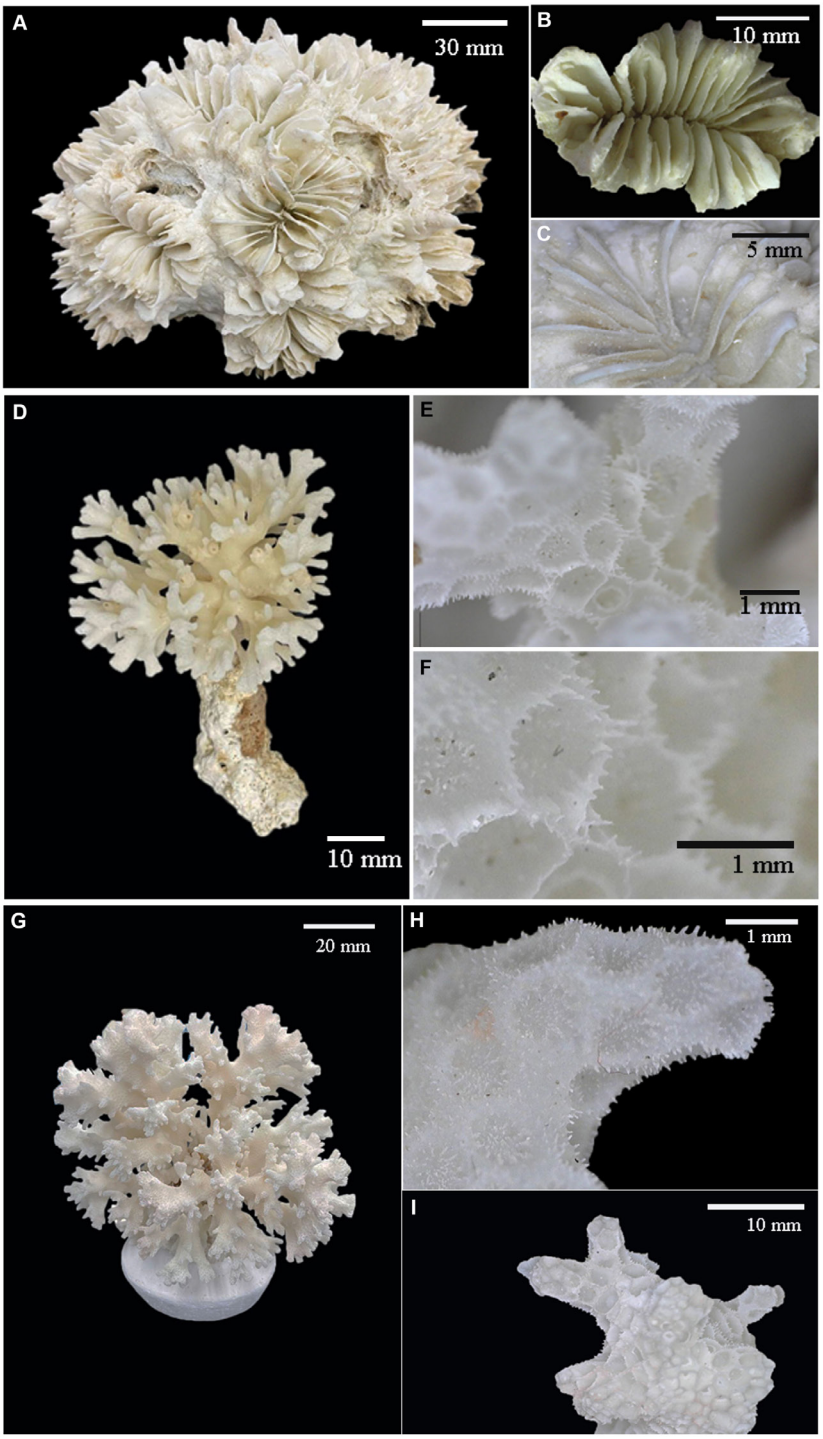

Figure 23. A–C, *Plerogyra sinuosa* (Dana, 1846), colony; B, C, Corallite valley with a large septa; D, *Pocillopora aliciae* Schmidt–Roach, Miller and Andreakis, 2013, colony fragment; E, F, Corallite; G, *Pocillopora damicornis* (Linnaeus, 1758), colony fragment; H, I, Corallite.

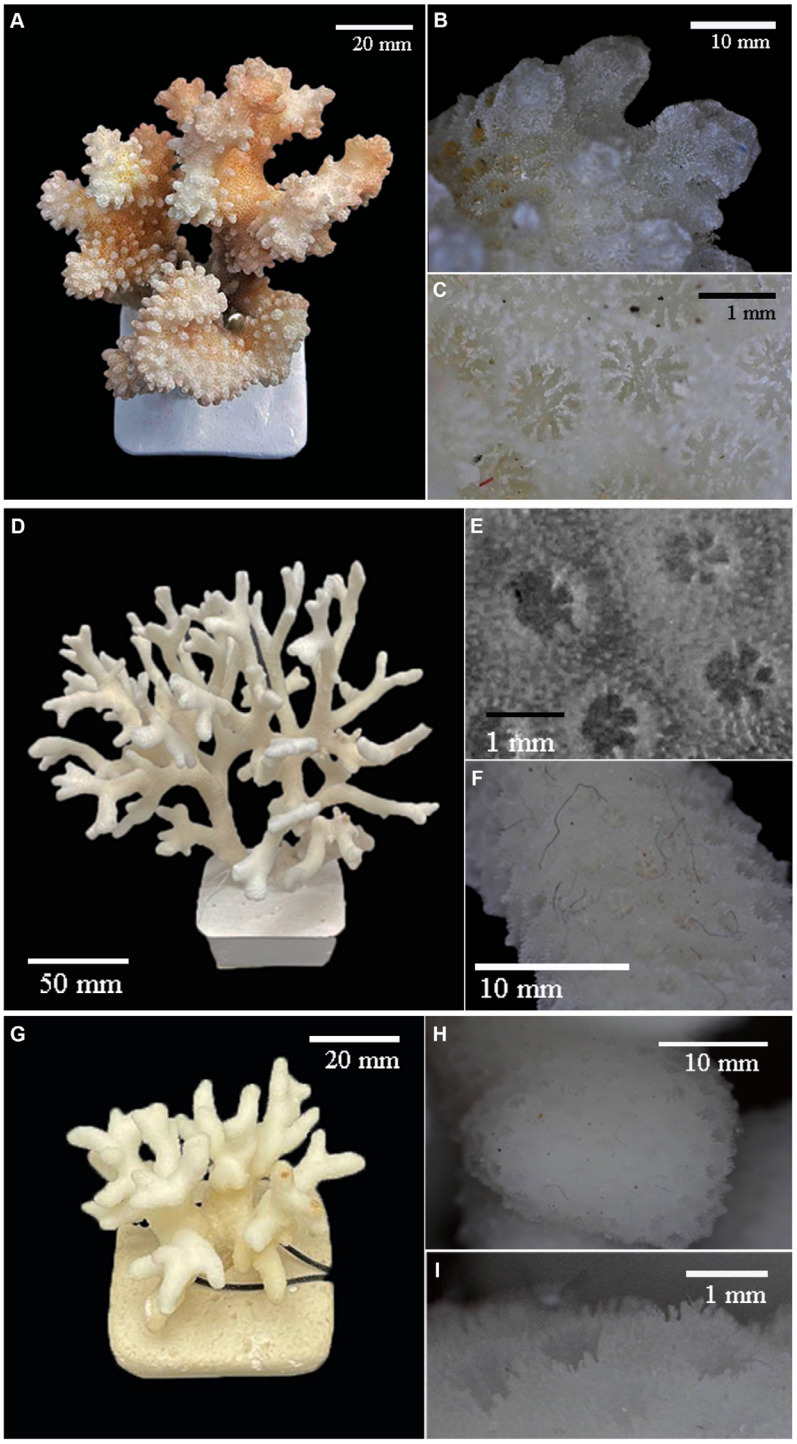

Figure 24. A–C, *Pocillopora verrucosa* (Ellis & Solandar, 1786); D–F, *Stylophora pistillata* (Esper, 1792); G–I, *Stylophora subseriata* (Ehrenberg, 1834). A, D, G, colony fragment; B, C, E, H, corallite; F, I, branch.

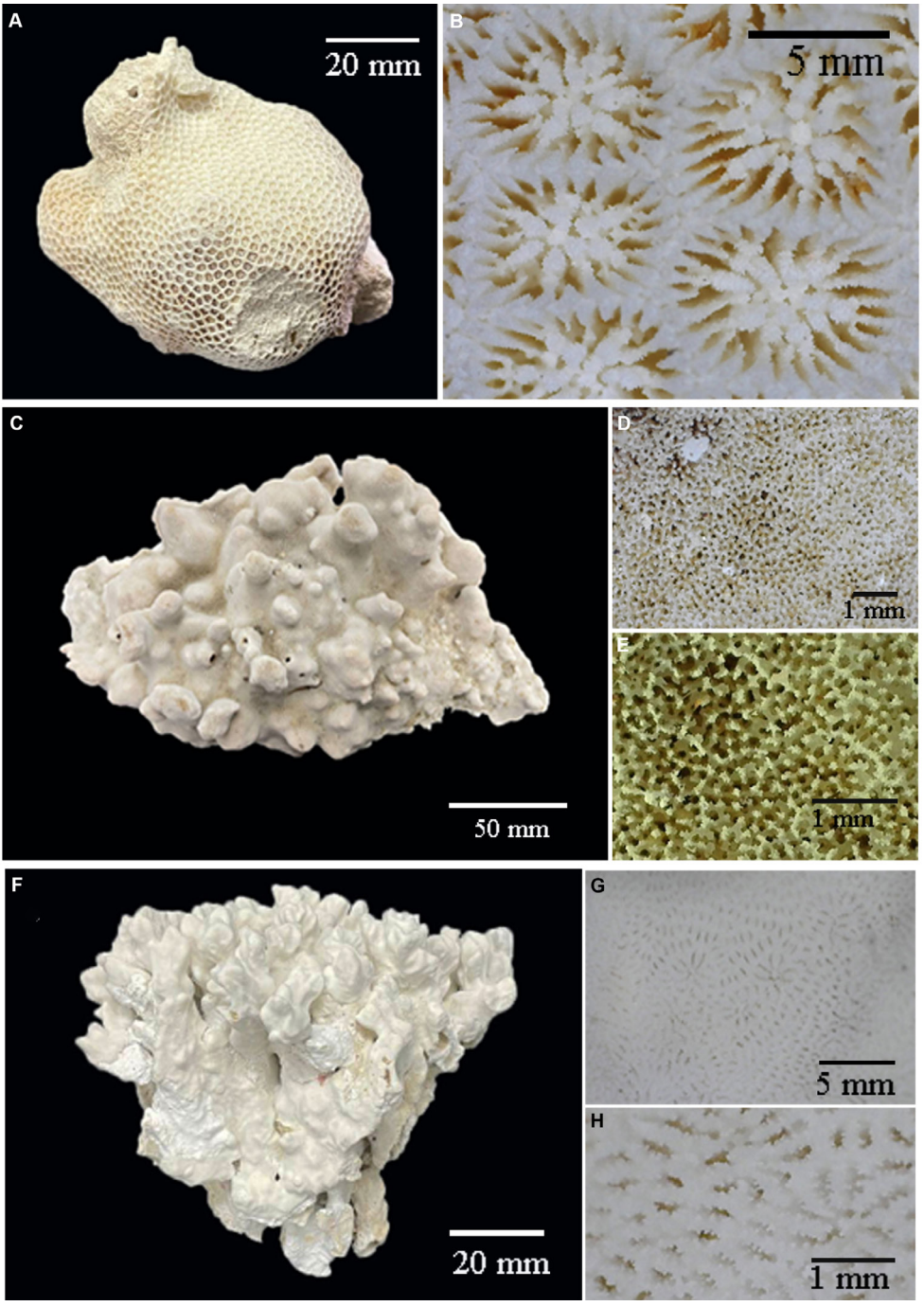

Figure 25. A–B, *Goniopora djiboutiensis* Vaughan, 1907; C–E, *Porites rus* (Forskal, 1775); *Psammocora contigua* (Esper, 1794). A, C, F, colony fragment; B, E, G, H, septa and corallite; E, F, coralli

Family Psammocoridae Chevalier & Beauvais, 1987
Genus *Psammocora* Dana, 1846

67. *Psammocora contigua* (Esper, 1794) (Figure 25F–H)
IUCN Red List Status: Least Concern (LC).
WoRMS: https://www.marinespecies.org/aphia.php?p=taxdetails&id=207267
Island: Teluk Teluran, Pulau Aur; Country: Malaysia; State Province: Johor.
UKM ID No.: UKMMZ-131CRLPA.

Table 2 shows the total number of Scleractinian found in three islands: Pulau Redang, Pulau Tioman and Sultan Iskandar Marine Park (SIMP). The current study found 15 families with 34 genera and 67 species. Acroporidae, Agariicidae, Coscinaraeidae, Dendrophyllidae, Diploastraiedae, Euphyllidae, Faviidae, Fungiidae, Helioporidae, Lobophyllidae, Merulinidae, Pocilloporidae, Poritidae, Psammocoridae, and Pachyseridae were the families found in SIMP. There are 11 new records of Scleractinian found in Peninsular Malaysia, namely *Acropora abrotanoides, Acropora aculeus, Acropora polystoma, Acropora vermiculata, Lithophyllon lobata, Symphyllia radians, Caulastrea vurcata, Echinopora hirsutissima* and *Pocillopora aliciaee*. Acroporidae family has found to be the most dominant Scleractinian in SIMP.

Table 2. Count of Scleractinian in Peninsular Malaysia according to Akmal *et al*., 2019—Pulau Redang, Akmal *et al*. 2019—Pulau Tioman, Mersing Islands—Jen Nie Lee *et al*., 2022 and Sultan Iskandar Marine Park (SIMP).

	Pulau Redang (Akmal *et al*., 2019)	**Pulau Tioman (Akmal *et al*., 2019)**	**Mersing Islands (Lee *et al*., 2022)**	**SIMP (This work)**
Family	13	14	16	14
Genus	47	55	Not stated	34
Species	128	239	261	67

Table 3. Count of Acropora species studied in Southeast Asia according to Wallace and Wolstenholme, 1998—Indonesia, Wallace *et al*. 2012—Thailand, Latypov, 2011—Vietnam, Nemenzo, 1981—Philippines, Robert, 2016—North Borneo.

Indonesia (Wallace and Wolstenholme, 1998)	**Thailand (Wallace *et al*., 2012a, 2012b)**	**Vietnam (Latypov, 2011)**	**Philippines (Asian Development Bank, 2014)**	**North Borneo (Robert, 2016)**
83	64	90	157	83

As compared to Table 3, SIMP has a total number of 20 species from the genus *Acropora* which are fewer than other previous studies, *i.e*. 83 in Indonesia, 64 in Thailand, 90 in Vietnam, 157 in Philippines, and 83 in North Borneo.

DISCUSSION

A total number of 67 Scleractinian species was successfully catalogued in the SIMP including 14 new records. As compared to the previous studies in Peninsular Malaysia (Table 2), 239 species were recorded in Tioman Island, 128 species in Redang Island, and 261 species from the Mersing islands (Lee *et al*., 2022). The lower number of Scleractinian species recorded in the current study at Sultan Iskandar Marine Park (SIMP) compared to previous surveys in Peninsular Malaysia may be attributed to differences in sampling scope, methodology, and verification approaches. Unlike earlier studies that often relied on extensive *in situ* visual surveys covering wider spatial and temporal scales, the present study is based on the examination of actual collected specimens, which provides a more conservative, but taxonomically reliable estimate of species richness. This approach minimizes misidentification, but may underrepresent total diversity due to logistical and ethical constraints on specimen collection within a protected area. Additionally, natural biogeographic differences between the studied reef systems, along with potential habitat-specific variations, could also contribute to the comparatively lower species count.

It has been reported that most of the corals in the Peninsular Malaysia are not in excellent health, but rather in between poor and fair condition. This may due to increase of sedimentation, pollution such as waste from garbage or untreated sewage, and also from tourism activities such as snorkelling and diving (Toda *et al*., 2007). These reasons may impact in the growth of reef of Peninsular Malaysia. The three most dominant families in SIMP were Acroporidae, Merulinidae, and Fungiidae. Acroporidae had the highest species diversity with three genera, that is *Acropora*, *Isopora* and *Montipora*.

The distribution of *Acropora* was dominant in SIMP and also was found to be the most common in five countries in Southeast Asia (Table 3). It has been reported that Philippines recorded 157 species of *Acropora*, which is the highest in five countries followed by Vietnam (90 species), Indonesia and North Borneo both with 83 species, Thailand (64 species) ,and 20 species of *Acropora* were in SIMP. Redang and Tioman Islands as well as Sibu Islands were also recorded to have high coverage of *Acropora* (Lee *et al*., 2021). It has been reported that *Acropora* spp. are able to grow faster per unit of time, and also its branch can reach up to 20cm/year and sole colonies can continue to grow up to ten meters in height or diameters (Clifton *et al*., 2010; Daud and Musyidi, 2013). The dominance of *Acropora* may due to its ability to withstand the environmental conditions such as wave actions, currents, and also loads of sediment (Lee *et al*. 2021).

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