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SCLERACTINIAN CORALS OF THE ERSTWHILE TRAVANCORE COAST (SOUTHWEST OF INDIA)

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ABSTRACT

Patchy growths of hard corals are found to occur along the coast of erstwhile Travancore at the southwest coast of India. The formation extends from Enayam to Quilon. The most common genus is *Pocillopora* and is represented by five species. Massive genera like *Porites, Favia, Favites, Goniastrea* and *Platygyra* as well as *Leptastrea* are non-conspicuous in this area. The ahermatypes are lillte studied, but from the information gathered during the present study by dredging off Quilon indicates that they are well respresented. A total of 29 species belonging to 17 genera of scleractinians is reported in this work. Out of these, 13 species divided among six genera are hermatypes and the rest, 16 species of 11 genera is ahermatypes. The coral fauna in structure and composition is more related to that of the Gulf of Mannar than Lakshadweep.

INTRODUCTION

THE WESTCOAST of Indian Peninsula is mostly devoid of significant coral formations. However, isolated coral growths have been reported from Malvan, Malpi and Ratnagiri along the deep waters of the northwest coast (Nair and Qasim, 1977; Qasim and Wafer, 1979). A fairly rich patchy growth of coral occurs in the Gulf of Kutch from Okha to Piroton Island in Gujarat Coast (Pillai *et al.*, 1980; Patel, 1978; Pillai and Patel, 1988). During the last 25 years many workers have studied the coral formations and corals of the seas around India including the Lakshadweep, and Andaman and Nicobar Islands. The present investigations have shown that patchy coral growth occurs from Vizhinjam to Muttom (Fig. 1) which was part of the pre-independent Travancore State. Except for a few records of deep-water ahermatypes from the Travancore Coast by Alcock (1893, 1898), there seems to be no record of the coral fauna of this area in literature.

The authors are thankful to Shri P.E. Sampson Manickam, CMFRI, Cochin for permitting us to report on his collection of ahermatypes from off Quilon. They also thank Shri P. Raghavan for the photoprints used in the illustration.

MATERIAL

The material was collected during 1987 to '89 between Vizhinjam and Enayam by the authors. In addition to these, a collection of ahermatypes dredged by FORV *Sagar Sampada* off Quilon (76°22′ to 76°45′E - 08°26′ to 08°35′N) from a depth of 40 to 100 m and provided by Shri P. E. Sampson Manickam is also incorporated in this work.

CORAL FORMATION

The coral formations of erstwhile Travancore State is found between 76°35′ to 77°15′E and 08°50′ to 08°52′N stretching from Kadiyapattanam in the south to Quilon in the

Occurrence : Enayam.

Distribution : Maldives, Lakshadweep, west coast of India, Palau Islands, Marshall Islands, Caroline Islands, Solomon Islands, Cook Islands, Hawaii.

Pocillopora meandrina Dana, 1846 var. ***nobilis*** Verrill (Pl. III B)

Pocillopora meandrina var *nobilis* Vaughan, 1907, p. 98, pl. 14, figs 34, pl. 22, figs. 1-2a (synonymy); Scheer and Pillai, 1974, p. 14 (synonymy).

Colonies range from 15 to 17 cm in greater spread and upto 10 cm in total height. Branches expanding towards top; 5 to 6.5 cm broad 1.5 to 1.7 cm thick at growing edge. Verrucae uniform, rounded, average 2 mm in diameter. Calices 1 to 2 mm in length in polygonal ones and 1 to 2 mm to diamater in circular ones at proximal parts of branches. Septa and columella poorly developed. Broad flattened branches with mostly uniform verrucae is characteristic of this species.

Localities : Vizhinjam, Enayam.

Distribution : Maldives, southwest coast of India, Nicorbar Islands, Philippines, Marshall Islands, Solomon Islands, Japan, Fanning Islands, Tahiti, Hawaiian Islands.

Pocillopora eydouxi Miline Edwards and Haime, 1860 (Pl. IV B)

Pocillopora eydouxi Scheer and Pillai, 1974, p.15, pl. 1, fig.5, pl. 2, figs. 1,2 (synonymy); Pillai, 1986, p. 115, pl.1, fig. 2 (synonymy).

Probably the most abundant species of *Pocillopora* that occurs here. Growth form semiarborescent with stout, subcylinderical branches upto 25 cm in height and 6 to 7 cm in thick at base. Verrucae 2 to 4 mm thick and 2 to 6 mm long. Calices or verrucae about 1.5 in length, polygonal, rounded at base of branches 0.8 to 1 mm in diameter. Septa in two cylces well developed with a distinct columella.

Locality : Enayam, Mulloor.

Distribution : From the western Indian Ocean throughout to Fijii and Hawaii.

ACROPORIDAE Verrill

Acropora Oken, 1815

Three species of this genus are recorded from the area of present study. However, truely arborescent species of this genus are not seen. *A. efflorescens* and *A. hyacinthus* form solid plate like coralla by fusion of the main branches. Though Brook (1893) placed *A. efflorescens* and *A. hyacinthus* in distinct subgenera the relationship of these still remains to be critically studied. An examination of the present specimens shows that there is a possibility that *A. efflorescens* and *A. hyacinthus* are one and same though the degree of development of branchlets shows variation in these two. Some colonies of *A. hyacinthus* also forms solid plate-like coralla as is typical of *A. efflorescens,* but the peripheral branches of the former are better developed. However, we described them here separately as is followed by earlier workers.

Acropora efflorescens (Dana) 1846

Madrepora efflorescens Dana. Brook, 1895, p. 35, *Acropora efflorescens* Scheer and Pillai, 1974, p. 19, pl. 5, fig. 2; Pillai and Scheer, 1976, p. 26, pl.3, fig. 3 (synonymy).

Corallum flattened with solid plates wherein main branches not generally discernible. Upper side with numerous short proliferations about 1 cm in height with a central axial corallite and ascending labellate radial corallites. Axials about 2 mm in diameter 2-3 mm long. Radials, 1-2 mm broad and 2-3 mm long. Twelve septa in axials, radials have poorly developed first cycle.

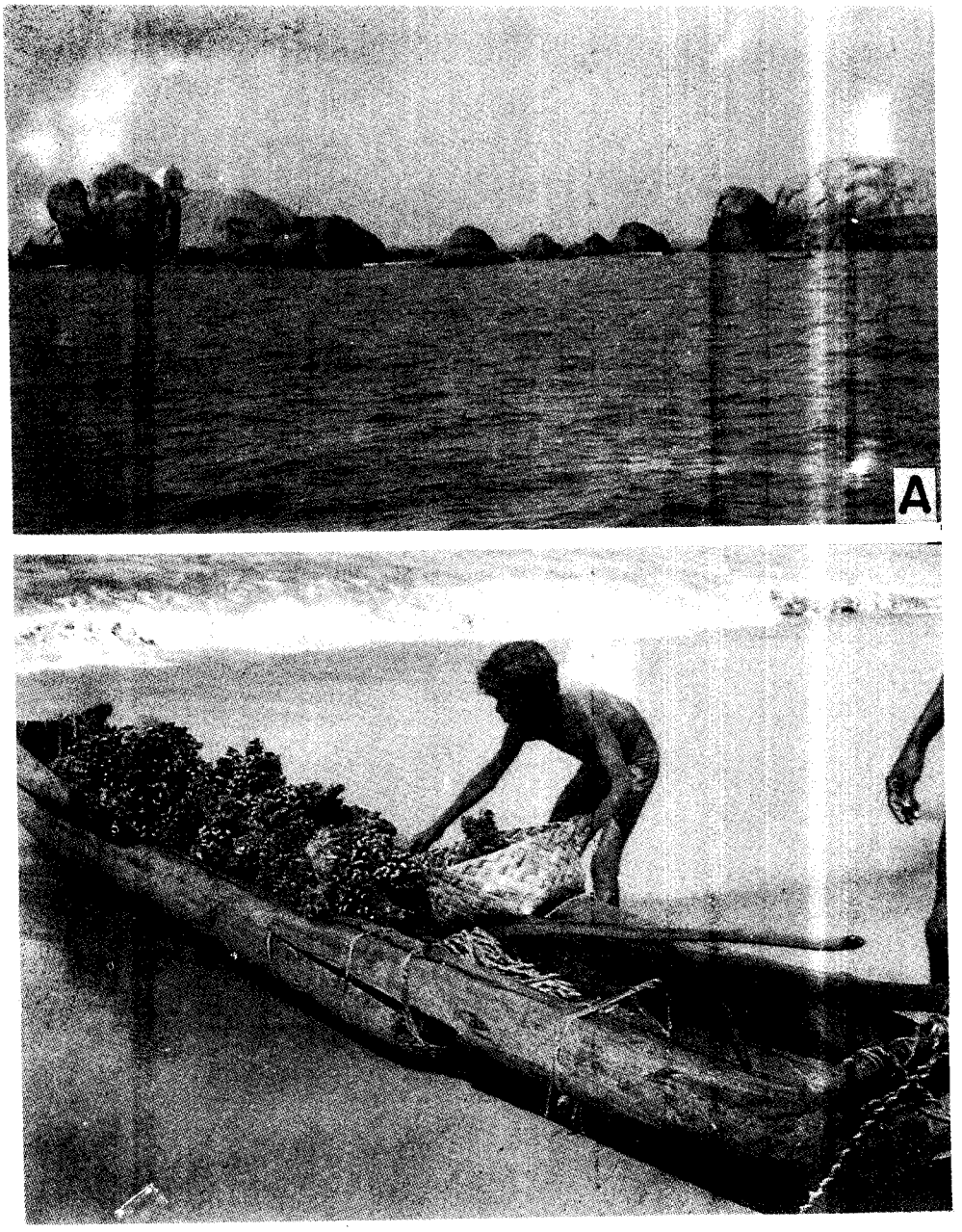
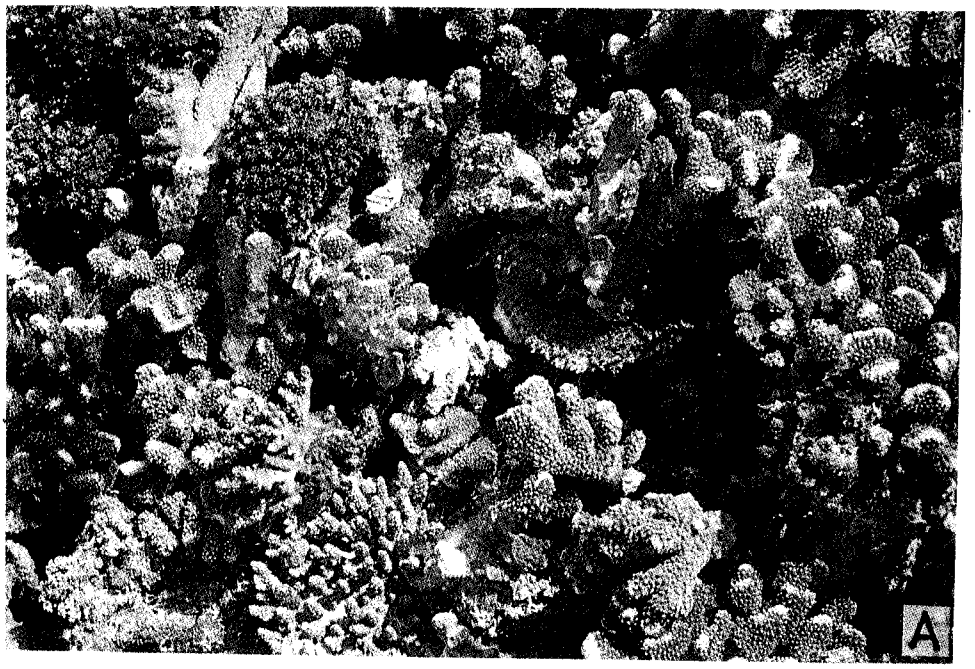


PLATE I A. Enayam rocks around which corals are found to grow and B. Corals collected from Enayam being brought ashore.



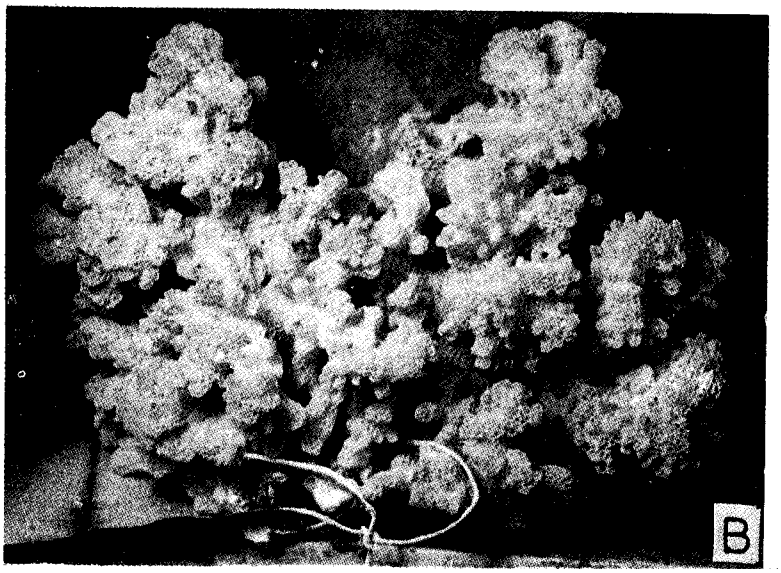


PLATE II A. A view of the exploited corals ready for sale and B. *Pocillopora damicornis* from Enayam (X 0.8).

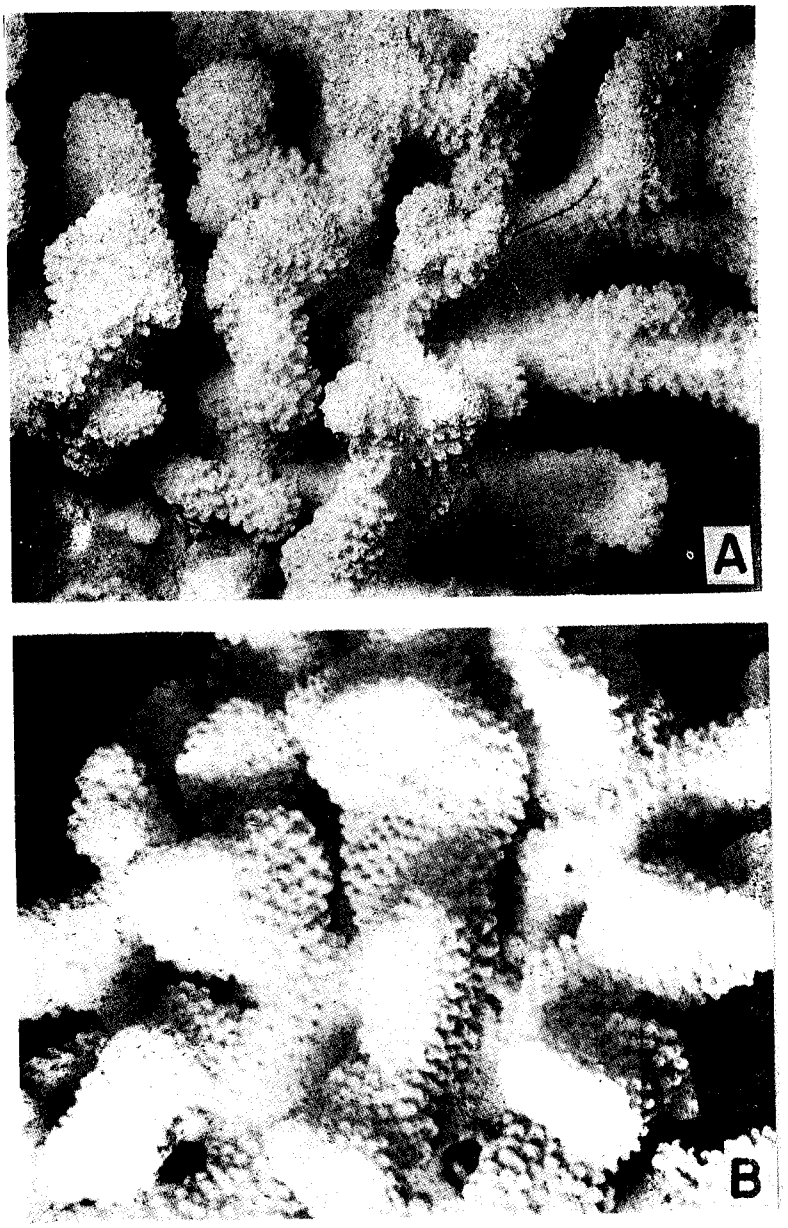


PLATE III A. *Pocillopora ligulata* from Enayam (X 0.8) and B. *Pocillopora meandrina var. nobilis* from Enayam (X 0.8).

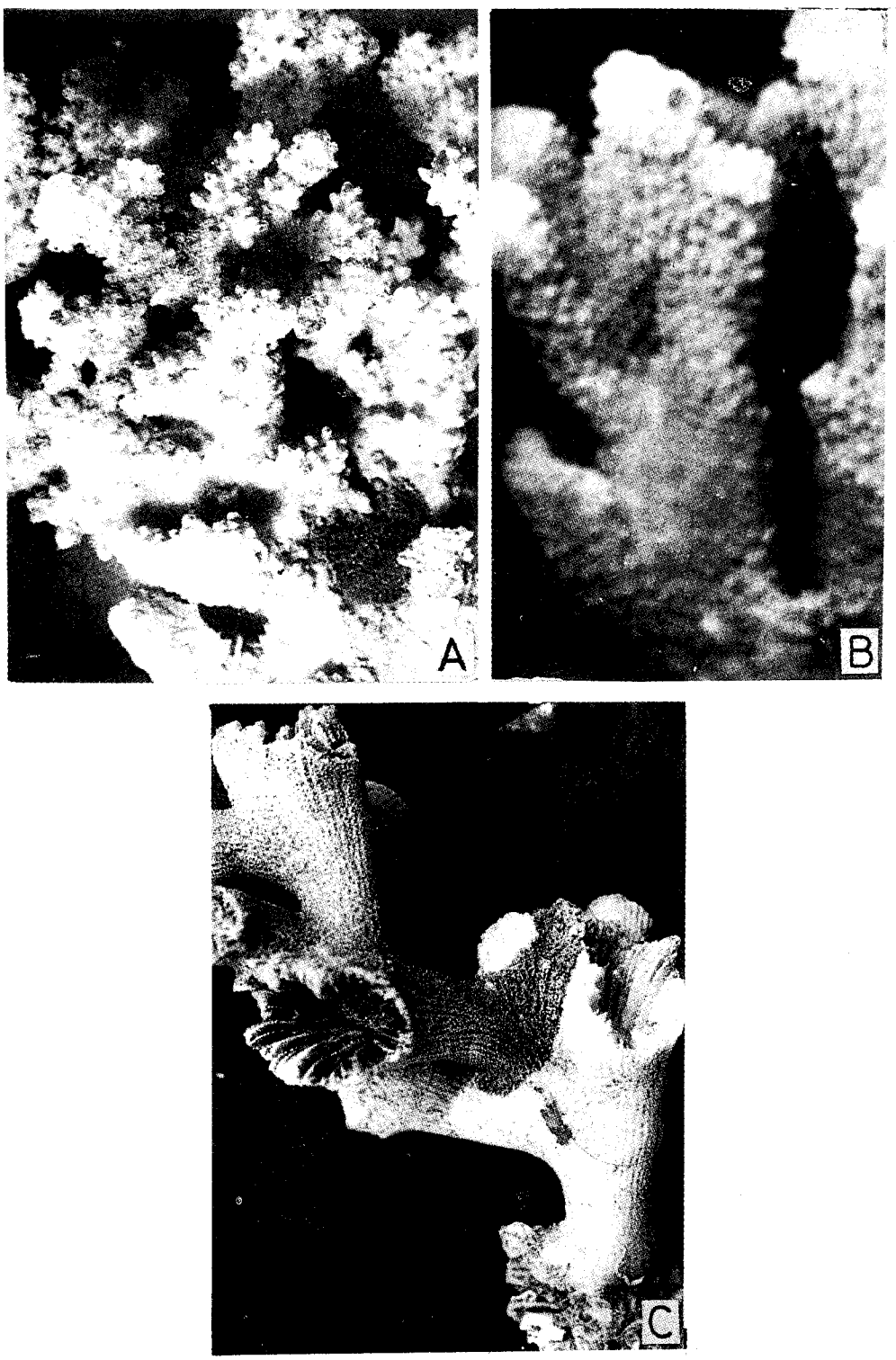


PLATE IV A. *Pocillopora verrucosa* from Mulloor, Vizhinjam (X 0.7), B. *Pocillopora eydouxi* from Mulloor (X 0.7) and C. *Dendrophyllia cornigera* from off Quilon (X 1.9).

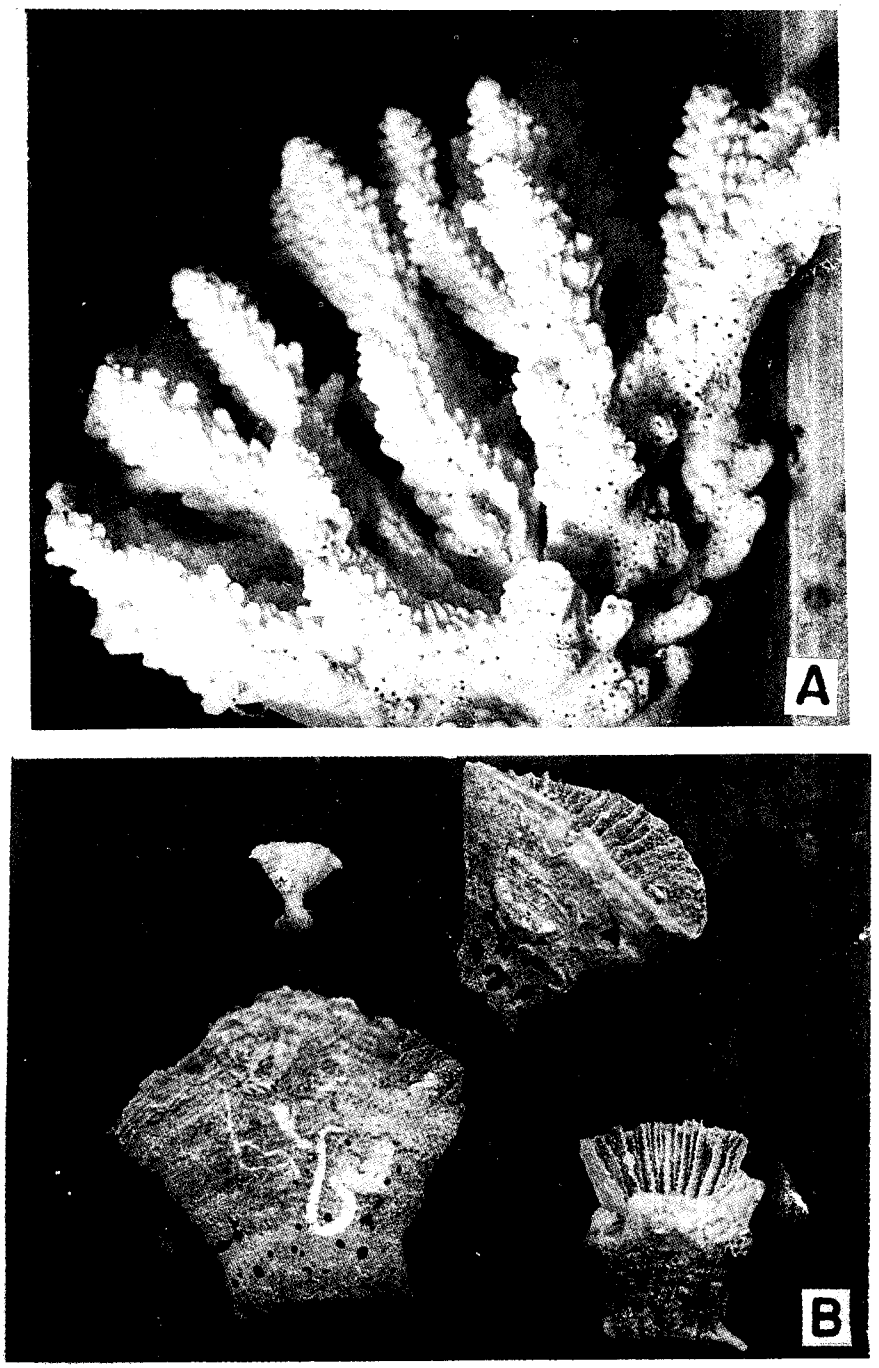


PLATE V A. *Acropora valida* from Enayam (X 0.8) and B. *Flabellum stokesi* off Quilon (X 1.7).

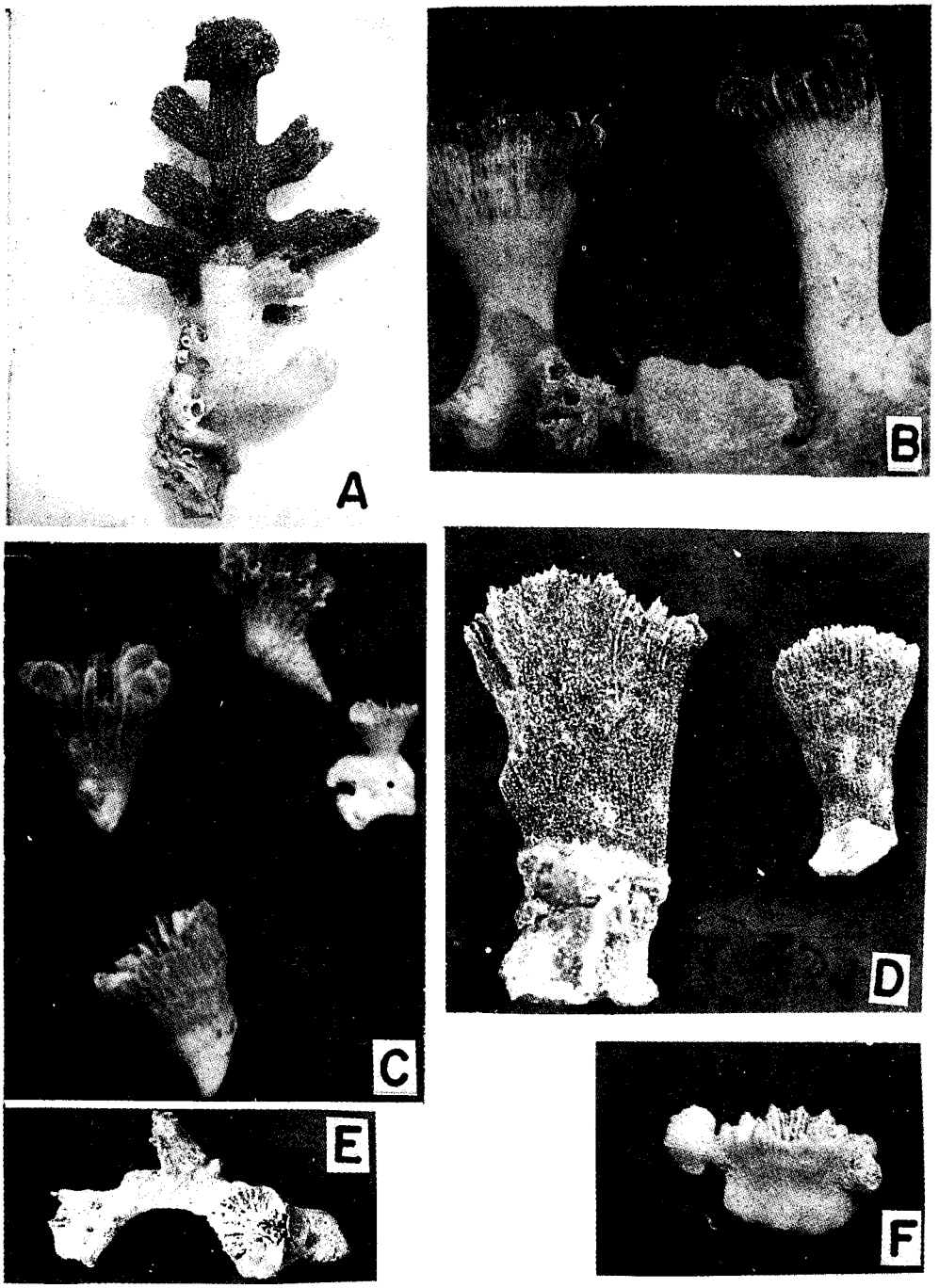


PLATE VI A. *Dendrophyllia miniscula* (X 1.8), B. *Paracyathus stokesi* (X 2), C. *Caryophyllia arcuata* (X 2), D. *Balanophyllia cumingii* (X 1.9), E. *Solenosmilia variabilis* (X 1.9) and F. *Endopachys grayi* (X 2.5). All from off Quilon.

Locality : Enayam.

Distribution : Maldives, Lakshadweep, southwest coast of India, Andaman and Nicobar Islands, Singapore, East Indies.

Acropora hyacinthus (Dana) 1846

Acropora hyacinthus (Dana), Pillai, 1986, p. 122, pl. 5, fig. 1 (synonymy).

Both, Scheer and Pillai (1983) and Pillai (1986) have drawn up a long list of synonymy for this widespread species, based on examination of a large number of specimens from many localities as well as examination of the types of Brook (1893) in British Museum (N.H.), London. Pillai (1986) has also given a detailed description of the species based on specimens from southeast coast of India.

The list of synonyms include *A. cytheria* (though Antonius *et al.*, 1990 treat this separate), *A. armata, A. reticulata, A. patula, A. arcuata, A. pectinata, A. delicatula, A. latistella, A. biferia, A. kenti, A. thurstoni* (all of Brook) and *A. conferta* (Quelch). Veron and Wallace (1984) has also drawn up a long list of synonymy for this species which is more or less in agreement with Pillai (1986) though the latter author has not consulted Veron and Wallace (1984) at the time of writing the atricle. Veron and Wallace (1984) also cited *Acropora surculosa* doubtfully under the list of synonyms of *A. hyacinthus* remarking that 'the name *surculosa* has mostly been used to Great Barrier Reef specimens, but Pillai and Scheer (1976) clearly use it for a separate species (probably *A. millepora*). However, after an examination of Dana's type of *Madrepora surculosa* in USNM and Ehrenberg's type of *Heteropora millepora* in Berlin Museum as well as examination of this species in the field from the Gulf of Mannar, Pillai (1986) has merged *A. surculosa* with *A. millepora.* The affinity of this species to *A. efflorescens* has been already mentioned.

Specimens with solid plate like corallum formed by fusion of main branches. Peripheral branches 5 to 6 cm long, a major distinction observed from specimens we assign to *efflorescens.*

Locality : Enayam.

Distribution : Red Sea to Tuamotu Archipelago.

Acropora valida (Dana) 1846 (Pl. V A)

Acropora valida (Dana) Pillai and Scheer, 1976, p. 29, pl. 7, figs, 3,4; Veron and Wallace, 1984, p. 346, figs. 850-854 (synonymy).

Acropora variabilis (Klz.) Scheer and Pillai, 1983, p. 43, pl. 8, figs. 1, 2 (synonymy); Pillai, 1986, p. 131 (synonymy).

Specimens with a thick encrusting base from which several main branches arise that subdivide to form a caespitose corallum. Upper branchlets 2 to 5 cm long and 1.0 to 1.5 cm thick with tapering apex bearing a large axial corallite. Axial corallite 2 to 4 mm thick at top, more at base. Radials nariform or tubular, arranged more or less in longitudinal rows along axis of branch. Tips of radials beaked with oval openings. Between prominent radials both immersed and subimmersed raidals present. Larger radials 5 to 6 mm long and 2 to 3 mm thick. Wall of radials finely echinulate. Septa in two cycles.

Veron and Wallace (1984) have merged *Acropora variabilis* Klunzinger (type from the Red Sea) with *A. valida* (Dana). They have also included *A. rousseaui* (Milne Edwards and Haime), *A. concinna* (Brook) and *A. dissimilis* (Verrill) under the list of synonymy. However, Scheer and Pillai (1983), based on a study of several specimens from the Red Sea felt that *A. rousseaui* as described and illustrated by Marenzeller from the Red Sea is synonymous with *A. squarrosa* (Ehrenberg).

Locality : Enayam.

Distribution : Red Sea, Maldives, Sri Lanka, Southwest coast of India, Gulf of Mannar, Andaman and Nicobar Islands, Mergui Archipelago, Cocos-keeling Islands, Australia, Philippines, Marshall Islands, Tuamotu Archipelago, Fiji, Samoa and Cook Islands.

Montipora de Blainville, 1830

The genus *Montipora* is known to this area by *M. turgescens* and *M. foliosa.* The former is with *foveolate* and the latter with *tuberculate* coenenchyme. (*sensu* Bernard, 1897; not Veron and Wallace, 1984) coenenchyme.

Montipora turgescens Bernard, 1897

Montipora turgescens Pillai, 1969, p. 418; Scheer and Pillai, 1974, p.14 (synonymy); Pillai, 1986, p. 138; Pillai & Patel, 1988. p. 62. Pl. I B.

Only one specimen, Corallum encrusting surface raised to small hillocks, greater spread 16 cm; thickness at growing edge 5 mm. Calices 0.5 to 0.8 mm in diameter, with a more or less solid thecal wall. Corallites about 1 mm apart. Septa in two cycles, secondaries rudimentary. Coenenchyme around thecal wall swell up forming foveolation in the form of ramparts.

Locality : Enayam.

Distribution : Central Indian Ocean, Lakshadweep (Pillai and Jasmine, 1989). Westcoast of India, Gulf of Mannar, Nicobar Islands, Great Barrier Reef; Solomon Islands, Philippines, Marshall Islands, Ellice Islands (Pillai, 1986).

Montipora foliosa (Pallas)

Montipora foliosa (Pallas) Pillai, 1986, p. 144, pl. 6, fig. 1 (synonymy). Pillai and Patel 1988, p. 63, Pl. 2C, Pillai and Jasmine, 1989, p. 185, fig. 7.

Species characterised by larger foliaceous corallum and colonies may form 1 to 2 m in diameter. However, as pointed out by Pillai (1986) and Pillai and Jasmine (1989) in shallow waters it may form encrustation. A small colony showing typical foliaceous growth was collected from Vizhinjam Harbour. Other specimens are mostly from Enayam rocks, found encrusted on colonies of *Pocillopora* or *Acropora valida* with foliaceous thin growing edges. Either colonies are all young or it may be due to exposure that prevents upward foliaceous growth. Tubercles on upper surface of corallum run together to form long continuous low ridges enclosing calices in valleys. Calices 0.5 to 0.8 mm in diameter. Primary septa well developed, secondaries rudimentary.

Localities : Vizhinjam, Enayam.

Distribution : Indian Ocean and throughout Pacific as far east as New Hebrides. It is hitherto not known from the Red Sea and its ecological equivalent in the Red Sea is *M. erythrae.* It is recently recorded from Lakshadweep by Pillai and Jasmine (1989) and Mombosa Kenya (Pillai, unpubl. observation).

Suborder : FUNGIINA Verrill

Superfamily : *Agariciicae* Gray

Family : *Siderastreidae* de Blainville

Pseudosiderastrea Yabe and Sugiyama, 1933

Pseudosiderastrea tayami Yabe and Sugiyama, 1933.

Pseudosiderastrea tayami Pillai, 1986, p. 151, pl. 8, fig. 3 (synonymy); Pillai and Patel, 1988, p. 63, pl. 9, fig. B.

The species was once collected from Tangassery Reef of Quilon and was reported in detail (Pillai, 1986). Corallum encrusting with polygonal corallites 4 to 6 mm long and

broad. Intercorallite wall thin, acute. Septa 40 to 50 in large corallite which undergo fusion. Generally 12 major septa reach columella. Septal sides with granules, edges serrated. A single ring of synapticula. Columella solid. Asexual reproduction by extratentacular budding.

Locality : Quilon.

Distribution : Western Indian Ocean; Gulf of Kutch, Southwest coast of India, Gulf of Mannar, Andamans, East Indies, Japan.

Superfamily : *Poriticae* Gray

Family : *Poritidae* Gray, 1842

Porites Link

The genus *Porites* which displays encrusting, massive or ramose growthforms form a very dominant element among the hermatypes all over the world. However, it is not found as a common form in the area of the present study. The collection has a single specimen from Enayam which is reported herein. However, a massive dead specimen of a second species was also obtained from Enayam. The Calicular characters are all wornout and a safe identification of this is not possible.

Porites lichen Dana, 1846

Porites lichen Dana, 1846; Pillai, 1986. p. 158 (synonymy).

Corallum encrusting on a dead calcareous alga. Surface level or rising to small gibbosities. Corallites generally polygonal, 0.8 to 1 mm in greater diameter, shallow. Intercorallite wall sometimes absent, thus two to five corallites running together to form small valleys. Septal numbers irregular, pali four, poorly developed.

Locality : Enayam.

Distribution : Western Indian Ocean to Hawaii. From the Indian region it is known from Lakshadweep (Pillai and Jasmine, 1989); west coast of India and the Palk Bay and to the Gulf of Mannar.

Suborder : FAVIINA

Family : *Faviidae* Gregory, 1900

The faviids form a conspicuous element on all reefs in Indo-Pacific represented by many genera. However, as in the case of poritids, they are also not found in any significant manner during the present studies. The authors were able to get a single specimen which is tentatively identified as follows.

Favites Link, 1807

Favites abdita (Ellis and Solander) 1786.

Favites abdita (Ellis and Solander) 1786; Scheer and Pillai, 1983, p.114, pl.28, fig. 6 (synonymy); Pillai, 1986, p. 165, pl. 12, fig. 2 (synonymy).

A small specimen with typical hillocky growthform, and intercorallite wall fused and elevated on one side of corallite. Polygonal corallites range from 5 to 9 mm in greater diameter with 30 to 40 septa and 12 to 15 of them reaching columella. Size of corallites and number of septa relatively smaller than typical specimens described from elsewhere in the Indo-Pacific. Pali present on edges of fused septa reaching columella.

Locality : Vizhinjam.

Distribution : Widespread from Red Sea to Fanning Island in the Indo-Pacific.

Family : *Rhizangiidae* d-Orbigny, 1900

Clandangia Milne Edwards and Haime, 1851

The genus in the extant form is known only from India, though fossil records extend both in Europe and Asia from Tertiary to Recent. A single living species of this genus viz. *C. exüsta* is known.

Cladangia exüsta Lutken, 1873

Cladangia exüsta Lütken Pillai, 1969, pp.410-411. pl. I.

The species was redescribed by Pillai (1969) for the first time since Lütken. A single specimen from Kadiyapattanam. Corallum encrusting with a maximum thickness of 3 mm at growing edges. Corallites circular, level or projecting to a maximum of 5 mm. Adjacent corallites 1 to 5 mm apart. Calices shallow, columella rising to level of thecal rim or only less than 1 mm below level of thecal rim. Septa in three cycles, third fusing to sides of higher cycles. Edges dentate. Same large corallites with upto 40 septa. Columella papillary. Other details were described by Pillai (1969).

Recently, Dr. Bapuji of the Regional Research Laboratory, Bhuvaneswar collected specimens of this species from the Orissa Coast. A fairly large specimen encrusting over some hard substratum, is very heavy, with a metalic sound when tapped. The surface rises into small irregular branches 3 to 5 cm high as in the case of some specimens of *Cyphastrea*. Dr. Bapuji (per. comm.). also informs that the species is fairly common at certain sites in Orissa.

Distribution : India.

Suborder : CARYOPHYLLIINA Gray

Family : *Caryophylliidae* Gray

Subfamily : *Caryophylliinae* Gray

Paracyathus Milne Edwards and Haime, 1848.

Paracyathus stokesi Milne Edwards and Haime, 1848 (Pl. VI B)

Paracyathus stokesi Pillai and Patel, 1988, p. 71, pl. 12C (synonymy).

Twelve specimens; all except one, dredged off Quilon; range from 9 to 22 mm in greater diameter at top. Height ranges from 10 to 28 mm. Calices compressed in larger specimens. Attachment base narrow. Pillai and Patel (1988) described the species from Okha. Calicular characters of present specimens do not display much variation.

Locality : Kadiapattanam, Off Quilon (50 m).

Distribution : Sri Lanka (Gardiner and Waugh, 1938, p. 186). Southwest coast of India, Gulf of Kutch, Puri (Northeast coast of India), Mergui Archipelago.

Paracyathus profundus Duncan

Paracyathus profundus Duncan, 1889, p. 4, p.1, figs. 4-6. Pillai, 1986, p. 183.

A detailed description of this species based on material from the Palk Bay and the Gulf of Mannar is already provided by Pillai (1986). He has also discussed the affinities of this species after an examination of Duncan types in the Indian Museum, Calcutta. Present specimens with a broad base of attachment and corallite almost of uniform diameter from base to top. Total height range from 8 to 15 mm in different specimens and found attached to underside of other hermatypes. Septa range from 45 to 60 depending on calicular diameter all exsert and slightly arched. Septal edges entire sides granular. Three cycles of septa with bi- or trilobed pali. Costae extend to base corallite. Calicular fossae chocolate brown in colour.

The species seem to differ from *P. stokesi* essentially in the growth form. *P. stokesi* with a turbinate corallum and a narrow base of attachment, while in *P. profundus* corallum mostly cylindrical and uniform in thickness from base to top or base slightly more thick than top. The nature of pali also seems to differ. In *P. stokesi* palus on major septa not

lobed and with a deep cleft between upper and lower edges of septa. In *P. profundus*, prominent pali bi- or trilobed. In both species, edges of larger septa entire.

Locality : Kadiyapattanam.

Distribution : Southeast and southwest coast of India, Mergui Archipelago (Type locality).

Caryophyllia Lamarck

The genus *Caryophyllia* is known previously from the southwest coast of India by atleast two species *viz. C. calvus* (= *C. ambroisa* Alcock) and *C. paradoxus* Alcock. The present collection includes a third species *viz. C. arcuata* which is also previously recorded from the deep waters off Mangalore.

Synopsis of Caryophyllia *from the southwest coast of India*

1. Corallum in fused massess, each corallite with a cylindrical peduncle. Septa in five cycles, fifth often incomplete. Larger septa highly exsert ..... *C. paradoxus* Alcock

2. Corallum solitary, cornuate, Septa in five cycles; exsert. Pali 17 to 18 .... *C. clavus* Scacchi

3. Corallum cornuate, solitary. Septa in four cycles. Twelve septa broad and exsert. Pali 11 to 18, poorly developed .... *C. arcuata* MED–H

Caryophyllia arcuata (Milne Edwards and Haime) 1848 (Pl. VI C)

Caryophyllia arcuata (MED-H) Marenzeller, 1904, p.295, pl. 16 figs. 3.3a (synonymy).

Caryophyllia ephyla Alcock, 1898, p.13, pl.1, figs. 4, 4a.

Caryophyllia scyllaemorpha Alcock, 1898, p.13, pl. 1, figs. 3, 3a.

Caryophyllia scobinosa Alcock, 1902, p. 8, pl. 1, figs. 2, 2 a.

Collection includes many specimens. Young ones (5 to 6 mm in calicular diameter) attached to small gastropod or broken bivalve shells, while larger ones (9 to 10 mm in diameter) free with very narrow, often curved pointed based. Corallum, solitary, cornuate, total height range from 4 to 12 mm. Calices slightly elliptical. Septa in four cycles. First and second cycle highly exsert to 1 mm. Edges of septa entire, sides granular. Columella formed of twisted ribbonlike trabecuale and major septa merge with columella. Pali poorly developed and scarcely recognizable. Costae correspond to septa and almost extent to base of corallite.

Locality : Off Quilon (50 m).

Distribution : Lakshadweep (183 cm), Kerala Coast, Off Madras, Mangalore.

Heterocyathus Milne Edwards and Haime

The genus is probably monotypic. Earlier described species such as *H. roussaeanus* Semper, *H. parasiticus* Semper, *H. pulchelles* and *H. oblongatus* Rheberg and *H. woodmasoni* Alcock are all seems only skeletal variations of this solitary caryophyllid coral.

Heterocyathus aequicostatus Milne Edwards and Haime, 1848

Heterocyathus aequicostatus Gardiner, 1904, p. 105, pl. 3, figs. 1-43 (synonymy); Scheer and Pillai, 1974, p. 61, pl. 28, figs. 3,4; Scheer and Pillai, 1983, p.158, pl. 36, Fig. 9 (synonymy) Pillai, 1986, p.186, pl. 13, fig. 4.

Several specimens from 50 m depth of Quilon.

Described in detail by Pillai (1986).

Locality : Off Quilon.

Distribution : Red Sea, Zanzibar, Maldives, Westcoast of India, Nicobar, Gulf of Mannar, China Sea, Philippines.

Subfamily : *Parasmiliinae*

Solenosmilia Duncan 1873

'Dendroid or subphaceloid colonies produced by intratentacular budding. Corallites cylindrical with some granular stereome. Septa relatively few; columella very week; endothecal dissepiments tubular' (Wells, 1956).

Alcock (1898) described *S. jeffreyi* as new species from Travancore Coast from a depth of 787 m. Zibrowius (1974) who made a critical study of the genus opined that *S. jeffreyi* is identical with *S. variabilis* Duncan, 1873 from the Atlantic.

Solenosmilia variabilis (Duncan) 1873 (Pl. VI E)

Solenosmilia variabilis Mosely, 1881, p. 181, pl. 9, figs. 1-5 (synonymy); Marenzeller, 1904, p. 310, pl. 15, figs. 4, 4a. Zibrowius, 1974, p. 768 (synonymy). Scheer and Pillai, 1983, p. 160. *Solenosmilia jeffreyi* Alcock, 1898, p. 27, pl. 3, figs. 3, 3a, 3b.

A small dead branch of a dendroid colony with a total height of 22 mm belongs to this species. Only three corallites, one of which with a small bud. Rim of corallites eroded a bit. Diameter of corallites 5 to 6 m. Calices shallow and elliptical. Septa in four cycles, first three subequal and join columella. Fourth cycle very narrow. Septa slightly projecting into calyx, edges entire and sides granular. Columella conspicuous composed of twisted trabeculae. Costae conspicuous at thecal rim fading on the branches.

Locality : Off Quilon (50 m).

Distribution : Cosmopolitan. Atlantic, Natal Coast, Red Sea, Westcoast of India, Australia.

Family : *Flabellidae*

Flabellum Lesson, 1831

Solitary, free or fixed in early stage, free in adult condition, compressed and fan-shaped. Calicular fossa narrow and deep. Septa numerous with entire wavy edges, sides smooth or granular. Columella feable. Costae present. Wall thin.

Many specimens of a single species. It is cosmopolitan in distribution with a bathymetric range of 3 to 3200 m. Known from Sri Lanka and Maldives.

Flabellum stokesi Milne Edwards and Haime, 1848 (Pl. V B)

Flabellum stokesi MED-H. Scheer and Pillai, 1974, p .62, pl. 29, figs. 1,2 (synonymy).

Flabellum crassum Bourne, 1905, p. 196, pl. 1, figs. 3, 3a figs. Pl. 1, fig. 4 *(Flabellum rubrum* Bourne, non Quoy and Gaimard).

Smallest 8 mm in greater diameter at top with a very narrow peduncle attached to a gastropod shell. Largest 28 mm in greater diameter, lesser 14 mm opening gaped out. Base narrow, corallite compressed from side to side; free. A single spine each on either side of base. Septa in five cycles in large calices. Major septa only slightly exsert, edges entire or crenulated. Sides granular. Axial fossa narrow into which lower part of septa vertically descending. Columella poorly visible. Costae visible in young corallites, covered over by epitheca in adult corallites. Outside bands represents lines of growth.

Locality : Off Quilon, 100 m.

Distribution : Indian Ocean, in the Pacific as far east as Philippines.

Remarks : Squires (1963) has discussed the difference between *F. rubrum* and *F. stokesi.* According to him ephebic stage of *F. rubrum* is attached while the other is free. *F. stokesi* has wings or spines on sides while *rubrum* does not have them. Basal rootlets are present in *rubrum* and is lacking in *stokesi.* According

to Squires (1963) the specimens described by Bourne (1905) under the name *F. rubrum* from Ceylon (Sri Lanka) belongs to *F. stokesi* and not to *rubrum* Quoy and Gaimard.

Suborder : DENDROPHYLLIINA Vaughan and Wells

Family : *Dendrophylliidae* Gray

The family is represented in the collection by the genera *Balanophyllia, Endopachys, Heteropsammia* all of which are solitary and *Dendrophyllia* and *Tubastraea* which are colonial.

Balanophyllia Wood, 1844

About 30 species of this genus are described in literature, many of which are based on limited number of types. The skeletal variations in the various species still need critical assessment and as such many of the species could only be synonym with others. A dozen species of this genus are recorded by various workers from the Central Indian Ocean including Maldives, Ceylon (Sri Lanka), Bay of Bengal and Mergui Archipelago. The present collection includes two specimens and are identified as follows.

Balanophyllia gumingii Milne Edwards and Haime, 1848 (Pl. VI D)

Balanophyllia cumingii Bourne, 1905, p. 209, pl. 2, figs. 7, 7a (synonymy); Gardiner and Waugh, 1939, p. 238, pl. 1, fig. 1. Scheer and Pillai 1983. p. 168, pl. 38, Fig. 8.9 (synonymy).

Corallum solitary compressed. Larger corallite total height 30 mm. Diameter of corallite at the top 30 mm × 9 mm. Basal diameter 10 mm. Second specimen 17 mm high. Top diameter 11 × 7 mm. Base 6 mm thick. Septa in five cycles, primaries and secondaries subequal and projecting into calyx and slightly exsert. Septa narrow and vertically descending to meet columella. At least three cycles reach columella. Fifth cycle units to fourth which in turn units to third. Fossa deep, 7 mm in larger corallite. Columella spongy at bottom of calicular fossa. Costae conspicuous at top of calyx with spinulations.

Distribution : Red Sea, Sri Lanka, West coast of India, East Indies and Philippines.

Endopachys Londsdale, 1845

Characterised with solitary corallum which is compressed from side to side and with wing like expansion of costae along longer axis of corallite. Septa undergo fusion in typical dendrophyllid pattern.

Endopachys grayi Milne Edwards and Haime, 1848 (Pl. VI F)

Endopachys grayi MED. H. Gardiner and Waugh, 1939. p. 241 (synonymy)

Only one specimen from off Quilon. Corallum compressed, free cuneiform expanding towards top. Alation of coaste on either side form wing like expansion. Two small buds present, one on either side of corallite at thecal rim where coastal expansion terminate. Height 8 mm. Diameter of corallite 9 × 6 mm, about 4 mm deep. Total number of septa 44 – primaries and secondaries prominent and most exsert and along with adjoining terteries, they form 12 conspicuous elevations at thecal rim. Edges of major septa entire, those of lower cycles serrated. Fourth cycle of septa unite to third and 24 septa reach columella. Columella at bottom of axial fossa, composed of twisted trabeculae. Costae correspond to septa and extend to base of corallite. Corallum porous.

Distribution : Indian Ocean, East Indies, Philippines, Galapagos, Cocos Island Cosmopolitan.

Heteropsammia Milne Edwards and Haime, 1848

Solitary, overgrowing on small gastropod shells with commensal sipunculid that shows small openings at basal part of corallum. Septa

in dendrophyllid fashion undergoing fusion. Costae non-conspicuous.

Two species of this genus are well defined *viz. H. michelini* characterised by three cycles of highly elevated septa on the thecal rim and *H. cochlea* with only two cycles of elevated septa on thecal rim. For a discussion on affinities of various species reference may be made to Scheer and Pillai (1974).

Heteropsammia cochlea (Spengler) 1871

Heteropsammia cochlea Horst, 1922, p. 66 (synonymy). Horst, 1926, p. 51. Gardiner and Waugh, 1939, p. 242.

Heteropsammia aphrodes Alcock, 1893, p. 145, pl. 5, figs. 9, 9a.

One specimen from off Quilon, solitary, 13 small openings by sipunculid at base. Total height 4 mm. Basal diameter 9 mm. Calyx, 6.5 mm. Septa in four cycles. The primaries and secondaries along with the adjoining higher cycles form 12 conspicuous elevations at top of thecal wall. Columella deep seated. Costae non-recognizable.

Distribution : Persian Gulf, Southwest coast of India. Zanzibar, Sri Lanka, East Indies, Philippines, Australia.

Tubastraea Lesson, 1834

Tubastraea aurea (Quoy and Gaimard) 1833

Tubastraea aurea (Q&G) Scheer and Pillai, 1983, p. 173, pl. 40, figs. 8 (synonymy), Pillai 1986, p. 191, pl. 12, fig. 7 (synonymy); Pillai & Patel 1988, p. 72.

Specimens from Kadiyapattanam. Corallum placoid. 13 corallites in corallum. Corallites 6 to 7 mm in diameter; 7 to 9 mm in height. Calices rounded or oval, 3 to 4 mm deep. Total number of septa varies from 38 to 45 in different calices. Septa little exsert, all steeply descending. Twelve septa reach a rudimentary columella. Costae extend to base of corallites. Living colonies eosine red.

Distribution : Red Sea eastward to Fanning Island.

Dendrophyllia De Blainville, 1830

The genus is characterised by colonial, dendroid or arborescent, colonies formed by extratentacular budding. Corallum porous and costate. Columella trabecular, spongy or honey-comb shaped.

Dendrophyllia indica Pillai, 1969

Dendrophyllia indica Pillai, 1969b, p. 407, pls. 1,2. Pillai, 1986, p. 192.

This species is originally described from Tuticorin. For a detailed description, reference may be made to Pillai (1969 a). Characterised with an arborescent corallum with thick branches. Corallites projecting. About 10 mm in diameter with four cycles septa. Septa narrow and vertically descending with typical dendrophyllid fusion. Columella conspicuous.

One small branch with five corallites dreged off Quilon, is identified with this species. Another specimen from Kadiyapattanam from shallow waters, club-shaped as in paratype described by Pillai (1969 a). Corallites are 5 to 8 mm in diameter with only three cycles of septa in smaller calices.

However, intermediate forms between holotype and paratype has so far not been found. Though septal characters of these two forms more or less same, it is now rather doubtful whether the massive and club-shaped forms really the initial stage of *D. indica* with arborescent growth. However, until more material is obtained they are considered to be one and the same.

Distribution : West coast of India, Gulf of Mannar, Orissa (Bay of Bengal).

Dendrophyllia sp. ef ***cornigera*** (Lamarck), 1816 (Pl. V C)

Dendrophyllia cornigera Marenzeller, 1904, p. 313, pl. 18, fig. 21 (synonymy), Zibrowius, 1980.

p. 172, pl. 87, figs. A to J. (synonymy); Scheer and Pillai, 1983, p. 172, pl. 40, figs. 4, 5.

Arborescent, 20 to 30 cm in height with outwardly directed branches with obliquely ascending corallites average 20 mm in diameter, turbinate and subelliptical. Septa in five cycles the fifth being rudimentary. Columella well developed. Septa exsert, sides granular (Milne Edwards and Haime, 1860).

The present specimen from off Quilon is 5.5 cm in total height with four obliquely placed large corallites bearing smaller bud corallites on sides. Greater diameter of corallites 15 to 17 mm, lesser 8 to 9 mm, compressed; 6-7 mm deep. Septa in five cycles, first three cycles somewhat subequal, exsert (fifth cycle incomplete) narrow and vertically descending. Columella very well formed, projecting at bottom of calyx. Costae conspicuous, granular, intercoastal spaces with many perforations.

D. cornigera has been recorded from the Central Indian Ocean by Horst (1926) and from the Red Sea by Scheer and Pillai (1983). However, Zibrowius (1980) is of the opinion that all records of this species outside Mediterranian waters and Atlantic is based on incorrect identification. The exact position of the specimens including the present so far recorded under the name *D. cornigera* from Indo-Pacific thus remains to be ascertained.

Distribution : Indian Ocean, Red Sea, Amirantee, Maldives, Providence Is., Southwest coast of India, Atlantic, Mediterranean.

Dendrophyllia minuscula Bourne, 1905 (Pl. VI A)

Dendrophyllia minuscula Bourne, 1905, p. 213, pl. 2, fig. 11, 11a. Horst, 1922, p.51, pl.8, fig. 30; Gardiner and Waugh, 1939 (part). Scheer and Pillai, 1983, p. 172, pl. 40, figs. 6,7. Pillai and Patel 1988, p. 72, pl. 9C.

Balanophyllia praecipoa Gardiner and Waugh, 1939, p. 240, pl. 1, fig. 2.

Two specimens from off Quilon. One dead and has a total height of 5.5 cm with a basal thickness of 20 mm. Second specimen 3.8 cm in total height, base 6 mm thick. 12 calices all radiating from central stem. Corallites average 4 mm in diameter, projecting upto 10 mm. Septa in four cycles total range from 24 to 35. Primaries very prominent, exsert forming a crown of six points at thecal rim along with adjacent ones. Columella slightly projecting. Costae prominent.

D. praecipoa Gardiner and Waugh (1939) originally described from Zanzibar (73 to 165 m depth), shows no noteworthy variation from *D. minuscula* to warrant its separation.

Distribution : Zanzibar, Maldives, Sri Lanka, Southwest coast of India, Gulf of Kutch, Andamans, Queensland.

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