II. NOTES ON DECAPODA IN THE INDIAN MUSEUM.

III. The Species obtained by R.I.M.S.S. 'Investigator' during the Survey Season 1910-11.

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(Plate i.)

During the season 1910-11 it was unfortunately only possible to make four hauls of the trawl in deep water; but at one of the stations a large number of interesting Decapod Crustacea were obtained and, inasmuch as many of these species appear to be rare, we have thought it as well to draw up a few notes on the collection.

The only species hitherto undescribed is a Macruran of the genus *Merhippolyte*, the first representative of the family Hippolytidae which has yet been found in deep water off the coasts of India. A small crab, allied to the genus *Carcinoplax*, also seems to belong to a species as yet unknown; this specimen is being referred to Col. Alcock and is not included in the present account.

Of the others in the collection perhaps the most interesting is the male of *Aristeomorpha rostridentata* (Bate), a species previously known from females only. *Pentacheles hextii* of Alcock is identified with the Atlantic and Mediterranean *Polycheles typhlops* and our knowledge of the distribution of several other scarce forms has been considerably extended.

The stations at which the collection was made are all situated off the S.W. coast of India; they are—

St. 388. 26-iv-11. 7° 44′ 10″ N., 76° 35′ 45″ E. 670 fathoms.

St. 389. 27-iv-11. 9° 01′ 50″ N., 75° 55′ 50″ E. 81 ,,

A considerable number of corals (Caryophyllinae) were obtained at this station.

St. 390. 27-iv-11. 9° 09′ N., 75° 46′ E. 260 fathoms.

On this occasion the net caught on a rock and was badly torn. No Decapoda were taken.

St. 391. 27-iv-11. 9° 14′ 10″ N., 75° 45′ E. 237 fathoms.

This haul was remarkable for the large number of the Gastropod, *Xenophora pallidula*, which were obtained. The majority of the Decapoda which form the subject of the present paper were found at this station.

Only a few of the more important papers dealing with deep-sea Decapoda are cited. The date appended to an author's name affords reference to the short bibliography at the end of the paper.

DECAPODA NATANTIA.

Tribe **Penaeidea.**

Family *PENAEIDAE.*

Sub-family PENEINAE.

Peneopsis coniger var. **andamanensis** (Wood-Mason).

Metapeneus coniger var. *andamanensis*, Alcock, 1901, p. 17, and 1906, p. 27, pl. iv, fig. 13.

Peneopsis coniger var. *andamanensis*, de Man, 1911, p. 61.

Eleven males and nineteen females were obtained at St. 389.

The distinctions between the variety and the typical form which are afforded by the thelycum are well marked and apparently constant. The form found in the variety has been illustrated by Alcock and we take this opportunity of giving a similar figure of the thelycum of the typical *P. coniger* (pl. i, fig. 7).

In males we have been unable to detect the pair of spines which de Man mentions at the base of the second peraeopods.

Parapeneus rectacutus (Bate).

Peneus (*Parapeneus*) *rectacutus*, Alcock, 1901, p. 17, and *Ill. Zool. Invest.*, Crust., pl. xlix, fig. 5.

Parapeneus rectacutus, Alcock, 1906, p. 33, pl. vi, figs. 19, 19a-b, and de Man, 1911, pp. 78, 82.

A much damaged female from St. 391 may safely be referred to this species. The station represents the most westerly point at which *P. rectacutus* has been observed.

With reference to de Man's notes on this species (*loc. cit.*, p. 82) we would observe that the minute rudiments of exopods on the thoracic legs, mentioned by Wood-Mason and Alcock (1891, p. 274), can be detected in examples preserved in the Indian Museum. The ridge defining the anterior part of the cervical groove agrees precisely with Alcock's figure, but in some females the spine which is stated to occur on the basis of the second peraeopods appears to be missing. The last pair of legs fails to reach to, or slightly exceeds, the apex of the antennal scale. There is no sharp spine at the distal end of the lobes of the petasma.

Haliporus aequalis, Bate.

Haliporus aequalis, Alcock, 1901, p. 23, and de Man, 1911, p. 32.

Seven males and fourteen females were obtained at St. 391.

Aristaeus semidentatus, Bate.

Aristaeus semidentatus, Alcock, 1901, p. 31, and *Ill. Zool. Invest.*, Crust., pl. xlix, fig. 3.

? *Aristeus semidentatus*, de Man, 1911, p. 29.

Six males and eleven females were obtained at St 391. They agree precisely with Alcock's account and with other specimens in the Museum collection. The pleurobranchs in advance of somite xiv are the merest rudiments, minute papillae without trace of pinnae.

It would appear doubtful whether the specimens obtained by the 'Siboga' really belong to this species, for de Man states that the pleurobranchs above the base of the first four peraeopods are "distinct filaments, similar to those of *A. virilis*"; whereas the difference in this respect between the present specimens and the examples which Alcock referred to *A. virilis* is most marked.

Hemipeneus crassipes (Wood-Mason).

Hemipeneus crassipes, Wood-Mason and Alcock, 1891, p. 281, fig. 7; Alcock, 1901, p. 33, and *Ill. Zool. Invest.*, Crust., pl. xlix, figs. 1, 2.

A single male, 77 mm. in length, was found at St. 388.

Among the males of this species preserved in the Indian Museum, two different types of modification are observed in the ultimate and penultimate segments of the external maxillipeds. The differences are shown in pl. i, figs. 8 and 9. In one form (fig. 9), that which is shown in the 'Investigator' illustrations, the penultimate segment is cylindrical and swollen and the ultimate segment is dilated at the base with the distal part curved outwards and provided with a spatulate tip. In the other type (fig. 8) the penultimate segment is flatter and less swollen and is produced distally as a strong acuminate process in front of the insertion of the ultimate joint. The latter is curved as in the type figured by Alcock; but it is not dilated at the base.

It is with the second of these two types that the specimen from St. 388 corresponds, and it is possible that the form deserves recognition as a distinct variety. The material at our disposal is not, however, in good condition and we are content to leave the matter pending the acquisition of further specimens.

Aristaeomorpha rostridentata (Bate).

Aristaeus (*Aristaeomorpha*) *rostridentata*, Alcock, 1901, p. 39, and *Ill. Zool. Invest.*, Crust., pl. ii, fig. 1.

Two males, obtained at St. 391, unquestionably belong to the same species as the female example recorded by Alcock and Wood-Mason under the name of *A. rostridentata*, and there can be

little doubt that all are correctly referred to the species described in the 'Challenger' Report.

The resemblance of the species to the well-known Mediterranean form, *A. foliacea* (Risso), is very striking and Bouvier in his account of the Peneidae collected by the Prince of Monaco (1908, p. 56) was unable to determine the distinctions with any degree of precision. On comparing the two species, however, several characteristic differences may be observed.

The rostrum in both sexes is shorter in *A. rostridentata* than in specimens of *A. foliacea* of larger size. In the single female example of the former species, the rostrum trends more strongly upwards towards the apex than in specimens of *A. foliacea* of the same sex, while in male *A. rostridentata* it reaches only to the end of the basal joint of the antennular peduncle and its lateral carina is straight, or slightly concave ventrally, showing no trace of the sinuosity seen in male *A. foliacea*.

But perhaps the most important distinction is to be found in the areolation of the carapace. The pterygostomian region is much broader in proportion to its length in *A. rostridentata* than in *A. foliacea* and the same is true of the branchial region, though the differences in this case are not so well-marked. In *A. rostridentata* the length of the pterygostomian region (measured from the antero-lateral margin of the carapace to the postero-dorsal end of the hepatic groove) does not exceed 2·5 times its greatest breadth, while it is more than 3·5 times as long as broad in *A. foliacea* (*cf.* figs. 5 and 6, pl. i). The ridge defining the upper boundary of the branchial region is, moreover, slightly less sinuous in the Indo-Pacific species.

The specimens examined yield the following measurements (in mm.):—

	A. rostridentata (Bate).			*A. foliacea* (Risso).			
Sex	♀	♂	♂	♀	♀	♀	♂
Total length	149	*ca.*125	*ca.*119	*ca.*215	*ca.*215	170	137
Length of rostrum ..	29	11·5	10·5	45+	49+	41+	14
Length of carapace ..	43	40·5	37	57	55·5	41	38·5
Length of pterygostomian region	17·3	16·5	15·7	25·5	23·5	18·3	17
Breadth of pterygostomian region	7·3	7·2	7	6·5	6·5	4·5	4·5
Ratio of length to breadth of pterygostomian region..	2·4	2·3	2·2	3·9	3·6	4·0	3·8

In other respects there appears to be an extremely close resemblance between the two forms, but the dactyli of the last two pairs of peraeopods, which, in the specimens of *A. rostridentata*, are unfortunately broken off in all but two instances, appear to be longer than in *A. foliacea* and measure more than half the length of their respective propodites. The telson, also,

seems to be longer in *A. rostridentata* than in *A. foliacea*. In the former species it reaches exactly to the apex of the inner uropod, the slightly greater length shown in the 'Investigator' Illustrations being due in all probability to a perspective effect.

We have been unable to find any distinctions between the two species in regard to the form of the oral appendages or of the thelycum and petasma.

Bouvier (*loc. cit.*, p. 53) states that the branchial formula of *Aristaeomorpha* is the same as that of *Benthesicymus*; but Alcock notes the presence of two arthrobranchiae at the base of the penultimate pair of peraeopods, which, according to Bouvier's account (*l.c.*, p. 17), do not occur in the latter genus. Examination of the specimens in the Indian Museum shows that these branchiae occur both in the Indo-Pacific and in the Mediterranean species of *Aristaeomorpha*.

In the Indian Museum no specimen of *Aristaeomorpha* can be found bearing the name *A. giglioliana*, but the example figured by Wood-Mason under this name is undoubtedly that which is preserved in the collection with the label "'Washington,' St. xiv, 13-viii-81; 39° 01′ 28″ N., 9° 30′ 19″ E. 772 metres. Enrico H. Giglioli." It is evident that Wood-Mason figured this specimen from the Mediterranean for comparison with *A. rostridentata*, but his reasons for assigning it a new specific name remain obscure, for he never published any description. The measurements of the specimen, a female 170 mm. in length, are shown on p. 18; it is unquestionably an example of *A. foliacea*.

Family *SERGESTIDAE*.

Sergestes bisulcatus, Wood-Mason.

Sergestes bisulcatus, Alcock, 1901, p. 49; *Ill. Zool. Invest.*, Crust., pl. 1, figs. 1, 1a-b, and Stebbing, 1905, p. 87, pl. xxiv A.

A small female, about 46 mm. in length, is referred to this species. It was obtained at St. 388 and was almost certainly caught during the ascent of the trawl.

S. bisulcatus is very closely allied to the Atlantic *S. robustus*, Smith, but is readily distinguished by the sharply cut cervical groove, which is specially distinct on the dorsum of the carapace.

Tribe **Caridea.**

Family *PASIPHAEIDAE*.

Sympasiphaea annectens, Alcock.

Sympasiphaea annectens, Alcock, 1901, p. 63, and *Ill. Zool. Invest.*, Crust., pl. lii, fig. 7.

A large female, 91 mm. in length, was obtained at St. 388.

The rostrum is more strongly elevated at the apex than in the type and the epipod at the base of the second maxilliped,

though small, is well formed and could hardly be described as a mere papilla.

Hitherto this species was only known from a single specimen; but a third example is preserved in the Museum collection. This specimen measures 76 mm. in length and was obtained at St. 297. 13-iv-02. Gulf of Oman; 25° 11′ 30″ N., 57° 15′ E. 689—700 fathoms.

Family *HOPLOPHORIDAE.*

Hoplophorus gracilirostris, A. Milne-Edwards.

Hoplophorus gracilirostris, Alcock, 1901, p. 73.

A single male, about 55 mm. in length, was taken at St. 391.

Family *PANDALIDAE.*

Pandalus (Plesionika) martius, A. Milne-Edwards.

Pandalus (*Plesionika*) *martius*, Alcock, 1901, p. 95.

Three damaged specimens, one an ovigerous female, appear to belong to this species. They were obtained at St. 391.

Heterocarpus gibbosus, Bate.

Heterocarpus gibbosus, Alcock, 1901, p. 103.

Three small specimens were found at St. 391. In all these examples the rostrum is considerably longer than in adults and exceeds the median length of the carapace.

Family *HIPPOLYTIDAE.*

Merhippolyte calmani, sp. nov.

(Pl. i, figs. 1—4.)

The general form is slender and the surface of both carapace and abdomen is glabrous and without trace of punctation. The rostrum is twice, or rather more than twice, the length of the carapace, straight to the end of the second joint of the antennular peduncle and thence to the apex very strongly ascendant. The vertical height of the apex above the dorsal line of the carapace continued forwards is about equal to the carapace-length. At its base the rostrum is armed with three large and almost equidistant teeth; the median one is situated directly over the orbit, while the anterior one reaches about to the end of the eyes. At the extreme apex there is a small dorsal tooth but the upper margin between this point and the eyes is wholly unarmed. On the ventral edge there are ten teeth, large and closely set towards the base, smaller and more distant towards the apex. Between the proximal teeth of both margins there are a few setae. All the teeth are fixed. The rostral carina is continued backwards

on the carapace and disappears before reaching the posterior third. The antero-inferior angle of the carapace is rectangular—not spinous (fig. 4).

The abdominal terga are all smoothly rounded dorsally. The sixth somite is longer than the telson excluding its terminal setae and is more than twice the length of the fifth. The telson is a little shorter than the inner uropod; its apex is very narrow and is furnished with two pairs of spines the outer of which is more than twice the length of the inner. The upper surface of the telson is slightly flattened and is provided with two pairs of dorso-lateral spinules. There is no movable spine at the base of the uropods.

The cornea of the eye is greatly expanded; it is much wider than the stalk and its breadth is fully a quarter the median length of the carapace. In the entire absence of an ocellus the species differs markedly from *M. agulhasensis*.

The antennular peduncle reaches to about half the length of the antennal scale. The basal joint is long and bears a sharply-pointed lateral process which reaches nearly to its distal end; the second and third segments are very short and subequal. The antennal scale is distinctly shorter than the carapace. Its outer margin is slightly concave and terminates in a short spine which fails to reach the apex of the lamella.

The mandible is provided with a large incisor process and a three-jointed palp. The basal segment of the latter is distinctly longer than the second (fig. 3). The first and second maxillipeds each possess an exopod and an epipod and the second maxilliped in addition bears a large podobranch. The third maxilliped also possesses both an exopod and an epipod, the former reaching to about half the length of the antepenultimate segment.

The first peraeopod reaches almost to the end of the antennular peduncle; the carpus is about the same length as the chela and the fingers are less than half the length of the palm. On the internal surface of the carpus near its distal end is an excavated notch, margined with setae and having a stout spine at its proximal end. The apparatus resembles a comb and is perhaps used for cleaning the antennae or other appendages (fig. 2).

The second peraeopods reach beyond the end of the antennal scale by almost the whole length of the propodus. The carpus is composed of 14 or 15 segments, the ultimate of which is only a trifle shorter than the chela.

The third peraeopod reaches beyond the apex of the scale by the length of the dactylus. At the distal end of the merus are two stout spines. The fourth peraeopod reaches only to the end of the antennular peduncle and is shorter than the fifth which reaches to the tip of the spine at the distal end of the antennal scale—on the distal half of the merus of these two last pairs there are a few large spines the number of which seems subject to considerable variation. The dactyli of the last three pairs bear from four to six strong spines.

The branchial formula is as follows:—

	VII.	VIII.	IX.	X.	XI.	XII.	XIII.	XIV.
Pleurobranchiae ..	..	..	..	1	1	1	1	1
Arthrobranchiae ..	..	..	2	1	1	1	1	..
Podobranchiae ..	..	1	..	..	..	..	..	..
Epipods ..	1	1	1	1	1	1	1	..

So far as we are aware only two species belonging with certainty to this genus have been described, *M. agulhasensis*, Bate, the type of the genus, and *M. orientalis*, Bate. Calman, in his valuable contribution to our knowledge of this family (1906), has pointed out that Hodgson's *M. australis* is in reality a species of *Nauticaris* and has also suggested that Milne-Edward's *Hippolyte spinifrons*, which G. M. Thomson referred to *Merhippolyte*, is in all probability a species of *Alope*. With this suggestion we were inclined to concur; but Chilton (1911, p. 547) has recently recorded four specimens of *M. spinifrons* from the Kermadec Is. and it is clear from his paper that the species is quite distinct from *Alope palpalis*. *M. spinifrons*, however, still stands in urgent need of redescription.

From both the species in the 'Challenger' Report and from *M. spinifrons* the present species is readily distinguished by the peculiar form of the rostrum and by many other less conspicuous characteristics. Though it agrees almost exactly with Miss Rathbun's account of *Spirontocaris kauaiensis* from the Hawaiian Islands (1906, p. 913) the resemblance must be entirely superficial. The carpus of the second peraeopods in *Spirontocaris* is composed of only six or seven segments and it is to be assumed that such a number occurs in *S. kavaiensis*—it is not mentioned in the description. Apart from this feature the two genera are readily distinguished by the gill-formula and by the number of segments in the mandibular palp.

Two specimens of *Merhippolyte calmani*, 50 and 56 mm. in length, were obtained at St. 391. Both examples are female and in the larger, which is ovigerous, the eggs measure ·46 × ·39 mm. in their longer and shorter diameters.

Family *CRANGONIDAE.*

Aegeon (Parapontocaris) bengalense, Wood-Mason.

Aegeon (*Parapontocaris*) *bengalense*, Alcock, 1901, p. 122, and *Ill. Zool. Invest.*, Crust., pl. ix, fig. 1.

Two male specimens, measuring 29 and 30·5 mm. in length, were obtained at St. 391.

Except for the customary sexual distinctions in the second pair of pleopods and in the outer ramus of the antennular peduncle, the specimens closely resemble the females described by Alcock: we would note, however, that in both sexes there are very frequently two or three spines on each carina of the sixth abdominal somite in addition to the terminal one.

Two other samples of this species, hitherto unrecorded, are preserved in the Indian Museum—

St. 136. 4-v-92. 15° 41′ N., 72° 43′ E. 444 fathoms. One female; about 41 mm. in length. Regd. No. $\frac{7056}{10}$.

St. 279. 18-iii-11. 11° 35″ 15″ N., 80° 02″ 15″ E. 300 fathoms. Two males, four females (one ovigerous); 30—48 mm. in length. Regd. Nos. $\frac{4080\text{-}5}{10}$.

DECAPODA REPTANTIA.

Tribe **Eryonidea.**

Family *ERYONIDAE.*

Genus **POLYCHELES,** Heller.

The majority of recent authors have not followed Spence Bate in the recognition of distinct genera, *Polycheles* and *Pentacheles*, and there can be no doubt that, as many subsequent authors have shown, the distinctions employed in the 'Challenger' Report are untenable.

Alcock, however, in 1901 again recognized the two separate genera, distinguishing them by the characters afforded by the epipodites of the third maxillipeds and of the peraeopods. Unfortunately at the date when he was writing, little was known as regards these structures in the case of *Polycheles typhlops*, the type of the genus *Polycheles* and the first recent species of Eryonidea to be described.

By actual comparison of specimens we have been able to convince ourselves that Alcock's *Pentacheles hextii* must be regarded as a synonym of *Polycheles typhlops* and this, if two genera are to be recognized, necessitates the transposition of the names *Polycheles* and *Pentacheles* as applied by him. In *P. typhlops* the epipod at the base of the third maxilliped is small; but the distinction in this respect between the genera seems of little moment. More important by far is the condition of the epipods at the base of the peraeopods and in *P. typhlops* these structures agree precisely with those of specimens which Alcock referred to *Pentacheles* and with the account contained in his description of that genus.

Faxon, however, in 1895 (p. 118) remarks that "an examination of a large number of species discloses a gradual transition in the development of the epipods from large well-developted organs, through small, delicate thin ones, to merest rudiments

in the shape of small expansions at the base of the stem of the gill." While this is not the case with the Indian species—Alcock found that they fell readily into two groups—the passage quoted above, coming as it does from a high authority on crustacean morphology, seems to show that the two groups merge in the Eastern Pacific and we propose, therefore, to combine once more the genera *Polycheles* and *Pentacheles*.

Polycheles typhlops, Heller.

Polycheles typhlops, Heller, 1862, p. 389, pl. i, figs. 1—6, and Senna, 1903, p. 332, pl. xviii, figs. 1—11.

Pentacheles hextii, Alcock, 1894, p. 237; 1901, p. 172, and *Ill. Zool. Invest.*, Crust., pl. x, fig. 2.

One female, 70 mm. in length, was obtained at St. 391.

This specimen agrees in all its characters with examples described by Alcock under the name of *P. hextii*; but we are of the opinion that the form which has received this name is identical with the older *Polycheles typhlops* of Heller, a species hitherto known only from the Mediterranean and East Atlantic.

We have closely compared specimens of *P. hextii* with two examples of *P. typhlops* obtained by the 'Talisman' expedition off the Cape Verde Islands and with a large drawing of a specimen from the W. coast of Ireland. The only difference that we have been able to discover is that the epipod at the base of the outer maxillipeds is a trifle larger in the Atlantic specimens; but the spinulation and proportions of examples from the two localities and the peculiar character of the orbit correspond so precisely that the specific identity of the two forms cannot be doubted.

The species affords yet another illustration of the wide-spread distribution of many deep-sea Crustacea.

Polycheles phosphorus, Alcock.

Polycheles phosphorus, Alcock, 1901, p. 168, and *Ill. Zool. Invest.*, Crust., pl. viii, fig. 2.

A female, 74 mm. in length, was found at St. 388.

Anomura.

Tribe Galatheidea.

Family *GALATHEIDAE*.

Munida microps, Alcock.

Munida microps, Alcock, 1901, p. 240, and *Ill. Zool. Invest.*, Crust, pl. xiii, fig. 5.

A single male, 36 mm. in length when fully extended, was obtained at St. 388.

Munida andamanica, Alcock.

Munida andamanica, Alcock, 1901, p. 242, and *Ill. Zool. Invest.*, Crust., pl. xii, fig. 2.

Two females and one male were taken at St. 391. The length of the specimens, when fully extended, ranges from 38 to 52 mm.; the largest example is an ovigerous female. To the abdominal sterna of the two smaller individuals an interesting parasitic Isopod, belonging to the family Liriopsidae, is attached.

Family *UROPTYCHIDAE*.

Ptychogaster investigatoris, Alcock and Anderson.

Ptychogaster investigatoris, Alcock, 1901, p. 281, and *Ill. Zool. Invest.*, Crust., pl. xlv, fig. 1.

One female, slightly larger than the type and only other known specimen, was found at St. 391. The two individuals are in closest possible agreement.

Tribe **Paguridea**.

Family *PAGURIDAE*.

Sub-family PAGURINAE.

Paguristes puniceus, Henderson.

Paguristes puniceus, Alcock, 1905, p. 38, pl. iii, fig. 6, and *Ill. Zool. Invest.*, Crust., xxxii, fig. 1.

Fourteen specimens, three of which are ovigerous females, were obtained at St. 391. The majority inhabited shells of *Xenophora pallidula*; but one was found in *Ranella perca*, and one in a species of *Pleurotoma*.

Two females are parasitized by *Peltogaster*, a genus of Rhizocephala not hitherto recorded from Indian seas.

Sub-family EUPAGURINAE.

Parapagurus andersoni, Henderson, var. **brevimanus**, Alcock.

Parapagurus andersoni var. *brevimanus*, Alcock, 1905, p. 103.

Two males, inhabiting shells of *Solariella infundibulum*, were found at St. 388.

Tomopagguropsis lanata, Alcock.

Tomopagguropsis lanata, Alcock, 1905, p. 137, pl. xiii, fig. 4.

A single male was obtained at St. 391 in a shell belonging to the genus *Pleurotoma*.

Sympagurus arcuatus, Milne-Edwards and Bouvier, var. **monstrosus**, Alcock.

Sympagurus arcuatus var. *monstrosus*, Alcock, 1905, p. 104, pl. x, fig. 5.

Six specimens in *Cancellaria cretacea*, Smith, *Pleurotoma* sp. and in other gastropod molluscs, were taken at St. 391. The majority of the shells are encrusted by an anemone.

Nematopagurus indicus, Alcock.

Nematopagurus indicus Alcock, 1905, p. 109, pl. xii, fig. 4.

Two specimens, a male and an ovigerous female obtained at St. 391, are referred to this species.

They agree with Alcock's description and with the type specimens in every particular except the eyes. These extend only to the end of the proximal third of the ultimate segment of the peduncle and are slightly shorter and very distinctly stouter than in the type. We have been unable to find any other distinctions and we are convinced that the specimens are correctly referred to this species.

Bouvier (1900, pp. 194, 198, and 1894, p. 69, pl. xi, figs. 2—6) has shown that in *Sympagurus bicristatus*, Milne-Edwards, and *S. gracilipes*, Milne-Edwards, there is considerable variation in the size of the eye. In the case of the former species Bouvier notes that in examples from comparatively shallow water the cornea is as a rule more dilated than in those from greater depths; in *S. gracilipes*, however, he is of the opinion that no such correlation exists.

The present specimens were found in 237 fathoms and it is interesting to note that in these examples the eyes are more dilated than in the type specimens obtained at a depth of only 102 fathoms. The case, so far as the evidence goes, is therefore precisely the reverse of that found in *S. bicristatus*; but many instances of a parallel development in one direction or the other might be cited and it is no more difficult to believe that a shallow water species migrating to greater depths would find it more advantageous to increase its corneal area than that another species also migrating in a similar manner should in this respect, retrogress, finding that its other senses rendered ocular vision a secondary consideration.

The specimens were found in shells of *Nassaria coromandelica*, Smith.

Brachyura.

Tribe **Dromiacea.**

Family *HOMOLIDAE.*

Homola megalops, Alcock.

Homola megalops, Alcock, 1899, p. 9; 1901, p. 62, and *Ill. Zool. Invest.*, Crust., pl. xiv, figs. 1, 1a.

Nineteen males and ten females (five ovigerous), ranging in length of carapace from 12·5 to 54 mm., were obtained at St. 391.

Many of these specimens are of considerably greater size than those which afforded Alcock material for his original description and we notice that *large* males differ from his account in the following features:—

The chelipeds are both longer and stouter; the merus and carpus are distinctly broader than the meri of the ambulatory legs and the chela may reach to the end of the propodus of the next limb.

The whole under surface of the chela, except for the extreme tips of the fingers, is clad in a thick and deep, dark brown velvety pubescence which is not present in females.

The palm is very conspicuously longer than the dactylus and at the base of the latter, on the inner edge, there is a stout tooth which is not found in females or young males.

The spines on the anterior region of the carapace, though always distinct, are less prominent in large individuals.

Measurements of the carapace (including rostrum) and chelipeds of forty-two examples of this species, show that whereas in the female the growth of the cheliped is proportional to that of the carapace throughout the whole period of its existence, this, as in many other species of Brachyura, is by no means the case with the male. In young examples of the latter sex, in which the carapace does not exceed 30 mm. in length, the cheliped has the same proportions as in females; but, as growth continues, there is a relatively greater increase in the length of the chelate leg. In females and young males the proportion of cheliped-length to carapace-length is approximately 1·5, whereas in large males it may reach as much as 2·0.

This marked difference between the sexes is illustrated in the accompanying figure (p. 28).

Tribe **Oxystomata.**

Family *DORIPPIDAE.*

Ethusa andamanica, Alcock.

Ethusa andamanica, Alcock, 1899, p. 33, and *Ill. Zool. Invest.* Crust., pl. xiv, fig. 8.

It is with some doubt that a single ovigerous female from St. 391 is referred to this species.

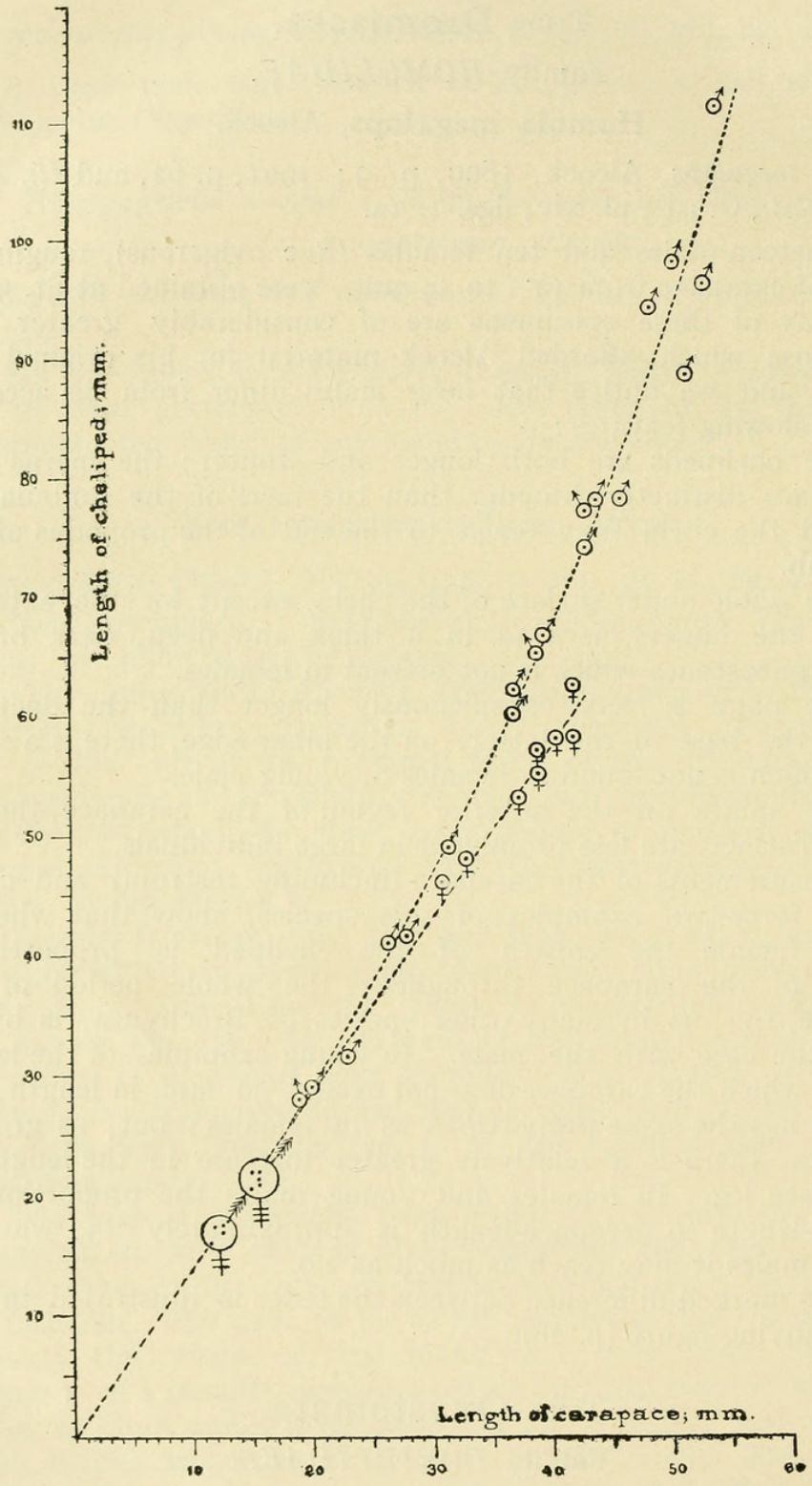

Diagram showing the relation between length of carapace and length of cheliped in forty-two examples of *Homola megalops*. The two large circles at the base of the curve represent respectively, the upper circle four males and three females, the lower four males and two females.

The carapace, which is 10 mm. in length, corresponds closely with that of Alcock's types; but it is perhaps not quite so strongly narrowed anteriorly.

The posterior parts of the carapace and the whole frontal border are beset with long setae and in the possession of such an investment on the former region the specimen approaches *E. hirsuta*, McArdle (1900, p. 474, and *Ill. Zool. Invest.*, Crust., pl. lxxii, fig. 1, 1a). In *E. hirsuta*, however, the external orbital spines are longer than in *E. andamanica* and have a different form, though they do not always reach beyond the tips of the frontal teeth as stated in McArdle's description. The external orbital angle is much broader in *E. andamanica* than in *E. hirsuta* and its internal margin is markedly sinuous in the former, straight or slightly concave in the latter.

Except for the hairs on the cardiac and branchial regions we are unable to differentiate our specimens from the types of *E. andamanica* and the possibility that such a character was originally present in the latter specimens, but was lost before they were examined, cannot be overlooked.

The species which Doflein (1904, p. 27, pl. xiii, figs. 7, 8) describes under the name of *E. andamanica* seems to differ in several material respects from the type specimens of that species. In the original examples the external orbital angle is decidedly broader than is shown in Doflein's figures and the dactyli of the second and third peraeopods are longer than their propodites.

Family *RANINIDAE.*

Lyreidus channeri, Wood-Mason.

Lyreidus channeri, Alcock, 1899, p. 38, and *Ill. Zool. Invest.*, Crust., pl. lxxiii, figs. 1, 1a.

A single specimen, with carapace 19 mm. in length, was obtained at St. 391.

Family *CALAPPIDAE.*

Mursia bicristimana, Alcock and Anderson.

Mursia bicristimana, Alcock, 1899, p. 23, pl. iii, fig. 3.

Eight specimens, ranging in length of carapace from 10·5 to 23 mm., were obtained at St. 391. Doflein (1904, p. 41) regards this form as merely a sub-species of De Haan's *M. armata.*

Family *LEUCOSIIDAE.*

Randallia lamellidentata, Wood-Mason.

Randallia lamellidentata, Alcock, 1899, p. 26, and *Ill. Zool. Invest.*, Crust., pl. v, figs. 5, 5a—b.

Nine males 13—23 mm. in length, and one huge ovigerous female, measuring 35 mm., were obtained at St. 391. The latter

specimen, the only known example of its sex, differs from the males in the following features:—

1. The spine on the carapace at the posterior end of the intestinal region is blunt—little more than a tubercle—and cannot be said to overhang the posterior margin.
2. The lamelliform teeth which fringe the lateral and posterior margins of the carapace are much less conspicuous.
3. The 4th—6th abdominal terga are fused and the sutures partially obliterated; but the telson is freely movable. All the segments are covered with vesiculous granules and at the distal end of the sixth there is a blunt tubercle comparable with that found in the male but by no means so evident.
4. The coxal joints of all the legs are elevated on either side of the abdomen and form a thin outstanding crest.

The close-set tubercles which cover both surfaces of the chelipeds and the upper portions of the merus, carpus and propodus of the ambulatory legs are in both sexes much more conspicuous than is shown in plate v of the "Investigator" Illustrations.

Tribe **Brachygnatha.**

Family *GONOPLACIDAE.*

Sub-family CARCINOPLACINAE.

Psopheticus stridulans, Wood-Mason.

Psopheticus stridulans, Alcock, 1899, p. 73; 1900, p. 309, and *Ill. Zool. Invest.*, Crust., pl. v, fig. 1.

One specimen, a female with carapace 11 mm. in length, was found at St. 391. *P. stridulans* has, hitherto, only been recorded from the Andaman Sea and S. W. of the Great Nicobar.

Family *MAIIDAE.*

Sub-family INACHINAE.

Physachaeus ctenurus, Alcock.

Physachaeus ctenurus, Alcock, 1899, p. 40; *Ill. Zool. Invest.*, Crust., pl. xviii, figs. 1—1b, and Doflein, 1904, p. 71, pl. xxiv, figs. 1—4, pl. xlii, figs. 1—7, pl. xlviii.

Two males and one ovigerous female were obtained at St. 391.

Sub-family PISINAE.

Sphenocarcinus aurorae, Alcock.

Sphenocarcinus aurorae, Alcock, 1899, p. 84.

Twelve males and fifteen females (ten ovigerous) were obtained at St. 391. A drawing of this species, which has not hitherto been figured, will be found on pl. i, fig. 10.

Sub-family MAIINAE.

Maia gibba, Alcock.

Maia gibba, Alcock, 1899, p. 56, and *Ill. Zool. Invest.,* Crust., pl. xxi, figs. 5, 5a.

Ten specimens, ranging from 18 to 40 mm. in the length of the carapace and rostrum, were found at St. 391.

In the smaller examples four spines in the median line of the carapace are decidedly longer than in larger individuals, in which they are scarcely distinguishable from the general tuberculation of the surface. In young specimens also five spines on the lateral margin of the carapace are more conspicuous than in the adult and thus resemble *M. miersi,* Walker (1890, p. 113, pl. vi, figs. 1—3), though the distinctions between the species still remain quite definite.

Maia gibba was hitherto known only from the three type specimens obtained in the Andaman Sea.

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