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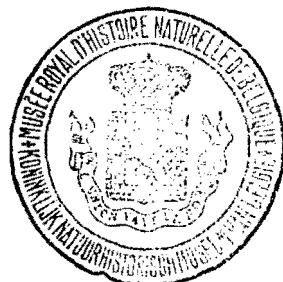
ON SOME SPECIES OF THE GENUS PALÆMON, FABR., FROM TAHITI,  
SHANGHAI, NEW GUINEA, AND WEST AFRICA.

BY

DR. J. G. DE MAN, of Ierseke (Holland).

(Communicated by Rev. T. R. R. STEBBING, M.A., F.R.S., Sec.L.S.)

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L O N D O N :

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VIII. *On some Species of the Genus Palæmon, Fabr., from Tahiti, Shanghai, New Guinea, and West Africa.* By Dr. J. G. DE MAN, of Ierseke (Holland). (Communicated by the Rev. T. R. R. STEBBING, M.A., F.R.S., Sec.L.S.)

(Plates 18–20.)

Read 3rd March, 1904.

THE following Report contains the description of some species of the genus *Palæmon*, Fabr., several of which were sent to me for examination by Prof. F. Jeffrey Bell, of the British Museum (Natural History), whereas the others, belonging to my private collection, were gathered in fresh water at Catumbella, near Benguella, by Mr. P. Kamerman, the same gentleman to whom I am also indebted for the interesting *Brachyura* from Angola described four years ago in *Mémoires Soc. Zool. de France*, 1900, pp. 31–65, pls. i., ii. One species from Catumbella has not previously been observed in West Africa, and may even eventually prove to be new to science; another, from Cameroon, unfortunately represented by only one specimen, seems to be the rare *P. Foaï*, Cout., the exact habitat of which is still unknown; and finally a remarkable hitherto unknown character of *P. asperulus*, v. Martens, was observed, namely, that some segments of the abdomen are carinated.

The following species are described:—

*Palæmon (Eupalæmon) lar*, Fabr.

*Palæmon (Parapalæmon?) asperulus*, v. Martens.

*Palæmon (Macrobrachium) latimanus*, v. Martens.

*Palæmon (Eupalæmon) macrobrachion*, Herklots.

*Palæmon (Eupalæmon) Foaï*, Cout.

*Palæmon (Macrobrachium) jamaicensis* (Herbst),  
var. *Vollenhovenii*, Herklots.

*Palæmon (Macrobrachium) Olfersii*, Wiegmann.

*Palæmon (Macrobrachium?)* sp.

#### A.—INDO-PACIFIC SPECIES.

##### PALÆMON (EUPALÆMON) LAR, Fabr. (Plate 18. fig. 1.)

Confer: Spence Bate, Report on the 'Challenger' Macrura, 1888, p. 789, pl. 129. fig. 1; de Man, Notes from the Leyden Museum, i. 1879, p. 168 (sub nomine *Pal. ornati*, Oliv.), and in Max Weber, Zoolog. Ergebn. Reise Niederl. Ost-Indien, ii. 1892, p. 445, and Abhandlungen der Senckenbergischen Naturf. Gesellschaft, Bd. xxv. Heft iii. 1902, p. 774.

Four adult males from fresh water at Tahiti. British Museum (Natural History).

The tooth-formulæ and the measurements of the legs of the second pair are indicated in the Table. These specimens closely resemble the figure quoted from the 'Challenger' Report. The rather slender rostrum is as long as or somewhat longer than the peduncles

of the upper antennæ, though not reaching to the end of the scaphocerites; the upper margin is slightly convex above the eyes, and its distal half is more or less turned upward. The third tooth is situated just above the orbital margin; in three specimens this tooth is as long as the second, and both are longer than the others, but in the male No. 4 these teeth are not longer than the rest.

The telson of No. 1 and No. 2 ends in a short median acute tooth (fig. 1); the inner of the two spines on each side is three times as long as the outer, and overreaches the median tooth by its distal half. In the two other specimens the median tooth and the spines are more or less worn off. In these four specimens the second legs are of about equal size; in all the slender fingers are gaping, just as in the figure quoted, in consequence of the strong development of the teeth with which they are armed, and they are also somewhat curved inward. The dactylus is regularly curved towards the tip and usually a little shorter than the immobile finger; the latter is provided with a conical tooth at a fourth of its length from the articulation and with a smaller one between this tooth and the proximal end of the finger. The dactylus bears also a conical and compressed tooth at a third of its length from the articulation, which is not smaller than the tooth of the other finger, and between this tooth and the articulation is seen four or five much smaller obtuse teeth; sometimes, however, the latter are more or less rudimentary.

The second legs are of a fine dark purple colour, darkest on the fingers, which appear almost black; the articulation of the fingers is beautiful orange-red, as also the articulation between carpus and palm, and the fingers are marked with pale spots, as in the figure in the 'Challenger' Report. The dorsal surface of cephalothorax and abdomen and the posterior margin of the upper teeth of the rostrum have also a purple colour, though paler than that of the second legs, being more cherry-red. As regards their colour, our specimens apparently agree with those from the River Papeuriri in Tahiti, described in the Report on the 'Challenger' *Macrura*.

An adult male and an adult female from Patani, on the island of Halmahera, are now before me (*vide* de Man, in *Abhandl. Senckenb. Naturf. Gesellschaft*, xxv. Heft 3, 1902, p. 777). In these specimens the cephalothorax and the abdomen are *not* adorned with the beautiful purple colour observed on the specimens from Tahiti, and *the three posterior pairs of legs are longer and more slender*. So, *e. g.*, in the adult male from the River Tobelo, that is 115 mm. long, the meropodites of the fifth pair are 16 mm. long, and, measured on their outer side, in the middle 1.6 mm. broad; the carpopodites are 10.5 mm. long, and 1.6 mm. broad at the distal end; the propodites have a length of 17 mm. and are 0.96 mm. broad in the middle, the terminal joints finally are 4.5 mm. long. In our male (No. 4), however, of exactly the same size, the meropodites of the fifth pair are 14 mm. long and 1.85 mm. broad in the middle; the carpopodites are 8 mm. long and 1.6 mm. broad at the distal end; the propodites are 15 mm. long and 1.12 mm. broad in the middle, the terminal joints finally are 3.5 mm. long.

The Tahiti species may therefore be regarded as a *local variety*, for which I propose the name *spectabilis*, because it is certainly identical with *P. spectabilis*, Heller, from the same island.

*Measurements in millimetres.*

	1. ♂.		2. ♂.		3. ♂.		4. ♂.	
Length of the animal .....	125		118		116		110	
Length of the whole leg .....	155	145	153	147	122	116	138	135
Length of the merus .....	30	29	28.5	28	24	23	27	26.5
Width of the merus at the distal end ....	5.4	5.2	5	5	4.5	4.5	4.75	4.75
Length of the carpus .....	27	26	27	26	21	21	25	25
Width of the carpus at the distal end ....	5.5	5	5.5	5.25	4.75	4.75	5	5
Length of the palm .....	42	37	43	40	33	30	37	36
Breadth of the palm in the middle .....	5.75	4.75	5.33	5.25	4.75	4.5	5.25	5
Thickness of the palm in the middle ....	5	4.25	4.5	4.5	4.25	4	4.5	4.5
Length of the fingers .....	30.5	27	29	28	23.5	21.5	26.5	25
Length of the whole hand .....	72.5	64	72	68	56.5	51.5	63.5	61
Formula of the rostrum .....	$\frac{2}{9}$ $\frac{1}{3}$		$\frac{2}{9}$ $\frac{1}{3}$		$\frac{2}{8}$ $\frac{1}{3}$		$\frac{2}{7}$ $\frac{1}{3}$	

## PALEMÓN (PARAPALEMÓN ?) ASPERULUS, v. Martens. (Plate 18. figs. 2-8.)

*Palemón asperulus*, v. Martens, Archiv Naturg. xxxiv. Jahrg. 1868, p. 43, Taf. 1. fig. 5.

*Palemón asperulus*, Ortmann, Zool. Jahrb., Syst. v. p. 708.

One young female from South Hu-peh, China. British Museum (Natural History).

Though *P. asperulus* was described a third of a century ago, it has apparently never been observed since that time, and, so far as I am aware, no mention of this species has been made since 1868, except by Dr. Ortmann, who, however, did not have any specimens at his disposal. We must therefore regret that only one young female has been collected, for, according to von Martens, *P. asperulus* is a common species in the fish-market of Shanghai.

Our female is 47 mm. long from tip of rostrum to the extremity of the telson, quite young therefore, this species attaining, indeed, a length of 83 mm. The rostrum (fig. 2) is *short* and reaches to the distal end of the antennular peduncles; it is lanceolate, and appears very slightly arcuate above the eyes. The upper margin bears 10 equal teeth, the first of which is placed just twice as far from the posterior as from the anterior margin of the cephalothorax. This first tooth stands a little farther from the second than the following teeth, that are equidistant and reach to the tip of the rostrum. The under edge bears 3 teeth, which are smaller than those of the upper margin; the first is situated just below the seventh tooth of the latter, and these teeth have also about the same length and extend to near the tip. The rostrum has a stout shape and that part which is situated above the lateral crest appears, in the middle of the rostrum,

as high as that below it. *Three teeth are on the cephalothorax*, the fourth is situated just before the orbital margin.

Von Martens describes the rostrum as being as long as the scaphocerites (*l. c.* p. 34); but in his figure it does not reach so far; this figure, however, is inaccurately drawn, for the lateral spines of the cephalothorax have been forgotten altogether.

The hepatic spine is a little smaller than the antennal, and is situated posterior to and somewhat below the latter.

The cephalothorax is covered, though not closely, *with very small spinules*, which are only 0.04 mm. long. The abdomen is finely punctate. The first segment (Pl. 18. fig. 3) presents *a remarkable form*, which has not hitherto been observed in any species of this genus, *the dorsal part of it being distinctly tricarinate by three, not very sharp, longitudinal carinæ, that reach from the anterior to the posterior margin of the segment*. The two lateral carinæ converge very slightly backwards, and the upper surface is *concave* between the median crest and each lateral one; even on the outer side of each lateral carina the surface appears a little concave, though a second lateral crest does not exist. Though the second segment is not at all carinate, its surface appears, however, on each side of the median line, near the posterior margin, very slightly concave. The third and fourth segments are rounded above, but the fifth is *distinctly carinate* in the median line of the dorsal surface, though only along the posterior half; on each side of the crest the surface appears a little concave. The telson tapers rather strongly towards the posterior extremity (fig. 4), that ends in a sharp acute median tooth, which is shorter than the internal of the two spines on each side of it. The upper surface of the telson is roughened by minute spinules, which are still smaller than those of the cephalothorax. The anterior pair of spines on the upper surface is a little farther from the anterior end of the telson than from the posterior extremity; it is, of course, very seldom that a third spine occurs on the left side, close to the anterior one.

The short filament of the upper antennæ is united for a very short distance with the outer one, this distance being only one-third of the length of the third joint of the peduncle. The external footjaws project half their terminal joint beyond the peduncles of the outer antennæ. The legs of the first pair overreach the scaphocerites by the length of their hands: the fingers are just as long as the palm. The carpus, which is somewhat thickened as usual at its distal end, is 5.5 mm. long, the hands are 3.6 mm. long; *so that the carpus is only once and a half as long as the hand* (fig. 5).

The legs of the second pair (fig. 6) are *equal and rather feeble*; they project a fourth of their wrist beyond the scaphocerites. Measured along its upper margin, the merus appears 5.2 mm. long; this joint is almost cylindrical and thickens but very slightly anteriorly, so that it is 1.6 mm. thick at the distal end. The carpus, which is 6.4 mm. long, is distinctly *somewhat longer* than the merus: von Martens says that both joints are equally long, but in his figure the merus appears distinctly shorter. The carpus also thickens gradually towards the distal end, and is, moreover, slightly compressed; in consequence of this, the distal extremity appears 1.9 mm. broad looked at from above, but only 1.65 mm. when it is measured at the outer side (fig. 7).

The carpus bears on its outer side a *longitudinal ridge* along its whole length, and this ridge is continued for a short distance, about 1.5 mm., along the outer margin of the palm. Both merus and carpus bear, moreover, on their upper surface an impressed longitudinal line, which runs in the same direction from the distal end of the ischium to that of the carpus (fig. 6). The hand is 13 mm. long, the palm measures 7.5 mm., the fingers 5.5 mm.; *the palm is thus somewhat longer than the carpus and the fingers*, and the proportion between palm and fingers also conforms to the original description, according to which their proportion should be as 3:2. The lateral margins of the palm, which is 2 mm. broad in the middle, are parallel with each other, so that its upper surface presents *the same breadth* almost along its whole length; the palm is 1.5 mm. thick in the middle, so that it appears a little compressed *in the proportion of 4:3*. The fingers shut close together and are somewhat curved inward, so that the inner margin of the hand runs very slightly concave; the fingers are also a little broader than thick and they have the same breadth to near their acute tips. Each finger bears a sharp cutting-edge, at the proximal end of which is seen a small conical tooth; the dactylus bears, moreover, a second tooth between it and the articulation, so that the tooth of the immobile finger is situated just between the two of the dactylus. One observes on each side of the cutting-edge the usual short hairs as in other species, and on the upper and lower surface of the fingers small tufts of short hairs, which are somewhat longer near the tips, but otherwise the fingers are quite smooth. The straight inner border of the palm is beset with very small spinules, 0.12 mm. long, visible only by means of a magnifying-glass; still smaller ones are seen on the outer margin; the lower surface of the palm bears also a few microscopical spinules, but the upper is nearly smooth. The palm is also a little hairy; the hairs are short, fine, and widely separate. The other joints of these legs are everywhere covered with similar small spinules and similar short fine hairs. The second legs are 32 mm. long, measuring just *two-thirds* the length of the animal; they have a pale flesh-colour.

The three posterior pairs of legs are *short and stout*. Those of the third pair reach nearly to the end of the antennal scales, the two others are but little shorter. The meropodites of the third pair (fig. 8) are 5.33 mm. long, measured along their upper margin, and 1 mm. thick on their outer side; the propodites are 5 mm. long and 0.72 mm. broad in the middle, the terminal joints finally are 1.9 mm. long. The meropodites of these legs are thus *five*, the strongly compressed propodites *seven* times as long as broad on their outer side, and the terminal joints are little longer than a third of the propodites. The propodites are armed with nine mobile spines along the posterior margin of their upper and lower surfaces; these spines measure 0.32–0.38 mm., and are about half as long as these joints are broad. The propodites are a little hairy on their upper and on their lower surface, as also along their anterior margin, but are otherwise smooth; the other joints are also a little hairy and almost smooth, though a few microscopical spinules may be distinguished under the microscope.

*Palæmon asperulus* should very likely be referred to the subgenus *Parapalæmon*.

Those species with which *P. asperulus* is most closely allied are *P. (Parapalæmon)*

*javanicus* from Java and Sumatra, *Palæmon* (*Parapalæmon*) *Horstii*, de Man, from Celebes, and *P.* (*Eupalæmon*) *elegans*, de Man, from Java. A female with eggs of *P. javanicus*, Heller, described by myself in the 'Notes from the Leyden Museum,' i. 1879, p. 181, is now before me, and also type specimens of *P. elegans* from Buitenzorg. The female of *P. Horstii* is still unknown, so that the type specimens of this species were not required.

The female of *P. elegans* differs at first sight from our female of *P. asperulus* by the legs being *much more slender and by the slender carpus of the second legs being distinctly longer than the palm; the abdomen is not carinate*, and there are other differences.

The abdomen of *P. javanicus* is also rounded, without a trace of the longitudinal carinæ that are characteristic of the Chinese species. In the female of *P. javanicus* all the legs are, moreover, *more slender*. The carpus of the first pair is twice as long as the hands. In the second legs, which are also considerably *more slender* than those of *P. asperulus*, the palm appears in the right leg just as long as, but in the left distinctly shorter than, the carpus.

The legs of *P.* (*Parapalæmon*) *Horstii* are *short and stout*, and evidently bear a close resemblance to those of *P. asperulus*; but if my figures of the second legs of the male (in Max Weber's 'Decapoden des Indischen Archipels,' 1892, Taf. 27. fig. 39) are compared with the figure of *P. asperulus* in von Martens's paper, there can be little doubt that the species are different. The rostrum closely agrees in both species, but in that of *P. Horstii* there are *four* teeth on the cephalothorax.

*P.* (*Parapalæmon*) *asperulus*, v. Martens, has hitherto only been observed at Shanghai.

PALÆMON (MACROBRACHIUM) LATIMANUS, v. Martens. (Plate 18. figs. 9-12.)

*Palæmon latimanus*, von Martens, Archiv Naturg. Bd. xxxiv. 1868, p. 44.

*Palæmon latimanus*, de Man, Archiv Naturg. Jahrg. liii. 1888, p. 557; and in Max Weber's Zoolog. Ergebn. Reise Niederl. Ost-Indien, ii. 1892, p. 477, Taf. 28. fig. 45; and in Abhandl. Senckenbergischen Naturf. Gesells. Bd. xxv. Heft 3, 1902, p. 780.

*Palæmon* (*Macrobrachium*) *latimanus*, Nobili, Annali Museo Civico Genova, Ser. 2, vol. xx. (xl.) 1900, p. 485, figs. 3 a-c & 4.

*Palæmon latimanus*, Schenkel, in Verhandl. Naturf. Gesells. Basel, Bd. xiii. Heft 3, p. 512 (1902).

Five adult males and one young female from Dinawa, Owen Stanley Range, 120 miles inland from Yule Island, at an altitude of 4000 feet.

In the third of my papers quoted above I supposed that the two male specimens from Celebes, 107 mm. and 103 mm. long, were adult, because they were even a little longer than the type specimen described by von Martens, which measured 97 mm. The five adult males from Dinawa, which are all about the same size, are, however, still *considerably larger*, for they measure from tip of rostrum to the end of the telson 130-140 mm. Specimens of this size have never been examined, so far as I am aware. Unfortunately, however, they have all lost the legs of the second pair, but one second leg is lying loose in the bottle.

In the large males the rostrum extends to the middle of the terminal joint of the antennular peduncles, or to the end of it; it closely resembles the figure published by Nobili of the type specimen of von Martens, but in some specimens the upper margin is more strongly inclined downward. In these five individuals the upper margin bears five, the lower two teeth, and in all the first *two* teeth stand on the cephalothorax. In two males the second tooth of the upper margin is just as long as the following two together (fig. 10), but in the others it is but little longer than the third tooth (fig. 9). In Nobili's figure of the type the second tooth of the lower margin is as far from the first tooth as from the tip, but in the Dinawa males the two teeth stand close together and the second is considerably farther from the tip than from the first tooth. In the young female which is 75 mm. long the rostrum is .5 mm. longer than the peduncles, and it is armed above with 6, below with 3 teeth; two stand again on the cephalothorax, the second is but little larger than the following, and the foremost tooth is still a little farther from the tip than the length of the fifth and of the sixth tooth taken together. The three teeth of the under margin are smaller than those of the upper; the third reaches to the distal end of the penultimate joint of the upper peduncles.

Only in one single male (fig. 11) the extremity of the telson ends in a short acute median tooth; the inner of the two spines on each side is twice as long as the outer and extends beyond the median tooth a third of its length. In the other specimens the extremity of the telson is more or less worn off, and in the female this segment is wanting.

In these adult males the outer footjaws project the distal fourth of their penultimate joints beyond the peduncles of the outer antennæ. The legs of the first pair extend a third or a fourth of their wrist beyond the scaphocerites. The fingers are just as long as or a little longer than the palm, and the carpus is once and a half as long as the hand.

Only in one male, which has a length of 130 mm., the first four joints of the right leg of the second pair are still present; the merus, which is 23 mm. long, extends 2 mm. beyond the scaphocerites.

The large left leg of the second pair, which lies loose in the bottle (fig. 12), is 152 mm. long, and is consequently somewhat longer than the animal, for it no doubt belonged to one of the five males. It closely agrees with Nobili's figure of the type, but the palm is comparatively longer and the dactylus appears a little longer than the immobile finger. Measured along the outer margin, the merus appears to be 33 mm. long; looked at from above the proximal extremity that articulates with the ischium, it appears to be 5 mm., the distal end, however, 8 mm. broad. The carpus is 22 mm. long and measures, in conformity with the original description, two-thirds of the merus; viewed from above its proximal extremity, it appears 3.75 mm. broad, and its greatest width, at a fourth of the whole length from the distal end, measures 10 mm. The hand, measured along the outer margin, appears to be 71 mm. long, the palm 42.5 mm., the fingers 28.5; *the palm is twice as long as the carpus*, and the fingers are a little shorter than the merus. The palm is, in the middle of its length, 11 mm. broad and 7.75 mm. thick, being compressed in the proportion of 1:1.4; in the type specimen



figured by Nobili this proportion is as 1 : 1.22 or as 1 : 1.23 (*vide* de Man, in Max Weber's 'Decapoden des Indischen Archipels,' p. 479). This difference depends, no doubt, upon the difference of age, or is perhaps individual. In a male specimen from Minahassa the palm of the left leg was 25 mm. long, 10.5 mm. broad, and 8.5 mm. thick; though the palm was a little less broad than in the leg that I am describing, it was, however, somewhat thicker, so that the proportion was as 1 : 1.23 (de Man, in Kükenthal's 'Decapoda,' 1902, p. 783). *The palm is thus four times as long as broad*; in the type figured in the 'Annali del Museo Civico di Genova' the palm appears three times as long as broad, but the type specimen is much younger, being only 97 mm. long, and the leg that is figured measures only 85 mm. The fingers of our specimen shut close together, and the dactylus is almost 1.5 mm. longer than the immobile finger. At the end of a short black-coloured cutting-edge, which extends almost along a third of the length of the finger from the tip, is seen a small conical tooth, and another of the same size stands in the middle between this tooth and the articulation; between this second tooth and the articulation the finger presents two smaller teeth, and between this second tooth and that at the end of the cutting-edge are seven small teeth that gradually decrease in size distally. The black-coloured cutting-edge of the immobile finger is somewhat longer, extending along two-fifths of its length, and it presents a conical tooth at its proximal end; between the latter and close to the articulation this finger carries fifteen small teeth, of which two or three in the middle are a little larger than the others. The dactylus, however, carries only ten teeth between the cutting-edge and the articulation. The number of these teeth apparently increases with the age; in a young male from the island of Rotti, 50 mm. long, each finger bore only nine teeth between the tooth at the end of the cutting-edge and the articulation (de Man, in Max Weber's 'Decapoden des Indischen Archipels,' 1892, p. 480). The whole leg is covered with small spinules. On the outer margin of the merus they are less numerous than elsewhere; but on the outer, and in a less degree also on the inner, side of the carpus these spinules are more crowded than on the upper and lower surface of this joint. The outer margins of the palm and of the dactylus are closely beset with these spinules, but their number gradually decreases towards the inner margin of the palm, and on the upper as also on the lower surface of both fingers they are few in number. The spinules on the inner margin of the immobile finger are very slightly larger than those on the inner margin of the palm and than the crowded spinules on the outer margin of the dactylus. This leg has a reddish colour, but on the inner side of merus and carpus it is marbled with black, as are also the distal extremities of the red-coloured fingers.

The three posterior legs are stout. Those of the third pair project a third or a fourth of the length of their carpopodites beyond the scaphocerites; the fourth pair is somewhat shorter; and the fifth legs extend scarcely beyond the middle of the antennal scales. The meropodite of the fifth legs of one of the adult males from Dinawa is 17 mm. long and 2.75 mm. thick in the middle; the carpus, measured to the articulation with the propodite, appears 10.5 mm. long and 2.66 mm. thick on its outer side; the propodite is 18 mm. long and 1.75 mm. broad in the middle, and the dactylopodite measures 5 mm.

In all the specimens of *P. latimanus* that I have examined anteriorly, the upper

margin of the rostrum was armed with 10, 9, rarely 8 teeth, which reached to the tip, and Nobili describes also 8 or 9 teeth for specimens from the Mentawai Islands; in seven individuals from Celebes, recently described by Schenkel, three were armed with 9, the four others with 7, 8, 11, and 12 teeth. The type specimen from the island of Samar finally had a rostrum armed with 6 teeth on the upper margin. We may consequently conclude that the number of these teeth is subject to much variation, and there are perhaps local varieties in which it is constantly larger. The male specimen from North Halmahera, 74 mm. long, that I have described in the third of the papers quoted (p. 782), is lying before me. The meropodites of the fifth pair are 9 mm. long and 1.33 mm. broad on their outer side; the carpopodites are 5 mm. long and 1.2 mm. thick at the distal end; the propodites are 10 mm. long and 0.85 mm. broad in the middle; the dactylopodites finally are 2.75 mm. long. The three posterior legs are thus comparatively *a little less stout* in proportion to their length than those of the adult specimens from Dinawa.

*Palæmon (Macrobrachium) latimanus* has hitherto been recorded from the following localities:—Mentawai Islands (*Nobili*); Flores (*de M.*); Rotti (*de M.*); Timor (*de M.*); Amboina (*de M.*); Halmahera (*de M.*); Celebes (*de M., Schenkel*); Samar (*von Martens*); Fiji Islands (*Ortmann*). Fresh water.

#### B.—SPECIES FROM WEST AFRICA.

PALEMON (EUPALEMON) MACROBRACHION, Herklots. (Plates 18. and 19. figs. 13–29.)

*Palemon macrobrachion*, Herklots, Additamenta ad Faunam Carcinologicam Africæ Occidentalis, L. B., 1851, p. 15.

*Palemon macrobrachion*, de Man, in Notes from the Leyden Museum, i. 1879, p. 177.

Confer: Carl W. S. Aurivillius, 'Krustaceen aus dem Kamerun-Gebiete,' in Bihang till K. Svenska Vet.-Akad. Handlingar, Bd. xxiv. Afd. iv. No. 1, 1898, p. 19.

The following collection is lying before me:—

One male of medium size, obtained by Messrs. Büttikofer and Sala in 1881 in Liberia. (Leyden Museum.)

One adult male and one somewhat younger female without eggs, from the River Prah, South of Ashantee, West Africa. (British Museum, Natural History.)

Nine specimens of medium size (1 ♂, 8 ♀) from the Congo Coast, probably from Ambriz.

About 300 young and very young specimens, half of which have unfortunately lost their legs of the second pair, from fresh water at Catumbella, near Benguella; presented to me, together with the Congo specimens, by my cousin, Mr. P. Kamerman.

Dr. Aurivillius, who has also studied a large number of specimens of this species collected in Cameroon, was led to the conclusion that *P. macrobrachion* ought to be identified with *P. acanthurus*, Wiegman; and he is followed in this opinion by Miss Rathbun in Proc. U.S. National Museum, xxii. 1900, p. 315. *The identity of both species appears very probable also to me: nevertheless I prefer to describe the*

African specimens still provisionally under the name given to them by Herklots, because neither Aurivillius nor myself was enabled to study also American individuals of *Palæmon acanthurus*. It may be possible, indeed, that slight differences exist between the two species, differences that have been overlooked in the published descriptions, and we must consider that von Martens, who examined American specimens of *P. acanthurus* together with one from Sierra Leone, was unable to decide whether the latter specimen was to be referred or not to *P. acanthurus* (*vide* Archiv f. Naturg. xxxv. Jahrg. 1869, p. 30).

The rostrum of the male specimen\* from Liberia, the cephalothorax of which is closely covered with minute spinules, *differs rather much from all the other specimens* in the large collection lying before me. In the first place, *it is but little longer than the peduncles of the internal antennæ*, much shorter than the scaphocerites, and it extends *straight forward, being not at all upturned at the extremity* (Pl. 18. fig. 13). The 11 teeth of the upper margin extend to the tip, *there being no smooth interspace separating one or two apical teeth from the preceding*. The first two stand on the carapace and are somewhat more distant from one another than the others. One observes 5 teeth along the distal half of the lower margin, the first of which is situated just below the seventh tooth of the upper border.

The right leg of the second pair is almost once and a half as long as the animal, the left is but 4 mm. shorter. As regards the length and the shape of the joints, these legs fully agree with that of the adult male from the River Prah described below, and the same conformity is observed as regards the number, the form, and the arrangement of the spinules with which the joints are beset. Each finger is armed with a small conical tooth, but between this tooth and the articulation there are only two or three smaller teeth; both fingers of each leg are thickly covered with a woolly felt. The three posterior legs are comparatively just as long as in the adult male from the River Prah and agree also in the other characters; the meropodites of the legs of the third pair are 11.5 mm. long and, in the middle, 1.66 mm. broad.

The rostrum of the adult male (Table, No. 2) from the River Prah is broken off, only the three posterior teeth of the upper margin are still present; two of them are on the carapace, the third just above the orbital margin. The cephalothorax is somewhat roughened anteriorly, especially on the sides, by microscopical spinules, only visible by means of a magnifying-glass. They exist also on the telson. In my first description of *P. macrobrachion* (*l. c.* 1879) the carapace is said to be smooth. The anterior pair of spinules on the upper surface of the telson is situated exactly in the middle, the posterior pair just half-way between the anterior and the extremity. The latter ends in an acute median tooth in the middle, on either side of which are inserted the two usual spines; the internal spines extend considerably beyond the median tooth.

The inner or shorter of the two outer flagella of the upper antennæ are 20 mm. long from their extremity to the end of the peduncle, being slightly longer than the latter;

\* For the measurements of the body and of the second legs, as also for the toothing of the rostrum, I refer to the Table on p. 321, where the dimensions of 38 specimens are given. The joints of the second legs have been measured along their outer margin.

they are united for a fifth of their length with the outer flagella and are slightly serrated.

The external maxillipedes extend a third of their terminal joint beyond the peduncle of the lower antennæ. The legs of the first pair, which are 42 mm. long, project with little more than their hands beyond the tip of the antennal scales. The slender carpus is 18 mm. long, and 1.33 mm. thick at the distal end; it is almost three times as long as the chela, which is 6.66 mm. long and the fingers of which are slightly longer than the palm. Only one leg (fig. 14) of the second pair is still present; this leg is a little longer than the animal. The merus extends for about a third of its length beyond the antennal scales; it is straight and thickens slightly to a little behind its distal end, its greatest width being 6.5 mm.; this joint appears consequently five times as long as thick. The carpus is one-fourth longer than the preceding joint; it is slender and thickens slightly and rather regularly towards the distal end, its diameter being here about *one-eighth* of the whole length. The carpus is, however, not quite straight, but very slightly curved, so that the inner margin appears a little concave, the outer very slightly convex. *The palm has about the same length as the merus and is as much shorter than the carpus as the latter.* The almost quite straight palm is *cylindrical*, presenting over its whole length a diameter of 4 mm., so that this joint is 8 times as long as thick. The fingers, which are thickly covered *with a woolly felt*, quite close together; the immobile finger is straight, the dactylus, however, very slightly arcuate. The immobile finger is armed with a small conical tooth, about 0.75 mm. high, at one-third of its length from the articulation, and between this tooth and the articulation seven or eight smaller teeth are observed, placed in a longitudinal row. The dactylus carries likewise a small conical tooth, 1.5 mm. beyond that of the immobile finger, and between it and the articulation five or six smaller teeth. The inner and the inferior sides of merus, carpus, and palm are covered with slender spinules, those on each side are somewhat larger and arranged here more or less distinctly in two longitudinal rows, four in all therefore, but the upper and outer sides are closely beset with much smaller spinules.

The following legs are stout, a little hairy, and thickly covered, except on the lateral parts, with minute spinules; the legs are, however, partly broken and incomplete. The propodites of the third pair reach almost to the end of the scaphocerites; the carpus of the following pair reaches to the cornea of the eyes, that of the fifth pair finally extends to the anterior margin of the cephalothorax. The meropodites of the legs of the third pair are 17 mm. long and 2.5 mm. thick in the middle.

The cephalothorax of the female from the River Prah is smooth. The upper margin of the rostrum (fig. 15) is straight till a little beyond the middle, then it curves very slightly upwards, reaching to the end of the scales. It is armed above with 9 basal teeth, the first two are on the carapace, the third just above its anterior margin, and the ninth tooth reaches almost to the distal end of the peduncles of the inner antennæ; finally with two small *apical* teeth close to the tip, the posterior of which is separated by a smooth interspace, which is 5 mm. long, from the foremost tooth of the basal portion. The first and the second teeth are twice as distant from each other as the second is from the third, and the three or four foremost teeth of the basal portion increase very slightly

in length. The convex inferior margin carries 5 teeth, the first of which is situated below the seventh of the upper margin, the fifth just opposite the middle of the smooth interspace. The two portions into which the rostrum is divided by the lateral crest are equally high.

The outer footjaws project beyond the peduncles of the lower antennæ by a third of their terminal joint. The legs of the first pair extend by half their hand beyond the antennal scales; the slender carpus, 11.5 mm. long, is two and a half times as long as the chela, which measures 4.5 mm., and the fingers of which are somewhat longer than the palm. Only the right leg of the second pair is still present (fig. 16). It is considerably feebler than that of the male and reaches with the distal third of the carpus beyond the antennal scales. The carpus, 2 mm. thick at the distal end, is 1.25 mm. thick at the extremity. The fingers shut together and are *thickly covered with felt*; the palm is 1.9 mm broad when looked at from above, but only 1.7 mm. in the middle when the lateral side is measured, so that it is not exactly cylindrical. The spinules with which the joints are covered are comparatively much smaller than in the adult male, but their arrangement is the same. The hand is a little longer than the carpus, and the carpus is much longer than the merus. The following three legs are somewhat less stout than those of the adult male and their joints are almost smooth; those of the fifth pair reach to the end of the scaphocerites; the two other pairs, which have about the same length, are a little shorter. The meropodites of the third pair are 10.5 mm. long and, in the middle, 1.33 mm. thick.

The situation of Boutry, where the type specimens of Herklots were obtained, is in the immediate vicinity of the River Prah, for Boutry is situated close to Dixcove, and that place is not far distant from the mouth of the river.

The cephalothorax of the only male from the Congo Coast is almost smooth. The slender rostrum (Pl. 19. fig. 17), which projects about 1 mm. beyond the antennal scales, is not straight, for the distal half curves somewhat upward and the upper margin is very slightly arcuate above the eyes. The basal portion carries 9 teeth, three of which are on the cephalothorax, and the ninth tooth reaches to the distal end of the penultimate joint of the antennular peduncles; then follows a smooth interspace, 5 mm. long, finally two smaller apical teeth close to the extremity. The first and the second teeth are a little more distant from each other than the following. The inferior margin is provided with 6 teeth, the first immediately before the eyes, the following increase in length, and the sixth is situated below the penultimate apical tooth of the upper margin. The rostrum resembles that of the female from the River Prah, but is more strongly turned upward and has a more slender form. The first legs overreach the scales only by the length of their fingers; the carpus is 7.5 mm., the hand 3.66 mm. long.

Though this specimen is but little smaller than the male from Liberia, the legs of the second pair are *considerably shorter*, and have the same form and length as in the females. This fact, however, is often observed in the males of this genus. As regards the measurements of the right leg, I refer to the Table; they nearly agree with those of the female from the River Prah. The whole leg is somewhat shorter than the animal and fully agrees in its other characters with that female. I will only add that the merus

reaches as far forward as the peduncle of the upper antennæ, and that the palm is 2.1 mm. broad looked at from above and 1.9 mm. in the middle measured on the outer side. The fingers are already covered with the characteristic woolly pubescence. The left leg is only 30 mm. long and almost quite smooth. The following legs are also smooth; those of the fifth pair reach to the end of the antennal scales.

Five of the eight females from the Congo Coast are provided with eggs; the largest of these five is 80 mm., the shortest 58 mm. long from the tip of the rostrum to the end of the telson. The cephalothorax is smooth. The rostrum (fig. 18) agrees, in its general characters and outer appearance, with that of the female from the River Prah and in all it curves more or less upward at the distal end; the teeth-formulæ are given in the Table. In all eight females 8, 9, or 10 teeth of the basal portion are separated by a *smooth interspace* from one or two, rarely three apical teeth, and these apical teeth are either closely situated near each other or a little distant; two or three teeth are on the carapace and the lower margin is armed with 4, 5, or 6 teeth.

In the larger specimens the fingers of the first pair project beyond the antennal scales, in the smallest one these legs are just as long as the scaphocerites. The legs of the second pair agree with those of the female from the River Prah. They are generally equal, half as long or little more than half as long as the animal. In the largest female, which is 80 mm. long, these legs project a fourth of their carpus beyond the antennal scales; in another (No. 7), which has almost the same size, the second legs (Pl. 18. fig. 19) are just as long as the scaphocerites. In the former specimen the carpus is 12 mm. long, and 1.5 mm. thick at the distal end, in the other these numbers are 10 mm. and 1.6 mm.; so that the carpus of No. 5 appears somewhat slenderer than in the other. In two females the carpus is a little shorter than the hands, but in the others these joints have about the same length; the fingers, which in all are covered with a *felt-like pubescence*, though the tips are generally devoid of it, are usually a little shorter than the palm. The fingers carry about the same teeth as in the male, but they are fewer in number and smaller. So, *e. g.*, in the female (No. 6) the dactylus (figs. 20-22) carries an obtuse tooth at one-third of its length from the articulation and behind it four other teeth, which are also obtuse, a little smaller and of unequal size. The immobile finger is also armed with an obtuse tooth at the end of its cutting-edge, and this edge is a little longer than on the other finger; between this tooth and the articulation are seen six smaller teeth, also of unequal size. Looked at from above the palm presents the same breadth along its whole length, but viewed from the lateral side, palm and fingers slightly decrease in height or thickness and the fingers taper gradually towards their tip. In the largest female (No. 5) the upper surface of the palm is 1.5 mm. broad, but looked at from the outer side the palm appears 1.4 mm. thick at its proximal end, 1.3 in the middle, and 1.1 at the base of the fingers. Fine short hairs are distributed on the joints, and as regards the distribution and size of the small spinules on their inner and lower surface, these Congo specimens fully agree with the female from the River Prah. So, *e. g.*, the spinules on the inner margin of the carpus of the leg figured (fig. 20) are rather slender and 0.25-0.27 mm. long (fig. 21); similar spinules occur on the inner margin of the palm; those on the inner margin of the merus are, however,

a little shorter and thicker. The spinules on the outer margin of the joints are much thinner and feebler. The three posterior legs agree also with those of that female. In the largest female (No. 5) the legs of the fifth pair exceed the antennal scales by the length of their dactylopodites; the two preceding pairs are a little shorter, extending only to the end of the scales. Their joints have a smooth, shining surface.

The numerous specimens from Catumbella, 28 of which have been measured, are almost all very young, and the few of somewhat larger size are, however, younger than the Congo individuals described above. The largest specimen is a male, measuring 60 mm. (No. 11 of the Table). The cephalothorax is apparently still smooth. The rostrum (Pl. 19. fig. 23), which extends to the end of the scales and curves very slightly upwards at the extremity, makes a rare exception to nearly all the other individuals: there are, for instance, *no apical teeth* on the upper margin; the 10 teeth of the upper margin, the third of which is situated just in front of the anterior margin of the cephalothorax, reach to the distal end of the antennular peduncles; and the space between the tenth tooth and the apex, 2.75 mm. long, is slightly convex, without apical teeth. The first legs overreach the antennal scales by half the palm; the carpus is 7.5 mm., the hand 3.5 mm. long. The left leg of the second pair (the right is wanting) measures two-thirds the length of the animal, and projects almost with two-thirds of the carpus beyond the antennal scales. Though this specimen is but little shorter than the Congo male described above, this leg, however, is much shorter, less stout, and the surface of the joints is almost smooth, the spinules being less distinctly developed; the measurements, however, present the same proportions, and the fingers are already covered *with the woolly pubescence* characteristic of this species. The other legs agree with those of that male, the fifth pair reaching to the end of the scales.

In the other specimens the rostrum, which is as long as the scales or projects very little (0.5-1.5 mm.) beyond them, is *generally more or less turned upwards at the distal end* (fig. 24); it is usually armed above with 8, 9, or 10 teeth on the basal portion and with one or two apical teeth, separated by a smooth interspace from the preceding; and when two apical teeth are present, then they are situated close together near the tip of the rostrum or at some distance from one another. The lower margin is armed with 4, 5, or 6 teeth. So, *e. g.*, in a male specimen that is 37 mm. long, the rostrum, the formula of which is  $\frac{10+2}{4}$  and the slender distal end of which curves a little upward, projects slightly beyond the scales for half a millimetre, as in many other individuals. The first legs reach to the end of the antennal scales, and those of the second pair, that are just half as long as the animal, overreach the antennal scales by the whole length of their hand. In another male of exactly the same length the first legs are just as long as in the preceding specimen, but those of the second pair project a fourth of their carpus beyond the scaphocerites; the legs of the third pair reach as far forward as the terminal spine of the lateral margin of the scales.

In the largest female (No. 22), which is 58 mm. long, the first legs project only by half the length of their fingers beyond the distal end of the antennal scales; the chelæ, in which the fingers are distinctly longer than the palm, are just half as long as the slender carpus. The legs of the second pair (Pl. 18. fig. 25 and Pl. 19. fig. 26) are little



more than half as long as the animal, and project beyond the distal end of the scales by a third part of their carpus. The chelæ are also slender and somewhat shorter than the preceding joint; the fingers, already slightly pubescent, are a little shorter than the palm. The palm is 1 mm. broad above, and its breadth remains the same along its whole length, but it narrows slightly towards the base of the fingers when the lateral side is looked at: the palm is 0.75 mm. high in the middle, so that it is but slightly compressed, namely in the proportion of 4 : 3. The second legs are nearly smooth and the fingers are marked *with small red spots*. The third and fourth legs reach almost to the end of the scales.

In younger females, which are 35 mm. long, the first legs reach as far forward as the lateral terminal spine of the scales; the second legs, half as long as the animal, project with only their chelæ beyond the distal end of the scales. This is also the case in still younger individuals, though sometimes the wrist projects a little beyond the scales. Now it should be remarked that the carpus of the second legs has generally in these younger specimens from *Catumbella* a somewhat slenderer form than in the older individuals from the Congo Coast, as will be found by comparing in the Table the proportion between the length of this joint and its thickness at the distal end in different individuals.

As regards the teeth of the fingers in these *Catumbella* individuals, the following may be remarked:—Each finger is provided with a cutting-edge, at the end of which stands an obtuse tooth, and between this tooth and the articulation are seen a few other teeth. So, *e. g.*, in a male specimen that is 35 mm. long, the dactylus carries two rounded teeth between the tooth at the end of the cutting-edge and the articulation, but on the immobile finger there are here no teeth at all.

Of another male (No. 20), which is 29 mm. long, one of the equal second legs is represented in fig. 27, and the teeth of its fingers in fig. 28 of Pl. 19. The cutting-edge of the dactylus extends along two-thirds of its length, that of the immobile finger is a little longer. The obtuse tooth at the end of the cutting-edge of the dactylus is a little smaller than that of the other finger. Between that tooth and the articulation on the dactylus two obtuse teeth of equal size are seen, as large as the distal tooth; on the immobile finger, however, three much lower teeth, also of equal size, but considerably smaller than the tooth at the end of the cutting-edge.

In the largest female (No. 22), which has a length of 58 mm., the dactylus is armed with four, the immobile finger with two teeth between the obtuse tooth at the end of the cutting-edge and the articulation; all are smaller than the distal teeth, and those of the dactylus are of somewhat unequal size (Pl. 19. fig. 26). In another female, which is 33 mm. long, there are but two small teeth on each finger between the tooth at the end of the cutting-edge and the articulation; in another, 30 mm. long, three, and in this individual the middle of the three teeth on the dactylus appears double. In both females the cutting-edge of the dactylus is a little shorter than that of the immobile finger. In a fourth young female, 25 mm. long (No. 38), the teeth of the fingers are shown in Pl. 19. fig. 29. The obtuse tooth at the end of the cutting-edge is situated on the dactylus at one-third of its length from the articulation, and behind it there exists still only one, situated about twice as far from the articulation as from the distal tooth and of about



the same size. Just in the middle between both teeth one sees the distal tooth of the immobile finger, which is as large as that of the dactylus; posterior to it this finger carries still two low teeth that are a little smaller.

*Palæmon (Eupalæmon) sundaicus*, Heller, from the Java Sea, is perhaps the most closely allied form. One of the four female specimens which I described a few years ago is lying before me (*vide* Zool. Jahrb., Syst. ix. 1897, p. 779, Taf. 37. fig. 71). It is 75 mm. long, and its size is thus about the same as that of the *macrobrachion* specimens from the Congo. The rostrum has about the same form and characters, but *it arises almost in the middle of the cephalothorax*; the distance of the first tooth from the posterior margin of the cephalothorax is indeed *twice* as great as its distance from the anterior margin; in *P. macrobrachion*, however, *five to eight* times as far, so that in the African species this tooth is situated much *nearer* to the orbital margin. In *P. sundaicus* the two spines on the sides of the cephalothorax are situated about in the same horizontal line, but the hepatic spine of *P. macrobrachion* is situated *much lower*. The legs of the second pair much resemble each other in both species; but the fingers are smooth, *not* covered with the woolly pubescence characteristic of the West-African form, and *their toothing is different*, the dactylus being armed with only two teeth, the immobile finger with only one. The second legs are, moreover, otherwise coloured. The other legs present also a great conformity in both species. According to Max Weber, *P. sundaicus* inhabits the coast of Natal (Max Weber, Zool. Jahrb., Syst. x. 1897, p. 165).

*Palæmon (Eupalæmon) macrobrachion*, Herklots, inhabits the rivers of West Africa from Liberia to Benguella.

PALÆMON (EUPALÆMON) FOAI, Coutière. (Plate 19. figs. 30-37.)

*Palæmon (Eupalæmon) Foai*, nov. sp., Coutière, Bull. Muséum d'Hist. nat. Paris, 1902, No. 7, p. 517.

One single male, collected in the River Kribi, 25 miles from the coast of Cameroon, West Africa. This specimen belongs to the British Museum.

This species, certainly different from *P. (Eupalæmon) macrobrachion*, Herklots, is apparently related to *Palæmon paucidens*, Hilgd., a species discovered at Adeli, near Bismarckburg, Togo Country, described by Hilgendorf in Sitzungsber. Gesellschaft Naturf. Freunde, Berlin, 1893, No. 5, p. 155. As Coutière does not compare his species with *P. paucidens*, it will be done in the course of this description.

Our specimen is 8 cm. long from the tip of the rostrum to the end of the telson; Coutière's largest specimen was 70.5 mm. long. The cephalothorax is smooth. The rostrum is stout and projects *straight forward* exactly to the end of the antennal scales; it is armed above with six, below with two teeth. The rostrum arises on the anterior half of the cephalothorax; the distance of the first tooth from the anterior margin of the cephalothorax is just one-fourth the whole length of the upper surface from the posterior to the anterior margin. The upper margin is *very slightly* convex above the eyes, but in *P. paucidens* the rostrum, which is armed above with 7-8, below with 1-2 teeth, and scarcely extends beyond the distal end of the antennular peduncles, has been described as high, foliaceous ("blattförmig"), and short. Just as in the species

from Togo Country, however, only one tooth is situated posterior to the orbital margin, the second standing already before it. The second tooth is the longest of all, for the distance of its tip from that of the first, 5.5 mm. long, measures just one-third the distance of the tip of the first tooth from the posterior margin of the cephalothorax. The two following teeth are shorter than the second, 3 mm. long, and the fifth and the sixth, each a little more than 2.5 mm. long, are again a little shorter than the two preceding; the sixth is 2 mm. distant from the tip of the rostrum. The teeth of the upper margin are all rather small. In the middle of the free portion of the rostrum, immediately posterior to the point of the fourth tooth, that part which is situated above the lateral crest is but very little higher than that below it; the rostrum is not at all high. In the middle of the rostrum the lower margin appears slightly convex; the two teeth are still smaller than those of the upper margin and are situated, about as in *P. paucidens*, on the anterior half of the inferior margin. The first is situated a little beyond the middle of the fifth tooth of the upper margin, the second just behind the middle of the sixth; the distance of the second tooth from the tip of the rostrum is twice as long as the length of that tooth and twice as long as the distance of the sixth tooth of the upper margin from the tip. The hepatic spine is situated below and posterior to the antennal one, exactly below the first tooth of the rostrum. Our specimen also agrees with Hilgendorf's description in this character, that the two pairs of spinules on the upper surface of the telson are situated *more backward* than in *P. macrobrachion*, as is represented in my figures. The telson (figs. 31 & 32), which is 11 mm. long and 4 mm. broad at base, ends in an acute median tooth, with two spines on each side as usual, the inner of which extends beyond the median tooth, about as in *P. macrobrachion*. The anterior pair of spinules on the upper surface is situated 6 mm. from the anterior end of the telson, *immediately behind the middle*; it is 2.25 mm. distant from the posterior pair, and the latter 2.75 mm. from the tip of the median tooth at the end of the segment. In *P. macrobrachion*, however, the first pair of spinules is situated just *before* the middle of the telson. The eye-peduncles are a little longer than broad. The short flagellum of the upper antennæ, which is distinctly serrated and 12.5 mm. long, is united only for a sixth of its length with the outer one, and is scarcely longer than their peduncle.

The outer footjaws reach two-thirds of their terminal joint beyond the distal end of the peduncles of the outer antennæ. The legs of the first pair (fig. 33) project a fourth of their wrist beyond the distal end of the antennal scales. The slender carpus is 11.5 mm. long and 0.9 mm. thick at the distal end; the hands are half as long as the wrist and the fingers are just as long as the palm.

Unfortunately, one of the second legs is lost; the other, 75 mm. long, has almost the same length as the body. It is a *rather feeble* leg in proportion to the size of this specimen; but I have shown in the description of *P. macrobrachion* that the length and the size of the second legs differ sometimes very much in different specimens: compare, *e. g.*, in the Table on p. 321 the male (No. 1) from Liberia and that from the Congo (No. 4). The second leg (fig. 34) of our specimen from the River Kribi much resembles that of *P. macrobrachion* as regards the proportion of the length of the joints, but it differs at first sight *in the absence of the woolly felt* with which the

fingers are covered in the last-named species. The merus is 14·5 mm. long, the carpus 18 mm., the hand 25·25 mm., viz. the palm 16 mm., the fingers 9·25 mm. Just as in *Palæmon macrobrachion*, the carpus is *distinctly longer* than the merus and *shorter* than the whole hand; it is also *a little longer* than the palm and *almost twice as long* as the fingers. The latter measure little more than one-third the length of the whole hand. The slender merus thickens gradually and regularly towards the distal end, and, being here 2·4 mm. broad, this joint appears just *six times* as long as the thickness at the distal end. The merus of *P. macrobrachion* thickens not so regularly towards the distal extremity. The slender carpus widens likewise regularly towards its distal extremity, and, being here 2·5 mm. broad, this joint appears just seven times as long as thick at the distal end. The hand closely resembles that of the male of *P. macrobrachion* from Liberia described p. 303. Viewed from above, the palm appears 2·2 mm. broad, and presents the same breadth along its whole length; in a lateral view, just as in *P. macrobrachion*, the breadth slightly decreases towards the base of the fingers, and in the middle of its length the palm is 1·9 mm. thick. The palm is not quite cylindrical, but very nearly so, and it is a little less broad than the distal end of the carpus. Just as in the male from Liberia, the fingers are a little curved inwards, so that the inner margin of the hand is slightly concave. The fingers shut close together. The dactylus appears at its base a little broader or thicker than the other finger, and tapers regularly towards the tip; it is armed with a small conical tooth just at a third of its length from the articulation, and between it and the latter there are still two other similar teeth. The immobile finger likewise carries a tooth, a little nearer to the articulation than in the other finger, and also two other teeth between the articulation and the distal tooth. Between the distal tooth and the tip a sharp cutting-edge is seen on each finger. The joints are covered with small spinules which on the upper outer side are smaller and less numerous than elsewhere; on the outer border of the palm they are arranged in a longitudinal row, but they are here a little smaller than on the inner margin. These spinules occur also on the fingers. The joints of this leg are very slightly hairy; the hairs, however, are very short and fine, and the leg has a reddish colour. In the larger leg of the second pair of *P. paucidens* from Togo Country, the merus was 11·3 mm. long, the carpus 11·5 mm., the palm 15·5 mm., and the fingers 9·6 mm.; merus and carpus were thus *shorter* than in our specimen, *especially the carpus*, which was *scarcely longer* than the preceding joint.

In the species described by Hilgendorf the fingers were each armed, beside with the basal teeth, with seven spines ("Dornen"), standing on both sides of the cutting-edge; *these spines are wholly wanting in our species from the River Kribi.*

The three posterior legs of our specimen resemble those of *P. macrobrachion*; they are, however, a little stouter. Those of the third pair project, by little more than their terminal joints, beyond the scaphocerites, those of the two other pairs only by half their dactylopodites. The meropodites of the fifth pair are 11·5 mm. long and 1·04 thick, measured on the outer side; the carpopodites are 6·5 mm. long and 1·5 mm. thick at the distal end; the propodites are exactly as long as the meropodites and 0·7 mm. broad in the middle; the terminal joints are 3·1 mm. long.

In a female specimen of *Palæmon macrobrachion* from Congo of about the same size, being 78 mm. long, the legs of the fifth pair have the following measurements:—The meropodites are 9.5 mm. long and 0.86 mm. thick in the middle; the carpus is 6 mm. long and 0.82 mm. thick at the distal end; the propodites are 11.5 mm. long and 0.5 mm. broad in the middle, the terminal joints finally are 3.2 mm. long. In *P. macrobrachion* the propodites of these legs are thus distinctly longer than the meropodites and, like the carpopodites, a little more slender than in the male from the River Kribi. The three posterior legs of the male from the River Kribi are covered with scattered microscopical spinules, especially on their upper margin. Hilgendorf has not described the three posterior legs of *P. paucidens*.

[For note received since this paper was in type, see p. 327.—SEC. L.S.]

**PALÆMON (MACROBRACHIUM) JAMAICENSIS (Herbst), var. VOLLENHOVENII, Herklots.**

(Plates 19, and 20, figs. 38–53.)

*Palæmon Vollenhovenii*, Herklots, in Tijdschrift voor Entomologie, i. 1858, p. 96; de Man, in Notes from the Leyden Museum, i. 1879, p. 178.

*Palæmon jamaicensis* (? Herbst), Benedict, in Proc. U.S. National Museum, vol. xvi. 1893, p. 540.

*Palæmon jamaicensis*, Herbst, var. *Vollenhovenii*, Aurivillius, in Bihang till K. Sv. Vet.-Akad. Handl., Bd. xxiv. Afd. iv. No. 1, 1898, p. 16, Taf. 2, figs. 1–5.

The following collection is lying before me \* :—

One adult male from Liberia. (Leyden Museum.)

Three nearly adult males and two young females, from the River Prah, Ashantee. (British Museum.)

190 specimens of different size, collected in the river at Catumbella, near Benguella. (Private collection.)

Some time ago Dr. Ortmann, who was enabled to compare adult males of this species from Cameroon with American specimens of *P. jamaicensis* (Herbst), finally concluded that the African form was quite identical with the American type (Ortmann, 'Os Camarões da agua doce da America do Sul,' S. Paulo, 1897, p. 209). Aurivillius, however, who compared ten specimens from Cameroon with one adult individual from Central America, is inclined to regard the African form as a variety of *P. jamaicensis*; and I like to follow him provisionally in this opinion, because no American specimens are at my disposal. Nevertheless, I suppose that fresh descriptions of the African form will still be welcome.

The largest specimen of all lying before me is the male from Liberia. The rostrum (fig. 38), closely resembling that which has been figured by Aurivillius (*l. c.* fig. 1), reaches to the end of the peduncles of the upper antennæ, and is armed above with 16 teeth, a number already observed by that Swedish naturalist; they are equidistant, but the first

\* The measurements of the body and of the second legs are indicated in the Table (p. 322), also the formulæ of the rostrum. The joints of the second legs are measured on their upper surface, the merus, *e. g.*, up to the distal end of the upper margin of the ischium. Nos. 4 and 5 are the Congo specimens described in my paper of 1879.

is slightly more distant from the second than the others, and the distance of the foremost tooth from the tip is a little longer than the interspace between the preceding teeth. Five teeth are on the cephalothorax. The rostrum is slightly convex above the eyes and its distal half is directed downward.

In young individuals of this species (fig. 39) the posterior extremity of the telson ends in an *acute* triangular point, and of the two spines on each side the inner larger one reaches beyond the acute extremity; the anterior pair of spinules is situated immediately behind the middle. In older individuals, however, the telson extremity is usually more or less worn off, and it is therefore quite erroneous to describe it as largely rounded, as H. Milne-Edwards and Ortmann have done (Ortmann, in Zool. Jahrb., Syst. v. 1891, p. 729, Taf. 47. fig. 7). In the male from Liberia the extremity of the telson appears still triangular, but the acute point is already worn off.

The outer footjaws of this specimen are just as long as the peduncles of the upper antennæ, overreaching those of the lower antennæ by their terminal joint.

The legs of the first pair extend for half their carpus beyond the scaphocerites; and the hands, which are 11.5 mm. long, and in which the fingers appear a little shorter than the palm, are slightly more than half as long as the wrist, which measures 20.5 mm.

The larger leg (fig. 40) of the second pair is situated on the left side. The merus reaches almost to the end of the antennal scales. The carpus, which is 10 mm. broad at its distal extremity, is *not shorter* than the merus when the upper surface is measured; and an individual of about the same size, in which both joints were also equally long, has been described by Aurivillius from Cameroon (*l. c.* p. 17). The hand, a little more than half as long as the body, is somewhat more than three times as long as the carpus, and the palm appears almost twice as long as this joint. The palm, somewhat more than three times as long as broad, is *a little broader* than the carpus and a little less thick than broad, viz. 11.5 mm. thick and 12.5 mm. broad. The fingers, a sixth shorter than the palm, are armed each with a conical tooth, that on the immobile finger is somewhat larger and situated somewhat closer to the articulation than on the dactylus; between this tooth and the articulation the dactylus carries in addition three small obtuse teeth, the immobile finger only one. The fingers are slightly curved inward, and leave therefore a narrow interspace between them when closed. The whole leg is closely beset with small acute denticles, which are larger and less numerous on the inner side. The right leg fully agrees with the other, but the carpus is a little shorter than the merus, the fingers are almost as long as the palm, and the teeth with which they are armed are considerably smaller.

The legs of the third pair reach as far as the scaphocerites, those of the fourth as far as the external maxillipedes, and the legs of the last pair extend to the end of the peduncles of the outer antennæ. The meropodites of the fifth pair are 16 mm. long and 2.25 mm. thick, measured on their lateral side; the carpopodites 9 mm. long and 2.25 mm. thick at their distal end; the propodites 15 mm. long and 1.4 mm. thick in the middle, measured on their outer side.

The three males from the River Prah are about the same size as that from Liberia;

in all the rostrum is broken off, and this is also the case with the legs! A larger leg of the second pair, lying loose in the bottle, belongs very likely to the male No. 2 that still bears its shorter left leg. This loose leg (No. 2, *r*) closely resembles the larger leg of the male from Liberia, but the fingers are a little longer in proportion to the palm, and the large tooth of each finger is somewhat more distant from the articulation. The palm, 11 mm. broad, is 9.5 mm. thick in the middle. The other, shorter leg fully agrees with the shorter leg of the male from Liberia, which in this specimen is borne on the right side.

In the female No. 3, from the River Prah, the rostrum, slightly arcuate above the eyes, reaches almost to the end of the antennal scales, and resembles that of the male from Liberia. The last two joints of the outer footjaws, the right leg of the second pair, and the three posterior legs are wanting. The merus of the left leg reaches to the middle of the antennal scales; the carpus, 9 mm. long, is 3.25 mm. broad at the distal end. The inner margin of the chela is concave, the palm is 3.75 mm. broad and 3 mm. thick in the middle, and the fingers, that shut close together, are only armed with minute teeth near the articulation, and are as long as the palm. The other female has lost its legs.

Such a large and fine collection as that of the 190 specimens from the river at Catumbella has most probably never been at the disposal of any naturalist. Unfortunately, in half of them the legs of the second pair are wanting.

The teeth-formulæ of the rostrum of 22 males and as many females (that are all provided with the legs of the second pair, so that they certainly belong to this species) are the following:—

*Males*.—One specimen  $\frac{11}{4}$ ; five specimens  $\frac{12}{3}$ ; six specimens  $\frac{12}{4}$ ; one specimen  $\frac{12}{6}$ ; one specimen  $\frac{13}{3}$ ; one specimen  $\frac{13}{4}$ ; one specimen  $\frac{13}{5}$ ; one specimen  $\frac{14}{3}$ ; two specimens  $\frac{14}{4}$ ; one specimen  $\frac{14}{6}$ ; one specimen  $\frac{15}{4}$ ; one specimen  $\frac{18}{5}$ .

In one specimen the upper margin bears 11 teeth, in twelve 12, in three 13, in four 14, in one 15, and in one 18. The lower margin is armed in seven individuals with 3 teeth, in eleven with 4, in two with 5, and in two with 6.

*Females*.—Six specimens  $\frac{12}{3}$ ; six specimens  $\frac{12}{4}$ ; one specimen  $\frac{13}{3}$ ; six specimens  $\frac{13}{4}$ ; three specimens  $\frac{14}{4}$ .

In twelve specimens 12 teeth on the upper margin, in seven 13, in three 14. The lower margin is armed in seven females with 3, and in fifteen with 4 teeth.

In the males the number of teeth on the upper margin varies from 11 to 18, *the most frequent number is 12*; the teeth of the lower margin vary from 3 to 6, *the usual number is 4*. In the females the upper teeth vary from 12 to 14, the lower from 3 to 4; *the usual number of the former is 12, of the latter 4, exactly as in the males*.

In twenty-three specimens 4 teeth are on the cephalothorax, in four 5, and in two 3; in ten specimens the fourth tooth stands just above the orbital margin, in five the fifth.

In not a single one of the 190 specimens from Catumbella is the rostrum limited to the length of the antennular peduncles; in the larger individuals (fig. 41) it generally reaches

more or less beyond these peduncles, though still not extending to the tip of the scales; but in the numerous specimens of smaller size, the quite young ones, the rostrum usually extends to the extremity of the scales, and even rarely a little beyond them. It has the same form as in the specimens from Liberia and from the River Prah that have been described above, and it agrees also with the figures in the paper of Aurivillius (*l. c.* figs. 1 & 2). The upper margin is *slightly convex* above the eyes, and the distal half is directed *downward*, but the acute tip is generally somewhat *turned upward*; the rostrum is slender, tapers gradually to a point, and the part situated above the lateral crest is scarcely higher than that below it.

In the largest male but one (No. 7) the outer footjaws project with their terminal joint beyond the peduncles of the lower antennæ, just as in the adult male from Liberia; in quite young individuals they overreach these peduncles about three-fourths of the terminal joint. The legs of the first pair project beyond the antennal scales for half their wrist; this joint is 14 mm. long; the hands are 7.34 mm. long, and the fingers are very slightly shorter than the palm. Only the left leg (fig. 42) of the second pair is present, and this leg is apparently the larger one. The merus reaches as far forward as the antennal scales. When this leg is compared with the larger leg of the male from Liberia, or with the described larger leg of the specimen from the River Prah, *the joints appear less stout, being somewhat less broad or thick in proportion to their length*. The merus and the carpus are equally long; the former is 5.25 mm. thick, and the diameter of the carpus at its distal extremity, measured above, is 6 mm. broad. The palm is nearly as long as that of the larger leg from the River Prah, viz. 35 mm., but only 8 mm. broad instead of 11 mm.; the palm is 6 mm. thick in the middle. The spinules on the inner side of the palm are somewhat larger than in the individuals from Liberia and the River Prah. The fingers are a little shorter in proportion to the palm, and their tips are less abruptly curved inward than in the specimens from Upper Guinea; the teeth are typically developed, so that the fingers leave an interspace between them. The legs of the third pair project for half their terminal joints beyond the end of the scaphocerites, those of the fourth reach to the end of the peduncles of the internal antennæ, and the last pair is but very little shorter. These legs are thus a little shorter than in the adult male from Liberia, but this may depend upon age; for the rest, they agree in other characters.

In the male No. 8 the rostrum is slightly upturned at its distal end and reaches to the end of the antennal scales. The right leg is the larger (fig. 43), but it is considerably smaller than in the specimen just described; the fingers are but little shorter than the palm and shut close together, as the teeth are still quite small. The dactylus bears two small teeth between the articulation and the distal tooth; likewise the immobile finger. The second legs appear quite as slender as in the preceding individual. The merus of the right leg is 3.5 mm. broad, the carpus 4.25 at its distal end, and the palm is 4.5 mm. thick in the middle.

In the largest male (No. 6) the legs of the second pair are rather feeble and short, when compared with the two males already described. In both legs (fig. 45) the carpus reaches to the distal end of the scales, and the right leg is but 3 mm. longer than the

left. The palm of the right leg is 3.5 mm. broad and 3 mm. thick in the middle; the carpus, which has a length of 10.5 mm., is 3.6 mm. thick at the distal end, so that in this specimen the palm appears *not broader* than the carpus. The dactylus carries *five* small teeth of equal size between the tooth at the end of the cutting-edge and the articulation; on the index, however, only one obtuse tooth is seen behind that at the extremity of the cutting-edge. All these teeth are very small and of equal size, so that the fingers shut close together. This specimen is evidently an individual variety, in the same way as *Palæmon vagus*, Heller, is a variety of the well-known Indian *P. lar*.

In the male No. 12 the rostrum fully resembles that of the male No. 8 described above; it reaches to the end of the scales, but there are only 11 teeth on the upper and 3 on the lower margin; three teeth stand on the cephalothorax. The outer footjaws project for four-fifths of their terminal joint beyond the peduncles of the lower antennæ. The carpus of the first legs is 7 mm. long, and projects for two-fifths of its length beyond the distal end of the scales; the hand, 3.75 mm. long, is little more than half as long as the carpus, and fingers and palm have the same length. The left leg of the second pair is the larger, projecting for a third of the carpus beyond the scaphocerites. The merus is distinctly longer than the carpus and 1.4 mm. thick at the distal end; the carpus is 1.8 mm. thick at its distal extremity. The palm is 2.25 mm. broad and 1.8 mm. thick in the middle.

In the quite young male (No. 16) the rostrum (Pl. 20. fig. 46) reaches, as in most young individuals, to the end of the scales, and four teeth stand on the cephalothorax. The outer footjaws project for three-fifths of their terminal joint beyond the peduncles of the external antennæ. The carpus of the legs of the first pair, 5.3 mm. long, extends for one-fifth of its length beyond the scaphocerites; and the hand, 3 mm. long, is again a little more than half as long as the wrist. The larger leg of the second pair is the left one (Pl. 19. fig. 47); the carpus extends for a fourth of its length beyond the scales; the merus is .8 mm., the carpus 1.16 mm. thick, at their distal extremities. The palm is 1.42 mm. broad and 1.31 mm. thick in the middle. The immobile finger (Pl. 20. fig. 48) bears one, the dactylus two obtuse teeth between the conical tooth at the end of the cutting-edge and the articulation. The legs of the third pair reach to the end of the scales, the two following are somewhat shorter.

In the largest female but one from Catumbella, 84 mm. long, which bears no eggs, the rostrum (fig. 49) reaches midway between the distal end of the antennular peduncles and that of the scales. It fully resembles that of the preceding specimens from the same locality: the fifth tooth stands just above the orbital margin, the upper margin is slightly convex above the eyes and the tip is somewhat turned upwards; the third tooth of the lower margin reaches to the middle of the terminal joint of the antennular peduncles. The outer footjaws extend almost for the whole terminal joint beyond the extremity of the peduncles of the outer antennæ. The carpus of the first legs is 13 mm. long, and projects for half its length beyond the antennal scales; the hand is 7 mm. long. The left leg (fig. 50) of the second pair is considerably larger than the right (fig. 51). The merus is 3 mm., the carpus 3.4 mm. thick, at their distal ends, and the latter projects for half its length beyond the end of the scales; the palm, slightly longer than the



fingers, is 4.5 mm. broad and 3.5 mm. thick in the middle. The fingers shut close together; the dactylus is armed with two small teeth, the immobile finger with one besides the tooth at the extremity of the cutting-edge.

In the young female No. 23 finally the rostrum reaches to the end of the scaphocerites and agrees with the other specimens. The outer footjaws project for two-thirds of their terminal joint beyond the lower peduncles, and the legs of the first pair for a fourth of the carpus beyond the distal end of the scales. The larger leg of the second pair is the left (fig. 52), measuring just two-thirds of the body. The merus is 1 mm., the carpus 1.33 mm. broad, at their distal ends, and the latter projects for a third of its length beyond the antennal scales. The palm is 1.52 mm. broad and 1.27 mm. thick in the middle; as usual, the dactylus (fig. 53) is provided with two, the index with one small tooth behind the distal tooth at the end of the cutting-edge. The legs of the third pair reach to the extremity of the scaphocerites.

The larger leg of the second pair of the large male (No. 7) from Catumbella has a pale yellowish-green colour; the carpus appears on the inner, the palm on its outer side dark green, and the fingers are also dark green to their tips, but they show a yellowish-red tinge at their proximal ends and at their articulation. In the other specimens these legs are of a pale flesh-colour, reaching to the base of the fingers; the latter are dark bluish coloured, often with pale tips.

It is, indeed, a pity that in Liberia and in the River Prah no younger specimens have been collected or at Catumbella individuals of larger size, for then it would have been possible to decide *whether the more slender appearance of the second legs of the Angola specimens is caused by their younger age or not; in the latter case the Angola form would be a distinct, new variety of Palæmon jamaicensis.* Benedict has already observed (*l. c.*) that specimens from the Quanza River at Cunga are "a little more slender" than others from Old Providence, West Indies. If further researches should prove this to be really the case, I propose for this variety the name *angolensis*.

PALEMON (MACROBRACHIUM) OLFERSII, Wiegmann. (Plate 20. figs. 54-74.)

*Palæmon Olfersii*, Wiegmann, in Archiv für Naturg. Jahrg. 2, vol. i. 1836, p. 150; Greeff, in Sitzungsber. Gesells. zur Beförderung ges. Naturw. Marburg, 1882, No. 2, p. 30; Ortman, in Revista do Museu Paulista, No. ii. 1897, p. 212, Est. i. figs. 10 & 11; Aurivillius, *l. c.* p. 23.

*Palæmon spinimanus*, H. Milne-Edwards, Hist. Nat. Crust. ii. p. 399; von Martens, in Archiv für Naturg. 1869, p. 26, Taf. ii. fig. 3.

*Bithynis Olfersii*, Rathbun, The Brachyura and Macrura of Porto Rico, Washington, 1901, p. 124.

One adult male from the River Prah, Ashantee. (British Museum.)

60 young specimens, a third of which are males, from the river at Catumbella, near Benguella. (Private collection.)

The adult male from the River Prah is 58 mm. long from the tip of the rostrum to the end of the telson. The rostrum (fig. 54) reaches almost to the end of the antennular peduncles, is slightly directed downward, and armed above with 16, below with 5 teeth; the upper teeth are equal, small, equidistant, and five are on the cephalothorax. The telson tapers rather much towards the triangular pointed extremity and the anterior pair of spinules is situated just before the middle. The outer footjaws are as long as the

posterior to it only two teeth are recognizable, one of which is conical, the other low and rounded. The other hand agrees with that described.

In the youngest female (No. 17) finally, which is 21 mm. long, the apical part of the rostrum (fig. 71) is slightly turned upward and extends just a little beyond the antennal scales. The legs of the first pair reach to the distal end of the scaphocerites. The carpus is 2 mm. long, and 0.22 mm. thick at the distal end; the hand is 1.16 mm. long, the palm measuring 0.62 mm., the fingers 0.54 mm., and the palm is 0.25 mm. broad. The second legs (fig. 72) are almost equal and their wrists reach almost to the end of the scales, so that the fingers and two-thirds of the palm project beyond the scales. In both chelæ the cutting-edge of the immobile finger extends along about two-thirds of the finger, that of the dactylus is somewhat shorter; at the end of each cutting-edge there is a well-developed conical tooth and, between it and the articulation, on each finger two other teeth that are a little smaller, especially those of the immobile finger (fig. 73).

PALÆMON (MACROBRACHIUM?) sp. (Plate 20. figs. 75-80.)

One male and one egg-bearing female from Catumbella, near Benguella.

I describe first the female, because it is still provided with both legs of the second pair. The specimen is 46 mm. long from tip of rostrum to the end of the telson. The eggs are very numerous and small. The rostrum (fig. 75) is *short*, a little arcuate above the eyes, then inclined downward, but the apex is very slightly turned upward again; the rostrum extends a little beyond the distal end of the penultimate joint of the upper antennæ. It is armed above with 11 rather strong teeth, that reach the distal extremity, four of them standing on the cephalothorax, the fifth just above the orbital margin; the first tooth, a little more distant from the second than the following, is situated twice as far from the posterior margin of the cephalothorax as from the anterior. The lower margin bears two quite small teeth immediately in front of the eyes. The cephalothorax is smooth. The hepatic spine is smaller than the antennal one and situated behind and rather far below the latter. Both in the female and in the male the extremity of the telson (fig. 76) is triangular, but the acute tip itself is apparently worn off, so that the extremity appears to be truncate (fig. 77); on each side one observes the usual two spines, of which the inner reaches beyond the truncate tip. The anterior pair of spinules is situated just behind the middle. The outer footjaws project with their terminal joint beyond the peduncles of the external antennæ.

The legs of the first pair (fig. 78) extend with their chelæ beyond the distal end of the antennal scales; the carpus is 4.8 mm. long; the hands, the fingers of which are distinctly somewhat shorter than the palm, measure 3.5 mm. The carpus is 0.74 mm. thick at its distal end, this being almost one-sixth of its length, so that it has a rather stout shape.

The legs of the second pair are *equal* (fig. 79) and 28 mm. long, a little more than half the length of the body; they project for a small part of their carpus beyond the antennal scales. The merus of the left leg is 5 mm. long and 1.75 mm. thick anteriorly; the carpus is 4.75 mm. long and 2 mm. thick at the distal end; the palm is 5.5 mm. long,

2.25 mm. broad, and 1.66 mm. thick in the middle; the fingers finally are 5 mm. long. The palm is thus *very little* broader than the carpus. The fingers, about as long as the palm and as the merus, but a little longer than the carpus, shut close together; their inner margins (fig. 80) are provided with a sharp cutting-edge, and between it and the articulation each finger is beset with three or four very small teeth. The whole leg is covered with acute spinules, which on the inner margins of the joints are a little longer than elsewhere; the joints seem, moreover, to be covered with felt and are somewhat hairy.

Similar to the legs of the first pair, the three posterior pairs are *stouter and less slender* than those of the young males of *P. Olfersii* that have been described on p. 315. In the young male of this species, which has a length of 41 mm. (No. 5 of the Table), the meropodites\* of the third pair of legs (fig. 74) are 5 mm. long and 0.96 mm. broad in the middle, measured on their outer side, *i. e.*, five times as long as broad; the propodites are 4.4 mm. long and 0.54 mm. broad in the middle, a little more than eight times as long as broad. In our female (fig. 81), however, the meropodites of the third pair are 5.5 mm. long, but 1.4 mm. thick, so that they are only four times as long as broad, and the propodites, 4.6 mm. long and 0.7 mm. broad, are hardly seven times as long as broad. The legs of the third pair reach in the female to the end of the scaphocerites, those of the fourth pair are as long as the outer footjaws, and the last pair are still somewhat shorter. The three posterior legs are hairy along their upper and lower margins, but for the rest quite smooth.

The male, that unfortunately has lost its second legs, has exactly the same size as the female. The rostrum fully agrees with that of the female, bearing also 11 teeth above, but it reaches to the middle of the terminal joint of the upper antennæ, and there are three small teeth on the lower margin. The outer footjaws reach almost to the end of the scales, projecting a fifth part of the penultimate joint beyond the lower peduncles. The first legs overreach the antennal scales with half their carpus; this joint is 5.5 mm. long and 0.73 mm. thick at the distal end, so that it appears a little more elongate than in the female; the chelæ are 3.8 mm. long. The two following pairs of legs are wanting, those of the fourth pair reach almost to the end of the scales, the last pair is incomplete. I at first thought that the female was that of *P. Olfersii*, and that the legs of this species were much thicker in the female than in the male. This would, however, be quite an exceptional phenomenon, and this opinion was fully refuted by the examination of the male, in which the legs are just as stout and thick as in the female. It is therefore to be regretted that the second legs of the male are wanting. I have not succeeded in identifying this species with any yet known, but it bears apparently a great resemblance to *P. (Macrobrachium) Iheringi*, Ortm., from Brazil.

\* The joints are measured on their outer side, along their upper margin.

Measurements in millimetres of *Palæmon* (*Eupalæmon*) macrobrachion, Herklots.

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17.	18.	19.
	♂.	♂.	♀.	♂.	♀.	♀.	♀.	♀.	♀.	♀.	♂.	♂.	♂.	♂.	♂.	♂.	♂.	♂.	♂.
Length of the animal ..	70	135	85	65	80	78	76	68	64	59	60	52	50	45	43	43	39	35	31½
Formula of the rostrum	$\frac{2}{11}$ $\frac{5}{5}$	..	$\frac{3}{9+2}$ $\frac{5}{5}$	$\frac{3}{9+1+1}$ $\frac{6}{6}$	$\frac{2}{8+1+1}$ $\frac{5}{5}$	$\frac{3}{10+2}$ $\frac{6}{6}$	$\frac{3}{10+1}$ $\frac{6}{6}$	$\frac{2}{9+1+1}$ $\frac{4}{4}$	$\frac{2}{9+1+1}$ $\frac{5}{5}$	$\frac{3}{10+2}$ $\frac{6}{6}$	$\frac{2}{10+0}$ $\frac{5}{5}$	$\frac{3}{9+2}$ $\frac{4}{4}$	$\frac{2}{8+1+2}$ $\frac{5}{5}$	$\frac{2}{10+2}$ $\frac{5}{5}$	$\frac{2}{8+1+2}$ $\frac{4}{4}$	$\frac{9+1}{5}$	$\frac{2}{10+2}$ $\frac{5}{5}$	$\frac{10+2}{5}$	$\frac{2}{10+1+1}$ $\frac{6}{6}$
Whole length of the legs of the second pair ... }	100	155	52	50	43	49	39	37	36	29	43	31.5	30	26	..	..	..	..	..
Length of the merus ..	22	32	10.5	11	8.5	9.5	8.5	7.5	7.25	5.75	8.25	6.25	6	5	6.2	4.8	4	3.46	3.46
"    "    carpus ..	28	42	13.5	14.5	12	13.75	10	10.5	10.25	8	11.5	9.5	8.5	7	7.5	6.6	5.4	4.15	5
Diameter of the carpus at the distal end ... }	3.75	5.5	2	2	1.5	1.75	1.6	1.4	1.33	0.95	1.66	0.9	1	0.9	1	0.81	0.6	0.46	0.5
Length of the hand....	35.5	53.5	16	17.5	12	15.5	12.25	10.5	10.5	8.25	14	8.2	8.75	7.75	9.25	5.9	4.5	3.8	3.63
"    "    palm....	23	34	9	10	6.5	8.5	6.75	5.5	6	4.5	8	4.5	5	4.25	5	3.4	2.4	2	2
"    "    fingers ..	12.5	19.5	7	7.5	5.5	7	5.5	5	4.5	3.75	6	3.7	3.75	3.5	4.25	2.5	2.1	1.8	1.63
	20.	21.	22.	23.	24.	25.	26.	27.	28.	29.	30.	31.	32.	33.	34.	35.	36.	37.	38.
	♂.	♂.	♀.	♀.	♀.	♀.	♀.	♀.	♀.	♀.	♀.	♀.	♀.	♀.	♀.	♀.	♀.	♀.	♀.
Length of the animal ..	29	27	58	54	52	51	50	36	35	35	32	31	30	27.5	27	26	26	25	25
Formula of the rostrum	$\frac{9+1+1}{5}$	$\frac{9+2}{5}$	$\frac{2}{9+1+2}$ $\frac{5}{5}$	$\frac{3}{10+1}$ $\frac{5}{5}$	$\frac{2}{10+2}$ $\frac{5}{5}$	$\frac{2}{9+2}$ $\frac{5}{5}$	$\frac{2}{9+1}$ $\frac{4}{4}$	$\frac{9+1}{5}$	$\frac{2}{11+2}$ $\frac{4}{4}$	$\frac{9+2}{6}$	$\frac{2}{9+2}$ $\frac{5}{5}$	$\frac{8+1+1}{5}$	$\frac{8+2}{5}$	$\frac{2}{10+1}$ $\frac{5}{5}$	$\frac{8+1+1}{5}$	$\frac{10+2}{6}$	$\frac{2}{10+1}$ $\frac{6}{6}$	$\frac{2}{8+1+1}$ $\frac{5}{5}$	$\frac{2}{9+1}$ $\frac{4}{4}$
Whole length of the legs of the second pair ... }	..	12	34	29.5	27	..	..	17	..	16.5	..	..	..	13	14	11.5	12	11.5	..
Length of the merus ..	3	2.8	6.75	6	5.66	5.2	5.1	3.46	3.46	3.46	3.31	2.9	3.15	2.8	2.9	2.4	2.6	2.4	2.5
"    "    carpus ..	4.3	3.27	10.25	8.5	8	7	6.2	5	5	5	4.75	4	4.52	4.1	4.35	3.46	3.7	3.54	3.9
Diameter of the carpus at the distal end ... }	0.44	0.4	1	0.86	0.8	0.8	0.8	0.6	0.52	0.47	0.48	0.46	0.46	0.38	0.42	0.37	0.37	0.32	0.36
Length of the hand....	3.46	3	9.25	7.83	7	6.65	6.5	4.18	4	3.65	3.64	3.27	3.52	3	3.2	2.6	3	2.5	2.84
"    "    palm....	2	1.65	5	4.33	4	3.85	3.7	2.36	2.31	2	2.1	1.81	1.9	1.64	1.76	1.42	1.66	1.4	1.6
"    "    fingers ..	1.46	1.35	4.25	3.5	3	2.8	2.8	1.82	1.7	1.65	1.54	1.46	1.62	1.36	1.44	1.18	1.34	1.1	1.24

FROM THE INDO-PACIFIC AND WEST AFRICA.

No. 1, Liberia; Nos. 2 and 3, River Prah; Nos. 4-10, Congo; Nos. 11-38, Catumbella.

*Measurements in millimetres of Palæmon (Macrobrachium) jamaicensis (Herbst), var. Vollenhovenii, Herklots.*

	1. ♂.		2. ♂.		3. ♀.	4. ♂.	5. ♀.	6. ♂.	7. ♂.	8. ♂.	9. ♂.	10. ♂.		11. ♂.		12. ♂.				
Length of the body . . . . .	136		about 145		90	140	130	96	90	80	71	70		54		50				
Formula of the rostrum . . . . .	$\frac{5}{16}$ $\frac{5}{5}$		broken.		$\frac{4}{13}$ $\frac{4}{4}$	$\frac{4}{12}$ $\frac{4}{4}$	$\frac{12}{5}$	$\frac{5}{12}$ $\frac{5}{4}$	$\frac{5}{12}$ $\frac{5}{3}$	$\frac{4}{12}$ $\frac{4}{4}$	$\frac{4}{15}$ $\frac{4}{4}$	$\frac{4}{12}$ $\frac{4}{6}$		$\frac{4}{14}$ $\frac{4}{4}$		$\frac{3}{11}$ $\frac{3}{4}$				
Length of the whole leg of the second pair . . . . .	left.	right.	l.	r.	l.	195	115	l.	r.	l.	r.	l.	r.	l.	r.	l.	r.			
Length of the merus . . . . .	22.5	20	17	19.35	9.5	35	22	10.5	11	17.5	11.75	13.3	9	9.25	9	11	7	7	6.5	6
"    "    carpus . . . . .	23	19.5	16.3	19.25	9	32	20	10	10.5	18	11.5	13.6	8.75	8.75	8.25	11	6.8	6.5	5.85	5.3
"    "    hand . . . . .	78	62	53	69	26	107	52	28	29.5	59.5	32	41	24.75	25	24.5	33.5	18.3	18.5	16	13.25
"    "    palm . . . . .	43	32	27	36	13.25	62	28	14.25	15	35	17	22	12.5	12.5	13	17.5	9.65	9.5	8.5	6.75
Breadth of the palm in the middle . . . . .	12.5	9	8	11	3.75	..	..	3.3	3.5	8	4	5.3	3.16	3.16	3.5	4.8	2.65	2.75	2.25	1.65
Thickness of the palm in the middle . . . . .	10.5	7.5	6.3	9.5	3	..	..	3	3.1	6.25	3.25	4.4	2.75	2.65	3	4	2.25	2.3	1.88	1.4
Length of the fingers . . . . .	35	30	26	33	12.75	45	24	13.5	14.5	24.5	15	19	12.25	12.5	11.5	16	8.6	9	7.5	6.5
	13. ♂.		14. ♂.		15. ♂.	16. ♂.	17. ♀ (ova).	18. ♀.	19. ♀.	20. ♀.	21. ♀.		22. ♀.		23. ♀.	24. ♀.				
Length of the body . . . . .	45		41		40	38	100	84	73	62	52		42		40	31				
Formula of the rostrum . . . . .	$\frac{4}{13}$ $\frac{4}{3}$		$\frac{4}{14}$ $\frac{4}{4}$		$\frac{4}{12}$ $\frac{4}{4}$	$\frac{4}{12}$ $\frac{4}{4}$	$\frac{5}{12}$ $\frac{5}{4}$	$\frac{5}{12}$ $\frac{5}{3}$	$\frac{4}{13}$ $\frac{4}{4}$	$\frac{4}{13}$ $\frac{4}{3}$	$\frac{4}{13}$ $\frac{4}{4}$		$\frac{4}{12}$ $\frac{4}{4}$		$\frac{4}{12}$ $\frac{4}{3}$	$\frac{4}{13}$ $\frac{4}{4}$				
Length of the whole leg of the second pair . . . . .	l.	r.	l.	r.	l.	r.	l.	r.	l.	r.	l.	r.	l.	r.	l.	r.	l.	r.		
Length of the merus . . . . .	5.6	5.25	5.3	5	4	4.2	4.75	4	11.5	12	9.75	8.75	8.5	7.5	7.3	5.5	6.3	5	4.75	3.5
"    "    carpus . . . . .	5.25	5	5	4.83	3.5	3.6	4.5	3.5	11.25	11.8	9.25	8.35	7.8	7	7.25	5	6	4.5	4.5	3.3
"    "    hand . . . . .	14	13.25	12	11.65	8.9	9	10.25	8.25	29.3	32	23	21	19	19.5	18.5	11	10.25	10.75	10.75	7
"    "    palm . . . . .	7	6.5	6	5.65	4.5	4.5	5.25	4.25	15	16.5	11.5	11	10	10	9.5	5.5	8	5.25	5.5	3.5
Breadth of the palm in the middle . . . . .	2.2	2.1	1.65	1.6	1.3	1.4	1.5	1.2	4.2	4.5	2.6	3	2.65	2.6	2.4	1.75	2.25	1.6	1.5	1
Thickness of the palm in the middle . . . . .	1.75	1.65	1.4	1.4	1.12	1.16	1.4	1.12	3.4	3.4	2.25	2.4	2.2	2.25	2	1.5	1.83	1.4	1.35	0.75
Length of the fingers . . . . .	7	6.75	6	6	4.4	4.5	5	4	14.35	15.5	11.5	10	9	9.5	9	5.5	8.25	5.5	5.25	3.5

No. 1, Liberia; Nos. 2 and 3, River Prah; Nos. 4 and 5, Congo; Nos. 6-24, Catumbella.

*Measurements in millimetres of Palæmon (Macrobrachium) Olfersii, Wieg.*

	1. ♂.	2. ♂.	3. ♂.	4. ♂.	5. ♂.	6. ♂.	7. ♂.	8. ♂.	9. ♂.
Length of the animal .....	58	44	42	42	41	38.5	36	34	27
Formula of the rostrum .....	$\frac{5}{5}$	$\frac{4}{15+1}$	$\frac{4}{13+1}$	$\frac{5}{14+1}$	$\frac{5}{16+1}$	$\frac{5}{14}$	broken.	$\frac{4}{15+2}$	$\frac{3}{14+2}$
Total length of the legs of the second pair.	l. 66 r. 22	l. 28.5 r. 22	l. 36.5 r. 23	l. 23 r. 21	l. 25 r. 35	l. 21 r. 29	l. 23.5	l. 19 r. 15.5	l. 9.2 r. 9.5
Length of the merus .....	12	5 3.75	6.5 4	4.25 3.9	4.3 6.25	4 5	4	3.6 3	2.56 2.6
Diameter of the merus .....	6	1.6 1.1	2.5 1.4	1.2 0.92	1.45 2.4	1.1 1.65	1.5	0.74 0.6	0.36 0.4
Length of the carpus .....	13.5	5.5 4	7.25 4.4	4.65 4.2	4.8 7	4 5.5	4.5	3.7 3	2.8 2.84
Diameter of the carpus .....	5.25	1.6 1.2	2.65 1.5	1.4 1.1	1.6 2.5	1.4 2	1.8	0.92 0.72	0.44 0.5
Length of the hand .....	29.5	11.25 8	15.5 8.65	8.5 7.1	9.5 16	7.5 11.75	9.5	6.5 5	3.8
" " palm .....	17	5.5 3.5	8.5 3.75	4 3.3	4.25 8.75	3.5 6.75	3.5	3.34 2.5	2
Breadth of the palm .....	8.5	1.8 1.2	3.65 1.58	1.54 1.2	1.8 3.4	1.5 2.5	2	1.1 0.82	0.58
Thickness of the palm .....	5.8	1.5 1	2.65 1.2	1.2 0.8	1.3 2.3	1 1.75	1.5	0.8 0.65	0.4
Length of the fingers .....	12.5	5.75 4.5	7 4.9	4.5 3.8	5.25 7.25	4 5	6	3.16 2.5	1.8

	10. ♀.	11. ♀.	12. ♀.	13. ♀.	14. ♀.	15. ♀.	16. ♀.	17. ♀.
Length of the animal .....	41	40	36	31	29	28	24	21
Formula of the rostrum .....	$\frac{4}{16+1}$	$\frac{4}{16+2}$	$\frac{4}{15+1}$	$\frac{4}{15+1+2}$	$\frac{4}{15+2}$	$\frac{3}{12+1+2}$	$\frac{13+2}{7}$	$\frac{3}{14+2}$
Total length of the legs of the second pair.	l. 26 r. 21	l. 19.6 r. 19	l. 17.5 r. 15	l. 15.5 r. 15	l. 16.5 r. 15	l. 14.5 r. 14	l. 13.6 r. 13.5	l. 9.2 r. 9.5
Length of the merus .....	4.65 4	3.65	3.4 3.5	3.04 3.06	3.2 3	2.74 2.7	2.7 2.7	2.06 2.14
Diameter of the merus .....	1 0.78	0.85	0.6 0.66	0.52 0.48	0.58 0.5	0.42 0.42	0.42 0.4	0.27 0.3
Length of the carpus .....	5.65 4.75	4	3.9 4.1	3.7 3.52	3.66 3.5	3.32 3.26	3.06 3	2.12 2.2
Diameter of the carpus .....	1.2 0.88	1.1	0.74 0.82	0.64 0.63	0.74 0.63	0.52 0.52	0.5 0.53	0.38 0.38
Length of the hand .....	9 6.8	6.58	5.5 6.3	4.66 4.54	5.34 4.3	4 4.1	4.06 4	2.58 2.8
" " palm .....	4.6 3.3	3.14	3 3.4	2.44 2.38	3 2.3	2 2.1	2.16 2.14	1.34 1.4
Breadth of the palm .....	1.44 0.96	1.14	0.86 1	0.74 0.71	0.9 0.68	0.63 0.6	0.62 0.6	0.4 0.44
Thickness of the palm .....	1.2 0.7	0.85	0.65 0.7	0.5 0.5	0.65 0.5	0.4 0.5	0.4 0.4	0.33 0.34
Length of the fingers .....	4.4 3.5	3.44	2.5 2.9	2.22 2.16	2.34 2	2 2	1.9 1.86	1.28 1.4

FROM THE INDO-PACIFIC AND WEST AFRICA.

No. 1, River Prah ; Nos. 2-17, Catumbella.

In the females, and in the males Nos. 7-9, the diameter of merus and carpus is measured at the distal extremity ; in the other males, however, in the middle.

TABLE OF THE WEST-AFRICAN SPECIES OF THE GENUS *PALÆMON*, FABR.,  
CONTAINED IN THIS PAPER.

Miss Rathbun, in her instructive paper "The Decapod Crustaceans of West Africa" (Proc. U.S. National Museum, vol. xxii. 1900, p. 315), mentions four species of the genus *Palæmon* as inhabiting West Africa. Three species ought now to be added to them, viz., *P. (Eupalæmon) Foaï*, Cout., another undetermined species of the same subgenus from the Upper Congo (Coutière, *op. cit.* p. 519), and finally the species from Catumbella belonging to the subgenus *Macrobrachium*, related to *P. Iheringi*, Ortm. Some principal characters of the five species described in this paper are the following:—

A. Large chelipede with palm cylindrical. (Subgenus *Eupalæmon*.)

a. Rostrum  $\frac{(8, 9, \text{ or } 10) + (1 \text{ or } 2)}{4, 5, \text{ or } 6}$  dentate.

Apical teeth of the upper margin usually present.

Anterior pair of spinules situated before the middle of the telson.

Carpus of second legs longer than merus, *always longer than palm*, fingers covered with felt.

*P. macrobrachion*, Herklots.

β. Rostrum  $\frac{1}{2}$  dentate, no apical teeth.

Anterior pair of spinules situated immediately behind the middle of the telson.

Carpus of second legs longer than merus and longer than palm, fingers without felt.

*P. Foaï*, Cout. (River Kribi.)

B. Large chelipede with palm more or less compressed. (Subgenus *Macrobrachium*.)

γ. Rostrum  $\frac{11-16}{3-6}$  dentate, no apical teeth.

Carpus of second legs about as long as merus or a little shorter, *always shorter than palm*.

Three posterior legs slender.

*P. jamaicensis*, Herbst, var. *Vollenhovenii*, Herklots, and var. ? *angolensis*, de M.

δ. Rostrum  $\frac{(13-16) + (1 \text{ or } 2)}{4-7}$  dentate, apical teeth present.

Carpus of second legs about as long or slightly longer than merus, either a little longer or a little shorter than palm.

Posterior legs slender . . . . . *P. Olfersii*, Wiegmann.

ε. Rostrum  $\frac{11}{2}$  dentate, no apical teeth.

Carpus of second legs about as long as merus, but not longer than it, slightly shorter than palm.

Posterior legs, also the others, thicker than those of the two preceding species.

*Palæmon* sp. (Catumbella.)

## EXPLANATION OF THE PLATES.

## PLATE 18.

- Fig. 1. *Palaemon (Eupalaemon) lar*, Fabr. Extremity of the telson of the largest male, long 125 mm.,  $\times 6$ .
- Fig. 2. *Palaemon (Parapalaemon?) asperulus*, v. Martens. Lateral view of cephalothorax and rostrum of the young female,  $\times 3$ .
3. Abdomen of the same,  $\times 3$ .
4. Extremity of the telson,  $\times 25$ .
5. Right leg of the first pair,  $\times 6$ .
6. Right leg of the second pair, looked at from above,  $\times 6$ .
7. Lateral view of the carpus of the same leg, viewed from the outer side, the upper surface is situated on the left hand,  $\times 6$ .
8. Right leg of the third pair,  $\times 6$ .
- Fig. 9. *Palaemon (Macrobrachium) latimanus*, v. Martens. Lateral view of cephalothorax and rostrum of an adult male from Dinawa,  $\times 2$ .
10. The same of another adult male,  $\times 2$ .
11. Extremity of the telson of an adult male,  $\times 10$ .
12. Left leg of the second pair of an adult male, viewed from above,  $\times 1\frac{1}{2}$ .
- Fig. 13. *Palaemon (Eupalaemon) macrobrachion*, Herklots. Lateral view of cephalothorax and rostrum of a male, long 70 mm., from Liberia,  $\times 2$ .
14. Right leg of the second pair of the adult male from the River Prah, viewed from above,  $\times 1\frac{1}{2}$ .
15. Lateral view of cephalothorax and rostrum of the female from the River Prah,  $\times 2^*$ .
16. Right leg of the second pair of same female, looked at from above,  $\times 2$ .
19. Left leg of the second pair of the female (No. 27), long 76 mm., from the Congo Coast,  $\times 2$ .
20. Right leg of the second pair of the female (No. 6), long 78 mm., from the Congo Coast,  $\times 2$ .
21. Two spines of the inner margin of the carpus of this leg,  $\times 25$ .
22. Teeth of the fingers of this leg,  $\times 25$ . The hairy felt has been omitted.
25. Left leg of the second pair of the largest female, long 58 mm., from Catumbella,  $\times 2$ .
27. Right leg of the second pair of the male (No. 20), long 29 mm., from Catumbella,  $\times 5$ .

## PLATE 19.

- Fig. 17. *Palaemon (Eupalaemon) macrobrachion*, Herklots. Lateral view of cephalothorax and rostrum of the male (No. 4) from the Congo Coast,  $\times 2$ .
18. The same of the female (No. 7) from the same locality,  $\times 2$ .
23. Lateral view of cephalothorax and rostrum of the largest male, long 60 mm., from Catumbella.  $\times 2$ .
24. The same of the largest female, long 58 mm., from the same locality,  $\times 2$ .
26. Teeth of the fingers of the left leg of the second pair of this female,  $\times 25$ . The teeth of the dactylus are on the left hand.

\* Though this figure, as also fig. 18 of Plate 19, are quite accurate, their appearance is not natural, as they have been turned downward by the draughtsman, so that the rostrum runs horizontally forward and somewhat downward, instead of being turned slightly upward.



- Fig. 28. Teeth of the fingers of the right leg of the second pair of the male (No. 20), long 29 mm., from Catumbella,  $\times 50$ .
29. Teeth of the fingers of one of the legs of the second pair of the young female (No. 38), long 25 mm., from Catumbella,  $\times 50$ .
- Fig. 30. *Palæmon (Eupalæmon) Foai*, Cout., male, from the River Kribi. Lateral view of cephalothorax and rostrum,  $\times 2$ .
31. Telson,  $\times 3$ .
32. Extremity of the telson,  $\times 12$ .
33. Leg of the first pair,  $\times 2$ .
34. Left leg of the second pair,  $\times 2$ .
35. Two spinules of the inner margin of the palm of the same leg,  $\times 25$ .
36. Two spinules of the longitudinal row on the outer margin of the palm, and six thinner ones near that row on the upper surface of the palm of the same leg,  $\times 25$ .
37. Teeth of the fingers of the same leg,  $\times 25$ . The teeth of the dactylus are on the left side.
- Fig. 38. *Palæmon (Macrobrachium) jamaicensis* (Herbst), var. *Vollenhovenii*, Herklots. Lateral view of cephalothorax and rostrum of the adult male from Liberia,  $\times 1\frac{1}{2}$ .
39. Extremity of the telson of a young male (No. 14), long 41 mm., from Catumbella,  $\times 25$ .
40. Larger (left) leg of the second pair of the same male,  $\times 1\frac{1}{2}$ .
41. Lateral view of cephalothorax and rostrum of the male (No. 7), long 90 mm., from Catumbella,  $\times 2$ .
42. Left leg of the second pair of the same male,  $\times 1\frac{1}{2}$ .
43. Right leg of the second pair of the male (No. 8), long 80 mm., from Catumbella,  $\times 1\frac{1}{2}$ .
44. Left leg of second pair of same male,  $\times 1\frac{1}{2}$ .
45. Right leg of the second pair of the largest male (No. 6), long 96 mm., from Catumbella,  $\times 1\frac{1}{2}$ .
47. Larger (left) leg of the second pair of the young male (No. 16), long 38 mm., from Catumbella,  $\times 3$ .

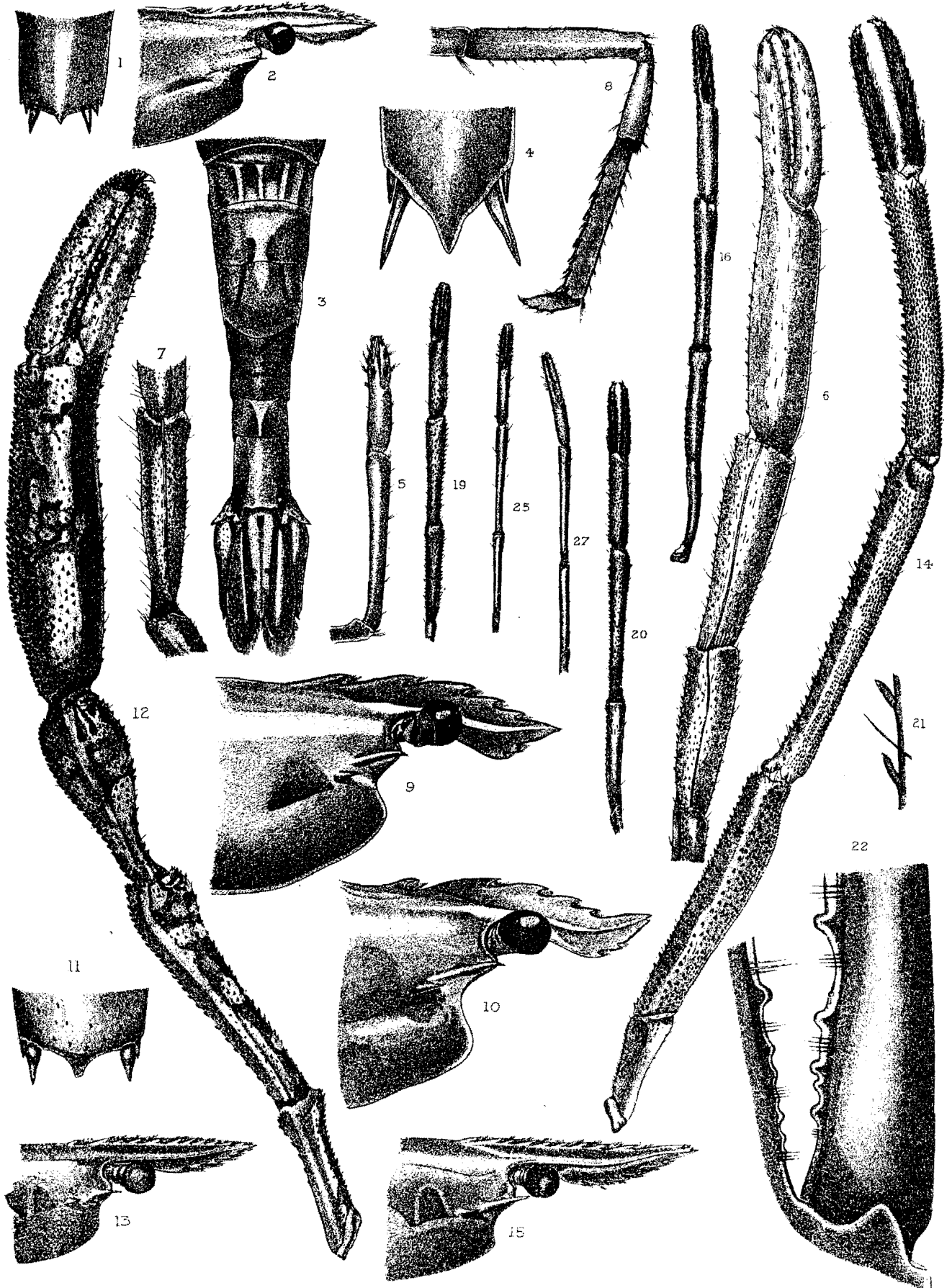
## PLATE 20.

- Fig. 46. *Palæmon (Macrobrachium) jamaicensis* (Herbst), var. *Vollenhovenii*, Herklots. Lateral view of cephalothorax and rostrum of the young male (No. 16), long 38 mm., from Catumbella,  $\times 3$ .
48. Teeth of the fingers of the larger (left) leg of the second pair of the same male,  $\times 13$ .
49. Lateral view of cephalothorax and rostrum of the largest female but one from Catumbella (No. 18), long 84 mm.,  $\times 2$ .
50. Left leg of the second pair of the same female,  $\times 1\frac{1}{2}$ .
51. Right leg of the second pair of the same female,  $\times 1\frac{1}{2}$ .
52. Left leg of the second pair of the young female (No. 23), long 40 mm., from Catumbella,  $\times 3$ .
53. Teeth of the fingers of the same leg,  $\times 13$ .
- Fig. 54. *Palæmon (Macrobrachium) Olfersii*, Wiegmann. Lateral view of cephalothorax and rostrum of the adult male from the River Prah,  $\times 3$ .
55. Left leg of the second pair of the same male,  $\times 1\frac{1}{2}$ .
56. Lateral view of cephalothorax and rostrum of the male (No. 3), long 42 mm., from Catumbella,  $\times 3$ .
57. Extremity of the telson of the same male,  $\times 25$ .
58. Left leg of the first pair of the same male,  $\times 6$ .
59. Larger (left) leg of the second pair of the same male,  $\times 2$ .
60. Teeth of the fingers of the same leg,  $\times 5$ .
61. Right leg of the second pair of the same specimen,  $\times 2$ .
62. Teeth of the fingers of the same leg,  $\times 10$ .

- Fig. 63. Left leg of the second pair of the young male (No. 7), long 36 mm., from Catumbella,  $\times 2$ .  
 64. Teeth of the fingers of the same leg, enlarged.  
 65. Left leg of the second pair of the young male (No. 8), long 34 mm.,  $\times 3$ .  
 66. Teeth of the fingers of the same leg,  $\times 25$ .  
 67. Lateral view of cephalothorax and rostrum of the largest female (No. 10); long 41 mm., from Catumbella,  $\times 3$ .  
 68. Left leg of the second pair of the same female,  $\times 3$ .  
 69. Teeth of the fingers of the same leg,  $\times 25$ .  
 70. Right leg of the second pair of the same female,  $\times 3$ .  
 71. Lateral view of cephalothorax and rostrum of the youngest female (No. 17), long 21 mm., from Catumbella,  $\times 6$ .  
 72. Right leg of the second pair of the same female,  $\times 6$ .  
 73. Teeth of the fingers of the same leg,  $\times 25$ .  
 74. Right leg of the third pair of the male (No. 5), long 41 mm., from Catumbella,  $\times 5$ .  
 Fig. 75. *Palaemon* (*Macrobrachium*?) sp. Lateral view of cephalothorax and rostrum of the female from Catumbella,  $\times 3$ .  
 76. Telson of the male,  $\times 5$ .  
 77. Extremity of the telson,  $\times 25$ .  
 78. Right leg of the first pair of the female,  $\times 5$ .  
 79. Left leg of the second pair of the female,  $\times 3$ .  
 80. Teeth of the fingers of the same leg,  $\times 25$ .  
 81. Right leg of the third pair of the female,  $\times 5$ .

[NOTE received since the foregoing pages were in type :—

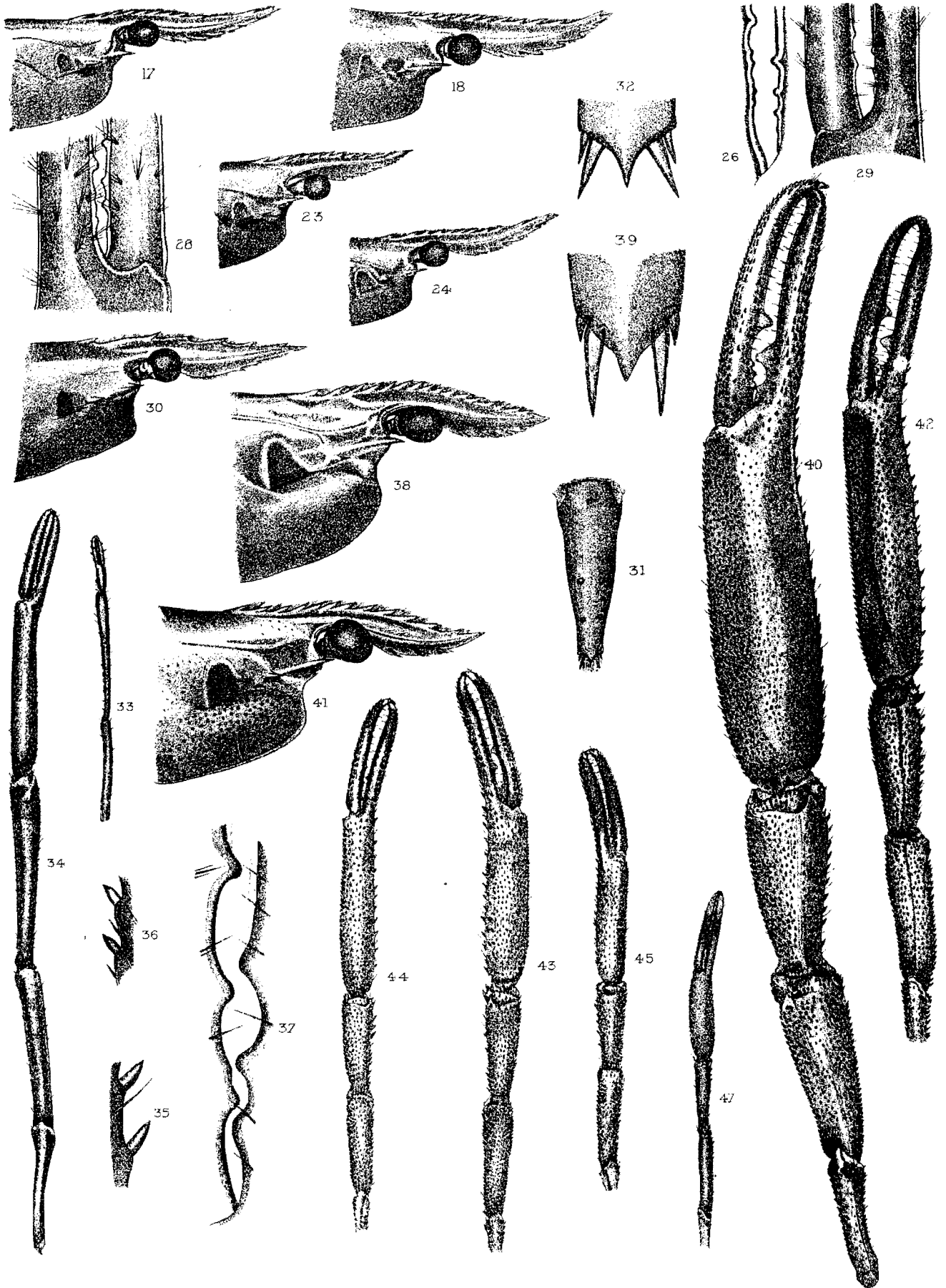
The preceding description (pp. 306–309) agrees quite well with that of Coutière. Of the three specimens described by him, a male long 70.5 mm. and two somewhat younger females, the male had for its rostrum the formula  $\frac{1}{4}$ , the two females respectively  $\frac{1}{8}$  and  $\frac{1}{3}$ . In the male the carpus of both legs of the second pair was a little longer than in the specimen from the River Kribi, being once and a half as long as the merus, and the fingers of the larger left leg measured not quite one-third the length of the whole hand. The joints of these legs are described as smooth, except some sharp spinules on the lower border of the palm; when touched, the legs appeared, however, to be slightly scabrous. Coutière makes no mention of the characteristic position of the spines of the telson, and it is remarkable that he does not compare his species with *P. paucidens*, Hilgd.—17th November, 1904. J. G. DE M.]



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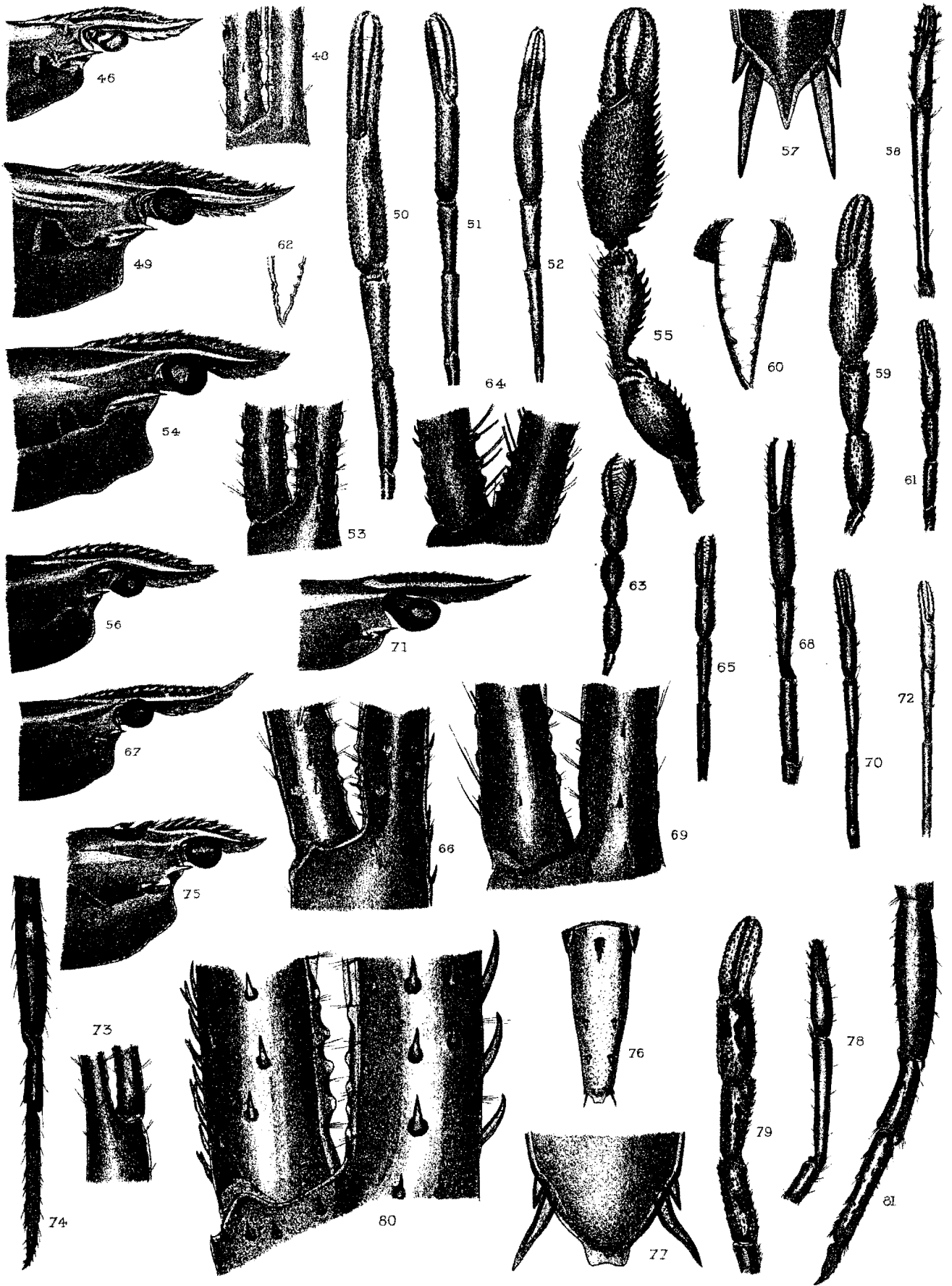
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