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., F.L.S., F.G.S.,
AND
WILLIAM FRANCIS, JUN., F.L.S.

VOL. III.—SEVENTH SERIES.

LONDON:
PRINTED AND PUBLISHED BY TAYLOR AND FRANCIS.
SOLD BY SIMPKIN, MARSHALL, HAMILTON, KENT, AND CO., LD.;
WHITTAKER AND CO.: BAILLIÈRE, PARIS:
MACLACHLAN AND STEWART, EDINBURGH:
HODGES, FIGGIS, AND CO., DUBLIN: AND ASHER, BERLIN.
1899.

THE ANNALS

AND

MAGAZINE OF NATURAL HISTORY.

[SEVENTH SERIES.]

"..... per litora spargite muscum,
Naiades, et circùm vitreos considite fontes:
Pollice virgineo teneros hìc 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 conchylia succo."

N. Parthenii Giannettasi, Ecl. 1.

No. 13. JANUARY 1899.

I.—*Natural History Notes from H.M. Royal Indian Marine Survey Ship 'Investigator,' Commander T. H. Heming, R.N., commanding.*—Series III., No. 2. *An Account of the Deep-sea Crustacea dredged during the Surveying-season of* 1897–98. By A. Alcock, Major, Indian Medical Service, Superintendent of the Indian Museum, and A. R. S. Anderson, Captain, Indian Medical Service, Surgeon-Naturalist to the Survey.

Deep-sea Crustacea dredged by the 'Investigator,' to the number of about 190 species, have already been described in the following papers:—

J. Wood-Mason.—J. A. S. B. vol. lvi. pt. 2, 1887, pp. 206–207, pl. i., and p. 376; Ann. & Mag. Nat. Hist., Feb. 1891, pp. 187–202; March 1891, pp. 258–272; Oct. 1891, pp. 269–286; Nov. 1891, pp. 353–362; April 1892, pp. 265–275, pls. xiv., xv.; May 1892, pp. 358–370; Feb. 1893, pp. 161–172, pls. x., xi.

G. M. Giles.—J. A. S. B. vol. lvii. pt. 2, 1888, pp. 220–231, pls. vi., viii., ix.

W. Weltner.—SB. Ges. naturf. Freunde, Berlin, 1894, pp. 80–87.

A. Alcock.—Ann. & Mag. Nat. Hist., March 1894, pp. 225–245; April 1894, pp. 321–334; May 1894, pp. 400–411; J. A. S. B. vols. lxiv., lxv., and lxvii. pt. 2, 1895, 1896, 1898.

A. Alcock and A. R. S. Anderson.—J. A. S. B. vol. lxiii. pt. 2, 1894, pp. 141–185, pl. ix.

A. R. S. Anderson.—J. A. S. B. vol. lxv. pt. 2, 1896, pp. 88–106.

J. R. Henderson.—J. A. S. B. vol. lxv. pt. 2, 1896, pp. 516–536.

Many of the species described in these papers have been figured in thirty-five plates of "Illustrations of the Zoology of the 'Investigator,'" published in the years 1892–1898.

In the present paper we offer a list of 92 species of deep-sea Crustacea obtained by the 'Investigator' between the months of October 1897 and April 1898. Of these species 31 appear to be new to science and 12 more new to the Indian record. This brings the number of species of Crustacea known to inhabit the depths of the Indian seas to something over 230.

Among the more interesting of our new finds are:—

(1) *Pentacheles sculptus*, a species that also inhabits the depths off the Atlantic coast of the United States; (2) a species of *Richardina* (a genus allied to *Stenopus*) differing very little from the type of the 'Travailleur' expedition; (3) a true *Pylocheles*, so much like the Caribbean species described by M. A. Milne-Edwards, that we at first thought it to be the same; (4) a *Munidopsis* that is quite certainly the same as the 'Travailleur' *Galathodes rosaceus* figured by M. A. Milne-Edwards; (5) a *Homola* having the same "macrurous" carapace as the Mediterranean *H. Cuvieri* and very closely related to that species; (6) a curious primitive Dromioid having the same branchial formula as the Caribbean *Homolodromia* of A. Milne-Edwards (not the *Homalodromia* of Miers), and seeming, in fact, to differ from the Caribbean form only in having orbits like those of *Dromia*; (7) a species of the Corystoid genus *Trachycarcinus*—a genus only known hitherto from off the Pacific coast of Central America; (8) two species of the Lithodoid genus *Paralomis*; (9) a *Pinnoteres* inhabiting a species of *Lima* dredged in 430 fathoms.

Of all the dredging-stations of this season the most prolific was one a few miles to the south-west of Wadge Bank, the exact position being 7° 17′ 30″ N., 76° 54′ 30″ E., the depth 430 fathoms, and the corrected bottom-temperature "38° Fahr." —though we suspect there is some mistake about the temperature, and that 38° is a clerical error for 48°. A preliminary

sounding brought up "grey mud," but the dredge soon fouled coral and was brought up full of masses of *Caryophyllia paradoxus*, sp. n., *Desmophyllum vitreum*, sp. n., *Lophohelia investigatoris*, sp. n., and *Solenosmilia Jeffreyi*, sp. n. Captain Anderson estimates that there was about half a ton of it—living and dead.

More than 30 species of Crustacea were obtained from this haul, including two of *Parapagurus* and one of *Pagurodes*, two of *Paralomis*, five of *Munidopsis*, one of *Ptychogaster* and two of *Uroptychus*, two Homoloids and one Dromioid, and a *Trachycarcinus*. And of the species of *Munidopsis* one was represented by 237 specimens and another by 52.

One event of this season appears to show that deep-sea dredging may be a matter of mere chance. In December 1890 the ship dredged in 188–220 fathoms off the Cinque Islands (11° 31′ 40″ N., 92° 46′ 40″ E.) and made perhaps the best haul of her record, getting her trawl-bag more than half full of solid specimens, of which a multitude of 29 species of Fishes and 23 species of Crustacea formed only a portion. In April 1898 exactly the same spot was dredged—bearings being carefully taken—and although no accident occurred, the results were extremely poor.

In the following list the new species are noted, and the species that are new to the Indian record are marked with an asterisk. All the new species have been figured, and the figures will be published either in the issue of the "Illustrations of the Zoology of the 'Investigator'" for 1899 or in a Report that one of us has now in the press on the deep-sea Brachyura collected by the 'Investigator.'

For the determination of the Macrura the second-named of the joint authors is chiefly responsible, for those of the Brachyura and Anomura the first-named is chiefly responsible.

Schizopoda.

Gnathophausia zoœa, Suhm, G. O. Sars. 430 fath.

Decapoda.

Peneus rectacutus, Spence Bate. 370–419 fath.
Parapeneus investigatoris, sp. n. 133–419 fath.
Metapeneus philippinensis, Sp. Bate. 185 fath.
Haliporus taprobanensis, sp. n. 550 fath.
Aristæus semidentatus, Sp. Bate. 360–430 fath.
—— *coruscans*, Wood-Mason. 824 fath.
—— *crassipes*, Wood-Mason. 360–606 fath.
Aristæopsis Edwardsiana (Johnson). 430 fath.

Benthesicymus investigatoris, sp. n. 370–640 fath.
Sergestes robustus, S. I. Smith. 370-419 fath.
—— *rubro-guttatus*, Wood-Mason. 498 fath.
Crangon andamanensis, Wood-Mason. 185 fath.
Pontocaris media, sp. n. 55 fath.
Glyphocrangon investigatoris, Wood-Mason. 360 fath.
—— *Gilesii*, Wood-Mason. 370–419 fath.
—— *unguiculata*, Wood-Mason. 824 fath.
Alpheus Shearmii, sp. n. 430 fath.
**Heterocarpus levigatus*, Spence Bate. 430 fath.
—— *gibbosus*, Spence Bate. 185–419 fath.
Plesionika bifurca, Alcock and Anderson. 370–419 fath.
—— *affinis*, sp. n. 172–303 fath.
Pandalus ? martius, A. M.-Edw. 194–430 fath.
*—— ? *ensis*, A. M.-Edw. 185 fath.
—— *Alcocki*, Anderson. 360 fath.
**Chlorotocus ? gracilipes*, A. M.-Edw. 185 fath.
Acanthephyra sanguinea, Wood-Mason. 194–640 fath.
—— *eximia*, S. I. Smith. 498 fath.
Hoplophorus gracilirostris, A. M.-Edw. 185–419 fath.
Palæmonella laccadivensis, Alcock and Anderson. 430 fath.
Nematocarcinus tenuipes, Sp. Bate. 836 fath.
Pasiphæa unispinosa, Wood-Mason. 360 fath.
Eryonicus indicus, sp. n. 824 fath.
**Pentacheles sculptus*, S. I. Smith. 824–836 fath.
—— *phosphorus*, Alcock. 370–419 fath.
Nephrops andamanica, Wood-Mason. 185 fath.
Nephropsis Stewarti, Wood-Mason. 185–360 fath.
—— *atlantica*, Norman. 498 fath.
Callianassa lignicola, sp. n. 185 fath.
Calastacus felix, sp. n. 430 fath.
Iconaxius kermadeci, Spence Bate. 360–430 fath.
(?) *Richardina spongicola*, sp. n. 498 fath.
Pylocheles Miersi, sp. n. 185 fath.
Parapagurus pilosimanus, S. I. Smith. 824–836 fath.
*—— *affinis*, Henderson. 430 fath.
—— *Andersoni*, Henderson. 430 fath.
**Pagurodes limatulus*, Henderson. 430 fath.
Paguristes puniceus, Henderson. 370–419 fath.
Paralomis investigatoris, sp. n. 430 fath.
—— *indica*, sp. n. 430 fath.
Munida militaris, Hend., var. *andamanica*, Alcock. 185–419 fath.
—— *squamosa*, Hend., var. *prolixa*, Alcock. 185–194 fath.
—— *microps*, Alcock. 640 fath.
—— *comorina*, sp. n. 430 fath.
Munidopsis stylirostris, Wood-Mason. 824–836 fath.
—— *dasypus*, Alcock. 498 fath.
—— *Hemingi*, sp. n. 430 fath.
—— *iridis*, sp. n. 430 fath.
—— *Goodrigii*, sp. n. 430 fath.
*—— ? *rosacea*, A. M.-Edw. 430 fath.
—— *trifida*, Henderson. 498 fath.
—— *Moresbyi*, sp. n. 430 fath.
Ptychogaster investigatoris, sp. n. 405 fath.
—— *Hendersoni*, sp. n. 430 fath.
**Uroptychus australis*, Henderson, var. ? 459 fath.

Uroptychus bacillimanus, sp. n. 430 fath.
—— *fusimanus*, sp. n. 430 fath.
—— *cavirostris*, sp. n. 75–60 fath.
Homola profundorum, sp. n. 430 fath.
—— *megalops*, Alcock. 370–419 fath.
Paromolopsis Boasi, Wood-Mason. 430–498 fath.
Hypsophrys longipes, sp. n. 430 fath.
Arachnodromia Baffini, gen. et sp. n. 430 fath.
**Ethusa gracilipes*, Miers. 836 fath.
—— *indica*, Alcock. 360 fath.
Lyreidus Channeri, Wood-Mason. 360 fath.
Physachæus ctenurus, Alcock. 185 fath.
Echinoplax pungens, Wood-Mason. 185 fath.
**Cyrtomaia Suhmi*, Miers. 430 fath.
Platymaia Wyville-Thomsoni, Miers. 185 fath.
Scyramathia Rivers-Andersoni, Alcock. 430 fath.
Trachycarcinus glaucus, sp. n. 430 fath.
Sphenomerides trapezioides, Wood-Mason. 90 fath.
Benthochascon Hemingi, gen. et sp. n. 185 fath.
Carcinoplax longipes, Wood-Mason. 430 fath.
Psopheticus stridulans, Wood-Mason. 185–419 fath.
Pilumnoplax Sinclairi, sp. n. 430 fath.
Camatopsis rubida, gen. et sp. n. 194 fath.
Ptenoplax notopus, Alcock and Anderson. 185 fath.
Pinnoteres abyssicola, sp. n. 430 fath.

Stomatopoda.

**Squilla leptosquilla*, Brooks. 185-419 fath.

Amphipoda.

**Cystisoma spinosum* (Fabr.). 172–498 fath.

BRACHYURA.

Family Homolidæ.

Homola, Leach.

Homola profundorum, sp. n.

Carapace very decidedly macruriform, deep, ovoid-triangular, broadest abaft the middle of the branchial region, tapering to an acutely spiniform rostrum, of which the length is about a third that of the rest of the carapace. Diverging from either side of the base of the rostrum is a spine of similar form and size. The only other elevations on the carapace are a hepatic spine just behind the hollow for the retracted eye, an antennal spine just outside the antennal base, and a blunt denticle near the middle of the ill-defined lateral border.

The gastric region is well delimited and the *linea anomurica* is broad, conspicuous, and dorsal.

The stout cylindrical terminal joint of the eye-stalks is longer than the slender basal joint; the eyes are of good size, well pigmented, and hemispherical.

The chelipeds are slender, but are stouter than the legs; the arm has the outer lower border spinate and, on the upper border, a few spinules and a strong terminal spine; both the inner and the outer angles of the wrist are armed with a strong spine, the fingers are much shorter than the hand and have the cutting-edge entire.

The legs are slender and subcylindrical, the second and third pair (which are slightly longer than the first) are at least three times the length of the carapace. In the first three pair there are a few distant spines and a strong terminal spine on the anterior border of the merus, a few articulating spinules at the far end of the posterior border of the propodite, and a comb of articulating spines along the posterior border of the dactylus, the last joint being but half the length of the last but one. The dorsal fourth pair of legs are far slenderer than the others and do not reach the end of the merus of the preceding pair; their propodite is triangular, owing to the expansion of its posterior border, and opposes a sharply serrated edge to the less strongly toothed posterior border of the short dactylus, the parts being cheliform rather than subcheliform.

The body and appendages are coated with very short distant bristles, which do not conceal the surface; there are some longer and thicker bristles along the edges of the chelipeds and a very few scattered hairs along the edges of the legs.

Three young females from off the Travancore coast, 430 fathoms.

The carapace of these is about 13 millim. long and about 9 millim. in greatest breadth.

This species is most closely related to *Homola Cuvieri*, Risso, and belongs therefore to the late Professor Wood-Mason's genus *Paromola*.

Hypsophrys, Wood-Mason.

Hypsophrys longipes, sp. n.

Rostrum deeply bifid. Linea anomurica distinct.

Four large spines on the anterior border of the carapace, namely, two close together at the base of the rostrum, one at either orbital angle.

Lateral borders of dorsum of carapace well defined, spinulate; the ridge on the side-wall of the carapace that defines the branchial regions anteriorly is also spinulate. A row of spines on the hepatic region, the largest of which is on the lateral border of the carapace and has a spine dorsad of it.

Gastric region obscurely subdivided; each lateral subregion is armed with five or six large spines, while on the median region there is a central spine, sometimes followed by a row of spinules. Subhepatic and suborbital region with numerous large spines, one of which is "antennal."

Eyes well pigmented. Antennary flagella more than twice the length of the carapace.

Rows of spinules on the exposed surface of the ischium, merus, and exognath of the external maxillipeds, and a row on the basal joint of the antennules.

Chelipeds slender, reaching not far beyond the end of the carpus of the first pair of legs; the arm and wrist not stouter than the meropodites of the first three pair of legs; spinate and spinulate as in the preceding species; fingers as long as the hand.

The second and third pair of legs, which are slightly longer than the first and three times as long as the fourth, are four times the length of the carapace. In the first three pair of legs the merus is compressed and has its anterior border spinate and its posterior borders spinulate; the posterior border of the propodite carries a few distant articulating spinelets, and the dactylus (which is about two thirds the length of the preceding joint) has a close comb of articulating spines along its posterior border.

The fourth (dorsal) pair, which are extremely slender, have the posterior border of the merus strongly spinate; the propodite is several times larger than the minute dactylus.

The terminal joint of the male abdomen ends acutely.

Hairs and bristles are sparsely present, just as in the preceding species.

The carapace of a large egg-laden female is 38 millim. long and 30 millim. broad.

Eleven specimens, representing adults and young of both sexes, were lately dredged off the coast of Travancore at 430 fathoms.

Family **Dromidæ**.

Arachnodromia Baffini, gen. (?) et sp. n.

Branchiæ 20 on either side, as in *Homolodromia*.

Carapace elongate-oblong, but somewhat broader behind

than in front, deep, inflated, tomentose, unarmed except for a few sharp granules anteriorly and laterally; two creases break either lateral border, the posterior one being continued to the cardiac region as the cervical groove.

Front prominent, horizontal, bifid from its base.

Antennule and eye retractile into an orbit almost like that of *Dromia*. Eye-stalks long and slender, not completely filling their part of the orbit; eyes small, but well-formed and well-pigmented. Antennal flagella longer than the carapace.

Palate well delimited from the epistome; the ridges defining the expiratory canals very distinct; external maxillipeds distinctly opercular, but with a pediform cast.

Chelipeds equal, slender, though considerably stouter than the legs, about $1\frac{2}{3}$ times the length of the carapace, unarmed except for a few sharpish granules, visible only when the dense tomentum is removed; the fingers well calcified, hollowed *en cuillère*, the tip of the dactylus fitting into a notch in the tip of the thumb.

Legs cylindrical, smooth beneath a thick tomentum. The first two pair are more than twice the length of the carapace; their dactyli are stout, are about $\frac{2}{3}$ the length of the preceding joint, and are sharply spinate along the posterior edge up to a terminal claw. The last two pair are about the same length as the carapace, are subdorsal in position, and end in a small claw-like dactylus that shuts down on a circlet of spines at the end of the preceding joint.

The sternal grooves of the female end, without tubercles, at the level of the openings of the oviducts.

The abdomen of both sexes consists of seven separate segments; the pleuræ of the third to the sixth somites are remarkably large and independent, and the last abdominal tergum is nearly as long as the preceding five combined.

Two males and a female from off the Travancore coast, 430 fathoms.

This species at first sight might be taken for the *Homolodromia paradoxa* of A. Milne-Edwards, in which, however, it is stated that there are no orbits and that the antennules are not retractile.

Family **Corystidæ**.

Trachycarcinus, Faxon.

Trachycarcinus glaucus, sp. n.

Carapace irregularly pentagonal, its surface coated with

short, stiff, club-shaped hairs; the regions well-defined, rather tumid, much subdivided into tumid lobules, of which the convexities are capped by clusters of large conical granules, and the general surface also is studded, especially in the young, with similar granules.

Front narrow, horizontal, prominent, deeply cleft into three prongs of nearly equal size.

Antero-lateral borders half as long again as the postero-lateral, armed with three stout pinnulate spines, not including the outer orbital angle; postero-lateral borders entire, posterior border finely beaded.

Upper orbital wall deeply cleft into three pinnulate teeth, lower orbital border deeply concave, its inner angle strongly spiniform. Eye-stalks slender, rather long; the eyes, which are more ventral than terminal, are dull and faintly pigmented (as in many species of *Munidopsis*), and are non-faceted.

Antennary flagella short, extremely slender, not hairy.

Chelipeds remarkably unequal in the male, equal in the female.

The smaller cheliped of the male and both chelipeds of the female are about as long as the carapace and are coated almost to the finger-tips with stiff club-shaped hairs, which are short except along the upper border of the wrist and hand and of the basal part of the finger, where they are long; beneath the hairs are some scattered granules, and along the upper border of the arm, wrist, and hand are some denticles; the inner angle of the wrist is strongly spiniform, and the far end of the upper border of the hand is dentiform.

The larger cheliped of the male is about twice the length of the carapace, about half its length being formed by the hand and fingers; the greatest breadth of the hand is about half the length of the carapace. It is almost smooth, the upper border of the arm and hand and the inner border and upper and outer surfaces of the wrist alone being furnished with denticles and hairs; the inner angle of the wrist is spiniform.

The legs are covered with short, stiff, club-shaped hairs, which are rather more thick-set on the anterior borders and on the dactyli than elsewhere. The second and third pair, which are rather longer than the first and last pair, are somewhat less than $1\frac{2}{3}$ times the length of the carapace. All the dactyli end in a little claw.

The abdomen of the male consists of seven distinct segments, but the third, fourth, and fifth move together.

In life the animal is covered with a coat of mud held together by the hairs above described, the only bare parts

being the hand and fingers and part of the arm of the larger cheliped of the male.

The colours in life are described by Dr. A. R. Anderson as "white, with a bluish tinge, eyes with a slight reddish opalescence." In spirit the bluish tinge is fainter, the eyes are a pale milky yellow-ochre, and the large hand is ivory-white.

The dimensions of the largest male are as follows:—

	millim.
Length of carapace	18·5
Breadth of carapace	14·5
Combined length of hand and fingers along lower border	14·75
Combined length of basal joints, arm, and wrist along upper border	15

Fifteen specimens were dredged off the Travancore coast at a depth of 430 fathoms. The bottom consisted chiefly of coral (living and dead).

Several of the specimens were egg-laden females. The eggs are comparatively few in number and are large, their diameter being about 1·3 millim.

This species is very like *Trachycarcinus corallinus*, Faxon, which was dredged by the 'Albatross' off Panama and the Pacific coast of Mexico at depths of 546–695 fathoms. It differs from that species in the following particulars:—

The carapace is more granular and its lobules are capped by blunt conical spinules, *not* smooth tubercles, and its posterior border is finely and irregularly beaded, *not* dentate.

The front is deeply cut into three spines or prongs of almost equal size, *not* into three teeth of which the middle one is larger than the others.

The eyes, though very pale, are distinctly pigmented, *not* devoid of pigment.

The inner angle of the wrist of the smaller cheliped is very strongly spiniform, *not* unarmed.

As Mr. Faxon says, *Trachycarcinus* is very closely related to *Trichopeltarium*; in fact, the relation is so close as to make the separation of the two forms almost doubtful.

Family **Portunidæ**.

Benthochascon Hemingi, gen. et sp. n.

Closely related to *Bathynectes*.

Carapace subquadrilateral, its length about $\frac{7}{8}$ its breadth,

depressed, the regions faintly indicated by slight inequalities of level, its surface very finely granular.

The front, which is about a fourth the greatest breadth of the carapace, forms a thin laminar three-lobed projection. The antero-lateral borders, which are hardly arched and are not much more than half the length of the postero-lateral, are thin and are cut into four procurved teeth, of which the foremost is the orbital angle and the largest and the hindmost is spine-like and the longest. Postero-lateral borders slightly convergent; posterior border concave.

Eye-stalks short and thick, eyes large; orbits deep, two obsolescent sutures in the roof, a shallow notch in the outer wall, the inner angle of the floor almost as prominent as the outer frontal lobes.

Antennules folding transversely, their fossæ widely open to their respective orbits. The antennæ lie loosely in the orbital hiatus; the basal joint is short, slender, and movable, the second joint just reaches the turned-down edge of the front; the flagellum is considerably longer than the orbit.

Epistome well delimited from the palate. Though the expiratory channels are well-defined grooves there are no distinct palate-crests. The external maxillipeds fall far short of the anterior margin of the buccal cavern, leaving the expiratory canals permanently open.

Chelipeds massive, somewhat unequal, about two thirds as long again as the carapace, smooth; the hand, of which about half is formed by the fingers, forms rather more than half their entire length; the inner angle of the wrist is a large acute spine, and there is a spinule on the upper edge of the hand just behind the finger-joint.

Legs smooth; a notch and spiniform tooth at the far end of the upper border of all the meropodites. The first three pair are nearly twice the length of the carapace; the last pair are not much longer than the chelipeds and have the carpus shortened and the next two joints paddle-like and plumed.

Andaman Sea, 185 fathoms.

Family **Carcinoplacidæ**.

Pilumnoplax, Stimpson.

Pilumnoplax Sinclairi, sp. n.

Carapace subquadrilateral, much depressed, a little more than three quarters as broad as long, very finely frosted, perfectly bare, the regions fairly indicated.

Front horizontal, slightly prominent, square cut, grooved

but not distinctly notched in the middle, more than a third the greatest breadth of the carapace ; its free edge is turned vertically downwards to form a narrow concave facet with raised margins.

The antero-lateral borders are not much more than half the length of the postero-lateral ; they are thin and sharp and are cut into three teeth, of which the first is broad and somewhat emarginate, and the other two are acute. On the postero-lateral borders, just behind the junction with the antero-lateral, is a denticle.

The eyes are small but well-formed, and are freely movable. The orbits conceal the retracted eyes to dorsal view ; their upper margin is fissured near the middle and the lower margin is slightly excavated just below the outer angle ; the inner angle of the lower margin is not prominent, though dentiform.

The antennules fold transversely and their fossæ are freely open to their respective orbits.

The basal antennal joint is short and slender ; the next joint reaches the front ; the flagellum, which arises in the orbital hiatus, is about twice the length of the orbit.

The outer maxillipeds completely close the buccal cavern.

The chelipeds in the female (male unknown) are unequal, the large one being not quite twice as long as the carapace ; their surface, under the lens, is finely frosted ; the inner angle of the wrist is strongly pronounced and is capped by a pair of acute teeth.

Legs moderately stout, unarmed, smooth, almost hairless ; the third pair, which are somewhat the longest, are about two and a half times the length of the carapace. The dactyli are compressed-styliform.

Colours in spirit French-grey, fingers much darker grey.

A single female specimen, from off the Travancore coast, 430 fathoms, has the carapace 13 millim. long and 16 millim. broad.

This species is closely related to *Pilumnoplax heterochir* (Studer), Miers, but is distinguished from it by the entire and more prominent front, by the absence of transverse markings on the carapace, by the longer legs, and by the smoothness of the chelipeds and legs.

From *Pilumnoplax abyssicola*, Miers, which it also closely resembles, it is distinguished by the smooth carapace (to the naked eye), by the turned-down milled edge of the front, by the spinule on the postero-lateral border, by the fissured upper margin of the orbit, and by the double spine of the inner angle of the wrist.

Family **Rhizopidæ.**

Camatopsis rubida, gen. et sp. n.

Nearest related to *Xenophthalmodes*.

Body and appendages covered with velvet.

Carapace deep, rudely semicircular, hardly broader than long, strongly convex fore-and-aft and declivous anteriorly, nearly flat from side to side; its only markings are two longitudinal grooves defining the epibranchial regions.

Front much less than a fourth the greatest breadth of the carapace, obscurely bilobed.

Orbits large, deep, the upper margin entire and cut in the anterior border of the carapace, the excision, however, being exactly compensated by the convex bulging of the anterior (true inner) borders of the eye-stalks; these are almost immovably fixed in the orbits. The eyes are reduced to a speck of pigment placed on the ventral surface of the tip of their stalks.

Antennule-fossæ widely open to their respective orbits, small and entirely filled by the basal antennule-joint to the complete exclusion of the large flagellum.

The small basal antenna-joint is wedged in between and beneath the eye-stalk and antennule, the second joint hardly reaches the front, the flagellum is considerably longer than the orbit.

The epistome is of good width. The buccal cavern is squarish and is almost entirely closed by the external maxillipeds. These have the merus as long as and markedly broader than the ischium, owing to the semilunar expansion of the outer border of the merus; the palp is jointed to the antero-internal angle of the merus. The efferent branchial canals cause an angular bulging in the pterygostomian regions.

The chelipeds are unequal in the male, the longer one being about $1\frac{3}{4}$ times the length of the carapace; they are unarmed and have their movements of abduction and extension somewhat cramped; the arm is short and trigonal, the wrist rather long and crooked; in the larger hand the fingers meet only at tip.

The last pair of legs are subdorsal and have the terminal joints strongly ciliated and the dactylus slightly compressed. The other legs have trigonal and elegantly plumose dactyli.

The abdomen of the male does not nearly fill the space between the last pair of legs; it is four-jointed.

Between the fourth and fifth segments of the sternum in the male a long narrow plate is intercalated.

Three males from the Andaman Sea, 194 fathoms.

Family **Pinnoteridæ**.

Pinnoteres, Latreille.

Pinnoteres abyssicola, sp. n., ♀.

Carapace as long as broad, circular, smooth; front rather prominent, about one fifth the greatest breadth of the carapace. The whole of the eyes and eye-stalks and almost the whole of the orbit are visible in a dorsal view. The eyes are well developed, but very pale. The dactylus of the external maxillipeds is styliform and is inserted at the end of the preceding joint. The lower border of the thumb is fringed with fine hairs. The legs are slender; the second and third pair are both about $1\frac{1}{2}$ times as long as the carapace, and have the dactylus slightly longer than it is in the other two pair.

A single female with eggs and with a carapace about 8 millim. in diameter was taken from a living individual of a large species of lamellibranch of the genus *Lima*, dredged off the coast of Travancore at a depth of 430 fathoms.

It is interesting to notice that this species is quite like any other *Pinnoteres*, and has apparently undergone no modification by exposure to bathybial conditions.

ANOMURA.

Family **Paguridæ**.

Pylocheles, Milne-Edwards.

Pylocheles Miersi, sp. n.

This species so closely resembles *Pylocheles Agassizii*, characterized by M. A. Milne-Edwards in Bull. Mus. Comp. Zool. vol. viii., 1880, and fully described and figured in Mem. Mus. Comp. Zool. vol. xxxiii., 1893, that from an examination of a single specimen we believed it to be the very same species.

However, ten specimens, dredged in the Andaman Sea at 185 fathoms, and including adults of both sexes, agree in exhibiting certain differences from the West-Indian species. These differences are as follows:—

(1) The grooves of the carapace are without hairs and the arched line that bounds the gastric region anteriorly is very faint.

(2) The front border of the carapace is simply sinuous,

the teeth that occur in *P. Agassizii* being here rounded off instead of acute.

(3) The ophthalmic scales seem to be even less conspicuous, and the eyes seem to be even more reniform.

(4) The antennal spine and acicle are less sharply serrated.

(5) The high serrated carpal crest that overhangs the base of the hand is cut into two unequal lobes; the anterior surface of the hand, when denuded of its mat of hairs and bristles, is pitted rather than granular, and the edges of the hand are rather less acutely serrate.

(6) The first two pair of legs when fully extended reach beyond the tips of the fingers.

(7) The first abdominal tergum, in the male only, is rather more exposed; all the abdominal terga are almost hairless; and the posterior edge of the sixth tergum is excised.

In all other respects this species agrees exactly with the description and figures of *P. Agassizii* in the Memoir cited. Its habits, however, seem to be somewhat different, for whereas *P. Agassizii* was found burrowing in hard sand and in sponge, all our ten specimens were tightly impacted in the natural hollows of decaying driftwood that had sunk to the bottom—*e. g.* sticks of mangrove and bamboo.

Colours in life: upper surface of carapace and legs orange, lower surface white, eyes brown, eggs bright yellow. Spirit-specimens are cream-colour, with a metallic iridescence on the gastric region and on most of the abdominal terga.

Off east coast of North Andaman Island, 185 fathoms.

[I regret that in my list of Crustacea common to the "continental slopes" of the East and West Indian regions, published in Ann. & Mag. Nat. Hist. ser. 7, vol. ii., August 1898, pp. 140–141, this species appears as *Pylocheles Agassizii*.—A. A.]

Family **Lithodidæ**.

Paralomis, White, Bouvier.

Paralomis indica, : p. n.

This is closely related to *P. verrucosa* (Dana), with a 'Challenger' duplicate of which species from Magellan Straits it has been compared. It differs chiefly from *P. verrucosa* in the following respects:—

The antero-lateral and lateral borders of the carapace are more irregularly and much more acutely spiny.

The abdomen, behind the second segment, has its dorsal surface somewhat creased, but not tuberculous.

The eyes are relatively much larger.

The movable antennal acicle has only two spines, one of which is small, on its outer border; the antennary flagella are nearly as long as the carapace.

The chelipeds and legs are relatively longer and slenderer; the wrist is longer and its inner angle does not form a foliaceous lobe.

Carapace piriform, convex, very slightly longer than broad; gastric, cardiac, and branchial regions well defined, the gastric and branchial tumid and prominent, the cardiac, though convex, a good deal sunken. The surface of the carapace, as of the second abdominal segment, is studded with vesiculous, pustulous, and conical tubercles of various sizes.

Rostrum very distinctly and evenly trifid and having a denticle on either side near the base.

Lateral margins of carapace, from the spiniform orbital angle to the posterior border, armed with spines of various sizes; posterior border armed with conical tubercles of uniform size.

Eye-stalks with a few denticles dorsally. Antennulary peduncles smooth. Antennal peduncle with the first two joints spiniform at the outer angle, the flagellum about as long as the carapace.

The movable antennal acicle, which reaches slightly beyond the end of the antennal peduncle, ends very acutely; its outer edge bears a spinule and a large spine, its inner edge bears three small spines.

Chelipeds and legs spiny, especially on the dorsal surfaces. The right cheliped is distinctly stouter, and the right legs are distinctly longer, than the left. The legs, which are nearly a dactylus longer than the chelipeds and rather less massive than the left cheliped, are about $1\frac{2}{3}$ times the length of the carapace.

The second abdominal segment consists of a single plate dorsally, which is dimpled on either side of the middle line.

The abdomen of the male has a slight twist to the right and is nearly symmetrically constituted; in the female, although it is unsymmetrical, it is not much more twisted.

Four specimens, the largest of which has the carapace 39·5 millim. long and 37 millim. broad, were taken off the Travancore coast at 430 fathoms.

Colours in spirit pale milky orange-pink, eyes intensely black.

Paralomis investigatoris, sp. n.

This appears to be most nearly related to the *Paralomis aspera* of Faxon, from off the Pacific coast of Panama.

Carapace piriform, convex, slightly longer than broad; gastric, cardiac, and branchial regions well defined, tumid; the entire surface of the carapace, as of the second abdominal segment, is closely covered with equal-sized papilliform tubercles, each of which is encircled by a crown of small stiff hairs.

Rostrum very distinctly and evenly trifid, the middle spine with a few minute denticles at the proximal end of its ventral border; its sides and dorsal surface are spinate.

Lateral margins of carapace, from the spiniform orbital angle to the middle of the branchial regions, armed with sharp curved spines.

Eye-stalks dorsally spinulose. Antennulary peduncle smooth. Antennal peduncle with the first two joints spiniform at the outer angle and the third joint spiniform at the inner angle, the flagellum longer than the carapace.

The movable antennal acicle reaches nearly to the end of the peduncle and ends very acutely; its outer edge bears at least three large spines and its inner edge three small spines.

Chelipeds and legs thickly spiny, especially on the dorsal surfaces. The right cheliped is very slightly stouter than the left, which is not stouter than the legs; but the right legs are not longer than the left. The legs all end in a little black claw and are hardly half a dactylus longer than the chelipeds; they are about $1\frac{2}{3}$ times the length of the carapace.

The second abdominal segment bears a single dorsal plate, which is rather deeply dimpled on either side of the middle line.

The abdomen of the male is quite straight and practically symmetrical; in the female it is not quite symmetrical and is slightly twisted to the right.

Four specimens, the largest of which has the carapace 33 millim. long and 29·5 millim. broad, from off the Travancore coast, 430 fathoms.

Colours in spirit orange, eyes intensely black.

These are the first representatives of the genus *Paralomis* ever taken in Indian seas. A closely allied form—*Lithodes Agassizii*—was, however, taken in 1896 close to the spot where these two species of *Paralomis* were dredged last year.

Family Galatheidæ.

Munida, Leach.

Munida comorina, sp. n.

Seems hardly to differ from the Caribbean *Munida caribæa*, A. M.-Edw. (which Faxon says is the same as *M. irasa*, A. M.-Edw.), having, like it, a long denticulated rostrum, no cardiac spine, and a smooth abdomen.

Dorsal surface of carapace transversely striated and bearing eight spinules, namely a pair behind each supraocular spine, one on either side behind and external to the first pair, and one on either side just beyond the bifurcation of the cervical groove; but all these spines need careful looking for with a lens.

Rostrum well over half the length of the rest of the carapace and about three times as long as the supraocular spines (and, like them, acicular), finely and obscurely denticulated in its distal half.

Abdomen perfectly smooth.

The two spines on the dilated portion of the antennular peduncle are long and slender. Eye-stalks barrel-shaped, eyes not reniform.

Chelipeds slender, twice the length of the fully extended body and rostrum and twice the length of the longest legs; distant spines along the inner aspects of the arm and wrist, and distant spinules along the inner border of the hand; fingers straight, but in some males the immobile finger is excavated and slightly bent at base for the reception of one or two enlarged teeth of the dactylus.

The fully extended body is only 15 millim. long.

Thirty specimens, from off the Travancore coast, 430 fath.

Munidopsis, Whiteaves.

Munidopsis trifida, Henderson.

Munidopsis trifida, Henderson, 'Challenger' Anomura, p. 156, pl. xvi. fig. 2.

We have already reported this species, which was originally discovered by the 'Challenger' in the fjords of western Patagonia, as also occurring in Indian seas; and Capt. Anderson has again this year dredged two fine specimens in the Andaman Sea at 498 fathoms.

One of these (an egg-laden female) agrees in every particular with Henderson's description and figure; the other,

which is a large male, has the hands enlarged and the immobile finger so bent and hollowed in its basal half that the movable finger meets it only near the tip, the movable finger being furnished with a serrated tubercle that occupies, without filling, the hollow of its fellow.

Munidopsis ? rosacea, A. Milne-Edwards.

Galathodes rosaceus, A. Milne-Edwards, Recueil de Figures de Crustacés, pl. xiii. fig. 1.

Two hundred and thirty-seven specimens from off the Travancore coast, 430 fathoms, are almost certainly identical with the 'Travailleur' species.

Our young female specimens, the size of the female figured by Milne-Edwards (which is stated to be enlarged three times), agree exactly with that figure; but in our adults the chelipeds are modified in a way that is not quite alike in any two out of over a hundred specimens.

In adults one or, more usually, both of the chelipeds are much, but very variably, thickened, especially in respect of the hand. Further, in certain adult males of no pre-eminent size the immobile finger of one or, more usually, both hands is bent and hollowed in its basal half, so that the fingers meet only near the tip, as in the adult male of the preceding species.

If this species be not the *Munidopsis* (*Galathodes*) *rosacea* of Milne-Edwards, at any rate it, like that species, has *Munidopsis* (*Galathodes*) *tridentata*, Esmark, for its nearest relative.

Munidopsis Hemingi, sp. n.

Near *M. ornata*, Faxon.

Carapace convex, broader behind than in front, covered with squamiform tubercles in no very conspicuous transverse arrangement, the regions well defined; a pair of tubercles on the anterior part of the gastric region are acute.

Rostrum short, simple, triangular, carinate; anterior border of carapace with a blunt tooth, antero-lateral border cut into three teeth, posterior border unarmed.

Abdomen unarmed, smooth, the second and third terga transversely bicarinate.

Eyes slightly movable, a tiny papilliform spinule at their inner angle.

Inner border of merus of external maxillipeds armed with two large spines.

Chelipeds in the female (male unknown) equal, as long as

the extended body without the telson and longer than the legs by their finger-length ; their dorsal surfaces are covered with squamiform markings, the only spine is a small one near the distal end of the inner border of the wrist ; the fingers are as long as the palm.

The first three pairs of legs have the dorsal surfaces of the meropodites and next two joints covered with squamiform markings ; the dactyli are about half the length of their propodites.

Two specimens—the largest a female 25 millim. long—from off the Travancore coast, 430 fathoms.

The eggs are of enormous size, being nearly 2 millim. in major diameter after contraction in spirit.

The difference between *Munidopsis Hemingi* and *M. ornata*, Faxon, is very slight ; in the latter species the edges of the rostrum are serrate and the chelipeds and legs are armed with some spines.

Munidopsis iridis, sp. n.

Extremely closely related to *M. margarita*, Faxon.

Carapace subquadrilateral, convex, its regions well delimited and tumid, its surface armed with numerous acute subsquamiform tubercles and symmetrically disposed spines, of which a pair on the anterior part of the gastric region and one in the middle of the cardiac region are slightly enlarged.

Rostrum short, simple, triangular, carinate, its edges indistinctly serrulate in their distal half ; anterior border of carapace armed with an acute spine at the outer angle of the orbital notch ; lateral borders armed with four acute spines, posterior border with several spines ; a row of spinules above the postero-lateral border.

Second, third, and fourth abdominal terga transversely bicarinate, the first four or five carinæ bearing symmetrically disposed spines ; the corresponding pleuræ are unicarinate, the anterior of them (second) having a single upstanding spine.

Eyes almost immovable ; an inconspicuous spinule at their inner angle.

Three spines, two of which are large, on the inner border of the merus of the external maxillipeds.

Chelipeds markedly unequal in the male, very rarely slightly unequal in the female ; in both sexes the dorsal surfaces of the arm and wrist are spiny, a few of the spines along the inner edge being enlarged, and the inner edge of the palm is spinulous.

In the adult male both chelipeds are vastly stouter than

the legs: the larger is about half as long again as the fully extended body and from a dactylus to half a dactylus longer than its fellow, and has the hand enlarged and the immovable finger so arched that the fingers meet only at tip; the smaller cheliped is very variable, sometimes it is hardly different from its fellow, but usually it is more slender, especially in respect of the hand, and usually the fingers meet throughout the greater part of their extent.

In the female the chelipeds are stouter, but not vastly stouter, than the legs, and are about as long as the fully extended body, and the fingers are nearly straight.

The legs are about as long as the body in its natural pose (with the abdomen bent) and are scabrous; the anterior border of the merus and carpus is spiny, the dactylus is nearly half the length of its propodite and has its posterior border almost imperceptibly serrulate.

The sternum and neighbouring joints of the legs are beautifully iridescent, as also sometimes is the dorsal surface of the bent-up portion of the abdomen.

Fifty-two specimens from off the Travancore coast, 430 fathoms.

An adult male has the body 26·5 millim. in extreme length and the larger cheliped 38 millim. long. An egg-laden female is 21 millim. long and its chelipeds measure the same.

Munidopsis Goodrigii, sp. n.

Differs from all known Indian species in having the eyes absolutely immovable, yet furnished with neither spine nor spinule. Its nearest relative is, perhaps, the Philippine species *M. Milleri*, Henderson.

Carapace subquadrangular, convex, slightly broader behind than in front, its regions well delimited, its posterior half deeply sculptured transversely.

Gastric region with some not very conspicuous squamiform sculpture and with a pair of large spines situated anteriorly; a spine on either side of, and a pair of spinules in the middle of, the anterior cardiac region.

Rostrum short, simple, rather slender, smooth. A large acute spine on the anterior margin of the carapace; lateral borders with two large spines and a spinule, posterior border smooth.

Abdomen smooth, the second tergum transversely bicarinate, the third transversely grooved.

Eyes quite immovable, without spine or spinule. Two

large spines on the inner edge of the merus of the external maxillipeds.

Chelipeds in the female (male unknown) slender, unequal, the larger one slightly longer, the smaller one very slightly shorter, than the fully extended body; two rows of spines on the arm, both series continued, but much less conspicuously, along the wrist, but not along the hand; the fingers meet throughout their length.

Legs long, the first three pairs being scarcely shorter than the fully extended body: their merus has a few spinules at the proximal end of its anterior border, and both its borders terminate acutely; their carpus is carinate and ends in a spine; their dactylus is more than half the length of the propodite and has its posterior border spinulate.

A single female from off the Travancore coast, 430 fathoms.

The length of the carapace is 21·5 millim., of the larger cheliped 24 millim., of the smaller cheliped 21 millim.

Munidopsis Moresbyi, sp. n.

Carapace convex, broader behind than in front, covered as far as the tip of the rostrum with transverse, squamiform, ciliated sculpture, spineless, the regions inconspicuous.

Rostrum of moderate length, simple, triangular, dorsally carinate. A blunt tooth on the anterior border of the carapace; lateral borders cut into two blunt lobes exclusive of the subacute antero-lateral angle, but these lobes may be almost indistinguishable; posterior border smooth.

Abdomen unarmed, the second to the fifth terga transversely grooved; the fifth and sixth terga, the telson and the outer half of the blades of the swimmeret, and the margins of the pleuræ with a fine, rather irregular, squamiform sculpturing.

Eyes freely movable, spineless, more or less retractile beneath the rostrum.

Two very inconspicuous teeth on the inner edge of the merus of the external maxillipeds.

Chelipeds and legs covered with ciliated squamiform sculpturing, unarmed.

Chelipeds moderately stout, equal in both sexes, as long as the body in its natural pose (with the abdomen flexed), not half a dactylus longer than the legs; palm and fingers as long as the three preceding joints combined, the fingers slightly longer than the palm.

The dactyli of the legs are about half the length of the propodites and have the posterior border serrated.

A male and a female from off the Travancore coast, 430 fathoms.

In the male the carapace is 38 millim. long and the chelipeds 27 millim.

Colour in life pink.

This species is not very closely related to any of those with which we are acquainted. In the system of MM. Milne-Edwards and Bouvier (Ann. Sci. Nat. Zool. sér. 8, vol. xvi. 1894) it would be placed alongside *M. ornata*, Faxon, but it is very different from that species. It well illustrates the difficulties that attend the splitting-up of *Munidopsis* into subordinate genera, for it might almost equally well be placed with *Elasmonotus* or with *Orophorhynchus*, although it is unlike the typical species of those genera.

Ptychogaster, A. Milne-Edwards.

[*Ptychogaster*, sp.

A single very small specimen from off the Maldives, 459 fathoms, is so closely similar to *P. Milne-Edwardsi*, Henderson, from off the Patagonian coast, that we do not feel justified in giving it a distinctive name, but await further material.]

Ptychogaster Hendersoni, sp. n.

Carapace (including rostrum) equal in length to the first six fully extended abdominal terga, covered with spinules and spines, in which a definite serial arrangement of the larger spines is hardly manifest.

All the abdominal terga (telson excepted) and pleuræ bear spines: the first tergum has a transverse spiny carina continuous with a similar carina on the anterior edge of the second pleuræ; the second has two such carinæ; the third has a longitudinal row of spines at the junction with either pleura; the fourth and fifth have two transverse series of spines, besides an occasional spine on their posterior edge; the sixth has numerous spines, including three conspicuous transverse series.

First segment of the telson not much more than half the length of, and slightly broader than, the second.

External maxillipeds unarmed, except for the fine teeth along the inner edge of the ischium, hairy along inner edge, especially at distal end.

Chelipeds and legs long, slender, and spiny; in the female (male unknown) the chelipeds are more than $2\frac{3}{4}$ times the

length of the fully extended body and nearly half as long again as the legs; the first two pair of legs are nearly of one length, but the third pair are the longest by nearly a dactylus, owing to the elongation of their propodite, which is nearly five times as long as the dactylus.

A female from off the Travancore coast, 430 fathoms, is 30 millim. in extreme length when fully extended, and has chelipeds 86 millim. long and third pair of legs 55 millim. long.

Colour salmon-pink, eyes deeply pigmented.

Ptychogaster investigatoris, sp. n.

Carapace short, its length (including the rostrum, which is slightly more than a fourth the total length of the carapace) is only equal to that of the first five and a half fully extended abdominal terga; its surface is everywhere studded with spinules and spines, the largest of which show a tolerably plain arrangement in four longitudinal series.

The only abdominal tergum (besides the telson) that is quite free from spines is the third: the first tergum has a transverse spiny carina continuous with a similar carina on the edge of either pleura of the second segment; the second has a transverse raised row of four large spines, besides several teeth; both the fourth and fifth are separated from their pleuræ on either side by a longitudinal row of two or three spines or serrations; the sixth is covered with retrorse spinules and spines, including three conspicuous transverse series, of which the last far overhang the telson.

The first segment of the telson is hardly perceptibly longer, and slightly narrower, than the second; the surface of both bears some inconspicuous capillary spinelets or bristles.

The pleuræ of the third and fourth abdominal somites are devoid of spines.

The external maxillipeds are unarmed, except for the ischial serrations, and are very hairy in their distal half.

Chelipeds and legs long, slender, and spiny; the chelipeds in the female (male unknown) are about $2\frac{2}{5}$ times the length of the fully extended body and half as long again as the legs; the racquet-like form of the hand, due to the bowing of the basal half of the fingers, is more than ordinarily conspicuous.

Of the first three pair of legs the first is slightly the longest and the second slightly the shortest; the dactyli of all are hardly more than a quarter the length of the propodites.

A female from the Andaman Sea, 405 fathoms, is

55 millim. in length when fully extended, and has chelipeds 132 millim. and first legs 91 millim. long.

The eyes are large and rather pale.

Uroptychus, Henderson.

Uroptychus, sp.

A large egg-laden female, the body of which when fully extended measures 36·5 millim., can only be distinguished from the Australasian *U. australis*, Henderson, by having the under and inner surfaces of the arm and wrist studded with vesiculous granules. It is probably a variety of *U. australis*.

Uroptychus bacillimanus, sp. n.

Nearest to *U. gracilimanus*, Henderson, from which it seems to differ only in having the carapace pitted and the posterior border of the propodites of the legs unarmed, and to the Atlantic *U. rubrovittatus*, A. M.-Edw., from which it differs in having slender chelipeds and also the posterior border of the propodites of the legs unarmed.

Carapace unarmed, except for a tiny spinule at either antero-lateral angle and another at the outer angle of either orbital notch; its surface covered with a fine squamiform pitting, its lateral borders with a regular squamiform crenulation.

Rostrum triangular, simple, acute, more than a third of its length projecting beyond the eyes.

Abdomen smooth; the third to sixth pleuræ rounded.

Eyes small, their major diameter less than a fifth the length of the rostrum, brown in colour.

Antennal acicle acutely triangular, reaching about two thirds the distance along the terminal joint of the antennal peduncle.

Chelipeds in both sexes about twice the length of the fully extended body, very slender in the male, still more slender in the female, perfectly smooth, but bearing (as do also the legs) some curiously long and delicate silky hairs; the hand is longer and slightly broader than the wrist, the fingers are considerably less than half the length of the palm.

Legs slender, less than half the length of the chelipeds; a few spinules on the posterior border of the dactyli, but only a single one (situated terminally) on the posterior border of the propodites.

A young male and female from off the Travancore coast, 430 fathoms, and an egg-laden female from off Ceylon,

320 fathoms. The last when fully extended measures 29 millim. from tip of rostrum to end of telson.

This species is readily distinguished from *Uroptychus nitidus*, of which undoubted specimens have been dredged by the 'Investigator,' in the form of the chelipeds, the smaller eyes, and the pitted carapace.

Uroptychus fusimanus, sp. n.

Dorsal surface of carapace studded with numerous spines in more or less distinct rows, the well-defined cariniform lateral borders acutely spinate. Abdomen perfectly smooth.

Carapace (without rostrum) slightly longer than broad; cervical suture very well defined; rostrum acutely triangular, simple, the frontal margin on either side of it deeply concave for the eye.

Antennal acicle large, reaching as far as the tip of the peduncle.

Chelipeds in both sexes equal, about $1\frac{2}{3}$ times the length of the fully extended body, much stouter and rather more than one third of their extent longer than the legs, subcylindrical as far as the compressed and broadened hands; along the upper and inner surfaces of the arm and wrist are longitudinal rows of spines, those in at least two rows being conspicuously enlarged and sharply raised; hands smooth, broadened, the edges of the palm almost cristiform.

First three pair of legs slender, smooth, the meropodites somewhat dilated, the third pair about a dactylus shorter than the other two; the dactyli are less than a third the length of their propodites, and they alone have the posterior border finely toothed in the distal two thirds.

Seven specimens (one an egg-laden female), from off the Travancore coast, 430 fathoms.

The fully extended body of the largest female measures 31 millim. and the chelipeds 53 millim.; that of the largest male measures 27 millim. and the chelipeds 42 millim.

Uroptychus cavirostris, sp. n.

Dorsal surface of carapace perfectly smooth; two sharp spines (including the one at the antero-lateral angle) on either lateral border. Abdomen perfectly smooth.

Carapace (without rostrum) longer than broad; cervical groove not well defined, branchial regions well defined by swelling. Rostrum simple, acute, broadly triangular, dorsally concave. A minute spinule at the outer angle of the orbit.

Antennal acicle not reaching to the tip of the peduncle. Eyes nearly reaching tip of rostrum.

Chelipeds in the female (male unknown) not much less than twice the length of the fully extended body, much stouter than, and more than twice as long as, the legs; smooth, except for a hook-like spine on the ischium, a few squamiform granules on the under surface of the base of the merus, and a few inconspicuous denticles on the terminal borders of the merus and carpus; they gradually broaden to the palm, which is the broadest joint and is more than twice the length of the fingers; the tips of the fingers are hidden by some very long silky hairs.

The first three pair of legs are short, slender, and smooth, except for strong serrations on the posterior border of the curved dactylus and of the propodite. The third pair are very slightly the longest.

A single egg-laden female from off the east coast of North Andaman Island, 75–60 fathoms.

The length of the fully extended body is 17 millim., of the chelipeds 32 millim., of the longest (third) pair of legs 13·5 millim.

II.—*On the British* Pandalidæ. By W. T. Calman, B.Sc., University College, Dundee.

[Plates I.–IV.]

In a paper "On Deep-sea Crustacea from the South-west of Ireland" * I lately recorded the occurrence for the first time in British waters of two species of *Pandalus*, referred to the *P. propinquus* and *P. leptorhynchus* of G. O. Sars, in addition to the two already known to occur in our seas—*P. Montagui*, Leach, and *P. brevirostris*, Rathke. In the present paper brief descriptions and figures are given of the more important diagnostic characters of these four species, some of which characters have not hitherto been pointed out.

In his account of the Crustacea dredged by the 'Caudan' in the Bay of Biscay M. Maurice Caullery has recently described † a species of *Pandalus* differing from all the members of the family hitherto described in possessing on

* Trans. Roy. Irish Acad. xxxi. pt. 1, 1896; see p. 6.

† "Résultats Scient. de la Campagne du 'Caudan' dans le Golfe de Gascogne, 1895: Crustacés Schizopodes et Décapodes," par M. Caullery, 'Annales de l'Université de Lyon,' 1896, pp. 377–381.

XLIII.—*Natural History Notes from H.M. Royal Indian Marine Survey Ship 'Investigator,' Commander T. H. Heming, R.N., commanding.* — Series III., No. 2. *An Account of the Deep-sea Crustacea dredged during the Surveying-season of* 1897–98. By A. Alcock, Major, Indian Medical Service, Superintendent of the Indian Museum, and A. R. S. Anderson, Captain, Indian Medical Service, Surgeon-Naturalist to the Survey.

[Continued from p. 27.]

MACRURA.

Family **Penæidæ.**

Penæus, Fabr.

Penæus rectacutus, Sp. Bate.

Penæus rectacutus, Sp. Bate, 'Challenger' Macrura, p. 266, pl. xxvi fig. 2 (exc. 2 *z*).
Metapenæus rectacutus, Wood-Mason & Alcock, Ann. & Mag. Nat. Hist., Oct. 1891, pp. 274, 275.

Spence Bate suggests that *Penæus serratus* and *Penæus rectacutus* may prove to be the same species. The former, of which there are two 'Challenger' specimens from Fiji in the Indian Museum, possesses no epipodite on the twelfth segment, while the latter has one.

In the males of this species the outer branch of the antennulary flagellum is about twice the length of the inner and has a very stout base suddenly narrowing and tapering into a long filamentous extremity; from about the middle of the lower and inner side of this thickened base a small sharp conical tooth, as in *Metapenæus coniger*, projects; the inner branch is horizontally flattened in the proximal quarter of its length, and here forms a rigid semicircular loop downwards below the outer branch, as in *Penæus serratus*; on again reaching the level of the outer branch it gives off a small flattened hooked process articulating with the conical tooth on the outer branch, and becoming twisted on itself, and so vertically flattened lies alongside and in close apposition to the outer branch. Towards its extremity the inner branch becomes thin and filiform like the outer.

The absence of a rudimentary anterior arthrobranchia from the thirteenth segment seems to exclude this species from Wood-Mason's genus *Metapenæus*.

4 ♂, 3 ♀, from Station 235, 370–419 fathoms.

Parapenæus, S. I. Smith.

Parapenæus investigatoris, sp. n.

Allied to *Parapenæus fissurus*, Sp. Bate, having the same branchial formula as we described for that species in Journ. Asiat. Soc. Bengal, vol. lxiii. pt. ii. 1894, p. 144 (from which, by a copyist's error, the epipodite on appendage 8 was omitted); the same longitudinal and vertical fissures in the carapace; a similar dorsal carina, bearing a single sharp tooth on the gastric region, and produced into a rostrum ciliated inferiorly, furnished with six teeth superiorly; a similar compressed abdomen, with the carina of the fourth, fifth, and sixth segments ending in a small tooth covering a small V-shaped notch in the posterior dorsal margin of the fourth and fifth segments; and a very similar telson and swimmeret.

It can at once be distinguished from *Parapenæus fissurus*, of which there are two 'Challenger' specimens from Zebu in the Indian Museum, by the presence of a well-marked sharp branchiostegal tooth placed slightly behind the anterior margin of the carapace, and not on it as in Spence Bate's species. It further differs in the length of the rostrum, which reaches only just beyond the end of the first joint of the antennulary peduncle instead of beyond the end of the second joint; in the rostrum sloping gently upwards in its proximal, gently downwards in its distal half; in the relative shortness of the carapace, which, exclusive of the rostrum, is only very little more than $\frac{1}{3}$ the length of the abdomen instead of nearly $\frac{1}{2}$ the length; in the great relative length of the sixth abdominal segment, which is $2\frac{1}{2}$ times the length of the fifth segment instead of about $1\frac{3}{4}$ times its length; in the third abdominal segment being non-carinate; in the inner plate of the swimmeret extending for about $\frac{1}{4}$ its length beyond the extremity of the telson; in the inner branch of the antennulary flagellum being slightly the longer, nearly as long as the carapace exclusive of the rostrum, and gradually expanding at its base, while the outer branch expands suddenly into a base considerably thicker than that of the inner branch; in the "thelycum" being of a different structure; and in never appearing to grow to the same size as *Penæus fissurus*.

5 ♀, 2 ♂, from Station 233, 185 fathoms.
3 ♀, 6 ♂, from Station 235, 370–419 fathoms.
2 ♀, 1 ♂, from Station 166, 133 fathoms.

Haliporus, Spence Bate.

Haliporus taprobanensis, sp. n.

This species appears to be nearly allied to *Haliporus thetis*, Faxon. The carapace is leathery, with deep cervical and longitudinal grooves. The dorsal carina is thrice interrupted in its course—by the cervical groove, by a broad shallow groove about midway between the cervical groove and the posterior margin of the carapace, and again close to the hinder margin of the carapace. Here the carina ends as a small tubercle separated from the posterior margin by the dorsal extremity of the longitudinal groove; in front of the cervical groove the carina is very prominent, armed with four teeth, and produced into a short slightly upraised rostrum, fringed below with long hairs. The rostrum, which appears to have been broken and imperfectly repaired, reaches just beyond the end of the cornea, ends in a sharp straight point, and is armed above with two small teeth near its base; succeeding these is a pair of minute teeth at the same level, one on each side of the rostrum, and beyond these a couple of sinuosities.

The first antennal tooth is separated from the tooth behind it by a groove running obliquely downwards and backwards from the level of the eye-stalk. On the posterior margin of the cervical groove is a well-marked sharp tooth, continued posteriorly into an elevated rounded ridge, running backwards parallel to and at a little distance from the longitudinal groove. The branchiostegal tooth, situated at the lower end of the frontal margin, is not so minute as in *Haliporus thetis*, and is continued backwards as an elevated ridge to the posterior margin of the carapace.

The abdomen is compressed and throughout carinate dorsally. The first, second, and third segments are marked by a deep transverse groove separating an anterior smooth articular from a posterior part of each segment. In the first segment the articular portion is nearly as long as the part behind the groove, the posterior half alone of which is elevated into a carina. In the second and third segments the articular portion forms only about $\frac{1}{4}$ of the total length of the segment, and the entire part behind the groove is carinate. The fourth, fifth, and sixth segments are carinate throughout their entire length. The carina is grooved in its centre and produced into a small sharp tooth at the posterior extremities of the fourth, fifth, and sixth segments; the posterior dorsal central margin of the second, third, fourth, and fifth segments is slightly notched V-wise. The transverse grooves on the

first to third abdominal segments are continued down on the pleuræ of these segments; furthest down and most marked on the first, the shortest distance and least marked on the third. The first to fifth segments are also furrowed by a transverse groove in their posterior quarter running nearly parallel to the hinder edge of each tergum, but bending obliquely forward and downward on reaching the pleuræ, where they fade away before attaining the margin. The fifth and sixth segments have an elevated horizontal ridge at the union of the pleuræ and terga, and the sixth possesses in addition an elevated ridge passing obliquely upwards and backwards from its articulation with the fifth segment to its posterior margin. The sixth segment is very slightly longer than the fifth. The telson lacks its extremity; dorsally it is widely grooved and on each side of the groove is an elevated ridge ending posteriorly in a short sharp spine. From these ridges the sides slope down obliquely, bear three minute spinules on either side, and have their lower margins fringed with hair.

The swimmeret is similar to that of *Haliporus thetis*, only differing in the sculpturing.

The appendages appear to be very like those of *Haliporus thetis*.

The branchial formula is :—

	Pleuro-branchia.	Arthro-branchia.	Podo-branchia.
VII.	..	1 (rudimentary)	Ep.
VIII.	..	2 (ant. small)	1+Ep.
IX.	1	2	*r*+Ep.
X.	1	2	*r*+Ep.
XI.	1	2	Ep.
XII.	1	2	Ep.
XIII.	1	2	Ep.
XIV.	1	0	
	6	13	1+2*r*+7 Ep.

There is not even a microscopic trace of any podobranch on the epipodites of the second and third pairs of legs, while that of the first pair is present on one side only.

The exopodites of all the ambulatory legs are small but plainly visible.

The points in which this species differs from *Haliporus thetis* are :—the larger branchiostegal spine situated at the lower end of the frontal margin, and not some distance back on the inferior margin; the absence of the two bifurcations of the carina on the carapace, the dorsal carina of the first abdo-

minal segment only occupying about $\frac{1}{4}$ the dorsal length of the segment; the absence of the longitudinal furrows on the sides of the abdominal segments; the shortness of the sixth segment; and a different branchial formula.

One specimen (♀), measuring 160 millim. from tip of rostrum to end of broken telson, was caught at Station 219, 550 fathoms.

Benthesicymus, Spence Bate.

Benthesicymus investigatoris, sp. n.

This species is very closely allied to *Benthesicymus Bartletti*, S. I. Smith, agreeing with it except in the following points:—the dactylus of the external maxilliped is truncated, but terminates in a pair of small curved spines apparently functioning as pincers; the fourth abdominal segment is carinated in its posterior three quarters; and the long slender spine is absent from the fifth abdominal tergum.

Station 222, 400–200 fathoms, 2 ♂, 1 ♀.
Station 228, 640 fathoms, 1 ♀.
Station 234, 498 fathoms, 1 ♂, 1 ♀.
Station 235, 370–419 fathoms, 1 ♀.

Family **Crangonidæ**.

Pontocaris, Spence Bate.

Pontocaris media, sp. n.

The only points in which this species disagrees with the description and figures of Spence Bate's *Pontocaris pennata* ('Challenger' Crustacea Macrura, p. 499, pl. xci.) are the following:—

(1) The rostrum is pointed, not bifid at tip.

(2) The infero-lateral carina on either side is bluntly and evenly serrated, not smooth.

(3) The eyes are very much smaller, the orbital notch is more pronounced, and the tooth at its outer angle much larger—the condition of parts being like that of *Pontocaris propensalata* (Spence Bate, *op. cit.* p. 496, pl. xc. fig. 2).

(4) The wing-like processes of the antero-lateral angles of the carapace are not quite so oblique.

(5) As in *P. propensalata*, the fifth, sixth, and seventh thoracic sterna are longitudinally carinated.

(6) The antennal scale is short and subcircular, somewhat as in *P. propensalata*.

From *P. propensalata* it differs in having seven carinæ on the carapace instead of five, and in the far more elaborate sculpture of the abdominal terga, as well as in the greater obliquity of the antero-lateral angles of the carapace.

Four specimens from the Andamans, 55 fathoms.

Family **Alpheidæ**.

Alpheus, Fabr.

Alpheus Shearmii, sp. n.

This species in the frontal region of its carapace resembles *Alpheus tridentatus*, Dana, while the hand of its right chela resembles that of *Alpheus gracilipes*, Stimpson.

The integument is thin and submembranous.

The carapace is perfectly smooth, rounded and non-carinate superiorly; the rostral and supraocular teeth are subequal and very short; the eyes are somewhat deficient in pigment and so small that they cause no projection upwards of the carapace.

Near each postero-lateral angle of the telson is a couple of small spines and on each side of the dorsal surface of the telson is a similar couple of spines.

The telson and plates of the swimmeret are fringed with long hair.

Of the antennulary base the first joint is slightly longer than the second and the latter about twice the length of the third. The antennulary acicle is flat and tapers quickly from its base to a slender sharp needle-like point reaching about one third the way along the second joint.

The antennal scale is wide, thin and convexly curved in its anterior and inner margins, thickened and slightly concave as to its outer margin, which terminates in a short sharp tooth.

The right great chela, the only one present, is twisted so that the finger and thumb lie horizontally. The lower and inner margin of the hand is quite smooth and continuous with the thumb, the outer and upper margin presents a **V**-shaped notch close to the articulation of the hand and finger. Running from end to end of the upper surface of the hand, close to its outer margin, is a groove with a well-marked rounded crest on its inner side. The distal end of the crest ends on a level with the notch on the upper margin in a somewhat prominent smoothly rounded eminence.

The opposable edge of the thumb is slightly curved and

armed with two small teeth near the joint, while the corresponding edge of the finger is nearly straight and armed with a single tooth near the joint. The large plug-like tooth usually present on the fingers of shallow-water forms is wholly absent.

Station 232, 430 fathoms, one specimen.

Family **Pandalidæ**.

Pandalus, Leach.

Pandalus ? ensis, A. Milne-Edwards.

Pandalus ? ensis, A. Milne-Edwards, Rec. Fig. Crust.

With some doubt we identify with this species three specimens—one perfect with the exception of the fourth and fifth pairs of legs, which are absent, the other two considerably broken, trawled at Station 233, 185 fathoms. They only differ from the figure in possessing three instead of two teeth on the dorsal margin of the rostrum. The position of these three teeth differs in the three specimens, although occupying much the same space as the two teeth of the type. In all other respects our specimens appear to be the same as the type.

Chlorotocus, A. Milne-Edwards.

Chlorotocus gracilipes, A. Milne-Edwards,
var. *andamanensis*, nov.

Three specimens were obtained at Station 233, 185 fathoms, and differ from the figure of the species in the Rec. Fig. Crust. in the following points:—the rostrum, in our one unbroken specimen, is armed with four teeth only on its lower margin; there is a small sharp ocular spine; the dorsal carina behind the orbital margin bears five teeth in two, four teeth in one specimen; the postero-inferior angle of the fifth abdominal pleura is pointed and sharp, not rounded; the sixth abdominal pleura is produced postero-inferiorly into a small sharp tooth, not rounded; the telson bears at its extremity, in addition to the sharp central tooth, a pair of lateral movable spines, and between these and the central tooth bunches of long stiff hairs.

Heterocarpus, A. Milne-Edwards.

Heterocarpus lævigatus, Spence Bate.

Heterocarpus lævigatus, Spence Bate, 'Challenger' Macrura, p. 636, pl. cxii. fig. 3.

In one specimen, 178 millim. long from tip of rostrum to end of telson, the dorsal crest is armed with four large teeth, while in seven other specimens there are five teeth on the crest. The under margin of the rostrum is armed with eleven to thirteen teeth. (In Spence Bate's type the rostrum was broken.) In the smaller specimen the rostrum is bent up at an acute angle and the dorsal spines are relatively longer than in the larger specimens.

Station 232, 430 fathoms, eight specimens.

New to the Indian fauna.

Plesionika, Spence Bate.

Plesionika affinis, sp. n.

Closely allied to *Plesionika uniproducta* and *Plesionika unidens*.

Carapace smooth, dorsally carinate in rather more than its anterior half, armed behind the level of the orbit with three procumbent teeth on the carina, which is produced into a slender rostrum rather longer than the dorsal length of the carapace. At first the rostrum curves quickly downwards to the level of the antennules, on reaching which it continues with a slight downward tendency to its tapering extremity. On its dorsal margin above the eye are three procumbent teeth, the most anterior at the level of the cornea, and close to the tip is a minute spinule; on the anterior fourth of its lower margin are some six minute procumbent spinules.

The anterior margin of the carapace is similar in form to that of *Plesionika uniproducta*, and, like it, armed with well-developed teeth corresponding to the antennules and the fronto-lateral angle.

The third abdominal segment in its posterior dorsal quarter is surmounted by an upstanding carina produced posteriorly into a sharp well-marked tooth overhanging the fourth segment. The rest of the abdominal segments are smooth. The sixth segment is rather more than twice the length of the fifth segment.

The second joint of the antennal base is armed with a long sharp tooth like that of *Plesionika uniproducta* (*vide* 'Challenger' Macrura, pl. cxiii. fig. 1 *c*).

Two specimens, 36 millim. from tip of rostrum to end of telson, were obtained at Station 236, 172–303 fathoms.

Family **Pasiphæidæ.**

Pasiphæa, Savigny, Edw.

Pasiphæa unispinosa, Wood-Mason.

Pasiphæa unispinosa, Wood-Mason, Ann. & Mag. Nat. Hist., Feb. 1893, pp. 163, 164; Illustrations Zoology 'Investigator,' Crustacea, pt. i. 1894, pl. iii. fig. 7, ♀.

Pasiphæia cristata americana, Faxon, Bull. Mus. Comp. Zool. vol. xxiv. p. 208, Aug. 1893.

Pasiphæia americana, Faxon, Mem. Mus. Comp. Zool. vol. xviii. pp. 173–175, pl. xlv. figs. 1–1 *e* (1895).

Our specimens, both the types and that taken this season, agree in all particulars with Faxon's lucid, concise, and very careful description of *Pasiphæia americana*.

One large female, 116 millim. from anterior end of carapace to end of telson, the terminal few millim. of which are wanting, was taken at Station 229, 360 fathoms.

Family **Homaridæ.**

Nephropsis, Wood-Mason.

Nephropsis Stewarti, Wood-Mason.

Nephropsis Stewarti, Wood-Mason, Journ. Asiat. Soc. Bengal, vol. xlii. pt. ii. 1873, p. 39, pl. iv., and Ann. & Mag. Nat. Hist. (4) xii. 1873, p. 59; A. Milne-Edwards, Ann. Sci. Nat. Zool. (5) xix. pl. xx. figs. 1–3; Alcock & Anderson, Journ. Asiat. Soc. Bengal, vol. lxiii. pt. ii. 1894, p. 161; Anderson, Journ. Asiat. Soc. Bengal, vol. lxv. pt. ii. 1896, p. 96; Ill. Zool. 'Investigator,' Crustacea, pt. iv. pl. xxvii. figs. 1, 1 *a* (1896).

In this species, as in *Nephropsis atlantica*, the lateral rostral spines are variable in position. In one of the males captured this year, instead of being as usual in the posterior, the spines are situated in the anterior half of the rostrum, which is short, slightly curved, and very similar to the rostrum of *Nephropsis Carpenteri*. In consequence of the shortness of the rostrum the antennulary peduncles equal it in length.

Two males, one from Station 229, 360 fathoms, the other from Station 233, 185 fathoms.

Colours in life: upper surface of abdomen very pale orange, extreme outer border of terga bright red, pleuræ white; inner leaf of swimmeret bright red, outer leaf white, bordered by pale orange; upper surface of posterior $\frac{3}{4}$ of carapace orange, suddenly changing to bright red in the anterior $\frac{1}{4}$ and rostrum; sides of carapace white; the two small dorsal tubercles and the faint ridge joining them white; antennular base

white, flagella bright red; antennal base and proximal half of flagellum white, distal half of flagellum pale orange; large cheliped white, except finger and thumb, which are pale orange, extreme tips of finger and thumb white; hands and fingers of second, third, and fourth pairs of walking-legs bright red, remainder of legs white; lower surface of thorax and abdomen white.

Family Callianassidæ.

Calastacus, Faxon.

Calastacus felix, sp. n.

This species differs from *Calastacus stilirostris* and *C. investigatoris* in the following particulars:—the carapace is covered with a scanty growth of short, stiff, yellowish, forwardly directed hairs, springing either singly or in groups of two or three from the bottom of small pits in the surface of the test, these hairs being both longer and stouter on the gastric region than elsewhere. The lateral margins of the rostrum, like those of *Calastacus investigatoris*, extend backwards a short distance on either side of the carapace as outstanding ridges, each bearing a couple of spines, the anterior pair of which is much larger than the posterior. A dorsal carina extends from the base of the rostrum to the posterior margin of the carapace, where it ends on a small lobe projecting into the gap left between the backwardly projecting pleuræ of the carapace. The tubercle at the posterior termination of the carina of *C. investigatoris* is only represented in this species by a small irregularity of the carina. Occupying the anterior $\frac{2}{3}$ of the gastric region is a line of small, sharp, forwardly projecting teeth arranged in the form of a horseshoe, with its free ends turned backwards. The rostrum bears on each side a pair of asymmetrically arranged teeth.

A small, somewhat irregular, but pigmented cornea is present.

Of the great cheliped the wrist, near its junction with the hand, is considerably wider than the wrist-hand joint, especially on its lower margin, which projects as a blunt tooth. In the other two species the carpo-propodal joint is as wide as the widest part of the carpus.

Near the centre of the cutting-edge of the immobile finger is a large tooth. The carpus, propodus, and dactylus are covered with long, coarse, but somewhat sparse hair like that on the carapace.

The second pair of walking-legs is absent.

On the hands and fingers of the third and fourth pairs are small corneous prickles, arranged either singly or in transverse rows of two or three.

The abdominal segments are dorsally carinate, the carina being most prominent on the anterior three segments, gradually widening and becoming less and less marked on the fourth, fifth, and sixth segments.

The telson ends in a rounded central lobe, running down to which is a dorsal central groove. On the lateral margins of the telson are a few small teeth and near the proximal end one considerably larger than the others.

A median longitudinal ridge divides the inner plate of the swimmeret into two nearly equal parts and terminates distally in a small sharp tooth. A similar ridge divides the outer plate of the swimmeret into two subequal parts; the movable segment is very small, its inner end just passing beyond the central ridge, and the margin of the suture is armed with a few small acute teeth, as also is the distal half of the outer border of the plate with five similar small teeth.

In *Calastacus investigatoris* and *felix* both male and female external genital orifices are present, as in *Parastacus*, described by Dr. Emar Lönnberg in 'Zool. Anzeiger' of June 2, 1898. On this point Faxon is silent in his description of *Calastacus stilirostris*.

Callianassa, Leach, A. Milne-Edwards.

Callianassa lignicola, sp. n.

This is a small species, the carapace measuring 3·3 millim., the abdomen 11·5 millim.

The form of the carapace resembles that of *Callianassa pachydactyla*, similar longitudinal and oblique grooves being present in both species. Anteriorly it is produced into an acute small rostrum.

The abdominal segments are all smooth. The first is considerably narrower in front than behind; the second, which also increases in width posteriorly, is by far the longest of all the segments and almost twice the length of the first. The telson is well developed, diminishing in width posteriorly, and on its dorsal surface is a broad median furrow expanding posteriorly to the full width of the telson; the end is square, with the corners rounded off. The outer plate of the swimmeret is about $\frac{1}{3}$ longer than the inner plate and armed on its outer straight margin with a small tooth. The pleuræ of all the abdominal segments are very short, smooth, and gently rounded at their margins.

The eye-stalk is triangular in section; its inner margin is prolonged into a short acute spine beyond the level of the cornea, and on its outer side is the small, circular, darkly pigmented cornea.

The peduncle of the first antennæ is about $\frac{1}{3}$ the length of the carapace and terminates in two flattened flagella. The peduncle of the second antennæ is rather longer than that of the first and ends in a tapering slender flagellum about $1\frac{1}{3}$ times the length of the carapace.

The second and third joints of the external maxilliped are expanded to form an irregular oblong cover. On the upper-side of the second joint is a prominent pectinate ridge.

The right is over twice the bulk, although not much longer than the left great cheliped. The lower margin of the ischium is armed with five small, subequal, acute, saw-like teeth; the proximal end of the lower margin of the merus bears one somewhat larger tooth, and the distal three joints, except for a small tooth on the cutting-edge of the thumb, are smooth and unarmed. The second, third, and fourth pairs of legs are of the usual type; the fifth terminates in a mass of hair obscuring the small subchelate finger.

The appendages of the first two abdominal segments are small and slender, the first terminating in a single thin short limb, while the second ends in a pair of slightly stouter limbs. The appendages of the succeeding three segments contrast strongly with the first two pairs; they terminate in a pair of flattened subequal branches fringed with long hair, the outer branch sickle-shaped, the inner lancet-like. On the inner side of each inner limb is a short tooth-like process.

Two specimens, one a female measuring 14·8 millim. in extreme length, the other 11 millim., were obtained from burrows in the interior of water-logged mangrove-twigs at Station 233, 185 fathoms.

Colour in life chalky white.

Family **Eryontidæ**.

Pentacheles, Spence Bate.

Pentacheles sculptus, S. I. Smith.

Pentacheles sculptus, S. I. Smith, Bull. Mus. Comp. Zool. x. 1882–83, pp. 23–31, pls. iii., iv.

Polycheles sculptus, Faxon, Mem. Mus. Comp. Zool. vol. xviii. 1895, p. 122, pl. C, fig. 2.

Five specimens (four males, one female) were obtained at Stations 230 and 231, 834 and 836 fathoms respectively.

From tip of rostrum to end of telson they vary from 119 to 74 millim.

All our specimens show the distinctive peculiarities not of Faxon's Pacific variety, but of the typical Atlantic species. In shape and general appearance they resemble *Pentacheles phosphorus*, but can at once be distinguished from this by having two instead of one spine on the outer side of the basal antennulary joint, by being armed with one spine instead of two between the rostral spines and the pair of spines about the centre of the gastric area, by having no spines on the carapace posterior to the cervical groove and between the median carina and the sublateral carina, and by the presence of a procumbent spine on the first five instead of the first four abdominal segments.

New to the Indian fauna.

Eryonicus, Spence Bate.

Eryonicus indicus, sp. n.

Closely resembling *Eryonicus cæcus*, Bate (Faxon), from which it differs in the following particulars:—the dorsal median spines are arranged thus—2 (rostral), 1, 1, 2, 1, 1, 2, 2, 1, 2; the anterior three groups of spines, exclusive of the rostral, are considerably larger than those figured by Faxon; behind the orbit there are but three spinules on the gastric region; the branchial ridge bears 7, not 5 spinules; the last spine on the lateral carina is by far the largest of all those on the animal; the 5 large spines on the lower of the two ridges below the lateral carina are considerably smaller than the last spine of the lateral carina, show no regular diminution in size from the first to the last (indeed, the middle one is the longest), and are both followed and preceded by a row of denticles on the ridge; the dorsal row of spines on the abdomen consists of one spine on the first, second, fifth, and sixth segments and two spines on the third and fourth segments, the spines of each pair being united by a connecting longitudinal ridge, and the posterior spine of each pair much exceeding the anterior in length; on the proximal end of the telson is one spine; only about the inner half of the orbit is filled by the eye-stalk, between which and the outer orbital margin is a wide gap crossed anteriorly by a conical process of the eye-stalk, similar to that of *Eryonicus cæcus*, which, however, does not quite reach the outer margin of the orbit; the basal joint of the first antenna ends in a long internal and a short external spine, and is not fringed

with hair on its inner margin; the second pair of abdominal appendages bear on the inner terminal branch a single long blunt process or stylamblis, and not a pair of processes.

One specimen, measuring 42 millim. from tip of rostrum to end of telson, was obtained at Station 230, 824 fathoms.

There are very good grounds for believing that the specimen came from a considerable depth.

Since writing the above, one of us has trawled a second slightly larger specimen off Colombo in 480–428 fathoms. The colours in life were:—carapace pale brown; abdomen dirty white; swimmeret slightly tinged with pink; first and second antennæ, fingers of great cheliped, and second, third, and fourth pairs of thoracic legs pale pink.

Family **Stenopidæ.**

? Richardina, A. M.-Edw.

Richardina, A. Milne-Edwards, Recueil de Figures de Crustacés.

A little Crustacean, which was found inhabiting a Hexactinellid sponge dredged at 498 fathoms in the Andaman Sea, closely resembles, and may even perhaps be identical with, the *Richardina spinicincta* figured by M. A. Milne-Edwards on pl. viii. of the work above cited.

It is as closely as possible related to *Stenopus* and *Stenopusculus*, from which it seems to differ chiefly in the stouter and more compact body, in the shorter and less lax appendages, in the reduction of the spinature of the body, and in the complete absence of pigment from the eye.

? *Richardina spongicola*, sp. n.

The cephalothorax, which is of thinner texture than the other parts, is short, broad, and tumid; the prominent posterior edge of the cervical groove is armed with a row of procumbent spines, and a second concentric but shorter row of spines surrounds the base of the rostrum; otherwise the carapace is smooth.

The rostrum, which is nearly a third the length of the rest of the carapace, has the dorsal edge serrated throughout and the ventral edge serrated at the tip only.

The eyes, which are on short stoutish stalks, are quite without pigment and have some spinules round their base dorsally.

The antennal scale is falciform; its outer edge ends in a spine, its inner convex edge is strongly ciliated.

The external maxillipeds are stout, a little longer than the

first pair of legs, and nearly as long as the combined carapace and rostrum; their ischium and merus are compressed and somewhat broadened.

Except for a few spinules on the carpus of the great cheliped the legs are smooth.

The first three pair of legs are truly chelate and the last two pair are apparently so, since their small dactylus ends in a pair of claws.

The first pair is slender. [The second pair is broken off in our single specimen.] The third pair is of Alphean oddness, the left being slender and non-elongate, while the right is nearly as long as the body without the telson and is very massive, especially as regards the hand. The last two pair have a three-joint carpus and a two-joint propodite.

The abdomen is perfectly smooth except for the telson, which is longitudinally divided into two lobes by a deep groove, the strong convexity of each groove being spiny.

The first pair of abdominal legs in the female are uniramous, the last pair (swimmeret) have the outer edge of the outer lobe serrated.

The single specimen, which is an egg-laden female, measures 26 millim. from the tip of the rostrum to the tip of the telson.

The eggs are few and are of very large size—nearly 1·5 millim. in diameter after contraction in spirit.

Order STOMAPODA.

Squilla leptosquilla, Brooks.

Squilla leptosquilla, W. K. Brooks, 'Challenger' Stomapoda, p. 30, pl. i. figs. 1 & 2.

Three very fine specimens from the Andaman Sea, 185 and 370–419 fathoms. They undoubtedly came from the depths.

Order AMPHIPODA.

Cystisoma spinosum (Fabr.), Stebbing.

Cystisoma spinosum, Stebbing, 'Challenger' Amphipoda, p. 1319, pls. cliv.–clvi.

Two specimens from the Andaman Sea, 498 and 172–303 fathoms. Though they came up in the trawl they were accompanied by such pelagic forms as *Salpa*, *Pyrosoma*, and *Firuloides*, with which no doubt they were associated in life.