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A REVIEW OF THE GENUS *ANACROPORA* RIDLEY, (SCLERACTINIA, ACROPORIDAE) WITH THE DESCRIPTION OF A NEW SPECIES

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ABSTRACT

A few remarks on the genus *Anacropora* Ridley (Scleractinia, Acroporidae) are made, based on a re-examination of the existing types of the various described species. *A. reptans* and *A. gracilis* are merged with *A. forbesi*, while *A. puertogalerae* is considered synonymous with *A. spinosa*. A key to the valid species is given along with the description of a new species.

INTRODUCTION

DURING the spring and summer of 1970, the author spent several weeks in the Zoology Department of the British Museum (Nat. Hist) London, where he examined the reference collection of corals. The collection includes among others, the types of Quelch (1886), Brook (1893), Bernard (1896, 1897, 1905, 1906), Matthai (1914, 1928) and Crossland (1952). While examining these materials, an unnamed specimen of *Anacropora* was noticed which on critical examination was proved to be hitherto undescribed species. This provided the interest for this short communication.

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Genus *ANACROPORA* Ridley

The generic name *Anacropora* was proposed by S. O. Ridley in 1884 to accommodate a species from the Keeling Islands. Ridley based his new genus on a single species, *viz., A. forbesi* which by monotypy forms the type of the genus.

Bernard (1897) defined the genus thus: "*Anacroporae* may therefore be defined as branched Montiporinae which, owing to the typical divergence of the thin branches at wide angles, tend to form low matted tangles rather than arborescent stocks, and in which many of the calicle walls grow faster than the feebly developed cortical layer, and are thus protuberant; the laminate radial elements typical of Madreporidae, but lost in *Montipora* reappear in the protuberant walls as septa and costae". Vaughan and Wells (1943) in their revision of the Orders and Families of Scleractinia redefined the genus as follows: "Like *Montipora*, but with less porous coenenchyme that becomes dense below; branched, branches forming low matted tangles".

Like the closely related *Acropora* and *Montipora*, *Anacropora* has also the first two cycles of septa. From *Montipora* it differs in having slightly protuberant

CASE D: Clouds associated with wind discontinuities

Plate III E and F show the APT mosaics of forenoon and afternoon of 2nd April 1970. The low level winds enter the peninsular India from both the Bay of Bengal and Arabian Sea, where anticyclonic circulations exist, during this season. A well marked line of confluence forms over the central region of the Peninsular India. However, mere confluence due to the synoptic conditions is apparently not sufficient in development of significant clouding as can be seen from the morning ESSA-8 picture. Insolation received during the day combined with the convergence due to synoptic conditions, results in marked convective/activity along the zone of convergence during afternoon hours.

CASE E: Diurnal changes on clouding associated with marked synoptic situation during the Southwest Monsoon Season

Plate IV show APT mosaics of forenoon and afternoon of 2nd July 1970 and 00 and 12Z surface charts of the same day. The circular cloud banding around the well marked low pressure area is centred near latitude 23°N and longitude 81°E. Even though the banding is noticeable in both morning and evening, its structure is much more organised and clearly defined in the afternoon pictures, enabling the determination of the cloud vortex centre with greater accuracy. It is found that this feature is noticed in almost all the monsoon depressions and well marked low pressure areas, we came across during the period of our study.

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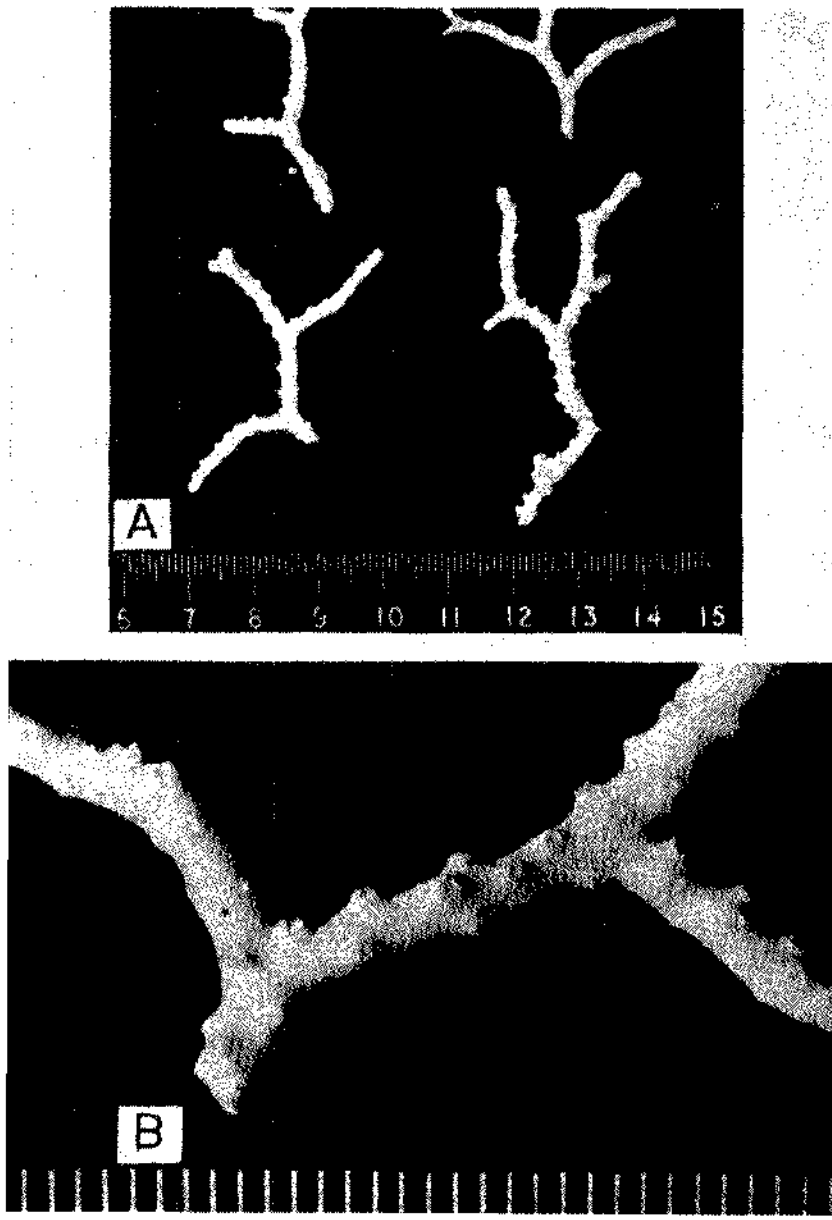

PLATE I A. *Anacroplis matthai* n. sp., Holotype, BMNH 92.4.5.42, and B. The same magnified.

calices—a feature not typical of the former genus. The absence of axial corallites and an undifferentiated coenenchyme at the growing tips distinguishes it from *Acropora* (Bernard, 1897).

EARLIER DESCRIBED SPECIES OF *ANACROPORA*

As already mentioned, Ridley (1884) described only one species, *viz.*, *A. forbesi*, while proposing the genus. Quelch (1886) added two more species, *A. gracilis* and *A. solida* from the "Challanger" collections. A fourth species (*A. spinosa*) was described by Rheberg (1892). Bernard (1897) recognised two more, *A. erecta* and *A. reptans* bringing the total to six. For nearly 67 years, till 1964, there seems to have no addition to the extant species, when Nemenzo (1964) described *A. puertogalerae* from the Philippine waters. Thus, altogether the following "seven" species have been described from the Indo-Pacific:

1. *A. forbesi* Ridley, 1884 (Ridley, 1884, p. 287, pl. 11, fig. 1). Typelocality: Keeling Islands. Location of the type: British Museum Natural History (hereafter BMNH) London, No. 84.2.16.40.7.

2. *A. gracilis* Quelch, 1886, (Quelch, 1886, p. 170, pl. 10, figs. 6, 6a). Typelocality: Banda (12 fms). Location of the type; BMNH. No. 85.2.1.10. Also a few more branches from Evans Bank, Arafura Sea (15 fms).
3. *A. solida* Quelch, 1886 (Quelch, 1886, p. 170, pl. 10, figs. 7, 7a). Typelocality: Kandavu. Location of the type: BMNH, No. 85.2.1.11.

4. *A. spinosa* Rheberg, 1892 (Rheberg, 1892, p. 42, pl. 3, fig. 9). Typelocality: Pelew (Palau) Islands. Location of type: Was in Hamburg Museum, West Germany, reported to be lost during the bombardment of World War II.

5. *A. erecta* Bernard, 1897 (Bernard, 1897, p. 173, pl. 34, fig. 18). Typelocality: Solomon Islands. Location of the type: BMNH. No number is found at present on the label.

6. *A. reptans* Bernard, 1897 (Bernard, 1897, p. 174, pl. 34, fig. 19. Typelocality: Macclesfield Bank, China Sea (32 fms). Location of the type: BMNH. No. 93.9.1.197.

7. *A. puertogalerae* Nemenzo, 1964 (Nemenzo, 1964, p. 222, pl. 12, figs. 1,4). Typelocality: Paniquian Island, Puerto Galea, Philippines. Location of the type: Department of Zoology, University of Philippines, Quezon City. No. U. P. C. 296. (Type not examined by the present author).

Geographical distribution

The genus, though not a common one in shallow waters, is known from both Indian and Pacific Oceans. Indian Ocean records are very few, probably due to inadequate collecting. There is one specimen among the BMNH collections, labelled, *Anacropora forbesi* from the Providence Islands. Rosen (1971) includes Seychelles also and possible Indian Ocean records according to him are four. From the Pacific the genus is known from, Fiji, Marshall Islands, Palau Islands, China Sea, Solomon Islands, Philippines, East Indies and Arafura Sea. Recently Dr.

D. R. Stoddart of Cambridge University has collected a good suit of specimens of *A. spinosa* (Pillai and Stoddart, Ms) from the very shallow waters of the Solomon Islands. The following is a list of geographical areas from where the various known species are recorded. In this list no appraisal is made of the synonymy of the species, which will be discusssed in a later section.

Kandavu	:	*A. solida*
Marshall Islands	:	*A. forbesi* and *A. reptans*
Palau Islands	:	*A. forbesi* and *A. spinosa*
Solomon Islands	:	*A. erecta* and *A. spinosa*
Philippines	:	*A. puertogalerae*
China Sea	:	*A. forbesi* and *A. reptans*
Arafura Sea	:	*A. gracilis*
East Indies	:	*A. forbesi, A. gracilis* and *A. matthaii* n.sp.
Keeling Islands	:	*A. forbesi*
Seychelles	:	? (After Rosen, 1971)
Providence Islands	:	*A. forbesi*

THE SPECIES PROBLEM

In spite of the comparatively few species hitherto known under this genus, one is tempted to believe, especially after a critical examination of the types and cotypes of the various species, that separation of some of the species is not taxonomically sound. Bernard (1897) had little problem with the species criteria and subsequent authors made no attempt to change or re-interpret Bernard's arrangement of the species, till Yabe and Sugiyama (1941) thought that *A. gracilis* and *A. solida* are only variants of *A. forbesi*. But Wells (1954) opined that *A. gracilis* should be treated separate from *A. forbesi*. According to him (Wells, 1954) in *A. forbesi* "the calices are more closely set with more prominent septa than in *A. gracilis* and the coenenchymal surface is denser with frostering of tiny granules" (p.441). In BMNH there is a specimen (No. 93.9.1.197) labelled *A. reptans*. It resembles BMNH 92.4.5.8, which is *A. gracilis*, in most respects expect for the slightly better developed septa. In both the corallites are equally protuberant and placed at equal distance and the coenenchymal spinulation is of the same nature and magnitude. Besides, both have coalescent branches. As already mentioned the difference is only in the degree of development of septa, but for that the specimens are not easily separable. The difference in the degree of development of septa within the different colonies of the same species or even within the different parts of the same colony is a common morphological feature controlled by ecological parameters, in related genera such as *Acropora* and *Montipora*. Again BMNH 92.4.5.47, a specimen labelled *A. gracilis* by Bernard from Evans Bank has very conspicuous primary cycle of septa similar to BMNH 93.9.1.197. Yet another specimen labelled *A. reptans*, from the China Sea, has poorly developed septa as in some specimens of *A. gracilis*. This means *A. gracilis* and *A. reptans* grade towards each other and are only skeletal variants. The type of *A. forbesi* differs from the type of *A. gracilis* only in the conspicuous and exsert septa of the former and thus, is more or less similar to *A. reptans*. There is no marked difference in the coenenchymal ornamentation of *A. forbesi* and *A. gracilis* (Any loss in one or the other due to long time preservation and handling is not accounted here). The above discussion is suggestive of the very close similarity of *A. forbesi, A. reptans* and *A. gracilis*. The author is led to believe that all these are one and the same. Any minute skeletal variation that can be made out among these may be phenotypic.

With regard to *A. solida* which Yabe and Sugiyama (1941) merged with *A. forbesi*, the type is only in the form of two fragments. The calices are very small, pin-hole-like, better seen under a magnifying glass. The corallites are mostly level, hardly projecting. The surface coenenchyme has a solid look. Quelch (1886) speaks of the coenenchymal surface as "finely echinulate or granulated". However, at present the type has lost most of its granulations. It certainly looks different from *A. forbesi* and in the absence of material intermediate in characters for comparative studies it may be desirable to consider *A. solida* as different from *A. forbesi*.

A. erecta is intermediate between *A. solida* and *A. forbesi*, as far as the size of the calices is concerned. The septa are poorly developed, only the directives are of any importance, which meet sometimes at the centre of the axial fossa. In many cases the calicular openings are slightly compressed. On the whole it looks different from *A. forbesi*. *A. spinosa* is easily distinguished from other members of the genus by virtue of its conical spines – a feature *A. puertogalerae* also shares. According to Nemenzo (1964) *A. puertogalerae* differs from *A. spinosa* in its better developed calices. The difference between the two is only comparative and not absolute. Pillai and Stoddart (Ms) have recently studied a good suit of specimens of *A. spinosa* from the Solomon Islands and came to the inescapable conclusion that *A. spinosa* and *A. puertogalerae* are identical.

In view of this it is felt that there are only five valid species (including the one described here as new) of *Anacropora, viz., A. forbesi, A. solida, A. erecta, A. spinosa* and *A. matthaii* n. sp. Even among these, *A. solida* and *A. erecta* are of doubtful validity and in future may prove to be only skeletal variants of *A. forbesi*.

KEY TO THE VALID SPECIES OF *ANACROPORA* RIDELY

1.	Surface with conical prominent spines	*A. spinosa* Rheberg
2.	Surface without conical spines	3
3.	Corallites in dendrophylliid pattern both in form and arrangement	*A. matthaii* n. sp.
4.	Corallites not in dendrophylliid pattern	5
5.	Corallites level, pin-hole-like	7
6.	Corallites projecting, bursiform	8
7.	Corallites wide apart, coenenchyme solid	*A. solida* Quelch
8.	Corallites 0.7 to 1 mm in diameter; opening rounded; septa conspicuous, both the cycles complete, primaries generally exsert	*A. forbesi* Ridley
9.	Corallites 0.5 to 0.6 mm in diameter; opening slightly compressed; septa poorly developed, cycles incomplete, primaries generally not exsert	*A. erecta* Bernard

Anacropora matthaii n. sp.
(Plate I A, B)

Material: Holotype : BMNH 92.4.5.42 (8 branches)
Type locality : Dammar Island, East Indies.
Collection : Admirality. Depth: 18 fms (data from BMNH Zoological accession list).

Description: Ramose, branches coalescent, slender, 2.2 to 2.5 mm in thickness in the type; branchlets equal in thickness to the main branches, apices obtuse; lengthiest branch 5.5 mm long. Corallites projecting, wall uniformly elevated on all sides giving a dendrophylliid appearance; height of corallite wall 0.9 to 1.1 mm; distance between adjacent corallites 2.5 to 3 mm; a few corallites slightly more dialated at the base than at the top. Opening 0.8 to 0.9 mm in fully grown corallites; wall very thin and highly porous; septa in two cycles, primaries prominent, thickened at top of wall; one or both the directives larger than others, secondaries spiny, 2 to 6 in numbers, cycle generally complete.

Transverse section of branches shows a central loose laminated reticulum with an outer layer 0.5 mm in thickness in a branch 2.5 mm in diameter; surface coenenchyme with minute granules, between which are present many rounded pores visible under a lens, granules are arranged in longitudinal rows. Pores on the corallite walls are larger than those on branch surface, probably due to filling in as growth proceeds.

Remarks: *Anacropora matthaii* is quite different from any other species previously described under this genus. The slender straight branches with the dendrophylliid pattern of corallites seem to give sufficient justification for proposing this new species. The lack of visible ridges on the wall and branch surface and the absence of a columella totally rules out any affinity with *Dendrophyllia*. The present species is named after the late Professor G. Matthai, whose contributions to our knowledge of scleractnian corals are well known.

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