

MARINE DEMOSPONGIAE  
OF MAHE ISLAND  
IN THE SEYCHELLES BANK  
(INDIAN OCEAN)

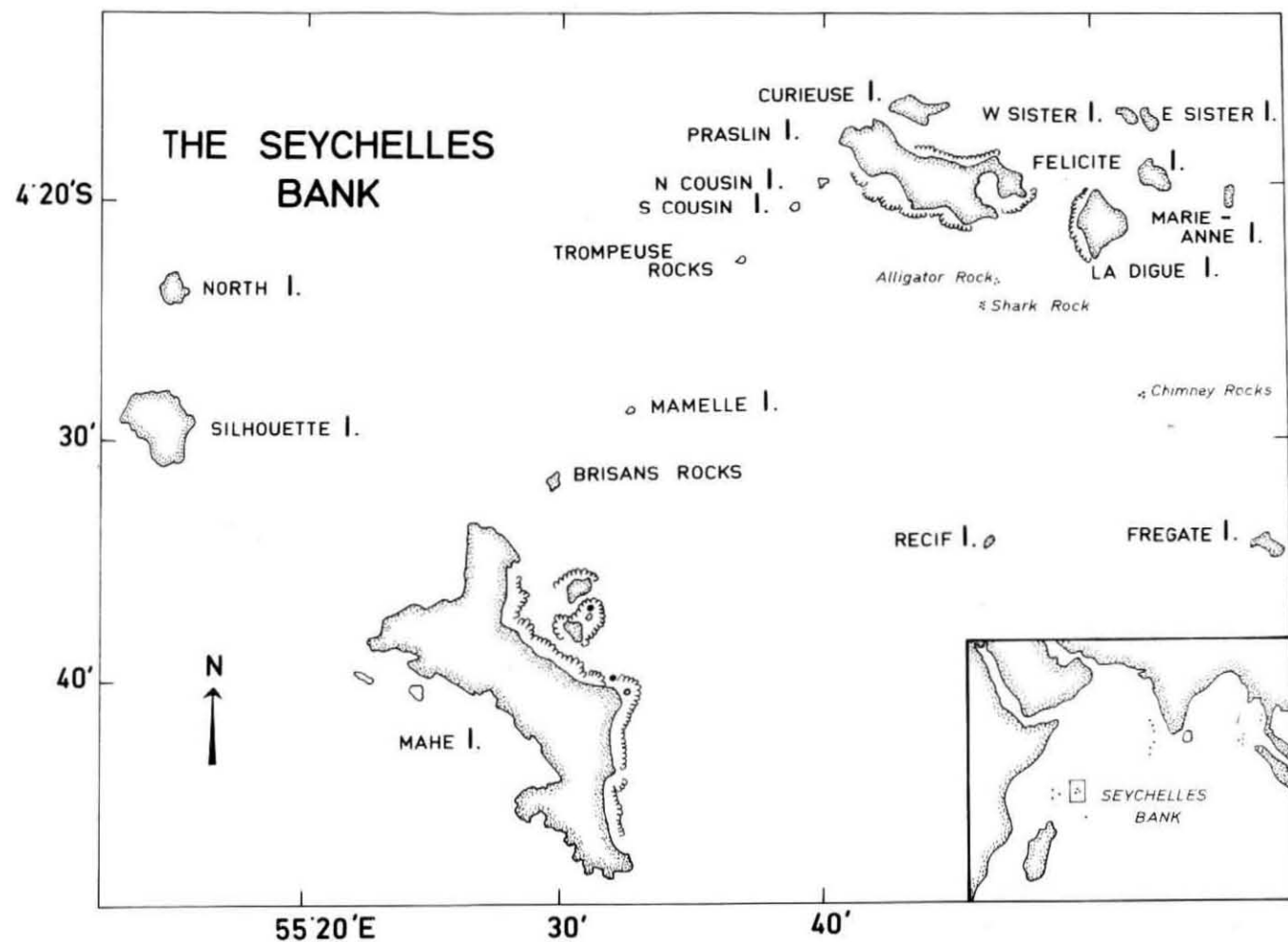
by

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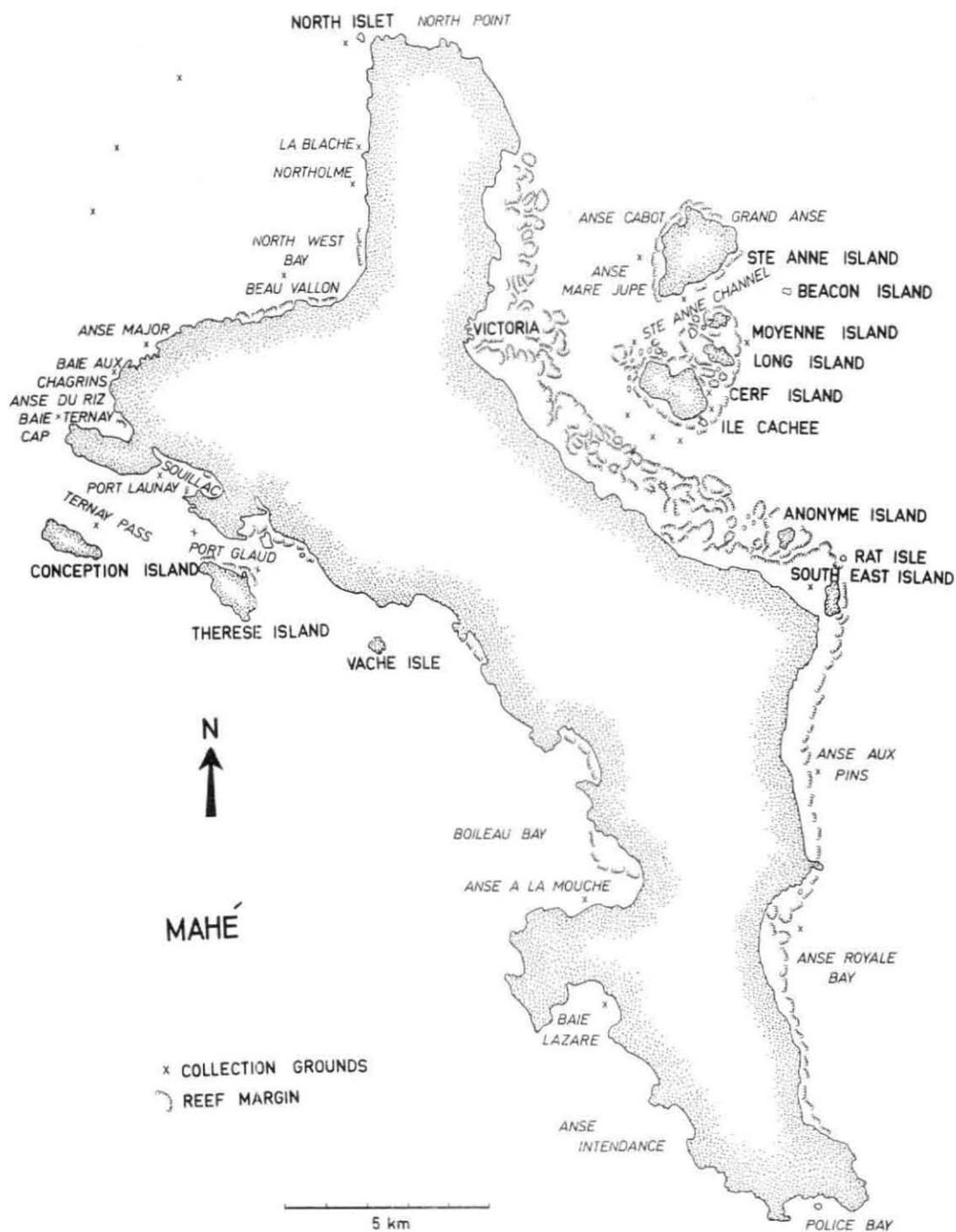
(Central Marine Fisheries Research Institute, Mandapam Camp, South India)

## CONTENTS

	Pages
INTRODUCTION .....	1
LIST OF SPECIES .....	5
GENERAL DISTRIBUTION .....	10
SYSTEMATICS .....	12
Order Keratosida .....	12
Order Haplosclerida .....	18
Order Poeciolosclerida .....	23
Order Halichondrida .....	41
Order Hadromerida .....	48
Order Epipolasida .....	63
Order Choristida .....	73
Order Carnosida .....	83
ACKNOWLEDGEMENTS .....	89
REFERENCES .....	91
PLATES .....	<i>in fine</i>



Map 1. - Enlarged map of the Seychelles Bank showing the distribution of various granitic Islands. Two coralline islands (Bird and Dennis) are outside the map. Inset map shows the geographic position of the Seychelles Bank.



Map 2. - Map of Mahe Island with the collection centres (marked x).



## INTRODUCTION

The present account deals with an extensive collection of sponges made from the Mahe Island in the Seychelles Bank by Prof. J. BOUILLON, Université Libre de Bruxelles, Belgium and kindly placed at my disposal by the authorities of the Musée Royal de l'Afrique Centrale, Tervuren, Belgium (1). Excepting a few the specimens were in a dry condition. A detailed study of the above collection revealed that it is more extensive than any other earlier collection from that area, as it was found to contain 73 species (including one subspecies and a variety) belonging to 56 genera divided among 25 families (Table II). Six specimens could be identified only up to the generic level for want of sufficient material. The following six species viz. *Thorectopsamma seychellensis*, *Jaspis bouilloni*, *J. jonesi*, *Stelletta cylindrica*, *Aurora oxytoxa*, *Acanthocinachyra seychellensis* and a variety *Biemna variantia* (BOWERBANK) var. *seychellensis* are new to science; an additional 46 species and one subspecies of Demospongiae are new records from the Seychelles Bank. Calcarea and Hyalospongiae are not represented in the collection.

The holotypes of the described species are present in the collections of the Musée Royal de l'Afrique Centrale, Tervuren.

The Seychelles Bank (Maps 1, 2) lies about 954 km north of Madagascar and 2,490 km south-west of India. Though the islands in the Bank are mostly confined between 4° and 5° S, the Bank extends between Lat. 3° 4' and 7° 15' S or up to the vicinity of Coetivy Island. The longitudinal extent is from 54° to 57° E. The area of the Bank is about 31,000 sq km and the Bank is within the 100 fathom line.

The islands found here are of two origins - coralline and granitic. Bird and Dennis Islands, at the northern edge of the Bank, are of the former category whereas the others, about 32 in number, are of granitic origin.

The island of Mahe, the largest of the group, is about 28 km long and 5-8 km wide. The terrain ranges from low-lying areas near the mouth of rivers to the two peaks of Morne Seychellois (907 metres) and Trois Frères (724 metres). The rest of the island, for the most part, is covered with thick forest. The

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TABLE I

S. No. 1	Reported as 2	By 3	Revised name 4	Transfer by 5
1	* <i>Carterispongia otahitica</i> (ESPER)	RIDLEY, 1884	<i>Phyllospongia foliascens</i> (PALLAS) typical variety	DE LAUBENFELS, 1948, p. 54
2	<i>Hircinia byssoides</i> (non LAMARCK) (RIDLEY, 1884)	RIDLEY, 1884	Unrecognisable except as <i>Ircinia</i>	DE LAUBENFELS, 1948, p. 76
3	<i>Hircinia</i> sp.	RIDLEY, 1884	Unrecognisable	—
4	<i>Spongelia spinifera</i> SCHULZE	TOPSENT, 1893	<i>Dysidea fragilis</i> (MONTAGU)	BURTON, 1934, p. 583
5	<i>Aplysina fusca</i> RIDLEY (non CARTER, 1880)	RIDLEY, 1884	<i>Verongia crassa</i> (HYATT)	LENDENFELD, 1889, p. 423
6	* <i>Cacospongia cavernosa</i> SCHMIDT	RIDLEY, 1884	<i>Fasciospongia cavernosa</i>	DE LAUBENFELS, 1948, p. 120
7	<i>Reniera rosea</i> (BOWERBANK)	TOPSENT, 1893 DENDY, 1921	<i>Haliclona rosea</i> ?	BURTON, 1956, p. 124
8	<i>R. cribriformis</i> RIDLEY	RIDLEY, 1884 DENDY, 1921	<i>H. cribriformis</i>	BURTON, 1959, p. 218
9	<i>R. camerata</i> RIDLEY	RIDLEY, 1884 DENDY, 1921	<i>H. camerata</i>	BURTON, 1934, p. 531
10	<i>Acervochalina fenitima</i> (SCHMIDT) var.	RIDLEY, 1884	<i>H. minor</i> (ROW)	BURTON, 1934, p. 541 (footnote)
11	* <i>Iotrochota purpurea</i> (BOWERBANK)	DENDY, 1921	<i>I. purpurea</i>	—
12	* <i>I. baculifera</i> RIDLEY	TOPSENT, 1893	<i>I. baculifera</i>	—
13	<i>Cornulella lundbecki</i> DENDY	DENDY, 1921	<i>C. lundbecki</i>	—
14	<i>Acervochalina fenitima</i> (SCHMIDT)	TOPSENT, 1893 (non RIDLEY, 1884; ref. BURTON, 1934, p. 541, footnote)	<i>A. fenitima</i>	—
15	<i>Acervochalina fenitima</i> (SCHMIDT) var.	RIDLEY, 1884 (ref. BURTON, 1934, p. 541, footnote)	<i>Tubulodigitus</i> sp.	—
16	<i>Petrosia seychellensis</i> DENDY	DENDY, 1921	<i>Haliclona seychellensis</i>	BURTON, 1959, p. 219

17	<i>Phloeodictyon seychellensis</i> DENDY	DENDY, 1921	<i>Oceanapia seychellensis</i>	HEREIN
18	<i>P. fistulosa</i> (BOWERBANK)	DENDY, 1921	<i>O. fistulosa</i>	TOPSENT, 1897, p. 467
19	<i>Siderodermella ramosa</i> DENDY	DENDY, 1921	<i>S. ramosa</i>	—
20	<i>Lithoplocamia lithistoides</i> DENDY	DENDY, 1921	<i>L. lithistoides</i>	—
21	* <i>Myxilla incrustans</i> (JOHNSTON)	DENDY, 1921	<i>M. dendyi</i>	BURTON, 1959, p. 231
22	* <i>Clathria frondifera</i> (BOWERBANK)	RIDLEY, 1884	<i>C. frondifera</i>	—
23	* <i>C. procera</i> (RIDLEY)	DENDY, 1921	<i>C. procera</i>	—
24	<i>C. madrepora</i> DENDY	DENDY, 1921	<i>Thalysias madrepora</i>	DE LAUBENFELS, 1936, p. 105
25	<i>Colloclothria ramosa</i> DENDY	DENDY, 1921	<i>Colloclothria ramosa</i>	—
26	<i>Mycale crassissima</i> (DENDY)	DENDY, 1921	<i>M. crassissima</i>	—
27	* <i>Axinella carteri</i> (DENDY)	DENDY, 1921	<i>A. carteri</i>	—
28	<i>Sigmaxinella durissima</i> DENDY var. <i>erecta</i> DENDY	DENDY, 1921	<i>Axinella durissima</i>	BURTON, 1959, p. 259
29	<i>Protoschmidtia hispidula</i> RIDLEY	RIDLEY, 1884	<i>Phycopsis hispidula</i>	DE LAUBENFELS, 1936, p. 70
30	<i>Higginsia petrosioides</i> DENDY	DENDY, 1921	<i>H. petrosioides</i>	—
31	<i>Halichondria panicea</i> JOHNSTON	DENDY, 1921	<i>H. panicea</i>	—
32	<i>H. nigra</i> var. DENDY	DENDY, 1921	<i>H. nigra</i>	—
33	<i>H. aplysinoides</i> DENDY	DENDY, 1921	<i>Trachyopsis aplysinoides</i>	BURTON, 1937, p. 38
34	<i>Hymeniacidon</i> sp.	TOPSENT, 1893	<i>Hymeniacidon</i> sp.	—
35	* <i>Spirastrella vagabunda</i> RIDLEY	DENDY, 1921	<i>S. cuspidifera</i> (LAMARCK)	BURTON, 1959, p. 209
36	<i>Suberites</i> sp.	RIDLEY, 1884	<i>Suberites</i> sp.	—
37	<i>Terpios fugax</i> DUCH. & MICH.	DENDY, 1921	<i>T. fugax</i>	—
38	* <i>Alema seychellensis</i> WRIGHT	WRIGHT, 1881	<i>Tethya diploderma</i> SCHMIDT	BURTON, 1924, p. 1039
		DENDY, 1916		
39	* <i>Donatia ingalli</i> (BOWERBANK)	DENDY, 1916	<i>T. robusta</i> BOWERBANK	BURTON, 1924, p. 1037
40	<i>Tethya cliftoni</i> BOWERBANK	RIDLEY, 1884	<i>T. diploderma</i>	BURTON, 1924, p. 1039
		TOPSENT, 1893		
41	<i>Ecinomeia rotundum</i> SOLLAS	TOPSENT, 1893	<i>E. acervus</i> BOWERBANK	BURTON, 1959, p. 194
42	<i>Aurora rowi</i> DENDY	DENDY, 1916	<i>A. rowi</i>	—
43	* <i>Paratetilla bacca</i> (SELENKA) var. <i>violacea</i> (KIESCHNICK)	DENDY, 1921	<i>P. bacca</i>	BURTON, 1959, p. 200
44	* <i>Samus anonyma</i> GRAY	SOLLAS, 1888	<i>S. anonyma</i>	—
45	<i>Chondrilla australiensis</i> CARTER	DENDY, 1916	<i>C. australiensis</i>	—

\* Species represented in the present collection also.

capital and the principal port, Victoria, is situated on the north-east coast. The eastern side of the island, and some localised areas on the western side are fringed by coral reefs.

Of the other islands, Praslin, La Digue, Félicité, Marie Anne, West Sister, East Sister, Curieuse, North Cousin and South Cousin, are situated at the north-east, and Frigate and Recif at the east of Mahe Island. Bird and Dennis Islands are situated at the north, at a distance of 100 and 88 km respectively.

The sea surface temperature varies from 27.5° to 32° C. Higher temperature is observed during March, April and May whereas figures for October-November are generally lower. Salinity varies very little, highest being 35.5 and lowest, 35.0/00. Other details regarding tides, wave action, pH, etc. are given elaborately by TAYLOR (1968).

In spite of the several expeditions in the Indian Ocean in the past, our knowledge of the sponge fauna of Seychelles is mainly from the work of WRIGHT (1881), RIDLEY (1884) (H.M.S. «Alert»), TOPSENT (1893) and DENDY (1916, 1921) (H.M.S. "Sealark"). About 40 recognisable species of marine sponges from various islands like Mahe, Praslin, La-Digue, etc. have been recorded by the above workers. A list of species hitherto known from the Seychelles Bank including those in the present collection, with their revised names, is appended below (Table I).

TABLE II

LIST OF SPECIES REPRESENTED IN THE PRESENT COLLECTION

(Those marked "P" are reported previously  
from Seychelles Bank.)

Phylum PORIFERA GRANT  
Class DEMOSPONGIAE SOLLAS  
Order KERATOSIDA GRAY  
Family SPONGIIDAE GRAY

1. *Heteronema erecta* KELLER
2. *Hyattella cribriformis* (HYATT)
- P 3. *Phyllospongia foliascens* (PALLAS)
4. *Thorectopsamma seychellensis* n. sp.
- P 5. *Fasciospongia cavernosa* (SCHMIDT)

Order HAPLOSCLERIDA TOPSENT  
Family HALICLONIDAE DE LAUBENFELS

6. *Haliclona retiderma* (DENDY)
7. *H. cribricutis* (DENDY)

Family DESMACIDONIDAE GRAY

- P 8. *Iotrochota purpurea* (BOWERBANK)
- P 9. *I. baculifera* RIDLEY

Family ADOCHIDAE DE LAUBENFELS

10. *Sigmatocia fibulata* (SCHMIDT)
11. *Petrosia nigricans* LINDGREN

Order POECILOSCLERIDA TOPSENT  
Family COELOSPHAERIDAE HENTSCHEL

12. *Oceanapia* sp.

Family PHORBASIDAE DE LAUBENFELS

13. *Echinodictyum clathratum* DENDY  
14. *Damiriana schmidtii* (RIDLEY)

Family CYAMONIDAE DE LAUBENFELS

15. *Cyamon vickersi* (BOWERBANK)

Family MYXILLIDAE HENTSCHEL

- P 16. *Myxilla dendyi* BURTON

Family TEDANIIDAE RIDLEY & DENDY

17. *Tedania anhelans* (LIEBERKUHN)  
18. *Acanthacarnus souriei* LEVI  
19. *Lissodendoryx isodictyalis* (CARTER)  
20. *L. massalis* (DENDY)

Family OPHLITASPONGIIDAE DE LAUBENFELS

- P 21. *Clathria frondifera* (BOWERBANK)  
P 22. *C. procera* (RIDLEY)  
23. *Mycale grandis* GRAY  
24. *M. spongiosa* (DENDY)  
25. *Mycale* sp.  
26. *Zygomycale parishii* (BOWERBANK)

Family AMPHILECTIDAE DE LAUBENFELS

27. *Biemna variantia* (BOWERBANK) var. *seychellensis* new  
28. *Toxemna tubulata* (DENDY)  
29. *Tylodesma truncata* (HENTSCHEL)

Order HALICHONDRIDA VOSMAER  
Family AXINELLIDAE RIDLEY & DENDY

- P 30. *Axinella carteri* (DENDY)  
31. *Axinella* sp.  
32. *Axinella* sp.  
33. *Phakettia conulosa* (DENDY)  
34. *Phycopsis* sp.  
35. *Myrmekioderma granulata* (ESPER)

Family HYMENIACIDONIDAE DE LAUBENFELS

36. *Acanthella cavernosa* DENDY

Order HADROMERIDA TOPSENT  
Family SPIRASTRELLIDAE HENTSCHEL

- P 37. *Spirastrella cuspidifera* (LAMARCK)  
38. *S. inconstans* (DENDY)  
39. *S. pachyspira* LEVI  
40. *Sigmosceptrella laevis* (LINDGREN)  
41. *Timea stellata* (BOWERBANK)  
42. *T. stellivarians* (CARTER)  
43. *T. stelligera* (CARTER)

Family SUBERITIDAE SCHMIDT

44. *Suberites carnosus* (JOHNSTON)  
45. *Pseudosuberites andrewsi* KIRKPATRICK  
46. *Aaptos aaptos* (SCHMIDT)

Family CLIONIDAE GRAY

47. *Amorhinopsis excavans* CARTER  
48. *Aka minuta* THOMAS  
49. *Cliona celata* GRANT  
50. *C. vastifica* HANCOCK  
51. *Thoosa armata* TOPSENT

Order EPIPOLASIDA SOLLAS  
Family JASPIDAE DE LAUBENFELS

- 52. *Prostylyssa oculata* (KIESCHNICK)
- 53. *Jaspis penetrans* (CARTER)
- 54. *J. bouilloni* n. sp.
- 55. *J. jonesi* n. sp.
- 56. *Zaplethea digonoxea* ssp. *diastra* VACELET & VASSEUR

Family SOLLASELLIDAE LENDENFELD

- 57. *Epipolasis salomonensis* (DENDY)

Family TETHYIDAE GRAY

- P 58. *Tethya diploderma* SCHMIDT
- P 59. *T. robusta* BOWERBANK
- 60. *T. japonica* SOLLAS

Order CHORISTIDA SOLLAS  
Family ANCORINIDAE GRAY

- 61. *Ecionemia laviniensis* DENDY
- 62. *Myriastra purpurea* (RIDLEY)
- 63. *Stelletta cylindrica* n. sp.
- 64. *Aurora oxytoxa* n. sp.

Family GEODIIDAE GRAY

- 65. *Geodia lindgreni* (LENDENFELD)

Family CRANIELLIDAE DE LAUBENFELS

- 66. *Cinachyra cavernosa* (LAMARCK)
- 67. *Acanthocinachyra seychellensis* n. sp.
- P 68. *Paratetilla bacca* (SELENKA)

Family KALIAPSIDAE DE LAUBENFELS

- 69. *Discodermia* sp.



Order CARNOSIDA CARTER  
Family HALINIDAE DE LAUBENFELS

70. *Halina plicata* (SCHMIDT)  
71. *Plakortis simplex* SCHULZE  
P 72. *Samus anonyma* GRAY

Family CHONDRILLIDAE GRAY

73. *Chondrilla nucula* SCHMIDT

A perusal of the above given list may prove that out of the 73 species represented in this collection, 53 are recorded for the first time from the Seychelles Bank. Their general distribution in eight widely separated geographical regions, namely, Atlantic Ocean, Mediterranean Sea, Red Sea, Indian Ocean, Australian region (same as Indo-Australian region of H.M.S. Challenger Report (1887, Geographical area No. IV in the Plate), Pacific Ocean, Arctic and Antarctic, is given in Table III.

Most of the species represented here are widely distributed in Indian Ocean. The sponge fauna of Seychelles Bank shows great affinity to that of Australian region. 40 species are common to the Seychelles and Australian region. The next area which has more common with the Seychelles fauna is the Red Sea. There are 29 species common to both these areas; 23 species common to Seychelles and the Pacific Ocean; 14, to Mediterranean Sea; 20, to Atlantic Ocean; 1, to Antarctic and 2, to Arctic.

The following 8 species are rather cosmopolitan in their distribution: 1. *Tedania anhelans* (LIEBERKUHN), 2. *Lissodendoryx isodictyalis* (CARTER), 3. *Suberites carnosus* (JOHNSTON), 4. *Cliona celata* GRANT, 5. *C. vastifica* HANCOCK, 6. *Aaptos aaptos* (SCHMIDT), 7. *Plakortis simplex* SCHULZE and 8. *Chondrilla nucula* SCHMIDT.

BURTON (1930) stressed the importance of water currents in relation to the distribution of sponges in the marine environment. According to BURTON (1932) the study of the current pattern may help in interpreting the natural and well-marked areas of distribution. Indian Ocean at its north and west is bounded by the continents of Asia and Africa respectively, and at the south by cold waters of the west wind drift, which is an impassable barrier for most marine animals. Hence this area forms a closed system of circulatory currents, and here the water currents flow largely from east to west across the southern Indian Ocean. This may be the reason for the large scale spreading of the Australian and west Pacific species to Indian Ocean. The various currents prevailing in the equatorial region as well as the monsoon currents sweeping the continental shelves may also be responsible for the extensive distribution of sponges found in the Indian Ocean.

TABLE III  
GENERAL DISTRIBUTION OF THE SPECIES REPRESENTED  
IN THE PRESENT COLLECTION

S. No. 1	Species 2	A.O. 3	M.S. 4	R.S. 5	I.O. 6	A.R. 7	P.O. 8	E. 9
1	<i>Heteronema erecta</i> KELLER	—	—	×	×	—	×	—
2	<i>Hyattella cribriformis</i> (HYATT)	×	—	×	×	×	—	—
3	<i>Phyllospongia foliascens</i> (PALLAS)	—	—	×	×	×	×	—
4	<i>Thorectopsamma seychellensis</i> n. sp.	—	—	—	×	—	—	—
5	<i>Fasciospongia cavernosa</i> (SCHMIDT)	—	×	×	×	×	—	—
6	<i>Haliclona retiderma</i> (DENDY)	—	—	—	×	—	—	—
7	<i>H. cribriculis</i> (DENDY)	—	—	—	×	—	—	—
8	<i>Iotrochota purpurea</i> (BOWERBANK)	—	—	—	×	×	×	—
9	<i>I. baculifera</i> RIDLEY	×	—	×	×	×	×	—
10	<i>Sigmatocia fibulata</i> (SCHMIDT)	×	×	—	×	×	—	—
11	<i>Petrosia nigricans</i> LINDGREN	—	—	×	×	×	—	—
12	<i>Oceanapia</i> sp.	—	—	—	×	—	—	—
13	<i>Echinodictyum clathratum</i> DENDY	—	—	—	×	—	—	—
14	<i>Damiriana schmidtii</i> (RIDLEY)	—	—	×	×	×	×	—
15	<i>Cyamon vickersi</i> (BOWERBANK)	×	—	—	×	—	—	—
16	<i>Myxilla dendyi</i> BURTON	—	—	—	×	—	—	—
17	<i>Tedania anhelans</i> (LIEBERKÜHN)	×	×	×	×	×	×	—
18	<i>Acanthacarnus souriei</i> LÉVI	×	×	—	×	—	—	—
19	<i>Lissodendoryx isodictyalis</i> (CARTER)	×	×	×	×	×	×	—
20	<i>L. massalis</i> (DENDY)	—	—	—	×	—	—	—
21	<i>Clathria frondifera</i> (BOWERBANK)	—	—	×	×	×	—	—
22	<i>C. procera</i> (RIDLEY)	—	—	×	×	×	—	—
23	<i>Mycale grandis</i> GRAY	—	—	×	×	×	—	—
24	<i>M. spongiosa</i> (DENDY)	—	—	—	×	×	—	—
25	<i>Mycale</i> sp.	—	—	—	×	—	—	—
26	<i>Zygomycale parishii</i> (BOWERBANK)	×	—	—	×	×	×	—
27	<i>Biemna variantia</i> (BOWERBANK) var. <i>seychellensis</i> new	—	—	—	×	—	—	—
28	<i>Toxemna tubulata</i> (DENDY)	×	—	—	×	×	—	—
29	<i>Tylodesma truncata</i> (HENTSCHEL)	—	—	—	×	×	—	—
30	<i>Axinella carteri</i> (DENDY)	—	—	×	×	—	—	—
31	<i>Axinella</i> sp.	—	—	—	×	—	—	—
32	<i>Axinella</i> sp.	—	—	—	×	—	—	—
33	<i>Phakettia conulosa</i> (DENDY)	—	—	—	×	—	—	—
34	<i>Phycopsis</i> sp.	—	—	—	×	—	—	—
35	<i>Myrmekioderma granulata</i> (ESPER)	—	—	—	×	×	×	—
36	<i>Acanthella cavernosa</i> DENDY	—	—	—	×	—	—	—
37	<i>Spirastrella cuspidifera</i> (LAMARCK)	—	×	×	×	×	×	—
38	<i>S. inconstans</i> (DENDY)	—	—	×	×	×	×	—
39	<i>S. pachyspira</i> LÉVI	—	—	×	×	—	—	—

S. No. 1	Species 2	A.O. 3	M.S. 4	R.S. 5	I.O. 6	A.R. 7	P.O. 8	E. 9
40	<i>Sigmosceptrella laevis</i> (LINDGREN)	—	—	—	x	x	—	—
41	<i>Timea stellata</i> (BOWERBANK)	x	x	—	x	x	—	—
42	<i>T. stellivarians</i> (CARTER)	—	—	—	x	—	—	—
43	<i>T. stelligera</i> (CARTER)	x	—	—	x	—	—	—
44	<i>Suberites carnosus</i> (JOHNSTON)	x	x	x	x	x	x	Ar
45	<i>Pseudosuberites andrewsi</i> KIRKPATRICK	—	—	—	x	x	—	—
46	<i>Aaptos aaptos</i> (SCHMIDT)	x	x	x	x	x	x	—
47	<i>Amorphinopsis excavans</i> CARTER	—	—	—	x	x	—	—
48	<i>Aka minuta</i> THOMAS	—	—	—	x	—	—	—
49	<i>Cliona celata</i> GRANT	x	x	x	x	x	x	Ar
50	<i>C. vastifica</i> HANCOCK	x	x	x	x	x	x	—
51	<i>Thoosa armata</i> TOPSENT	x	—	x	x	—	—	—
52	<i>Prostylyssa oculata</i> (KIESCHNICK)	—	—	—	x	x	—	—
53	<i>Jaspis penetrans</i> (CARTER)	—	—	—	x	—	—	—
54	<i>J. bouilloni</i> n. sp.	—	—	—	x	—	—	—
55	<i>J. jonesi</i> , n. sp.	—	—	—	x	—	—	—
56	<i>Zaplethea digonoxea</i> ssp. <i>diastra</i> VACELET & VASSEUR	—	—	—	x	—	—	—
57	<i>Epipolasis salomonensis</i> (DENDY)	—	—	—	x	—	—	—
58	<i>Tethya diploderma</i> SCHMIDT	x	—	x	x	x	x	—
59	<i>T. robusta</i> BOWERBANK	—	—	x	x	x	x	—
60	<i>T. japonica</i> SOLLAS	—	—	x	x	x	—	—
61	<i>Ecionemia laviniensis</i> DENDY	—	—	—	x	—	—	—
62	<i>Myriastria purpurea</i> (RIDLEY)	—	—	x	x	x	x	Ant
63	<i>Stelletta cylindrica</i> n. sp.	—	—	—	x	—	—	—
64	<i>Aurora oxytoxa</i> n. sp.	—	—	—	x	—	—	—
65	<i>Geodia lindgreni</i> (LENDENFELD)	—	—	—	x	x	—	—
66	<i>Cinachyra cavernosa</i> (LAMARCK)	—	—	x	x	x	x	—
67	<i>Acanthocinachyra seychellensis</i> n. sp.	—	—	—	x	—	—	—
68	<i>Paratetilla bacca</i> (SELENKA)	—	—	x	x	x	x	—
69	<i>Discodermia</i> sp.	—	—	—	x	—	—	—
70	<i>Halina plicata</i> (SCHMIDT)	—	x	—	x	x	—	—
71	<i>Plakortis simplex</i> SCHULZE	x	x	x	x	x	x	—
72	<i>Samus anonyma</i> GRAY	x	—	—	x	x	x	—
73	<i>Chondrilla nucula</i> SCHMIDT	x	x	x	x	x	x	—

A.O. : Atlantic Ocean; M.S. : Mediterranean Sea; R.S. : Red Sea; I.O. : Indian Ocean; A.R. : Australian region; P.O. : Pacific Ocean; E. : Elsewhere. x : present; — : absent.

## SYSTEMATICS

### Order KERATOSIDA GRANT

Sponges devoid of proper mineral skeleton. Foreign inclusions (sand grains, spicules of other sponges, etc.) may get incorporated in varying degrees.

### Family SPONGIIDAE GRAY

Skeleton reticulate with elastic spongin. Surface conulose, conules correspond to the tips of main fibres.

#### KEY TO THE SUBFAMILIES OF SPONGIIDAE

1. Fibres without axial specialisation or stratification. Spongin elastic ..... *Spongiinae*
2. Fibres markedly stratified and with axial specialisation. Spongin not elastic ..... *Verongiinae*

### Subfamily *Spongiinae* DE LAUBENFELS

Following genera are represented in the present collection : 1. *Heteronema* KELLER, 2. *Hyattella* LENDENFELD and 3. *Phyllospongia* EHLERS.

Of the 3 above-mentioned genera the first two are devoid of any sand cortex whereas the third possesses it.

### Genus *Heteronema* KELLER

#### *Heteronema erecta* KELLER (Pl. I, Figs 1, 1A; Pl. VI, Fig. 3)

*Heteronema erecta* KELLER, 1889, p. 340, p. 20, figs 4, 7, 8. BERGQUIST, 1965, p. 129, fig. 2 (Synonymy). THOMAS, 1968 (under publication).

*Duriella nigra* ROW, 1911, p. 370, pl. 41, fig. 29. BURTON, 1937, p. 43.

*Thoractopsamma mela* DE LAUBENFELS, 1954, p. 29, fig. 15; pl. 8, fig. 6. DE LAUBENFELS, 1955, p. 138.

*Material* : 87 bits ranging in size from 20-40 mm (MT 1356) (1).

*Description* : Body encrusting; with digitate branches arising from older parts. Branches with diameter varying between 8 to 12 mm, but may rarely fuse together and form irregular or ring-like growth here and there.

*Colour* : Dark brown or black when dry.

*Consistency* : Hard and incompressible.

Surface conulose, conules 1 to 2 mm high and at an interval of 2 to 3 mm; tips blunt. In the older parts the conules are very small.

The oscules small, 1-2 mm in contracted state.

The ectosome is densely charged with brown pigment granules.

The dermal skeleton is composed of well developed fibres connecting the tips of adjacent conules. Main skeleton consists of primaries radiating towards the surface. These primaries are cored with sand grains in enormous quantities and hence, at some places, the whole reticulation appears to be a mass of sand grains. These primaries are connected together by secondaries which are also equally cored by sand grains. But fibres without sand grains, to a considerable distance, are also rarely noted. Primaries have an average diameter of 0.2 mm and connectives, 0.11 mm. Spongin pale yellow in colour.

*Distribution* : Red Sea, Indian Ocean, Pacific Ocean.

#### Genus *Hyattella* LENDENFELD

#### *Hyattella cribriformis* (HYATT) (Pl. I, Fig. 2)

*Stelospongos cribriformis* HYATT, 1877, p. 531.

*Hyattella cribriformis* DE LAUBENFELS, 1948, p. 39 (Synonymy). THOMAS, 1968 (under publication).

*Material* : 10 specimens (MT 1345, 1377).

*Description* : Body thickly encrusting on hard objects or tubular and repent. Surface smooth or honey-combed; the entire surface is covered by dermal membrane which is punctured here and there. Interior cavernous and often with an

(1) MT : Registration number in the collections of the Musée Royal de l'Afrique Centrale.

axial cavity. In the present collection there are a number of specimens where only fibres are preserved.

The largest specimen (of washed out group) has a size of 160 mm x 130 mm and a height of 80 mm. It was thickly encrusting.

*Colour* : Dark brown when dry.

*Consistency* : Hard and slightly compressible.

The surface is minutely conulose, conules 0.2 to 1 mm high and give a velvety appearance to the surface.

The dermal membrane is semi-transparent and detachable. Foreign particles are abundantly represented in some parts.

The skeleton is composed of a well developed reticulation of primaries and connectives. Arenaceous objects are present only in the primaries. Diameter of a primary fibre may vary from 0.05 to 0.1 mm. These primaries ultimately end in the surface conules, and in some cases two or more unite together and form compound conules. Connectives may vary considerably in diameter (0.05 to 0.09 mm). Meshes are rectangular or rounded. Spongin is pale amber coloured.

*Distribution* : Atlantic Ocean, Red Sea, Indian Ocean, Australian region.

### Genus *Phyllospongia* EHLERS

*Carterispongia otahitica* reported from Seychelles (RIDLEY, 1884) is, according to DE LAUBENFELS (1948), *P. foliascens* (typical variety).

### *Phyllospongia foliascens* (PALLAS)

(Pl. I, Fig. 4; Pl. VI, Figs 1, 2, 4)

*Spongia foliascens* PALLAS, 1766, p. 395.

*Phyllospongia foliascens* LENDENFELD, 1889, p. 196, pl. 5, fig. 3; pl. 6, figs 1, 3, 4, 10; pl. 7, fig. 11; pl. 14, fig. 2; pl. 24, fig. 6 (Synonymy). BERGQUIST, 1965, p. 131, figs 3, 3a, 3b (Synonymy). THOMAS, 1968 (under publication).

*Carterispongia foliascens* BURTON, 1934, p. 573.

*Phyllospongia lekanis* DE LAUBENFELS, 1954, p. 15, fig. 7; pl. 3, fig. b.

*Material* : Two specimens (MT 1376).

*Description* : Sponge attached to the base by a short peduncle, and body broadly expands to form a funnel. Largest specimen has a funnel diameter of 85 mm. The other specimen is an auricular one with a maximum width of 70 mm to the funnel. Thickness of the lamella, 2 mm average.

*Colour* : White when dry.

*Consistency* : Leathery.

Oscules are not visible. Pores minute, 0.028 mm diameter, and are situated just above the subdermal canals. Subdermal canals extensive and narrow, 0.5 to 0.9 mm wide and continuous. The ramifications of the subdermal canals give a characteristic appearance to the surface.

Dermal region is loaded with sand, which may get peeled off at places exposing the extensive cavities beneath.

The skeletal arrangement has been described in detail by previous workers (LENDENFELD, 1889; WILSON, 1925; BERGQUIST, 1965; DE LAUBENFELS, 1954).

*Distribution* : Red Sea, Indian Ocean, Australian region, Pacific Ocean.

#### Subfamily **Verongiinae** DE LAUBENFELS

Two genera, *Thorectopsamma* BURTON and *Fasciospongia* BURTON, are represented in the present collection.

#### Genus **Thorectopsamma** BURTON

##### **Thorectopsamma seychellensis** n. sp. (Pl. I, Figs 3, 3A; Pl. VI, Figs 5, 6)

*Material* : Eight specimens (branches), probably parts of one or two complete specimens (CMFRI Nos. 126 & 127). Holotype MT 1403, paratypes MT 1404.

*Description* : Body composed of tubular branches with diameter varying between 15 to 25 mm. Body wall 1 to 3 mm thick. In some cases these branches may fuse together basally forming a compact mass; branches may grow erect or fall down on the substratum and grow.

Largest specimen has 160 x 80 mm size (MT 1403, type). Here several branches are fused together to form a compact mass. Largest individual branch is 120 x 20 mm in size (MT 1404).

*Colour* : Dark brown when dry.

*Consistency* : Rather hard but slightly compressible.

Oscules are usually seen on erect branches, at the terminal part, in groups of 3 to 8. Diameter, 1 to 3 mm. Pores are not traceable.

The surface is conulose, conules low, 1 to 1.5 mm high and 2 to 3 mm apart. Generally conules are more pointed and long when they are at the actively growing parts of the specimen.

The ectosome is well developed, with an average thickness of 0.11 mm. Sand grains are rarely met with in some parts.

The skeleton is composed of a well developed reticulation of rectangular meshes. Meshes 1 to 2 mm in greatest width. Fibres run vertically up along the inner side of the wall and curve out towards the peripheral part. The primary fibres with a diameter varying between 0.18 to 0.56 mm divide, and each branch thus formed ends in the surface in a conule. These primary fibres are connected together by secondaries in a scalariform pattern. Secondary fibres are considerably smaller than the primaries (0.18 to 0.28 mm). Spongin is pale amber coloured and distinctly laminated. Normally primaries are densely cored with sand grains and other objects, and in some places these inclusions may even conceal the spongin outside. The secondaries are cored in varying degrees. In some places there may not be sand grain inside the fibre. But detailed examination revealed that a uniform and continuous core inside the secondaries is a more common phenomenon than an exception.

There is no definite dermal skeleton. But the connectives found at the vicinity of the conule usually have smaller diameter when compared to those of the deeper parts. They may have an average diameter of 0.13 mm and are heavily cored by sand grains. They support the dermal membrane.

The genus *Thorectopsamma* is created by BURTON (1934) with type, *T. irregularis* from Australia. The characteristic feature of the type is the presence of laminated fibres, of which both primaries and secondaries are cored by foreign material. *T. irregularis* is irregularly massive in shape. Primary fibres have a diameter of 0.2 mm and secondaries, 0.120 mm.

The present species differs from *T. irregularis* in the following respects : 1. larger fibres; 2. tubular body pattern.



There is no dermal skeleton for BURTON's species but in the present specimen, there is slight demarcation between the secondaries of the deeper parts and of dermal parts, which again is something peculiar for the present new species.

### Genus **Fasciospongia** BURTON

Only one species is represented in the present collection (*F. cavernosa* (SCHMIDT)). A previous record of this species from Seychelles is that of RIDLEY (1884) (as *Cacospongia cavernosa*).

#### **Fasciospongia cavernosa** (SCHMIDT) (Pl. I, Fig. 5)

*Cacospongia cavernosa* SCHMIDT, 1862, p. 28.

*Fasciospongia cavernosa* DE LAUBENFELS, 1948, pp. 119, 120-123 (Synonymy).  
THOMAS, 1968 (under publication).

*Material* : A small bit (MT 1386).

*Description* : The present specimen is only a small fragment of a lamellar branch. Size 40 x 30 mm and thickness of the lamella, 15 mm.

*Colour* : Pale grey.

*Consistency* : Fibrous.

Surface conulose, conules 1 to 2 mm high and 1 to 2 mm apart. Ridges connecting the adjacent conules cut the surface into deep rectangular depressions.

Oscules marginal, 1-2 mm in diameter and compound. Pores small, in groups and highly contractile.

The ectosome and endosome are not differentiated well from each other.

The skeleton is a well developed reticulation of stout primary fibres running towards the surface and ending in the conules. Main fibres have a diameter varying between 0.28 to 0.37 mm and are cored by sand grains, foreign spicules, etc. Secondaries have a diameter between 0.09 to 0.13 mm and are devoid of any inclusion. In between the meshes are found slender fibres of 0.037 mm diameter. Meshes become irregular in the interior. Fibres are distinctly laminated.

*Distribution* : Mediterranean Sea, Red Sea, Indian Ocean, Australian region.

Order HAPLOSCLERIDA TOPSENT

Families represented in the collection are the following : 1. Haliclونidae DE LAUBENFELS, 2. Desmacidonidae GRAY and 3. Adociidae DE LAUBENFELS.

Family HALICLONIDAE DE LAUBENFELS

Genus *Haliclona* GRANT

*Haliclona retiderma* (DENDY)

(Pl. I, Fig. 11)

*Halichondria retiderma* DENDY, 1921, p. 38, pl. 2, fig. 5; pl. 12, figs 7 a, b.

*Material* : Five specimens (MT 1384) (CMFRI - S. 14).

*Description* : Body massive, attached to the substratum by a broad base. Largest specimen has a size of 30 x 25 mm.

*Colour* : Pale yellow, when dry.

*Consistency* : Hard and friable. Surface uniform.

*Ectosome* : Consists of a well developed reticulation of oxeas. Spongin scarcely visible. Meshes rectangular, the interspaces of which are usually intersected by oxeas distributed either singly or in groups. Pores minute, oval; average diameter, 0.23 mm.

The canals are found running up to the surface, where they get blocked by the dermal reticulation as in *Petrosia testudinaria* (LAMARCK). Main fibres are well developed towards the outer part whereas in the interior they form ill-defined bands. Their diameter varies from 0.063 to 0.126 mm, and mesh size from 0.28 to 0.56 mm. Concentrically laid "brown material", as in *Orina sagittaria* (SOLLAS), is present in these specimens also.

*Spicules* : Oxeas. Uniformly curved in most, but younger forms slightly angulated. Size 0.161 to 0.422 (0.378 mm) (1) x 0.008 to 0.017 (0.012 mm).

*Distribution* : Indian Ocean.

*Haliclona cribricutis* (DENDY)

(Pl. I, Fig. 12; Pl. VI, Fig. 8)

*Reniera cribricutis* DENDY, 1921, p. 32, pl. 3, figs 1 a, 1 b; pl. 12, fig. 1. DENDY & FREDERICK, 1924, p. 497.

(1) Average based on the measurement of ten spicules.

*Material* : Four specimens (MT 1374) (CMFRI - S. 15).

*Description* : Sponge irregular, tuberous, attached by many points to the substratum. Surface slightly conulose. The ridges connecting the adjacent conules and the projecting lateral walls of the subdermal cavities together give a characteristic appearance to the surface. Dermal membrane is transparent. Deep subdermal canals are visible through the dermal membrane.

The largest specimen in the present collection is U-shaped with both arms attached to the substratum (coral). Body about 30 mm in diameter. The second specimen is a finger-shaped one; and was growing attached to a coral rock by its lateral side. Diameter of the body about 12 mm. All the other specimens are irregular in shape.

*Colour* : Pale gray when dry.

*Consistency* : Slightly compressible with poor resiliency.

Oscules numerous; irregularly distributed on the general surface, 1-4 mm in diameter and compound. Oscular rim slightly elevated. Pores minute; about 0.02 mm.

The skeletal arrangement of the specimens agrees well with that of the type specimen and hence it is not necessary to give details here.

*Spicules* : Oxeas - slightly curved, sharply and gradually pointed. Axial canal well developed in most cases. Size 0.134 to 0.175 (0.142) x 0.004 to 0.008 (0.006 mm).

*Distribution* : Indian Ocean.

Family **DESMACIDONIDAE** GRAY

Genus **Iotrochota** RIDLEY

**Iotrochota purpurea** (BOWERBANK)

(Pl. I, Fig. 8; Pl. VII, Fig. 9)

*Halichondria purpurea* BOWERBANK, 1875, p. 293.

*Iotrochota purpurea* RIDLEY, 1884, p. 434, pl. 33, fig. 1; pl. 42, fig. e. DENDY, 1921, p. 97. BURTON, 1934, p. 553 (Synonymy). LEVI, 1961, p. 18, fig. 23.

*Material* : 23 broken branches ranging in length from 1-5 cm (MT 1401) (CM FRI - S. 16).

*Description* : Sponge ramose, branches varying in diameter from 1 to 20 mm, often dividing into two or three at the extremity. Surface conulose, conules 1 to 2 mm high and 1 to 3 mm apart.

*Colour* : Black brown when dry.

*Consistency* : Fairly tough.

The ectosome is well developed and supported by the main fibres ending in the surface. Dermal skeleton, of tangentially arranged styles, is present.

The main skeleton consists of well developed fibres varying between 0.075 to 0.094 mm in diameter. Meshes formed are more or less polygonal in outline with an average mesh size of 0.377 mm. Fusion of fibres is quite extensive in the interior, but towards the outer part, the primaries and connectives are clearly separable from each other. The tips of primary fibres end in the surface conules, and the number of spicules in cross section may vary from 8 to 20. Spongin is pale yellow in colour.

*Spicules* : 1. Dermal styles. Slightly curved and sharply pointed; rarely blunt (3 %). Length varies from 0.243 to 0.263 (0.246 mm) and width from 0.002 to 0.005 (0.003 mm).

2. Main styles. Shape as in the former. Size 0.142 to 0.180 (0.163 mm) x 0.004 to 0.008 (0.005 mm).

3. Birotulates. Chord length about 0.016 mm.

*Distribution* : Indo-Pacific.

***Iotrochota baculifera* RIDLEY**  
(Pl. I, Fig. 7)

*Iotrochota baculifera* RIDLEY, 1884, p. 435, pl. 39, fig. m.; pl. 42, fig. f. BURTON, 1959, p. 239 (Synonymy). BERGQUIST, 1965, p. 163 (Synonymy). THOMAS, 1968 (under publication).

*Material* : 43 pieces representing different growth forms like branching, massive and encrusting (MT 1387).

*Description* : Sponge encrusting in the initial stage, assuming lamellar, branching and anastomosing or irregularly massive forms in later life. Surface highly conulose; conules 0.8 to 1.5 mm high and 1 to 1.5 mm apart. Oscules small; 1 to 2 mm in diameter and distributed irregularly on the surface.

*Colour* : Dark purple or dark brown when dry.

*Consistency* : Hard but compressible.

*Ectosome* : A well developed dermal membrane, supported by strongyles arranged tangentially, is present. But near the conules a radial arrangement is often met with.

The main skeleton consists of well developed reticulation of fibres cored by smooth styles. Main fibres run at an angle to the surface and connected together by secondaries in a scalariform pattern. The main fibres have a diameter of 0.13 mm and secondaries, 0.063 mm. Spongin is pale brown in colour, and the amount present may vary considerably from specimen to specimen as well as from place to place.

*Spicules* : 1. Styles. Slightly curved and sharply pointed, rarely with blunt or stair-stepped tips. Size 0.168 to 0.189 (0.175 mm) x 0.004 to 0.008 (0.006 mm).

2. Strongyles. Straight, tips may show slight inflation. Size, 0.201 to 0.243 (0.225 mm) x 0.004 to 0.006 (0.004 mm).

3. Birotulates. With 4 teeth on either end. Size 0.012 mm. In some specimens they are scarcely represented.

*Distribution* : Atlantic Ocean, Red Sea, Indian Ocean, Australian region, Pacific Ocean.

Family **ADOCIIDAE** DE LAUBENFELS

Genus **Sigmatocia** DE LAUBENFELS

**Sigmatocia fibulata** (SCHMIDT)

(Pl. I, Fig. 9)

*Reniera fibulata* SCHMIDT, 1862, p. 73.

*Gellius fibulatus* RIDLEY, 1884, p. 424. LEVI, 1957, p. 209.

*Sigmatocia fibulata* THOMAS, 1968 (under publication).

*Material* : One specimen (MT 1414).

*Description* : Sponge thinly encrusting on a branched coral. Height 4 mm.

*Colour* : Pale white in alcohol.

*Consistency* : Compressible with poor resiliency.

Oscules are not visible. Pores minute, oval; diameter, 0.028 mm.

Surface is smooth and uniform.

The ectosome is well developed and detachable, reinforced by oxeas arranged horizontally. Meshes triangular. Sigmas are abundantly represented.

Main skeleton is an isodictyal reticulation of oxeas. The meshes are triangular with one side formed of one or two oxeas. Spongin is present at the corners only.

*Spicules* : 1. Oxeas. Sharply pointed and slightly curved at the centre. Size 0.134 to 0.172 (0.147 mm) x 0.004 to 0.006 (0.005 mm).

2. Sigmas. C shaped with a notch at the centre. When well developed chord length 0.021 mm.

*Remarks* : In the Gulf of Mannar and Palk Bay this species grows in association with an alga, *Ceratodictyon spongiosum* (ZANARD). But the present specimen is free from this alga.

*Distribution* : Atlantic Ocean, Mediterranean Sea, Indian Ocean, Australian region.

#### Genus **Petrosia** VASMAER

#### **Petrosia nigricans** LINDGREN (Pl. I, Fig. 10; Pl. VI, Fig. 7)

*Petrosia nigricans* LINDGREN, 1897, p. 480. BURTON, 1959, p. 222 (Synonymy).

*Material* : Seven bits (MT 1375) (CMFRI - S. 28).

*Description* : Sponge thickly encrusting, growing into massive, mammiform and lobose structure or irregularly repent. Branches attached to the substratum by many points.

Largest specimen has a height of 70 mm, and was attached to the substratum by three points.

*Colour* : Pale black.

*Consistency* : Hard.

Oscules numerous, oval or circular in outline and compound. Rim slightly elevated; sometimes ridges are found connecting adjacent oscules. Greatest diameter of an oscule, 3 mm. Pores minute, 0.06 mm.

The ectosome is well developed and detachable. Oxeas are tangentially arranged, rarely in a polygonal pattern. Black pigment granules are abundantly represented in the dermal part.

*Endosome* : Dense.

The skeleton is composed of a well developed reticulation of oxeas. Meshes polygonal, 0.2 mm diameter. Fibres have a diameter varying between 0.09 to 0.15 mm. But their true nature is often concealed by oxeas strewn irregularly in the interspaces. Spongin is scarcely visible and is colourless.

*Spicules* : Oxeas. Younger forms are sharply pointed at both ends. Well developed forms are slightly angulated and abruptly pointed. Stylote or strongylote forms are also met with. Size 0.06 to 0.264 (0.231 mm) x 0.004 to 0.013 (0.010 mm).

*Distribution* : Red Sea, Indian Ocean, Australian region.

#### Order POECIOLOSCLERIDA TOPSENT

The following families are represented : 1. Coelosphaeridae HENTSCHEL, 2. Phorbasidae DE LAUBENFELS, 3. Cyamonidae DE LAUBENFELS, 4. Myxillidae HENTSCHEL, 5. Tedaniidae RIDLEY and DENDY, 6. Ophlitaspongiidae DE LAUBENFELS and 7. Amphilectidae DE LAUBENFELS.

#### Family COELOSPHAERIDAE HENTSCHEL

##### Genus *Oceanapia* NORMAN

##### *Oceanapia* sp. (Pl. I, Figs 16, 16A)

*Material* : Several bits and one bushy specimen (MT 1396) (CMFRI - S. 34).

*Description* : In all these cases only the fistular part is retained. In the largest specimen the basal part forms a rounded peduncle of 20 mm diameter, and is formed of two tubes united together laterally. This peduncle has a height of 30 mm and at its distal point divides polychotomously and the branches grow up in a parallel way dividing into branchlets. The diameter of the individual branch varies from 3 to 11 mm. The thickness of the wall of the branch varies from 0.5 to 2 mm. Total height of this specimen is 140 mm. Oscules and pores are not visible. The central cavity is continuous throughout and in the case of broken branches their tips open out as a continuation of the central canal.

*Colour* : Pale white.

*Consistency* : Hard and incompressible.

Surface smooth. Ectosome is well developed and oxeas are tangentially arranged without any definite pattern.

The main skeleton is composed of well developed reticulation of oxeas ranging in diameter from 0.09 to 0.15 mm. The meshes are oval or irregular in outline and the spongin content is high. In some places, especially at the older parts of the specimen, there are many compound fibres formed by the fusion of ordinary fibres.

*Spicules* : Oxeas. Uniformly curved and sharply pointed. Rarely stair-stepped or strongylote forms are also noted. Size from 0.11 to 0.273 x 0.004 to 0.012 mm. Small spicules of 0.1 x 0.004 mm size are present in all specimens examined.

*Remarks* : There is considerable similarity between these specimens and *Phloeodictyon coriaceum* TOPSENT (1904) from Azores.

Family **PHORBASIDAE** DE LAUBENFELS

Genus **Echinodictyum** RIDLEY

**Echinodictyum clathratum** DENDY  
(Pl. I, Fig. 6)

*Echinodictyum clathratum* DENDY, 1905, p. 175, pl. 11, fig. 4. DENDY, 1921, p. 73. BURTON, 1937, p. 31, pl. 4, fig. 25. RAO, 1941, p. 451. THOMAS, 1968 (under publication).

*Material* : One specimen (MT 1415).

*Description* : Body consists of clathrous branches attached to a bivalve shell by a slightly constricted peduncle. Branches are covered externally by an aspiculous dermal membrane which is pierced here and there by pseudoscules. Total height of the specimen, 40 mm and width, 20 mm.

*Colour* : Pale brown when dry.



*Consistency* : Spongy.

The oscules and pores are not separable from each other. Surface conulose, styles project considerably beyond the surface.

Skeleton is composed of an irregular net work of fibres cored by oxeas and echinated by acanthostyles. Spongin is sparsely visible and the fibres vary in diameter from 0.084 to 0.174 mm. These fibres end in the surface conules where they are supported by long styles.

*Spicules* : 1. Oxeas. Uniformly curved and sharply pointed. Stair-stepped or even blunt (2 %) forms are also seen. Size 0.18 to 0.75 (0.41 mm) x 0.004 to 0.014 (0.008 mm).

2. Styles. Long and slightly curved. Tips with hair-like terminations. Size up to 1.32 x 0.012 mm. Rare when compared to the previous category.

3. Dermal styles. Size 0.39 x 0.003 mm.

4. Acanthostyles. Head well developed and densely spined. Body with recurved spines. Rarely smooth forms are also noted. Size 0.084 x 0.006 mm.

*Distribution* : Indian Ocean.

#### Genus **Damiriana** DE LAUBENFELS

##### **Damiriana schmidt** (RIDLEY) (Pl. I, Fig. 13)

*Crella schmidt* RIDLEY, 1884, p. 432, pl. 41, fig. a.

*Damiria australiensis* DENDY, 1896, p. 28. LINDGREN, 1898, p. 25, pl. 17, fig. 10; pl. 19, fig. 15 (Synonymy).

*Damiria schmidt* TOPSENT, 1897, p. 455.

*Dendoricella schmidt* HENTSCHEL, 1909, p. 328, fig. 22. HENTSCHEL, 1912, p. 432. DENDY & FREDERICK, 1924, p. 505.

*Damiriana schmidt* LEVI, 1958, p. 30, fig. 25. THOMAS, 1968 (under publication).

*Damiriana hawaiiiana* DE LAUBENFELS, 1950, p. 14, fig. 7.

**Material :** A small highly damaged bit (MT 1394). Size 20 x 18 mm.

**Description :** Surface highly pitted; brought about by the sinking of dermal membrane following the contour of the subdermal canals. Oscules and pores are not traceable.

**Colour :** Pale white when dry.

**Consistency :** Friable.

The ectosome is thin and semi-transparent; thickness about 0.05 mm. Tylotes are arranged in the dermal part tangentially.

The main skeleton is composed of an ill-defined reticulation of oxeas with triangular or rectangular meshes, each side of which is formed of 2 to 4 spicules arranged side by side. Spongin is pale yellow in colour and found only at their tips. Imperfect spicular tracts are usually present in deeper parts.

**Spicules :** 1. Tylotes. Dermal, straight and heads oblong. Size 0.201 to 0.218 (0.21) x 0.002 to 0.004 (0.003 mm).

2. Oxeas. Slightly curved and uniformly pointed; rarely stylote. Size 0.159 to 0.231 (0.197 mm) x 0.004 to 0.012 (0.009 mm).

3. Isochelas. Arcuate. Chord length up to 0.033 mm.

4. Sigmas. Two types are seen. Both are C or S shaped. Smaller type with chord length of 0.012 mm and larger type with, 0.048 mm. Larger forms are rarely met with.

**Distribution :** Red Sea, Indian Ocean, Australian region, Pacific Ocean.

#### Family CYAMONIDAE DE LAUBENFELS

##### Genus *Cyamon* GRAY

##### *Cyamon vickersi* (BOWERBANK)

(Pl. I, Fig. 14)

*Dictyocylindrus vickersii* BOWERBANK, 1864, p. 267, fig. 234. CARTER, 1879, p. 292, pl. 27, figs 5-8.

(?) *Trikentron wickersi* TOPSENT, 1889, p. 33, fig. 2A.

*Cyamon vickersii* GRAY, 1867, p. 546. DENDY, 1921, p. 108, pl. 4, fig. 4; pl. 16, fig. 5. BURTON & RAO, 1932, p. 355.

*Cyamon vickersi* DE LAUBENFELS, 1936, p. 80.

*Cyamon dendyi* DE LAUBENFELS, 1936, p. 80.

**Material :** Two specimens (MT 1349) (CMFRI - S. 39). The largest specimen is found on a bivalve shell. The other is very small and attached to a coral stone.

**Description :** Body encrusting mainly; at one side it grows slightly up, to a height of 5 mm where it forms 9 vertical columns each varying from 1 to 3 mm in diameter. The surface of the encrusting portion is slightly hispid, so also the vertical columns. Oscules and pores are not visible in the dry state. Total area occupied by this specimen (in the shell) is 20 x 40 mm. Other specimen agrees closely with the first in general shape; area occupied, 7 x 2 mm.

**Colour :** Dark brown when dry.

**Consistency :** Firm and compressible.

**Ectosome :** Remnants of a thin aspiculous dermal membrane, stretching across the dermal brushes, are visible at places. Highly charged with brown pigment granules.

The main skeleton is composed of plumose columns of styles with their basal portion buried deep in spongin, running radially and ending in the surface brushes. Pseudotetract and triact spicules are seen in between these styles strewn irregularly. These columns diverge towards the peripheral portion, but may get interconnected with styles arising from adjacent columns.

**Spicules :** 1. Stout styles. Slightly curved and sharply pointed, rarely strongylote. Length varies from 0.377 to 0.528 (0.452 mm) and width from 0.016 to 0.021 (0.018 mm). These spicules are quite predominant in fibres. 2. Long styles. Associated with fibres, at their peripheral parts. Length varies from 0.754 to 1.50 (1.01 mm) and width from 0.004 to 0.012 (0.008 mm). Rare when compared to the former type.

3. Slender styles of peculiar form. Often with a curve at the basal half, rest of the body straight and uniform throughout. Rarely symmetrical or asymmetrical swellings are also noted. Apex abruptly pointed; sometimes with lancet like expansion. Tip portion minutely spined. They project out of the fibres in an angle to the former. Size 0.252 to 0.315 (0.281 mm) x 0.001 to 0.006 (0.003 mm).

4. Tetract spicules. Di, tri, tetra or pentact. Three rays are in one plane and other at right angles to the others and slightly longer. Tips of the rays sharply pointed in younger forms whereas in the adult they are more or less blunt. Rays spined in varying degrees, sometimes with recurved hooks. Size of the median ray 0.071 x 0.012 mm and that of the basal ray, 0.063 x 0.012 mm.

*Remarks* : The spicular details of present specimens resemble closely to those of DENDY's (1921) specimen from Amirante. DE LAUBENFELS (1936) expresses the doubt regarding the conspecificity of this species (DENDY, 1921) with that of BOWERBANK's *Dictyocylindrus vickersii* (1864) stating that " but it was (DENDY's specimen) violet to brown instead of yellow, and the tetraxon spicules were sharply pointed instead of being strongylote ", and has even proposed a new name - *dendyi* - for this Indian Ocean species. But in DENDY's description it is stated that " all four rays in the adult spicules are more or less blunted at the apex " and sharply pointed rays are found only in the younger forms.

*Distribution* : Atlantic Ocean, Indian Ocean.

Family MYXILLIDAE HENTSCHEL

Genus *Myxilla* SCHMIDT

*Myxilla dendyi* BURTON

(Pl. II, Fig. 1)

*Myxilla incrustans* DENDY, 1921, p. 89.

*Myxilla dendyi* BURTON, 1959, p. 231. (Non) *Myxilla incrustans* (JOHNSTON) AUCT.

*Material* : One highly damaged specimen (MT 1347).

*Description* : Sponge massively encrusting on a coral. Highly friable. Surface even, but the structure of the dermal membrane is greatly exaggerated at places by the dense quantity of sand grains embedded.

*Colour* : Pale yellow, dermal region white.

*Consistency* : Friable.

Oscules and pores are not traceable.

*Ectosome* : Thin dermal membrane is present roofing the extensive subdermal cavities beneath.

*Endosome* : No specialisation.

The dermal skeleton is composed of tornotes arranged horizontally in an irregular pattern. Microscleres are also distributed abundantly in the dermal part. In some places extensive areas without any spicule are also met with.

The main skeleton is irregular in most places. Rarely plurispicular tracts of acanthostyles are seen running towards the surface. The bulk of the

skeleton is arranged in triangular meshes. Each arm of the triangle is composed of 2-5 acanthostyles connected together by spongin at their corners.

*Spicules* : 1. Acanthostyles. Head slightly developed and spinous. Body irregularly spined except at the apex. Straight or slightly curved. Size 0.121 to 0.151 (0.130 mm) x 0.004 to 0.008 (0.006 mm).

2. Tornotes. Straight or slightly curved with one mucrone at each end. Size 0.142 to 0.160 (0.154 mm) x 0.001 to 0.002 (0.002 mm).

3. Chelae spatuliferae. Chord length, 0.020 mm, inseparable into different sets.

4. Sigmas. C or S shaped. Chord length varies from 0.012 to 0.033 (0.025 mm), and width up to 0.001 mm.

This species is first described by DENDY (1921) as *Myxilla incrustans* (JOHNSTON, 1842). Later BURTON (1959) created a new species, *M. dendyi* based on DENDY's description and other specimens collected during the John MURRAY Expedition. According to BURTON this species differs from *M. incrustans* (JOHNSTON) in four important respects. They are : 1. smaller dimensions of spicules, 2. chelae are not divisible into different sets, 3. tornotes have no ornamentation other than a single mucrone and 4. inclusion of arenaceous objects in the tissue.

The above features hold good with regard to the present specimen also.

*Distribution* : Indian Ocean.

#### Family TEDANIIDAE RIDLEY & DENDY

##### Genus *Tedania* GRAY

##### *Tedania anhelans* (LIEBERKUHN) (Pl. I, Fig. 15)

*Halichondria anhelans* LIEBERKUHN, 1859.

*Tedania anhelans* LEVI, 1963, p. 32, fig. 33, pl. 5D & E.

*Tedania nigrescens* BURTON, 1959, p. 241 (Synonymy).

*Material* : Two bivalve shells encrusted with this specimen (MT 1416).

*Description* : Sponge encrusting, oscules and pores not visible. Surface smooth and uniform.

*Colour* : Pale grey when dry.

*Consistency* : Friable, and this friability is due to the inclusion of sand particles into the skeleton.

*Spicules* : 1. Styles. Slightly curved and sharply pointed. Base uniformly curved. Size 0.231 to 0.256 (0.243 mm) x 0.004 to 0.008 (0.005 mm).

2. Tornotes. Head well developed and with minute spines. Straight or slightly curved. Size 0.197 to 0.222 (0.210 mm) x 0.004 mm average.

3. Onychaetas. Size 0.147 to 0.176 (0.163), width about 0.002 mm.

*Distribution* : Cosmopolitan.

### Genus *Acanthacarnus* LEVI

#### *Acanthacarnus souriei* LEVI

(Pl. II, Fig. 2)

*Acanthacarnus souriei* LEVI, 1965, p. 40 (Synonymy). THOMAS, 1968 (under publication).

*Material* : A small encrustation on a bivalve shell (MT 1384).

*Description* : Sponge encrusting, thickness 0.5 to 1 mm, surface hispid. Oscules and pores are not present.

*Ectosome* : Dermal tylodes are arranged horizontally. Microscleres are also well represented.

The skeleton is composed of a basal coating of pale spongin springing up here and there into vertical columns. Spicules, mainly styles, are arranged in a plumose manner. Such columns are echinated abundantly by cladotylotes and acanthostyles.

*Spicules* : 1. Tylotes. Dermal. Straight, heads microspined. Size 0.21 to 0.23 x 0.002 mm.

2. Styles. Curved and rarely with microspined heads. Size up to 0.3 x 0.006 mm.

3. Cladotylotes (rose-stem). Two types are seen. Size of the larger, 0.126 x 0.004 mm and of the smaller, 0.054 x 0.002 mm.

4. Acanthostyles. Straight and spined throughout. Size 0.060 x 0.004 mm.

5. Isochelas. Chord length 0.016 mm.

6. Toxas. Size varies from 0.061 to 0.210 mm. Smaller forms strongly curved at the centre. Width up to 0.003 mm.

*Remarks* : TANITA (1963) described *Acarnus tenerus* from Noto Peninsula. This species should be transferred to the genus *Acanthacarnus* LEVI. *A. tenerus* differs from the other species of *Acanthacarnus* in the respect that it is "an oval mass, more or less dorso-ventrally compressed".

*Distribution* : Atlantic Ocean, Mediterranean Sea, Indian Ocean.

Genus **Lissodendoryx** TOPSENT

**Lissodendoryx isodictyalis** (CARTER)  
(Pl. II, Fig. 3)

*Halichondria isodictyalis* CARTER, 1882, p. 285.

*Lissodendoryx isodictyalis* TOPSENT, 1897, p. 456. HARTMAN, 1958, p. 41 (Synonymy). HECHTEL, 1965, p. 38 (Synonymy).

*Material* : One encrusting specimen (MT 1421).

*Description* : Sponge thinly encrusting, thickness 1 to 2 mm. It was found growing in association with another species of sponge (*Jaspis jonesi* n. sp.) on a coral *Heterocyathus* sp. Area occupied, 2 to 3 mm.

*Colour* : Pale yellow when dry.

*Consistency* : Friable.

Oscules are not visible in dry state. Pores minute and in groups. Surface smooth.

Ectosome is well developed, containing tangentially arranged tylotes. Microscleres are densely distributed in the dermal part, together with arenaceous objects. Dermal membrane roofs extensive subdermal cavities.

The endosome is "crumb-of-bread" like. Styles are arranged in an isodictyal pattern with one side formed of 2 to 5 spicules. Spongin is colourless and found at the corners only.

*Spicules* : 1. Tylotes. Heads well developed and oblong. When well formed, measure  $0.218 \times 0.004$  mm.

2. Styles. Slightly curved and sharply pointed, rarely blunt or stair-stepped. Size, when well developed,  $0.201 \times 0.006$  mm.

3. Isochelas. Tridentate. Chord length varies from 0.021 to 0.032 (0.025 mm).

4. Sigmas. C or S shaped. Chord length 0.020 to 0.028 mm.

*Distribution* : Atlantic Ocean, Mediterranean Sea, Red Sea, Indian Ocean, Australian region, Pacific Ocean.

**Lissodendoryx massalis** (DENDY)  
(Pl. II, Fig. 4)

*Plocamia massalis* DENDY, 1921, p. 78, pl. 14, figs 5 a-c.

*Dendoricella* (?) *massalis* TOPSENT, 1928, p. 64.

*Lissodendoryx massalis* BURTON, 1935, p. 400.

*Material* : Several slides (MT 1420) (CMFRI - S. 48).

*Description* : Sponge thinly encrusting, 1 to 1.5 mm thick, occupying an area of 2 x 3 mm. Surface smooth, oscules and pores are not visible.

*Colour* : Dark brown.

*Consistency* : Papery.

In the dermal part tylotes are arranged tangentially. Brown pigment granules (diameter 0.008 to 0.016 mm) are also abundant.

Main skeleton consists of acanthostyles arranged in triangular meshes, each side of which is formed of 2 to 3 spicules lying side by side. Spongin visible at the corners only. Occasionally imperfect spicular bundles are found running towards the surface.

*Spicules* : 1. Tylotes. Dermal. Heads well developed and minutely spined. Size 0.222 to 0.260 (0.235 mm) x 0.004 mm.

2. Acanthostyles. Slightly curved; more or less uniformly spined and spines rarely in whorls. Size 0.105 to 0.142 (0.113 mm) x 0.006 mm. The styles are acutely pointed in the initial stage and the spines are uniformly distributed on the surface except at the pointed tips. Later, as the spination becomes more dense on both ends, the acutely pointed tip may get concealed giving the appearance of an acanthostrongyle.

3. Isochelas. Palmate, chord length 0.016 mm when well developed.

*Remarks* : The exact systematic position of this species is not known. DENDY (1921) reluctantly included this species under the genus *Plocamia* SCHMIDT. Later, TOPSENT (1928) transferred it to the genus *Dendoricella* LUNDBECK - a genus characterised by main oxeads or strongyles, dermal oxeads, tornotes or tylotes and with peculiar arcuate chelas and/or sigmas. BURTON (1935) transferred this species to the genus *Lissodendoryx* TOPSENT.

The dimensions of spicules found in the present specimen do not tally well with those of the type. DENDY's specimen was a massive one, 65 x 35 mm in size with the spicules slightly longer than those of the present specimen. Thinly



encrusting habit seen in the present specimen may denote an early stage in the development.

*Distribution* : Indian Ocean.

Family **OPHLITASPONGIIDAE** DE LAUBENFELS

Genus **Clathria** SCHMIDT

**Clathria frondifera** (BOWERBANK)

(Pl. II, Fig. 6; Pl. VIII, Fig. 4)

*Halichondria frondifera* BOWERBANK, 1875, p. 288.

*Clathria frondifera* RIDLEY, 1884, pp. 448, 612, pl. 42, fig. i; pl. 53, fig. j. LINDGREN, 1898, p. 27. DENDY, 1905, p. 170. BURTON, 1937, p. 27 (Synonymy). LEVI, 1961, p. 21. THOMAS, 1968 (under publication).

*Material* : Four complete specimens and several bits (MT 1369).

*Description* : All these specimens show similarity in the form of growth. Sponge, sessile or massively clathrous, consisting of lamellae anastomosing, ornamented towards the periphery by blunt or spiny processes varying in length from 2 to 6 mm.

The largest specimen, which is attached to the shell of *Pecten* sp., has a height of 136 mm and width of 85 mm. The interior is quite cavernous.

*Colour* : Grey when dry.

*Consistency* : Compressible but hard.

The skeletal arrangement of this species has been well described by previous authors.

*Spicules* : 1. Main styles. Slightly curved and sharply pointed. Length varies from 0.113 to 0.212 (0.188 mm) and width from 0.006 to 0.010 mm.

2. Acanthostyles. Size, when well developed, 0.060 x 0.006 mm.

3. Interstitial subtylostyles. Straight, head slightly developed and spinous. Average size 0.252 x 0.004 mm.

4. Dermal subtylostyles. Slightly curved and sharply pointed. Head somewhat well developed and minutely spined. Size 0.088 x 0.003 mm average.

5. Isochelas. Palmate, 0.016 mm chord.

6. Toxas. With a central curve or irregularly curved. Length up to 0.160 mm; hair-like.

*Distribution* : Red Sea, Indian Ocean, Australian region.

***Clathria procera* (RIDLEY)**  
(Pl. II, Fig. 5; Pl. VII, Fig. 3)

*Rhaphidophylus procerus* RIDLEY, 1884, p. 451, pl. 39, fig. K; pl. 42, fig. o.

*Tenacia procera* BURTON & RAO, 1932, p. 340.

*Clathria procera* DENDY, 1921, p. 64. BURTON, 1937, p. 28. BURTON, 1959, p. 243 (Synonymy). THOMAS, 1968 (under publication).

*Material* : Five entire specimens and several bits (MT 1365).

*Description* : Body composed of a clathrous mass of flattened to rounded branches. Main and connecting branches are not well demarcated. Tips of branches end blindly where the diameter vary from 4 to 6 mm. Lateral fusion of these branches may give rise to flattened lamellae.

The largest specimen in the present collection has a size of 110 x 70 mm.

*Colour* : Pale white when dry.

*Consistency* : Slightly compressible.

Oscules and pores are not visible in dry state.

The ectosome is pale white in colour, easily detachable; thickness 0.1 to 0.2 mm.

The skeletal arrangement is in the typical *Clathria* pattern with well developed reticulation of pale spongin fibres, echinated by acanthostyles and cored by subtylostyles. The outer extremities of these fibres support the dermal skeleton. Diameter of an average fibre comes up to 0.1 mm. The connectives are slightly thinner than the main fibres. In some specimens the interstitial subtylostyles get connected together uniformly by a small quantity of spongin.

*Spicules* : 1. Main subtylostyles. Straight or slightly curved. Head minutely spined. Length varies from 0.201 to 0.310 (0.274 mm) and width from 0.004 to 0.012 (0.007 mm).

2. Acanthostyles. Head distinct and spined minutely. Body with sharp recurved spines or rarely with tubercles. Tips sharply pointed. Size 0.058 to 0.075 (0.067 mm) x 0.004 to 0.009 (0.007 mm).

3. Interstitial subtylostyles. Straight or slightly curved. Head prominent and minutely spined. Size 0.210 to 0.294 (0.260 mm) x 0.004 to 0.008 (0.006 mm).
4. Dermal subtylostyles. Slightly curved and sharply pointed. They are arranged in the surface in a brush-like pattern. Head spined minutely. Size 0.1 mm average.
5. Isochelas. Chord length, 0.012 to 0.016 mm.
6. Toxas. Hair-like, length up to 0.147 mm.

*Distribution* : Red Sea, Indian Ocean, Australian region.

### Genus **Mycale** GRAY

#### **Mycale grandis** GRAY (Pl. II, Fig. 7)

*Mycale grandis* GRAY, 1867, p. 533. BURTON, 1934, p. 547 (Synonymy).  
BURTON, 1937, p. 23, pl. 2, fig. 13. VACELET & VASSEUR, 1965, p. 104.  
THOMAS, 1968 (under publication).

*Mycale armata* THIELE, 1903, p. 950, fig. 16.

*Material* : A small bit (MT 1352).

*Description* : Sponge massively encrusting. Surface uniform, and dermal skeleton easily detachable. Oscules and pores are not visible.

*Colour* : Pale white in alcohol.

*Consistency* : Fibrous and compressible with poor resiliency.

The dermal skeleton is well developed, average thickness, 0.08 mm. Subtylostyles are tangentially arranged. Sand grains are often incorporated into the dermal part.

The main skeleton is composed of well developed fibres ranging in diameter from 0.084 to 0.210 mm. The connectives are more slender than the main fibres. The outermost part of the main reticulum supports the dermal skeleton. Large anisochelas are arranged obliquely on these fibres.

*Spicules* : 1. Subtylostyles. Slightly curved or rarely crooked. Head well developed or rarely stylote (3 %). Size varies from 0.37 to 0.66 (0.52 mm) and width from 0.004 to 0.016 (0.011 mm).

2. Large anisochelas. Usually attached to fibres. Lateral teeth long and pointed. Chord length up to 0.134 mm.

3. Medium sized anisochelas. Chord length up to 0.071 mm.

4. Small anisochelas. Chord length 0.016 mm.
5. Large sigmas. C or S shaped, rather abundant. Chord length up to 0.054 mm.
6. Small sigmas. Chord length, 0.021 mm.
7. Raphides. In bundles. Individual raphide about 0.040 mm.

*Distribution* : Red Sea, Indian Ocean, Australian region.

***Mycale spongiosa* (DENDY)**

(Pl. II, fig. 8; Pl. V, Fig. 9; Pl. VII, Fig. 8)

*Esperella spongiosa* DENDY, 1896, p. 15.

*Mycale spongiosa* BURTON, 1928, p. 119.

*Mycale fistulata* HENTSCHEL, 1911, p. 292, fig. 4.

var. *macrochela* HENTSCHEL, 1911, p. 294.

*Material* : One specimen (MT 1366) (CMFRI - S. 67).

*Description* : Sponge covering a twig to a length of 95 mm, each side expending in the form of a triangular wing to a distance of 15 mm on either side of the support. Thickness of the specimen, 20 mm.

*Colour* : Pale gray.

*Consistency* : Compressible and with good resiliency.

Ectosomal portion in the present specimen is not preserved intact.

The primary fibres run towards the surface and are interconnected by secondaries in a scalariform pattern. The primaries have a diameter of 0.18 mm and may contain, in cross section, 30 to 50 spicules bound together by pale yellow spongin and secondaries, 5 to 20 spicules. The secondaries may have a diameter of 0.10 mm. Tylostyles are rarely seen scattered in the endosome.

*Spicules* : 1. Tylostyles. Head well developed. Axial canal conspicuous. Size 0.147 to 0.235 (0.205 mm) x 0.001 to 0.004 (0.002 mm).

2. Sigmas. C or S shaped. Chord length varies from 0.084 to 0.105 (0.092 mm) and width 0.004 mm.

3. Anisochelas. Usually in rosettes but rarely solitary forms are also met with. Chord length varies from 0.021 to 0.026 mm.

A few raphides (0.021 mm long) were present, they can be accidental.

There is close similarity between the spicular measurements of this species and those of *E. euplecteliodes* ROW (1911) from Red Sea.

*Distribution* : Indian Ocean, Australian region.

Spicular measurements (in mm) of *M. spongiosa* recorded by previous authors :

<i>Species</i>	<i>Tylostyles</i>	<i>Sigmas</i>	<i>Anisochelas</i>
<i>E. spongiosa</i> DENDY, 1896	0.158 × 0.002	0.066	0.025
<i>M. spongiosa</i> BURTON, 1928	0.196 × 0.004	0.045	0.028-0.036
<i>M. fistulata</i> HENTSCHEL, 1911	0.248-0.296 × 0.003-0.004	0.042-0.065	0.024-0.026
var. <i>macrochela</i> HENTSCHEL, 1911	0.217-0.252 × 0.004-0.005	0.090-0.100	0.019-0.025
<i>M. spongiosa</i> (MT 1366)	0.147-0.235(0.205) × 0.001-0.004(0.002)	0.084-0.105 (0.092) × 0.004	0.021-0.026

### ***Mycale* sp.**

(Pl. II, Fig. 9; Pl. V, Fig. 6)

*Material* : One highly damaged specimen, associated with polychaete, *Potamilla* sp. (MT 1353) (CMFRI - S. 68).

*Description* : In the present specimen only the skeletal net work is retained.

The skeleton is reticulate, composed of main fibres running towards the surface and secondaries connecting them in a scalariform pattern. Diameter of the main fibres varies from 0.09 to 0.1 mm, and that of connectives, 0.05 to 0.09 mm. Spongin scarcely visible. Meshes rectangular, with a larger diameter of 1 mm.

*Spicules* : 1. Tylostyles. Straight and acutely pointed, sometimes blunt (8 %). Axial canal well developed. Size 0.243 to 0.273 (0.260 mm) × 0.004 to 0.008 (0.006 mm).

2. Sigmas. C shaped or rarely crooked. Size 0.033 to 0.063 mm, thin and hair like and not divisible into different sets.

3. Anisochelas. Chord length, when well developed, 0.033 mm.
4. Raphides. Straight and hair-like. Size 0.063 to 0.100 mm. Rarely in groups.

In addition to these spicules, an isochela, 0.012 mm chord length, and some stout toxas have also been observed. But it is not sure whether these spicules are proper to this sponge.

Since the specimen at hand is only the skeleton after the soft parts being washed off, it is quite difficult to come to any specific level. But this sponge appears to be very peculiar in view of the shape of its sigmas and raphides.

Genus **Zygomycale** TOPSENT

**Zygomycale parishii** (BOWERBANK)

(Pl. II, Fig. 10)

*Raphiodesma parishii* BOWERBANK, 1875, p. 283.

*Zygomycale parishii* TOPSENT, 1930, p. 431 (vide DE LAUBENFELS, 1950). HECHTEL, 1965, p. 48, pl. 5, fig. 3 (Synonymy). THOMAS, 1968 (under publication).

*Material* : One specimen (MT 1344).

*Description* : Body attached to the substratum by many points, and composed of rounded to flattened branches united together to form a clathrous structure. Fusion of branches is so compact that the true nature of individual branch is often difficult to make out. Size 70 x 60 mm.

*Colour* : Pale yellow.

*Consistency* : Compressible with good amount of resiliency.

Oscules and pores are not visible. The dermal part has been detached completely and the specimen at hand is only a mass of the main skeleton.

The main skeleton is composed of an irregular net work of fibres ranging in diameter from 0.05 to 0.2 mm. Spongin is pale yellow in colour and the quantity is quite noticeable. Primaries and connectives are easily recognisable.

*Spicules* : 1. Subtylostyles or styles. Head well developed and body slightly curved. Tips sharply pointed. Size 0.21 to 0.365 (0.292 mm) x 0.002 to 0.012 (0.007 mm).

2. Large anisochelas. Chord length 0.048 mm (maximum).

3. Small anisochelas. Chord length 0.021 mm (maximum).

4. Sigmas. C or S shaped. Maximum chord length noted is 0.075 mm.

5. Small sigmas. Chord length 0.021 mm.
6. Isochelas. Chord length 0.008 mm.
7. Toxas. With broad angle at the centre. Length 0.084 mm.
8. Raphides. Hair-like; length, 0.02 mm, usually in groups.

*Distribution* : Tropical Atlantic Ocean, Indian Ocean, Pacific Ocean, Australian region.

Family **AMPHILECTIDAE** DE LAUBENFELS

Genus **Biemna** GRAY

***Biemna variantia*** (BOWERBANK) var. ***seychellensis*** new  
(Pl. II, Fig. 11)

*Material* : One specimen (MT 1348) (CMFRI No. 16)

*Description* : Body spherical, size 130 x 110 mm. Shells and pebbles are heavily incorporated into the body. Pores and oscules are not present. Surface uneven.

*Colour* : Pale brown when dry.

*Consistency* : Friable.

The dermal skeleton consists of tangentially arranged styles. Microscleres are well represented in the dermal part.

The main skeleton consists of irregular bands of styles running towards the surface. Raphides are found in groups, scattered irregularly in between these bands of megascleres.

*Spicules* : 1. Styles. Slightly curved and sharply pointed, rarely blunt. Size 0.452 to 0.849 (0.736 mm) x 0.008 to 0.033 (0.021 mm).

2. Sigmas. Two sizes are found. C or S shaped, rarely one or both extremities blunt. Larger forms have a chord length varying between 0.050 to 0.063 x 0.004 mm and smaller forms, between 0.021 to 0.029 mm.

3. Raphides. In bundles. Individual raphide measure up to 0.28 mm; hair-like.

4. Microxeas. Size 0.040 to 0.048 mm x 0.001 mm. A second set of raphides (?) are also present. Length as in microxeas and can be their younger forms.

5. Commatas. Size 0.014 mm.

*Remarks* : This can only a variety of *B. variantia* (BOWERBANK, 1861) in spicular characters. *B. variantia*, according to BURTON (1930), is distributed in North Atlantic and adjacent Arctic waters, and taking the great geographical separation of the locality of the present specimen into consideration, this new variety is recognised here.

Genus *Toxemna* HALLMANN

*Toxemna tubulata* (DENDY)  
(Pl. II, Fig. 12)

*Desmacella tubulata* DENDY, 1905, p. 155, pl. 9, fig. 4.

*Toxemna tubulata* HALLMANN, 1917, p. 673. THOMAS, 1968 (under publication).

*Biemna tubulata* DENDY, 1921, p. 57. BURTON & RAO, 1932, p. 327, pl. 18, fig. 4. RAO, 1941, p. 441.

*Material* : One specimen encrusting on a bivalve shell (MT 1390).

*Description* : Sponge thinly encrusting. Height, 1 to 3 mm. Surface hispid.

*Colour* : Pale grey.

*Consistency* : Friable.

There is no differentiation between the ectosome and endosome.

The skeleton is composed of confused bundles of styles running towards the surface and in the peripheral parts projecting out giving a sort of hispidity to the surface.

*Spicules* : 1. Styles. Slightly curved and sharply pointed. Base uniformly rounded. Size, when well developed, 0.302 x 0.005 mm.

2. Sigmas. C or S shaped. Chord length, 0.016 to 0.032 (0.025 mm). Rarely in sigmodragmas.

3. Microxeas. Size 0.050 to 0.071 x 0.002 to 0.004 mm.

4. Toxas. Rare. Size 0.029 mm.

5. Raphides. In groups, individual length up to 0.109 mm.

*Distribution* : Atlantic Ocean, Indian Ocean, Australian region.

Genus *Tylodesma* THIELE

*Tylodesma truncata* (HENTSCHEL)  
(Pl. II, Fig. 13; Pl. V, Fig. 1; Pl. VII, Fig. 1)

*Biemna truncata* HENTSCHEL, 1912, p. 353, pl. 9, fig. 24.

*Tylodesma truncata* BURTON, 1930, p. 527.

*Material* : Several bits (MT 1361) (CMFRI - S. 77). Owing to the high friability no specimen is completely preserved.



A well developed dermal membrane is absent. Normally the main fibres extend beyond the surface giving a conulose appearance to the entire surface. Spicules may even project out of the extremity of the fibre in brush-like pattern. In the dermal region, extending between the conules, the spicules may get arranged irregularly or rarely (in thinly encrusting specimens) in bands.

The main skeleton is composed of plurispicular fibres running vertically up and connecting each other at irregular intervals by connectives. Meshes rectangular, 1 to 2 mm. Primary fibres have a diameter varying from 0.2 to 0.5 mm and connectives a little lesser, say, 0.1 to 0.25 mm. Amount of spongin present in the fibres may vary considerably from place to place and specimen to specimen. In some parts, especially in the junction between primaries and secondaries, the deposition of spongin is too high, and hence the mesh may appear even rounded or elliptical in outline. Tylostrongyles are scattered in the endosome also.

*Spicules* : 1. Tylostrongyles. Straight or slightly curved. Head well developed and axial canal prominent in most. Size 0.273 to 0.298 (0.285 mm) x 0.004 to 0.008 (0.006 mm).

2. Sigmas. C or S shaped, size 0.054 to 0.067 (0.058) x 0.002 mm, but hair-like forms are also met with.

*Distribution* : Indian Ocean, Australian region.

#### Order HALICHONDRIDA VOSMAER

The following families are represented : 1. Axinellidae RIDLEY & DENDY and 2. Hymeniacidonidae DE LAUBENFELS.

#### Family AXINELLIDAE RIDLEY & DENDY

This family is divided into two subfamilies by DE LAUBENFELS.

#### Subfamily Axinellinae DE LAUBENFELS

#### Genus *Axinella* SCHMIDT

#### *Axinella carteri* (DENDY)

(Pl. II, Fig. 14; Pl. VII, Fig. 2)

*Acanthella carteri* DENDY, 1889, p. 93, pl. 4, fig. 6. DENDY, 1921, p. 119, pl. 4, fig. 5. LEVI, 1961, p. 16, fig. 19. VACELET & VASSEUR, 1965, p. 99, pl. 6, fig. 20.

*Axinella carteri* BURTON, 1937, p. 35, pl. 6, fig. 37. BURTON, 1959, p. 258 (Synonymy). THOMAS, 1968 (under publication).

*Material* : Five specimens (MT 1371).

*Description* : Body lamellar, attached to the base by a stalk; surface of the lamella conulose; conules form extensive ridges on the surface and run in a diverging manner towards the margin of the lamella. Fusion of lamellae quite common.

Largest specimen in the present collection has a height of 170 mm and width of 180 mm. Thickness of the lamella about 4 mm. Conules form ridges of 1 to 2 mm high. Both surfaces are alike. The other specimens are all quite similar to this in growthform.

*Colour* : Yellowish grey when dry.

*Consistency* : Stiff and leathery.

Oscules and pores are not visible in dry condition.

The skeletal arrangement suits well with the description of DENDY (1889).

*Spicules* : 1. Stout styles. Slightly curved, base evenly rounded. Tips sharply pointed or rarely blunt. Size 0.301 to 0.574 (0.509 mm) x 0.004 to 0.025 (0.015 mm).

2. Slender styles. Long and slightly curved. Mainly seen in the surface brushes. Base may show slight degrees of swelling. Size 0.773 to 1.28 (0.962 mm) x 0.004 to 0.016 (0.011 mm). Rarely represented.

*Distribution* : Red Sea, Indian Ocean.

#### ***Axinella* sp.**

(Pl. II, Fig. 16; Pl. V, Fig. 2; Pl. VII, Fig. 4)

*Material* : Eight complete specimens and several bits (MT 1405) (CMFRI - S. 85).

*Description* : The specimens, in external shape, compare well with *Sigmaxinella durissima* (DENDY) var. *massalis* DENDY (1921). All are massive or cake shaped with oscules scattered throughout the body. Diameter of the oscules from 2 to 3 mm, rather abundant, and the oscular margin may or may not be elevated. Surface structure also suits well with that of *S. durissima* var. *massalis*.

*Colour* : Brick red when dry.

*Consistency* : Hard but friable.

Surface conulose, conules low; connected together forming compound conules and separated from adjacent ones by shallow meandering grooves. A thin transparent dermal membrane covers the surface in living condition.

The skeletal arrangement is in typical *Axinella* pattern. The axial condensation is not well marked off from the extra-axial. Spicules plumosely arranged. Fibres never show a uniform distribution of spongin and hence subject to considerable variation; diameter from 0.008 to 0.042 mm, but towards the surface these fibres divide in one plane, each branch containing a brush of spicules at its extremity. The connections between adjacent fibres are restored through single spicule extending in between, and connected on either side by small quantity of spongin.

*Spicules* : Styles. Slightly curved and sharply pointed. Axial canal well developed in most. Base uniformly rounded. Size 0.339 to 0.396 (0.359 mm) x 0.008 to 0.016 (0.012 mm).

Occasionally straight tylostyles measuring to about 0.6 mm x 0.016 mm were also noted, but failed to observe them *in situ* and hence can be of extraneous origin.

These specimens differ from *Sigmaxinella durissima* var. *massalis* DENDY (1921) in the absence of oxeas and trichodragmas.

***Axinella* sp.**  
(Pl. II, Fig. 17)

*Material* : One specimen (MT 1409) (CMFRI - S. 86).

*Description* : The body is club-shaped with a total height of 60 mm, attached to a coral rock. The basal part of the body, where it comes in contact with the substratum, has a diameter of 5 mm and at its distal end about 10 mm. The surface is highly corrugated and this structure is brought about by blunt conules and the shallow valleys in between. Small openings of about 1 mm diameter are distributed in between the conules. General shape of this specimen is similar to that of *Axinella echidnaea* RIDLEY, photographed by RIDLEY and DENDY (1887, pl. XXXVI, fig. 3).

*Colour* : Brick red when dry.

*Consistency* : Compressible with good resiliency.

*Ectosome* : A thin aspiculous dermal membrane is present.

*Endosome* : Fibrous.

The main skeletal arrangement is in typical *Axinella* pattern. Axial fibres run vertically up through the central portion. These fibres have a thickness varying between 0.063 to 0.147 mm and contain 6 to 12 spicules in cross section. From this axial part extra-axial fibres, which have a diameter varying between 0.04 to 0.1 mm, are given off in a slanting manner. These fibres may contain 2 to 4 spicules (in cross section); and get connected in scalariform pattern by secondaries. Spongin is pale yellow in colour and the quantity noted is pretty high.

*Spicules* : Styles. Slightly curved and sharply pointed. Head rather well developed and more conspicuous in younger forms. Size 0.252 to 0.315 (0.302 mm) x 0.002 to 0.023 (0.012 mm).

Genus **Phakettia** DE LAUBENFELS

**Phakettia conulosa** (DENDY)

(Pl. II, Fig. 15; Pl. VII, Fig. 6)

*Phakettia conulosa* DENDY, 1921, p. 116, pl. 6, fig. 4; pl. 17, fig. 2.  
var. *mauritiana* DENDY, 1921, p. 117, pl. 6, fig. 5.

*Axinella conulosa* BURTON, 1959, p. 259.

*Phakettia conulosa* DE LAUBENFELS, 1936, pp. 130-131.

*Material* : Two specimens (MT 1381).

*Description* : Proliferously lamellar, attached to the substratum by a thick stalk; stalk sometimes ridged corresponding to the extension of lamella. Lamellae 2 to 4 mm in thickness, both surfaces are beset with minute conules, which sometimes join together and form ridges running towards the margin of the lamella. Branches originating from the lamella always at right angles.

Largest specimen has a height of 96 mm; the lamellar extension about 126 mm.

*Colour* : Light brown when dry.

*Consistency* : Tough and fibrous.

Pores and oscules are distributed as in the type.

The axial skeleton is quite dense, composed of fibres running vertically up, containing 5 to 8 spicules and covered by pale spongin. The extra-axials emerge out at right angles from the axial part and pierce out at the surface. The number of spicules in the extra-axial fibres (in cross section) may vary from 1 to 3. Spicules are scattered irregularly in the interior also. Average

diameter of an axial fibre is 0.105 mm and that of extra-axial, 0.04 mm. Connecting fibres unite the extra-axials in an irregular pattern.

*Spicules* : 1. Stout styles. Slightly curved and sharply pointed, rarely blunt (2 %). Length varies from 0.528 to 0.623 (0.575 mm) and width, 0.016 to 0.029 (0.020 mm).

2. Long styles. Extremely rare. Length about 1.211 mm and width, 0.014 mm.

*Distribution* : Indian Ocean.

### Genus **Phycopsis** CARTER

#### **Phycopsis** sp.

Pl. II, Fig. 18; Pl. VII, Fig. 5)

*Material* : Thirteen incomplete specimens (MT 1362) (CMFRI - S. 89).

*Description* : Sponge spherical, tuberous or irregularly lobose. Surface highly conulose, conules 1 to 3 mm high and with blunt tips. Radial ridges connecting the adjacent conules intersect the surface thereby producing rectangular to irregular compartments. The surface ornamentation of these specimens bear close resemblance to that of some *Ircinia* sp.

The largest specimen has a height of 100 mm and width of 90 mm. Thickness of the lamella, at its base, up to 30 mm.

*Colour* : Pale brown when dry.

*Consistency* : Hard and incompressible.

Oscules are large and compound in nature, 3 to 5 mm diameter; terminal or scattered irregularly on the surface. Pores not seen.

Demarcation between the ectosome and endosome is totally wanting. But in sections the outer surface appears to be quite compact than the interior.

The skeletal arrangement is typical of the genus *Phycopsis*. Tracts of oxeas are found running vertically up through the central part of the body. They never form dense reticulation in the interior. From each band are given off branchlets which ultimately end at the tip of each conule. But they seldom project beyond the surface.

Brown pigment granules, of 0.25 mm diameter, are scattered throughout the body. Spongin is not present.

*Spicules* : 1. Oxeas. Uniformly curved and sharply pointed. Stair-stepped or strongylote forms are also met with; but there is no ground to regard them as a second category. Axial canal well developed. Size 0.566 to 1.13 (0.864 mm) x 0.002 to 0.021 (0.013 mm).

The genus *Phycopsis* CARTER is based on *P. hirsuta* CARTER (1883) from South Australia. It is " stipitate thickly and dichotomously branched, looking altogether like a species of *Fucus* ". Spicules are oxeas " 29 by 2/3 to 1,800ths inch in its greatest dimensions ". CARTER'S (1883) second species, *P. fruticulosa* also is " stipitate, bushly, thickly and dichotomously branched from a common stem; clothed with bright brown filamentous processes ". Spicules are oxeas " about 35 by 1 1/2 - 1,800ths inch ".

Another species transferred to this genus by DE LAUBENFELS (1936) is *Protoschmidtia hispidula* RIDLEY (1884). It has a reticulated skeleton of oxeas of 0.14 x 0.006 mm. size.

The presence of strongylote oxeas and ordinary oxeas is a distinguishing feature of *P. terpnis* DE LAUBENFELS (1954). The strongylote oxeas seen in the present specimen, hence, may show its affinity to *P. terpnis*. But the surface structure of the present specimens as well as the colour are quite different from those of DE LAUBENFELS above species.

#### Subfamily **Higginsiinae** DE LAUBENFELS

#### Genus **Myrmekioderma** EHLERS

#### **Myrmekioderma granulata** (ESPER) (Pl. II, Fig. 19)

*Alcyonium granulatum* ESPER, 1830, p. 71, pl. 24.

*Myrmekioderma granulata* BERGQUIST, 1965, p. 177, figs 27 A, B (Synonymy).  
THOMAS, 1968 (under publication).

*Material* : Three specimens (MT 1388).

*Description* : Body irregularly massive, attached to the substratum by a broad base. Surface nodular with good amount of silt settled in the interspaces. Largest specimen has a diameter of 30 mm and height of 11 mm.

*Colour* : Pale white.

*Consistency* : Hard and incompressible.

Oscules and pores are not visible.

A definite cortex is present; thickness 0.5 mm average and deeply pigmented.

*Endosome* : Dense.

The skeletal arrangement tallies well with the descriptions of previous workers.

*Spicules* : 1. Oxeas. Uniformly curved and sharply pointed in most, rarely stair-stepped; strongylote or stylote. Size 0.698 to 0.868 (0.811 mm) x 0.006 to 0.021 (0.016 mm).

2. Acanthoxeas. With a central curve. Spined in varying degrees. Rarely stylote. Size 0.121 to 0.396 (0.359 mm) x 0.008 to 0.012 (0.009 mm).

3. Raphides. Hair-like, size 0.10 to 0.12 mm.

A long shafted triaene also was present in the spicule preparation but it can be of extraneous origin.

*Distribution* : Indian Ocean, Pacific Ocean, Australian region.

#### Family HYMENIACIDONIDAE DE LAUBENFELS

##### Genus *Acanthella* SCHMIDT

##### *Acanthella cavernosa* DENDY (Pl. II, Fig. 23; Pl. VII, Fig. 7)

*Acanthella ? stipitata* var. RIDLEY & DENDY, 1887, p. 178.

*Acanthella cavernosa* DENDY, 1921, p. 120, pl. 7, fig. 7; pl. 17, fig. 3. BURTON, 1934, p. 565. BURTON, 1937, p. 36, pl. 6, fig. 36. THOMAS, 1968 (under publication).

*Material* : Four specimens (MT. 1407).

*Description* : Specimen massively lobose composed of trabeculae ranging from 1 to 2 mm in width, branching and anastomosing, and covered externally with transparent dermal membrane pierced here and there with pseudosculas. The trabeculae end blindly in the surface giving a characteristic conulose appearance to the surface. There is considerable similarity in the growth form of this species and *Clathria frondifera* (BOWERBANK) collected from the same place.

The largest specimen in the present collection has a height of 80 mm and width of 50 mm. All these specimens were attached to the substratum by small base.

*Colour* : Golden yellow when dry.

*Consistency* : Though but compressible.

The skeletal arrangement of these specimens agrees well with that of the type.

*Spicules* : 1. Slender styles. Slightly curved or crooked. Size 0.377 to 0.943 (0.622 mm) x 0.008 to 0.012 (0.010 mm).

2. Strongyles. Sinuous. Size 0.943 to 1.13 (1.00 mm) x 0.004 to 0.008 (0.007 mm). In some cases one end is less wider than the other.

*Distribution* : Indian Ocean.

#### Order HADROMERIDA TOPSENT

The following families are represented : 1. Spirastrellidae HENTSCHEL, 2. Suberitidae SCHMIDT and 3. Clionidae GRAY.

#### Family SPIRASTRELLIDAE HENTSCHEL

#### Genus *Spirastrella* SCHMIDT

#### *Spirastrella cuspidifera* (LAMARCK) (Pl. II, Fig. 20; Pl. VIII, Fig. 3)

*Spirastrella cuspidifera* BURTON, 1959, p. 208 (possible synonymy). THOMAS, 1968 (under publication).

*Material* : Fiftyfive specimens (MT 1360, 1373, 1379, 1399).

*Description* : Specimen boring in the initial stage, later the main mass inside the coral produces finger-shaped structures bearing excurrent and incurrent openings. In later life the basal part of these finger-like processes may fuse together forming a massive base with submeandrine surface.

In the present collection there are 10 specimens exactly resembling in form, the photograph of *Spirastrella montiformis* (HALLMANN, 1912, p. 119, pl.



XXI, fig. 3) and the rest are rather tubular, conical or irregularly massive. The largest specimen, in the present collection, has a base of 180 mm diameter and height, 130 mm.

*Colour* : Pale yellow when dry.

*Consistency* : Hard and incompressible.

Surface microscopically hispid throughout. In cross section of the digitate process 5 excurrent canals are found running vertically up, the central one being slightly wider than the rest.

There is no clear-cut demarcation between the ectosome and endosome. In the outer region smaller tylostyles are met with in brushes usually. This region is more pigmented than the rest.

The main skeleton consists of vague bundles of tylostyles running towards the outer surface. They may get confused in the deeper parts.

*Spicules* : 1. Tylostyles. Straight or slightly curved. Head oblong, spherical or slightly trilobed. Size 0.264 to 0.754 (0.547 mm) x 0.008 to 0.016 (0.013 mm).

2. Spirasters. Different types noted.

A. Robust type. Resembles those of *S. coccinea* (DUCHASSAING and MICHELOTTI, 1864). Size 0.033 x 0.005 mm.

B. Slender forms with spines or tubercles arranged in a spiral manner. Zigzag with 3 to 5 bends; size up to 0.063 mm.

C. Small straight forms. With spines on either end, or rarely semicircular; length up to 0.010 mm.

It appears from the bulk in the present collection that this species is very common in Mahe Island. All of them were growing outside the support into a massive form.

*Distribution* : Red Sea, Indian Ocean, Australian region, Pacific Ocean.

### ***Spirastrella inconstans* (DENDY)**

(Pl. II, Fig. 21; Pl. VIII, Fig. 6)

*Suberites inconstans* var. *globosa*, var. *moeandrina*, var. *digitata* DENDY, 1887, pp. 154-157, pl. 9-10.

*Spirastrella inconstans* THIELE, 1899, p. 10, pl. 1, fig. 3; pl. 5, fig. 4. BURTON, 1937, p. 14, pl. 8, fig. 51 (Synonymy). FISHELSON, 1966, pp. 17-25. THOMAS, 1968 (under publication).

*Spirastrella purpurea* VOSMAER, 1911 (parts).

*Spirastrella globularis* DENDY, 1921, p. 141, pl. 4, fig. 5; pl. 18, fig. 15. LEVI, 1961, p. 13, fig. 15.

*Material* : Five entire specimens and several bits (MT 1367, 1370).

*Description* : Body tubular, digitate, globular or meandrine in shape. All of them were growing deep rooted in sand. Shells and pebbles are heavily incorporated into the body.

*Colour* : Light brown.

*Consistency* : Hard and incompressible.

Oscules terminal in tubular forms, or scattered irregularly in the surface in meandrine forms. Diameter 3 to 8 mm and protected by an oscular rim which is highly contractile.

Surface microscopically hispid. Symbiotic barnacles are generally present in the surface partly engulfed.

A definite ectosome is lacking. Brown pigment granules are scattered in the outer part.

Skeletal arrangement tallies well with that of the type.

*Spicules* : 1. Tylostyles. Slightly curved and sharply pointed. Head spherical, trilobed or rarely rounded (stylote). Small spicules are present in the surface brushes. Size 0.226 to 0.647 (0.542 mm) x 0.004 to 0.016 (0.011 mm).

2. Spirasters. Slender with 2 to 5 bends or straight. Spines sharply pointed or blunt. Size 0.016 to 0.032 x 0.002 mm.

A sexual reproduction in this species is by buds formed from the distal parts in digitate forms. Buds thus formed may get nipped off from the parent body and form new colonies. *S. globularis* (DENDY, 1921; LEVI, 1961) is only a specimen in this phase of development. Cirriped *Balanus longirostrum* HOEK, is usually found in association with this species.

*Distribution* : Red Sea, Indian Ocean, Australian region, Pacific Ocean.

### ***Spirastrella pachyspira* LEVI**

(Pl. II, Fig. 22)

*Spirastrella pachyspira* LEVI, 1958, p. 19, fig. 15. LEVI, 1961, p. 13, fig. 14. VACELET & VASSEUR, 1965, p. 94, pl. 5, fig. 13. THOMAS, 1968 (under publication).

*Material* : A small encrustation on a coral rock (MT 1393).

*Description* : Sponge encrusting, occupying an area of 4 x 2 mm. Thickness about 1 mm. Surface uniform.

*Colour* : Pale white in alcohol.

*Consistency* : Fleshy.

Oscules and pores are not traceable.

There is no differentiation between the ectosome and endosome. Endosome is quite dense due to the interlocking of the modified spirasters. Tylostyles are set in a radial pattern and their tips projecting beyond the surface give a characteristic roughness to the surface.

*Spicules* : 1. Tylostyles. Straight or slightly curved. Head well developed; globular or rounded. Tips sharply pointed or rarely blunt (5 %). Length varies from 0.35 to 0.711 (0.521 mm) and width, 0.017 mm average. Head about 0.02 mm in well developed forms.

2. Spirasters. Four different types are met with.

A. Highly branching type. Spines highly branching and plate-like. Size when well developed, 0.075 x 0.105 mm.

B. Ordinary robust type. Size 0.042 x 0.018 mm.

C. Slender type, with three to five bends. Spines at the angles only; blunt or sharply pointed. Size 0.042 x 0.003 mm.

D. Small spirasters with curved axes and spines arranged in groups, two on either end and one in the convex part. Size 0.015 mm.

*Distribution* : Red Sea, Indian Ocean.

#### Genus **Sigmosceptrella** DENDY

#### **Sigmosceptrella laevis** (LINDGREN)

(Pl. III, Fig. 1; Pl. V, Fig. 3)

*Latrunculia laevis* LINDGREN, 1897, p. 484. LINDGREN, 1898, p. 43, pl. 17, fig. 12; pl. 19, fig. 24.

*Material* : Two entire specimens and several bits (MT 1406, 1413) (CMFRI - S. 100).

*Description* : Sponge often with a central crater which is brought about by the expansion of the sides in a radial pattern as in some funnel-shaped specimens of *Axinella* spp. The inner and the outer surfaces of the wall are minutely

conulose; conules small and broadly triangular. In some specimens it is seen that the actively growing part of the funnel may get cut up into several branches and grow erect in the form of thin ridged trabeculae. These branches may or may not fuse together. This characteristic shape is more or less uniform throughout the specimens examined. But in some cases the central cavity may get obliterated by ridges corresponding to those of the growing tips projecting into the cavity. Largest specimen in the collection has a width of 8 mm, height 12 mm. Central cavity 5 mm in diameter.

*Colour* : Pale yellow.

*Consistency* : Compressible and resilient.

Oscules and pores are not visible in the dry condition.

Surface conulose, conules correspond to the terminations of the main fibres in the surface. Conules found in the actively growing parts usually longer, 0.5 to 1 mm high.

Ectosome and endosome are not clearly separable from each other.

The dermal skeleton is composed of small tylostyles arranged irregularly. At places they may form bands containing 5 to 8 spicules. Discorhabds are abundant in the dermal part.

The main skeleton is composed of well developed network of pale brown spongin fibres, cored and echinated by large styles. The primary fibres run to the surface in an angle to the latter, and end in the surface conules supporting them. Number of spicules in these fibres, in cross section, may vary from 5 to 8. These primaries are interconnected by secondaries in an irregular pattern by slender fibres containing 1 to 4 spicules in cross section. Primaries have a diameter of about 0.1 mm and connectives, 0.04 mm.

*Spicules* : 1. Styles. Slightly curved and sharply pointed, base uniformly rounded or with faint swellings. Swellings on the shaft regular or irregular. Axial canal well developed in most cases. Size 0.301 to 0.396 (0.339 mm) x 0.012 to 0.018 (0.015 mm).

2. Tylostyles. Head oblong and with greatest diameter at its middle portion; neck narrow and body fusiform. Often polystylote. Tips sharply pointed or stair-stepped. Size 0.301 to 0.377 (0.32 mm) x 0.004 to 0.008 (0.006 mm).

3. Sigmodiscorhabds. With four distinct whorls of spines and ending in a median spine. Whorl of spines near the median spine always smaller than the rest. These spines are arranged in four lobes as in *Sigmosceptrella quadrilobata* DENDY (1921). In the early development of the discorhabd it passes through a sigmoid stage typical of the genus *Sigmosceptrella* DENDY. When well developed, these spicules measure 0.042 x 0.016 mm. Younger C

shaped forms about 0.016 x 0.008 mm. Spines on the rhabd mainly conical or rarely blunt.

*Remarks* : LINDGREN'S original (1897) and subsequent (1898) descriptions did not give the details regarding the developmental stages of the discorhabd. *S. laevis* differs from *Sigmosceptrella triloba* (SCHMIDT, 1875) and *Sigmosceptrella fibrosa* (DENDY, 1897) in the four lobed nature of sigmodiscorhabd and from *Sigmosceptrella quadrilobata* DENDY in the possession of large styles measuring to about 0.018 mm in diameter.

*Distribution* : Indian Ocean, Australian region.

#### Genus *Timea* GRAY

##### *Timea stellata* (BOWERBANK)

(Pl. III, Fig. 2)

*Hymedesmia stellata* BOWERBANK, 1866, p. 150. TOPSENT, 1900, p. 114, pl. 3, fig. 15 (Synonymy).

*Timea stellata* GRAY, 1867, p. 544. BURTON, 1934, p. 569 (Synonymy). SARA, 1958, p. 232, fig. 8 b. THOMAS, 1968 (under publication).

*Stelligera stellata* BABIC, 1922, p. 270, fig. L'.

*Material* : A small encrustation on a rock. Area occupied 2 x 4 mm (MT 1424).

*Description* : Thinly encrusting, 1 to 2 mm high. Surface hispid. Oscules and pores are not traceable. It has almost a friable consistency and the colour is pale yellow.

The skeletal arrangement is in typical *Timea* pattern.

*Spicules* : 1. Tylostyles. Straight and sharply pointed. Head spherical, oblong or trilobed; size 0.191 to 1.553 (0.711 mm) x 0.002 to 0.014 (0.011 mm). 2. Strongylasters. Centrum small, rays 3 to 6, and nodular. Total diameter varies from 0.012 to 0.029 (0.016 mm), rays about 0.003 mm in width.

*Distribution* : Atlantic Ocean, Mediterranean Sea, Indian Ocean, Australian region.

##### *Timea stellivarians* CARTER

(Pl. III, Fig. 3)

*Hymedesmia stellivarians* CARTER, 1880, p. 50, pl. 4, figs 10 a-e. DENDY, 1905, p. 120.

*Timea stellivarians* DENDY, 1921, p. 143.

*Timea* sp. THOMAS, 1968 (under publication).

*Material* : A small encrustation on a coral rock, area occupied 3 x 5 mm (MT 1417).

*Description* : Sponge encrusting, surface hispid due to the presence of tylostyles projecting from the interior. Oscules and pores are not visible in dry state.

*Colour* : Pale white.

*Ectosome* : There is a specialized zone of microscleres towards the outer part.

Skeletal arrangement resembles well with that of the type.

*Spicules* : 1. Tylostyles. Straight and sharply pointed. Head oval. Size 0.377 to 0.566 x 0.01 mm.

2. Oxyasters. Rays sharply pointed and conical. Total diameter 0.029 mm, length of ray about 0.008 mm.

3. Oxyasters. With comparatively small centrum and long rays. Tips of the rays capitate and minutely spined. Size varies from 0.012 to 0.021 mm.

4. Oxyasters. With small centrum and sharply pointed rays. Total diameter 0.008 mm. But these can only be the younger forms of the two previous types.

*Distribution* : Indian Ocean.

***Timea stelligera* (CARTER)**  
(Pl. III, Fig. 4)

*Suberites stelligerus* CARTER, 1882, p. 124, fig. 2.

*Hymedesmia stelligera* TOPSENT, 1904, p. 114, pl. 12, fig. 8.

*Timea stelligera* TOPSENT, 1928, p. 36. THOMAS, 1968 (under publication).

*Material* : A small encrustation covering an area of 3 x 4 mm (MT 1424).

*Description* : Encrusting, 1 to 2 mm thick; central portion slightly thicker than the surrounding areas. Surface hispid.

*Colour* : Pale yellow.

*Consistency* : Rather smooth.

Oscules and pores are not traceable. The details of skeletal arrangement suit exactly with the descriptions by previous workers.

*Spicules* : 1. Tylostyles. Head spherical to rounded and body straight or slightly curved. Tips sharply pointed or blunt (8 %). Size 0.193 to 1.37 (0.711 mm) x 0.002 to 0.014 (0.006 mm). Younger forms are usually found in the dermal part, radially arranged.

2. Chiasters. Centrum circular, with 4 to 12 cylindrical rays, extremity of which with crown of spinelets. Diameter 0.008 to 0.012 (0.009 mm).

*Distribution* : Atlantic Ocean, Indian Ocean.

Family **SUBERITIDAE** SCHMIDT

Genus **Suberites** NARDO

**Suberites carnosus** (JOHNSTON)

(Pl. III, Fig. 5)

*Halichondria carnosa* JOHNSTON, 1842, p. 146, pl. 13, figs 7, 8.

*Suberites carnosa* GRAY, 1867, p. 523.

*Suberites carnosus* RIDLEY, 1884, p. 465. TOPSENT, 1900, p. 233, pl. 7, figs 1-6 (Synonymy). RAO, 1941, p. 426. LEVI, 1959, p. 125, fig. 12. THOMAS, 1968 (under publication).

*Material* : Four specimens (MT 1382).

*Description* : Massive with club-shaped projections from the upper part, or fig-shaped. Oscules and pores are not visible in dry state. Surface minutely hispid.

Largest specimen has a height of 42 mm and width of 55 mm.

*Colour* : Pale grey when dry.

*Consistency* : Hard and incompressible in dry condition.

There is no demarcation between the ectosome and endosome.

*Spicules* : Tylostyles. Straight or slightly curved or rarely sinuous. Head may show considerable variation : globular, ovate or even trilobed; head more prominent in younger spicules. Axial canal well developed in some (17 %). Size 0.283 to 0.773 (0.622 mm) x 0.004 to 0.016 (0.013 mm).

*Distribution* : Arctic Ocean, Atlantic Ocean, Pacific Ocean, Mediterranean Sea, Indian Ocean, Red Sea.

Genus **Pseudosuberites** TOPSENT

**Pseudosuberites andrewsi** KIRKPATRICK

(Pl. III, Fig. 6)

*Pseudosuberites andrewsi* KIRKPATRICK, 1900, p. 135, pl. 12, fig. 12; pl. 13, fig. 7. BURTON, 1934, p. 567. BURTON, 1937, p. 14, pl. 8, fig. 48. RAO, 1941, p. 425. THOMAS, 1968 (under publication).

*Material* : One specimen (MT 1398).

*Description* : Body massive and growing erect. Total height of the specimen 40 mm and width 25 mm.

*Colour* : Pale yellow.

*Consistency* : Friable.

Oscules about 1 mm in diameter; margin slightly elevated. Pores small and irregular in outline.

Surface has a corrugated appearance. This is due to the sinking of the dermal membrane following the contour of the extensive subdermal cavities.

*Ectosome* : Dermal membrane is thin and semitransparent; spicules are tangentially placed. Sand grains are abundantly incorporated into the dermal portion.

The endosome has a crumb-of-bread appearance.

The skeleton consists of ill-defined bands of spicules running to the surface, interconnected by spicules distributed either singly or in groups. These main bands at their extremities support the dermal membrane.

*Spicules* : Tylostyles. Head well developed, circular, oblong or rarely trilobed. Shaft slightly curved. Size 0.18 to 0.29 (0.24 mm) x 0.004 to 0.005 (0.004 mm).

*Distribution* : Indian Ocean, Australian region.



Genus *Aaptos* GRAY  
*Aaptos aaptos* (SCHMIDT)  
(Pl. III, Fig. 7; Pl. VIII, Fig. 5)

*Ancorina aaptos* SCHMIDT, 1864, p. 33, pl. 4, fig. 11.

*Aaptos aaptos* DENDY & FREDERICK, 1924, p. 508 (Synonymy). BURTON, 1937, p. 13. LEVI, 1958, p. 24. LEVI, 1959, p. 122. LEVI, 1961, p. 10, fig. 10. VACELET & VASSEUR, 1965, p. 92, pl. 4, fig. 10. THOMAS, 1968 (under publication).

*Material* : Five specimens (MT 1357).

*Description* : Body irregularly spherical, attached to the substratum at many points. Surface uneven. Oscules and pores are not traceable. The largest specimen has a size of 110 x 67 x 37 mm. The other specimens bear close resemblance to the largest, in general shape and surface structure.

Spicular measurements (in mm) of *Aaptos aaptos* (SCHMIDT)

<i>Author and year</i>	<i>Locality</i>	<i>Strongyloxeas</i>	<i>Styles</i>
DENDY, 1916	Okhamandal	$1.1 \times 0.034$	$0.26 \times 0.008$
BURTON, 1937	Gulf of Mannar	$1.0 \times 0.04$	$0.5 \times 0.007$
LÉVI, 1958	Red Sea	$1.8 \times 0.045$	$0.4-0.45 \times 0.020-0.030$
LÉVI, 1959	Gulf of Guinea	$2.4 \times 0.070$ (styles)	$0.125-0.55$ (tylostyles)
LÉVI, 1961	Aldabra Island	$0.800-1.10 \times 0.032$	$0.225-0.475 \times 0.007-0.013$
VACELET & VASSEUR, 1965	Madagascar	$0.60-1.5 \times 0.030-0.032$	$0.18-0.43 \times 0.009-0.006$
THOMAS, 1968	Gulf of Mannar	$0.573-1.35(1.18) \times 0.012-0.033(0.026)$	$0.207-0.339(0.261) \times 0.004$
1357 A	Seychelles (Mahe)	$0.489-1.225(1.05) \times 0.008-0.021(0.015)$	$0.168-0.231(0.192) \times 0.004-0.006(0.004)$
1357 B	Seychelles (Mahe)	$0.754-1.132(1.02) \times 0.018-0.037(0.026)$	$0.245-0.377(0.301) \times 0.004-0.008(0.006)$
1357 C	Seychelles (Mahe)	$0.679-1.264(0.905) \times 0.018-0.037(0.022)$	$0.207-0.434(0.283) \times 0.004-0.008(0.006)$

*Colour* : Dark brown externally and pale brown internally when dry.

*Consistency* : Hard and incompressible.

Ectosome and endosome are not well demarcated.

The skeleton is typically radial, composed of strongyloxeas and small cortical styles.

A detailed discussion of the synonymy of this species is given in DENDY & FREDERICK (1924).

*Spicules* : 1. Strongyloxeas. Straight or slightly curved. Bases evenly rounded and tips sharply and gradually pointed, rarely stair-stepped or strongylote. Maximum width at the distal half (measurements are given in Table).

2. Styles. Dermal. Slightly curved and width uniform.

*Distribution* : Atlantic Ocean, Mediterranean Sea, Red Sea, Indian Ocean, Australian region, Pacific Ocean.

#### Family CLIONIDAE GRAY

The family Clionidae GRAY is divided into two groups. The first group, where the microscleres are simple, is called *Cliona* group and the other, where more complicated microscleres are present, the *Thoosa* group. Genera like *Amorphinopsis* CARTER, *Aka* DE LAUBENFELS and *Cliona* GRANT come under the former group and the genus *Thoosa* HANCOCK under the latter.

#### Genus *Amorphinopsis* CARTER

##### *Amorphinopsis excavans* CARTER (Pl. III, Fig. 8)

*Amorphinopsis excavans* CARTER, 1887, p. 77, pl. 5, figs 12-15. ANNANDALE, 1915, p. 467, fig. 4 A. THOMAS, 1968 (under publication).

var. *digitifera* ANNANDALE, 1915, p. 469, figs 4 B, 5.

var. *robinsoni* ANNANDALE, 1918, p. 198, pl. 2, fig. 3; pl. 9, fig. 1.

*Material* : A piece of coral rock infested by this species (MT 1355).

*Description* : The dermal part of the specimen is represented by a small encrustation, 2 x 3 mm diameter and the mass in the interior has ramifications throughout the coral rock, which is disintegrated to the maximum.

*Colour* : Pale white.

Oscules are not present, but pores are found in between dermal reticulation in groups. They have an elliptical outline; diameter 0.03 mm average.

The dermal skeleton is a well developed reticulation of oxeas bound together by spongin.

The main skeleton is composed of irregular bands of oxeas running towards the outer part and supporting the dermal net work. Small styles are abundantly represented in the dermal part, whereas in the interior oxeas predominate.

*Spicules* : 1. Oxeas. May show considerable variation in size and shape. They may be uniformly curved or slightly angulated at the centre. Tips sharply pointed, rarely stair-stepped or stylote. Length up to 0.61 mm and width, 0.020 mm.  
2. Styles. Slightly curved and sharply pointed. Maximum length noted is 0.3 mm and width 0.008 mm.

*Distribution* : Indian Ocean, Australian region.

#### Genus **Aka** DE LAUBENFELS

##### **Aka minuta** THOMAS (Pl. III, Fig. 9)

*Aka minuta* THOMAS, 1969 (under publication).

*Material* : Two specimens; one coral (*Pocillopora* sp.) and one bivalve shell (MT 1363) infested with this species.

*Description* : Sponge boring; cavities inside irregular, 2 to 6 mm in diameter. Interconnections of adjacent chambers are reduced to mere pores on the wall, which are often closed by sphincters. Branches of coral infested with this species, as in those from Gulf of Mannar, show a stunted growth.

Surface of the coral is ornamented with pores of 0.8 mm diameter, through which the papillae project out.

*Spicules* : Oxeas. Slightly angulated at the centre, and sharply pointed. Size 0.1 to 0.117 (0.116 mm) x 0.003 to 0.004 (0.003 mm).

The nearest relative of this species is *Cliona nodosa* HANCOCK (1849) (= *Aka nodosa*) (DE LAUBENFELS, 1936). But the spicules of *A. nodosa* appear to be quite peculiar since they are slightly recurved at their tips. Measurements of spicules of *A. nodosa* do not agree well with those of the present species.

*Distribution* : Indian Ocean.

Spicular measurements (in mm) of *A. minuta* from Gulf of Mannar and Seychelles (Mahe Island)

Host	Locality	Oxeas	
		Length	Width
<i>Pocillopora damicornis</i> (coral)	Gulf of Mannar	0.096-0.126(0.119)	0.002-0.007(0.005)
—do—	—do—	0.085-0.130(0.118)	0.001-0.007(0.005)
Massive coral rock	—do—	0.109-0.130(0.121)	0.001-0.007(0.005)
<i>Pocillopora damicornis</i> (coral)	Mahe Island	0.1-0.117(0.116)	0.003-0.004(0.003)

### Genus *Cliona* GRANT

#### *Cliona celata* GRANT (Pl. III, Fig. 10)

*Cliona celata* TOPSENT, 1900, p. 32, pl. 1, figs 5, 6-9; pl. 2, fig. 1 (Synonymy). ANNANDALE, 1915, p. 7 (Synonymy). ARNDT, 1935, p. 44, fig. 74 (Synonymy). OLD, 1941, p. 8, pl. 1, 2, 3, 7, 8. HARTMAN, 1958, p. 16. HARTMAN, 1964, p. 2, pl. 1, fig. 3. THOMAS, 1968 (under publication).

*Material* : One shell of *Strombus* sp. (MT 1389).

*Description* : Boring made by this species is confined to certain areas of the shell, mainly at its thickest part. Excurrent papillae protude through larger openings on the surface of the shell (0.9 to 1.2 mm) and incurrent ones through smaller openings which are generally distributed towards the inner part of the shell. The cavities found inside the shell usually irregular, 1 to 2 mm in greatest diameter.

The general morphology, anatomy, physiology and development of this species have been well worked out by previous authors (TOPSENT, 1900; GEORGE & WILSON, 1919; HARTMAN, 1958; GOREAU & HARTMAN, 1963).

*Spicules* : 1. Tylostyles. Head trilobed, body straight or slightly curved. Size 0.235 to 0.310 (0.256 mm) x 0.002 to 0.008 (0.006 mm).

2. Oxeas. Slightly curved and with hair-like dimensions. Length maximum noted is 0.105 mm.

No spirasters were found.

*Distribution* : Cosmopolitan.

***Cliona vastifica* HANCOCK**  
(Pl. III, Fig. 11)

*Cliona vastifica* HANCOCK, 1849, p. 342, pl. 15, fig. 12. ANNANDALE, 1915, p. 8 (Synonymy). ARNDT, 1935, p. 45, fig. 76 (Synonymy). HARTMAN, 1958, p. 21, fig. 5 (Literature & Synonymy). LEVI, 1958, p. 17, fig. 12. HARTMAN, 1964, p. 3, pl. 1, fig. 5. THOMAS, 1968 (under publication).

*Material* : Two pieces of shell bored by this species (MT 1346, 1412).

*Description* : Boring pattern resembles the photograph given by OLD (1941, pl. 7, A-D). In the thicker parts of the shell the openings are rather irregular. The chambers made inside the shell are globular, 0.75 mm in total diameter.

*Colour* : Pale grey.

The morphology of this species has been well worked out by previous workers (HANCOCK, 1849; HARTMAN, 1958).

1. Tylostyles. Slightly curved or straight. Head well developed, spherical or trilobed. Size 0.168 to 0.252 (0.193 mm) x 0.004 to 0.008 (0.005 mm).

2. Oxeas. Microspined in varying degrees or rarely smooth, the central portion of which often with a belt of long spines. Rarely stylote. Size 0.054 to 0.109 (0.084 mm) x 0.002 to 0.004 (0.003 mm).

3. Spirasters. Straight and uniformly granulated or with 2 to 4 angulations. Spines at the convex parts only. Length up to 0.012 and width about 0.004 mm.

It is a widely distributed species in the littoral area of Indian seas and may even flourish well in brackish water environments.

*Distribution* : Cosmopolitan.

Genus **Thoosa** HANCOCK

**Thoosa armata** TOPSENT

(Pl. III, Fig. 12; Pl. V, Fig. 5)

*Thoosa armata* TOPSENT, 1888, p. 81, pl. 7, fig. 9. TOPSENT, 1891, p. 579. TOPSENT, 1904, p. 109, pl. 11, fig. 5. ANNANDALE, 1915, p. 21. TOPSENT, 1918, p. 559. ARNDT, 1927, p. 11, fig. 6. LEVI, 1959, p. 124. LEVI, 1965, p. 12.

*Material* : One coral (*Pocillopora* sp.) infested by this sponge (MT 1359) (CM FRI - S. 118).

*Description* : Cavities found inside the coral are irregular, 1 to 2 mm in larger diameter, and the interconnections long (1 to 1.5 mm) and 0.5 to 0.8 mm in diameter. No papillae are seen, but small pores are present on the surface of coral.

*Spicules* : 1. Tylostyles. Straight and head globular. Length 0.24 mm and width about 0.002 mm (only one spicule is found in a preparation *in situ* and since there is no other sponge living in its vicinity, it is considered a proper one).

2. Amphiasters. Rays in two sets, each ray with a microspined head. Younger forms have conical spines and as it grows the rays become capitate with microspined heads. Finally, as a result of the extra thickening of the shaft and spines the entire spicule looks like a sphere with globular elevations throughout. When well developed, size 0.012 x 0.008 to 0.021 x 0.016 (0.018 x 0.015 mm).

3. Amphiasters. Rays long and lanceolate at their distal ends. Size 0.048 mm, rays 0.016 x 0.004 mm.

4. Amphiasters. Body slender and rays capitate. Size 0.033 to 0.050 (0.042 mm), rays, 0.020 mm. This can only be an younger form of the former.

5. Oxyasters. Centrum small, rays long and abruptly pointed. Reduction of rays quite common. Spicules with two rays are pretty abundant though those with 3, 4 and 5 rays are also rarely met with. Size (of spicule with 2 rays) 0.067 to 0.117 (0.10 mm) x 0.003 mm.

6. Oxeas. Rarely represented, often with a swelling in the centre. Size 0.160 x 0.002 mm.

TOPSENT in his original description stated that oxeas are an essential element in the spiculation. But many of the later workers have failed to record them. ANNANDALE (1915), in his specimen from Andamans, could see oxeas measuring 0.09 mm in length. In the present specimen from Seychelles a number of oxeas measuring up to 0.16 mm are present.

The larval development of this species has been well worked out by TOPSENT (1904).

*Distribution* : Tropical Atlantic, Red Sea, Indian Ocean.

#### Order EPIPOLASIDA SOLLAS

The following families are represented : 1. Jaspidae DE LAUBENFELS, 2. Sollasellidae LENDENFELD and 3. Tethyidae GRAY.

#### Family JASPIDAE DE LAUBENFELS

Two subfamilies are recognised here : 1. Rhaphidistiinae DE LAUBENFELS and 2. Jaspinae DE LAUBENFELS.

#### Subfamily Rhaphidistiinae DE LAUBENFELS

#### Genus Prostilyssa TOPSENT

#### **Prostilyssa oculata** (KIESCHNICK) (Pl. III, Fig. 13)

*Suberites oculatus* KIESCHNICK, 1896, p. 534.

*Ciocalypa oculata* THIELE, 1900, p. 75, pl. 3, fig. 27.

var. *maxima* HENTSCHEL, 1912, p. 428, pl. 21, fig. 61.

*Prostilyssa oculata* BURTON, 1937, p. 38, pl. 7, fig. 39. THOMAS, 1968 (under publication).

*Material* : Five specimens.

*Description* : Body tuberous or irregularly massive, with finger-like processes ending in oscules (now closed).

Surface highly corrugated, the largest specimen has a height of 50 mm and width of 40 mm.

*Colour* : Pale white when dry.

*Consistency* : Friable.

Surface smooth or corrugated at places.

Oscules and pores are all closed in dry condition.

Ectosome is well developed and is supported by pseudoxeas and styles arranged in a tangential manner. Sand grains are also heavily incorporated.

The main skeleton is composed of pseudoxeas arranged in bands running to the ectosomal part where they support the dermal skeleton. Sand grains are found in the interior also.

*Spicules* : 1. Pseudoxeas. Slightly curved and sharply pointed at one end. Maximum width is noted at the central part of the spicule. Size 0.51 to 0.687 (0.581 mm) x 0.010 to 0.016 (0.012 mm).

2. Styles. Slightly curved and sharply pointed. Width uniform throughout. Average size 0.3 x 0.006 mm.

*Remarks* : The measurements of spicules in these specimens are slightly smaller than those recorded by previous workers from different localities.

*Distribution* : Indian Ocean, Australian region.

#### Subfamily **Jaspinae** DE LAUBENFELS

##### Genus **Jaspis** GRAY

##### **Jaspis penetrans** (CARTER) (Pl. III, Fig. 14)

*Tisiphonia penetrans* CARTER, 1880, p. 141, pl. 7, fig. 44.

*Coppatias (Tisiphonia) penetrans* DENDY, 1905, p. 231.

*Coppatias penetrans* ANNANDALE, 1915, p. 459.

*Jaspis penetrans* THOMAS, 1969 (under publication).

*Material* : Several slides (MT 1418).

*Description* : Sponge boring into calcareous objects (corals). Shape of the galleries irregular. They usually grow along with other species of *Cliona*.

The skeleton consists of large oxeads, scattered irregularly, intermingled with microxeas. Oxyasters are found in large numbers inside the tissue.

*Spicules* : 1. Large oxeads. Gradually and sharply pointed, length 0.47 mm and width 0.010 mm average.



2. Microxeas. Uniformly curved or slightly angulated. Average size 0.063 x 0.004 mm.

3. Oxyasters. Centrum small and with 6 rays; rays microspined. Diameter 0.012 mm average.

It is a common boring sponge of the Indian seas. It is found from the collection that it is not uncommon in Seychelles also.

*Distribution* : Indian Ocean.

**Jaspis bouillonii n. sp.**

(Pl. III, Fig. 15; Pl. V, Figs 4, 4A; Pl. VIII, Figs 1, 2)

*Jaspis* sp. THOMAS, 1968 (under publication).

*Material* : Two specimens (MT 1411) (CMFRI Nos. 138 & 139).

*Description* : Body with massive base and branches growing erect to a height of 10 to 20 mm. Branches are conical in shape with ridges running longitudinally up towards the growing tips. Surface conulose, conules may join together to form ridges. Size of the largest specimen, 45 x 40 mm.

*Colour* : Dermal membrane pale white and interior pale yellow.

*Consistency* : Hard and incompressible.

Oscules and pores are not traceable.

*Ectosome* : The dermal skeleton is well developed, and when dry may come off easily. Thickness, 0.2 mm average.

*Endosome* : Dense.

The dermal skeleton is well developed and densely packed with oxyasters. No other spicules are found in the dermal region.

The main skeleton is composed of loose bands of oxeas running vertically up through the deeper parts. Towards the dermal region, from such ill-defined bands are given off small bands which end in the conules. Oxeas pierce the conule at its summit. This arrangement gives a characteristic hispidity to the surface. Conules which are devoid of supporting oxeas are also met with.

*Spicules* : 1. Oxeas. Slightly curved and sharply pointed, rarely strongylote. Some with a swelling at the centre; but not so frequent as in *Halicnemia arbuscula* TOPSENT (1928) (measurements are given in Table).

2. Oxyasters. Centrum small, with 3 to 8 acutely pointed rays. Rays spinous in varying degrees, or rarely smooth. Suppression or branching of ray is common.

The present species differs from the other species of *Jaspis* so far recorded by the possession of large oxyasters (up to 0.1 mm) with spiny rays. I have great pleasure in naming this species after Prof. J. BOUILLON, Université Libre de Bruxelles, Belgium.

Measurement (in mm) of spicules *Jaspis bouilloni* n. sp.

<i>Species</i>	<i>Locality</i>	<i>Oxeas</i>	<i>Oxyasters</i>
<i>Jaspis</i> sp. THOMAS (1968)	Gulf of Mannar	0.849-1.244(1.03) × 0.012-0.033(0.024)	0.016-0.034(0.027)
<i>Jaspis bouilloni</i> n. sp. No. 1411	Mahe Island (Seychelles)	0.566-0.792(0.707) × 0.008-0.021(0.012)	0.016-0.067(0.031)
<i>Jaspis bouilloni</i> n. sp. No. 1411 A	—do—	0.698-0.886(0.773) × 0.008-0.021(0.013)	0.014-0.101(0.038)

***Jaspis jonesi* n. sp.**  
(Pl. III, Fig. 16)

*Material* : One small encrustation on a coral *Heterocyathus* sp. (MT 1421) (CMFRI No. 137).

*Description* : Sponge rather semicircular, with the highest region coinciding the elevation of the coral where it comes to about 3 mm in total height, and the rest thinly encrusting. Arenaceous objects are highly incorporated.

*Colour* : Pale white.

*Consistency* : Hard and incompressible.

Oscules and pores are not visible due to the dry nature of the specimen.

The dermal area is greatly exaggerated by the inclusion of foreign objects.

*Endosome* : Dense.

The skeletal arrangement is irregular, composed of large oxeas arranged in confusion. There is no difference between the oxeas of dermal region and those of the interior.

Small oxyasters are abundant in the outer part of the specimen but towards the interior their number may dwindle away and the large oxyasters take their place.

*Spicules* : 1. Oxeas. Straight or slightly curved, rather fusiform and sharply pointed. Size 0.452 to 1.01 (0.773 mm) x 0.008 to 0.033 (0.010 mm).

2. Oxyasters (choanosomal). Centrum small, rays long, slender and sharply pointed. Axial canal well developed. Number of rays from 6 to 12 but they may get suppressed in varying degrees. Rarely rays spined at their tips. Total diameter from 0.050 to 0.096 (0.071 mm), width of a ray, at its base, 0.002 mm average.

3. Oxyasters (dermal). Centrum small, rays, 6-12. Total diameter from 0.004 to 0.016 mm.

*Remarks* : The spiculation of this species recalls that of certain species of reduced *Stelletta* like *S. brevis* and its varieties *lutea* and *paupera* HENTSCHEL (1909) from Australia. But the total absence of triaenes and radial architecture together with the exclusions of dermal strongylasters suggest strongly against a stellettid affinity in this case. The oxyasters found here resemble those of the genus *Halicnemia* BOWERBANK.

This species is named after Dr. S. JONES, Director of Central Marine Fisheries Research Institute, Mandapam Camp, India.

#### Genus *Zaplethea* DE LAUBENFELS

##### *Zaplethea digonoxea* ssp. *diastra* VACELET & VASSEUR (Pl. III, Fig. 17)

*Zaplethea digonoxea* DE LAUBENFELS, 1950, p. 32, fig. 21.

ssp. *diastra* VACELET & VASSEUR, 1965, p. 90, pl. 3, fig. 9. THOMAS, 1968 (under publication).

*Material* : One specimen encrusting on a massive coral (MT 1368).

*Description* : Sponge encrusting, height 1 to 2 mm. Surface has a corrugated appearance.

*Colour* : Pale white when dry.

*Consistency* : Hard and compact.

Oscules and pores are not visible. There is no clear cut demarcation between the ectosome and endosome.

Large oxeas are in ill-defined tracts with their tips projecting slightly beyond the surface giving a certain amount of hispidity to the surface. Microxeas and asters are arranged irregularly inside.

*Spicules* : 1. Oxeas. Uniformly curved and sharply pointed. Size 0.452 to 0.773 (0.584 mm) x 0.008 to 0.018 (0.012 mm).

2. Microxeas. Biangulated or irregularly curved, and some with a swelling in the centre. Size 0.084 to 0.193 (0.126 mm) x 0.004 to 0.008 (0.005 mm).

3. Oxyasters. Centrum small and with 3 to 8 conical smooth rays. Size 0.016 to 0.050 (0.025 mm), width of a ray, at its base, 0.004 mm maximum.

4. Oxyasters. Centrum small and with 4 to 10 spiny rays. Rays acutely pointed; spines more prominent at the tips. Size 0.012 to 0.032 (0.018 mm).

*Remarks* : The asters found in the present specimen have slightly larger diameter than those recorded by previous workers (see Table, p. 69).

*Distribution* : Indian Ocean.

#### Family SOLLASELLIDAE LENDENFELD

#### Genus **Epipolasis** DE LAUBENFELS

#### **Epipolasis salomonensis** (DENDY)

(Pl. III, Fig. 18)

*Spongosorites salomonensis* DENDY, 1921, p. 125, pl. 17, figs 6 a-c.

*Epipolasis salomonensis* DE LAUBENFELS, 1936, p. 162.

*Material* : One specimen (MT 1364) (CMFRI - S. 126).

*Description* : Body composed of a tuberous mass, from which arise two conical branches bearing oscules at their extremity. Size 110 x 40 mm. These branches

Spicular measurements (in mm)  
of *Z. digonoxea* ssp. *diastra* VACELET & VASSEUR

<i>Species</i>	<i>Locality</i>	<i>Oxeas</i>	<i>Microxeas</i>	<i>Oxyasters</i>	<i>Oxyasters</i>
<i>Z. digonoxea</i> ssp. <i>diastra</i> VACELET & VASSEUR (1965)	Madagascar	0.400-0.900 × 0.006-0.018	0.085-0.130 × 0.003	0.019-0.022	0.010-0.015
<i>Z. digonoxea</i> ssp. <i>diastra</i> THOMAS (1968)	Gulf of Mannar	0.611-0.953(0.811) × 0.006-0.018(0.013)	0.08-0.16(0.13) × 0.003-0.015(0.004)	0.019-0.035(0.020)	0.008-0.016(0.010)
<i>Z. digonoxea</i> ssp. <i>diastra</i> No. 1368	Mahe Island (Seychelles)	0.452-0.773(0.584) × 0.008-0.018(0.012)	0.084-0.193(0.126) × 0.004-0.008(0.005)	0.016-0.050(0.025)	0.012-0.032(0.018)

have a length of 20 and 40 mm respectively. A number of coral bits are incorporated into the body. No trace of attachment is seen.

*Colour* : Pale yellow externally and white internally.

*Consistency* : Hard and incompressible.

Surface hispid. Oscules terminal on branches, 2 to 3 mm in diameter.

*Ectosome* : It is well developed; and easily detachable. Small oxeads are arranged irregularly.

*Endosome* : Dense. Large canals varying in diameter from 0.5 to 2 mm are often seen running towards the surface.

The skeletal arrangement tallies well with that of the type.

*Spicules* : 1. Large oxeads. Uniformly curved or slightly crooked. Tips sharply pointed, stair-stepped or blunt. Maximum size noted is 1.24 x 0.041 mm. 2. Small oxeads. Dermal, uniformly curved or slightly angulated. Average size 0.4 mm x 0.007 mm. The measurements of these two types of oxeads always overlap considerably and it is not sure whether these are two different sets at all.

*Remarks* : DENDY'S specimen (1921) was dark brown in alcohol. But the present specimen is pale yellow externally and pale white internally.

*Distribution* : Indian Ocean.

#### Family TETHYIDAE GRAY

#### Genus *Tethya* LAMARCK

#### *Tethya diploderma* SCHMIDT (Pl. III, Fig. 19)

*Tethya diploderma* SCHMIDT, 1870, p. 52, pl. 4, fig. 11. BURTON, 1937, p. 12, pl. 9, fig. 56 (Synonymy). LEVI, 1956, p. 7, fig. 4. THOMAS, 1968 (under publication).

*Donatia diploderma* TOPSENT, 1918, p. 574, figs 12-14. BURTON, 1924, p. 1039 (Synonymy).

*Alema seychellensis* WRIGHT, 1881, pp. 13-20.

*Tethya seychellensis* KIRKPATRICK, 1900, p. 133. LEVI, 1958, p. 23, fig. 18.

*Donatia seychellensis* DENDY, 1916, p. 265, pl. 48, fig. 4.

*Material* : One specimen (MT 1350).

*Description* : Body spherical, attached to the substratum by a broad base. Surface conulose; ridges extending across the conules give a sort of tessellated appearance to the surface.

*Colour* : Pale grey when dry.

*Consistency* : Rather hard and incompressible.

The cortex is well developed; thickness, 0.1 mm. Spherasters are sparsely represented and in this respect it comes close to *T. japonica* (*vide infra*).

The main skeleton consists of radial bundles of strongyloxeas traversing the endosome at irregular intervals. Young strongyloxeas are found in the choanosome just beneath the cortex.

*Spicules* : 1. Strongyloxeas. Straight and sharply pointed, stair-stepped or even strongylote. Length varies from 0.15 to 1.207 mm and width from 0.006 to 0.016 mm.

2. Spherasters. Rays conical and sharply pointed, rarely branched or blunt. Total diameter varies from 0.025 to 0.063 mm.

3. Tylasters. Centrum small, with 3 to 8 rays. Tips of rays slightly spined or even smooth. Total diameter, 0.016 mm.

4. Oxyasters. Centrum small and usually with 6 rays. Rays smooth or slightly roughened, spiny or even branched. Maximum diameter 0.040 mm.

*Distribution* : Red Sea, Indian Ocean, Australian region, Pacific Ocean, Atlantic Ocean.

***Tethya robusta* BOWERBANK**  
(Pl. III, Fig. 20)

*Tethya robusta* BOWERBANK, 1873, p. 10, pl. 2, figs 12-17. THOMAS, 1968 (under publication).

*Donatia robusta* BURTON, 1924, p. 1037 (Synonymy).

*Material* : One specimen (MT 1392).

*Description* : Sponge spherical, attached to the substratum by a broad base. Surface with tubercles of 1 mm diameter. Oscules and pores are not traceable in dry state. Diameter of specimen 11 mm, height 6 mm.

*Colour* : Pale white.

*Consistency* : Hard and incompressible.

*Cortex* : 1 to 1.8 mm thick.

The skeletal arrangement is in typical *Tethya* pattern and there is nothing more to add to what the previous workers have described.

*Spicules* : 1. Strongyloxeas. Straight, tips sharply pointed, stair-stepped or even blunt. Size 0.698 to 1.77 (1.20 mm) x 0.012 to 0.028 (0.021 mm).

2. Spherasters. Two types are present as in DENDY's (1916) specimen. In the smaller forms, rays are tent-like, length of ray 1/5th the diameter of the centrum. In larger forms, rays are about 1/3rd to 1/2 the diameter of the centrum. Size of the former 0.032 to 0.046 mm (length of ray about 0.008) and of the latter from 0.033 to 0.155 (0.084 mm).

3. Cortical chiasters. Centrum small, rays with a crown of spines at their tips, average diameter, 0.012 mm.

4. Choanosomal chiasters. Rays long with spines at their tips or oxeote. Average diameter, 0.02 mm.

*Distribution* : Red Sea, Indian Ocean, Australian region, Pacific Ocean.

### ***Tethya japonica* SOLLAS**

(Pl. III, Fig. 21)

*Tethya japonica* SOLLAS, 1888, p. 430, pl. 44, figs 7-14. BURTON, 1934, p. 568. BURTON, 1937, p. 13. THOMAS, 1968 (under publication).

*Donatia japonica* DENDY, 1916, p. 262, pl. 48, fig. 2. BURTON, 1924, p. 1039 (Synonymy).

*Material* : One specimen (MT 1351).

*Description* : Surface ornamented with fine conules. Conules rarely gemmiferous. Diameter of the specimen 10 mm. It was attached to the substratum



by a broad base. The basal part of this specimen is with two long root like appendages, whose tips were attached to the substratum by disc like structures.

*Colour* : Pale white externally and pale yellow internally.

*Consistency* : Rather fleshy in alcohol.

Oscules and pores are not traceable.

The cortex is well developed; thickness 0.9 to 1.8 mm. Inner half slightly fibrous.

The strongyloxeas are arranged in bands of 0.18 mm diameter, running radially to the surface conules, where each band expands and the spicules project beyond the surface. Rooting tufts and gemmules are supported by bands of strongyloxeas. Just beneath the cortex, in the choanosome, young strongyloxeas are distributed in between two adjacent bands. The cortex is not highly charged with spherasters. Chiasters are distributed richly in the surface and choanosome.

*Spicules* : 1. Strongyloxeas. Straight, tips sharply pointed, stair-stepped or strongylote. Size 0.58 to 1.28 (1.00 mm) x 0.008 to 0.016 (0.014 mm).  
2. Spherasters. Rays sharply pointed; length 1/2 the diameter of the centrum. Size 0.037 to 0.061 (0.046 mm).  
3. Chiasters. Centrum small, rays blunt at their tips, 6 to 12 in numbers, diameter 0.008 to 0.012 mm.

*Distribution* : Red Sea, Indian Ocean, Australian region.

#### Order CHORISTIDA SOLLAS

The following families are represented : 1. Ancorinidae GRAY, 2. Geodiidae GRAY, 3. Craniellidae DE LAUBENFELS and 4. Kaliapsidae DE LAUBENFELS.

#### Family ANCORINIDAE GRAY

Two subfamilies are considered : 1. Ancorininae DE LAUBENFELS and 2. Stellettiniae SOLLAS.

Subfamily **Ancorininae** DE LAUBENFELS

Genus **Ecionemia** BOWERBANK

**Ecionemia laviniensis** DENDY  
(Pl. III, Fig. 22)

*Ecionemia laviniensis* DENDY, 1905, p. 81, pl. 3, fig. 2. DENDY, 1921, p. 242, pl. 44, fig. 6; pl. 46, fig. 5. LEVI, 1961, p. 7, fig. 5.

*Material* : One specimen (MT 1395) (CMFRI - S. 132).

*Description* : Sponge growing thickly encrusting on a coral. Thickness maximum noted, 5 mm. Pebbles and small pieces of corals are incorporated heavily into the body.

Oscules and pores are not present. Surface hispid.

The skeletal arrangement suits well with that of the type.

*Spicules* : 1. Dichotriaenes. Shafts conical and sharply pointed, rarely blunt. Clads rarely polychotomous. Shafts, 1.1 x 0.042 mm; protoclads, 0.04 x 0.03 mm and deuteroclads, 0.08 x 0.021 mm; chord, 0.27 mm.

2. Plagiotriaenes. Probably younger forms of the former. Always smaller than the above mentioned in dimensions.

3. Protriaenes. Hair-like and very rare. Well developed forms measure : shafts, 1.5 x 0.004 mm; clads, 0.041 x 0.004 mm. Another type of protriaenes seen in this specimen resemble that figured by DENDY (1905) for *Stelletta herdmani* (pl. 2, fig. 6 c). Here the shaft is slightly curved and fusiform. Length up to 0.8 mm and width 0.014 mm. Clads short and sharply pointed.

4. Anatriaenes. Rare, length up to 0.6 mm and width 0.008 mm. Chord length 0.025 mm.

5. Oxeas. Uniformly curved or slightly angulated. Malformations are common; stylote or even strongylote. Size 0.566 to 1.5 (1.15 mm) x 0.008 to 0.058 (0.037 mm).

6. Microxeas. Measuring 0.13 mm average; probably younger forms of the larger oxeas.

7. Microstrongyles. Slightly angulated and with an inflation at the centre. Granulated in varying degrees or rarely smooth. Size 0.063 to 0.134 (0.092 mm) x 0.004 to 0.008 (0.006 mm). Younger forms usually oxeote.

8. Chiasters. Mainly dermal with 5 to 8 rays. Diameter 0.008 mm.

9. Oxyasters. Mainly choanosomal. Rays conical and diameter up to 0.021 mm.

*Remarks* : In the present specimen two types of asters, viz., small with strongylote rays and large with oxeote rays, are present.

*Distribution* : Indian Ocean.

Subfamily **Stellettinae** SOLLAS

Genus **Myriastr**a SOLLAS

**Myriastr**a **purpurea** (RIDLEY)  
(Pl. III, Fig. 23)

*Stelletta purpurea* RIDLEY, 1884, p. 473, pl. 40, fig. E; pl. 43, fig. J. BURTON, 1926, pp. 44-49. THOMAS, 1968 (under publication).

*Myriastr*a *purpurea* LEVI, 1958, p. 9, figs 5 a-d. BERGQUIST, 1961, p. 201, figs 19 a-b. LEVI, 1965, p. 7, fig. 4.

*Material* : Two specimens (MT 1391).

*Description* : Body spherical or oblong in shape. Diameter 5 and 10 mm respectively.

*Colour* : Gray when dry.

*Consistency* : Hard and incompressible.

Oscules and pores are not traceable in dry state.

The skeletal arrangement suits exactly with that described by previous workers.

*Spicules* : 1. Orthotriaenes. Shafts stout and sharply pointed; rarely blunt. When well developed measure : shafts, 1.28 x 0.033 mm; clads, 0.132 x 0.025 mm; chord length, 0.25 mm.

2. Anatriaenes. Shafts abruptly pointed or rarely blunt. Clads sharply recurved in well developed forms whereas "T" shaped in the younger. Various parts measure : shafts, 1.6 x 0.021 mm; clads, 0.063 mm; chord length, 0.088 mm.

3. Oxeas. Slightly curved and sharply pointed. Size 1.03 x 0.021 mm.

4. Microxeas. Size 0.283 x 0.002 mm. Scarcely represented.

5. Tylasters. With 4 to 8 rays; suppression of rays quite common. Diameter up to 0.021 mm.

*Distribution* : Red Sea, Indian Ocean, Australian region, Pacific Ocean, Antarctic.

Genus *Stelletta* SCHMIDT

*Stelletta cylindrica* n. sp.  
(Pl. IV, Fig. 1; Pl. V, Fig. 7)

*Material* : Several bits; probably different parts of the same specimen (MT 1354) (CMFRI Nos. 141 & 142).

*Description* : Body cylindrical with a central canal of 5-8 mm diameter running length-wise inside the body. Thickness of the wall varies from 2 to 3 mm.

*Colour* : Pale yellow when dry.

*Consistency* : Hard.

Surface microscopically hispid due to the presence of microxeas projecting from the interior. Oscules and pores are not present. Several barnacles live engulfed in the body.

The skeletal arrangement is in typical *Stelletta* pattern. Orthotriaenes and dichotriaenes have their clads just beneath the surface. An interesting character found in this species is the presence of a horizontally arranged plate of oxeas and microscleres in the interior. When viewed from the interior these oxeas together with the membrane bearing small irregular pores (0.02 to 0.09 mm) give the appearance of a thin uniform membrane something like the dermal membrane of other sponges. The cavity inside the sponge never opens to the outside, but ends blindly.

*Spicules* : 1. Dichotriaenes. Shafts conical and sharply pointed. Size 0.283 to 0.584 (0.452 mm) x 0.016 to 0.025 (0.021 mm); chord, 0.100 to 0.168 (0.134 mm); protoclads, 0.029 mm and deuteroclads, 0.032 mm average.  
2. Orthotriaenes. Suppression of clads quite common. Axial canal well developed, size almost the same as the former.  
3. Anatriaenes. Very rare, shafts about 0.339 x 0.016 mm, blunt at tips; clads 2 or 3; chord length 0.062 mm.  
4. Oxeas. Uniformly curved and sharply pointed. Rarely stylote. Size 0.622 to 0.943 (0.811 mm) x 0.008 to 0.033 (0.021 mm).  
5. Microxeas. Dermal, uniformly curved, or rarely crooked. Size 0.12 to 0.16 (0.13 mm) x 0.001 mm.  
6. Oxyasters. (Anthasters). Centrum small, with 2 to 10 rays, tips blunt or pointed; spined throughout. Suppression of rays quite normal. Size from 0.010 to 0.025 mm.  
7. Strongylasters. With 4 to 8 rays, rays not spiny. Mainly these spicules are found towards the dermal part and rarely in the endosome. Diameter from 0.008 to 0.010 mm.

*Remarks* : The spicular dimensions, in this case, are quite smaller when compared to those of the other species of the genus *Stelletta*. Elaborate cavity found inside the specimen and a uniform horizontal layer of oxeas in the interior are distinguishing characters of this new species. Taking the hollow cylindrical shape of the body into consideration the specific name *cylindrica* is proposed here.

Genus **Aurora** SOLLAS

**Aurora oxytoxa** n. sp.  
(Pl. IV, Fig. 2)

*Material* : Two highly damaged specimens (MT 1400) (CMFRI Nos. 143 & 144).

*Description* : Sponge thinly encrusting in the initial stage, later giving off tubular branches growing up and uniting at irregular intervals producing an amorphous mass. Wall, 1 to 3 mm thick and cavity inside, 2 to 5 mm in diameter. Foreign particles are incorporated abundantly.

*Colour* : Pale brown when dry.

*Consistency* : Fleshy.

Oscules and pores are not present in dry condition.

The skeletal frame work is in typical *Aurora* pattern. There is a well defined cortex, ranging from 0.18 to 0.56 mm in thickness, containing densely packed oxyasters. Main skeleton is radially arranged, consisting of bands of oxeote spicules. Orthotriaenes have their heads arranged in different levels, and in most well developed forms their heads are just beneath the cortex. Clads poorly developed.

In the subcortical zone several canals are found running in longitudinal direction. Toxiform oxyasters are abundantly represented in the lining tissue of these canals.

*Spicules* : 1. Orthotriaenes. Shafts conical and sharply pointed. Clads vestigial. Length of the shaft up to 0.641 and width 0.012 mm. Clads, 0.067 mm.

2. Oxeas. Slightly curved and sharply pointed. Maximum size noted is 0.489 x 0.021 mm.

3. Spherasters. Mainly cortical but fairly common in the choanosome also. Centrum spherical and rays conical. In advanced stages the centrum enlarges considerably giving the shape of an irregular sphere. Younger forms have small centrum and sharply pointed rays. Total diameter 0.008 to 0.033 (0.021 mm).

4. Oxyasters. Choanosomal. They appear to be toxiform and the rudiments of the other rays can be found at the centre. The existing two rays are curved in different directions. Tips of the rays gradually and sharply pointed. Size, when well developed, 0.168 x 0.006 mm. But usually hair-like.

The spicules mentioned above are specific to this sponge and such toxiform spicules are rarely seen in the phylum *Porifera*; perhaps frequently in the genus *Thoosa* HANCOCK, and rarely in genera like *Isopos* (*Isopos apiarium* SCHMIDT) and *Erylus* (*Erylus nummulifer* TOPSENT).

This species usually grows in association with some other sponges. Sponges like *Timea stellata* (BOWERBANK), *Timea stelligera* (CARTER) and *Toxemna tubulata* (DENDY) are found growing in association with this species.

The structure of the sponge is typical of the genus *Aurora* and taking the toxiform nature of oxyasters into consideration the specific name *oxytoxa* is proposed here.

Family **GEODIIDAE** GRAY

Genus **Geodia** LAMARCK

**Geodia lindgreni** (LENDENFELD)  
(Pl. IV, Fig. 4)

*Sidonops picteti* LINDGREN, 1897, p. 486. LINDGREN, 1898, p. 67, pl. 18, figs 17 a, b; pl. 20, fig. 6.

*Sidonops lindgreni* LENDENFELD, 1903, p. 102. LENDENFELD, 1910, p. 223.

*Geodia lindgreni* THOMAS, 1968 (under publication) (not *S. picteti* TOPSENT, 1897).

**Material** : One highly damaged specimen (MT 1397).

**Description** : Sponge hemispherical, attached to a coral stone by a broad base. Total diameter, at its base, 15 mm, height 8 mm.

**Colour** : Pale white.

**Consistency** : Hard and incompressible.

Oscules, not present, pores are distributed throughout the surface, protected by sphincter; diameter about 0.1 mm.

The skeletal arrangement suits well with that described by previous workers.

- Spicules* : 1. Orthotriaenes. Shafts conical and clads at right angles to the former; usually subequal. Length of clads up to 0.4 mm and width 0.016 mm. Size of shaft 2 x 0.029 mm. The clads are arranged beneath the sterraster crust.
2. Anatriaenes. Shafts long and hair-like. Size 2.8 x 0.008 mm; clads, when well developed, 0.042 mm and chord length 0.060 mm.
3. Protriaenes. Clads suppressed in varying degrees, shafts fusiform and axial canal well developed. Size when well developed : length of the shaft 3.8 mm and width 0.018 mm. Maximum length of clad 0.092 mm.
4. Oxeas. Size 2.1 x 0.25 mm.
5. Styles. Slightly curved. They are usually seen at the pore membrane reinforcing it. Size 0.2 x 0.006 mm.
6. Sterrasters. Oval in outline. Size 0.1 x 0.088 mm.
7. Oxyasters. Choanosomal. Centrum small, rays long and slightly roughened. Average size 0.030 mm.
8. Strongylasters. Dermal; size 0.005 mm.

*Distribution* : Indian Ocean, Australian region.

#### Family CRANIELLIDAE DE LAUBENFELS

##### Genus *Cinachyra* SOLLAS

##### *Cinachyra cavernosa* (LAMARCK) (Pl. IV, Fig. 3)

*Tethya cavernosa* LAMARCK, 1815, p. 17.

*Tethya cranium* var. *australiensis* CARTER, 1886, p. 127.

*Cinachyra australiensis* BURTON, 1934, p. 523 (Synonymy). BERGQUIST, 1965, p. 199 (Synonymy). THOMAS, 1968 (under publication).

*Craniella australiensis* VACELET & VASSEUR, 1965, p. 88.

*Chrotella australiensis* BURTON, 1937, p. 12. RAO, 1941, p. 424.

*Chrotella cavernosa* BURTON, 1959, p. 200.

*Material* : Five specimens (MT 1385).

*Description* : Body tuberos, globular or irregular in shape, attached to the substratum by a broad base. Oscules terminal or absent. Porocalices small and scattered or totally absent. Silt is present in the surface.

*Colour* : Pale grey when dry.

*Consistency* : Hard.

The skeletal arrangement tallies well with the description of previous workers.

*Spicules* : 1. Protriaenes. They may project considerably beyond the surface. Length of the shafts up to 2.1 mm and width about 0.008 mm. Clads 0.030 to 0.063 mm. Diaenes or monaenes are also noted.

2. Anatriaenes. Shafts long and hair-like distally. Average length, 1.7 mm and width 0.004 mm. Clads, 0.033 mm average and chord, 0.063 mm.

3. Oxeas. Slightly curved and sharply pointed. Rarely stylote forms are also met with. Size 2.8 x 0.046 mm.

4. Microxeas. Slightly curved and sometimes granulated. Their abundance may vary from specimen to specimen. Average size 0.126 mm x 0.002 mm.

5. Sigmaspires. Roughened throughout, C or S shaped and rarely contorted. Size 0.012 mm.

*Distribution* : Red Sea, Indian Ocean, Australian region, Pacific Ocean.

#### Genus *Acanthocinachyra* LEVI

##### *Acanthocinachyra seychellensis* n. sp.

(Pl. IV, Fig. 5)

*Material* : One specimen encrusting on a coral stone (MT 1410) (CMFRI No. 145).

*Description* : Sponge irregularly encrusting, surface hispid, and without oscules. Surface lodges a large amount of silt uniformly. Height 4mm maximum.

*Colour* : Pale grey when dry.

*Consistency* : Hard and incompressible.

The skeletal arrangement is typical of the genus with acanthoxeas distributed abundantly in between the radial bundles of oxeas. Protriaenes project considerably beyond the surface.



*Spicules* : 1. Protriaenes. Shafts slender, size 1.88 mm when well developed, width 0.004 mm; clads 0.046 x 0.004 mm. Rarely prodiaenes and promonaenes are seen.

2. Anatriaenes ?

3. Oxeas. When well developed uniformly curved; younger forms slightly crooked. Tips sharply pointed, stair-stepped or rarely blunt. Size 0.849 to 1.641 (1.245 mm) x 0.006 to 0.042 (0.021 mm).

4. Acanthoxeas. Younger forms smooth or granulated in varying degrees. Middle portion with symmetrical or asymmetrical inflation bearing a belt of long spines. Sometimes this portion may bear a long spine (rudimentary ray ?). When well developed they are uniformly ornamented with recurved spines. Spines on the body rarely in whorls. Most of the spicules give a toxiform appearance. Size 0.256 to 0.315 (0.285 mm) x 0.006 to 0.008 (0.007 mm).

5. Sigmaspores. Abundant and uniformly granulated. Size 0.008 to 0.012 mm.

*Remarks* : LEVI (1964) created a new genus *Acanthocinachyra* with type *A. enigmatica* from Inhaca (Mozambique). In *A. enigmatica* the spicules, especially oxeas and acanthoxeas, were considerably larger (in the case of oxea, 2.8 to 3.8 x 0.014 to 0.025 mm and acanthoxea, 0.250 x 0.040 mm) and anatriaenes were of quite usual occurrence. In the present species the acanthoxeas found are considerably longer with smaller diameter. The possession of a swelling in the centre and toxiform appearance are peculiar to the acanthoxeas of this species.

#### Genus *Paratetilla* DENDY

##### *Paratetilla bacca* (SELENKA)

(Pl. IV, Fig. 6; Pl. VIII, Fig. 7)

*Paratetilla bacca* DENDY, 1921, p. 21 (Synonymy). BURTON, 1959, p. 200 (Synonymy). VACELET & VASSEUR, 1965, p. 88, pl. 3, fig. 7. BERGQUIST, 1965, p. 198, fig. 34. LEVI, 1965, p. 5, fig. 1. THOMAS, 1968 (under publication).

*Material* : Four specimens (MT 1378).

*Description* : Bod spherical or irregularly globular; with shallow pore bearing pits. Surface highly hispid with good amount of silt settled. Largest specimen has a diameter of 67 mm.

*Colour* : Pale grey when dry.

*Consistency* : Hard and incompressible.

There is a "nucleus" at the centre of the specimen from which the bundles of oxeas radiate. The oxeas project considerably beyond the surface supported by anatriaenes. Orthotriaenes are found at the junction of ectosome and endosome with their shafts radiating towards the central part.

*Spicules* : 1. Orthotriaenes. Clad length about 0.369 and width 0.028 mm. Tips sharply pointed, strongylote, stair-stepped or with branches. Shafts equal to clads in length in younger forms whereas in well developed forms, shafts are poorly developed. Length about 0.18 mm and width 0.021 mm, but usually smaller.

2. Protriaenes. Shafts fusiform. Suppression, either partial or complete, of the clads is quite common. Dimensions are the following: shafts 3.96 x 0.013 mm; clads 0.058 x 0.008 mm.

3. Anatriaenes. Younger forms are more or less "T" shaped; axial canal well developed in most. Shaft 3.86 x 0.008 mm; chord length 0.046 mm.

4. Oxeas. (Choanosomal). Slightly curved and sharply pointed. Tips malformed in varying degrees. Size 1.28 to 3.01 (2.26 mm) x 0.012 to 0.033 (0.023 mm)

5. Microxeas. Uniformly curved. Size 0.151 to 0.336 (0.24 mm) x 0.002 mm. Sometimes hair-like.

6. Sigmaspines. C or S shaped, uniformly roughened. Size 0.009 to 0.016 mm.

*Distribution* : Red Sea, Indian Ocean, Australian region, Pacific Ocean.

#### Family KALIAPSIDAE DE LAUBENFELS

##### Genus *Discodermia* BOCAGE

##### *Discodermia* sp.

(Pl. IV, Fig. 7; Pl. V, Figs 8, 11)

*Material* : A coral rock containing this specimen (MT 1425) (CMFRI - S. 141).

*Description* : The specimen is found inside a coral rock compactly arranged inside, in elliptical cavities of about 4 x 2 mm size. There are 4 cavities like the above mentioned inside the coral. All these cavities are interconnected by pores, whereas one opens to the outside by a large opening of about 1.5 mm diameter. It is not sure whether this species is actually boring or merely occupying the cavities made by other sponges. But in such cavities no other sponge spicules were found.

The discotriaenes are found in the outer part of the mass inside the cavities, with their shaft pointing into the interior and the disc portion touching

the inner surfaces of the cavities compactly. Microstrongyles are found abundantly in between the discotriaenes. Large oxeas are arranged radially in the interior.

*Spicules* : 1. Tetracrepid desmas. These originate as a calthrop, later each arm accumulate silica and form long branches ornamented with wart-like processes. Individual branchlets may interlock and form a compact plate at places. When well developed the total diameter comes up to 0.566 mm, width of a ray (in between the origin of the ray and its first dividing portion) 0.028 mm average. Suppression of one or two rays of the original calthrop also is common.

2. Discotriaenes. Disc may show innumerable variations. Shaft conical and measure 0.042 mm and the disc about 0.31 mm.

3. Oxeas. Uniformly curved and sharply pointed. Size 0.46 x 0.008 mm.

4. Smaal granulated oxeas. With an angle at the centre. Size about 0.088 x 0.002 mm.

5. Microstrongyles. Slightly inflated at the centre, rarely oxeote. Size from 0.012 to 0.032 x 0.004 mm.

*Remarks* : It is not actually known whether this sponge is a boring one or inhabits the excavations made by other sponges. The details regarding pores, oscules, etc. could not be studied due to the dry and inconspicuous nature of the specimen. The spiculation, in this case, is quite characteristic and is not tallying with any of the known species of *Discodermia*.

#### Order CARNOSIDA CARTER

#### Family HALINIDAE DE LAUBENFELS

Two subfamilies are represented : 1. Halininae DE LAUBENFELS and 2. Corticiinae VOSMAER.

#### Subfamily Halininae DE LAUBENFELS

#### Genus Halina BOWERBANK

#### *Halina plicata* (SCHMIDT) (Pl. IV, Fig. 10; Pl. V, Fig. 10)

*Corticium plicatum* SCHMIDT, 1868, p. 2, pl. 2, fig. 11.

*Samus simplex* CARTER, 1880, p. 60, pl. 5, fig. 26. CARTER, 1887, p. 75.

*Stoebea plicata* ANNANDALE, 1915, p. 458 (Synonymy).

*Material* : One coral rock riddled by this species (MT 1419).

*Description* : The cavities found inside the coral rock are small, 1 to 3 mm in diameter; circular or oval in outline and interconnected with slender canals. Shape of the sponge tissue inside the cavity is exactly the same as the outline of the cavity. From such masses branches are given off in all directions. Each branch is conical in shape in the initial stage, and later on may assume rounded or elliptical outline with diameter varying between 0.01 to 0.16 mm. Tip portion of each branch thus given off may get expanded after a short interval to form the "nucleus" of a future chamber. Branchlets are often seen arising from such branches. They also function as an ordinary branch and form tunnels inside.

The dichotriaenes have their shafts pointing outwards. They are more or less crowded together in the tissue inside the chamber, but on the branches they are scarcely distributed. Streptasters are more or less uniformly distributed both in the main mass and branches.

*Spicules* : 1. Dichotriaenes. Shafts conical, length 0.063 mm average and width up to 0.016 mm, clads rarely trifid. Measurements are the following : protoclads, 0.033 x 0.021 mm; deuteroclads, 0.079 x 0.016 mm; chord, 0.21 mm. Small slender spicules figured by TOPSENT (1896, pl. 22 o'd') were not present.

2. Streptasters. Straight, spines at both ends and with two or more whorls at the centre of the shaft. In some, spines are distributed irregularly. Size 0.008 to 0.014 x 0.002 mm (excluding spines).

ANNANDALE (1915) remarked that this species is often associated with some species of *Cliona*. But the cavities made by this sponge on coral rock are quite characteristic and other species of *Cliona* are not found in association with this sponge.

*Distribution* : Mediterranean Sea, Indian Ocean, Australian region.

#### Genus **Plakortis** SCHULZE

##### **Plakortis simplex** SCHULZE

(Pl. IV, Fig. 8)

*Plakortis simplex* SCHULZE, 1880, pp. 430, 449, pl. 21, figs 14-16. LENDENFELD, 1903, p. 121. TOPSENT, 1928, p. 140. DE LAUBENFELS, 1954, p. 246, fig. 170.

*Placortis simplex* TOPSENT, 1896, p. 556, pl. 21, fig. 7. ROW, 1911, p. 292. BABIĆ, 1922, p. 292, fig. Z.

*Material* : Four specimens (MT 1358) (CMFRI - S. 145).

**Description :** Sponge encrusting thickly, surface uneven, margin slightly curved in. Oscules and pores are closed in preserved condition. Largest specimen has a size of 30 x 20 x 10 mm.

**Colour :** Pale yellow or brown.

**Consistency :** Fleshy in 60 % alcohol.

The skeletal arrangement and other details of anatomy agree well with the description given by SCHULZE (1880).

**Spicules :** 1. Oxeas. With rudimentary rays at the centre, arms subequal. Size 0.084 to 0.126 (0.109 mm) x 0.002 to 0.004 (0.003 mm).

2. Triods. Fewer in number when compared with the former category. Rays subequal, length of individual ray ranges from 0.028 to 0.040 x 0.001 to 0.003 mm.

**Distribution :** According to DE LAUBENFELS (1954) this species is circum-equatorial in distribution.

#### Subfamily **Corticiinae** VOSMAER

##### Genus **Samus** GRAY

##### **Samus anonyma** GRAY

(Pl. IV, Fig. 9)

*Samus anonyma* GRAY, 1867, p. 526. SOLLAS, 1888, p. 57 (Synonymy). DE LAUBENFELS, 1936, p. 180. DE LAUBENFELS, 1950, p. 130. DE LAUBENFELS, 1954, p. 245. LEVI, 1959, p. 121.

**Material :** It was not possible to get a specimen *in situ* in coral rock. Spicules of this interesting species are found intermingled with the spicules of *Cliona* spp. A small fragmentary tissue is mounted on a slide (MT 1423) (CMFRI - S. 148).

**Spicules :** 1. Amphitriaenes. When well developed protoclads measure 0.021 x 0.012 mm, deuteroclads, 0.033 x 0.008 mm. Clads bifid or trifid. Total length 0.050 to 0.132 mm.

2. Sigmas. C shaped, 0.008 to 0.010 mm chord length.

**Remarks :** Some information regarding the origin of the amphitriaene is given by SOLLAS (1888) and according to him "one of them (spicules) presented a slender rhabdome bearing two cladi at each end, those of the one end lying in

the same plane as those at the other; but the one pair are trichotomate and the other simple. The other presents a rhabdome 0.0118 mm long, bearing two cladi as long as itself at one end, but terminating in a sharp point without branching at the other. The cladi each bear two very minute spines, one at each side, near the pointed extremity; in other words, they are trichotomous".

In the present specimen (slide) it is seen, that the amphitriaene at its early stage, is a typical calthrop as in the other members of the order Carnosida. The rays are broadly triangular (fig. a) first, later as the rays grow further, their tips become distinctly prominent at the apex of the originally broad ray (figs b & b'). Of these four rays, 3 which are equal in size, are in one plane and the fourth resembling the "apical ray" as seen in some calcareous sponge spicules, is slightly longer than the rest (say 0.012 mm). Spicule at this stage looks like a long shafted triaene (fig. b''). All the 4 rays normally divided trichotomously; but rays without further branching also are seen (fig. c). The branches thus formed from the terminal part of the long ray are always at right angles to those 3 at the other end, so in dorsal view they appear to arrange in two circles. Later these rays divide dichotomously or trichotomously and form a well developed spicule (figs e & f).

*Distribution* : Atlantic Ocean, Indian Ocean, Australian region, Pacific Ocean (circum-tropical).

#### Family CHONDRILLIDAE GRAY

##### Genus *Chondrilla* SCHMIDT

##### *Chondrilla nucula* SCHMIDT (Pl. III, Fig. 24)

*Chondrilla nucula* SCHMIDT, 1862, p. 39, pl. 3, fig. 22. HECHTEL, 1965, p. 74 (Synonymy).

*Material* : One specimen (MT 1422) (CMFRI - S. 151).

*Description* : Sponge spreading irregularly on the surface. Thickness 1 to 2 mm.

*Colour* : Chocolate.

*Consistency* : Fleshy.

The surface is smooth and slimy. Oscules and pores are not detectable.

The ectosome is highly pigmented; thin and detachable. The endosome is fleshy. Large canals running vertically up are prominent in sections.

*Spicules* : Spherasters. Centrum large, and rays conical. Total diameter, in well developed forms, up to 0.032 mm and rays 0.004 mm.

*Distribution* : Cosmopolitan.

While examining the spicule preparation of some species of *Cliona*, a number of other interesting spicules were also found intermingled with them. For the guidance of future workers a detailed description is given below :

1. *Cliona mucronata* SOLLAS (pl. V, fig. 13). This is a widely distributed species in the Indian Ocean. The characteristic mucronate spicules of this species were rarely represented in the spicule preparation for species of *Cliona*, *Amorphinopsis* and *Jaspis*. Size of spicule 0.084 x 0.025 mm, head about 0.021 mm.

2. *Cliona* sp. (pl. V, fig. 14). Here also a modified type of mucronate spicule is present. The shaft just before its mucrone gets inflated. This bulb-like portion is actually formed of 4 lobes set at right angles to each other. Length of spicule varies from 0.084 to 0.105 mm and head, 0.008 mm (diameter). Swelling of the shaft, before the mucrone, 0.008 mm in diameter. Axial canal well developed. Shaft 0.004 mm wide.

3. *Cliona* sp. (*C. levispira* ? TOPSENT) (pl. V, fig. 15). Smooth spirasters resembling to those of *C. levispira* TOPSENT (TOPSENT, 1904, pl. XII, fig. 1c) were noted in some preparations (only two spicules were found). Size 0.054 x 0.002 and 0.067 x 0.004 mm.

4. *Placospongia* sp. (pl. V, fig. 16). Two growth stages of the sterrospires of *Placospongia* sp. were also found. There is no previous record of the genus *Placospongia* from Seychelles.

5. *Agelas* sp. (pl. V, fig. 17). One style with 10 annulations. Length 0.176 and width 0.029 mm (including annulation) and 0.021 mm (excluding annulation).

6. Peculiar strongyles (pl. V, fig. 12). Three different stages were noted. When well developed they may have 20 to 24 whorls of tubercles on the shaft. Size 0.079 to 0.163 x 0.004 to 0.025 mm.

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PLATE I

(Inset scale shows 0.1 mm throughout)

1. *Heteronema erecta* KELLER : Main skeleton.
- 1A. *H. erecta* KELLER : Main skeleton showing at places spongin fibres devoid of coring sand grains.
2. *Hyattella cribriformis* (HYATT) : Main skeleton.
3. *Thorectopsamma seychellensis* n. sp. : Main skeleton.
- 3A. *T. seychellensis* n. sp. : Slender fibres supporting the dermal membrane.
4. *Phyllospongia foliascens* (PALLAS) : Longitudinal section of the lamella giving the details of fibres and the dermal armour of sand grains.
5. *Fasciospongia cavernosa* (SCHMIDT) : Main fibre ending in conule and connectives.
6. *Echinodictyum clathratum* DENDY : (a) Style (Scale-A); (b) Dermal style (Scale-A); (c) Oxeas (Scale-A); (d) Acanthostyle (Scale-B).
7. *Iotrochota baculifera* RIDLEY : (a) Styles; (b) Strongyle; (c) Birotulate.
8. *Iotrochota purpurea* (BOWERBANK) : (a) Main styles; (b) Dermal style; (c) Birotulate.
9. *Sigmatocia fibulata* (SCHMIDT) : (a) Oxeas; (b) Sigmas.
10. *Petrosia nigricans* LINDGREN : Oxea and its modifications.
11. *Haliclona retiderma* (DENDY) : Oxea.
12. *Haliclona cribricutis* (DENDY) : Oxeas.
13. *Damiriana schmidtii* (RIDLEY) : (a) Tylote (Scale-A); (b) Oxeas (Scale-A); (c) Arcuate isochelas (Scale-B); (d) Large sigma (Scale-B); (e) Small sigmas (Scale-B).
14. *Cyamon vickersi* (BOWERBANK) : (a) Stout styles; one with strongylote modification (Scale-A); (b) Long style (Scale-A); (c) Slender styles of peculiar form (Scale-B); (d) Tetracts (di, tri and pentact forms are given) (Scale-A).
15. *Tedania anhelans* (LIEBERKÜHN) : (a) Style; (b) Tornote; (c) Onychaeta.
16. *Oceanapia* sp. : (a) Oxeas.
- 16A. *Oceanapia* sp. Main skeleton viewed from the interior. Only outline is given.

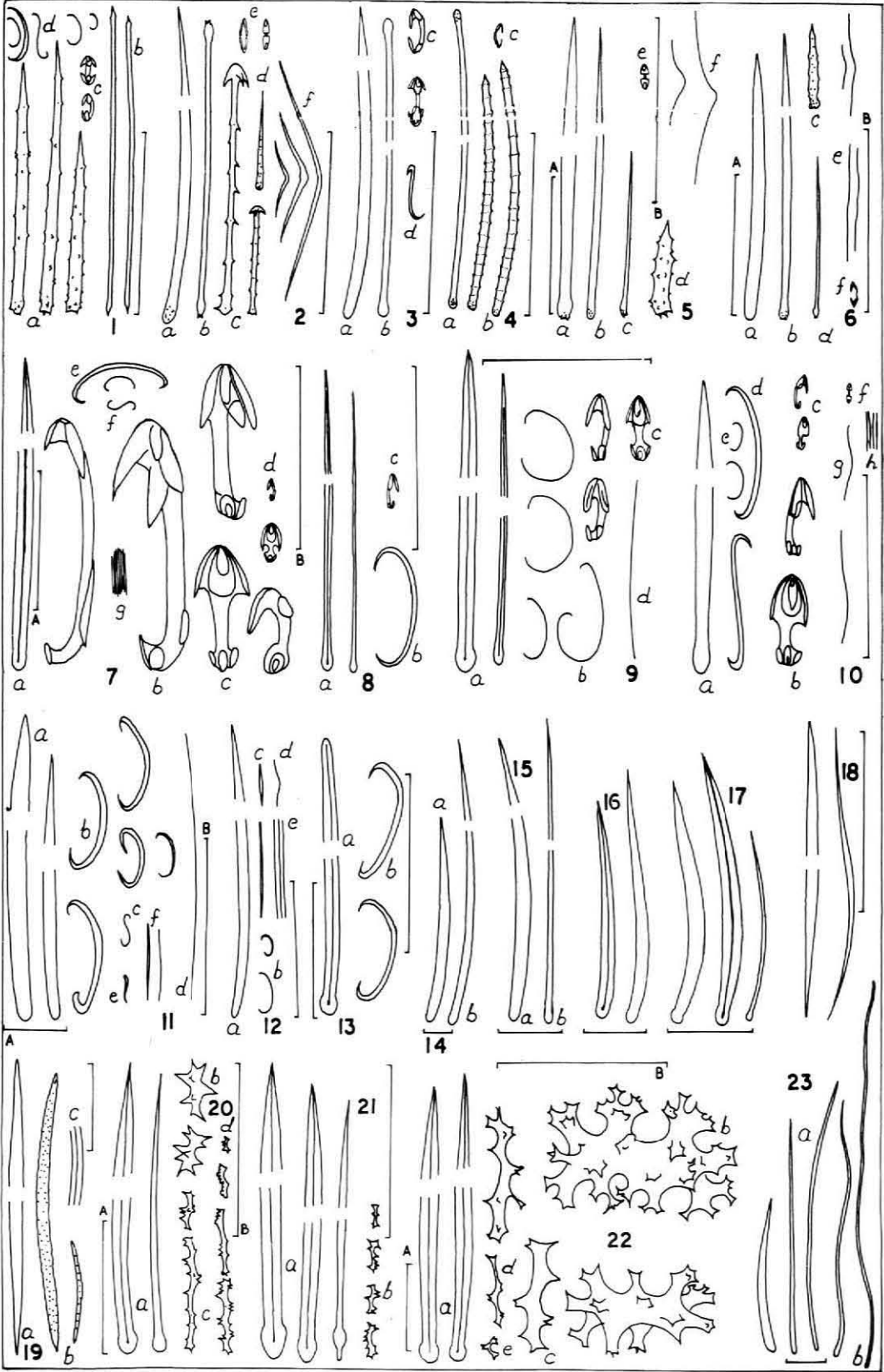




## PLATE II

(Inset scale shows 0.1 mm throughout)

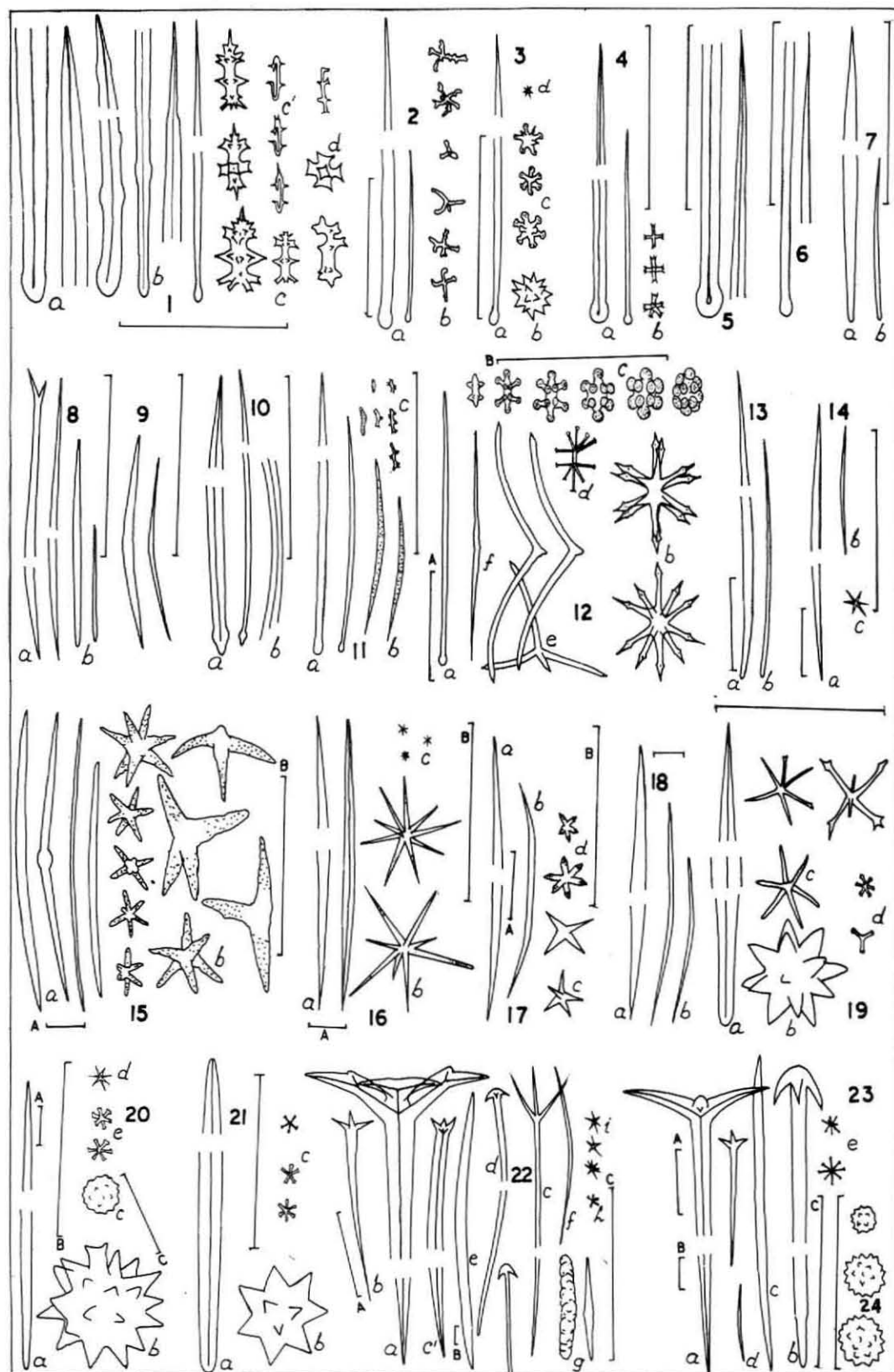
1. *Myxilla dendyi* BURTON : (a) Acanthostyles; (b) Tornotes; (c) Chelae spatuliferae; (d) Sigmas.
2. *Acanthacarnus souriei* LEVI : (a) Style; (b) Tylote; (c) Cladotylotes; (d) Acanthostyle; (e) Isochela; (f) Toxas.
3. *Lissodendoryx isodictyalis* (CARTER) : (a) Style; (b) Tylote; (c) Tridentate isochela; (d) Sigma.
4. *Lissodendoryx massalis* (DENDY) : (a) Tylote; (b) Acanthostyles; (c) Isochela.
5. *Clathria procera* (RIDLEY) : (a) Main subtylostyle (Scale-A); (b) Interstitial subtylostyle (Scale-A); (c) Dermal subtylostyle (Scale-A); (d) Acanthostyle (Scale-A); (e) Isochela (Scale-B); (f) Toxas (Scale-A).
6. *Clathria frondifera* (BOWERBANK) : (a) Main style (Scale-A); (b) Interstitial subtylostyle (Scale-A); (c) Acanthostyle (Scale-A); (d) Dermal subtylostyle (Scale-A); (e) Toxas (Scale-A); (f) Isochela (Scale-B).
7. *Mycale grandis* GRAY : (a) Subtylostyle (Scale-A); (b) Large anisochela, one in the initial stage of development (Scale-B); (c) Medium sized anisochelas (Scale-B); (d) Small anisochela (Scale-B); (e) Large sigma (Scale-B); (f) Small sigmas (Scale-B); (g) Raphides (Scale-B).
8. *Mycale spongiosa* (DENDY) : (a) Tylostyles; (b) Sigma; (c) Anisochela.
9. *Mycale* sp. : (a) Tylostyles; (b) Sigmas; (c) Anisochelas; (d) Raphide.
10. *Zygomycala parishii* (BOWERBANK) : (a) Subtylostyle; (b) Large anisochelas; (c) Small anisochelas; (d) Large sigma; (e) Small sigmas; (f) Isochela; (g) Toxas; (h) Raphides.
11. *Biemna variantia* (BOWERBANK) var. *seychellensis* new : (a) Styles (Scale-A); (b) Large sigmas (Scale-B); (c) Small sigmas (Scale-B); (d) Raphide (Scale-B); (e) Commata (Scale-B); (f) Microxea (Scale-B).
12. *Toxemna tubulata* (DENDY) : (a) Style; (b) Sigmas; (c) Microxea; (d) Toxa; (e) Raphides.
13. *Tyloidesma truncata* (HENTSCHEL) : (a) Tylostrongyle; (b) Sigmas.
14. *Axinella carteri* (DENDY) : (a) Stout style; (b) Slender style.
15. *Phakettia conulosa* (DENDY) : (a) Stout style; (b) Long style.
16. *Axinella* sp. : Styles.
17. *Axinella* sp. : Styles.
18. *Phycopsis* sp. : Oxeas.
19. *Myrmekioderma granulata* (ESPER) : (a) Oxea; (b) Acanthoxeas; (c) Raphides.
20. *Spirastrella cuspidifera* (LAMARCK) : (a) Tylostyles (Scale-A); (b) Robust spirasters (Scale-B); (c) Slender spirasters (Scale-B); (d) Small spirasters (Scale-B).
21. *Spirastrella inconstans* (DENDY) : (a) Tylostyles; (b) Spirasters.
22. *Spirastrella pachyspira* LEVI : (a) Tylostyles (Scale-A); (b) Spirasters with branched spines; (c) Robust spirasters; (d) Slender spirasters; (e) Spirasters with curved axis.
23. *Acanthella cavernosa* DENDY : (a) Slender styles; (b) Strongyle.



# PLATE III

(Inset scale shows 0.1 mm throughout)

1. *Sigmosceptrella laevis* (LINDGREN) : (a) Styles; (b) Tylostyles; (c) Sigmodiscorhabds; (c') Sigmoid stage of sigmodiscorhabd; (d) End view of sigmodiscorhabd.
2. *Timea stellata* (BOWERBANK) : (a) Tylostyles; (b) Strongylasters.
3. *Timea stellivarians* (CARTER) : (a) Tylostyle; (b) Oxyaster; (c) Oxyasters with capitate rays; (d) Small oxyaster.
4. *Timea stelligera* (CARTER) : (a) Tylostyles; (b) Chaisters.
5. *Suberites carnosus* (JOHNSTON) : Tylostyle.
6. *Pseudosuberites andrewsi* KIRKPATRICK : Tylostyle.
7. *Aaptos aaptos* (SCHMIDT) : (a) Strongyloxea; (b) Style.
8. *Amorphinopsis excavans* CARTER : (a) Oxeas; (b) Style.
9. *Aka minuta* THOMAS : Oxeas.
10. *Cliona celata* GRANT : (a) Tylostyles; (b) Oxeas.
11. *Cliona vastifica* HANCOCK : (a) Tylostyles; (b) Oxeas; (c) Spirasters.
12. *Thoosa armata* HANCOCK : (a) Tylostyle; (b) Amphiasters with lanceolate rays; (c) Amphiasters with microspined heads; (d) Amphiaser with capitate rays; (e) Oxyasters (different types); (f) Oxea.
13. *Prostylyssa oculata* KIESCHNICK : (a) Pseudoxea; (b) Style.
14. *Jaspis penetrans* (CARTER) : (a) Oxea; (b) Microxea; (c) Oxyaster.
15. *Jaspis bouilloni* n. sp. : (a) Oxeas (Scale-A); (b) Oxyasters (Scale-B).
16. *Jaspis jonesi* n. sp. : (a) Oxeas (Scale-A); (b) Oxyasters, choanosomal (Scale-B); (c) Oxyasters, dermal (Scale-B).
17. *Zaplethea digonoxea* ssp. *diastrea* VACELET and VASSEUR : (a) Oxea (Scale-A); (b) Microxea (Scale-B); (c) Oxyasters (Scale-B); (d) Oxyasters, spiny (Scale-B).
18. *Epipolasis salomonensis* (DENDY) : (a) Oxea, large; (b) Oxea, small.
19. *Tethya diploderma* SCHMIDT : (a) Strongyloxea; (b) Spheraster; (c) Oxyasters; (d) Tylasters.
20. *Tethya robusta* BOWERBANK : (a) Strongyloxea; (b) Spheraster, large; (c) Spheraster, small; (d) Chiaster with oxeote rays; (e) Chiasters, cortical.
21. *Tethya japonica* SOLLAS : (a) Strongyloxea; (b) Spheraster; (c) Chiasters.
22. *Ecionemia laviniensis* DENDY : (a) Dichotriaene (Scale-A); (b) Plagiotriaene (Scale-A); (c) Protriaene (Scale-A); (c') Peculiar protriaene (Scale-A); (d) Anatriaene (Scale-C); (e) Oxea (Scale-B); (f) Microxea (Scale-C); (g) Microstrongyles (Scale-C); (h) Chiasters, dermal (Scale-C); (i) Oxyasters, choanosomal (Scale-C).
23. *Myriastrea purpurea* (RIDLEY) : (a) Orthotriaenes (Scale-A); (b) Anatriaene (Scale-A); (c) Oxea (Scale-B); (d) Microxea (Scale-B); (e) Tylasters (Scale-C).
24. *Chondrilla nucula* SCHMIDT : Spherasters.



# PLATE IV

(Inset scale shows 0.1 mm throughout)

1. *Stelletta cylindrica* n. sp. : (a) Dichotriaenes (Scale-A); (b) Orthotriaenes (Scale-A); (c) Anatriaene (Scale-A); (d) Oxea (Scale-B); (e) Microxea (Scale-D); (f) Oxyasters (anthasters) (Scale-C); (g) Strongylasters (Scale-C).
2. *Aurora oxytoxa* n. sp. : (a) Orthotriaenes (Scale-A); (b) Oxea (Scale-A); (c) Spherasters (Scale-B); (d) Oxyasters (Scale-B).
3. *Cinachyra cavernosa* (LAMARCK) : (a) Prototriaenes (Scale-B); (b) Anatriaenes (Scale-B); (c) Oxea (Scale-A); (d) Microxea (Scale-B); (e) Sigmaspires (Scale-B).
4. *Geodia lindgreni* (LENDENFELD) : (a) Orthotriaene (Scale-B); (b) Anatriaenes (Scale-B); (c) Prototriaenes (Scale-A); (d) Oxea (Scale-B); (e) Styles (Scale-C); (f) Sterraster (Scale-A); (g) Oxyaster (Scale-C); (h) Strongylaster (Scale-C).
5. *Acanthocinachyra seychellensis* n. sp. : (a) Oxeas (Scale-A); (b) Acanthoxeas (Scale-C); (c) Prototriaenes (Scale-B); (d) Sigmaspires (Scale-D).
6. *Paratetilla bacca* (SELENKA) : (a) Orthotriaenes (Scale-A); (b) Prototriaenes (Scale-C); (c) Anatriaenes (Scale-C); (d) Oxea (Scale-B); (e) Microxeas (Scale-A); (f) Sigmaspires (Scale-C).
7. *Discodermia* sp. : (a) Tetracrepid desmas, different stages (Scale-A); (b) Discotriaenes, different stages (Scale-A); (c) Oxea (Scale-B); (d) Granulated oxeas (Scale-B); (e) Microstrongyles (Scale-B).
8. *Plakortis simplex* SCHULZE : (a) Oxeas; (b) Triods.
9. *Samus anonyma* GRAY : (a) Amphitriaene - initial stage of development, when rays are broadly triangular; (b) Calthrop stage; (b') Calthrop with broadly triangular rays; (b'') Calthrop possessing a long median ray; (c) Rays branching at their tips (two views); (d) Trichotomously dividing median ray (view from below); (d') Rays resulting from the above division (in d) undergoing further division thereby producing an adult spicule; (e, f) Well developed amphitriaene; (g) Sigmas.
10. *Halina plicata* (SCHMIDT) : (a) Dichotriaenes (different views) (Scale-A); (b) Streptasters (Scale-C); (c) Main mass found inside the cavity (Scale-B); (d) Branches given off from the main mass; (e) "Nucleus" of a future colony formed by the expansion of the tip of a branch; (f, f') Branch formation, initial stage; (g) Branchlets formed from a branch.



## PLATE V

(Inset scale 0.1 mm wherever not specified otherwise)

1. *Tylodesma truncata* (HENTSCHEL) : Skeletal arrangement.
2. *Axinella* sp. : Extra-axial fibres.
3. *Sigmosceptrella laevis* (LINDGREN) : Skeletal arrangement.
4. *Jaspis bouilloni* n. sp. : Longitudinal section of a branch.
- 4A. *J. bouilloni* n. sp. : Structure of a conule.
5. *Thoosa armata* TOPSENT : Section of the coral showing the pattern of boring.
6. *Mycale* sp. : Primary fibres radiating towards the surface.
7. *Stelletta cylindrica* n. sp. : Horizontally arranged spicules lining the central cavity (view from the inner cavity of the sponge).
8. *Discodermia* sp. : Cavities found inside the coral rock (scale 4 mm).
9. *Mycale spongiosa* (DENDY) : Primary fibres.
10. *Halina plicata* (SCHMIDT) : Pattern of boring.
11. *Discodermia* sp. : Interlocking of tetracrepid desmas.
12. Strongyles of an unknown sponge (figs 12 to 17 same scale).
13. Mucronate spicule of *Cliona mucronata* SOLLAS.
14. A modified mucronate spicule of *Cliona* sp.
15. *Cliona levispira* ? TOPSENT : Two smooth spirasters.
16. *Placospongia* sp. : Sterrospires.
17. *Agelas* sp. : Annulated style.

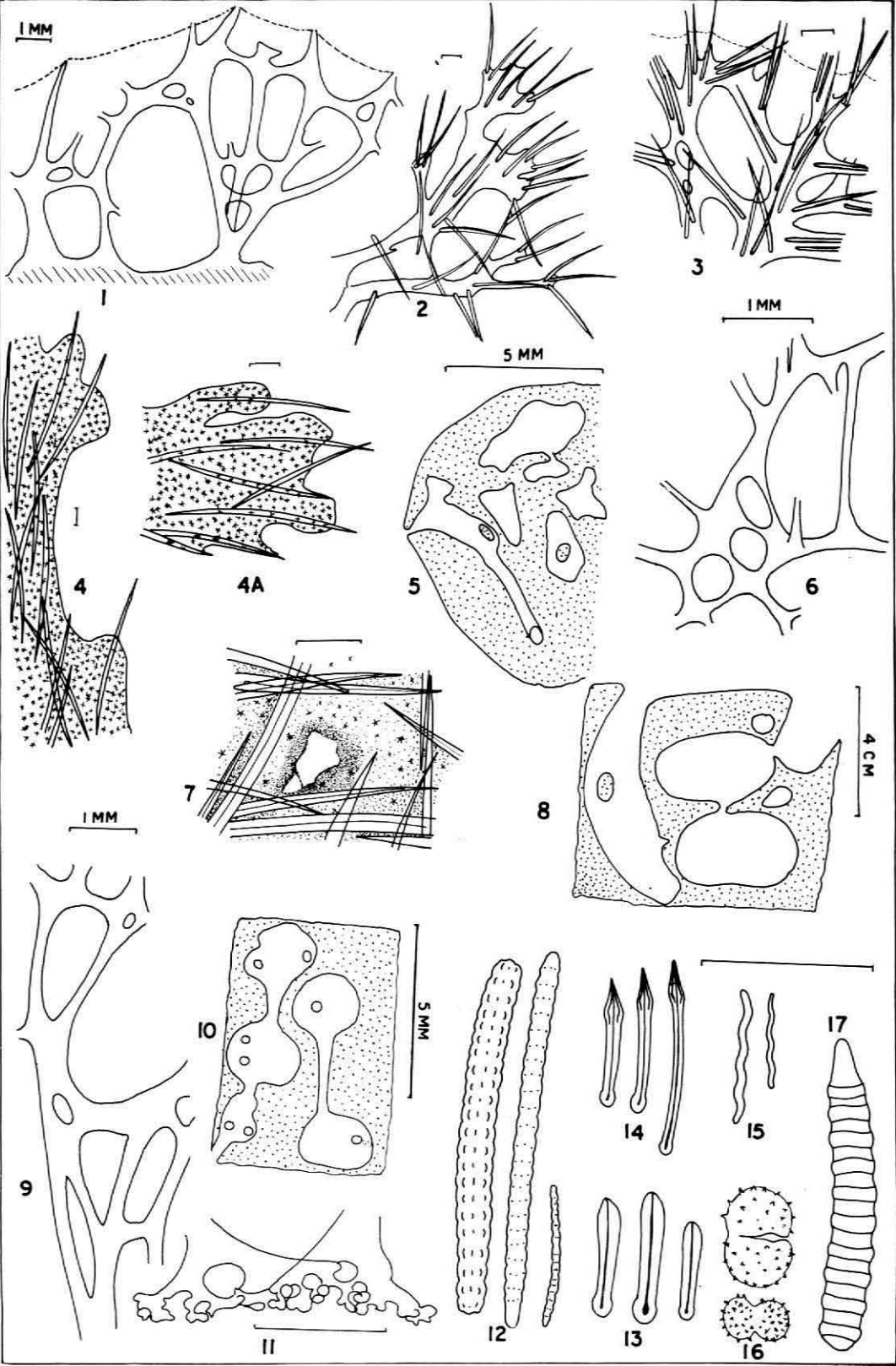




PLATE VI

1. *Phyllospongia foliascens* (PALLAS).
2. *P. foliascens* (PALLAS).
3. *Heteronema erecta* KELLER.
4. *Phyllospongia foliascens* (PALLAS) (inner surface of the sponge, a magnified view).
5. *Thorectopsamma seychellensis* n. sp.
6. *T. seychellensis* n. sp. (entire specimen).
7. *Petrosia nigricans* LINDGREN.
8. *Haliclona cribricutis* (DENDY).

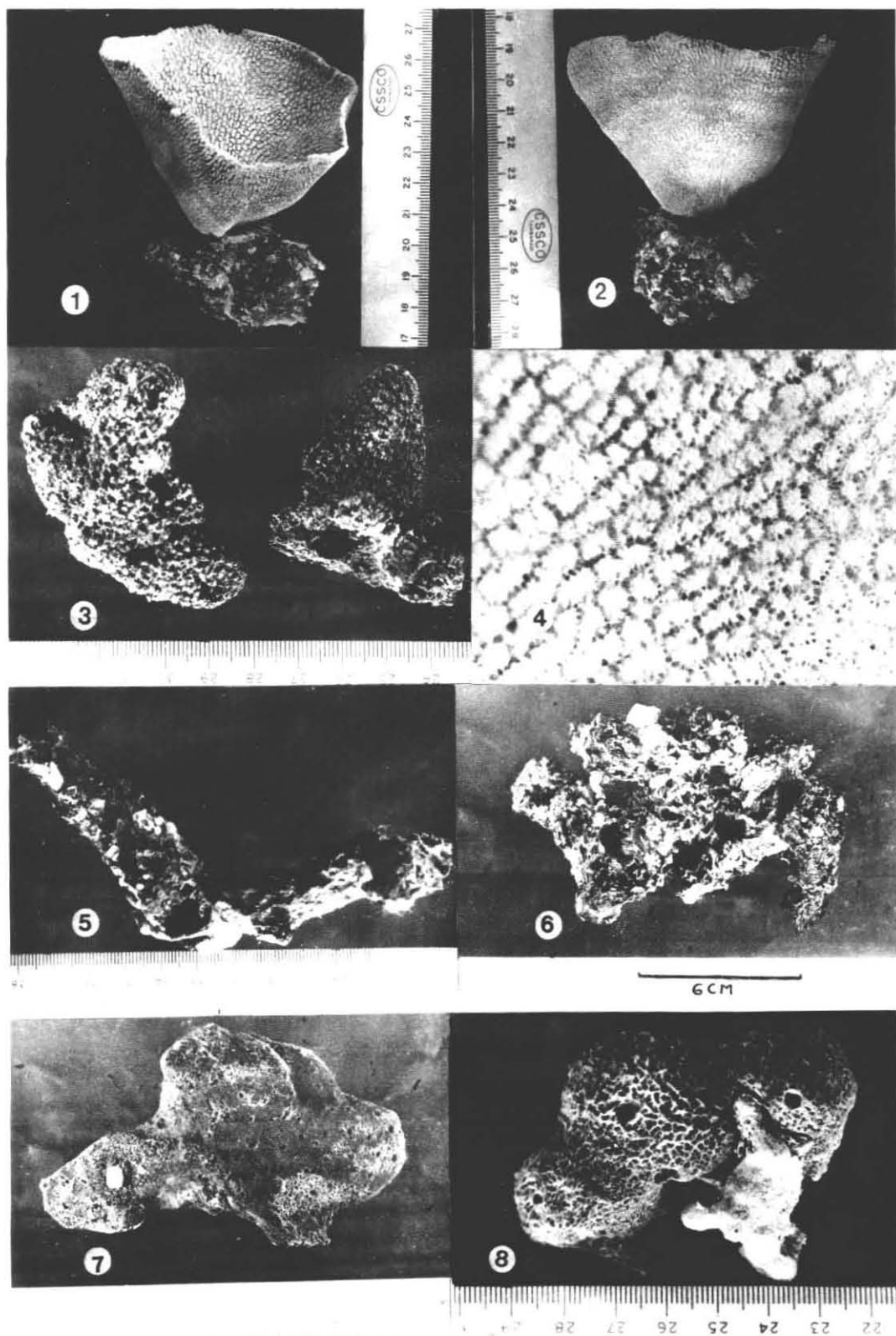


PLATE VII

1. *Tylodesma truncata* (HENTSCHEL).
2. *Axinella carteri* (DENDY).
3. *Clathria procera* (RIDLEY).
4. *Axinella* sp.
5. *Phycopsis* sp.
6. *Phakettia conulosa* (DENDY).
7. *Acanthella cavernosa* (DENDY).
8. *Mycale spongiosa* (DENDY).
9. *Iotrochota purpurea* (BOWERBANK).

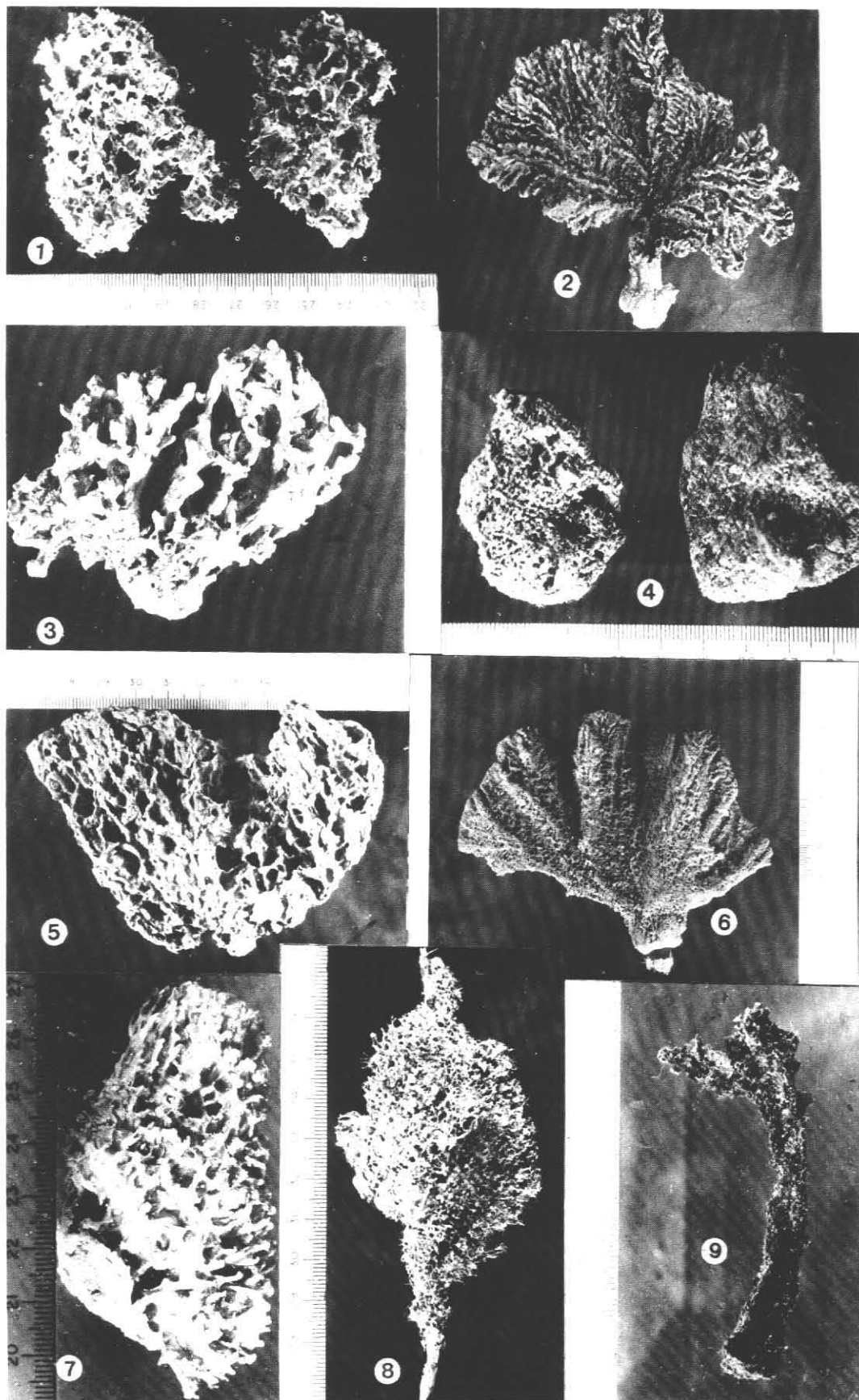
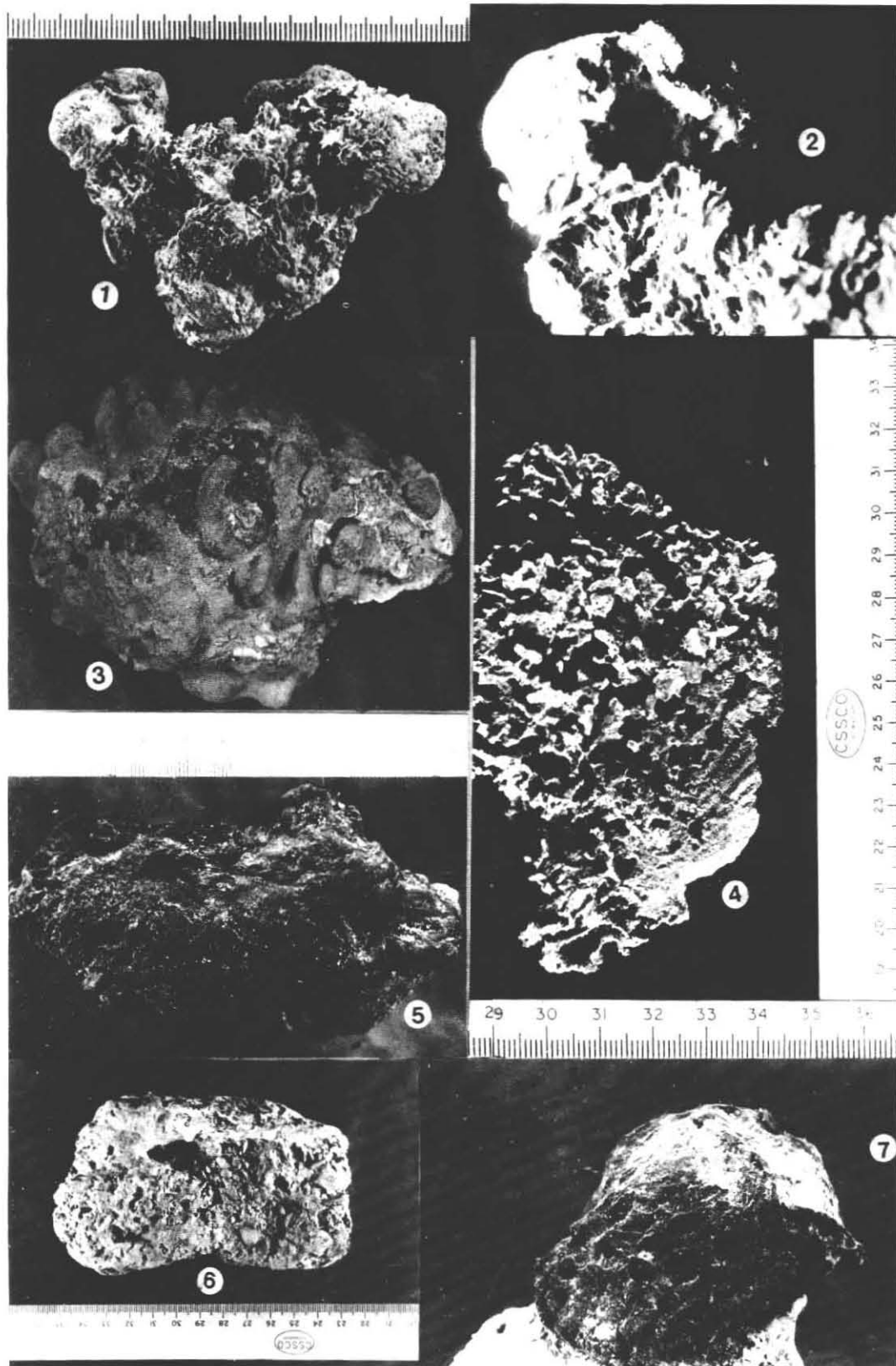


PLATE VIII

1. *Jaspis bouilloni* n. sp.
2. *J. bouilloni* n. sp. (a part of the above specimen enlarged).
3. *Spirastrella cuspidifera* (LAMARCK).
4. *Clathria frondifera* (BOWERBANK).
5. *Aaptos aaptos* (SCHMIDT).
6. *Spirastrella inconstans* (DENDY).
7. *Paratetilla bacca* (SELENKA).



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