

# THE ANNALS

AND

## MAGAZINE OF NATURAL HISTORY.

[SEVENTH SERIES.]

No. 87. MARCH 1905.

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XXVII.—*Natural History Notes from the R.I.M.S. 'Investigator,' Capt. T. H. Heming, R.N. (retired), commanding.*—Series III., No. 6. *An Account of the new and some of the rarer Decapod Crustacea obtained during the Surveying Seasons 1901–1904.* By A. C. MACGILCHRIST, M.A., M.B., Ch.B., Capt. I.M.S., Surgeon-Naturalist to the Survey.

DURING the season 1901–1902 the R.I.M.S. 'Investigator' was engaged in surveying parts of the Persian Gulf. Here most of the trawling and dredging operations were in comparatively shallow water, and a goodly collection of Brachyura was obtained. During the following two seasons the Tenasserim and Arakan coasts were being surveyed, and the collections were obtained mostly by deep-sea trawling *en route* between Bombay and the survey-ground on the outward and homeward journeys.

Besides a short account of some of the rarer species and varieties obtained, three new species of Macrura, two new species of Anomura, together with one new genus and five new species of Brachyura are here described.

### MACRURA.

Fam. Peneidæ.

PENEUS, Fabr.

*Peneus fissurus*, Spence Bate.

*Peneus fissurus*, Spence Bate, 'Challenger,' vol. xxiv. pt. i. 1888, p. 263.

This species is new to the Indian fauna. This year, strange  
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to say, they were caught in abundance on two occasions in the Gulf of Martaban, 46 and 61 fathoms. In one haul fifteen males and seven females were obtained.

They agree in all details with Spence Bate's description. In the Indian variety the rostrum is long, horizontal, slightly turned up at the tip, and armed dorsally with 6 (sometimes 5) teeth; it is half (or more) the length of the carapace, longer in the female, where it is  $1\frac{1}{2}$ –2 mm. more than half the length of the carapace, and is about twice the length of the eye.

The antennules of the female are shorter and more slender (both peduncles and flagella) than those of the male, and in consequence the antennal scale, which in the male is shorter than the antennular peduncle, is in the female considerably longer than the peduncle.

The antenna is about  $1\frac{1}{2}$  times the length of the body (excluding the rostrum).

Two typical specimens of female and male give the following measurements:—

	Female.	Male.
	mm.	mm.
Length of body, excluding rostrum . . . .	68	73
„ rostrum . . . . .	12	12
„ antenna . . . . .	99	106
„ smaller antennular flagellum .	$6\frac{1}{2}$	$18\frac{1}{2}$
„ larger „ „ .	11	24
„ carapace . . . . .	19	21

On analysis and comparison of about two dozen specimens the following sexual differences are apparent:—

*Female.*—Rostrum about twice the length of the eye and  $1\frac{1}{2}$ – $2\frac{1}{2}$  mm. longer than half the length of the carapace: antennular peduncle considerably shorter than the antennal scale; its *larger* flagellum very slightly longer than half the length of the carapace, and its smaller flagellum about two thirds the length of the larger.

*Male.*—Rostrum seldom twice the length of the eye and about half the length of the carapace: antennular peduncle projects beyond the antennal scale; its *smaller* flagellum is very little shorter than the carapace, and the larger flagellum is a third as large again as the smaller.

Roughly speaking, the smaller flagellum of an adult male is about three times the length of that of a female. The small young male resembles the female as regards the relative lengths of antennal scale and antennular peduncle and flagella.

The sixth abdominal segment is not twice the length of the fifth. Exopodites are not present on any of the legs. Epipodites are absent from the external maxillipeds as well as from the last three pairs of legs. There are no pleurobranchiæ on the last two thoracic segments.

BENTHESICYMUS, Spence Bate.

*Benthesicymus armatus*, sp. n.

In the general form, cut, and outline of rostrum and carapace this species resembles *B. brasiliensis* (Sp. Bate), but in the former there is a distinct hepatic spine as in *B. moratus* (S. I. Smith, Alb. Crust. 1886, p. 90).

With *B. moratus* this species is very closely allied. They differ only in the following points:—*B. moratus* has a sharp tooth posteriorly on the carina of the dorsum of the third, fourth, and fifth abdominal segments; its third abdominal segment is carinated; its sixth abdominal segment is more than twice as long as high; its antennal scale is relatively narrower, and the rostrum—judging from the description—is not raised so much at the base as in this species.

The rostrum is long, reaching the tips of the eyes, and is dorsally armed with two small teeth. Between the crest of the rostrum and the cervical groove the median carina is very prominent; behind this it is distinct, though less prominent, to very nearly the posterior margin of the carapace. The post-antennular angular projection of the carapace ends acutely anteriorly, and from this lobe a crest passes backwards in the direction of the hepatic spine. The branchiostegal spine, which is placed well back on the margin of the antero-lateral sinus, is larger than the hepatic spine and is well buttressed posteriorly. The carapace is deep, as in *B. brasiliensis*.

The eyes are in a bad state of preservation; they seem to be deficient in pigment.

The antennular peduncles reach about halfway along the antennal scales. The antennal scales are broad, being only about  $2\frac{1}{2}$  times as long as broad.

The last joint of the endopodite of the first maxilliped is  $\frac{1}{5}$ – $\frac{1}{6}$  as long as the penultimate joint, and the distal extremity of the exopodite suddenly ends in a flagellum. The second and third maxillipeds agree in all details with the description and plates of *B. moratus* (*loc. cit.*).

The branchial formula is typical of *Benthesicymus* (Alcock, Desc. Cat. Ind. Deep-sea Crust. 1901, p. 43). Rudimentary exopodites are present on all the legs.

A small carina begins on the posterior two thirds of the fourth abdominal segment, and is continued backwards; on the sixth segment it is a rigid well-marked carina which terminates abruptly at the posterior margin. There is no tooth or spine on any of these segments. The third abdominal segment has neither carina nor spine. The sixth abdominal segment is barely twice as long as high. The telson has had its tip broken off.

Only one specimen (a female) has been obtained—trawled at Sta. 287, Arabian Sea, 1506 fathoms—and it gives the following measurements:—

	mm.
Length of rostrum .....	10·5
"    carapace with rostrum .....	61·6
"    antennal scale.....	31
Breadth of "    " .....	12·3
Length of sixth abdominal segment .....	25
"    endopodite of tail-fan .....	23·5
"    exopodite " .....	32·5
Length from tip of rostrum to tip of telson (about)	157

This species is most closely connected with *B. moratus*, but can be distinguished from it by the points of difference already noted. From *B. Tanneri* and *B. brasiliensis* it can be distinguished by the presence of an hepatic spine and the absence of teeth on the carinæ of the abdominal segments. In *B. Bartletti* there is a long spine on the dorsum of the fifth abdominal segment. In *B. altus* the posterior margin of the sixth abdominal segment is elevated to form a transverse ridge.

Will be figured in an early issue of the "Illustrations of the Zoology of R.I.M.S. 'Investigator.'"

GENNADAS, Spence Bate.

*Gennadas carinatus* (?), S. I. Smith.

*Benthescymus carinatus*, Smith, Alb. Crust. in Rep. U.S. Fish. Comm. 1882, p. 396; Alcock and Anderson, J. A. S. B. pt. ii. vol. lxiii. 1894, p. 147; Alcock, Desc. Cat. Ind. Deep-sea Crust. 1901, p. 46.

At Sta. 306, Arabian Sea, 930 fathoms, a large specimen (apparently the female of this species) was trawled. Previous to this there was only one specimen (a male, caught in the same locality, near the Laccadives, 902 fathoms) in the Indian Museum.

The following are the measurements of this female:—

	mm.
Length of rostrum .....	13
"  carapace .....	56
"  abdomen .....	88
"  antennal scale .....	30.5
Breadth of " " .....	14.5
Length of sixth abdominal segment .....	22
"  telson .....	24.4
"  inner uropod .....	26
"  outer " .....	29

It agrees in all details with descriptions of this species, except as regards the relative lengths of sixth abdominal segment, telson, and endopodites of tail-fan. The sixth abdominal segment is slightly shorter than the telson, and the telson is not quite so long as the endopodite of the tail-fan.

A sternal tubercle is present in the female between the bases of the first pair of abdominal appendages. The crest-like dorsal carina on the third abdominal segment occurs only on the posterior two thirds.

The "thelycum" is peculiar. Between the bases of the fourth pair of legs a prominent central papilla stands. Towards this papilla a hairy process passes inwards and backwards from the base of each of the third pair of legs, and from the base of each of the fourth pair of legs a tongue-shaped process projects inwards and backwards posterior to the papilla. The papilla thus stands in the centre between the tips of these four processes.

#### Fam. Pandalidæ.

HETEROCARPUS, A. M.-Edwards.

*Heterocarpus longirostris*, sp. n.

At Sta. 310, Bay of Bengal, 960 fathoms, two males of this species were trawled. Of known species they are most closely allied to *H. lævigatus*, from which they differ only in the following characters:—

The rostrum is straighter and much longer (being about  $1\frac{3}{4}$  times the length of the carapace) and is multiserrate dorsally, the teeth being  $\frac{IV+9}{12 \text{ to } 14}$ ; the orbital spine is much larger, it is as large and projects quite as far as the branchiostegal spine; the blunt carina of the third abdominal somite is posteriorly acutely produced to a bluntish point, and is not merely strongly convex; the sharp antennular scale is shorter, it falls well short of the extremity of the second

joint of the antennular peduncle; the antennal scale is longer and narrower; it is about  $\frac{2}{3}$  length of the carapace, and its greatest breadth is very little more than  $\frac{1}{4}$  its length.

	mm.
Length from tip of rostrum to tip of telson . . . . .	144.5
Length of rostrum . . . . .	54
„ carapace . . . . .	31
„ fifth abdominal somite . . . . .	5.8
„ sixth „ „ . . . . .	9
„ telson . . . . .	18

*H. oryx* (A. M.-Edwards) differs from this species in having spines on the third, fourth, and fifth abdominal segments and antennular flagella shorter than rostrum. In *H. carinatus* (S. I. Smith) the rostrum is shorter; antennular flagella are shorter than rostrum; third and fourth abdominal terga are produced posteriorly as spines.

This species has been figured, and will appear in "Illustrations of the Zoology of R.I.M.S. 'Investigator,'" Crust. pt. xi., which is now being issued.

#### Fam. Glyphocrangonidæ.

##### GLYPHOCRANGON, A. M.-Edwards.

##### *Glyphocrangon longirostris* (?), Smith.

*Glyphocrangon longirostris*, Smith, 'Albatross,' Dec. Crust. 1886, p. 51.

Of this species, which is new to the Indian fauna, two specimens (male and female) were trawled at Sta. 326, off the Arakan coast, Bay of Bengal, 1100 fathoms. They are smaller than the specimens described by Smith, but agree with descriptions of this species except as regards the eyes. In the Indian specimens the eyes are decidedly smaller (length of carapace, including rostrum, about  $8\frac{1}{2}$  times the greatest diameter of the eyes) and are not of a dark purplish brown, but of a washed-out purple or a tint resembling blackberry much diluted with cream.

	Male.	Female.
	mm.	mm.
Length from tip of rostrum to tip of telson . . . . .	64	73
Length of rostrum . . . . .	14.8	17
„ carapace, excluding rostrum . . . . .	14	17
Greatest diameter of eye . . . . .	3.4	4
Length of antennal scale . . . . .	6.5	7.6
Greatest breadth of antennal scale . . . . .	3.9	4.4
Length of telson . . . . .	12.2	14.2
„ inner lamella of uropod . . . . .	9	10.4
„ outer „ „ . . . . .	8.5	9.5

The rostrum narrows from the antero-lateral teeth forwards; the antero-lateral teeth are large and prominent. The anterior part of the third carina is represented by 3 or 4 very small discrete tubercles on the hepatic area. There are a few scattered small low tubercles on the dorsum of the carapace between the carinæ. The large tubercles representing the first and second carinæ and the broad flat low tubercles of the abdomen have, like the other carinæ of the carapace, an eroded worm-eaten appearance. A fine velvety pile covers the carapace and rostrum.

There are only nine branchiæ on either side—arthrobranchiæ (5) on ninth to thirteenth somites, and pleurobranchiæ (4) on eleventh to fourteenth—each series diminishing in size from behind forwards. From its reduced number of branchiæ, its relatively small eyes, which are somewhat deficient in pigment, and its dorsal and subdorsal carinæ of the carapace being broken up into lines of tubercles, this Indian species would come under Alcock's subgenus *Plastocrangon* (Alcock, Desc. Cat. Ind. Deep-sea Crust. 1901, pp. 125 & 133).

Of Indian species already known it is most nearly related to *G. (Plastocrangon) cæcescens*, from which it differs in having larger eyes; rostrum longer, slender throughout, acute, and with only two pairs of teeth; a less granular surface; and only one tooth on the anterior part of the fourth carina. *G. sicaria* (Faxon) differs from this species in having the orbital spines smaller and less deflected outwards and the anterior part of the fourth carina divided by a notch into two prominences, of which the posterior is the more salient. In *G. nobilis* (A. M.-Edwards) the rostrum is relatively shorter and its median dorsal keel does not run so far back; the 3 or 4 tubercles representing the anterior part of the second (subdorsal) carina are all produced to spinous points, and not merely the foremost of them; the tubercles on the abdomen are more numerous and discrete; the eyes have more pigment.

#### Fam. Axiidæ.

#### CALASTACUS, FAXON.

#### *Calastacus longispinis*, McArdle.

*Calastacus longispinis*, McArdle, Ann. & Mag. Nat. Hist. ser. 7, vol. viii. Dec. 1901, p. 522; Illus. Zool. Invest., Crust. pl. lvii. figs. 2, 2 a.

This species was described by McArdle from a single specimen (female) dredged in the Arabian Sea at Sta. 279

in 300 fathoms. This season another female—a more complete and larger specimen (length of carapace and rostrum 16.6 mm., of abdomen 27 mm.)—was trawled at Sta. 297 in the Gulf of Oman, 700–689 fathoms.

The median carina running backwards from the rostrum carries a large procurved acute spine in the anterior part of the gastric region. There is some variation in the number of spines on the rostrum and gastric region of the carapace. The margin of the rostrum has 4 or 5 spinelets in front of a basal spine on either side in its free portion, and on the continuation backwards of the rostral margin on each side the spines vary from 2 to 4 and may display a want of symmetry in number and position on the two sides of the same specimen. The spines lying between these and the median carina similarly vary from 2 to 3 in number.

The chelipeds were wanting in McArdle's specimen. In this specimen the larger is 26 mm. long, the hand alone measuring  $9\frac{1}{2}$  mm. The ischium, merus (except distal part), and palm are much compressed. The lower borders of ischium, merus, and hand, and the upper borders of merus and carpus (distal parts), palm, and finger are spinose. These spines are best developed on the merus; elsewhere (except at distal end of lower border of ischium) they are mere spinules. There is a small spine on the upper border of ischium near its distal end. The fingers are about as long as the palm and their prehensile edges are finely serrulate, the teeth pointing towards the tips of the fingers; there is no hiatus left on closure. The smaller cheliped is 17 mm. long; the inferior borders of ischium and merus are spinose; the fingers are very minutely and regularly serrulate.

The second pair of ambulatory legs are  $25\frac{1}{2}$  mm. long; the third pair are very slightly shorter; the fourth pair resemble the second and third pairs, but are considerably shorter and more slender.

The telson has a fair-sized terminal spine with an upcurved tip.

#### ICONAXIOPSIS, Alcock.

##### *Iconaxiopsis spinigera*, sp. n.

In size this species is intermediate between *I. laccadivensis* and *I. andamanensis*. The length of the rostrum is also intermediate; it usually reaches to about the middle of the second joint of the antennular peduncle, but shows considerable variation in length, sometimes falling short of the end of the basal joint, sometimes reaching the distal end of the



second joint of the peduncle. The edges of the rostrum are microscopically serrulate, as in *I. laccadivensis*. A median dorsal carina passes back from the rostrum for a short distance on the gastric region. On the average the rostrum is longer in the female. Little reliance can be placed on the length of the rostrum in determining this species.

The abdomen is longer than the carapace; the pleura of the second, third, and fourth abdominal segments are vertically produced and pointed. The carapace with the rostrum is about as long as the first five abdominal segments combined. The projecting pleura are very pliable, yet retain their smooth surface. In the female the appendages of the first abdominal segment are uniramous, slender and long, about  $\frac{2}{3}$  the length of those of the second segment; in the male they appear to be wanting. They also seem to be wanting in the male of *I. laccadivensis*, but are present and well developed in the male of *I. andamanensis*. The telson has a small median posterior spine.

The eye-stalks are very short and the eyes have no pigment. All that is visible of the eyes is a fair-sized hemispherical white lobule on either side of the base of the rostrum.

The upper antennular flagellum is about as long as the carapace (without the rostrum) measured in the mid-dorsal line, is slightly longer than the lower or inner flagellum and is two or more times its thickness.

Both "stylocerite" and "scaphocerite" are large; the former is the longer and almost reaches the end of the antennal peduncle.

The exopodite of the second maxilliped is much longer than the endopodite. The branchiæ agree with the typical formula of *Iconaxiopsis* as given by Alcock (Desc. Cat. Ind. Deep-sea Crust., Macr. 1901, p. 194), except that I was unable to find any rudimentary podobranch or arthrobranch on the second maxilliped; they differ widely from the formula of *Iconaxius* (Spence Bate).

The chelipeds are massive, chelate, and subequal, the left (rarely the right) being the larger in both sexes. Both chelipeds are about the same length and are approximately as long as the abdomen; more than half this length is made up by the hand. The more massive cheliped has a longer, deeper, and more inflated palm than the other. In the former the palm is longer than the fingers, in the latter the fingers are longer than the palm. The upper border of the palm carries a row of (usually about 8) forwardly directed and prominent spines, which increase in size from behind

forwards and are easily visible to the naked eye. The palm, and especially the fingers, have numerous long hairs. On the upper margin of the free finger there is generally a spinule, best developed on the larger hand and in the male. A ridge, which is spinulose, runs along the outer margin of the broad lower border of the palm and fixed finger. The stouter hand presents a hiatus when the fingers are closed; into this space there projects from the basal end of the prehensile edge of the free finger a broad compressed tooth. The fixed finger is finely serrated in its distal two thirds, on the far side of a fair-sized conical tooth. In the smaller hand there is no hiatus; the fingers are curved inwards and excavated on their inner surface; the prehensile edge of the fixed finger is finely serrated. At the base of the fixed finger, at the distal end of the outer surface of the palm, a conical spine, simple or multicuspid, projects forwards.

In the female the larger hand is sometimes arrested in its development; for instance, in one specimen the large tooth on the free finger is in evidence, yet there is no hiatus, or, as in another specimen, not even this tooth is developed, and the larger hand exactly resembles the smaller in shape and form.

The lower borders of the ischium and merus of the chelipeds are spinose, and 1-3 small low spinules are sometimes visible on the upper border of the merus at its distal end.

The first to fourth pairs of ambulatory legs are slender; the first pair are shorter than the second and third pairs, smooth and minutely chelate. The second and third pairs are about equal in length; their propodites are compressed and have along their posterior borders a row of small tufts of setæ, which at first sight appear like fine spinules. The fourth pair of legs are about the same length as the first pair. The dactyli of the second, third, and fourth pairs of legs are short and subspathulate, and their distal edge is finely serrated, the anterior tooth being produced as a long curved hook.

The eggs are round, large (about 1.6 mm. in diameter), and few in number, about a dozen on the average.

At Sta. 310, Bay of Bengal, 960 fathoms, about a dozen specimens were trawled; of these five were females, four of which were egg-laden. An average-sized specimen gave the following measurements:—

	mm.
Length of carapace and rostrum . . . . .	8
"    abdomen . . . . .	13
"    chelipeds . . . . .	13
"    hand . . . . .	7.5

This species differs from *I. laccadivensis* in being of larger size, upper border of palm spinose in all its extent, fingers more setose, rostrum shorter, pleura of second to fourth abdominal segments more pointed, eyes without pigment, fixed finger in neither hand has two basal enlarged teeth separated by a notch. In *I. andamanensis* the rostrum is shorter and its edges smooth, eyes longer and more slender, pleura of second to fourth abdominal segments are not vertically produced or pointed, upper border of palm is not spinose, carapace with rostrum measured in the mid-dorsal line is merely a little longer than the first four abdominal segments combined.

This species will be figured in an early issue of "Illustrations of the Zoology of R.I.M.S. 'Investigator.'"

## ANOMURA.

### Fam. Pylochelidæ.

#### CHEIROPLATÆA, Spence Bate.

Two specimens (male and female) of a new species of this genus were obtained at Sta. 327, off the Arakan coast, 419 fathoms. Each was housed in the mud-lined cavity of a piece of water-logged bamboo. They are closely allied to, but quite distinct from, *C. cenobita* (Spence Bate, Chall. Macr. Crust. pt. i. 1888, p. 12).

These specimens have been handed over to Major Alcock, Superintendent of the Indian Museum, by whom they will be described in his monograph on the Indian Paguridea, which will shortly be published.

This new species will be figured in "Illustrations of the Zoology of R.I.M.S. 'Investigator.'"

### Fam. Lithodidæ.

#### LITHODES, Latreille.

#### *Lithodes Agassizii*, S. I. Smith.

*Lithodes Agassizii*, S. I. Smith, Bull. Mus. Comp. Zool. x. 1882, p. 8, pl. i.; Henderson, Chall. Anom. p. 42.

A large female of this species, measuring with outspread legs about  $2\frac{1}{2}$  feet across, was taken at Sta. 301, northern part of the Arabian Sea, 1000 fathoms.

	mm.
Length of carapace, excluding rostrum and posterior spines .....	105
Length of rostrum with its spine .....	22
"    spines at base of rostrum .....	18
"    larger spines of carapace .....	14-28
"    smaller " " .....	3-5
"    larger spines on margin of carapace ....	12-28
"    smaller " " " " .....	3-8
Greatest breadth of dorsal surface of carapace, excluding spines .....	93

The large spines on the carapace are less numerous than in any of the specimens described by Smith; in all other details this specimen agrees with Smith's description.

The gastric region is armed with three pairs of large spines, the cardiac region with two pairs, the intestinal with one pair, and the branchial region on either side with six large spines; the more posterior of these twelve pairs of spines on the dorsum of the carapace are longer than the anterior, and dotted in between these dorsal spines are about an equal number of smaller spines about  $\frac{1}{5}$  the size of the large spines. On the margin of the carapace behind the large hepatic spine and the cervical suture are 9 large spines and 2-7 intervening smaller spines about half (or less) the size of the larger. These marginal spines are not exactly symmetrical in place or size on the two sides. There is a small median spine in the sinus in the middle of the posterior border of the carapace.

This specimen differs very little from Smith's larger adult specimen. Like the latter it is nine tenths as broad as long, and the number of *large* spines differ only on the branchial regions and margin of carapace, where the difference in length of the larger and smaller spines may not have been so pronounced as in this specimen. The rostral spine, however, and the spines at its base are much longer in this specimen, being as long as the average large spine on the carapace, and resemble those of Smith's smaller adult specimen.

The abdomen has three large outstanding spines situated on the central plate which represents the fused first and second abdominal terga; the other spines on the abdomen are small in comparison with these three.

A figure will be given in the next issue of "Illustrations of the Zoology of R.I.M.S. 'Investigator.'"

## Fam. Galatheidæ.

## MUNIDOPSIS, Whiteaves, Faxon.

*Munidopsis dasypus*, Alcock.

*Munidopsis dasypus*, Alcock, Ann. & Mag. Nat. Hist., April 1894, p. 329; Alcock, Descr. Cat. Ind. Deep-sea Crust., Macr. and Anom. 1901, p. 252; Illus. Zool. Invest. pl. xiii. fig. 9.

Although numerous adult female specimens of this species have been caught in past years, the males have hitherto been represented by only two small young specimens. This season, at Sta. 331, east of Andamans, 569 fathoms, two adult males were obtained; the extreme length of body of the larger male is 55 mm., and the length of chelipeds is 69 mm.

The chelipeds of the male are (right and left approximately equally) enlarged in all joints and in all dimensions when compared with those of the female. The palms are much broadened and the fingers when closed leave at their base a fairly wide hiatus, into which a 3- or 4-cusped tooth projects from the mobile finger.

The extreme length of body of the larger male caught prior to this season was 28 mm., and its chelipeds were slender throughout, like those of the female, and without a hiatus at the base of the fingers.

There seem to be considerable and fairly frequent variations from the typical (and much the commonest number) 4 spines on the posterior border of the carapace. Variations found are 2, 3, 5, and 7.

A figure of the male will appear in "Illustrations of the Zoology of R.I.M.S. 'Investigator.'"

*Munidopsis Wardeni*, Anderson, var. *andamanica*.

*Munidopsis Wardeni*, Anderson, J. A. S. B. vol. lxxv. pt. 2, 1896, p. 99; Alcock, Descr. Cat. Ind. Deep-sea Crust., Macr. and Anom. 1901, p. 257; Illus. Zool. Invest., Crust. pl. lv. fig. 1.

As mentioned by Alcock in his Descriptive Catalogue of Anomura, there are in the Indian Museum two small specimens of *M. Wardeni* dredged off the Andamans in 500 fathoms, and in these the abdominal terga have no spines. This season two similar but larger specimens (one an egg-laden adult female) were trawled at Sta. 331, east of the Andamans, in 569 fathoms, so that there would seem to be a distinct variety of species *Wardeni* in that locality.

## Measurements of egg-laden female :—

	mm.
Length of body from tip of rostrum to end of telson. . . . .	45
„ chelipeds. . . . .	54

Besides the absence of spinules on the transverse carinae of the second and third abdominal terga, the surface of the carapace generally is smoother and its ridges and rugae less prominent.

*Munidopsis Milleri*, Henderson, var.

*Munidopsis Milleri*, Henderson, Chall. vol. xxvii., Anom. p. 155.

This specimen agrees with *M. Goodridgei* (Alcock and Anderson) and *M. spinipes* (sp. n. et sub descr.) in differing from all other Indian species in having the eyes fused ventrally, immovable, and furnished with no spine or spinule. This variety also comes from much the same depth and locality as *M. Goodridgei*: the former from 568 fathoms, west of Ceylon; the latter from 430 fathoms, off the Travancore coast.

This specimen differs from Henderson's description of *M. Milleri* in the following points :—

(1) Gastric area armed with one pair of spines and three (instead of one) pairs of spinules. These spinules are arranged one pair behind the other and all lying on the circumference of an imaginary circle on the posterior half of the gastric region, thus :—the first pair situated behind the spines; the second pair behind these and wider apart, placed on the lateral margins of the gastric region; the third pair close together near the posterior margin of the gastric region.

(2) Rostrum is not spinulose, but subsquamiform.

(3) Instead of a spinule being present on the anterior border of the carapace behind the antennal peduncle, the largest spine on the carapace is situated there.

(4) Inner margin of palm is spinose and the upper surface is not smooth and glabrous, but has a few scattered tubercles and tufts of long silky hairs.

(5) There is a well-marked spinule in the centre of the triangular dilated area of the carapace, lying between the two divisions of the cervical groove.

This specimen differs from *M. Goodridgei* chiefly in :—

(1) Posterior border of carapace spinulose.

(2) An extra spine on the lateral border of the carapace.

(3) Three extra pairs of spinules on the gastric region and

a spine on either side of the carapace between the two divisions of the cervical groove.

Unfortunately only one specimen (a male) was obtained at Sta. 334, west of Ceylon, 568 fathoms.

*Munidopsis spinipes*, sp. n.

This species agrees with *M. Goodridgei* and *M. Milleri*, var. (above described), amongst Indian species in having the eyes absolutely immovable, yet furnished with neither spine nor spinule.

The carapace is convex, subquadrangular, about the same breadth in front and behind. A pair of large spines are situated anteriorly on the gastric region. There is no vestige of a spine or spinule on the cardiac region or posterior border of the carapace. The rostrum is short and styliform; towards its tip there is obscure microscopic serration on its lateral margins. The supra-antennal spines are of good size. On the lateral border there are three large spines and one or two spinules, situated thus:—One spine at the antero-lateral angle, a second at the anterior angle of the triangular area lying between the two divisions of the cervical groove, and the third immediately behind the posterior division of the same groove; behind the second spine and lying with it between the two divisions of the cervical groove there may be one or two spinules, diminishing in size from before backwards.

The abdomen is smooth and has a few scattered hairs; the second tergum is transversely bicarinate, and the third transversely grooved. In the telson on either side between the two lateral plates there is a small calcareous patch, much the same as in *M. ciliata*.

The basal joint of the antennule has one spine and three spinules: the spine (large) on the outer side and two spinules on the inner side of the distal end of the joint; whilst the third spinule is on the far side of the globular swelling on the upper and outer surface of the basal joint. On the inner edge of the merus of the external maxillipeds there are two large spines.

The chelipeds are subequal and much longer than (nearly a third as long again as) the fully extended body. The arm has three longitudinal rows of spines and four large terminal spines; the wrist has two rows of spines and four terminal spines; both edges of the outer surface of the palm are spinose. The fingers are not straight, but meet throughout their length; the fixed finger is finely serrated, and a little

beyond its centre it has a projecting lobe which fits into a corresponding depression in the free finger. The free finger is finely dentate in its distal half or so; its proximal half forms a projection, with its free margin coarsely dentate, which fits into a depression at the basal end of the fixed finger. There is no epipodite on any of the thoracic legs.

The ambulatory legs are long; the first pair are longer than the fully extended body. The merus of the first three pairs has a row of spines almost throughout the whole extent of its anterior border, and this is continued along the anterior border of the carpus as a row of spines, and not merely as a terminal spine; their dactylus is hardly or only very slightly more than half the length of the propodite.

Three egg-laden females and one male were taken in the trawl at Sta. 310, Bay of Bengal, 960 fathoms. The male unfortunately had lost its chelipeds. The largest female gives the following measurements:—

	mm.
Length of fully extended body, including rostrum ..	30·6
„ chelipeds .....	39
„ first pair of ambulatory legs .....	31·8

This species is very closely allied to *M. Goodridgei*, from which it differs mainly in having no spines or spinules on the cardiac region; chelipeds not very unequal, both of them much longer than the fully extended body, and both edges of the outer surface of the palm spinose; legs more spinose, the carpus having a row of two or more spines, and not merely a terminal spine on its anterior border; the lateral border of the carapace with three spines and two spinules instead of two spines and one spinule.

This new species has been figured for the next issue of “Illustrations of the Zoology of R.I.M.S. ‘Investigator.’”

*Munidopsis (Orophorhynchus) ciliata*, Wood-Mason.

*Munidopsis ciliata*, Wood-Mason, Ann. & Mag. Nat. Hist., Feb. 1891, p. 200; Faxon, Mem. Mus. Comp. Zool. xviii. 1895, p. 84; Alcock, Desc. Cat. Ind. Deep-sea Crust., Anom. p. 267; Illus. Zool. Invest., Crust. pl. xi. fig. 3.

*Munidopsis brevimana*, Henderson, Chall. Anom. p. 154, pl. xvii. fig. 1.

One male specimen (length of body, including rostrum, 43 mm.; length of chelipeds  $24\frac{1}{2}$  mm.) was caught at Sta. 326, Bay of Bengal, 1100 fathoms. It presented the following peculiarities:—Carapace and abdomen tomentose; lateral margins of carapace armed with only three spines, two only



being present between the two divisions of the cervical groove and no spine at all at the extreme antero-lateral angle of the carapace. In other respects this specimen agrees with descriptions of *M. ciliata*.

Last season at Sta. 310, Bay of Bengal, 960 fathoms, three small specimens of this species were caught in the same trawl: the smallest had the five typical spines on the lateral margins of the carapace; the other two had an extra small spine (making four in all) between the two divisions of the cervical groove. The number of spines on the lateral borders of the carapace of this species would thus seem to vary from three to six.

Fam. Uroptychidæ.

UROPTYCHUS, Henderson.

*Uroptychus glyphodactylus*, sp. n.

Length of carapace, including rostrum, less than its greatest breadth. Carapace moderately convex from side to side, its surface and margins all smooth and glabrous except for a spine at each antero-lateral angle. Hardly any indication of regions. Rostrum has a broad base, but is exceedingly short, horizontal, and placed on a lower level than the summit of the carapace; in length it is considerably shorter than the eye-stalks. The pterygostomial region is very limited in extent, smooth, slightly inflated, and produced anteriorly as a well-marked acute spinule.

The eyes are of moderate size and, to the naked eye, of a uniformly brown colour; but under a lens they appear as a delicate dark brown network enclosing large pale facets. The eye-stalks are short, stout, and freely mobile.

The antennal acicle is very short and stunted, not more than  $\frac{1}{3}$  the length of the antennal peduncle, the distal end of the penultimate joint of which the acicle does not reach. Like the rostrum it is broad at the base and rapidly tapers to a point. The flagellum is barely twice the length of the peduncle.

	Male.	Female.
	mm.	mm.
Length of body, including rostrum . . . . .	11	
"    "    excluding    "    . . . . .	$10\frac{1}{4}$	
"    carapace, including rostrum . . . .	$4\frac{3}{4}$	$4\frac{3}{4}$
"    chelipeds . . . . .	26	22
"    second pair (longest) of ambula- latory legs . . . . .	12	12
Greatest breadth of carapace . . . . .	$5\frac{1}{4}$	$5\frac{1}{4}$

The chelipeds are long and smooth, except for a spinule on the dorsal margin of the ischium at its distal extremity and 1-3 prominent spinules at the distal ends of both merus and carpus on their upper and inner aspects. There are a few tufts of hairs (2-5 in each tuft) scattered sparingly on the joints, but mostly on the carpus; these tufts may escape notice unless looked for with a lens. On the fingers there are numerous hairs. The palm is very slightly shorter than the wrist and slightly dilated. The fingers are elegantly curved, forming at their base a wide hiatus, into which a conical tooth projects from the prehensile edge of each finger—that from the free finger being the larger and more distally placed. The summits of these two teeth are seen under a strong lens to be furnished with numerous spiniform cusps. In slightly more than their distal or apical third the closed fingers leave no gap, the prehensile margins in that region being smooth or very minutely serrulate. The chelipeds are about five times the length of the carapace, including the rostrum.

The ambulatory legs are about one third the stoutness of the chelipeds; the first pair are slightly shorter than the second, which are about half the length of the chelipeds; the third pair are more than a dactylus shorter than the first or second pair. The legs are smooth, unarmed, and glabrous, except the dactyli and the posterior border of the propodites. These latter parts are well coated with hairs. The dactyli are strongly curved and long, being about the same length as the propodite, and their posterior border is finely toothed in its distal two thirds; the posterior border of the propodites is unarmed.

The abdomen is smooth and has hairs only on the margins of the pleura, telson, and caudal swimmerets. The telson is much shorter than (about half the length of) the caudal swimmerets.

The ova are large, about 1 mm. diameter, and comparatively few in number.

One male and an egg-laden female were trawled at Sta. 331, east of the Andamans, 569 fathoms. The female was found and preserved clinging to a species of *Virgularia*, the first pair of ambulatory legs fixed to the stem from below upwards, and the second and third pairs clasping the stem from above downwards (or behind forwards).

In the female neither spines nor hairs are so well developed as in the male. For instance, the spine at the distal end of the upper margin of ischium of cheliped is hardly evident, and there are fewer and less prominent spines at

the distal ends of merus and carpus. The chelipeds of the female are much more slender and shorter than those of the male. Both chelipeds of the male are approximately equally enlarged (right palm possibly slightly more dilated than the left).

Of species hitherto described this one comes nearest *Diptychus uncifer* (A. M.-Edwards) and *D. politus* (Henderson). The new species differs from the former in having a shorter rostrum and still shorter antennal acicle; merus of cheliped smooth on its under surface, and no sharp tubercle on under surface of ischium; merus and carpus armed distally; fingers entirely different. It differs from *D. politus* in the rostrum being much shorter and the acicle still more so; carapace broader than long; fingers different. This species can be at once distinguished by the form of the fingers, size of rostrum and antennal acicle, and the carapace being broader than long.

The telson and caudal swimmerets of the females of this genus are not so acutely flexed on the preceding segments or so closely applied to them as in the males.

Figures of both the male and female, the latter clinging to a species of *Virgularia*, will appear in "Illustrations of the Zoology of R.I.M.S. 'Investigator.'"

## BRACHYURA.

### OXYRHYNCHA.

#### Fam. Maiidæ.

#### *Cyrtomaia Goodridgei*, McArdle.

*Cyrtomaia Goodridgei*, McArdle, Ann. & Mag. Nat. Hist. ser. 7, vol. vi., Nov. 1900, p. 472; Ill. Zool. Invest. pl. lix. figs. 1, 1 a, 1 b, & 1 c.

Of this species, described by McArdle from a single large male specimen, this season three more specimens—an adult and a young male and an egg-laden female—were obtained.

*Dimorphism in the male.*—The adult male was caught at Sta. 332, south-east of South Andaman Island, 279 fathoms. It is somewhat smaller than McArdle's specimen, but it presents this very striking and curious difference—its chelipeds are in all joints, but especially the distal extremities of the palms, very much enlarged and inflated. In the general arrangement of the spines on the chelipeds both specimens agree, and the gape (about 45°) is similar in both. The hiatus, however, left at the base of the fingers when closed is in the enlarged chelipeds much wider. The fingers

are stout at the base and rapidly taper towards the tips, and for this reason they appear relatively shorter than in McArdle's specimen. Both chelipeds of this new specimen are equally enlarged, and the relative lengths of their joints are maintained and correspond with those of the type specimen. Those ambulatory legs which happen to be present are not disproportionate in length or thickness when compared with the "type."

In the small male (length of carapace and rostrum 11 mm.) caught at Sta. 322, east of South Andaman Island, 378 fathoms, the chelipeds are slender and resemble a female's.

There is no evidence of the "type" having been attacked by parasites or other disease which might account for the chelipeds not being enlarged.

The relative size of the hand and palm in the "type," new male, and egg-laden female respectively can be judged from the following measurements:—

	Type ♂. mm.	New ♂. mm.	Ovige- rous ♀. mm.
Length of carapace and rostrum . . . . .	33½	29	21½
"    gastric spine . . . . .	13	11	7
"    branchial spine . . . . .	8	7	4
Greatest breadth . . . . .	32	28	21
Length of chelipeds . . . . .	77	100	45½
"    hand . . . . .	35½	46½	21
Maximum and minimum breadth of palm . . . . .	5½-3½	11-4	2½-1¾

*Description of the female.*—The egg-laden female was caught at Sta. 323, west of Cape Negrais, 463 fathoms. As in the male, on the strongly deflexed anterior portion of the carapace are well-raised granular ridges, three on either side extending from the large gastric spine to (1) the prominent postocular spine, (2) base of rostrum, and (3) base of concavity of orbital notch. The two innermost ridges which run to the base of the rostrum are thickly coated with long peg-shaped hairs. Rostral spines form a U-shaped interspace and the interantennular spine descends in the same plane as the deflexed anterior portion of the carapace. There is merely a warty tubercle or prominence on a granular mesial ridge midway between the two long gastric spines. Similarly a short warty transverse ridge represents the small intestinal spine.

The antero-external angle of the merus of the external maxillipeds is produced as a flat rounded projection armed with 3 or 4 acute spinules on its margin. Chelipeds and legs are armed with spines and setæ.

In the female the chelipeds are only very slightly stouter than the first ambulatory legs. The fingers are very indistinctly toothed, the prehensile edges being merely roughened; they are not close-fitting. A small but well-marked acute spine is present at the base of the free finger on its dorsal aspect (present also in the male).

The sternum of the female has seven prominent spines, arranged as follows:—a spine at the base of each cheliped; another at the base of each of the first pair of ambulatory legs, on the margin of the concavity in which the eggs lie; a pair of spines placed transversely at the anterior edge of the same cavity; one (smaller) spine in the middle line between the last pair mentioned and the anterior border of the sternum. The whole space between the bases of the four pairs of legs is concave and occupied by the eggs, which are small and numerous.

The abdomen of the female is broad and carinate, except the posterior two thirds of the last segment; it consists of seven distinct segments, of which the fifth and sixth are broadest. The surface is very granular and sparsely covered with longish hairs. A granular tubercle is present on the carina of the first segment and a prominent acute spine on that of the sixth segment. The ambulatory legs diminish in length and girth from first to last; the last two pairs are very slender; the last pair in this egg-laden female are acutely flexed and carried dorsally.

Colour in life deep pink.

The female and the enlarged chelipeds of the male will be figured in an early issue of "Illustrations of the Zoology of R.I.M.S. 'Investigator.'"

#### Fam. Parthenopidæ.

#### EUMEDONUS, Edw.

#### *Eumedonus granulatus*, sp. n.

Carapace depressed and sharply pentagonal. Bifurcation of rostrum at tip very faint, occasionally absent, and then the bilobed nature of the rostrum can only be made out by the median longitudinal dorsal groove. The rostrum is transversely narrower and thicker (dorso-ventrally) than in *E. zebra*, where it is a broad thin lamina deeply bifid at the tip. There are no coloured band-markings on the carapace. The surface of the body generally, including chelipeds and legs, is coarsely but evenly and regularly granular. The regions of the carapace are well defined.

Chelipeds of female are no longer than the ambulatory legs, those of the male are much longer; in both sexes they are more massive and armed with spines which are granular and not very acute. The most prominent of these spines is, as in *E. zebra*, that at the inner angle of the wrist. The palms of the male have no teeth on their upper border, those of the female have 2-4 teeth. The chelipeds are unequal in both sexes, the chief difference being in the relative size of the palms; there is little difference in length, and that difference is due mainly to the palm of the right hand being longer as well as stouter than that of the left.

The ambulatory legs are only slightly compressed; the upper border of the merus is seldom cristate, but is granular (that of fourth pair being dentate) and ends in a distal tooth.

This species differs from *E. zebra* in having its surface coarsely granular; no coloured bands on carapace; rostrum narrower, thicker, and only faintly notched at the tip; merus of legs not (or very seldom) strongly compressed or cristate.

*Commensalism.*—Fixedly adhering to the carapace and legs of a large male are a few tubicolous worms (*Serpula*) and one small patch of what seems to be Foraminifera Perforata (*Polytrema*).

At Sta. 291, 49-48 fathoms, two adult males, two ovigerous females, and several young specimens were got; at Sta. 296, 47 fathoms, an egg-laden female and a young male were obtained: all are from the Persian Gulf, mud and sand bottom.

The largest specimens give the following measurements:—

	Ovigerous female. mm.	Male. mm.
Length of cheliped .....	11	21
"    carapace .....	10	11·5
"    third pair of ambulatory legs ..	12	13·5
Greatest breadth of carapace.....	10·8	11·5

This new species will be figured in an early issue of "Illustrations of the Zoology of R.I.M.S. 'Investigator.'"

#### OXYSTOMA.

##### Fam. Leucosiidæ.

#### OREOPHORUS, Rüppell.

##### *Oreophorus reticulatus*, Adams and White.

*Oreophorus reticulatus*, Alcock, Carcin. Fauna Ind., Oxyst. p. 174 and references.

Of this very variable species a single ovigerous female was

taken at Sta. 291, Persian Gulf, 49–48 fathoms. The carapace is 12 mm. long and 15 mm. broad; the length of the chelipeds is 15 mm. The eggs are minute and numerous; they do not interfere with the tight closing on the thorax of the lid-like abdomen.

This specimen presents the following peculiarities:—The surface and edge of the carapace, the pterygostomial regions, the external maxillipeds, the anterior margin of the thorax, and the chelipeds down to the very fingers are prettily ornamented in parts with an encrusting growth of Foraminifera (*Polytrema miniaceum*, Moebius, 'Meeresfauna von Mauritius'). These Foraminifera form dark red irregular jagged processes on the grey-coloured carapace and other parts. The caverns are shallow; the second cavern has a wide open communication with the third, so wide that they look like one elongate cavern. The floors of the caverns and of the channel which bounds the intestinal region have bead-like granules scattered over them. The tumid branchial regions are raised to a rugged peak, as in *O. reticulatus*, var. *alcicornis*, but the tip is not bifid. The outer surface of both fingers is smooth, without any trace of rows of pits.

Of seven Indian Museum specimens from off Ceylon, 34 fathoms, five have fingers exactly as in this specimen, the other two have well-marked rows of pits on the outer surface of the fingers. These Ceylon specimens are also encrusted, but nothing like to the same extent, with the same species of Foraminifera; they have, however, three distinct and separate caverns on either side, and the branchial regions are tumid, but not raised and rugged.

*Ixoides cornutus*, gen. et sp. n.

This genus agrees with *Arcania* and *Ixa* in having the hands much longer than broad, tapering from a swollen base, and the fingers opening in a nearly vertical plane, the tip of the dactylus movable through an arc of about 60°. It is more closely allied to *Ixa*, but it can be distinguished from either by the following diagnostic points:—The fingers are two thirds the length of the palm, or about half the combined lengths of wrist and palm; the sides of the carapace are produced into two stout, conical, horn-like processes, tapering from their base; carapace is globular and its median regions are not pronouncedly demarcated by channels or grooves; the merus of the external maxilliped has its outer edge cut away and bevelled, and this bevelled edge forms the inner wall of the afferent branchial canal; the front is moderately

prominent, projecting about as far as the salient edges of the afferent branchial canal.

The carapace of this species is globular, rhomboidal, not very much broader than long, produced at the junction of the antero-lateral and postero-lateral borders into a stout horn-like process, which projects straight outwards, tapering steadily but very gradually until in its distal fifth it rapidly tapers off to a point; the proximal end of the lateral processes is not inflated or sausage-shaped, as in *Ixa*. Except for a deep sulcus on either side of the intestinal region, separating it from the branchial regions, there is no pronounced grooving of the carapace; in the adult faint indications of grooving can be made out, and in the young this grooving, although faint, is more discernible; much more distinct grooving can be seen in species of *Arcania*. The carapace in the young is covered with small vesiculous granules, which in the adult for the most part disappear, except in the anterior part of the carapace and at the bases of the processes. Between these vesiculous granules the surface is rough and finely granular. At either end of the posterior margin is a large, stout, papilliform process about a third of the length of the lateral processes. On the middle of the intestinal region there is a much smaller bullous projection. The front is bilobed and projects further forward than in *Ixa*. A very small bullous projection occurs on the summit of the antero-lateral convexity of the subhepatic region.

The orbits are emarginate on the dorso-lateral aspect in the region of the orbital sutures. The antennules do not fold so obliquely (by reason of the front of the carapace projecting more forwards) as in *Ixa*. The antennal peduncles are small but distinct, and their flagella rudimentary.

The external maxillipeds, as in *Ixa*, are partly sunken below the level of the edges of the buccal cavern, which is triangular, and the ischium is grooved along its inner border, but the merus is quite different and peculiar in its shape. The merus is grooved only in its basal fifth or so; beyond this its outer edge is bevelled to such a degree that the upper surface in its distal two thirds is a mere ridge, and the bevelled outer edge dovetails with the margin of the efferent branchial canal and forms the inner wall of the afferent branchial channel. The inner borders of the exognaths are concave, their distal ends curving inwards and converging. The surface of the exognath is strongly convex and, like the raised outer border of the ischium, has a band of vesiculous granules; its distal free margin is well fringed with hairs



and falls short of the raised anterior edge of the afferent branchial canal by a distance equal to about half the length of the merus.

The chelipeds are long, about twice the length of the carapace; the distal half of the hand is very slender; the fingers are about two thirds the length of the palm and are filiform.

The abdomen of the adult male (female unknown) consists of five pieces, the third, fourth, and fifth segments having coalesced; in the young specimen the sutures are still visible.

Three specimens (one large and two small males) were taken at Sta. 292, Persian Gulf, mud bottom, 53 fathoms. The largest gave the following measurements:—

	mm.
Length of carapace . . . . .	29
Breadth, including lateral processes . . . . .	62.5
Length of lateral process . . . . .	14.5

Only one cheliped is present in the large specimen, and that one has had the tips of the fingers broken off; but one of the smaller specimens has a complete cheliped, which shows the following characters:—The cheliped is slightly more than twice the length of the carapace; the fingers are well under half the length of the hand, are slightly hooked at the tip, and have their prehensile edges closely set with small microscopic jagged teeth, and at regular intervals a few larger and recurved teeth. This specimen gives the following measurements:—

	mm.
Length of carapace . . . . .	10
"    cheliped . . . . .	20½
"    palm . . . . .	5.6
"    free finger . . . . .	3.8

This species has been figured for "Illustrations of the Zoology of R.I.M.S. 'Investigator.'"

Fam. Dorippidæ.

ETHUSA, ROUX.

*Ethusa hirsuta*, McArdle.

*Ethusa hirsuta*, McArdle, Ann. & Mag. Nat. Hist. ser. 7, vol. vi., Nov. 1900, p. 474; Illus. Zool. Invest., Crust. pl. lix. figs. 2, 2 a.

This species was described by McArdle from an adult

female and a young male. This season two males were caught at Sta. 333, off the west coast of Ceylon, 400 fathoms.

*Description of adult male.*—The chelipeds are very unequal; the right is in all joints and in all dimensions much larger than the left: the disparity in size is most marked in the palm, the right being many times larger than the left. The left cheliped resembles that of the female, is not enlarged, and is more slender than the first and second pairs of ambulatory legs; the right cheliped is more massive than these legs in all joints. The left cheliped does not reach as far as the fingers of the right, and the right cheliped is about three quarters the length of the first pair of ambulatory legs. The fingers meet only at their tips, and the prehensile edges are smooth and without a vestige of teeth, unless a smooth rounded lobe or bulging on the under surface of the free finger of the enlarged cheliped be excepted. The palm of the enlarged cheliped is large, broad, and inflated, and the fingers are short and stout.

	Male.
	mm.
Length of carapace .....	12
Breadth       " .....	12
Length of smaller cheliped .....	17½
" larger       " .....	24
" first ambulatory legs.....	35
" second     "       " .....	40

A noteworthy and what appears to be a specific character of *E. hirsuta* is the length of snout or spout formed by the efferent branchial channels. This spout, in either sex, extends forwards well between the bases of the antennules. In none of the males in the Museum collection do the external orbital spines reach quite as far forwards as the rostral spines; they fall short, however, by very little. The inner pair of frontal teeth have a distinct tendency to be stouter and longer than the outer pair and to point slightly outwards.

The large male, which has the dimensions given above, will be figured in the next issue of "Illustrations of the Zoology of R.I.M.S. 'Investigator.'"

#### CYCLOMETOPA.

#### Fam. Xanthidæ.

#### XANTHODES, Dana.

#### *Xanthodes cumatodes*, sp. n.

Carapace roughly hexagonal; frontal and antero-lateral

borders forming together a strongly convex arch; the postero-lateral borders strongly convergent; the fronto-orbital border much more than half the greatest width of the carapace.

The anterior two thirds of the carapace are markedly areolated and peculiarly granular; the granules are bead-like and for the most part arranged in transverse rows, these rows occupying the tops of successive small ridges, which look like wavelets or ripples moving in a forward direction. Between these rows of granules and in the grooves defining the regions the carapace is smooth. The margins and sides of the carapace, along with the posterior third of the surface, are fairly uniformly studded with granules. No hairs on carapace. A sinuous groove marks off the fronto-orbital region; the gastric region is defined and divided into three subregions by similar deep grooves, while a shallow longitudinal groove on either side divides the lateral gastric subregions in two; the branchio-hepatic regions are divided by grooves into about four areas (a marginal, two dorsal, and an internal triangular one).

Front bilobed; the outer angle is not sharply marked off, and from it pass inwards two beaded ridges, which give the front the appearance of having a double edge. The outer angle is separated from the supraorbital margin by a well-marked notch. Antero-lateral border divided into four granular lobes or teeth. Between the first tooth and the external orbital angle there is a depression which allows, in a dorsal view, a small tubercle to be seen; this tubercle lies close to the first tooth of the antero-lateral border and lies in a line between it and the angle of the buccal cavity. The third lobe or tooth is largest, the first smallest; the second and fourth are about equal.

The three grooves of the orbital border are distinct. The inner and outer ends of the lower orbital margin end in teeth, the inner being much the larger. The basal antennal joint is short and just reaches the front. A small dog's-ear-shaped flap projects from the eye-stalk on to the dorsal aspect of the cornea, and on this stands a tuft of setæ. There is a transverse row of granules on the front of the eye-stalk just internal to the cornea, the uppermost granule being usually enlarged and dentiform.

The anterior edge of the merus of the external maxilliped is almost transverse; there is a notch in it just external to the inner angle. The longitudinal ridges that define the efferent branchial canals are indistinct and do not reach the anterior boundary of the buccal cavern.

The chelipeds are not twice the length of the carapace;

merus not entirely hidden beneath the carapace; its outer surface has transverse rows of pearly granules and its upper border is spinulose in its distal part. Outer surface of wrist and palm furnished with pearly granules. The outer surface of the wrist is irregular, but generally shows a transverse groove at the distal end and a prominent tooth at the angle of the upper or inner border. The outer surface of the palm shows three parallel longitudinal furrows, as in *X. Lamarckii*, the pearly granules at the margins of the furrows being arranged in rows. The inner surface of the palm is smooth and polished. The fingers are pointed and blackish brown in spirits.

Upper margin of merus of ambulatory legs serrulate. The upper border of the carpus is peculiar; it is furnished with a central and a subdistal hump, which make it saddle-shaped. The upper border of the propodite is convex and, like that of the carpus, finely granular. A fine longitudinal granular ridge runs along the outer surface of carpus and propodite. Dactylus is long and bristly and ends in a short horny spine.

Six females (four ovigerous) and one male were trawled at Sta. 292, Persian Gulf, mud bottom, 53 fathoms. The male, which is about the size of the largest female, gives length of carapace 8, length of cheliped 12, and greatest width 11.3 mm.

This species will be figured in an early issue of "Illustrations of the Zoology of R.I.M.S. 'Investigator.'"

#### ACTUMNUS, Dana.

##### *Actumnus margarodes*, sp. n.

Carapace subcircular, with concave postero-lateral borders, strongly areolated and moderately convex; it is not much broader than long. Fronto-orbital border is about two thirds the greatest width of the carapace. The central lobes of the front are prominent, somewhat depressed, and the central notch is shallow; the outer angles of the front are not large, are well marked off from the central lobes, but are only marked off from the supraorbital angles by a shallow groove. The antero-lateral border is cut into three teeth exclusive of the outer orbital angle.

The main areolation on the anterior half of the carapace is -U- shaped, and is surmounted by a band (1-2 deep) of sharp crystalline granules; the lateral arms are continued outwards and backwards in a gentle curve towards the third or last tooth of the antero-lateral border. A short

transverse band of these granules also lies on the branchial region on either side in a line between the posterior teeth of the antero-lateral borders. A similar band marks the anterior cardiac region, and the inner halves of the supra-orbital margins are likewise furnished with these granules. A few of these crystalline granules also occur on the upper aspect of the wrist and palm of both the larger and smaller chelipeds.

The posterior half of the carapace has a dense short furry coating, as also have thorax, abdomen, chelipeds to bases of fingers, and the exposed surfaces of the legs.

The supra-orbital margin has a notch just internal to the outer angle. The outer orbital angle is dentiform and similar to the teeth of the antero-lateral border. Just below the outer angle is an angular notch. The basal antennal joint just reaches the front; the orbital hiatus is not closed.

The chelipeds are unequal; upper border of arm is serrulate; inner angle of wrist is sharp, its exposed surface having a few sharp crystalline granules, as also has the outer surface of the palm. Margins of legs are fringed with long hairs.

Only one male specimen was obtained, at Sta. 292, Persian Gulf, 53 fathoms. Length of carapace 6 mm., the greatest width 7.5 mm. A figure of this specimen will be given in "Illustrations of the Zoology of R.I.M.S. 'Investigator.'"

#### Fam. Cancridæ.

#### TRICHOPELTARIUM, A. M.-Edwards.

#### *Trichopeltarium ovale*, Anderson.

*Trichopeltarium ovale*, Anderson, J. A. S. B. vol. lxxv. pt. 2, p. 103; Illus. Zool. Invest., Crust. pl. xxv. figs. 4, 4a; Alcock, Carc. Faun. Ind. no. 4, Brach. Cyclom. pt. 2, 1899, p. 96.

This species was described by Anderson from a single specimen (a female) caught off the west coast of Ceylon. This season another female was caught at Sta. 323, west of Cape Negrais, 463 fathoms, and also a male at Sta. 322, east of South Andaman Island, 378 fathoms.

*Description of male.*—It is smaller than any of the females in the Museum collection. As in the female, a very prominent and procurved lateral epibranchial spine is present on either side; it is about the same size as the frontal prongs. The three frontal spines are about the same length; in the specimens available the central spine is in the male very

slightly shorter and in the females very slightly longer than the lateral. The measurements of the male are as follows :—

	mm.
Length of carapace, including mid-frontal spine..	55
Greatest breadth of carapace.....	47
Depth of carapace .....	29
Length of greater cheliped .....	91
"    smaller    "    .....	51
"    first pair of ambulatory legs .....	85

The corneæ are very deficient in pigment and are represented by small, hemispherical, pinkish-tinged patches placed obliquely (posterior aspect) on the summit of the long, slender, but rigid eye-stalks, which are freely movable in the horizontal plane. These corneal patches seem to be very easily detached, for they are absent from about half the number of eye-stalks examined.

The chelipeds are very unequal in the male; all joints of the larger cheliped (the right) are enlarged in all dimensions. The merus is huge, and is not curved to correspond with the inflated pterygostomial region; it is straight, and fully half the joint projects free beyond the margin of the carapace. The most marked difference between the two chelipeds is in the hands. The palm of the larger cheliped is inflated and its inner surface is practically smooth, being coated merely by very minute vesiculous granules. The fingers are markedly different in the two chelipeds. Instead of being long, slender, acute, curved, slightly excavated on the inner surface, and of equal length (tips coinciding), as in the smaller cheliped and in those of the female, the fingers of the larger cheliped are straight, stout, and relatively short. The fixed finger is relatively very short and inflated: the free finger is deep and vertically compressed; its free border is highly arched and is armed with spines, tubercles, and hairs almost to the very tip. The free finger is  $21\frac{1}{2}$  mm. long and overlaps in parrot-beak fashion the short fixed finger, which is only 13 mm. long. The fingers, when approximated, are not close-fitting, and each has 6 or 7 coarse teeth. The smaller cheliped is stouter than the legs.

Both sternum and abdomen are much narrower than in the female. At the level of the interspace between the bases of the first and second pairs of ambulatory legs the breadth of the abdomen is about  $\frac{1}{3}$  breadth of sternum in the same transverse line. The abdomen is seven-jointed and covered with coarse hairs; the first two segments bear spines just as in the female; the other segments, however, have neither

spines, tubercles, nor granules, but are all smooth like the last segment of that of the female. The vasa efferentia perforate the coxopodites of the last pair of legs, the openings being of fair size.

The male has been figured for "Illustrations of the Zoology of R.I.M.S. 'Investigator.'"

Fam. Corystidæ.

GOMEZA, Gray.

*Gomezia distincta*, de Haan, var.

*Corystes* (*Oeidea*) *distincta*, de Haan, Faun. Jap., Crust. 1850, p. 45, pl. xiii. fig. 2.

*Gomezia*, Gray, Zool. Misc. p. 39.

The only difference between this variety and the type described by de Haan is that the spine of the infraorbital margin of this one is much shorter than (in fact reaches only about a third of the way along) the supraorbital spine.

It should also be noted that of the ten marginal spines on either side of the carapace the four anterior ones, although decidedly larger and with broader bases than the following spines, are not by any means so much larger in comparison with these latter as the figure given by de Haan represents them. In this case it requires more than a superficial examination or glance to make out that the four anterior spines are larger; in de Haan's figure these four are enormous compared with the following spines.

Only one specimen (a male), 8 mm. long and 5.5 mm. broad, was caught, and unfortunately its chelipeds and legs are wanting. It was trawled at Sta. 292, Persian Gulf, 53 fathoms.

This genus is new to the Indian fauna.

C A T O M E T O P A.

Fam. Gonoplacidæ.

CERATOPLEX, Stimpson.

*Ceratoplax granulosa*, sp. n.

Length of carapace is three quarters its greatest breadth. Front is a little less than one third its greatest breadth, deflexed, decidedly arched, and deeply notched.

Not only is the palm on its outer surface covered with very prominent vesiculous granules, but the surface and sides of the carapace as well, except a transversely oval patch

about half the breadth of the carapace stretching across the intestinal region, where the surface of the carapace is densely pitted. Regions of carapace are fairly well marked out. Surface of carapace, chelipeds, and legs sparsely covered with hairs and the margins are more thickly coated and with coarser hairs, which latter have a tendency to be arranged in rows, as, for instance, on the propodite of the first ambulatory leg.

	Male.
	mm.
Breadth of carapace .....	16
Length „ .....	12
Breadth of front .....	5
Length of third pair of legs .....	27

Orbits are widest internally, corresponding with the eye-peduncles, which are conical, with the broad base internal. Eyes are fairly well pigmented, little, if at all, deficient in pigment. The antero-superior margin of the eye-peduncle is acute, covered with longish hairs, and lies in line with a similarly hair-clad transverse ridge at the upper borders of the deflexed front, this ridge marking the angle of flexion of the front on the carapace proper.

The basal joint of the antenna reaches the level of the lower border of the orbit and falls short of reaching the posterior border of the deflexed front merely by the breadth of the slender second antennal joint. The second antennal joint projects by more than half its length beyond the front and supports the third joint (which is more than half the length of the second joint) and a moderately long flagellum.

The buccal cavern gradually widens from behind forwards; longitudinal ridges of endostome evanescent; ischium of external maxillipeds a little longer than broad and with a longitudinal sulcus; merus transverse, with the antero-external angle produced and rounded, and with a notch at the antero-internal angle from which the next joint springs.

Chelipeds are shorter than legs; the inner angle of the wrist is produced to form a very distinct tooth or spine, and on the upper margin of the merus is a subdistal tooth, very well developed and prominent and more acute than that on wrist. Ambulatory legs are compressed, except the dactyli, which are styliform; the third pair, which are the longest, are  $2\frac{1}{4}$  times the length of the carapace, and the fourth or last pair are much smaller than the others. Projecting distally from the postero-superior margins of the coxopodites of the ambulatory legs are peculiar tortoise-foot-like processes, the distal free margin of each process being toothed



or pectinate and reaching a fair distance along the ischiopodite. They are most easily seen when the legs are drawn away from the sides of the carapace, for these small processes, which are rigidly fixed to the coxopodites, then project dorsally—free and solitary. When the legs are drawn up towards the sides of the carapace each process lies in close contact with the posterior surface of the basipodite and ischiopodite of its own leg, and gives support to these joints in forward movements (legs being fixed) of the body of the crab. The largest process is that of the third or largest pair of legs. The process arises from the coxopodite immediately above and continuous with the usual angular projection of the coxopodite in the region of the hinge-joint between coxo- and basipodite.

The first two abdominal segments are very short: the first is very broad, but does not reach the bases of the last pair of legs; it is wedged firmly in between the posterior border of the carapace and the thorax.

Colour in life dark muddy grey.

One specimen (a male of the above dimensions) was caught at Sta. 328, Gulf of Martaban, 61 fathoms.

This new species differs in the following points from the hitherto described species:—In *C. ciliata* the outer surface of palm is smooth and polished; carapace punctate and regions not distinguishable; third pair of ambulatory legs shorter. In *C. arcuata* basal antennal joint shorter; upper margin of palm not cristate; outer surface of palm smooth and naked; general configuration of carapace different. In *C. hispida* a thicker coating of hairs, and hairs coarser; carapace pitted; front broader; eyes deficient in pigment. In *C. (?) laevis* carapace smooth and shiny; front wider; wrist and outer surface of palm smooth. With *C. villosa* and *C. leptocheles* (Zehnter) this new species has very little in common.

*C. granulosa* will be figured in the next issue of "Illustrations of the Zoology of R.I.M.S. 'Investigator.'"

#### Fam. Palicidæ.

#### PALICUS, Philippi.

#### *Palicus investigatoris*, Alcock, var.

*Palicus investigatoris*, Alcock, Carc. Faun. Ind., no. 6, Brach. Catom. p. 455.

This variety differs from the "type" only in the following characters:—

(1) There is a small but distinct fissure towards the inner end of the lower border of the orbit.

(2) The four teeth of the front are not equally acute; the inner two are long and acute, but the outer, although projecting well forward, are broad, blunt, and rounded at the end.

(3) The teeth on the posterior border resemble more those of *P. serripes* in being broad and blunt.

(4) Between the sharp little tubercles on the areolæ of the carapace the surface is not smooth, but is densely and finely granular.

Only a male (9 mm. long and 11 mm. broad) was obtained, Sta. 291, Persian Gulf, 49–48 fathoms.

### Fam. Ptenoplacidæ.

#### PTENOPLAX, Alcock and Anderson.

##### *Ptenoplax dentata*, sp. n.

Carapace very flat and depressed, transversely oval, and its antero-lateral borders dentate. Surface very finely granular beneath a short furry coating; front and antero-lateral borders with much longer hairs. Front proper is extremely narrow, about  $\frac{1}{4}$  greatest breadth of carapace; in length about  $\frac{1}{9}$  greatest breadth of carapace, deflexed, and with its tip free, horizontal, and tapering to a point—not expanded and bilobed as in *P. notopus*. Orbital and frontal borders together are slightly more than  $\frac{1}{3}$  greatest breadth of carapace; antero-lateral border is long, convex, and armed with 3 teeth (besides the supraorbital tooth); postero-lateral border is convex and smooth; posterior border proper is straight and raised. Regions of carapace are fairly well defined. The branchial regions are much depressed and less inflated than in *P. notopus*. The two transverse sutures so conspicuous and sharply defined in *P. notopus* are not present, but the blunt, convex, transverse ridges in which the sutures exist in *P. notopus* are here quite as prominent and similarly situated, the anterior passing across the carapace between the penultimate teeth of the antero-lateral borders.

The side-walls of the carapace are also finely granular and meet the dorsal surface almost at right angles. The pterygostomial regions are deeply grooved and the sternum is pentagonal, as in *P. notopus*, their surface being finely granular.

	Male. mm.
Length of carapace, including front . . . . .	9
"          "          alone . . . . .	$7\frac{3}{4}$
Greatest breadth of carapace . . . . .	11
Length of hand . . . . .	$7\frac{1}{2}$

Orbits are incomplete; their inferior border is formed by the basal joint of the antennule, that of the antenna, and the infraorbital spine. A vertical antero-posterior plane through the supraorbital spine passes between the basal joint of the antenna and the infraorbital spine. Eye-stalks are short and conical; the cornea (small and hemispherical) is placed obliquely (looking outwards) on the summit of the eye-stalk. The basal joint of the antennule is hugely inflated, globular, freely mobile, and with a finely granular surface; second and third joints cylindrical and comparatively slender, fold transversely on the swollen basal joint. The antennæ arise on the same level with and between antennule and infraorbital spine, and the flagellum is about half the length of the carapace.

The eyes, second joint of antennule, and the inflated basal antennule joint all extend outwards and reach about the same distance. This is a specific character of this new species. In *P. notopus* the eyes extend outwards as far as the infraorbital spine, and the second antennule joint also extends well beyond the inflated basal joint and reaches the basal joint of the antenna.

Epistome is linear; buccal cavity is wider in front than behind. Efferent branchial channels are well defined, patulous, and produced anteriorly. External maxillipeds are subpediform and leave uncovered the greater part of the underlying mouth-parts; the palp arises from the apex of the small oval merus; merus and ischium have a finely granular surface.

Chelipeds are unsymmetrical in the male; both are about the same length, but the right is thicker in all its joints. Both hands are also of equal length, but they differ in the relative lengths of palm and fingers; the right hand has not only a stouter but also a slightly longer palm than the left, but the latter makes up the difference by having longer fingers. The length of the hand, which equals that of the remaining part of the cheliped minus the wrist, is very slightly less than the length of the carapace. The smaller palm is compressed, the larger inflated. Fingers are longer than palm, compressed, acute, curved, and slightly excavated on the inner surface. The fingers of the smaller hand are

indistinctly serrated, those of the larger are coarsely dentate. Surface of chelipeds (except fingers) is finely granular and the margins of arm and wrist are fringed with long hairs.

The first three pairs of ambulatory legs are slender, compressed, have a finely granular surface as far as the merus (inclusive), and end in sabre-shaped dactyli; carpopodites and propodites are fringed with long hairs. The fourth or last pair of legs are small, subdorsal in position, and arise near the middle line of the body.

The abdomen of the male consists of five separate segments—third, fourth, and fifth being fused—and has a finely granular surface. The abdomen corresponds very closely with that of *P. notopus*, even to the crescentic ridge on the sixth segment. Its breadth opposite the penultimate pair of legs is about a third of the breadth of the sternum at the same point. The genital ducts open as in *P. notopus*.

Only a single specimen, and of the above dimensions, was obtained, trawled at Sta. 332, south-east of South Andaman Island, 279 fathoms.

This specimen is of special interest, as it adds a second species to the hitherto solitary species—*P. notopus*—of the family Ptenoplacidae of the Indian fauna. The two species resemble each other closely, but differ markedly in the following points:—The sculpture and outline of the front and carapace, especially the antero-lateral borders and the transverse sutures of the carapace; the orbits; the relative lengths of the eyes, the second and basal joints of the antennules.

Has been figured for "Illustrations of the Zoology of R.I.M.S. 'Investigator.'"

XXVIII.—*Natural History Notes from the R.I.M.S. 'Investigator,' Capt. T. H. Heming, R.N. (retired), commanding.*—Series III., No. 8. *On a new Genus of Teleostean Fish closely allied to Chiasmodus.* By A. C. MACGILCHRIST, M.A., M.B., Ch.B., Capt. I.M.S., Surgeon-Naturalist to the Marine Survey.

Suborder PERCESOCES (Boulenger).

Fam. Chiasmodontidae, Gill.

*Dysalotus Alcocki*, gen. et sp. n.

B. 7. D. VIII. 27. A. 27. P. 11. V. I, 5.

The body is elongate and compressed; its height contained