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	PAGE
XXIV. The Fauna of Brackish Ponds at Port Canning, Lower Bengal. Part X. <i>Dr. J. G. de Man</i>	211
XXV. The Fauna of Brackish Ponds at Port Canning, Lower Bengal. Part XI. <i>W. M. Tattersall</i>	233
XXVI. On some Oriental Solifugæ with descriptions of new forms. <i>A. S. Hirst</i>	241
XXVII. The difference between the Takin (<i>Budorcas</i>) from the Mishmi Hills and that from Tibet, with notes on variation displayed by the former. <i>T. Benthum</i>	249
XXVIII. On <i>Caridna nilotica</i> (Roux) and its varieties. <i>Dr. J. G. de Man</i>	255
XXIX. Description of a new species of <i>Charaxes</i> from the Bhutan Fron- tier. <i>G. deRhé-Philipe</i>	285
XXX. First Report on the Collection of Culicidæ and Corethridæ in the Indian Museum, with descriptions of new genera and species. <i>F. V. Theobald</i>	287

MISCELLANEA (pp. 303—307).

Measurements of the skeletons of two large Indian Elephants in the Indian Museum—*T. Benthum*. The young of *Aelurus fulgens*—*T. Benthum*. Notes on some Batrachia recently added to the collection of the Indian Museum—*N. Annandale*. Breeding habits of *Tylotriton verrucosus*—*N. Annandale*. The occurrence of *Rhinodon typicus* at the head of the Bay of Bengal—*R. E. Lloyd*. Note on *Ephydatia meyeri* (Carter)—*N. Annandale*.

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XXIV. THE FAUNA OF BRACKISH PONDS
AT PORT CANNING, LOWER BENGAL.

PART X.—DECAPOD CRUSTACEA, WITH AN ACCOUNT OF A SMALL
COLLECTION FROM BRACKISH WATER NEAR CALCUTTA AND
IN THE DACCA DISTRICT, EASTERN BENGAL.

By DR. J. G. DE MAN, *Ierseke, Holland.*

The collection of Decapod Crustacea, chiefly gathered in brackish water ponds at Port Canning, comprises eleven species, three of which are new to science. Very interesting are also the numerous specimens of *Palæmon lamarrei*, H. M. Edw., a species that, since its first description in 1837, did no more appear in literature, or that has been misunderstood.

The collected species are the following:—

- Scylla serrata* (Forsk.), de Haan.
- Tympanomerus stapletoni*, sp. nov.
- Pachygrapsus propinquus*, sp. nov.
- Varuna litterata* (Fabr.), M. Edw.
- Metaplex dentipes* (Heller).
- Leander*, sp.
- Palæmon* (*Eupalæmon*) *lamarrei*, H. M. Edw.
- Palæmon*, sp.
- Caridina*, sp.
- Caridina propinqua*, sp. nov.
- Caridina nilotica* (Roux), var. *bengalensis*, var. nov.

The last-mentioned species is described in another paper, which appears at p. 255 of this Journal, entitled "On *Caridina nilotica* (Roux) and its varieties."

I. *Scylla serrata* (Forsk.), de Haan.

Scylla serrata (Forsk.), de Haan, Alcock, "Materials for a Carcinological Fauna of India," No. 4, pt. ii, Calcutta, 1899, p. 27 (*ubi synonym.*).

Two young males and a female of medium size from Port Canning (estuary of the Matla River).

The carapace of the female is 95 mm. broad and 64 mm. long. Outer angle of the wrist of the chelipedes with one small spine. In the smaller of the two males the last antero-lateral spine of the carapace is distinctly larger than the rest; the distance between the tips of these teeth, *i.e.*, the greatest breadth of the carapace, mea-

sure 20 mm., whereas it is 13.3 mm. long without the abdomen. Frontal lobes rounded, little prominent. In the other male, the carapace of which is 38 mm. broad and 25.5 mm. long, the last antero-lateral tooth is hardly larger than the rest and the four frontal lobes are already triangular, the lateral lobes being subacute. In this specimen the anterior margin of the right cheliped carries four spines, that of the left, as usually, three; in both males there is also but one small spine on the outer side of the wrist.

2. *Tympanomerus stapletoni*, sp. nov.

(Plate xviii, fig. 1.)

Forty-seven males and fifteen females, four of which are egg-bearing. They were collected by Mr. H. E. Stapleton in the Dacca District from a tidal river, the water of which is more or less brackish throughout the year.

Reg. No. $\frac{5137}{10}$.

As has already been observed by Col. Alcock (*Journal Asiatic Soc. Bengal*, vol. lxxix, pt. ii, No. 3, 1900, p. 371) the name *Tympanomerus* is a most unfortunate one, for, both in *Tymp. orientalis* (de M.) and in the present species, there are no tympana on the meropodites of the ambulatory legs; it is only in *Tymp. pusillus* (de Haan), from Japan, that small tympana exist on the meropodites of the last pair of legs. Specimens of *Tymp. orientalis* and *Tymp. pusillus* are lying before me. *Tymp. stapletoni* is intermediate in size between the two other species; it is somewhat larger than *Tymp. orientalis* but it does not attain the size of *Tymp. pusillus*. Both in the male and in the female the distance between the outer orbital angles is *one-fifth* longer than the length of the carapace, the epistome excluded. From the middle of the cardiac region the upper surface gradually slopes down towards the fronto-orbital margin and towards the moderately deflexed front. As in the two other species, the intestinal region, which is smooth and obliquely deflexed downward, is bounded anteriorly by a transverse ridge that runs between the coxæ of the fifth pair of legs; the intestinal area appears in *Tymp. stapletoni* higher (longer) in proportion to its breadth than in the two other species. Whereas in *Tymp. stapletoni* the transverse ridge runs quite parallel with the posterior margin of the carapace, it curves, laterally, a little backward in *Tymp. pusillus*; the posterior margin of the carapace measures, in *Tymp. stapletoni*, two-thirds the distance between the outer orbital angles. The other regions are not or very indistinctly defined. Somewhat nearer to the transverse ridge just described than to a line uniting the outer angles of the orbits, the shallow, transverse, median part of the cervical groove is situated, which median part is interrupted in the middle. The depressed upper surface is marked with transverse, symmetrically arranged, short, impressed lines, which are more numerous on the lateral regions than on the

gastric area ; they are wanting on the deflexed, somewhat pubescent, branchial regions and near the transverse, intestinal ridge. On the lateral regions of the carapace these lines are situated on transverse, pubescent ridges and prominences with crenulated margins. The anterior margin of the front measures one-fourth the distance between the outer orbital angles, and reaches in the middle further forward than at its rounded lateral angles ; the lateral margins of the front are first slightly directed inward and then pass with a regular curve into the sinuous, transverse, upper margin of the orbits. The upper surface of the front is broadly and rather deeply grooved in the middle, whereas the lateral parts carry five or six oblique, impressed lines at either side.

The orbits are *transverse* as in *Tymp. orientalis* and almost once and a half as broad as the front. The antero-lateral portion of the lateral borders of the carapace, formed by the extraorbital and by the epibranchial tooth, slightly diverges, whereas the postero-lateral portion slightly converges backward. The outer margin of the extraorbital tooth is at a right angle with the upper orbital margin, so that the extraorbital tooth is not very sharp and moderately prominent. The epibranchial tooth, hardly discernible when the carapace is looked at from above, appears, in a lateral view of the latter (fig. 1c), as a tooth larger than the extraorbital one, from which it is separated by a deep, vertical notch, the anterior margin of the epibranchial tooth being at a right angle with the outer margin of the other. Whereas the margins of the extraorbital and of the epibranchial tooth are rather sharp and continuous, the postero-lateral margins are often interrupted and appear therefore ill defined ; the oblique, ciliated line on the sides of the carapace is directed towards the posterior end of the epibranchial tooth. In *Tymp. pusillus* the postero-lateral margin is well defined and the epibranchial tooth is obtuse, but quite visible from above, as it projects laterally beyond the small extraorbital tooth ; this is also the case in *Tymp. orientalis*, but the divergent, antero-lateral margin is here much longer, and the oblique, ciliated line runs to the middle of the lateral border of the carapace (compare de Man, *Zoolog. Jahrb.* (Spengel), iv, 1889, p. 448).

Eye peduncles stout, smooth, transverse ; eyes terminal. Antennules folding obliquely. Lobe or tooth on the posterior margin of the epistome triangular, acute, very prominent. Lower margin of the orbits finely serrated, running nearly as in *Tymp. pusillus*, but less prominent ; no tooth therefore at the outer angle, as is observed in *Tymp. orientalis*. Pterygostomian region finely granulated and ciliated, as in *Tymp. pusillus*, but the lower, oblique groove that runs from the antero-external angle of the buccal frame obliquely backward, is very shallow and situated nearer to the lower orbital margin than to the lateral margin of the buccal frame, whereas in *Tymp. pusillus* it runs farther distant from the orbital margin than from the buccal frame.

Posterior margin of the buccal frame (fig. 1b) once and a half as broad as the distance between its antero-external angles, and

measuring two-thirds the greatest width. External maxillipeds shutting closely together. Ischium a little broader than long, its antero-internal angle produced, antero-external corner situated lower than the rest of the surface and bounded by a hairy line that runs obliquely from the outer margin to the antero-internal angle. Merus a little longer than the ischium and, though slightly broader than long, hardly as broad as the latter; this joint is sculptured with a sort of Y-shaped sulcus starting from the antero-external angle, as in *Tymp. orientalis*, but the outer branch is shorter and reaches hardly beyond the middle of the joint. Carpus ovate, concave, two last joints cylindrical. The outer margin of merus and ischium combined is regularly arcuate. Exognath completely concealed.

Sternum and abdomen are smooth. The abdomen (fig. 1d) of the male, which somewhat more resembles that of *Tymp. orientalis* than that of *Tymp. pusillus*, is 7-jointed. The terminal or seventh segment is, in the adult male, 1.5 mm. long,¹ and its posterior margin is 1.35 mm. broad; the lateral margins are a little concave and the tip is rounded. The penultimate segment, 1.1 mm. long, is a little shorter than the terminal, and as its lateral margins are convex, it presents its greatest breadth of 1.88 mm. in the middle, appearing almost twice as broad as long. The fifth joint is 1.52 mm. long, *i.e.*, as long as the terminal segment, and, *being strongly constricted just behind the middle*, appears *time-glass-shaped*; the anterior margin of this joint is 1.6 mm. broad, the posterior 1.72 mm. and at the constriction it is 1.1 mm. broad. The fourth joint is 0.96 mm. long, two-thirds of the preceding and its straight, posterior margin, 2.52 mm. broad, is $2\frac{1}{2}$ -times as broad as this joint is long. The third joint is 1.14 mm. long, a little longer than the fourth, and, as its margins are somewhat arcuate, it is 3.1 mm. broad, also two and a half times as broad as long, like the preceding segment. The second segment is very short, 0.62 mm. long, half as long as the third and 2.76 mm. broad. The first joint, finally, is the shortest and the broadest of all, 0.32 mm. long and 3.2 mm. broad; the posterior margin of the sternum, however, between the coxæ of the fifth legs, is 4.6 mm. broad.

The broad abdomen of the female much resembles that of *Tymp. pusillus*; the terminal joint, which is rounded at the tip, is 1.04 mm. long and its posterior margin is 1.9 mm. broad.

Chelipedes equal both in the male and in the female. The chelipedes of the male (fig. 1) more resemble those of *Tymp. pusillus* (de Haan) than those of *Tymp. orientalis*; they are just twice the length of the carapace and are thus rather short. The margins of the arm are unarmed, but they are granular, especially the upper one, the outer surface is nearly smooth, though a few microscopical granules are scattered on it, mostly near the upper margin; the granules are only visible by means of a lens. The upper surface of the carpal joints, which resemble those of *Tymp. pusillus*,

¹ All the joints are measured in the middle.

is smooth, their inner border is unarmed but microscopically granular, and one observes also a tuft of hair on the inner side just below the inner margin. Measured horizontally, the length (6.4 mm.) of the chelæ (fig. 1e) appears equal to that of the carapace, whereas the fingers, measuring one-third that length, appear half as long as the palm; the palm, 4.4 mm. long and 3 mm. high, is a little longer than high and the chelæ are, therefore, twice as long as high. The very finely granulated upper margin of the palm is obtuse, but in *Tymp. pusillus* the upper margin appears slightly compressed; the convex, outer surface of the palm is nearly smooth, but the rounded lower border appears again very finely granular, when examined under a lens, and this fine granulation extends nearly to the end of the immobile finger. Like the outer, so also the inner surface of the palm is marked with dark reticulate lines; on the inner surface these lines are finely granular. The straight, upper margin of the very oblique dactylus is also finely granular, but the granules are wanting along the middle line; the outer surface is slightly convex, smooth, somewhat punctate, and the prehensile edge carries eleven or twelve small teeth of equal size along its whole length. In *Tymp. pusillus* the outer side of the immobile finger is obtusely carinate longitudinally, though the granulate carina does not reach to the tip; in *Tymp. stapletoni* this carina is hardly discernible and the outer side of the finger is smooth; the immobile finger which is in a line with the lower margin of the palm is also finely denticulate like the dactylus. The fingers, which have slightly excavated tips, are, in younger males, comparatively longer.

The chelipedes of the female that are shorter than the legs, resemble those of *Tymp. pusillus*; the chelæ are half as long as the length of the carapace and the fingers that have broad-tipped, spoon-shaped extremities are slightly longer than the palm; the immobile finger is carinate longitudinally on its outer side.

The two middle pairs of ambulatory legs are a little longer than the others; in the adult male the legs of the antepenultimate pair are just twice as long as the distance between the outer orbital angles. *Tymp. stapletoni* is a species in which the meropodites carry no trace at all of "tympana," and proves more than any other the unfitness of the name of the genus. The meropodites are moderately dilated, so, e.g., are those of the antepenultimate pair little more than twice as long as broad, being 5 mm. long and 2.25 mm. broad in the middle. Their unarmed upper margin is granulated, and on the meropodites of the three first pairs the granules extend almost to the middle of the outer surface, but those of the last pair are nearly smooth; the lower margin is also finely granulated. The two following joints are less strongly compressed than those of *Tymp. pusillus* and are smooth, though somewhat punctate; finally, the terminal joints, which are compressed laterally, are a little shorter than the propodites.

Eggs very numerous, small, globular, 0.28—0.3 mm. broad.

Upper surface of the carapace dark blue, chelipedes and legs

marbled with partly reticulate, darker lines on a pale, olivaceous ground-colour; fingers ochraceous towards the tip. Ischium and posterior part of the merus of the outer foot-jaws and adjacent parts of the pterygostomian region whitish. Sternum and abdomen mottled with very small, dark points.

Measurements in millimetres.

	♂	♂	Ovigerous ♀	
Distance between the outer orbital angles	7.7	7.2	6.2	5.75
Greatest breadth of carapace	9	8.4	7	6.5
Length of carapace, without epistome	6.4	6	5.1	5
Length of the chelipedes	13	12.5	5.75	6.25
Length of the antepenultimate legs	15	14.5	9	9.5

3. *Pachygrapsus propinquus*, sp. nov.

(Plate xviii, fig. 2.)

A young male and a somewhat larger, sterile female from brackish water pools at Port Canning, Lower Bengal.

Carapace quadrangular, the distance between the outer orbital angles being one-third greater than the length. Upper surface depressed, very slightly arched transversely and longitudinally. Cervical groove quite distinct, interrupted at either side of the transverse median part, which is a little arcuate and placed immediately behind the middle. For the rest the regions are not defined, except the posterior cardiac area, which is indistinctly separated by shallow grooves from the branchial regions. Lateral margins of the carapace moderately convergent posteriorly, slightly concave in the middle, *with no tooth or spine* behind the acute outer orbital angles, that are directed outward. Branchial regions with eight or nine oblique, linear ridges, that barely extend on to the horizontal part of the upper surface; there is but a single transverse ridge on the hepatic regions, about midway between the orbits and the lateral parts of the cervical groove.

Front little more than half as broad as the distance between the outer orbital angles; it is strongly deflexed, though it is still partly visible when the carapace is looked at from above. Frontal lobes *four* in number, rounded, little prominent; lateral lobes a little broader than the internal ones; lower margin of the front very slightly concave in the middle, as in *Pach. minutus*. Anterior half of the gastric region and frontal lobes with numerous, transverse markings that are continued on to the front; the rest of the upper surface perfectly smooth. Posterior margin of the carapace about three-fourths the breadth of the front.

Orbits moderately oblique, eye-peduncles nearly smooth. Lower margin of the orbits sharp; opposite the basal part of the eye-peduncle, between its base and the cornea, the infraorbital

margin is divided into three or four small obtuse teeth and the arcuate, inner part appears somewhat uneven; the outer part of the margin carries a small, rounded notch not far from the outer orbital angle, and appears for the rest entire. Between the crenulate anterior margin of the buccal cavity and the arcuate, inner part of the infraorbital margin one observes a small, obtuse, dentiform lobe, at some distance from the anterolateral angle of the buccal cavity; in *Pach. minutus* this lobe is broader, transverse, almost contiguous to the antero-lateral angle of the buccal cavity and nearly in a line with the anterior margin of the latter. Subhepatic and subbranchial regions smooth, though pubescent. Lobe or tooth near the arcuate, inner part of the orbital margin triangular, subacute, separated by a rather broad hiatus from the front.

External maxillipeds (fig. 2a) as in *Pach. minutus*, a male specimen of which from the Bay of Batavia is lying before me; inner margin of the ischium straight (in *Pach. lævis*, Borr., concave), merus slightly broader than long, little shorter than the ischium, its inner angle obtuse, less produced than in *Pach. lævis*. Terminal segment (fig. 2b) of the male abdomen obtuse, almost as long as broad at base and distinctly longer than the penultimate segment; sternum and abdomen smooth.

Outer and inner sides of the merus of the right chelipede (the left is wanting in both specimens) furnished with transverse, squami-form, pubescent ridges, lower margin denticulate and with a sharp spine at the far end; anterior margin with a large, acute spine distally, followed on the distal margin by two smaller ones and preceded by three or four very small, acute teeth. Upper surface of the carpus with transverse and oblique ridges and with a small acute spine at the inner angle. Chela (fig. 2c) less convex than in *Pach. minutus*, upper margin of the palm with finely granular, oblique ridges, outer surface very finely granular, the granules only visible through a lens; a strong longitudinal ridge runs from near the tip of the immobile finger until near the carpal articulation; lower side of the palm with oblique markings and ridges. Fingers a little shorter than the palm, dactylus granular above and at its base, outer side of the fingers and lower margin of the index smooth; tips of the fingers spoon-like, glabrous.

Ambulatory legs (fig. 2) slenderer than those of *Pach. minutus*. Meri with transverse ridges on their outer surface and with an acute tooth above; the meri of the first pair are armed with two strong spines at the far end of their lower margin, those of the two middle legs with three and those of the last pair also with two, but on the three posterior legs these teeth are smaller than the two spines with which the lower margin of the meri of the 1st pair is armed. The three last joints are bristly and the dactyli, which are slightly curved at the acuminate tips, are but little shorter than the propodites.

Pachygrapsus lævis, Borr., from Funafuti (*Proc. Zool. Soc.*, 1900, p. 592, pl. xlii, fig. 7) is no doubt different. Of the single female on which this species was founded, the distance between the

outer orbital angles should be 7.5 mm., the length 6 mm., but the abdomen is apparently included, for, according to the figure, the length appears to be 5 mm., so that in this species the carapace is broader in proportion to its length, being just once and a half as broad as long. The frontal lobes are *seven* in number, the front is broader and the external maxillipeds are also different.

Pachygrapsus longipes, Rathb. (*Proc. National Museum*, xvi, 1893, p. 247, and *Bull. U. S. Fish Commission* for 1903, Wash., 1906, p. 840, pl. viii, fig. 7), from Honolulu, appears to resemble very much *Pach. planifrons*, de Man, from the Bay of Batavia (*Archiv. f. Naturg.*, bd. 53, 1888, p. 368, pl. xvi, fig. 2), but it is quite remarkable that neither Miss Rathbun nor Dr. Borradaile make mention of this species.¹ Unfortunately Miss Rathbun does not say whether, in *Pach. longipes*, the front is deflexed or not, but in the figure, published in 1906, the front resembles that of *Pach. planifrons*. According to this figure the propodal joints of the ambulatory legs should be *slenderer* than those of our species from Port Canning, so, *e.g.*, the propodites of the penultimate pair appear, in that figure, four times as long as broad; in the larger specimen of *Pach. propinquus*, however, these joints are *three times as long as broad*, *viz.*, 5 mm. long (measured along their posterior margin) and 1.6 mm. broad. I therefore suppose this Hawaiian form to be distinct from the species of the brackish pools at Port Canning. The slate-coloured upper surface of the carapace, and the red-brown legs are mottled with small dark spots. Measurements of the two specimens in millimetres—

Distance between the outer orbital angles	10.7	8.3
Length of carapace	8	6.25
Breadth of front	5.8	4.4
Breadth of posterior margin of carapace	4.5	3.5

4. *Varuna litterata* (Fabr.), M. Edw.

Varuna litterata (Fabr.), M. Edw., Alcock, *l.c.*, No. 6, 1900, p. 401.

Port Canning, brackish water pools, January 28—30, 1906, collected by Dr. N. Annandale, four males, two females (Reg. No. $\frac{5115}{10}$; Nov. 12, 1906, nine males, three females).

Backergunge, seven males, nine females, collected by H. E. Stapleton (Reg. No. $\frac{5138}{10}$).

Dhappa, near Calcutta, slightly brackish water, twenty-eight males, two females.

All the specimens are young, the largest being a female from

¹ I wish to call attention to the fact that in vol. xxv of the *Zoological Record* for 1888 my paper on the Crustacea collected by Dr. Brock (*Archiv. f. Naturg.*, bd. 53, 1888) was mentioned in the List of Publications but not in the Systematic Part. The *Zoological Record* should not have been entrusted to such regardless authors.

Port Canning, the carapace of which is 23 mm. long. The anterior margin of the front is straight or very slightly concave. The specimens gathered at Dhappa are the youngest of all, the carapace of the smallest being hardly 4 mm. long.

5. *Metaplax dentipes* (Heller).

Helice dentipes, Heller, *Crustaceen der Novara-Reise*, 1865, p. 62, pl. v, fig. 5.

Metaplax dentipes, de Man, in *Journal Linnean Soc.*, xxii, 1888, p. 162, pl. xi, figs. 1—3; Alcock, *l.c.*, 1899, p. 433.

A male and a female, both adult, from brackish water pools at Port Canning.

The carapace of the male is 27.5 mm. broad and 20 mm. long, the epistome excluded. The infraorbital ridge consists of 23 lobules, that are quite typical. The penultimate segment of the abdomen is 3.5 mm. long, its anterior margin is 3.25 mm. broad, the posterior 5 mm., whereas the antepenultimate joint is 3 mm. long and the terminal joint as much.

The musical crest does not reach to the middle of the anterior margin of the arm and does not extend as far as the ischium; in a younger male from the Mergui Archipelago, lying before me, the crest is placed on the middle third of the anterior margin, conformably with my description of 1888; in this male the carapace is 19 mm. broad and 13.5 mm. long. The chelipedes of this male from Port Canning are equal, the chelæ are 26 mm. long, the palm 16.5 mm. long and 10.5 mm. high; the length of the palm is in proportion to its height as 13 : 8.3, according to my paper of 1888 this proportion should be 13 : 9½ for *Met. dentipes* and 13 : 8 for *Met. distinctus*, H. M. Edw. The chelæ closely resemble, indeed, those of the latter species (de Man, *l.c.*, pl. 10, fig. 9), as regards their shape and the serrations of the fingers.

The carapace of the female is 22 mm. broad and 16.5 mm. long, the infraorbital ridge consists of 23 lobules and hardly reaches beyond the lower margin of the orbits. The chelipedes are equal, 21 mm. long, almost as long as the carapace is broad; the two lower margins of the arm are finely denticulate, the outer surface granular, the upper margin hairy. Upper surface of the wrist minutely granular; chelæ 10 mm. long, about three times as long as high, fingers a little longer than the palm, the outer surface of which is minutely granular. In my work on the Crustacea collected by Capt. Storm I have pointed out that the ambulatory legs of *Met. elegans*, de M., are *slenderer* in the male than in the female (*Zoolog. Jahrb.* (Spengel), viii, Abth. f. Syst. 1895, p. 596); the same difference is presented by the male and female of *Met. dentipes*, the ambulatory legs being *much slenderer* in the male than in the female. So, e.g., are the legs of the penultimate pair of the male 56 mm. long, those of the female 41 mm., about twice as long as the carapace is broad; the meropodites of these legs are, in the male, 20 mm. long and 5.3 mm. broad; in the female, however, 14.5 mm. long

and 5.5 mm. broad, appearing, in the latter, *considerably broader* than in the male; the following joints are also slenderer in the male. The upper margin of the meropodites of the four ambulatory legs is armed, in the female, with an acute tooth near the distal end and this tooth is preceded, on the antepenultimate and penultimate pairs, by nine or ten smaller teeth that gradually become smaller. In the adult male the subdistal tooth is present on the meropodites of the four legs, but it is comparatively smaller than in the female, and the teeth that precede it, on the antepenultimate and penultimate pairs, are quite rudimentary, hardly recognizable. The ambulatory legs of the male are everywhere tomentose; in the female the mero- and carpopodites are nearly glabrous.

Geographical distribution: Ceylon (Heller), Mergui Archipelago (de Man), banks of the Hooghly, the mud-flats of Arakan, Tenasserim, and Mergui (Alcock).

6. *Leander*, sp.

(Plate xviii, fig. 3.)

Seventy specimens from Dhappa, near Calcutta, collected in slightly brackish water.

These specimens are all young, the largest are 23 or 24 mm. long from tip of rostrum to end of telson, but the majority are still younger and of different size. They belong to the group of *L. styliferus*, M. Edw. = *longirostris*, H. M. Edw. (*Hist. Nat. Crust.*, ii, p. 394), *L. tenuipes*, Hend., *L. japonicus*, Ortm., *L. carinatus*, Ortm., *L. hastatus*, Auriv., etc., but they show differences from all these species. I suppose, however, that these differences are *juvenile* characters and I therefore do not wish to describe these specimens as a new species, for probably they will later prove to belong either to *L. styliferus* or to *L. tenuipes*, the former of which inhabits an estuary of the Ganges, the Sunderbunds, Mergui, the Gulf of Martaban and Karachi, while the second has also been observed in the Gulf of Martaban, at Madras and at Bombay.

The rostrum, the distal half of which is upturned, exceeds the antennal scales by one-third or one-fourth of its length, but in the youngest individuals it hardly reaches beyond them. The basal crest, which reaches to the end of the first joint of the antennular peduncle or to the middle of the second, is usually armed with six, more rarely with seven or five teeth; these teeth are equidistant or the first is a little farther distant from the second than the following from each other, and the first tooth is situated just above the orbital margin or, just behind it, on the carapace. There is but one apical tooth; only in one specimen was a trace of a second observed by means of the microscope; the lower margin carries usually five, more rarely six or four teeth; in the youngest specimens there are often only three.

Branchiostegal spine a little larger than the antennal spine. Abdominal segments *not* carinate; in one of the largest specimens, the carapace of which is 9 mm. long, the rostrum included, and 3.9

mm. without it, the sixth segment of the abdomen is 2.4 mm. long, almost two-thirds the length of the carapace without the rostrum. The telson (fig. 3), distinctly longer than the sixth segment, reaches almost to the level of the spine on the outer margin of the exopodite of the caudal fin; the strongly tapering telson terminates in a slender, acute, median point or spine, the short, subterminal, outer spinules hardly reach to the middle of the median spine, but the inner spinules are almost twice as long as the median point. The two pairs of spinules on the upper surface are situated on its posterior half.

The shortest of the three antennular flagella extends by one-third of its length beyond the antennal scales. The spine at the outer margin of the antennal scales, is placed near the obtuse, oblique tip of the blade; the distance between the extremity of the blade and the tip of the spine measures only $\frac{1}{11}-\frac{1}{10}$ the length of the outer margin of the scale.

The legs of the first pair are slightly shorter than the antennal scales; carpus and merus are of equal length and one-fifth or one-sixth longer than the chela (fig. 3a), which is four times as long as broad, and the fingers of which are a little longer than the palm. In one of the largest specimens the merus of first legs is 1.4 mm. long, the carpus 1.45 mm.; the chela is 1.2 mm. long and 0.29 mm. broad.

The legs of the second pair are equal and extend with the fingers beyond the antennal scales (fig. 3b). Merus a little broader, but *slightly shorter* than the ischium, together as long as the chela. The carpus, which gradually thickens distally, measures two-thirds the length of the ischium and appears also distinctly *shorter* than the merus; its thickness at the distal end is about one-fourth its length. The chela much resembles that of *L. tenuipes*, Hend. (Henderson, "A Contribution to Indian Carcinology," 1893, pl. 40, fig. 14). The chela appears, in the largest specimens, just as long as the carapace without the rostrum; the palm, which is somewhat inflated, is very slightly longer, but much thicker than the carpus, whereas the elongate, slender fingers are *once and two-thirds* as long as the palm; the fingers have sharp cutting edges, but no teeth, and their apices are strongly curved inward; the palm appears in the middle once and a half as thick as the distal end of the carpus. The whole leg seems to be smooth. In one of the largest specimens ischium, merus, carpus, palm and fingers are respectively 2.04 mm., 1.75 mm., 1.36 mm., 1.46 mm. and 2.4 mm. long; in a younger specimen, about 17 mm. long, these numbers are, in the same order, 1.6 mm., 1.4 mm., 1.02 mm., 1.02 mm., and 1.74 mm., the palm appearing here just as long as the carpus.

The three other legs are very slender and in the largest specimens reach slightly beyond the antennal scales. The measurements of a leg of the fifth pair (fig. 3c) of a specimen 18 mm. long are as follows: merus 1.86 mm. long and 0.14 mm. broad, 13 times as long as broad; carpus 0.85 mm. long, propodus 2 mm. long and 0.1 mm. broad in the middle, 20 times as long as broad; dactylus 0.85 mm. long, 0.1 mm. broad near the propodal articulation,

and regularly tapering to the acuminate point which is slightly curved inward.

The adult *L. styliferus*, H. M. Edw., differs according to Henderson's description (*l.c.*, p. 439) by the following: There are often two or three apical teeth on the rostrum, the lower margin of which is armed with 7—10 teeth. The last four abdominal segments are dorsally more or less carinated. The distal spine on the outer margin of the antennal scale is placed farther distant from the apex, the distance equalling nearly one-third of the total length of the outer margin. The palm of the chelæ of the second legs should be sulcate on its outer side, the sulcus bounded by two ridges.

The adult *L. tenuipes*, Hend., differs at first sight by the merus of the second legs that has twice the length of the ischium and that has an ill-defined sulcus on its upper surface. The apex of the telson is described as blunt, but may perhaps have been worn off as is often the case. The shortest of the antennular flagella does not reach the end of the antennal scales.

7. *Palæmon (Eupalæmon) lamarrei*, H. M. Edw.

(Plate xix, fig. 4.)

Palæmon lamarrei, H. Milne Edwards, *Hist. Nat. Crustacés*, ii, 1837, p. 397.

Nec: *Palæmon lamarrei*, de Haan, *Fauna Japonica*, Crustacea, p. 171.

Nec: *Palæmon lamarrei*, Ortmann, in *Zool. Jahrb.*, v, Abth. f. Syst. 1890, p. 701, taf. xlvii, fig. 2.

Twenty-five specimens from brackish water pools at Port Canning, Lower Bengal, collected by Dr. N. Annandale, 28—30th January, 1906.

Thirty-nine specimens from Calcutta (Museum tank, fresh water), collected 19th December, 1906.

These specimens, though very numerous, are all young, the largest specimen from Port Canning being 38.5 mm. long from tip of rostrum to end of telson; the largest individual from Calcutta is 30.5 mm. long, the rest are all of a smaller size. The fact that no adult specimens have been gathered is so much the more to be regretted, because they apparently belong to *Pal. lamarrei*, M. Edw., a species which since its first description does no more appear in literature or has been misunderstood.

I have already pointed out ("Notes from the Leyden Museum," i, 1879, p. 166) that a species described by de Haan as *Pal. lamarrei* was identical with *Pal. amaxonicus*, Heller, from South America, but the existence of this species in Japan has not been confirmed as far as I am aware.

Without any ground Dr. Ortmann (*l.c.*) declared the localities mentioned by Milne Edwards and by de Haan as false, and, therefore, described Heller's species under the name of *Pal. lamarrei*.

Henderson ("A Contribution to Indian Carcinology," 1893, p. 442) regards *Pal. lamarrei* as being merely the young of *Pal. carcinus* (Fabr.), and by Lanchester *Pal. lamarrei* is regarded as a variety of *Pal. carcinus* ("Annals and Mag. Nat. History," ser. 7, vol. vi, 1900, p. 263 and "Proc. Zool. Soc." London, 1901, p. 565).

The rostrum, that exceeds the antennal scales in the largest specimen by one-third, in the younger individuals by one-fourth of its length, whereas in the youngest specimens it barely reaches beyond them, is upturned distally and presents, as regards its tothing, a great variation. In 21 specimens from Port Canning the following tothing was observed:—

$\frac{7+1+2}{9}$, one specimen.	$\frac{5+1+1}{8}$, one specimen.	$\frac{5+1+2}{7}$, one specimen.
$\frac{6+1+1}{9}$, " "	$\frac{7+2}{7}$, " "	$\frac{5+2}{7}$, " "
$\frac{7+2}{8}$, " "	$\frac{7+1+1}{7}$, " "	$\frac{5+1}{7}$, " "
$\frac{7+1+1}{8}$, " "	$\frac{7+1}{7}$, " "	$\frac{7+2}{6}$, " "
$\frac{7+1}{8}$, " "	$\frac{6+2}{2}$, three specimens.	$\frac{6+1}{6}$, " "
$\frac{6+2}{8}$, two specimens.	$\frac{6+1}{7}$, one specimen.	$\frac{5+2}{6}$, " "

In 35 specimens from Calcutta the tothing was as follows:—

$\frac{8+2}{9}$, one specimen.	$\frac{7+1}{8}$, one specimen.	$\frac{6+2}{7}$, three specimens.
$\frac{8+1}{9}$, " "	$\frac{7+?}{8}$, two specimens, in which the tip is broken.	$\frac{6+1+1}{7}$, one specimen.
$\frac{7+1}{9}$, " "	$\frac{6+2}{8}$, one specimen.	$\frac{6+1}{7}$, three specimens.
$\frac{9+2}{8}$, " "	$\frac{6+1}{8}$, " "	$\frac{8+1+1}{6}$, one specimen.
$\frac{8+2}{8}$, " "	$\frac{8+1+2}{7}$, " "	$\frac{8+2}{6}$, " "
$\frac{8+1}{8}$, " "	$\frac{7+1+?}{7}$, one specimen, in which the tip is broken.	$\frac{8+1}{6}$, " "
$\frac{7+1+1}{8}$, " "	$\frac{7+2}{7}$, three specimens.	$\frac{7+2}{6}$, " "
$\frac{7+2}{8}$, three specimens.	$\frac{7+1}{7}$, " "	$\frac{7+1}{6}$, " "

These numbers prove that there are proximally in most cases 7 or 6, more rarely 8 and exceptionally 9 or 5 upper teeth, that

specimens with one apical tooth are as numerous as those the rostrum of which carries two apical teeth, and that the lower margin usually is armed with 7 or 8, rarely with 6 or 9 teeth. According to Milne Edwards the rostrum should carry 6 or 7 upper teeth proximally and as many on the lower margin, but it is remarkable that he makes no mention at all of the apical tooth or teeth. Generally the *two* first teeth are placed on the carapace, only in two specimens from Calcutta one tooth is placed on the carapace, and in a single specimen from the same locality the three first teeth are placed upon it. The apical tooth or teeth, which are much smaller than those on the proximal part of the upper margin, are usually separated from the latter by a *long smooth interspace*, which is as long as the distance between the foremost proximal tooth and the anterior margin of the carapace, rarely somewhat shorter than that distance; rarely, *i.e.*, in 11 out of 56 specimens, the foremost proximal tooth is placed on the smooth interspace, about midway between the preceding and the apical teeth. In the largest specimen from Port Canning (fig. 4), the rostrum of which presents the toothing formula $\frac{5+1+2}{7}$, the foremost proximal tooth of the upper margin is placed just above the first of the lower, immediately in front of the distal end of the first joint of the antennular peduncle; in other individuals the foremost proximal tooth is situated more or less in front of the first tooth of the lower margin; the proximal teeth of the upper as well as those of the lower margin are equidistant, and the former are larger than the latter. The rostrum is moderately broadened at the level of the first tooth of the lower margin and the latter appears a little concave at the base.

Several specimens of *Pal. carcinus* from the Kutei river, Borneo (Siboga Expedition), lie before me, amongst which are several young ones, the youngest specimen being nearly 70 mm. long, rostrum included. The rostrum of *Pal. carcinus* is narrower, less broadened than in *Pal. lamarrei*, it reaches farther beyond the antennal scales and the toothing is different; of the twelve or thirteen teeth of the upper margin the *three* first are placed on the carapace, and there is *no long smooth interspace* as in *Pal. lamarrei*, though the three or four teeth on the upturned part of the rostrum are farther distant from each other than the proximal teeth; the lower margin, finally, presents also a larger number of teeth, eleven or twelve, which reach to near the tip.

The sixth segment of the abdomen (plate xix, fig. 5) is *comparatively longer and broader* in *Pal. lamarrei* than in *Pal. carcinus*. In the specimen of the latter species, which is 70 mm. in length, the carapace, rostrum excluded, being 12 mm. long, the sixth segment is 5.5 mm. long and 4.3 mm. broad in the middle; in the largest specimen of *Pal. lamarrei*, which has a length of 38.5 mm., the carapace of which, without the rostrum, being 6.8 mm. long, the sixth segment of the abdomen is 3.9 mm. long and 2.4 mm. broad.

The slender telson (fig. 4d) apparently tapers less strongly than that of *Pal. carcinus* (fig. 5a), but it reaches almost to the

end of the endopodite of the caudal fin; this is not the case in *Pal. carcinus*; the telson ends in an acute point which reaches beyond the short, outer pair of subterminal spinules, whereas the long, inner pair extends far beyond the median spine. The telson is somewhat flattened on its posterior half, and the two pairs of spinules on the upper surface are placed as in *Pal. carcinus*; in the largest specimen from Port Canning there are three spinules on the left side and two on the right.

The shortest antennular flagellum which, as in *Pal. carcinus*, is united with the outer for a very short distance, exceeds the antennal scales by two-thirds of its length; free end of the antennal scales obtuse, reaching far beyond the outer spine. The third or distal joint of the mandibular palp is once and a half as long as the second; the third joint carries five setæ, two of which at the distal end are a little longer than the joint itself. External maxillipeds as in *Pal. carcinus*, extending with half their terminal joint beyond the tip of the antennal peduncle.

The first pair of legs reach to the spine at the far end of the outer margin of the antennal scales. The slender carpus, which is somewhat thickened distally, is one-fourth longer than the merus, which is nine times as long as broad and broader than the carpus; the chela is almost half as long as the carpus, its length being to that of the carpus as 4 : 9; the fingers are one-fourth longer than the palm. In the largest specimen from Port Canning the merus is 2.75 mm. long and 0.3 mm. broad; the carpus is 3.4 mm. long, the chela 1.52 mm., the palm 0.68 mm., the fingers 0.84 mm.; in a specimen from Calcutta which is 29 mm. in length, the merus is 2.3 mm. long and 0.23 mm. broad, just ten times as long as broad; the carpus 2.7 mm. long, the chela 1.26 mm., the palm 0.62 mm., the fingers 0.64 mm.

The second legs (fig. 4e) project with one-fourth of their propodites beyond the antennal scales and are twice as long as the carapace, rostrum excluded. The merus measures one-fourth the whole leg and is eleven times as long as broad; the carpus, which has a slenderer shape, and which thickens at the distal end, is just *once and a half* as long as the merus, *almost twice as long as the chela and three times as long as the palm*. The palm (fig. 4f) is a little longer than the fingers; it is a little broader than the distal extremity of the carpus and once and a half as broad as thick, being slightly compressed. Of the largest specimen from Port Canning, the carapace of which is 6.75 mm. long without the rostrum, the merus is 3.35 mm. long and 0.3 mm. broad; the carpus is 5.1 mm. long, the chela 2.97 mm., the palm 1.6 mm. and the fingers 1.37 mm. In one of the largest specimens from Calcutta (carapace 4.8 mm. long without the rostrum) the merus is 2.75 mm. long and 0.2 mm. broad, the carpus 3.9 mm. long, the chela 2.26 mm., the palm 1.15 mm., the fingers 1.11 mm.; in a younger specimen from Calcutta (carapace 3.7 mm. long without the rostrum) the merus is 1.9 mm. long and 0.16 mm. broad, the carpus 2.75 mm. long, the chela 1.65 mm., the palm 0.84 mm., the fingers 0.81 mm.

The following legs are slender, those of the fifth pair extend with their dactyli beyond the antennal scales. In a young specimen from Calcutta, which is 24 mm. in length, the legs of the fifth pair show the following measurements: merus 2.66 mm. long and 17 times as long as broad, carpus 1.4 mm. long, propodus 3 mm. long and 0.11 mm. broad in the middle, dactylus 1 mm. long and just as broad at the articulation as the preceding joint in the middle. The propodite, much slenderer than the merus and thickening towards the distal extremity, is just three times as long as the dactylus, which is very slightly curved towards the extremity.

Pal. amazonicus, Heller, with which *Pal. ensiculus*, Smith, and *Pal. jelskii*, Miers, are regarded as identical by Dr. Ortmann, is no doubt a different species. Three specimens of de Haan's *Pal. dieperinkii* from Surinam (Leyden Museum), a species identical with *Pal. amazonicus* (de Man, "Notes, Leyden Museum," i, 1879, p. 167) are lying before me. In this species the telson tapers to a pointed extremity, whereas the lateral spinules do not reach the tip; the two pairs of spinules on the upper surface are situated more forward, the anterior pair being farther distant from the tip of the telson than from its base. The rostrum is higher at its base, though in this species also the two first teeth are on the carapace. Unfortunately the three specimens are adult, the carapace of the youngest, without the rostrum, being 21 mm. long, so that I am unable to compare the legs, the measurements of which show other proportions than in very young specimens.

As regards *Pal. carcinus*, I wish to observe that in the youngest specimen from the Kutei river the carpus (6.75 mm.) of the second legs is but *little longer* than the merus (5.5 mm.); *slightly shorter* than the chela (7.25 mm.) and only once and a half as long as the palm (4.25 mm.).

Geographical distribution: Coast of Bengal (H. M. Edw.).

8. *Palæmon*, sp.

Two specimens from Dhappa, near Calcutta, slightly brackish water.

The two specimens are of equal size, 17—18 mm. long from tip of rostrum to end of telson; they are apparently very young and the legs, especially those of the first and second pairs, are wanting, so that I am unable to identify them with any known form.

The lanceolate rostrum is straight and barely reaches beyond the antennal scales. In both specimens the rostrum is $\frac{1}{3}$ dentate; the two first teeth are placed on the carapace and are once and a half respectively almost twice as far distant from each other as the second from the third; the following teeth are equidistant, but in one specimen the tenth tooth is farther remote from the eleventh, the distance between these two teeth being equal to the distance between the eleventh tooth and the tip, in the other the ninth and the tenth are farther distant than the preceding.

Body smooth. The telson tapers to a median point, far exceeded by the long, inner pair of subterminal spinules; the anterior

pair of spinules on the upper surface is placed just in the middle of the telson.

Prof. Henderson ("A Contribution to Indian Carcinology," 1893) describes five species observed near Calcutta and in rivers of India, but all seem to be different. *Pal. altifrons* differs by a shorter and deeper rostrum, that of *Pal. dayanus* presents another toothing $\frac{7-9}{5-6}$; in *Pal. scabriculus* the four to six first teeth are situated on the carapace, *Pal. dispar* is probably also different and this is, of course, also the case with *Pal. carcinus*.

9. *Caridina*, sp.

Three specimens which seem to belong either to *Car. gracilirostris*, de M., or to *Car. gracillima*, Lanch., were gathered at Dhappa, near Calcutta, in slightly brackish water. Unfortunately, the rostrum is broken or incomplete at the tip and most of the legs are wanting, so that it proved to be impossible to determine them with certainty.

10. *Caridina propinqua*, sp. nov.

(Plate xix, fig. 6.)

Five specimens of different size from Dhappa, near Calcutta, collected in slightly brackish water. This species is closely related to *Car. syriaca*, Bouv., from Syria, and still more to *Car. fossarum*, Heller, from Persia, but is perhaps different.

The largest specimen is 20.5 mm. long from tip of rostrum to tip of telson and all are devoid of eggs, so that these specimens are, therefore, probably young.

In the largest specimen the rostrum, which just reaches beyond the far end of the second joint of the antennular peduncles, projects at first straight forward to the middle and then turns slightly downward. The upper margin is armed with 21 rather small teeth that stand until near the tip; the three first teeth are placed on the carapace. On the slightly convex median part of the upper margin the teeth are placed nearer together (fig. 6); the penultimate tooth is a little farther distant from the antepenultimate than the preceding, and the foremost tooth is still slightly farther distant from the penultimate. The distance between the foremost tooth and the acute tip of the rostrum is only one-tenth the length of the rostrum proper, and not yet twice as long as the distance between the foremost tooth and the penultimate. The rostrum, 3.1 mm. long from the tip to the anterior margin of the carapace and 0.46 mm. broad, not yet seven times as long as broad, appears a little lower (less broad) than that of *Car. syriaca* (Bouvier, "Observations nouvelles sur les crevettes de la famille des Atyidés," 1905, p. 82, fig. 6). The lower margin carries a single tooth that is smaller than the teeth of the upper margin and placed at the anterior third of the rostrum; the anterior part of the lower margin between this

tooth and the tip, which appears slightly concave in *Car. syriaca*, appears in *Car. propinqua* straight and the rostrum is proximally less concave:

In another specimen nearly of the same size the rostrum of which is broken off, four teeth are placed on the carapace. In the third specimen, 19.5 mm. long, the rostrum is turned downward from the base and reaches to the end of the second joint of the antennular peduncle; the rostrum—2.5 mm. long from the tip to the anterior margin of the carapace and 0.4 mm. high (broad)—has the same form as in the first specimen. The upper margin carries 17 equidistant teeth, four of which are placed on the carapace; the foremost tooth is farther remote from the acute tip than in the preceding specimen, its distance from the tip is nearly one-sixth the length of the rostrum proper and as long as the space occupied by the four anterior teeth together. The lower margin carries two teeth on its anterior half; these teeth, smaller again than those of the upper margin, are situated just below the foremost and the penultimate tooth of the latter.

The fourth specimen is much younger, being 13.5 mm. long. The rostrum, little longer than the first joint, rises at first a little upward, but soon curves downward and has, therefore, another shape than in the preceding specimens. There are again 17 teeth on the upper margin, four of which are on the carapace; the distance between the foremost tooth and the tip measures one-seventh the length of the rostrum proper. The rostrum appears a little less broad (high) than in the preceding specimens, its height being only one-eighth of its length. There is but one small tooth on the lower margin, situated just below the penultimate tooth of the upper.

Unfortunately in the youngest specimen, 10 mm. long, the tip of the rostrum is broken off, the existing part reaches quite horizontally to the end of the first joint of the antennular peduncle and carries 16 teeth, five of which are on the carapace; the lower margin bears two teeth. The telson of the third specimen carries, on the posterior third of its upper surface, two pairs of spinules, the posterior spinule on the left side is wanting; the triangular tip carries at either side four or five spinules, the first of which, at the outer angles, is as usual the shortest, the second the longest, 0.3 mm. long, the third 0.24 mm. long, the fourth 0.16 mm. The telson (fig. 6a) of the second specimen carries at its posterior extremity at the right side six, at the left seven spinules (fig. 6b), the first small spine at the left angle being apparently supernumerary. The upper surface carries two pairs of spinules, but one spinule at the right side is wanting. The telson of the largest specimen carries three pairs of spinules above, the anterior pair placed somewhat nearer to the base than to the tip of the telson.

Antennular peduncle reaching to the middle of the distal spine of the antennal scales, shorter therefore than the latter. The first joint, *i.e.*, the distance between the anterior margin of the carapace and the far end of this joint, is slightly longer than the

two following joints taken together ; the second joint is little more than half as long as the first and about three times as long as broad ; the third joint measures three-fifths the length of the second. The acuminate stylocerite reaches, as in *Car. syriaca*, almost to the end of the first joint and diverges slightly outward ; the spine at the end of the outer margin of the first joint measures two-fifths the length of the second. External maxillipeds reaching to the end of the second joint of the antennular peduncle.

The legs of the first pair (fig. 6c) reach almost to the end of the antennal peduncle. The carpus, which is one-third longer than the merus, resembles that of *Car. lævis*, Heller, and is 2.5—2.7 times as long as broad distally ; its upper margin is slightly concave, the lower straight, and it is just half as thick proximally as distally. The chela, one-fourth longer than the carpus, is a little more than twice as long as broad, and the fingers are once and a half to twice as long as the palm.

The second legs (fig. 6d) reach to the middle of the antennal scales, projecting just beyond the antennal peduncles. The carpus, once and a half as long as the merus, is moderately slender and 4.5—5.5 times as long as thick distally. The chela (fig. 6e), shorter than the carpus, is nearly three times as long as broad, the proportion between length and breadth varying between 2.64 and 3.32 ; the fingers are a little more than once and a half to twice as long as the palm.

Merus of third legs nine times as long as broad and armed near its lower margin with four spines which are 0.21 mm. long ; the second spine is placed somewhat nearer to the proximal than to the distal extremity, the first just midway between the second and the proximal extremity, the third as far from the second as the second from the first, the fourth near the distal extremity. There is also a spine near the distal end of the carpus. The dactyli (fig. 6f) measure barely one-third the length of the propodites ; they carry five or six spines. In the third specimen, the rostrum of which is $\frac{1}{2}$ toothed, the dactyli are five times as long as broad and armed with four spines, besides the terminal claw ; the third is separated by a long, smooth interspace from the penultimate spine, probably abnormally, for, in the two larger specimens, the five or six spines are arranged regularly as in other species.

The meropodites of the fourth legs are 8 times as long as broad and armed with four spines near their lower margin, the fourth being inserted near the distal end. The propodites, 13.6 times as long as broad, are 3.6 times as long as the dactyli, that are almost five times as long as broad ; the dactyli are armed with nine spines, the terminal claw included.

Unfortunately, only in one specimen, the third, a fifth leg is present ; in the other specimens these legs are wanting. The meropodite, 1.4 mm. long, is 8 times as long as broad ; there is a spine 0.18 mm. long near the distal extremity of the lower margin. Propodite 1.76 mm. long, about 14 times as long as broad ; the dactylus, almost six times as long as broad, measures *two-fifths* the

length of the propodite and is armed with 48 spinules, the terminal claw included. *Caridina syriaca*, Bouv., is at once distinguished by the upper teeth of the rostrum, *none of which are placed on the carapace.*

When the descriptions of *Car. fossarum* (Heller, in "Sitzungsber. K. Akad. Wiss.," 1862, p. 411, and de Man, in Max Weber's "Zool. Ergebn. Reise Niederl. Ost-Indien," ii, 1892, p. 397) are compared, it becomes obvious that the Bengal species chiefly differs by the lower margin of the rostrum presenting only 1 or 2 teeth instead of 7—9. In the same paper (*l.c.*, p. 377) I have, however, pointed out that in *Car. lævis*, Heller, a closely related species from Java, the lower margin presents not only 3 teeth, as was described by Heller, but sometimes 4 to 9, 11 or 15, though also a specimen was observed from the same locality with 2 teeth and another in which the lower margin carried only one tooth! This great variation may also be proper to *Car. propinqua*, and in that case this species should perhaps prove to be identical with *Car. fossarum*: a further observation of specimens of the Bengal species appears therefore necessary. Several ovigerous females of *Car. lævis*, Heller, from the freshwater lake Situ Bagendit, Java (de Man, *l.c.*, p. 376) are lying before me. This species may easily be distinguished by the legs of the first and of the second pair. The carpus of the first legs closely resembles that of *Car. propinqua*, as it is also two and a half times as long as broad, but the fingers are a little shorter. The carpus (plate xix, fig. 7) of the second legs has a slenderer shape, being almost eight times as long as thick distally; the chief difference is, however, presented by the chela which has a *much slenderer form*, being 4—4.7 times as long as broad (fig. 7a); in *Car. propinqua* only about 3 times (fig. 6e).

As regards the other legs the two species closely agree as is proved by the measurements given below, and also by the following: The meropodites of the third pair are about 9 times as long as broad, there is a spine on the middle of the lower margin of the ischium and three on that of the meropodites; the second spine is inserted a little nearer to the distal than to the proximal extremity, the first just midway between the proximal extremity and the second spine, the third near the distal extremity; these spines are 0.2 mm. long. A similar spine occurs at the far end of the carpus. The propodites carry 16—18 spinules along their lower margin; the dactyli are in the same proportion to the propodites as in *Car. propinqua*, but they are armed with eight or nine spines.

The meropodites of the fifth pair are, in *Car. lævis*, just 8 times as long as broad and one-fourth shorter than those of the third; the ischium has no spine, but there is a spine near the middle of the lower margin of the meropodites and another, not far from the distal extremity. There is also a spine at the far end of the carpus and three smaller spines between the former and the proximal extremity.

Car. hova, Nob., from Madagascar and *Car. opaensis*, Roux, from Celebes are also related species. In the Madagascar species

the tip of the rostrum is slightly directed upward. The third joint of the antennular peduncle is described as subequal to the second; the stylocerite reaches to the middle of the second joint. External maxillipeds projecting beyond the antennal scales. The carpus of first legs is more distinctly excavate and more regularly conical; the fingers are as long as or barely longer than the palm. The chela of the second legs is shorter in proportion to the carpus, the dactyli of the third pair measure one-fourth and those of the fifth barely one-fifth of the propodite, appearing much shorter than in *Car. propinqua* (Nobili, "Boll. Mus. Zool. Torino," xx, 1905, No. 499).

The rostrum of *Car. opaensis*, Roux, is also *turned upward* at the tip and carries three or four teeth on the lower margin. The carpus of the first legs is three times as long as thick distally and *the fingers are slightly shorter than the palm*; those of the second legs, as also the dactyli of the following, are shorter than those of *Car. propinqua* (Roux, "Décapodes d'eau douce de Célèbes, Genève," 1904, p. 547, figs. 8, 9 and 10).



EXPLANATION OF PLATES XVIII AND XIX.

- FIG. 1.—*Tympanomerus stapletoni*, sp. nov., adult male, $\times 3$;
1a front viewed from above ; *1b* buccal frame and
external maxillipeds ; *1c* lateral view of the antero-
lateral margin of the carapace ; *1d* abdomen ; *1e* outer
view of the chela ; figs. *1a*—*e* all taken from the adult
male and all $\times 6$.
- „ 2.—*Pachygrapsus propinquus*, sp. nov., female, $\times 3$; *2a* external
maxilliped of this female, $\times 6$; *2b* three last segments
of the abdomen of the male, $\times 6$; *2c* chela and carpus
of the right chelipede of the female, $\times 6$.
- „ 3.—*Leander*, sp., telson, $\times 25$; *3a*, *3b* and *3c* legs of the first,
of the second and of the fifth pair, each $\times 12\frac{1}{2}$.
- „ 4.—*Palæmon (Eupalæmon) lamarrei*, H. M. Edw., carapace
and rostrum of the largest specimen from Port Can-
ning $\times 3$; *4a* extremity of the rostrum of this specimen
 $\times 25$; *4b* carapace and rostrum of a younger speci-
men from Calcutta, $\times 3$; *4c* lateral view of the sixth
abdominal somite and telson of the largest specimen
from Port Canning, $\times 5$; *4d* telson of a younger speci-
men from Calcutta, $\times 10$; *4e* leg of the second pair of
the largest specimen from Port Canning, $\times 10$ (the
chela being placed somewhat obliquely) ; *4f* chela of
this leg, $\times 17$.
- „ 5.—Sixth abdominal somite and telson of a young specimen,
long 70 mm. (rostrum included) of *Pal. (Eupalæmon)*
carcinus, Fabr., from the river Kutei, Borneo $\times 5$; *5a*
telson of another young specimen, 75 mm. long, from
the same river, $\times 5$.
- „ 6.—*Caridina propinqua*, sp. nov., anterior part of carapace,
antennular and antennal peduncles, $\times 12$; *6a* telson,
 $\times 12$; *6b* extremity of telson, $\times 50$; *6c* leg of 1st pair,
 $\times 25$; *6d* leg of second pair, $\times 17$; *6e* chela of this leg,
 $\times 25$; *6f* dactylus of third leg, $\times 50$; all the figures
are taken from the largest specimen, except figs.
6a and *6b* which are from the specimen the rostrum
of which is broken off.
- „ 7.—*Caridina lævis*, Heller, from Java, leg of the second pair, \times
17 ; *7a* chela of this leg, $\times 25$.

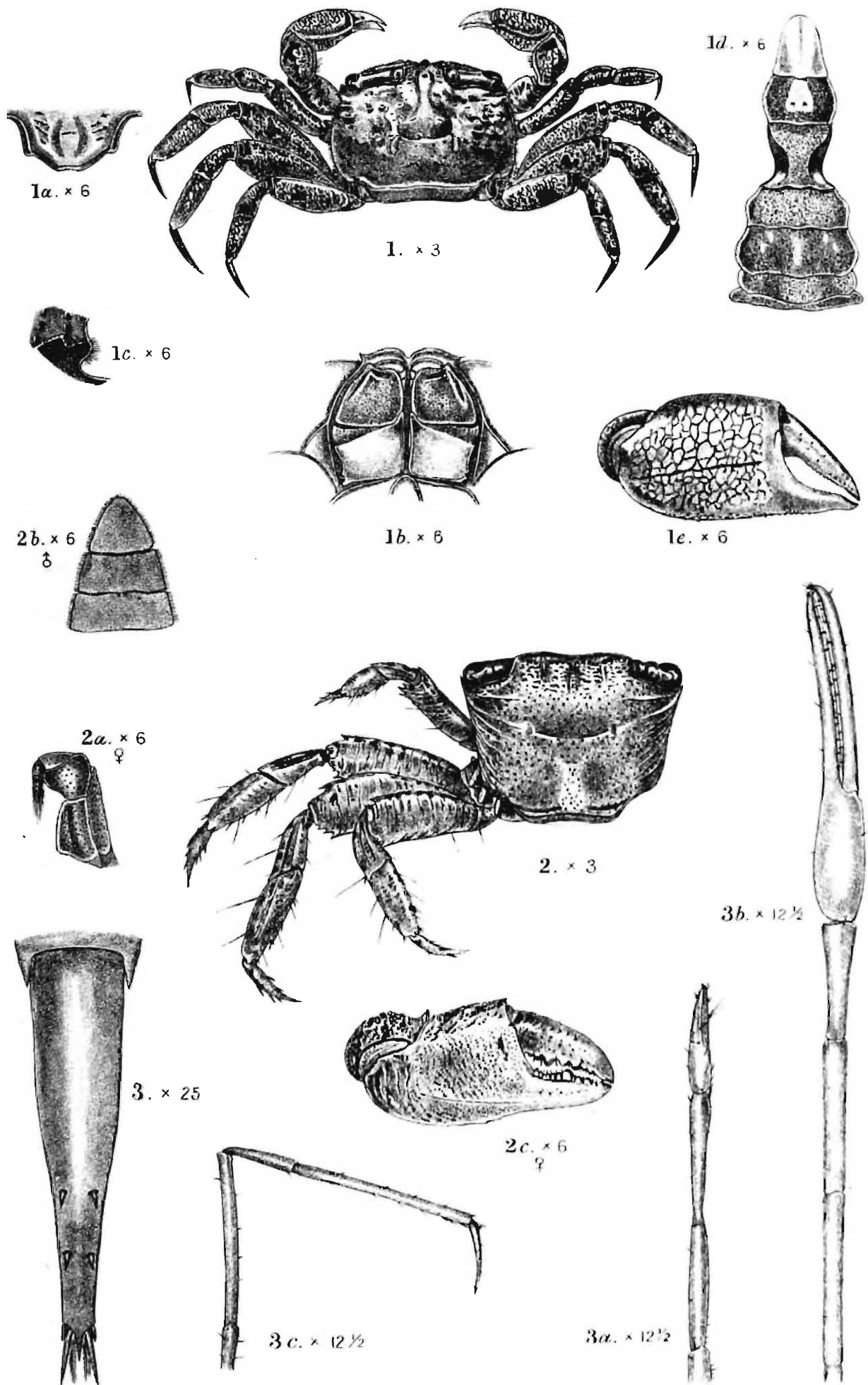
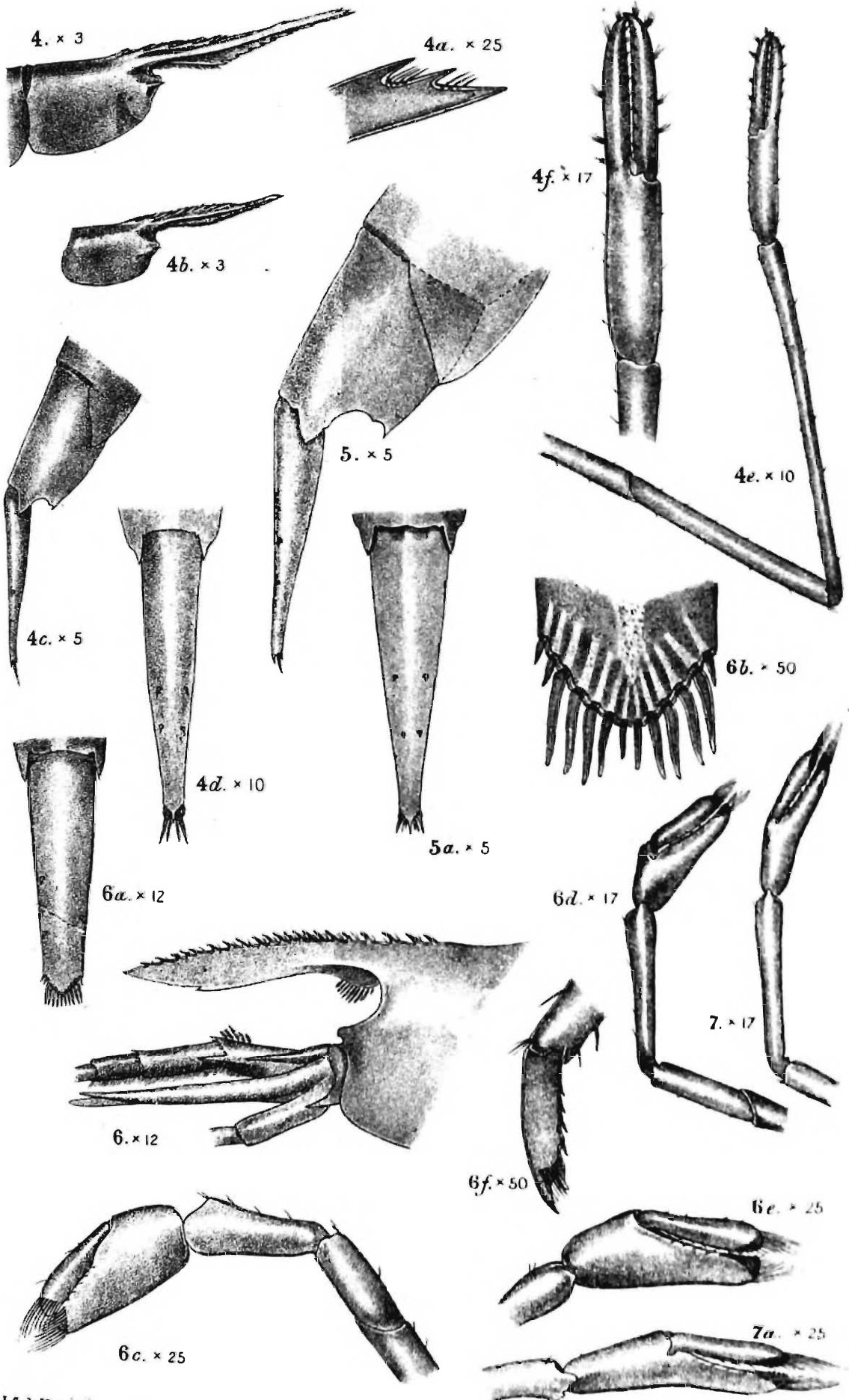


Fig. 1. *TYMPANOMERUS STAPLETONI* n. sp.
 Fig. 2. *PACHYGRAPSUS PROPINQUUS* n. sp. Fig. 3. *LEANDER* sp.



J. G. de Man. del.

Fig. 4. PALAEMON LAMARREI H.M. EDW.
Fig. 6. CARIDINA PROPINQUA n.sp.

Fig. 5. PALAEMON GARGINUS Fabr.
Fig. 7. CARIDINA LAEVIS Haller

H. P. F. & Co. Lith. Edin.

XXV. THE FAUNA OF BRACKISH PONDS
AT PORT CANNING, LOWER BENGAL

PART XI.—TWO NEW MYSIDÆ FROM BRACKISH WATER
IN THE GANGES DELTA.

By WALTER M. TATTERSALL, *M.Sc.*

I am indebted to the courtesy of Dr. J. G. de Man, to whom I wish to express my thanks, for the opportunity of examining and describing the two species of Mysidæ which form the subject of the present note. The material was collected in brackish water ponds near Calcutta by Dr. Nelson Annandale, who is making an exhaustive study of the lacustrine fauna of Bengal. The majority of the specimens belong to the interesting genus *Macropsis*, but appear to differ in some points from the widely distributed and hitherto only known species, *M. slabberi*, sufficiently to warrant the establishment of a second species of that genus. The second new form here described is represented by only nine specimens. It belongs to the little known and somewhat obscure genus *Potamomysis*, but after much hesitation, I have decided to institute a new species for its reception.

Sub-fam. MYSINÆ.

Genus POTAMOMYSIS, Czerniavsky.

Potamomysis, Czerniavsky, *Monog. Mysid. Imperii Rossici*, fasc. i, p. 129, 1882; fasc. iii, p. 78, 1883.

This genus was described by Czerniavsky in the monograph referred to above, and has not since, so far as I am aware, been met with. The type of the genus with its single species, *P. pengoi*, was a female, and I cannot gather from the text that Czerniavsky ever examined male specimens. Yet in the two keys to the genera of Mysidæ which he gives on pages 57 and 62 of the first part of his monograph, he places *Potamomysis* in that group of genera characterised by having the first, second and fifth pleopods of the male rudimentary as in the female, the third and fourth pairs somewhat dissimilar from those of the female, but not truly natatory.

If I am right in referring the present species to *Potamomysis*, the position assigned to this genus in Czerniavsky's keys is incorrect, since the third, as well as the first, second and fifth pleopods of

the male, appears to be simple and rudimentary as in the female, the genus thus agreeing in this respect with *Neomysis* and *Diamysis*. The species here dealt with is otherwise so closely in agreement with the general characters of *Potamomysis pengoi* that for the present I prefer to refer it to the same genus, which may therefore be diagnosed as follows:—

POTAMOMYSIS, Czerniavsky.

Antennal scale long and narrow, subulate, ciliated all round, two jointed.

Thoracic legs with the tarsus three to four jointed.

Telson short; apex entire, truncated, armed with numerous spines; lateral margins armed with short subequal spines along their entire length; no median apical setæ.

Pleopods of the male; the first, second, third and fifth pairs simple, uniramous and rudimentary as in the female; the fourth pair with a short peduncle and inner ramus as is usual in the subfamily *Mysinæ*, the outer ramus very long and slender, three jointed, the terminal joint bearing two long spiniform ciliated filaments and a single long smooth filament.

The genus is thus very closely allied to both *Neomysis* and *Diamysis*, but the form of the telson suffices to distinguish it from both, while male specimens are further distinguished by the form and armature of the fourth pair of pleopods.

Potamomysis assimilis, sp. nov.

(Plate xxi, figs. 1—8.)

General form (fig. 1) small, linear and compact.

Carapace (fig. 1) covering all the thoracic segments but the last; only slightly produced in front into a small obtuse rostral projection; antero-lateral corners apparently rounded.

Pleon (fig. 1) longer than the thorax; first five segments more or less subequal in length; sixth segment one-and-a-half times as long as the fifth.

Antennular peduncle (fig. 2) about half as long as the antennal scale; basal joint the longest; second joint small; third joint longer than the second and more robust, with a single plumose seta at the inner distal corner; a similar seta at the inner distal corner of the second joint, and at the outer distal corner of the third joint.

Antennal peduncle (fig. 3) less than half as long as the scale, with the terminal two joints subequal in length.

Antennal scale (fig. 3) equal in length to the last two segments of the pleon, long and narrow, subulate in shape, about seven times as long as broad, setose all round, two jointed, the second joint equal to between one fourth and one fifth of the entire length of the scale; spine on the outer corner of the basal joint well-developed and acute.

Eyes reaching to about the distal extremity of the basal joint of the antennular peduncle; rather stout; cornea occupying the entire distal part of the eye, pigment very black.

Mouth parts of the usual type in the *Mysinæ*, with no outstanding feature of importance.

Thoracic legs (figs. 4, 5, 6); first and second without a distinct dactylus; third to eighth with the tarsus equal in length to the merus and three jointed in all but the eighth, where it is four jointed.

Telson (fig. 7) about two-thirds of the length of the last segment of the pleon, and rather longer than broad at its base; apex truncate and bounded at each corner by a long spine between which are about seventeen shorter spines; lateral margins armed throughout their length with about ten short spines.

Inner uropod about twice as long as the telson; no spines on the inner ventral margin.

Outer uropod about one-and-a-quarter times as long as the inner.

Length of an adult female with eggs in the broad lamellæ, 5 mm.; length of the largest male, apparently mature, 4 mm.

The above description and fig. 1, pl. xxi, are taken from an adult female, 5 mm. long. The figures of the various parts are from a male measuring 4 mm. in total length, and this difference in size probably accounts for the difference in armature of the telson as shown in fig. 7 and that given in the above description. A still smaller specimen, 3 mm. in length, had only seven spines on the apex of the telson between the two large lateral ones. Czerniavsky has shown similar differences between young and adult specimens of *P. pengoi*.

A male of 4 mm. appears, to judge by the fourth pleopods, to be mature if not fully grown. The fourth pleopod of such a male is shown in fig. 8. The basal joint is short and the inner ramus of the usual structure. The outer ramus is long and styli-form, reaching to the posterior end of the sixth segment of the pleon. It is three jointed, the second the shortest and the terminal joint the longest. The latter is furnished at its apex with two long, subequal ciliated filaments and on the outer distal margin with a single smooth filament, longer than the ciliated filaments at its apex. There is no prominent hirsute lobe on the antennules of the above male specimen, such as is usually met with in male *Mysidæ*. It is replaced by a tuft of long hairs proceeding from a small tubercle on the distal ventral edge of the antennular peduncle.

Locality of capture.—Dhappa, near Calcutta, slightly brackish water (canal), six females and three males.

This species differs from *P. pengoi* in the following points:—

- (1) *Size*.—The type-specimen of *P. pengoi* was an adult female measuring 10 mm. Adult females of the present species with eggs in the brood-pouch only measure 5 mm.

- (2) *Antennal scale*.—The second joint of the antennal scale of *P. pengoi* is described as small, and only about one ninth of the whole antennal scale in length. In *P. assimilis* the second joint of the scale is rather large and equal to between one fifth and one quarter of the length of the scale.
- (3) Czerniavsky describes in *P. pengoi* two secondary spines at the terminal part of the tarsus of the thoracic limbs in addition to the dactylus, giving the whole limb a tri-unguiculate appearance. No such secondary dactyli appear to be present in *P. assimilis* though, as shown in fig. 6, there are sundry setæ in the position shown by Czerniavsky for the secondary nails. It may be that Czerniavsky has mistaken the setæ for spines and this apparent difference between his species and the present one may not actually occur.

Otherwise the two species are in very close agreement and the occurrence in brackish water in India of a species of this obscure genus is of special interest.

Genus MACROPSIS, G. O. Sars.

Macropsis orientalis, sp. nov.

(Plate xxii, figs. 1—9.)

The differences between *M. orientalis* and the only other known species of this curious genus, *M. slabberi*, are mainly differences in the proportions which the various parts bear to one another.

These differences are most conveniently brought out in a table of comparative measurements of the two species, side by side. It will be best, therefore, to give such a table first and then to discuss the characters of the two species, one by one, in the light of the table.

The measurements of *M. slabberi* are taken from specimens from Saltash Bridge, near Plymouth, which I received through the courtesy of the Marine Biological Station at Plymouth.

The sum of the differences between the two species is that *M. orientalis* is a much more robust form, *M. slabberi*, on the other hand, being very slender and attenuated, with the various appendages correspondingly elongated.

Measurements.		<i>Macropsis slabberi.</i>		<i>Macropsis orientalis.</i>	
		Actual length in mm.	Percentage of length from rostrum to tip of telson.	Actual length in mm.	Percentage of length from rostrum to tip of telson.
1	Length of eye .. ..	.86	17.4	.52	9.2
2	Width ,, ,, at cornea ..	.24	4.8	.25	4.4
3	Length ,, cornea .. ..	.19	3.9	.17	3.0
4	,, ,, antennular ped. ..	.92	18.6	.67	11.8
5	,, ,, first joint .. ..	.52	10.5	.32	5.6
6	,, ,, second joint .. ..	.19	3.9	.15	2.6
7	,, ,, third ,, .. ..	.21	4.2	.20	3.5
8	,, ,, antennal scale .. ..	.82	16.6	.92	16.3
9	,, ,, carapace	1.50	30.3	1.90	33.6
10	,, ,, exposed part of thorax.	.25	5.0	.44	7.8
11	,, ,, 1st pleon segment	.30	6.0	.33	6.0
12	,, ,, 2nd ,, ,, ..	.34	6.8	.36	6.4
13	,, ,, 3rd ,, ,, ..	.39	7.9	.39	7.0
14	,, ,, 4th ,, ,, ..	.43	8.7	.42	7.4
15	,, ,, 5th ,, ,, ..	.45	9.1	.46	8.1
16	,, ,, 6th ,, ,, ..	.79	16.0	.67	11.8
17	Width ,, 6th ,, ,, ..	.36	7.3	.45	8.0
18	Length ,, telson to base of terminal spine.	.37	7.5	.42	7.4
19	,, ,, telson to tip of terminal spine.	.44	9.0	.47	8.3
20	,, ,, telson to extreme apex.	.49	9.9	.68	12.0
21	,, ,, inner uropod .. ..	.92	18.6	.94	16.6
22	,, ,, outer ,,	1.18	23.9	1.27	22.5
23	Total length—rostrum to tip of telson.	4.94	100.0	5.65	100.0

Carapace.—The carapace in *M. orientalis* is slightly longer proportionally than in *M. slabberi*, and correspondingly broader. The front part is more evenly rounded and consequently less produced in the former than in the latter species (fig. 1)

Pleon.—The measurements 11—16 in the above table of the segments of the pleon of the two species show that in *M. slabberi* the segments are proportionately more elongate than in *M. orientalis*. Especially is this so with the sixth segment which in the former species is one-and-three-quarter times as long as the fifth, while in *M. orientalis* it is less than one-and-a-half times that length. At the same time the measurement 17 shows that the sixth segment of the pleon is relatively narrower in *M. slabberi* than in *M. orientalis*, and that the rest of the body is correspondingly narrower in the former species.

Eye.—In *M. orientalis* the eye is only 9 per cent. of the total body-length, is very little more than twice as long as broad at the cornea, and the latter occupies the distal third of the whole eye. In *M. slabberi* the eye is 17 per cent. of the total body-length, is three-and-a-half times as long as broad, and the cornea occupies the distal two ninths of the whole eye. So that in *M. orientalis* the eye is on the whole very much shorter than in *M. slabberi*.

The antennular peduncle in *M. orientalis* is considerably shorter than in *M. slabberi*, being only 11·8 per cent. of the total body-length in the former compared with 18·6 per cent. in the latter. The shortening of the antennular peduncle in *M. orientalis* is proportional to that of the eye, so that in both species the eye bears the same relation to the antennular peduncle, *i.e.*, it extends to about the distal end of the second joint. The spine-like seta on the outer distal corner of the basal joint of the antennular peduncle is scarcely as robust in *M. orientalis* as in *M. slabberi*.

The antennal scale is of practically the same size in both species, with the result that, owing to the shortening up of the antennular peduncle in *M. orientalis*, the scale extends beyond the antennular peduncle, while in *M. slabberi* it falls short of it.

Telson.—The telson of *M. orientalis* (fig. 7) differs from that of *M. slabberi* mainly in having the serrated apical portion more produced and the whole telson consequently proportionally longer. The serrated apical portion of the telson in *M. slabberi* is only about one quarter of the entire length of the telson, whereas in *M. orientalis* it is considerably more than one third of that length.

In the structure of the various appendages the two species show considerable resemblance, but minor differences are to be noted. For this purpose I give, on pl. xxii, figures of the various appendages of *M. orientalis* for comparison with those of *M. slabberi*.

In the second thoracic limb of *M. orientalis* (fig. 5) the terminal joint is somewhat longer and narrower than in the same limb of *M. slabberi*. The number of joints in the tarsus of the third to the eighth thoracic limbs of *M. orientalis* varies from five to nine, the eighth limb usually having fewest joints in the tarsus. Thus in one female example dissected the joints of the tarsus were seven in the third, fourth and fifth limbs, eight in the sixth, nine in the seventh and only six in the eighth. Figure 6 depicts the eighth thoracic limb of a male with only five joints in the tarsus.

The fourth pleopod of the male of *M. orientalis* differs rather markedly from the same appendage in *M. slabberi*, in having the first joint of the outer ramus shorter than the entire inner ramus. In *M. slabberi* the reverse obtains. Otherwise the appendages in question are very similar.

I could not detect any spine on the inner ventral margin of the inner uropod of *M. orientalis* such as exists in *M. slabberi*.

Length of the largest specimens of *M. orientalis*, both males and females, 7 mm. from the rostrum to the apex of the telson.

Locality of capture.—Dhappa, near Calcutta, slightly brackish water, 270 specimens, 4—7 mm. long; Port Canning, Lower Bengal, brackish water ponds, 117 specimens, 4—7 mm. long.

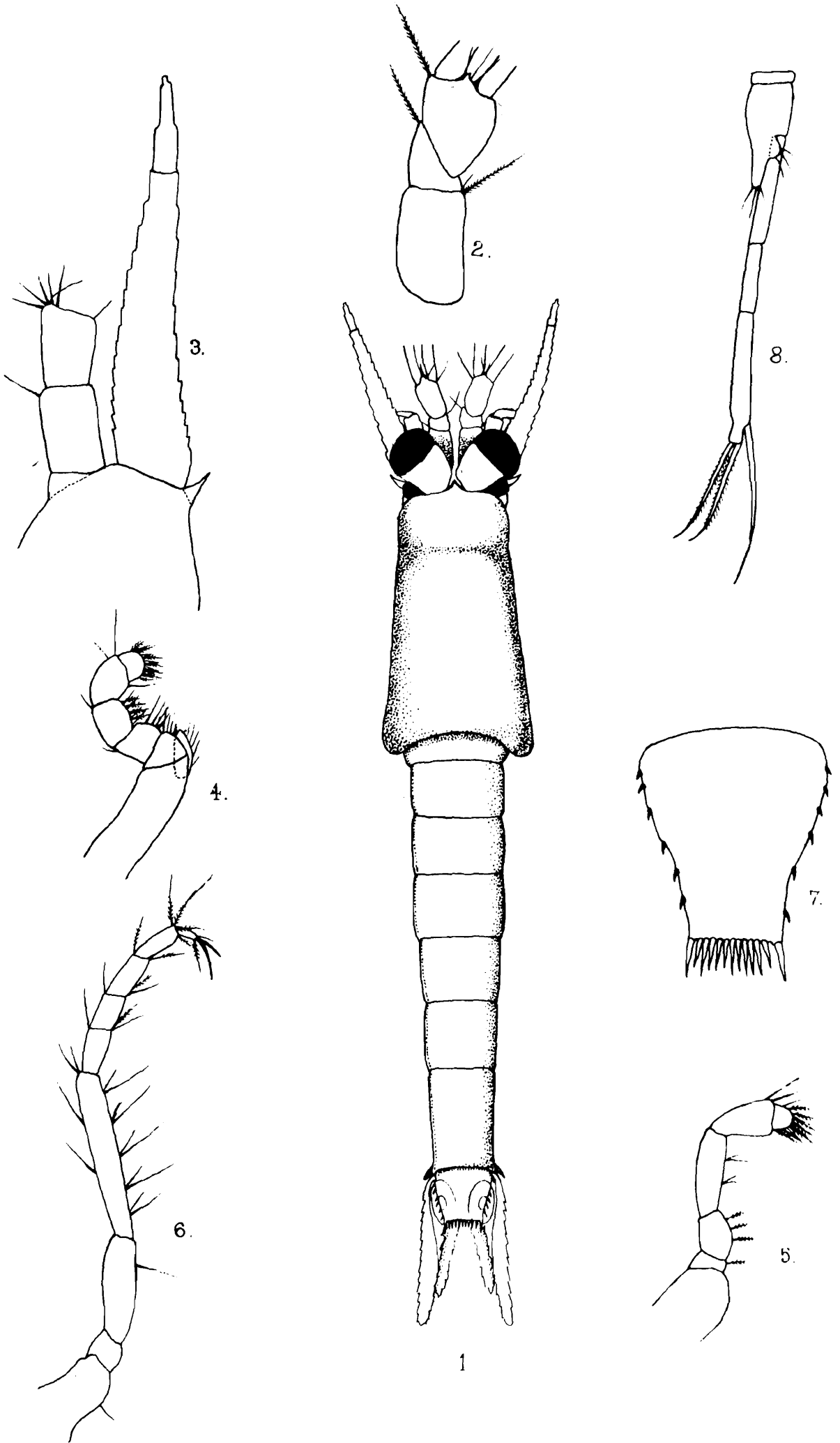
M. orientalis is apparently an abundant species in suitable localities.



EXPLANATION OF PLATE XXI.

POTAMOMYSIS ASSIMILIS, sp. nov.

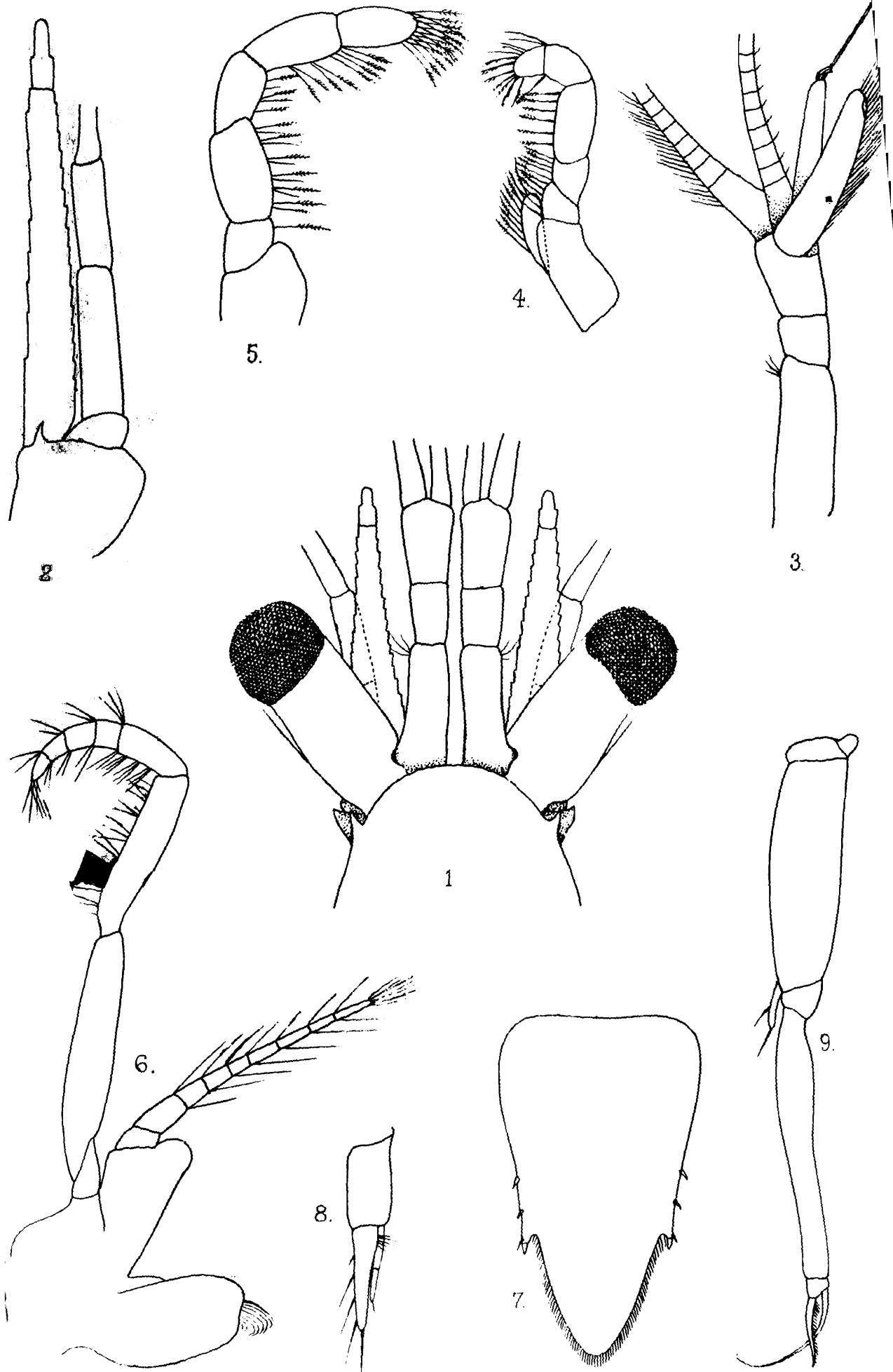
- FIG. 1.—Adult female, 5 mm. long, dorsal view.
,, 2.—Antennular peduncle, $\times 100$.
,, 3.—Antennal scale and peduncle, $\times 100$.
,, 4.—Endopod of first thoracic limb, $\times 100$.
,, 5.—Endopod of second thoracic limb, $\times 100$.
,, 6.—Endopod of eighth thoracic limb, $\times 100$.
,, 7.—Telson, $\times 100$.
,, 8.—Fourth pleopod of male, 4 mm., $\times 100$.



EXPLANATION OF PLATE XXII.

MACROPSIS ORIENTALIS, sp. nov.

- FIG. 1.—Anterior end of a female 6 mm. long, $\times 75$.
,, 2.—Antennal scale, $\times 75$.
,, 3.—Antennule of male, $\times 75$.
,, 4.—Endopod of first thoracic limb, $\times 75$.
,, 5.—Endopod of second thoracic limb, $\times 75$.
,, 6.—Eighth thoracic limb of male, $\times 75$.
,, 7.—Telson, $\times 75$.
,, 8.—Third pleopod of male, $\times 75$.
,, 9.—Fourth pleopod of male, $\times 75$.



MACROPSIS ORIENTALIS, sp. nov.

A Chowdhary, lith

XXVI. ON SOME ORIENTAL SOLIFUGÆ, WITH
DESCRIPTIONS OF NEW FORMS.

By A. S. HIRST (*British Museum, Nat. Hist.*).

The new forms described in this paper (with the exception of *Galeodes fischeri* and *Eusimonia celeripes*) form part of the collection of the Indian Museum, Calcutta. It is owing to the kindness of Dr. N. Annandale that I have been enabled to examine and to describe them.

Galeodes darius, Pocock.

1895, *Ann. Mag. Nat. Hist.* (ser. 6), vol. xvi, p. 81; 1889-1900, *Journ. Linn. Soc.*, vol. xxvii, p. 403; 1905, Birula, *Bull. Acad. Imp. Sci. St. Petersburg* (ser. 5), vol. xxii, p. 260.

♀ *Mandible*.—Upper jaw armed with two minor intermediate teeth, the posterior one small. Lower jaw also with two minor teeth.

Palpi.—Patella armed ventrally with bristles which are alternately very long and rather short; tibia of palp with five or six pairs of spines, some of which exceed the height of the segment.

Legs.—Tarsi of second and third legs with seven spines, the posterior basal spine being absent. Tarsi of fourth legs with five pairs of spines.

Locality.—Fao, Persia.

Remarks.—This species is closely allied to *G. macmahoni*, Pocock, but differs in that the tibia of the tarsus is darkened.

Galeodes aulicus, sp. nov.

♂. *Colour*.—Pale sandy yellow; head and terga of abdomen infusate; mandibles pale above and marked with faint stripes; patella, tibia and tarsus of palp deeply infusate, the distal half of the femur dark or pale; first leg with tibia and tarsus darkened, the posterior legs entirely pale.

Head.—Width of head-plate about half the length of the patella of the maxillipalp and considerably less than the length of the tibia.

Mandible.—Blade of flagellum resembling that of *G. agilis*, Pocock. Lower jaw with one or two minor teeth.

Palpi.—Patella armed with four long and strong ventro-lateral spines and with a median row of spines, tibia with six (in one of the specimens with only four) pairs of strong and rather short spines, the anterior pair, however, exceeding the height of the segment; "cylinder-bristles" absent.

Legs.—Tarsi of second and third legs with four pairs of spines, tarsi of fourth legs with five pairs of spines, bristles of tarsus of fourth leg stout and a little curved.

Measurements in mm.—Length of body 34; width of head 11·5; length of patella of palp 23·5; of tibia of palp 15·5; of tarsus of palp 3·5.

Locality.—Seistan. Two males (one of them mutilated) collected by Col. MacMahon.

Remarks.—This new species agrees with *G. citrinus*, Pocock, and *G. schach*, Birula, in the absence of “cylinder-bristles” from the ventral surface of the palp, but differs from them in having the distal segment of the tarsus of the fourth legs armed with a pair of spines.

Galeodes festivus, sp. nov.

♂ *Colour*.—Pale sandy yellow; head with a pair of dark lateral patches; abdomen with the anterior and posterior margins of the terga darkened; mandibles fawn-coloured above and with well marked stripes; patella, tibia and tarsus (with the exception of its distal extremity) of maxillipalp deeply infuscate, the patella almost as dark as the tibia; femur of maxillipalp with the distal third darkened; fourth pair of legs with the distal segments strongly infuscate; the anterior legs paler.

Mandibles.—Lower jaw with two minor teeth, the posterior one being minute. Blade of the flagellum narrower as compared with the length than is the case in *G. agilis*, Pocock.

Palpi.—Patella about twice as long as the width of the head, and armed below with three rows of spines, some of which exceed the height of the segment; tibia with six pairs of spines, the distal pair alone exceeding the height of the segment; “cylinder-bristles” fairly slender, subcylindrical and with the basal rings rather high.

Legs.—Tarsi of second and third legs armed with seven spines, the posterior basal spine being absent. Tarsi of fourth legs with five pairs of spines. Bristles of tarsi of fourth pair of legs broader and less sharply pointed than is the case in *G. agilis*. Blade of external malleolus less than half the width of the head.

Measurements in mm.—Length of body 42; width of head 10; length of palp 62; of first leg 45; of fourth leg 61; of patella of palp 21·5; of tibia of palp 15; of tarsus of palp 3·75.

Locality.—Seistan, a single male specimen collected by Col. MacMahon.

Remarks.—This species is closely allied to *G. agilis*, Pocock, differing from it in the shape of the bristles of the tarsi of the fourth legs.

Galeodes truculentus, Pocock.

1889-1900, *Journ. Linn. Soc.*, vol. xxvii, p. 402; 1905, Birula, *Bull. Acad. Imp. Sci. St. Petersburg* (ser. 5), vol. xxii, pp. 252 and 253.

This species is very closely allied to (perhaps identical with) *G. araneoides*, Pallas. The bristles of the pad of the fourth leg, however, are broad and not very sharply pointed.

♂ *Mandible*.—Lower jaw with three minor teeth.

Palp with the patella a little more than twice the width of the head.

Legs.—Tarsi of second and third legs with four pairs of spines. Tarsus of fourth leg with four pairs of spines.

Remarks.—The fourth leg of the male measures 50 mm. and not 60 mm. as stated in Mr. Pocock's description.

Galeodes citrinus, Pocock.

1895, *G. citrinus*, Pocock, *Ann. Mag. Nat. Hist.* (ser. 6), vol. xvi, p. 81; 1889-1900, *G. citrinus*, Pocock, *Journ. Linn. Soc.*, vol. xxvii, pp. 403 and 404; 1900, *G. nigripalpis*, Pocock, *Fauna of British India*, Arachnida, p. 144; 1905, *G. citrinus*, Birula, *Bull. Acad. Imp. Sci. St. Petersburg* (ser. 5), vol. xxii, p. 254; *G. pococki*, Birula, *loc. cit.*, p. 256.

Mandible.—Lower jaw with a single minor tooth.

Palpi.—Patella twice or a little more than twice the width of the head-plate; tibia ventrally without cylinder-bristles.

Legs.—Tarsi of second legs with four anterior spines and two posterior spines (one on each segment); tarsi of third legs usually armed with seven spines (the posterior basal spine being absent) or with the same armature as the second legs. Tarsi of fourth legs with four pairs of spines, the distal segment unspined.

There are two forms of this species—

(1) The typical form: Colour paler than in the variety *nigripalpis*; tarsus of palp pale yellow; legs not darkened; size large (up to 40 mm.); locality Jask.

(2) Var. *nigripalpis*, Pocock: Tarsus of palp infusate; legs slightly darkened; abdominal terga much darker than in the typical form; size smaller (up to 29 mm.); locality Omara, Baluchistan.

Galeodes indicus, Pocock.

1900, Pocock, *Fauna of British India*, Arachnida, pp. 142-144.

Dr. Birula compares this species with his *G. auronitens*. The two species are not closely allied, however, for *G. auronitens* belongs to the *caspius* group, whilst *G. indicus* belongs to the *araneoides* group. Pocock says in his description of *G. indicus* "Tarsi of legs armed as in *G. fatalis*, except that the distal segment is spined." The word 'spined' in this sentence is a misprint for 'unspined,' for in *G. fatalis*, Licht. and Herbst, the distal tarsal segment of the fourth leg is spined, whilst this is not the case in *G. indicus*.

Galeodes chitralensis, sp. nov.

♂ *Colour*.—Paler than in *G. indicus*, Pocock; head scarcely darkened, but darker than the legs, which are sandy yellow; ocular-

tubercle black; abdominal terga infusate; the ventral surface of the abdomen a dirty greyish colour; mandibles marked with faint stripes; palp pale yellow in colour.

Mandibles.—Lower jaw with two minor teeth which are close together and followed by a slight gap. Blade of flagellum somewhat longer and narrower than is the case in *G. indicus*.

Palpi.—Patella slightly more than twice the width of the head (in *G. indicus*, the patella of the palp is considerably more than twice the width of the head). Spines of the tibia six in number, the first and third alone exceeding in length the height of the segment; "cylinder-bristles" long and slender as in *G. indicus*.

Legs.—Tarsi of second and third legs armed with seven spines, the posterior basal spine having disappeared. Tarsi of fourth legs with four pairs of spines, the distal segment without spines; bristles of pad of tarsus narrower than in *G. indicus*. Blade of external malleolus about half the width of the head.

Measurements in mm.—Length of body 24.5; width of head 6.5; length of palp 39; of first leg 29; of fourth leg 41.5; of patella of palp 14; of tibia of palp 10.25; of tarsus of palp 3.

Locality.—Chitral, a single male specimen collected by Mr. F. J. Daley.

Remarks.—The male of this species differs from that of *G. indicus*, Pocock, in its much paler colour and shorter palpi.

Galeodes chitralensis pallescens, sub-sp. nov.

This sub-species structurally resembles the typical form, except in the armature of the lower jaw, which is armed with three minor teeth (it is probable that the lower jaw of the typical form is also normally armed with three teeth); the terga of the abdomen, however, are pale yellow in colour.

Measurements in mm.—Length of body 31.5; width of head 7.5; length of palp 46.5; of first leg 32.5; of fourth leg 49; of patella of palp 16.25; of tibia of palp 12; of tarsus of palp 3.

Locality.—Sambalpur, Central Provinces, India; a single male specimen collected by Mr. V. Ball.

Galeodes fischeri, sp. nov.

Colour.—Closely resembling that of *G. indicus obscurior*, Pocock.

♀ *Mandible* with the lower jaw armed with three minor teeth. Flagellum similar to that of *G. indicus*.

Palpi.—Shorter than in *G. indicus*, the patella about twice the width of the head; "cylinder-bristles" of tibia sparse, slender and very short, usually measuring considerably less than a quarter of the length of the spines, whilst in *G. indicus* they are often more than half the length of the spines.

Legs.—Proximal segment of tarsus of second and third legs provided with three spines anteriorly, the posterior side with a single spine, distal segment with a single spine, situated on the

anterior side. Tarsi of fourth legs with four pairs of spines; the distal segment unspined.

Measurements in mm.—Length of body 25; width of head 6.5; length of palp 42.5; of first leg 30.5; of fourth leg 43.5; of patella of palp 14; of tibia of palp 10.75; of tarsus of palp 3.

♀ *Mandible.*—Upper jaw with two minor teeth between the principal ones, dentition of lower jaw similar to that of the male.

Palp.—Patella and tibia with long and slender spines as in *G. indicus*.

Legs.—Blade of external malleolus almost equalling the breadth of the ocular tubercle.

Measurements in mm.—Length of body 24; width of head 7.75; length of palp 35; of first leg 25; of fourth leg 36.5; of patella of palp 11; of tibia of palp 9; of tarsus of palp 3.

Locality.—North Coimbatore District, Madras, three males and two females collected by Mr. C. E. C. Fischer.

Remarks.—This species differs from *G. indicus*, Pocock, in that the “cylinder-bristles” of the tibia of the palp are very short.

Galeodes bacillifer, Pocock.

1900, *G. bacillifer*, Pocock, *Fauna of British India*, Arachnida, p. 144; 1904, *G. bacillifer*, Birula, *Ann. Mus. Zool. Acad. St. Petersburg*, vol. ix, p. 395; 1905, *G. bacillifer*, Birula, *Bull. Acad. Imp. Sci. St. Petersburg* (ser. 5), vol. xxii, p. 256.

The tibia of the palp of the male is provided ventrally with a few very long and slender “cylinder-bristles” in the typical specimen. These bristles are confined to the basal half of the segment. In the specimens determined by Dr. Birula as belonging to this species the “cylinder-bristles” are said to be absent.

Galeodes annandalei, sp. nov.

Colour.—Yellowish white; head greyish above, the ocular tubercle black; abdomen with the terga darkened, its ventral surface greyish yellow; mandibles slightly darkened above and marked with broad stripes; patella, tibia and tarsus of palp and the femora and patellæ of the legs slightly infuscate.

Mandibles with upper jaw provided (between the principal teeth) with two minor teeth of fairly large size, lower jaw with three minor teeth.

Palpi.—A little shorter than in *G. bacillifer* (see measurements); patella armed with long and thin spines as in *G. indicus* and *bacillifer*; tarsus with a pair of strong bristles as in *G. bacillifer*.

Legs.—Tarsi of second and third legs ventrally with four pairs of spines; tarsi of fourth legs also with four pairs of spines, the distal segment being unspined.

Abdomen.—Fifth abdominal segment ventrally with a curved row of thin yellowish bristles,

Measurements in mm.—Length of body 27·5; width of head 7·5; length of palp 37·5; of first leg 25; of fourth leg 41·5; of patella of palp 12·5; of tibia of palp 10; of tarsus of palp 2·5.

Locality.—Malakand, N.-W Frontier of India; a single female example.

Remarks.—This new species is closely allied to *G. bacillifer*, Pocock, but is darker in colour, the abdomen being ornamented above with a dark band.

The following key shows some of the principal differences between the males of the species of *Galeodes* (sub-gen. *Galeodes*) that I have been able to examine:—

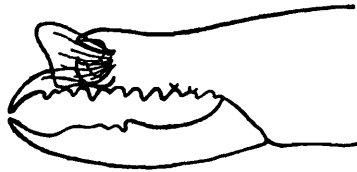
1	{	¹ Distal segment of tarsus of fourth leg armed below with a pair of spines	2	
		Distal segment of tarsus of fourth leg without spines	7	
2	{	Tibia of palp furnished ventrally with "cylinder-bristles"	3	
		Tibia of palp ventrally without "cylinder-bristles"		.. <i>G. aulicus</i> , Hirst.
3	{	Proximal tarsal segment of second and third legs with a posterior basal spine		<i>G. afghanus</i> , Pocock.
		Proximal tarsal segment of second and third legs without a posterior basal spine	4	
4	{	Tibia of palp fuscous	5	
		Tibia of palp yellow		<i>G. macmahoni</i> , Pocock
5	{	Size large (over 40 mm.); yellow; patella of palp twice width of head	6	
		Smaller (about 30 mm.); browner; patella of palp less than twice width of head		. <i>G. orientalis</i> , Stol.
6	{	Bristles of pad of tarsus of fourth leg broad, their ends abruptly pointed		<i>G. festivus</i> , Hirst.
		Bristles of pad of tarsus very much narrower, their ends sharply pointed		. <i>G. agilis</i> , Pocock.
7	{	Tibia of palp furnished ventrally with "cylinder-bristles"	8	
		Tibia of palp ventrally without "cylinder-bristles"		<i>G. citrinus</i> , Pocock.
8	{	"Cylinder-bristles" of tibia of palp long (either slender or stout)	9	
		"Cylinder-bristles" of tibia of palp very stout, slender and cylindrical		<i>G. fischeri</i> , Hirst.

¹ The posterior legs of the male specimen of *G. afghanus*, Pocock, are missing. The female which is supposed to belong to this species, however, has the distal segment of the fourth leg armed below with a pair of spines.

- | | | | | |
|----|---|---|----|---------------------------------|
| 9 | { | Bristles forming pad of tarsus of fourth leg not clavate in shape | 10 | |
| | | Bristles forming pad of tarsus of fourth leg clavate in shape | | <i>G. bacillifer</i> , Pocock. |
| 10 | { | Proximal tarsal segment of second and third legs without a posterior basal spine | 11 | |
| | | Proximal tarsal segment of second and third legs usually with a posterior basal spine | | <i>G. araneoides</i> , Pallas. |
| 11 | { | Legs sandy yellow, patella of palp twice the width of the head | | <i>G. chitralensis</i> , Hirst. |
| | | Legs browner, patella of palp considerably more than twice the width of the head | | <i>G. indicus</i> , Pocock. |

Eusimonia celeripes, sp. nov.

Colour.—Pale yellow; head infusate; abdomen greyish yellow; palpi and legs slightly infusate.



Mandible of *Eusimonia celeripes*, Hirst.

Mandible.—Dorsal horn short, pointed and slightly curved; Flagellum strongly curved, the terminal part abruptly narrowed and sharply pointed. Vertical lamina with the lower corner not rounded but angular. Upper jaw with the fourth, seventh and eighth teeth (from the anterior end) the largest; the first, third, sixth, ninth and tenth of large size, the remaining teeth being small. Lower jaw furnished with a strong tooth, which is usually preceded by two or three rudimentary teeth.

Palpi.—Inner side of tibia of palp armed towards the distal end with six spines, the ends of which are blunt and often enlarged; the proximal spine is the largest.

Abdomen.—Third abdominal segment provided with a cluster of 6-7 short and stout bristles. Fourth abdominal segment with twelve long and slender bristles.

Measurements in mm.—Length of body 10.5.

Locality.—Kaschgar Steppe. Three males collected by Mr. Constantine Aris.

Remarks.—This species is closely allied to *E. turkeстана*, Kraepelin, from which it differs in the form of the flagellum, dentition of the mandibles, and in the number of bristles on the ventral surface of the fourth abdominal segment.

XXVII. THE DIFFERENCE BETWEEN THE
TAKIN (*BUDORCAS*) FROM THE MISHMI
HILLS AND THAT FROM TIBET, WITH
NOTES ON VARIATION DISPLAYED BY
THE FORMER.

By T. BENTHAM, *Indian Museum.*

(Plate xxiii.)

In the collection of the Indian Museum there are twelve skulls and frontlets of *Budorcas taxicolor*, nine of which are known to come from the Mishmi Hills and one from E. Tibet, two having no known history. In the Mishmi series, two sets of skulls can be so arranged that they show a marked difference in rise from the young to the adult stage. This rise is marked by the gradual approximation of the horns. The youngest of the series, which are all males, has the horns at their bases quite two inches apart, and this distance gradually becomes less and less until we eventually arrive at a specimen in which the horns are coincident and very large. The only Tibetan species, which is a young adult, seems to possess horns which are almost identical in size and distance apart with No. 2 of the Mishmi series. This almost serves to point out that Mishmi and Tibetan animals cannot with certainty be distinguished by the size, shape, or distance apart of their horns. The only thing that can be said on this point is that the horns are very variable and that this variability seems to be consequent on the age of the animal. (For description of horns cf. Chalmers Mitchell, *Proc. Zool. Soc.*, 1907, p. 467; Lydekker, *Game Animals of India*, etc., p. 162; Hodgson, *Journ. Asiat. Soc. Bengal*, vol. xix, p. 65; Milne Edwards, *Réch. des Mam.*, 1868-74, p. 367.)

A more important point lies in the shortness and broadness of the nasal bones of the *Budorcas* from Tibet, as compared proportionately with all the Mishmi specimens. This feature carries with it a larger space to the opening of the nasal chamber, which is deeper and higher than in the animal from Assam. In referring to the nasal chamber it must also be noted that in the Tibetan skull the ridges starting from the edge of the maxilla at the junction of this bone with the premaxilla and lying on the floor of the nasal chamber are far less marked than in the Mishmi skull (see pl. xxiii, A and B, figs. 2 and 3). This last statement also applies to the pits underlying the vomer, which are larger and deeper in the Mishmi animal. The difference in these ridges undoubtedly shows that as a consequence of their development the maxillo-turbinals are far more developed in the Assam form than in that from Tibet, a fact

which is not altogether surprising, since the Mishmi Takin lives in jungle, where its sense of smell would be more indispensable than if its habitat were on the bare plateaux of Tibet.

The premaxilla is longer in the Tibetan skull, proportionately, and more slender than in the other specimens. This is also quite evident in Milne Edward's drawing of the nose-cavity in a specimen from Moupin.¹

In the skeleton the only difference between the Assam and Tibetan forms seems to lie, as far as can be judged from the same author's plates, in the humerus. This difference probably is not important, perhaps being due to age. The outer tuberosity of the Mishmi humerus is larger and has a greater curve inwards than that in the Moupin humerus figured. The bicipital groove is therefore deeper. The deltoid ridge also is more strongly marked. The anterior cannon-bone is shorter and broader in proportion in the Tibetan *Budorcas*, while with regard to the posterior cannon-bone the reverse is the case.

Comparison of Mishmi skins *inter se* exhibits great variation. The colour in males varies from russet-brown to light straw-grey. In no individuals are the dark parts pure black. In fact the younger the animal is, the darker the colour of the skin. The following is a list of the observations taken from skins ranging in age from young to fully adult:—

Budorcas taxicolor, ♂ *Skins from Assam: Age Series.*

Serial No.	Length of horn.	Length of anterior hoof, front face.	Colour.
1	None	1.25 in.	Uniform dark russet-brown; legs and a small patch on the nose inclining to black; dorsal streak very faint and more marked on hind quarters; interior of ears, a patch on the loins, a small patch over eye light brown.
2	.75 in.	2.25 in.	Hair becoming lighter and more golden in colour at the tips along the edge of the dorsal streak, which is now better marked and is beginning to show signs of appearing between shoulders. Rest of the skin as in No. 1.
3	2.5 in.	2.5 in. ..	Dorsal streak quite well marked and dark brown, the hairs having black tips. More yellowish colour on the back which, mingling with the reddish brown hairs it is replacing, gives the back in parts a greenish appearance. A light patch beginning to be evident on the forehead.

¹ *Récherches des Mammifères* (Paris), 1868-74, pl. lxxvi.

Serial No.	Length of horn.	Length of anterior hoof, front face.	Colour.
4	21 in.	3 in. ..	Whole of back yellow, varying from straw colour nearer the dorsal streak to chestnut on the sides. Crescentic patch on forehead and the lining to ears straw colour. Rest of head, as also flanks, very dark brown. Under parts dark brown, the hairs of legs tipped black.
5	22 in.	3.25 in.	Altogether duller; the dorsal streak beginning to disappear. General colour of the upper parts drab straw colour with a slight greenish tinge. Under parts almost black. Nearest to the Tibetan specimen in colour, and also to Hodgson's original description of the type, although it is not the same specimen.

The two females in the collection also show a decided difference *inter.se*, no doubt due to age. In both the dark dorsal stripe present in the males is faint and nearly absent; the younger animal exhibits the browner tendencies shown in the younger males, while the older one is greyer in appearance. Both skins are larger than any male skin in the Museum's possession. This indicates that the female may be larger than the male, if the evidence of the dry skins is anything to go upon.

The Tibetan skin shows the following coloration, approaching the oldest Mishmi example in appearance:—

General colour above yellowish fawn inclining to grey, the hairs at their bases being straw colour; hair of back lighter straw colour along the edges of the dorsal streak, the hair of which is dark brown with black tips. Dorsal streak extending from root of tail, which is black, to the middle of the shoulders, where it gives way to a straw coloured stripe extending across the occiput to the forehead¹ behind the ears and between the eyes. A small light patch at the anterior corner of the eye, and the interior of the ears straw coloured; hair of the muzzle and sides of head black, some of the hairs being different shades of brown and straw colour at their bases; long hairs at sides of body light dull grey with long black tips; a small russet-brown patch above each hoof.

The following is an abstract of Mr. Lydekker's description of *Budorcas taxicolor whitei* in the *Field* of November 16th, 1907, this sub-species having been formed on four specimens from Bhutan.

¹ Hodgson had a model of the Mishmi Takin sent him. This was made by a Mishmi chief, and had a light yellow half-moon mark on the forehead; *vide Journ. Asiat. Soc. Bengal*, vol. xix, p. 69.

The first two specimens were both adult (a male and a female), and the horns of the bull were shorter than those of the cow. The second two were those of an immature male and adult female. From this evidence Mr. Lydekker states that the horns of an adult Bhutia bull would have been 14 to 15 inches in length as compared with 20 to 24 in the Mishmi Takin. But, from the statistics quoted, the same thing might be said with regard to the Tibetan Takin as compared with the Mishmi form. It appears, also, that the yellow colour of the hair in the animal from Bhutan is intermediate in area between that of Mishmi and that of Tibetan examples. The yellow colour of the hair is seemingly also intermediate between the two extremes in some representatives of the same Mishmi race. Indeed, one example of this race in the Museum is almost identical in appearance with the Tibetan animal.

A grey Takin is mentioned by Mr. Lydekker¹ as coming from Sze-chuen, and he proposes to form a new sub-species for its reception. The animal is a female and is light grey on the upper parts.

The gentleman who sent the specimen to Mr. Rowland Ward says that there are two kinds of Takin in Sze-chuen, one a small red animal and the other a large grey one. It is not improbable that the female *Budorcas* is larger than the male, and I have shown that the young are dark russet-brown, and the adults light in appearance. It is probable that the small "race" mentioned consists simply of young examples of the large grey form, and, as is quite common among ungulates, that the young separate into flocks, while the adult males or females, as the case may be, go about singly or in pairs. An observant person could, with the greatest ease, make at least three sub-species from the Mishmi skins in the Indian Museum, if they had chanced to be from different localities simply on the evidence of coloration and variation of horns. I may also mention that we have two stuffed specimens from the Mishmi Hills in addition to those already noticed. These are presumably adult, and though they are somewhat faded, it can easily be seen that the female is larger and greyer in appearance, standing 3 feet 5 inches at the shoulder, while the male is reddish, and is only 2 feet 8 inches in height. These animals, looked at from a great distance, would be thought to be distinct species.

On the evidence of the facts stated above, I am perfectly willing to admit that the Mishmi and Tibetan animals are distinct, not so much on the evidence of coloration, but on that of the characteristics of the skull, on which the Tibetan animal perhaps deserves specific rank.

In the face, however, of the occurrence of so much variation in Mishmi animals, it is quite reasonable to suppose that a like variation occurs among those beyond the hills.

Appended is a list of measurements of skulls and skeletons of the ♂ specimens in the Indian Museum and of the one described by Milne Edwards.

¹ In the *Field* of May 9th, 1908.

[NOTE.—Since writing this paper I have been permitted by Mr. I. H. Burkill of the Industrial Section, Indian Museum, to examine a shield from the Daffia Hills made of *Budorcas* hide. This skin is probably that of a young animal and is brownish in appearance, the dorsal stripe being indistinct. This fact is interesting only as regards the distribution of the Takin, if we may assume that the skin is that of an individual killed in the Daffia and not in the Mishmi Hills.]

Measurements of Skulls.

Measurements in millimetres.	Mishmi average.	♂ Mishmi Hills. A. R. Comber.	♂ Mishmi Hills. E. T. Dalton.	♂ Mishmi Hills.	♂ Mishmi Hills.	♂ Tibet. Milne Edwards (juv.).	♂ E. Tibet (juv.).
Basal length of skull	386	395	375	415	360	400	353
Breadth between orbits ..	145	165	144	145	125	93	134
Length nasals ..	136	142	136	150	115	..	98
Breadth nasals ..	77	98	70	88	70	58	80
Depth from highest point of nasals to lowest point of maxilla ..	167	174	168	171	154	130	143
Length of premaxilla ..	149	155	155	158	130	..	130
Length from tip of nasals to end of premaxilla ..	147	171	147	143	128	..	135
Breadth between premaxillæ at junctions with maxillæ ..	91	98	93	98	75	..	75
Length from between horns to end of nasals ..	251	245	247	268	243	..	215
Length of maxillary tooth-line ..	124	122	131	115	127	..	120
Length from first pre-molar to end of premaxilla	120	135	115	125	105	..	99
Length of space between the horns at base ..	14	20	coincident.	15	7	..	25
Length of horn ..	571	544	571	514	408	480	365
Circumference at base of horn ..	285	290	323	294	235	320	235
Length tip to tip	245	328	265	220	185	330	160
Length from coronoid process to angle	146	..	138	..	155	..	134
Breadth from third molar to angle ..	94	..	93	..	95	..	75
Length of mandibular tooth-line ..	125	..	125	..	125	..	119

Measurements of Skeletons.

Measurements in millimetres.	♂ <i>Budorcas taxicolor</i> (<i>tibetanus</i>), Alphonse Milne Edwards.	♂ <i>Budorcas taxicolor</i> , Mishmi Hills, Assam.	♂ <i>Budorcas taxicolor</i> , Mishmi Hills.	♂ juv. <i>Budorcas taxicolor</i> , Mishmi Hills.
Length of the humerus	315	262	310	260
Transverse diameter of the superior extremity of the humerus	101	86	110	70
Thickness of the great tuberosity	33	35	37	25
Minimum diameter of the diaphysis	36	48	70	53
Length of the inferior extremity of the humerus	69	61	65	60
Length of the radius	275	250	265	210
Length of the superior extremity of the radius	61	51	69	58
Breadth of the inferior extremity of the radius	58	48	80	55
Length of the ulna	365	217	356	250
Length of the anterior cannon bone	103	120	130	
Minimum breadth of the anterior cannon-bone	44	30	50	
Maximum breadth of the anterior cannon-bone	65	50	69	
Minimum thickness of the anterior cannon-bone	20	21	25	
Length of the femur	335	273		288
Transverse diameter of the superior extremity of the femur	95	80		85
Maximum diameter of the diaphysis	31	40		42
Transverse diameter of the inferior extremity	81	74		78
Antero-posterior diameter of the inferior extremity	83	80		85
Length of the posterior cannon-bone	151	114		120
Minimum transverse diameter	33	43		30
Maximum transverse diameter	56	59		50

Broader and shorter in proportion.

Longer and narrower in proportion.

Anterior cannon-bone missing.

Femur missing, also posterior cannon-bone.

Shorter and broader in proportion.

EXPLANATION OF PLATE XXIII.

FIG. 1.—Floor of nasal chamber in skull of *Budorcas* from Assam.

„ 2.—Floor of nasal chamber in skull of *Budorcas* from E. Tibet.

A = Pit. B = Ridge separating the pits. T = Maxillo-turbinal.

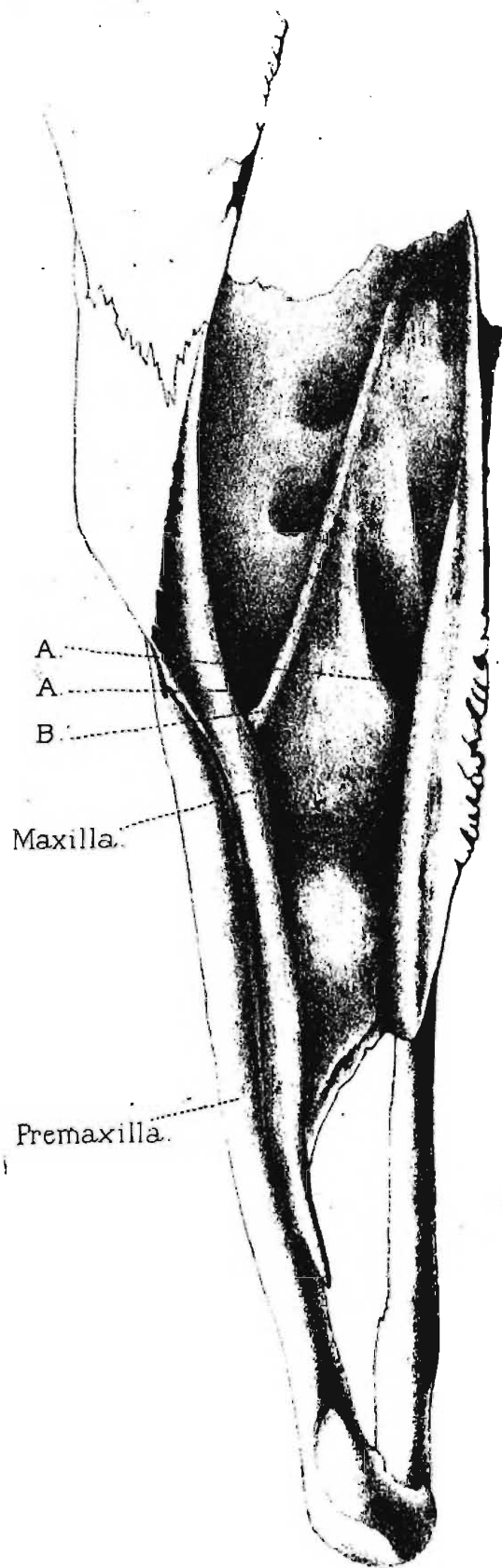


Fig. 2.

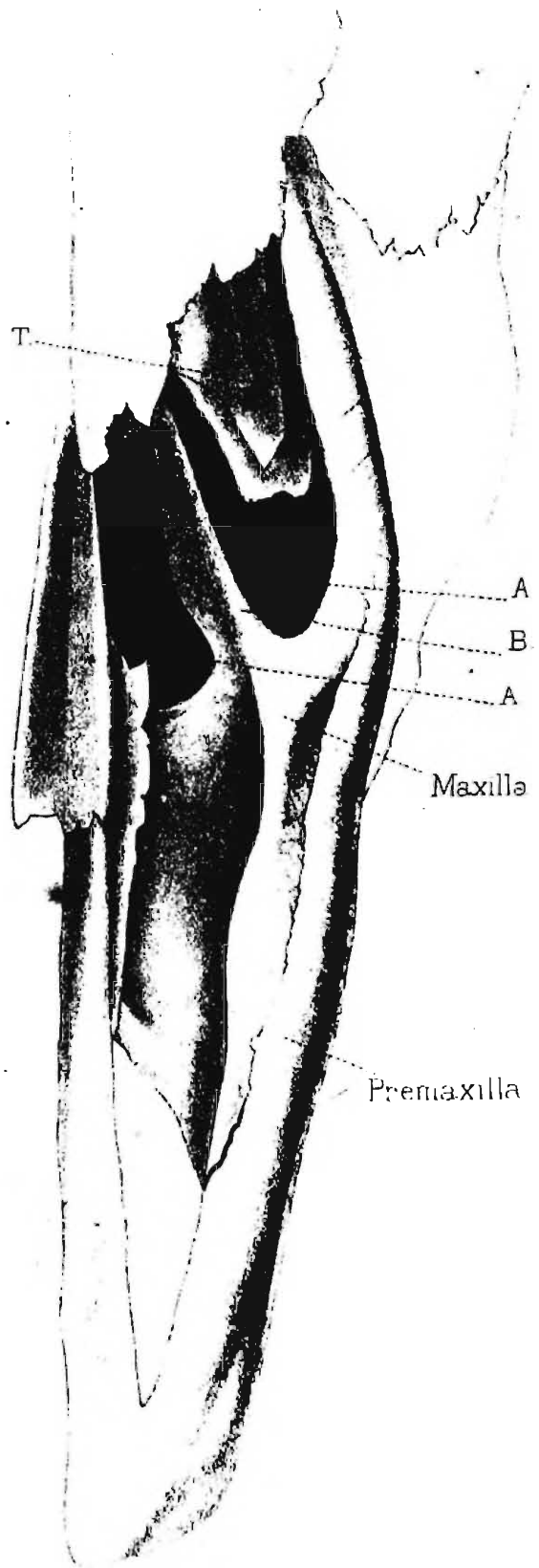


Fig. 1.

XXVIII. ON *CARIDINA NILOTICA* (ROUX)
AND ITS VARIETIES.

By Dr. J. G. DE MAN, *Ierseke, Holland.*

The collection of Crustacea obtained from brackish water ponds at Port Canning, Lower Bengal, which is described at p. 211 of this Journal, comprised also very numerous specimens of a variety of *Caridina nilotica* (Roux) which proved to be new. As our knowledge of this species and its varieties appears still much confused and unsatisfactory, the present paper will, I think, be welcome.

The typical species, *Caridina nilotica* (Roux) from the Nile, was described by Roux, as a *Pelias*, in the *Annales des Sciences Naturelles*, t. xxviii, 1833, p. 73, pl. 7.

Compare the following papers :—

Hickson, S. J., On a new Species of the genus *Atya* (*A. wyckii*) from Celebes, in: *Annals and Magaz. of Natural History* for Nov. 1888, p. 357, pls. xiii, xiv.

de Man, J. G., in: *Max Weber's Zoolog. Ergebnisse einer Reise nach Niederl. Ost-Indien*, ii, 1892, p. 386, pl. xxiv, figs. 29, 29 k.

Max Weber, Zur Kenntniss der Süßwasser-Fauna von Süd-Afrika, in: *Zoolog. Jahrbücher* (Spengel), Abth. f. System. x, 1897, p. 168.

Schenkel, E., in: *Verhandl. der Naturf. Gesellschaft in Basel* xiii, 1902, Heft 3, pp. 497-499.

de Man, J. G., in: *Abhandl. der Senckenberg. Naturf. Gesellschaft*, xxv, 1902, p. 895.

Bouvier, E. L., in: *Bulletin Scientif. de la France et de la Belgique*, t. xxxix, 1905, pp. 78-80.

Calman, W. T., in: *Proceed. Zoolog. Soc. London*, 1906, vol. i, p. 189.

The following material lies before me :—

1. Twenty-three specimens, some of which are adult and egg-bearing, collected, December 1903, in ponds and canals near Cairo, Egypt, and presented to me by Capt. S. S. Flower, Director of the Zoological Gardens at Giza, near Cairo, January 1904.
2. Twenty specimens, some of which are egg-bearing, of *Caridina longirostris*, H. M. Edw., from the river Maçta, near Oran, co-types, received in 1890 from the

Museum at Paris; these specimens have already been described by me in my paper of 1892 (*l.c.*).

3. An egg-bearing female and a younger specimen without eggs from the Lake Victoria Nyanza, Bay Kavirondo, received, May 1904, from Prof. E. L. Bouvier,—*Caridina wyckii*, Hicks., var. *paucipara*, de Man; these specimens were collected, Sept. 1903, by M. Alluaud.
4. Three egg-bearing females from the river Umgeni, Natal, collected Nov. 1894, and received from Prof. Max Weber,—*Car. wyckii*, Hicks.
5. Six adult specimens, three of which are ova-bearing, from the river Umhlasine, Natal, collected by Prof. Max Weber in 1894 and presented by him,—*Car. wyckii*, Hicks. var. *paucipara*, M. Weber.
6. One egg-bearing adult female and 60 young specimens collected by Dr. N. Annandale, Jan. 28—30th, 1906, in brackish water ponds at Port Canning, Lower Bengal.
7. Fourteen ova-bearing adult females and 48 younger specimens collected, Nov. 12th, 1906, in the same locality.
8. Twenty-four ova-bearing females of somewhat smaller size than the preceding and 40 young specimens gathered, Dec. 8th, 1906, in the same locality.
9. Four specimens, one of which is adult, collected at Dhappa, near Calcutta, in slightly brackish water.
10. Three adult specimens with eggs from the river near Palopo, Luwu, Celebes, described by me, *l.c.*, 1892, p. 388, as the typical form of *Car. wyckii*.
11. Three adult specimens with eggs, from the river near Mbawa, Flores, described by me, *l.c.*, 1892, p. 393, also as the typical form of *Car. wyckii*.
12. Three adult females with eggs from Maros, Celebes, described by me, *l.c.*, 1892, p. 393, as the variety *gracilipes* of *Car. wyckii* (Hickson).

A punctual and close examination of this large interesting material and accurate measurements of the thoracic legs led to the following results:—

- (a) *Caridina longirostris*, H. M. Edw., from Oran is not identical with *Car. nilotica* (Roux) from Egypt, but proved to be a *distinct variety* of it.
- (b) The specimens from Lake Victoria Nyanza ought not to be referred to the var. *paucipara*, M. Weber¹; as regards the measurements of their legs, they almost fully resemble the var. *gracilipes*, de M., from Celebes,

¹ Prof. Bouvier in his valuable paper on the *Atyidae* (*l.c.*, 1905), erroneously supposes this variety to have been described by me.

but they agree with the typical *nilotica* from Egypt by the large size of their eggs.

- (c) The specimens collected in the river Umgeni, Natal, were wrongly referred by Prof. Weber to *Car. wyckii*, Hicks.; they ought to be considered as a distinct variety *natalensis* nov.
- (d) The specimens obtained from Port Canning and from Dhappa, Lower Bengal, though closely related to the var. *gracilipes* from Celebes, are, at least for the present, to be regarded as a distinct and new variety *bengalensis* nov.
- (e) The specimens from the river near Palopo, Luwu, Celebes, from the river near Mbawa, Flores, and from the other localities mentioned by me, *l.c.*, 1892, p. 386, are not to be referred to *Car. wyckii* (Hicks.), but ought to be considered as a proper variety, for which the name of *brachydactyla* nov. is proposed.
- (f) According to Dr. Calman (*l.c.*, p. 190), the co-types of Prof. Hickson's species from Celebes should have the carpus exactly as in the types of *longirostris*; they are therefore different from the var. *brachydactyla* and ought to be considered as a distinct variety *wyckii* (Hicks.).
- (g) All the varieties living on the islands of the Indian Archipelago and in Bengal are certainly distinct from those occurring in Africa.

The typical *Car. nilotica* (Roux) inhabits Egypt (the Nile, freshwater ponds and canals); its at present known varieties are the following:—

- | | |
|--|--|
| 1. var. <i>longirostris</i> , H. M. Edw. | River Macta, Oran. |
| 2. var. <i>natalensis</i> , n. | Natal. |
| 3. var. <i>paucipara</i> , M. Weber. | Natal. |
| 4. var. <i>bengalensis</i> , n. | Bengal. |
| 5. var. <i>wyckii</i> , Hicks. | Lake Tondano, Minahassa,
Celebes, at a height of 2,000
feet above sea-level. |
| 6. var. <i>minahassa</i> , de M. | Minahassa, Celebes. |
| 7. var. <i>brachydactyla</i> , n. | Celebes, Saleyer, Flores. |
| 8. var. <i>gracilipes</i> , de M. | Celebes, Saleyer. |

Key to the varieties of Caridina nilotica (Roux).

- I. Number indicating the proportion between length and breadth of the carpus of 1st pair of legs usually 2 or more than 2; rarely falling to 1.8, or quite exceptionally to 1.66 (var. *bengalensis*).

- a. Dactylus of 3rd pair of legs always longer than $\frac{1}{5}$ of the propodite (number indicating the proportion between the length of both joints varying between 3.3 and 4.6); dactylus of 5th pair also longer than $\frac{1}{5}$ of the propodite (the number of proportion varying between 2.87 and 4.5).
- b. Number indicating the proportion between length and breadth¹ of the dactylus of 3rd pair less than 4.
- c. Number indicating the proportion between length and breadth of the dactylus of 5th pair varying between 4 and 4.6; dactylus of 5th pair with 40—50 spinules.
- d. ova 0.7—0.86 mm. long *nilotica* (Roux).
- dd. ova 0.42—0.46 mm. long *natalensis*, nov.
- cc. Number indicating the proportion between length and breadth of the dactylus of 5th pair varying between 4.6 and 6.2; dactylus of 5th pair with 60—74 spinules; ova 0.96—1.06 mm. long. *paucipara*, M. Weber.
- bb. Number indicating the proportion between length and breadth of the dactylus of 3rd pair usually larger than 4, of 5th pair varying between 5 and 6.
- e. Number of proximal teeth of the upper margin of the rostrum usually varying between 12 and 20; ova usually 0.35 mm. long, their length varying between 0.33 and 0.4 mm. var. *gracilipes*, de M.
- ee. Number of proximal teeth of the upper margin of the rostrum usually varying

¹ The breadth of the dactylus is measured at the level of the 1st lateral spinule.

between 20 and 24; ova usually 0.45 or 0.46 mm. long, varying between 0.42 and 0.49 mm.

var. *bengalensis*, nov.

aa. Dactylus of 3rd pair about $\frac{1}{6}$ the length of the propodite (number indicating the proportion between the length of both joints varying between 5.8 and 6.2); dactylus of 5th pair $\frac{1}{6}$ — $\frac{1}{5}$ of the propodite. Ova 0.39—0.44 mm. long

var. *brachydactyla*, nov.

II. Number indicating the proportion between length and breadth of the carpus of 1st legs usually less than 1.8, rarely rising to 1.9, but never reaching to 2.

f. Number indicating the proportion between the length of propodite and dactylus of 3rd pair larger than 5, of 4th pair, 4.

var. *wyckii* (Hicks.).

ff. Number indicating the proportion between the length of propodite and dactylus of 3rd pair usually less than 4, rarely reaching to 4.2; that of 5th pair always less than 4.

g. ova 0.55 mm. long

var. *minahassa*, de M.

gg. ova 0.33—0.39 mm. long.

var. *longirostris*, H. M. Edw.

Whereas in the foregoing key the principal characters are indicated by which the varieties may be distinguished, the following part contains my observations on the rostrum and on the thoracic legs.

I. *Caridina nilotica* (Roux), typical form.

TABLE A.

(Plate xx, figs. 1, 1a, 1b.)

In the figure of Roux's quoted paper of 1833, the rostrum extends distinctly beyond the antennal scales; its upper margin carries 13 teeth, two of which are on the carapace, there is no subapical tooth, and the lower margin is armed with 14 teeth. In the 21 specimens from Cairo which lie before me, not one presents such a small number of teeth on the upper margin. On Table A

the tothing-formulae of the rostrum of 10 specimens are indicated, the other 11 specimens show the following tothing¹ :—

$$\frac{20^3 + 1}{14}; \frac{20^3 + 1 + 1}{11} \text{ (young individual).}$$

$$\frac{21^2 + 1 + 2}{13} \text{ (young individual).}$$

$$\frac{22^3 + 1}{17}; \frac{22^3 + 1 + 1}{15}.$$

$$\frac{23^3 + 1}{14}; \frac{24 - ?}{15}; \frac{24^3 + 2}{12}; \frac{25^3 + 1}{15};$$

$$\frac{24^2 + 4}{0} \text{ (in this specimen the rostrum is abnormal, quite}$$

straight, longer than the carapace and than the scaphocerites, whereas the proximal row of teeth reaches to the end of the antennular peduncles; the teeth of the lower edge are wanting).

$$\frac{27^3 + ?}{\text{probably 16 or 17}} \text{ (the first two or three teeth of the lower}$$

margin are grown together, the tip is broken off and the proximal row of teeth reaches beyond the scaphocerites).

In these specimens the usual number of proximal teeth of the upper margin proves therefore to vary from 20 to 24 and two or three are placed on the carapace. In four specimens one observes an isolated tooth between the proximal row and the subapical tooth, in one case even two isolated teeth are observed.

Of 16 specimens, in which the tip of the rostrum is well preserved 13 are armed with a single subapical tooth, in 2 specimens two are observed and in 1 even four, but the latter specimen is apparently abnormal, because the lower margin carries no teeth at all. In the specimens the rostrum of which is not injured, the number of teeth of the lower margin varies from 11 to 20, there being ordinarily 11, 14, 15 or 16 teeth present. The rostrum commonly extends beyond the scaphocerites, appearing a little longer than the rest of the carapace. The proportion between the length of the unarmed terminal part of the upper edge and that of the proximal row of teeth is very variable; sometimes, as in the specimen figured by Roux, the proximal row appears little more than once and a half as long as the unarmed terminal part (Table A, Nos. 5—8), in other cases the unarmed part is shorter and in No. 4 it measures barely one-third the length of the proximal row.

Though the carpus of the 1st pair of legs appears usually twice or more than twice as long as broad, it presents sometimes a stouter shape, as in No. 5 of the Table; in such specimens the carpus has exactly the same shape as in some individuals of the var.

¹ In each formula near the number of proximal teeth a smaller type indicates how many teeth are placed on the carapace.

longirostris from Oran, which variety may, however, still be distinguished by the more slender dactyli of the three posterior legs and by the much smaller eggs. The fingers of the 1st pair of legs are about once and a half as long as the palm, and those of the 2nd pair are also less than twice as long as the palm.

The ischium of the three posterior legs is unarmed. The meropodite of the 3rd pair of legs is armed with three stout spines, the first placed at the level of the proximal third part of the upper margin; the third is situated near the distal extremity, the second midway between the two others. Carpus of the three posterior legs with a similar spine near the distal extremity. The meropodites of the 5th pair of legs carry two spines, like those of the third pair; 0.24 mm. long; the first is placed immediately beyond the middle, the second near the distal extremity.

The dactylus of the 3rd pair is usually armed with 8 or 9 spines the terminal claw included, in the largest specimen (No. 1) it carried 10 spines and in another (No. 8) I observed even 12; in a specimen 20 mm. long, on the contrary, the dactylus presented only 7 spines; their number appears, therefore, to be rather variable. The dactyli of the 5th legs are armed with 40—50 spinules.

The eggs (fig. 1b) are *few in number but large*, larger than in all the other varieties except the var. *paucipara*, being 0.7—0.86 mm. long and 0.42—0.5 mm. broad. The size of the eggs is not only variable in different individuals, but those of one and the same specimen present slight differences as regards their length and breadth. So, e.g., the ova of the female No. 3 presented the following measurements: 0.7 mm. × 0.42 mm.; 0.7 mm. × 0.43 mm.; 0.7 mm. × 0.44 mm.; 0.71 mm. × 0.42 mm.; 0.73 mm. × 0.44 mm.; 0.74 mm. × 0.44 mm. Of the female No. 5, however, the measurements were as follows: 0.8 mm. × 0.47 mm.; 0.82 mm. × 0.47 mm.; 0.84 mm. × 0.49 mm.; 0.86 mm. × 0.48 mm.

The largest specimen, received from Capt. Flower, is a female with eggs, 29 mm. long.

The two specimens from Lake Victoria Nyanza (compare Table B) differ from the preceding by the dactyli of the three posterior legs; these joints show a *slenderer* shape, somewhat as in the var. *gracilipes* from Celebes, as is proved by comparing the two Tables A and B. In the ova-bearing female, 27 mm. long, the dactylus of the 3rd pair (fig. 2) is armed with 10 spines, in the other with 11; the dactyli of the 5th pair (fig. 2a) are armed with 49 and 50 spinules respectively. In the female 27 mm. long the ischium of the 3rd legs is unarmed, the meropodite carries three spines, 0.21 mm. long, the 2nd spine is placed a little nearer to the proximal than to the distal extremity of the joint, the 1st just midway between the proximal extremity and the 2nd spine, the 3rd near the distal extremity. In the other specimen, however, the meropodite of the 3rd legs presented four spines, the 2nd somewhat nearer to the proximal than to the distal extremity, the 3rd just beyond the 2nd, the 1st midway between the 3rd and the proximal extremity, the 4th near the far end of the joint. The eggs (fig. 2b)

of the female No. 1 are a little smaller than those of the typical form, being 0.62—0.7 mm. long and 0.38—0.4 mm. broad; the measurements of nine eggs are as follows: 0.62 mm. × 0.38 mm.; 0.62 mm. × 0.39 mm.; 0.62 mm. × 0.4 mm.; 0.63 mm. × 0.38 mm.; 0.64 mm. × 0.39 mm.; 0.65 mm. × 0.4 mm.; 0.66 mm. × 0.38 mm.; 0.68 mm. × 0.4 mm. and 0.7 mm. × 0.39 mm.

The measurements of these eggs agree with those indicated by Dr. Calman (*l.c.*) for specimens from the same Lake Victoria Nyanza; also as regards the measurements of the 1st legs, his specimens agree with those of Table B, but the dactyli of the three posterior legs are apparently a little shorter in Calman's specimens.

2. *Caridina nilotica* (Roux), var. *natalensis*, nov

TABLE C.

(Plate xx, figs. 3, 3a, 3b.)

Prof. Max Weber, in his quoted paper on the freshwater fauna of South Africa, referred numerous specimens collected by him in the rivers of Natal, partly to the typical form of *Car. wyckii* (Hicks.), partly to a new variety *paucipara*. A close examination of three adult ova-bearing females from the river Umgeni,—co-types received from him,—proved, however, that they only differ from the typical species, inhabiting Egypt, by the much smaller size of the eggs, whereas they fully agree with it as regards the measurements of the thoracic legs (compare Table C with Table A).

According to Max Weber the dactyli of the 3rd pair should measure $\frac{1}{6}$, those of the 5th $\frac{1}{6}$, of the length of the propodites; in the three co-types, however, measured on Table C, the dactyli appear distinctly longer. But even when supposing that the dactyli are in other specimens indeed as short as indicated by Prof. Weber, there are apparently still other differences between this Natal variety and the var. *brachydactyla*, nov., from Celebes. The fingers of the 1st legs are in the females from the river Umgeni about once and a half as long as the palm, but in the var. *brachydactyla*¹ twice or more than twice as long; the fingers of the 2nd legs appear also comparatively longer in the var. *brachydactyla* than in the var. *natalensis*. The dactyli of the three posterior legs show a still stouter shape in the Indian variety, and those of the 3rd pair carry only six or seven spines, the terminal claw included, but in the var. *natalensis*, though sometimes seven, also often eight or nine, as was already indicated by Max Weber.

The ischium of the three posterior legs appears unarmed in the females from the river Umgeni. The meropodite of the 3rd legs is armed with three spines, the 1st just or nearly in the middle of the joint, the 3rd near the distal extremity and the 2nd midway between the 1st and the 3rd, or a little nearer to the 2nd. The

¹ Prof. Weber did compare, of course, his Natal specimens with the material described by me in 1892 (*l.c.*); the "typical form" of *Car. wyckii* appears now as the var. *brachydactyla*,

carpus has also a spine near the far end. The meropodite of the 5th legs has but one spine near the distal extremity, there is also a spine on the carpus near the far end, and one observes five small spinules between this spine and the proximal extremity of this joint.

The ova are 0.42—0.48 mm. long and 0.24—0.295 mm. broad, presenting the same size as those of the var. *bengalensis* and of the var. *brachydactyla*. The measurements of ten eggs are as follows: 0.42 × 0.27 mm.; 0.42 × 0.29 mm.; 0.43 × 0.26 mm.; 0.43 × 0.28 mm.; 0.44 × 0.24 mm.; 0.44 × 0.27 mm. (two eggs); 0.44 × 0.29 mm.; 0.455 × 0.285 mm.; 0.46 × 0.295 mm.

The specimens from the Lake Nyasa, described by Dr. Calman (*l.c.*, p. 190), are probably to be referred to this variety.

3. *Caridina nilotica* (Roux), var. *paucipara*, M. Weber.

TABLE D.

(Plate xx, figs. 4, 4a, 4b.)

Caridina wyckii, Hickson, var. *paucipara*, Max Weber, *l.c.*, p. 168.

This variety, which inhabits the rivers Umhloti and Umhlasine, and together with the var. *natalensis* the river Umbilo, all situated in Natal, differs from the typical form of Egypt (1) by the *slenderer* dactyli of the 5th legs, which dactyli are armed with 60—74 spinules instead of 40—50; (2) by *somewhat larger* eggs; and (3) perhaps also by the rostrum. The teeth on the upper edge should be, according to Max Weber, 11—20 in number, less, therefore, than in the Egyptian species; in two of the five co-types the measurements of which are given in Table D the rostrum carries one subapical tooth, in two others this tooth is wanting altogether, in the fifth specimen the tip of the rostrum is injured. The unarmed terminal part is described as being somewhat shorter or just as long as the toothed part of the upper margin; in No. 2 of Table D the unarmed part appears even a trifle longer than the row of teeth, in No. 1 it is just as long, and in two other specimens the toothed part appears once and a half as long as the unarmed one. As regards the number of teeth on the lower margin (12—18) this variety agrees with the typical form.

When the measurements of the legs given in Table D are compared with those of the Egyptian form in Table A, one observes a close resemblance except only in the *proportion between length and breadth* of the dactyli of the 5th pair; in the *paucipara* specimens this proportion varies between 4.6 and 6.2, in the typical form, however, between 4 and 4.6. It ought, however, to be remarked that in some specimens of both varieties the same number (4.6) sometimes occurs, and in these individuals the dactyli present just the same form. In the egg-bearing female No. 1 the ischium of the 3rd legs is armed with a spine near the far end of its lower margin; the meropodite carries three spines, the 2nd somewhat nearer to the distal extremity than to the proximal, the 1st midway between the 2nd and the

proximal extremity, the 3rd near the far end. Carpus with a spine near the distal extremity. The ischium of the 5th legs is unarmed, the meropodite carries two spines, the 1st nearer to the distal than to the proximal extremity, the 2nd near the distal end. Carpus also with a spine near the distal extremity. Another co-type (No. 4) agrees as regards the armature of ischium and meropodite with the preceding specimen.

According to Weber's description the dactylus of the 3rd and 4th pairs should measure about $\frac{1}{5}$, that of the 5th $\frac{1}{4}$ of the propodite: in the co-types measured on Table D, these dactyli appear a little longer.

The eggs (fig. 4b) are few in number and *the largest* of all the other varieties: they are 0.96—1.06 mm. long and 0.55—0.67 mm. broad. Nine eggs of No. 1 presented the following measurements: 0.96 × 0.6 mm.; 0.97 × 0.62 mm.; 0.98 × 0.62 mm.; 0.98 × 0.67 mm.; 1 × 0.62 mm.; 1.02 × 0.62 mm.; 1.02 × 0.63 mm.; 1.02 × 0.64 mm.; 1.05 × 0.6 mm. Four eggs of female No. 3 presented the following measurements: 1.1 × 0.64 mm.; 1.04 × 0.64 mm.; 1.04 × 0.65 mm.; 1.06 × 0.62 mm.; and the measurements, finally, of four eggs of No. 4 were 0.96 × 0.55 mm.; 0.97 × 0.58 mm.; 0.98 × 0.59 mm. and 1 × 0.58 mm.

4. *Caridina nilotica* (Roux), var. *longirostris*, H. M. Edw.

TABLE E.

(Plate xx, figs. 5, 5a, 5b.)

Caridina longirostris, H. Milne Edwards, Hist. Nat. Crust., ii, 1837, p. 363; de Man, *l.c.*, 1892, p. 396, tab. xxiv, fig. 29l, 29m, 29 mm; Bouvier, *l.c.*, 1905, p. 78.

The 20 specimens, co-types, of *Car. longirostris* from the river Macta, Oran, that are lying before me are the same that were examined and figured by me in 1892. Ten have been measured (Table E). This form proved to be *quite different* from the Egyptian typical species; it may at once be distinguished by *its much smaller eggs* (fig. 5b), which are as small as those of the varieties *gracilipes*, de M., and *brachydactyla*, de M., from Celebes, being 0.33—0.39 mm. long and 0.21—0.26 mm. broad. So, *e.g.*, five eggs of the female No. 2, which was 18.5 mm. long, presented the following measurements: 0.35 × 0.21 mm.; 0.38 × 0.24 mm.; 0.38 × 0.25 mm.; 0.38 × 0.26 mm.; 0.39 × 0.23 mm.; and five eggs of the female No. 7, 16.5 mm. long, the following: 0.33 × 0.23 mm.; 0.34 × 0.23 mm.; 0.36 × 0.23 mm.; 0.36 × 0.24 mm.; 0.37 × 0.25 mm.

The tothing-formulæ of the rostrum of three specimens that are not in the Table are as follows:—

$$\frac{15^1 + 1}{13}; \frac{18^2 + 1}{14}; \frac{19^3 + 1}{15};$$

and in these specimens the proportion between the length of the

toothed part and that of the terminal unarmed part of the upper margin is respectively expressed by the numbers 1.38, 2 and 1.4. Besides one subapical tooth, the upper edge is armed with 14—21 teeth, the lower with 11—17. On an average the toothed part of the upper edge appears only once and a half as long as the terminal unarmed part, but in the typical form from the Nile the unarmed part is usually *shorter*, measuring sometimes even barely one-third of the toothed part (Table A, No. 4). My contention (*l.c.*, 1892, p. 396) that all the upper teeth are placed on the rostrum proper, proved to be erroneous, for one or two are placed on the carapace behind the orbital margin. This variety is, however, also distinguished by the thoracic legs. The carpus of the 1st legs appears usually *broader* in proportion to its length than in the typical form of Egypt and than in the other varieties, except the var. *wyckii*, Hicks., and the var. *minahassa*, de M. The average number, indeed, indicating the proportion between length and breadth of the carpus is for the eight measured specimens from the river Macta 1.64, but for the ten of the typical form from Cairo 2; the carpus of the var. *longirostris* appears therefore *on the average once and a half as long as broad*. As is proved by the measurements, the shape of the carpus of the 2nd legs is *very variable*: in some specimens, indeed, this joint is not quite four times, but in other cases almost five times as long as broad.

The dactyli of the three posterior legs are always *a little longer than one-fourth of the propodite*, nearly as in the Egyptian form, but they are *a little slenderer*; those of the 3rd pair are armed with 7—10 spines, the terminal claw included, those of the 5th with 35—40. The ischium of the 3rd legs carries a spine in the middle, the meropodite of these legs is armed with 3 spines, the 2nd about in the middle, the 1st midway between the 2nd and the proximal extremity, the 3rd near the distal end. Carpus with a spine near the far end and with two smaller spinules between this spine and the proximal extremity. The meropodite of the 5th legs carries a spine just in the middle and one near the distal extremity, while one also observes a spine near the distal end of the carpus.

The var. *longirostris* attains a length of 19 mm., its size being smaller than that of the typical form.

5. *Caridina nilotica* (Roux), var. *bengalensis*, nov.

TABLE F.

(Plate xx, figs. 6, 6a, 6b.)

Caridina wyckii (Hickson), Henderson, "A Contribution to Indian Carcinology," 1893, p. 434 (Trans. Linnean Soc. Zool., Ser. 2, vol. v); Nobili, Boll. Mus. Zool. Torino, xviii, No. 452, 1903, p. 6.

The 191 specimens enumerated above and collected in brackish ponds at Port Canning and at Dhappa, near Calcutta, apparently belong to a new variety, different from those living in Africa as also from the varieties that have been observed on the islands of the Indian Archipelago. This new variety differs from

the typical form of *Car. nilotica* of Egypt by the *slenderer* *dactyli* of the three posterior legs and by the *much smaller* eggs; it presents a greater resemblance to the var. *gracilipes*, de M., from Celebes.

The examination of 61 specimens, mostly adult or egg-bearing, from Port Canning, proved the following: *The usual number of teeth in the proximal series of the upper margin varies between 20 and 24*; in ten specimens 24 teeth were observed, in nine 23, in nine 22, in ten 21 and in eight 20; in two specimens the proximal row consisted of 25 teeth, in three of 26, in three of 27, in one of 29; in only two individuals were 19 teeth and in only one (very young) specimen were 17 teeth observed. The rostrum usually extends slightly beyond the antennal scales, or it appears just as long, rarely is it a little shorter. In all the specimens the proximal row of teeth appears *considerably longer* than the terminal unarmed part and the proportion between the length of the latter and that of the proximal row of teeth is as 1 : 2—4.5. Whereas in the adult ova-bearing female (No. 1 of Table F) 28 mm. in length, the proximal row of teeth is only twice as long as the terminal unarmed part, it is 4 or 5 times as long in a quite young specimen (No. 15) 12.5 mm. in length, and, as is shown by the Table, the other specimens present all possible intermediate proportions. Usually two teeth are placed on the carapace, often, however, three and in one specimen four teeth are placed on the carapace. One observes one subapical tooth as often as two; of the 61 specimens 24 carried one subapical tooth, in 31 two subapical teeth were found, in 2 three and in 1 specimen even four (compare the tothing-formulæ). In some specimens one or two isolated teeth occur on the unarmed terminal part of the upper edge between the proximal row and the subapical tooth: of the 61 examined specimens, 13 presented one isolated tooth and in one case two existed. The usual number of teeth on the lower margin varies between 11 and 14: of the 61 specimens in sixteen the lower margin was armed with 11 teeth, in eleven with 12, in eight with 13, in ten with 14, in two with 15, in two with 16, in one with 17, in five with 10, in three with 8 and in one with 6. One of the specimens in which the lower margin is armed with 8 teeth and also that with 6 are adult ova-bearing females.

The largest specimen from Dhappa (26.5 mm. long) differs a little from the preceding. The rostrum projects with one-third of its length beyond the antennal scales, *i.e.*, farther than in the Port

Canning specimens; it is $\frac{21^1 + 1}{13}$ dentate and the two foremost

teeth of the upper margin are farther distant from each other than the rest. In this specimen the proximal row of teeth is but 1.8 times as long as the terminal unarmed part.

In Table F the tothing-formulæ of 16 specimens are indicated; the formula—

$$\frac{17^2 + 1 + 1}{6}$$

is that of an ova-bearing female, 16.5 mm. long, the rostrum of which is slightly shorter than the scaphocerites and than the carapace; and the formulæ of 45 other specimens, all from Port Canning, are as follows :—

$\frac{19 + 1 + 2}{11}$, one specimen.	$\frac{22^2 + 1 + 2}{13}$, one specimen.
$\frac{19^2 + 1}{11}$, " "	$\frac{22^3 + 2 + 1}{12}$, " "
$\frac{20^2 + 1}{8}$, " "	$\frac{23 + 2}{8}$, " "
$\frac{20^2 + 3}{10}$, " "	$\frac{23^2 + 2}{10}$, " "
$\frac{20^2 + 2}{11}$, " "	$\frac{23^2 + 2}{12}$, two specimens.
$\frac{20^2 + 1}{13}$, " "	$\frac{23^2 + 1}{14}$, one specimen.
$\frac{20^4 + 1}{13}$, " "	$\frac{23^4 + 2}{14}$, " "
$\frac{20^2 + 1 + 1}{12}$, " "	$\frac{23^2 + 1 + ?}{14}$, one "
$\frac{20^3 + 1 + 2}{12}$, " "	$\frac{23^2 + 1 + 2}{11}$, " "
$\frac{21^3 + 2}{8}$, a female with eggs.	$\frac{24^2 + 1}{10}$, " "
$\frac{21^2 + 2}{10}$, one specimen.	$\frac{24^3 + 2}{10}$, " "
$\frac{21^2 + 1}{11}$, two specimens.	$\frac{24^3 + 2}{12}$, " "
$\frac{21^2 + 2}{12}$, one specimen.	$\frac{24^4 + 1}{12}$, " "
$\frac{21 + 3}{13}$, " "	$\frac{24^3 + 2}{13}$, " "
$\frac{21^3 + 1 + 1}{14}$, one "	$\frac{24 + 1 + 2}{13}$, " "
$\frac{22^2 + 1}{11}$, " "	$\frac{24 + 1 + 4}{14}$, " "
$\frac{22^3 + 1}{11}$, one egg-bearing female, 15.5 mm. long.	$\frac{25^3 + 1}{11}$, " "
$\frac{22^3 + 1 + 1}{11}$, two specimens.	$\frac{26^3 + 1}{14}$, " "
$\frac{22^2 + 2}{11}$, one specimen.	$\frac{26^3 + 2}{16}$, " "
$\frac{22^3 + 2}{12}$, " "	$\frac{27^4 + 2}{12}$, " "
$\frac{27^3 + 1}{14}$, " "	$\frac{29^2 + 1 + 2}{15}$, " "

According to my original description in Max Weber's Zoolog. Ergebn. einer Reise in Niederl. Ost-Indien, ii, 1892, p. 393, pl. xxiii, figs. 29 and 29e, according to Schenkel (Beitrag z. Kenntniss der Dekapoden-fauna von Celebes, 1902, p. 498) and also according to Bouvier (*l.c.*, 1905, p. 73), the rostrum of the var. *gracilipes* is characterised (1) by the proximal row of the upper edge consisting of 12—20 teeth, the usual number being 15—17 (de Man); (2) by the occurrence, usually, of one subapical tooth, rarely two; (3) by the unarmed terminal part being longer than the proximal row, or just as long, or rarely shorter, but in the latter case the proximal row of teeth is no more than twice as long as the unarmed part. Schenkel, indeed, remarks about the rostrum: "meist ungefähr die Hälfte, seltener nur $\frac{1}{3}$ des Oberrandes zahnlos." In a single specimen from the river Bonéa on the island of Saleyer the upper margin presented 24 teeth (de Man, *l.c.*, 1892, p. 395), but this is, no doubt, an exceptional case.

The upper surface of the telson carries four pairs of spinules, in some specimens five spinules were observed on one side and four on the other; the telson ends posteriorly in a very short tooth, 0.06 mm. long, whereas the hinder edge itself, *i.e.*, the linear distance between the outer angles, is 0.35 mm. broad; at either side of the median tooth four spines are inserted, the first of which, at the outer angle, is the shortest of all—0.12 mm. long; the next spine is the longest—0.33 mm.; the third and the fourth are subequal, the third being 0.22 mm. long, the fourth, contiguous to the median tooth, 0.2 mm. The telson of typical specimens of the var. *gracilipes*, de M., from Maros, Celebes, which are lying before me, fully agrees with that of the Bengal variety.

External maxillipeds reaching to the end of the antennular peduncle.

The legs of the 1st and 2nd pair agree with those of the typical form from Egypt and also with those of the var. *gracilipes*. The carpus of the 2nd legs presents a rather variable form: sometimes (No. 1) it is very slender, as in the var. *gracilipes*, but in other specimens, also adult, its shape is as stout as in the var. *longirostris* from Oran (egg-bearing female No. 3).

The dactylus of the 3rd pair of legs (fig. 6), which is armed with 8—10 spines, the terminal claw included, usually presents *the same slender shape* as in the var. *gracilipes*, it being 4 or more than 4 times as long as broad; rarely, however, has the dactylus the same stout shape as in the typical *Car. nilotica* from Egypt, so, *e.g.*, in the egg-bearing female No. 7, the dactylus of which is 3.8 times as long as broad. The meropodites of the 3rd legs are, in the adult female, No. 1, ten times as long as broad and armed with three stout spines of equal length (0.26—0.27 mm.); the first is inserted a little nearer to the proximal than to the distal extremity, the second is as far distant from the distal extremity as the first from the proximal, and the third is placed close to the distal extremity. A similar spine occurs near the middle of the ischium and another near the distal end of the lower margin of the carpus.

The meropodites of the 5th pair—nine times as long as broad—are armed with one spine just beyond the middle and another near the distal extremity; also a spine near the distal end of the carpus. The dactyli, which are armed with 45—55 spinules, have the same slender shape as in the var. *gracilipes*, being five or more than five times as long as broad.

The eggs (fig. 6b) are a little larger than those of the var. *gracilipes*; they are usually 0.45 or 0.46 mm. long and 0.28 mm. or 0.3 mm. broad, the length varying between 0.42 mm. and 0.49 mm., the breadth between 0.25 mm. and 0.3 mm. Females (15.5 mm. long) gathered in December in the brackish ponds of Port Canning are already provided with eggs which are of just the same size as those of the largest specimens, as, e.g., those of the female (28 mm. long) collected in November.

This variety has also been observed by Henderson at Madras and by Nobili at Pondicherry.

6. *Caridina nilotica* (Roux), var. *wyckii* (Hickson).

Dr. Calman (*l.c.*, 1907, p. 190) has pointed out, as was already made probable by Prof. Bouvier, that the species described by Hickson (*l.c.*) as *Atya wyckii*, has the first carpus exactly as in the types of *Car. longirostris*, H. M. Edw., and he adds that specimens received from Prof. Hickson agree very closely with the var. *minahassa* described by me, differing chiefly in the shorter dactylus of the three posterior legs, that of the 4th pair being less than one-fifth, and that of the 5th pair one-fourth of the corresponding propodus. Hickson's species, which was discovered in Lake Tondano, situated also in that mountain district of Minahassa, Celebes, thus proves to be a proper variety distinguished from the var. *minahassa*, de M., as from the var. *longirostris*, H. M. Edw., by the short dactyli of the three posterior legs. Unfortunately neither Hickson nor Calman indicate the size of the eggs. Hickson's variety is not lying before me, so that as regards the other characters of this form I must refer to his paper.

7. *Caridina nilotica* (Roux), var. *brachydactyla* nov.

TABLE G.

(Plate xx, figs. 8 a—c.)

Synon.: *Caridina wyckii*, de Man, *l.c.*, 1892, pp. 386—393, tab. xxiv, fig. 29f, 29g, 29i, 29ii, 29k, 29cc, 29dd (typical form).

The preceding remarks about the var. *wyckii* (Hickson) prove at once that that form which I considered in 1892 (*l.c.*) to be the typical form of *Car. wyckii*, is, indeed, quite distinct, differing chiefly by the more slender carpus of the 1st pair of legs. This carpus, indeed, appears 2.1—2.5 times as long as broad, presenting the same form as in the typical *Car. nilotica* from the Nile. This variety, which has been observed on the islands of Celebes, Saleyer and Flores, may henceforth be known under the name of *brachydactyla*.

Though it has been fully described in my work of 1892, I wish to add the following: In this work, p. 390, the fingers of the first legs are said to be about once and a half as long as the palm; this observation, probably made by means of a feeble magnifying-glass, proved to be erroneous. Four adult ova-bearing females, co-types of the specimens described in 1892 and taken out of Prof. Weber's collection, have now been exactly measured under the microscope, (Table G): the fingers of the 1st pair now appear to be 2—2.5 times as long as the palm. The carpus of the 2nd legs appears in some specimens very slender (six times as long as thick distally) (Table G, No. 3), but in other individuals it presents the same form as in the typical *nilotica* from the Nile and as in the var. *longirostris*. The fingers of the 2nd chelæ now prove also to be more than twice as long as the palm.

There is no spine on the ischial joint of the three posterior legs. The meropodites of the 3rd legs are armed with 3 spines; the 2nd spine is placed just beyond the middle, the 1st midway between the 2nd and the proximal extremity of this joint or somewhat nearer to the 2nd spine, the 3rd near the distal extremity. Carpus with a spine near the far end. The dactyli measure about $\frac{1}{6}$ the length of the propodite.

The meropodites of the 5th legs carry one spine near the distal extremity, as also their carpus; the dactyli are also short, measuring $\frac{1}{8}$ — $\frac{1}{6}$ the length of the propodite.

Quite characteristic is *the stout shape* of the dactyli of the three posterior legs, though it ought to be remarked that the shape of those of the 3rd legs is somewhat variable (*cf.* Nos. 1 and 4 of Table G).

The eggs are very numerous and small, 0.39—0.44 mm. long and 0.22—0.25 mm. broad, presenting nearly the same size as those of the var. *bengalensis* and *natalensis*. Nine eggs of the female No. 1 from Mbawa, Flores, show the following measurements: 0.39 mm. \times 0.23 mm.; 0.4 mm. \times 0.23 mm.; 0.4 \times 0.24 mm.; 0.41 \times 0.22 mm.; 0.42 \times 0.23 mm.; 0.42 \times 0.24 mm.; 0.42 \times 0.25 mm.; 0.43 \times 0.23 mm.; 0.44 \times 0.24 mm.

8. *Caridina nilotica* (Roux), var. *gracilipes*, de M.

TABLE H.

(Plate xx, figs. 7, 7a, 7b.)

Caridina wyckii, Hickson, var. *gracilipes*, de Man, *l.c.*, 1892, p. 393, tab. xxiv, figs. 29 a—e.

This variety, which inhabits the islands of Celebes and Saleyer, is chiefly characterised by the slender dactyli of the three posterior legs, by the carpus of the 1st legs being twice or a little more than twice as long as broad, by the shape and tothing of the rostrum and by its small eggs, which are usually 0.35 mm. long. Three co-types, adult ova-bearing females, from Maros, Celebes, are measured on Table H. In two of the three the fingers of the 1st chela appear

a little more than once and a half, and those of the 2nd pair 1·8 to 2 times as long as the palm. The dactyli of the 3rd legs, which in two of the three females appear a little shorter, but in the third even a little longer than $\frac{1}{4}$ of the propodite, are armed with 9 or 10 spines, the terminal claw included, but, according to the original description, they are often armed with 11 or 12 spines.

The specimens referred by Schenkel (*l.c.*, p. 498) to this variety seem partly to belong to another form,—probably to the var. *wyckii* (Hicks.),—because in some of his specimens the carpus presented the same shape as in the var. *longirostris*.

The var. *gracilipes* is most closely related to the var. *bengalensis*, from which it seems to differ by the characters of the rostrum and by slightly smaller eggs.

9. *Caridina nilotica* (Roux), var. *minahassa*, de M.

TABLE I.

(Plate xx, figs. 9, 9a, 9b.)

Caridina nilotica (Roux), var. *minahassa*, de Man, *l.c.*, 1902, p. 895.

Table I is taken from that in the quoted paper, the numbers having been calculated. This variety is *most closely related* to the var. *longirostris*, H. M. Edw., from Oran, but differs (1) *by the much larger size* of its eggs which are 0·55 mm. long, or once and a half as long as those of the variety inhabiting the river Macta; (2) by the dactyli of the third legs being *slightly shorter* in proportion to the length of the propodite (compare Tables E and I). The dactyli of the three posterior legs have the same slender shape as those of the varieties *longirostris* and *gracilipes*, but those of the third pair are armed with 7 or 8 spines, the terminal claw included, whereas those of the fifth pair carry 33—38 spinules as in the African variety.

Measurements of the typical form of *Caridina*

	No. 1	No. 2	No. 3
Length from tip of rostrum to tip of telson in millimetres	29	28.5	27.5
Toothing-formula of the rostrum	$\frac{23^3+1}{20}$	$\frac{19+1+1+?}{16}$	$\frac{19^3+?}{11}$
Rostrum longer >, or shorter < than the scaphocerites	>	>	>
Rostrum longer >, or shorter < than the carapace	>	=	>
Proportion between the length of the tooth- ed and that of the unarmed part of the upper margin	2		
Length of carpus	1	1	1.02
Breadth of carpus	0.54	0.52	0.46
Proportion between length and breadth of carpus	1.85	1.92	2.22
Length of chela	1.4	1.36	1.3
Breadth of chela	0.65	0.63	0.6
Length of fingers	0.83	0.79	0.82
Proportion between length of fingers and that of palm	1.45	1.39	1.7
Proportion between length and breadth of chela	2.15	2.15	2.16
Length of carpus	1.76	1.8	1.8
Breadth of carpus at distal extremity	0.41	0.42	0.36
Proportion between length and breadth of carpus	4.3	4.3	5
Length of chela	1.5	1.5	1.45
Breadth of chela	0.57	0.59	0.55
Length of fingers	0.92	0.88	0.91
Proportion between the length of fingers and that of palm	1.6	1.4	1.7
Proportion between length and breadth of chela	2.6	2.54	2.6
Length of propodite	2.35	2.48	2.48
Breadth of propodite in the middle	0.194	0.19	0.18
Proportion between length and breadth of propodite	12.1	13	13.8
Length of dactylus	0.63	0.6	0.62
Proportion between length of propodite and that of dactylus.	3.9	4.1	4
Breadth of dactylus	0.176	0.16	0.16
Proportion between length and breadth of dactylus	3.6	3.75	3.87
Number of spines of dactylus, terminal claw included	10	9	9
Length of propodite		2.9	
Breadth of propodite in the middle		0.19	
Proportion between length and breadth of propodite		15	
Length of dactylus		0.92	
Proportion between length of propodite and that of dactylus		3.26	
Breadth of dactylus		0.2	
Proportion between length and breadth of dactylus		4.6	
Number of spines of dactylus, terminal claw included		43	

nilotica (Roux) from Cairo, Egypt.

No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	No. 10	REMARKS.
$\frac{27}{20^2 + 1}$ 16	$\frac{26}{21^3 + 1}$ 17	$\frac{26}{21^3 + 1 + 1}$ 16	$\frac{25 \cdot 5}{18^3 + 1}$ 15 or 16	$\frac{23 \cdot 5}{20 + 1}$ 15	$\frac{20}{22^3 + 1}$ 11	$\frac{17 \cdot 5}{22 + ?}$ 14	No. 1, No. 3 and No. 5 are ova-bearing females. In specimen No. 2 the unarmed part of the upper margin is shorter than the toothed part; in No. 3 and No. 10 the tip of the rostrum is injured.
>	>		>	>	>	>	
>	>		>	>	>	>	In No. 8 the dactylus of fifth legs is broken at the extremity.
3.1 1 0.49	1.83 0.92 0.51	1.68 0.94 0.46	1.65 1 0.52	1.86 0.9 0.36	2.46 0.78 0.36	0.65 0.29	
2 1.34 0.59 0.82	1.8! 1.28 0.628 0.78	2 1.15 0.59 0.71	1.92 1.25 0.66 0.75	2.5 1.05 0.47 0.68	2.17 1 0.46 0.63	2.2 0.88 0.38 0.56	
1.58	1.56	1.61	1.5	1.84	1.7	1.75	
2.3 1.68 0.38	2 1.64 0.37	2 1.64 0.36	1.9 1.56 0.38	2.23 1.46 0.28	2.17 1.34 0.276	2.3 1.1 0.22	
4.42 1.44 0.53 0.92	4.4 1.4 0.55 0.92	4.55 1.3 0.554 0.8	4.1 1.35 0.56 0.83	5.2 1.15 0.426 0.73	5 1.1 0.435 0.69	5 0.96 0.36 0.64	
1.77	1.91	1.6	1.6	1.74	1.68	2	
2.7 2.3 0.184	2.55 2.14 0.16	2.35 2.18 0.166	2.4 2.12 0.172	2.7 1.94 0.154	2.53 1.75 0.16	2.7 1.5 0.13	
12.5 0.56	13.4 0.56	13.1 0.52	12.3 0.56	12.6 0.55	11 0.49	11.5 0.45	
4.1 0.16	3.8 0.15	4.2 0.14	3.8 0.156	3.53 0.14	3.6 0.14	3.3 0.116	
3.5	3.7	3.71	3.6	3.93	3.5	3.9	
8 2.55 0.186	8 2.56 0.184	8 2.58 0.174	8 2.55 0.18	12 2.52 0.154	7 2.04 0.16	8 1.8 0.13	
13.7 0.74	14 0.8	14.8 0.8	14.2 0.8	16.4	12.7 0.64	14 0.58	
3.44 0.184	3.2 0.2	3.22 0.18	3.2 0.19	0.16	3.2 0.14	3.1 0.13	
4	4	4.4	4.2		4.57	4.5	
44	42	42	46		37	35	

TABLE B.

Measurements of specimens from the Lake Victoria Nyanza.

	No. 1	No. 2
Length from tip of rostrum to tip of telson in millimetres	27	22
Toothing-formula of the rostrum	$17^2 + 1$	$21^2 + 1$
Rostrum longer >, or shorter < than the scaphocerites	>	>
Rostrum longer >, or shorter < than the carapace	>	>
Proportion between the length of the toothed and that of the unarmed part of the upper margin	1	3.1
Length of carpus	0.88	0.82
Breadth of carpus	0.404	0.35
Proportion between length and breadth of carpus	2.2	2.34
Length of chela	1.1	1
Breadth of chela	0.5	0.43
Length of fingers	0.68	0.61
Proportion between length of fingers and that of palm	1.62	1.56
Proportion between length and breadth of chela	2.2	2.3
Length of carpus	1.58	1.38
Breadth of carpus at distal extremity	0.306	0.27
Proportion between length and breadth of carpus	5.2	5
Length of chela	1.22	1.14
Breadth of chela	0.446	0.384
Length of fingers	0.77	0.72
Proportion between the length of fingers and that of palm	1.71	1.7
Proportion between length and breadth of chela	2.73	3
Length of propodite	2.16	1.8
Breadth of propodite in the middle	0.15	0.13
Proportion between length and breadth of propodite	14.4	14
Length of dactylus	0.57	0.51
Proportion between length of propodite and that of dactylus	3.8	3.53
Breadth of dactylus	0.13	0.104
Proportion between length and breadth of dactylus	4.4	5
Number of spines of dactylus terminal claw included	10	11
Length of propodite	2.42	2.02
Breadth of propodite in the middle	0.17	0.14
Proportion between length and breadth of propodite	14.1	14.4
Length of dactylus	0.8	0.7
Proportion between length of propodite and that of dactylus	3	2.9
Breadth of dactylus	0.16	0.14
Proportion between length and breadth of dactylus	5	5
Number of spines of dactylus, terminal claw included	50	49

TABLE C.

Measurements of *Caridina nilotica* (Roux),
var. natalensis nov.

TABLE D.

Measurements of *Car. nilotica*
(Roux), *var. paucipara*,
Max Weber.

No. 1	No. 2	No. 3	No. 1	No. 2	No. 3	No. 4	No. 5	REMARKS.
39	36 5	34	34	33.5	32.5	32	29	
20 ² + 1	18 ¹ 1	17 ² + 1	13 ³ + 1	13 + 0	16 ² + 0	19 ³ + ?	16 + 1	
14	16	18	18	14	12	16	20	
>	>	>	>	=	=		>	
>	>	>	>	>	<		>	
1.35	1.04	1.1	1	0.95	1.5	..	1.43	
1.4	1.26	1.22	1.2	1.34	1.26	1.28	1.06	
0.72	0.62	0.56	0.68	0.684	0.64	0.71	0.47	
2	2	2.2	1.76	1.96	2	1.8	2.3	
1.7	1.64	1.5	1.55	1.7	1.56	1.65	1.22	
0.81	0.74	0.73	0.84	0.93	0.78	0.87	0.6	
0.97	1.01	0.85	0.89	0.92	0.86	0.87	0.76	
1.33	1.6	1.31	1.35	1.18	1.23	1.11	1.65	
2.1	2.2	2.1	1.84	1.83	2	1.9	2.1	
2.3	2.3	2.1	2.36	2.4	2.2	2.34	1.9	
0.5	0.47	0.45	0.51	0.49	0.47	0.48	0.37	
4.6	5	4.66	4.63	5	4.7	5	5.1	
1.75	1.76	1.64	1.8	1.9	1.7	1.75	1.44	
0.67	0.68	0.64	0.74	0.76	0.71	0.72	0.54	
1.08	1.12	1.04	1.19	1.25	1.07	1.05	0.98	
1.6	1.75	1.73	1.95	1.9	1.9	1.5	2.1	
2.6	2.6	2.5	2.43	2.5	2.4	2.43	2.66	
3.1	2.96	2.85	2.95	3	3.08	2.85	2.35	
0.226	0.208	0.19	0.22	0.23	0.22	0.224	0.224	
13.7	14.2	15	13.4	13	14	12.7	10.5	
0.68	0.67	0.63	0.68	0.66	0.72	0.66	0.6	
4.6	4.4	4.5	4.3	4.5	4.3	4.3	3.9	
0.188	0.18	0.18	0.186	0.2	0.188	0.194	0.178	
3.7	3.7	3.5	3.65	3.3	3.8	3.4	3.37	
8	9	7	9	8	8	8	9	
3.7	3.6	3.46	3.7	3.76	3.7	3.66	3.3	
0.216	0.22	0.195	0.244	0.24	0.21	0.238	0.196	
17	16.4	18	15	15.7	18	15.1	16.8	
0.82	0.88	0.82	1.07	1.07	1.18	1.15	0.98	
4.5	4.1	4.22	3.4	3.5	3.1	3.2	3.36	
0.2	0.198	0.186	0.232	0.22	0.19	0.22	0.184	
4.1	4.4	4.4	4.6	4.9	6.2	5.2	5.32	
50	50	46	62	70	72	72	68	

No. 1 of Table B is an ova-bearing female.
The three specimens of Table C are ova-bearing females from the river Umgeni, Natal.
The five specimens of Table D are from the river Umhlasine, Natal; they are, like those of Table C, co-types from Prof. Weber's collection. No. 1, No. 3 and No. 4 are ova-bearing females; in No. 3 and No. 2 a subapical tooth is wanting, and in No. 4 the rostrum is injured.

Measurements of *Caridina nilotica* (Roux)

	No. 1	No. 2	No. 3	No. 4	No. 5
Length from tip of rostrum to tip of telson in millimetres	19 $21^2 + 1$	18.5 $17^2 + 1$	18 $16^2 + 1$	18 $17^1 + 1$	17.5 $15^1 + 1$
Toothing-formula of the rostrum	17	16	12	14	15
Rostrum longer >, or shorter < than the scaphocerites	slightly >	slightly >	slightly >	>	slightly >
Rostrum longer >, or shorter < than the carapace	slightly >	slightly <	slightly >	>	>
Proportion between the length of the toothed and of the unarmed part of the upper margin	1.65	1.32	1.24	1.26	1.42
Length of carpus	0.84	0.82		0.75	0.7
Breadth of carpus	0.48	0.54		0.5	0.4
Proportion between length and breadth of carpus	1.75	1.52		1.5	1.75
Length of chela	1.12	1.2		1.08	1
Breadth of chela	0.56	0.67		0.59	0.5
Length of fingers	0.66	0.64		0.64	0.68
Proportion between length of fingers and that of palm	1.5	1.16		1.46	2.1
Proportion between length and breadth of chela	2	1.8		1.83	2
Length of carpus	1.46	1.42			1.32
Breadth of carpus at distal extremity	0.335	0.38			0.288
Proportion between length and breadth of carpus	4.36	3.7			4.6
Length of chela	1.18	1.18			1.08
Breadth of chela	0.5	0.58			0.424
Length of fingers	0.78	0.78			0.78
Proportion between the length of fingers and that of palm	1.95	1.95			2.6
Proportion between length and breadth of chela	2.36	2			2.55
Length of propodite	1.88	1.8	1.82		1.65
Breadth of propodite in the middle	0.146	0.15	0.124		0.122
Proportion between length and breadth of propodite	13	12	14.7		13.5
Length of dactylus	0.51	0.52	0.5		0.47
Proportion between length of propodite and that of dactylus	3.7	3.6	3.64		3.5
Breadth of dactylus	0.12	0.124	0.11		0.1
Proportion between length and breadth of dactylus	4.25	4.2	4.5		4.7
Number of spines of dactylus, terminal claw included	8	9	9		8
Length of propodite	2.08		1.88	1.84	
Breadth of propodite in the middle	0.12		0.115	0.11	
Proportion between length and breadth of propodite	17		16.3	16.7	
Length of dactylus	0.6		0.55	0.52	
Proportion between length of propodite and that of dactylus	3.46		3.4	3.54	
Breadth of dactylus	0.12		0.11	0.11	
Proportion between length and breadth of dactylus	5		5	4.7	
Number of spines of dactylus, terminal claw included	37		35	35	

Measurements of *Caridina nilotica* (Roux), var. *brachydactyla* nov.

longirostris, H. M. Edw.

	No. 7	No. 8	No. 9	No. 10	No. 1	No. 2	No. 3	No. 4	REMARKS.
	16.5	16.5		14	31.5	31	33	29	No. 2 and No. 7 of Table E are ova-bearing females. The four specimens of Table G are all ova-bearing; No. 1 and No. 2 are from Mbawa, Flores; No. 3 and 4 from Palopo, Celebes, all co-types of Max Weber's collection of 1892.
	15+1	rostrum broken off.	16+1	16 ² +1	19 ³ +1	21+1+2	26 ³ +2	22+1	
slightly	>		>	>	slightly	=	<	slightly	
	slightly		>	>	<	=	<	>	
	>		>	>	slightly	slightly	<	slightly	
					<	>	<	>	
5	1.18		1.6	1.44	1.9	3.3	4.4	2	
8	0.75	0.8		0.59	1.32	1.15	1.56	1.3	
18	0.48	0.42		0.39	0.64	0.48	0.63	0.54	
32	1.56	1.9		1.51	2.1	2.4	2.5	2.4	
	1.1	1.02		0.91	1.7	1.56	1.94	1.6	
	0.58	0.5		0.5	0.77	0.61	0.88	0.71	
7	0.64	0.65		0.54	1.14	1.11	1.34	1.1	
56	1.39	1.75		1.5	2	2.5	2.23	2.2	
14	1.9	2.04		1.82	2.2	2.56	2.2	2.25	
	1.34	1.38	1.35	1	2.18	1.95	2.76	2.3	
	0.33	0.295	0.34	0.296	0.48	0.4	0.464	0.42	
	4	4.7	4	3.4	4.5	4.87	6	5.5	
	1.08	1.1	1.06	0.92	1.74	1.75	2.03	1.72	
	0.5	0.45	0.5	0.48	0.72	0.6	0.76	0.64	
	0.7	0.74	0.71	0.59	1.25	1.2	1.45	1.18	
	1.15	2.05	2	1.78	2.55	2.2	2.5	2.2	
	2.6	2.44	2.1	1.9	2.5	2.9	2.7	2.7	
58	1.78	1.7	1.62	1.36	3.1	3.25	3.4	3	
13	0.122	0.118	0.122	0.11	0.224	0.2	0.232	0.17	
	14.6	14.4	13.3	12.3	13.8	16.2	14.7	18.2	
44	0.51	0.46	0.44	0.4	0.5	0.52	0.58	0.52	
5	3.5	3.7	3.7	3.4	6.2	6.2	6	5.8	
11	0.108	0.096	0.1	0.094	0.186	0.168	0.198	0.146	
	4.7	4.8	4.4	4.2	2.7	3.1	3	3.5	
	10	8	9	7	7	6	6	6	
118	1.84		1.75	1.44	4.1		4.5		
	0.102		0.106	0.098	0.24		0.22		
	18		16.3	14.7	17.1		20		
34	0.56		0.51	0.44	0.68		0.83		
5	3.28		3.4	3.27	6		5.4		
115	0.102		0.11	0.094	0.2		0.22		
7	5.5		4.6	4.68	3.4		3.8		
	39		35	30	34		50		

Measurements of *Caridina nilotica* (Rowley)

	No. 1	No. 2	No. 3	No. 4	No. 5
Length in millimetres from tip of rostrum to tip of telson	28 $20^2 + 2$	25 $22^2 + 1$	23 $21^2 + 2$	23 $24 + 2$	21.5 $27^2 + 1^2$
Toothing-formula of the rostrum	11	17	11	14	16 or 17
Rostrum longer >, or shorter < than the scaphocerites	slightly >	slightly >	slightly >	>	>
Rostrum longer >, or shorter < than the carapace	slightly <	=	slightly >	>	>
Proportion between the length of the toothed and that of the unarmed part of the upper margin	2	4.4	3.26	3	3.2
Length of carpus	1.06	1.02	0.9	0.85	0.8
Breadth of carpus	0.48	0.58	0.46	0.43	0.36
Proportion between length and breadth of carpus	2.2	1.8	2	2	2.2
Length of chela	1.3	1.34	1.1	1.1	1.06
Breadth of chela	0.56	0.7	0.56	0.56	0.5
Length of fingers	0.78	0.8	0.67	0.63	0.63
Proportion between length of fingers and that of palm	1.5	1.5	1.56	1.34	1.5
Proportion between length and breadth of chela	2.3	1.9	2	2	2.1
Length of carpus	1.95	1.8	1.5	1.48	1.46
Breadth of carpus at distal extremity	0.33	0.38	0.36	0.314	0.26
Proportion between length and breadth of carpus	6	4.7	4.2	4.7	5.6
Length of chela	1.35	1.34	1.28	1.15	1.1
Breadth of chela	0.46	0.56	0.47	0.44	0.38
Length of fingers	0.84	0.88	0.86	0.75	0.72
Proportion between length of fingers and that of palm	1.65	1.9	2	1.87	1.9
Proportion between length and breadth of chela	3	2.4	2.7	2.6	2.9
Length of propodite	2.46	2.2	1.96		
Breadth of propodite in the middle	0.18	0.166	0.146		
Proportion between length and breadth of propodite	13.7	13.2	13.4		
Length of dactylus	0.6	0.55	0.5		
Proportion between length of propodite and that of dactylus	4.1	4	4		
Breadth of dactylus	0.14	0.138	0.12		
Proportion between length and breadth of dactylus	4.3	4	4.1		
Number of spines of dactylus, terminal claw included	10	9	9		
Length of propodite	2.95		2.2	2.28	
Breadth of propodite in the middle	0.175		0.126	0.142	
Proportion between length and breadth of propodite	17		17	16	
Length of dactylus	0.88			0.7	
Proportion between length of propodite and that of dactylus	3.35			3.3	
Breadth of dactylus	0.16			0.13	
Proportion between length and breadth of dactylus	5.5			5.4	
Number of spines of dactylus, terminal claw included	54			45	

of 1st pair of legs.

of 2nd pair of legs.

of 3rd pair of legs.

of 5th pair of legs.

bengalensis nov., from Port Canning.

6	No. 7	No. 8	No. 9	No. 10	No. 11	No. 12	No. 13	No. 14	No. 15	No. 16	REMARKS.
0 +2	20 24 ³ +1	17.5 21 ³ +2	17 21+1	17 26 ² +1+2	16	16 25 ³ +2	14.75 24 ² +1	14.5 21+1	12.5 22+2	10 17+2	
	13	11	11	14		14	15	13	12	11	
	=	=	slightly <	>		>	>	slightly >	=	slightly >	
	slightly <	slightly <	slightly <	>		>	>	>	slightly <	slightly >	
5	3.3	4	2.7	2		3.8	2.85	2.7	4.5	2.55	
78	0.82	0.79	0.76	0.55	0.68	0.56	0.53	0.5	0.56	0.32	
42	0.46	0.44	0.39	0.24	0.41	0.26	0.22	0.22	0.35	0.16	
9	1.8	1.8	1.95	2.3	1.66	2.1	2.4	2.3	1.6	2	
06	1.1	1.02	0.95	0.77	0.98	0.75	0.72	0.65	0.8	0.46	
52	0.55	0.54	0.472	0.32	0.5	0.3	0.29	0.3	0.41	0.204	
54	0.6	0.62	0.59	0.49	0.62	0.46	0.455	0.4	0.48	0.274	
52	1.2	1.55	1.6	1.75	1.72	1.6	1.75	1.6	1.5	1.47	
3	2	1.9	2	2.4	1.96	2.5	2.5	2.2	1.95	2.25	
3	1.46	1.33	1.3	1.02	1.25	1		0.88	0.98	0.55	
3	0.3	0.31	0.26	0.17	0.268	0.18		0.166	0.22	0.13	
3	4.9	4.3	5	6	4.7	5.5		5.3	4.4	4.23	
1	1.2	1.05	1.03	0.85	1	0.82		0.7	0.86	0.51	
48	0.45	0.45	0.37	0.28	0.42	0.266		0.24	0.33	0.17	
72	0.81	0.69		0.55	0.67	0.52		0.46	0.57	0.34	
9	2.1	1.9		1.8	2	1.75		1.9	1.96	2	
3	2.7	2.33	2.8	3	2.4	3.1		3	2.6	3	
76	1.84	1.7		1.4	1.55	1.3		1.16	1.24	0.76	
128	0.146	0.13		0.106	0.108			0.094	0.09	0.062	
7	12.6	13		13.2	14.3		15	12.4	14	12	
47	0.47	0.5		0.4	0.45		0.36	0.33	0.36	0.226	
74	3.9	3.4		3.5	3.44		3.33	3.9	3.4	3.36	
108	0.124	0.12		0.088	0.096		0.076	0.08	0.08		
4	3.8	4.1		4.5	4.7		4.7	4.1	4.5	6	
	9	10		8	8		8	6	9		
	2.06	1.86	1.72	1.8	1.68	1.66		1.4	1.46		
	0.146	0.122	0.125	0.095	0.114	0.094		0.08	0.1		
14	0.68	15.2 0.62	14 0.6	19 0.54	15 0.56	17.7 0.53		18	14.6 0.48		
	3	3	2.87	3.3	3	3.1			3		
	0.136	0.12	0.12	0.095	0.1	0.1		0.086	0.09		
	5	5.2	5	5.7	5.6	5.3			5.4		
49		43	47	41	40	41			40		

No. 5, No. 10, Nos. 12-14, Port Canning, January 28-30th, 1906.
 Nos. 1-4, No. 6 and No. 16, Port Canning, November 12th, 1906.
 Nos. 7-9, No. 11 and No. 15, Port Canning, December 8th, 1906.
 Nos. 1-9 and No. 11 are ova-bearing females. The rostrum of No. 5 was injured.

TABLE H.

Measurements of Caridina nilotica (Roux), var. gracilipes, de M.

	No. 1	No. 2	No. 3
Length in millimetres from tip of rostrum to tip of telson	28.5	27	
Toothing-formula of the rostrum	$17^2 + 1$	$20^2 + 1$	$13^2 + 1$
	13	17	11
Rostrum longer >, or shorter < than the scaphocerites..	>	>	>
Rostrum longer >, or shorter than the carapace ..	=	>	>
Proportion between the length of the toothed and that of the unarmed part of the upper margin	1.17	1.6	0.75
Length of carpus	1.16	1.1	1.06
Breadth of carpus	0.49	0.55	0.48
Proportion between length and breadth of carpus	2.37	2	2.2
Length of chela	1.36	1.42	1.26
Breadth of chela	0.59	0.7	0.6
Length of fingers	0.78	0.87	0.8
Proportion between length of fingers and that of palm	1.34	1.6	1.74
Proportion between length and breadth of chela	2.3	2	2.1
Length of carpus		2.14	1.9
Breadth of carpus		0.39	0.35
Proportion between length and breadth of carpus		5.5	5.4
Length of chela		1.5	1.4
Breadth of chela		0.59	0.52
Length of fingers		0.96	0.94
Proportion between length and breadth of fingers		1.8	2
Proportion between length and breadth of carpus		2.54	2.7
Length of propodite	2.46	2.64	2.4
Breadth of propodite	0.178	0.18	0.15
Proportion between length and breadth of propodite	13.8	14.7	16
Length of dactylus	0.64	0.61	0.55
Proportion between length and breadth of dactylus	3.84	4.32	4.4
Breadth of dactylus	0.14	0.128	0.13
Proportion between length and breadth of dactylus	4.6	4.8	4.2
Number of spines of dactylus, terminal claw included	9	10	10
Length of propodite	3.1	3.1	2.7
Breadth of propodite in the middle	0.178	0.164	0.16
Proportion between length and breadth of propodite	17.4	19	17
Length of dactylus	0.84	0.82	0.72
Proportion between length of propodite and that of dactylus	3.7	3.8	3.75
Breadth of dactylus	0.156	0.14	0.146
Proportion between length and breadth of dactylus	5.4	6	5
Number of spines of dactylus, terminal claw included	56	57	46

of 1st pair of legs. of 2nd pair of legs. of 3rd pair of legs. of 5th pair of legs.

us at distal extremity of palm
between length and breadth of fingers and that of chela
between length and breadth of fingers and breadth of carpus
between length and breadth of propodite
between length and breadth of dactylus

slightly

(4th pair).

TABLE I.

Measurements of *Caridina nilotica* (Roux), var. *minahassa*, de M.

No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	No. 10	REMARKS.
										Nos. 1—3 of Table H co-types of the var. <i>gracilipes</i> , de M., from the river at Maros, Celebes; No. 1 and No. 2 ova-bearing.
0.86	0.84		0.8	0.8		0.72	0.6	0.64	0.6	
0.52	0.49		0.47	0.49		0.48	0.48	0.4	0.35	
1.65	1.71		1.7	1.6		1.5	1.25	1.6	1.7	
1.18	1.18		1.04	1.1		1.02	1.06	0.92	0.9	
0.62	0.62		0.55	0.6		0.58	0.54	0.49	0.48	
0.68	0.68		0.64	0.6		0.64	0.6	0.56	0.52	
1.36	1.36		1.6	1.2		1.7	1.3	1.6	1.4	
1.9	1.9		1.9	1.8		1.8	2	1.9	1.9	
1.5	1.4		1.3		1.2		1.12	1.12	1.1	
0.35	0.34		0.29		0.32		0.32	0.266	0.25	
4.3	4.1		4.5		3.7		3.5	4.2	4.4	
1.2	1.16		1.04		1.04		1.04	0.92	0.94	
0.56	0.5		0.45		0.51		0.5	0.42	0.43	
0.8	0.74		0.66		0.6		0.6	0.6	0.58	
2	1.76		1.7		1.4		1.4	1.9	1.6	
2.1	2.32		2.3		2		2.1	2.2	2.2	
1.84		1.72	1.66		1.54	1.52	1.6	1.3	1.4	
0.13		0.11	0.115		0.11		0.11	0.1	0.092	
14		16	14.4		14		15	13	15	
0.44		0.42	0.44		0.4	0.38	0.44	0.33	0.35	
4.2		4.1	3.8		3.8	4	3.6	4	4	
0.1		0.09	0.1		0.09	0.08	0.09	0.08	0.08	
4.4		4.6	4.4		4.4	4.7	4.9	4.1	4.4	
	1.96	1.9	1.8			1.76			1.56	
	0.1	0.1	0.1			0.106			0.092	
	19	19	18			17			17	
	0.56	0.55	0.52			0.51			0.47	
	3.5	3.4	3.5			3.4			3.3	
		0.1	0.1			0.1			0.092	
		5.5	5.2			5.1			5	

Measurements in millimetres of *Caridina propinqua* and *Car. laevis*.

	1	2	3	4	5	6	7	8
Length in millimetres from tip of rostrum to tip of telson	20.5		19.5	13.5				
Length of merus	0.66	0.64	0.6		0.75	0.78	0.75	
Length of carpus	0.88	0.86	0.8		0.83	0.84	0.82	
Breadth of carpus	0.335	0.348	0.306		0.326	0.32	0.34	
Proportion between length and breadth of carpus	2.6	2.5	2.6		2.54	2.6	2.4	
Length of chela	1.1	1.1	1.06		1.04	1.05	1.04	
Breadth of chela	0.52	0.46	0.46		0.454	0.4	0.44	
Proportion between length and breadth of chela	2.11	2.4	2.3		2.3	2.6	2.4	
Length of fingers	0.72	0.7	0.7		0.64	0.64	0.61	
Proportion between length of palm and that of fingers	1.9	1.75	2		1.6	1.56	1.42	
Length of merus	0.95	0.94	0.78		1.12	1.1	1.06	
Length of carpus	1.5	1.42	1		1.6	1.6	1.52	
Breadth of carpus at distal extremity	0.27	0.27	0.23		0.206	0.22	0.24	
Proportion between length and breadth of carpus	5.5	5.2	4.4		7.7	7.3	6.3	
Length of chela	1.16	1.18	0.96		1.34	1.26	1.28	
Breadth of chela	0.42	0.4	0.3		0.285	0.28	0.31	
Proportion between length and breadth of chela	2.7	2.95	3.2		4.7	4.5	4	
Length of fingers	0.74	0.74	0.63		0.79	0.72	0.72	
Proportion between length of palm and that of fingers	1.76	1.7	1.9		1.44	1.33	1.3	

} of 1st pair of legs.

} of 2nd pair of legs.

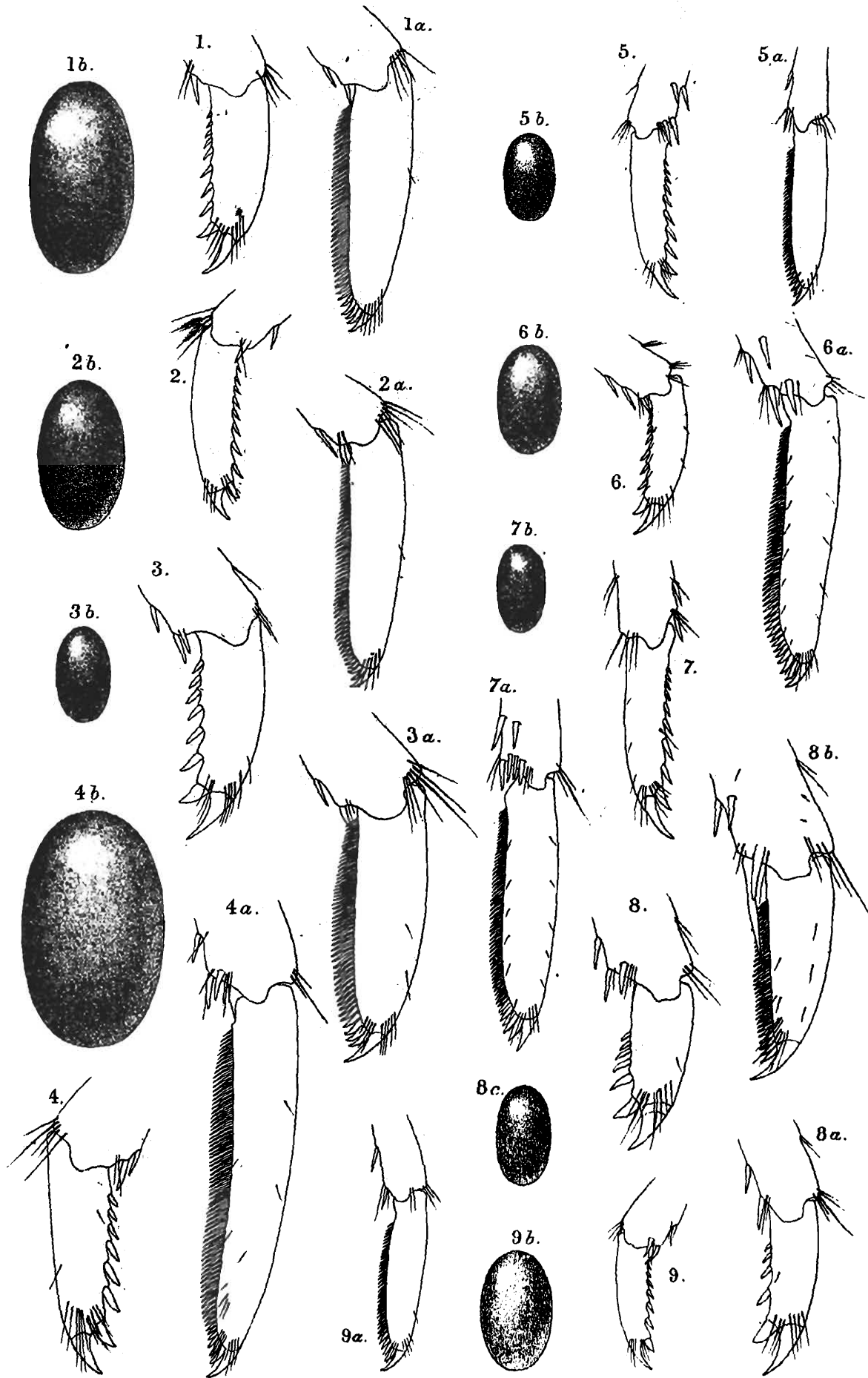
Length of meropodite	1·9	1·82	1·7	1·28	2·06	2	2·06	
Breadth of meropodite.	0·22	0·22	0·2	0·162	0·24	0·22	0·235	
Proportion between length and breadth of meropodite	8·6	8·3	8·5	8	8·6	9	8·8	
Length of propodite	1·6	1·4	1·55	1·16; 1·16	1·7	1·6	1·66	
Breadth of propodite	0·14	0·15	0·13	0·1; 0·1	0·136	0·13	0·132	
Proportion between length and breadth of propodite	11·4	9·3	12	11·6; 11·6	12·5	12·3	12·5	
Length of dactylus	0·46	0·42	0·53	0·4; 0·42	0·5	0·5	0·52	
Breadth of dactylus	0·11	0·108	0·11	0·08; 0·08	0·116	0·12	0·118	
Proportion between length and breadth of dactylus	4·2	4	4·8	5; 5	4·3	4·2	4·4	
Proportion between length of propodite and that of dactylus	3·5	3·3	3	2·9; 2·8	3·4	3·2	3·2	
Number of spines of dactylus	6	5	5	4; 6	9	9	8	
Length of meropodite			1·4		1·6		1·58	1·62
Breadth of meropodite.			0·175		0·2		0·2	0·204
Proportion between length and breadth of meropodite			8		8		8	8
Length of propodite			1·76		2·06		2·06	2·15
Breadth of propodite			0·122		0·13		0·13	0·12
Proportion between length and breadth of propodite			14·4		16		16	18
Length of dactylus			0·74		0·85		0·84	0·92
Breadth of dactylus			0·13		0·132		0·13	0·12
Proportion between length and breadth of dactylus			5·7		6·44		6·5	7·66
Proportion between length of propodite and that of dactylus			2·38		2·4		2·45	2·33
Number of spines of dactylus, terminal claw included			48		78		75	

Nos. 1—4 *Caridina propinqua*, sp. nov. No. 1 20·5 mm. long; No. 2 about the same length, rostrum broken off; No. 3 19·5 mm. long; No. 4 13·5 mm. long (in No. 4 both legs of third pair are measured). Nos. 5—8 *Car. laevis*, Heller, adult ovigerous specimens.

EXPLANATION OF PLATE XX.

The dactyli are enlarged 50 times, the eggs 33 times.

- FIG. 1.—*Caridina nilotica* (Roux), typical form from Cairo, dactylus of third pair of the egg-bearing female (No. 1 of Table A); 1*a* dactylus of fifth pair of the specimen No. 7; 1*b* egg, 0.86 mm. long, of the female No. 5.
- „ 2.—*Car. nilotica* (Roux), variety from Lake Victoria Nyanza, dactylus of third pair of the female 27 mm. long, 2*a* dactylus of fifth pair and 2*b* egg, 0.67 mm. long, of the same female.
- „ 3.—*Car. nilotica* (Roux), var. *natalensis* nov., dactylus of third pair of the female No. 1 of Table C; 3*a* dactylus of fifth pair of the same female; 3*b* egg, 0.42 mm. long, of the female No. 2.
- „ 4.—*Car. nilotica* (Roux), var. *paucipara*, M. Weber, dactylus of third pair; 4*a* dactylus of fifth pair and 4*b* egg, 1.04 mm. long, of the female No. 3 of Table D.
- „ 5.—*Car. nilotica* (Roux), var. *longirostris*, H. M. Edw., dactylus of third pair and 5*a* of fifth pair of the female No. 7 of Table E; 5*b* egg, 0.39 mm. long, of the female No. 2.
- „ 6.—*Car. nilotica* (Roux), var. *bengalensis* nov., dactylus of third pair of the female No. 6 of Table F; 6*a* dactylus of fifth pair and 6*b* egg, 0.47 mm. long, of the female No. 1.
- „ 7.—*Car. nilotica* (Roux), var. *gracilipes*, de Man, dactylus of third pair, 7*a* of fifth pair and 7*b* egg, 0.38 mm. long, of the female No. 2 of Table H.
- „ 8.—*Car. nilotica* (Roux), var. *brachydactyla*, nov., dactylus of third pair, 8*b* of fifth pair and 8*c* egg, 0.44 mm. long, of the female No. 1 of Table G; 8*a* dactylus of third pair of the female No. 4.
- „ 9.—*Car. nilotica* (Roux), var. *minahassa*, de Man, dactylus of third pair and 9*a* of fifth pair of a specimen, 16 mm. long, co-type from Kükenthal's Collection; 9*b* egg, 0.55 mm. long.



J. G. & Man. del.

M^rParlane & Erskine Lith Edin^g

CARIDINA NILOTICA (ROUX), AND ITS VARIETIES.

XXIX. DESCRIPTION OF A NEW SPECIES OF
CHARAXES FROM THE BHUTAN
FRONTIER

By G. W. V. DERHÉ-PHILIPÉ.

Charaxes raidhaka, sp. nov.

Closely allied to *C. fabius*, Fabricius. Termen of fore wing more oblique, and both termen and dorsum shorter than in *C. fabius*, giving the wing a narrower and more pointed appearance.

Upper side.—Fore wing, ground colour a deep velvety black, darker generally than in the allied form; basal area greyish black. Immaculate except for a subterminal series of cream-coloured spots decreasing in size towards the apex; these spots larger and more marked than in *C. fabius*, those at the posterior angle being twice as large as in most examples of the latter. Hind wing, discal band as in *C. fabius*, but generally paler and narrower; subterminal series of light yellow spots complete, terminal markings greenish blue, not yellow.

Under side.—Ground colour a purplish grey, appreciably different from the usual ground colour of *C. fabius*. Markings arranged as in the latter, but the discal white bar on the fore wing obsolete and the sinuous black lines less defined. Ochreous red discal and purple submarginal lunular markings on hind wing large and distinct.

In regard to the outline of the fore wings, careful measurements of several males of *C. fabius* from different parts of India show the relative lengths of the costa, termen and dorsum to be in the proportions of 100: 75: 64 or 65; while similar measurements of the new form are in the proportions of 100: 70: 60. The difference in outline, though slight, is distinct.

The species is not represented either in the de Nicéville collection or in the Indian Museum collections; nor is it described in Rothschild's "Monograph on the *Charaxes* and allied genera" (*Novitates Zoologicae*, vols. v, vi and vii). It would appear to approach some of the Malayan forms of the genus; except for the almost unmarked fore wing, the upper side is not unlike that of *C. echo*, Butler, as illustrated and described in the above work.

Expanse 3.16 inches. Described from a single male taken near Jainti on the Raidhak River (Bhutan frontier), 2,000 feet, in June, and now in my collection.

XXX. FIRST REPORT ON THE COLLECTION
OF CULICIDÆ AND CORETHRIDÆ IN
THE INDIAN MUSEUM, CALCUTTA, WITH
DESCRIPTIONS OF NEW GENERA AND
SPECIES.

By FRED. V. THEOBALD, M.A., etc.

Amongst the first consignment of the large collection of mosquitoes sent me to examine by the Indian Museum, Calcutta, only thirty-seven species were found. Amongst these are three new species of *Stegomyia*; a new variety of *Neomacleaya indica*, Theobald; a new *Leicesteria*; a new *Culex*; a new *Chrysoconops* and two new genera I have called *Brevirhynchus* and *Radioculex*, each of which contains but a single species. Both of these genera are very marked.

An examination of a long series of a *Culex* with banded proboscis has not been critically made, but I am inclined to believe that they all belong to one species, owing to the various gradations seen in it, and that in consequence several of the species coming under the *Culex microannulatus* group, such as *C. vishnui*, etc., will have to be sunk under one of the old names such as *C. sitiens*. The same applies to the genus *Desvoidea*, as the series shows such great variation in colour.

The numbers in brackets refer to the number of specimens in the collection.

SPECIES IN THE COLLECTION.

Family CULICIDÆ.¹

1. *Anopheles aitkenii*, Theobald-James.

A single ♀ and badly damaged ♂ Meenglas, Dooars, Jalpaiguri [*C. Wallich*], 9-viii-07. These are the only other specimens of this *Anopheles* I have seen since those sent me by Capt. James, I.M.S. (*vide Mon. Culicid.*, vol. iii, p. 22, 1903).

2. *Myzomyia rossii*, Giles.

Five specimens taken at light at Calcutta in November; eighteen taken in December at Port Canning, Lower Bengal, and one taken in January at Sylhet, Assam.

¹ The majority of the Anophelinæ in the collection, were not sent to Mr. Theobald.—ED., *Rec. Ind. Mus.*

3. *Nyssorhynchus fuliginosus*, Giles.

Calcutta, two taken in November and one at light in December.

4. *Myzorhynchus barbirostris*, Van der Wulp.

Calcutta, one female in December.

5. *Myzorhynchus vanus*, Walker.

Calcutta, one in October, twenty-one in November and ten in December; Port Canning, Lower Bengal.

6. *Toxorhynchites immisericors*, Walker.

Aijal (3,600 ft.), Lushai Hills, Assam, ♀, 24-iv-04.

7. *Mucidus scataphagoides*, Theobald.

Bauria, Bengal [*D. A. Tyrie*], 17-viii-07 (one ♀); Damukdia Ghat, E. Bengal, 22-viii-07 (one ♀).

*8. *Stegomyia tripunctata*, sp. nov.

Head black with three silvery white spots, one median in front and one on each side, proboscis and palpi black.

Thorax black with dull bronzy scales; prothoracic lobes white scaled.

Abdomen black with basal lateral white spots which meet on the dorsum on the 5th and 6th segments to form basal bands.

Legs black, unbanded.

♀ Head black, clothed with flat black scales except for a snowy white area in front between the eyes, and a patch on each side of somewhat less shiny hue, chætæ black, two projecting forwards between the eyes, two curving downwards over the basal segments of the antennæ; eyes coppery and golden; clypeus brown, shiny; proboscis thin and black; palpi short, black scaled and with black chætæ; antennæ dark brown, verticillate areas pale, base of second segment testaceous, basal segment black, shiny, with some small curved black chætæ.

Thorax shiny black, with rather large narrow-curved bronzy scales and some paler areas here and there, prothoracic lobes covered with flat silvery white scales, scutellum testaceous with flat black scales, metanotum black, pleuræ black with silvery white flat scales forming a long patch and two spots.

Abdomen narrow, black scaled, with basal white lateral patches, which meet on the fifth and sixth segments to form basal white bands, border-bristles small and pale.

Legs deep brown with bronzy reflections, venter of femora and coxæ pale; ungues small, equal and simple.

Wings with dense brown scales, almost *Tæniorhynchus*-like in form, first submarginal cell much longer, but scarcely narrower

than the second posterior cell, its base much nearer the base of the wing than that of the second posterior, its stem not quite a fourth of the length of the cell, stem of the second posterior about two-thirds the length of the cell, posterior cross-vein slightly more than its own length distant from the mid.

Length, 3 mm.

Habitat, Lushai Hills, Assam [E. C. Macleod].

Observations.—Described from two females. It comes very near *Stegomyia amesii*, Ludlow, but can at once be told by having a large white spot in the middle of the front of the head. One specimen shows some pallid scales on the mid lobe of the scutellum and the white lateral spots do not form bands at all.

*9. *Stegomyia albolateralis*, sp. nov.

Thorax blackish brown with a broad silvery white patch on each side in front.

Abdomen black with basal white lateral spots and traces of basal bandings on the apical segments.

Legs and proboscis deep blackish brown, unbanded.

♀ Head clothed with flat dark brown scales, a few grey ones around the eyes and creamy ones at the sides, clypeus black, nude, with a distinct short pointed process on each side, palpi and proboscis deep brown to black, antennæ deep brown.

Thorax black with narrow-curved bronzy scales except at the sides in front where they are silvery white forming two rectangular shoulder-patches, and a few of the same coloured scales pass around the front of the thorax next the head, and there are a few dull creamy ones scattered about before the scutellum and traces of a short pale-scaled line on each side; the scales behind are larger than those in front, chætæ black in front, dull golden over the roots of the wings, scutellum black with flat black scales and golden brown border-bristles, metanotum shiny and black; prothoracic lobes with flat shiny white scales, pléuræ with spots of flat silvery white scales.

Abdomen black with basal lateral silvery white spots which may spread upwards so as to form indistinct basal white bands on the last one or two apical segments, venter with broad basal white bands.

Legs blackish brown, unbanded, coxæ and venter of fore and mid femora pale, the former with silvery white scales, hind femora pale creamy white for about two-thirds of their length, fore and mid ungues equal and uniserrate.

Wings with fork-cells of moderate length, the first submarginal a little longer, but scarcely narrower than the second posterior cell, its base about level with that of the latter, its stem a little more than half the length of the cell, stem of the second posterior cell more than two-thirds the length of the cell, posterior cross-vein sloping towards the apex of the wing, about twice its own

length distant from the mid. Lateral vein-scales long and thin, especially on the third vein.

Habitat Sylhet, Assam [*Major Hall*], and Lungleh, Lushai Hills, Assam.

Time of capture July at Lungleh, September at Sylhet.

Observations.—Described from five ♀ ♀ It is a very marked *Stegomyia*, easily told by the thoracic adornment. One of the specimens shows some additional prominent adornment on the back of the thorax before the scutellum and a dull creamy patch of scales just behind the root of the wings.

The specimen from Lungleh was taken in a bungalow.

*10. *Stegomyia assamensis*, sp. nov.

Thorax deep brown, a white-scaled area in front less than one-fourth the area of the mesothorax, and a small scaled patch in front of the root of each wing.

Abdomen deep brown, unbanded, with basal lateral white spots, the scales raggedly arranged below. Legs brown, a pale spot near apex of fore and mid tibiæ, a basal pale band to mid metatarsi, hind femora pale, except for a brown band in the middle, base and apex of metatarsi white, base of first hind tarsal white. Proboscis deep brown.

♀ Head black, clothed with flat black scales and some white ones in the middle, a narrow line around the eyes and at the sides, and short thick black chætæ in front projecting forwards and inwards over the eyes, which are large and silvery; palpi black scaled, traces of some paler scales apically; proboscis black; antennæ dark brown, basal segment with grey tomentum.

Thorax shiny black, clothed with bronzy brown narrow-curved scales, except for a small area in front which has pale creamy white scales and a small white-scaled area on each side in front of the roots of the wings passing up on to the mesonotum some short distance, and a small patch of pale scales in front of the bare space before the scutellum; chætæ black to dark brown; scutellum testaceous with flat dusky scales and rich brown border-bristles; pleuræ rich brown with silvery white puncta.

Abdomen deep brown, unbanded, with basal lateral white spots and rather long dusky border-bristles; venter black with basal white bands, the scales long and out-standing, giving a ragged appearance.

Legs brown and banded; fore and mid legs with the femora pale at the base and below, the tibiæ with a creamy area before the apex which is black,—this is most marked in the fore pair; the rest of fore legs unbanded, but in the mid the metatarsus has a pale basal band; femora of the hind legs pale creamy with a broad dark band on the apical half, base and apex of the metatarsus with a pale band, also the base of the first tarsal, remainder dark; fore and mid ungues equal and uniserrate, the hind equal and simple.

Wings with brown scales, the lateral ones dense and rather flattened; fork-cells short, the first a little longer and narrower than the second, its base very slightly nearer the base of the wing than that of the second posterior; its stem not quite as long as the cell, stem of the posterior as long as the cell; supernumerary and mid cross-veins in a straight line, posterior cross-vein about two-and-a-half times its own length distant from the mid.

Length 4.5 mm.

Habitat Sylhet, Assam [Major Hall].

Time of capture April (13-iv-05).

Observations.—Described from a single ♀ The adornment of the thorax and legs will at once separate it from others of this genus. It presents certain aberrations which, however, are not sufficient to separate it on one-sex characters alone from *Stegomyia*. These characters are the long raggedly arranged ventral scales, the somewhat longer palpi and the somewhat broader wing-scales; these differences are, however, more of size than of structure.

11. *Stegomyia scutellaris*, Walker.

Calcutta, July (3), August (33), September (11), October (5), common during the hot weather and the rains, disappearing in winter, active by day [N. Annandale]; Sylhet, Assam [Major Hall], April (17); Lushai Hills, Assam [E. C. Macleod], May (2), June (11), July (26); Manipur [C. A. Gourlay], July (1); Katihar, Purneah District, N. Bengal [C. A. Paiva], October.

12. *Stegomyia fasciata*, Fabricius.

Calcutta, May (2), July (3), August (1), September (4), October (4); Lucknow, November (1); Purneah, N. Bengal [C. A. Paiva], August (1); Lushai Hills, Assam [E. C. Macleod] (? damaged); Bhim Tal, Kumaon, 4,500 ft., September [N. Annandale].

13. *Hulecæteomyia pseudotæniata*, Giles.

Lungleh (?), hatched 29-vii-04 (two ♀♀ and three ♂♂). Very large specimens 5 to 5.5 mm.

*14. *Neomacleaya indica*, Theobald, var. *simplex*, var. nov.

Very similar to the type, but the abdomen has only the median lateral white spots, no trace of banding, and the first submarginal cell is longer than the second posterior cell. The other characters all very similar.

Habitat Sylhet, Assam [Major Hall].

Time of capture June (a single ♀).

*15. *Leicesteria apicalis*, sp. nov.

Thorax rich brown with a creamy yellow line around the front and sides; pleuræ rich brown with pale spots. Palpi and

proboscis blackish, the former about half the length of the latter.

Abdomen deep blackish brown with apical yellow semicircular dorsal patches and white lateral spots which swell out apically.

Legs brown, with traces of narrow pale basal banding.

♀ Head clothed with brownish flat scales and paler upright forked scales behind and with creamy spindle-shaped scales placed at right angles to the others around the eyes, palpi and proboscis blackish brown, the former very nearly half the length of the proboscis, this with dense scales at the base; antennæ brown, the basal segment large with bright ochraceous scales.

Thorax shiny black with narrow-curved bronzy and dull ochreous scales with a well-defined area of creamy yellow scales around the front and sides; chætæ pale golden brown, especially over the roots of the wings where they are somewhat darker; scutellum testaceous with flat dusky brown and a few dull ochreous scales; metanotum nude, chestnut-brown with a grey sheen in places; pleuræ brown to yellowish brown with numerous patches of small flat ochreous scales.

Abdomen dusky black, each segment with a median apical semicircular yellow patch, and with a lateral snowy white mark which expands apically; hairs and border-bristles golden; venter pale ochreous.

Legs deep brown, banded, femora pale at the base and beneath; traces of pale knee-spots; fore legs with small yellowish bands at the tibio-metatarsal joint, and at the junction of the first tarsal and metatarsal and apex of the first tarsal; in the mid legs the bands are more confined to the base of the segments and occur on the second tarsal also, in the hind legs extending to the other two segments; pale hairs on the tibiæ.

Wings with rather short fork-cells; the first a little longer and narrower than the second, its base a little nearer the apex of the wing, its stem about two-thirds the length of the cell; stem of the second posterior cell nearly as long as the cell; posterior cross-vein about one-and-a-half times its own length from the mid; scales dense on the apical areas of the veins.

Length 5 mm.

♂ Palpi long and thin, acuminate, no hair-tufts; longer than proboscis by about the last segment, brown with three pale yellow bands, the last two involving both sides of the segments; antennæ loosely plumose, plume-hairs brown, segments mostly pallid except where the verticillate hairs unite and on the long apical segments; fore and mid ungues unequal, uniserrate.

Length 5 mm.

Habitat Lushai Hills, Assam [*E. C. Macleod*], 1,500 ft.

Time of capture May.

Observations.—Described from two ♀♀ and one ♂. Two hatched from larvæ and one caught 1,500 ft.

Closely allied to *Leicesteria longipalpis*, but easily distinguished by the apical abdominal yellow marks.

16. *Desvoidea obturbans*, Walker.

Sylhet [*Major Hall*] and Lushai Hills [*E. C. Macleod*], Assam.
Four specimens of typical form.

16a. *Desvoidea obturbans*, Walker, var. *fusca*, Theob.

Sylhet, Assam [*Major Hall*], March (2), April (5), May (3), June (2); Lushai Hills, Assam [*E. C. Macleod*], August (11); Calcutta, May (2), August (34), at light, September, October, November and December.

16b. *Desvoidea obturbans*, Walker, variegated-scutellum variety.

Sylhet, Assam, January (2), May (12), June (3); Calcutta, May (1), August (4), September (1), October (1); Lushai Hills, Assam, July (2); Manipur, August (1), in bungalow.

NOTE.—All variations in colour between the true *obturbans* of Walker and the *fusca* of Theobald seen in these specimens, and hence the latter species is sunk as a variety.

*Genus *BREVIRHYNCHUS*, gen. nov.

Head clothed with flat scales, also the scutellum, the latter large.

Thorax with narrow-curved scales at the edges of the mesonotum; prothoracic lobes and pleuræ with flat scales. Proboscis of ♀ short, thick, about one-third of the length of the whole insect, curved twice; of the male thinner and slightly longer in proportion, palpi of the ♀ two-thirds the length of the proboscis, apparently of two segments, the apical one long; palpi of the ♂ longer than the proboscis, acuminate, no hair-tufts, of four segments, the two last nearly equal.

Wings with dense scales, some *Tæniorhynchus*-like. Fore ungues of male unequal, the larger uniserrate; mid equal and uniserrate.

A very distinct genus easily told by the short, thick sinuous proboscis of the ♀, and the relatively long palpi as well as the squamose structure of the thorax with its flat lateral scales. The mid ungues of the ♂ being equal is also characteristic.

*17. *Brevirhynchus magnus*, sp. nov.

Thorax rich brown in the middle with white border all around the front and sides, pleuræ densely white scaled; head black, white around the edge and in the middle, the short thick proboscis black; the palpi black, nearly as long as the proboscis.

Abdomen black with basal median yellow patches, snowy white triangular lateral spots. The base of the triangles towards the posterior borders of the segments, but a black line of scales between the fifth, sixth, and seventh spots yellow at the base, venter with broad yellow basal bands, narrow black apical ones.

Legs blackish with faint traces of banding. Male palpi long and thin, acuminate.

♀ Head clothed with rather large flat dusky black scales, creamy white ones at the sides, and some black ones below them and then white again, a narrow band passing around the eyes and some pale ones in the middle; some long golden brown chætæ projecting forwards; proboscis short, thick, swelling apically (but actual apex acuminate), twice curved, jet black, hairy; palpi long and thin, about two-thirds the length of the proboscis, the apical segment very long, black, some pale scales below at the apex and traces of others below at the base of the long segment; antennæ brown, basal segment with some flat pale scales.

Thorax shiny black clothed with long thin narrow-curved bronzy brown scales, becoming broader behind, and with large narrow-curved white scales in front and the sides, forming a white border around the brown central area; toward the roots of the wings the white area is composed of large white flat scales, and some occur elsewhere passing on to the densely flat white-scaled pleuræ, which also bear a median patch of flat black scales; prothoracic lobes covered with flat white scales; chætæ scanty, a patch of golden brown much curved ones, in front of the roots of the wings, rather short; scutellum with flat dusky scales and some paler ones, scales large; metanotum nude, deep brown except at the apex where it is reddish testaceous.

Abdomen blackish, here and there the testaceous integument shines through the scales, first two segments plain, third to eighth with basal yellow scales, the third to fifth with median semi-circular patches, the others with yellow basal bands, very broad on the last two segments, laterally are large snowy white triangular patches, the bases of the triangles towards the apices of the segments, but cut off from them by narrow apical black-scaled lines, the corners of the triangles show on the dorsum as white spots, from the third to the seventh segments as almost apical spots; border-bristles dusky, on the last five segments the white lateral spots are yellow at the base.

Legs thick, black, paler below, white knee-spots and traces of minute pale basal banding; chætæ on the femora and tibiæ golden; fore and mid ungues simple, minutely uniserrate.

Wing-scales dense, brown, a few pale ones near the base broad and almost *Tæniorhynchus*-like in places, first submarginal cell longer and narrower than the second posterior cell, its base nearly level with that of the latter, its stem just a little longer than half the length of the cell, stem of the second posterior cell not quite two-thirds the length of the cell; posterior cross-vein sloping towards the base of the wing, twice its own length distant from the mid; the third long vein carried on as a very distinct pseudo-vein to the base of the wing.

Length 6 mm.

♂. Head, thorax and abdomen much like the ♀, but the flat white scales at the sides of the thorax more numerous and the

scutellum has many pale scales, the lateral lobes having them very dense, black at the base, yellow at the apex. Antennæ plumose, with flaxen brown plume-hairs, palest at their base, proboscis rather short, but not so thick as in the female; palpi thin, acuminate, of four segments, the last two nearly equal, dark brown with a basal pale band to the segments; on hair-tufts, one or two large chætæ.

Legs as in the female, the narrow basal banding rather more distinct, fore unguis very unequal, the larger with a large tooth, the smaller thin and apparently simple, mid unguis equal and uniserrate, hind absent.

Length 6 mm.

Habitat Sylhet, Assam [*Major Hall*].

Time of capture May.

Observations.—Described from a ♂ and ♀. A most marked and beautiful species easily told by the quaint proboscis and abdominal markings. The hind unguis of the male absent.

*Genus *RADIOCULEX*, gen. nov.

Head clothed with small flat scales and a group of upright forked ones behind. Palpi of female thin, longer than in *Culex*, of the male long, longer than the proboscis, composed of two segments, the apical one short and clavate, with thorn-like chætæ; proboscis curved and swollen apically, shorter than the body; antennæ of female pilose, of male densely plumose.

Thorax and scutellum with narrow-curved scales, metanotum nude; blunt curved chætæ project over the head.

Male genitalia with normal narrow claspers. Fork-cells small; the marginal cell of peculiar form in both sexes, swollen out in the middle, contracted near apex of wing and widening again at the apex; scales large, median vein-scales single, small and spatulate.

A very distinct genus with shiny integument, especially on the thorax, and easily told by the curious marginal cell and male palpi.

*18. *Radioculex clavipalpus*, sp. nov.

Head brown and grey, proboscis deep brown, curved, unbanded.

Thorax deep shiny brown, yellow at the sides, pleuræ pallid.

Abdomen deep violet brown, the segments paler at their bases, but not banded, pale lateral basal spots.

Legs deep brown with narrow pale bands involving both sides of the joints, last hind tarsal pale.

Male antennæ with flaxen plume-hairs, palpi a little longer than proboscis, the apical segment large and swollen but short.

♀ Head clothed with small flat scales all over of a pale ochreous grey, with brown and violet patches seen in certain lights, a large area of black upright forked scales in the middle behind,

with a distinct median division; palpi rather long and thin, clothed with brown scales and some violet ones and a few white ones at the apex; the pale testaceous ground-colour shows through here and there; clypeus shiny, deep brown, traces of a lateral process on each side, antennæ brown, testaceous at the base, hairs dark, proboscis deep brown, curved, not as long as the body.

Thorax black and shiny in the middle, yellow at the sides, the junction of the two colours being abrupt, the median dark area has narrow-curved bronzy scales, the yellow areas have shiny narrow-curved golden scales, in front projecting over the head are tufts of black, blunt, thick, curved bristles of various lengths, over the roots of the wings and in front of them long golden chætæ darkening at their apices; there are also a few pale creamy scales forming a more or less pronounced spot in front of the bare space in front of the scutellum, and an obscure line of the same on each side of it; scutellum blackish with narrow-curved bronzy scales and deep brown border-bristles; metanotum blackish brown, nude; pleuræ pale ochreous.

Abdomen unbanded, clothed with small flat scales showing brown and violet colours, with pale golden border-bristles giving a general false appearance of basal pale bands when examined with a lens; laterally the abdomen shows testaceous hues, and there are pale-scaled lateral marks running right down the segments.

Legs with pallid coxæ, also base and venter of femora; rest dark brown; hind femora yellow at the apex, with five prominent chætæ along one side and smaller ones on the apex, etc.; a narrow pale band at the junction of the metatarsal and first tarsal segments, also first and second tarsals on the fore and mid legs, other segments dark brown; on the hind legs the banding is more pronounced and extends to all the joints, the last segment being almost white below; ungues all equal and simple.

Wings with short fork-cells, about the same length, but the submarginal narrower than the second posterior cell, its base a little nearer the apex of the wing, its stem about one-and-a-third times its length, stem of the second posterior cell a little longer than the cell; marginal cell swollen on the middle, narrowed apically and again expanded at the wing-apex; posterior cross-vein slightly longer than the mid, not quite its own length distant from it; outer costal border spinose; median vein-scales single, small and spatulate; scales dense on subcostal and first long vein; lateral vein-scales on the apical areas of the second, third and fourth veins broad and flat.

Length 3.5 to 4 mm.

♂. Head, thorax, abdomen and legs as in the female. Antennæ with dense flaxen plume-hairs, almost golden at their base, flagellum banded; apical segments long, deep brown; proboscis bright ochreous, purple-brown at the apex, which is hairy; palpi longer than the proboscis, straight, of two segments, the apical one short and swollen, ochreous with ochreous scales and some violet ones, especially above and at the apices of the two

segments, the last segment with dark stiff thorn-like chætæ, becoming small towards the apex. Ungues of the fore and mid legs unequal, the fore with a small tooth at the base of the smaller one, a large tooth in the middle of the larger claw and a small spine-like tooth at its base, mid claws with two teeth on the larger claw; none on the smaller; hind claws equal and simple.

Wings with small fork-cells like the female; the submarginal only about half the width of the second posterior-cell, its stem about one-and-a-third times its length; stem of the second posterior also about one-and-a-third times the length of the cell; the first long vein markedly bent in the middle and approaching the upper branch of the second, thus forming a very curious marginal cell; the posterior cross-vein is only half its own length distant from the mid.

Length 3.5 to 4 mm.

Habitat Calcutta; Berhampur, Murshidabad District, Bengal, 1-1-08 [R. E. Lloyd].

Time of capture November and December in Calcutta, and one in July, common in brushwood during the cold weather [N. Annandale]; January at Berhampur.

Observations.—Described from a long series, some taken at light. The specimens show some variation in size and colour, but the marked black shiny thorax with the clear-cut yellow area on each side and the quaint marginal cell will at once identify it.

19. *Pseudotheobaldia niveitæniata*, Theobald.

Theog, 8,000 ft., Simla Hills, 2-v-07 [N. Annandale].

20. *Banksiella luteolateralis*, Theobald.

Sylhet, Assam [Major Hall], 23-xi-04 and x-04.

21. *Culex mimeticus*, Noë.

Lushai Hills, Assam [E. C. Macleod], 1-vi-04, one ♀.

22. *Culex microannulatus*, Theobald.

Calcutta, July (7), August (71), September (11), October (4), November (21); Purneah, N. Bengal, August (8); Gopkuda Island, Lake Chilka, Ganjam, August (3); Sylhet, Assam, January (10), February (5), April (1), May (1), November and December; between Bolpore and Rampore Haut, E. I. Railway, Bengal, in railway carriage, August (1).

23. *Culex vishnui*, Theobald.

Sylhet, Assam [Major Hall], January and February; Port Canning, Lower Bengal, July (1); Gopkuda Island, Lake Chilka, Ganjam, August (1).

24. *Culex sitiens*, Wiedemann.

Calcutta, August, September.

25. *Culex gelidus*, Theobald.

Calcutta, August (27), September (7), October (8), November (13), December (4), not uncommon in houses and at light, and in the open on shrubs [*N. Annandale*]; Purneah, N. Bengal, August (3); Katihar, Purneah, N. Bengal, October (1); Sylhet, Assam [*Major Hall*], May (1); between Bolpore and Rampore Haut, E. I. Railway, Bengal, in railway carriage, August [*C. A. Paiva*].

26. *Culex tigripes*, Grandpré.

Calcutta, July (5), August (8), September (2), October (6), November (2); Damukdia Ghat, E. Bengal, July (3); Manipur [*C. A. Gourlay*], in bungalow, August; Sylhet, Assam [*Major Hall*], February 1904 (1), April 1904 (1), May 1904 (1), December 1904 (2); Port Canning, Lower Bengal, December 1907 (2).

27. *Culex fatigans*, Wiedemann.

Calcutta, August (3), October (13), November (2), December (5), common in houses, only bites in the evening and at night [*N. Annandale*]; Lucknow, November (38); Gopkuda Island, Lake Chilka, Ganjam, August (2); Berhampur, Murshidabad District, Bengal [*Major R. Milne*], December (9); Anaithpur, Bijnor District, United Provinces, November; Siliguri, N. Bengal, July (1); Purneah, N. Bengal, August (2); Meenglas Dooars, Jalpaiguri, June [*C. Wallich*]; Sylhet, Assam [*Major Hall*], January (4), February (8), April (9), May (14), June (22), August (1), November (3), December (2); Manipur [*C. A. Gourlay*], grass compound, August (19); Lushai Hills, Assam, June, July and August (3); Bhogaon, Purneah, N. Bengal, October (1).

*28. *Culex minor*, sp. nov.

Head brown, slightly darker at the sides and paler around the eyes; proboscis and palpi brown.

Thorax bright brown; pleuræ ochreous with two brown patches.

Legs deep brown, unbanded, bases pallid.

Abdomen deep brown, with pale lateral basal spots and pale venter.

♀ Head deep brown, with pale narrow-curved scales, pale lateral flat scales and blackish upright forked scales, except in front between the eyes where they are golden brown, chætæ black, except between the eyes where they are golden; proboscis, palpi, antennæ and clypeus brown.

Thorax dark brown, clothed with very slender narrow-curved bright brown scales, paler just in front of the head and at the sides,

larger chætæ deep brown, but the smaller ones in front of the wings, and some over the head pale golden; scutellum pale brown with small narrow-curved pale golden scales similar in colour to those at the mesonotum near it; pleuræ pale ochreous with some pale flat scales and two dark patches; metanotum bright chestnut-brown.

Abdomen deep brown, clothed with deep brown scales and with dull white lateral basal patches, but extending partly along the whole length of the segments; border-bristles pale, venter mostly grey scaled.

Legs brown, unbanded, coxæ pallid, base and venter of femora pale; ungues small, equal and simple.

Wings with rather long fork-cells, the first submarginal much longer and a little narrower than the second posterior cell, its base nearer the base of the wing, its stem less than one-third the length of the cell; stem of the second posterior about two-thirds the length of the cell; mid cross-vein nearer the apex of the wing than the supernumerary, the posterior cross-vein nearly twice its own length distant from the mid.

Length 3 to 3.5 mm.

♂ Palpi thin, brown, the last two segments about equal, with short black bristles, scarcely to be called a hair-tuft. Fore ungues unequal, uniserrate; mid nearly equal, uniserrate; hind small, equal and simple.

Wings with the first submarginal cell a little longer and narrower than the second posterior cell, its base a little nearer the base of the wing. Claspers of male genitalia rather broad, lateral process of basal lobe with three large broad spines and three smaller ones.

Length 3 to 3.5 mm.

Habitat Sylhet, Assam [*Major Hall*]; Lushai Hills, Assam [*E. C. Macleod*]; Calcutta [*N. Annandale*]; Lungleh, Lushai Hills, Assam.

Time of capture Calcutta in December; Lushai Hills, June, July.

Observations.—Described from two ♀♀ and three ♂♂. A small obscure species easily told by its unbanded abdomen. It can only be confused with *Culex fuscocephala*, Theob., described from Ceylon, but the latter has a dark fuscous head, and there are no basal lateral pale spots.

29. *Tæniorhynchus ager*, Giles.

Sylhet, Assam [*Major Hall*], January (5), February (2), April (1), May (1); some specimens large, up to 6 mm.

30. *Tæniorhynchus tenax*, Theobald.

Sylhet, Assam [*Major Hall*], March (1), April (1), May (2), June (1); Manipur [*C. A. Gourlay*], August.

*31. *Chrysoconops pygmæus*, sp. nov.

Head and thorax golden yellow, proboscis and palpi ochreous, with dusky scales especially at the tip of the proboscis.

Abdomen violet-brown with some basal creamy bands and yellow-scaled apex.

Legs unbanded. ochreous brown.

Wing-scales brownish, fork-cells rather small.

♀ Head yellowish brown clothed with creamy yellow narrow-curved scales, dense golden yellow upright forked scales and golden chætæ. Eyes black and silvery. Palpi rather long, ochreous with rather transparent dusky scales and black chætæ; proboscis ochreous, clothed with metallic violet-brown scales; antennæ brown with pale bands at the verticels and testaceous basal segments.

Thorax bright reddish brown, shiny, clothed with golden yellow curved scales and golden yellow chætæ; scutellum similarly adorned, with two large golden posterior border-bristles on each side of the mid lobe and two very small ones between; metanotum golden yellow; pleuræ yellow and brown with two patches of silvery white flat scales.

Abdomen clothed with brown and metallic violet scales, the fourth segment with a basal yellow-scaled band, the next with a more prominent one and the apical segments with many yellow scales, hairs golden.

Legs ochreous, clothed with brown scales which darken towards the end, base and venter of femora with ochreous scales, in some lights the leg-scales show violet reflections; chætæ brown; ungues dark, equal and simple.

Wings with brownish scales; fork-cells rather short, the first submarginal a little longer and narrower than the second posterior, its base a little nearer the apex of the wing than that of the latter, its stem nearly two-thirds the length of the cell, stem of the second posterior a little more than half the length of the cell; posterior cross-vein not quite its own length distant from the mid. Halteres pale yellow.

Length 4 mm.

Habitat Sylhet, Assam [Major Hall].

Observations.—Described from a single perfect ♀ It comes very near *Chrysoconops brevicellulus*, but can be told by the completely golden thorax, smaller size and different venation.

32. *Chrysoconops brevicellulus*, Theobald.

Calcutta, August (1); Sylhet, Assam; Sangar, Manipur Hut, February (1), May (1), June (1), at night; Manipur [C. A. Gourlay], August, on wall of bungalow.

33. *Mansonia uniformis*, Theobald.

Sylhet, Assam [Major Hall], January (2), February (3), March (1), May (8), June (3), July (1), December (4); Manipur [C. A.

Gourlay], June and September, in a stable and bungalow ; Gopkuda Island, Lake Chilka, Ganjam, August, 7-15 P.M. (2) ; Bhogaon, Purneah District, N. Bengal [*C. A. Paiva*], October (24) ; Calcutta, November (17), some at light ; Katihar, Purneah District, N. Bengal [*C. A. Paiva*], October (17).

34. *Mansonioides annulifera*, Theobald.

Calcutta, August and December (2) ; Port Canning, L. Bengal, December [*N. Annandale*] ; Manipur [*C. A. Gourlay*] ; Katihar, Purneah District, N. Bengal [*C. A. Paiva*], October ; Sylhet, Assam [*Major Hall*], May (4), June (3).

N.B.—This species comes in the genus *Mansonioides*, Theob., not *Mansonia*.

*35. *Mimomyia minuta*, sp. nov.

Head dull ochreous brown, proboscis long and thin, unbanded.

Thorax dark shiny brown, pale ochreous at the sides.

Abdomen deep brown with basal creamy yellow bands and pale basal lateral spots.

Legs brown with narrow pale bands involving both sides of the joints.

♂ Head small, triangular in outline, clothed with small flat dull ochreous scales behind and dull brown darker ones in front, some large black upright forked scales behind ; antennæ long, brown, basal segment shiny reddish brown with a long bristle, second segment long, longer than the next three, pale at its base, hairs moderate, (not plumose) ; proboscis deep brown, long and thin, swollen apically, nearly as long as the whole body ; clypeus small, triangular, dark brown ; palpi very short, thick and conical.

Thorax deep shiny brown, with brown chætæ (denuded), some narrow-curved bronzy brown scales showing ; scutellum black with narrow-curved bronzy brown scales with deep brown border-bridles, four to the mid lobe ; metanotum deep brown, paler in the middle ; pleuræ pale ochreous with an irregular dark central patch.

Abdomen deep brown, the segments with basal creamy bands which are contracted in the middle and which spread out laterally to form basal lateral spots, posterior border-bridles pale golden ; venter banded with dull white, black and ochreous scales, the latter apical, the black colour median.

Legs brown, base and venter of femora yellowish, knee-spots dull white, the joints of the tibiæ and tarsi with narrow yellow bands involving both sides of the joints.

Wings with a single row of small spatulate median vein-scales, and some large narrowly pyriform lateral vein-scales ; costa spinose, fork-cells of nearly equal length, the first submarginal a little narrower than the second posterior, its stem nearly as long as the cell, stem of the second posterior cell about two-thirds the length of the cell, the base of the second fork-cell nearer the base of the

wing than that of the first fork-cell; posterior cross-vein longer than the mid, rather more than its own length distant from it.

Length 2.8 mm.

Habitat Sylhet, Assam [*Major Hall*].

Time of capture November (27-xi-04).

Observations.—Described from a single ♂. It may be pointed out that the unguis of the fore legs seem to be simple and are unequal and curved; the mid appear to be equal and simple and the hind ones very small; without dissection the structure of the unguis cannot be made out accurately.

36. *Ædeomyia squamipenna*, Arribalzaga.

Calcutta, at light, November (1).

Family CORETHRIDÆ.

37. *Corethra asiatica*, Giles.

Calcutta (Zoological Gardens, Alipore), May (1), July (1), August (36), common resting on damp walls during the daytime and flying to light at night (Museum compound) [*N. Annandale*], September (16), November (6), December (2); Sibpur, near Calcutta, August (2); Katihar, Purneah District, N. Bengal, at light (1).



MISCELLANEA

MAMMALS.

MEASUREMENTS OF THE SKELETONS OF TWO LARGE INDIAN ELEPHANTS IN THE COLLECTION OF THE INDIAN MUSEUM.—

(1) ♂, *Bilkandi, Nia Dumka, Santal Parganas, presented by Mr. W M Smith, 1870.*

(*Cf. W L. Sclater, Cat. Mamm. Ind. Mus., ii, p. 207, specimen a.*)

Height from anterior dorsal ver-	Ft.	In.
tebræ, highest point	11	3
Height from highest point of		
scapula	10	6
Frontal length of skull	0	49·6
Orbital breadth of skull	0	29·25
Length of humerus	0	41·25
,, ,, ulna	0	39
,, ,, femur	0	48
,, ,, tibia	0	30
Circumference of tusk at socket	0	21·75

From the manner in which it is mounted, it is possible that the height of the skeleton is exaggerated by a few inches, but the animal in life probably measured 12 feet from the highest point. This appears to be a record so far as *E. indicus* is concerned. The tusks of the specimen are not in the Museum.

(2) ♂, *presented by H. H. the Maharaja of Benares, 1906.*

Height from anterior dorsal ver-	Ft.	In.
tebræ, highest point	9	4
Height from highest point of		
scapula	9	0
Frontal length of skull	0	45
Orbital breadth of skull	0	25
Length of humerus	0	38
,, ,, ulna	0	36
,, ,, femur	0	42
,, ,, tibia	0	25·5
Circumference of tusk at socket.	0	13·5

This elephant headed the procession at the Delhi Durbar in 1903, and was thought to be an elephant of unusual height and power.

The tusks had been artificially shortened.

T. BENTHAM.

THE YOUNG OF *Ælurus fulgens*.—The two individuals examined are about three weeks old and were born in captivity, in July, the mother, in a pregnant condition, having been caught by some Bhutias in the vicinity of Darjiling and kept in the Museum there. The young are totally different from the adult in coloration, but the characteristic markings are fairly well defined. The following is a short description :—

Back dull smoky fawn becoming blackish grey on the under parts; the crown of the head and sides of the face, with the exception of the rings round the eyes, greyish red; the legs, tail, and ears smoky brown, the white markings of the adult being here represented by dark grey.

T. BENTHAM.

BATRACHIA.

NOTES ON SOME BATRACHIA RECENTLY ADDED TO THE COLLECTION OF THE INDIAN MUSEUM.—The specimens noticed below are chiefly from the Amherst District, Tenasserim, and the Himalayas. Those from the former district were taken by myself in March last, those from the Himalayas mostly by Mr. R. Hodgart, the Museum Collector.

Rana vicina, Stoliczka.

Numerous specimens from British Garhwal at an altitude of about 6,000 feet [*Hodgart*]. This is the common frog of the S. W. Himalayas at about this altitude.

Rana doriae, Boulenger.

Several small specimens from a jungle stream in the Dawna Hills near Kawkareik (or Kawkareit) in the interior of the Amherst District (altitude about 3,000 feet), March 1908.

Rana laticeps, Boulenger.

A large specimen from a jungle stream in the same locality, but nearer the base of the hills. Apparently a common species above about 2,000 feet.

Rana limborgi, W. L. Sclater.

A specimen from the same locality (2,000 feet), agreeing in proportions and other characters with Sclater's description, but differing slightly in colour. I have been unable to trace the type specimen of this species, which should be in our collection.

Rana limnocharis, Wiegmann.

Equally common in swamps in the plains and in jungle streams in the Himalayas and the mountains of Burma up to 5,000 feet. Some specimens were lately collected on Baratang Island of the

Andaman group by Mr. B. B. Osmaston, who presented them to the Museum. On account of their peculiar coloration they were sent for examination to Mr. Boulenger, who agreed that they belonged to this species. The dorsal surface was of a rich chocolate-brown when the specimens were fresh, and the limbs were profusely banded.

Rana nigrovittata, Blyth.

Several specimens from the neighbourhood of Moulmein, near the coast of the Amherst District.

Ixalus cinerascens, Stoliczka.

A specimen from the Dawna Hills which agrees well with the type. There are several specimens in our collection taken by Stoliczka, one of them being the type.

Ixalus annandalei, Boulenger.

A specimen from Kurseong [*Annandale*], July 1908.

A very abundant species round Kurseong (altitude 4—5,000 feet), where it is known to Europeans as the "coppersmith frog," from its peculiar metallic and monotonous croak, which continues all day in dull weather. It often sits in tea-bushes, one individual answering another in a neighbouring bush.

Bufo stomaticus, Lütken.

A specimen from Kurseong [*Hodgart*], and another from Damukdia on the Ganges (E. Bengal). This species is not uncommon at an altitude of 5,000 feet in the Darjiling district. If it is really distinct from *Bufo andersoni*, the ranges of the two overlap.

Megalophrys parva, Boulenger.

Numerous tadpoles of a *Megalophrys* were obtained in a jungle stream in the Dawna Hills at an altitude of about 3,000 feet. They agreed with examples of the larva of *M. montana* from the Malay Peninsula, except in colour. Mr. Boulenger, who has examined specimens, believes them to belong to the species he has just redescribed under the above name (*Proc. Zool. Soc. London*, 1908).

N. ANNANDALE.

BREEDING HABITS OF *Tylototriton verrucosus*.—In order to obtain further information regarding the breeding habits of this newt I visited Kurseong in the Darjiling hills at the beginning of last July. In every small pond or large puddle of rain water the females were abundant, but I did not see a single male. Numerous eggs were found lying on the bottom of the pools, sometimes singly and sometimes joined together in pairs as described in my former note (*Rec. Ind. Mus.*, vol. i, p. 278); occasionally they were attached lightly to blades of grass. As early as the first week in

July the eggs contained embryos ready or nearly ready to break loose as free larvæ, which already have external rudiments of fore limbs. The exact stage at which the larvæ emerge seems to differ slightly in different individuals.

As regards Mr. Hodgart's statement that the newts are able to draw blood by means of their tails from the hand of a captor, I can only say that I failed to observe anything of the kind. The tail is to some extent prehensile, and is curled round the finger when the animal is held in the hand. In the living female the ridge at the base of the tail is soft, only becoming hard when the animal is dead and has been preserved in formalin.

N. ANNANDALE.

FISH.

THE OCCURRENCE OF *Rhinodon typicus* AT THE HEAD OF THE BAY OF BENGAL.—A specimen of this rare basking shark was recently caught by Captain Gorr of the Pilot's Ridge light vessel at the mouth of the River Hooghly, and presented to the Museum by Mr. W. L. Allnut.

The measurements of the freshly caught fish were as follows:—

	Feet.	Inches.
“ Length from nose to tip of tail ..	14	0
Round the head ..	8	6
„ „ stomach ..	9	6
Across the nose ..	4	0
„ „ mouth ..	3	6 ”

The specimen was harpooned at the surface, over $26\frac{1}{2}$ fathoms of water (Lat. $20^{\circ} 51' 30''$ N., Long. $87^{\circ} 52' 0''$ E.), on March 23rd.

The colour of the skin was dark bluish grey with large, irregular paler blotches. The teeth were very small and numerous, each consisting of a single recurved cusp. They were arranged in a band on the upper and lower jaw, each band extending nearly to the angles of the mouth. Each band contains about 350 rows of teeth, each row consisting of about 10 teeth, making about 7,000 in all.

Although the shark has been recorded from Ceylon and Java, this appears to be the first time it has been met with in the upper parts of the Bay of Bengal.

R. E. LLOYD, *Capt.*, I.M.S.

SPONGES.

NOTE ON *Ephydatia meyeri* (CARTER).—On page 272, vol. i of these “Records,” it is stated that the presence of vesicular cells in the parenchyma is a recognized character distinguishing *Ephydatia fluviatilis* from *E. mülleri*, and the conclusion is drawn that *E. meyeri*, Carter, is a variety of the former species. This is a serious error, as exactly the contrary is the case. The note was printed during my absence from India, and a printer's error or *lapsus calami* crept in whereby “*fluviatilis*” was printed for “*mülleri*.” The

Owing to delay in the press two important papers on Diptera, which were to have been issued in this part, have been omitted. They will be issued immediately as an additional number (vol. ii, part v) of the "Records."

Publications of the Indian Museum.

	Rs. As.		Rs. As.
Account of the Deep-sea Brachyura collected by the R.I.M.S. "Investigator." By A. Alcock, M.B., C.M.Z.S.	6 0	Catalogue of Moths of India, Parts I to VII. By E. C. Cotes and C. Swinhoe, F.L.S., F.Z.S., etc.	5 12
Account of the Deep-sea Madreporaria collected by the R.I.M.S. "Investigator." By A. Alcock, M.B., C.M.Z.S.	4 0	Echinoderma of the Indian Museum: Account of the Deep-sea Holothurioida collected by the R.I.M.S. "Investigator." By R. Kœhler and C. Vaney	16 0
Account of the Triaxon (Hexactinellid) sponges collected by the R.I.M.S. "Investigator." By F. E. Schulze, Ph.D., M.D.	16 0	Echinoderma of the Indian Museum: Shallow-water Holothurioida collected by the R.I.M.S. "Investigator." By R. Kœhler and C. Vaney	2 0
Account of the Alcyonarians collected by the R.I.M.S. "Investigator," Part I. By J. Arthur Thomson, M.A., and W. D. Henderson, M.A., B.Sc.	16 0	Echinoderma of the Indian Museum: Deep-sea Ophiuroidea collected by the R.I.M.S. "Investigator." By R. Kœhler	10 0
Aids to the identification of Rats connected with Plague in India. By W. C. Hossack, M.D.	0 8	Echinoderma of the Indian Museum: Shallow-water Ophiuroidea collected by the R.I.M.S. "Investigator." By R. Kœhler	4 0
Catalogue of the Archæological Collections in the Indian Museum, Parts I and II. By J. Anderson, M.D., LL.D., F.R.S.	4 12	Figures and Descriptions of Nine Species of Squillidæ from the Collection of the Indian Museum. By J. Wood-Mason, F.Z.S., etc., edited by A. Alcock, M.B., C.M.Z.S.	2 0
Catalogue of Coins of the Indian Museum, Parts I to IV. By C. J. Rodgers, M.R.A.S., M.N.S.	24 0	Guide to the Zoological Collections exhibited in the Bird Gallery of the Indian Museum. By F. Finn, B.A., F.Z.S.	0 12
Catalogue of the Coins in the Indian Museum, Calcutta, including the Cabinet of the Asiatic Society of Bengal. Part I.—The Early Foreign Dynasties and the Guptas. Part II.—Ancient Coins of Indian Types. Part III.—Persian, Mediæval, South Indian, and Miscellaneous Coins. By Vincent A. Smith, M.A., F.R.N.S., M.R.A.S., I.C.S., Retd.	22 8	Guide to the Zoological Collections exhibited in the Fish Gallery of the Indian Museum. By A. Alcock, M.B., C.M.Z.S.	0 8
Catalogue of Indian Crustacea. Part I.—Introduction and Brachyura Primigenia. By A. Alcock, M.B., LL.D., F.R.S.	7 0	Guide to the Zoological Collections exhibited in the Invertebrate Gallery of the Indian Museum. By A. Alcock, M.B., C.M.Z.S. (<i>Out of print.</i>)	
Catalogue of the Indian Decapod Crustacea. Part II.—Anomura. Fasciculus I.—Pagurides. By A. Alcock, M.B., LL.D., F.R.S., C.I.E.	14 0	Guide to the Zoological Collection exhibited in the Reptile and Amphibia Gallery of the Indian Museum. By A. Alcock, M.B., C.M.Z.S. (<i>Out of print.</i>)	
Catalogue of the Indian Decapod Crustacea. Part III.—Macrura. Fasciculus I.—The Prawns of the Peneus Group. By A. Alcock, M.B., LL.D., F.R.S., C.I.E.	7 0	Hand List of Mollusca in the Indian Museum, Parts I and II, and Fasciculus E. By G. Nevill, C.M.Z.S., etc. Index Parts I and II. By W. Theobald	7 4
Catalogue of Indian Deep-sea Crustacea: Decapoda Macrura and Anomala in the Indian Museum. By A. Alcock, M.B., LL.D., C.M.Z.S.	10 0	List of Batrachia in the Indian Museum. By W. L. Sclater, M.A., F.Z.S.	1 0
Catalogue of Indian Deep-sea Fishes in the Indian Museum. By A. Alcock, M.B., C.M.Z.S.	5 0	List of Birds in the Indian Museum. Part I.—Corvidæ, Paradiseidæ, Ptilonorhynchidæ and Crateropodidæ. By F. Finn, B.A., F.Z.S.	1 0
Catalogue of Mammalia in the Indian Museum, Part I. By J. Anderson, M.D., LL.D., F.R.S. Part II. By W. L. Sclater, M.A., F.Z.S.	6 0	List of Snakes in the Indian Museum. By W. L. Sclater, M.A., F.Z.S.	1 0
Catalogue of Mantodea in the Indian Museum, Parts I and II. By J. Wood-Mason, F.Z.S., etc.	2 0	Monograph of the Asiatic Chiroptera and Catalogue of the Species of Bats in the Indian Museum. By G. E. Dobson, M.A., M.B., F.R.S.	3 0
		Monograph of the Oriental Cicadidæ, Parts I to VII. By W. L. Distant, F.E.S.	31 14

The above can be obtained from the Superintendent of the Indian Museum, Calcutta, and from Messrs. Friedlander & Sohn, 11, Carlstrasse, Berlin.

Other Publications edited and sold by the Superintendent of the Indian Museum (also obtainable from Messrs. Friedlander & Sohn) issued by the Director of the Royal Indian Marine.

Illustrations of the Zoology of the R.I.M.S. "Investigator" 1892. Fishes, Plates I to VII. Crustacea, Plates I to V, 1894. Fishes, Plates VII to XIII. Crustacea, Plates VI to VIII. Echinoderma, Plates I to III, 1895. Echinoderma, Plates IV and V. Fishes, Plates XIV to XVI. Crustacea, Plates IX to XV, 1896. Crustacea, Plates XVI to XXVII, 1897. Fishes, Plate XVII. Crustacea, Plates XXVIII to XXXII. Mollusca, Plates I to VI, 1898. Fishes, Plates XVIII to XXIV. Crustacea, Plates XXXIII to XXXV. Mollusca, Plates VII and VIII, 1899. Fishes, Plates XXV and XXVI. Crustacea, Plates XXXVI to XLV, 1900. Fishes, Plates XXVII to XXXV. Crustacea, Plates XLVI to XLVIII. Index, Part I, 1901. Crustacea, Plates XLIX to LV. Mollusca, Plates IX to XIII, 1902. Crustacea, Plates LVI to LXVII. Crustacea, Plates LXVIII to LXXVI. Fishes, Plates XXXVI to XXXVIII, 1905. Crustacea (Malacostraca), Plates LXXVII to LXXIX. Crustacea (Entomostraca), Plates I and II. Mollusca, Plates XIV to XVIII, 1907.—Re. 1 per plate.