

XX CRUSTACEA DECAPODA

By STANLEY KEMP, B.A., Assistant Superintendent,
Indian Museum.

(Plates xvii—xxi.)

In the present report twelve different forms of Decapod Crustaceans are recorded, viz.:—

- Potamon (Potamiscus) decourcyi*, sp. nov.
 " " *aborense*, sp. nov.
 " " *obliteratum*, sp. nov.
 " (*Geotelphusa*) *adiatretum*, Alcock.
 " " " var. *lophocarpus*, nov.
 " " *superciliosum*, sp. nov.
 " (*Acanthotelphusa*) *feae*, de Man.
Paratelphusa (Barytelphusa) harpax, Alcock.
Palaemon hendersoni, de Man.
Caridina weberi, de Man, var.
 " *excavata*, sp. nov.
 " *hodgarti*, sp. nov.

One of the species, *Potamon (Potamiscus) obliteratum*, was found by Mr. F. H. Gravely in the Darna Hills on the Burmo-Siamese frontier, and is included here in order to render more complete the account of the subgenus to which it belongs. Of the remainder, six are to be regarded as true hill forms, having been found in the small mountain streams draining into the Dihang river, while five, *Potamon (Acanthotelphusa) feae*, *Paratelphusa (Barytelphusa) harpax* and the three species of *Caridina* were found at the base of the hills and in the Brahmaputra valley.

No less than seven of the eleven Abor forms appear to have been undescribed hitherto, and the collection is, in consequence, of but little assistance in determining the geographical relationships of the fauna.

The subgenus *Potamiscus*, as far as is at present known, extends from Rajputana, Nepal and Darjiling to Burma and has been found at Cachar in Assam, while *Potamon (Geotelphusa) adiatretum* has been recorded from the Dafia country, from the Khakyen Hills and from Moulmein. *Potamon (Acanthotelphusa) feae*, described from the Upper Irrawaddy, seems to be not uncommon in Assam north of the Brahmaputra, and *Paratelphusa (Barytelphusa) harpax* is a species of wide distribution in north-

east India. *Palaemon hendersoni* is known from Darjiling and the border of the Southern Shan States. *Caridina weberi*, which appears to have a very wide distribution in India, Burma and Malaysia, is represented in the Brahmaputra valley by a race which will in all probability prove to have a definite geographical significance. The collections in the Indian Museum indicate that *Caridina hodgarti* extends along the base of the Himalayas from the Tista and Mahananda rivers eastwards to the Abor country.

Of the new forms which are described the most interesting appear to be *Caridina excavata* and *C. hodgarti*, which, in the reduced number of their epipods differ from all species of the genus in which such details have received attention. In a previous paper¹ I have remarked on the presence of *Xiphocaridina curvirostris*, a primitive form hitherto known only from New Zealand, in the Upper Brahmaputra valley, and the existence of these two aberrant species of *Caridina* suggests that the Atyid fauna of N.-E. India is likely to prove of exceptional interest.

It need hardly be pointed out that the description of the crabs noticed in this paper would have been almost impossible had it not been for Alcock's comprehensive memoir on the Indian Potamonidae.

On the species of *Geotelphusa* obtained in the Abor country many examples of a Temnocephalid were found. These have been identified by Mr. F. H. Gravely as *Temnocephala semperi*, Weber (see p. 229 of this volume). Moreover, certain eggs found in the gill-chambers of *Caridina*, on comparison with those found in a similar situation in other parts of India, afford evidence of the existence of *Caridinicola*² in the Brahmaputra valley.

For assistance in making collections both of Decapoda and of other groups I am under a great debt of gratitude to the Officers of the 32nd Sikh Pioneers. To them, and in particular to Capt. the Hon. M. de Courcy, I have to express my thanks.

The type specimens of the new species are preserved in the Indian Museum.

Family POTAMONIDAE.

Sub-family POTAMONINAE.

Genus *Potamon*, Savigny.

Sub-genus *Potamiscus*, Alcock.

The sub-genus *Potamiscus* was instituted by Alcock to receive those species of *Potamon* in which the flagellum of the exopod of the outer maxillipedes is absent or vestigial. It is probable that several species of Potamonidae already described really belong to this sub-genus, but the character has been overlooked by the majority of authors, and the confusion is increased by the fact

¹ Rec. Ind. Mus., VII, p. 113 (1912).

² *Caridinicola*: a genus belonging to the Temnocephaloid family Scutariellidae (see Annandale, Rec. Ind. Mus., VII, p. 243, 1912).

that it is only since the publication of Alcock's memoir that it has been possible to separate the sub-families Potamoninae and Gecarcinucinae in a satisfactory manner. The classification of the great majority of the known species of the family will have to be revised in the light of Alcock's work.

It might, indeed, be argued that the species allocated to *Potamiscus* do not form a natural group and that the character used for distinguishing the sub-genus is one of doubtful value, more especially in view of the fact that the exopodite of the outer maxillipede shows varying stages of degeneration in *Phricotelphusa* and *Globitelphusa*, sub-genera of the Gecarcinucinae, and that in one of the specimens of a new species of *Potamiscus*, described below, the lash of the exopod is well developed on both sides, though quite vestigial in the other six examples.

Two undescribed species of *Potamiscus* were obtained in the Abor country and another very remarkable form, also hitherto unknown, has recently been found by Mr. F. H. Gravely in the Dawna Hills. Excluding *P. tumidulum*, Alcock, concerning which additional information is still lacking, five representatives of the sub-genus are now known from India.

These fall into two very distinct groups. One, which comprises *P. annandalei* and *P. decourcyi*, shows clear affinities with *Potamon*, s.s., while the relationships of the three allied forms included in the second group are much less easy to trace. In course of time it may be necessary to restrict the sub-genus to this group, with *P. sikkimense*, Rathbun, as type, though it will then be very difficult to frame a satisfactory diagnosis which will exclude *P. annandalei* and its ally.

For the present it is not proposed to make any alteration of the kind. Alcock's classification has at least the great merit of convenience, no small advantage in a group presenting such difficulties as do the Potamonidae, and until the extra-Indian species have been classified on the lines which he has advocated, such questions as the mutual relationships of the different sub-genera are best left untouched.

The five species may be tabulated as follows:—

I. Post-orbital crests sharp-edged and undermined.

- a. Post-orbital crests not separated from epigastric crests and continued as a well-defined ridge to the blunt epibranchial tooth; crenulate anterolateral margin of carapace not sharply pinched off from the general surface

annandalei, Alc.

- b. Post-orbital crests separated from epigastric crests by a groove and broken into tuber-

cles in the vicinity of the small but acute epibranchial tooth; crenulate antero-lateral margin sharply pinched off from the general surface

decourcyi, sp. nov.

II. Post-orbital crests not sharp-edged or undermined, but merged to some extent in the large rugosities of the anterior part of the carapace.

a. Carapace feebly convex fore and aft; crenulate antero-lateral margin well defined, but not strongly curved inwards; a very small and inconspicuous gap in the margin anterior to the obsolete epibranchial tooth

sikkimense, Rathbun.

b. Carapace strongly convex fore and aft; crenulate antero-lateral margin well defined and strongly curved inwards; a deep gap in the margin anterior to the large blunt epibranchial tooth

aboreense, sp. nov.

c. Carapace strongly convex fore and aft; crenulate antero-lateral margin obsolete, defined merely by a few isolated tubercles behind the small but acute epibranchial tooth; a small nick in the margin anterior to the latter

obliteratum, sp. nov.

Potamon (Potamiscus) decourcyi, sp. nov.

(Plate xvii, figs. 1-3.)

The length of the carapace slightly exceeds three quarters of the breadth and its depth is rather less than half its breadth; it is decidedly convex fore and aft and slightly so from side to side. The surface is pitted and a little roughened. • The antero-lateral portions are strongly tuberculo-rugose, as are also, but to a less marked extent, the anterior regions behind the epigastric and post-orbital crests. On the side walls are fine oblique striae which pass across the postero-lateral border.

The cervical groove is well marked, though not deeply graven, where it defines the mesogastric area; but its lateral continuations towards the orbits are almost entirely or entirely suppressed. No trace of them exists in a very large male, but they are just perceptible as very faint and extremely shallow depressions in the younger

examples. The fore lobe of the mesogastric areola is well defined and the median groove is continued, though not always very clearly, almost to the margin of the front.

The epigastric and post-orbital crests are sharp and distinct. The epigastric crests are narrow and are separated from the post-orbitals by well-defined grooves; though considerably in advance of the post-orbital crests in the middle line, they slope away on either side and in conjunction with these crests form a common curve across the anterior portion of the carapace. The post-orbital crest is sharply cut and trenchant up to the point where the cervical groove would cut it, if it were defined, but beyond this it is broken up into a number of sharp tubercles (fig. 1).

The front in adults is much less than one-third the breadth of the carapace; in small individuals about one-third. Immediately behind and parallel with its edge it bears a bilobed eminence which in dorsal view almost or quite conceals the margin. In this respect the species resembles *Potamon pealianum*, but the eminences are not quite so pronounced. The edge is sometimes very feebly bilobed when seen from in front.

In the smaller specimens there is only a faint indication of a gap between the upper and lower borders of the orbit; this feature, however, is very strongly developed in the adult male. The anterolateral borders are sharply pinched off from the carapace, strongly crenulate and well arched, and the epibranchial tooth is well developed.

In the abdomen of the adult male (fig. 3) the sixth segment is twice as broad as long and the seventh a little more than three quarters as long as broad.

The mandibular palp is simple. The flagellum of the exopodite of the external maxillipedes is vestigial in six specimens (fig. 2), but moderately developed in the seventh (a small example). The merus of the endopod is nearly as long as broad.

The chelipedes are almost or quite equal in all the specimens examined. The external surfaces of the merus, carpus and propodus are squami-rugose; the spine at the inner angle of the carpus is strong and sharp. The fingers are as long as the palm, pitted in the large example, both pitted and fluted in the smaller individuals. The upper border of the propodus bears vesiculous granules, some of which are also found at the base of the dactylus.

The dactyli of the walking legs are longer than their propodi; in the two middle pairs the propodus is rather more than two and a half times as long as broad.

In an adult male, the type specimen, the carapace is 63 mm. broad, 49 mm. long and 29 mm. deep. In the next largest specimen, also a male, the breadth of the carapace is 26 mm., its length 20 mm. and its depth 11.5 mm.

The species which bear the closest resemblance to *Potamon decourcyi* appear to be *Potamon (Potamon) pealianum*, Wood-Mason, and *Potamon (Potamiscus) annandalei*, Alcock. From the former it differs in the total suppression of the cervical groove, in the

marked separation of the epigastric and post-orbital crests and in the vestigial condition of the flagellum of the outer maxillipedes. From the latter it is distinguished by the much greater rugosity of the antero-lateral portions of the carapace, by the more strongly arched and better defined antero-lateral borders, by the narrower epigastric crests and by the deep groove which separates them from the post-orbitals. In *P. annandalei* the post-orbital crests are continued sharply and uninterruptedly to the blunt epibranchial tooth, whereas in *P. decourcyi* they are broken up into tubercles external to the point where the cervical groove would, had it existed, have cut them. The epibranchial tooth is moreover much sharper in the present species.

The large male specimen was obtained for me by Capt. the Hon. M. W. R. de Courcy (Regd. no. $\frac{8006}{10}$, TYPE) in the Sirpo valley near Renging. The other examples were taken at Rotung ($\frac{8007}{10}$), at a point a few miles south of Kebang ($\frac{8009}{10}$), and on the banks of the Siyom R. below Debuk Damda ($\frac{8008}{10}$). All were found under stones in small hill streams at altitudes of between 1000 and 1500 ft.

Potamon (*Potamiscus*) *aborensis*, sp. nov.

(Plate xviii, figs. 4, 5.)

This species differs conspicuously from the preceding and from *P. annandalei* in that the post-orbital crests are not sharply cut and prominent, but are merged to a great extent in the rugosities of the carapace. Its nearest allies are *P. sikkimense*, Rathbun, and *P. oblitteratum*, sp. nov.

The length of the carapace is about five-sixths its greatest breadth and the depth is about half the breadth. The carapace is much more convex fore and aft than in *P. sikkimense* and is slightly but decidedly convex from side to side. The anterior and antero-lateral parts of the carapace are very strongly rugose (fig. 4), the whole dorsal surface is pitted and there are well-marked oblique striae on the side-walls which pass across the postero-lateral borders.

The cervical groove is distinct where it defines the mesogastric area, but thence onwards to the post-orbital crests is obsolete, its course being only discerned with the greatest difficulty.

The epigastric and post-orbital crests, as in *P. sikkimense*, are not distinctly separated from one another and form a common curve. The crests are not sharp and salient but are to a great extent merged in the large and conspicuous rugosities of the anterior part of the carapace, this is more particularly the case with the post-orbitals. The position of the epibranchial tooth is marked by a strong blunt angular lobe (fig. 4) of a far more evident nature than in *P. sikkimense* (fig. 8)—a lobe the prominence of which is greatly emphasized by the large gap which separates it from the outer orbital angle. In *P. sikkimense*, moreover, the post-

orbital crest near the lateral border is faint and the dorsal surface in these regions is, except for the rugosities, smoothly curved from the orbit backwards. In *P. aborense*, however, the surface in the neighbourhood of the outer orbital angle is situated at a much lower level than the lateral portions behind the post-orbital crest, the latter being in this part precipitous and becoming steeper and more strongly emphasized the nearer it approaches the epibranchial lobe. It is in the mutual relations of the surface of the carapace in the neighbourhood of the epibranchial lobe and the orbit that the readiest distinctions between the two species are to be found (*cf.* figs. 4 and 8).

Behind the epibranchial lobe the antero-lateral margin is defined by a crenulate ridge which is relatively much shorter and curves inwards further and more abruptly than in *P. sikkimense*.

The front is deflexed, a trifle more than a third the breadth of the carapace, and the area between its margin and the epigastric crests is tuberculo-rugose.

Posteriorly the whole carapace is more definitely narrowed than in the allied species, or rather, appears to be so, because the lateral parts of the dorsal surface slope downwards somewhat sharply, leaving only a trifle more than one-third of the actual breadth on the same level as the median horizontal line. The distinction in this respect between the present species and *P. obliteratum* is very marked.

The antepenultimate abdominal segment of the male is shorter than the penultimate (fig. 5), and in this particular *P. aborense* resembles the Nepalese examples of *P. sikkimense* recorded by Alcock in his Catalogue as *P. sikkimense* var. (fig. 6). In typical *P. sikkimense* the antepenultimate segment is longer than the penultimate (fig. 7).

The terminal segment of the mandibular palp is simple. The merus of the external maxillipedes is a trifle broader than long, and in no case is there a vestige of a flagellum on the exopod.

The chelipedes are equal in the adult female, but markedly unequal in males of similar dimensions; they are if anything slightly smoother than in the allied species. The spine at the inner angle of the carpus is sharp and the fingers are almost as long as the palm, pitted, but not fluted, and between them when the claw is closed there is no appreciable gap. In adult males the palm of the larger claw is strongly inflated, more so than in *P. sikkimense*.

The legs are decidedly more slender than in *P. sikkimense* and the propodus of the penultimate pair is more than two and a half times as long as broad.

The three specimens in the collection are of closely similar size. The breadth of the carapace varies from 17 to 18 mm., the length from 14 to 15 mm. and the depth from 8.5 to 9.5 mm. In life two of the examples were rather conspicuously mottled with deep brown on a pale brown or olivaceous ground, the colouring being particularly noticeable on the side walls of the carapace. The female is ovigerous and carries a number of eggs, in life of a

bright red colour, averaging 2.4×2 mm. in longer and shorter diameter.

P. aborense appears to be rare in the Abor country, but as all the specimens were found under stones in dry situations it may be that the species has habits different from the majority of forms obtained in the country and this perhaps accounts for its apparent scarcity.

All three type-specimens come from the vicinity of Rotung at altitudes of between 1000 and 1300 ft.; one ($\frac{8012}{10}$) was found at no great distance from the Egar stream; another, the ovigerous female ($\frac{8013}{10}$), was taken in March from a short burrow with a slightly enlarged terminal chamber behind a large stone on a steep hillside; the remaining example was obtained by Capt. de Courcy when cutting a road between Rotung and the Sireng stream ($\frac{8011}{10}$).

Potamon (Potamiscus) obliteratum, sp. nov.

(Plate xviii, figs. 9, 9a.)

I take this opportunity of describing a very fine species of *Potamiscus* obtained recently by Mr. F. H. Gravely in the Dawna Hills. In most cases I would hesitate to give an account of a species of Potamonid represented, as in the present instance, only by a single individual; but the specimen is in several respects highly peculiar and this fact, together with the circumstance that two other new species of the sub-genus are described in the present paper, may perhaps be held to justify its inclusion.

The individual is a female with the carapace 19 mm. long, 23.5 mm. broad and 13 mm. deep; it is thus proportionately slightly deeper even than in *P. aborense*. The carapace (fig. 9) is strongly and evenly convex fore and aft and slightly so across its greatest breadth, and everywhere on its dorsal surface it is rather coarsely pitted.

Seen from above it is very noticeably quadrate in shape. The sides of the carapace are, indeed, less convergent posteriorly than in the allied species; but the principal reason of its square appearance is that the postero-lateral portions do not slope away obliquely to the bases of the last two pairs of walking legs, as in *P. sikkimense* and *aborense*, but are inflated and have the lateral walls abruptly declivous.

The antero-lateral portions of the carapace are strongly rugose and a number of prominent ridges and tubercles obscure the post-orbital and epigastric crests. The frontal surface in advance of the latter is sharply tuberculous.

The cervical groove is deeply cut where it defines the posterior part of the mesogastric lobe and with its lateral backward continuations forms a well-defined figure in the form of an H. The course of its anterior branches towards the post-orbital crests can only be traced with great difficulty.

The epigastric crests are a little in advance of the post-orbitals and are separated from them by a distinct furrow: both are obscured by large rugae. The post-orbital crests break into tubercles in the vicinity of the epibranchial tooth and, as in *P. aborense*, the surface in front of them is situated at a much lower level than that behind them.

The front is square-cut, not very strongly deflexed and occupies about one-third of the greatest breadth of the carapace.

The outer orbital angle is acute and beneath it there is no notch in the lower border. The epibranchial tooth is small, but acute, and is separated by a sharp nick from the margin in front of it.

The antero-lateral margin is for the most part rounded off; the usual crest is obsolete and is represented merely by a few tubercles in the immediate neighbourhood of the epibranchial tooth (fig. 9). This peculiar feature at once distinguishes *P. oblitteratum* from every other Indian species of the genus *Potamon*.

The side walls of the carapace bear short oblique rows of tubercles which, posteriorly, take the form of ridges and pass across the border to the dorsal surface.

The mandibular palp is simple. The outer maxillipedes along with the adjacent parts of the carapace and all the segments of the walking legs bear coarse, scanty, yellowish hairs. The ischium of the outer maxillipedes is, as usual, deeply grooved in a longitudinal direction. The merus is about as long as broad. The right exopod bears a short and rudimentary flagellum (fig. 9a); but of this, on the other side no vestige can be found.

The chelipedes in the single female specimen are slightly unequal and are rather more strongly tuberculate than in the two allied species. The carpal spine is long and slender. The palm of the chela is somewhat inflated; on its dorsal surface tubercles are conspicuous and a few of these extend on to the base of the dactylus. The fingers are grooved and pitted; when the claw is closed their tips are crossed and no appreciable gap remains between them.

The walking legs are long and slender, those of the second pair, which are the longest, measuring 46 mm. The propodus of this limb is two and three quarter times as long as broad and the dactylus is as long as the propodus and half the carpus.

Though the evidence afforded by the flagellum on the exopod of the outer maxillipedes is somewhat inconclusive, the affinities of this species are clearly with *P. aborense* and *P. sikkimense* from both of which, as from all other Indian species of the genus, it is readily distinguished by the obliteration of the antero-lateral crest of the carapace.

The single type specimen was obtained by Mr. F. H. Gravely in November, 1911, at Sukli on the E. side of the Dawna Hills near the Burmo-Siamese frontier. It was found in a log of rotten wood lying by the roadside at an altitude of about 2100 ft. (Regd. no. 8147).

Sub-genus *Geotelphusa*, Stimpson.**Potamon (*Geotelphusa*) *adiatretum*, Alcock.**

(Plate xviii, figs. 10-12.)

1910. *Potamon (Geotelphusa) adiatretum*, Alcock, Cat. Indian Decapod Crust., pt. I, fasc. ii, p. 59, pl. iii, fig. 11.

This species has hitherto been known from four specimens only: the type, which is said to have come from Moulmein, an individual from the Khakyen Hills and two examples found by Col. Godwin-Austen in the Dafla country.

On critical comparison the following differences are found between the Abor specimens and the type:—The surface of the carapace in the former is more distinctly pitted, the frontal and post-orbital regions are a little less strongly deflexed (fig. 10), the cervical groove where it defines the mesogastric area is wider and more deeply graven, the crenulate antero-lateral margin of the carapace is better defined and the spine at the inner angle of the carpal segment of the chelipede is shorter (fig. 12).

In respect of the prominence of the antero-lateral margin, the specimens agree much more closely with the Dafla examples than with the type. In course of time it will perhaps be possible to separate one or more geographical races of the species, but this can only be done satisfactorily when a good series of Burmese specimens is available.

In the collection, which comprises fourteen specimens, are several adult males. In these the chelipedes are markedly unequal and in the larger one the fingers are both very strongly curved and meet only at the tip, leaving a huge gap between them when the claw is closed.

The number of teeth with which the fingers are armed is very variable. In the oldest specimens, in which the gape is widest, each finger bears as a rule a single tooth near the middle of its inner margin. In rather less well-developed individuals these teeth are also found, with, in addition, others between them and the apex of the claw (fig. 11).

In full-grown males the last abdominal segment is a trifle wider than long, rounded at the apex, and as a rule with sinuous lateral margins. In the largest specimen the carapace is 21 mm. in breadth and 15 mm. in length.

All the specimens were found under stones in small streams running into the Dihang river or its tributaries at altitudes of between 900 and 2000 ft. The precise data are as follows:—

Jan. 13th, 1912. Five specimens, 3 ♂ and 2 ♀ (Regd. no. $\frac{8018}{10}$), from a stream on the left bank of the Dihang R. near Yembung.

Jan. 17th, 1912. One male, with symbiotic *Temnocephalidae*, from the Yembung river ($\frac{8021}{10}$).

Feb. 1st, 1912. Three specimens, 1 ♂ and 2 ♀, with symbiotic Temnocephalidae, from a small stream flowing into the Siyom R. below Debuk Damda ($\frac{8019}{10}$).

Feb. 5th to 10th, 1912. Five specimens, 3 ♂ and 2 ♀, from a stream between Renging and Upper Renging, collected by Capt. de Courcy and Mr. I. Burn Murdoch ($\frac{8020}{10}$).

Var. *lophocarpus*, nov.

(Plate xviii, figs. 13, 14.)

Thirty-five additional specimens of *P. adiatretum* are distinguished from the preceding by characters of sufficient importance to merit varietal recognition.

In general facies these examples bear an exceedingly close resemblance to the others. The form of the carapace is identical and differs in the features already noted from the type of *P. adiatretum*. Examined with a lens, the same pitting is observed, but the surface is dull and does not present the polished appearance which characterizes the majority of the typical specimens.

It is, however, in the structure of the chelipedes that the most distinctive varietal differences are to be found. In the var. *lophocarpus* no trace whatever remains of the spine at the inner angle of the carpus (fig. 14) and, were it not that this spine is reduced in size in the Abor examples of *P. adiatretum* (fig. 12), this character alone might be held sufficient for specific differentiation.

In the variety also a tuft of coarse hairs, entirely absent in the case of the other specimens, springs from the antero-internal face of the carpus, *i.e.* the portion on which the palm of the chela abuts when the limb is flexed. In addition, short hairs of a similar nature are to be found round the base of the dactylus and at the proximal end of the inner margins of both fingers (fig. 13). These hairs are scanty or, in rare instances, wholly missing in some of the largest individuals, but it may, I think, be assumed that their absence in these cases is due solely to mechanical agencies.

The eggs of an ovigerous female were in life of a bright red colour.

To specialized local races in which the geographical factor can be successfully demonstrated the term 'sub-species' is perhaps more properly applicable; but as the term 'variety' has frequently been used with a geographical significance in the case of freshwater crabs, it should be noted that all the evidence available with reference to the var. *lophocarpus* negatives the view that it is a localized race. Although the two forms of the species were not actually found together, the localities in which one or other occurred have no precise correlation with either horizontal or vertical distribution: the variety was found at a place exactly intermediate between others in which only the typical form was taken.

The specimens were found in hill streams at an elevation of 600-2000 ft. above sea-level.

Dec. 31st, 1911. One male from Upper Rotung, collected by Capt. de Courcy (Regd. no. $\frac{8022}{10}$).

Jan. 9th, 1912. Three specimens, one ♂ and two ♀, from the Egar stream between Renging and Rotung ($\frac{8023}{10}$).

Jan. 10th, 1912. Three specimens, one ♂ and two ♀, from the Lalek stream near Renging ($\frac{8027}{10}$).

Feb. 6th-12th, 1912. Two males from the neighbourhood of Rotung, collected by Capt. de Courcy ($\frac{8028}{10}$).

Feb. 11th, 1912. Sixteen specimens, nine ♂ and seven ♀, some with symbiotic Temnocephalidae, in small streams between two and three miles S. of Yembung ($\frac{8026}{10}$, TYPES).

March 21st, 1912. Six specimens, five ♂ and one ♀, in the Sirpo valley between Janakmukh and Renging ($\frac{8024}{10}$).

March 26th, 1912. Two males in a stream near Balek ($\frac{8025}{10}$).

Potamon (Geotelphusa) superciliosum, sp. nov.

(Plate xviii, figs. 15-18.)

This species is allied to *P. adiatretum* but differs in the following particulars:—

1. The carapace has much the same proportions but the front is less deflexed and posteriorly the surface is slightly flatter, with the divergent branches of the cervical groove on either side of the mesogastric area more conspicuous.
2. The epigastric and post-orbital crests are well defined and separated in most cases by a rather definite groove. *The post-orbital crests are specially prominent* and exist as a thin but salient ridge which disappears before reaching the lateral margin (fig. 15).
3. In young specimens the epigastric and post-orbital crests and the surface in the vicinity of the antero-lateral margin are finely rugose, and the oblique wrinkles on the side walls of the carapace are much more conspicuous. In very large examples the rugosity of the crests is diminished though traces of it are always found near the antero-lateral margin.
4. The epibranchial tooth, wholly absent in *P. adiatretum*, is represented by a small and inconspicuous nick in the finely crenulate antero-lateral ridge, the latter being sharper and better defined even than in the Abor specimens of the preceding species (fig. 16).
5. There is, as in *P. adiatretum*, no trace of an external orbital tooth, but the lower border of the orbit does not run quite flush into the upper border, the two margins joining at slightly different levels.

In young specimens the outer surfaces of the carpus and chela are strongly pitted, but scarcely any trace of this remains in adult

males. The spine at the inner angle of the carpus is strong and sharp (fig. 18) and is much better developed than in the Abor examples of *P. adiatretum*. The fingers of the chela are grooved. In adult males the chelipedes are very unequal and, as in *P. adiatretum*, the fingers of the larger claw when closed leave between them a huge gap, meeting only at the tips (fig. 17). The teeth on the fingers appear to be very variable in number and position and the tufts of hairs found in *P. adiatretum* var. *lophocarpus* are entirely absent.

The mandibular palp is simple. The merus of the outer maxillipedes is much broader than long and its anterior margin is rather deeply concave; the exopod is provided with a long flagellum.

This species appears to reach a much greater size than that described by Alcock, but the characteristic differences between the two forms are quite distinct even in the very smallest individuals. In a large male the carapace is 38 mm. broad, 27 mm. long and 16 mm. deep.

It will be noticed that in the possession of a rudimentary epibranchial tooth and prominent post-orbital ridges *P. supercili- osum* departs somewhat from the definition of the sub-genus *Geotelphusa* as laid down by Alcock. The affinities of the species with *P. adiatretum* are, however, clear.

The twelve specimens obtained were found in hill streams between altitudes of 600 and 2000 ft.

Jan. 13th-17th, 1912. Six males, some with symbiotic Temnocephalidae, in the Yembung river (Regd. no. $\frac{8014}{10}$).

Jan. 19th, 1912. One male in the Egar stream between Renging and Rotung ($\frac{8015}{10}$).

Feb. 9th, 1912. Three males and one female, some with symbiotic Temnocephalidae, in the Yembung river ($\frac{8016}{10}$).

March 26th, 1912. Four males, two very large, in a stream near Balek ($\frac{8017}{10}$, TYPES).

Sub-genus *Acanthotelphusa*, Ortmann.

Potamon (*Acanthotelphusa*) *feae*, (de Man).

1898. *Paratetphusa feae*, de Man, Ann. Mus. Civ. Genova (2), XIX, p. 393, pl. iv, fig. 3.

1910. *Potamon* (*Acanthotelphusa*) *feae*, Alcock, Cat. Indian Decapod Crust., pt. I, fasc. ii, p. 66, pl. xi, fig. 51.

The Abor specimens are all small, the carapace of the largest being only 17 mm. in breadth.

The carapace is much less distinctly areolated than in the four larger specimens examined by Alcock; the post-orbital crest does not form the definite tubercles found in those individuals, but exists as a very obscure and ill-defined eminence which

extends laterally almost to the longitude of the outer orbital tooth. In typical *feae*, also, a broad transverse ridge across the epibranchial region in the neighbourhood of the posterior anterolateral spine limits anterior and posterior depressions and of this, in the Abor examples, only the merest indication can be found.

I have been able to examine a number of *P. feae* taken in December, 1910, in the Deshnoi river on the Assam-Bhutan frontier in the north-east of the Darrang district (Regd. no. $\frac{8032}{10}$). This series comprises both large and small specimens and the evidence they afford leads me to believe that it may be necessary at some future date to recognize different races of this species. On comparing specimens of equal size, a slight but quite noticeable difference can be observed in the prominence of the transverse epibranchial ridges and in the character of the post-orbital crests. The more important features of *P. feae* are well shown in all the examples.

This species was described by de Man from Bhamo and Teinzo in the Upper Irrawaddy and has been recorded by Alcock from Sadiya and the Dafla country.

The specimens in the Abor collection were found at the following localities:—

Nov. 26th, 1911. One very small example from the Dikrang river near Sadiya (Regd. no. $\frac{8029}{10}$).

Dec. 12th, 1911. Three very small examples from the Brahmaputra river at Kobo ($\frac{8030}{10}$).

March 26th, 1912. Seven males and two females from a stream near Balek ($\frac{8031}{10}$).

All were found on the plains between elevations of 400 and 600 ft. I am almost certain that the species does not exist in the hill streams at higher altitudes, though it was apparently in such situations that specimens were obtained in the Dafla country by Col. Godwin-Austen.

Sub-family *GECARCINUCINAE*.

Genus *Paratelphusa*, Milne-Edwards.

Sub-genus *Barytelphusa*, Alcock.

Paratelphusa (*Barytelphusa*) *harpax*, Alcock.

1910. *Paratelphusa* (*Barytelphusa*) *harpax*, Alcock, Cat. Indian Decapod Crust., pt. I, fasc. ii, p. 95.

A single small specimen with the carapace 14 mm. in breadth was found near Sadiya in the Dikrang river (Regd. no. $\frac{8033}{10}$). The species appears to be widely distributed in Assam south of the Brahmaputra and is also recorded from the vicinity of Harmutti in the Dafla country.

Family PALAEMONIDAE.

Genus *Palaemon*, Fabricius.*Palaemon hendersoni*, de Man.

(Plate xix, figs. 19-23.)

1907. *Palaemon* (*Parapalaemon*?) *hendersoni*, de Man, Trans. Linn Soc., Zool. (2) IX, p. 446, pl. xxxiii, figs. 66-68.

1910. *Bithynis* (*Parapalaemon*) *hendersoni*, Rathbun, Bull. Mus. Comp. Zool., Harvard, LII, p. 316, pl. v, fig. 3.

The length of the carapace and rostrum is a little less than that of the abdomen, excluding the telson. The carapace, except on the walls covering the branchial chamber, is closely covered with very minute prickles which are easily removed by wear. The anterior margin is lobed at the base of the orbit and at the lower limit of this lobe there is a sharp antennal spine arising close behind the edge. The hepatic spine is small (figs. 19, 20).

The rostrum commences as a blunt dorsal crest a little in front of the middle point of the carapace and extends beyond the end of the first segment of the antennular peduncle, sometimes as far as the junction of the second and third segments. Dorsally it bears from five to seven teeth, of which from one to three (usually two) are situated on the carapace behind the longitude of the posterior limit of the orbital notch. The teeth are more or less evenly spaced, but the posterior one is as a rule separated by a greater distance than the rest. Between the dorsal teeth are numerous hairs. On its ventral margin the rostrum bears one or two teeth near the apex.

The eyes are deeply pigmented. In dorsal view a small ocellus is visible, imperfectly separated from the cornea.

The basal segment of the antennular peduncle is considerably longer than the two following combined. The laminar plate, which forms the outer portion of the segment, terminates in a stout external tooth which reaches beyond the middle of the succeeding segment; the lateral process consists of a sharp spine which extends as far forwards as the eyes. Anteriorly the inferior margin of the second segment is strongly produced. The two rami composing the upper (and outer) flagellum are fused basally for a distance scarcely greater than the extreme length of the last peduncular segment (fig. 20).

The antennal scale is about two and a half times as long as broad, and the spine which terminates the slightly convex external margin does not nearly reach the broadly rounded apex of the lamellar portion.

The outer maxillipedes extend to the end of the antennular peduncle; the ultimate segment, including the corneous terminal spine, is only a trifle shorter than the antepenultimate.

The first pereopods reach beyond the antennal scale by a little more than the length of the propodus. The proportional

lengths of the merus, carpus and chela are respectively as 13, 15 and 10. The dactylus is almost exactly equal in length to the palm.

The second peraeopods may attain a monstrous size in males; the two limbs may be equal in length or markedly unequal, but as a rule show varying degrees of inequality in large individuals. In very large specimens the greater of the two legs extends beyond the apex of the scale by the whole of the chela and carpus. The second peraeopods of eight large specimens yield the following measurements:—

Measurements, mm.							Proportion of length of larger chelipede to total length (100).	Proportional lengths of segments of larger chelipede to propodus (100).		
Total length.	Length of right chelipede.	Length of left chelipede.	Larger chelipede.					Merus.	Carpus.	Dactylus.
			Length of merus.	Length of carpus.	Length of propodus.	Length of dactylus.				
59	60	46.5	11	7.7	29.5	16.0	101.7	37.3	26.1	54.2
57	57.5	53	11	8.5	29.0	16.0	100.9	37.9	29.3	55.2
56	50	59	10.5	7.3	30.0	16.0	105.4	35.0	24.3	53.3
53	49	42.5	8.7	6.7	24.0	12.0	92.5	36.3	27.9	50.0
49	36.5	42	7.5	5.7	19.5	10.3	85.7	38.5	29.2	52.8
49	40.5	44.5	8.5	5.5	21.5	11.5	90.8	39.5	25.6	53.5
46	44	40	8.0	6.0	20.5	10.3	95.7	39.0	29.3	50.2
44	37	34	7.0	5.1	17.5	8.8	84.1	40.0	29.1	50.3

The whole limb (fig. 21) is closely covered with minute prickles and these become upstanding spinules on the inferior surfaces of the ischium and merus. The palm is devoid of setae, but both fixed and movable fingers are strongly fluted and, in the hollows between the ridges, are numerous pits from which tufts of coarse hair arise (fig. 22). In living specimens these hairs always retain a quantity of fine mud. The grooving of the fingers is much more marked than in *Palaemon dayanus*, Henderson, and by this feature alone *P. hendersoni* is readily distinguished from its allies. The palm is flattened, the depth being scarcely more than three-quarters of the breadth. In large males the fingers are toothed and may gape considerably. The fixed finger usually bears two teeth in its proximal half, while the dactylus also has two, situated distally of those on the opposite edge. The distal tooth of the fixed finger is frequently broad at the apex with two or more tubercles upon it.

The third peraeopods reach a trifle beyond the apex of the antennal scale, the fourth almost to the end of the antennular peduncle and the fifth a little beyond the eye. All three pairs are beset with small prickles, most strongly developed on the posterior surfaces of the ischium and merus, and bear also scattered hairs. On the posterior and postero-internal aspects of the propodus are

a number of small movable spines arranged in two linear series. The dactylus bears a single terminal spine and numerous short hairs and is about two-sevenths the length of the propodus.

The branchial formula is the same as in other species of the genus.

The telson is broad with a triangular apex. It bears two pairs of dorsal spinules and two pairs at the apex (fig. 23). Of the latter, those of the outer pair are very small, while those of the inner are larger and extend a little beyond the apex. Between these spinules the margin is furnished with long plumose setae.

There can, I think, be very little doubt that the specimens described above are correctly referred to de Man's *P. hendersoni* from Darjiling; but it is strange that in the original description no mention is made of the characteristic grooving of the fingers of the large chelipede. In the Indian Museum are numerous examples of this species from the valley below Kurseong, a locality at no great distance from Darjiling, collected by Dr. Annandale and Mr. F. H. Gravely, and in these specimens the grooves on the fingers are clearly shown.

The Abor specimens agree with de Man's description and differ from the Kurseong examples and from most of those recorded by Miss Rathbun in having the fingers of the second peraeopod as long as, or a trifle longer than the palm.

The species has hitherto been recorded only from Darjiling (*de Man*) and from the Gokteik gorge on the border of the southern Shan States in Burma (*Rathbun*).

Palaemon hendersoni was found plentifully in the Abor country in the Sirpo stream near Renging (Regd. nos. $\frac{8139-41}{10}$, $\frac{8143-4}{10}$), and in the Egar stream between Renging and Rotung ($\frac{8142}{10}$, $\frac{8145-6}{10}$).

Family ATYIDAE.

Genus *Caridina*, H. Milne-Edwards.

Caridina weberi, de Man, var.

(Plate xix, figs. 24, 25; plate xx, figs. 26-28.)

A *Caridina* which occurs in abundance in the Darrang district in tributaries of the Brahmaputra and has been found in the main river itself at Dibrugarh and Kobo appears to represent a race of *C. weberi*, de Man. This species was originally described from Flores and Celebes (de Man, 1892)¹ and a variety called *sumatrensis* is recorded from Sumatra (de Man, 1892),² from Engano I., near Sumatra (Nobili, 1900)³ and from Cochin China, Siam and the environs of Bombay (Bouvier, 1905).⁴

¹ In Max Weber's Zool. Ergebn. Reise niederl. Ost.-Ind., II, p. 371, pl. xxii, fig. 23.

² *Ibid*, p. 375, pl. xxii, fig. 23g.

³ Ann. Mus. Civ. Genova (2), XX, p. 476.

⁴ Bull. Sci. France et Belg., XXXIX, p. 83.

I have compared specimens from the Brahmaputra system with examples from Bombay determined by Prof. Bouvier as var. *sumatrensis* and with others which appear to represent the same form from Medha, Yenna Valley, Satara district, collected by Mr. F. H. Gravely, and find a few differences which may ultimately prove of importance.

The rostral teeth are less numerous. Those on the dorsal margin vary in number from 10 to 17 (12—14 in 74% of the specimens examined) and of these 3 to 5 (usually 4) are situated on the carapace behind the orbital notch. On the ventral margin there are from 1 to 5 teeth (2 or 3 in 78% of the specimens examined).

The fact that a number of dorsal teeth are situated on the carapace behind the orbit (figs. 24, 25) shows that the Brahmaputra race is more closely allied to the var. *sumatrensis* than to the typical form. In the variety, however, the dorsal teeth are decidedly more numerous (16—20), and comparison with specimens from the Satara district seems to indicate that the Assamese individuals are more stoutly built with rather shorter and less slender limbs.

In the chelae of the second peraeopods (fig. 27) the palmar portion is decidedly more than half the length of the dactylus, a feature noticed by Bouvier in examples of var. *sumatrensis*.

C. weberi appears to be one of the commonest species of *Caridina* in India and Burma: a large collection of specimens from widely different localities awaits examination in the Museum. It will probably be possible to distinguish a number of local races, but to attempt to do so at the moment would be premature and beyond the scope of the present paper.

The colour of living specimens is very variable. They may be uniformly dark, blotched or mottled. Frequently a broad whitish mid-dorsal stripe is found running the whole length of the animal and occasionally specimens are obtained which are vertically barred on the sides.

Specimens of the Brahmaputra race of *C. weberi* were found on the Abor expedition at Kobo (Regd. no. $\frac{8162}{10}$) and at Dibrugarh ($\frac{8163}{10}$). The form is also represented in the Museum collections by numerous examples from the Darrang district on the right bank of the Brahmaputra,—from the Dhansiri R. at Kowpati ($\frac{8164}{10}$), from the Deshnoi and Rowta rivers on the frontiers of Assam and Bhutan ($\frac{8165-6}{10}$), from Mazbat ($\frac{8167}{10}$) and Mangaldai ($\frac{8168}{10}$).

Caridina excavata, sp. nov.

(Plate xx, figs. 32-35; plate xxi, figs. 36, 37.)

The rostrum extends beyond the end of the antennular peduncle and in some examples reaches just to the apex of the antennal scale. In lateral view it is dorsally a little convex in the

neighbourhood of the orbit and a trifle concave towards the apex. In the proximal half of the upper margin it bears a series of 9 to 16 teeth (10 to 13 in 71% of the specimens examined). They are evenly spaced and movable and from 0 to 3 (usually 1 or 2) are situated on the carapace behind the orbital notch. The distal half of the rostrum is wholly unarmed dorsally, the small tooth found close behind the apex in *C. nilotica* and numerous other species being absent. On the ventral margin there are 2 to 8 fixed teeth (4 to 6 in 87% of the specimens examined). These teeth are placed in the distal half and the posterior one is, as a rule, situated immediately below the foremost of the dorsal series (fig. 36).

The antero-lateral margin of the carapace is obtusely lobed below the orbital notch and immediately beneath this lobe there is a strong antennal spine. The orbital notch is excavated to a very unusual extent (fig. 37); the antero-lateral angles of the carapace are rounded.

The eyes are well pigmented. The segments of the antennular peduncle decrease progressively in length. The lateral process reaches beyond the eyes but does not extend to the end of the basal segment. The second segment is about one and two third times as long as wide. The antennal scale is about three times as long as broad and its straight outer margin terminates in a stout spine which is far exceeded by the rather narrowly rounded apex of the lamella.

The third maxillipedes reach to the end of the second segment of the antennular peduncle.

All the peraeopods are unusually slender. In those of the first pair, which reach about to the extremity of the eyes, the carpus (fig. 32) is *three* times as long as wide and is only very slightly excavated anteriorly. The chela is longer than the carpus, the dactylus is one and a half times as long as the palm and the length of the propodus is about three and a half times its greatest breadth.

The peraeopods of the second pair (fig. 33) reach a little beyond the end of the antennular peduncle. The carpus is slender, about five and a half times as long as wide and is equal in length to the chela. The dactylus is longer than the palm and the breadth of the palm is less than a quarter the length of the entire chela.

The third peraeopods reach almost to the apex of the antennal scale and the fourth to the end of the antennular peduncle. The merus in each pair bears a single tooth in the middle of its posterior margin and one at the distal end; a similar tooth is found at the end of the carpus. The dactylus bears from eight to ten small teeth on its margin exclusive of the spinous apex.

In the fifth pair (fig. 34) the propodus is longer than in the fourth and the whole limb is consequently of greater length; the merus and carpus are usually provided with teeth as in the preceding pairs. The slender dactylus is about one third the length of

the propodus and is armed with from 40 to 50 close-set serrated spines (figs. 34, 35).

The branchial formula is as follows :—

	Maxillipedes.			Peraeopods.				
	1	2	3	1	2	3	4	5
Pleurobranchiae ..	..	..	..	1	1	1	1	1
Arthrobranchiae ..	..		2	1	..	..	..	..
Podobranchiae	ep. rud.	1	ep.	ep.	ep.	± ep.	..	..

The epipod on the third peraeopods is sometimes present, sometimes absent : more usually it is suppressed.

The telson bears two pairs of dorso-lateral spinules ; there is a small spinule on either side of the apex and the margin between them is rounded and bears eight spines, the outermost slightly the largest.

Large specimens reach a length of about 25 mm. In an ovigerous female (only one example obtained) the eggs average 1.0 mm. × .68 mm. in longer and shorter diameter.

A characteristic feature in the colouration of living specimens is the presence of a broad vertical band of pigment on the side-walls of the carapace immediately over the pleurobranch at the base of the third peraeopods.

In many species of *Caridina* the branchial formula is unknown ; but in all cases in which it has hitherto been examined epipods have been found at the bases of the first four pairs of peraeopods. The absence of these appendages from the fourth pair and their occasional absence from the third seems therefore to constitute a very important feature of *C. excavata*. Apart from this character its nearest ally appears to be *C. acutirostris*, Schenkel,¹ from Celebes.

A single example of *C. excavata* was found at Sadiya in the Dikrang river, while numerous other specimens were obtained in January, 1911, in the Tezpur district on the Assam-Bhutan frontier. These were taken, for the most part, in a small back-water of the Rowta R. in the Brahmaputra drainage system (Regd. no. $\frac{8159}{10}$), and in this particular spot the species was found to the exclusion of *C. weberi* var. and *C. hodgarti* which were abundant in other parts of the district. A few specimens were found in the Rowta R. itself ($\frac{8160}{10}$) and in irrigation channels at Mazbat in the same vicinity ($\frac{8161}{10}$), but the species was for the most part decidedly rare.

¹ Verhandl. naturf. Ges. Basel, XIII, 1902, p. 496, pl. viii, fig. 3.

The specimen from Sadiya has unfortunately been mislaid. Those from the backwater of the Rowta R. may be recognized as types of the species.

Caridina hodgarti, sp. nov.

(Plate xx, figs. 29-31; plate xxi, figs. 38, 39.)

The rostrum is slender and in well-grown specimens reaches well beyond the apex of the antennal scale. Its dorsal margin is slightly concave in lateral view and at the apex it is straight or trends a little upwards. In the proximal half of the upper margin there is a series of 8 to 16 rather close-set equidistant movable teeth. The number most commonly found is 11; 10 to 12 occur in 67% and 9 to 13 in 92% of the specimens examined. The posterior tooth is in rare cases situated on the carapace behind the orbital notch; between each pair of teeth there is a single seta. Immediately behind the slender apex there is a single fixed tooth; occasionally two are found in this position and in rare instances none at all. The ventral margin is furnished with from 1 to 7 stout fixed teeth, widely separated. The number most commonly found (48% of the specimens examined) is 4, and 3 to 5 occur in 91% of the examples (fig. 38).

The carapace is compressed, of greater proportional length than in most species of the genus, and the only spine present is the antennal.

The eyes are well pigmented. The lateral process of the basal segment of the antennular peduncle is sharply pointed and extends beyond the eyes. The second segment is twice as long as wide and is nearly twice the length of the third. The antennal scale is narrow, about four and a half times as long as wide; its inner margin in the distal half is straight or even very slightly concave and the straight outer margin terminates in a sharp spine far behind the narrow apex of the lamella (fig. 39).

The third maxillipedes and all the peraeopods are very short. The former scarcely reach the distal end of the second segment of the antennular peduncle.

The first peraeopods only reach a trifle beyond the base of the antennal scale. The carpus (fig. 29) is one and a half times as long as broad; it is scarcely at all excavate anteriorly and is three quarters the length of the chela. The palm is as long as broad and is shorter than the dactylus.

The peraeopods of the second pair (fig. 30) reach a little beyond the eyes. The carpus is about three times as long as broad and is about equal in length to the chela. The palm is scarcely longer than broad and is a little shorter than the dactylus.

The last three pairs of peraeopods bear spines on the meral and ischial segments much as in the preceding species. The third reach nearly to the end of the second segment and the fourth to the end of the first segment of the antennular peduncle, while the fifth reach as far forwards as the eyes. The dactyli of the third