

# THE ANNALS

AND

## MAGAZINE OF NATURAL HISTORY.

[SIXTH SERIES.]

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"..... per litora spargite muscum,  
Naiades, et circum vitreos considite fontes:  
Pollice virgineo teneros hic carpite flores:  
Floribus et pictum, divæ, replete canistrum.  
At vos, o Nymphæ Craterides, ite sub undas;  
Ite, recurvato variata corallia trunco  
Vellite muscosis e rupibus, et mihi conchas  
Ferte, Deæ pelagi, et pingui conchyliis succa."  
*N. Parthenii Giannettasii Eol. 1.*

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No. 37. JANUARY 1891.

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I. — *Natural History Notes from H.M. Indian Marine Survey Steamer 'Investigator,' Commander R. F. Hoskyn, R.N., commanding.*—No. 21. *Note on the Results of the last Season's Deep-sea Dredging.* By J. WOOD-MASON, Superintendent of the Indian Museum, and Professor of Comparative Anatomy in the Medical College of Bengal, and A. ALCOCK, M.B., Surgeon I. M. S., Surgeon-Naturalist to the Survey.

DURING eight seasons' surveying-operations along the Indian coasts the 'Investigator,' in her passages from surveying-ground to surveying-ground, has availed herself of numerous opportunities of collecting information about the life of the depths of the Indian seas. In the present paper we propose to give a general sketch of the results of the last season's labours in this direction, as summed up in twelve hauls of the trawl, in depths ranging from 90 to 1439 fathoms, in the Bay of Bengal and in that part of the Arabian Sea intervening between the Laccadive Islands and the Malabar coast, which we have called the Laccadive Sea.

We could not, in the time available, include the deep-sea collections of previous seasons; but we hope that in course of time these too may be noticed—at least in the same general way.

Except in the classes of Fishes and Crustaceans we have made no attempt at systematic detail, our object being to

enlist the interest of European naturalists in an almost unworked field of Indian zoology, and not single-handed to engage in an impossible research.

The apparatus generally used was a reversible trawl with steel-wire rope.

*List of the 'Investigator' Deep-sea Dredging-Stations during the Season 1889-90.*

Station No.	Position.	Depth in Fathoms.	Nature of Bottom.	Temperature Fahr.	
				At surface.	At bottom.
56	Off west coast of Andamans, between N. & S. Sentinel Islands.	240-220	Coral sand, with Foraminifera.	84°	?
62	Bay of Bengal, lat. 16° 45' N., long. 88° 32' 50" E.	1439	Brown mud.	79·7	35·3
76	Bay of Bengal, off Ganjam coast, 25 miles S.E. $\frac{1}{2}$ E. Barwa Beacon.	93	Brown mud.	79	64
81	Bay of Bengal, off Ganjam coast, 24 miles S.E. Gopálpur.	93-89	Brown mud.	?	?
96	Bay of Bengal, lat. 18° 30' N., long. 84° 46' E.	98-102	Sand.	80	64
97	Bay of Bengal, lat. 18° 26' N., long. 85° 24' E.	1310	Olive mud.	80	36·2
100	Bay of Bengal, lat. 16° 55' 41" N., long. 83° 21' 18" E.	840	Brown mud.	79	41
101	Bay of Bengal, lat. 16° 11' 15" N., long. 82° 30' 30" E.	922	Brown mud.	87	39
102	Bay of Bengal, lat. 15° 38' N., long. 82° 30' E.	920-690	Brown mud.	85	39·75 (at 920 fath.)
103	Bay of Bengal, lat. 15° 14' N., long. 81° 09' E.	1260	Blue mud.	86	36
104	Laccadive Sea, off Elicapeni Shoal, lat. 11° 12' 47" N., long. 74° 25' 30" E.	1000	Olive mud, with coral detritus and 2·15 per cent. Foraminifera.	83	38·6
105	Laccadive Sea, off Goa coast, lat. 15° 02' N., long. 72° 34' E.	740	Grey ooze, coral mud, and 12·5 per cent. Foraminifera.	83	44

Grade A. *PLASTID OZOA*.Class *RETICULARIA*.

The Foraminifera of the Bay of Bengal have been largely determined by Dr. John Murray from small quantities of deep deposit sent home by Commander A. Carpenter, R.N., D. S. O., lately in charge of the Marine Survey of India. The results of one of Dr. Murray's analyses of mud brought up by the 'Investigator' from the Bay of Bengal (lat.  $17^{\circ} 34'$  N., long.  $87^{\circ} 59'$  E., 1300 fathoms) will be found in the 'Magazine of the Scottish Geographical Society,' vol. v. p. 420 (August 1889), to which it is sufficient for our purpose to refer.

Off the west coast of the Andamans, in 240 to 220 fathoms, a few specimens of *Masonella planulata*, H. B. Brady, were found adhering to the tangles. *Masonella*, it may be recalled, is a new Astorhizid genus instituted by Dr. Brady (Ann. & Mag. Nat. Hist. (6) iii. (1889), p. 293) for the reception of two species of Andaman 'Investigator' Foraminifera with large discoid, arenaceous, reticulated tests, in the radiating tubules of which the living sarcode is contained. In sorting the collection specimens were discovered (*Promasonella*, Wood-Mason) which establish a connecting-link between *Astorhiza* and *Masonella*; and of this genus there are two species, *Promasonella Carpenteri*, Wood-Mason, and *P. alterniramis*, Wood-Mason.

Grade B. *ENTEROZOA*.Subgrade A. *CŒLEENTERATA*.Phylum *NEMATOPHORA*.Class *SCYPHOMEDUSÆ*.Order *DISCOMEDUSÆ*.Family *Ephyridæ* (COLLASPIDÆ).*ATOLLA*, Hæckel.

Two slightly differing specimens of a species of this 'Challenger' deep-sea form were taken—and they were the only deep-sea Medusæ taken—during the season. Both were trawled in the Bay of Bengal, off the Madras coast, one in 840, the other in 920 to 690 fathoms.

Both have the central disk of the exumbrella, inside the

exumbral coronal furrow, with an entire (*i. e.* not indented) margin—in this respect differing from *Atolla Wyvillii*, Hæckel, and from *Atolla Bairdii*, Fewkes.

In both the edges of the marginal lobes and the entire surface of the gastro-vascular cavity are covered with a delicate, deciduous, violet-black membrane. In one specimen the thick external coronal muscle forms a very broad, in the other a comparatively narrow, band.

The bathybial habitat of *Atolla* has been argued by Professor Hæckel on the ground of the retrogression of some of the organs of sense. It might be added that the violet-black of the pigmented parts is such as in our experience is only to be found in undoubted bathybial forms, as in certain deep-sea Zoantharia and Fishes.

### Class ANTHOZOA.

#### Subclass ALCYONIOMORPHA.

#### Order PENNATULIDA.

In 240 to 220 fathoms, off the west coast of the Andamans, some fine specimens of an *Umbellula* were taken; and in 1000 fathoms, in the Laccadive Sea, several specimens of a Funiculid were obtained with the polyparium coloured a uniform delicate pink.

#### Subclass ACTINIOMORPHA.

#### Order ACTINIARIA.

#### Family Actinidæ.

Specimens of three gigantic species of bathybial Actiniaria were met with during the season—one species in 1310 fathoms in the Bay of Bengal (Station 97), the others in the Laccadive Sea in 1000 and 740 fathoms (Stations 104 and 105).

An *Epizoanthus* symbiotic with *Hyalonema* must also be mentioned.

Lastly, at 740 fathoms in the Laccadive Sea there was obtained a colonial Zoantharian closely resembling Professor S. I. Smith's figure (Proc. U. S. Nat. Mus. iii., 1883) of *Epizoanthus paguriphilus*, Verrill, which, like Professor Verrill's species, forms a "carcinœcium" for a hermit-crab of the genus *Parapagurus*. In our specimen, however, no adventitious particles have been incorporated either in the cœenchyma or in the tests of the polyps; but the whole

expanded colony forms a smooth mass of a cartilaginous consistence. No trace is to be detected of any spiral shell which might have formed a basis of investment for the polyps.

### Order MADREPORARIA.

Only four species of deep-sea corals were taken during the season, but all on different occasions. Two of them appear to be new to science, and are here described. We take this opportunity of describing also a remarkable specimen of a (deep-sea) *Rhizotrochus* from the neighbourhood of Gaspar Straits, lately presented to the Indian Museum by Captain Worsley.

#### *MADREPORARIA APOROSA.*

##### Family Turbinolidæ.

[*RHIZOTROCHUS*, Edw. & H.

##### 1. *Rhizotrochus Worsleyi*, sp. n., Alcock.

Corallum translucent, extremely thin and fragile, low, moderately compressed, cornute, terminating abruptly in a small, curved, laterally-situated pedicle, the longitudinal axis of which meets the same axis of the calicle at an angle of about  $125^{\circ}$ . From the thecal wall, which is almost smooth with but faint and incomplete costal striations, branch out ten coarse, rudely cylindrical, hollow rootlets of unequal length, which communicate directly with the calicular cavity; they are arranged in two irregularly concentric series. The calicle is deep, but largely filled up by the prominent primary and secondary septa; its orifice is irregularly elliptical, and its margin is everted, in places impendent, and crenulate and irregularly plicated. There are six systems of septa and five complete cycles; the septa are not exsert, except where they coincide with the indentations of the marginal plications; and in all the systems, except in the half-system coincident with and in the half-system opposite to the laterally-situate pedicle, they have a strong lateral twist towards the pedicle; their surfaces are finely and distantly granular. The primary and secondary septa of the same system are coequal, but the different systems are unequal with one another; they descend almost vertically, but with the lateral twist referred to, to be loosely fused in the bottom of the calicle by their edges, which there become sinuous, and thus to form a rudimentary parietal columella; their surfaces are transversely striated. The



septa of the third cycle are in general barely one fifth the breadth of the septa of the first two cycles; they descend to the bottom of the calicle. The septa of the fourth cycle, which reach just over halfway down the calice wall, are still narrower, and those of the fifth cycle, which end quite in the upper part of the calice, are mere ridges.

Height of corallum from base to calicular margin  $\cdot 75$  inch; longitudinal diameter of calicular orifice  $\cdot 95$  inch; transverse diameter of calicular orifice  $\cdot 70$  inch; depth of calicular fossa  $\cdot 55$  inch; length of longest rootlet  $\cdot 55$  inch.

From the Eastern Telegraph Co.'s cable, in the neighbourhood of Gaspar Straits. One specimen.

*Rhizotrochus Worsleyi* differs from the other known species of the genus most conspicuously in its irregularity, which is shown in the shape of the corallum and in the size and arrangement of the principal cycles of septa. Further, the rudimentary parietal columella appears to be characteristic.]

## CARYOPHYLLIA, Stokes.

### 2. *Caryophyllia communis*, Moseley.

*Caryophyllia communis*, Moseley, 'Challenger' Reports, vol. ii. pt. vii. pp. 135-138, pl. i. figs. 4 and 5; Pourtalès, Bull. Mus. Comp. Zool. vol. vi. p. 100, pl. i. figs. 12 and 13.

This species, which the 'Challenger' and the 'Blake' have found to have an extended range over the Atlantic Oceans, was taken by the 'Investigator' in 1000 fathoms off the Elicapeni Bank in the Laccadive Sea. Over two hundred large specimens, more than half of them living, came up in a single haul of the trawl.

Many of the dead coralla were incrustated with siliceous sponge.

### 3. *Caryophyllia ephyala*, sp. n., Alcock.

Attached by a broadish base to some loose spicules from the anchor-rope of a *Hyalonema*.

The corallum, which is thin and entirely invested with a vitreous epitheca, is goblet-shaped, the short cylindrical peduncle being constricted immediately above the base of attachment and then rather suddenly expanding into a slightly-curved turbinate calice with a broadly elliptical mouth. Costæ extending from calicular margin to base, faint, subequal, slightly wrinkled.

Septa in four complete cycles, exsert, especially those of the coequal first and second cycles, beautifully crimped. A

crown of very large twisted pali opposite the tertiary septa, and these, to make room for the pali, are cramped and pressed back, presenting very sinuous, thickened, bilaterally doubled-up margins.

Columella conspicuous, consisting of several large twisted lamellæ.

Extreme height of corallum .40 inch ; diameters of elliptical calicular orifice .30 by .20 inch.

A single specimen from off the west coast of the Andamans, 240 to 220 fathoms (Station 56).

The specimen is small and may possibly be immature, but its characters are so well marked that we propose a distinctive name for it.

#### STEPHANOTROCHUS, Moseley.

##### 4. *Stephanotrochus nitens*, sp. n., Alcock.

Corallum bowl-shaped, dense and stony throughout, ivory-white. The epithecate base is gently convex, culminating in a central obtuse point ; the side-wall rises with an outward slope of about 35 degrees from the vertical. The primary and secondary costæ, which radiate from the central basal point, are salient throughout, coarse and crenulate on the base, sursumversely spinate or serrate on the side-wall of the theca ; the tertiary and quaternary costæ show as faint finely granular radial striations, most conspicuous at the junction of base and side-wall, and obsolescent about halfway up the latter. The calicle has a circular margin and a very capacious fossa. There are six systems of septa, with four complete cycles and an incomplete fifth. All the septa are exsert, those of the first two cycles projecting about .17 of an inch and those of all the higher cycles about .05 of an inch above the calicular margin ; and all are of an unpolished smoothness, with thin trenchant edges. Within the calicle the coequal primary and secondary septa are conspicuously pre-eminent. They repeat the simple curve of the thecal wall, and near the middle of the fundus of the calicular fossa their ends become depressed, thickened, and tortuous, and enter into loose interrupted fusion, in which the tertiaries of the systems in which a fifth cycle is developed also join, to form an inconspicuous radicate columella, from which arise small, erect, subconical, finely granular pinnacles to the number of about ten, excluding the paliform papillæ to be next described. Just external to this the edge of each primary septum rises into a low, dentate, paliform process, while the edges of the

secondary septa show linear series of two or three small uncinatè paliform papillæ. The tertiary septa have their edges widely notched just below the middle of their curve, the lower angle of the notch projecting as a small uncinatè paliform lobe; below this they approach and are occasionally fused with the secondaries. The septa of the fourth cycle are thin lamellæ which end about halfway down the calicular wall, except in the systems in which a fifth cycle is developed, where they resemble but do not equal the tertiaries.

Height of corallum from base to limit of epitheca .35 inch, from base to edge of calice .75 inch, from base to summit of primary and secondary septa .90 to .92 inch; diameter of calicular orifice 1.4 inch; depth of calicular fossa .60 inch.

The soft tissues of the polyp are very thick and fleshy; the oral disk and tentacles are a very dark purple.

The characteristic feature in the corallum of this species is the comparatively slight exsertion of those quaternary or quinary septa which lie next the primaries; usually they are equally exsert with the tertiaries, and in only two systems do they distinctly surpass these last in height.

Of the paliform processes those only of the third cycle are truly paliform; these, though not very prominent, project enough to form a support for the retracted oral disk.

The form of the corallum is intermediate between the cup-shaped and platter-shaped extremes figured by Professor Moseley from the 'Challenger' collection.

From the Laccadive Sea, at 740 fathoms (Station 105).

One fine perfect specimen.

### MADREPORARIA FUNGIDA.

#### Family Fungiidæ.

#### BATHYACTIS, Moseley.

##### 5. *Bathyactis symmetrica* (Pourtalès).

*Fungia symmetrica*, Pourtalès, Ill. Cat. Mus. Comp. Zool. (1871), no. iv. p. 46, pl. vii. figs. 5 and 6.

*Fungia symmetrica*, Duncan, Trans. Zool. Soc. viii. p. 334, pl. xlix. figs. 16-19.

*Bathyactis symmetrica*, Moseley, 'Challenger' Reports, vol. ii. pt. vii. pp. 186-190, pl. x. figs. 1-13.

Three specimens of this very widely ranging deep-sea Fungiid were obtained in the Bay of Bengal, 920 to 690 fathoms (Station 102).

The diameter of the corallum of the largest specimen is .80 inch.



Phylum **PORIFERA.**Class **SILICOSPONGIÆ.**

Numerous specimens of sponges, belonging to seven genera and eight species, were obtained during the season in deep sea. Seven species are Hexactinellid, and one is a siliceous sponge with thickly felted monaxial spicules.

On muddy bottoms between 100 and 1500 fathoms in the northern part of the Bay of Bengal not one sponge was found. But off the west coast of the Andamans, from a clean bottom of coral-sand in 240 to 220 fathoms, the tangles came up incrustated with *Farrea* (two species) and with a few specimens of *Euplectella* (one species), *Hyalonema* (one species), and two other species of Hexactinellid sponges.

Again, in 1000 fathoms in the Laccadive Sea numerous sponges were taken in the trawl, including *Euplectella*, *Hyalonema*, and over twenty specimens of a firm, compact, globular species, of which the skeleton is formed by a thick felt of monaxial siliceous spicules. These last either were adherent to dead coralla of *Caryophyllia communis* or had grown round the anchor-stalks of dead *Hyalonema*.

The anchor-stalks of all our living specimens of *Hyalonema* were thickly incrustated with colonies of an *Epizoanthus*.

Subgrade B. **CÆLOMATA.**Phylum **VERTEBRATA.**Class **PISCES.**

The bathybial fishes collected during the season number thirty-five species, of which all but ten are new to science. As the whole of these species have been already described or noticed in this Magazine ('Annals,' Sept. & Oct. 1890), it will be sufficient now to give merely a list of them.

We divide them into (1) true bathybial forms, and (2) forms which are locally bathybial in the surface-heated seas of India.

(1) The true bathybial fishes are twenty-five species; among them are the following apparently new types:—

(i.) *Bathyseriola* ('Annals,' Sept. 1890, p. 202).—A Carangid with the general aspect of *Cubiceps*.

(ii.) *Ponerodon* (l. c. p. 203).—A Trachinid which might be taken for the Gadoid *Chiasmodon*, but that, besides having large pseudobranchiæ and an armed preopercle and wanting an air-bladder, it has the first ray of the ventral, the first and second (small) rays of the anal, and all the rays of the first dorsal fin in the form of well-characterized non-articulated

spines. Our specimen, which is over 6 inches long and in good preservation, was examined in the fresh state, and if it should prove to be identical with *Chiasmodon*, we consider that *Chiasmodon* must be removed from the Malacopterygians, while *Ponerodon* must become a synonym.

(iii.) *Paroneirodes* (l. c. p. 206).—A Pediculate with the spinous dorsal fin reduced to two (luminiferous) cephalic tentacles, and hardly differing from the Arctic *Oneirodes*.

(iv.) *Tauredophilium* (l. c. p. 212).—A Brotuline Ophidiid allied to the 'Challenger' Indo-Pacific genus *Acanthonus*, but having the eyes reduced to hidden rudiments.

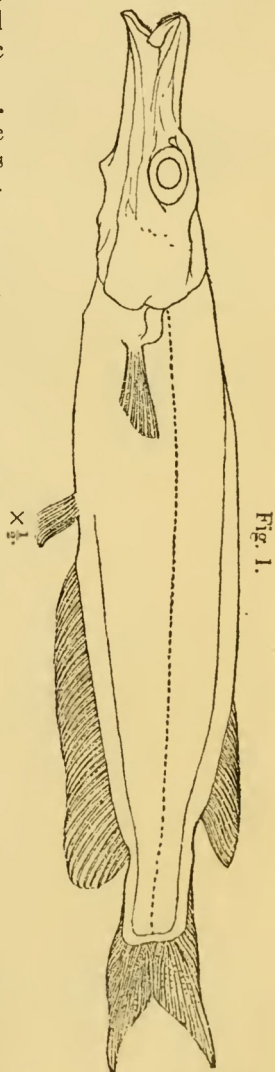
(v.) *Dermatorus* (*ibid.* Oct. 1890, p. 298).—A Brotuline Ophidiid with close affinities to the wide-ranging deep-sea form *Porogadus*.

(vi.) *Scopelengys* (l. c. p. 302).—A Scopelid apparently related to both *Scopelus* and *Nanobranchium*.

(vii.) *Thaumastomias* (*ibid.* Sept. 1890, p. 220).—A Stomiid differing from the remarkable genus *Malacosteus* only in some details of dentition, in the forward position of the ventral fins, and in the complete absence of pectoral fins. The curious hyomental muscular band, which allows the lower jaw to be turned completely backwards over the hyper-extended head, is as well developed as it is in *Malacosteus*.

(viii.) *Narcetes* (*ibid.* Oct. 1890, p. 305).—An Alepocephalid very nearly allied to *Bathytroctes*, from which it differs most conspicuously in the pluriserial arrangement of the teeth in the jaws.

(x.) *Aulastomatomorpha* (l. c. p. 307).—A most remarkable Alepocephalid, differing from all other genera of its own family in having the pseudo-branchiæ quite rudimentary and the bones of the head prolonged into a



long snout. The head of this unique fish is covered throughout with a thick spongy glandular skin of a dazzling white reflexion and probably luminous in function. In correlation with this the eyes are very large. Fig. 1 represents *Aulastomatomorpha phospherops*, one half the natural size.

(x.) *Promyllantor* (l. c. p. 310).—A Murænid of the Conger alliance, characterized by the almost inferior position of the mouth, and by the broad bands of villiform teeth in the jaws and palate.

The complete list is as follows:—

		Fathoms.
1. <i>Melumpheüs mizolepis</i> , Gthr. ....	Bay of Bengal.	1310
2. <i>Buthyseriola cyanea</i> , g. et sp. n. (A.)	"	90-102
3. <i>Ponerodon vastator</i> , g. et sp. n. (A.)	"	920-690
4. <i>Paroneirodes glomeratus</i> , g. et sp. n. (A.) .....	"	1260
5. <i>Neobythites pteratus</i> , sp. n. (A.) ..	{ Laccadive Sea.	1310
6. <i>Bathyonus glutinosus</i> , sp. n. (A.) ..		1000
7. <i>Monomitopus nigripinnis</i> , g. et sp. n. (A.). (Ophidiidæ.) .....	Bay of Bengal.	1310
8. <i>Paradicrolene Vaillantii</i> .....	Laccadive Sea.	740
9. <i>Dermatorus trichiurus</i> , g. et sp. n. (A.) .....	"	"
10. <i>Tauredophidium Hextii</i> , g. et sp. n. (A.) .....	"	"
11. <i>Macrurus Hoskynii</i> , sp. n. (A.) ..	Bay of Bengal.	1310
12. — <i>Wood-Masoni</i> , sp. n. (A.) ..	"	"
13. — <i>Hextii</i> , sp. n. (A.) .....	Laccadive Sea.	1000
14. <i>Bathygadus longifilis</i> , Goode and Bean .....	"	"
15. <i>Scopelus pyrsobalus</i> , sp. n. (A.) ..	"	"
16. <i>Scopelengys tristis</i> , g. et sp. n. (A.)	Bay of Bengal.	920-690
17. <i>Chauliodus Sloanii</i> .....	Laccadive Sea.	1000
18. <i>Thaumastomias atrox</i> , g. et sp. n. (A.)	Bay of Bengal.	922 & 1260
19. <i>Bathytroctes squamosus</i> , sp. n. (A.)	"	1310
20. <i>Narctes erimelas</i> , g. et sp. n. (A.)	Laccadive Sea.	740
21. <i>Platytrectes apus</i> , Gthr. ....	"	"
22. <i>Aulastomatomorpha phospherops</i> , g. et sp. n. (A.) .....	"	"
23. <i>Halosaurus affinis</i> , Gthr. ....	"	1000
24. — <i>Hoskynii</i> , sp. n. (A.) .....	"	"
25. <i>Promyllantor purpureus</i> , g. et sp. n. (A.) .....	"	"

(2) The local bathybial or hemibathybial forms taken were:—

		Fathoms.
26. <i>Parascombrops pellucidus</i> , Alcock . .	Bay of Bengal.	98-102
27. <i>Centropristis investigatoris</i> , sp. n. (A.) . . . . .	"	"
28. <i>Uranoscopus crassiceps</i> , sp. n. (A.)	"	"
29. <i>Trigla hemisticta</i> , Schlegel . . . . .	"	"
30. <i>Gobius cometes</i> , sp. n. (A.) . . . . .	"	"
31. <i>Cullionymus carebares</i> , sp. n. (A.)	"	"
32. <i>Scianectes macrophthalmus</i> , Alcock	"	"
33. <i>Cynoglossus Carpenteri</i> , Alcock . .	"	"
34. <i>Scopelus pterotus</i> , sp. n. (A.) . . .	"	"
35. —, sp. . . . .	"	"

## Phylum **ECHINODERMA.**

### Class **ASTEROIDEA.**

Asteroidea were trawled on three occasions, and thirty-eight individuals of nine species and as many genera were collected. Of these thirty-two specimens, of five species and genera, were obtained on a clean and comparatively hard bottom of coarse coral-sand off the west coast of the Andaman Islands, in 240 to 220 fathoms, while the six remaining specimens, of four species and genera, came from 740 to 1000 fathoms in the Laccadive Sea, where the bottom consists principally of coral-mud. Of nine fairly successful hauls in water of 100 to 1500 fathoms in the northern part of the Bay of Bengal, where the bottom consists of soft mud (terrigenous deposit), not one produced a starfish.

There is little doubt that the investigation by a specialist of this collection, which is but a small part of the accumulations of several years' trawling in Indian waters, would bring to light some new forms.

We have here attempted nothing more than to roughly indicate the affinities of the forms most recently acquired.

## Order **PHANEROZONIA.**

### Family **Archasteridæ.**

#### 1. **PONTASTER**, Sladen.

Three fairly perfect specimens of a species very near to *P. venustus*, Sladen, were taken in the Laccadive Sea, off the Elicapeni shoal, in 1000 fathoms. In our specimens the supero-marginal plates are more numerous and the inner series of spinelets on the infero-marginal plates is comparatively

stronger ; but in all other respects they correspond with the description of the ' Challenger ' species. Colours in the fresh state light pink.

## 2. PLUTONASTER, Sladen.

We refer with some hesitation to this genus a single specimen of a proctuchous form from 740 fathoms, off the coast of Goa. It has supero-marginal plates, with a prominent, centrally-placed dorsal spine ; but the Madreporiform body is exposed and the adambulacral plates are covered with small spinelets, as in the subgenus *Tethyaster*. Colour in the fresh state light pink. The stomach of this specimen contained an intact *Natica* and an empty *Dentalium* tube.

## Family Porcellanasteridæ.

### 3. PORCELLANASTER, Wyville Thomson.

One small specimen of a form resembling in all important particulars *P. cæruleus*, Sladen, was obtained from 740 fathoms on the same occasion as the last preceding. Some of the actinal intermediate plates carry a delicate centrally-placed spicule. Colour in the fresh state bluish white. The stomach was distended with mud.

## 4. Family Astropectinidæ.

A small mutilated Astropectinid, of whose exact position we cannot be assured, was taken in 240 to 220 fathoms, off the west coast of the Andaman Islands.

## Family Pentagonasteridæ.

### 5. NYMPHASTER, Sladen.

From 240 to 220 fathoms, in the same situation as the last, a single specimen closely related to *N. protentus*, Sladen. Colour yellowish white.

### 6. MEDIASTER, Stimpson.

With considerable hesitation we refer to this genus a single specimen from 740 fathoms, off the coast of Goa. It has all the essential characters of the genus, except that it does not bear pedicellariæ. Colour light pink.



## Order CRYPTOZONIA.

## Family Zoroasteridæ.

## 7. ZOROASTER, Wyville Thomson.

Twenty-three specimens of a species nearly resembling *Z. Ackleyi*, Perrier, from off the West-Indian Islands. Off the west coast of the Andamans, 240 to 220 fathoms. Colours brick-red.

## Family Echinasteridæ.

## 8. PLECTASTER, Sladen.

We venture to include in this genus a remarkable crypto-zone, reticulate form, characterized by the exceedingly wide-meshed reticulation of the abactinal plates (which leave large interspaces each of which is perforated by innumerable papulæ), by the groups of stout spinelets imbedded in membrane borne by the abactinal plates, and by the parallel, biserial, palisade-like armature of the adambulacral plates. In only one specimen, however, are the actinal intermediate plates—and in that one only a few of the plates—spinate. Five specimens, from 240 to 220 fathoms, off the west coast of the Andamans. Colours dark reddish brown.

## Family Pedicellasteridæ.

## 9. PEDICELLASTER, Sars.

Two large specimens of a species characterized by very numerous and very large forcipiform pedicellariæ, from 240 to 220 fathoms, in the same situation as the last.

## Class OPHIUROIDEA.

Eight or nine species of Ophiuroidea were obtained during the season. Of these six or seven species, numbering several scores of individuals, were caught in the tangles on a clean bottom of coarse coral-sand off the west coast of the Andamans (240 to 220 fathoms). A single specimen was taken in the Laccadive Sea in 740 fathoms, bottom coral-mud; and off the Madras coast, from a muddy bottom in 1310 fathoms, six small specimens of a form which is probably *Ophiomastus* were obtained.

In a group presenting so many technical difficulties we

have not in the time available made any attempts at determination.

### Class **ECHINOIDEA**.

From the station off the west coast of the Andamans which yielded such a rich result in Sponges, Umbellulids, Asteroids, and Ophiuroids were also obtained numerous specimens of Cidarids of the genera or subgenera *Dorocidaris* and *Porocidaris*.

The first of these had previously been noted by the 'Investigator' as exceedingly abundant off the reefy Andaman coasts in 100 to 250 fathoms. Off the Madras coast, in 1310 fathoms (Station 97), two specimens of a large irregular Echinoid with hard, thin, and very brittle test were met with. And finally, in the Laccadive Sea, at 740 and 1000 fathoms, several fine specimens of *Phormosoma* of three different species were taken.

### Class **HOLOTHUROIDEA**.

In the mud of the north-western part of the Bay of Bengal (Stations 76, 81, 97, 101, 102) Holothurians were fairly abundant. Those near the 100-fathom limit, as far as superficial examination goes, are indistinguishable from the shallow-water forms to be found in this vicinity. Those from 690 to 1310 fathoms were characteristic forms with the body-wall of the mucoid or gelatinous consistence of the tissues of a Medusa, defying preservation, and of a uniform coloration ranging from pinkish purple to dark violet.

In the Laccadive Sea, at 740 and 1000 fathoms, similar large Holothurians were numerous; and at the latter depth two specimens of the deep-sea genus *Deima*, with rigid calcareous exo-skeleton, were taken.

### Phylum **MOLLUSCA**.

#### Branch A. **GLOSSOPHORA**.

### Class **GASTROPODA**.

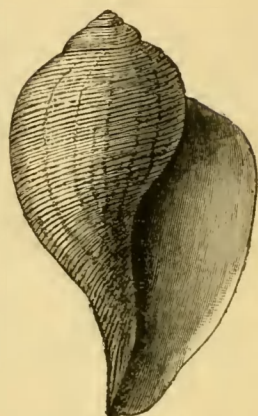
#### Family **Sycotypidæ**.

#### 1. *Sycotypus*, sp. (Fig. 2.)

A large species; the shell characterized by a comparatively exsert spire, by a relatively short and broad siphonal

canal, by the umbilicus open to the very apex, and by a supra-sutural band of white glaze left throughout the spire by a portion of the callus remaining uncovered during growth. The longitudinal ribs of the shell are obtundate, alternately broad and narrow, with finely wrinkled edges, the crenulations being produced at regular intervals to form by their approximation very narrow, decussating, transverse lines. Colour of shell warm cinnamon, with transverse streaks of darker brown corresponding to lines of growth. Colour of the animal delicate pink, the edges of the mantle shading into a lemon-yellow. Three large specimens from a sandy bottom in 98 to 102 fathoms off the Ganjam coast.

Fig. 2.

 $\times \frac{1}{2}$ .

#### Family Pleurotomidæ.

2. A single small Pleurotomid was taken from the mud at Station 97, 1310 fathoms.

#### Family Strombidæ.

##### 3. *Rostellaria delicatula*, Nevill. (Fig. 3.)

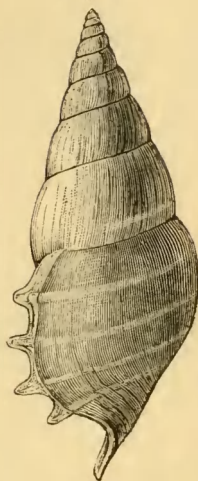
*Rostellaria delicatula*, Nevill, Journ. As. Soc. Beng. vol. 1. (1881), pt. ii. p. 262.

This species has now become recognized as a quite characteristic inhabitant of the infra-littoral of the Bay of Bengal at and near the 100-fathom contour, as far as this has yet been explored by the 'Investigator,' from Arrakan to the Godávari. The living animal is a bright pink, and it has imparted to the spirit in which it was preserved a beautiful magenta colour, which has stained permanently the packing-material, the legs and the branchiæ of some Penæi, and the soft tissues of a Chætopod and of some other mollusks, contained in the tin in which it was first placed. The eyes are very large. The animal is possessed of great vitality, and, though coming from a considerable depth, lives happily for days in a bucket of sea-water, and appears to be unaffected by

prolonged deprivation of water in the moist atmosphere of ship-board.

The type appears to have been described from an abnormally thin and varicose shell, which also, judging from the slight development of the digitate processes of the outer margin of the aperture, was probably young. The thinness of the type specimen is perhaps to be explained by its having come from a greater depth, our present series showing that the thickness of the shell varies inversely as the depth.

Fig. 3.



#### Family Phoridæ.

##### 4. *Xenophora pallidula* (Reeve).

A tolerably perfect dead shell was taken off the west coast of the Andamans in 240 to 220 fathoms (Station 56). It may be mentioned that Prof. Wood-Mason dredged a dead and weathered specimen of this shell in the Andaman Sea at 228 fathoms, at the same time with the type of the Homarid genus *Nephropsis*; and that in 1887 Commander Carpenter dredged a fine series of living specimens in 290 to 240 fathoms very near the position of Station 56.

#### Family Capulidæ.

##### 5. *Amalthea*, sp.

Some small specimens, symbiotic with *Rostellaria delicatula*, were taken in 98-102 fathoms (Station 96).

#### Family Calyptræidæ.

##### 6. *Crepidula*, sp.

At Station 105 in the Laccadive Sea, at 740 fathoms, a single specimen was obtained of a curious form which we doubtfully refer to this genus.

The shell is broadly and not quite regularly oval, depressed, thin, translucent, and covered with a delicate olive-green

epidermis; the apex is posterior, produced, pointed, with a slight spiral inclination to the left; the posterior fifth of the aperture is closed by a horizontal shelly lamina. The animal has the tentacles subulate and the eyes apparently absent; but the rostrum is produced, in continuation of the buccal cavity, into a long proboscis, which is grooved dorsally and expanded at the apex.

#### Class SCAPHOPODA.

7. An empty shell of a *Dentalium* was found in the stomach of a starfish of the genus *Plutonaster* at Station 105, 740 fathoms. In its proportions and polished whiteness it much resembles the shell of *Dentalium perlongum*.

#### Class CEPHALOPODA.

8. Only two cuttle-fishes were obtained, both of the order Decapoda. One was taken at Station 101, 922 fathoms, and from the transparency of its tissues, as well as from the fact of its being alive when brought on board, we infer that it is a pelagic form. The other was removed from the stomach of a fish (*Uranoscopus crassiceps*) taken in 98 to 102 fathoms (Station 96).

#### Branch B. LIPOCEPHALA.

#### Class LAMELLIBRANCHIATA.

#### Family Pectinidæ.

#### 9. *Amussium*, sp.

At 740 fathoms in the Laccadive Sea, on a bottom of coral-mud, numerous specimens of an *Amussium* were found. It is a species with a large, compressed, subequivalve, slightly inequilateral, thin, white, semitransparent shell, with small subequal ears. The interior of the shell is highly polished and each valve is strengthened by eleven conspicuous radiating costulæ, the middle and longest of which reaches from the dorsal margin only three quarters of the distance to the ventral margin of the shell. The costulæ of the right valve are of nearly the same width throughout; but those of the left increase in breadth from dorsum to venter, and are club- or fan-shaped. The animal is white and has no vestiges of pallial eyes, as has been previously observed in other species of the genus.



Attached to the exterior of several shells were some curious dull green objects resembling fronds of *Fucus*. These consisted of a thallus-like expansion firmly adherent to the shell, ending in a free vesicle, the contents of which resemble yolk of egg; they are perhaps eggs of some fish.

### Family Mytilidæ.

#### 10. *Modiola*, sp.

An almost characteristic inhabitant of the mud of the Bay of Bengal, as at present explored, in and near 100 fathoms, is a species of *Modiola* with a very thin, transparent, polished shell of an olive or dull yellow colour. The byssus is a large bunch of fine silky threads saturated with fine mud usually. Met with in beds in thick mud in 89 to 93 fathoms, and on sand in 98 to 102 fathoms.

[To be continued.]

II.—Notes on *Longicorn Coleoptera* of the Group *Cerambycinæ*, with Descriptions of new Genera and Species. By CHARLES J. GAHAN, M.A., Assistant in the Zoological Department, British Museum.

[Continued from vol. vi. p. 261.]

SINCE the first part of these notes was written Professor Chr. Aurivillius, of Stockholm, has called my attention to two species belonging to the group, which were described by Dalman in Schönherr's 'Synonymia,' and which have apparently been omitted from the Catalogue of Gemminger and Harold. The first species—*Lamia serricornis*—is considered by Prof. Aurivillius to be identical with *Prospophilus pilosicollis*, Thoms.; and with this conclusion I quite agree. The synonymy of the species will accordingly read:—

*Prospophilus serricornis*, Dalm.

= *Lamia serricornis*, Dalm. Schönh. Synon. i. 3, Appendix, p. 160.

= *Prospophilus pilosicollis*, Thoms.

Prof. Aurivillius was good enough to send me for examination some specimens of the second species mentioned above—*Lamia umbrina*, Dalm. These were found to agree quite well