

middle, is composed of 16 segments, those of the proximal half are as long as or very little longer than thick, those of the distal half once and a half as long as thick, the terminal segment 0,18 mm. long, styliform, 0,04 mm. thick at base. The 7 last segments are furnished with olfactory filaments and, excepting the 3 or 4 first ones, the segments bear on their lower surface tufts of short, plain hairs. The lower flagellum, 2,9 mm. long and 0,08 mm. thick in the middle, slightly longer but only half as thick as the upper, is composed of 15 segments of unequal length, that are all, except the two first ones, much longer than thick and provided below with long setae; the eighth segment, e. g., is 0,26 mm. long and 4-times as long as thick, the three last segments are 0,22 mm. long and also nearly 4-times as long as thick. The internal antennae, 5,54 mm. long, are a little shorter than the carapace and the flagella are slightly longer than the peduncle.

External antennae nearly as long as the abdomen. The terminal or 5<sup>th</sup> joint of their peduncle extends just beyond the distal end of the peduncle of the inner antennae; the 4<sup>th</sup> or penultimate joint is 2 mm. long and 0,23 mm. thick in the middle, about 8-times as long as thick; as in all the other species of this collection the 2<sup>nd</sup> joint carries on its distal end a small, acuminate spine, the scaphocerite. The terminal joint measures two-fifths the penultimate; only one flagellum is still present, 9,4 mm. long, but some last segments are broken off.

External maxillipeds (Fig. 17e) subpediform. The two first joints are small, obtuse, unarmed. Measured in the middle the ischium appears to be 1,52 mm. long; the slightly concave, outer margin is 1,54 mm. long, posteriorly this joint is 0,95 mm. broad, anteriorly 0,65 mm., and in the middle 0,8 mm. In the middle the ischium appears half as broad as it is long, it has a quadrangular shape, slightly narrowing anteriorly, with rounded postero-internal angle and nearly straight inner border; the anterior margin that articulates with the merus, runs a little oblique. Measured in the middle, the merus shows a length of 1,1 mm.; the straight outer margin is 1,14 mm. long, the slightly arcuate inner 1,15 mm., the posterior margin that articulates with the ischium, is 0,51 mm. broad and anteriorly the breadth is 0,74 mm. The merus, the length of which measures little more than two-thirds that of the ischium, has also a quadrangular shape; this joint, that is once and a half as long as broad in the middle, widens somewhat anteriorly and its anterior border that runs parallel with the posterior, is a little concave near the obtuse, antero-internal angle. Carpus 0,84 mm. long, 0,45 mm. thick distally; propodus 1 mm. long, 0,47 mm. broad, twice as long as broad, barely broader than the preceding joint; dactylus 0,7 mm. long, 0,22 mm. broad, finger-shaped, obtuse. Inner border of merus and ischium fringed as usual with hairs, that are 1,2 mm. long, the other joints with similar hairs. Like in other species the inner surface of the ischium bears a comb of about 25—30 acute teeth of different size, situated nearer to the outer than to the inner margin and curving inward at its proximal end; the foremost tooth is larger than the others. This comb is continued on the inner surface of the preceding joint and here also the foremost tooth is larger than the rest. Like in other species one observes a row of long hairs on the inner surfaces of the merus and of the following joints.

The 2<sup>nd</sup> chelipeds are as in the other species, the carpus is 1,8 mm. long and 0,95 mm. broad distally.

The 5<sup>th</sup> legs are cheliform and present also nothing remarkable. Merus 2,75 mm. long, 0,37 mm. thick in the middle, 7-times as long as thick; carpus 1,9 mm. long, 0,5 mm. thick distally; propodus until the distal end of the fixed finger 2,5 mm. long, 0,4 mm. thick at the proximal extremity and in the middle, 0,52 mm. at the articulation of the dactylus; the latter, 0,7 mm. long, slightly longer than the immobile finger. This leg as usual immersed distally in a brush of hairs.

*Callianassa Sibogae* may be easily recognized by the lamellar, strongly compressed, acuminate rostrum, the shape of the abdominal terga, of the caudal fan and of the outer maxillipeds.

3. *Callianassa (Cheramus) propinqua* de Man. Pl. XII, Fig. 18—18d.

*Callianassa propinqua* J. G. de Man, in: Tijdschr. d. Ned. Dierk. Vereen. (2) Dl. IX, 1905, p. 609.

Stat. 114. July 8. Kwandang-bay-entrance. Lat. 0° 58'.5 N., long. 122° 55' E. 75 m. Bottom hard sand, very fine. One female with eggs.

Though closely allied to *Call. (Cheramus) praedatrix*, this specimen belongs apparently to another species, distinguished by the caudal fan, the less broad ischium of the external maxillipeds, by the internal antennae etc. Unfortunately in this specimen the larger cheliped is wanting and in the single type specimen of *Call. praedatrix* the smaller is broken off. Length of carapace, rostrum included, 3,4 mm., abdomen 9,6 mm., total length 13 mm. Rostrum (Fig. 18) spiniform, narrow, acuminate, reaching a little beyond the middle of 1<sup>st</sup> joint of antennular peduncle. Carapace as long in proportion to the abdomen as in *Call. praedatrix*; distance (0,8 mm.) between the distinct cervical groove and the posterior border of the carapace also one-fourth its length. *Lineae thalassinicae* distinct.

Except the caudal fan the abdomen resembles that of *Call. praedatrix*. First segment saddle-shaped, 0,92 mm. long. Second and 6<sup>th</sup> segments respectively 1,9 mm. and 1,84 mm. long, nearly of equal length, distinctly longer than the rest; 6<sup>th</sup> segment (Fig. 18a) 1,48 mm. broad, one-fourth longer than broad. Telson 1,2 mm. long, without the median tooth, two-thirds the length of the 6<sup>th</sup> segment, and at the level of its greatest width, anteriorly, 0,95 mm. broad; it is one-fourth longer than broad, appearing comparatively a little less broad than the telson of *Call. praedatrix*. Otherwise than in this species the telson is rounded posteriorly; it bears, as in *Call. praedatrix*, in the middle line an acute tooth, 0,09 mm. long and attached to the lower surface. Posteriorly the border of the telson presents in the middle line a very small notch, 0,03 mm. broad, still less broad than the tooth at its base and only perceptible by means of the microscope. At a distance, about 3-times as long as the median tooth, the telson bears at each side a small movable spine, 0,06 mm. long, two-thirds the length of the median tooth; somewhat further forward the lateral borders bear a second movable spine, just as long as the first and the distance between the two spines is two-thirds of the distance between the posterior spine and the median tooth. The telson is fringed with the usual articulated, ciliated hairs, 0,38 mm. long, and between the median tooth and the posterior lateral spinule long plain setae are inserted, of which the longest are 0,9 mm. long. A few short setae are observed on the upper surface near the lateral borders

and anteriorly at the level of the greatest width the upper surface carries in the middle the usual transverse row of setae, the longest of which reach to the end of the telson.

The uropods, directed backward, extend beyond the telson, the outer rather considerably. Basal joint rounded, perhaps with a very small, acute tooth on its posterior border near the base. Inner uropod 1,3 mm. long, presenting its greatest width of 0,7 mm. at the level of the lobe on the anterior border, at one-fourth its length from the base, and hence narrowing to the obtuse apex, the greatest width is thus a little more than half the length of the plate; anterior border as far as the proximal lobe straight, posterior arcuate. On the outer side of the distal extremity 3 or 4 slender spines are inserted, that are slightly curved backward; on the inner side of it and near the posterior margin some plain setae exist, of unequal length, those at the apex being 0,7 mm. long. The upper surface carries, near the proximal lobe on the anterior border, three slender bristles, the middle of which is the longest, 0,2 mm. long. Outer uropod 1,64 mm. long, one-fourth longer than the inner, 0,88 mm. broad, presenting the greatest width not far from the distal border; it has an elongate quadrangular form, becomes distally a little wider and is almost twice as long as broad. The straight anterior border and the slightly arcuate posterior, that run nearly parallel with one another, make right angles with the barely arcuate, distal border and both angles are quite distinct, obtuse, but not rounded; the distal border is 0,76 mm. broad. Both uropods are fringed with the usual plumose and articulated hairs; the distal border of the outer is furnished with the ciliated, though unjointed stiff setae that are 0,96 mm. long at the postero-external angle and that become gradually shorter anteriorly. As in other species slender spines, that are slightly curved forward and that gradually diminish in length, are implanted near the distal end of the posterior border. As regards the additional row of bristles near the antero-external angle of the upper surface this species agrees with *Call. praedatrix*: it is short, measuring only one-third the length of the distal border, from which it barely diverges. Two short bristles are inserted near the anterior border, not far from the distal extremity and near the distal bristle that is slightly longer than the other, one observes a rather short seta.

Pleopods of 1<sup>st</sup> segment slender, uniramous filaments, those of 2<sup>nd</sup> still more slender, biramous; pleopods of the three following segments biramous, foliaceous with a short stylambly that is 0,2 mm. long and 3-times as far distant from the base of the plate as it is long.

The eyestalks (Fig. 18) that are a little longer than the rostrum, reach almost to the distal end of 1<sup>st</sup> antennular article; their inner margins are contiguous, their tips obtuse and the large spot of black pigment is as far distant from the base as from the tip.

Internal antennae (Fig. 18) 2,45 mm. long, somewhat shorter than the carapace; flagella a little shorter than the distance between the distal extremity of their peduncle and the base of the rostrum. Second joint of the peduncle shorter than 1<sup>st</sup>, 0,22 mm. long, 0,16 mm. thick distally; 3<sup>rd</sup> joint 0,54 mm. long, 2 $\frac{1}{2}$ -times as long as 2<sup>nd</sup> and slightly tapering forward. The upper flagellum, 1,16 mm. long and 0,095 mm. thick in the middle, is composed of 14 segments; the 5 or 6 proximal segments are nearly as long as thick, the following are a little longer, so e. g. the eighth segment is 0,12 mm. long and 0,093 mm. thick distally, the tenth also 0,12 mm. long and 0,075 mm. thick. The lower flagellum that has nearly the same length,

is 0,06 mm. thick in the middle, i. e. two-thirds of the other, so that the upper flagellum appears distinctly thicker than the lower; it is composed of 11 segments that are distinctly longer than thick and that are furnished below with the usual long setae.

External antennae 7,3 mm. long, more than twice as long as the carapace. The peduncle is 1,62 mm. long and extends with its terminal joint beyond the peduncle of the inner antennae; as in the other species of this collection a small spinule occurs on the distal end of the antepenultimate joint, above; the 4<sup>th</sup> joint is 0,66 mm. long and 0,107 mm. thick in the middle, the 5<sup>th</sup> or terminal joint is 0,46 mm. long, two-thirds the 4<sup>th</sup> and 0,095 mm. thick. Flagellum 5,68 mm. long, consisting of 50 segments.

The external maxillipeds (Fig. 18*b*) resemble those of *Call. modesta* de Man. Basipodite with a small tooth at the antero-internal angle. Ischium quadrangular; measured in the middle it proves to be 0,78 mm. long and 0,367 mm. broad, twice as long as broad, outer border slightly concave, inner straight, their angles with the posterior margin are rounded. The anterior margin of the ischium, 0,34 mm. broad, runs somewhat oblique, parallel with the posterior. Measured in the middle the merus proves to be 0,4 mm. long without the spine on the anterior margin and 0,45 mm., the spine included. The posterior margin that articulates with the ischium, is 0,31 mm. broad, the greatest width, however, anteriorly is 0,51 mm. The merus is half as long as the ischium, but anteriorly distinctly broader; the slightly convex, outer margin is 0,42 mm. long, much longer than the inner and the anterior border is armed in the middle with a sharp spine, directed inward. The antero-internal angle is rounded and between the spine and the antero-external angle the anterior border is straight. Carpus 0,44 mm. long, half as thick distally; propodus 0,42 mm. long and a little more than half as broad, presenting its greatest width of 0,24 mm. at one-third its length from the carpal articulation. Dactylus 0,3 mm. long, shorter than the two preceding joints, 3-times as long as thick, finger-shaped. As in other species there is a prominent comb of 25 sharp teeth on the inner surface of the ischium, placed nearer to the outer than to the inner border; larger teeth alternate with smaller ones and the comb is prolonged on the basipodite. The following joints carry a row of setae on their inner surface; of the setae on the inner margin of ischium and merus the longest measure 0,52 mm., being considerably longer than the ischium is broad.

The smaller cheliped (Fig. 18*c*) is about 6,5 mm. long, half as long as the body. Measured in the middle, the ischium, combined with the preceding joint, proves to be 1,36 mm. long: it has a slender shape, 0,24 mm. broad in the middle, 5- or 6-times as long as broad and widening a little distally, being 0,38 mm. broad at the distal end; the lower margin is armed with 6 slender spines, that become a little longer distally, the foremost being 0,19 mm. long and 0,04 mm. broad at its base. Merus 1,3 mm. long, as long as the preceding joint, presenting its greatest width of 0,54 mm. just in the middle and narrowing regularly both forward and backward. The merus, 2 $\frac{1}{2}$ -times as long as broad, has both its upper and lower margin regularly curved, the upper entire, unarmed, the lower, however, armed just in the middle with a slender spine, that exactly resembles in length and shape the foremost spine of the ischium. The lower border carries also some distantly placed setae of unequal length. Measured along its straight upper border the carpus appears to be 1,4 mm. long, a little longer than the merus, 0,56 mm. broad at the distal extremity and 0,18 mm.



near the meral articulation; the carpus that is quite unarmed, grows regularly broader towards the distal end, being here  $2\frac{1}{2}$  times as long as broad distally and with the lower border slightly arcuate. The chela is 2,14 mm. long, the palm 0,84 mm., the fingers 1,3 mm.; the slender chela is almost once and a half as long as the carpus, the fingers once and a half as long as the palm. The palm, 0,64 mm. broad near the articulation of the fingers, appears a little longer than broad; the slender fingers taper to the tips, the lower bears 4 or 5 obtuse and low teeth in the middle, but the rest of its cutting-edge like also that of the dactylus, are entire. The lower border of the chela is fringed with rather short setae and the fingers are, as usual, hairy.

Second legs as in the other species; lower border of the merus fringed with setae, which are 1 mm. long, more than twice as long as the joint is broad. Carpus 0,84 mm. long and half as broad distally.

Merus of 3<sup>rd</sup> legs (Fig. 18*d*), measured along the upper border, 1,24 mm. long and 0,3 mm. broad, 4-times as long as broad. Carpus, measured in the middle, 0,9 mm. long, 0,48 mm. broad distally; upper border straight. The propodus is 0,64 mm. long and 0,39 mm. broad in the middle, being about once and a half as long as broad; the lobe on the hinder edge, 0,14 mm. long, measures one-fourth the whole length and is rather sharp, the proximal part of the lower border being straight. The upper margin is slightly curved, the lower entire, nowhere emarginate, but, as in *Call. praedatrix*, the long setae with which it is fringed, are reddish-brown coloured. Dactylus 0,4 mm. long, 0,16 mm. broad, as in *Call. praedatrix*. Legs of 4<sup>th</sup> and 5<sup>th</sup> pair wanting.

5. *Callianassa (Cheramus) jocularis* de Man.

Pl. XII, Figs. 19, 19*b*, 19*c*; Pl. XIII, Figs. 19*a*, 19*d*—19*m*.

*Callianassa jocularis* J. G. de Man, in: Tijdschr. d. Ned. Dierk. Vereen. (2) Deel IX, 1905, p. 610.

- Stat. 2. March 8. Madura-strait. Lat.  $7^{\circ} 25' S.$ , long.  $113^{\circ} 16' E.$  56 m. Bottom: grey mud with some radiolariae. Three males, two females, all rather young.
- Stat. 5. March 10. Lat.  $7^{\circ} 46' S.$ , long.  $114^{\circ} 30'.5 E.$  330 m. Bottom: mud. Four females, two of which with eggs.
- Stat. 19. March 19/21. Bay of Labuan Tring, west coast of Lombok. Lat.  $8^{\circ} 44'.5 S.$ , long.  $116^{\circ} 2'.5 E.$  18—27 m. River-mud, coral, coralsand. One young male and nine females, most are adult and two are provided with eggs.
- Stat. 47. March 8/12. Bay of Bima, near South fort. 13—31 m. Bottom: mud with patches of fine coral sand. Three males, two females, not quite adult.
- Stat. 53. April 21/22. Bay of Nangamessi, Sumba. Up to 36 m. Bottom: coral sand; near the shore mud. Two young specimens.
- Stat. 71. May 10—June 7. Makassar and surroundings. 27—32 m. Bottom: mud, sand with mud. One very damaged young specimen.
- Stat. 114. July 8. Kwandang-bay-entrance. Lat.  $0^{\circ} 58'.5 N.$ , long.  $122^{\circ} 55' E.$  75 m. Bottom: hard sand, very fine. One young female.
- Stat. 115. July 9/11. East side of Pajunga Island, Kwandang-bay. 31 m. One ova-bearing female.
- Stat. 213. Sept. 26—Oct. 26. Saleyer-anchorage and Surroundings, including Pulu Pasi Tanette, near the North point of Saleyer-island. Up to 36 m. Bottom: coralreefs, mud and mud with sand. Six rather young specimens, four males and two females.
- Stat. 254. Dec. 10. Lat.  $5^{\circ} 40' S.$ , long.  $132^{\circ} 26' E.$  310 m. Bottom: fine grey mud. Three specimens, amongst which one egg-bearing female.
- Stat. 306. Febr. 8, 1900. Lat.  $8^{\circ} 27' S.$ , long.  $122^{\circ} 54'.5 E.$  247 m. Bottom: sandy mud. Four young specimens.

A species of small size, one of the largest specimens is a female without eggs from Stat. 19. The carapace of this specimen is 4,75 mm. long, rostrum included, the abdomen 13,55 mm., the whole animal 18,3 mm.: the carapace, without the rostrum, measures one-third the length of the abdomen. The carapace has the usual form. The rostrum (Fig. 19) that barely reaches beyond the middle of 1<sup>st</sup> antennular article, is spiniform, pointed, rather broad at its base and, viewed from above, its lateral margins appear concave; it projects forward almost in the level of the upper surface of the gastric region and is often slightly inclined downward. No antennal tooth on the carapace. One or two long setae are inserted on the anterior border of the carapace at the extremity of the short groove near the outer angle of the eyestalks. *Lineae thalassinicae* distinct. Cervical groove deep, its distance from the concave posterior border of the carapace one-sixth its whole length, rostrum included.

First segment of abdomen trapeziform, 1,8 mm. long, not coalesced with the 2<sup>nd</sup>, with rounded antero-lateral angles; anteriorly less broad than the distance between the two *lineae thalassinicae*, the 1<sup>st</sup> segment is much broadened posteriorly, being here almost twice as broad. Second segment 2,5 mm. long, 2,8 mm. broad, longer than the rest, nearly as long as the 3<sup>rd</sup> and 4<sup>th</sup> segments taken together; 4<sup>th</sup> segment distinctly shorter than 3<sup>rd</sup>, the 5<sup>th</sup> somewhat longer than the 3<sup>rd</sup>, the 6<sup>th</sup> longer than the three preceding segments. The 6<sup>th</sup> segment (Fig. 19a), 2,2 mm. long and 2,4 mm. broad, somewhat broader than long, is less broad than the preceding segments; it shows its greatest breadth anteriorly, the lateral margins slightly converging towards the concave posterior border, not far from which the lateral margins are slightly notched. The upper surface of this segment which appears slightly convex longitudinally, is furrowed in the middle line posteriorly for a very short distance, viz., for one-fifth the length of the segment. The abdomen is smooth, rounded, not carinate.

The abdominal pleura are rudimentary. Those of the 1<sup>st</sup> segment end in a sharp point in the male, but are obtuse in the female.

The telson, somewhat convex both transversely and longitudinally, is considerably smaller than the 6<sup>th</sup> segment, the length being two-thirds the length of the latter. The telson is 1,4 mm. long and 1,6 mm. broad anteriorly, distinctly a little broader than long, and presents its greatest width at one-third its length from the anterior margin. Hence the straight lateral margins converge backward, passing with a regular curve into the nearly straight hind border, which is almost as broad as the anterior margin, that articulates with the 6<sup>th</sup> segment. The posterior border of the telson bears a microscopical acute tooth in the middle, it is fringed with short hairs and between them with short movable spines and it carries, moreover, on each side a tuft of longer plain hairs. A short transverse row of long hairs exists in the middle of the upper surface and one or two shorter hairs are implanted between this row and the lateral margins.

The uropods, directed backward, are considerably longer than the telson, the outer, indeed, extends with more than half its length beyond it. The inner uropod, which is 1,3 mm. long, 0,6 mm. broad at its base and 1,04 mm. posteriorly, becomes broader backward and is broadly rounded; this limb, the nearly straight outer border of which curves regularly into the rounded, distal border, is fringed with ciliated hairs as usual, with some plain hairs between them on the rounded apical border and the latter bears moreover some short slender spines.

The outer uropod, that has a characteristic rhomboidal form, is 1,9 mm. long and 1,36 mm. broad, nearly once and a half as long as broad; its almost straight, slightly sinuate, anterior border makes an acute, though rounded angle with the somewhat curved distal border and the curved posterior border appears more or less concave on its distal third or distal half. The outer uropod is fringed along its borders with feathered setae, that look as if composed of numerous joints, similar to those of the inner; the distal border is moreover thickly furnished with long, plumose, stiff setae that are not articulated, 0,8—1 mm. long posteriorly and that become shorter near the antero-external angle of the plate. The concave distal part of the inner border bears long slender spines, that are more strongly curved forward than in *Call. (Cheramus) orientalis* (Bate) and that gradually decrease in length. The outer uropod bears an additional, slightly arcuate row of close-set stiff setae, that extends from the obtuse antero-external angle of the plate to the middle of the distal border, diverging very little from it. The inner uropod bears one, the outer two longitudinal ribs down the middle.

In younger individuals the uropods appear less broadened in proportion to their length and the curved spines and the long stiff setae of the distal border are comparatively longer.

In the male the pleopods of the 1<sup>st</sup> and 2<sup>nd</sup> segment are apparently wanting. The pleopods of the 1<sup>st</sup> segment of the female are slender, uniramous filaments, those of the 2<sup>nd</sup> are also slender, though biramous, both with many outstanding setae. The abdominal appendages of the three following segments (Fig. 19*l*) are foliaceous and biramous, the exopodite somewhat longer and less broad than the endopodite, both fringed with ciliated, articulated setae. The endopodite of these three pairs of pleopods of the female bears a very short internal appendix, 0,22 mm. long, nearly as in *Call. (Cheramus) orientalis* (Bate), 4-times as far distant from the base than it is long, and furnished with many cincinnuli on the distal half of its outer margin (Fig. 19*m*).

The eggs are not very numerous, globular, diameter 0,4 mm. broad.

The eyestalks reach to the distal end of 1<sup>st</sup> antennular article; their straight, inner margins are contiguous, the outer converge forward, so that the eyestalks are less broad anteriorly than at their base; the antero-internal apices are more or less sharp, extending in some individuals farther forward than the rounded antero-external angles, but in other specimens the oblique lateral margins continue to the apices, without forming an antero-external angle. The black pigment of the eye is situated on the inner half of the stalks, in the middle, and divided in a larger inner and a smaller outer portion.

Antennular peduncle 1,5 mm. long<sup>1)</sup>, the 1<sup>st</sup> joint, measured from the anterior border of the carapace, 0,6 mm. long; the 2<sup>nd</sup> is 0,3 mm. long and 0,18 mm. thick at the distal end, the 3<sup>rd</sup> 0,6 mm. long and 0,13 mm. thick in the middle. The 3<sup>rd</sup> joint, that tapers a little towards the distal end, is just twice as long as the 2<sup>nd</sup> and fringed on its lower border with long ciliated hairs. Of the two subequal flagella the lower is 2 mm. long, the upper 1,9 mm.; they are somewhat longer than the peduncle and these antennae, that measure 3,5 mm., are a little shorter than the carapace. The upper flagellum is a little thicker than

1) The measurements of the two pairs of antennae, of the external maxillipeds and of the thoracic legs are taken from a smaller specimen, collected also at Stat. 19, viz., from a female which was 16,8 mm. long (carapace 4,3 mm., abdomen 12,5 mm.).

the other and composed of 19 segments, that are nearly all somewhat longer than thick, so e. g. the 6<sup>th</sup> segment is 0,135 mm. long and 0,095 mm. thick at the distal end; the other flagellum is composed of 14 segments that are somewhat slenderer than those of the upper, so e. g. the 6<sup>th</sup> segment is 0,16 mm. long and 0,075 mm. thick distally, the segments of this flagellum are provided with a few long hairs at their distal ends.

Antennal peduncle as long as that of the inner antennae. The 1<sup>st</sup> joint is somewhat expanded, bulging out laterally, the antepenultimate joint reaches barely as far forward as the 1<sup>st</sup> joint of the antennular peduncle; the 2<sup>nd</sup> joint bears, nearly as in *Call. modesta*, a very small scale, only 0,11 mm. long, the pointed tip of which is curved inward; it is probably movable and should be considered as a rudimentary scaphocerite. The 4<sup>th</sup> or penultimate joint is 0,6 mm. long and 0,11 mm. thick in the middle; the terminal joint is 0,42 mm. long and 0,08 mm. thick in the middle; the 5<sup>th</sup> joint measures two-thirds the length of the 4<sup>th</sup> and both are a little slenderer than the peduncle of the inner antennae. In this specimen the flagellum was lost. In another from Stat. 47, the carapace of which is 4,16 mm. long, rostrum included, the penultimate joint of the antennal peduncle is 0,6 mm. long, the scaphocerite 0,11 mm., the last joint 0,5 mm.; the flagellum is 5,26 mm. long, a little longer than the carapace and more than 3-times as long as the peduncle. The flagellum is composed of 36 segments; the 1<sup>st</sup> segment, 0,22 mm. long, is almost half as long as the terminal joint of the peduncle and almost 3-times as long as the 2<sup>nd</sup>, which is 0,08 mm. long and just as broad; the following segments become gradually longer than broad and those of the distal half are also slenderer, so e. g. is the penultimate segment 0,16 mm. long and 0,035 mm. broad, 4-times as long as broad. In an egg-laden female, long 15 mm., from Stat. 5 the antennal flagellum is composed of 42 segments: the number of segments is thus variable.

The external maxillipeds (Fig. 19c) are subpediform. The two first joints are very small, the basipodite with a rounded inner border. The ischium is 1,08 mm. long, measured along its straight inner margin, and 0,58 mm. broad posteriorly; the anterior margin that articulates with the merus, is 0,34 mm. broad and runs a little obliquely, parallel with the concave hind border, that articulates with the 2<sup>nd</sup> joint. The outer margin is somewhat concave and both the outer and the inner pass posteriorly with a regular curve into the posterior margin. At the limit between the posterior and middle third part of its length the ischium appears just half as broad as long; while it grows broader backward, it decreases in breadth forward, so that the anterior border measures only one-third the length of the joint. The merus is triangular and the outer margin makes a nearly right angle with the oblique posterior that articulates with the ischium; the inner margin is slightly convex. The straight outer margin is 0,62 mm. long, the merus appears therefore almost twice as long as broad at its base; the oblique inner margin is 0,8 mm. long. The carpus, nearly 0,56 mm. long, little shorter than the merus, is much thickened distally, being here 0,28 mm. thick, at its base, however, 0,16 mm.; the outer border is slightly curved, the inner slightly sinuate. The propodus, 0,62 mm. long, is as long as the merus, barely longer than the carpus; it becomes less broad towards the distal end, being here 0,14 mm. broad, and 0,31 mm. not far from the articulation with the carpus. The narrow dactylus, 0,37 mm. long, tapers regularly to the extremity. All the joints are fringed with long, ciliated hairs, excepting the outer margin of the merus and a

few are implanted on the outer surface, about in the middle. The inner surface of the ischium is armed in this specimen with a row of nine strong spines, that runs obliquely from the antero-internal angle of the joint to the postero-external and a similar spine is placed on the inner surface of the basipodite; the inner surface of the ischium is also a little hairy posteriorly near the internal margin. The following joints bear a row of long setae on their inner surface near the inner margin.

In a female without eggs from Stat. 2, that is 16 mm. long, the ischium of the external maxillipeds appears somewhat less broad posteriorly; this joint is 1,06 mm. long, but the greatest width posteriorly is only 0,49 mm. The inner surface is armed not with 9, but with 16 spines. In a female without eggs from Stat. 5 the ischium of the external maxillipeds is 1 mm. long and 0,47 mm. broad, the inner surface bears 12 spines. The merus is 0,64 mm. long, its base 0,3 mm. broad. The number of spines on the ischium appears to be somewhat variable.

In their general appearance the anterior legs resemble those of some species of the subgenus *Trypaea*, namely of *Call. (Trypaea) australiensis* Dana, *maldivensis* Borr. and *brachyophthalma* A. M.-Edw. Either the right or the left is the larger. The larger cheliped agrees in its general characters with that of *Call. gigas* Dana and *Call. longimana* Stimps. In the female, long 16,8 mm., from Stat. 19 this leg (Fig. 19d) has a length of nearly 13,5 mm., being a little shorter than the body. The ischium, 2,7 mm. long, appears narrow along the proximal half, except the proximal extremity, that is slightly thickened; it becomes gradually broader from the middle to the distal end, the joint being here 0,84 mm. broad, 3-times as broad as proximally. The lower border bears three minute sharp teeth in the middle and is fringed with short setae, a few occur also on the upper border. The merus, 3 mm. long and 1,2 mm. broad in the middle, almost 3-times as long as broad, is a little longer than the ischium; it is trilateral, with a flattened, inner surface, whereas the slightly convex upper and the more flattened lower make a right angle with one another. The nearly straight upper margin bears two close-standing, rather small spines at the proximal extremity, of which the posterior is a little smaller than the other; sometimes, however, they are wanting. The lamellate, very sharp, lower edge is armed with a large spiniform tooth proximally and this tooth is often a little enlarged at its base. Both the upper and the lower margin are furnished with a few, rather short setae. The compressed carpus is 2,4 mm. long and just as broad at the articulation with the chela; of this joint, that is a little shorter than the ischium and the merus, both the straight upper and the regularly curved lower border are sharp and carinate, with rather obtuse distal extremities. The chela, measured to the tip of the immobile finger, is 4,8 mm. long, the palm 2,7 mm., so that the fixed finger appears distinctly somewhat shorter than the palm; the palm, proximally as broad as the carpus, decreases slightly in breadth distally, being 2,12 mm. broad at the articulation of the dactylus. The dactylus of this specimen is a little longer than the fixed finger and its tip is more strongly curved downward: both fingers (Fig. 19e) are furnished with about 20 small conical teeth, along the whole length of their prehensile border, and these teeth are a little larger in the middle than elsewhere. The fingers are hairy as usual, the carinate margins of the palm and the carinate lower edge of the carpus are fringed with rather short, close-set hairs. All the joints are smooth.

The length of the joints of the larger cheliped is, however, rather

variable, as is proved by other specimens. In an egg-bearing female, long 16,5 mm., from Stat. 19, the merus is 2,4 mm. long and 0,85 mm. broad, armed with the typical spines. The carpus is 2,3 mm. long and 1,75 mm. broad distally, the chela 3,65 mm. long, the palm 2 mm. In this specimen the carpus appears slightly longer than the palm and the carpus is also a little less broad than long.

In another female without eggs (Figs. 19*h*, 19*i*) from the same Station, long 14,5 mm., the merus is only 2,2 mm. long and 1,02 mm. broad in the middle, little more than twice as long as broad, and the lower border is more curved. The carpus is 2,2 mm. long and 1,9 mm. broad distally, the chela 3,45 mm. long, the palm 1,7 mm. long, the fingers 1,75 mm. The fingers that are distinctly longer than the palm and that are of equal length, are typically armed with 25 small conical teeth along the whole length of their prehensile border, somewhat larger in the middle than near the tip and a little smaller on the dactylus than on the fixed finger. In this specimen the carpus is also longer and even much longer than the palm and a little less broad than long.

In a young specimen, long 7,5 mm., from Stat. 53, the merus of the larger cheliped, placed on the left side, is 1 mm. long and half as broad; the lower margin bears the strong spine at the proximal end, but, opposite to it, the upper border does not bear two small spines, but one single spine, which is half as long as the spine on the lower. In this specimen the upper or thicker antennular flagellum is still only composed of 12 or 13 segments, the lower of 8.

Sometimes the two spines at the proximal end of the upper border of the merus are wanting, so e.g. in the ova-bearing female from Stat. 115. The ischium, 1,3 mm. long, is armed with three spines on its lower border, somewhat larger than usual, the posterior just behind the middle, the two others, gradually larger, on the distal half. The merus, 1,2 mm. long and 0,53 mm. broad in the middle, shows no trace of the dorsal spines, but the large spine on the lower border is well-developed. The carpus is 1,55 mm. long and 0,84 mm. broad distally, the chela 1,88 mm. long, the palm 1,04 mm. long. This specimen has a length of 12,5 mm.

The two dorsal spines of the merus are also wanting in a young male, long 12,5 mm., from Stat. 213; the proximal tooth on the lower border ends abnormally in two spines instead of one.

The smaller cheliped is much shorter and slenderer and its form is quite different. In the female, long 16,8 mm., from Stat. 19 this leg (Fig. 19*f*) measures 8,8 mm., i.e. about two-thirds the length of the larger cheliped. The joints are all strongly compressed. The slender ischium, 1,8 mm. long, is 0,28 mm. broad proximally, 0,29 mm. in the middle, and 0,5 mm. at the distal extremity, being here somewhat broadened; the lower border of this joint, which is 6-times as long as broad, bears a few short hairs and is armed with two small spines on its distal half. The merus, 1,44 mm. long, somewhat shorter than the ischium, is 0,62 mm. broad in the middle and is narrowed somewhat both proximally and distally; the merus which is quite unarmed, is slightly curved longitudinally, the upper surface is slightly convex transversely, the lower slightly concave; the merus is a little more than twice as long as broad, its upper border slightly arcuate. The slender carpus is 2,6 mm. long, more than one and a half times as long as the merus; it is 0,2 mm. broad at the proximal end, 0,47 mm. broad in the middle and 0,5 mm. at the distal extremity,

so that the carpus is five times as long as broad; the upper border is straight, the lower, at first arcuate, appears a little concave distally. The chela, measured to the tip of the fixed finger, is 2,1 mm. long, somewhat shorter than the carpus, and almost one and a half times as long as the merus; the palm, 0,8 mm. long, is 0,53 mm. broad. The palm, as broad as the carpus, is one and a half times as long as broad and the slender tapering fingers are one and a half times as long as the palm; the fingers are straight, their pointed tips not curved inward and their cutting-edges are entire, not denticulate. The lower border of the carpus, both the upper and the lower border of the chela and of the dactylus are fringed with rather long plain hairs; some setae occur also on the upper margin of the carpus. Figure 19g represents the smaller cheliped of the female, long 18,3 mm., from Stat. 19 and much resembles the described one.

The second chelipeds closely resemble those of *Call. rotundicaudata* (TH. R. R. STEBBING, South African Crustacea, 1902, Pt. II, Pl. VIII, prp 2). In the female, long 16,8 mm., from Stat. 19 the merus is 1,8 mm. long and shows its greatest width of 0,65 mm. at one-third its length from the base.

In the legs of the 3<sup>rd</sup> pair (Fig. 19k) the lobe on the hinder edge of the propodus is large, rounded below and posteriorly. The propodus is 1,2 mm. long with and 0,77 mm. without the posterior lobe, 0,66 mm. broad distally and 0,53 mm. at the articulation with the carpus. The lobe that measures a little more than one-third the whole length of the joint, is 0,54 mm. broad; opposite the carpal articulation the lower border of the propodus presents in the right leg four, in the other three shallow notches of equal length and there is a spine, long 0,15 mm., at the distal end of the border. The nearly straight dactylus is 0,7 mm. long, 3-times as long as thick and tapers towards the tip; the dactylus, the propodus and the distal end of the carpus are thickly fringed with long setae.

The genital apertures of the female are large.

The 4<sup>th</sup> and the 5<sup>th</sup> legs are also similar to those of *Call. rotundicaudata*. The merus of the 4<sup>th</sup> legs of the female, long 16,8 mm., is 1,75 mm. long and 0,46 mm. broad in the middle, nearly four times as long as broad, and it is one and a half times as long as the ischium. The carpus that has the same form as that of the smaller cheliped of the anterior legs, is 1,48 mm. long, a little shorter than the merus, and 0,38 mm. broad, presenting the greatest width near the distal extremity; this joint is also 4-times as long as broad. The propodus is 1,2 mm. long, nearly two-thirds the length of the merus, 0,4 mm. broad at the proximal and 0,32 mm. at the distal extremity; it is thickly fringed with hairs on the lower border and some setae are finely denticulate on their anterior edge; one of these denticulate hairs, just at the distal end, is 0,32 mm. long and a little stronger than the rest. Many long plain hairs are also observed near the upper margin and the straight dactylus, which is 0,54 mm. long, is immersed in long setae.

The sternal plaque, immediately behind the legs of the 4<sup>th</sup> pair, is almost as long as broad and broadest anteriorly; the lateral margins are S-shaped and the plaque is posteriorly bilobed, with two rounded lobes. The outer surface has one or two pits anteriorly on either side of the middle line. In the largest female, long 18,3 mm., from Stat. 19 the plaque is 0,92 mm. broad anteriorly.

The slender merus of the subchelate 5<sup>th</sup> legs, 1,6 mm. long and 0,27 mm. broad in the

middle, is 6-times as long as broad in the female, long 16,8 mm.; the carpus, 1,3 mm. long, shorter than the merus, is narrow at its base and becomes considerably wider distally, being here 0,36 mm. broad, 3-times as much as proximally. The chela, measured to the tip of the immobile finger, proves to be 1,26 mm. long, the palm just 1 mm., 4-times as long as the fixed finger; the chela, almost as long as the carpus, grows slightly broader until the articulation of the dactylus, being here 0,34 mm. broad, proximally, however, 0,28 mm. The triangular, slightly arcuate dactylus is little longer than the immobile finger; both fingers, like also the distal half of the palm, are thickly covered with setae.

Of the five specimens from Stat. 2 two are typical, but the three others do not fully agree with the preceding description. The largest is a female without eggs, long 16 mm. The telson differs from the typical species, because it is rounded posteriorly, presenting no straight posterior margin; it is slightly emarginate in the middle line and bears here a small tooth as in the typical species. The 3<sup>rd</sup> joint of the antennular peduncle is  $2\frac{1}{2}$ -times as long as the 2<sup>nd</sup>, a little longer than usual.

In another specimen, long 13 mm., the telson (Fig. 19*b*) has the same form as in the female long 16 mm. and is moreover just as long as broad, viz., 1,22 mm.; it is not emarginate in the middle line, but the median tooth is distinct. This specimen bears the smaller leg of 1<sup>st</sup> pair, (Fig. 19*f*), the larger is wanting in all the five specimens. The ischium is 1,2 mm. long, 0,25 mm. broad in the middle, 5-times as long as broad, its lower border is unarmed; the merus, also 1,2 mm. long and 0,51 mm. broad, presents the typical form, like also the carpus, that is 1,9 mm. long and 0,42 mm. broad. The chela, however, is 2,06 mm. long, the palm 0,82 mm. long and 0,58 mm. broad; the fixed finger is 1,22 mm. long. The chela is here a trifle longer than the carpus, not shorter as in the type, and the dactylus is not straight, but distinctly curved. These three specimens are provisionally considered as a variety.

*Call. jocularatrix* de Man is referred to the subgenus *Cheramus* on account of the narrow external maxillipeds, the telson is, however, a little broader than long and rather short, so that this species could be placed with the same right in the subgenus *Callichirus*.

*Call. (Cheramus) orientalis* (Bate) from the Arafura Sea, in which the external maxillipeds are also narrow (Confer: J. G. DE MAN, A contribution to the knowledge of twenty-two species and three varieties of the genus *Callianassa* Leach, 's Gravenhage 1928, p. 9, Pl. I, fig. 2, 2*a*), the ischium and the merus being together also more than three times as long as broad, differs by a longer telson, of which the posterior margin is emarginate, by the outer uropod being shorter with regard to the breadth and by the 5<sup>th</sup> joint of the antennal peduncle being shorter than half the length of the 4<sup>th</sup>.

6. *Callianassa (Cheramus) lobetobensis* de Man. Pl. XIII, Fig. 20; Pl. XIV, Figs. 20*a*—20*d*.

*Callianassa lobetobensis* J. G. de Man, in: Tijdschr. Ned. Dierk. Vereeniging, (2) IX, 1905, p. 607.

Stat. 306. Febr. 8, 1900. Lat. 8° 27' S., long. 122° 54'.5 E. 247 m. Bottom: sandy mud. Two females, the larger with eggs, the other without eggs, bearing a Bopyrid in its cephalothorax.

This species, discovered in Lobetobi Strait between the islands of Flores and Solor, is apparently closely related to *Call. intermedia* from the Bali Sea. The larger specimen is 20 mm.



long, the carapace, rostrum included, 5,4 mm. long, the abdomen until the extremity of the lateral lobes of the telson, 14,6 mm., the proportion between both being the same as in *Call. intermedia*. The cervical groove, however, is situated at one-fourth the length of the carapace from its concave posterior margin, viz., at a distance of 1,34 mm. *Lineae thalassinicae* distinct. The rostrum is spiniform, acute, turned upward and reaches as far forward as in *Call. intermedia*, distinctly less far forward than the 1<sup>st</sup> joint of the antennular peduncle.

The abdomen resembles also that of *Call. intermedia*, as regards the shape and the relative length of the segments, excepting the caudal fan (Fig. 20), which presents some differences. The 2<sup>nd</sup> segment is very little longer than the 6<sup>th</sup>, but distinctly broader; the 6<sup>th</sup> is 2,5 mm. long, just as broad anteriorly, a little less posteriorly. Its posterior margin bears on each side two tufts of hair, the longest hairs measuring 1,9 mm. The four other segments show the same form in the two species.

Likewise as in *Call. pugnatrix* and *Call. intermedia* the telson is bilobed, its lateral borders are armed posteriorly with two movable spines and the median notch bears also a strong spine. Measured in the middle line to the base of the median notch, the telson appears to be 1,9 mm. long, but 2,22 mm., when measured laterally to the obtuse extremities of the lateral lobes, so that it appears little shorter than the penultimate segment. The telson is 1,75 mm. broad anteriorly, nearly one-fourth longer than broad; it is divided posteriorly by a rather deep median notch, 0,3 mm. long, into two obtuse lobes. At the concave base of the notch an acute spine is attached on the lower surface and this spine does not yet reach to the posterior end of the lateral lobes. The lateral margins of the telson run parallel until just beyond the middle and are furnished posteriorly each with two strong movable spines, that are strongly curved backward near their base; the posterior pair is inserted at the level of the base of the median spine and the two spines on either side are just as far distant from one another as the median notch is long. The anterior spine is 0,25 mm. long, a little shorter than the length or depth of the notch; the other is a little shorter and stouter. At one-fourth the length of the telson from its base the upper surface bears a transverse row of hairs, that are 1,7 mm. long, reaching to the end of the lobes; at the same level one observes near the lateral margins a small tuft of 3 or 4 very short hairs and a few hairs are implanted behind the median tuft. The telson is fringed posteriorly with articulated, plumose setae, that are 0,7 mm. long and, as in the other species, much thinner plain setae of unequal length are inserted all around the extremity of the lobes on their upper surface, and the longest of these setae are 1,2 mm. long.

Basal joint of caudal swimmerets rounded, unarmed. The inner uropod, which, extended backwards, appears to be a little shorter than the telson, is 2 mm. long and presents its greatest width of 1,18 mm. just beyond the middle; it is broadly rounded apically and appears a little more than half as broad as long. The anterior margin is straight along two-thirds the length of the plate and this straight part ends in a small sharp spine, 0,04 mm. long, which does not occur in *Call. intermedia*. This uropod is fringed with articulated, plumose setae; on the anterior half of the rounded apical border 9 or 10 movable bristles are implanted, the longest of which measure 0,3 mm. and are slightly curved backward; on the middle and on the posterior part of the apical border some plain setae are inserted, like the bristles, on the upper surface of the plate; the longest measure 1,3 mm. At a short distance

(0,22 mm.) from the middle of the apical border a small, movable spine or bristle, 0,08 mm long, is implanted on the upper surface and a few short hairs are scattered over it. The outer uropod is 2,32 mm. long and reaches for a short distance beyond the telson, when directed backwards; it gradually broadens apically and presents therefore its greatest width of 1,55 mm. not far from the truncate, apical border. The anterior border of the outer uropod, that is once and a half as long as broad, is straight, fringed on the lower side with ciliated hairs and makes a distinct right angle with the apical border; the latter curves regularly into the posterior border and is thickly clothed with ciliated setae of unequal length. The posterior border, also fringed with ciliated, articulated hairs, bears on its distal part a row of stout bristles, 8 or 9 in number and that are curved forward; the proximal bristles are 0,75 mm. long, the following decrease gradually in length. The additional row of bristles, that is 0,6 mm. long, extends almost to the middle of the apical border, is contiguous to it along its anterior half and diverges then very little from it; the row is composed of short, straight bristles, the posterior ones of which reach barely beyond the apical border.

The eyepeduncles that much resemble those of *Call. intermedia*, are 0,6 mm. long and 0,5 mm. broad at their base, little longer than broad; they are a little shorter than the 1<sup>st</sup> joint of the antennular peduncle and a little longer than the rostrum; their inner margins are contiguous, their tips truncate and their arcuate, outer border is anteriorly slightly concave. One observes near the middle of their inner border a small transverse spot of black pigment and more laterally and deeper some pigment more.

The inner antennae are in the larger specimen not equally long, a phenomenon observed also in other species: the left, indeed, measures 3,76 mm., the right 3,54 mm., owing to the flagella of the former being a little longer than those of the right antennula. The peduncle that reaches as far forward as the penultimate joint of that of the outer antennae, is 1,4 mm. long from its base until the insertion of the thicker, upper flagellum and 1,5 mm. until the inner, distal extremity of the 3<sup>rd</sup> joint. The 1<sup>st</sup> joint, that measures about one-fourth the whole peduncle, is broadened at its base, narrower at its distal end, where it proves to be 0,27 mm. broad, when the antennulae are looked at from above; the 2<sup>nd</sup> joint is 0,24 mm. long, two-thirds the length of the 1<sup>st</sup>, distally 0,23 mm. thick, proximally 0,18 mm., being anteriorly nearly as thick as it is long. The 3<sup>rd</sup> joint, 0,91 mm. long until its obtuse distal extremity, is almost 4-times as long as the 2<sup>nd</sup>; it is 0,19 mm. thick at its base, 0,17 mm. in the middle and 0,14 mm. at the insertion of the upper flagellum, so that this joint, which tapers distally, appears almost 5-times as long as thick. The upper flagellum, little shorter than the other, consists in both antennulae of 19 segments; the first segments are partly broader than long, so e. g. the 2<sup>nd</sup> 0,06 mm. long and 0,1 mm. broad; in the middle of the flagellum the segments are longer than thick, so is e. g. the 9<sup>th</sup> segment 0,155 mm. long and 0,1 mm. thick distally, once and a half as long as thick, the four following segments present the same measurements, the 15<sup>th</sup> is 0,095 mm. long and 0,085 mm. thick, the terminal segment is slenderer and longer, 0,11 mm. long and 0,03 mm. thick at its base. The 5 or 6 last joints are furnished with olfactory filaments.

The lower flagellum consists in the somewhat shorter right antennula of 14, in the left of 12 segments, which are all longer than thick, so e. g. is the 6<sup>th</sup> segment in the right

antennula 0,25 mm. long and nearly 4-times as long as thick, the 12<sup>th</sup> segment is 0,18 mm. long and 0,05 mm. broad, the last segment, finally, also 0,18 mm. long, but 0,03 mm. thick at its base and tapering. Looked at from above, the upper flagellum appears in the middle almost twice as thick as the lower, the proportion being as 11:6. The 2<sup>nd</sup> and the 3<sup>rd</sup> joint of the peduncle and the segments of the lower flagellum are furnished below with some long setae, of which a few, on the flagellum, are ciliate.

The antennal peduncle is 2,4 mm. long, the flagella are lost. The antepenultimate joint bears at its distal end the small, spiniform, acuminate scaphocerite, which is 0,17 mm. long and 0,09 mm. broad at its base; the penultimate is 1,1 mm. long, a little curved, and 6-times as long as thick, the terminal joint, finally, is 0,66 mm. long, measuring three-fifth parts of the penultimate.

The external maxillipeds (Fig. 20a) are pediform and much resemble those of *Call. modesta*. The rectangular ischium is 1,2 mm. long, measured in the middle and presents its greatest width of 0,56 mm. about at one-third its length from the base; this joint narrows slightly distally, so that the somewhat oblique anterior border, that articulates with the merus, is 0,37 mm. broad, two-thirds of the greatest width posteriorly; the inner margin, that is provided with long setae of unequal length, the longest measuring 1 mm., is straight, the outer border is slightly concave anteriorly and the postero-lateral angles are rounded. The ischium is thus somewhat more than twice as long as broad in the middle. The merus is rhomboid and proves to be 0,7 mm. long, when measured along its slightly curved, outer border, that is the longest of the four; the merus is thus a little more than half as long as the ischium. The nearly straight anterior border runs parallel with the posterior and is little longer than it; a small sharp spine, 0,08 mm. long and directed inward, occurs at the angle between the anterior and the distinctly convex inner border and the latter is furnished, like the ischium and like the inner margins of the following joints, with long setae. Just in the middle the merus is 0,54 broad, distinctly broader here than the anterior part of the ischium. The two following joints are equally long, viz., 0,6 mm., the propodus is once and a half as long as broad, the dactylus shorter, 0,46 mm. long and 3-times as long as thick. These maxillipeds differ from those of *Call. modesta* especially by the spine, with which the merus is armed, being placed in *Call. modesta* at some distance from the rounded antero-internal angle. The prominent crest on the inner side of the ischium is formed by 20—25 sharp teeth of unequal length and the rows of hair on the inner surface of the following joints are also well-developed.

In both specimens the right cheliped is the larger.

The slender ischium of the larger cheliped (Fig. 20b) is 2 mm. long and 0,4 mm. broad in the middle, 5-times as long as broad and thickening somewhat both distally and proximally; the slightly concave, lower border bears 8—10 spines, of which the 2—4 proximal ones are extremely small, the rest, on the distal half of the joint, larger. Merus oval, though truncate at both extremities, 2,2 mm. long and 0,92 mm. broad in the middle, exclusive of the spines of the lower border. The lateral borders of this joint, which is nearly as long as the ischium and about  $2\frac{1}{2}$ -times as long as broad, are a little curved; the lower border is armed with four spines on its proximal half, that are a little larger than those of the ischium and that grow a little longer from the first near the proximal extremity to the fourth

on the middle of the margin; a single spine, directed forward and as large as the spine on the middle of the lower, is placed on the upper border, at one-fourth the length of the merus from the articulation with the ischium. The carpus is 1,7 mm. long and 1,52 mm. broad distally, being thus a little shorter than the merus and slightly longer than broad; the upper border is straight, the lower regularly curved and both carry a few hairs. The chela is 4,1 mm. long to the pointed extremity of the immobile finger, the palm 2,5 mm. long and 1,8 mm. broad in the middle; the palm is thus one and a half times as long as the carpus and almost one and a half times as long as broad. The lower border of the chela is fringed with setae until the tip of the immobile finger, that are arranged in small tufts; the prehensile edge of the fixed finger is slightly convex in the middle but not denticulate; the somewhat curved, pointed dactylus, which is a little longer than the other finger, bears a low, obtuse tooth in the middle and its upper border is also setose.

The smaller cheliped (Fig. 20c) resembles that of *Call. (Cheramus) jocularis* and of *Call. (Callichirus) Pestae*, the latter being a new mediterranean species described in 1928. The slender ischium is 2,12 mm. long, 0,38 mm. broad in the middle and 0,64 mm. at the articulation with the merus; the straight, lower margin of this joint, that somewhat widens from the middle to the distal end and that is 5-times as long as broad, is armed along its whole length with 9 small spines, of which the 4 or 5 proximal ones are very small, the following gradually a little larger, the foremost, not far from the distal extremity, being 0,1 mm. long, one-fifth the breadth of the ischium at this place; this margin bears also some short setae. The merus is 2 mm. long, almost as long as the ischium and has the same oval form as that of the larger leg; it shows its greatest width of 0,76 mm. in the middle, exclusive of the spine, being thus likewise  $2\frac{1}{2}$ -times as long as broad; the somewhat curved upper border is armed at one-fourth of its length from the proximal end with a spine, which is directed forward and twice as large as the foremost spine of the ischium; a similar spine, just of the same size, occurs in the middle of the little curved, lower margin that carries also some short setae and moreover an extremely small, sharp tooth, only 0,02 mm. long, which may easily be overlooked, exists at a distance of 0,25 mm. from the proximal end. The slender carpus is 2,5 mm. long, somewhat longer than the merus, 0,6 mm. broad in the middle, 0,66 mm. at the distal end, being thus 4-times as long as broad; a tuft of setae is placed at the distal end of the straight upper border and similar setae, 1 mm. long and shorter, are implanted along the lower margin. The chela is 2,85 mm. long, almost one and a half times as long as the merus and a little longer than the carpus; the palm is 1,15 mm. long and 0,68 mm. broad in the middle. The slender tapering fingers, the prehensile edges of which are entire and the pointed tips of which cross one another, are once and a half as long as the palm; both the upper and the lower border of palm and fingers are hairy.

The 2<sup>nd</sup> legs resemble those of the other species, the carpus is 1,4 mm. long and 0,74 mm. thick distally, half as thick as long.

The merus of the 3<sup>rd</sup> legs (Fig. 20d) is 2,16 mm. long, 0,46 mm. broad just in the middle and presents its greatest width of 0,49 mm. at one-third its length from the distal end, so that this joint appears nearly 5-times as long as broad. The carpus, 1,4 mm. long, measures two-thirds the length of the merus; 0,18 mm. broad at its proximal end, it grows wider

distally, so that the distal border is 0,65 mm. broad, i. e. almost half the length; the carpus bears, on its outer surface, a tuft of long setae near the distal end of its straight upper border and another in the obtuse angle, that makes the lower border with the distal one. The quadrangular propodus is 1,26 mm. long, measured between the truncate distal border and the obtuse tip of the lobe on the hinder edge, whereas it is 1,05 mm. long between the carpal articulation and the distal border. Measured in the first mentioned direction the length of the triangular proximal lobe appears to be one-fifth the length (1,26 mm.) of this joint; the upper border is slightly curved, it makes a right angle with the distal border and an obtuse one with the proximal. The angle between the distal border and the lower is rounded and bears a short spine; the lower margin, that until the proximal lobe runs parallel with the upper, presents three (in the other specimen four) shallow notches, nearly of the same length and, excepting these notches, it is thickly furnished with long hairs until the tip of the proximal lobe; these hairs are longest on the latter, measuring here 1,5 mm. The propodus presents its greatest width of 0,72 mm. in the middle of the upper border and is thus almost twice as long as broad; the upper border and the outer surface are also hairy. The dactylus, 0,7 mm. long, little more than half as long as the propodus and 3-times as long as thick, tapers to the point and is covered on its outer surface and along its margins with hair.

The slender carpus of the 4<sup>th</sup> legs is 1,7 mm. long and gradually widens distally; being 0,3 mm. broad just in the middle and 0,4 mm. at the distal end, it is 4-times as long as broad. The elongate lamellar propodus proves to be 1,54 mm. long, measured in the middle, and 1,4 mm., when measured along its straight upper margin; it is 0,38 mm. broad near its proximal end, 0,4 mm. in the middle and 0,3 mm. near the distal articulation, so that the propodus appears 4-times as long as broad. Its outer surface is covered with tufts of hair and the low is rather thickly beset with setae, especially distally, whereas one observes on the distal half of the lower border several denticulated setae. The dactylus, 0,66 mm. long, is not yet half as long as the propodus and also thickly beset with hair.

The legs of the 5<sup>th</sup> pair are cheliform and slender. The merus is 2,2 mm. long and 7-times as long as thick, slender; the slightly curved carpus is 1,65 mm. long, a little shorter than the merus, and grows gradually thicker towards the distal end which is 0,4 mm. thick, one-fourth of its length. The propodus is 1,85 mm. long until the tip of the immobile finger, a little longer than the carpus; the fingers are 0,52 mm. long and shut close together. The propodus is also somewhat curved, 0,3 mm. broad at its base and 0,36 mm. near the articulation of the fingers, and is thus 5—6-times as long as broad. The distal end of the propodus and the fingers are concealed by a brush of hair.

Sternal plaque bifid anteriorly, bilobed posteriorly.

The abdominal appendages of the 1<sup>st</sup> segment are slender, uniramous; those of the 2<sup>nd</sup> also slender, but biramous, the three following pairs of pleopods are biramous, but foliaceous, lanceolate; the stylamblys, inserted at two-fifths the length of the endopodite from its base, is very short, 0,3 mm. long, conical and furnished along the distal half of its outer border with cincinnuli. The endopodite is 2,5 mm. long.

The numerous eggs are ovate, 0,6—0,66 mm. long and 0,4—0,45 mm. broad, one and a half times as long as broad.

7. *Callianassa (Cheramus) intermedia* de Man. Pl. XIV, Fig. 21—21d.

*Callianassa intermedia* J. G. de Man, in Tijdschr. Ned. Dierk. Vereen. (2), Dl. IX, 1905, p. 609.

Stat. 5. March 10. Lat.  $7^{\circ}46'$  S., long.  $114^{\circ}30'.5$  E. 330 m. Bottom mud. One female without eggs.

Length 16,4 mm. Carapace, rostrum included, 4,4 mm. long, abdomen 12 mm., carapace, without rostrum, one-third the length of the abdomen. *Lineae thalassinicae* well-developed. Cervical groove deep, distance between the cervical groove and the concave posterior margin of carapace 0,9 mm., one-fifth the length of the latter. Rostrum (Fig. 21) spiniform, reaching a little beyond the middle of 1<sup>st</sup> joint of antennular peduncle, pointed. Carapace smooth, not carinate, without antennal tooth.

As regards the relative length and size of the segments the abdomen agrees with *Call. praedatrix* and other species, smooth above, not carinate. First segment, 1,4 mm. long, saddle-shaped, divided by a transverse groove in a less broad anterior and a wider posterior part, the latter grooved laterally as in other species. Second and 6<sup>th</sup> segments about of equal length, 2<sup>nd</sup> broader than 6<sup>th</sup>, hardly broader than long; the 3<sup>rd</sup>—5<sup>th</sup> as in *Call. praedatrix*, 6<sup>th</sup> 2,2 mm. long and broad (Fig. 21a). Antero- and postero-lateral angles of 6<sup>th</sup> segment with four tufts of setae as in *Call. praedatrix* and other species. The telson much resembles that of *Call. pugnatix*, which occurs at the same locality. As in this species the telson is bilobed and the lateral margins are armed posteriorly with two movable spines (Fig. 21b). Measured in the middle line the telson proves to be 1,68 mm. long, but with the lateral lobes included 1,78 mm.; anteriorly at the level of its greatest width the telson is 1,6 mm. broad, posteriorly at the level of the posterior spines, 1,1 mm. The telson is a little longer than broad, even when measured in the middle line, and somewhat shorter than the 6<sup>th</sup> segment. The lateral margins converge slightly backwards, the lobes are rounded and the notch between them is 0,1 mm. deep, somewhat less deep than in *Call. pugnatix*; different from this species but alike as in *Call. praedatrix*, an acute median tooth is attached on the lower surface of the telson, just near the bottom of the notch and this tooth reaches as far backward as the lateral lobes. A line, that unites the posterior pair of lateral spines, is 0,13 mm. distant from the median notch, nearly as much as the notch is deep; the spines are of equal length and shape, 0,14—0,15 mm. long, curved at their base and directed backward; they are as far distant from one another as they are long. The telson is fringed with plumose setae, those of the lobes are 0,6 mm. long, the long simple hairs on the margins of the lobes are 1,1 mm. long. At one-third its length from the anterior margin the upper surface bears in the middle a transverse row of long plain hairs, of which the longest extend to the end of the telson; a few short hairs exist also near the lateral edges and on the upper surface.

The uropods, on the contrary, resemble more those of *Call. praedatrix*, so that, as regards the characters of the caudal fan, *Call. intermedia* appears intermediate between the two others. Both uropods are short, not extending beyond the telson when directed backward. Basal joint rounded, unarmed, but there is a sharp tooth just near it on the outer uropod, above. Inner uropod 1,44 mm. long, 1,02 mm. broad, oval, not yet one and a half times as long as broad, rounded apically; anterior border straight proximally, posterior arcuate. Three or four slender movable spines, the longest of which is 0,3 mm. long,

are implanted on the apical border externally, 4 or 5 long plain hairs in the middle of it and a few also more inward. The outer uropod is very short, 1,64 mm. long, 1,36 mm. broad distally, only one-fifth longer than broad; 0,7 mm. broad at its proximal end, the outer uropod widens considerably, so that it appears almost twice as broad distally. Anterior border straight, making a right angle with the straight apical border that passes by a regular curve into the inner or posterior margin; antero-external angle obtuse, postero-external rounded. Both uropods are fringed with long multiarticulate hairs, apical border densely furnished, as in other species, with stouter, though also plumose setae, that are not articulate, of different length, the longest measuring 1,1 mm. As in other species the rounded postero-external angle is armed with 9 or 10 long, slender spines, that are curved forward; the first at the end of the inner border is the longest, 0,76 mm. long, the following gradually decrease in length. The outer uropod, similar to that of *Call. praedatrix*, though broader in proportion to its length, carries, as in other species, an additional row of spines that much resembles that of *Call. pug-natrix*. This row, indeed, is strongly arcuate and diverges rather much from the apical border, its inner extremity being 0,56 mm. distant from the anterior border and 0,36 mm. from the apical; it does not extend to the middle of the uropod and is composed of 8 or 9 slender spines, that are as stout as those of the postero-external angle and the innermost of which is the largest, 0,6 mm. long; they are slightly curved forward and project beyond the apical border. The outer uropod presents the two usual midribs and 2 or 3 hairs are observed near the anterior border, not far from the antero-external angle.

The appendages of the two first segments of the abdomen are slender filaments, uniramous on the first, biramous on the second, the three following pleopods are biramous, foliaceous, with a short stylamblys.

The eyestalks that are 0,46 mm. long, little shorter than the 1<sup>st</sup> joint of the antennular peduncle, are just as broad at their base, appearing rather broader than in other species; inner margins contiguous, apices obtuse, outer borders regularly curved and a large spot of black pigment, broader than long, is situated on the middle of the stalk.

Inner antennae 3,1 mm. long, shorter than the carapace. First joint of antennular peduncle 0,52 mm. long, 2<sup>nd</sup> joint, the shortest of all, 0,21 mm. long and 0,19 mm. thick distally; 3<sup>rd</sup> 0,52 mm. long, as long as 1<sup>st</sup> and 2<sup>1/2</sup>-times as long as 2<sup>nd</sup>. The upper flagellum, 1,75 mm. long and 0,13 mm. thick or broad in the middle, is composed of 13 segments, that are nearly all a little longer than thick; so e.g. the 5<sup>th</sup> segment is 0,17 mm. long and 0,135 mm. thick, the 8<sup>th</sup> 0,15 mm. long, 0,13 mm. thick, the last 0,13 mm. long and 0,03 mm. thick at its base. The other flagellum, 1,84 mm. long and 0,07 mm. thick, is little longer, but much thinner, being only half as thick as the other; it consists of 11 segments, as usual slender and longer than thick, so e.g. is the 3<sup>rd</sup> segment 0,24 mm. long and more than 3-times as long as thick. This flagellum is furnished with long plain setae, the other bears the usual olfactory filaments; the flagella are once and a half as long as the peduncle.

The antennal peduncles extend with their terminal joint which is 0,6 mm. long, beyond those of the inner antennae; the penultimate joint is 0,8 mm. long and 0,14 mm. thick in the middle, almost 6-times as long as thick. The 3<sup>rd</sup> joint, that carries on its upper surface a small spine, the scaphocerite, extends as far forward as the 1<sup>st</sup> joint of the antennular peduncle. Flagella lost.

The external maxillipeds and the smaller cheliped are also wanting.

The ischium of the larger cheliped (Fig. 21c), which is placed on the left side, is 2 mm. long and resembles that of *Call. praedatrix*; being 0,4 mm. thick proximally and 0,76 mm. distally, it gradually grows thicker on the distal half, being here almost twice as broad. The lower border is armed with 9 spines that gradually grow longer distally. The merus, 2,2 mm. long and 1,1 mm. broad in the middle, exclusive of the spines, is just twice as long as broad and appears therefore somewhat less broad than that of *Call. praedatrix*; the upper border, much less curved than in this species, bears a short spine near the proximal extremity. The very sharp, expanded, lower margin is denticulate almost along its whole length, being armed with eight slender spines; of these those on the middle of the border are longer than the rest, 0,32 mm. long. The merus is trilateral, the upper surface making an obtuse angle with the lower and the inner surface is flattened; in *Call. praedatrix* this angle is less distinct. The carpus, 1,46 mm. long and 2,08 mm. deep, appears a little longer with regard to the merus than that of *Call. praedatrix*, but has for the rest about the same form. The chela resembles also that of *Call. praedatrix* and is 4,5 mm. long; the palm, 2,8 mm. long and 2,3 mm. broad, somewhat longer than broad, is almost twice as long as the carpus and longer than the fingers; the palm is broader than the carpus and both of the palm and the carpus the upper and the lower border are carinate. The slightly convex, outer surface is smooth, presenting no trace of a groove at the base of the fixed finger as in *Call. praedatrix*. The immobile finger carries one large tooth beyond the middle; the dactylus that is slightly longer, presents a rather small, obtuse tooth in the middle and between it and the tip 8 or 9 smaller teeth that gradually become smaller.

The 2<sup>nd</sup> legs resemble those of *Call. praedatrix* and other species, the carpus is 1 mm. long and 0,64 mm. broad distally.

Merus of 3<sup>rd</sup> legs (Fig. 21d) 1,64 mm. long, 0,42 mm. broad, four times as long as broad; carpus 1,08 mm. long, 0,56 mm. broad, presenting the same form as that of *Call. praedatrix*. The two last joints have also the same form as in this species. The propodus is 1 mm. long, 0,56 mm. broad in the middle, almost twice as long as broad; the lobe on the hinder edge is obtuse, 0,14 mm. long, i. e. one-seventh the whole length; the upper margin is as much curved as in *Call. praedatrix*, the lower presents three shallow notches that decrease in length distally and the first of which is a little farther distant from the distal than from the proximal extremity of the border, i. e. from the tip of the proximal lobe. The dactylus is 0,6 mm. long and 0,2 mm. thick at base, 3-times as long as thick, similar to that of *Call. praedatrix*. At the distal end of the lower border of the propodus not far from the articulation of the dactylus, one observes a movable spine, long 0,12 mm. The setae with which this leg as also those of the 2<sup>nd</sup> pair are fringed, are uncoloured.

The carpus of the 4<sup>th</sup> pair of legs is 1,3 mm. long and 0,38 mm. thick distally; propodus 1,12 mm. long, 0,38 mm. broad, 3-times as long as broad, a little shorter than the preceding joint and less slender than in *Call. praedatrix*. Lower border not prolonged distally as takes place in this species, so that the 4<sup>th</sup> legs are not subcheliform; lower border fringed with setae, that distally are denticulate. Dactylus 0,54 mm. long, 0,18 mm. thick. Sternal plaque bifid anteriorly, bilobed posteriorly.



Fifth legs cheliform as in *Call. praedatrix*. Merus 1,6 mm. long, 0,27 mm. thick in the middle; carpus 1,24 mm. long, 0,32 mm. thick not far from the distal end. Propodus until the distal end of the lower finger 1,28 mm. long, 0,27 mm. broad at the proximal extremity, 0,32 mm. in the middle and at the articulation of the dactylus, which is 0,43 mm. long. Distal end of propodus and dactylus immersed in a brush of long hairs as usual.

Though closely related to *Call. praedatrix*, *Call. intermedia* may be distinguished by the characters of the caudal fan, of the internal antennae, of the merus of the larger cheliped, of the propodus of 3<sup>rd</sup> legs etc.

*Call. intermedia* bears also some resemblance to *Call. (Trypaea) Bouvieri* Nobili from Djibouti, the type of which was kindly sent me for examination by Dr. NOBILI. (G. NOBILI, in: Annales des Sciences Nat. 9<sup>e</sup> Série. Zool. T. IV, Paris 1906, p. 105, Pl. VI, fig. 3). The merus of the larger cheliped has a different form, the dilatation of the lower border being comparatively larger and triangular; the upper border bears several teeth on its proximal half; the carpus is comparatively much larger, being but little shorter than the palm and but little shorter than broad: near the articulation with the chela the carpus is 3 mm. broad, whereas its greatest length in the middle (the posterior border being rounded) measures  $2\frac{2}{3}$  mm. The chela, finally,  $5\frac{1}{4}$  mm. long, has a different shape, the palm being emarginate at the base of the immobile finger, that has a slender, tapering form, slightly curved upwards towards the pointed tip and not toothed at all. The dactylus is armed with 2 or 3 strong teeth and the pointed tip is strongly curved downward.

The caudal fan bears a close resemblance to that of *Call. intermedia*, but the additional row of spines on the outer uropod extends about to the middle, diverges posteriorly little from the apical border and is beset with more numerous, less strong spines. The telson is only slightly concave in the middle of its posterior border, the emargination being less deep than in *Call. intermedia*.

8. *Callianassa (Cheramus) praedatrix* de Man. Pl. XV, Figs. 22—22d.

*Callianassa praedatrix* J. G. de Man, in: Tijdschr. Ned. Dierk. Vereeniging (2) Dl. IX, 1905, p. 607.

Stat. 204. Sept. 20. Between islands of Wowoni and Buton; northern entrance of Buton-strait.

Lat.  $4^{\circ} 20' S.$ , long.  $122^{\circ} 58' E.$  76—94 m. Bottom sand with dead shells. One female without eggs.

A species related to *Call. (Trypaea) maldivensis* Borr. and *Call. (Trypaea) Bouvieri* Nobili. Length 23 mm. Carapace long 5,9 mm., rostrum included, abdomen 17 mm., the carapace measuring about one-third the length of the abdomen. Rostrum spiniform, though rather not sharp, short, reaching to the middle of 1<sup>st</sup> joint of antennular peduncle. No antennal tooth on carapace. Carapace smooth, rounded, not carinate. *Lineae thalassinicae* and cervical groove distinct; distance between the latter and the posterior border of carapace 1,5 mm. long, one-fourth the length of the carapace, rostrum included. Abdomen, except the caudal fan, much resembling that of *Call. jocularis* and *Call. pugnatris*. First segment saddle-shaped, consisting of a less broad anterior and a wider posterior part, separated by a transverse furrow; 1<sup>st</sup> segment 1,8 mm. long, measuring three-fifths the length of the 2<sup>nd</sup>. When BORRADAILE's fig. 3a of *Call. maldivensis* (Fauna and Geography Maldives and Laccadive Archipelagoes, Vol. II, Part 3, Pl. LVIII)

is indeed accurate, then, of course, the 1<sup>st</sup> segment presents in this species a quite different form. Second segment 3 mm. long, quadrate, just as long as the 6<sup>th</sup>, both segments distinctly a little longer than the others. Length of 3<sup>rd</sup> segment three-fourths that of 2<sup>nd</sup>, 4<sup>th</sup> 1,65 mm. long, the shortest of all, 5<sup>th</sup> 2,65 mm. long, little shorter than 2<sup>nd</sup> and even slightly longer than 3<sup>rd</sup>; 6<sup>th</sup> segment (Fig. 22) a little longer than broad, its lateral margins slightly notched not far from the posterior margin, bearing, as in other species, a tuft of long setae on the postero-lateral angles and another between it and the middle line of the segment. Antero- and postero-lateral angles of the 2<sup>nd</sup>—6<sup>th</sup> segments rounded, obtuse.

Telson, measured in the middle line, 2,45 mm. long, on each side of the median notch 2,5 mm., this length being five-sixths that of the 6<sup>th</sup> segment (Fig. 22a). Anteriorly, at one-fourth its length from the anterior margin, the telson is 2,05 mm. broad, presenting here, as also in the middle, its greatest breadth, and appears therefore one-fourth longer than broad. The lateral margins are slightly arcuate in the middle, parallel anteriorly and converge somewhat posteriorly, so that the posterior border, 1,5 mm. broad, measures about three-fourths the greatest width. The posterior border presents a shallow triangular notch in the middle, 0,06 mm. deep and 0,5 mm. broad, i. e. one-third of its breadth; on each side of this median notch the posterior margin is slightly sinuate. The telson is armed in the middle line with a strong pointed tooth, long 0,32 mm., attached to the lower surface, just near the posterior margin and slightly curved forward. The posterior margin is furnished, except on the median notch, with short movable bristles, 0,1 mm. long, between which long plain hairs are inserted, some of which are 2 mm. long; below them one observes plumose setae that slightly become longer laterally, those near the lateral angles are 0,55 mm. long. The rounded postero-lateral angles bear a somewhat curved spine, long 0,25 mm., and not far from it, the lateral margin bears another similar spine of the same shape and size; the two spines are as far distant from one another as they are long. The lateral margins are also supplied with some plumose setae. A little in front of the middle the upper surface carries a transverse row of 8 or 10 bristles with a few long setae in the middle; the latter are 1,7 mm. long, the longest bristles 0,38 mm. Between this row and the lateral margin the telson bears two other smaller sets of bristles, the inner with 3, the other with 4. Three short, close-standing bristles are moreover observed on the upper surface just near the middle of the lateral margins and a few very short setae are dispersed upon it.

Extended backwards, both uropods project beyond the telson, the inner almost by one-third, the outer nearly by half its length. Basal joint unarmed, rounded, but there is a small sharp spine on the upper surface of the outer uropod, at its base. The inner uropod, 2,2 mm. long and 1,4 mm. broad, is oval, broadest in the middle, rounded apically and nearly one and a half times as long as broad. The inner uropod, fringed as usual with feathered hairs, bears on the distal half of its curved, inner or posterior border 9 or 10 slender, slightly curved bristles, the longest of which are 0,45 mm. long; like on the outer uropod there is an additional series of 12 or 13 similar bristles or spines close to the apical border externally. A few short bristles are placed, behind one another, on the upper surface near the anterior border; on the right uropod one observes 6 other bristles in two sets respectively of 4 and 2 on the distal end near the inner border, on the left 3, namely 2 more inward, the 3<sup>rd</sup> on the

middle line of the plate, all short and of unequal length. The breadth of the inner uropod is two-thirds that of the telson. The outer uropod, 2,9 mm. long and 2 mm. broad, not yet one and a half times as long as broad, is one-third longer than the inner and has a characteristic form. The nearly straight anterior border makes namely a right angle with the distal or apical one and this angle is not at all rounded or obtuse, as e. g. in *Call. jocularix*, but distinctly angular; the distal border, also nearly straight, regularly curves into the posterior that is also slightly arcuate; this uropod presents therefore its greatest width about at one-third its length from the distal border and appears here just as broad as the telson. The outer uropod, fringed as usual with multiarticulate ciliated hairs, is very thickly beset with stouter, though also ciliated setae on the distal border, of which the longest measure 1,5 mm. As in other species the distal third of the posterior border is armed with 10 slender spines, which are slightly curved forward and 0,85 mm. long; this distal third part of the posterior border is not concave as in *Call. jocularix*, but slightly convex, like the rest of this border. The additional series of short bristles, 0,7 mm. long, does not yet extend to the middle of the distal border and is nearly contiguous to it, diverging in a still less degree from the border than in *Call. jocularix*. Except a few small bristles near the distal half of the anterior border, the upper surface is glabrous and unarmed, but presents, as usual, two ribs down the middle, that of the inner one.

First pleopods slender, uniramous, second also slender, biramous. The pleopods of the three following pairs are biramous, foliaceous, with a stylamblys that is somewhat shorter than its distance from the base of the endopodite.

The triangular eyestalks, 0,8 mm. long and 0,5 mm. broad at their base, one and a half times as long as broad and longer than the rostrum, reach almost to the distal end of 1<sup>st</sup> antennular article; their straight inner margins are separated by a narrow interspace and their apex is obtuse; the slightly convex cornea is situated on the middle of the stalk on its outer side and there is a small spot of black pigment situated somewhat farther from the tip than from the base.

The inner antennae, 5,2 mm. long, are almost as long as the carapace, rostrum included. First joint of their peduncle 0,86 mm. long, 2<sup>nd</sup>, the shortest of all, 0,38 mm. long and 0,3 mm. thick at the distal end; 3<sup>rd</sup> joint 1,14 mm. long, 3-times as long as the 2<sup>nd</sup>, 0,2 mm. thick in the middle, slender, almost 6-times as long as thick, supplied, like the 2<sup>nd</sup>, on its lower surface with long hairs. Flagella of subequal length, 2,8 mm. long, a little longer than the peduncle (2,4 mm). Upper flagellum 0,11 mm. thick, barely thicker than the other, composed of 23 segments, that are partly as long as, partly a little longer than thick; the 9<sup>th</sup> segment, 0,18 mm. long and one and a half times as long as thick, is slightly longer than the rest; the segments of the distal half are as long as thick, except the terminal one, which is 0,14 mm. long, 4-times as long as thick at its base. Olfactory hairs few in number. The other flagellum, 0,08—0,09 mm. thick, consists of 16 segments, that are longer than thick and become slenderer distally; it is furnished with more and longer hairs than the upper.

The antennal peduncle extends almost with the whole terminal joint beyond the distal extremity of the peduncle of the inner antennae. The 2<sup>nd</sup> joint, furnished above with a curved

spine, as small as in the other species, reaches as far forward as the 1<sup>st</sup> joint of the antennular peduncle; the 4<sup>th</sup> joint, 1,4 mm. long and 0,16 mm. thick in the middle, being here less thick than the 3<sup>rd</sup> joint of the other peduncle, though slightly thickening at both extremities, is 8 or 9-times as long as thick. The terminal joint, 1 mm. long, is 0,14 mm. thick in the middle; the flagella are lost.

The external maxillipeds (Fig. 22*b*) closely resemble those of *Call. (Calliactites) rotundicaudata* Stebbing (South African Crustacea, Pt. II, 1902, Pl. VIII, mxp. 3). The first two joints small, unarmed. Ischium and merus as much expanded as in this species, the former 1,64 mm. long and 1,11 mm. broad in the middle, one and a half times as long as broad; posterior margin 0,6 mm. broad, anterior border that articulates with the merus, 1 mm. broad, somewhat oblique, parallel with the posterior; outer border straight, inner very slightly curved and densely fringed with hairs that are little shorter than the merus is broad. A few setae are inserted on the outer surface of the ischium, especially anteriorly. The inner surface of the ischium carries, as in other species, a prominent comb, that runs nearer to the outer border than to the inner; this comb, which is slightly curved outward at its posterior extremity, is armed with 33 acute teeth of various size, larger teeth alternating with smaller ones. Measured in the middle, the merus proves to be 0,92 mm. long, exclusive of the anterior spine and 1,04 mm., when the spine is included; the merus, 1,24 mm. broad, is a little broader than long and slightly broader than the ischium. The posterior margin that articulates with the latter, is 0,85 mm. broad; the outer border is regularly curved as in *Call. rotundicaudata*. In the middle of its anterior border the merus is armed with a rather small, sharp spine, directed inward, 0,11 mm. long; from this spine until the postero-internal angle the border appears regularly curved, an antero-internal angle wanting completely; the rest of the anterior border between the spine and the antero-external angle is slightly concave. The arcuate inner margin is fringed with hairs, partly ciliated like those on the inner margin of the ischium; the outer surface on which many ciliated hairs are dispersed, is covered near the antero-internal border with very numerous, microscopical teeth or tubercles, that are 5 or 6  $\mu$  long; the row of setae on the inner surface is strongly developed. Carpus and propodus of subequal length, the carpus being 0,8 mm. long, the propodus 0,94 mm.; the former is 0,48 mm. thick distally, the propodus presents its greatest width of 0,53 mm. at two-fifths its length from the proximal articulation, being here a little more than half as broad as long. The somewhat tapering dactylus, 0,6 mm. long, is a little shorter than the two preceding joints and its greatest width, not far from the articulation, is one-third its length. The three last joints are provided with long hairs as in other species.

Ischium and basipodite combined of the right cheliped, the larger one, are 3,4 mm. long. The ischium, 0,68 mm. broad proximally, is much thickened on its distal half, being here 1,2 mm. broad, almost twice as thick as at the proximal extremity; the lower border is armed with 11 small spines, that slightly grow longer distally, the first being 0,03 mm. long, the last 0,15 mm., measured on their anterior edge. The merus, 3,5 mm. long and 2,4 mm. broad in the middle, is broadly oval, its lower margin being regularly dilated, so that this joint presents its greatest width in the middle of its length; it is almost one and a half times as long as broad. The lower surface is flattened,

the upper somewhat convex both transversely and longitudinally. The not very sharp upper border is regularly curved and nearly glabrous, the much sharper, lower border is denticulate almost along its whole length, the smaller proximal half armed with 6 small spines, nearly as long as those of the ischium, the rest of the border presenting small irregular, obtuse denticulations; the lower margin is also fringed with short hairs, implanted on the lower surface. The carpus, which is unarmed, proves to be 2,1 mm. long, measured along its upper margin, shorter than the merus, 3,36 mm. deep, more than one and a half times as deep as long; its regularly curved posterior margin is little expanded. Chela 7,15 mm. long, palm 4,4 mm. long and 4 mm. broad; the palm is twice as long as the carpus and slightly longer than the fingers. The outer surface of the palm which is a little longer than broad and a little broader than the carpus, appears slightly convex, both transversely and longitudinally; it is marked with a short longitudinal groove, that runs parallel with and not far from the lower border, at the base of the immobile finger; smooth in the middle and near the upper and lower margins that are carinate, the palm appears somewhat rugose on the rest of its outer surface. The inner surface of the palm is more flattened, presents, however, also a trace of a groove at the base of the fixed finger and appears at the level of this groove also a little rugose. The lower border of the palm is entire, not saw-like as in *Call. maldivensis*, and fringed, like the lower edge of the carpus, with short hairs within; the fingers, setose as in other species, are hardly denticulate; lower border of the fixed finger carinate.

Smaller cheliped wanting.

Second legs similar to those of *Call. rotundicaudata* and other species: the carpus is 1,5 mm. long and 0,83 mm. broad distally.

The legs of the 3<sup>rd</sup> pair (Fig. 22d) much resemble those of *Call. pugnatrix* de Man. Merus 2,3 mm. long, 0,66 mm. broad,  $3\frac{1}{2}$ -times as long as broad; carpus 1,7 mm. long, 0,88 mm. broad at the distal end, upper border straight, not slightly concave as in *Call. pugnatrix*. The propodus is 1,6 mm. long, 0,94 mm. broad in the middle, its upper border a little more curved than in *Call. pugnatrix*, the joint appearing therefore somewhat broader than in that species. The lobe on the hinder edge, 0,26 mm. long, one-sixth the length of the propodus, appears a little less obtuse, the proximal half of the lower border being straighter; the distal half of the latter is slightly emarginate at three places, the three shallow notches are of equal length and the first is a little farther distant from the proximal than from the distal end of the border. The distal border that articulates with the dactylus, is 0,4 mm. broad; there is a short spine, 0,1 mm. long, close by the distal end of the lower border. The dactylus, 0,9 mm. long, is 0,36 mm. broad and is a little thicker than in *Call. pugnatrix*. The hairs on the lower border of carpus and palm are, both in the 2<sup>nd</sup> and 3<sup>rd</sup> legs, orange coloured at their base.

Merus of 4<sup>th</sup> legs 2,75 mm. long and 0,53 mm. broad in the middle, 5-times as long as broad; carpus 1,9 mm. long, 0,47 mm. thick distally, 4-times as long as thick; propodus 1,92 mm. long, as long as the carpus, 0,415 mm. broad in the middle, almost 5-times as long as broad. The lower border of the propodus is prolonged distally into a short triangular tooth, so that this leg appears slightly subcheliform; the lower margin is fringed with long

hairs, that are orange-coloured at their base and it is thickly clothed with denticulate setae distally. The dactylus is 0,8 mm. long and 0,26 mm. thick in the middle, 3-times as long as thick, it does not taper from the base to the tip as in *Call. pugnatrix*, but appears even a little narrower at its base, viz., 0,24 mm.; it is furnished also with orange coloured hairs.

The 5<sup>th</sup> legs are cheliform. Merus 2,3 mm. long, 0,36 mm. broad in the middle; carpus 1,7 mm. long, 0,46 mm. thick not far from the distal extremity. The propodus is 2 mm. long until the extremity of the fixed finger, 0,4 mm. broad in the middle and 0,42 mm. at the articulation of the dactylus; the slightly curved dactylus, 0,56 mm. long, is but very little longer than the immobile finger. The distal end of the propodus, as far as a line running from the articulation of the dactylus to the middle of the lower border, as also the dactylus, are immersed in a brush of long hairs.

*Call. (Trypaea) Bouvieri* Nobili from Djibouti is at once distinguished by the characters of the larger cheliped, by the antennal peduncle being shorter than that of the inner antennae etc. (Confer p. 146).

9. *Callianassa (Cheramus) pugnatrix* de Man. Pl. XV, Figs. 23, 23a; Pl. XVI, Figs. 23b-23e.

*Callianassa pugnatrix* J. G. de Man, in: Tijdschr. d. Nederl. Dierk. Vereeniging, (2) Dl. IX, 1905, p. 611.

Stat. 5. March 10. Lat. 7°46' S., long. 114°30'.5 E. 330 m. Bottom mud. One specimen.

A species probably of small size. Length, rostrum included, 15 mm., carapace 4,2 mm. long, abdomen 10,8 mm.; carapace, rostrum included, longer than one-third the length of the abdomen, exclusive of the rostrum it measures exactly one-third of it. Carapace smooth, without antennal tooth. *Lineae thalassinicae* and cervical groove distinct, distance between the latter and the concave hind border one-fifth the length of the carapace, rostrum included. Rostrum (Fig. 23) slender, spiniform, as long as first joint of antennular peduncle.

Abdomen resembling that of *Call. jocularis* as regards the relative length of the segments, excepting the telson, which has a quite other form than in that species, with which it has been taken at the same Station. First segment considerably shorter than 2<sup>nd</sup>, narrowed in the middle, wider posteriorly than anteriorly. Second segment 2 mm. long, 2,2 mm. broad, distinctly longer than the rest; 3<sup>rd</sup> segment two-thirds of the 2<sup>nd</sup>, 4<sup>th</sup> a little shorter than 3<sup>rd</sup>, 5<sup>th</sup> slightly longer than it; the 6<sup>th</sup> segment (Fig. 23a), 1,9 mm, long and 2 mm. broad anteriorly, is a little less broad than the 2<sup>nd</sup>, but very little shorter; the lateral margins which are slightly notched not far from the posterior border, converge somewhat backward, so that the posterior margin, which is slightly sinuate in the middle, appears a little less broad than the breadth of this segment anteriorly. The hind border of the 6<sup>th</sup> segment bears, as in other species, a tuft of hairs on the rounded lateral angles and another between that tuft and the middle line. The broadened posterior part of the saddle-shaped, first segment is furrowed laterally. Postero-lateral angles of the four following segments obtuse; pleura of the 3<sup>rd</sup>—5<sup>th</sup> segments with a large pit, furnished with setae, near the middle of their lateral margin and another smaller one behind it; a similar hairy, impressed point is also observed on the 2<sup>nd</sup> segment near the postero-lateral angle.

Telson bilobed posteriorly, the rounded lobes separated from one

another by a deep notch, that bears in the middle line a slender acute tooth (Fig. 23 $\delta$ ). Measured in the middle line, the telson proves to be 1,6 mm. long to the extremity of the median tooth and 1,47 mm., when the tooth is excluded; measured to the posterior end of the lateral lobes, the telson appears 1,66 mm. long. Anteriorly where the telson shows its greatest width, it is 1,48 mm. broad; posteriorly at the level of the bases of the posterior lateral spines the width is 1,12 mm. The telson appears nearly quadrate, slightly longer (the lobes included) than broad anteriorly; the antero-lateral angles are rounded, the lateral edges, that are a little concave in the middle, distinctly converge backwards and the slender median tooth reaches not yet as far backwards as the rounded lateral lobes. Posteriorly the lateral margins bear two movable spines of equal length, 0,11 mm. long (Fig. 23 $\delta$ ); of these spines that are nearly as long as the median tooth, the posterior is inserted a little before the base of that tooth, the other twice as far distant from the posterior as the spines are long. At one-fourth its length from the anterior border the telson presents in the middle a transverse row of setae, 4 or 5 on either side of the middle line; nearest to the middle line a long hair, 0,7 mm. long, next to it a much stouter, though shorter seta, then a similar still shorter seta and a short hair. Three or four hairs, each with a much shorter one near it, are observed near the lateral margins and a few minute hairs exist on the upper surface. The rounded lobes are fringed with ciliated setae and on the outer part of their border with a tuft of longer plain hairs, some of which are 0,9 mm. long.

The uropods, extended backward, project beyond the telson, the inner by one-third, the outer by half its length; the basal joint is armed with a small spine. The oblong inner uropod, 1,55 mm. long, 0,82 mm. broad, is almost twice as long as broad, anterior border straight, posterior a little curved, extremity rounded, obtuse; the upper surface bears on the proximal half one shorter and two larger setae, one, 0,56 mm. long, just before the middle, nearer to the middle line of the plate than to the anterior border, another of the same length about in the middle between the former and the base of the plate, a third seta, 0,23 mm. long, is inserted just near and on the inner side of the first. The inner uropod is fringed with long, ciliated, articulated setae; on the outer side of the obtuse distal extremity are 2 or 3 rather short, slender setae and between these and the inner border several long plain hairs. The outer uropod, 1,86 mm. long and 1,24 mm. broad, is longer than the inner and just one and a half times as long as broad; rather narrow, 0,7 mm. broad, near the articulation it gradually widens along two-thirds its length from the base, is distally broadly and regularly rounded and appears therefore pear-shaped. The borders are fringed with ciliated articulated hairs, the rounded apical border is moreover furnished with long, stiff, ciliated setae, that are 1,3 mm. long and diminish in length towards the anterior margin; on the inner part of the distal border, between the long setae and the inner margin, occur, as in other species, 7 or 8 slender, not ciliated spines that are slightly curved forward and on the remaining outer part of the distal border several shorter straight spines. The additional row of spines on the antero-external part of the upper surface is rather much curved, but short, 0,3 mm. long, measuring only one-fourth the width of the uropod; it diverges rather considerably from the distal border, the inner end of the row being as far distant from it as the row itself is long. The row is composed of 9 or 10 spines,

that reach a little beyond the distal border of the plate. The inner uropod bears one, the outer two ribs down the middle; the inner uropod is a little more than half as broad as the telson, the outer appears in the middle as broad as it.

The genital apertures were irrecoznizable, so that it remained doubtful whether this specimen is a male or a female. The 1<sup>st</sup> segment of the abdomen bears a pair of slender, rather short, uniramous filaments, the 2<sup>nd</sup> is devoid of appendages, but has perhaps lost them. The pleopods of the three following segments are foliaceous, the exopodite slightly longer but almost as broad as the endopodite; all provided with a stylamblys long 0,3 mm., just half as long as its distance from the base of the endopodite.

Eyestalks (Fig. 23) triangular, very little shorter than basal antennular article, of the usual shape, blackish pigmented at the base of the yellowish coloured, distal half of the stalks.

Inner antennae 3,2 mm. long, three-fourths the length of the carapace. Antennular peduncle 1,5 mm. long; length of 1<sup>st</sup> joint, i. e. the distance between its distal extremity and a line uniting the postero-lateral angles of the eyestalks, 0,58 mm. long, 2<sup>nd</sup> joint 0,24 mm. long, the shortest of all, 0,2 mm. thick distally; 3<sup>rd</sup> 0,7 mm. long, 0,17 mm. thick in the middle, 3-times as long as 2<sup>nd</sup>. Second and third joint provided on their lower border with some long plain hairs, the longest measuring one millimeter. The upper flagellum, the distal half of which is provided with olfactory filaments, is much thicker and a little shorter than the other; it is 1,4 mm. long and composed of 12 or perhaps 13 segments, that are short and thick, except the last one. In a lateral view the 1<sup>st</sup> segment appears one and a half times as long as thick at the distal end, the 2<sup>nd</sup>, 0,1 mm. long, is once and a half as broad; the following segments are also thicker than long, the 6<sup>th</sup>, 0,16 mm. long and 0,18 mm. thick, is the thickest of all; the 8<sup>th</sup> segment is 0,13 mm. long, 0,14 mm. thick, the three following, gradually smaller, are as long as thick, the terminal segment, that tapers, is 0,12 mm. long and 0,04 mm. thick at base. The lower flagellum is 1,7 mm. long, a little longer than the upper; it is composed of 9 segments, which are nearly all slender, longer than thick. The 1<sup>st</sup> segment, 0,09 mm. long, appears in a lateral view, almost just as broad; the 2<sup>nd</sup>, 0,12 mm. long, is once and a half as long as thick; the four following are subequal, measuring 0,16 mm. and nearly twice as long as thick; the 7<sup>th</sup> segment, 0,24 mm. long, is almost 4-times as long as thick and appears a little longer than the rest, the penultimate measuring 0,2 mm., the terminal segment, finally, 0,19 mm. Both flagella, the lower of which is a little longer than the peduncle, carry a few long hairs at the distal end of their segments.

Antennal peduncle (the flagella of either of them are lost) little longer than that of the inner antennae, extending by half its terminal joint beyond it. The 2<sup>nd</sup> joint that reaches almost as far forward as the 1<sup>st</sup> joint of the antennular peduncle, bears, as in *Call. modesta* and *Call. jocularis*, a small slender spine, 0,16 mm. long and slightly curved inward. The 4<sup>th</sup> or penultimate joint, 0,7 mm. long, reaches to the middle of the 3<sup>rd</sup> joint of the other peduncle and the terminal joint is little more than half as long as the penultimate.

The external maxillipeds (Fig. 23c) closely resemble those of *Call. (Calliactites) modesta* de Man, but the merus bears no spine on its anterior border. The two first joints are small. The almost rectangular ischium is 0,92 mm. long, 0,49 mm. broad posteriorly, whereas the anterior border is 0,4 mm. broad; in the middle this joint appears exactly half



as broad as long; outer margin slightly concave, inner straight, postero-external and postero-internal angles rounded. The merus has a slightly curved outer margin, that is 0,6 mm. long; its posterior border that articulates with the ischium, is 0,36 mm. broad; the anterior margin is straight, 0,48 mm. broad and runs somewhat oblique, because the arcuate convex inner margin, into which it passes without forming an angle, is considerably shorter than the outer. The merus appears therefore a little broader than the ischium and anteriorly once and a half as broad as at its base. The three last joints resemble those of *Call. modesta*, the propodus, however, is a little broader, this joint being 0,55 mm. long and 0,34 mm. broad. As regards the long, plain hairs, with which the three last joints and the inner border of merus and ischium are fringed, this species agrees with *Call. modesta*, a few setae are also observed on the outer surface of ischium and merus. The prominent comb, armed with 27 or 28 sharp teeth of different size, larger teeth alternating with 2 or 3 smaller ones, also resembles that of *Call. modesta*, as regards its form and situation, and both species agree likewise as regards the rows of hairs on the inner surface of the following joints.

The ischium-joint of the left cheliped (Fig. 23d), the larger one, is together with the basipodite 2 mm. long. This joint, that widens towards the distal extremity, being here 0,73 mm. broad, proximally, however, 0,4 mm., has the lower margin armed with six acute spines that slightly increase in length; the first spine is as far distant from the proximal extremity as the 6<sup>th</sup> from the distal. The slightly concave upper margin carries some setae. The merus, 1,8 mm. long, nearly as long as the ischium, is just twice as long as broad and armed at the base of its lower margin with a very strong tooth or spine, the pointed tip of which is curved forward and that appears as long as the merus is broad at its base. The lower margin bears some hairs along its whole length and a few are observed on the slightly curved upper border. Carpus compressed as in other species, 2 mm. long, measured along its upper margin, and 1,84 mm. broad distally; distal extremities of both upper and lower margin obtuse, the lower fringed with hairs, that are 0,65 mm. long. Measured along its lower border the chela proves to be 4 mm. long; the palm is 2,5 mm. long and presents its greatest width of 2 mm. at one-third its length from the carpal articulation, so that it is a little longer than wide. The palm that slightly narrows distally, is distinctly longer than the fingers that cross one another when closed, and also longer than the carpus. The immobile finger carries one strong conical tooth in the middle and on each side of it the cutting-edge presents minute, hardly perceptible denticulations; the dactylus bears a long depressed tubercle just behind the middle of its cutting-edge; this tubercle or tooth that measures one-fifth the length of the finger, appears slightly concave and does not extend to the articulation; between the tooth and the extremity of the finger the cutting-edge presents fine denticulations, that at first are a little larger than those of the fixed finger, but become distally also almost hardly perceptible and do not reach to the tip. The distal border of the palm bears moreover a small obtuse tooth just above the cutting-edge of the immobile finger. The upper and the lower border of the carpus are carinate as also the lower border of the chela and the upper of the palm. The lower border of the chela is fringed with similar hairs as exist on the carpus and the pointed fingers bear the usual tufts of hair.

The 2<sup>nd</sup> chelipeds resemble those of *Call. modesta*, but they have a stouter shape.

The merus, 1,8 mm. long, is 0,57 mm. broad, almost three, instead of four, times as long as broad and appears widest not beyond the middle, but a little before it. The carpus, 1 mm. long, is 0,6 mm. thick at the distal end; the chela, finally, 1,44 mm. long (palm 0,44 mm., fingers 1 mm.), is 0,71 mm. broad, almost exactly half as broad as long.

The merus of the 3<sup>rd</sup> legs (Fig. 23e) is 1,5 mm. long and 0,41 mm. broad in the middle, being almost 4-times as long as broad; the lower border is provided with a few distantly placed hairs, the proximal of which are longer than this joint is broad. The carpus is 1 mm. long and exactly half as broad distally. The lobe on the hinder edge of the propodus is little developed and obtuse, so that in my opinion this propodus forms a connecting link between the propodus of a species of the subgenus *Calliactites*, e. g. *Call. modesta*, and that of one of the subgenera *Trypaea* or *Callichirus*, in which this lobe is large and well-developed. The propodus is 1,13 mm. long and 0,58 mm. broad a little beyond the carpal articulation, at two-fifths the length of the propodus from its posterior extremity; the propodus is thus half as broad as long. The length of the obtuse posterior lobe, i. e. the distance between its posterior extremity and the carpal articulation, 0,18 mm., is but one-sixth the length of the propodus; the propodus narrows towards the distal extremity, the distal margin that articulates with the dactylus, being 0,2 mm. broad. The lower border is armed with an apparently movable spine, long 0,24 mm., at the distance of 0,13 mm. from the distal end; posterior to this spine the lower border appears in one leg two, in the other three times slightly emarginate on the distal half and these notches are of unequal length, the distal one being the longest; the long setae are in these notches wanting. Long setae are also observed on the distal half of the upper border and on the outer surface of the propodus, like also on the extremities of both the upper and the lower border of the carpus. The tapering dactylus, 0,56 mm. long and 0,16 mm. broad at its base, is just half as long as the propodus and also fringed with hairs.

The merus of the 4<sup>th</sup> legs is 1,7 mm. long and 0,35 mm thick in the middle, 5-times as long as thick, with a few setae, long 0,7 mm., at the end of the upper border. Carpus 1,2 mm. long, 0,32 mm. thick at the distal end, 4-times as long as thick. Propodus 1,26 mm. long, almost as long as the carpus, 0,36 mm. broad in the middle, 3 $\frac{1}{2}$ -times as long as broad; this joint narrows a little distally, the distal margin that articulates with the dactylus, being 0,2 mm. broad. Lower margin fringed with long hairs, that are here and there ciliated, and supplied along its distal third with shorter setae, that are regularly ciliate on their anterior margin; at the distal end one observes, as in *Call. jocularis*, a stronger seta, that is 0,36 mm. long and 0,026 mm. thick at its base, two-thirds the length of the dactylus, and the distal half of the anterior margin of this seta carries 9 small teeth. Dactylus 0,56 mm. long and 0,15 mm. broad at its base; it is straight, provided with long hairs on each side. Propodus and dactylus are also furnished with long hairs on their outer surface, near the upper margin.

Sternal plaque posterior to 4<sup>th</sup> pair of legs as in *Call. jocularis*, bilobed posteriorly.

The legs of the 5<sup>th</sup> pair are wanting.

10. *Callianassa (Cheramus) pygmaea* n. sp Pl. XVI, Figs. 24—24g.

Stat. 181. Sept. 5/11. Ambon-anchorage. 54 m. Bottom mud, sand and coral. Two females, one of which is egg-bearing.

The two specimens are unfortunately badly damaged, in one the larger cheliped and the legs of the 4<sup>th</sup> pair are wanting and the antennal flagella incomplete, in the other both antennulae, both external maxillipeds and both legs of the 1<sup>st</sup> pair are lost, while the legs of the 3<sup>rd</sup> and 4<sup>th</sup> pair are also wanting or incomplete; the latter specimen bears still about a dozen of eggs, that are globular with a diameter of 0,3 mm. and of a red-brown colour.

The first specimen that will be described, is about 11 mm. long from tip of rostrum to end of telson and belongs thus to the species of small size, like *Call. (Calliactites) modesta* and *Call. (Cheramus) propinqua*, though *Call. (Cheramus) minima* Rathbun from Porto Rico is still smaller, the male being only 9 mm. long. In this specimen from Stat. 181 the carapace proved to be 2,85 mm. long, about one-fourth the whole length. Rostrum (Fig. 24 and 24a) spiniform, acuminate, arising from the whole width of the frontal border, with the lateral borders concave, and almost as long as basal antennular article; no lateral frontal teeth or prominences. Distance between the cervical groove and the posterior border of the carapace 0,42 mm., one-seventh the length of the carapace.

Second segment of abdomen 1,7 mm. long, the longest of all; 6<sup>th</sup> segment (Fig. 24b) 1,4 mm. long, presenting its greatest width of 1,26 mm. a little behind the 5<sup>th</sup> segment, a little longer than broad, lateral borders slightly convergent and notched at the posterior fourth. Telson, measured in the midline, 0,8 mm. long, at either side of the triangular median sinus 0,83 mm.; there is a very small, sharp tooth in the sinus, which tooth is 0,025 mm. long. The telson, which is a little more than half as long as the 6<sup>th</sup> segment, presents its greatest width of 0,96 mm. at one-third its length from the posterior border of that segment and proves to be one-seventh broader than long; behind the greatest width the lateral margins are slightly concave, converge and pass with a regular curve into the posterior lobes. At either side (Fig. 24c) two movable spinules are implanted, the anterior 0,04 mm., the posterior 0,06 mm. long and 0,025 mm. distant from one another; the anterior spinule is implanted at the end of the lateral margins. At the level of the greatest width in a transverse line 3 or 4 small spinules are implanted on the upper surface and a few long setae that reach to the posterior extremity.

Uropods much longer than telson. From the distal border of the unarmed basal joint a spiniform process proceeds on to the outer uropod. The outer uropod is 1,35 mm. long, 0,76 mm. broad, almost twice as long as broad, presenting its greatest width at the distal third. Anterior border a little curved on its distal half, armed with a movable spine, long 0,13 mm., at one-fourth its length from its distal extremity; the anterior border makes a distinct obtuse angle with the distal border that is rounded and regularly curves into the arcuate posterior border; overagainst the movable spine on the anterior border on the posterior the first of a row of movable, slender, curved spines is implanted, which is 0,45 mm. long and followed on the distal border by about a dozen similar spines, that gradually decrease in length, until near the antero-external angle of the uropod; the additional row of bristles that runs from this angle backward, is very short, 0,14 mm. long and diverges but little from the distal border. Inner uropod 1,1 mm. long, 0,52 mm. broad, twice as long as broad, obtusely rounded distally; as in *Call. (Cheramus) lobetobensis*, the nearest related species, at one-third of its length the anterior border is armed with a small, acute, immovable spine, between the basal joint and this spine the anterior border is glabrous; in front of the tip the anterior border bears a few movable

spinules. At a distance of 0,3 mm. from the base of this uropod on the upper surface a movable spinule is implanted, 0,21 mm. long, twice as far distant from the posterior as from the anterior border.

Eyestalks of the usual shape, as long as or a trifle longer than the basal joint of the antennular peduncle, with the inner margins contiguous till near the tips that are acute, outer borders arcuate; eyes black, small, not far from the tip, contiguous to the outer border.

Inner antennae 2,2 mm. long, about three-fourths the length of the carapace, the peduncle 1,24 mm. long, the longer flagellum 0,96 mm.; 2<sup>nd</sup> joint half as long as 1<sup>st</sup> or basal article, once and a half as long as thick; 3<sup>rd</sup> joint 0,6 mm. long, almost 3-times as long as 2<sup>nd</sup>, slender, 5-times as long as thick in the middle; thicker upper flagellum 0,8 mm. long, one-third longer than the 3<sup>rd</sup> joint of the peduncle and composed of 12 segments, of which the 1<sup>st</sup> or proximal one is longer than thick, all the following broader than long, except the terminal which is about thrice as long as thick. The lower thinner flagellum (Fig. 24*d*) measures 1 mm., one-fourth longer than the upper and consists of 13 segments, of which the 1<sup>st</sup> is longer than broad, the following as long as or little longer than thick, the 11<sup>th</sup> or antepenultimate almost, the 12<sup>th</sup> just twice as long as thick, the terminal segment 0,14 mm. long, slender, 6- or 7-times as long as thick.

Antennal peduncle a trifle longer than that of the inner antennae, scaphocerite represented by a small acute spine, 0,1 mm. long; penultimate joint 0,56 mm. long, 0,1 mm. thick in the middle, 5-times as long as thick and reaching to the middle of the 3<sup>rd</sup> joint of the antennular peduncle; terminal joint 0,38 mm. long, two-thirds the length of the preceding; flagellum incomplete.

The external maxillipeds (Fig. 24*e*), that much resemble those of *Call. (Cheramus) pug-natrix*, to which *Call. pygmaea* is closely related, are pediform and narrow. Ischium 2,3-times as long as broad in the middle, presenting its greatest width, which is nearly half the length, near the base and hence slightly narrowing forward; outer margin slightly concave, inner slightly convex; merus quadrangular, unarmed, half as long as the ischium, nearly as long as broad, outer and inner borders slightly curved, the outer longer than the inner; antero-external angle rounded, antero-internal subacute, anterior distal margin oblique; propodus about as long as the merus, not expanded, twice as long as broad; dactylus conical, a little shorter than the propodus, almost 3-times as long as broad at its base.

The smaller cheliped (Fig. 24*f*) is placed at the left side. Ischium 1,1 mm. long, 0,26 mm. broad in the middle, 4-times as long as broad, slightly widening distally; upper border nearly straight, unarmed, lower a little concave and armed with four, slender, sharp spines of equal length, the two middle ones a little farther distant from one another than the rest; merus 1,06 mm. long, 0,42 mm. broad in the middle, nearly as long as the ischium, not longer, 2,5-times as long as broad; it has an oval shape, upper border unarmed, lower armed just behind the middle with a slender acuminate spine, which is half as long as the joint is broad in the middle. Carpus 1,6 mm. long, once and a half as long as the merus, slender, 4-times as long as broad; both margins unarmed, the upper straight, the lower from the distal extremity nearly to the middle barely, hence rather rapidly converging towards the upper border. Chela 1,75 mm. long, a trifle longer than the carpus; near the articulation of the fingers, where it shows the greatest width, the chela is 0,52 mm. broad, being 3,4-times as long as

broad; palm 0,7 mm. long, decreasing in breadth towards the proximal extremity, fingers about one-third longer than the carpus, gradually tapering to the pointed tips that cross one another, cutting-edges straight, without teeth; lower border of the chela straight, fringed with setae to the tip of the finger.

The 2<sup>nd</sup> legs show the usual form as in the other species of this genus. Merus 1,25 mm. long, presenting its greatest width of 0,4 mm. about at the proximal third; hence the merus decreases in width both proximally and distally, lower border S-like, fringed with long setae along the two proximal third parts; carpus 0,7 mm. long, little more than half as long as the merus, its width or breadth two-thirds the length; chela 0,9 mm. long, palm 0,3 mm., fingers, measured horizontally, 0,6 mm., palm 0,52 mm. broad; carpus and chela setose.

The legs of the 3<sup>rd</sup> pair (Fig. 24g) also much resemble those of *Call. pugnatrix*. Merus 1 mm. long, 0,34 mm. broad in the middle, 3-times as long as broad, carpus 0,8 mm. long, 0,34 mm. broad, a little more than twice as long as broad; propodus from the distal border to the obtuse tip of the posterior lobe 0,82 mm. long, as long as the carpus, half as broad as long; posterior lobe triangular, obtuse, rather small, its length measuring only one-fifth the whole length of the joint, lower border fringed with long setae, that are once — in the other specimen twice — interrupted on the distal half by a glabrous, slightly concave emargination; a movable spine, long 0,16 mm., is implanted at the distal extremity of the border; dactylus long 0,34 mm., almost half as long as the propodus, 3-times as long as broad at base.

Legs of the 5<sup>th</sup> pair cheliform. Merus 0,96 mm. long, 0,16 mm. broad, slender, 6-times as long as broad, carpus 0,65 mm. long, 0,2 mm. thick distally, measuring nearly two-thirds the length of the merus and 3-times as long as thick, chela 0,8 mm. long, fingers very short, 0,16 mm. long, one-fifth the length of the chela; chela 4-times as long as broad, presenting its greatest width at the finger-cleft, fingers concealed by a brush of long setae.

The pleopods of the 1<sup>st</sup> segment are uniramous, short, two-jointed filaments, 0,4 mm. long; the basal joint is very short, 0,07 mm. long, the other, 0,33 mm. long, almost 5-times as long, becoming broader distally and provided here with long setae; the pleopods of the 2<sup>nd</sup> pair are also narrow, but biramous filaments, those of the three following segments are lamelliform.

The nearest allied species of *Call. pygmaea* are *Call. (Cheramus) lobetobensis* de Man and *Call. (Cheramus) pugnatrix* de Man. It agrees with the former by the possession of a spine on the anterior border of the inner uropods and in the general shape of the external maxillipeds, of the smaller cheliped and of the 3<sup>rd</sup> legs; in *Call. lobetobensis* the antennal peduncle is, however, much longer than that of the inner antennae, there is a spine on the anterior border of the merus of the external maxillipeds and of the smaller cheliped, the telson is distinctly longer than broad, more deeply notched, etc. In *Call. pugnatrix* the antennal peduncle is also but a trifle longer than that of the inner antennae, but the segments of the lower thinner flagellum show a much more slender form, being much longer than thick; the rostrum has a different shape. The additional row of bristles on the outer uropod is also short, the uropods have nearly the same form, but there is no spine on the inner uropod and the telson appears, as in *Call. lobetobensis*, bilobed, longer than broad; the external maxillipeds present in *Call. pugnatrix* and *Call. pygmaea* nearly the same form.

Notwithstanding this resemblance in certain characters *Call. pygmaea* should, however, be referred with more right to the subgenus *Callichirus*, the telson being broader than long and much shorter than the uropods, so that this species furnishes again a proof of the relationship between this subgenus and the subgenus *Cheramus* and the artificialness of the characters by which the two are distinguished.

11. *Callianassa (Cheramus) moluccensis* de Man.

Pl. XVI, Figs. 25—25*a*; Pl. XVII, Figs. 25*b*—25*c*.

*Callianassa (Cheramus) moluccensis* J. G. de Man, in: Tijdschr. d. Ned. Dierk. Vereeniging (2), Dl. IX, 1905, p. 606.

Stat. 231. Ambon. Reef. One male.

Unfortunately both legs of the 1<sup>st</sup> and of the 4<sup>th</sup> pair are wanting. Apart from these legs this specimen bears a very close resemblance to *Call. (Cheramus) indica* de Man. Together with the single specimen of the latter species it was sent by me to Dr. CALMAN of the British Museum, who informed me that this specimen from Ambon belongs also to another species than *Call. mauritiana* Miers from the Mauritius.

The male from the reef at Ambon is 60 mm. long; the carapace, 16,5 mm. long in the middle line, measures little more than one-fourth the length. The median rostral tooth (Fig. 25 and 25*a*) is broadly triangular like in *Call. indica*, but it is more advanced, sharper and extends to the level of the posterior margin of the eyes; the lateral teeth, between the eyeplates and the antennal peduncles, are as small as in *Call. indica* and rounded, so that the median tooth projects comparatively farther beyond them than in *Call. indica*.

For the rest the carapace and the abdominal segments agree nearly in both species. The telson (Fig. 25*b*), 6 mm. long and 6,6 mm. broad, resembles more that of *Call. mauritiana* (E. J. MIERS, in: Proc. Zool. Soc. 1884, Pl. I, Fig. 2), because it is a little broader in proportion to its length and because the lateral margins converge somewhat less backward than in *Call. indica*; its proportion to the 6<sup>th</sup> segment is, however, as in the latter species. The uropods resemble closely those of *Call. indica*, but they reach a little farther beyond the telson, when directed backward, and a small, sharp spinule is placed on the proximal end of the posterior rib of the outer uropod, just near the basal joint.

The eyestalks show a different form from those of *Call. indica* and *Call. mauritiana*. They are a little shorter in proportion to the breadth of their base than those of *Call. indica* and they do not yet reach to the distal end of basal antennular article; the eyestalks are namely 1,55 mm. long and 1,33 mm. broad at their base, whereas those of *Call. indica* are 3,2 mm. long and 2 mm. broad, the length being taken from the frontal border just inside of the lateral teeth. In *Call. indica* the inner margins are contiguous until near the tips; in the present species, however, they diverge gradually from the tip of the rostrum and curve regularly to the antero-external angle, which is sharp and slightly turned upwards and outwards. Three or four very short setulae occur on the upper surface near the inner border, but there are no teeth on the tip as are found in *Call. indica*. The oblique lateral border of each eyestalk runs S-like, appearing convex at the level of the eyes and concave between them and the antero-external angle. The distinctly faceted

and black pigmented, convex eyes are situated on the outer border of the stalks as in *Call. indica*, but they are comparatively larger and situated as far from the proximal end of the outer border as they are long and a little farther from the antero-external angle; in a lateral view the upper surface of the eyestalks slopes obliquely down as in *Call. indica* and it is flattened near the inner border and anteriorly.

The two pairs of antennae and the external maxillipeds resemble closely those of *Call. indica*.

The 2<sup>nd</sup> legs resemble also those of this species, but the chela, 5 mm. long, appears a little longer than the carpus, which is 4,5 mm. long and 2,5 mm. broad; the 3<sup>rd</sup> and the 5<sup>th</sup> legs also not differ from those of *Call. indica*.

The 1<sup>st</sup> pleopods (Fig. 25c) differ from those of *Call. indica*. They are as short as in this species, 3,4 mm. long, slender, uniramous and compressed; of the two lobes into which they terminate at their tip, the inner is obtuse, but the outer is hook-shaped, the hook being very sharp, reaching beyond the inner lobe and curved towards the inner side. The curved outer border of the hooky lobe is furnished with setae that are 2 mm. long and shorter, a tuft of similar setae is inserted on the middle of the outer border of the pleopod and some shorter hairs occur at the distal end and at the base of the obtuse lobe. The pleopods of the four following segments resemble those of *Call. indica*.

12. *Callianassa (Cheramus) indica* de Man. Pl. XVII, Figs. 26—26g.

*Callianassa (Cheramus) indica* J. G. de Man, in: Tijdschr. d. Nederl. Dierk. Vereeniging (2) Dl. IX, 1905, p. 605.

Stat. 16. March 15/16. Lat. 6° 59' S., long. 115° 24'.7 E. Bay of Kankamaraän, South coast of Kangeang. Reef. One male.

A better proof that the littoral Crustacea of the Indian Archipelago are still insufficiently known, could not be furnished than by the discovery of a new *Callianassa* of large size in the Java Sea! Unfortunately only one specimen was collected, in which one cheliped, probably the larger, is wanting. It was therefore impossible to decide whether this specimen might be referred or not to *Call. mauritiana* Miers (in: Proc. Zool. Soc. London, 1882, p. 341 and 1884, Pl. I, fig. 2) from the Mauritius, as was at first supposed because the caudal fan agrees much with MIERS'S figure. In the quoted description indeed nothing is said about the legs except the larger cheliped, nothing about the external maxillipeds nor about the two pairs of antennae. This specimen was therefore sent to Dr. CALMAN of the British Museum, who, having compared it with the two type specimens (♂ ♀) of *Call. mauritiana*, informed me that the *Callianassa* from the Java Sea belongs to a distinct species, for which information I am much obliged to him.

*Call. (Cheramus) indica* presents also a close relationship to *Call. (Cheramus) pachydactyla* A. M.-Edw. from the Cape Verde Islands (Nouv. Archives du Muséum, Mémoires T. VI (1870), p. 86, Pl. II, fig. 1).

The male from Kangeang reef is 90 mm. long, carapace 23 mm., abdomen 67 mm. The carapace that measures one-fourth the whole length, resembles that of *Call. pachydactyla* (l. c. fig. 1a), but it is less prominent anteriorly. The anterior border of the carapace, indeed, (Fig. 26a) is feebly advanced in the midline between the eyestalks and at each side of them;

the median rostral tooth is broadly triangular and subacute, the lateral teeth, situated between the eyestalks and the antennal peduncles, are also triangular, but less broad, rather obtuse and project still less forward than the median tooth. The median tooth presents a transverse row of four small puncta, in which short setulae are inserted, and appears for the rest smooth; the lateral teeth are a little concave and also a little pubescent, the setulae are implanted in small puncta, only perceptible, like those on the median tooth, by means of a magnifying glass. The gastric region is oval, 17,5 mm. long, from the median rostral tooth to the cervical groove which is as deep as in *Call. pachydactyla*, and extends thus along three-fourth parts of the length of the carapace; strongly convex transversely the gastric region appears also slightly curved longitudinally. The upper surface presents posteriorly, on each side, near the cervical groove two rather large puncta, situated behind one another; one observes, nearer to the middle line, at either side a longitudinal row of much smaller puncta on the posterior half and in all these puncta microscopical setae are implanted. For the rest the gastric region is quite smooth and shining. Branchial regions almost smooth, barely punctate. *Lineae thalassinicae* distinct.

The triangular first segment of the much depressed abdomen is nearly as long as the 2<sup>nd</sup>, the 3<sup>rd</sup> is a little shorter, the 4<sup>th</sup> a little shorter than the 3<sup>rd</sup>, but the 5<sup>th</sup> is again as long as the 2<sup>nd</sup>. The abdomen broadens gradually from the anterior end of the 1<sup>st</sup> segment to the 6<sup>th</sup>, but the 6<sup>th</sup> (Fig. 26c), that is a little longer than the preceding segments, is less broad than the 5<sup>th</sup>. The tergum of the 1<sup>st</sup> segment presents at each side a few large puncta, a few occur also on the 2<sup>nd</sup> laterally and on the 3<sup>rd</sup>—5<sup>th</sup> one observes a large irregular pit that separates the terga from the pleura; the pleura of these segments bear a tuft of hairs, on the 3<sup>rd</sup> posteriorly, on the 4<sup>th</sup> in the middle, on the 5<sup>th</sup> anteriorly. The 6<sup>th</sup> segment is transversely grooved on each side, about at one-third its length from the posterior margin; the grooves divide the lateral borders in a larger anterior and a shorter posterior part. The lateral margins of the posterior part bear a tuft of setae, a few are implanted near the inner end of the transverse grooves and the posterior border bears two tufts of setae on each side of the middle line.

The caudal fan much resembles that of *Call. pachydactyla* (l. c. Pl. II, fig. 1e). The telson measures nearly two-thirds the length of the 6<sup>th</sup> segment; the distance between its anterior and its posterior border measures 9,5 mm., whereas it shows its greatest breadth of 10 mm. at a little more than one-third its length from the anterior border. The telson is thus almost as broad as long. The antero-lateral angles are rounded; between them and there where the telson appears broadest, the lateral margins are slightly concave, which is not the case in *Call. pachydactyla*, according to the figure 1<sup>e</sup> of this species (l. c.). Behind the greatest width the lateral margins converge backward, appearing nearly straight and they finally curve into the posterior border which is slightly concave in the middle. The upper surface of the telson is vaulted in the middle, anteriorly until just behind the middle, and slopes obliquely down to the posterior border, appearing here a little concave; the vaulted portion extends to nearly midway between the middle line and the lateral margins, the lateral parts of the surface being flattened at each side. The telson is fringed posteriorly with setae and a small tuft of setae exists in the middle line on the posterior part of the vault.

The telson of *Call. mauritiana* is comparatively broader, almost one and a half



times as broad as long and also that of *Call. pachydactyla* appears a little broader than in *Call. indica*. In *Call. pachydactyla* the lateral borders are more regularly curved and the notch in the middle line is deeper, in *Call. mauritiana* the posterior margin is nearly straight and makes distinct angles with the lateral borders.

The basal joint of the uropods is unarmed and divided by a transverse groove in a larger anterior and a smaller posterior portion; in *Call. pachydactyla* the anterior portion appears smaller than the posterior. The inner uropod, directed backward, reaches just as far as the telson. It resembles that of *Call. pachydactyla*, but appears a little less broad in proportion to its length; this uropod is namely 7 mm. long and 7,75 mm. broad, little broader than long. The posterior or distal border is nearly straight, the anterior slightly curved proximally and the angle between both is rounded; the slightly arcuate, inner border passes also by a curve into the posterior. The anterior border is somewhat thickened and a straight prominent rib runs down the middle of the joint, reaching almost to the distal margin. That part of the upper surface which is situated between the rib and the anterior border, is somewhat uneven; a small tuft of setae occurs at the distal end of the rib and the apical border is fringed with setae. The inner uropod of *Call. mauritiana* has a quite different form, it is longer than broad, the anterior border is straight and makes a distinct angle with the posterior.

The shape of the outer uropod is the best perceptible on its lower surface, it appears then triangular, the slightly curved anterior border appears much shorter than the rounded distal margin and also somewhat shorter than the undulate inner. The outer uropod is 11,5 mm. long and 11 mm. broad; extended backward, it reaches a little beyond the telson. The thickened anterior border and the anterior of the two ribs that run down the middle, are united distally by a transverse ridge which is fringed with setae like the distal border; the posterior rib is narrower and curves distally backward. In the figure of *Call. pachydactyla* the outer uropod presents a somewhat different form, the ribs are not drawn at all, perhaps, however, this figure is inaccurate; the figure of *Call. mauritiana* agrees better with our specimen.

The eyestalks are characteristic (Fig. 26a, 26b). Measured in the middle line of the body they appear to be 2,5 mm. long from the tip of the rostrum to their anterior extremity and they are together 4 mm. broad at their base. In a lateral view their upper surface which is somewhat flattened or slightly concave on the proximal half, appears to slope obliquely down, whereas the lower extends horizontally forward. Each eyestalk is thus a little longer than broad at its base and appears triangular; the straight inner margins are contiguous until the tip, whereas the lateral borders converge distinctly forward. The rounded tips of the stalks are beset with four or five small teeth or tubercles, recognizable by means of a magnifying glass; one of them, near the outer angle, an obtuse tooth, is larger than the rest and directed obliquely outward. The shining black-pigmented eyes that do not seem to be faceted, are small, somewhat convex and situated on the outer border of the stalk, just midway between the base and the tip; behind the eyes the lateral border is straight, in front of them a little concave, and the narrowed distal part of the stalk is flattened and compressed. Viewed at from above the eyes appear distinctly farther distant from the inner border of the stalk than they are broad. The eyestalks of *Call. mauritiana* are different, as Dr. CALMAN wrote me: the eyes indeed are here situated closer by the tip of the stalks and are a little remote from the lateral border.

The internal antennae are 21,5 mm. long, nearly as long as the carapace, whereas the peduncle, 7 mm. long, appears half as long as the lower flagellum. The 1<sup>st</sup> joint, that reaches just as far forward as the eyestalks, is 2 mm. long and just as broad at the base, whereas it is but little less broad distally; the 2<sup>nd</sup> joint is just as long as the 1<sup>st</sup>, looked at from the lower side of the body, but only 1,5 mm. thick; the 3<sup>rd</sup> joint, 3 mm. long, is one and a half times as long as the 2<sup>nd</sup> and tapers to the distal end, so that this joint, 1 mm. broad in the middle, proves to be 3-times as long as broad. The 2<sup>nd</sup> and the 3<sup>rd</sup> joint are furnished on their outer border with long hairs. The lower flagellum, composed of 40 segments, is 2,5 mm. longer than the upper.

The external antennae are 39 mm. long, almost twice as long as the inner; the slender peduncle, 11 mm. long, projects by nearly two-thirds the terminal joint beyond the antennular peduncle, the penultimate and the terminal are nearly of equal length.

The external maxillipeds (Fig. 26*d*) resemble closely those of *Call. pachydactyla*. The ischium is nearly 7 mm. long; it widens a little distally, so that it proves to be 5,5 mm. broad at a distance of 2 mm. from the distal border, which is 5 mm. broad and articulates with the merus; the outer border of the ischium, which is little longer than broad, is straight, the inner somewhat curved and fringed with setae. The triangular merus is 4,25 mm. long, i.e. the length of the perpendicular from the tip to the posterior margin that articulates with the ischium; just in front of this margin it presents its greatest width of 5,75 mm., so that this joint appears one and a half times as broad as long; the outer margin is rather much curved. The carpus is 4,5 mm. long and 3,25 mm. broad, just beyond the middle. The propodus is 4,4 mm. long and 4 mm. broad; the lower margin of this joint, which is greatly dilated and as long as broad, is semicircular and fringed with hair. Dactylus almost as long as the propodus. The external maxillipeds of *Call. mauritiana* are narrower and their propodus is almost twice as long as broad.

The right leg of the 1<sup>st</sup> pair, probably the larger, is wanting, but Dr. CALMAN sent me a sketch of the smaller cheliped of the male type specimen of *Call. mauritiana* and informed me that it is very different from that of *Call. indica*. This cheliped (Fig. 26*e*), all the joints of which are unarmed, resembles apparently more the smaller cheliped of *Call. pachydactyla*. The compressed ischium is 10,5 mm. long; it is 2,4 mm. broad in the middle and, broadening a little distally, 3,8 mm. at the distal end, which articulates with the merus; the ischium is thus nearly 4-times as long as broad. The merus is oval, 9 mm. long, a little shorter than the ischium and, being 5,8 mm. broad in the middle, appears one and a half times as long as broad. The inner surface is flattened, the outer somewhat convex transversely and also somewhat longitudinally, both margins are a little curved. Measured along the straight, upper border the carpus proves to be 7,25 mm. long, somewhat shorter than the merus; it is 6,4 mm. broad or wide distally, and, the carpus being 6 mm. long in the middle midway between the upper and the lower border, it appears here nearly as broad as long. Measured to the tip of the immobile finger the chela proves to be 17 mm. long, almost twice as long as the merus; the palm, which is 9 mm. long, a little longer than the carpus, measured along its upper margin, but one and a half times as long as it, when measured in the middle, appears proximally just as broad or high as the carpus and

narrows a little distally, as in *Call. mauritiana*, so that it is 5,75 mm. broad at the level of the articulation of the fingers. The outer surface of the palm is somewhat convex transversely, a little also longitudinally and the inner surface is also slightly convex. The distal border of the outer surface appears just above the tapering immobile finger finely denticulate and the tip of this finger is slightly turned upward; the likewise tapering dactylus is distinctly somewhat curved and a little longer than the fixed finger, so that the palm, though a little longer than the latter, appears just as long as the dactylus. Both the upper and the lower margin of the palm are faintly carinate or sharp proximally and those of the carpus are also ridged. The fingers are not toothed at all. The lower margin of the merus is fringed with setae and both the upper and the lower margins of carpus and palm are beset, on the inner surface of these joints, with small tufts of setae, a few occur also near them on the outer side. Tufts of setae on the fingers as usual. The carpus of the smaller cheliped of *Call. mauritiana* is considerably longer than the palm and has a much slenderer form, 4-times as long as broad (J. G. DE MAN, A contribution to the knowledge of twenty-two species and three varieties of the genus *Callinassa* Leach, 's Gravenhage 1928, Pl. II, fig. 4c (Capita Zoologica, Deel II, Afl. 6)).

On the figure 1g (l. c.) of the 2<sup>nd</sup> legs of *Call. pachydactyla* the chela appears a little longer than the carpus, in *Call. indica*, however, the carpus is a little longer than the chela; as regards the shape of these joints and of the merus, *Call. indica* agrees with that figure. The merus of the 2<sup>nd</sup> legs is 11 mm. long and, in the middle, 4,25 mm. broad; the carpus is 7,5 mm. long and 3,8 mm. broad; the chela 6,4 mm. long and just as broad as the carpus.

The 3<sup>rd</sup> legs apparently also agree with those of *Call. pachydactyla*. The merus, 10,5 mm. long, is 3,2 mm. broad in the middle, a little more than 3-times as long as broad; the carpus, 8 mm. long, is 3,5 mm. broad distally. The distal end of the upper border of the propodus is a little more than one and a half times as far distant from the carpal articulation as the latter from the proximal end of the lower border, so that the rounded posterior lobe is but little shorter than the rest of the propodus; the distance between the distal end of the upper border and the proximal margin of the rounded lobe is 6,25 mm. long and this distance is just twice as large as the greatest breadth of the propodus; the slightly concave, lower margin is beset with tufts of setae and the posterior border of the lobe, as usual, fringed with longer setae. The flattened dactylus is 2,75 mm. long and 1,6 mm. broad, its borders are fringed with hairs, like the upper border of the propodus.

The legs of the 4<sup>th</sup> pair and the subcheliform legs of the 5<sup>th</sup> apparently agree with those of *Call. pachydactyla* and present nothing remarkable. The sternal plaque is funnel-shaped; the two narrow lateral walls, that are concave externally, diverge anteriorly and the interspace between them is filled up anteriorly by a rounded prominence that narrows between the legs of the 4<sup>th</sup> pair.

The 1<sup>st</sup> pleopods (Fig. 26f) are short, slender, compressed and become somewhat broader towards the distal extremity, which by a notch in the middle is divided into two rounded lobes (Fig. 26g), that are fringed with long setae. The pleopods of the 2<sup>nd</sup> segment are biramous, the rami foliaceous, narrow, the exopodite a little longer than the endopodite, on which no stylamblys was observed. The pleopods of the three following segments are much larger, biramous, the

rami foliaceous, the exopodite rather narrow, somewhat scythe-shaped and longer than the triangular, obtusely-pointed endopodite, which is broadly attached to the peduncle and furnished with a very small stylamblys, a little nearer to the proximal than to the distal end of the inner border. These pleopods resemble much those figured by BOAS (Studier over Decapodernes Slaegtskabsforhold, 1880, Tab. V, fig. 177), but the exopodite is more pointed. According to ORTMANN (in: Zoolog. Jahrbücher, VI, Syst. 1891, p. 48) the 3<sup>rd</sup>—5<sup>th</sup> pleopods of *Callianassa* should bear no stylamblys, but according to BORRADAILE (in: Annals Magaz. Nat. Hist. 1903, p. 544) it should be present.

*Call. (Cheramus) Fousseau mei* Nobili from the Red Sea is certainly the nearest related species. At my request Dr. A. BORELLI of the Zoological Museum at Turin kindly sent me five type specimens of NOBILI's species, of which the two largest are 60 mm. and 56 mm. long; in the latter specimen both legs of the anterior pair are present and one smaller cheliped is lying loose in the bottle. After a scrupulous examination I could detect only two essential differences. In the first place do the 1<sup>st</sup> pleopods (Pl. XVIII, Fig. 27a) of the male of *Call. Fousseau mei* present a different form, for they resemble those of *Call. moluccensis* (Fig. 25c): of the two lobes into which the second segment terminates the inner is obtuse, rounded, the other broader one is hook-shaped, the hook very sharp, reaching and curving beyond the inner lobe to the inner side. The other difference is presented by the external maxillipeds. In *Call. indica* the length of the merus measures two-thirds that of the ischium, the length and breadth of the merus are in proportion as 3 : 4, those of the ischium as 5 : 4; in *Call. Fousseau mei* (Pl. XVIII, Fig. 27), however, the length of the merus is in proportion to that of the ischium as  $2 : 3\frac{2}{3}$ , the length and breadth of the merus are in proportion as  $3 : 3\frac{1}{2}$  and those of the ischium as  $5 : 3\frac{2}{11}$ . In *Call. indica* the penultimate joint appears as long as broad, in *Call. Fousseau mei* distinctly longer than broad. These maxillipeds are therefore in *Call. Fousseau mei* less broadened, more pediform than in *Call. indica*, both the ischium and the merus less broad in proportion to their length, the merus, finally, a little shorter in proportion to the length of the ischium. For the rest the two species resemble one another closely, even in minute details, so e. g. are the tips of the eyestalks armed with small teeth, as in *Call. indica*. The smaller cheliped presents the same shape and characters, perhaps will the larger, which in the single type of *Call. indica* is wanting, prove to show differences: this must be left to later researches.

13. *Callianassa (Trypaea) amboinensis* de Man. Pl. XVIII, Figs. 28—28c.

*Callianassa amboinensis* J. G. de Man, in: Archiv f. Naturg. 53. Jahrg. Berlin 1888, p. 480, Taf. XX, fig. 4.

*Callianassa amboinensis* L. Zehntner, Crustacés de l'Archipel Malais, Genève 1894, p. 194, in: Revue Suisse de Zoologie, T. II.

*Callianassa (Calliactites) amboinensis* L. A. Borradaile, in: Annals and Magaz. of Nat. Hist. Ser. 7, vol. XII, Nov. 1903, p. 545.

Stat. 133. July 25/27. Anchorage off Lirung, Salibabu-Island. Reef. One egg-bearing female.

Both the type, a female, from the Museum of Göttingen and a female without eggs, long 21 mm., also from Amboina and described by ZEHNTNER, are lying before me. I am much

obliged to Prof. BEDOT of Geneva for having sent me this specimen which is provided with both legs of the 1<sup>st</sup> pair.

This species was wrongly referred by Dr. BORRADAILE (l.c.) to the subgenus *Calliactites*, in consequence, of course, of the unsatisfactory original description of the 3<sup>rd</sup> legs: it is, indeed, a true *Trypaea*, according to that author's diagnosis.

The female from Salibabu Island, though already egg-bearing, is somewhat smaller than the type from Amboina, which measures, like that of ZEHNTNER, 21 mm. from tip of rostrum to end of telson (in the original description erroneously 25 mm. were indicated as the length): the present specimen measures, indeed, only 17 mm. The carapace, rostrum included, is 3,65 mm. long, the abdomen 13,5 mm.; the carapace measures a little more than one-fourth the length of the abdomen. The rostrum (Fig. 28) is triangular, the tip not very sharp, its lateral margins somewhat concave and it measures only one-third the length of the 1<sup>st</sup> joint of the antennular peduncle. Just near the lateral angle of the eyestalks the lateral margins of the rostrum are notched; the notch is semicircular, small, 0,04 mm. deep and a short seta is implanted in it. *Lineae thalassinicae* distinct. The cervical groove is deep, the distance between the transverse posterior part of the groove and the posterior margin of the carapace measures one-fourth the length of the latter.

First segment of abdomen saddle-shaped, broader posteriorly than anteriorly, 1,6 mm. long. Second segment 2,7 mm. long, much longer than the others, about as long as the 3<sup>rd</sup> and 4<sup>th</sup> taken together, a little broader posteriorly than anteriorly. Third segment 1,7 mm. long, almost two-thirds of 2<sup>nd</sup>, 4<sup>th</sup> 1,3 mm. long, half as long as 2<sup>nd</sup>, the shortest of all; 5<sup>th</sup> 1,5 mm. long, longer than 4<sup>th</sup>, but shorter than 3<sup>rd</sup>, just as in other species. The 6<sup>th</sup> segment, 1,9 mm. long (Fig. 28a), measures two-thirds of 2<sup>nd</sup>, but is longer than the other segments; it is 2,36 mm. broad, broader than long. The telson is 1,56 mm. long and anteriorly 1,56 mm. broad, being just as long as broad; the somewhat convergent lateral margins curve regularly into the posterior border (Fig. 28b), that is a little concave in the middle and bears here a microscopical acute tooth, 0,02 mm. long, that not reaches beyond the posterior margin. Just there where the lateral margins curve into the posterior they carry a very small, movable spinule, only 0,04 mm. long; this spinule is 0,5 mm. distant from the median posterior tooth and the two spinules are 1 mm. distant from one another. The telson is fringed posteriorly with short, ciliated setae, 0,1—0,16 mm. long and it carries on each side a tuft of long plain hairs, the longest of which measure 1,3 mm. The upper surface carries in the middle a transverse row of long setae as usual and near the lateral borders 3 or 4 small tufts of hair, the foremost of which are 0,5 mm. long; there is also a small tuft of shorter hairs between the median row and the lateral margins.

The uropods are very short, extending but little beyond the telson, when directed backward; basal joint rounded anteriorly and posteriorly, unarmed. The inner uropod is oval, 1,8 mm. long, 1,08 mm. broad, presenting its greatest width just in the middle, rounded distally, with regularly arcuate anterior and posterior border; the length is in proportion to the breadth as 5 : 3. The barely prominent midrib bears two small movable spinules, 0,06 mm. long, the proximal one at one-third the length of the uropod from its base and somewhat nearer to the anterior than to the posterior border, the other about at one-third the length of the plate from

the distal extremity and somewhat closer by the posterior than by the anterior margin. There are a few short hairs on the upper surface except near the inner border. The inner uropod is fringed with plumose, articulated hairs, which at the tip are 0,5 mm. long; at the rounded tip and near the distal end of the inner border some plain setae are implanted that are a little longer. The outer uropod is just as long as the inner viz., 1,8 mm., but it is but one-fifth longer than broad, the greatest width being 1,5 mm. The anterior border of this uropod is nearly straight, but the rounded apical border and the arcuate inner form a regular curve, so that this limb appears nearly circular; it is fringed, as in the other species, with articulated plumose setae, on the apical border moreover with unjointed, plumose, stiff setae, nearly 0,7 mm. long, and it is armed at the inner side of the apical border with slender spines that are slightly curved forward. The antero-external angle is obtuse; the additional row of bristles near it is short, barely longer than one-third the width of the uropod and it diverges rather much from the apical border. There is a short spinule on the upper surface, 0,06 mm. long, inserted between the additional row of bristles and the basal joint, a little nearer to the former than to the latter and as far distant from the anterior border as from the additional row of bristles. The abdomen is smooth above, not carinate.

The 1<sup>st</sup> and 2<sup>nd</sup> pleopods are slender filaments, the former uniramous, those of the 2<sup>nd</sup> pair biramous; the three following pairs are foliaceous, the stylamblys short, 0,23 mm. long and half as thick, half its outer margin being supplied with cincinnuli; the stylamblys is twice as far distant from the base of the endopodite as it is long.

Eggs globular, diameter 0,44—0,46 mm. broad.

The eyestalks that are 0,8 mm. long and at their base 0,4 mm. broad, project with their acute apices which are turned outward, just beyond the distal extremity of 1<sup>st</sup> antennular article; the inner border of the stalks curves outward, immediately beyond the level of the cornea and the outer border of the triangular terminal part is slightly concave. The distinctly faceted cornea is situated on the outer side just behind the triangular terminal part of the stalk and in the present specimen the black spot of pigment is situated, apparently, a little distant from the outer border, whereas in the type from Amboina it is contiguous to it as shows my figure 4, l. c., Pl. XX. In the type the tips of the eyestalks are directed forward, because the inner border runs straight forward almost as far as the tip: these are probably individual differences.

The internal antennae are 3,5 mm. long, a little shorter than the carapace; the peduncle measures 2,34 mm., the lower flagellum, 1,16 mm. long, is just half as long as the peduncle. The 2<sup>nd</sup> joint is 0,5 mm. long, two-thirds of the 1<sup>st</sup>; it is 0,21 mm. thick at the distal end, so that it appears a little more than twice as long as thick, though slightly tapering proximally. The 3<sup>rd</sup> joint bears at the upper inner side, at the distal extremity, a triangular prolongation and is 1,2 mm. long without this prolongation, but 1,38 mm. when it is included; the 3<sup>rd</sup> joint, which is  $2\frac{1}{2}$ -times as long as the 2<sup>nd</sup>, has a slender shape, being 7- or 8-times as long as thick; looked at from above this joint appears, indeed, to be 0,175 mm. thick at the base, 0,148 mm. in the middle and 0,16 mm. at the distal extremity. Both the 2<sup>nd</sup> and the 3<sup>rd</sup> joints are furnished below with long ciliated hairs. The

thicker upper flagellum, 1,14 mm. long and 0,12 mm. broad in the middle (looked at from above), is composed of 14 segments that are all broader than long except the 1<sup>st</sup> and the last. The 1<sup>st</sup> segment is 0,16 mm. long and 0,1 mm. broad distally; the 5<sup>th</sup> is 0,1 mm. long and 0,12 mm. broad, the 8<sup>th</sup> 0,07 mm. long and 0,115 mm. broad, one and a half times as broad as long, the terminal joint is 0,07 mm. long and 0,04 mm. thick at the base. This flagellum shows the greatest breadth in the middle and tapers more towards the distal than towards the proximal extremity. The lower flagellum, which is very little longer, measuring 1,16 mm., is 0,08 mm. thick at its base and in the middle and tapers regularly to the distal extremity; it is a little more than half as thick as the upper and consists of 16 segments; the proximal are as long as thick or nearly so, the 4<sup>th</sup>, e. g., is 0,08 mm. long and just as thick, the 10<sup>th</sup> is 0,06 mm. long and 0,066 mm. broad, the penultimate, however, 0,06 mm. long and 0,045 mm. broad, the terminal segment, finally, is slender, tapering forward, 0,12 mm. long and 0,032 mm. thick at its base. The flagella are consequently a little shorter than the 3<sup>rd</sup> joint of the peduncle.

The external antennae are 6,7 mm. long, almost twice as long as the carapace. Their peduncle which is 1,7 mm. long, extends to the middle of the 3<sup>rd</sup> joint of that of the inner antennae; the 2<sup>nd</sup> joint bears above a very small, pointed scale, only 0,08 mm. long and about as broad; the 4<sup>th</sup> joint is 0,7 mm. long and less thick than the 2<sup>nd</sup> antennular article, the last joint, finally, 0,4 mm. long, 0,12 mm. thick, is little more than half as long as the 4<sup>th</sup>; the flagellum is 5 mm. long and composed of 45 segments.

The external maxillipeds are operculiform, the ischium and the merus being considerably expanded, the three last joints narrow. Measured in the middle the ischium proves to be 1,25 mm. long and, when measured along its straight, somewhat oblique anterior margin, 1,72 mm. broad; this joint, which is one and a half times as broad as long, has a slightly arcuate, inner border and a rounded postero-internal angle. The merus is 0,86 mm. long, 1,7 mm. broad; whereas it appears almost as broad as the ischium, its length is but two-thirds that of this joint; its outer margin is a little arcuate, anteriorly it is emarginate for the insertion of the carpus and the inner border is also curved. The carpus is 0,68 mm. long, 0,4 mm. thick distally, more than half as broad as long. The penultimate joint, 0,7 mm. long, as long as the carpus, presents its greatest width of 0,4 mm. at one-third its length from the carpal articulation, being little more than half as broad as long. The dactylus is finger-shaped, 0,41 mm. long, 0,17 mm. thick, little more than twice as long as thick and barely tapers towards the obtuse extremity. The inner margin of ischium and merus are fringed with ciliated setae of unequal length, the longest measuring 0,7 mm., much shorter than the breadth of these joints; similar setae occur on the other joints, those of the dactylus are shorter. The inner surface of the ischium carries a S-shaped row of 20 sharp teeth, that are rather small, when compared with those of other species; the row is 1 mm. long, situated at one-third the width of this joint from its outer margin and, as in other species, curves outward at its proximal end. Between this row of teeth and the outer margin the inner surface is somewhat hairy. The inner surface of the merus is also hairy on its outer half, but the row of hairs in the middle, that occurs in other species, is very short, rudimentary; on the three last joints the row of hairs on their inner surface is well-developed.

There is only one leg of the 1<sup>st</sup> pair, on the left side. This leg, the fingers of which are broken off, agrees with that which has been figured in my description of 1888 and which is the smaller one, as has been already remarked by ZEHNTNER (l. c.). Measured in the middle, the ischium appears to be 1,64 mm. long; it is 0,48 mm. broad in the middle, 0,7 mm. at the distal extremity,  $3\frac{1}{2}$ -times as long as broad; the lower margin bears on its distal half three very small, obtuse teeth. The oval merus, 1,62 mm. long and 1,12 mm. broad in the middle, is just as long as the preceding joint and one and a half times as long as broad. The arcuate upper border presents some distantly placed hairs, the longest at the distal end being 0,56 mm. long; the lower border which is quite unarmed, carries also some short hairs. The carpus is 1,24 mm. long and just as broad, the palm is 1,26 mm. broad.

The merus of the left leg of the 2<sup>nd</sup> pair is just half as broad as long, viz., 1,76 mm. long, 0,88 mm. broad, the carpus is 1,2 mm. long, 0,71 mm. broad; the chela is 1,4 mm. long, the palm 0,5 mm., the fingers 0,9 mm. and the palm, which is 0,65 mm. broad, is distinctly less broad than the carpus and the carpus less broad than the merus. The fixed finger bears 8 small teeth on the proximal half of its cutting-edge. In my original description (l. c. p. 482) the 2<sup>nd</sup> legs are erroneously described as resembling those of *Call. pachydactyla* (A. MILNE-EDWARDS, Nouv. Archives du Muséum, Mémoires, T. VI, Pl. 11, fig. 1g).

The merus of the 3<sup>rd</sup> legs (Fig. 28c) is almost half as broad as long, viz., 1,64 mm. long and 0,76 mm. broad, and presents its greatest width just in the middle; the carpus is 1,5 mm. long, 0,76 mm. broad, half as broad as long. The propodus has a rather irregular shape. Measured between the carpal articulation and that of the dactylus it proves to be 1 mm. long, but the distance between the rounded extremity of the posterior lobe and the distal end of the strongly curved upper margin measures 1,12 mm.; in the middle of this direction the propodus presents its greatest width of 0,78 mm., appearing then one and a half times as long as broad. The rounded lobe on the hinder edge is rather short, 0,14 mm. long, one-eighth the length of the propodus in this direction; as in other species a spine, 0,16 mm. long, occurs near the distal end of the lower margin and, posterior to it, this margin is twice emarginate, the notches being rather broad and shallow. The conical pointed dactylus is 0,6 mm. long, 0,2 mm. thick at its base, 3-times as long as thick.

Measured in the middle the merus of the 4<sup>th</sup> legs proves to be 1,7 mm. long, in the middle 0,74 mm. broad, nearly half as broad as long. The carpus is 3-times as long as broad, 1,5 mm. long, 0,5 mm. broad. The penultimate joint is rectangular, 1,3 mm. long, a little shorter than the carpus; this joint, the lateral margins of which are straight, narrows somewhat distally, being 0,44 mm. broad near the carpal articulation, 0,42 mm. in the middle and 0,3 mm. at the distal end; a straight spine, 0,34 mm. long and denticulate on its distal half, occurs at the distal end of the lower margin. The pointed dactylus is 3-times as long as thick, 0,64 mm. long and 0,2 mm. thick at its base.

The legs of the 5<sup>th</sup> pair are subcheliform. The merus, 4-times as long as broad, is 1,5 mm. long and presents its greatest breadth of 0,39 mm. not far from the distal end; the carpus is 3-times as long as thick, 1,3 mm. long, 0,45 mm. thick; the propodus is 1,5 mm. long until the tip of the fixed finger, 0,48 mm. broad distally and it is here immersed in a brush of hair; the dactylus, finally, is curved, longer than the immobile finger.



The following remarks about the type specimen of *Call. amboinensis*, a female from Amboina, described (l. c.) in 1888, will, I suppose, be welcome. Something concerning the length of this specimen and the form of the eyestalks has already been observed.

Looked at from above the 2<sup>nd</sup> joint of the antennular peduncle appears to be 0,53 mm. long and at the distal extremity 0,31 mm. thick; the 3<sup>rd</sup> joint is 1,4 mm. long, somewhat more than  $2\frac{1}{2}$ -times the length of the 2<sup>nd</sup>, the triangular prolongation at the distal end excluded, and 7-times as long as thick, being 0,23 mm. thick at the proximal, 0,2 mm. at the distal extremity and in the middle. The thicker flagellum, composed of 22 segments, is 1,5 mm. long, a little longer than the 3<sup>rd</sup> joint of the peduncle, but, when the distal prolongation of the latter is included, it appears to be 1,6 mm. long, slightly longer than the flagellum. The 1<sup>st</sup> segment of the thicker flagellum is 0,22 mm. long and 0,12 mm. thick distally, almost twice as long as thick; the following segments, however, are all considerably broader than long, except the last one. So e. g. is the 5<sup>th</sup> segment 0,08 mm. long, 0,13 mm. broad, the 8<sup>th</sup> 0,072 mm. long, 0,15 mm. broad, the two following present the same measurements and the flagellum presents thus here, in the middle, its greatest breadth of 0,15 mm.; the conical terminal segment is 0,08 mm. long and 0,04 mm. thick at its base. The other flagellum is a little longer, viz., 1,64 mm. and tapers regularly to the tip. It is composed of 23 segments, the 1<sup>st</sup>, 0,16 mm. long, is 0,095 mm. thick at the distal end and longer than thick; the 4<sup>th</sup> is 0,1 mm. long and 0,105 mm. thick, the 10<sup>th</sup> 0,06 mm. long and 0,095 mm. broad, broader than long, the penultimate 0,066 mm. long and 0,05 mm. broad, longer than thick, the last segment, finally, is conical, 0,13 mm. long and 0,04 mm. thick at its base. In the middle of this flagellum the segments are slightly broader than long, but they grow longer towards both extremities.

The ischium of the external maxillipeds, measured as has been indicated above, is 1,45 mm. long and anteriorly 1,8 mm. broad, the merus 1 mm. long and just as broad as the ischium. The carpus is 0,8 mm. long and 0,47 mm. broad distally, the propodus also 0,8 mm. long, its greatest width is 0,54 mm., the dactylus 0,53 mm. long, 0,22 mm. broad. The teeth on the inner surface of the ischium are 20 in number, all very acute, except 4 or 5 small teeth at the proximal end of the row; the foremost tooth is larger than the rest.

The tip of the rostrum appears in the type rather sharp, sharper than in the female collected by the Siboga-Expedition.

As is proved by the third specimen lying before me, the female from Amboina, which l. c. was described in 1894 by ZEHNTNER, the detached cheliped of the type is indeed the smaller one, on account of the shape of the carpus. In the larger cheliped of ZEHNTNER's specimen the carpus, measured in the middle of its outer surface, appears barely half as long as the palm and it appears also shorter in proportion to its width than in the smaller cheliped. In ZEHNTNER's female, the chela of the smaller cheliped appears comparatively smaller than that of the type specimen, the fingers have a slenderer form and are longer, almost as long as the palm. The chela of the smaller cheliped of the type resembles more that of the larger cheliped of ZEHNTNER's specimen. These are, no doubt, individual differences.

Geographical distribution: Amboina (DE MAN, ZEHNTNER).

14. *Callianassa (Callichirus) placida* de Man.Pl. XVIII, Figs. 29—29*b*; Pl. XIX, Figs. 29*c*—29*e*.*Callianassa placida* J. G. de Man, in: Tijdschr. Ned. Dierk. Vereeniging (2) Dl. IX, 1905, p. 612.

Stat. 58. April 25. Anchorage off Seba, Savu. Reef. One male.

Stat. 142. August 5/7. Anchorage off Laiwui, coast of Obi Major. Reef. One female without eggs.

A new species intermediate in its characters between *Call. (Callichirus) Martensii* Miers and *Call. (Callichirus) mucronata* Strahl.

The larger specimen, that from the reef at Obi Major, is 30,5 mm. long, the carapace (rostrum included) 6,8 mm., the abdomen 23,7 mm., the former measuring almost one-third the length of the abdomen. *Lineae thalassinicae* distinct. Cervical groove strongly defined, its distance, 1,34 mm., from the posterior margin one-fifth the length of the carapace. Anteriorly the carapace (Fig. 29) is trispinose, as in *Call. Martensii* and *Call. tridentata*. The median spine or rostrum, flattened above and gradually narrowing to the pointed tip, extends somewhat beyond the middle of 1<sup>st</sup> antennular article, being 0,85 mm. long; it is a little shorter than the eyestalks, reaching to the last fifth part of their length, i. e. to the corneae. The acuminate lateral spines, between the eyestalks and the antennal peduncle, are 0,33 mm. long, two-fifths the length of the median spine and reach almost to the distal extremity of 1<sup>st</sup> antennular article. The median spine carries at its base near the lateral margin a small tuft of setae and a few small tufts of setae are observed on the anterior part of the gastric region.

Carapace and abdomen smooth above, not carinate. First abdominal tergum, 3,5 mm. long, a little longer than broad and somewhat broader posteriorly than anteriorly. The 2<sup>nd</sup> and the 6<sup>th</sup> segment are almost of equal length, about 4,25 mm. long, longer than the rest; the 2<sup>nd</sup> is posteriorly a little broader than long. The 3<sup>rd</sup> segment measures three-fourths of the 2<sup>nd</sup>; it is a little longer than the 5<sup>th</sup> and as in other species the 4<sup>th</sup> is the shortest of all. The terga are all flattened above from before backward, but the 6<sup>th</sup> segment (Fig. 29*a*) which is somewhat longer than broad, is strongly convex transversely and also somewhat longitudinally. The caudal fan much resembles that of *Call. mucronata* (vide J. G. DE MAN, in: Archiv f. Naturg. 53. Jahrg. 1888, Taf. XXI, fig. 2*a*). Telson as in this species, 2,6 mm. broad anteriorly, 1,6 mm. long, one and a half times as broad as long; the S-shaped lateral margins converge backward and the posterior border, the lateral angles of which are rounded, projects slightly in the middle. The upper surface is somewhat convex in the middle from before backward and flattened laterally; it bears just in the middle a transverse row of hairs and a small tuft of setae is found on the posterior border at either side of the middle line.

The uropods, both considerably longer than the telson, resemble those of *Call. mucronata*. The basal joint is smooth, flattened, rounded, unarmed. The outer uropod is triangular, a little longer than broad, rounded distally; anterior border straight, making a right angle with the distal border and somewhat shorter than the inner, which is also straight and which makes no angle with the distal border, different from *Call. Martensii*. Distal border fringed with feathered setae and armed with small spines that grow longer backward and that extend to the posterior extremity. Raised part of the upper surface triangular, its form slightly different from that of *Call. mucronata* and extending a little beyond the middle of the plate; its distal

margin slightly arcuate and fringed with setae and spines as in other species. Inner part of the upper surface, which is covered by the inner uropod, concave; a small spine at the base near the inner margin. Inner uropod lanceolate, half as broad as long, obtusely pointed; anterior border curved, posterior nearly straight; upper surface carinate longitudinally, the carina obtuse, running somewhat nearer to the inner than to the anterior border. There is a tuft of long setae near the middle of the inner or posterior margin.

In the male from Stat. 58, which is 18 or 19 mm. long, the small abdominal appendages of the 1<sup>st</sup> segment resemble those of *Call. mucronata*, their extremity that is furnished with many long setae, ending anteriorly in a rounded tip, posteriorly in a rather sharp-pointed, hooked tooth. The pleopods of the 2<sup>nd</sup> pair are biramous, the outer branch 6-times as long as broad, longer but somewhat less broad than the inner, both with a few short setae on the obtuse tips. The pleopods of the three following segments are foliaceous, stylamblys very short, 0,1 mm. long and just as broad, situated in the middle of the inner of the endopodite.

In the female the first pleopods are also as in *Call. mucronata*, but the terminal joint is more elongate, 1,8 mm. long, 7-times as long as broad. Those of the 2<sup>nd</sup> pair are biramous, moderately slender, furnished with long, plumose setae; outer branch slender, slowly narrowing to the obtuse tip, 2,2 mm. long, 8-times as long as broad in the middle; inner branch just as long, but one and a half times as broad as the other. The inner branch bears a slender stylamblys, 0,4 mm. long and almost 6-times as long as broad, on its inner margin not far from the obtuse tip, beyond which it extends almost by half its length; it carries cincinnuli at its distal end. The stylamblys of the foliaceous pleopods of the three following segments is very short, 0,26 mm. long, implanted about on the middle of the inner margin.

Eyestalks (Fig. 29) of the larger specimen 1 mm. long, reaching not yet to the distal end of 1<sup>st</sup> antennular article; they are rounded apically and are here little less broad than at their base; their outer border is somewhat concave, the inner margins that are almost contiguous, end distally in a short conical tooth, which is directed inward and reaches not so far forward as the rounded apex of the stalks. The eye with distinctly faceted cornea and a speck of black pigment occupies the distal third part of the stalks.

Inner antennae 6,26 mm. long, peduncle 2,46 mm., flagella 3,8 mm., the latter one and a half times as long as the former. Distance between the anterior border of the carapace and the distal end of 1<sup>st</sup> antennular article 1,06 mm. long; 2<sup>nd</sup> joint 0,6 mm. long and nearly half as thick. Third joint 0,88 mm. long, one and a half times as long as 2<sup>nd</sup>, slightly tapering distally when looked at from above and nearly 4-times as long as thick. The upper flagellum that measures 3,5 mm., appears in a lateral view to broaden gradually, though slowly, until one-fourth of its length from the extremity and hence tapering to the latter; in a lateral view this flagellum proves to be 0,15 mm. thick at its base and 0,21 mm. at the broadened part. It is composed of 26 segments; in a lateral view the first 6 or 7 segments appear to be somewhat longer than thick, the following are as long as broad and on the broadened distal part the segments are distinctly broader than long, except the terminal segment, which, twice as long as the penultimate, appears almost three times as long as thick at its base. The lower flagellum, 3,6 mm. long, is 0,13 mm. thick at its base in a lateral view and tapers very slowly to the extremity, being 0,12 mm. thick in the middle; the upper flagellum appears

therefore, in the middle, one and a half as thick as the lower. The lower flagellum, consisting of 20 segments, all longer than thick, is furnished, just as the peduncle, on its lower side with long ciliated hairs.

External antennae 18,3 mm. long, somewhat more than half as long as the body, the peduncle measuring 3,3 mm., the flagellum 15 mm. The peduncle reaches with two-thirds its terminal joint beyond the peduncle of the inner antennae; the three first joints are together 1 mm. long, the 4<sup>th</sup> 1,2 mm., the 5<sup>th</sup> 1,1 mm.; the two last subequal joints are slenderer than the antennular peduncle and there is apparently no trace of a small spine on the articulation between the 3<sup>rd</sup> and the 4<sup>th</sup> joint, as occurs in other species. The flagellum, just half as long as the body, is composed of 75 segments, that are almost all longer than thick.

The external maxillipeds (Fig. 29*b*) are characterized especially by the strong expansion of their penultimate joint. The ischium is 1,28 mm. long, measured in the middle, and 1,12 mm. broad in the middle, little longer than broad; outer and inner margins nearly straight, parallel. Merus indistinctly triangular; it is 1,2 mm. long, measured between the antero-external angle and the posterior margin; its greatest width, at one-third its length from the posterior margin, which, 1,02 mm. broad, articulates with the ischium, is just as large as the length. The outer border is very slightly curved; the more strongly curved, inner border makes almost no angle at all with the somewhat concave anterior, that is 0,65 mm. broad, less broad than the posterior. The carpus has the usual form, it is 1,4 mm. long and 0,88 mm. thick distally. Propodus strongly expanded, 1,24 mm. long, 1,16 mm. broad, almost as broad as long; upper (outer) margin nearly straight, lower regularly curved and passing into the somewhat sinuate distal border, without making an angle. The propodus is almost just as broad as the merus and a trifle broader than the ischium. The finger-shaped dactylus is 1 mm. long, 0,26 mm. thick in the middle, nearly one-fourth its length; it tapers slowly to the obtuse tip that ends in a distinct claw and that is surrounded by some stout bristles. The inner surface of the ischium bears the usual row of sharp spines, somewhat nearer to the outer than to the inner border and slightly curved; one observes, parallel with this row, between it and the inner margin a row of small tufts of hair. The inner surface of the merus bears also a series of spines or short stiff bristles, running from the carpal articulation as far as the middle of this joint. One observes on the middle of the inner surface of the propodus a row of transverse tufts of hairs; that which is situated nearest to the carpus, is much larger than the rest. The long hairs with which the joints are fringed, are distinctly ciliate.

The 1<sup>st</sup> legs much resemble those of *Call. mucronata*. In both chelipeds (Fig. 29*c*, 29*d*) the lower border of the ischium is armed with 7 or 8 spines; the first 4 or 5 are small, the following become rapidly longer. The merus has the same form as in *Call. mucronata*, that of the larger cheliped (Fig. 29*c*) has its lower border sharp and faintly serrate, without a large tooth or spine, of that of the smaller leg the lower border is entire. The carpus of the larger cheliped is 2,4 mm. long and 2,8 mm. broad near the articulation with the chela; this joint, little broader than long, is comparatively longer than in *Call. mucronata*. The larger chela is 6,25 mm. long, the palm is 3,7 mm. long and 3,1 mm. broad; the palm, one and a half times as long as the carpus, is, in the middle, a little broader than it and

distinctly longer than the fingers, that cross one another when closed. The dactylus is strongly curved, both fingers are pointed. The joints of this leg are glabrous on their outer surface, the lower border of carpus and chela is cristate and fringed on both sides with hairs, which, on the inner side, are more numerous and longer. Carpus and chela (Fig. 29*d*) of the smaller cheliped resemble closely those of *Call. mucronata*. The carpus is 2,6 mm. long, 1,8 mm. broad near the articulation with the palm, almost one and a half times as long as broad; upper margin straight. The chela is 5,7 mm. long, the palm 2,9 mm. long and 1,9 mm. broad, the palm being a little longer, though nearly as broad, as the carpus. The joints are fringed with hairs just as in the other leg.

The 2<sup>nd</sup> legs show nothing remarkable. The carpus of the 3<sup>rd</sup> legs (Fig. 29*e*) is 2 mm. long and half as thick at the distal end, that, on its outer side, is fringed with long hairs, except in the middle. The propodus bears proximally an obtuse lobe on the hinder edge and resembles that of *Call. mucronata*. Measured between the carpal articulation and that of the dactylus, this joint proves to be 1,4 mm. long, but from the extremity of the hinder lobe to the distal end of the upper border 1,8 mm.; in the middle of the latter direction the propodus presents its greatest width of 0,96 mm., appearing not yet twice as long as broad. The lobe on the hinder edge measures about one-fourth the longer diameter of this joint; the upper border is slightly convex, the lower somewhat concave, but not emarginate and armed with a short spine near the distal end. The terminal joint, 0,8 mm. long and 0,48 mm. broad, is short and more than half as broad as long.

The two last pairs of legs agree with those of *Call. mucronata*.

In the somewhat younger specimen from Stat. 58 the 2<sup>nd</sup> segment of the abdomen is a little longer than the 6<sup>th</sup> and in both legs of the 1<sup>st</sup> pair the palm appears in proportion to the fingers a little longer.

*Call. placida* is apparently most closely related to *Call. (Callichirus) Coutierei* Nobili, a species found at Perim, Djibouti and Aden (G. NOBILI, in: Annales des Sciences Nat. 9<sup>e</sup> Série, Zool., Paris 1906, T. IV, p. 110, Pl. VII, fig. 1—1*δ*). Two adult females, one of which with eggs, of this species were kindly sent me in 1905 for examination by Dr. NOBILI. The female of *Call. Coutierei* attains a length of 80 mm. It is a pity that of *Call. placida* no egg-bearing specimens were collected, because it is now uncertain whether the female from Stat. 142 is full-grown or not. In *Call. Coutierei* the median rostral spine is obliquely directed upward, whereas in *Call. placida* it is slightly curved downward. In both species the cervical groove is equally far distant from the posterior margin of the carapace. The eyepeduncles of *Call. Coutierei* have a different form and agree more with those of *Call. mucronata*. In the adult, egg-bearing female of *Call. Coutierei* the eyepeduncles that just project beyond the distal end of 1<sup>st</sup> antennular article, are 2,65 mm. long and 1,4 mm. broad at their base, almost twice as long as broad; the strongly convex, oval cornea is placed subterminal, immediately behind the narrow extremity of the peduncle, on its outer side and this narrow, obtuse, terminal part of the peduncle, that measures one-ninth its length, is therefore situated in front of the cornea; the cornea is about one and a half times or twice as far distant from the frontal border of the carapace as it is long. The caudal fan resembles that of *Call. placida*, but the inner uropod is shorter and broader. The first legs bear a close resemblance, but the acute spines on the lower

border of the ischium are placed perpendicular to that border, whereas they are directed obliquely forward in *Call. placida*.

*Call. (Callichirus) tridentata* von Martens differs from *Call. placida* at first sight by the peduncles of the inner antennae that are not shorter but longer than those of the outer, while their flagella are shorter than the peduncles, not longer, by the characters of the chelipeds, by the propodus of the 3<sup>rd</sup> legs which is trilobate and still by other characters, for which I refer to my work on some species of the genus *Callianassa* (J. G. DE MAN, A contribution to the knowledge of twenty-two species and three varieties of the genus *Callianassa* Leach. With 148 illustrations on 12 plates. 's Gravenhage 1928, in: *Capita Zoologica*. Deel II, Afl. 6).

15. *Callianassa (Callichirus) mucronata* Strahl. Pl. XIX, Figs. 30—30e.

*Callianassa mucronata* Strahl, in: Monatsber. der K. Acad. der Wissensch. Berlin 1861, p. 1056.

*Callianassa mucronata* A. Milne-Edwards, in: Nouv. Archives du Muséum. Mémoires, Paris 1870, T. VI, p. 94.

*Callianassa mucronata* J. G. de Man, in: Archiv f. Naturg. Jahrg. 53, 1888, p. 484, Taf. XXI, fig. 2. — A. ORTMANN, in: Zoolog. Jahrb. VI, 1, Abth. für Syst., 1891, p. 57 and in: Jenaische Denkschr. VIII, 1894, p. 23.

*Callianassa (Cheramus) novaeguineae* J. Thallwitz, Decapoden-Studien, Berlin 1891, p. 31.

*Callianassa novaeguineae* J. G. de Man, in: Abhandl. d. Senckenb. Naturforschenden Gesellschaft, Frankfurt am Main 1902, Bd. XXV, p. 757.

Stat. 125. July 18/19. Anchorage off Sawan, Siau-island. Reef. Two females, one of which is adult, ova-bearing, the other young.

Stat. 131. July 24/25. Anchorage off Beo, Karakelang-islands. Reef. One female without eggs.

Stat. 174. August 28/29. Waru-bay, North Coast of Ceram. Reef. One male.

Stat. 231. Ambon. Reef. Three females without eggs.

STRAHL'S description of this species is rather short and incomplete, therefore two females from Ambon were sent by me to the Zoological Museum in Berlin, where Dr. PAPPENHEIM stated them to agree with the type specimen.

The egg-bearing female from Stat. 125, which is quite undamaged and therefore chosen for the following description, is 29 mm. long, apparently not yet full-grown, because this species attains the length of 40 mm. (DE MAN, l. c.). Carapace, (rostrum included) 6,5 mm. long, abdomen 22,5 mm., the former measuring not yet one-third the length of the latter. The strongly defined cervical groove reaches further backward than in *Call. placida*, to which this species is closely allied: its distance, 1,02 mm., from the posterior margin of the carapace is barely one-sixth, in *Call. placida*, however, one-fifth the length of the latter. The pointed spiniform rostrum reaches to the middle of the distance between the anterior border of the carapace and the distal end of 1<sup>st</sup> antennular article: according to ORTMANN the length of the rostrum should be somewhat variable. The angle of the anterior border between the eyestalks and the antennal peduncle is dentiform, sharp, as has already been described by Dr. THALLWITZ (l. c.), but it is not prolonged into a spine as in *Call. placida*.

Abdomen much similar to that of *Call. placida*. Second segment longer than the others and even a little longer than the 6<sup>th</sup>, the 6<sup>th</sup> slightly broader than long. The 3<sup>rd</sup>, 4<sup>th</sup> and 5<sup>th</sup> segment bear, as in *Call. placida*, a tuft of hair laterally. Fifth segment slightly longer than 3<sup>rd</sup>, 4<sup>th</sup> shorter than them. The posterior border of the telson is slightly concave; in the female

from Amboina, described by me in 1888, it is more distinctly concave, whereas in the specimens, collected by the "Siboga" on the same island, the posterior margin is slightly convex in the middle: all individual varieties.

The somewhat curved anterior border of the outer uropod (J. G. DE MAN, l. c. fig. 2a) makes an obtuse angle with the rounded distal border; the raised part of the upper surface reaches barely to the middle of the plate and has a somewhat other form than in *Call. placida*, because the distal border is a little shorter in proportion to the inner. There is a small spine at the base near the inner margin. The longitudinal rib on the upper surface of the inner uropod is quite distinct and runs nearer to the posterior than to the anterior border: in the female from Amboina, described by me in 1888, it did not occur or was not observed. Dr. PAPPENHEIM informed me that the posterior border of the inner uropod, which in the specimens from the reef at Ambon is regularly rounded, appears in STRAHL's type angular in the middle: this slight difference is no doubt individual.

The 1<sup>st</sup> pleopods (Fig. 30d) of the male from Stat. 174, which is 25 mm. long, are uniramous, two-jointed filaments, 1,5 mm. long; the 1<sup>st</sup> joint proves to be 0,8 mm. long, measured in the middle, and 0,28 mm. broad, i. e. about two-fifths the length. Terminal joint 0,7 mm. long, nearly as long as the other, somewhat broadening distally; the distal extremity, that is 0,28 mm. broad, about one-third the length of this joint, ends anteriorly in an obtuse tooth that carries at the tip 4 to 6 long setae, 1—1,3 mm. long, and some very short hairs, 0,06 mm. long, posteriorly in a hooked tooth, which reaches a little beyond the other and that bears also some long setae on its posterior margin. The 2<sup>nd</sup> pleopods of the male are biramous, subfoliaceous filaments; they are 3,2 mm. long and end in two branches, the outer one of which is 1,6 mm. long and rather narrow, being more than 4-times as long as broad; the inner branch is just as long, measured from its articulation with the basal joint to the tip, but it is twice as broad and appears therefore foliaceous; both branches have obtuse tips that carry some long setae, on the inner branch 1,5 mm. long, on the other shorter. The pleopods of the three following segments are biramous, foliaceous and considerably larger than the preceding. The stylamblys is very short, 0,3 mm. long, 0,18 mm. broad at base and sharp-pointed; its outer border is provided with cincinnuli on its distal half and it is 4- or 5-times as far distant from the base of the endopodite as it is long.

The 1<sup>st</sup> pleopods of the female are two-jointed, uniramous, moderately slender filaments; the terminal joint, one and a half times as long as the first, is in the female without eggs, long 36 mm., from Amboina (Fig. 30e) 2,5 mm. long, elongate, sole-shaped, its breadth in the middle being one-fifth its length; it is fringed with long ciliated setae. Second pleopods much similar to those of the male, being biramous filaments, the inner branch twice as broad as the outer, which is 2,8 mm. long and 7-times as long as broad, appearing therefore rather slender. Both have obtuse extremities and there is on the inner border of the inner branch a short obtuse appendix, 0,15 mm. long, not far from the tip, barely twice as far as it is long; in the egg-bearing female from Stat. 125 it is just as long, but it is here finger-shaped, 3-times as long as thick. This appendix, mentioned already by THALLWITZ, is apparently a rudimentary stylamblys, but it is destitute of cincinnuli. The pleopods of the three following pairs are biramous, foliaceous, similar to those of the male; the stylamblys is here very short, 0,48 mm. long, 0,26 mm. broad



at its base, shaped as in the male and 4-times as far distant from the base of the endopodite as it is long.

Eggs numerous, globular, small, diameter 0,65 mm.

Eyestalks contiguous, 1,14 mm. long, reaching to the distal extremity of 1<sup>st</sup> antennular article. They are not rounded distally as in *Call. placida*, but end in an obtuse narrow apex and present the convex, black pigmented and distinctly faceted cornea immediately behind this dentiform tip, on the outer side of the stalk; the eye is large, its diameter of 0,54 mm. being almost half as long as the eyestalks.

Inner antennae (Fig. 30) 6,14 mm. long, a little shorter than the carapace, their peduncle 2,94 mm., their flagella 3,2 mm. long; the latter are little longer than the peduncle. Distance between the anterior margin of the carapace and the distal extremity of 1<sup>st</sup> antennular article 1,14 mm. long; 2<sup>nd</sup> joint 0,52 mm. long, 0,36 mm. thick, once and a half as long as thick, comparatively thicker than in *Call. placida*. Third joint slightly tapering forward, when looked at from above, 1,28 mm. long and 0,29 mm. thick, almost 2½-times as long as 2<sup>nd</sup> and about 5-times as long as thick. Upper flagellum 2,92 mm. long, composed of 24 segments; the first segments are little broader than long in a lateral view, so e. g. is the 3<sup>rd</sup> segment 0,18 mm. long and 0,2 mm. thick; the following become gradually broader until the 13<sup>th</sup> segment, which is 0,12 mm. long and 0,26 mm. broad, twice as broad as long. The remaining segments narrow gradually, so that the penultimate is 0,08 mm. broad and just as long; the terminal segment is 0,15 mm. long and about half as thick at its base. The upper flagellum has therefore the same form as in *Call. placida*, but it appears broadest, in a lateral view, at one-third its length from the extremity. The lower flagellum, fringed like the peduncle on its lower side with long ciliated hairs, is 3,2 mm. long, slightly longer than the other and composed of 19 segments that are nearly all somewhat longer than broad; it is half as long as the carapace, — according to STRAHL, however, it should be as long as it, a difference that cannot more be explained, because in the type specimen the flagella are broken off, as Dr. PAPPENHEIM wrote me.

External antennae 12 mm. long, shorter than half the body. The peduncle that measures 3 mm., is nearly as long as that of the inner antennae, barely reaching beyond it; it remained doubtful, whether there is a trace of a scaphocerite, but a minute spine is wanting. The 4<sup>th</sup> and the 5<sup>th</sup> joints are of equal length, 1 mm. long, and are more slender than the antennular peduncle; the flagellum, composed of 48 segments, that are mostly a little longer than thick, is 9 mm. long, 3-times as long as the peduncle (in *Call. placida* 5-times), nearly one-third the length of the body (in *Call. placida* half the length of the body).

The external maxillipeds (Fig. 30a) resemble much those of this species. The ischium is longer in proportion to its breadth, measured in the middle, both longitudinally and transversely, it appears to be 1,92 mm. long and 1,18 mm. broad, more than one and a half times as long as broad. Merus triangular, because there is no anterior margin as occurs in *Call. placida*; the merus is 1,12 mm. long, measured from the tip to the posterior margin, and 1,22 mm. broad, the outer border is somewhat curved, the antero-internal at first straight, then regularly curved. Carpus 1,44 mm. long, 0,88 mm. broad distally, as in *Call. placida*. The propodus, though likewise much expanded, has another form as in *Call. placida*;



it is 1,42 mm. long and 1,02 mm. broad in the middle, appearing a little longer in proportion to its breadth, there is no distal margin, for the propodus is bordered below, between both articulations, by a regularly curved border. The finger-shaped dactylus is 0,9 mm. long, without the terminal claw, which is surrounded by stout bristles as in *Call. placida*; the dactylus is 0,28 mm. broad, not far from its base. The comb of sharp spines on the inner surface of the ischium proceeds from the anterior border somewhat nearer to the inner than to the outer border; it runs at first straight backward to the middle of the joint, curves then outward until the articulation with the 2<sup>nd</sup> joint and finally turns again inward. It is composed of 30 spines which on the anterior half of the row are more crowded and of unequal size, on the posterior more distantly placed. The arrangement of the setae and bristles on the inner surface of the following joints agrees with *Call. placida*.

In the ova-bearing female from Stat. 125 the larger cheliped (Fig. 30b) is placed on the left side, in the other specimen on the right; the slight differences from the description, published by Dr. THALEWITZ and myself (l. c.), of a type specimen, long 40 mm., of *Call. novaeguineae* = *mucronata*, are to be put down to the larger size of this specimen. The postero-internal border of the coxae of both legs ends in a short tooth, that carries a tuft of hairs. The lower edge of the ischium is not quite entire, but presents a few minute denticulations along its whole length. Merus 4 mm. long, 3 mm. broad, lower border sharp, lamellar, denticulate along its whole length. Carpus 2,4 mm. long in the middle, 4 mm. broad distally, in the type of *Call. novaeguineae* it was just half as long as broad. Chela 8,25 mm. long, palm 5,5 mm. long, 4,5 mm. broad, fingers a little shorter in proportion to the palm than in the full-grown type. Dactylus with two large obtuse tubercles on its proximal half, followed by a third smaller tooth, immobile finger with one tooth in the middle.

The smaller (right) cheliped much agrees with that of the adult female from Amboina, figured by me in 1888 (l. c. fig. 2b), though in this female carpus and palm appear a little longer in proportion to their breadth; the lower border of the ischium is entire. In the female without eggs from Stat. 131 that is 25,5 mm. long, the carpus of the smaller (right) cheliped has a somewhat slenderer form, being 2,25 mm. long and 1,45 mm. broad, whereas of the egg-bearing female from Stat. 125 the carpus is 2,7 mm. long and 2,15 mm. broad; merus and chela are also a little less broad in proportion to their length and the fingers are somewhat slenderer. In a female, long 36 mm., from Amboina without eggs the smaller (right) cheliped presents the same more slender form; the carpus is 3 mm. long and 2 mm. broad, the palm is not broader than the carpus and the upper border of carpus and palm is straight, not curved. In another female from the same locality the right leg seems to be the smaller (the other leg is wanting), because the merus has the typical form; this joint, indeed, is 3 mm. long and 1,8 mm. broad. Carpus and palm are, however, considerably broader in this leg than in the typical form, so that the chela especially shows some resemblance with that of the larger cheliped. The carpus is 2,3 mm. long and 2,2 mm. broad distally, appearing almost as broad as long; the chela is 5,5 mm. long, the palm 3,5 mm. long and 2,5 mm. broad. The form of the smaller cheliped proves thus to be rather variable in this species.

Carpus of 2<sup>nd</sup> legs half as broad as long, chela shorter and less broad than carpus. Third legs (Fig. 30c) similar to those of *Call. placida*. Carpus 2,4 mm. long and half as broad distally.

Propodus 1,6 mm. long from articulation to articulation and 1,82 mm., when measured between the tip of the obtuse lobe on the hinder edge and the distal end of the somewhat curved upper border; it is 1,14 mm. broad in the middle, little more than one and a half times as long as broad and somewhat broader than in *Call. placida*. The obtuse lobe on the hinder edge measures one-sixth the longer diameter, the lower border is straight, not emarginate, and bears a short spine at the distal end.

The two other legs and also the sternal plaque between them agree with those of *Call. placida*.

*Call. mucronata* Strahl bears also some resemblance to *Call. (Callichirus) Coutierei* Nobili from Djibouti, Perim and Aden. This species, however, two adult females of which were kindly sent me for examination by Dr. NOBILI, (Confer p. 174), may be distinguished by the following characters. Its size is twice as large, this species attaining a length of 80 mm. The median rostral spine is obliquely directed upward and on each side of it there is another. The cervical groove is farther distant from the posterior margin of the carapace, this distance being one-fifth the length of the latter, not one-sixth. The abdomen resembles that of *Call. mucronata*, but the inner uropod is comparatively shorter. The cornea is smaller, compared with the length of the eyepeduncle. The propodus of the external maxillipeds is a little more dilated. In both legs of the 1<sup>st</sup> pair the lower border of the ischium is armed with acute spines, that make right angles with the lower border itself and the larger cheliped has also a somewhat different form. There are no doubt still other differences of less importance.

16. *Callianassa (Callichirus) audax* de Man. Pl. XX, Figs. 31—31*i*.

*Callianassa audax* J. G. de Man, in: Notes from the Leyden Museum, Vol. XXXIII, 1911, p. 223.

Two female specimens without eggs of subequal size, collected in 1892 in the Straits of Malacca.

A remarkable species which in many characters presents some relationship with *Call. (Callichirus) Kraussi* Stebbing from the Cape of Good Hope.

The larger specimen, measured in the middle line, is 67 mm. long, the carapace being 17,5 mm. long; in the other specimen these numbers are respectively 60 mm. and 16 mm.; the carapace is thus but little longer than one-fourth the length of the body and than one-third that of the abdomen. Sutures of the carapace deep. Rostrum (Fig. 31) very short, measuring about one-sixth the length of the eyestalks, much broader at its base than it is long, depressed and rather obtuse; close by the lateral margins that like the whole frontal margin are fringed with short hairs, the upper surface of the rostrum presents some impressed points. At either side of the rostrum between the eyestalk and the antennal peduncle one observes a rounded prominence, only half as long as the rostrum itself.

Eyestalks almost as long as basal antennular article, twice or a little more than twice as long as broad at their base and with the subacute tips slightly turned outward; while the inner borders are straight and almost contiguous, the outer converge at first slowly, but, curving, beyond the eyes more rapidly toward the tip. Eyes black, situated just in the middle on the outer half of the peduncle; while the eyes are just half as wide as the stalk in the younger

specimen, they are a little broader in the other. The eyestalks are flattened above, excepting the terminal half, which is slightly convex.

Antennulae slightly shorter than the carapace, measured in the middle line; 2<sup>nd</sup> joint somewhat more than one and a half times as long as thick and a little shorter than 1<sup>st</sup>; 3<sup>rd</sup> one-fourth longer than 2<sup>nd</sup>, regularly narrowing forward and nearly 3-times longer than broad in the middle. Flagella of equal length (10,5 mm.), a little more than once and a half as long as the peduncle (6 mm.); lower flagellum tapering to a fine point, its outer border fringed with setae, that are also observed on the outer border of the 2<sup>nd</sup> and 3<sup>rd</sup> joint of the peduncle; the upper flagellum presents the same width along four-fifths of its length, slightly widened at one-tenth its length from the tip and hence rapidly tapering.

External antennae one and a half times as long as the inner antennae and as the carapace, measured in the median line. Antennal peduncle outreaching the peduncle of the inner antennae by one-fourth its terminal joint, which is much thinner but nearly as long as the 3<sup>rd</sup> joint of the latter; scaphocerite movable, very small, triangular, as long as broad at its base, with the tip rather obtuse; flagellum 18 mm. long, a little more than twice as long as the peduncle and almost twice as long as the flagella of the inner antennae.

The external maxillipeds (Fig. 31*b*) much resemble those of *Glypturus Branneri* Rathb. from the coast of Brazil (M. J. RATHBUN, in: Proc. Washington Acad. Sciences, Vol. II, 1900, p. 150, Pl. VIII, fig. 7), but the carpus is distinctly less broad than the propodus. Measured in the middle, the ischium, 4,5 mm. long, appears almost one-third longer than the merus (3,75 mm.) and almost as wide (3,8 mm.) as long; whereas in *Glypturus Branneri* both the outer and the inner border of the ischium should be straight according to the figure, in *Call. audax* both margins are decidedly curved. Merus one-third broader than long. The outer surface of both joints is rather flattened, but near the proximal articulation the ischium appears distinctly concave; the inner surface of both joints is also concave and bordered near their outer margin by a longitudinal row of long hairs, but the sharp, prominent, spinous crest, with which the ischium is armed in *Glypturus acanthochirus* Stimps., is wanting completely. The carpus is just as long as the merus and one and a half times as long as broad. The propodus, 3 mm. long and 3,25 mm. broad, is one-fourth shorter than the carpus, a little broader than long and distinctly broader than the carpus, though not twice as broad as in *Glypturus acanthochirus*; lower border arcuate, anterior slightly oblique and making an obtuse angle with the lower, that passes with a regular curve into the truncate posterior. Dactylus a little shorter than the propodus, slightly compressed, hairy; the inner border of the preceding joints is also hairy like the anterior border of the propodus and one observes a tuft of short setae on the inner surface of the carpus near the propodal articulation and another not far from it on the inner side of the propodus near the carpal articulation.

The legs of the 1<sup>st</sup> pair resemble somewhat those of *Call. gigas* Dana, but the merus of the larger cheliped is not armed with a single tooth on the proximal end of the lower border; in the larger specimen the right cheliped is the larger, in the other the left. Ischium of the larger cheliped (Fig. 31*c*) claviform, the proximal half being narrow, the distal half thickened, lower border finely serrate along its whole length. Merus a trifle shorter than the preceding joint, without strongly developed teeth or spines, but with the lower border widened

from near the proximal extremity to a little beyond the middle; the merus, 8 mm. long, is 5 mm. broad on the dilated part, appearing only a little more than one and a half times as long as wide. The lower border is finely denticulate by 13 or 14 small, acute teeth and a little hairy, the slightly curved upper border is also finely serrate along its whole length and a little hairy; the convex upper surface of the merus is smooth, the outer is covered with some small granules that disappear near the denticulate lower border, while in the younger specimen these granules are still wanting. On the distal half of the flattened inner surface of the merus 4 small tufts of setae are situated behind one another, while one observes 4 very small granules close to the articulation with the ischium. Measured along the nearly straight upper border, that on its outer side appears entire and smooth, but on the inner finely serrate, the carpus proves to be 7,75 mm. long, nearly as long as the merus, and, being 8,25 mm. broad, about as long as broad or deep. Outer and inner side of the carpus slightly convex, smooth and shining; the lower border, somewhat compressed distally and terminating in a small compressed tooth, appears, like the upper, on the outer side entire, on the inner inconspicuously serrate. Chela 15,5 mm. long, twice as long as the carpus, when measured along the upper border; palm 10,5 mm. long, one-third longer than the carpus, near the carpal articulation just as broad as the carpus, but slightly decreasing in breadth distally. Upper border of the palm carinate from the carpal articulation to a little beyond the middle, the rest of the upper border rounded and entire. Outer and inner surface of the palm slightly convex, smooth and shining, lower border of the chela finely denticulate along its whole length to near the tip of the fixed finger. The fingers (Fig. 31*d*), half as long as the palm, shut close together, while the pointed tips cross one another. Dactylus rather coarsely granulate on its upper border and on its inner lower surface, its outer surface smooth, except a few granules near the prehensile edge; the latter with a long granulate prominence on the proximal half, that is followed by a sharp somewhat compressed tooth. Inner upper side of the fixed finger granulate, prehensile border finely denticulate, the distal third part excepted. Distal border of the palm, near the articulation of the dactylus, granulate both on the inner and the outer side. In the younger specimen the fingers are a little longer in proportion to the palm and the granulation is much less developed.

The small cheliped (Fig. 31*e*) has, as in *Call. gigas*, a quite other form than the large. Ischium narrow, compressed, a little broader at both extremities than in the middle and quite smooth. Merus a little shorter than ischium, of a somewhat ovoid shape, twice as long as broad, smooth, the upper border slightly arcuate, the lower less so and a little hairy. Measured along the straight upper border the carpus proves to be 8,5 mm. long, one-third longer than the merus and 3-times as long as wide; the lower border, also straight, runs parallel with the upper, so that the carpus presents the same width along its whole length; it appears a little less broad than the merus. Chela 8 mm. long, a little shorter than the carpus, the palm, 4,25 mm. long, slightly longer than the fingers; the palm, which proximally appears almost as broad as the carpus, decreases slightly in breadth distally. The lower border of the chela is carinate, like that of the carpus and the upper border of the palm is also carinate to just beyond the middle. The fingers that shut close together, are setose and the cutting-edges are finely denticulate along the proximal half, the small sharp teeth being a little larger on the immobile finger than on the dactylus. Carpus and chela are, like the preceding joints, quite smooth.

The 2<sup>nd</sup> legs closely resemble those of *Call. armata* A. M.-Edw. (Nouv. Archives du Muséum. T. VI, 1870, Pl. I, fig. 8): the merus, 8 mm. long, is  $2\frac{2}{3}$ -times as long as broad in its proximal half.

The lobe on the hinder edge of the propodus of the 3<sup>rd</sup> legs (Fig. 31f) is much developed and these legs closely resemble those of *Call. Kraussi* Stebbing (South African Crustacea, I, 1900, Pl. III, fig. 3), but the anterior part of the propodus is almost one and a half times as broad as the posterior lobe and the posterior border, which in *Call. Kraussi* is distinctly concave, appears in *Call. audax* straight. Dactylus as in *Call. Kraussi*, merus a little more than 3-times as long as broad.

The 4<sup>th</sup> legs resemble also those of *Call. Kraussi*, but the merus that slightly grows broader distally and that is 4-times as long as broad in the middle, is a little curved.

Merus of 5<sup>th</sup> legs also 4-times as long as thick in the middle, slightly curved and slightly thickening distally, the somewhat compressed carpus also thickens a little towards the distal articulation.

Abdomen rather broad and depressed. First segment 7,75 mm. long, a little less than half as long as the carapace; at each side a deep groove runs close by and parallel with the lateral borders, the two grooves converge forward like the margins and reach to the distal fourth part of the segment. Second segment one-third longer than 1<sup>st</sup>, 10,25 mm. long, 11,75 mm. broad, and with an oblique depression near each antero-lateral angle. Measured in the middle line the 6<sup>th</sup> segment (Fig. 31a), rather strongly convex transversely and slightly also from before backward, proves to be 7,75 mm. long, while it is one-third broader than long, presenting its greatest width of 10,25 mm. at the anterior third. The lateral borders present at the posterior third a short furrow that runs transversely inward; a slightly arcuate, transverse groove runs just before the posterior margin and as well from the middle as from the lateral extremities of this groove a short furrow proceeds on the upper surface forward, the median furrow being more distinct than the lateral ones; the latter run obliquely forward and outward, terminating into the anterior transverse furrows.

The telson, which is 4,25 mm. long and 6,25 mm. broad, is much shorter than the 6<sup>th</sup> segment and nearly one and a half times as broad as long. Lateral margins slightly curved, posterior margin obtuse in the middle, at either side of which one observes a small, low, rounded prominence, a little more prominent than the obtuse middle, so that the margin appears slightly undulate. The upper surface of the telson shows in the middle a rectangular cavity, a little longer than wide, and reaching to the anterior third part which appears transversely convex; at each side of this cavity that occupies the middle third part of the telson and the lateral borders of which are punctate, one observes another more shallow pit that almost extends to the lateral margins.

Uropods much longer than the telson. Inner uropod triangular, almost twice as long (6 mm.) as broad (3,5 mm.), subacute, outer margin straight and shorter than the inner, which is a little curved; upper surface with an arcuate, little prominent ridge, that runs near the inner border to the tip. The anterior branch of the outer uropod does not project beyond the inner or posterior, therefore does the outer uropod appear regularly oval, nearly one and a half times as long (8,25 mm.) as broad (5,25 mm.), with the borders regularly rounded;

from the articulation a prominent ridge runs obliquely backwards, bending towards the rounded posterior end of the lamella, and between this ridge and the rounded anterior end is situated the outer branch or raised part of the uropod; the outer margin of this raised part is tomentose, while the tip is obtuse. The described curved ridge and the inner border of the raised part are also prominent on the lower surface of the uropod, while the inner uropod appears completely flattened below; the outer uropod does not extend beyond the inner.

The 1<sup>st</sup> pleopod (Fig. 31*g*) is clothed with long setae, most of which are feathered, the peduncle is slightly curved and thicker in the middle than at both extremities; the ramus, about as long as the peduncle, proved to consist of two joints, the first is a little longer but much thicker than the 2<sup>nd</sup>, which, 4-times as long as broad, presents along its whole length the same width and the tip is obtuse. Second pleopods biramous and also clothed with long setae; of the two rami that are equally long and depressed and that slightly narrow from the base to the obtuse tip, the inner appears about twice as broad as the outer, which is implanted on the anterior third of the stalk; the stalk is a little shorter, but broader or thicker than the rami. The inner ramus did not present a trace of an appendix interna or stylamblys. The pleopods of the three following segments (Fig. 31*i*) show nearly the same form as those of the species, figured by BOAS (Studier over Decapodernes Slaegtskabsforhold, 1880, Tab. V, fig. 177). The sickle-shaped outer rami are much longer than the inner, rounded at the tip, their outer margin is strongly curved and the arcuate ridge that one observes on their anterior surface and which on the posterior appears as a narrow groove, runs nearer to the middle than in BOAS's species; posteriorly the outer margin of these rami terminates in a small, obtuse lobe. The inner rami look like a rectangular triangle, two sides of which are equally long, while the hypotenuse is slightly curved; the straight, inner margins of the pleopods of every segment shut close together apparently by a retinaculum, which, however, is so small that it was not observed. A faint ridge is visible both on the outer and on the inner surface of the inner rami, that run from their posterior margin to their tip.

*Call. (Callichirus) Kraussi* Stebbing from the Cape of Good Hope differs by the following characters. The peduncle of the inner antennae is almost twice as long as that of the outer, the 3<sup>rd</sup> joint much longer and slenderer; the telson is less broadened, the inner uropod longer and narrower. In the larger cheliped the carpus is longer than the palm and appears less broad in proportion to its length, in the smaller the carpus has a stouter shape, the palm shorter and there are still many other differences.

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## INDEX

Note. — Synonyms are printed in Italics. The more important pages are indicated by heavier type.

- acanthochirus (Glypturus) **19**. 25. 180.  
 aequimana (Callichirus) (Callianassa) 28. 93. **114**.  
 affinis (Trypaea) (Callianassa) 27. 101.  
 affinis (Upogebia) (Upogebia) 22. 36. 38. 46.  
*africana* (Upogebia) (Upogebia) 22. 37. **51**.  
 Amboinae (Scallasis) (Callianassa) 30. 93.  
 amboinensis (Trypaea) (Callianassa) 27. 93. 107. **165**.  
 ancylodactyla var. amboinensis (Calliadne) (Upogebia)  
     24. 38. 50. **89**.  
 ancylodactyla (Calliadne) (Upogebia) 18. 24. 38. 50.  
     84. 85. **87**. 90.  
 anomala var. squamifera (Thalassina) 1. 4. 5. **12**.  
 anomala (Thalassina) 3—5. 14.  
 anomalus (Astacus) (Cancer) 3. 5.  
 armata (Callichirus) (Callianassa) 28. 93. 109.  
 articulata (Callichirus) (Callianassa) 28. 94. 108.  
 assimilis (Callichirus) (Callianassa) 28. 93. 109.  
 astacina (Laomedea) 15. **16**.  
 atlantica (Callichirus) (Callianassa) 28. 94. 112.  
 audax (Callichirus) (Callianassa) 28. 93. 113. **179**.  
 audax (Callianassa) 1. 18.  
 australiensis (Trypaea) (Callianassa) 27. 93. 104. 134.  
 Axianassidae **15**.
- Balssi (Ctenocheles) 25.  
 Balssi (Upogebia) (Upogebia) 22. 37. 43.  
 *barbata* (Gebia) 60.  
 Batei (Cheramus) (Callianassa) 26. 94. 95. 97. 98.  
 Bigea 18. 20. 25.  
 Bocourti (Callichirus) (Callianassa) 28. 94. **115**.  
 Bouvieri (Trypaea) (Callianassa) 27. 107. **146**.  
 Bowerbankii (Calliadne) (Upogebia) 24. 37. 48.  
 brachyophthalma (Trypaea) (Callianassa) 27. 94. **115**.  
     134.  
 Branneri (Glypturus) **19**. 25.
- brevicaudata (Callichirus) (Callianassa) 28. **115**.  
 caecigena (Calliactites) (Callianassa) 20. 25. 95. 96.  
     124.  
 californiensis (Trypaea) (Callianassa) 27. 105.  
 californiensis var. japonica (Trypaea) (Callianassa)  
     27. 93. 105.  
 Calliactites 25. 91. **95**. **96**.  
 Calliadne 24. 35. 47.  
 Callianassa 18—20. 25. **91**.  
 Callianassidae **18**. 20. 21.  
 Callianassinae 20.  
 Callianidea 18. 20. 21. **30**.  
 Callianideinae 20. **30**.  
 Callichirus 28. 91. **96**. **108**.  
 Calmani (Cheramus) (Callianassa) 26. 100.  
 capensis (Upogebia) (Upogebia) 22. 37. 41. 51.  
 cargadensis (Calliadne) (Upogebia) 24. 37. 48.  
*carinicauda* (Gebia) 60.  
 carinicauda var. gracilipes (Upogebia) (Upogebia)  
     44.  
 carinicauda (Upogebia) (Upogebia) 18. 22. 38. 39.  
     44. 53. **60**. 66.  
 celebica (Callianassa) 25. **115**.  
 ceramica (Trypaea) (Callianassa) 27. 93. 104.  
 ceratophora (Upogebia) (Upogebia) 22. 38. 46. **69**.  
     75.  
 Cheramus 26. 91. **95**. **97**.  
 chilensis (Thalassina) 3. 4.  
 chilensis (Trypaea) (Callianassa) 27. 94. 103.  
 coeca (? Scallasis) (Callianassa) 30.  
 Coutierei (Callichirus) (Callianassa) 28. 109. **174**.  
     **179**.  
 cristata (Trypaea) (Callianassa) 27. 107.  
 Ctenocheles 18. 20. 25.

- Danai (Upogebia) (Upogebia) 22. 35. 38. 39. **52**.  
54. 57.  
Darwinii (Calliadne) (Upogebia) 24. 37. 50. 81. **84**. 88.  
*Darwinii* (Gebiopsis) 84.  
deltaura (Calliadne) (Upogebia) 24. 36. 49.
- Eiseni (Callichirus) (Callianassa) 28.  
*Eiseni* (Lepidophthalmus) **110**.  
elongata (Callianidea) 21. 30.  
exigua (Gebicula) 25. **60**. 66. 68.
- fallax (Upogebia) (Upogebia) 22. 38. 42. **57**. 70.  
Filholi (Trypaea) (Callianassa) 27. 93. 101. 104.  
furcata (Calliadne) (Upogebia) 24. 36. 48.
- Gebicula 18. 20. 25. 69.  
gigas (Trypaea) (Callianassa) 27. 101. 134. 180. 181.  
Glypturus 18. **19**. 20. 25. 111.  
goniophthalma (Calliactites) (Callianassa) 25. 95. 96.  
gracilipes (Upogebia) (Upogebia) 22. 36. 42.  
gracilis (Thalassina) 3—5.  
Grandidieri (Callichirus) (Callianassa) 28. 92. 110.  
grandimana (Callianassa) **19**.  
grandimana (Glypturus) 25.  
Gravieri (Trypaea) (Callianassa) 27. 107.  
guineensis (Callichirus) (Callianassa) 28. 94. 114.
- Harmandi (Trypaea) (Callianassa) 27. 102.  
heterocheir (Upogebia) (Upogebia) 22. 38. 47.  
hexaceras (Calliadne) (Upogebia) 24. 38. 49. **81**. 85.  
87. 88.  
*hexaceras* (Gebiopsis) (Gebia) 81.  
*hirtifrons* (Gebia) 52. 56.  
*hirtifrons* (Upogebia) 43.  
hirtifrons (Upogebia) (Upogebia) 22. 38. 43. **65**.  
Hupferi (Gebicula) 25.
- indica (Cheramus) (Callianassa) 26. 93. 100. 159. **160**.  
intermedia (Axianassa) **15**. 17.  
*intermedia* (Calliadne) (Upogebia) 82. 83. 87.  
intermedia (Cheramus) (Callianassa) 26. 93. 97. 98.  
137—139. **143**.  
*intermedia* (Gebiopsis) 84.  
*intermedia* (Gebiopsis) (Gebia) 84.  
*intermedia* (Upogebia) 81. 84.  
*intermedia* var. *amboinensis* (Gebiopsis) 89.  
Issaefi (Upogebia) (Upogebia) 23. 39. 41.  
italica (Trypaea) (Callianassa) 27. 92. 101.
- japonica (Trypaea) (Callianassa) 27. 93. 106.  
joculatrix (Cheramus) (Callianassa) 18. 26. 93. 95.  
98. **130**. 141. 146. 148. 151. 153.
- Jousseaumei (Cheramus) (Callianassa) 26. 100. **165**.
- Kraussi (Callichirus) (Callianassa) 28. 94. 95. 113.  
179. 182. **183**.  
Krukenbergi (Callianassa) 94.
- laevicauda (Callianidea) 21. **30**.  
Laomediidae **15**.  
laticauda (Callichirus) (Callianassa) 28. 91. 92. 111.  
lignicola (Calliactites) (Callianassa) 25. 95. 97.  
littoralis (Risso) (Upogebia) (Upogebia) 23. 36. 41. 54.  
littoralis G. O. Sars (Upogebia) (Upogebia) 23. 36.  
**51**. 63. 64.  
lobetobensis (Cheramus) (Callianassa) 26. 93. 98.  
**137**. 158.  
longimana (Trypaea) (Callianassa) 27. 102. 106. 134.  
longipollex (Upogebia) (Upogebia) 23. 35. 39. **51**.  
longiventris (Callichirus) (Callianassa) 19. 29. 94. 108.  
longiventris var. *Borradailei* (Callichirus) (Callianassa)  
29. 92. 108.
- madagassa (Callichirus) (Callianassa) 29. 92. 113.  
major (Callichirus) (Callianassa) 29. 91. 94. 111.  
major (Upogebia) (Upogebia) 23. 39. 45. 62.  
maldivensis (Trypaea) (Callianassa) 28. 92. 107.  
134. 146.  
marginata (Callichirus) (Callianassa) 29. 94. 113.  
Martensii (Callichirus) (Callianassa) 29. 109. 171.  
mauritiana (Cheramus) (Callianassa) 26. 99. 160—164.  
maxima (Callichirus) (Callianassa) 29. 92. 112.  
maxima (Thalassina) 3.  
Metaxius **18**. 20. 21. 30.  
Meticonaxius **18**. 20. 21. 30.  
microps (Metaxius) 18. 20. 21.  
minima (Cheramus) (Callianassa) 26. 94. 97.  
minor (Cheramus) (Callianassa) 26. 92. 100.  
modesta (Calliactites) (Callianassa) 18. 26. 93. 97.  
**118**. 129. 140. 153—155.  
moluccensis (Cheramus) (Callianassa) 26. 93. 99. **159**.  
monoceros (Upogebia) (Upogebia) 23. 38. 46. 70.  
72. **75**.  
monodon (Meticonaxius) **19**. 21. 30.  
*mucronata* (Callianidea) 30. 31. 34.  
mucronata (Callichirus) (Callianassa) 18. 29. 92. 93.  
112. 171—**175**.
- neglecta (Upogebia) (Upogebia) 23. 38. 42.  
nitida (Calliadne) (Upogebia) 24. 36. 50.  
nocturna (Jaxea) 15. **16**.  
Novae-britanniae (Callichirus) (Callianassa) 29. 92.  
93. 114.  
Novae-britanniae var. (Callichirus) (Callianassa) 29. 114.



- novaeguineae* (*Callianassa*) 175. 178.  
*novaeguineae* (*Cheramus*) (*Callianassa*) 175.
- occidentalis* (*Callianassa*) 25. **115**.  
*octoceras* (*Calliadne*) (*Upogebia*) 24. 37. 49.  
*octoceras* var. *australiensis* (*Calliadne*) (*Upogebia*)  
 24. 38. 49.  
*operculata* (*Calliadne*) (*Upogebia*) 24. 37. 39. 50.  
*orientalis* (*Cheramus*) (*Callianassa*) 26. 93. 98. 119.  
 132. **137**.  
*Osiris* (*Upogebia*) (*Upogebia*) 23. 35. 37. 40.
- pachydactyla* (*Cheramus*) (*Callianassa*) 19. 26. 94.  
 100. 121. 160—164.  
*Pestae* (*Callichirus*) (*Callianassa*) 29. 92. 94. 111. 141.  
*petalura* (*Trypaea*) (*Callianassa*) 28. **115**.  
*placida* (*Callichirus*) (*Callianassa*) 29. 93. 108. **171**.  
 175—179.  
*praedatrix* (*Cheramus*) (*Callianassa*) 26. 93. 97. 99.  
 127. 143—**146**.  
*propinqua* (*Cheramus*) (*Callianassa*) 27. 93. 98. **127**.  
*pseudochelata* (*Upogebia*) (*Upogebia*) 23. 37. 43.  
*Pugettensis* (*Upogebia*) (*Upogebia*) 23. 39. 40. **56**.  
*pugnatrix* (*Cheramus*) (*Callianassa*) 27. 93. 99. 138.  
 143. 144. 146. 150. **151**. 157. 158.  
*pugnax* (*Upogebia*) (*Upogebia*) 28. 38. 45. 57—60.  
**66**. 70.  
*pygmaea* (*Cheramus*) (*Callianassa*) 1. 18. 27. 93. 99. **155**.
- rhadames* (*Calliadne*) (*Upogebia*) 24. 37. 47.  
*Rochei* (*Trypaea*) (*Callianassa*) 28. 104.  
*Rosae* (*Callichirus*) (*Callianassa*) 29. 110.  
*rotundicaudata* (*Calliactites*) (*Callianassa*) 26. 92. 94.  
 97. 123. 136. 149. 150.  
*rugosa* (*Calliadne*) (*Upogebia*) 24. 37. 39. 50.
- Sacculina* 69.  
*Savignii* (*Calliadne*) (*Upogebia*) 25. 35. 37. 47.  
*Scallasis* 30. 91.  
*scorpionoides* (*Thalassina*) 3. 14.
- secura* (*Calliactites*) (*Callianassa*) 26. 93. 96.  
*Sibogae* (*Cheramus*) (*Callianassa*) 27. 93. 98. **124**.  
*Simsoni* (*Upogebia*) (*Upogebia*) 28. 38. 40. **52**.  
*spinifrons* (*Upogebia*) (*Upogebia*) 23. 38. 46. 53.  
*spinigera* (*Upogebia*) (*Upogebia*) 23. 39. 45. 51.  
*Steenstrupii* (*Callianidea*) 30.  
*stellata* (*Gebia*) 37.  
*stellata* (*Upogebia*) (*Upogebia*) 23. 36. 39. 42.  
*stellatus* (*Cancer Astacus*) 35.  
*subspinosa* (*Upogebia*) (*Upogebia*) 23. 37. **51**.  
*subterranea* (*Cheramus*) (*Callianassa*) 27. 91. 92. 94. 97.  
*subterraneus* (*Cancer Astacus*) 91.  
*sp. α* (*Upogebia*) (*Upogebia*) 24. 38. 40. **52**.  
*sp. β* (*Upogebia*) (*Upogebia*) 24. 39. 44. **66**.  
*sp. γ* (*Calliadne*) (*Upogebia*) 25. 36. 49.  
*sp.* (*Calliactites*) (*Callianassa*) 26. 93. 97. **116**.  
*sp.* (*Thalassina*) 4.  
*sp.* (*Trypaea*) (*Callianassa*) 28.  
*sp.* (*Upogebia*) (*Upogebia*) 24.
- Talismani* (*Upogebia*) (*Upogebia*) 24. 36. 38. 47.  
*Thalassina* 3.  
*Thalassinidae* 3.  
*Thaumastocheles* 20.  
*tipica* (*Bigea*) 25.  
*Trachelifer* **15**.  
*tridentata* (*Callichirus*) (*Callianassa*) 30. 93. 110.  
 171. **175**.  
*truncata* (*Trypaea*) (*Callianassa*) 28. 92. 101.  
*Trypaea* 27. 91. **96**. **100**.  
*Turnerana* (*Callichirus*) (*Callianassa*) 30. 94. 114.  
*typa* (*Callianidea*) 18. 21. 30. **31**.  
*typus* (*Callianidea*) 31.
- uncinata* (*Trypaea*) (*Callianassa*) 28. 91. 94. 102.  
*Upogebia* 18. 20. 22. **35**. 39.  
*upogebiae* (*Pseudione*) 37.  
*Upogebiinae* 20.
- vigilax* (*Callichirus*) (*Callianassa*) 30. 93. 109.

EXPLANATION OF THE PLATES.

## PLATE I.

- Fig. 1. *Thalassina anomala* (Herbst) var. *squamifera* de Man. — Right antennal peduncle of the female, long 160 mm., from Stat. 131,  $\times 7$  ( $\alpha$  scaphocerite).
- Fig. 2—2c. *Axianassa intermedia* W. L. Schmitt. Cotype from the island of Curaçao. — 2 Frontal border of carapace with eyestalks and basal part of the peduncles of the two pairs of antennae,  $\times 37\frac{1}{2}$ ; 2a external maxilliped, outer side,  $\times 19$ ; 2b, 2c fusiform hairs on the inner border of the merus,  $\times 56$ .
- Fig. 3—3f. *Callianidea typha* H. M.-Edw. — 3 Frontal border of carapace with the eyestalks and the two pairs of antennae of the adult male from Stat. 64,  $\times 9$ ; 3a frontal border, eyestalks and basal joints of the inner antennae of this male,  $\times 22\frac{1}{2}$ ; 3b frontal border of carapace with the eyestalks, the inner antennae and the peduncles of the outer of the youngest male from Stat. 34,  $\times 22\frac{1}{2}$ ; 3c frontal border with the eyestalks and the basal joints of the inner antennae,  $\times 37\frac{1}{2}$ ; 3d right pleopod of 1st pair of the male from Stat. 64, looked at from the posterior side,  $\times 7$ ; 3e left pleopod of 1st pair of the largest male from Stat. 34, looked at posteriorly,  $\times 7$ ; 3f left pleopod of 1st pair of the egg-bearing female from Stat. 37, looked at posteriorly,  $\times 9$ .
- Fig. 4. *Upogebia* (*Upogebia*) sp.  $\alpha$ . Male from Stat. 149. — Anterior part of carapace, eyes and left antennal peduncle,  $\times 75$ .

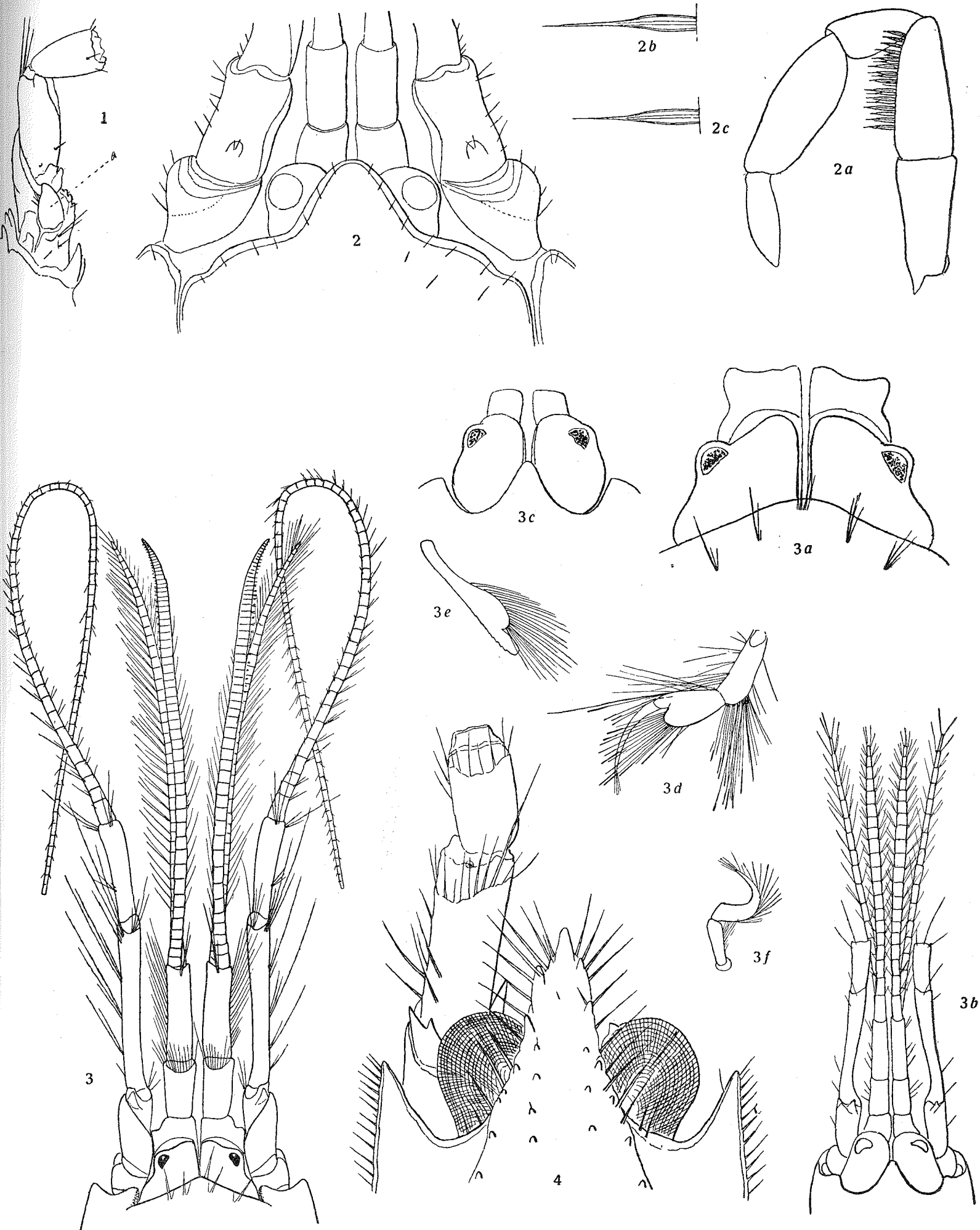
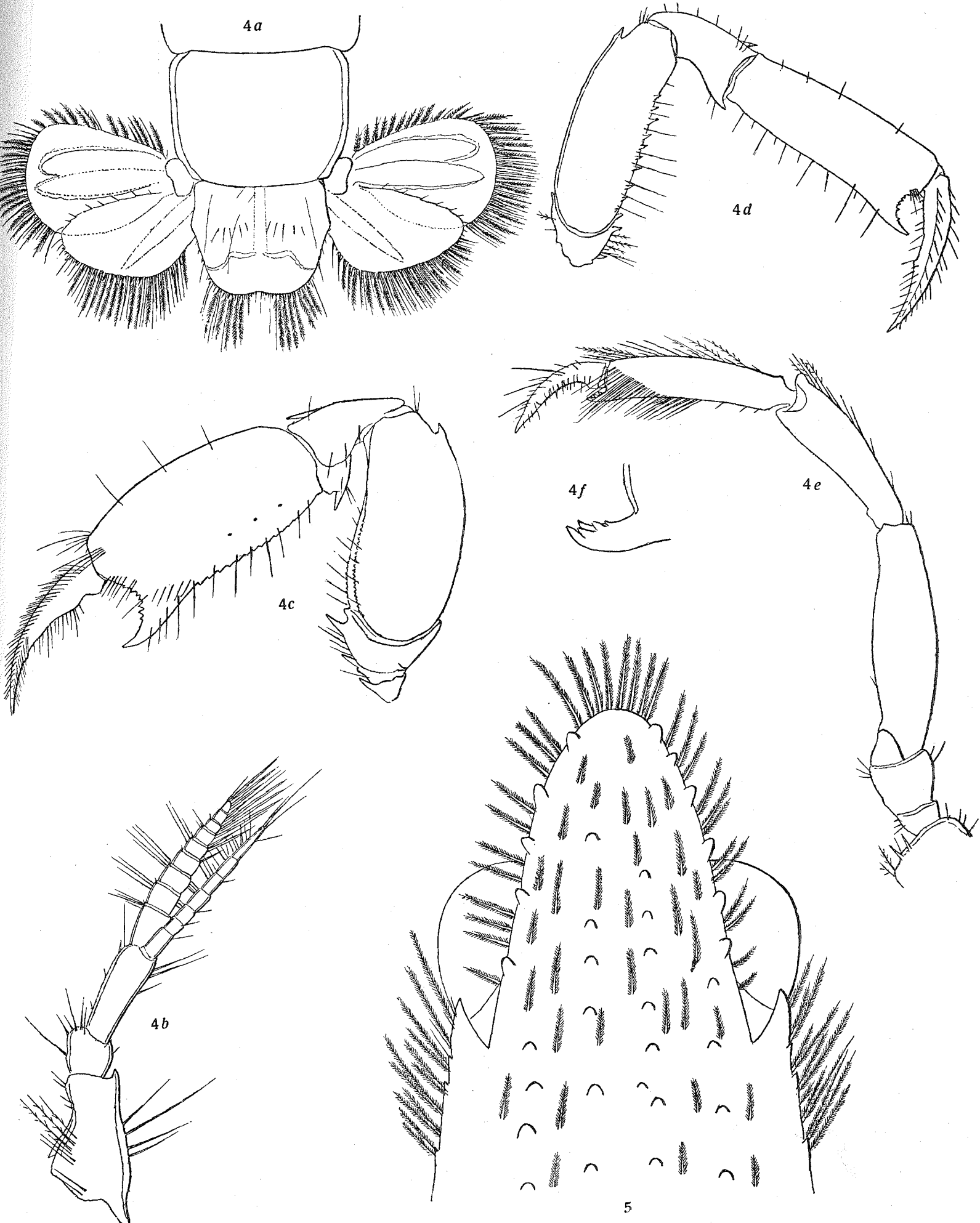


Fig. 1, 2-2c J. G. DE MAN, Fig. 3-3f, J. F. OBBES, Fig. 4 J. G. DE MAN, del.

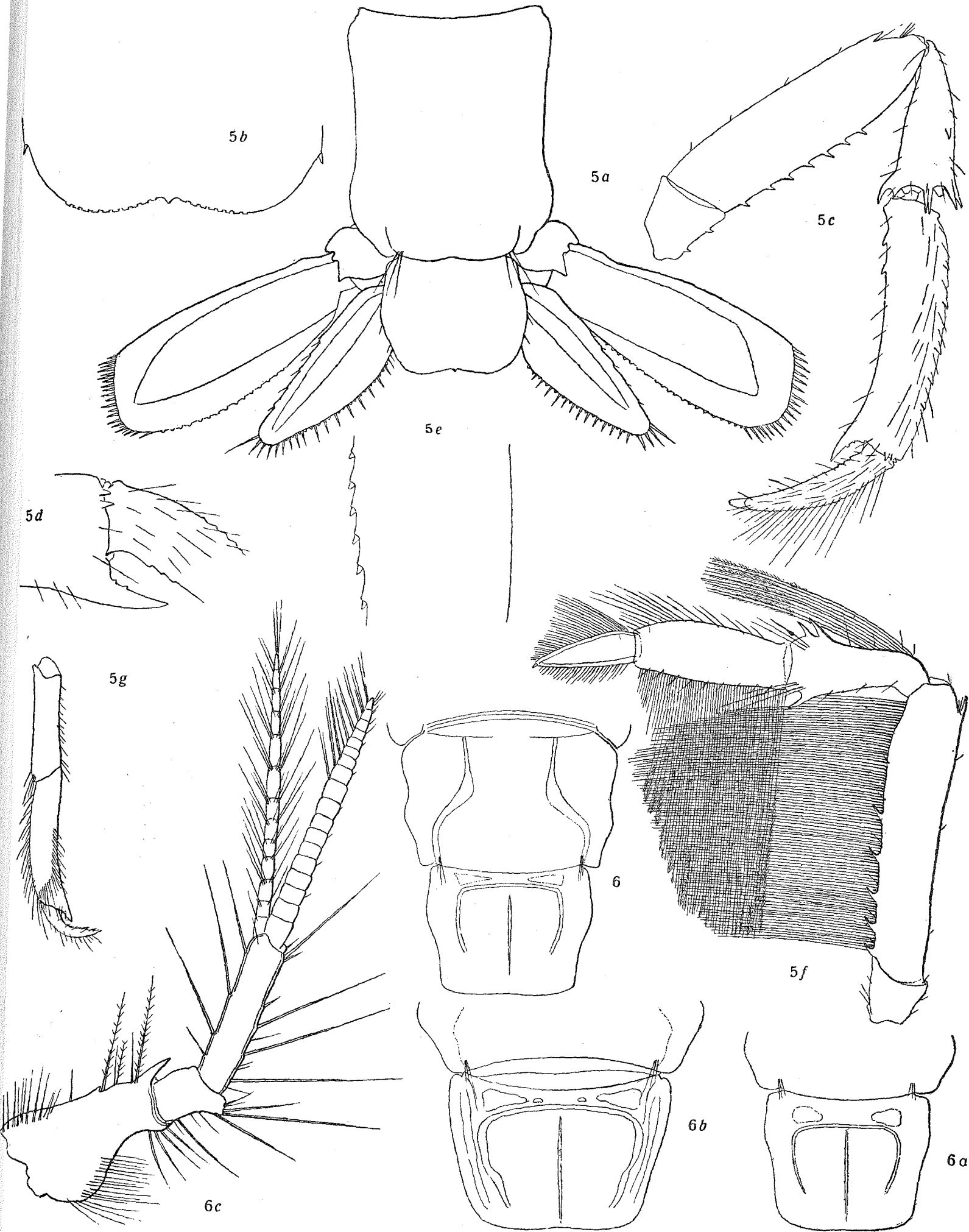
## PLATE II.

- Fig. 4*a*—4*f*. *Upogebia* (*Upogebia*) sp. *α*. Male from Stat. 149. — 4*a* Caudal fan,  $\times 19$ ; 4*b* left antennule,  $\times 56$ ; 4*c* left larger, 4*d* right smaller leg of 1<sup>st</sup> pair, outer side,  $\times 22\frac{1}{2}$ ; 4*e* left leg of 5<sup>th</sup> pair, outer side,  $\times 37\frac{1}{2}$ ; 4*f* distal end of the immobile finger of this leg,  $\times 112$ .
- Fig. 5. *Upogebia* (*Upogebia*) *fallax* de Man. Type specimen from Haingsisi. — Rostrum and anterior part of carapace,  $\times 112$ .



### PLATE III.

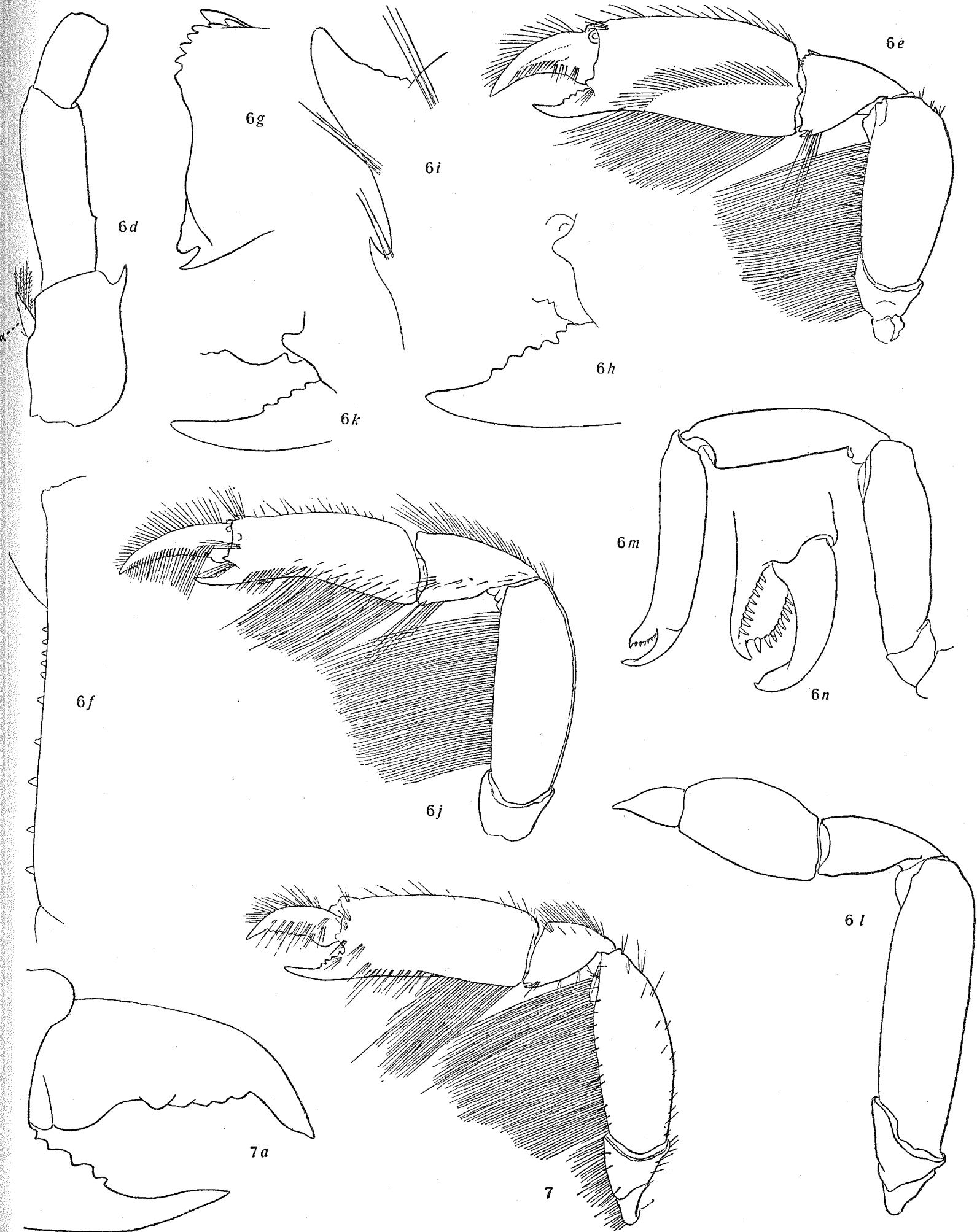
- Fig. 5a—5g. *Upogebia (Upogebia) fallax* de Man. Type specimen from Haingsisi. — 5a Caudal fan,  $\times 30$ , the long feathered hairs on the margins of the telson and uropods are lost; 5b posterior margin of telson,  $\times 75$ ; 5c one of the legs of 1<sup>st</sup> pair, looked at from the inner side,  $\times 30$ ; 5d basal part of dactylus and fixed finger of this leg, inner side,  $\times 60$ ; 5e a part of the distal half of the dactylus, outer side, presenting the teeth on the upper border,  $\times 150$ ; 5f leg of 2<sup>nd</sup> pair, outer side,  $\times 30$ ; 5g carpus, propodus and dactylus of 5<sup>th</sup> leg,  $\times 30$ .
- Fig. 6—6c. *Upogebia (Upogebia) carinicauda* Stimps. — 6 Sixth segment of abdomen and telson of the female, long 35 mm., from the beach of Thursday Island, belonging to the British Museum and which in 1884 was referred by E. J. MIERS to *Gebia carinicauda* Stimps.,  $\times 7\frac{1}{2}$ ; 6a telson of an egg-bearing female, long  $22\frac{1}{2}$  mm., from Stat. 213,  $\times 11$ ; 6b telson of an ova-bearing female, long 33 mm., from Ambon,  $\times 11$ ; 6c left antennule of the ova-bearing female from Ambon, lateral view,  $\times 30$ .





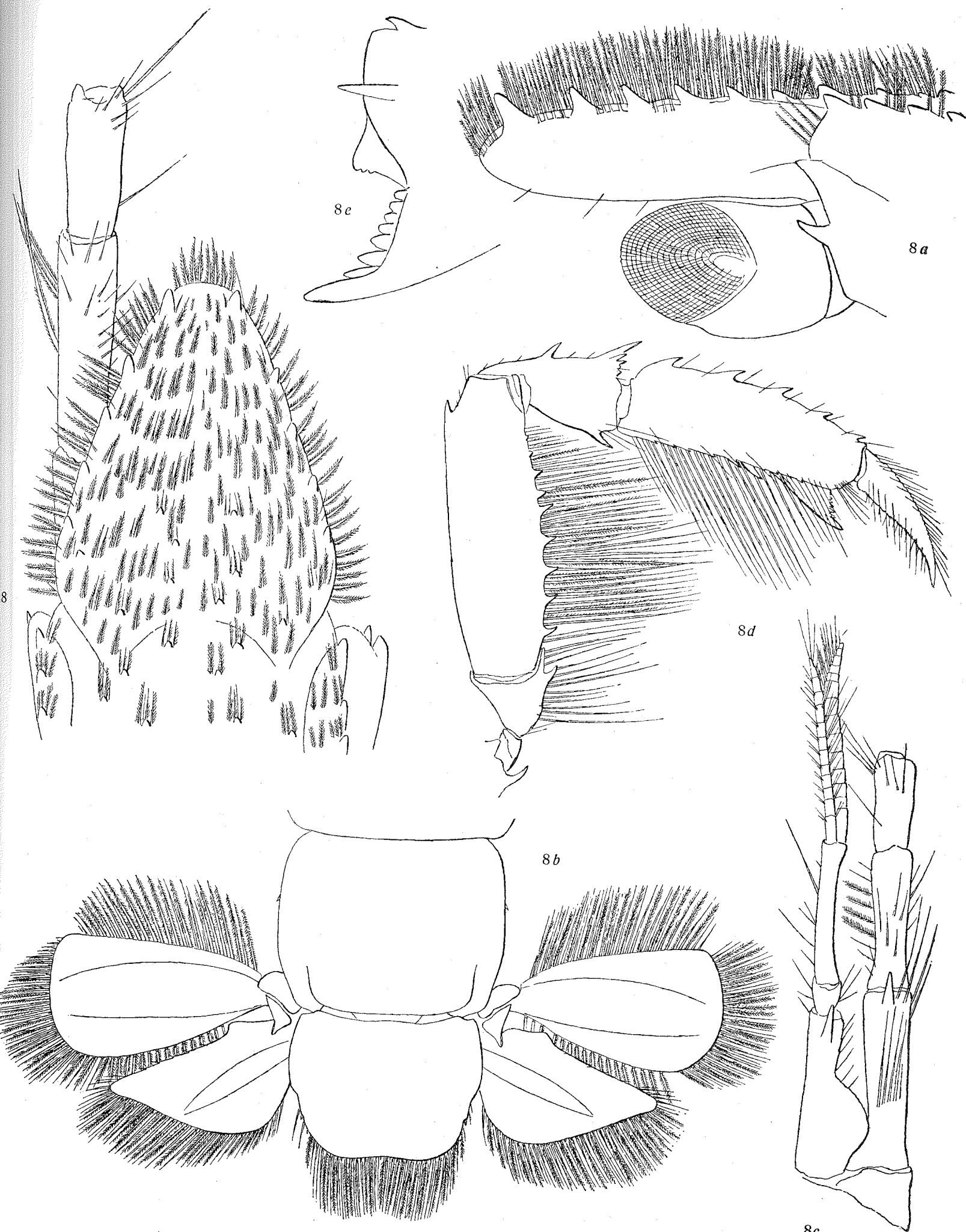
## PLATE IV.

- Fig. 6*d*—6*n*. *Upogebia (Upogebia) carinicauda* Stimps. — 6*d* Left antennal peduncle of this female, looked at from the supero-internal surface,  $\times 30$ , (setae not drawn, except on the scaphocerite); 6*e* left cheliped, outer side, of a male, long 23 mm., from Stat. 58,  $\times 11$ ; 6*f* lower border of the merus of this cheliped,  $\times 30$ ; 6*g* distal border of the carpus of this leg, outer side,  $\times 30$ ; 6*h* fixed finger of this cheliped, looked at somewhat obliquely,  $\times 30$ ; 6*i* lower border of chela and immobile finger of the right leg of a young female, long 18 m., from Stat. 58, inner side,  $\times 45$ ; 6*j* left cheliped, outer side, of a female, long 25 mm., from Amboina,  $\times 11$  (my private collection); 6*k* immobile finger of this cheliped,  $\times 37\frac{1}{2}$ ; 6*l* leg of 2<sup>nd</sup> pair of the male, long 23 mm., from Stat. 58,  $\times 15$  (hairs not drawn); 6*m* leg of 5<sup>th</sup> pair of the egg-bearing female from Ambon,  $\times 15$ ; 6*n* chela of this leg,  $\times 37\frac{1}{2}$ .
- Fig. 7—7*a*. *Upogebia (Upogebia) sp. β*. Female from Stat. 174. — 7 Left cheliped, outer side,  $\times 11$ ; 7*a* fingers of this cheliped, inner side,  $\times 37\frac{1}{2}$ .



## PLATE V.

Fig. 8—8e. *Upogebia (Upogebia) pugnax* de Man. Female from Stat. 311. — 8 Front and anterior border of carapace, with the left antennal peduncle,  $\times 56$  (the right sidewall of the carapace projects laterally a little more forward than the left); 8a lateral view of rostrum and anterior border of carapace, with the left eyepeduncle,  $\times 56$ ; 8b caudal fan,  $\times 19$ ; 8c left antennule and left antennal peduncle, looked at from the lower side,  $\times 37\frac{1}{2}$ ; 8d right leg of 1<sup>st</sup> pair, outer side,  $\times 19$ ; 8e immobile finger and anterior border of palm, inner side,  $\times 56$ .



8

8e

8a

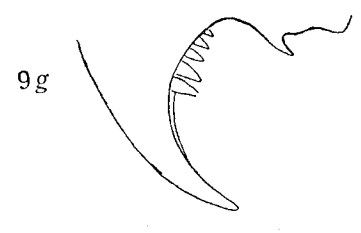
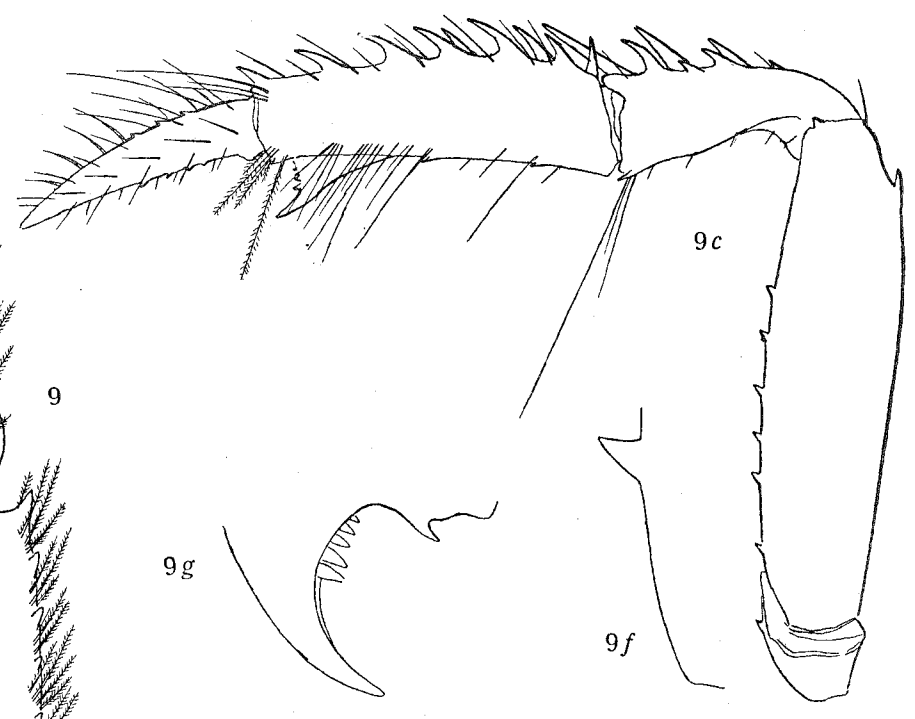
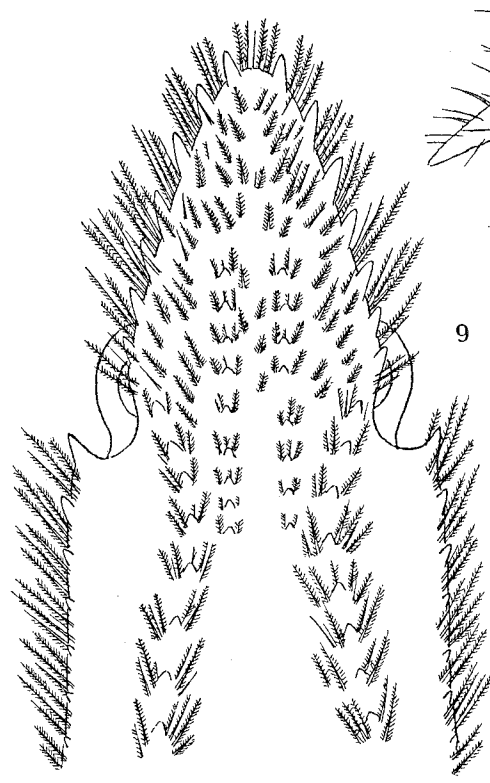
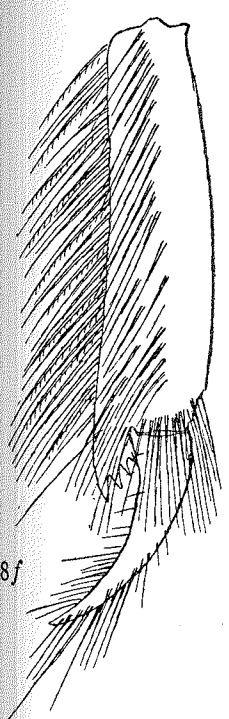
8d

8b

8c

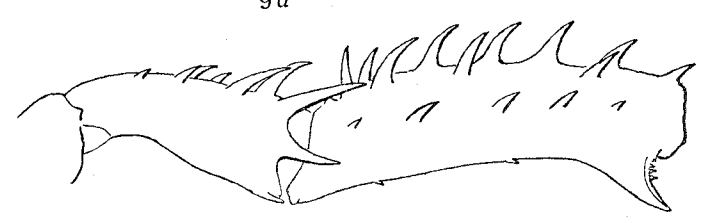
## PLATE VI.

- Fig. 8*f*. *Upogebia (Upogebia) pugnax* de Man. — Propodus and dactylus of the left leg of 5<sup>th</sup> pair, viewed from the inner side,  $\times 37\frac{1}{2}$ .
- Fig. 9—9*g*. *Upogebia (Upogebia) ceratophora* de Man. — 9 Rostrum and anterior part of carapace of the female from Stat. 53,  $\times 56$ ; 9*a* rostrum of the same specimen, lateral view,  $\times 75$ ; 9*b* sixth segment and caudal fan of the same female,  $\times 28$ ; the posterior margin of the telson is somewhat asymmetrical, the left lobe being a little larger than the right; 9*c* left leg of 1<sup>st</sup> pair of the specimen from Stat. 58, outer side,  $\times 37\frac{1}{2}$ ; 9*d* inner view of the carpus and of the propodus of this leg,  $\times 37\frac{1}{2}$ ; 9*e* tooth near the distal end of the upper border of the merus of this leg,  $\times 150$ ; 9*f* posterior tooth of the lower border of the merus of this leg,  $\times 150$ ; 9*g* immobile finger, of this leg, inner side,  $\times 150$ .
- Fig. 10. *Upogebia (Upogebia) monoceros* de Man. Female from Stat. 4. — Rostrum and anterior part of carapace,  $\times 56$ .

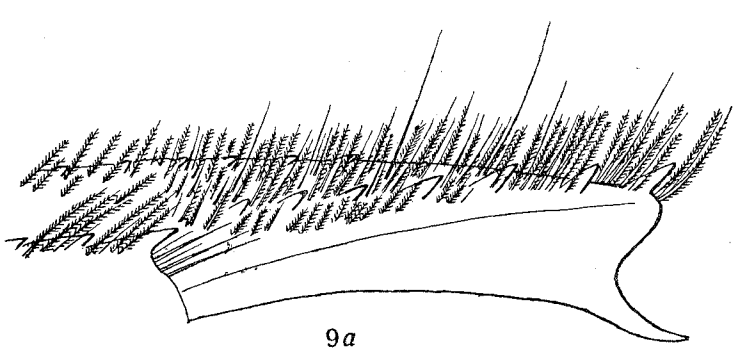
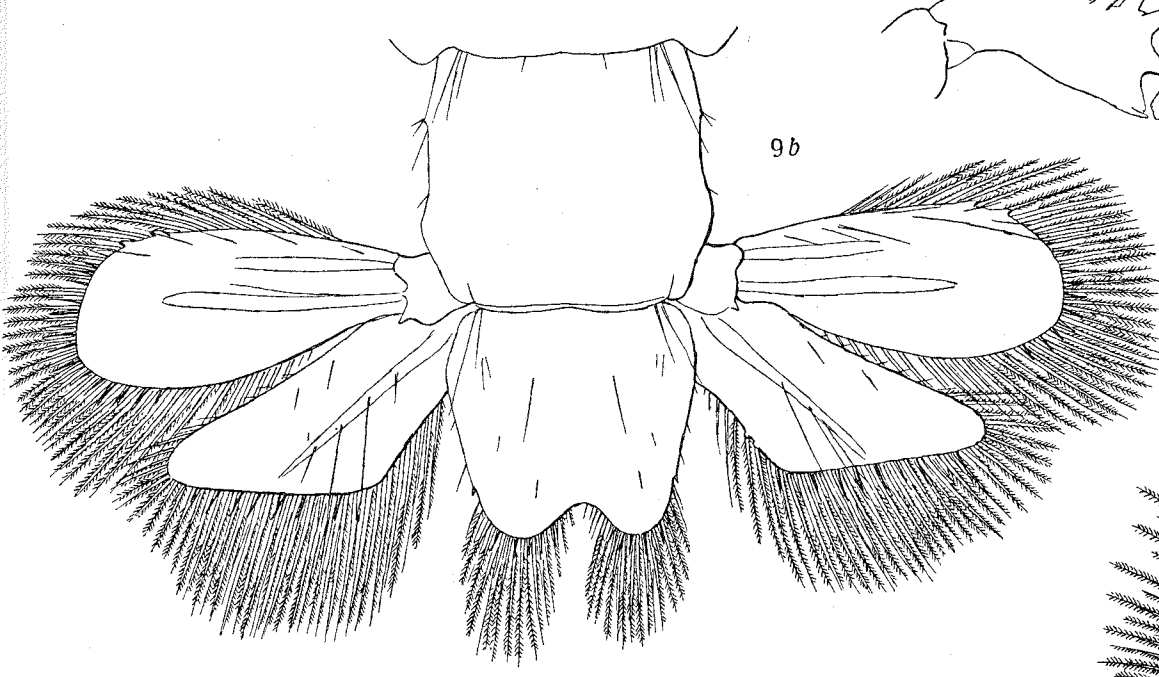


9f

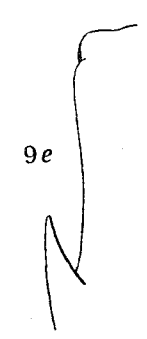
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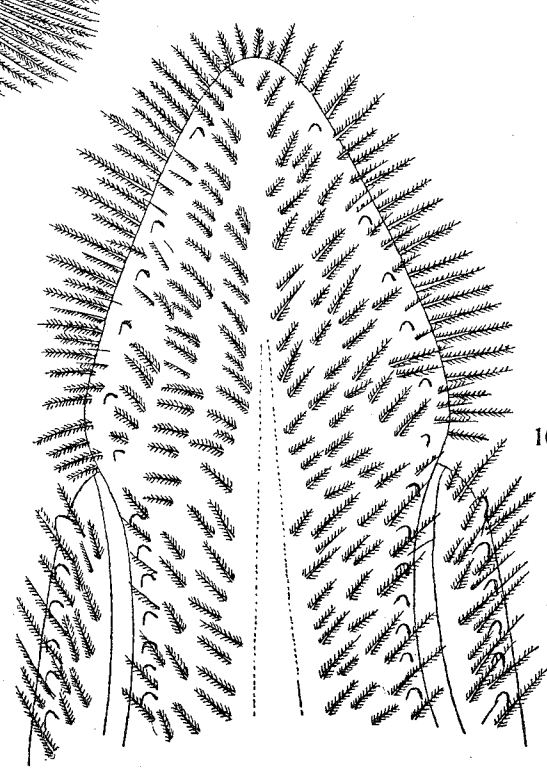
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9a



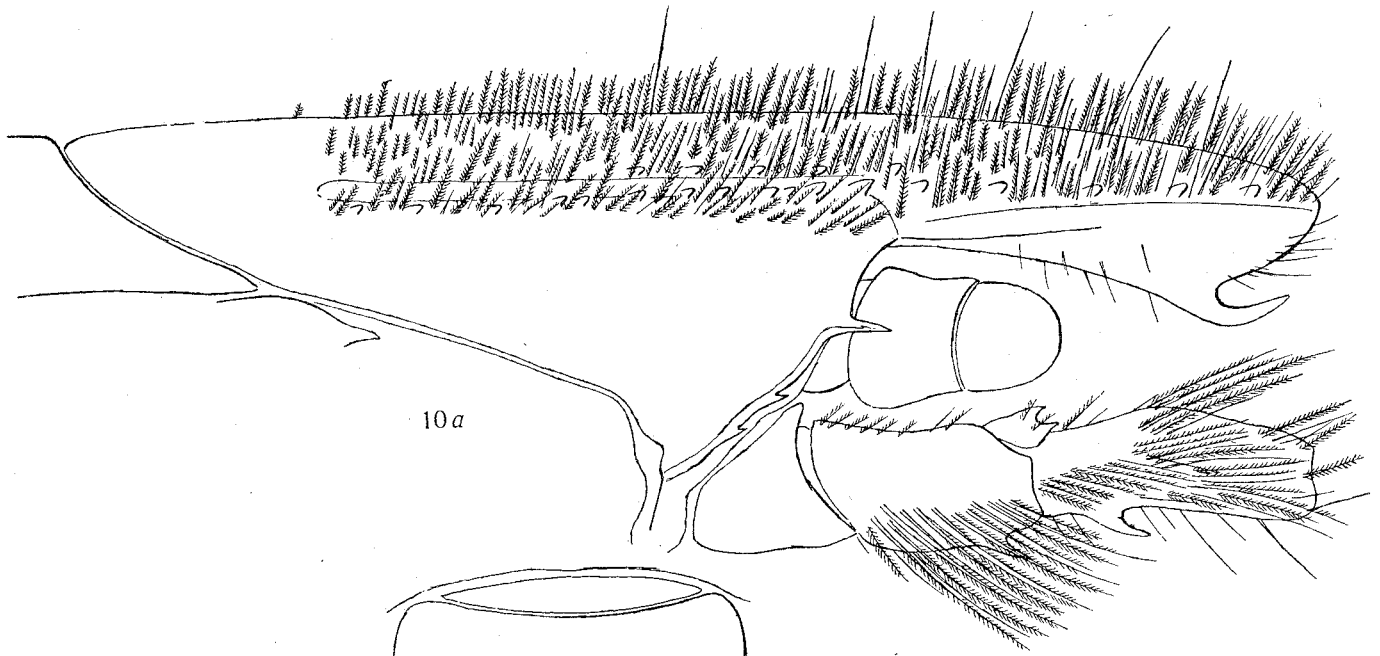
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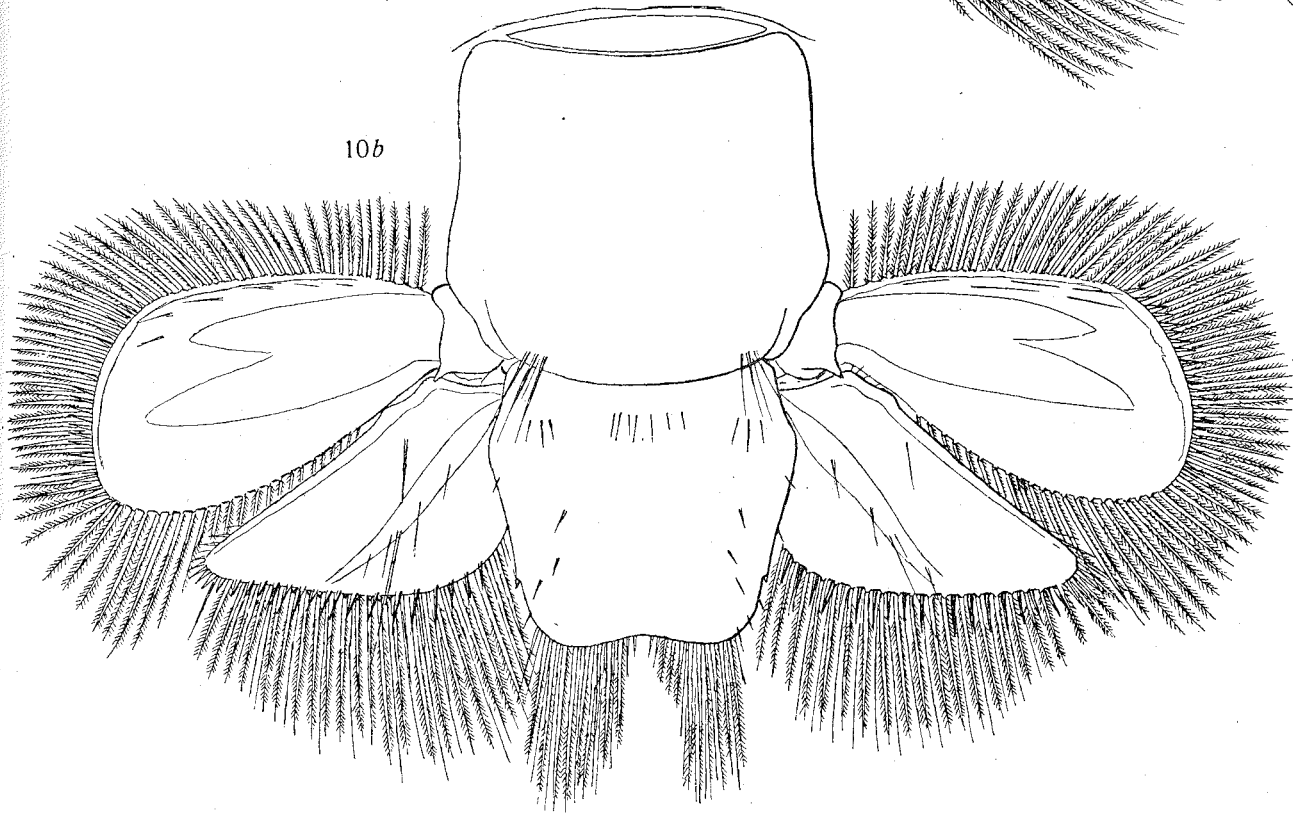
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## PLATE VII.

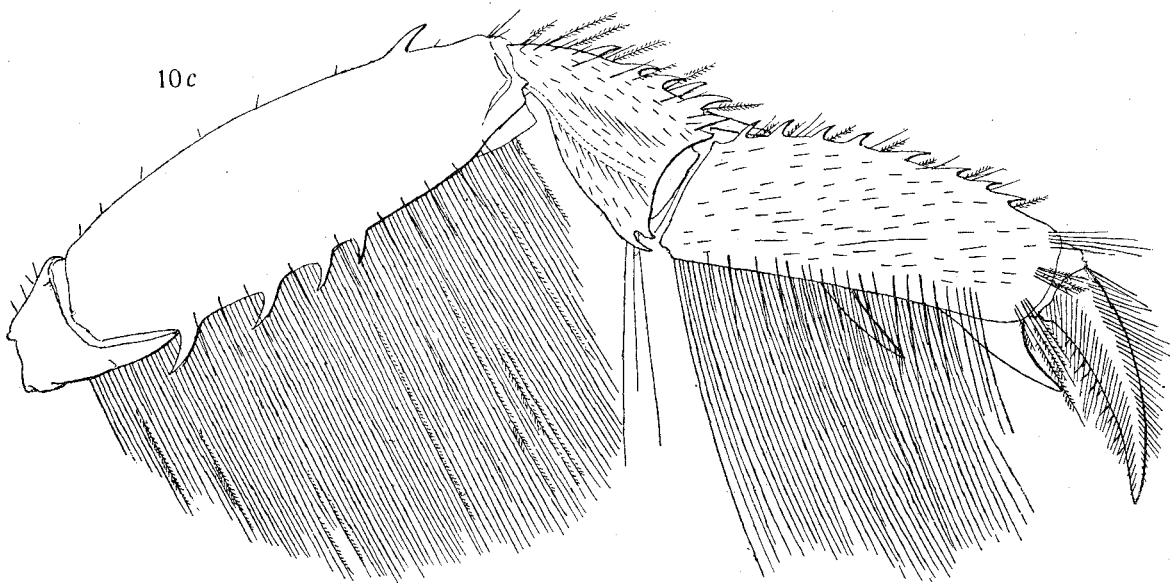
Fig. 10a—10d. *Upogebia (Upogebia) monoceros* de Man. — 10a Lateral view of rostrum, anterior part of carapace until the cervical groove, eyepeduncle and right antennal peduncle, the last joint excepted,  $\times 56$ ; 10b sixth segment of abdomen and caudal fan,  $\times 28$ ; 10c right leg of 1<sup>st</sup> pair, looked at from the outer side,  $\times 28$ , without coxo- and basipodite; 10d carpus and subchela of the same leg, looked at from the inner side,  $\times 28$ , hairs and feathered setae omitted.



10a



10b



10c

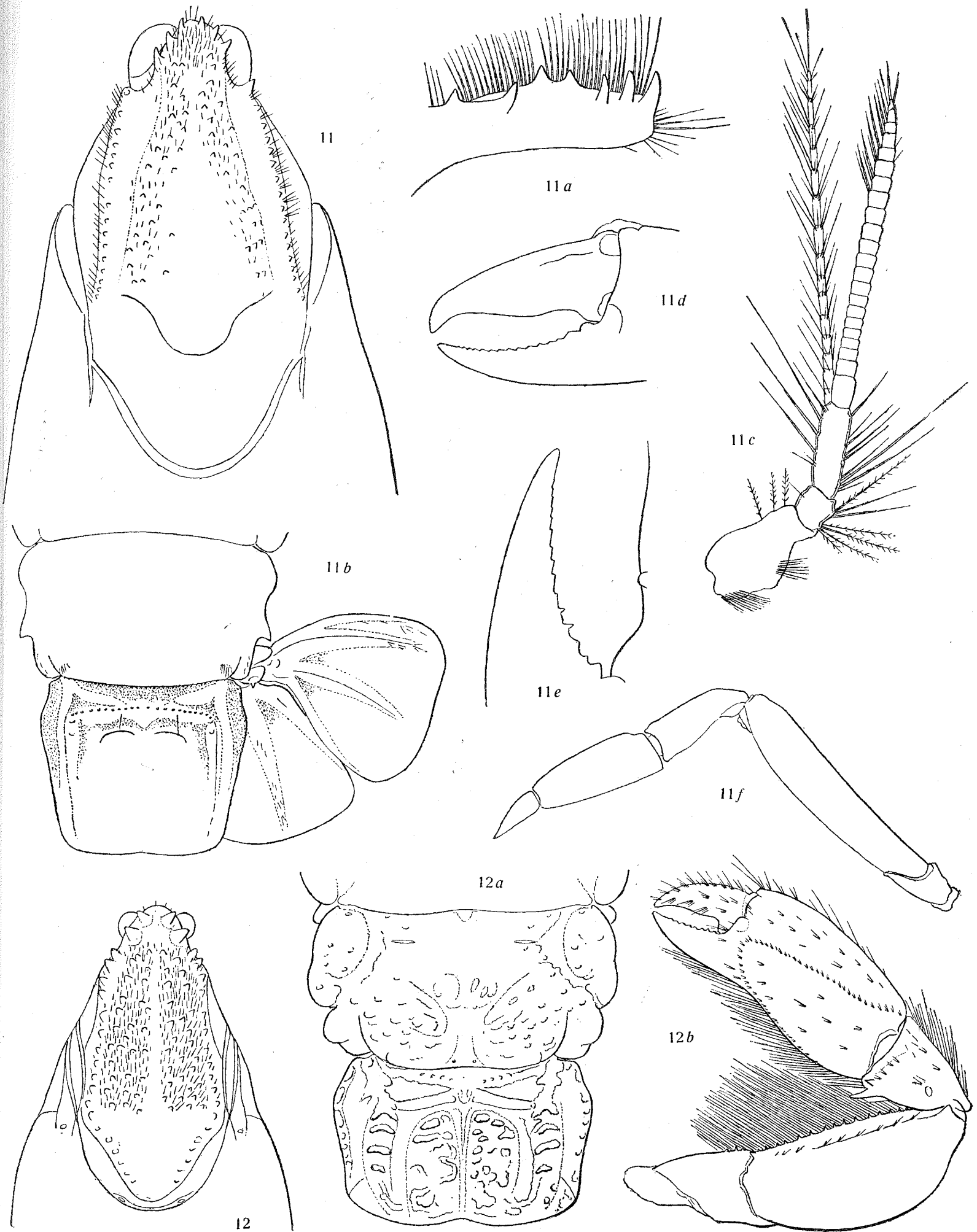


10d



## PLATE VIII.

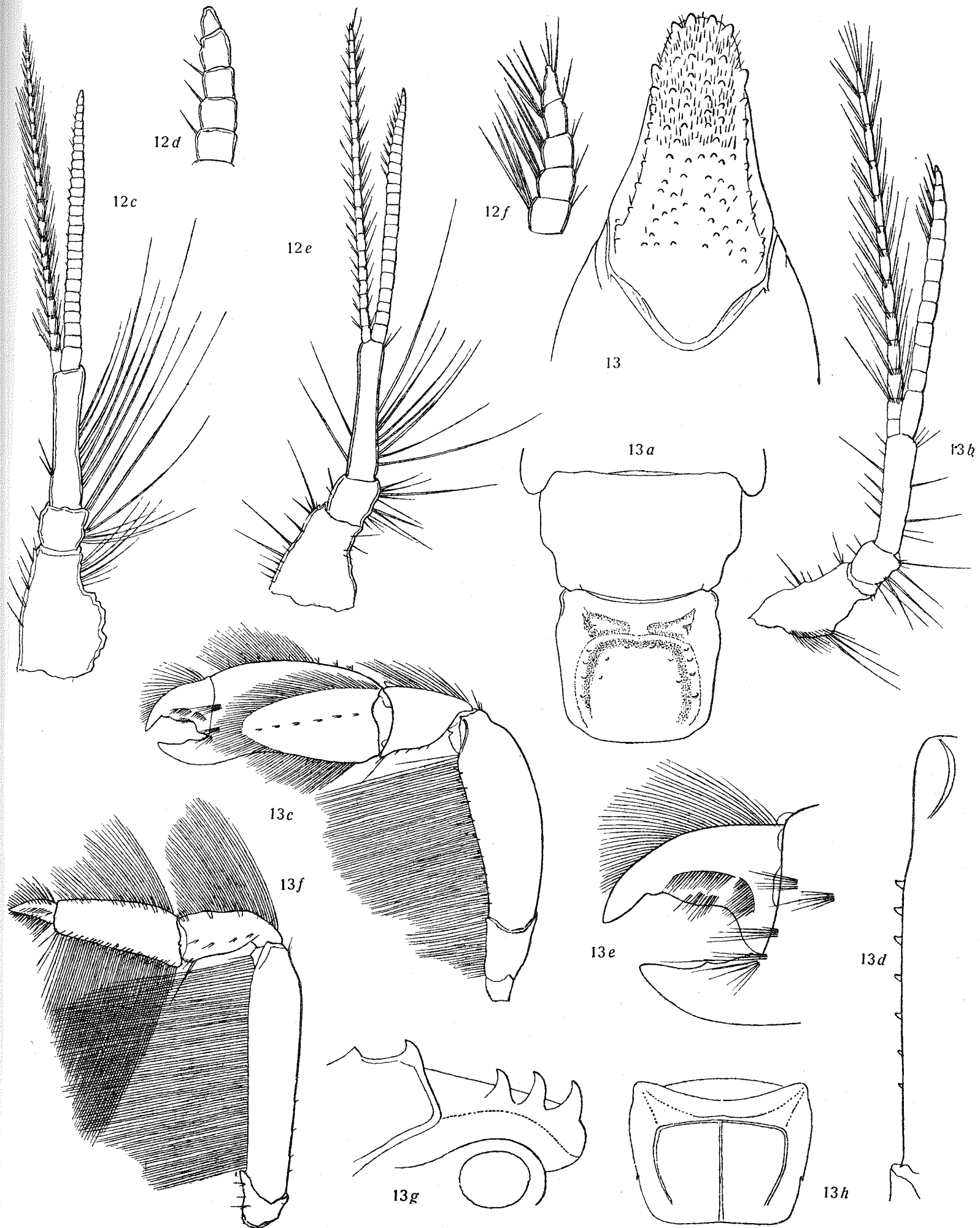
- Fig. 11—11f. *Upogebia (Calliadne) hexaceras* Ortm. All the figures are taken from the ova-bearing female from Stat. 164. — 11 Anterior part of carapace with the eyes,  $\times 22\frac{1}{2}$ ; 11a lateral view of the rostrum,  $\times 56$ ; 11b sixth segment of abdomen, telson and right uropods,  $\times 15$ ; 11c left antennule,  $\times 30$ ; 11d lateral view of the fingers of the left cheliped, outer side,  $\times 22\frac{1}{2}$ ; 11e the same fingers looked at from the inner side and somewhat obliquely, to show more distinctly the small teeth on the cutting-edge of the immobile finger and the obtuse tooth on the dactylus,  $\times 37\frac{1}{2}$ ; 11f left leg of 2<sup>nd</sup> pair, outer side,  $\times 12\frac{1}{2}$ , the long hairs with which this leg is furnished, are omitted, because they resemble those of *Upog. ancylodactyla*.
- Fig. 12—12b. *Upogebia (Calliadne) Darwinii* Miers. — 12 Anterior part of carapace with the eyes, of an adult male of *Gebiopsis intermedia* de Man, cotype from the Mergui Archipelago, out of my private collection,  $\times 9$ ; 12a sixth segment and telson of this male,  $\times 9$ ; 12b left cheliped of 1<sup>st</sup> pair, outer side, of this male,  $\times 9$ .



## PLATE IX.

Fig. 12*c*—12*f*. *Upogebia (Calliadne) Darwinii* Miers. — 12*c* Left antennule of this male,  $\times 19$ ; 12*d* the five last segments of the thicker flagellum of this antennule,  $\times 75$ ; 12*e* the left antennule of the ova-bearing female, long 38 mm., from Ambon,  $\times 19$ ; 12*f* the five last segments of the thicker flagellum of this antennule,  $\times 75$ .

Fig. 13—13*h*. *Upogebia (Calliadne) ancylodactyla* de Man. — 13 Anterior part of carapace of the ova-bearing female from Stat. 60,  $\times 22\frac{1}{2}$ ; 13*a* sixth segment of abdomen and telson of this female,  $\times 15$ ; 13*b* left antennule of this female,  $\times 30$ ; 13*c* left cheliped of this female, outer side,  $\times 15$ ; 13*d* lower border of the merus of this leg,  $\times 37\frac{1}{2}$ ; 13*e* fingers of this leg,  $\times 37\frac{1}{2}$ ; 13*f* left leg of 2<sup>nd</sup> pair of this female,  $\times 15$ ; 13*g* lateral view of rostrum and right eyepeduncle of the specimen from Stat. 323,  $\times 75$ , hairs omitted; 13*h* telson of this specimen,  $\times 19$ .



## PLATE X.

- Fig. 13*i*—13*j*. *Upogebia (Calliadne) ancylodactyla* de Man. — 13*i* Antennule of the specimen from Stat. 323, lateral view,  $\times 37\frac{1}{2}$ ; 13*j* fingers of the left cheliped of this specimen,  $\times 37\frac{1}{2}$ .
- Fig. 14—14*a*. *Upogebia (Calliadne) ancylodactyla* de Man var. *amboinensis* de Man. — 14 Telson of a female, long 19 mm., of *Gebiopsis intermedia* de Man var. *amboinensis* de Man, cotype out of my private collection, from Amboina,  $\times 15$ ; 14*a* antennule of this specimen, lateral view,  $\times 30$ .
- Fig. 15—15*c*. *Callianassa (Calliactites)* sp. Specimen from Stat. 86, long 5,64 mm. — 15 Sixth segment of abdomen and caudal fan,  $\times 37\frac{1}{2}$ ; 15*a* posterior margin of telson,  $\times 150$ ; 15*b* external maxilliped,  $\times 56$ ; 15*c* left leg of 3<sup>rd</sup> pair,  $\times 56$ .
- Fig. 16—16*b*. *Callianassa (Calliactites) modesta* de Man. The figure 16 is taken from the female, long 13,7 mm., from Stat. 116, the figures 16*a* and 16*b* from the female, long 13,4 mm., from Stat. 261. — 16 Sixth segment of abdomen and caudal fan,  $\times 19$ ; 16*a* external maxilliped,  $\times 30$ ; 16*b* larger cheliped, outer side,  $\times 13\frac{1}{2}$ .

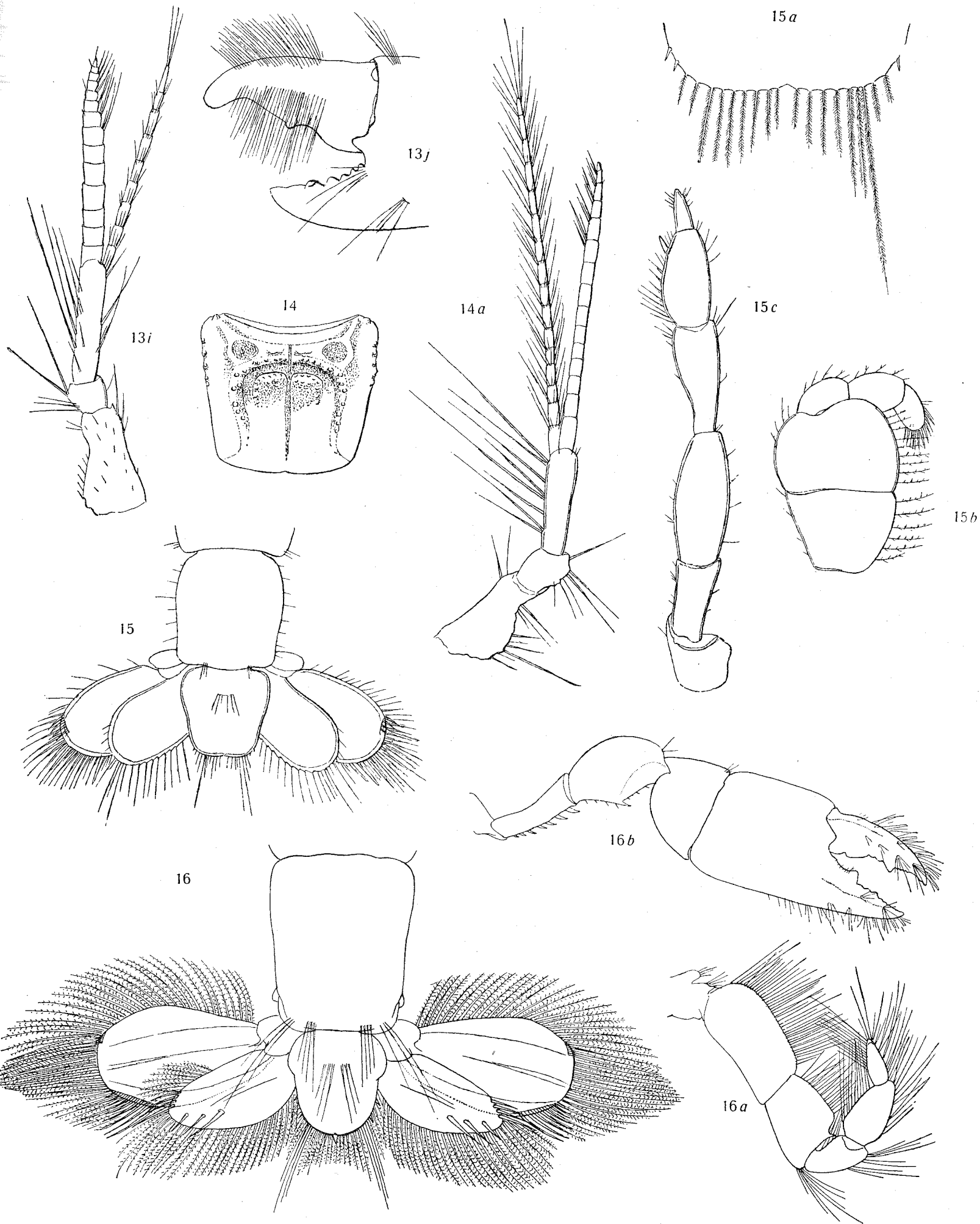
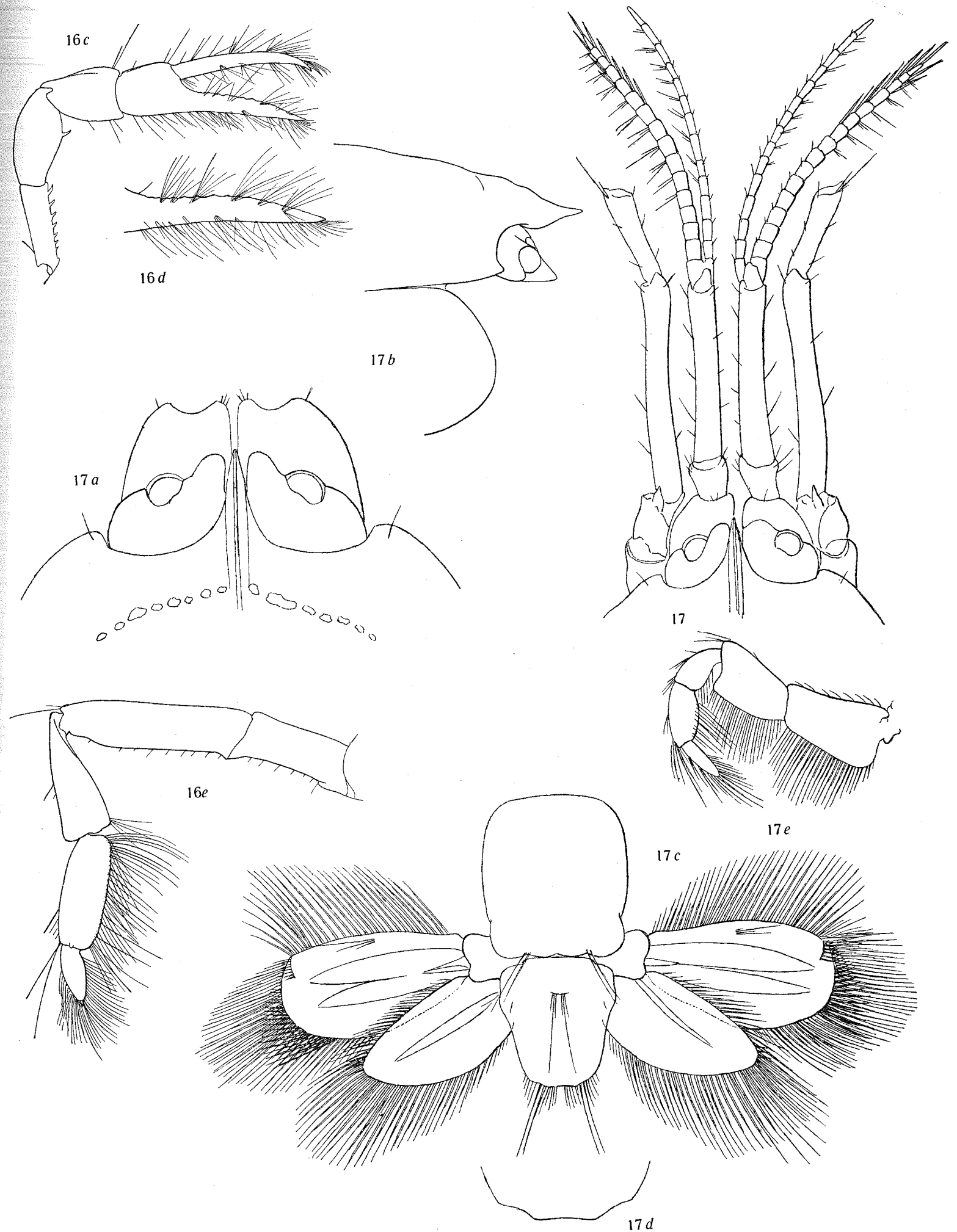


Fig. 13*i*, 13*j*, 14, 14*a*, 15—15*c* J. G. DE MAN, Fig. 16—16*b* J. F. OBBES, del.

## PLATE XI.

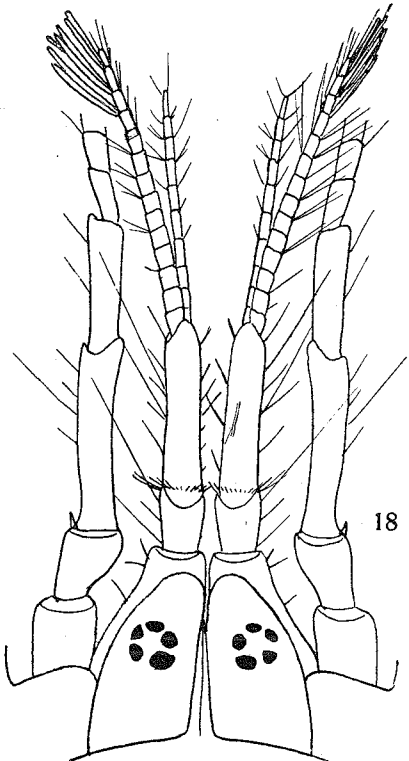
- Fig. 16c—16e. *Callianassa (Calliactites) modesta* de Man. The figures 16c and 16d are taken from the female, long 13,7 mm., from Stat. 116, the figure 16e from the female, long 13,4 mm., from Stat. 261. — 16c Smaller cheliped,  $\times 13\frac{1}{2}$ ; 16d immovable finger of this cheliped,  $\times 22\frac{1}{2}$ ; 16e leg of 3<sup>rd</sup> pair, outer side,  $\times 30$ .
- Fig. 17—17e. *Callianassa (Cheramus) Sibogae* de Man. — 17 Frontal region of the carapace, with eyestalks, antennules and antennal peduncles,  $\times 22\frac{1}{2}$ ; 17a frontal region, eyestalks and basal joints of the antennules,  $\times 37\frac{1}{2}$ ; 17b lateral view of frontal region and eyestalk,  $\times 22\frac{1}{2}$ ; 17c sixth segment of abdomen and caudal fan,  $\times 11$ ; 17d posterior border of telson,  $\times 22\frac{1}{2}$ ; 17e external maxilliped,  $\times 15$ . In the figures 17 and 17a the frontal border is looked at obliquely from before, so that the rostrum appears shorter than basal antennular article. Excepting fig. 17b the other figures of this species are drawn by the author.



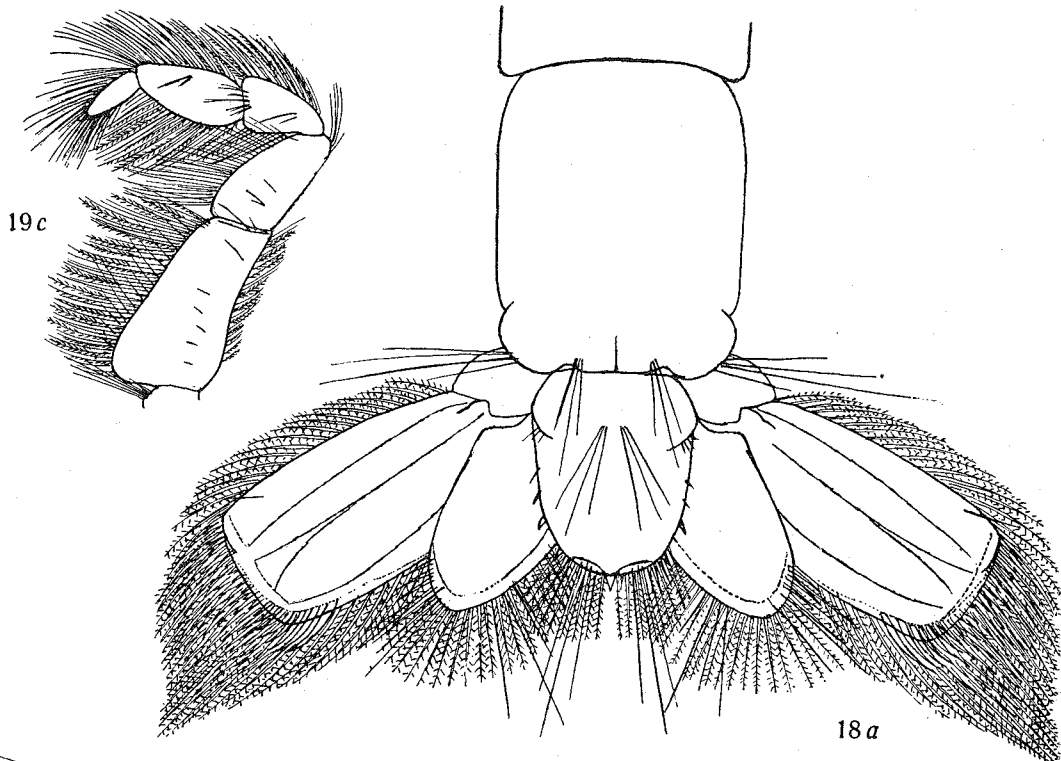


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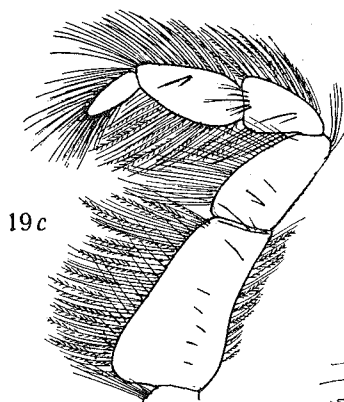
- Fig. 18—18*d*. *Callianassa (Cheramus) propinqua* de Man. — 18 Frontal region with the eyestalks, the antennules and antennal peduncles,  $\times 37\frac{1}{2}$ ; 18*a* sixth segment of abdomen and caudal fan,  $\times 22\frac{1}{2}$ ; 18*b* external maxilliped,  $\times 37\frac{1}{2}$ ; 18*c* smaller cheliped,  $\times 30$ ; 18*d* right leg of 3rd pair, outer side,  $\times 37\frac{1}{2}$ .
- Fig. 19, 19*b*—19*c*. *Callianassa (Cheramus) jocularis* de Man. — 19 Frontal region of carapace of the female, long 14,5 mm., from Stat. 19 with eyestalks, antennules and antennal peduncles,  $\times 37\frac{1}{2}$ ; 19*b* telson of a young specimen, long 13 mm., from Stat. 2, of the variety,  $\times 37\frac{1}{2}$ ; 19*c* external maxilliped of a female, long 16,8 mm., from Stat. 19, outer side,  $\times 22\frac{1}{2}$ .



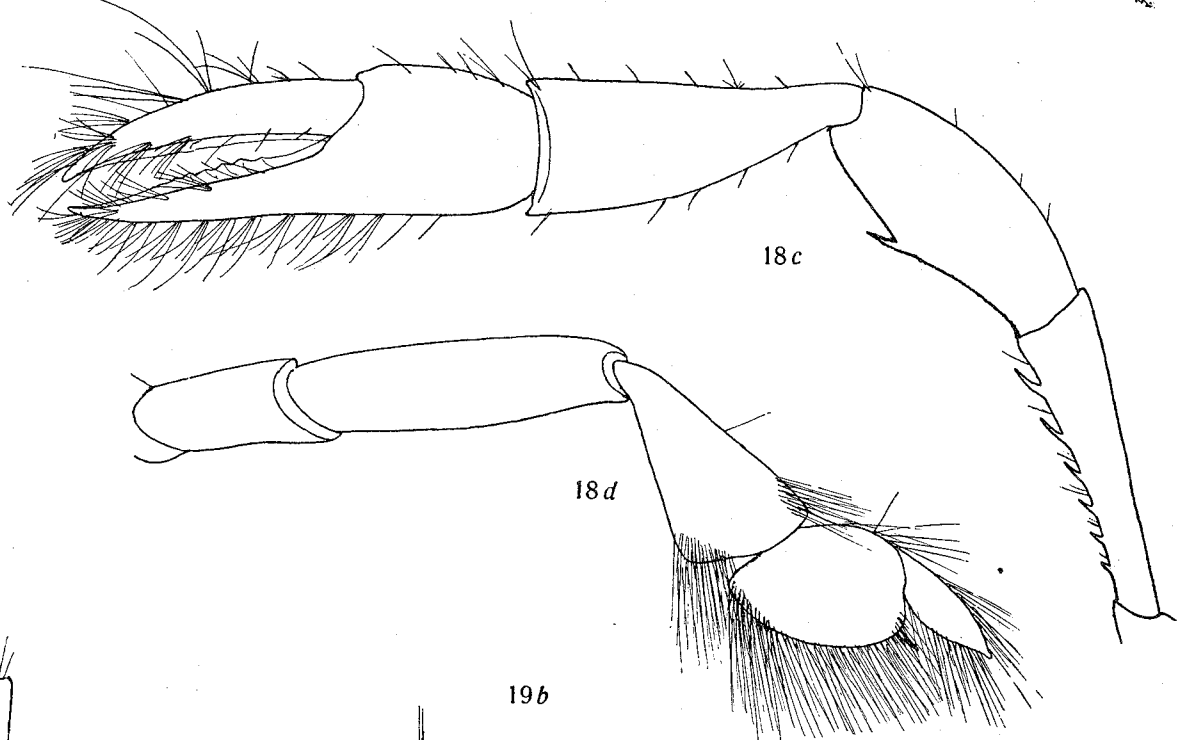
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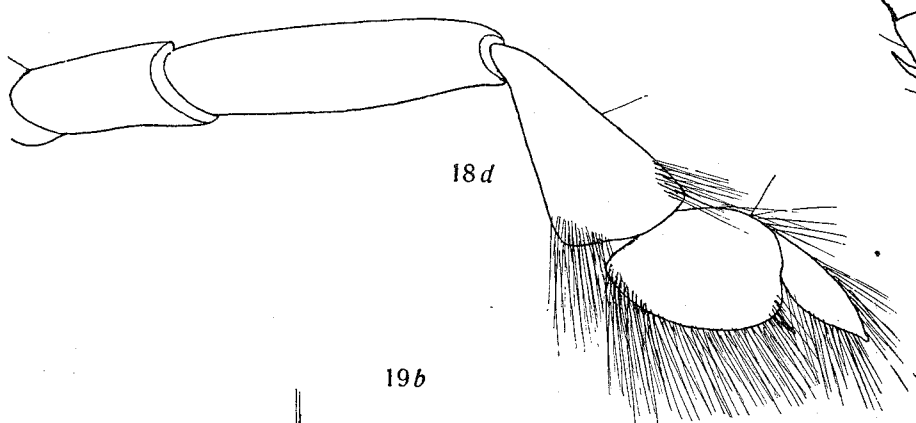
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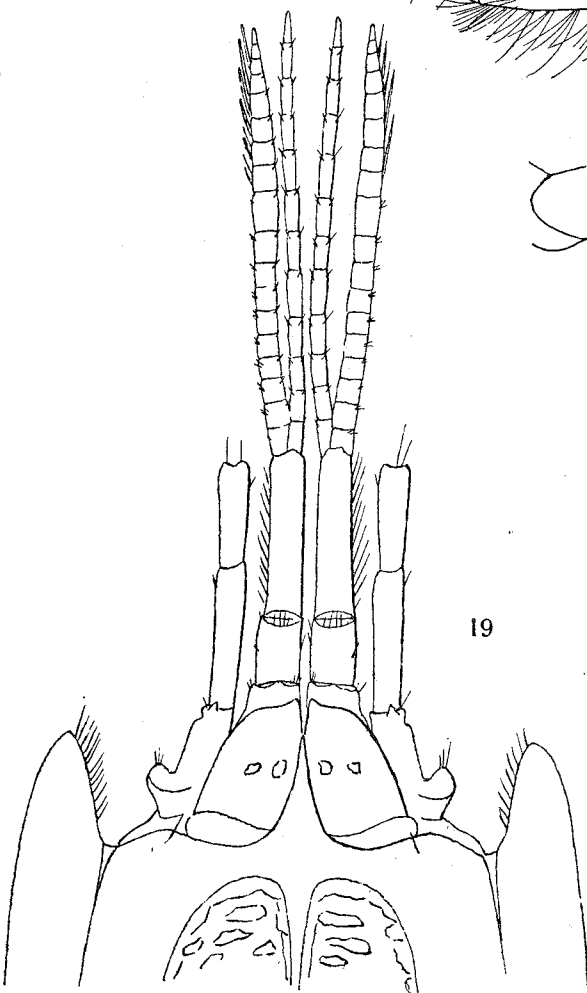
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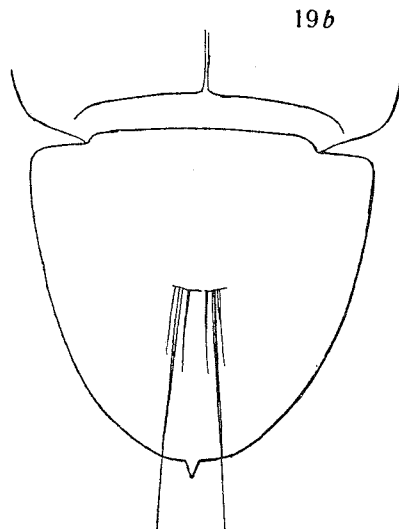
18c



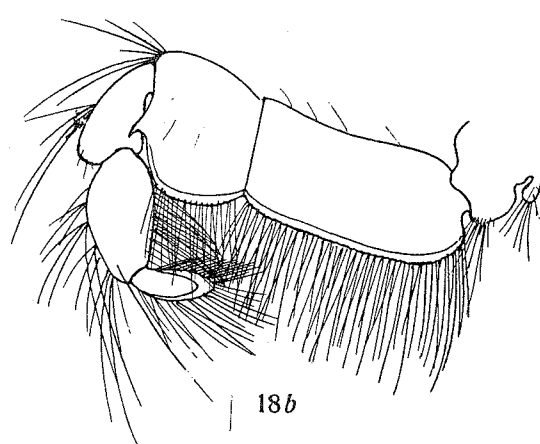
18d



19



19b

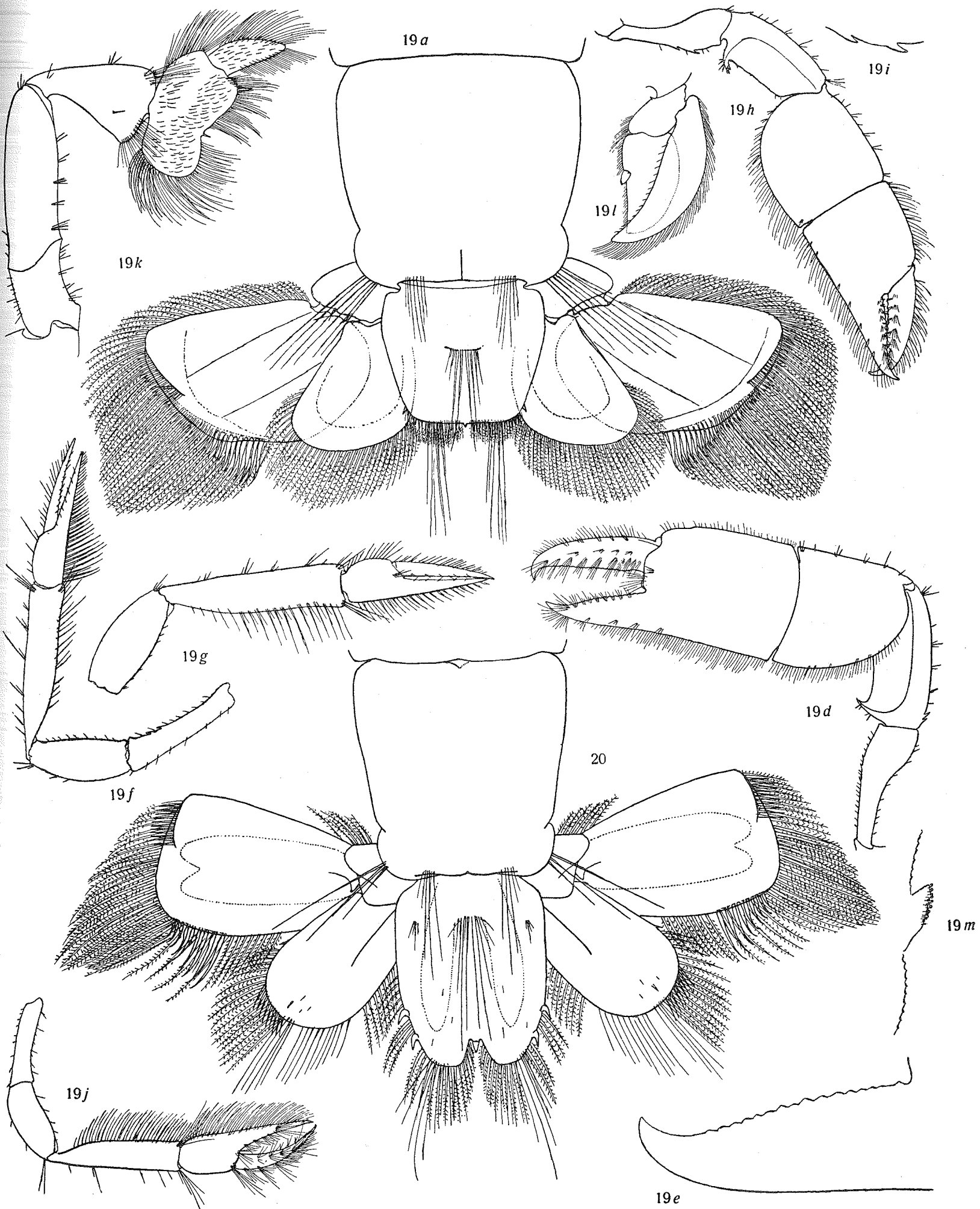


18b

### PLATE XIII.

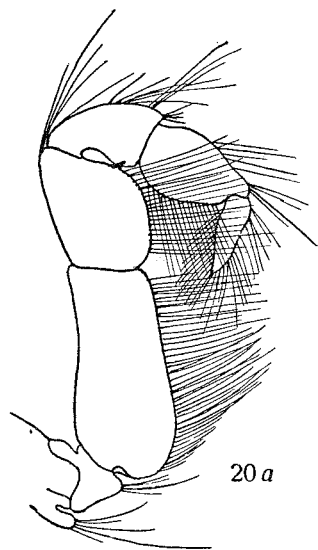
Fig. 19a, 19d—19m. *Callianassa (Cheramus) joculatrix* de Man. — 19a Sixth segment of abdomen and caudal fan of the female, long 14,5 mm., from Stat. 19,  $\times 22\frac{1}{2}$ ; 19d larger cheliped of the female, long 16,8 mm., from Stat. 19, outer side,  $\times 11\frac{1}{4}$ ; 19e fixed finger of this cheliped,  $\times 30$ ; 19f smaller cheliped of this female,  $\times 15$ ; 19g smaller cheliped of the female, long 18,3 mm., from Stat. 19,  $\times 15$ ; 19h larger cheliped of the female, long 14,5 mm., from Stat. 19, in which the carpus is longer than the palm,  $\times 11\frac{1}{4}$ ; 19i the two teeth on the ischium of this cheliped,  $\times 37\frac{1}{2}$ ; 19j smaller cheliped of the young specimen, long 13 mm., from Stat. 2, of the variety,  $\times 15$ ; 19k right leg of the 3<sup>rd</sup> pair of the female, long 18,3 mm., from Stat. 19,  $\times 22\frac{1}{2}$ ; 19l left pleopod of 5<sup>th</sup> pair of this female,  $\times 11\frac{1}{4}$ ; 19m stylamblys of this pleopod,  $\times 56$ .

Fig. 20. *Callianassa (Cheramus) lobetobensis* de Man. — 20 Sixth segment of abdomen and caudal fan of the ova-bearing female, long 20 mm., from Stat 306,  $\times 19$ .

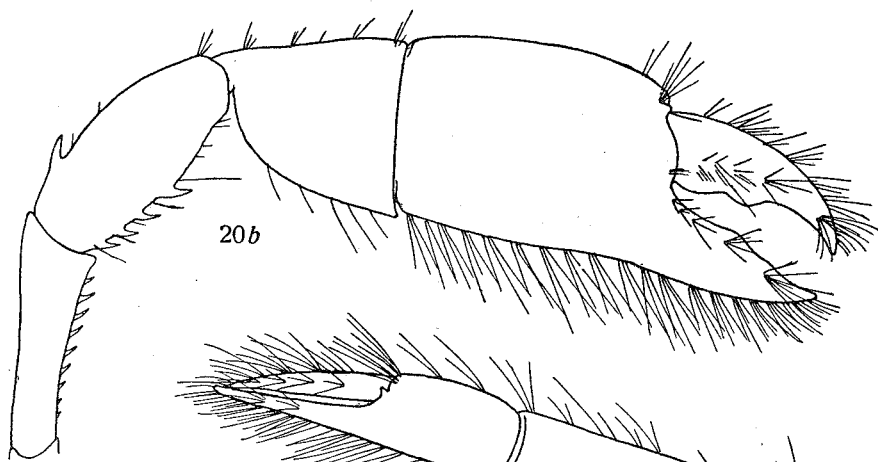


## PLATE XIV.

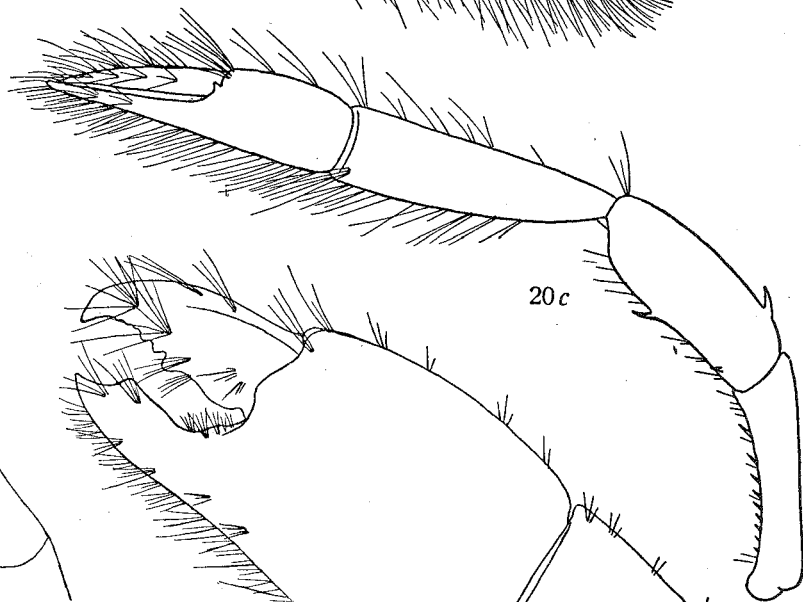
- Fig. 20a—20d. *Callianassa (Cheramus) lobetobensis* de Man. — 20a External maxilliped, outer side, of the ova-bearing female, long 20 mm., from Stat. 306,  $\times 22\frac{1}{2}$ ; 20b larger cheliped, outer side,  $\times 15$ ; 20c smaller cheliped, outer side,  $\times 15$ ; 20d third leg,  $\times 22\frac{1}{2}$ .
- Fig. 21—21d. *Callianassa (Cheramus) intermedia* de Man. — 21 Frontal region with eyestalks, antennules and antennal peduncles,  $\times 37\frac{1}{2}$ ; 21a sixth segment of abdomen and caudal fan,  $\times 15$ ; 21b posterior part of telson,  $\times 37\frac{1}{2}$ ; 21c larger cheliped,  $\times 15$ ; 21d left leg of 3<sup>rd</sup> pair,  $\times 30$ .
- (In Fig. 21 the number of segments is one too much both in the upper and in the lower flagellum and on the antennal peduncle a scaphocerite which is perhaps wanting, is not drawn).



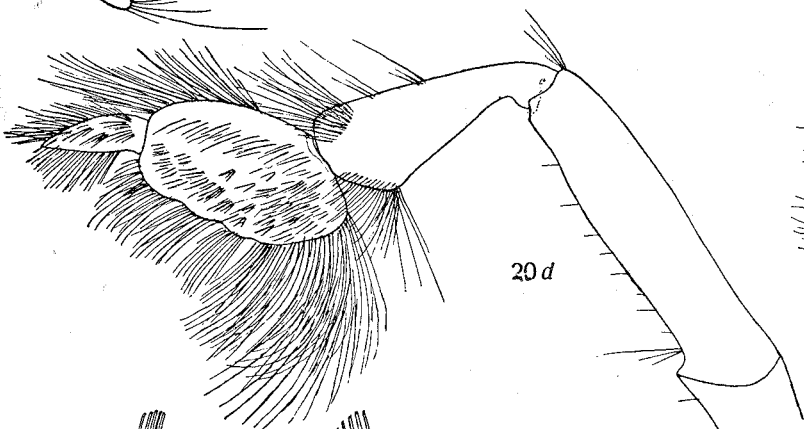
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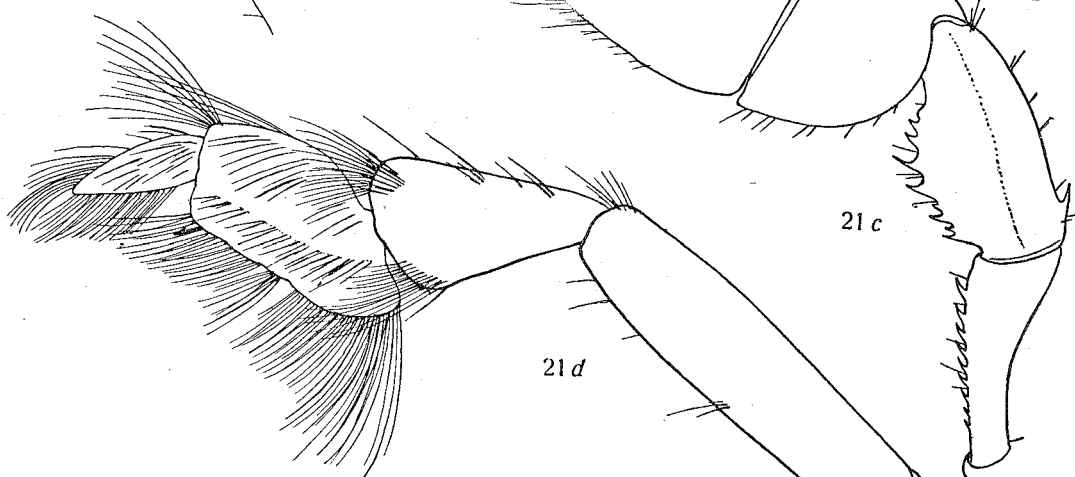
20b



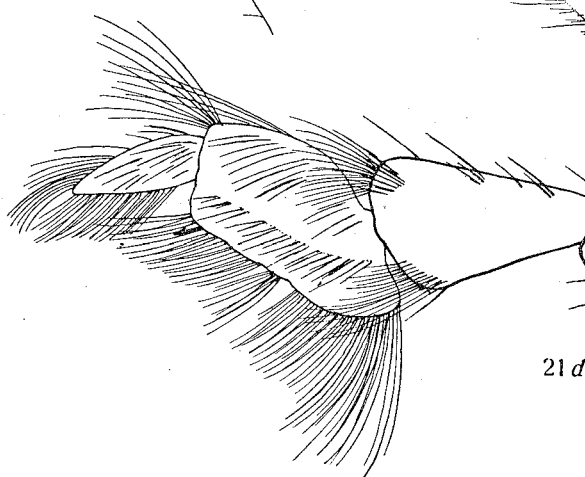
20c



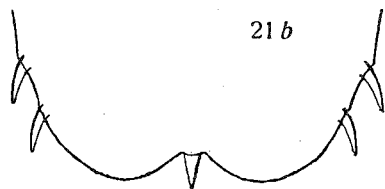
20d



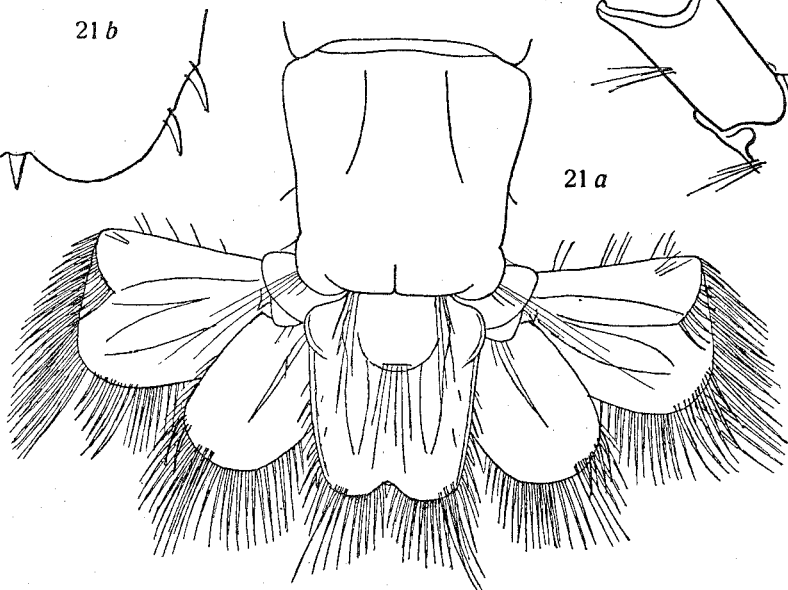
21c



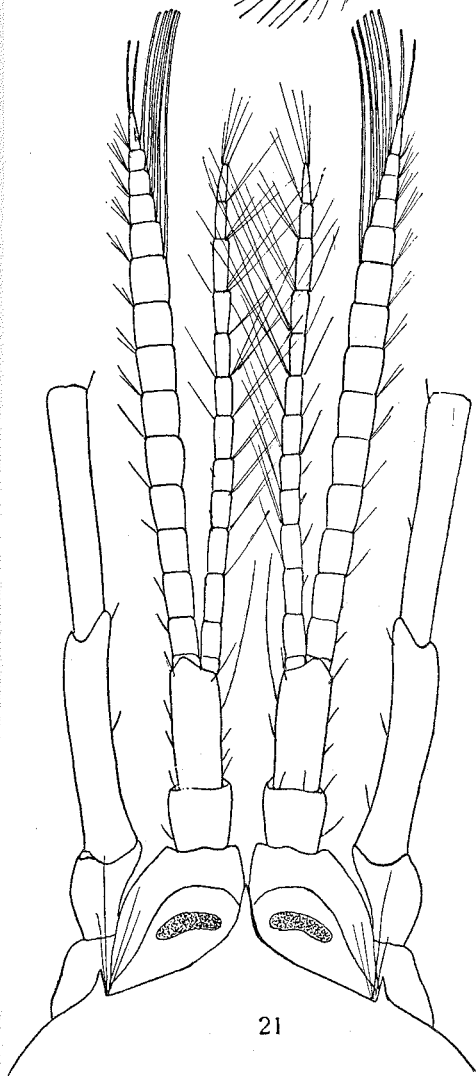
21d



21b



21a



21

## PLATE XV.

- Fig. 22—22*d*. *Callianassa (Cheramus) praedatrix* de Man. — 22 Sixth segment of abdomen and caudal fan,  $\times 13\frac{1}{2}$ ; 22*a* telson,  $\times 19$ ; 22*b* external maxilliped,  $\times 19$ ; 22*c* larger cheliped, outer side,  $\times 11\frac{1}{4}$ ; 22*d* leg of 3<sup>rd</sup> pair,  $\times 19$  (the figure 22*a* has been drawn by the author, because in fig. 22 the telson is drawn too short).
- Fig. 23—23*a*. *Callianassa (Cheramus) pugnatrix* de Man. — 23 Frontal region with eyestalks, antennules and antennal peduncles,  $\times 37\frac{1}{2}$ ; 23*a* sixth segment of abdomen and caudal fan,  $\times 15$ .

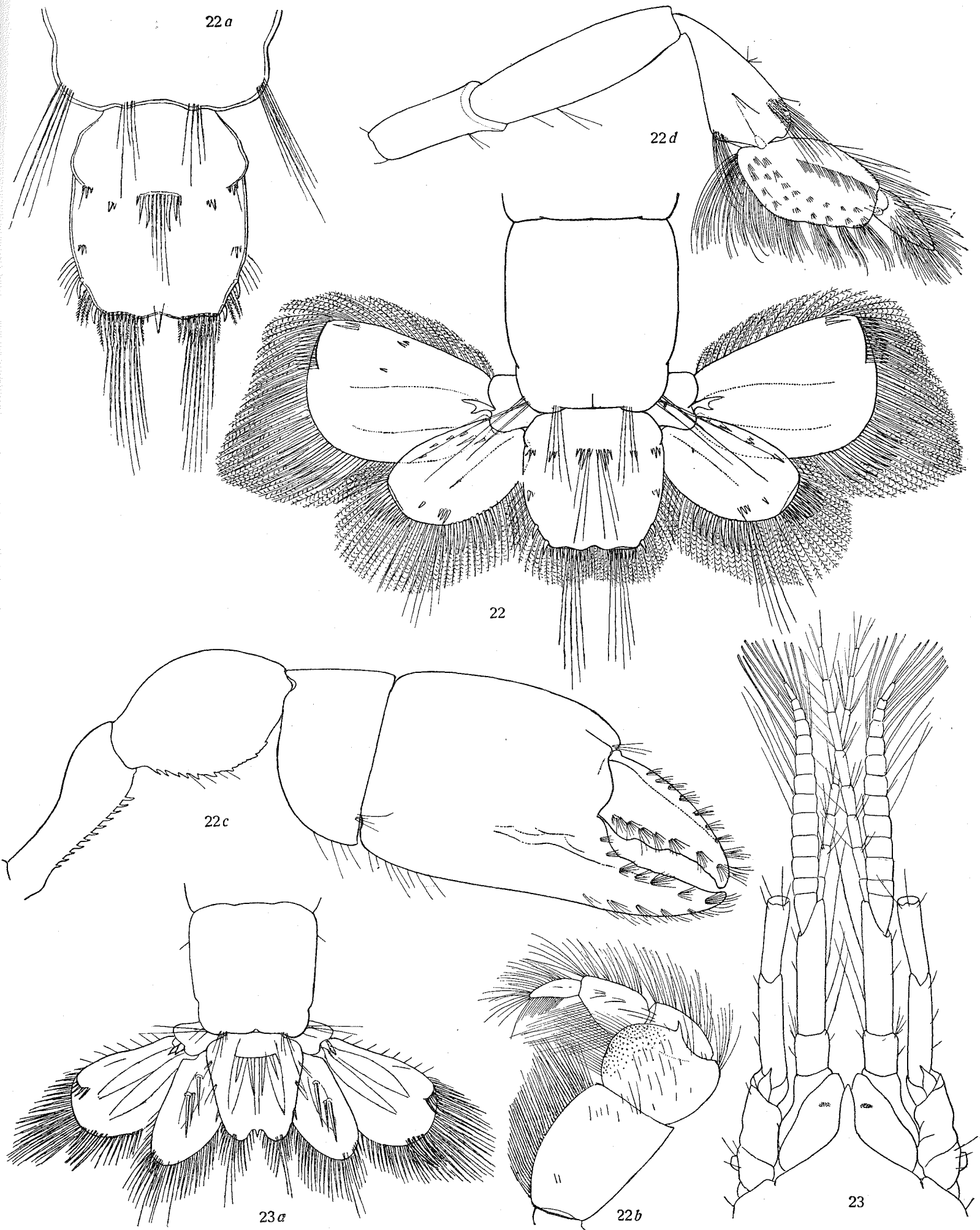


Fig. 22. *Thalassinidea*. I. F. G. I. G. de Man, 1911.



## PLATE XVI.

- Fig. 23*b*—23*e*. *Callianassa (Cheramus) pugnatrix* de Man. — 23*b* Posterior part of telson,  $\times 56$ ; 23*c* external maxilliped,  $\times 30$ ; 23*d* larger cheliped,  $\times 15$ ; 23*e* leg of 3<sup>rd</sup> pair, outer side,  $\times 30$ .
- Fig. 24—24*g*. *Callianassa (Cheramus) pygmaea* n. sp. — 24 Frontal region with eyestalks, antennulae and antennal peduncles,  $\times 37\frac{1}{2}$ ; 24*a* terminal part of rostrum,  $\times 112\frac{1}{2}$ ; 24*b* sixth segment of abdomen and caudal fan,  $\times 25$ ; 24*c* posterior border of telson,  $\times 75$ , hairs omitted; 24*d* thinner flagellum of antennule,  $\times 75$ ; 24*e* external maxilliped,  $\times 37\frac{1}{2}$ ; 24*f* smaller cheliped,  $\times 25$ ; 24*g* leg of 3<sup>rd</sup> pair,  $\times 37\frac{1}{2}$ .
- Fig. 25—25*a*. *Callianassa (Cheramus) moluccensis* de Man. — 25 Anterior part of carapace with eyestalks and the peduncles of the inner and outer antennae,  $\times 6\frac{3}{4}$ ; 25*a* lateral view of frontal region and eyestalks,  $\times 6\frac{3}{4}$ .

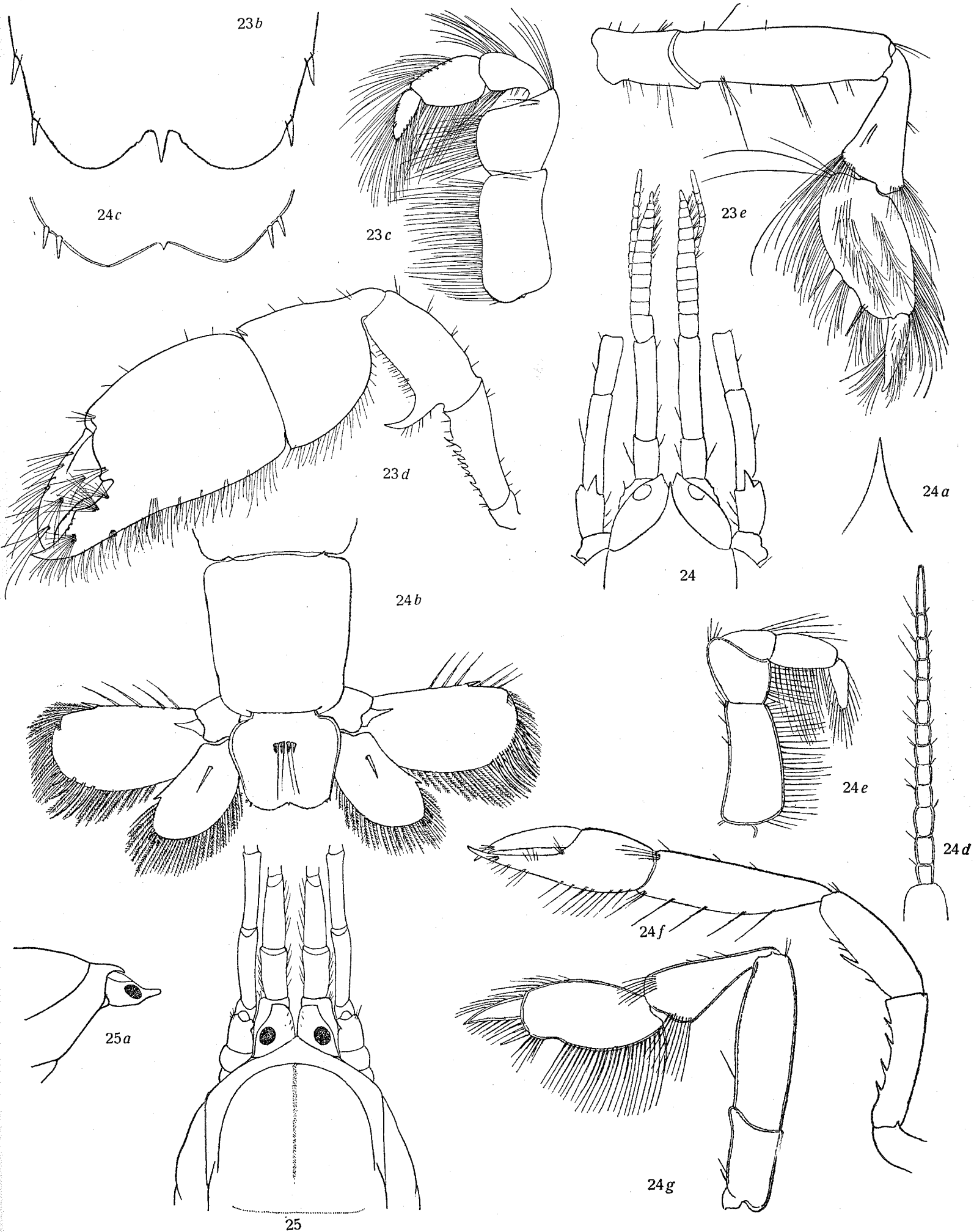


Fig. 23b—23e I. F. OBBES. 24—24g J. G. DE MAN. 25, 25a I. F. OBBES, del.

## PLATE XVII.

- Fig. 25*b*—25*c*. *Callianassa (Cheramus) moluccensis* de Man. — 25*b* Sixth segment of abdomen and caudal fan,  $\times 6$ ; 25*c* pleopod of 1<sup>st</sup> pair,  $\times 15$  (Fig. 25*c* has been drawn by the author).
- Fig. 26—26*g*. *Callianassa (Cheramus) indica* de Man. — 26 Carapace, eyestalks, and the two pairs of antennae,  $\times 3$ ; 26*a* frontal region, eyestalks and the peduncles of the two pairs of antennae,  $\times 7\frac{1}{2}$ ; 26*b* tips of the eyestalks,  $\times 37\frac{1}{2}$ ; 26*c* sixth segment of abdomen and caudal fan,  $\times 2\frac{1}{4}$ ; 26*d* left external maxilliped,  $\times 3\frac{3}{4}$ ; 26*e* smaller cheliped,  $\times 3\frac{3}{4}$ ; 26*f* pleopod of 1<sup>st</sup> segment,  $\times 11\frac{1}{4}$  (the terminal segment has probably lost many setae); 26*g* distal border of terminal segment of this pleopod,  $\times 37\frac{1}{2}$ .

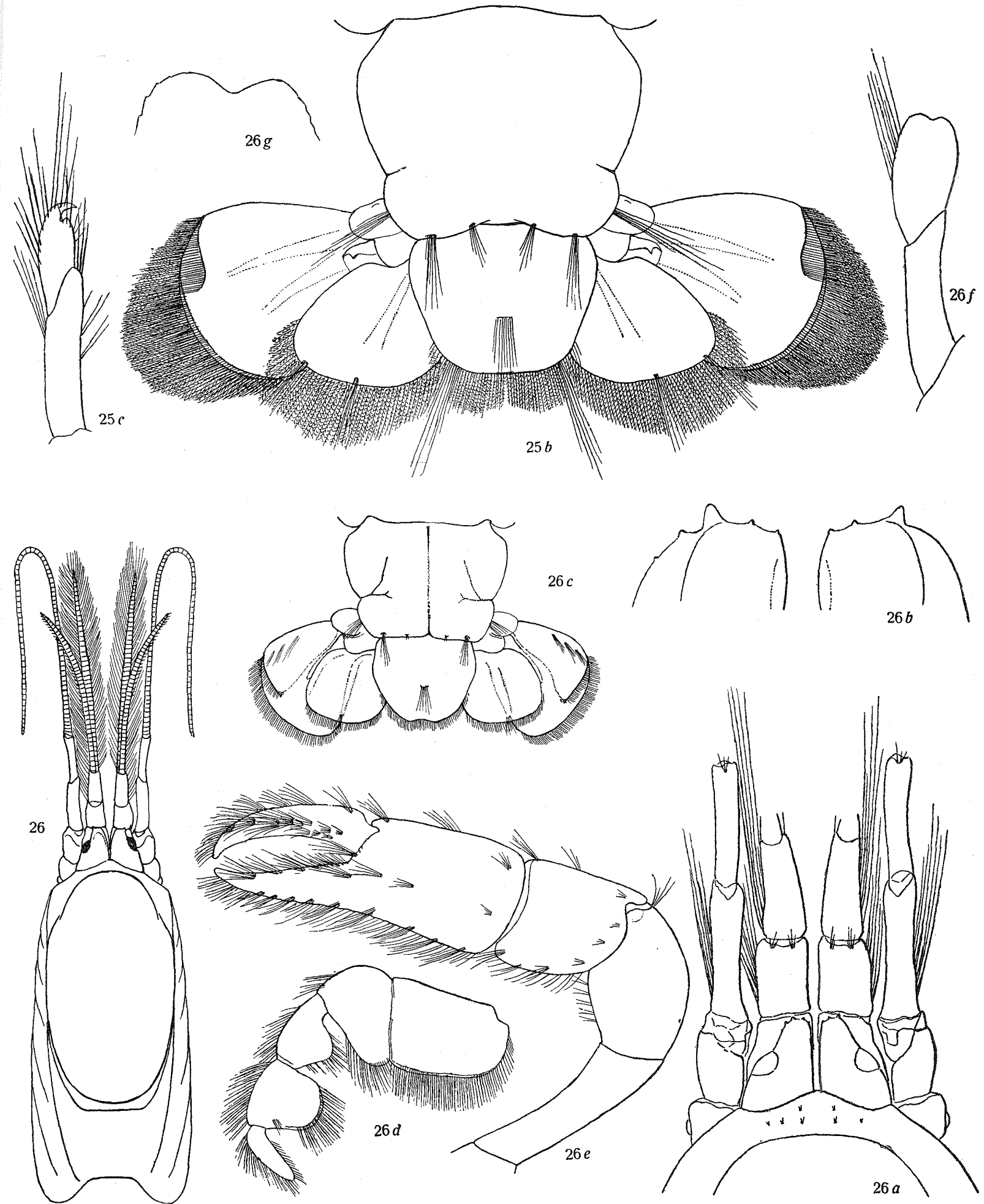


Fig. 25a-26g. J. G. DE MAN, 1906. Plate 11.

## PLATE XVIII.

- Fig. 27—27*a*. *Callianassa (Cheramus) Fousseaumei* Nobili. — 27 External maxilliped of a cotype, male, long 60 mm., of *Call. (Cheramus) Fousseaumei* Nobili from the Red Sea (Mus. Turin), outer side,  $\times 4\frac{1}{2}$ ; 27*a* pleopod of 1<sup>st</sup> segment of this cotype,  $\times 15$  (These two figures are drawn by the author).
- Fig. 28—28*c*. *Callianassa (Trypaea) amboinensis* de Man. — 28 Frontal region of carapace and eyestalks,  $\times 30$ ; 28*a* sixth segment of abdomen and caudal fan,  $\times 13\frac{1}{2}$ ; 28*b* posterior border of telson,  $\times 82$ ; 28*c* right leg of 3<sup>rd</sup> pair, outer side,  $\times 19$ . All these figures are taken from the female from Stat. 133.
- Fig. 29—29*b*. *Callianassa (Callichirus) placida* de Man. All the figures are taken from the female from Stat. 142. — 29 Frontal border of carapace with eyestalks, antennules and antennal peduncles,  $\times 19$ ; 29*a* sixth segment of abdomen and caudal fan,  $\times 15$ ; 29*b* external maxilliped, outer side,  $\times 19$ . (The figures 29*a* and 29*b* are drawn by the author).

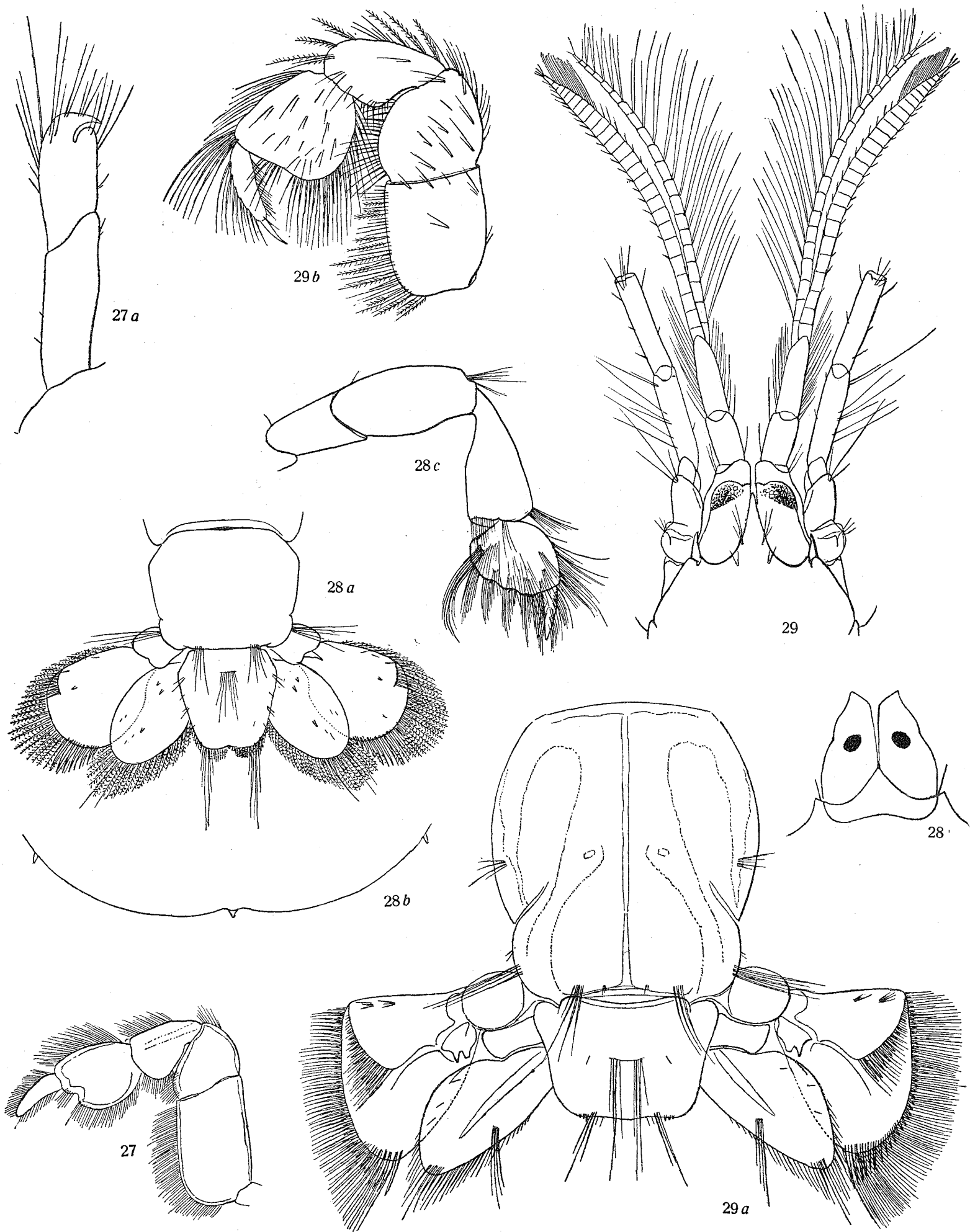


Fig. 27, 27a, 27b, 28a, 28b, 28c, 29, 29a I. G. DE MAN, 28 I. F. ORRIS del

## PLATE XIX.

- Fig. 29c—29e. *Callianassa (Callichirus) placida* de Man. — 29c Larger, 29d smaller cheliped, outer side,  $\times 11\frac{1}{4}$ ; 29e leg of 3<sup>rd</sup> pair, outer side,  $\times 19$ .
- Fig. 30—30e. *Callianassa (Callichirus) mucronata* Strahl. The figures 30—30c are taken from the ova-bearing female, long 29 mm., from Stat. 125. — 30 Antennule, lateral view,  $\times 22\frac{1}{2}$ ; 30a external maxilliped,  $\times 15$ ; 30b larger cheliped,  $\times 9$ ; 30c leg of 3<sup>rd</sup> pair, outer side,  $\times 15$ ; 30d pleopod of 1<sup>st</sup> segment of the male from Stat. 174,  $\times 22\frac{1}{2}$ ; 30e pleopod of 1<sup>st</sup> segment of a female from Ambon,  $\times 22\frac{1}{2}$ .

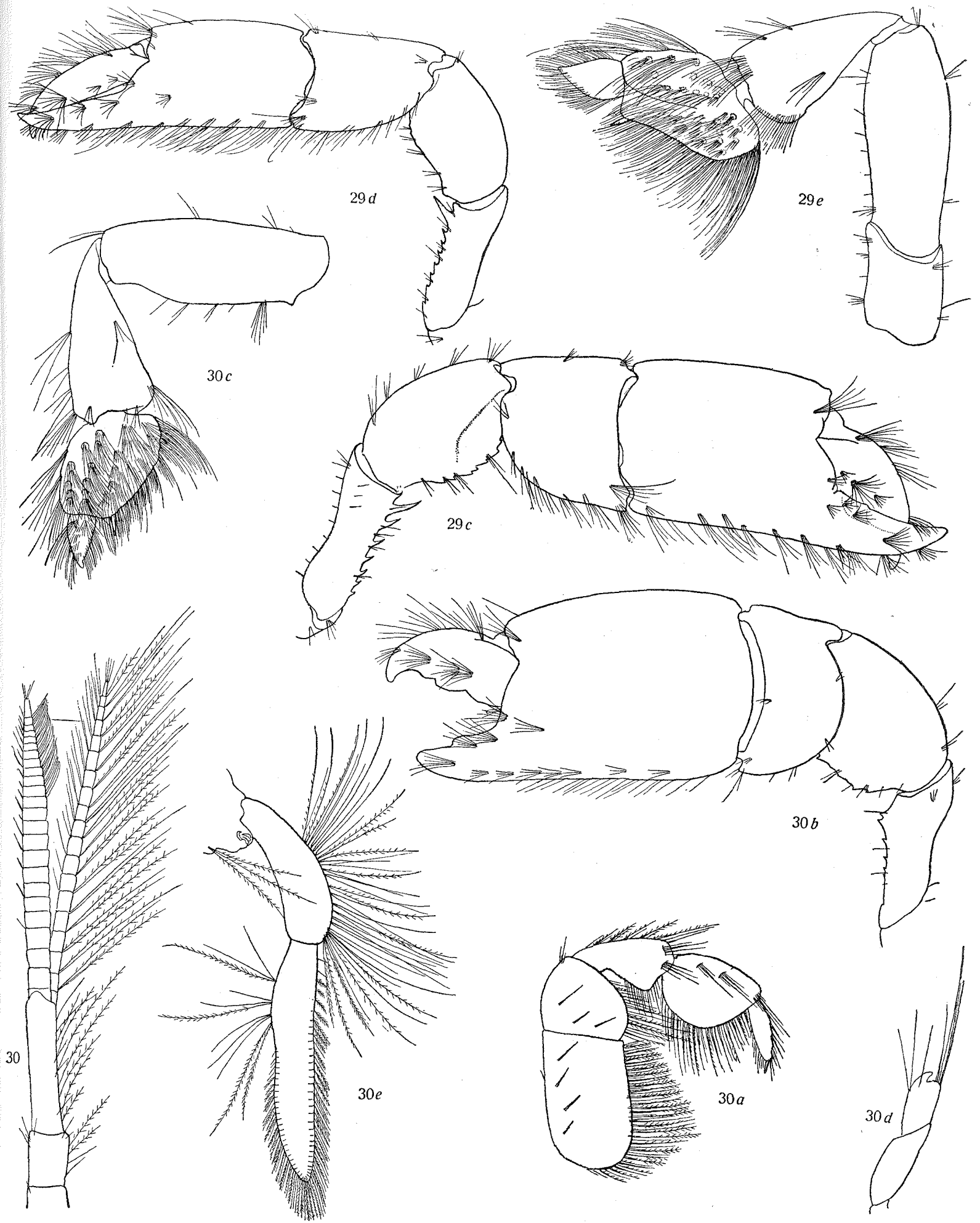


Fig. 29a-29e, 30, 29a'-29e' I. F. OPPES, 29a I. G. DE MAN, del.



## PLATE XX.

Fig. 31—31i. *Callianassa (Callichirus) audax* de Man. — 31 Frontal border of carapace with eyestalks and the peduncles of the two pairs of antennae,  $\times 9$ ; 31a sixth segment of abdomen and caudal fan,  $\times 6$ ; 31b external maxilliped, outer side,  $\times 5\frac{5}{8}$ ; 31c larger cheliped, outer side,  $\times 3\frac{3}{4}$ ; 31d fingers of this cheliped,  $\times 7\frac{1}{2}$ ; 31e smaller cheliped, outer side,  $\times 3\frac{3}{4}$ ; 31f leg of 3<sup>rd</sup> pair, outer side,  $\times 6\frac{3}{4}$ ; 31g left pleopod of 1<sup>st</sup>, 31h of 2<sup>nd</sup>, 31i of 3<sup>rd</sup> pair, all  $\times 5\frac{5}{8}$ .

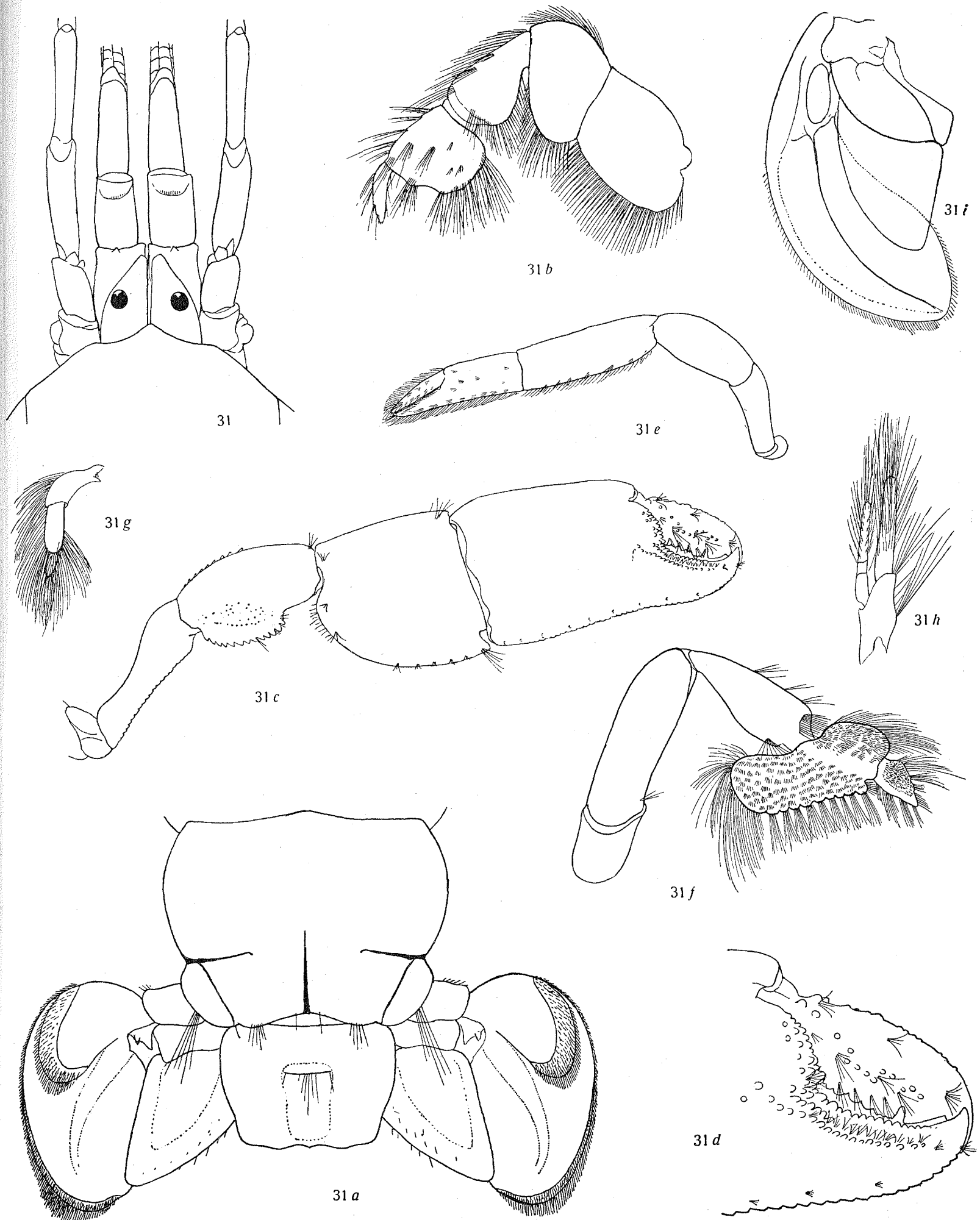


Fig. 31, 31a, 31c—31i I. F. OBBES. 31b I. G. DE MAN, del.