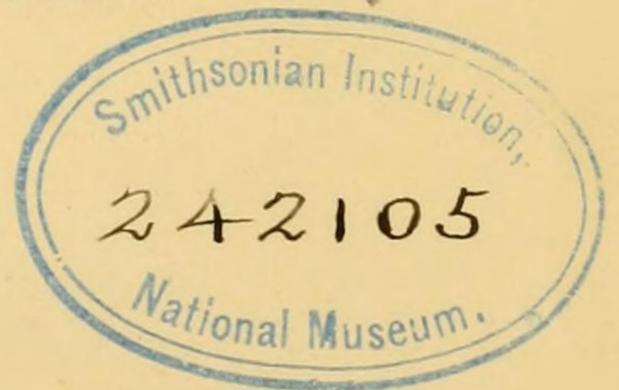


THE ANNALS  
AND  
MAGAZINE OF NATURAL HISTORY,  
INCLUDING  
ZOOLOGY, BOTANY, AND GEOLOGY.

(BEING A CONTINUATION OF THE 'ANNALS' COMBINED WITH LOUDON AND CHARLESWORTH'S 'MAGAZINE OF NATURAL HISTORY.')

CONDUCTED BY  
ALBERT C. L. G. GÜNTHER, M.A., M.D., Ph.D., F.R.S.,  
WILLIAM CARRUTHERS, F.R.S., V.P.L.S., F.G.S.,  
AND  
WILLIAM FRANCIS, Ph.D., F.L.S.

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VOL. VII.—SIXTH SERIES.  
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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 succo.”  
*N. Parthenii Giannettasii Ecl. 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	Olivemud, 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. *PLASTIDAZOA*.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° 34' N., long. 87° 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 Astrorhizid 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 *Astrorhiza* 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 cœnenchyma 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  $\cdot 40$  inch ; diameters of elliptical calicular orifice  $\cdot 30$  by  $\cdot 20$  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  $\cdot 17$  of an inch and those of all the higher cycles about  $\cdot 05$  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*, Portalès, 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 *Chiasmodus*, 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 *Chiasmodus*, we consider that *Chiasmodus* 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.) *Tauredophidium* (*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 *Nanobrachium*.

(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.) *Narctes* (*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

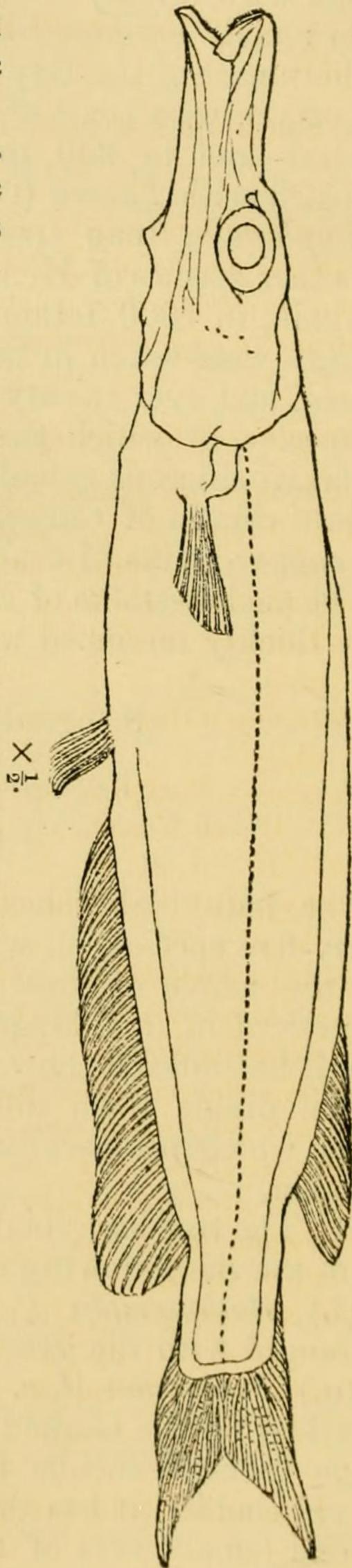


Fig. 1.

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>Melamphaës mizolepis</i> , Gthr. . . . .	Bay of Bengal.	1310
2. <i>Bathyseriola cyanea</i> , g. et sp. n. (A.)	„	90-102
3. <i>Ponerodon vastator</i> , g. et sp. n. (A.)	„	920-690
4. <i>Paroneiroides glomerosus</i> , g. et sp. n. (A.) . . . . .	„	1260
5. <i>Neobythites pterotus</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 Vaillanti</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 pyrsobolus</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>Narcetes erimelas</i> , g. et sp. n. (A.)	„	„
21. <i>Platytroctes apus</i> , Gthr. . . . .	Laccadive Sea.	740
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>Callionymus 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 cryptozone, 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.

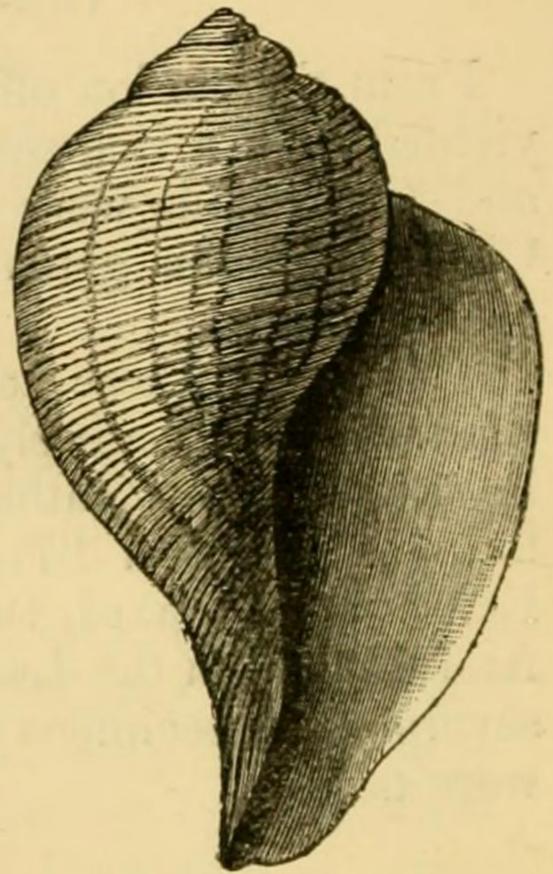
#### Family Sycotypidæ.

#### 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.

×  $\frac{1}{2}$ .

#### 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.)

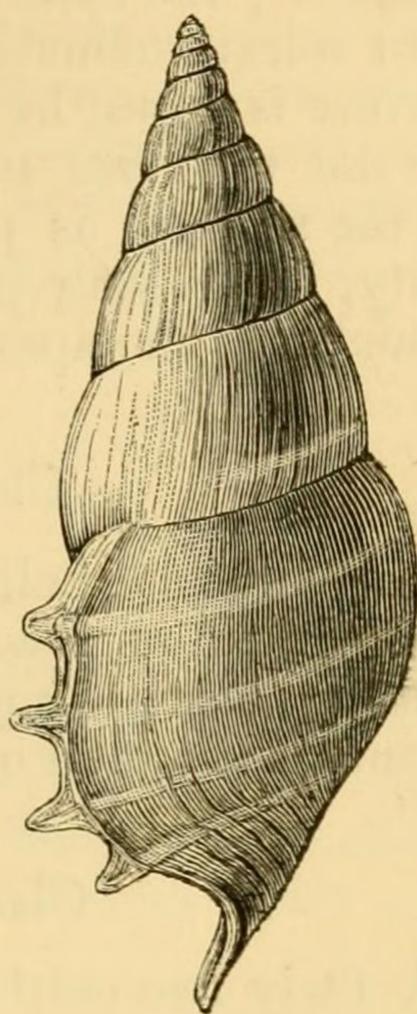
*Rostellaria delicatula*, Nevill, Journ. As. Soc. Beng. vol. 1. (1881), pt. ii. p. 262.

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 Phoridae.

##### 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 *Prospilus pilosicollis*, Thoms.; and with this conclusion I quite agree. The synonymy of the species will accordingly read:—

*Prospilus serricornis*, Dalm.

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

= *Prospilus 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

names. *Eumeles* is especially remarkable, and we would invite the attention of conchologists who hunt slugs (in old collections of museums and elsewhere) to the unusual arrangement of the tentacles in this genus, and to the fact that a number of Rafinesque's species are still at large.

The genus *Meghimatium*, v. Hasselt, 1824, was founded on a species of this genus from Java, and was quite recognizably described. The names *Tebennophorus*, Binn., and *Incilaria*, Benson, were both proposed in 1842, the probable priority being in favour of the first.

Morse in 1864 established the genus *Pallifera* for a species with ribbed jaw.

This review shows that several names for the genus, more or less certainly applying to it, were proposed anterior to 1842, the date of *Tebennophorus*. Of these names *Philomycus* and *Meghimatium* are the only ones available, *Eumeles* and *Limacella* being clearly inapplicable. Since continental authors generally have adopted the name *Philomycus*, it seems advisable to retain that designation for the genus if *Tebennophorus* must be rejected.

Philadelphia,  
December 2, 1890.

XXII.—*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.

[Continued from p. 19.]

### Phylum **APPENDICULATA.**

#### Branch CHÆTOPODA.

Fragments from mud from 89 to 93 fathoms, from 1310 fathoms, and from sand from 98 to 102 fathoms, in the Bay of Bengal.

## Branch ARTHROPODA.

## Class CRUSTACEA.

Of this class fifty-three species were obtained, of which fifty-one belong to the Malacostraca, and two to the Entomostraca.

## Grade MALACOSTRACA.

Amongst the fifty-one species belonging to this subclass every order except Amphipoda and Cumacea is represented, as follows:—

## Order SCHIZOPODA.

## Family Lophogastridæ.

## GNATHOPHAUSIA, Suhm.

At Stations 100 and 102, at 840 and 920 to 690 fathoms respectively, two fine specimens were obtained. They are of the usual uniform deep lake-colour, and they represent the two sections into which Sars has divided this genus.

1. *Gnathophausia Sarsii*, sp. n., Wood-Mason.

Belongs to the second section of the genus, in which it is nearest allied to *Gnathophausia Willemoesii*. The carapace covers the basal third of the first abdominal somite and has its dorsal spine produced as far as the posterior end of the third abdominal tergum; its extreme edge is expanded at the postero-inferior angle into a conspicuous rectangular lamina, into which neither its lower lateral keel nor its raised rim enters. The rostrum, which has lost its tip, appears to have been of the same form and proportions. Ocular and antennal spines well developed, divergent; the former are slightly curved and rather longer and slenderer than the latter. There are no branchiostegal spines. The upper half of the posterior margin of the carapace on each side and the lateral edges of the dorsal spine are minutely denticulated. Each of the five anterior abdominal terga has a dorsal keel produced posteriorly into a short sharp spine, and two subdorsal keels, and the posterior lobes of the pleura acuminate. The telson is tricarinate, having a fine median carina in addition to the much coarser sublateral ones, and appears to be more produced at the tip than in any other species.

Length from tip of rostrum to apex of telson 75 millim.

2. *Gnathophausia gracilis*, Suhm, var. *brevispinis*.

*Gnathophausia gracilis*, Suhm, Trans. Linn. Soc. Lond., Zool. ser. 2, vol. i. p. 33, pl. ix. fig. 1; Sars, Chall. Rep. vol. xiii. pt. xxxvii. Schizop. p. 48, pl. vii. figs. 6-10.

Our specimen differs from the one figured by Suhm in the small size of the spines of the infero-posterior corners of the carapace, the lower one of which is reduced to a minute outstanding point only visible when the animal is viewed from above. It may perhaps be found to differ also in the form and relative proportions of the wing-like antennal and branchiostegal spines, as well as in other respects, when better specimens of the typical form shall be available for comparison. In the meantime it will suffice to indicate it as a variety.

Length from tip of rostrum to apex of telson 82 millim.

Both the above specimens would appear to be males.

## Order DECAPODA.

## Family Penæidæ.

## HYMENOPENÆUS, S. I. Smith.

3. *Hymenopenæus* ? *microps*, S. I. Smith.

*Hymenopenæus* ? *microps*, S. I. Smith, Ann. Rep. Comm. Fish. 1884, p. 413 [69], pl. x. fig. 1.

Three specimens have been obtained—a male and a female from Station 104, 1000 fathoms, and a male from Station 105, 740 fathoms—of a species answering to Prof. Smith's diagnosis. They are all coloured a very deep vinous purple mottled with black, and are still of a deep wine-red, except the last two pairs of legs.

## SOLENOCERA, Lucas.

4. *Solenocera Hextii*, sp. n., Wood-Mason.

A strikingly beautiful Penæid of a bright pink colour was obtained in fair abundance at Stations 81 and 96, in 89 to 102 fathoms. It is remarkable for the great development of the respiratory mechanism in all its parts, especially the branchial chambers, the afferent and efferent divisions of which are sharply defined externally by the special prominence of the coincident parts of the branchiostegite, and also for the form of the antennules. These are shorter

and broader than those of any of the described species, and their inner or ensheathing branch is much less deeply semi-tubular, being indeed only slightly incurved along its lower margin and forming by its union with its fellow of the opposite side a strongly compressed tube, of which the lumen appears to be entirely filled by the two flat outer or olfactory branches of opposite sides. There is little doubt that this special development of the antennules has a causal relation to the presence of delicate sense-organs, which, owing to some unknown circumstances in the surroundings of the animal, stand in special need of protection.

This form had previously been found at 65 fathoms off Chittagong, at 68 fathoms off the Mahánadi Delta, and at 70 fathoms off the Godávari Delta.

#### GENNADAS, Spence Bate.

##### 5. *Gennadas parvus*, Spence Bate.

*Gennadas parvus*, Spence Bate, Ann. & Mag. Nat. Hist. (5) viii. p. 191; and 'Challenger' Macrura, 1888, p. 340, pl. lix.

A male and a female from Station 101, 922 fathoms, and Station 103, 1260 fathoms respectively, belong, there is little doubt, to the above species, which has such a wide geographical and bathymetrical range. Both were of a uniform deep lake-colour. *Amalopenæus elegans*, S. I. Smith, is probably the same species.

#### HEPOMADUS, Spence Bate.

##### 6. *Hepomadus? tener*, S. I. Smith.

*Hepomadus? tener*, S. I. Smith, Ann. Rep. Comm. Fish. 1884, p. 409 [65], pl. ix. figs. 7 and 8.

A female specimen was obtained at Station 97, 1310 fathoms, but is too much macerated for exact determination. Its colour in the fresh state was bright orange. = 229

#### HEMIPENÆUS, Spence Bate.

##### 7. *Hemipenæus Carpenteri*, sp. n., Wood-Mason.

Is closely allied to *Hemipenæus spinidorsalis*, Spence Bate, but differs in the following relations:—The thoracic legs are shorter, the three anterior pairs have the ischiopodite stouter, and longer in proportion to the succeeding joint, and the two last pairs are more filiform; the exopodites of the abdominal appendages are much longer; the rostrum is much weaker

and also shorter, barely reaching the apex of the basal joint of the antennular peduncle; the cervical suture appears to be more distinct in its dorsal part; and the hooked spine of the third abdominal tergum springs right from the anterior end instead of from the middle of the crest.

One female specimen from Station 97, 1310 fathoms.

Colours in the fresh state bright orange.

Length from tip of antennal scale to tip of caudal swimmeret in a straight line 118 millim.; length of exopodite of first abdominal appendage 42 millim.; length of carapace from middle of posterior margin to tip of rostrum 32.5 millim.; length of third thoracic leg 46 millim.

### Family Sergestidæ.

#### SERGESTES, Milne-Edwards.

##### 8. *Sergestes bisulcatus*, sp. n., Wood-Mason.

Closely allied to *S. robustus* and *S. mollis*, S. I. Smith, but readily distinguishable from both in the cervical being no less distinct across the back of the carapace than the gastro-hepatic groove. It differs from *S. mollis*, and apparently agrees with *S. robustus*, in the relative proportions of the joints of the antennular peduncles and in the form and proportions of the eyes, which are comparatively short and very distinctly widened from base of peduncle to apex of depressed hemispherical cornea; and it agrees with *S. mollis* and differs from *S. robustus* in the size of the rostrum.

Colour in the fresh state deep crimson-lake.

A female from Station 100, 840 fathoms, and a male from Station 105, 740 fathoms.

Length of male from tip of rostrum to apex of telson 60 millim., of female 63 millim.

##### 9. *Sergestes ? arcticus*, Kröyer.

*Sergestes arcticus*, Kröyer, Monog. Fremstill af Kraeb. *Sergestes*, pp. 24, 60, tabs. iii. and v.; Spence Bate, 'Challenger' Macrura, p. 436.

Our only specimen wants the spine on the outer margin of the exopodite of the caudal swimmeret said to be present in *S. arcticus*.

Colour in the fresh state deep crimson-lake.

From Station 101, 922 fathoms.

## Family Glyphocrangonidæ.

## GLYPHOCRANGON, A. Milne-Edwards.

The described species may, with the undescribed ones in our collection, be artificially arranged in three groups as follows:—

(1) Species with the anterior moiety of the fourth or lateral crest\* produced and expanded at its anterior end into a single huge vertically-compressed spine, which extends far beyond the level of the supraorbital margin of the carapace, and with the ridges and other elevations of the dorsal integument generally more or less sharp and roughly tuberculose.—*G. aculeatum*, A. M.-Edw., Spence Bate (= *G. Agassizii*, S. I. Smith), *G. regalis*, Spence Bate, and the following species, which, though not belonging to last season's collection, we think may be appropriately described here.

10. [*Glyphocrangon investigatoris*, sp. n., Wood-Mason.

Allied to *G. aculeata* and *G. regalis*, but distinguishable at a glance from the former by the posterior moiety of the third carapacial crest not being produced anteriorly into a spine and from both by its much more tuberculose cephalothorax and abdomen. From the latter, to which it is the more nearly allied, it further differs in having the posterior moiety of the third and fourth crests dentate and the lateral margins and carinæ of the telson sharply tuberculate for rather more than the basal third of their length. From *G. spinicauda*, A. M.-Edw., which, from Spence Bate's remark, would appear also to belong to this group, it differs in having the anterior moiety of the fourth crest undivided.

"The ground-colour" of this striking form "is old ivory-white with orange-white markings on tips of spines, &c.; the eyes are magenta." (*G. M. Giles.*)

Twenty-four specimens, of which three are adult (two of them ovigerous) females, were obtained at a single haul in lat. 19° 35' N., long. 92° 24' E., in 272 fathoms.

Length of rostrum 14.5 millim., of carapace from orbital to posterior margin 25 millim., of abdomen 51 millim.; total

\* To facilitate the following descriptions the carapacial crests, of which there are seven pairs, may be named "dorsal," "subdorsal," "sublateral," "lateral," "submarginal," "antemarginal," and "marginal," or may be simply numbered 1 to 7 in the order of their succession from the mid-dorsal line downwards on each side. The specific characters are taken from the four uppermost.

length 90·5 millim.; width between points of spines of lateral crests 20 millim.

A single adult (ovigerous) female was subsequently obtained in lat. 20° 17' 30" N., long. 88° 50' E., in 193 fathoms, in company with *Nephropsis Carpenteri*.]

(2) Species with the anterior moiety of the fourth crest divided into two parts produced anteriorly into moderate spines, the anterior of which never approaches the level of the supraorbital margin, and with the ridges and other elevations of the dorsal integument more or less sharp and roughly tuberculose.—*G. sculptus*, S. I. Smith, *G. granulosis*, *G. podager*, and *G. rimapes*, Spence Bate, and the following:—

11. *Glyphocrangon priononota*, sp. n., Wood-Mason.

Allied to *G. sculptus* and *G. granulosis*, but distinguishable at a glance from the former by the great strength and distinctness of all the crests, but especially of the dorsal and subdorsal (first and second), which are strongly toothed; by the posterior moiety of the sublateral (third) crest not terminating anteriorly in a tubercle; by the anterior moiety of the lateral (fourth) crest being merely divided by a notch and not reduced to two spines; by its more strongly tuberculate abdomen; by the pleura of the fifth abdominal somite being bispinose instead of trispinose; by the form of the dactylopodites of the fourth and fifth pair, which are simply pointed; by the teeth at the base of the rostrum being larger than the teeth of the rostrum itself; and probably in other details. It apparently agrees with *G. granulosis* in the strength and armature of the dorsal and subdorsal crests, but it differs in its narrower body; in the rostrum extending fully one third of its length beyond the antennular peduncle; in the posterior moieties of the sublateral and lateral (third and fourth) crests not being tuberculose, and the former of them not ending anteriorly in a strong cusp; and in the spines of the anterior moiety of the lateral (fourth) crest not being so large. From comparison with *G. podager* and *G. rimapes* it is altogether excluded by the simple dactylopodites of its fourth and fifth pairs of legs.

Two males and one female from Station 104, 1000 fathoms.

Colours in the fresh state deep pink; colour of eyes in spirit dark purple.

Length of rostrum 21·75 millim., of carapace from orbital to posterior margin 22 millim., of abdomen 59 millim.; total length 107 millim.

(3) Species in which the anterior moiety of the fourth crest is undivided and terminates anteriorly in a single small spine, and the ridges and tubercles of the occasionally pubescent dorsal integument are more or less blunt and smooth.—*G. longirostris*, S. I. Smith, *G. hastacauda* and *G. acuminata*, Spence Bate, ?*G. nobilis*, A. Milne-Edwards, and the two following species, of which the first, though belonging to the collection of a previous season, may fitly be introduced here:—

12. [*Glyphocrangon Gilesii*, sp. n., Wood-Mason.

Distinguished not only from all the other members of its group, but also from all the other species of the genus, by possessing the full complement of complete crests on both divisions of the carapace, the anterior moiety of the third crest being developed and produced anteriorly into a small spine just as in the case of the fourth crest. The gastric moiety of the second crest is divided into three parts, the foremost of which is produced into a minute spinule. There is a small tubercle in the gastro-rostral groove between the front ends of the dorsal (first) crests. With these exceptions the integument of the carapace is quite smooth and, except on the summits of the crests, which are very distinctly foveolate-rugose, somewhat polished. Except for the median crests and transverse grooves the sculpture of the abdominal terga is obsolete. The pleura of the four intermediate somites are bispinose at the extremities, with the smaller tooth posterior in the first three and anterior in the last, where the posterior spine rivals the single spine of the last pleuron. The antennal spine is longer and horizontally more expanded than the antero-lateral, which is invisible from above. The dactylo-podites of the fourth and fifth pairs of legs are lanceolate and simply acute at the tips.

A single female was obtained on the 8th December, 1887, eight miles south-east of Cinque Island, in the Andaman Sea, in 500 fathoms; bottom green mud.

The colour in spirit is ivory-white, with the tips of the spines, rostrum, and telson and the summits of the crests pale orange.

Length of rostrum 11 millim., of carapace 13·75, of abdomen 33; total 56·75 millim.]

13. *Glyphocrangon unguiculata*, sp. n., Wood-Mason.

Closely allied to the preceding; differs in the carapace and abdomen being covered with a very thin, filmy, delicate, and

deciduous velvety pubescence; in the anterior moiety of the sublateral crest being reduced to a thin, interrupted, unarmed wrinkle; in the anterior or gastric moiety of the subdorsal crest being broken up into a diffused, coarsish, subtuberculose wrinkling, terminated anteriorly by a spine; in the dorsal crests being subtuberculose; in the antennal and anterolateral spines being more divergent in a side view, or, in other words, less horizontal; in the postero-inferior angle of the second and third abdominal pleura being angular rather than spinose; and, finally, in the outer margin of the dactylopedites of the fourth and fifth pair of legs being produced near the apex into a minute incurved claw.

Two egg-laden females from Station 105, 740 fathoms.

Colour in life delicate pink; eyes in spirit dark purple.

Total length from tip of rostrum to apex of telson 73.5 millim.; of carapace, from supra-orbital to posterior margin, 18 millim.; of rostrum, from supra-orbital margin to apex, 13 millim.; of abdomen with telson 44 millim.

#### Family Miersiidæ.

#### EPHYRINA, S. I. Smith.

*Ephyrina*, S. I. Smith, Proc. U. S. Nat. Mus. 1885, p. 506.

*Tropiocaris*, Spence Bate, 'Challenger' Macrura, 1888, p. 835, pl. cxxxvi. fig. 1.

#### 14. *Ephyrina Hoskynii*, sp. n., Wood-Mason.

Closely allied to *Ephyrina Benedicti*, S. I. Smith (= *Tropiocaris planipes*, Spence Bate), but differs in having the carapace and the rostrum shorter, the latter not quite reaching the corneæ and terminating abruptly in a vertical sinuous margin; the eyes apparently smaller, and the third abdominal segment non-produced.

This exceedingly delicate specimen was in the fresh state of a dark red colour.

From Station 105, 740 fathoms.

Length from front margin of rostrum to apex of telson 60 millim.

#### HOPLOPHORUS, Milne-Edwards.

#### 15. *Hoplophorus Smithii*, sp. n., Wood-Mason.

A small species from Station 62, 1439 fathoms, and Station 103, 1260 fathoms, apparently distinguished from previously described species by the smallness of the spine at the postero-

inferior angle of the carapace and by the pleura of the first abdominal somite being strongly emarginate, but not spinose, at its antero-inferior angle. The efferent branchial channel is extremely large. The rostrum, which is  $\frac{13}{8}$ -toothed, descends to the first infra-marginal tooth, whence it is straight and slightly ascendant; its length, measured from its tip to the supra-orbital margin, is equal to the interval between the last-named point and the hinder margin of the second abdominal somite. The spiniform process of the third abdominal tergum is more than twice as large as those of the two other segments, which are subequal.

Colours in life bright pink, in spirit strongly iridescent.

The specimen from Station 103 measures 50 millim. from tip of rostrum to apex of telson; it was alive and active when brought on board.

#### ACANTHEPHYRA, A. Milne-Edwards.

##### 16. *Acanthephyra curtirostris*, sp. n., Wood-Mason.

Closely allied to *A. acutifrons*, Spence Bate, differing therefrom in its shorter and smaller carapace and in its much less produced rostrum, which does not reach beyond the middle of the terminal joint of the antennular peduncle and is armed on its upper margin with nine minute saw-like teeth, on its lower with a single strongish spine. The ocular papilla embraces the cornea.

Two males from Station 100, 840 fathoms, and one from Station 104, 1000 fathoms.

Length from tip of rostrum to apex of telson 85 millim.

##### 17. *Acanthephyra brachytelsonis*, Spence Bate.

*Acanthephyra brachytelsonis*, Spence Bate, 'Challenger' Macrura, 1888, p. 753, pl. cxxvi. fig. 7.

From Station 104, 1000 fathoms, eight specimens, of which two are fine adult males, and two mutilated specimens from 740 fathoms at Station 105.

Colours in the fresh state deep crimson-lake.

Length from tip of rostrum to apex of telson about 120 millim.

#### Family Alphæidæ.

##### DORODOTES, Spence Bate.

##### 18. *Dorodotes reflexus*, Spence Bate.

*Dorodotes reflexus*, Spence Bate, 'Challenger' Macrura, p. 678, pl. cxvi. fig. 3.

Six fine males from Station 97, 1310 fathoms, coloured bright pink, and one ovigerous female of moderate size from Station 62, 1439 fathoms.

The eggs are of two sizes and colours, the smaller being light brown, the larger bright pink like the mother, the difference in colour and size being due to the formation of an embryo.

When brought on board the carapace of every specimen was covered with a thick greasy secretion, probably cuticular in origin: in spirit the carapace still has a greasy appearance.

#### HETEROCARPUS, A. Milne-Edwards.

##### 19. *Heterocarpus Alphonsi*, Spence Bate.

*Heterocarpus Alphonsi*, Spence Bate, 'Challenger' Macrura, 1888, p. 632, pl. cxii. fig. 1.

Nine specimens, of which four are adult males, one an ovigerous female, and four immature males, were obtained at Station 105, 740 fathoms.

The colour in the fresh state is deep pink.

Length of male, from tip of rostrum to apex of telson, 137 millim.; of female 163 millim.

#### Family Pasiphæidæ.

##### PARAPASIPHÆ, S. I. Smith.

##### 20. *Parapasiphaë latirostris*, sp. n., Wood-Mason.

This fine species is distinguished by its high and short foliaceous rostrum, which barely reaches to the extremity of the eyes, is strongly arched above, is bispinose at its apex, and is preceded by five or six small teeth on the gastric region; by the corneæ occupying the whole extent of the apex of the depressed peduncles; and by the crest of the fourth abdominal tergum being produced backwards in the middle line into a sharp spine.

The single specimen is a female.

It was obtained at Station 105, in 740 fathoms, and in the fresh state was coloured a deep lurid red.

Length 103 millim.

##### 21. *Parapasiphaë Alcocki*, sp. n., Wood-Mason.

A smaller species taken at Station 101, 922 fathoms. It is distinguished by its short eye-stalks and globular corneæ,

and by the form of the rostrum, which terminates abruptly a little behind the anterior margin of the carapace in a vertical sinuous edge, much as in *Ephyrina Hoskynii*.

Colour in the fresh state deep crimson-lake.

One male specimen, measuring 64 millim. from the anterior margin of carapace to apex of telson.

### Family Nematocarcinidæ.

#### NEMATOCARCINUS, A. Milne-Edwards.

##### 22. *Nematocarcinus tenuipes*, Spence Bate.

*Nematocarcinus tenuipes*, Spence Bate, 'Challenger' Macrura, 1888, p. 812, pl. cxxxii. fig. 6.

Station 97, 1310 fathoms, four specimens; Station 104, 1000 fathoms, two specimens.

Colours in the fresh state bright orange.

### Family Homaridæ.

#### PHOBERUS, A. Milne-Edwards.

##### 23. *Phoberus cæcus*, A. Milne-Edwards, var. nov. *sublevis*, Wood-Mason.

*Phoberus cæcus*, A. Milne-Edwards, Ann. Sci. Nat. (6) xi. 1881, 4, p. 1.  
*Phoberus tenuimanus*, Spence Bate, 'Challenger' Macrura, 1888, p. 171, pls. xxi., xxii.

Our specimen differs from those of the 'Blake' and 'Challenger,' which seem to be identical, only in having one spine instead of three on the upper margin of the rostrum, and the carapace and dorsal integument generally less spinose.

Length from tip of rostrum to apex of telson 118 millim.; from extremity of extended chelæ to apex of telson 177 millim.

Colour delicate pink.

One male specimen from Station 105, 740 fathoms.

#### NEPHROPSIS, Wood-Mason.

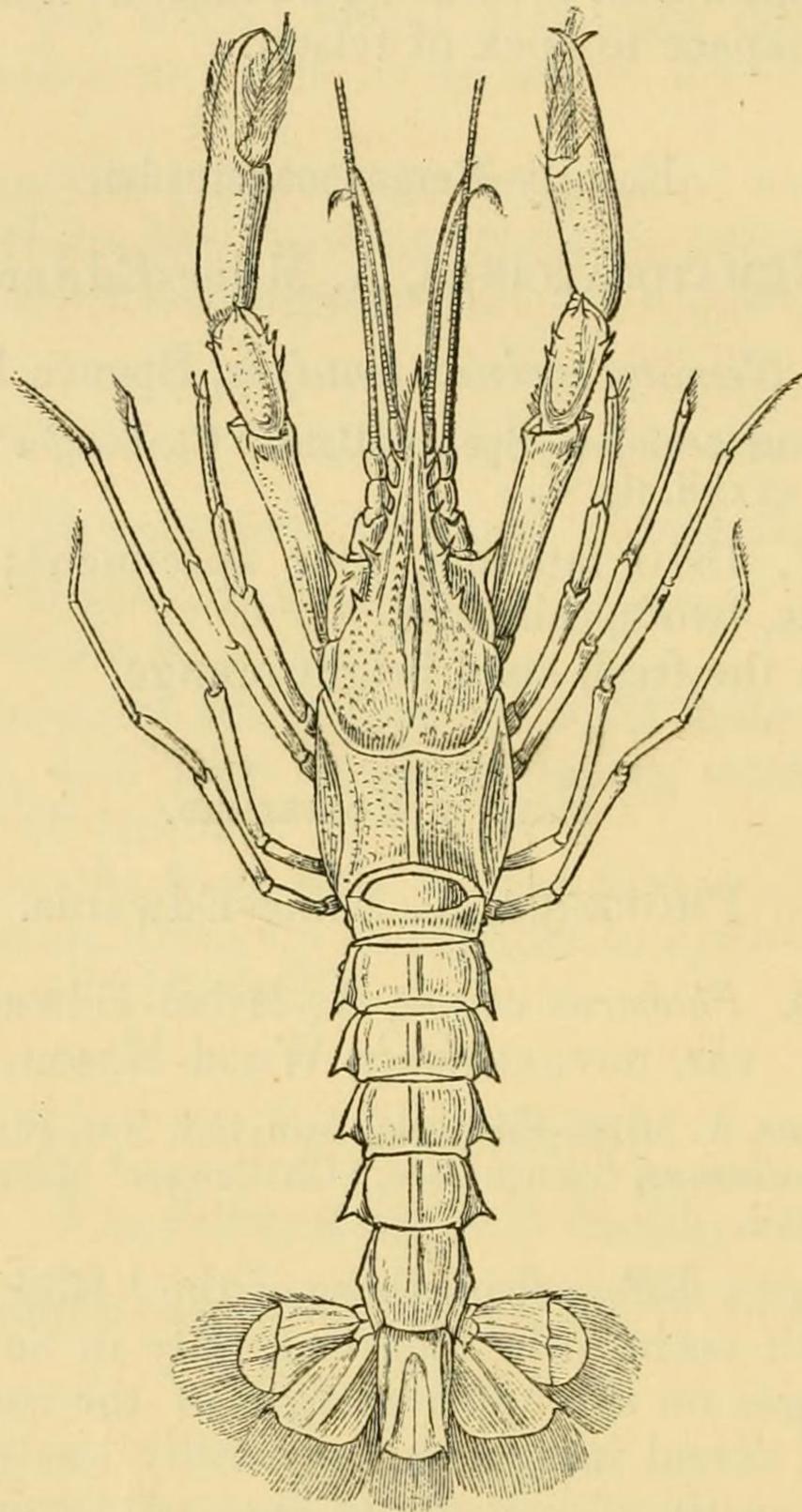
##### 24. *Nephropsis atlantica*, Norman.

*Nephropsis atlantica*, Norman, Proc. Roy. Soc. Edinb. 1881-82, vol. xi. p. 684.

Six specimens (four males and two females), from Station 105, 740 fathoms, agreeing with Canon Norman's excellent description of the male.

The species is abundantly distinct from *N. Agassizii* (= *aculeatus*), which, so far as the figure goes, is indistinguishable from *N. Stewartii*.

Fig. 4.



*Nephropsis atlantica*, Norman, ♂, nat. size.

Of our specimens one has three pairs, one two and a half pairs, three two pairs, and one a pair and a half of lateral spines on the rostral margins.

Colours in life pink, with a broad white longitudinal dorsal stripe.

Family **Thalassinidæ**.

**CALLIANASSA**, Leach.

25. *Callianassa*, sp.

Two specimens, probably male and female, of a small species from Station 76, 93 fathoms.

Colours in life deep-sea pink.

## Family Eryontidæ.

## WILLEMOESIA, Grote.

26. *Willemoesia forceps*, A. Milne-Edwards.

*Willemoesia forceps*, A. Milne-Edwards, Bull. Mus. Comp. Zool. vol. viii. 1880, p. 64.

One female specimen, of a bright pink colour, in length (measured from front margin of carapace to apex of telson) 99 millim., from Station 62, 1439 fathoms; and one male and one female specimen, of a milk-white colour, measuring respectively 84 millim. and 82 millim., from Station 97, 1310 fathoms.

## PENTACHELES, Spence Bate.

27. *Pentacheles*, sp.

A single specimen, with the chelipeds wanting, from Station 105, 740 fathoms.

Colour pale pink.

28. ? *Pentacheles* (? immature).

At Station 102, 920 to 690 fathoms, a very remarkable specimen was obtained, which may best be described for our present purpose as a *Pentacheles* with a globularly inflated carapace and all the spines of its dorsal integument of larva-like length and sharpness. It recalls a good deal the curious larva which Spence Bate has described and figured ('Challenger' Macrura, fig. 30, after a drawing by Willemoes von Suhm) under the name of "*Eryoneicus cæcus*." We believe that notwithstanding its great size—36 millim. in length—it is an immature form of some species of *Pentacheles*, bearing to the adult form a relation similar to that which exists between a just-hatched and an adult crayfish.

Our specimen speaks to the accuracy of Willemoes von Suhm's drawing of that which, there is little doubt, is only a very much younger stage.

Length 36 millim.

Colour in the fresh state pink.

## Family Parapaguridæ.

## PARAPAGURUS, S. I. Smith.

29. *Parapagurus abyssorum*, A. Milne-Edwards, MS.

*Parapagurus abyssorum*, Henderson, 'Challenger' Anomura, p. 87, pl. ix. fig. 2.

One fine specimen at Station 105, 740 fathoms.

Colour in the fresh state pink.

The animal was sheltered in a fine colony of an *Epizoanthus* similar to the figure of *Epizoanthus paguriphilus*, Verrill, in Professor S. I. Smith's paper in Proc. U. S. Nat. Mus. vol. iii. 1883.

### PAGURODES, Henderson.

#### 30. *Pagurodes*, sp.

All the dead shells of *Rostellaria delicatula* brought up at Stations 81 and 96 were tenanted by a small hermit-crab which fits fairly well into this genus. Its colour in the fresh state was bright pink, similar to the colour of the animals whose shells were appropriated.

### Family Galatheidæ.

#### GALACANTHA, A. Milne-Edwards.

#### 31. *Galacantha areolata*, sp. n., Wood-Mason.

A fine species closely allied to *Galacantha rostrata*, A. Milne-Edwards, but differing in its more distinctly areolated and more coarsely granulated carapace, and by having the apex of the horizontal portion of the rostrum short and minutely bifid, as well as in some other particulars.

One male specimen from Station 97, 1310 fathoms.

Colour, including the corneæ, dull milky orange.

Length 46 millim.

### MUNIDOPSIS, Whiteaves.

#### 32. *Munidopsis ciliata*, sp. n., Wood-Mason.

Closely allied to *Munidopsis brevimana*, Henderson, differing in having the transverse scale-like elevations of the carapace (which apparently also differ in form and distribution) and the ridges of the abdomen fringed with forwardly-directed hairs; and the lateral margins of the carapace armed with six spines, of which the foremost is only half the size of the supra-antennal, while the first of the four between the two divisions of the cervical groove is much larger than the supra-antennal, and the sixth is about the same size as the first and third.

One male specimen from Station 97, 1310 fathoms.

Colours in the fresh state milk-white.

Total length from apex of rostrum to apex of telson 35 millim.; length of carapace from posterior margin to apex of

rostrum 18 millim.; breadth of carapace between posterior and second third 10·5 millim.; length of chelipeds 19 millim.; length of rostrum 5 millim.

33. *Munidopsis stylirostris*, sp. n., Wood-Mason.

Allied to *Munidopsis curvirostra*, Whiteaves, differing in the somewhat slenderer rostrum passing off more suddenly from the fore margin of the carapace; in the spine of the antero-lateral angle being larger; in the presence behind the root of the rostrum of a pair of minute forwardly-directed spinules supported on small eminences, in place of the pair of well-developed spines seen in the same position in the preceding and other species; in the absence of medio-dorsal spines on the carapace and abdominal terga; and in the spinose chelipeds and legs. In the chelipeds the basipodite bears a spine at the apex of its hinder angle; the ischiopodite two near the apex, one below, the other above; the meropodite four, two above and two below, at the apex, besides three or four on the shaft towards the distal end; and the carpopodite also four in a similar position; while the chelæ, in which the fingers are equal in length to the palms, are unarmed. In the legs the carpopodite and meropodite each bear a spine at the upper apex. The corneæ appear to be narrower and more elongated, being distinctly cylindrical in the basal half.

Colour in the fresh state dull orange-pink, including the corneæ: in spirit pure ivory-white, with the non-faceted corneæ yellow.

Two female specimens from Station 105, 740 fathoms.

Total length 54 millim.; length of carapace 18·5, of rostrum 11 millim.; breadth of carapace between tridentate lobes behind antero-lateral tooth 15·5 millim.; length of chelipeds 40 millim.

ELASMONOTUS, A. Milne-Edwards.

34. *Elasmonotus Edwardsii*, sp. n., Wood-Mason.

Body and all the appendages completely clothed with a dense velvety pubescence. The carapace is moderately convex in all directions, but especially transversely and over the gastric region, which is delimited from the bisected cardiac region and from the hepatic regions by a transverse groove. The rostrum is porrect, acute, triangular, with straight sides and roof-shaped dorsal surface. The anterior margin of the carapace is armed rather farther from the middle line than

from the antero-lateral angle with a small triangular spine, the point of which is opposite the chink-like interval between the eyes and the antennal bases; the antero-lateral angle is slightly produced, and the interval between it and the supra-antennal spine is roundly emarginate; the lateral margin is divided by two notches into two lobes, the anterior and shorter of which, answering to the interval between the two divisions of the cervical groove, is vertically compressed, somewhat expanded laterally, subacute at the edge, and produced anteriorly into a blunt tooth; the peduncles of the eyes are indistinguishably ankylosed together and immovably united with the rostrum and antennular sternum, and give off from their inner side a long spine, which, being applied by its base to the under surface of the rostrum, presents the appearance of an orbital eave terminating anteriorly in a preocular spine, while the cornea on its outer side looks like an eye retracted into its orbit. The chelipeds and legs are short and stout; the ischiopodites of the former are armed at the apex above and below with one spine, the meropodites with four along their posterior angles (two on their inner and two on their outer apices), the carpopodites with one on the inner side; while the second, third, and fourth pairs of legs are armed on the upper margin of the meropodites with increasing series of seven, six, and five spines respectively, and on the upper margin of the carpopodites with three.

One male from Station 97, 1310 fathoms, the colour in the fresh state being milk-white, including the corneæ. In spirit the corneæ are yellow.

Total length 45 millim.; length of carapace 24 millim., of rostrum, from rostro-ocular suture to apex, 6 millim.; breadth of carapace across anterior lobes 15.4, of chelipeds 24 millim.

It is a remarkable circumstance that no specimens of the genera *Galathea*, *Munida*, and *Eumunida* were obtained during the past season, although in previous seasons specimens of one or other of them have not been uncommon in the trawl and on the tangles.

[To be continued.]

asymmetrical and abnormal positions of the genital pores in *Allurus*, sp.

For the present I content myself with merely noting without comment these interesting abnormalities.

#### EXPLANATION OF PLATE III.

##### *Astacus fluviatilis.*

*Fig. 1.* View of ventral surface of abnormal specimen of female crayfish, sufficient to show the position of the second genital aperture (*o.p.* 2) on each side, *o.p.* 1 being the normal oviducal pore; X., XI., XII., XIII., indicate the last four ambulatory limbs, which are represented as cut short; *Ab.* 1 the first abdominal sternum with normal female appendages.

*Fig. 2.* Side view of the same crayfish partially dissected; the hinder part of the carapace (*ca*) has been removed, the epimeron (*ep*) and gills have been cut away; the bases of the ambulatory appendages (10, 11, 12, 13) are represented; *o* is the normal ovary, *o.d.* 1 the normal oviduct, *o.d.* 2 the accessory oviduct passing into appendage 13; *Li.*, liver, underlying ovary; *Ab.* 1, *Ab.* 2, the first and second abdominal segments.

##### *Lumbricus herculeus.*

*Fig. 3.* Ventral view of segments XII. to XVI., showing on the animal's *left side* the normal oviducal pore (♀) and spermiducal pore (♂), and on the right side the abnormal position of these apertures.

*Fig. 4.* Dissection of segments IX. to XIII., to show the asymmetrical condition of internal structures. The normal condition obtains on the left side, the abnormal on the right; *spth.*<sup>1</sup>, *spth.*<sup>2</sup>, the spermathecæ; *ov.*, abnormally placed ovary; *cal.*, calciferous gland; *æs.*, œsophagus. None of the structures have been cut or removed, the calciferous gland and sperm-sac of segment XII. being absent.

XXVII.—*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.

[Concluded from p. 202.]

#### Family Inachidæ.

#### PLATYMAIA, Miers.

#### 35. *Platymaia Wyville-Thomsoni*, Miers.

*Platymaia Wyville-Thomsoni*, Miers, 'Challenger' Brachyura, 1886, p. 13, pl. ii. fig. 1.

Three specimens (one male and two ovigerous females), from Station 56, 240 to 220 fathoms.

The male measures:—

	millim.
Length of carapace . . . . .	93
Greatest breadth of carapace . . . . .	97
Expanse of legs . . . . .	700

The largest female measures :—

	millim.
Length of carapace . . . . .	80
Greatest breadth of carapace . . . . .	82
Expanse of legs . . . . .	400

All our specimens, including those taken on previous occasions, greatly exceed the 'Challenger' specimens in size. The males run much larger than the females, and the great chelæ are greatly enlarged, with the palms inflated and armed with three rows of slender hooked spines.

Our specimens differ from the type in a number of details, which do not justify the description of a new species without actual comparison with the type.

### ECHINOPLAX, Miers.

#### 36. *Echinoplax pungens*, sp. n., Wood-Mason.

Differs from *Echinoplax Moseleyi*, Miers, in its much larger size; in its much more numerous, more thickset, and longer spines; in its more regularly and symmetrically pyriform carapace; in its thicker legs; in its smaller eyes, which, when laid back, do not nearly reach to the spine which limits the ocular cavity posteriorly; and by the broader abdomen of the female.

Colour in the fresh state a brilliant straw-colour.

Five female specimens from Station 56, 240 to 220 fathoms, the largest of them measuring 340 millim. in expanse of legs, 60 millim. in breadth of carapace across the branchial regions, and 88 millim. in length of carapace from its hinder margin to the tips of the rostral spines.

Smaller specimens have a much more spiny abdomen and are generally more spiny than larger ones.

#### 37. *Encephaloides Armstrongi*, gen. et sp. n., Wood-Mason.

Remarkable for the large size of the branchial chambers, which are so inflated as to meet together over the back in a straight suture. Both the afferent and the efferent branchial openings are also very large.

In the female the cavity of the brood-pouch communicates with the branchial chambers by two canals, formed by deep

notches in the posterior angles of the thorax and by the base of the abdomen, whereby in all probability a current of fresh water is caused to flow over the eggs. The rostrum is triangular and shaped like the beak of a bird, and the antennary flagella are visible from above beyond its margins. The eyes, which are very small, are retractile against the sides of the carapace, and the narrow orbital eave is provided with a minute spine anteriorly and posteriorly. The legs are long and slender, with their segments, including even the tapering dactylopodites, cylindrical.

Numerous specimens were obtained at Stations 81 and 96, and at Station 76 over two hundred were taken, almost all of them being males. This form, in fact, is characteristic of the infra-littoral of the Bay of Bengal, near the 100-fathom limit, from the coast of Arrakan to the Godávari.

Colours in the fresh state:—Carapace pinkish yellow, ambulatory legs pink.

#### Measurements.

	Male. millim.	Female. millim.
Length of carapace .....	41·5	28
Breadth of carapace .....	42	27
Height of branchial regions .....	20·5	12
Expanse of first pair of ambulatory legs.	335	134
Length of chelipeds .....	74	33

#### ANAMATHIA, S. I. Smith.

##### 38. *Anamathia Livermorii*, sp. n., Wood-Mason.

Closely allied to *Anamathia pulchra*, Miers, differing in having the carpopodite and propodite of the chelipeds rounded instead of carinate.

The spines of the rostrum are as long as the distance in a straight line from the hinder margin of the carapace to the gastric spine. The carapace bears twenty spines disposed in five longitudinal rows, namely two lateral of three spines each, one dorsal of four, and two subdorsal of five each including the postoculars.

A male and two females from Station 56, 240 to 220 fathoms.

Length of the largest specimen 22 millim.

#### PUGETTIA, Dana.

##### 39. *Pugettia globulifera*, sp. n., Wood-Mason.

Allied to *Pugettia velutina*, Miers, with which it agrees in

the possession of two foliaceous tubercles on the inflected portion of the carapace on each side, and in the form of the orbits and postocular lobes; but from which it differs in the spines of the sides of the hepatic region being all but erect and expanded at the base into huge pear-shaped tubercles, which present themselves in an underview as two great smooth and polished white hemispherical bosses at the anterolateral angles of the buccal frame; also in its foliaceous-carinated chelipeds and in the club-shaped setæ with which its ambulatory legs are garnished.

Station 56, 240 to 220 fathoms.

Length 15.5 millim.

#### OXYPLEURODON, Miers.

##### 40. *Oxypleurodon cuneus*, sp. n., Wood-Mason.

Allied both to *Oxypleurodon Stimpsoni*, Miers, from 375 fathoms off the Philippines, and to *Sphenocarcinus corrosus*, A. M.-Edw., from 100 fathoms off Barbadoes; resembling the former in the form, number, and distribution of the carapacial prominences, and the latter in the form though not in the structure of the rostrum. In *Oxypleurodon Stimpsoni* the rostrum is formed by two horns which diverge widely from the level of the anterior end of the orbit, in *Sphenocarcinus corrosus* by two horns uniting together in the middle line to form an apically bifid wedge-shaped mass, and in the new species the carapace is produced into a long, slender, tapering rostrum, which is minutely bifid at the extremity. All the joints, except the dactylopodites, of all the legs are strongly crested dorsally.

Length of carapace, from tip of rostrum to posterior margin, 18.7 millim.; breadth between points of branchial eminences 13.7 millim.

Two males and one ovigerous female from Station 56, 240 to 220 fathoms.

#### DOCLEA, Leach.

##### 41. *Doclea ovis* (Herbst).

One young specimen from Station 96, 98 to 102 fathoms.

#### Family Cancridæ.

##### 42. *Nectopanope rhodobaphes*, gen. et sp. n., Wood-Mason.

Carapace about  $1\frac{1}{3}$  times as broad as long. Frontal

margin straight, entire—being only obsoletely bilobed—divided from the supra-orbital margin on each side by a slight notch for the reception of the first joint of the flagellum of the antennæ. Supra-orbital margin with one fissure, infra-orbital entire. Antero-lateral margins shorter than the postero-lateral, arched, armed with three teeth, including the extra-orbital angle. Branchial regions swollen, separated from the gastric by a V-shaped impression, from the cardiac by their own prominence, and by a slight transverse depression from the hepatic, which is separated from the gastric in a similar manner. Afferent and efferent branchial apertures large; the outer wall of the large efferent canal forms a sub-carinated elevation of the anterior pleural region. Chelipeds large, smooth, with a strong groove near the lower margin of the produced portion of the propodite on the outside; the upper margin of the propodite subcarinate; the carpopodite smooth, subquadrate, with a small spine at the inner angle; and the meropodite with a short sharp spine near the apex of its posterior angle. Ambulatory legs rather weak, the first three pairs subequal, the last shorter, with the meropodite curved in correspondence with the convexity of the branchial regions of the carapace; the dactylopodites are compressed-styliform, with a groove on each side and a slight fringe of setæ on the upper and lower margins, those of the last pair being, like their propodites, shorter and broader and fringed, especially below, with longer setæ; the ambulatory legs in fact are subnatatory, and agree in structure with those of the Portunidæ. Integument everywhere polished and glabrous, except for the presence of a few scattered setæ on the dorsal surface of the legs and for the dactylopoditic fringes.

In life this crab was of a beautiful deep-sea pink, with a dotted, V-shaped, white mark between the gastric and branchial regions.

One specimen was obtained at Station 96, 98 to 102 fathoms; the length of its carapace is 21.4 millim., and the greatest breadth between the points of the third teeth 29 millim.

The following species is referred provisionally to the same genus, though it differs in having the first tooth of the antero-lateral margin distinct from the orbit, and the legs, especially the last pair, not nearly so distinctly natatory.

43. *Nectopanope longipes*, sp. n., Wood-Mason.

Differs from the preceding in its branchial regions not

being inflated; in the form of the teeth of the antero-lateral margins of the carapace, the first of which is a rectangular plate entirely separate from the extra-orbital angle, while the two remaining are sharp and conical; in its relatively longer legs, which are setose at their extremities, with the dactylopodites of the last pair not much more expanded than those of the preceding pairs; in having the upper surface of the carapace dull and minutely granulose, and the fingers of the chelipeds black.

One male and one female, juv., from Station 56, 240 to 220 fathoms.

Length of carapace 8.5 millim., breadth 11.7 millim.

44. *Sphenomerus trapezioides*, gen. et sp. n., Wood-Mason.

Carapace about  $1\frac{1}{3}$  times as broad as long; its upper surface is smooth, polished, and tolerably convex in all directions, but especially antero-posteriorly; and it is devoid of all grooves except two faint crescentic ones, which separate the cardiac from the branchial regions. The deflexed and somewhat produced frontal margin is divided by a distinct notch into two truncate-rounded lobes, and is without granules or raised rim, as are also the entire upper and lower orbital margins. The antero-lateral margins, which are only about two thirds the length of the postero-lateral, form with the frontal margin a semicircular outline; each bears a minute spine at the extra-orbital angle, followed at equal distances by two smaller ones. There is also a small spine at the internal infra-orbital angle. The basal joint of the antennæ is not much developed and the flagellum occupies the internal orbital hiatus. The external maxillipeds have the mero-podite slightly oblong, with the succeeding joint articulated to its truncated antero-internal angle. The abdomen of the male is six-jointed, the third and fourth segments being almost indistinguishably ankylosed together.

Chelipeds in both sexes extending far beyond the carapace, massive, and of unequal size, the right being much larger than the left; the fingers are broadly banded with black across their middle, the palms are smooth, the wrist is rounded and smooth, with a minute spine on its inner side; the mero-podite is wedge-shaped at its proximal end and bears six to eight small spines on its thickened distal end, as in *Trapezia*. Ambulatory legs weak and narrow, with the two terminal joints articulated together and constructed as in *Trapezia*.

From Station 56, 240 to 220 fathoms.

Length of carapace 8.5 millim.; breadth between last pair of antero-lateral tubercles 11 millim.

This species was taken near the same place in a previous season.

Family **Leucosiidæ**.

45. *Parilia Alcocki*, gen. et sp. n., Wood-Mason.

This crab is remarkable not only for the great size to which it attains—equalling though not exceeding the *Myropsis goliath* of A. Milne-Edwards—but also for the great development of the respiratory mechanism. The finely and sharply granulated carapace is distinctly broader than long. When viewed from above it appears hexagonal in outline, the interval between the outer canthi of the afferent branchial apertures forming the wide and straight anterior side; the intervals between the outer canthus of the afferent branchial apertures and the last antero-lateral tooth of each side, the nearly straight antero-lateral sides; the intervals between the last antero-lateral tooth and the posterior branchial spine of each side, the very strongly arched postero-lateral sides; and the interval between the posterior branchial spines of opposite sides, the posterior side of the hexagon. It is depressed in front and strongly swollen behind, both vertically and horizontally, but especially horizontally, so as in a side view to appear wedge-shaped. The regions are well-marked, the much inflated branchials being sharply marked off from the elongated *fleur-de-lys*-shaped gastro-cardiac and from the hepatics by a deep groove, which, commencing behind the cardiac protuberance, passes forwards and inwards, and then curves boldly forwards and outwards to the first antero-lateral tooth on each side, and is deeply indented at intervals in its course. The hinder margin bears three short conical spines, of which the middle is small and tends to degenerate with age into a mere clump of granules. Above the marginal spines, on the vertical hinder surface, is a transverse row of three similar spines, of which two are on the branchial regions and the third and smallest arises from the middle of the cardiac boss, whence a carina passes forwards along the mid-dorsal line nearly to the frontal margin. The antero-lateral margin bears four spiniform tubercles, one in the middle of the length of the pterygostomian ridge (which, in the absence of an hepatic ridge, functions as a portion of the antero-lateral margin), and three separated from each other by equal intervals and from the pterygostomian by an interval equal to the sum of their own interspaces.

The two antennular lobes of the front, which is much as

in *Myra* and *Ilia*, are dorsally carinate. The supra-orbital margin is marked by two fissures; the infra-orbital is a stoutish triangular tooth, separated externally from the supra-orbital by an angular notch, internally by a wide hiatus from the front, and inferiorly from the notched upper edge of the afferent branchial opening by a considerable space. The structure of the orbit is in fact to all intents and purposes identical with that of *Ilia*, the only difference being that the extra-orbital notch forms a third fissure in the latter, whereas in *Myra* the notched edge of the afferent branchial opening forms, or comes into such close relation with the orbit that it seems to form, the lower margin of the latter, and that which answers to the lower orbital rim of *Parilia* is an extra-orbital lobe separated from the supra-orbital margin by a third and from the functional infra-orbital margin by a fourth fissure.

The little lobe which in *Myra* bounds the outer notch of the upper margin of the afferent branchial aperture and does not extend beyond the level of the extra-orbital lobe, is in *Parilia* laterally expanded to a huge extent on each side, so as to form the enormously wide orifices of the afferent branchial channels, and thus to treble the apparent width of the front. The exognaths of the external maxillipeds are commensurately and concomitantly widened, and are segments of a circle larger than a semicircle, thus exceeding in width the same parts even in *Philyra*; they are truncate at the extremity, and when closed leave a wide chink-like opening between themselves and the sides of the carapace.

The chelipeds are long, slender, and cylindrical, being about twice as long as the carapace in adult females and males of the same size, but no less than  $4\frac{1}{2}$  times as long as the carapace in giant specimens of the latter sex; they are finely and sharply granulated, especially on the upper surface, from the base to the insertion of the dactylopodite, whence they are smooth; the meropodites are about equal to the carpopodite with propodite up to the insertion of the dactylopodite, which is scarcely more than half the length of the propodite without its prolongation in females and in males of the same moderate size; the propodite increases slightly in vertical width to the insertion of the dactylopodite. The legs are of moderate length and strength and are almost smooth; their meropodite is almost equal to the propodite and dactylopodite together; the dactylopodites, which are strongly fringed on the upper and lower edges, are so twisted and curved that their smooth and transversely convex sides are directed forwards and upwards, and backwards and downwards

respectively, while their dorsal and ventral edges have become upper and lower.

The abdomen of the male is only five-jointed, the third, fourth, and fifth joints being ankylosed together. That of the female has the full number of distinct joints; the abdomen and sternum securely interlock, the sterna of the latter giving off a forwardly-increasing series of laminar processes which project downwards and inwards over the edges of the former; there is an erect spine on the sternum between the genital apertures, and the spacious brood-cavity communicates with the branchial cavity by a hole near each posterior angle of the thorax.

The eggs are very small, and in the specimen examined few.

Colours in life:—Carapace deep pink, fading gradually to pale straw-colour at the posterior margin; legs pink, with the articulations, like the chelæ, white.

Twenty-eight males at Station 96, 98 to 102 fathoms; previously obtained (ten females) off the Godávári Delta in 70 fathoms and (three males and one female) off the Mahánadi Delta in 68 fathoms.

	Female. millim.	Male. millim.
Length of carapace . . . . .	32	53
Breadth of carapace between last pair of antero-lateral tubercles . . . . .	37	63·5
Length of exognaths of external max- illipeds . . . . .	9	15·5
Breadth of exognaths of external max- illipeds . . . . .	6	10
Length of chelipeds . . . . .	67	250
Length of meropodites of chelipeds . . . . .	26·5	115
Length of propodites to insertion of dactylopodites . . . . .	20·5	95
Length of dactylopodites . . . . .	11	26·5

### RANDALLIA, Stimpson.

#### 46. *Randallia pustulosa*, sp. n., Wood-Mason.

Carapace above covered tolerably thickly with unequally large, rounded, submammillated, granulose tubercles, with much smaller ones interspersed. Of the largest tubercles one is on the hinder end of the prominent pterygostomian ridge, three are on the lateral margin, and two on the postero-lateral margin on each side. The regions are very distinctly marked out by grooves, the cardiac being especially deeply circumscribed, and the hepatic being separated from the gastric by a

fine groove which runs from the cervical without interruption to the outer of the two supra-orbital fissures. A huge recurved spine arises from the middle of the cardiac boss in addition to the two blunt triangular spines at the hinder margin of the carapace. The chelipeds are cylindrical and finely and sharply granulated; the meropodite is but little longer than the carpopodite with the palmar part of the propodite, which last is a little inflated in its basal half and about as long as the dactylopodite. The legs are not very strongly granulated: their dactylopodites have the same structure as in *Parilia Alcocki*. The abdomen, which interlocks with the thorax much in the same perfect way as in the last-named species, is five-jointed, the fourth, fifth, and sixth segments being ankylosed together; the seventh is acuminately triangular. The brood-cavity communicates by holes with the branchial cavity. The afferent branchial apertures are large and prominent; their carapacial border is divided by a fissure into two lobes, an outer with rounded and an inner with sinuous margin.

One female specimen from Station 56, 240 to 220 fathoms.

Length of carapace 32 millim.; breadth of carapace between last pair of lateral tubercles 33 millim.; length of chelipeds 65 millim., of their meropodite 26.5 millim., of palm of propodites 15 millim., of their dactylopodites 15 millim.

#### Family Raninidæ.

#### LYREIDUS, De Haan.

#### 47. *Lyreidus gracilis*, Wood-Mason.

*Lyreidus gracilis*, Wood-Mason, Journ. Asiat. Soc. Beng. 1888, vol. lvi. pt. ii. p. 376.

From Station 56, 240 to 220 fathoms.

#### Family Homolidæ.

[HOMOLA, Leach.

1. *Homola barbata* (Herbst).

?2. *Homola vigil*, A. M.-Edw.

#### PAROMOLA, gen. nov., Wood-Mason.

The basal joint of the eye-peduncle is elongated and the eye reaches the commencing orbit through a gap in the anterior

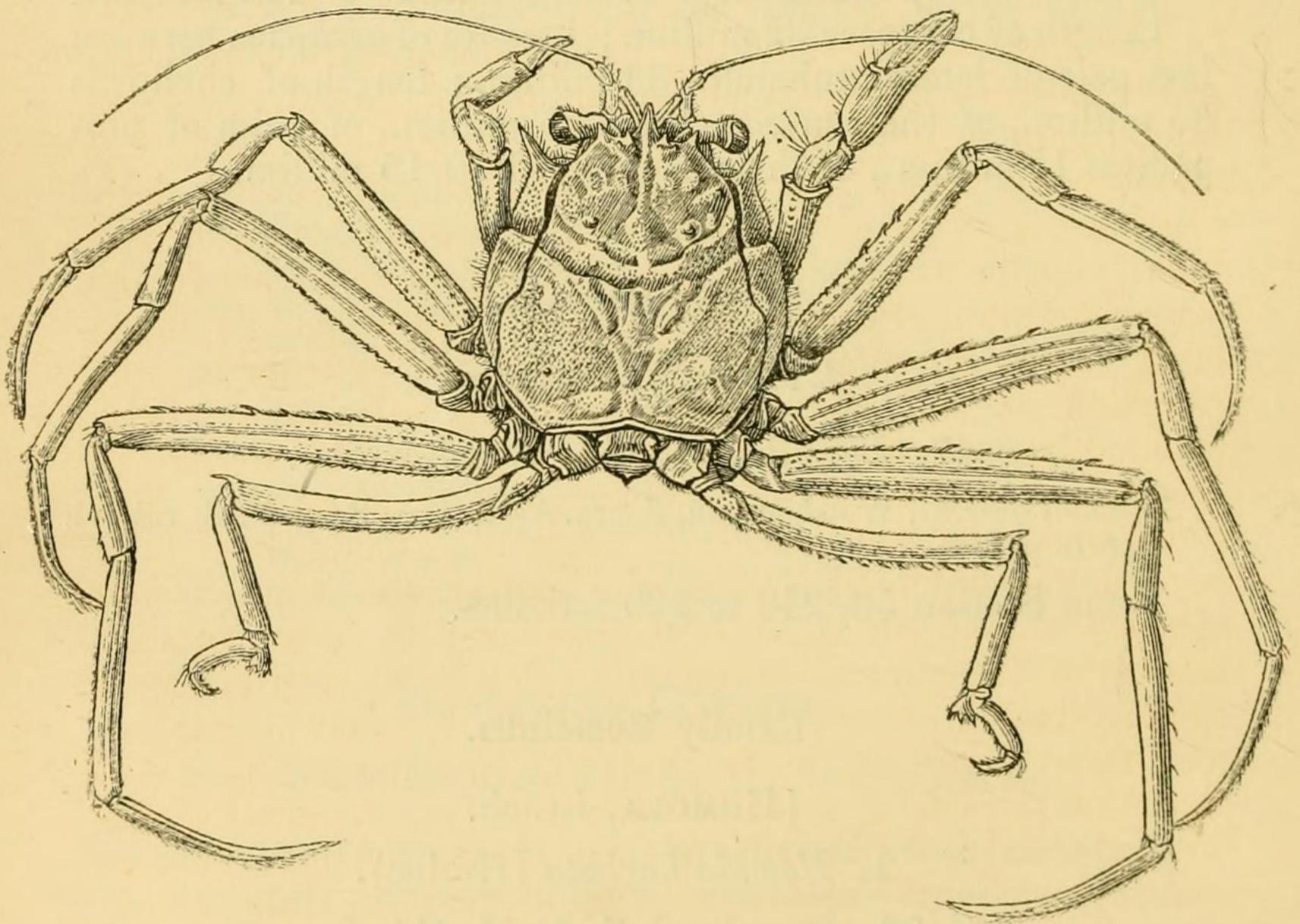
margin of the carapace between the rostral and supra-orbital spines. The orbit is a wide and shallow cavity, the bottom of which is still some distance behind the anterior margin, and it is defined externally by two spines. The very distinct and throughout dorsal *linea anomurica* runs to the base of the supra-orbital spine. The carapace is decidedly macrurous in form, thick, with the imperfectly-formed lateral margins twice interrupted by regional grooves. The last two joints of the fifth pair of legs form a perfect subchela, the dactylo-podite coming into complete relation with the basal toothed process of the propodite.

For *Homola Cuvieri* (Risso).

48. *Paromolopsis Boasi*, gen. et sp. n., Wood-Mason.

The basal joint of the eye-peduncle is elongated, and the eye reaches the orbit through a gap in the anterior margin of

Fig. 5.



*Paromolopsis Boasi*. From a photograph, natural size.

the carapace between the supra-orbital and antennal spines. The sides of the head are more produced, and the consequently more developed orbits are bounded externally by one very

large spine, the extra-orbital angle, which all but reaches the level of the rostrum.

The carapace, of an elegant urn-shaped outline, is depressed, with distinct carinated lateral margins, which are only once interrupted; it is, in fact, more brachyurous; the areolation, however, differs in no essential particular from that of other forms.

The *linea anomurica* is very distinct, dorsal in position, and runs to the interval between the supra-orbital and antennal spines. The last two joints of the fifth pair of legs form an imperfect subchela, the short dactylopodite not nearly reaching the nevertheless well-developed toothed process of the base of the propodite; their meropodites reach the end of the extra-orbital angle when laid forwards.

Colour in life red.

One specimen from off North Sentinel Island (Andamans), 480 fathoms.]

49. *Hypsophrys superciliosa*, gen. et sp. n., Wood-Mason.

The basal segment of the eye-peduncle not being elongated the eyes do not extend beyond the edges of the decurved lateral parts of the anterior margin of the carapace, and there are hence no orbits. The surface included between the anterior margin of the carapace above and at the sides on the one hand, and the antennary sternum on the other, is, above the ocular sternum, of considerable vertical extent, and is angulated supero-internally on each side of the rostrum for the reception of the longitudinally-plicated antennules; it is apparently made up of the ocular and antennular sterna and descending laminae of the fore margin of the carapace. The stout triangular and decurved rostrum extends but little beyond the antennal spines, the rostral and supra-orbital spines are small, sharp, recurved, and superior; the anterior margin of the carapace terminates below in a sharp antennal spine. The carapace is pubescent, thick, of somewhat macrurous form, anteriorly, in front of the two spines which are placed on the lateral lobes between the two divisions of the cervical groove, semicircular in outline, with the upper surface convexly declivous; behind these two spines it is parallel-sided, with the middle part of the upper surface flat and the lateral parts rounded; it bears two spines in the position of those which form the outer boundary of the orbit in *Paromolopsis Cuvieri*, with which it agrees exactly in areolation and tolerably closely in the degree to which the hepatic regions are advanced; the lateral margins are still less marked, being

only indicated by a few epibranchial spinelets. The *linea anomurica* is not apparent without dissection. The chelipeds, which agree in all essentials with *P. Cuvieri*, and the first three pairs of legs, which are very long and slender and armed with spines along both edges of the meropodites, are hairy, the former equally so throughout, the latter chiefly on the meropodites. The last pair of legs is weak, unarmed, and almost devoid of setæ, and differs from those of all the other species of the group with which we are acquainted in the form of its subchelæ, in which the dactylus is minute and folds back upon the slightly enlarged distal end of the propodite; its meropodites when laid forwards reach the spines of the antero-lateral margin.

The eggs are very small, and in the only ovigerous female examined are present in such volume as to cause the complete extension of the abdomen.

Colours in life pale pink, with the fringes of the chelæ black.

	Male. millim.	Female. millim.
Length of carapace from apex to hinder margin . . . . .	16.25	20.5
Breadth between spines at junction of arched fore- with parallel hinder-sided part . . . . .	13.25	17
Length of chelipeds . . . . .	36	42
Expanse of legs . . . . .	115	120

Four specimens, two males and two females, of which only one pair is in good order, were obtained at Station 105, depth 740 fathoms.

## Order ISOPODA.

### Family Bathynomidæ.

#### 50. *Bathynomus giganteus*, A. M.-Edw.

*Bathynomus giganteus*, A. Milne-Edwards, Comptes Rendus, 1879, t. lxxxviii. pp. 21-23; A. Agassiz, Three Cruises of the 'Blake,' 1888, vol. ii. p. 49, fig. 252.

Three females of this remarkable form were taken at Station 105, in 740 fathoms. They measure 160, 195, and 200 millim. respectively in length, in a straight line from the front of the head to the extremity of the telson. As the genital apertures are not traceable, and as the largest oostegal plate measures only 8 millim. in length in the largest speci-

men and only 4 millim. in the smallest, it is presumable to infer that the specimens are not adults.

The living animal is of a pale lilac colour.

*Bathynomus* was first obtained by the 'Blake' in 955 brasses north of Tortugas Reef in the Gulf of Mexico.

## Order STOMATOPODA.

### SQUILLA, auctorum.

#### 51. *Squilla tenuispinis*, sp. n., Wood-Mason.

Carapace small, with the antero-lateral angles produced suddenly to a small sharp spine, which does not project beyond the middle of the anterior margin, with its three carinæ evanescent at both ends in the præcervical part and at the anterior end only in the postcervical part, and with the postero-lateral angles rounded. Rostrum semioval, about as long as broad, with a faint median longitudinal ridge on its distal half, but without raised rims, covering only the middle of the base of the antennular somite, which is produced at each of its antero-lateral angles into a sharp spine a trifle longer than the antero-lateral spines of the carapace. Eyes asymmetrical in themselves, rather small, the greatest width of their conjoined lobes little exceeding the length of the rostrum.

Tergum of fifth thoracic somite curved forwards at its outer ends, which are terminated by a small spine; terga of the sixth and seventh triangularly produced and terminated by a small spine postero-laterally. First to fifth abdominal terga provided with eight carinæ, two submedian, two sublateral, two lateral, and two marginal, all the marginal, all the lateral except the first, and all the sublateral except the first and second ending posteriorly in a small spine; sixth tergum furnished with six coarser carinæ, two submedian, two lateral, and two marginal, all terminating in larger spines than those of the preceding somites, especially the marginal, which are prolonged into an acuminate spine nearly as long, but not nearly as stout, as the marginal and submedian spines of the telson. Telson transverse, furnished above with a strong, median, roof-shaped carina terminating posteriorly in a long and fine spine, which projects for some distance into the median notch of the hinder margin, and on the margin with six long and acuminate spines in three pairs, of which the submedian enclose an acute angle and have their inner edges for about half their length from the base minutely spinulose; the lateral are the longest and separated from the submedian by ten spinules (of which

the two extreme are larger than the rest), and the marginal are about the same length as the submedian and separated from the lateral by one spinule. The spine of the basal joint of the caudal appendages is divided into two long and acuminate lobes, of which the inner is about one and a third times as long as the outer and bears the usual minute cusp on its outer side.

The dactylopodite of the raptorial limbs is armed with four teeth, including the terminal claw on its inner edge, and is notched near the base of its outer edge.

Colour in life deep pink.

Total length from tip of rostrum to tips of submedian spines of telson 61 millim.

A single male was obtained at Station 96, in 90 to 100 fathoms.

A single young female specimen measuring only 37 millim. had previously been taken off Cheduba, Arrakan coast, at about the same depth.

#### Grade *ENTOMOSTRACA*.

#### Order *CIRRIPIEDIA*.

#### *SCALPELLUM*.

#### 52. *Scalpellum*, sp.

From Station 56, 240 to 220 fathoms, on a dead *Gorgonia* with a black polished stem.

#### 53. *Scalpellum*, sp.

From Station 96, 98 to 102 fathoms, a small cluster on a fragment of dead *Gorgonia*.

XXVIII.—*Bathynectes*, Stimpson, a British Genus of Crustacea *Brachyura*. By the Rev. Canon A. M. NORMAN, M.A., D.C.L., F.R.S., &c.

IN 1871 Stimpson established a genus, *Bathynectes*, to receive certain crabs nearly related to the genus *Portunus*, which had been dredged in 100–200 fathoms by Pourtalès in the Gulf-stream in the Straits of Florida. In 1877 Bovallius procured