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A CONTRIBUTION TO THE  
KNOWLEDGE OF TWENTY-ONE SPECIES  
OF THE GENUS UPOGEBIA LEACH

BY

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OF IERSEKE

WITH 79 ILLUSTRATIONS ON 6 PLATES



'S-GRAVENHAGE  
MARTINUS NIJHOFF

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## INTRODUCTION

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When for some time past I had begun to elaborate the Callianassidae collected by the Siboga-Expedition and in behalf of this work was desirous to compose a key for determining the known species of the whole world of the genus *Upogebia* Leach, I soon met with great difficulties because the descriptions of some species proved to be more or less incomplete and the figures insufficient, in consequence of which fact I did not succeed in composing such a key. I therefore formed the resolution to study these species exactly, to describe them in detail and to draw so many figures as should appear necessary. Of these 21 species, of which 8 belong to the subgenus *Calliadne* Strahl, the others to the subgenus *Upogebia* s.s., the indopacific have not been collected by the Siboga-Expedition; 13 inhabit the indopacific seas, 1 the coast of South-Africa, 2 the west coast of equatorial Africa, 1 the east coast of the United States of North America, while 4 have been found on the coasts of Europe. Among these species three proved to be new to science and an *Upogebia*, living in the interior of sponges at Port Jackson, proved to be a variety of *Upogebia (Calliadne) octoceras* Nobili, that inhabits the Red Sea. The three new species are 1° *Upog. neglecta* from the east coast of Australia, 2° *Upog. Balssi* from the Red Sea, 3° *Upog. gracilipes* from the Adriatic.

In order to accomplish this task, it proved necessary to study and to examine correctly determined specimens of the species already long known and the types and cotypes of those that have been described in the last years: with my requests for these specimens the Directions of the Musea to which I did apply myself, have all complied with the utmost courtesy. I want therefore to tender my best thanks to the following gentlemen who by intrusting these interesting specimens, have enabled me to write this paper: E. J. Allen, Esq., D. Sc. (Plymouth), Dr. J. Arwidsson (Upsala), Prof. Dr. H. Balss (Munich), L. A. Borradaile, Esq., Sc. D. (Cambridge), Dr. W. T. Calman, Esq. (London), Prof. Dr. Chas. Chilton (Christchurch), the late Prof. Dr. E. Giglio-Tos (Turin), Prof. Dr. Ch. Gravier (Paris), Samuel F. Hildebrand (Beaufort, N. C.), Mr. J. A. Kershaw (Melbourne), Dr. O. Pesta (Vienna) and Mr. W. T. Wells (Sydney).

All the figures have been drawn by the author.

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## LIST OF SPECIES

Upogebia ( <i>Calliadne</i> ) <i>Savignii</i> (Strahl)	Upogebia ( <i>Upogebia</i> ) <i>Issaeffi</i> (Balss)
„ „ <i>rhadames</i> (Nobili)	„ „ <i>littoralis</i> (Risso)
„ „ <i>furcata</i> (Aurivillius)	„ „ <i>capensis</i> (Krauss)
„ „ <i>Bowerbankii</i> (Miers)	„ „ <i>neglecta</i> n. sp.
„ „ <i>cargadensis</i> Borr.	„ „ <i>stellata</i> (Montagu)
„ „ <i>octoceras</i> Nobili	„ „ <i>gracilipes</i> n. sp.
„ „ „ „ var. <i>aus-</i>	„ „ <i>Balssi</i> n. sp.
„ „ <i>traliensis</i> n. var.	„ „ <i>hirtifrons</i> (White)
„ „ <i>deltaura</i> Leach	„ „ <i>major</i> (de Haan)
„ „ sp. $\alpha$	„ „ <i>affinis</i> (Say)
„ ( <i>Upogebia</i> ) <i>Danai</i> (Miers)	„ „ <i>spinifrons</i> (Haswell).
„ „ <i>Osiridis</i> Nobili	

### UPOGEBIA (CALLIADNE) SAVIGNII (Strahl)

Fig. 1.

J. C. Savigny, Description de l'Égypte, Pl. 9, fig. 3.

V. Audouin, Explic. sommaire des Planches de Crustacés de l'Égypte et de la Syrie, Paris 1827, p. 273.

*Calliadne Savignii* Strahl, in: Monatsber. K. Akad. Wiss. Berlin 1861, p. 1064.

*Upogebia (Calliadne) Savignyi* G. Nobili, in: Annales Sciences Nat. 9e Série, Zool. T. IV, p. 98, Paris 1906.

Among the species that upon my request were kindly sent me by the Direction of the Zoological Museum at Turin, are two egg-bearing females of *Upog. (Calliadne) Savignii* from Massaua, Red Sea, nearly of the same size, 26 mm. and 27 mm. long.

This species must be considered as the type of the subgenus *Calliadne*. The front (Fig. 1) is trilobed, as in *Upog. (Calliadne) furcata* (Aurivillius), but the lateral lobes, the anterior extremities of the lateral ridges of the cephalic region, are *shorter*, not reaching to the middle of the rostrum; rostrum triangular, obtuse, *shorter* than the eyestalks, extending only to the corneae and separated by *broad* interspaces from the lateral lobes. The lateral borders of the rostrum bear on their anterior half 4 or 5 teeth, the tips of which are directed backward and that are barely larger than the teeth or tubercles of the gastric region; the denticulate lateral borders of the rostrum are continued backward, diverging, but the margins of the interspaces between the rostrum and the lateral lobes are smooth, without teeth, just as the grooves that separate the gastric region from the lateral ridges.

The lateral ridges are nearly parallel and armed with 20—22 teeth, the tubercles on the gastric region are distributed irregularly, also in the middle, and extend only to midway between the apex of the rostrum and the cervical groove; a few tubercles occur also on the upper surface of the rostrum.

No spine on the antero-lateral border of the carapace.

In both specimens the 6th segment of the abdomen is 3 mm. long; in one female the telson is 3.4 mm. long, in the other 3.2 mm., but in both 3.8 mm. broad; it is thus a little broader than long, the greatest width at the limit of the anterior third part; posterior margin slightly curved, postero-lateral angles rounded. The lateral ridges on the upper surface are obtuse, the transverse crest little prominent. The spinule on the basal joint of the uropods and that at the base of the outer are of equal size and placed close by one another: *they are the only spinules that exist on the animal*. The inner uropod is as long as the telson, the outer a little longer, both possess the usual ridges and in both the apical border is beset with microscopical spinules.

In the Key at p. 96 of Nobili's work (l.c.) the four species of *Calliadne*, examined by him, are characterized by the relative length of the antennular peduncle with regard to that of the outer antennae; this character is in my opinion wrong and unfitting. As is distinctly visible in fig. 3 of Plate 9 of Savigny's work and as is also the case in the two females from Massaua, the antennular peduncle extends a little beyond the distal extremity of the penultimate joint of the antennal peduncle and in *Upog. rhadames* Nobili even to the middle of the terminal joint, so that we cannot say that in these species the antennular peduncle is much shorter than that of the outer antennae, on the other hand in a full-grown egg-bearing female of *Upog. Darwinii* from Ambon (Siboga-Exped.) the antennular peduncle reaches as far forward as in *Upog. rhadames* and in *Upog. octoceras* Nobili, of which cotypes were also examined by me, only to the distal extremity of the penultimate joint!

The upper border of the merus of the 1st legs bears at a short distance from the distal extremity a small sharp tubercle, that sometimes even is wanting, but no spine, and likewise there is a small tubercle on the lower border of the carpus, that sometimes is also absent. The upper and the lower border of the palm are rounded, the fixed finger laterally compressed; the upper border of the dactylus is carinate, the crest smooth, and there is also a smooth crest on the outer side.

*Upogebia (Calliadne) Savignii* (Strahl) occurs in the Red Sea from Suez to Djibouti and lives in the interior of sponges; according to the Reverend Stebbing this species should also occur on the east coast of South Africa at 33° 9' 30" Lat. S. and 28° 3' Long. E. (General Catalogue of South African Crustacea, 1910, p. 371).

### UPOGEBIA (CALLIADNE) RHADAMES (Nobili)

Fig. 2.

*Upogebia (Gebiopsis) rhadames* G. Nobili, Bull. Mus. d'hist. nat. Paris 1904, No. 5, p. 235 and in: Annales des Sciences Nat. 9e Série, Zool. Paris 1906, T. IV, p. 100.

Two females without eggs from Suakim, Red Sea, received from the Museum at Turin, 16 mm. and 17 mm. long.

Front trilobed (Fig. 2) as in *Upog. (Calliadne) Savignii* (Strahl). Rostrum of the female, long 17mm.,

a little shorter than the eyestalks, *less broad* than in Strahl's species, with two spiniform teeth on the tip placed abreast near one another, behind them the left lateral border bears still three, the right two similar teeth; on the upper surface of the rostrum are placed seven tubercles and until midway between the apex of the rostrum and the median portion of the cervical groove the gastric region bears rather sharp and conical tubercles. Lateral ridges of the cephalic part of the carapace with 14 teeth, of which the anterior is the largest and turned obliquely upward, the 5 following are but little smaller, then follow 8 distinctly smaller tubercles that decrease in size backward; between these teeth one or two long setae are implanted.

The 6th segment of the abdomen is 1,5 mm. long, the telson 2,3 mm. long, 2,5 mm. broad, regularly rounded posteriorly, so that there are no postero-lateral angles, lateral borders of telson almost parallel, barely converging; that part of the upper surface which is defined by the barely distinct transverse and lateral ridges or crests, appears concave. Uropods short, as long as the telson, the spinule on the basal joint and that at the base of the outer uropod as in *Upog. Savignii*.

Eyes black, occupying more than half the length of the eyestalk.

The peduncle of the inner antennae extends nearly as far forward as that of the outer; the 1st joint of the antennular peduncle is 0,8 mm. long, with an *extremely small* tooth at the distal end of the lower border, the 2nd joint 0,2 mm. long, 0,27 mm. broad, the 3rd joint 0,7 mm. long and 0,23 mm. broad in a lateral aspect, *3-times* as long as broad; thicker flagellum 1,52 mm. long, a little shorter than the peduncle, composed of 14 joints, of which the proximal or 1st,  $1\frac{1}{2}$ -times as long as broad, is as long as the two following taken together, the following joints nearly as broad as long; thinner flagellum 1,76 mm. long,  $\frac{1}{8}$  longer than the other and nearly as long as the peduncle, consisting of 13 or 14 joints that are longer than thick.

The inner lower border of the merus of 1st legs bears along its whole extent 10—12 small teeth. Chelae as in *Upog. Savignii*, but the lower border of the propodus is armed at the inner side with 7 or 8 minute teeth. Fingers of equal length, pointed, dactylus with an obtuse small tubercle on the upper border near the articulation. Following legs without spines.

In the other specimen the rostrum reaches to the anterior border of the eyestalks, rostrum with the same number of teeth as in the first. Lateral ridges of the cephalic region with 16 teeth, behind the foremost one 7 that are little smaller, the 8 following still smaller, at unequal distances, and gradually decreasing in size.

### UPOGEBIA (CALLIADNE) FURCATA (Aurivillius)

Fig. 3—3b.

*Gebia furcata* Carl W. S. Aurivillius, Krustaceen aus dem Kamerun-Gebiete, Stockholm 1898, p. 13. Taf. I, fig. 5—7 (Bihang till K. Svenska Vet. Akad. Handlingar. Band 24. Afd. IV. No. 1).

Owing to the courtesy of Dr. J. Arwidsson of the Zoological Institute at Uppsala I was enabled to examine one of the three type specimens of this species, females with eggs, from the river near Bibundi, Cameroon.

The specimen is about 12 mm. long, the length of the abdomen could not be measured exactly,

the posterior half being bent inward; the carapace is 4,3 mm. long, the distance between apex of rostrum and cervical groove 2,7 mm. Rostrum *a little shorter* than the eyestalks, while in fig. 5 of the original description it projects far beyond them; rostrum 0,4 mm. long, reaching only to the cornea and terminating into two acute teeth placed abreast; behind them the left border of the rostrum bears still one tooth (Fig. 3), but on the right none. Aurivillius, however, describes one or two teeth on the lateral borders of the rostrum behind the anterior pair, but in his figure 6 one observes on each border three teeth. The distance between the sharp anterior teeth at the end of the lateral ridges of the cephalic region measures 1 mm.; these teeth i. e. the lateral frontal lobes, extend, as in fig. 6, *to midway the rostrum*, are directed obliquely upward and placed above the eyes. The anterior tooth is followed backward on the left side (Fig. 3) by 4, on the right by 5 teeth, that are a little smaller, of equal size and placed at equal distances, then follows after a longer interspace a tooth that is curved forward and as large as the foremost one, and behind this tooth are placed on each ridge 3 smaller teeth, that decrease in size backward.

*No spine* on the antero-lateral border of the carapace. The posterior margin of the lateral portions of the cervical groove is armed in their middle part on the left side (Fig. 3) *with 4 acute spines*, directed forward, of which the posterior or 1st is the smallest, the 2nd the largest, the two following decreasing in length; on the right side there are here only 3 spines, because the smallest posterior spine is wanting. Of these spines in the figures 5 and 6 only one is represented, though four are described by Aurivillius.

Second and 6th somite of the abdomen each 1,4 mm. long. Telson trapeziform, 1,5 mm. long and 1,75 mm. broad,  $\frac{1}{8}$  broader than long; lateral edges straight, converging, posterior border straight. Upper surface of telson with the usual transverse and lateral carinae and with a fine median groove. Basal joint of uropods with a small spine posteriorly; uropods *short*, not longer than telson, the outer with curved anterior and apical margins, with two ridges, the inner triangular with one ridge.

Third joint of the antennular peduncle about as long as 1st and 2nd taken together, 0,6 mm. long and nearly 5-times as long as broad in a lateral view; flagella almost of equal length,  $1\frac{1}{2}$ -times as long as the 3rd joint of the peduncle, both composed of about 10 joints. Scaphocerite spiniform, pointed.

Legs of 1st pair equal. Ischium of left leg (Fig. 3a) with 3 acute spines on the lower border, growing longer from the 1st near the proximal extremity to the 3rd near the distal end, the 1st and 2nd close together on the proximal fourth part of the border, the 3rd at one-third the length of the border from its distal end. Merus 2,1 mm. long, 0,95 mm. broad, 2,2-times as long as broad; upper border with a spine curved forward near the distal extremity; on the proximal third part of the lower border of the outer surface three acute spines of equal size, long 0,18 mm., are implanted, perpendicular to the border, of which the 1st or posterior is  $1\frac{1}{2}$ -times as far distant from the 2nd as the 2nd from the 3rd. Carpus with a sharp tooth at the distal extremity of the lower border, a smaller spine on the distal border of the outer surface, somewhat nearer to the lower spine than to the upper border; a sharp small spine at the far end of the upper border and 2 smaller spines on the upper half of the distal border of the inner surface. Palmar portion of this leg 1,9 mm. long, 1,06 mm. broad, almost twice as long as broad, fixed finger 0,6 mm. long, (Fig. 3b)

with 7 or 8 teeth on the prehensile edge. Lower border of propodus with a small spine near the carpal articulation; a sharp small tooth or spine on the distal border of the outer surface immediately below the articulation of the dactylus, 5 sharp teeth along the whole extent of the upper border at the inner side. Dactylus 1 mm. long, half as high or broad as long, with 8 obtuse teeth on the distal half of the prehensile edge.

Upper border of merus and carpus of 2nd legs with a spine near the distal extremity.

Propodus of 3rd legs half as broad as long, with 10—12 long setae on the proximal half of the lower border and a tuft of shorter setae on the distal half; dactylus nearly as long as the propodus, pointed at the extremity, with a dense saw of about 10 slender thin spinules along the middle of the lower border; this saw is almost half as long as the dactylus, upper border of the dactylus smooth, not tuberculate, hairy along its whole length.

Legs of 5th pair subchelate; carpus 1 mm. long, propodus until the articulation of the dactylus just as long, dactylus curved, about half as long as the propodus, distal half broadened, broader than the proximal half and denticulate; fixed finger almost half as long as the dactylus.

Eggs 0,4—0,5 mm. broad.

After Aurivillius this species has not been found back.

#### UPOGEBIA (CALLIADNE) BOWERBANKII (Miers)

Fig. 4—4f.

*Gebiopsis bowerbankii* E. J. Miers, in: Report on the Zoolog. Collections made in the Indo-Pacific Ocean during the Voyage of H. M. S. "Alert" 1881—2. London 1884, p. 282.

Upon my request Dr. W. T. Calman of the British Museum has been so kind to send me the male specimen collected by Dr. J. S. Bowerbank at Fremantle, S. W. Australia, which was alluded to by Miers as a possibly new species under the name of *Gebiopsis Bowerbankii*, but which was placed by this author in the Museum Collection with the name of *Gebiopsis Darwinii*. I thank Dr. Calman very heartily, because it is now possible to publish the following detailed description and drawings.

Measured in the midline, the anterior teeth of the rostrum not included, the body appears to be 21,4 mm. long, the carapace 7,9 mm., the abdomen 13,5 mm. The distance (4,7 mm.) from the apex of the rostrum, the teeth not included, to the cervical sulcus is one and a half as long as the distance between this groove and the posterior margin of the carapace. The rostrum (Fig. 4 and 4a), 0,9 mm. long and 1,36 mm. broad at its base, is triangular, one and a half as broad as long, and its borders are armed on each side with 5 spines. The 1st or anterior spine is directed obliquely upward, forward and slightly outward, it appears a little larger than the 3rd, 4th and 5th; the 2nd spine is *much shorter* than the 1st and *much thinner* than all the other spines; the 3rd is broken off on both borders, so that only its basal part is still visible, the 4th and the 5th spines, finally, are also mutilated, but in the figures 4 and 4a I have drawn them in their natural size. Besides these 10 marginal spines one observes on the upper surface of the rostrum at either side of a shallow median groove still 10 other spines, but unfortunately nearly a dozen are broken off, their circular base being only visible; these spines are a little smaller than the marginal spines. The upper surface of the rostrum is

*anteriorly deflexed*, appearing curved in a lateral view; below the lateral denticulated margins the rostrum is excavate for the eyes on either side of the lower border that runs horizontally.

The rostrum is separated on each side by a rather narrow interspace from the anterior tooth of the lateral ridges of the cephalic region, i. e. from the lateral frontal lobe; these ridges are armed with about 20 sharp teeth, of which the foremost is twice as large as the 2nd, while the following gradually decrease in size; the foremost tooth is directed forward and slightly outward. The gastric region itself bears on each side of the middle a large number of acute teeth or tubercles, that are partly arranged in slightly oblique transverse rows and that are much smaller than those of the rostrum excepting a few anteriorly and laterally that are barely smaller than the teeth of the lateral ridges. The smooth median groove of the rostrum extends to the centre of the gastric region and bears here 4 or 5 small tubercles placed behind one another, but posterior to the latter the region appears smooth in the middle. The scabrous part of the gastric region extends as far backward as the lateral denticulated ridges and a few sharp tubercles occur between the posterior extremity of the latter and that of the scabrous part of the gastric region; the posterior third part of the surface between the apex of the rostrum and the cervical groove appears therefore smooth and devoid of tubercles. The upper surface of the rostrum and of the cephalic region is covered with hairs, longest on the rostrum and decreasing gradually in length backward; a line of setae occurs also just below the teeth of the lateral ridges, on the sides of the carapace.

A sharp spine on the antero-lateral border of the carapace just between the eyestalk and the base of the outer antenna. Upper part of the cervical groove deep.

The abdomen resembles that of *Upog. Darwinii* (Miers), excepting the 6th somite and the telson. The 1st and the 2nd somite are of equal length (2 mm.), the 6th little longer (2,2 mm.) and almost twice as broad (4 mm.). In *Upog. Darwinii* the lateral border of the 6th somite presents a little behind the middle a shallow incision (Fig. 4f), that divides it into two lobules, of which the anterior is *rounded* and *obtuse*, and more anteriorly, near the posterior border of the 5th somite, one observes on the upper surface an oblique rather deep groove that ends on the lateral border; in *Upog. Bowerbankii*, however, the lateral border of the 6th segment is *deeply emarginate* a little behind the middle, the anterior lobule appearing as a subacute tooth (Fig. 4b) and in front of this tooth the margin presents another emargination, by which another anterior though smaller lobule is formed. While in *Upog. Darwinii* (Miers) = *Upog. intermedia* (de Man 1888) the posterior margin of the 6th somite appears smooth and entire, in *Upog. Bowerbankii* it is armed, except near the lateral angles, *with about forty small, acute, conical teeth or spines* (Fig. 4c).

The telson (Fig. 4c) is *one-third* longer than the 6th somite, of a *subquadrate* shape, the greatest width anteriorly (3,2 mm.) being but little longer than the length (2,9 mm.); the nearly straight lateral margins converge slightly backward and sweep with a curve into the posterior margin that appears slightly concave in the middle, but the length of which cannot be measured because one cannot see exactly where the curve becomes straight. As in other species the upper surface arises anteriorly as a transverse crest, that laterally passes on each side into another running backward near the lateral margins; one observes under the microscope on the transverse crest *several small acute teeth*, a few also on the lateral ridges anteriorly and just behind the transverse crest; at  $\frac{1}{3}$  its length from the posterior margin the lateral margins bear a microscopical movable spinule. Basal



joint of the uropods with a spine posteriorly. Uropods as long as the telson, with the usual ribs and with their rounded apical margins armed with small sharp teeth.

The eyestalks reach almost to the end of the rostrum, hidden anteriorly on the inner side under its deflexed portion.

The peduncle of the inner antennae that extends as far forward as the anterior teeth of the rostrum, is 2,06 mm. long, the 1st or basal joint, 1 mm. long, almost as long as the 2nd and 3rd taken together, the 2nd 0,36 mm. long, the 3rd 0,7 mm., about twice as long as the 2nd, appearing in a dorsal view 3,5-times as long as thick (0,2 mm.) in the middle and provided above with long hairs; basal joint unarmed. Thicker flagellum 2,9 mm. long, 1,4-times as long as the peduncle, 11-times as long as broad, tapering and composed of 33 segments, of which the first or basal one, 0,26 mm. long and just as broad, is the longest of all, the 2nd half as long as the 1st, the 3rd one-fourth, the 4th about one-third of the 1st, the following subequal; excepting the 1st and the 3 or 4 terminal ones all the segments are broader than long. Olfactory hairs implanted along  $\frac{3}{4}$  the length of the flagellum. Thinner flagellum 2,8 mm. long, *a little shorter* than the other and composed of 19 segments, that are nearly all longer than thick.

The antennal peduncle extends by half its terminal joint beyond that of the inner antennae, scaphocerite very small, indistinct, the joints provided with long hairs, flagella lost.

Chelipeds (Fig. 4d, 4e) equal. Ischium with a small acute tooth near the far end of the lower border, preceded by a smaller one, while on the left leg a third smaller tooth is placed just before the first. Merus 4 mm. long, its greatest width 1,75 mm., a little more than twice as long as broad, upper border curved, with a very small acute tooth near the distal end at the inner side, which may easily be overlooked; lower border straight, *denticulate* by 9 or 10 small subacute teeth of unequal size. Carpus with a row of 14 or 15 acute teeth on the inner border of the upper surface, extending from the proximal to the distal extremity; these teeth are all microscopical, excepting the tooth at the distal extremity that measures  $\frac{1}{4}$  or  $\frac{1}{5}$  the length of the inner border of the carpus; just outside this tooth one or two microscopical teeth on the distal border of the upper surface. The outer surface of the carpus is longitudinally grooved not far from the upper border and there is a small sharp tooth at the distal end of the lower. Measured along the lower border from the carpus to the tip of the immobile finger the chela proves to be 5,5 mm. long, the palmar portion 3,8 mm. long and 2,4 mm. high, about one and a half as long as high, fingers 1,7 mm. long, measured horizontally, nearly half as long as the palm. Outer surface of the palmar portion smooth with, just above the middle, a longitudinal row of hairs extending from the proximal to the distal margin, another line of hairs a little below it and a third running obliquely from the lower border, at the base of the immobile finger, to the distal border of the palm, which is here armed just below the finger-cleft with a sharp spine directed slightly upward; the upper border of the palm presents on the inner side (Fig. 4e) near the distal end 5 or 6 small acute teeth and a spine at the extremity, 14 or 15 similar teeth, partly arranged in a longitudinal row, occur on the distal half of the inner surface just below the upper border; there are also some teeth on the inner side of the lower border on its proximal half, the distal border of the inner surface, finally, is armed with *two large spines*, one a little beneath the upper border, the other, somewhat smaller, between the fingers. In front of all these teeth setae are implanted. Fingers of *equal* length, the acute tips crossing one another; the

fixed finger is armed with 10 teeth, of which the first six are large, conical, sharp, directed obliquely forward, the four terminal ones gradually smaller and obtuse, there is moreover a small rounded tooth at the base of the finger; dactylus of a stout shape, curved, upper border with two small subacute teeth, the anterior larger than the other, and fringed on the inner side (Fig. 4e) with long hairs; outer surface with a ridge just above the middle and beneath it long setae are implanted; prehensile edge sharp, with a small rounded tooth proximally, just below the larger tooth of the upper border, inner side with a row of teeth or tubercles near the prehensile edge and very hairy between it and the upper border.

Following legs of the usual form in this genus, 5th legs subcheliform, the immobile finger, the prehensile edge of which bears 3 or 4 teeth, measuring  $\frac{1}{3}$  the length of the dactylus.

### UPOGEBIA (CALLIADNE) CARGADENSIS (Borr.)

Fig. 5.

*Upogebia (Calliadne) cargadensis* L. A. Borradaile, Penaeidea, Stenopidea, and Reptantia from the Western Indian Ocean, in: The Transactions of the Linnean Society of London. 2nd Series. Zoology. Vol. XIII, Part 2. London 1910, p. 263, Pl. 16, fig. 6.

It is much to be regretted that the original description of this species is not only too brief and insufficient, but that both the description and the only figure, representing one of the chelipeds, are liable to mistakes. In consequence of the conciseness of the description I first not succeeded in inserting *Upog. cargadensis* into the Key for determining the species of this genus, which will be published in my work on the Callianassidae of the Siboga-Expedition and I therefore applied to Mr. Borradaile for some further information which was kindly given to me. Dr. Borradaile wrote me indeed the following, which is taken over here literally:

“The telson of *Upogebia (Calliadne) cargadensis* has straight sides, a little excavate towards the base and sweeping with a curve into the straight hinder border. The length in the middle line is 2,25 mm., the width of the insertion on the 6th abdominal segment is 2,25 mm., the greatest width is 2,5 mm., the straight part of the posterior border is about 1,5 mm., but this is very difficult to measure, as it is impossible to decide exactly where the curve becomes straight. There is a transverse carina at the base and a longitudinal carina on each side a little within the margin.

In the uropod the exopodite and endopodite are of simple shape, the exopodite a little the longer. The outer and inner margins of the exopodite are slightly thickened and there is a longitudinal carina parallel to the outer margin at a short distance within it, and another, rather sharper, longitudinal carina in the middle. The endopodite has a thickened outer margin and a longitudinal carina in the middle. Both exopodite and endopodite and also telson have long fringes.

On the upper border of the merus of the first legs of this species there is a rather small but quite distinct tooth at a little distance from the end. On the great chela the two teeth of the dactylus are blunt and set on the inner side of the opposed edge. The hand and fingers are very hairy, and this has, I am sorry to find in the examination, misled me into describing certain spines that do not exist. The hand bears *two or three sharp thorns near the base below and some tubercles on the outside and to-*

wards the end of the upper surface. The hairs made some of these tubercles seem like spines and made me think there were more of them than there are. The two thorns on the upper edge of the dactylus and the two at the proximal end of the opposed edge of the immoveable finger do not exist. The proportions of the fingers of the same limb are quite correctly shown in the figure.

I send you also a rough sketch of the forepart of the carapace (Fig. 5). You will see that it is more like that of *Upog. Osiridis* Nobili than that of *Upog. Savignii*<sup>1)</sup>.

### UPOGEBIA (CALLIADNE) OCTOCERAS (Nobili)

Fig. 6—6e.

*Upogebia (Gebiopsis) octoceras* G. Nobili, Bull. Mus. d'hist. nat. Paris 1904, No. 5, p. 236 and in: Annales des Scienc. Nat. Paris. 9e Série. Zoologie. T. IV, 1906, p. 98.

Four female specimens, cotypes, collected in 1897 by Dr. Jousseume at Aden, or Obock or Perim, were kindly sent me by Prof. C. Gravier from the Paris Museum. It is a pity that the name of *octoceras* has been given to this species because the rostrum does not always present 8 teeth. In an egg-laden female, in which the 1st legs are wanting, long 41 mm., the *semicircular* rostrum extends barely as far forward as the eyestalks and is separated at the base by a narrow interspace from the anterior tooth of the lateral ridges of the cephalic region, i. e. from the lateral frontal lobes; the distance between the two lobes, i. e. between their apices, measures 2 mm., while the rostrum is only 1,1 mm. long. One observes, on the anterior half, on the left lateral border 4, on the right 3 teeth, the acute apices of which are slightly directed backward and the rostrum extends straight forward; on its upper surface 9 similar teeth are irregularly placed. Between the lateral grooves the gastric region is covered with many similar teeth, irregularly arranged, some also in the midline, and these teeth reach to midway between the tip of the rostrum and the cervical groove, the others reaching as far backward as the lateral ridges; all these teeth decrease in size backward and between them hairs are implanted. The lateral ridges or crests of the cephalic region bear each 14 or 15 teeth. The posterior margin of the 6th segment of the abdomen carries a great number of acute microscopical teeth, excepting the rounded, lobular, lateral angles. The caudal fan resembles that of *Upog. Darwinii*. The cephalothorax of this specimen is 11,5 mm. long, the abdomen 29,5 mm.

In another specimen without eggs, a female because it carries the pleopods of the 1st segment of the abdomen, the carapace is 10 mm. long; both legs of the 1st pair are present. The rostrum (Fig. 6 and 6a) is barely shorter than the eyestalks and the lateral borders carry each 4 teeth, placed about at equal distances from one another and extending to behind the middle, but the two anterior on the right border are contiguous to one another and perhaps fused; the teeth slightly increase in size from before backward. The upper surface of the rostrum carries 4 or 5 teeth. Like in the preceding specimen the distance between the anterior extremities of the lateral ridges of the cephalic region is 2 mm. broad, while the rostrum is 1,2 mm. long.

In the third specimen, an ova-bearing female nearly 41 mm. long, cephalothorax 11 mm., abdomen 30 mm., the lateral frontal lobes, i. e. the anterior extremities of the lateral ridges of the ce-

<sup>1)</sup> I had namely sent to Dr. Borradaile copies of my figures of the rostrum of these two species (Fig. 1 and 10).

phalic region, are 2,2 mm. distant from one another, while the rostrum is 1 mm. long; the rostrum (Fig. 6b and 6c), distinctly *a little shorter* than the eyes, is rounded and armed anteriorly with 6 *sharp spiniform teeth*, 3 on either side, that slightly increase in size from the 1st or anterior to the 3rd.; the rostrum, broader than long, presents also 6 or 7 teeth on the upper surface. The lateral ridges of the cephalic region carry each 16 or 17 acute teeth, nearly of equal size, except the anterior which is a little larger. The caudal fan is wanting. In this female the 1st or basal joint of the antennular peduncle (Fig. 6d) presents an extremely small, sharp tooth at the distal end of the lower border, the 2nd joint is 0,4 mm. long and in a lateral view 0,54 mm. broad, about  $\frac{1}{3}$  broader than long; 3rd joint 1,2 mm. long, 3-times as long as 2nd, 0,46 mm. broad, 2,6-times as long as broad, presenting a *less slender* form than in *Upog. Darwinii* (Miers) and *Upog. intermedia* (de Man), but resembling that of *Upog. ancylodactyla* (de Man), the variety *amboinensis* of this species and *Upog. hexaceras* (Ortm.). The thicker flagellum is 3 mm. long, as long as the peduncle, and composed of 24 joints, of which the 1st or proximal is 0,6 mm. long and just half as broad, measuring  $\frac{1}{3}$  the whole length of the flagellum; the following joints are all broader than long, excepting the terminal joint which is 0, 1 mm. long and 0,07 mm. broad at the base, a little longer than broad, conical, with a few hairs on the tip, of which the longest measures 0,72 mm.; this flagellum tapers towards the tip. The thinner flagellum measures 3,75 mm.,  $\frac{1}{4}$  longer than the other and is composed of 17 joints, that are all longer than thick; the 1st or proximal joint is 0,4 mm. long,  $\frac{1}{3}$  the whole length of the flagellum and 0,14 mm. thick, 3-times as long as thick; all the joints are provided with long setae, like the peduncle, those of the peduncle are feathered. The flagella therefore much resemble those of *Upog. hexaceras*, but in this species the thinner flagellum is barely longer than the other. The antennular peduncle reaches barely as far forward as the penultimate segment of that of the outer antennae.

Ischium and merus of the equal chelipeds without spines, the carpus also, excepting a very small, subacute denticle at the distal extremity of the upper border, at the inner side. Chelae unarmed, excepting a *slender sharp spine* on the distal border of the inner surface of the palm (Fig. 6e), a little below the upper border, opposite to the articulation of the dactylus. Upper and lower border of the palmar portion rounded, hairy. Fingers nearly half as long as the upper border of the propodus, of equal length; dactylus with the tip curved downward, upper border feebly carinate like the outer surface, the interspace between both carinae smooth and glabrous, the rest hairy; prehensile surface with a small tooth near the articulation, finely hairy between this tooth and the tip. Tip of fixed finger barely turned upward, prehensile edge presenting almost along its whole length a dozen of obtuse denticles that decrease in size towards the tip.

The other legs are destitute of spines.

Eggs very numerous, globular, 0,75—0,8 mm. broad.

The fourth specimen was damaged, the teeth of the rostrum and of the gastric region being worn off. *Upogebia (Calliadne) octoceras* Nobili is still only known from Aden, Obock and Perim.

#### UPOGEBIA (CALLIADNE) OCTOCERAS Nobili var. AUSTRALIENSIS n.

Fig. 7—7c.

Syn.: *Gebia hirtifrons* W. A. Haswell, Catalogue of the Australian Stalk-and sessile-eyed Crustacea, Sydney 1882, p. 164. (Nec White).

Confer: *Upogebia (Gebiopsis) octoceras* G. Nobili, Bull. Mus. d'hist. nat. 1904, No. 5, p. 236 and in: Annales Scienc. Natur. 9e Série. Zool. T. IV, 1906, p. 98.

Also Ch. Chilton, in: Transact. New Zealand Institute. Vol. XXXIX, 1906. Wellington 1907, p. 459.

8 specimens viz. one adult and two young males and five females two of which are ova-bearing, from the interior of sponges, Port Jackson; of these 6 were kindly sent me by the Direction of the Australian Museum, Sydney, 2 by Prof. Chilton of Canterbury College, Christchurch, who himself had received several specimens of this species from that Museum (Ch. Chilton, l. c.).

From the short description given by Haswell one should, of course, conclude that the species belongs to the subgenus *Upogebia*, for he describes the immobile finger of the 1st legs as "quite rudimentary" — according to Chilton, however, it belongs to the subgenus *Gebiopsis* = *Calliadne* and he adds that the authorities of the Australian Museum consider the specimens as probably belonging to *Gebiopsis bowerbankii* Miers. In view of this uncertainty I took the liberty to apply to the Direction of the Australian museum and to Professor Chilton with the request to send me one or more specimens of this form.

The examination now proved at once that this species should be considered as a variety of *Upog. (Calliadne) octoceras* Nobili, a species hitherto only known from Aden, Obock and Perim, Red Sea.

Nobili's description or diagnosis is too brief indeed, the length of the rostrum with regard to the eyestalks is not mentioned, but in the three cotypes that were examined by me, it was barely as long or distinctly *shorter* than the eyestalks: in all the specimens from Port Jackson, on the contrary, the rostrum is *distinctly longer* than these stalks. The largest of the 8 specimens is a female without eggs, long 48 mm., the cephalothorax measuring 15 mm., the abdomen twice as long; the rostrum that projects by a little more than half its length beyond the eyestalks, is not regularly rounded anteriorly as in the Red Sea type, but ends in an obtuse point, so that it appears rather triangular with slightly curved lateral borders; these borders carry each 5 or 6 teeth, those of the anterior pair are placed close together, for the rest the rostrum and the lateral frontal teeth agree with the type species. In the largest male, long 37 mm. (cephalothorax 13 mm., abdomen 24 mm.), front and rostrum show the same form as in the preceding specimen, the rostrum projects by half its length beyond the eyes, the distal half is slightly curved downward and the lateral borders bear each 7 teeth, the apices of which are bent backward as in the type species. In a female long 44 mm. (cephalothorax long 13 mm.) the rostrum is but little longer than the eyes and appears rounded anteriorly, as in the type species, with 5 teeth on each border, in another female of the same size the rostrum appears again more triangular, with obtuse tip and 4 or 5 teeth on each border. One of the egg-bearing females is 29 mm. long (cephalothorax 9,3 mm.), rostrum a little longer than the eyes, somewhat deflexed, with 5 teeth on each border. The other specimens agree with the preceding.

Eggs globular, few in number, diameter 1,5 mm., while in the type species they have a diameter of 0,75—0,8 mm.

*Upog. octoceras* belongs to that section of the subgenus in which the posterior margin of the 6th abdominal segment is beset with microscopical acute teeth or spinules; they are also present in these specimens along the whole extent of the border, excepting the postero-lateral lobules that are

smooth, and similar acute teeth exist also on the transverse and lateral carinae of the telson; all these teeth are well developed, especially in the adult male.

The inner antennae (Fig. 7) differ especially from those of the type species by the thinner flagellum which is almost  $1\frac{1}{2}$ -times as long as the upper, it is also thicker and not all the joints are longer than thick. In the female, long 44 mm., the 1st segment of the peduncle is 1,8 mm. long, the 2nd 0,6 mm. long and 0,7 mm. broad, the 3rd 1,2 mm. long and 0,45 mm. broad, 2,6-times as long as broad. The upper thicker flagellum is 4,35 mm. long, a little longer than the peduncle and consists of 29 joints. Like in the type species the 1st joint is 0,5 mm. long and 0,3 mm. broad, longer than all the others, that are all broader than long, excepting the terminal joint which is conical, 0,23 mm. long and 0,07 mm. broad at its base and two or three preceding; the 1st joint measures about  $\frac{1}{3}$  the whole length of the flagellum. The other flagellum, long 6,35 mm., is almost  $1\frac{1}{2}$ -times as long and composed of 30 joints; the 1st, 0,38 mm. long and half as broad, is longer than all the others and measures  $\frac{1}{17}$  the whole length of the flagellum, the 2nd and the 3rd joint are equal, each 0,13 mm. long and 0,19 mm. broad,  $1\frac{1}{2}$ -times as broad as long, the following are a little to twice as long as broad, the penultimate is 0,24 mm. long and 3-times as long as broad, the terminal joint 0,16 mm. long, 0,065 mm. broad at base. Measured in the middle of their length the upper flagellum (Fig. 7b) appears about  $1\frac{1}{2}$ -, in the type species  $2\frac{1}{2}$ -times as broad as the other (Fig. 7a).

In the female, long 48 mm., the 1st segment of the peduncle of the left antennule is 2 mm. long, the 2nd 0,6 mm. long, 0,75 mm. broad, the 3rd 1,3 mm. long, 0,56 mm. broad, 2,3-times as long as broad; the upper thicker flagellum, long 3,95 mm., as long as the peduncle, is composed of 24 joints, of which the 1st, 0,5 mm. long and 0,28 mm. broad, measures about  $\frac{1}{3}$  the whole length of the flagellum, the terminal joint 0,22 mm. long, 0,07 mm. broad at its base; the other flagellum incomplete. In the right antennule the peduncle presents the same measurements as in the left, the upper thicker flagellum, 3,3 mm. long and composed of only 14 joints, is probably abnormal, the other flagellum is well developed, 6,45 mm. long, a little more than  $1\frac{1}{2}$ -times as long as the upper (namely of the left antennule) and composed of 27 or 28 joints, of which the 1st joint 0,34 mm. long, 0,19 mm. broad. The measurements of one of the antennules, that are equal, in the male long 35 mm. are the following. First segment of the peduncle 1,4 mm. long, 2nd 0,5 mm. long, 0,68 mm. broad, 3rd 1,2 mm. long, 0,54 mm. broad, 2,2-times as long as broad. The upper thicker flagellum, long 4 mm., is composed of 30 joints, of which the 1st is 0,36 mm. long, 0,31 mm. broad, the terminal joint 0,2 mm. long, 0,08 mm. broad at its base; the other flagellum measures 5,6 mm. and consists of 25 joints of which the 1st is 0,35 mm. long, 0,17 mm. broad, the 2nd 0,12 mm. long, 0,2 mm. broad, the 3rd also broader than long, all the following longer than broad, terminal joint conical, 0,14 mm. long, 0,08 mm. broad at its base; the 1st joint measures  $\frac{1}{16}$  the whole length of the flagellum.

Chelipeds equal. The carpus bears a small spine at the distal end of the upper border at the inner side, a small spine of the same size occurs on the distal border of the inner surface of the palm opposite the middle of the base of the dactylus and a third (Fig. 7c) on the distal border of the outer surface just below the finger-cleft; other spines the chelipeds do not present, the spine on the distal border of the palm at the inner side exists both in the male and in the female, but it is *much smaller* than in the type species. The fingers are almost of equal length (Fig. 7c), the dactylus reaching just beyond the other finger; it is, however, incomprehensible that Haswell has referred these specimens to a spe-

cies of which the fixed finger is described as "quite rudimentary". The dactylus is strongly curved, pointed, its upper surface smooth, the prehensile surface bears, both in the male and in the female, a single small tooth a little behind the middle near the outer border, while the inner border of that surface bears 8 or 9 granules in the middle; sides very hairy. The cutting edge of the immobile finger is armed with a dozen, forwardly directed, acute teeth, of which one or two at the base and two or three near the tip are smaller than the rest. The small spines on the distal border of the palm are often broken off.

The other legs are destitute of spines, 5th legs subcheliform, the strongly arcuate dactylus twice as long as the fixed finger.

Further researches are necessary to decide whether the described characters of the inner antennae are indeed constant in this species and different from those of the Red Sea species, for the latter is not yet perfectly known in spite of my examination of the three cotypes.

### UPOGEBIA (CALLIADNE) DELTAURA (Leach)

Fig. 8—8b.

*Gebia deltaura* W. E. Leach, in: Transact. Linnean Soc. London, XI, 1815, p. 342.

*Gebia deltura* W. E. Leach, Malacostr. Podophth. Brit. T. XXXI, figs. 9—10.

*Gebia deltura* H. Milne Edwards, Hist. Nat. Crustacés. II, 1837, p. 314.

*Gebia deltura* Th. Bell, A History of the British Stalk-eyed Crustacea, London 1853, p. 225.

*Gebia deltaura* Th. R. R. Stebbing, A History of Crustacea. Recent Malacostraca. London 1893, p. 186.

*Gebia deltura* W. De Morgan, in: Journal Marine Biol. Assoc. Plymouth. New Ser. Vol. VIII. No. 5, 1910, p. 475, fig. 2.

*Gebiopsis deltura* K. Stephensen, in: Vidensk. Meddelelser fra den Naturhist. Forening i Kjöbenhavn for Aaret 1909, Kjöbenhavn 1910.

*Upogebia (Gebiopsis) deltaura* C. M. Selbie, The Decapoda Reptantia of the coasts of Ireland. London 1914, p. 103.

*Upogebia (Gebiopsis) deltaura* O. Pesta, Die Decapodenfauna der Adria. Leipzig und Wien 1918, p. 199, fig. 62.

*Upogebia (Gebiopsis) deltura* G. E. Webb, in: Journal Marine Biol. Ass. Plymouth. New Ser. Vol. XII, 1919, p. 85, Pl. I—IX, Pl. X fig. 1, Pl. XI fig. 1, Pl. XII fig. 1—4, 7, 8.

A male from the coast of Plymouth, kindly sent me by the Direction of the Biological Laboratory in this town, could be examined.

This specimen, 55 mm. long, is not yet full-grown, because according to Selbie (l. c.) this species attains the length of 100 mm., according to Webb (l. c. p. 81) even the length of 5 or 6 inches. Front (Fig. 8) trilobed. The rostrum which is slightly directed downward and 3 mm. long, measures  $\frac{1}{3}$  the length of the cephalothorax, which is 19 mm. long, and reaches almost to the distal end of the penultimate segment of the antennal peduncle, *as far beyond the eyestalks as they are long*; in De Morgan's figure (l. c.) it extends only half as far forward. The rostrum,  $1\frac{1}{2}$ -times as long as the distance between

the lateral rostral teeth of the 3rd pair that project the most laterally, bears on the right side 5, on the left 4 teeth, but there are none on the slightly concave upper surface; the two teeth of the anterior pair are separated by a narrow interspace and directed obliquely upward and a little outward; the teeth of the 2nd pair are directed a little more outward and those of the 3rd still more, so that the tips of the latter are the farthest distant from one another; the teeth of the 2nd pair are  $1\frac{1}{2}$ -times as far distant from the 1st as from the 3rd. The 2nd tooth on the right side is a little smaller than the third, probably an individual variation. The teeth of the 4th pair are only half as high as the 1st, 2nd and 3rd, are placed more inward and perpendicular to the surface, not turned outward; on the right side — not on the left — I observed still a 5th tooth, placed like the 4th. Lower border of the rostrum unarmed. The interspace between the rostrum and the lateral frontal lobes, i. e. the anterior teeth of the lateral ridges of the cephalic region, is less broad than in *Upog. Savignii* and *Upog. rhadames* and the lateral grooves become more shallow posteriorly; this anterior tooth is still a little larger than the rostral teeth of the anterior pair and directed obliquely upward and outward. The 15 or 16 teeth of each lateral ridge decrease in size backward and extend to near the cervical groove, the ridges are a little concave, the concavity on the outer side. The tubercles of the gastric region extend also till near the cervical groove, decreasing gradually in size, at either side of the midline, on which only one or two are placed; in front of each tubercle a tuft of dark brown hairs is implanted, the scabrous surface reaching until near the cervical groove. The upper surface of the rostrum is glabrous in the middle.

In the deep furrow between the rostrum and the foremost tooth of the lateral ridges the eyes are visible.

The 6th segment of the abdomen presents its greatest width of 10,3 mm. anteriorly and is 5,7 mm. long, almost twice as broad as long; posterior border smooth. The telson presents its greatest width of 8 mm. at  $\frac{1}{3}$  its length from the anterior border and is  $6\frac{1}{4}$  mm. long, about  $\frac{1}{3}$  broader than long. Behind the greatest width the lateral edges are a little concave and make obtuse angles with the straight posterior border; the upper surface has anteriorly a transverse carina, which is deeply grooved on either side, the lateral carinae are smooth, there is a fine median groove and the surface is rather coarsely punctate. The basal joint of the uropods that are as long as the telson, bears posteriorly a spinule, there is also a spinule at the base of the outer uropod; the arcuate apical border of the outer uropod and the straight apical border of the inner are, as in other species, beset with small acute teeth.

The antennular peduncle (Fig. 8a) reaches almost to the middle of the terminal segment of that of the outer antennae, the flagella that are nearly of equal length, project by  $\frac{2}{3}$  their length beyond the antennal peduncle; the 1st segment, long 2 mm., ends in a sharp spine, the 2nd is 0,9 mm. long, the 3rd, 3,3 mm. long, longer than the 1st and 2nd taken together and 9-times as long as thick in the middle, appears *very slender*; the thinner flagellum, composed of 13 joints, is nearly as long (3,4 mm.) as the 3rd segment of the peduncle and a little longer than the other flagellum, which, composed of 17 joints, is 3,1 mm. long.

Chelipeds (Fig. 8b) equal. Coxa with a spine at the distal end of the inner border. Lower border of the ischium with a spine near the distal extremity and 3 or 4 much smaller ones on the proximal half. Merus twice as long as broad, with a small spine at the inner side of the upper border at  $\frac{1}{4}$  its



length from the carpus; lower margin with 3 or 4 small spines on the proximal half. Carpus with a small spine at the distal end of the upper border, this spine measuring  $\frac{1}{4}$  the length of this border; near this spine at the inner side a small sharp tubercle on the distal border and 2 or 3 similar minute tubercles on the outer side; spine at the distal end of the lower border a little smaller than that of the upper, a longitudinal groove on the middle of the outer side. Palmar portion of the right chela 10 mm. long, 6 mm. broad in the middle,  $1\frac{1}{2}$ -times as long as broad; upper border slightly curved with a very small sharp tooth near the distal end, lower border in the right leg with one, in the left with two similar spinules, placed close together, not far from the proximal extremity. There is a minute sharp tooth on the distal border of the outer side of the palm just below the articulation of the dactylus, a similar denticle exists on the distal border of the inner surface, but here it is placed a little farther distant from the lower border than from the upper; for the rest both the outer and the inner surface are smooth, without tubercles or spines, but one observes on the lower half of the outer surface a V-shaped row of tufts of hair that, beginning not far from the carpus, runs obliquely upward to near the distal border; a longitudinal row of transverse tufts of setae occurs just below the upper border and there are also on this border. Dactylus just as long (6 mm.) as the palm is broad, a little more than half as long as the palm, of a rather stout shape, the height (2 mm.) of this finger being one-third its length; the slightly curved, upper border carries a row of 13 or 14 low tubercles, that are not all contiguous to one another, while both the outer and the inner border of the upper surface present 9 or 10 crenulations; these three rows do not extend to the tip of the finger, between the proximal extremity of the outer row of crenulations and the articulation are situated a pair of smooth granules. About at  $\frac{1}{3}$  its length from the articulation the prehensile border of the dactylus bears a rather small obtuse tooth which is followed by 6 or 7 smaller ones, not reaching to the tip of the finger. The somewhat laterally compressed, fixed finger reaches just beyond the middle of the horizontally stretched dactylus, that part which projects beyond the distal border of the palm is almost half as long as the latter, of which the lower border is concave; the proximal half of the prehensile edge bears 5 subacute teeth, of which the 5th or distal one is the largest, then follow, as regards their size, the 1st, the 4th, the 3rd and the 2nd; the distal half is smooth and the pointed tip is slightly curved upward.

Coxa of 2nd legs with a sharp spine curved downward at the proximal end of the inner border, merus with a small spine near the distal end of the upper border, lower margin like that of the merus of 1st legs with long hairs. Lower border of the merus of 3rd legs beset with some subacute tubercles. *Upogebia (Calliadne) deltaura* Leach shows, according to Mr. Webb, a uniform dirty cream colour.

Geographical distribution: Bohuslän, near the Koster-islands and in the Gullmarfjord (Goës). Kattegat (Stephensen). Coasts of East Friesland (Metzger). Off Helgoland (Metzger). North-east coast of Scotland (Sim), coasts of Ireland (Selbie), South coast of England (Salcombe, De Morgan), Channel Islands (Sinel), Mediterranean (Malta (Webb),) Cazza-island (Adensamer), Southern Adriatic (Pesta).

#### UPOGEBIA (CALLIADNE) sp. $\alpha$ .

Two specimens, collected July 23th 1906 by Prof. Ch. Gravier on the beach of Bella Vista, Island of San Thomé, kindly sent by him under the name of *Gebiopsis nitidus* A. M.-Edw.; they belong to the Paris Museum.

The cephalothorax of the larger specimen is about 6,7 mm. long, the distance between the apex of the rostrum and the deep cervical sulcus 4,4 mm. Measured to the base of the teeth at the anterior extremities of the lateral ridges, the rostrum proved to be 0,8 mm. long, these teeth are 1,32 mm. distant from one another. The rostrum, of which the anterior part is slightly directed downward, reaches but a little beyond the eyestalks and the lateral borders carry each on the anterior half two teeth; the teeth of the anterior pair, looked at from above, are 0,26 mm., those of the posterior pair 0,66 mm. distant from one another and the two teeth of each border are little farther distant from one another than those of the anterior pair, about in this manner . . . . At the level of the apices of the anterior teeth of the lateral ridges the upper surface of the rostrum bears at either side a tubercle; these two tubercles are a little less distant from one another than the rostral teeth of the posterior pair and behind them on the base of the rostrum one observes at each side another tubercle, that are as far distant from one another, Of the two teeth on the lateral border of the rostrum the anterior is a little larger than the posterior, both are, however, shorter than the hairs with which the rostrum is covered; the rostral teeth, as well the four on the lateral borders as those near the base, are a little *smaller* than the teeth on the anterior extremity of the lateral ridges. On the anterior half of the gastric region two tubercles occur in the midline, the tubercles of the lateral portions reach as far backward as the lateral ridges, but the median ones do not extend so far. Posteriorly, behind the scabrous surface, the gastric region presents at either side transverse rugosities. Behind the anterior tooth the lateral ridges bear four conical teeth of equal size, though a little smaller, then follow after a larger interspace six or seven still smaller teeth.

No spine on the antero-lateral border of the carapace.

Sixth segment of abdomen a little longer than telson, resembling that of *Upog. carinicauda*, convex longitudinally, with a groove at either side. Telson 2 mm. long, 2,65 mm. broad,  $\frac{1}{3}$  broader than long; lateral edges as in *Upog. carinicauda*, the telson presenting its greatest width along the two anterior fifth parts, where the lateral edges are concave, the remaining part also slightly concave, converging and curving into the posterior margin; *posterior margin distinctly emarginate, concave in the middle*. Like in *Upog. carinicauda* and most other species the telson bears anteriorly a slightly arcuate, transverse carina and at either side a longitudinal one, all with a few setae; a median groove, as usual, from the transverse carina to the posterior margin.

The eyestalks, of which the eyes occupy half the length, extend almost to the anterior pair of rostral teeth.

First segment of the antennular peduncle, which is probably 2 mm. long, with a small spine at the distal extremity of the lower border, the 3rd segment 0,8 mm. long and in a lateral view in the middle 0,14 mm. broad, rather slender, 6-times as long as broad. Thicker flagellum 1,4 mm. long, consisting of 13 or 14 joints; viewed laterally it shows in the middle a width of 0,14 mm., being 10-times as long as broad, with the distal third part tapering. The first proximal six joints are nearly as long as broad, the following a little broader than long. The other flagellum measures 1,6 mm., twice as long as the 3rd segment of the peduncle and consists of 11 joints, that are 3-times as long as broad. The antennular peduncle reaches barely to the distal end of the penultimate segment of that of the outer antennae, the flagella project by half their length beyond the antennal peduncle.

The rostrum extends to the distal third part of the penultimate joint of the antennal peduncle,

which is composed of four segments, the 3rd and the 4th being fused; scaphocerite 0,34 mm. long, being a movable, triangular, acute spine, lower border of 2nd segment without a spine, beset with long hairs; the 3rd segment which in a lateral view appears a little less broad on the proximal third part than on the rest, is a little longer than the 2nd and than the 4th, almost 3-times as long as broad and bears a tuft of long feathered hairs on the two distal third parts of the upper border, while also a line of hairs extends on the outer side from the proximal extremity of the lower border to the distal end of the upper. The 4th or terminal joint, a little more than half as long as the 3rd, is twice as long as broad, the flagellum, finally, 9,55 mm. long, about  $1\frac{1}{2}$ -times as long as the carapace, is composed of 68 joints.

Chelipeds equal. Ischium with 2 or 3 small teeth on the lower border, merus about twice as long as broad, upper border curved with a small spine near the distal end, lower border straight, armed along its whole length with many small acute teeth, that decrease in size from the proximal to the distal end. Carpus with a spine at the distal end of the inner border of the upper surface; on the outer side and near this border the carpus of the left leg bears one, of the right two teeth, half as long, on the distal border of the upper surface; there is also a spine at the distal extremity of the lower surface, near and above this spine a smaller acute tooth, two small teeth, finally, on the middle of the distal setiferous margin of the inner surface. When the dactylus is stretched straight forward, the chela, measured along the upper border to the tip of the dactylus, appears to be 4,8 mm. long, upper border of the punctate palmar portion 3,3 mm. long, 1,84 mm. high or broad, 1,8-times as long as broad; there are two teeth of equal size close by one another near the proximal end of the lower border (in the other younger specimen only one), two small teeth, finally, on the distal margin of the outer side just above the fixed finger. Dactylus a little more than half as long as the upper border of the palm, almost half as high at its base as long, with two subacute teeth at the base of the curved upper surface, of which the proximal is somewhat larger than the other, and with two similar teeth a little below the upper border, also near the articulation; prehensile edge with a dozen of obtuse teeth, of which the first, near the articulation, is the largest, the following are smaller and decrease in size. Immobile finger about  $\frac{1}{3}$  shorter than the dactylus, with three teeth almost of equal size on the proximal half of the prehensile edge, tapering, with the tip distinctly turned upward. Along the upper border of the dactylus long hairs are implanted and small tufts of long setae occur on the outer side of this finger, long setae exist also on the upper border of the palm at the inner side. A few small teeth occur on the upper half of the proximal border of the inner surface of the palm.

Merus of 2nd legs with a small spine near the distal end of the upper border, a minute denticle occurs also on the distal extremity of the upper border of the carpus.

The cephalothorax is 6,7 mm. long, the whole length about 19 mm. In the original description of *Gebiopsis nitidus* A. M.-Edw. (in: *Nouv. Archives du Muséum, Mémoires*, T. IV, Paris 1868, p. 63, Pl. 18, figs 4—7) the length of this species is said to be 24 mm., on the plate, however, 28 mm., while Dr. Ortmann in his description of *Geb. nitidus* (in: *Ergebnisse der Plankton-Expedition der Humboldt-Stiftung* Bd. II. G. b. Kiel und Leipzig 1893, p. 50, Taf. IV, fig. 2) does not mention the length in the text, but judging from his twice magnified figure the animal should have been nearly 35 mm. long. The specimen, described above, has thus attained almost the length of 24 mm., indicated by A. Milne Edwards and should thus have presented the characters of *Geb. nitidus*: this is,

however, not the case. In *Upog. (Calliadne) nitida* (A. M.-Edw.) the rostral teeth of the anterior pair are *contiguous to one another* and comparatively *much farther* distant from the posterior pair than in the specimen collected by Prof. Gravier. In *Upog. nitida* the chelipeds are *destitute of spines*, as also the legs of the 2nd pair, the dactylus of the 1st legs has a *stouter* shape and, finally, according to Ortmann's figure, the thinner flagellum of the internal antennae should be about 5-times as long as the terminal segment of the peduncle. In my opinion, the above described specimen should therefore not be referred to *Upog. nitida*.

Among the other known species of the subgenus *Calliadne* the specimen from San Thomé appears most related to *Upog. deltaura* Leach of the European seas, perhaps it should be considered as a very young specimen of this species, with juvenile characters: further researches must decide this question.

### UPOGEBIA (UPOGEBIA) DANAI (Miers)

Fig. 9—9d.

*Upogebia danai* (Miers), Ch. Chilton, Notes on the Callianassidae of New Zealand, Wellington 1907, p. 460 (in: Transact. New Zealand Institute, Vol. XXXIX, 1906) (Ubi literatura).

One of the three species, specimens of which were kindly sent me by Prof. Chilton, is *Upogebia (Upogebia) Danai*: a well-preserved male, long 33 mm. (carapace 12 mm., abdomen 21 mm.) and collected January 1915 at Opoulu, Kaifara Hr, was received. The specimens, examined and described by Chilton, were about 25 mm. long, Dana's specimens measured two inches nearly. Rostrum triangular,  $\frac{1}{4}$  longer than broad at its base, lateral frontal lobes measuring little more than  $\frac{1}{3}$  the length of the rostrum; the rostrum terminates in a single median tooth, the lateral borders are armed each with 5 teeth at subequal distances and slightly decreasing in size backward. The lateral lobes end in a tooth that is curved outward, their inner margin runs like a S and curves at the base into the lateral border of the rostrum; the outer margin of the left lobe is smooth, that of the right bears a tooth near the base; the lateral ridges of the cephalic region that barely diverge, carry 9 or 10 tubercles that gradually decrease in size backward. The row of tubercles on the lateral borders of the rostrum is continued backward, defining the gastric region laterally so that there are 16 or 17 tubercles from the apex of the rostrum to the end of the row; a few tubercles occur also on the posterior part of the upper surface of the rostrum and on the inner side of the lateral rows of the gastric area. The greater part of the upper surface of the gastric region is smooth and glabrous.

No spine on the antero-lateral border of the carapace, hepatic region everywhere *smooth*, posterior border of the lateral portions of the cervical groove smooth.

Sixth segment of abdomen (Fig. 9) 4 mm. long, 5 mm. broad,  $\frac{1}{4}$  broader than long, telson 3,5 mm. long, 4,25 mm. broad,  $\frac{1}{5}$  broader than long; the telson presents its greatest width just in front of the middle, from here the lateral edges converge backward and pass with a curve into the posterior margin which is very slightly concave in the middle; at the level of the greatest width one observes the barely prominent transverse ridge that bears a few hairs and that at either side passes into the lateral ridges; a narrow groove runs in the middle from the transverse ridge to the posterior margin. Both uropods are considerably longer than the telson, projecting beyond it by  $\frac{2}{3}$  their length, when directed backward; in both the apical margin is beset with small sharp teeth.

The eyestalks reach just beyond the lateral frontal lobes, cornea black. The peduncles of the inner antennae (Fig. 9a) are as long as those of the outer. The 1st joint of the antennular peduncle is 1,8 mm. long and bears a small acute spine, long 0,07 mm., at the distal end of its lower border; 2nd 0,6 mm. long, 0,46 mm. broad distally; 3rd joint 1,8 mm. long, *just as long as 1st*, 0,28 mm. broad in the middle in a lateral view, *rather slender*, 6-times as long as broad; thinner flagellum 1,45 mm. long,  $\frac{1}{6}$  *shorter* than the 3rd joint of the peduncle and composed of 10 joints, of which the 1st or proximal is 0,18 mm. long, 0,14 mm. broad, the 2nd also 0,14 mm. broad, but 0,1 mm. long, the following as broad as long or a little longer than broad, the last or terminal joint 0,22 mm. long and 0,075 mm. broad at its base, 3-times as long as broad; thicker flagellum 1,42 mm. long, consisting of 11 joints, of which the 1st or proximal is 0,24 mm. long, 0,22 mm. broad distally, the 2nd 0,16 mm. long, 0,24 mm. broad, the following much resembling the 2nd, the 6th 0,13 mm. long, 0,24 mm. broad; the following decrease in breadth, the antepenultimate 0,1 mm. long, 0,115 mm. broad, the penultimate smaller, the last 0,02 mm. long, 0,03 mm. broad. Thicker flagellum with the usual olfactory hairs, thinner very hairy, nearly of equal length, *distinctly shorter* than the 3rd joint of the peduncle.

Scaphocerite ending in two spines, of which the outer is twice as long as the inner; a spine, nearly as long as the outer, occurs near the distal extremity of the lower border of 2nd joint.

Chelipeds of *unequal* size, the left (Fig. 9b) the larger. Second joint of the left leg with a spine near the distal end of the lower border, lower border of the ischium with a sharp tooth, smaller than that of the base, near the far end and another smaller one near the proximal; merus twice as long as broad, with a small spine near the distal end of the sharply carinate, upper border, lower margin of the punctate outer surface with 4 spines posteriorly, which grow longer from the 1st. or proximal at the articulation with the ischium to the 4th, that has the same size as the spine on the 2nd joint; these four spines are followed firstly by 4 or 5 much smaller teeth gradually decreasing in size and then by many obtuse granules, until beyond the middle of the joint. Carpus half as long as the merus and little longer than broad, upper border *rather sharply carinate above*, the carina terminating with a rather small spine, a little outward on the distal border another which is slightly smaller; a *much larger* spine at the distal extremity of the lower border, no spine on the distal border of the inner surface. Palmar portion, measured along the upper border, barely longer than the merus and also about twice as long as broad; the upper border is ridged, the ridge smooth, ending abruptly just behind the distal extremity, near which one observes at the inner side a very small acute tooth, on the outer side a shallow, somewhat hairy groove runs along the ridge and it is also hairy at the inner side. The inner and the outer surface of the palm are smooth, the outer hairy on its lower half and at the base of the immovable finger; lower border hairy and armed, from the carpus to the base of the fixed finger, *with a dozen of sharp teeth* which, though of unequal size, generally grow longer from the 1st or proximal to the last; the fixed finger measures about  $\frac{1}{3}$  the length of the upper border of the palm, directed a little downward but not inward, straight, the acute tip not turned upward; this finger is everywhere smooth, the prehensile edge entire, without teeth, but one observes under the microscope on the distal border of the palm, between the fixed finger and the articulation of the dactylus, 5 very small teeth of unequal size (Fig. 9b, 9c). Dactylus little, nearly  $\frac{1}{6}$ , shorter than the upper border of the palm, almost 3-times as long as the fixed

finger, straight, upper surface grooved or concave, both borders (Fig. 9d) of the upper surface hairy and denticulate until a little beyond the middle of the finger; prehensile edge with a low rounded tooth in the middle.

Right leg *slenderer*. Base and ischium with the same spines and teeth as in the left leg; merus 3-times as long as broad, with a subdistal spine on the upper border, proximal half of the lower border with 7 acute teeth of unequal size, the 4th and the 6th equal and larger than the others; they are followed on the distal half by three microscopical teeth of unequal size. Carpus rounded above, the three spines much smaller than in the other leg. Palm almost 3-times as long as broad, lower border presenting only 5 acute teeth on the middle of its length, the 5th twice as large as the others that are equal; fixed finger comparatively *much shorter* than in the left leg, the 5 microscopical teeth increasing a little in size distally as in the other leg; dactylus almost  $\frac{1}{4}$  shorter than the upper border of the palm, inner border of the concave upper surface with 7 teeth placed on the middle third, outer border only with 2 at the base, prehensile edge entire, without a tooth.

Merus of 2nd legs 3-times as long as broad, unarmed; carpus with a small spine at the far end of the lower border. Propodus of 3rd legs with 3 microscopical teeth, situated behind one another at the distal margin of the outer surface; 4th and 5th legs unarmed, the 5th not subcheliform, the lower border of the propodus not projecting beyond its distal end.

The nearest allied species of *Upog. Danai* (Miers) is no doubt *Upog. (Upog.) Simsoni* (Thomson), first described by G. M. Thomson in 1892 from a single specimen collected on the east coast of Tasmania (in: Papers and Proceedings of the Royal Society of Tasmania for 1892. Tasmania 1893, p. 49, Pl. I, fig 3—5), while a few years later Fulton and Grant have published a more detailed description (in: Proc. Roy. Soc. Victoria, Vol. XIV (New Series), Pt. II, April 1902, p. 61, Pl. V, figs. 5, 6): they had found this species to be, fairly plentiful, burrowing under stones resting on a muddy bottom, below low water mark, inside „Black Head”, Flinders, Western Port.” When these two descriptions are compared with Chilton’s cited description of *Upog. Danai*, one finds barely any difference between the two species. It is remarkable that neither Thomson nor Fulton and Grant compare *Upog. Simsoni* with the species described by Dana under the name of *Gebia hirtifrons*, i. e. with *Upog. Danai*, so that Dana’s work has perhaps not been at their disposal, but it is still more surprising that Chilton does not compare *Upog. Danai* with Thomson’s species, for the two descriptions of this form were no doubt known to him; probably he also could not consult Dana’s work, for he writes „In his description, as quoted by Miers, Dana says etc.” (Chilton, l. c. p. 461). I therefore determined on applying to the Direction of the National Museum at Melbourne with the request to send me a specimen of *Upog. Simsoni* and so I had the pleasure to receive one of the four cotypes of this species preserved in that Museum, for which I tender my cordial thanks to the Direction. It is an ova-bearing female in perfect condition, which was collected in 1902 by the late S. W. Fulton at Shoreham, Victoria, and identified by him.

This specimen is 34 mm. long, carapace 12 mm., abdomen 22 mm. After a scrupulous examination and comparison with the male of *Upog. Danai* described above, both specimens that are of equal size, seem to differ only by the following differences. In the first place the telson of the cotype of *Upog. Simsoni* appears a little *shorter* in proportion to its width and in proportion to the length of the 6th

somite than in the specimen of *Upog. Danai*. In the specimen of *Upog. Simsoni* the 6th abdominal somite is 4,1 mm. long and 5,4 mm. broad, the telson 3,3 mm. long and 4,5 mm. broad; in the specimen of *Upog. Danai* the 6th somite is 3,8 mm. long, 4,9 mm. broad, the telson, however, 3,5 mm. long and 4,25 mm. broad. The other difference is presented by the fixed finger of the 1st pair of legs. While the palmar portion of the chela of the specimen of *Upog. Simsoni* appears also twice as long as high and shows, like the dactylus, the same characters as in the specimen of *Upog. Danai*, the fixed finger is *shorter* and of a *stouter* shape, that part of it which projects beyond the distal border of the palm, appearing only *one and a half as long as high* at its base; the prehensile edge is armed on the proximal half *with 4 small subacute teeth* that decrease in size from the 1st or proximal to the 4th, but the distal border of the palm between the fixed finger and the articulation of the dactylus appears *unarmed*. Fulton and Grant therefore rightly wrote (l. c. p. 63): „Its lower distal extremity (namely of the hand) is extended into a strong, short, rudimentary, inferior finger, which is toothed on its upper margin for its posterior half.”

For the rest the two specimens do not seem to differ. The shape and armature of the front, the rostrum and the cephalic part of the cephalothorax are like in the specimen of *Upog. Danai*; the hepatic region bears a diagonal line of 3 to 4 small tubercles, in the specimen of *Upog. Danai* this region appears smooth. The antennular peduncle is as long as that of the outer antennae and fully agrees, like also the flagella, with that of *Upog. Danai*. The 1st joint of the antennular peduncle proved, in the cotype of *Upog. Simsoni*, to be 1,6 mm. long, with a minute spine (as in *Upog. Danai*) at the distal end of the lower border, the 2nd 0,5 mm. long and 0,4 mm. broad distally, the 3rd 1,5 mm. long, 0,22 mm. broad in the middle, in a lateral aspect, appearing 7-times as long as broad. Thicker flagellum 1,32 mm. long, composed of 11 joints, the 1st or proximal 0,2 mm. long, 0,22 mm. broad, the 2nd 0,14 mm. long, 0,22 mm. broad, the 6th 0,12 mm. long, 0,22 mm. broad, the antepenultimate 0,1 mm. long, 0,14 mm. broad, the terminal joint 0,06 mm. long, 0,07 mm. broad. The thinner flagellum measures also 1,32 mm. and consists of 9 joints (in the specimen of *Upog. Danai* 10); the 1st joint is 0,2 mm. long, 0,16 mm. broad, the 2nd 0,12 mm. long and 0,16 mm. broad, the terminal joint 0,17 mm. long, 0,07 mm. broad at base. Like in *Upog. Danai* the two flagella are of *equal* length and *shorter* than the 3rd joint of the peduncle.

Eggs very numerous, small, 0,55—0,6 mm. long, a little less broad. The above-mentioned observations are, in my opinion, not decisive as regards the question whether the two species are indeed different or not, especially also because the two examined specimens are of different sex: when further researches should, however, prove that the described differences are permanent and that they occur also in the other sex, in this case Thomson's species should be considered as indeed different from *Upog. Danai*.

The Siboga-Expedition has collected at Stat. 149, on the west coast of Gebé-island, a male specimen of a species of the subgenus *Upogebia*, which perhaps will once prove to be a young stage of *Upog. Danai* or *Upog. Simsoni*, being only 14 mm. long. A detailed description with 7 figures of this specimen will appear in my work on the Callianassidae of this Expedition, it differs especially from these two species by the rostrum being separated by *broad* interspaces from the lateral frontal teeth; from *Upog. Danai* moreover by the *stout* shape of the 3rd joint of the antennular peduncle and by the flagella being almost *twice as long* as this joint, by the *smaller* teeth on the lower border of merus

and palm of the larger cheliped and by the lower border of the smaller chela being *entire, not toothed at all*. The 5th legs are subchelate.

### UPOGEBIA (UPOGEBIA) OSIRIDIS (Nobili)

Fig. 10—10b.

*Upogebia Osiridis* G. Nobili, in: Bull. Mus. d'hist. nat. Paris, 1904, No. 5, p. 235 and in: Bull. Scientif. France et Belgique, XL, 1906, p. 62, Pl. IV, fig. 14.

A male and an egg-bearing female collected at Aden, kindly sent me by the Direction of the Zoological Museum at Turin.

The rostrum (Fig. 10) extends almost by half its length beyond the eyestalks, is horizontally directed forward and bears on each lateral border 4 or 5 conical, subacute teeth that decrease in size from the anterior to the posterior; in the larger specimen, the female long 31 mm., there are only 3 teeth on the left side, but 4 on the right (Fig. 10 and 10a); the teeth of the anterior pair are placed immediately behind the rounded, setiferous tip. The upper surface of the rostrum is concave in the middle, bears no teeth, but is very hairy on each side; the rostrum, nearly  $\frac{1}{4}$  longer than broad at its base, is separated by a deep groove from the anterior tooth of the lateral ridges of the cephalic region and this tooth is subacute, directed obliquely upward and a little outward and barely larger than the anterior pair of rostral teeth; this anterior tooth is followed by four somewhat smaller teeth at unequal distances and after these by six much smaller teeth, the lateral ridges presenting 11 or 12 teeth at all; these ridges diverge backward and extend to near the lateral portions of the cervical groove. The sharp teeth on the lateral parts of the gastric region reach as far backward as the lateral ridges, so that the posterior third part of the surface between the tip of the rostrum and the cervical groove appears smooth and glabrous; the gastric region bears about 40 teeth.

Like in *Upog. (Upog.) Danai* (Miers), also in this species, in which the fixed finger of the 1st legs is much shorter than the dactylus, *no tooth or spine* occurs on the antero-lateral border of the carapace.

Of the female, long 31 mm., the telson is 3,2 mm. long, 4 mm. broad, a little broader than long; the posterior margin appears more concave in the middle than in fig. 14a of the original description, the postero-lateral angles are rounded; behind the transverse carina the upper surface presents a median furrow and on each side of it roundish pits. The basal joint of the uropods bears posteriorly a small sharp spine, which Nobili has not observed and a rather sharp denticle occurs also at the base of the outer uropod; directed backward the uropods appear a little longer than the telson, their apical edges are beset with sharp spinules.

The eyestalks reach to the 2nd pair of rostral teeth, counting up from the tip; cornea small, black.

The antennular peduncle (Fig. 10b) extends to the 2nd third part of the terminal segment of that of the outer antennae. The 1st segment is 1,35 mm. (1,2 mm.)<sup>1)</sup> long, with a minute spine, long 0,14 mm. in the female, at the distal extremity of the lower border; 2nd segment 0,4 mm. (0,32 mm.) long and anteriorly 0,46 mm. (0,39 mm.) broad, 3rd segment long 1,7 mm. (1,6 mm.), in the middle

<sup>1)</sup> The numbers in parenthesis are those of the male, which is smaller.



0,26 mm. (0,25 mm.) broad, about 6-times as long as broad; like the 2nd also the 3rd is provided with long setae. The thicker flagellum is 2,48 mm. (2 mm.) long, composed of 16 or 17 (14 or 15) joints, of which the 9 first ones have about the same length and width, while in the following these measurements decrease; the other thinner flagellum is 2,7 mm. (2,32 mm.) long and composed of 13 or 14 (12 or 13) joints, that are all longer than broad.

Nobili's description of the antennular peduncle proves thus to be wrong (l. c. 1906, p. 63), for he describes the two first segments as subequal and very short, the 3rd as being twice as long as the two first taken together.

Chelipeds equal. Ischium with a small tooth at the distal extremity of the lower border. Upper border of merus *unarmed*, lower surface with a row of microscopical teeth on the inner border and a row of still smaller ones on the outer; carpus at the distal extremity of the upper border with one or two very small teeth, at the distal end of the lower with a *long* spine. Measured along the upper border the palmar portion proves to be 4,5 mm. long in the male and 3 mm. broad or high,  $1\frac{1}{2}$ -times as long as broad, in the female just as broad, but 5,5 mm. long, almost twice as long as broad, dactylus nearly as long as the palm; when the dactylus is stretched out straight forward, the fixed finger reaches only to the 2nd fourth part of the former, the fixed finger bears 3 teeth that decrease in size from the proximal to the distal one. Upper border of the palm with two parallel carinae, of which the inner bears a row of 18—20 small teeth and at the distal end a larger acute tooth above the articulation; the inner surface of the palm is hairy on the upper half and near the articulation, while near the lower border a hairy ridge or carina runs from the proximal end to midway that border; the lower border of the palm is fringed with long hairs and *denticulate*. Nobili thus mistakes when writing (l. c. 1906, p. 63): "du côté inférieur elle (la paume de la main) est dépourvue de dents". On the distal half of the lower half of the outer surface of the palm are placed some small teeth, before which hairs are implanted and there are 3 small teeth on the distal border between the fixed finger and the articulation of the dactylus; these 3 teeth are probably wanting in the male. Upper surface of the dactylus smooth, bounded by two hairy crests, prehensile edge with about a dozen of obtuse teeth, of which the 1st or proximal is larger than the others; inner side with a hairy granular ridge, placed much closer by the upper border than by the lower and bearing a dozen of granules that become smaller distally. Other legs without teeth or spines.

Eggs globular, 1 mm. broad.

The nearest allied species seems to be *Upog. pugettensis* (Dana) from the west coast of North America. Geographical distribution: Red Sea, Djibouti, Aden (Nobili).

#### UPOGEBIA (UPOGEBIA) ISSAEFFI (Balss)

*Gebia (Upogebia) Issaeffi* H. Balss, in: Zoologischer Anzeiger, Bd. XLII, 1913, p. 239 and in: Ostasiatische Decapoden II. Die Natantia und Reptantia. München 1914, p. 89, fig. 48 and 49 (Abhandl. der math.-phys. Klasse der K. Bayer. Akademie der Wissenschaften. II. Suppl. Bd. 10. Abhandl.).

Among the specimens which upon my request Prof. Balss of Munich has been so kind to send me,

is also a type of *Upog. Issaeffi* from Wladiwostok, a male long about 36 mm. Though the chelipeds that especially characterize this species, have been described and excellently figured by the author, the following remarks will, I trust, be still welcome.

Rostrum triangular, almost twice as long as broad at base, each lateral border with 4 equal, short, acute teeth, placed at subequal distances from one another. Lateral ridges of the gastric region with 11 or 12 teeth, of which the foremost one is the largest, the following slightly decreasing in size; the foremost teeth, i. e. the lateral frontal teeth, measure  $\frac{1}{4}$  the length of the rostrum. Lateral grooves slightly divergent. No teeth in the midline of the gastric region, excepting the usual one at the end of the median groove of the rostrum; posterior fourth of the distance between tip of rostrum and cervical groove smooth, glabrous. Rostrum and anterior part of the gastric region hairy as usual. Lower border of rostrum unarmed. Under a strong magnifying-glass the lower oblique part of the cervical groove below the *linea thalassinica* appears very obscurely granular.

Spine on antero-lateral border of carapace distinct.

Sixth abdominal somite 4,5 mm. long, 6,25 mm. broad, with an obtuse tooth in the middle of its lateral borders. Telson 4,5 mm. long, just as long as 6th somite, 5,5 mm. broad, a little broader than long, lateral margins barely a little convergent, postero-lateral angles rounded, posterior margin slightly concave in the middle; transverse and lateral carinae little developed, median groove distinct, surface coarsely pitted on each side of it.

Eyestalks half as long as the rostrum, cornea black.

Internal antennae 7 mm. long,  $\frac{1}{5}$  the length of the body; 3rd joint of the peduncle 1,7 mm. long, slender, 8,5-times as long as thick in the middle when looked at from above, but 6,5-times in a lateral view; upper or outer flagellum 2,6 mm. long, one and a half as long as the 3rd joint of the peduncle and composed of 18 segments, thinner flagellum 3,1 mm. long with 15 segments.

Ischium of the equal chelipeds with a spine near the distal end of the lower border. Merus a little more than twice as long as broad, with a rather small spine near the distal end of the upper border, lower border of outer surface finely granular, lower surface with a row of 5 acute spines. Upper border of carpus finely granular with a large spine at the distal extremity, on the outside of which the distal margin bears still 3 much smaller spines that gradually decrease in size; as in other species a spine which is a little smaller than the large one, occurs on the distal border of the inner surface, a little nearer to the upper than to the lower border and a still smaller spine is found at the distal end of the lower surface; the ridge on the lower border of the outer surface is smooth. Palmar portion of the chela almost twice as long as high, with a longitudinal ridge on the upper border of the outer surface, that appears somewhat uneven proximally, smooth along the greater middle part, with 4 or 5 granules distally and a small sharp spine outside of the distal extremity; parallel with it on the inner side another faintly serrulate, longitudinal line. Both the outer and the inner surface of the palm are smooth, excepting an oblique row of acute granules, interrupted in the middle, on the lower part of the former with a sharp tooth at the distal end just below the finger-cleft; a few hairy lines exist on the outer surface, one or two on the inner. Immobile finger turned inward and downward, with a conical tooth a little nearer to the base than to the tip, lower border until to the carpus smooth. Dactylus a little shorter than the palm; one observes on the upper surface a longitudinal crest that bears on its outer side *a row of very fine, crowded, transverse striae*, about 100 in number,

broadest in the middle and narrowing towards the tip, perhaps a stridulating ridge (Balsl. c.); a row of 7 granules occurs on the proximal half of the lower border of the outer surface and close by this border a ridge or crest runs on the outer surface until to the tip and this ridge is also granulated on its proximal half, while along the lower border and between the two rows of granules the finger is very hairy; lower border of the inner surface granulate and hairy, lower surface with a row of 9 or 10 oblique ridges or tubercles and with two obtuse teeth on its outer border (the lower border of the outer surface), of which the proximal is somewhat larger than the other and that are placed opposite to the tooth and the tip of the fixed finger.

Coxa of 2nd legs with a small acute tooth on lower border, merus 4-times as long as broad, with a small spine near the distal end of the upper border, a spine nearly of the same size at the proximal end of the lower border and another smaller one just before it.

Merus of 3rd legs likewise 4-times as long as broad, with 7 or 8 acute teeth on their lower border that is hairy.

Exopodite of pleopods elliptical, pointed, endopodite half as long, rounded.

### UPOGEBIA (UPOGEBIA) LITTORALIS (Risso)

Fig. II—IIb.

*Thalassina littoralis* A. Risso, Hist. Nat. des Crustacés des environs de Nice, Paris 1816, p. 76, Pl. 3, fig. 2.

*Gebia littoralis* H. Milne Edwards, Hist. Nat. Crust. II 1837, p. 313.

*Gebia littoralis* C. Heller, Die Crustaceen des südlichen Europa. Wien 1863, p. 205, Taf. VI, fig. 12—15.

*Gebia littoralis* P. Fischer, in: Actes de la Soc. Linnéenne de Bordeaux, Paris, T. XXVIII, 1872, p. 15.

*Gebia littoralis* V. Czerniavsky, Crustacea Decap. Pontica Littoralia. Charkov 1884, p. 85.

*Gebia littoralis* A. Ortmann, in: Zoolog. Jahrb. VI. Abth. f. Syst. Jena 1891, p. 53, Taf. I, fig. 6.

*Upogebia (Upogebia) littoralis* O. Pesta, Die Decapodenfauna der Adria. Leipzig und Wien 1918, p. 197, fig. 61 (partim) (ubi literatura).

One younger and two adult males from the Gulf of Naples, belonging to my private Collection of Decapoda, respectively 48 mm., 46 mm. and 39 mm. long.

Front tridentate, as in *Upog. stellata*. Rostrum extending horizontally forward to just beyond the middle of the penultimate segment of the antennal peduncle, about  $1\frac{1}{2}$ -times as long as broad at its base, broader than that of *Upog. stellata* and *Upog. gracilipes*, lower border unarmed; each lateral border bears 4 or 5 teeth, the teeth of the anterior pair immediately behind the obtuse rounded tip of the rostrum, separated by a small interspace, the teeth only half as high as the rostrum; these anterior teeth are a little larger than the following. The rostrum is separated by a triangular incision from the anterior teeth of the lateral ridges of the gastric region, so that the eyestalks that reach to the anterior pair of rostral teeth are entirely visible, the lateral diverging grooves become gradually less deep backward. The lateral crests or ridges of the cephalic region that extend to near the cervical groove, are armed each with 13 or 14 acute teeth, of which the anterior one is the largest and nearly

as large as the anterior tooth of the lateral borders of the rostrum, the following are smaller and decrease in size backward. The upper surface of the rostrum is grooved longitudinally, the groove reaching to the middle of the gastric region, and bears posteriorly at each side 1 or 2 small teeth; the small acute teeth of that region are placed in two or three rows, that extend on each side as far backward as the lateral ridges, but in the middle they are separated by a smooth interspace, *broader* than in *Upog. stellata* and *deltaura*, so that on the posterior half of the gastric region the smooth median part appears as broad as the lateral parts that are covered with tubercles, together with the furrows and the lateral ridges. In one adult specimen no tubercles exist in the midline of the gastric region, but in the two other specimens a tooth or tubercle is here observed at the end of the median furrow.

The antero-lateral border of the carapace is armed with a spine behind the eye. As in *Upog. stellata* and *gracilipes* the lateral portions of the cervical groove are bordered behind, just below the linea thalassinica, with some sharp granules, a few also above the linea.

Sixth segment of the abdomen  $1\frac{1}{2}$ -times as broad as long, slightly broader in proportion to the length than in *Upog. stellata*, in which it is only  $\frac{1}{4}$  broader than long; the telson appears in proportion to the length of the 6th segment as long as in Montagu's type species of the genus, almost  $1\frac{1}{2}$ -times as broad as long and presents nearly the same shape, but the posterior margin is straight, not emarginate and the transverse carina is situated more forward, as in *Upog. deltaura*; as in this and other species the transverse carina is deeply furrowed and there is a longitudinal median furrow on each side of which the upper surface appears rugose. Spinule at the base of the outer uropod small, smaller than that on the basal joint. The uropods resemble those of *Upog. stellata*, the outer is just as long as broad, apical border armed in both with small sharp teeth, ribs smooth, not denticulate, those of the inner uropod hairy on their posterior border.

The antennular peduncle reaches about to the middle of the terminal segment of that of the outer antennae. First segment of antennular peduncle 2 mm. long, armed, as in *Upog. stellata* and *Upog. gracilipes*, at the distal end of the lower border with a spine, that reaches to the distal third part of the lower border of the 2nd segment, which is 0,8 mm long; the 3rd segment, 2,4 mm. long, 3-times as long as the 2nd, is somewhat shorter than the 1st and 2nd taken together and appears  $5\frac{1}{2}$ -times as long as broad in the middle, looked at laterally, being *a little more slender* than in *Upog. stellata*, though not so slender as in *Upog. deltaura*. The thicker flagellum, 4 mm. long, about  $\frac{1}{4}$  shorter than the peduncle, consists of 19 joints that are nearly as long as broad or a little longer than broad or broader than long, as is the case in the 7 last joints, excepting the terminal one; the thinner flagellum is 4,4 mm. long,  $\frac{1}{10}$  longer than the other and is composed of 16 joints which are all longer than thick. Scaphocerite of outer antennae triangular, terminating in a sharp spine.

Chelipeds (Fig. 11—11b) equal. Inner border of the coxae with a sharp spine, curved forward, at the distal end. Lower border of ischium with 4 or 5 spines that increase in size distally. Merus a little more than twice as long (8 mm.) as broad (3,5 mm.), upper border somewhat curved with a spine at  $\frac{1}{4}$  its length from the distal extremity, at the inner side; lower border of outer surface with acute granules, that become smaller distally; on the proximal half of the lower surface 2—6 larger sharp spines are implanted, that are followed on the remaining part of that surface by much smaller spines. Carpus half as long as the merus, with a comparatively small spine at the distal end of the upper border, close by

and outward of this spine 2 much smaller teeth of equal size are observed (Fig. 11 and 11a), spine at the distal end of the lower border barely larger than the upper; the distal border of the carpus is hairy, that of the inner side bears near the upper spine very long hairs that reach to the middle of the propodus. This species is especially characterized by the form of the chela. Upper border of propodus 9,25 mm. long, lower border until to the apex of the fixed finger just as long, height or width of propodus near the carpal articulation 4 mm., distance between the distal extremity of the upper border to the tip of the fixed finger 6,5 mm., height or width of the propodus in the middle at the base of the immovable finger 6,25 mm.; dactylus 7,75 mm. long, fixed finger 3,2 mm. The propodus is thus a little longer than the merus and  $1\frac{1}{2}$ -times as long as broad in the middle; the slightly curved upper border of the outer surface of the palm presents a smooth crest or ridge from the proximal to the distal extremity, at the inner side and parallel with this ridge there is another crest that begins, slightly curved, at the proximal end of the former (Fig. 11a), reaching about to the distal third of the upper border and which is armed with smooth granules of unequal size. Along the smooth ridge a shallow, finely hairy groove runs parallel with it; at the inner side this ridge bears a few hairs, between both ridges the upper border is punctate and long hairs exist at the inner side of the granulated ridge. Near the upper border the distal margin of the palm bears a thick acute spine (Fig. 11, 11a) and a little more backward near the smooth crest another which is much smaller. The proximal margin of the outer side of the palm is thickened like a crest, the outer surface itself is smooth, hairy near the articulation of the dactylus and on its lower portion, one observes here also some smooth granules on the distal half above the fixed finger. The lower surface of the palm (Fig. 11b) is flattened until midway between the carpus and the articulation of the dactylus; the base of this triangular lower surface is contiguous to the carpus, the apex anteriorly and this surface is bounded at each side by a denticulate crest, the outer crest is denticulate along its whole length, on the inner the small teeth are less numerous but sharper; near the two crests and also on the flattened lower surface long hairs are implanted. The conical fixed finger is as long as the flattened lower surface of the palm and directed obliquely downward and a little inward; this finger is everywhere smooth, without teeth and projects barely beyond the articulation of the dactylus. On the inner side of the palm long hairs are implanted on the upper half (Fig. 11a), a S-shaped granular crest runs along the proximal border of the lower half and on this lower half smooth granules are observed, near some of which hairs are implanted. Excepting the two acute teeth at the distal end of the upper border, neither the distal border of the outer side nor that of the inner are armed with a tooth or spine. The dactylus, 7,75 mm. long, is only  $\frac{1}{6}$  shorter than the upper border of the palm, slightly arcuate, rather slender, the width or height at the base measuring  $\frac{1}{3}$  the length; the dactylus is  $2\frac{1}{2}$ -times as long as the free part of the other finger. The slightly concave, upper surface of the dactylus is bounded at each side by a smooth ridge, at the proximal end the external ridge bears 4 or 5 granules, the inner 2 or 3 rather obtuse denticles; outer side near the ridge hairy; a little behind the middle the prehensile edge bears a small obtuse tooth and immediately behind it on the outer side 3 still smaller teeth, of which the 1st or proximal is the largest; between the first mentioned tooth and the tip of the finger there is a row of 11 or 12 low rounded denticles. On the inner side of the finger close by the ridge of the upper surface one observes a narrow hairy groove, bounded by a crest that bears a few granules proximally, near and below this crest there is still another on the distal half and near the finger-cleft are

3 small granules; there are also hairs on the inner side of the teeth. When the dactylus is turned downward, it projects by the distal fourth part beyond the fixed finger.

Coxae of 2nd legs with a spine at the proximal end of their inner border. Merus 4-times as long as broad, upper border with a spine near the distal end; lower border with 2 spines near the proximal extremity, on the right leg placed close by one another, on the left a little more distant and the 2nd spine is here smaller than on the right leg; carpus with a small spine at the distal end both of the upper and the lower border.

Merus of 3rd legs with 3 small spinules on the lower border, the 1st near the proximal extremity, the 2nd, of the same size, in the middle, the 3rd, microscopical, on the distal end; upper border unarmed.

According to Dr. O. Pesta *Upog. littoralis* attains the length of 6 centim. and presents, full-grown, a pale whitish or greenish colour, while the abdomen should be often transparent; after Mr. Webb (l. c.) this species is of a greenish gray colour.

In 1884 G. O. Sars has described the development of a species of *Upogebia* from the coast of Norway, which he referred to *Upog. littoralis* (Risso); Webb (l. c.) proved, however, that both species are different, so that in this case five species should inhabit the coasts of Europe.

Geographical distribution: Black Sea (Czerniavsky); Mediterranean (Nizza, Naples, Messina (Risso, H. Milne Edwards, Heller, Ortmann, Thiele)); Adriatic (Heller, Pesta); coast of Portugal (Osorio); Southwest coast of France (Fischer).

### UPOGEBIA (UPOGEBIA) CAPENSIS (Krauss)

Fig. 12.

*Gebia major*, var. *capensis* F. Krauss, Die Südafrikanischen Crustaceen, Stuttgart 1843, p. 54.

*Upogebia capensis* (Krauss), H. Lenz und K. Strunck, Die Dekapoden der deutschen Südpolar-Expedition 1901—1903. I. Brachyuren und Macruren mit Ausschluss der Sergestiden. Berlin 1914, p. 291 (ubi literatura).

*Upogebia capensis* (Krauss), H. Balss, in: L. Schultze, Zool. und anthropol. Ergebnisse einer Forschungsreise im westl. und zentralen Südafrika. Fünfter Band, zweite Lieferung. Jena 1913, p. 108 (62), Fig. 8 (left anterior leg, inner side).

*Gebia africana* A. Ortmann, Crustaceen der Semonschen Forschungsreisen, Jena 1894, p. 22, Taf. II, fig. 4 (Jenaische Denkschriften VIII).

?*Gebia subspinosa* W. Stimpson, in: Proc. Acad. Nat. Scienc. Philadelphia 1860, p. 22.

2 females, one of which is full-grown and egg-bearing, collected by L. Schultze in Lüderitz Bay, South West Africa, were kindly sent me for examination by Professor H. Balss of Munich.

The egg-bearing female is 66 mm. long, the other 55 mm. Rostrum and gastric region like in *Upog. major* (de Haan), but the lateral borders of the rostrum bear each 5 or 6 teeth and the lateral grooves of the cephalic region *diverge in a lesser degree posteriorly*; lateral ridges each with 12 teeth, terminal tooth of each ridge, i. e. the lateral frontal lobe, about  $\frac{1}{4}$  the length of the rostrum. Spine on anterolateral border of carapace small, distinct, lateral sides of gastric region smooth.

Telson (Fig. 12) of the larger female 7 mm. long, 10 mm. broad a little before the middle, almost  $1\frac{1}{2}$ -times as broad as long; lateral margins at first slightly divergent, a little concave, then curving into the straight remaining parts that slightly converge, so that the posterior margin, which is a little concave in the middle, measures  $\frac{4}{5}$  the greatest width; transverse and lateral carinae depressed, median furrow distinct.

First joint of antennular peduncle with a spine at the distal end of lower border, 2nd joint 1 mm. long and almost just as broad, 3rd joint 3,6 mm. long, and, measured laterally, 0,56 mm. broad in the middle, 6,4-times as long as broad; the thicker flagellum, 4,8 mm. long,  $\frac{1}{3}$  longer than the 3rd joint of the peduncle, appears *somewhat shorter* with regard to the 3rd joint than in *Upog. major* (de Haan) and is composed of 22 joints; the 1st joint a little longer than thick and a little longer than the following, that are nearly as broad or slightly broader than long, the last joint conical; thinner flagellum probably a little longer than the other. Scaphocerite of antennal peduncle rather large, terminating in a sharp spine.

The eyestalks reach to the middle of rostrum.

Anterior legs equal. Coxa with a small sharp spine at the distal end of the lower border of the inner surface; lower border of ischium with 4 or 5 acute teeth, of which the two distal ones are somewhat larger than the preceding; merus 11 mm. long and about half as broad, with a small spine near the distal end of the upper border; outer surface smooth except near the lower border where it is obliquely wrinkled, lower border finely denticulate; lower border of inner surface also finely denticulate, except near the base where 3 or 4 larger spines occur.

Carpus with a rather small spine at the distal end of the smooth, hairy, upper border, with 5 very small denticles on the outside of it on the distal margin that articulates with the chela, lower border of outer surface also smooth; a spine at the distal end of the lower border of the carpus, corresponding with the lower border of the chela and a third on the distal margin of the inner surface, placed somewhat nearer to the upper than to the lower border, the three spines nearly of the same size; distal margin of lower surface hairy.

When the dactylus is stretched out horizontally forward, the chela proves to be 18 mm. long, the palm 10,3 mm. long and 6,5 mm. high or broad; the palmar portion resembles that of *Upog. major* (de Haan), excepting in the following particulars. In *Upog. major* (de Haan) the upper border of the palm bears two parallel denticulated ridges, with a sharp spine at the distal end of the outer, in *Upog. capensis*, however, three, which as in de Haan's species are very hairy; the immobile finger is a little longer than in *Upog. major* and quite unarmed, with no teeth immediately behind its lower border nor on the prehensile edge of its inner surface; in both species one observes an elevated ridge close by and parallel with the proximal border, articulating with the carpus, of the inner surface, but, while in *Upog. major* the inner surface of the palm is quite smooth, it is armed in *Upog. capensis*, except near the elevated ridge and the lower crest, with numerous sharp granules, of which one near the base of the immobile finger is much larger than the others; near each granule a long hair is implanted. A row of 7 or 8 sharp teeth extends on the proximal half of the lower border of the palm from the carpal articulation almost to the unarmed base of the fixed finger. The dactylus presents quite different characters in both species. The slightly concave, smooth, upper surface is bordered on each side by a denticulated ridge, this is also the case with the prehensile

lower surface and a fifth row of acute denticles occurs on the outer side of the very hairy finger.

Merus of 2nd legs 4-times as long as broad, with a small spine near the distal end of the upper border, lower border unarmed; the coxa of these legs bears also a subacute tooth on the lower border of the inner surface; on the 3rd pair these teeth were not observed.

Eggs very numerous, small, globular, diameter 0,9 mm. broad.

As already suggested by Prof. Balss (l.c. 1913) *Gebia africana* is no doubt identical with this species: the merus of 1st and 2nd legs should be unarmed, but the only specimen on which this species was established, was much damaged, so that these spines were no doubt broken off.

As regards *Gebia subspinosa*, it appears to me very probable that also this species is identical with that of Krauss. Stimpson indeed described the spine at the inner surface of the palm near the base of the fixed finger and, as mentioned above, there is also in *Upog. capensis* a spine on the coxa of the legs of the 1st and 2nd pair; only the words "pollex intus bidentatus, dentibus minutis" do not agree, because in the two specimens lying before me, that are also females like that of Stimpson, the prehensile surface of the fixed finger appears smooth.

Geographical distribution: South Africa (Port Elisabeth (Ortmann), Zwartkops River, Algoa Bay (Stebbing), Table Bay (Krauss), Simon's Bay (Lenz and Strunck), False Bay (Stebbing); South West Africa (Lüderitz Bay (Balss)).

#### UPOGEBIA (UPOGEBIA) NEGLECTA n. sp.

Fig. 13—13e.

One female without eggs from Port Stephens, east coast of Australia. To the specimens which very courteously were sent me for examination by the Direction of the Australian Museum, Sydney, belongs a female without eggs, about which the list of specimens sent remarks; "this is one (the smaller) of 2 specimens designated "Types" (of *Gebia spinifrons* Haswell) in the "Records" at the Australian Museum." This specimen, however, proved to be a new species, quite different from *Upog. spinifrons*, and it is apparently only in consequence of a mistake that it has been considered as a cotype of this species.

The species to which the female from Port Stephens is the most closely related, is the likewise new *Upogebia gracilipes* from the Adriatic, described afterward: it chiefly differs by some characters of the rostrum, the uropods and the pereopods, especially the chelipeds. The specimen is 45,5 mm. long, the cephalothorax measuring 15,5 mm., the abdomen 30 mm., while the tip of the rostrum is 9,75 mm. distant from the cervical groove, numbers that fully agree with the female of *Upog. gracilipes*. The rostrum (Fig. 13, 13a) that almost extends to the distal end of the penultimate segment of the antennal and to the middle of 3rd segment of the antennular peduncle, resembles that of *Upog. littoralis* (Risso), being  $1\frac{1}{2}$ -times as long as broad at base, triangular with obtuse, rounded tip; the lateral borders are armed, the left with 6, the right with 5 subacute conical teeth that slightly decrease in size from the anterior which is the largest, backward; the teeth of the anterior pair are as far distant at their base as the bases of the teeth are broad. The rostrum is grooved in the midline and at each side of it 3 teeth are placed on the posterior half behind one another. The lateral frontal teeth that measure a little more than  $\frac{1}{4}$  the length of the rostrum, are conical, pointed, directed straight forward and



separated by *narrow* interspaces from the rostrum, much narrower than those of *Upog. gracilipes*; behind the large anterior tooth the lateral ridges bear each 15 or 16 acute teeth that decrease in size backward; like in other species, the rows of teeth pass posteriorly into those of the gastric region. The lateral ridges are slightly curved outward, in *Upog. gracilipes* they are straight. The lateral grooves that separate the lateral ridges from the gastric region, are less broad than in *Upog. gracilipes*, the tuberculate gastric area is therefore broader. Immediately behind the anterior third of the distance between the tip of the rostrum and the cervical groove a tubercle is placed in the midline of the gastric region, another smaller more backward.

There is a spine on the antero-lateral border of the carapace behind the eye.

Lateral portions of the cervical groove bordered by about a dozen sharp granules, of which the upper 7 or 8, below the linea thalassinica, are larger than the rest.

Sixth segment of abdomen 7,2 mm. broad, 5,2 mm. long. Telson (Fig. 13b) 4,8 mm. long, 6 mm. broad,  $\frac{1}{4}$  broader than long, almost as narrow as in *Upog. gracilipes*, but distinctly *less broad* than in *Upog. littoralis*, in an adult male of which the telson is 4,9 mm. long, 6,6 mm. broad; it shows its greatest width just behind the anterior third part, transverse and lateral carinae distinct, smooth, the transverse carina placed a little more forward than in *Upog. gracilipes*; postero-lateral angles rounded, posterior margin slightly concave, median groove present. Basal joint of uropods with posterior spine. The uropods show *another form* than in *Upog. gracilipes*, but resemble those of *Upog. littoralis*; outer uropod 5,4 mm. long and 5 mm. broad, *as long as broad*, while in *Upog. gracilipes* it is  $1\frac{1}{2}$ -times as long as broad; anterior and distal margins arcuate, distal margin in both beset with minute spines. When directed backward, both uropods project by half their length beyond the telson. Pleopods on 1st segment well developed.

The inner antennae are 9 mm. long,  $\frac{1}{5}$  the length of the body; of the peduncle that measures 5 mm., the 1st segment bears a well developed spine at the distal end of the lower border, the 3rd is 2,3 mm. long and nearly 8-times as long as broad in the middle, *very slender*, a little shorter than the 1st and 2nd taken together. Flagella a little shorter than the peduncle. Upper thicker flagellum long 4 mm., composed of 24 joints, that are all a little,  $1\frac{1}{4}$ — $1\frac{1}{2}$ -times, as long as thick or broad, excepting the 8 or 9 last ones which are as long as broad or still broader; thinner flagellum  $\frac{1}{8}$  longer than the upper, composed of 21 joints, that are all much longer than thick; looked at from above the upper flagellum appears  $1\frac{1}{2}$ -times as broad as the lower. Scaphocerite terminating in an acuminate spine.

Chelipeds (Fig. 13c) equal, resembling those of *Upog. gracilipes*, but *less slender*. Coxa with a spine at the distal end of the inner lower border. Lower border of ischium with 3 or 4 small spines, of which the distal one is the largest. Merus 3-times as long (8,5 mm.) as broad (2,8 mm.) in the middle, with a small spine near the distal end of the upper border; lower border of the outer surface with a few microscopical teeth, that of the inner fringed with long hairs and armed with 4 equal spines of moderate size on the proximal half and a few smaller ones. Carpus almost half as long as merus,  $1\frac{1}{2}$ -times as long as broad, with 3 spines above on the distal border, of which the inner one is the largest, the following gradually smaller; there is a groove on the outer surface, of which the lower border is ridged, a spine at the distal border below, which is a little larger than that of the upper border. Propodus measured along the upper border 7 mm. long, almost twice as long as the carpus,

*a little shorter* than the merus, 7,75 mm. long when measured to the apex of the fixed finger, 3 mm. broad or high in the middle, 2,3- respectively 2,6-times as long as broad; upper border slightly arcuate, with two parallel ridges, of which the inner is hairy and microscopically denticulate along its whole extent, the outer smooth; there is a spine at the distal end of the inner ridge and another spine of the same size is placed, not far from the finger-cleft, between both ridges. As in other species a hairy groove runs along the smooth ridge on the outer side, outer side smooth, punctate, with a spine on the distal border just below the finger-cleft; lower border of propodus *flattened*, as in *Upog. littoralis*, the triangular flattened surface *more elongate* than in this species, reaching farther forward, to the base of the immobile finger, with the borders finely granular and hairy, especially at the inner side, and, as in other species, a hairy crest or ridge runs from the proximal end near the lower border, on the inner side, to midway the propodus; one observes a row of long hairs on the smooth inner surface of the palm above, below the denticulated ridge, a few hairs on the rest of the surface, and, as on the outer side, a spine on the distal margin just below the finger-cleft. Fixed finger (Fig. 13*d*) compressed, turned downward, a little inward, that part which projects beyond the distal border of the propodus measuring  $\frac{1}{5}$  the length of the upper border of the latter; the finger is pointed, the tip not curved upward, with 6 or 7 small subequal teeth on the proximal half of the prehensile edge. Dactylus 5,6 mm. long, only  $\frac{1}{5}$  shorter than the upper border of the palm, 4-times as long as the projecting part of the immobile finger; it is slightly curved, slender, tapering, its upper surface flattened or slightly concave, with the inner border denticulate (Fig. 13*e*) and hairy, the outer smooth, prehensile edge with numerous small obtuse teeth nearly along its whole extent.

Coxa of 2nd legs with a small tubercle at the proximal end of the inner border. Merus 5-times as long as broad, with a small spine near the distal end of the upper border; inner lower border fringed with long hairs, outer lower border with 3 small spines, of which the 1st near the proximal extremity is the largest, the following gradually smaller, the 3rd a little behind the middle; carpus with a spine at the distal end both of the upper and the lower border.

Merus of 3rd legs 5-times as long as broad in the middle, the lower border with a spine near the proximal end and another just before the middle; carpus with a small spine at the far end of the lower border. Fourth and 5th legs unarmed, the latter subcheliform, the fixed finger very short.

This species differs from *Upog. (Upog.) gracilipes* de Man by the shorter, broader rostrum, which is separated by less broad interspaces from the lateral frontal teeth or lobes, by the different form of the outer uropod, by the less slender pereopods, by the lower border of the propodus of 1st legs being flattened, by the upper border of the palm being armed with only two spines, by the presence of a spine on the distal margin of the inner surface and by the different characters of the dactylus.

#### UPOGEBIA (UPOGEBIA) STELLATA (Montagu)

Fig. 14—14*d*.

*Gebia stellata* Th. Bell, A History of the British Stalk-eyed Crustacea. London 1853, p. 223. (ubi literatura).

*Gebia stellata* Th. R. R. Stebbing, A History of Crustacea. Recent Malacostraca. London 1893, p. 185.

- Upogebia stellata* W. De Morgan, in: Journal Marine Biolog. Assoc. New Ser. Vol. VIII, No. 5. Plymouth 1910, p. 475, fig. 1.
- Gebia stellata* K. Stephensen, in: Videnskab. Meddelelser fra den Naturhist. Forening i Kjøbenhavn for Aaret 1909. Kjøbenhavn, 1910, p. 276.
- Upogebia stellata* C. M. Selbie, The Decapoda Reptantia of the coasts of Ireland. Part. I. London 1914; p. 104.
- Upogebia stellata* G. E. Webb, in: Journal Marine Biolog. Assoc. Plymouth. New Ser. Vol. XII 1919, p. 103, Pl. X, figs. 2—11; Pl. XI, fig. 2—6; Pl. XII, figs. 5, 6, 9 and 10.

An adult male, long about 44 mm., from Plymouth, kindly sent me, together with a specimen of *Upog. deltaura*, by the Direction of the Biological Laboratory in that town.

As the late Mr. Selbie remarks, this species attains only half the size of *Upog. deltaura*. The rostrum, turned a little downward, reaches almost to the distal extremity of the penultimate segment of the antennal peduncle and that part which projects beyond the eyestalks is a little shorter than the latter (De Morgan, l.c. fig. 1). The front is tridentate, as in *Upog. deltaura*, the rostrum being separated likewise by a deep incision from the anterior teeth of the lateral ridges of the cephalic region; these incisions are rather broad, so that the eyestalks, that extend to just beyond the middle of the rostrum, are almost visible *in their whole length*. The rostrum that narrows a little towards the tip, is twice as long as broad at the base and the lateral borders bear each 7 or 8 teeth; the teeth of the anterior pair that are directed a little obliquely upward, are not placed on the tip of the rostrum as in De Morgan's figure 1, but as far distant from the tip as they are high and the two are separated by an interspace as broad as the teeth are. The following teeth decrease in size. The lateral ridges of the cephalic region bear on the left side 18, on the right 15 teeth, they diverge a little backward as in other species, though they slightly project laterally in the middle; the anterior tooth is the largest of all, still a little larger than the rostral teeth of the anterior pair, the following teeth, 7 at the left, 5 at the right side, are smaller, then follows both on the right and on the left side a somewhat larger tooth, a little smaller than the anterior, and the remaining teeth, that extend to the cervical groove, become gradually smaller. There are no teeth on the upper surface of the rostrum, nor on the midline of the anterior half of the gastric region, but in the middle of the region 3 small tubercles are placed behind one another and more backward still a few smaller ones are observed. The deep groove which at each side separates the anterior half of the gastric region from the lateral rows of teeth, is about half as broad as the gastric region, but more backward the region becomes broader, the groove narrower and less deep; the gastric area is covered with rather sharp tubercles that laterally reach as far backward as the lateral ridges, but not in the middle, so that the posterior part,  $\frac{1}{4}$  the distance between the tip of the rostrum and the cervical groove, is smooth and glabrous; in the middle of the gastric region the tubercles extend farther towards the sides, i. e. the region is in the middle broader than anteriorly and posteriorly. Lower border of rostrum smooth, unarmed.

Posterior border of the cervical groove, there where it is crossed by the linea thalassinica, beset with numerous granules as far as the anterior border of the carapace, a few also above that linea; excepting the 3 or 4 upper ones these granules are only visible under the microscope, 50-times magnified.

A spine on the antero-lateral border of the carapace (De Morgan, l.c. fig. 1).

The 6th segment of the abdomen (Fig. 14), 5,5 mm. long and quite anteriorly, at the greatest width, 6,8 mm. broad, is the longest of all and  $\frac{1}{4}$  broader than long; this segment is very convex transversely, less convex from before backward, symmetrically punctate; lateral borders parallel, a little narrowed in the middle. Telson 4,2 mm. long, 5,7 mm. broad, almost  $1\frac{1}{2}$ -times as broad as long,  $\frac{1}{4}$  shorter than 6th segment; it shows its greatest width at  $\frac{1}{3}$  its length from the anterior border and the slightly arcuate, lateral edges curve regularly into the posterior border, that is emarginate in the middle. Transverse carina, at  $\frac{1}{3}$  the length of the telson from the anterior border, rather indistinct, like the lateral carinae, all with a few short setae; median impressed line distinct. Basal joint of the uropods with a small acute spine posteriorly, there is also a spinule at the base of the outer uropod; when directed backward both uropods reach by half their length beyond the telson. Anterior and distal border of the outer uropod arcuate, that of the inner straight, distal or apical border in both beset with microscopical spinules; of the two ribs on the upper surface of the outer uropod the posterior is twice as broad as the anterior, which presents near the distal border 4 or 5 microscopical teeth; the ridge on the inner uropod bears on its distal half 4 acute teeth.

The antennular peduncle, long 4,54 mm., reaches to the middle of the 3rd segment of that of the outer antennae; the 1st segment, 2 mm. long, bears a sharp spine at the distal end of the lower border and is nearly  $\frac{1}{3}$  shorter than the 2nd and the 3rd taken together; the 3rd segment is less slender than in *Upog. deltaura*, only 4,6-times as long as broad, in a lateral aspect. The thicker flagellum, long 4,56 mm.,  $2\frac{1}{2}$ -times as long as the 3rd segment (1,84 mm.), is composed of 32 joints, of which the 1st is a little longer than broad, the following broader than long, the penultimate again longer than broad, the last joint conical, a little longer than broad; the other flagellum, 4,2 mm. long, a little shorter than the thicker, consists of 24 joints, which are all longer than thick. In the left antennule the thinner flagellum is also composed of 24 joints, but the thicker of 31. The thicker flagellum is thus just as long as the peduncle, while, according to Mr. Webb (l.c. p. 84), the peduncle should be considerably shorter.

The squamiform scaphocerite on the 2nd segment of the antennal peduncle ends distally into two spinules, of which the inner is more slender and a little longer than the other.

Chelipeds equal (Fig. 14a—d). Coxa with a small spine at the distal extremity of the lower margin, a small spine also at the distal extremity of the lower border of the ischium. Merus  $2\frac{1}{2}$ -times as long as broad, with a spine near the distal end of the upper border, lower border armed with small spines along its whole extent, of which the 3 or 4 proximal ones are a little larger than the following that are placed on the inner border. Measured along the upper border the carpus appears  $\frac{1}{3}$  longer than broad, with a long spine directed obliquely forward, upward and a little inward, at the distal extremity, *half as long* as the upper border; at a short distance one observes at the inner side another spine, nearly half as long (Fig. 14b), at the outer side close by the large spine two very small ones, of which the upper is a little larger than the other; the spine at the distal extremity of the lower surface (Fig. 14a, 14b) measures only  $\frac{1}{3}$  the length of the large spine; a longitudinal groove on the middle of the outer surface. Propodus, measured along the upper border, 6,75 mm. long, but 8 mm. when measured along the lower from the carpus to the tip of the fixed finger, while it is 3,5 mm. broad in the middle, twice as long as broad, exclusive of the fixed finger; the slightly arcuate, upper border

of the palm is covered with small sharp granules and hairy, both on the inner and on the outer surface another line of hairs runs not far from the upper border and parallel with it; the upper surface of the palm bears thus three parallel rows, of which the middle one is granular.

The strongly compressed immobile finger is directed downward and somewhat inward, that part of the finger which projects beyond the distal border of the palm, measures  $\frac{1}{4}$  the length of the upper border; on the proximal half of the prehensile edge the fixed finger bears three obtuse teeth, of which the 1st or proximal is very small, the two following increase in size, the pointed distal half is smooth and curved upward. The lower border of the fixed finger is smooth, the lower border of the palm also not denticulate, but fringed with long hairs; on the lower half of the outer surface of the palm there is, as in *Upog. deltaura*, a V-shaped row of transverse small tufts of hair and the upper half is also setose. The small acute tooth which in *Upog. (Calliadne) deltaura* occurs on the distal margin of the outer surface of the palm, is *wanting*, but, as in this species, the upper side bears, immediately behind the articulation of the dactylus, a sharp tooth at the distal extremity of the external row of hairs (Fig. 14a, 14c); the small acute tooth, finally, that in *Upog. deltaura* occurs about in the middle of the distal margin of the inner surface, is represented in *Upog. stellata* by a *longer* pointed spine (in Fig. 14c the spine on the left side), placed nearer to the upper border, opposite to the middle of the articulation. The somewhat arcuate, rather slender dactylus (Fig. 14c, 14d) is 5 mm. long,  $\frac{1}{4}$  shorter than the upper border of the palm and almost 3-times as long as that part of the immobile finger which projects beyond the distal border of the palm; at the proximal end near the inner border of the smooth glabrous, upper side of the dactylus occurs a high conical tooth, the inner border itself is finely denticulate, these denticles begin at  $\frac{1}{4}$  the length of the finger from its base and reach to the distal fourth part, while at the inner side of these teeth the finger is fringed with long hairs; the external border of the upper side is bounded by a smooth ridge. The lower border of the outer surface of the dactylus presents proximally a few small granules, some occur also on the lower border of the inner side, but these are larger, more numerous and constitute the inner border of the lower surface; long hairs exist at the upper side of these granules, also at the lower side of the external row. The smooth lower surface of the dactylus bears externally the cutting-edge (Fig. 14d  $\alpha$ ), that projects a little in the middle; one observes at the proximal end two small obtuse teeth or granules and inward of the proximal granule a larger obtuse tooth; at the inner side of the cutting-edge hairs are implanted.

A triangular tooth exists on the proximal end of the inner border of the coxae of 2nd legs, merus 4,5-times as long as broad in the middle, with a sharp spine near the distal end, carpus almost half as long as the merus, with a spine at the distal extremity of the upper border and a somewhat smaller one at that of the lower. Following legs are wanting.

The industrious Montagu who has discovered this species, the type species of the genus, describes the colour as "yellowish-white, covered with minute stellated orange spots, as it appears under a lens, which give a predominance to the last." (Stebbing, l. c. p. 185).

Geographical distribution: Salcombe Estuary (Montagu, Allen, De Morgan); Near the mouth of the Yealm and from fish-stomachs at Plymouth (Norman and Th. Scott); Falmouth in stomachs of various fish and boring at lower-water mark at Helford (Norman and Th. Scott); coast of Northumberland and Durham (Norman and Brady); St. Andrews (M'Intosh).

The whole westcoast of France (Bonnier); Roscoff (C. Schlegel); Channel Islands (Norman); coast of Belgium, North-Hinder, Southern part of Deepwaterchannel (Tesch); coast of East Friesland (Metzger); Heligoland (Metzger, Hoek); Kattegat (Meinert); Bohuslän (Lovén).

### UPOGEBIA (UPOGEBIA) GRACILIPES n. sp.

Fig. 15—15d.

Syn.: *Upogebia (Upogebia) littoralis* O. Pesta, Die Decapodenfauna der Adria. Versuch einer Monographie. Leipzig und Wien 1918, p. 197, fig. 61 (partim).

My private Collection of Crustacea contains 3 male specimens of *Upog. (Upog.) littoralis* (Risso) from the Gulf of Naples that are described above. In his valuable Monograph of the Decapod Crustacea of the Adriatic Pesta publishes at p. 198 two figures, one representing the whole animal, a male, the other carpus and chela of another male, of *Upog. littoralis* (Risso); in the former the chela shows a quite different, much slenderer form than in the other figure a. I was touched by this singular fact and took therefore the liberty to apply to Dr. O. Pesta of the Naturhistorisches Museum at Vienna with the request to send me for examination a male specimen with such a slender cheliped and a female of the species described by him under the name of *Upog. littoralis* (Risso): both specimens were soon received, for which courtesy I thank Dr. Pesta heartily. From a scrupulous and accurate examination I drew up the conclusion that both specimens belong to a new species different from *Upog. littoralis* (Risso), for which the name of *Upog. gracilipes* is proposed.

The male specimen of *Upog. gracilipes* has been collected 13 January, 1884 at Pirano, Adriatic, female at Servola, near Trieste.

Both specimens are of a somewhat smaller size than the male specimens of *Upog. littoralis* (Risso) from the Gulf of Naples, the male is 40 mm. long, the female 44 mm.; in the male the cephalothorax is 14 mm. long, the abdomen 26 mm., the distance between the tip of the rostrum and the cervical groove 9 mm.; in the female these numbers are in the same succession 15 mm., 29 mm. and 9,5 mm.

The rostrum (Fig. 15, 15a) that extends horizontally forward almost to the distal end of the penultimate segment of the antennal and to a little beyond the middle of the 3rd segment of the antennular peduncle, is rather narrow, about 2,3-times as long as broad at its base; from the rounded apex the lateral borders diverge backward until at a short distance before the lateral frontal teeth and from here they converge towards the gastric region; the rostrum presents therefore its greatest width a little before the lateral frontal teeth. The lateral borders of the rostrum are armed each with 6 or 7 subacute conical teeth, that are obliquely directed upward and forward; the two teeth of the anterior pair are a little less distant from one another at their base than they are here broad themselves, the following that slightly decrease in size, are placed at subequal distances. A few teeth occur on the posterior half of the upper surface of the rostrum. The lateral frontal teeth, that are directed almost straight forward, parallel with one another, are separated from the rostrum by rather broad interspaces; though measuring only  $\frac{1}{8}$  (in the female  $\frac{1}{5}$ ) the length of the rostrum, in proportion to which they appear rather short, the lateral frontal teeth are indeed much larger than the rostral teeth. The lateral cristae of the cephalic region bear, behind the large anterior tooth, a row of 15 or 16 teeth, of which the first 8 or 9 are smaller, only about half as long as the large anterior tooth, the remaining 7 or 8 are still much smaller. The lateral cristae are straight, run backward

until near the cervical groove, where the row of teeth curves inward to unite with the tubercles of the gastric region. One tooth or tubercle occurs in the midline of the gastric region, just as far distant from the cervical groove as from the apex of the rostrum; on each side of the midline the teeth or tubercles of the gastric region are not numerous. As in other species brown hairs are implanted in front of all the teeth. In the female (Fig. 15) the right lateral frontal tooth measures  $\frac{1}{5}$ , the left  $\frac{1}{6}$  the length of the rostrum, the left being a little shorter than the right. Straight lower border of the rostrum hairy, unarmed.

Lateral portions of the cervical groove bordered by 5 or 6 acute granules behind, of which in the male 2 or 3 become visible under a magnifying glass, while for the others, like for those of the female, a microscope is necessary.

Antero-lateral border of carapace with a spine near the eyestalk. Branchial regions finely rugose.

No pleopods on 1st segment of abdomen in the male, in the female they are present. Sixth segment of abdomen in the male 6,25 mm. broad, 4,5 mm. long, in the female 7,1 mm. broad, 5 mm. long; lateral borders emarginate just in front of the middle. Telson in the male 4,25 mm. long, 5,1 mm. broad, in the female (Fig. 15b) 4,7 mm. long, 5,6 mm. broad; only  $\frac{1}{3}$  broader than long it appears *almost quadrate* and presents its greatest width at  $\frac{1}{4}$  its length from the anterior border; the lateral margins are concave on the anterior fourth part, for the rest they are straight, converging and sweeping with a curve into the posterior margin which is *slightly emarginate* in the middle, so that it appears bilobate; transverse carina at the level of the greatest width distinct like the lateral carinae and the median groove, surface between the groove and the carinae coarsely punctate. Basal joint of uropods with the usual spine posteriorly; both uropods, when directed backward, project by half their length beyond the telson, outer uropod *obovate*,  $1\frac{1}{2}$ -times as long as broad, basal spinule curved backward, inner uropod with both the anterior and the posterior border straight; there is a small acute tooth at the antero-external angle of the outer uropod, the distal or apical margins of both uropods present for the rest only a few microscopical teeth.

The eyestalks extend to the middle of the rostrum, cornea occupying  $\frac{1}{4}$  the length of the stalk.

The inner antennae reach by  $\frac{3}{4}$  the length of their flagella beyond the antennal peduncle. The measurements of the left antennule of the female are the following. First segment of the peduncle 2,2 mm. long, with a spine at the distal end of the lower border that reaches to the middle of 2nd, 2nd 0,54 mm. long, 0,64 mm. broad, a little broader than long; 3rd segment 2,3 mm. long, as long as 1st and in a lateral view 0,35 mm. broad in the middle, being 6,5-times as long as broad, of a rather slender shape, slightly thicker at the two extremities. Thicker flagellum 4,3 mm. long,  $\frac{1}{8}$  shorter than the peduncle and composed of 26 or 27 joints, that are all slightly broader than long or as broad as long; thinner flagellum 4,65 mm. long,  $\frac{1}{12}$  longer than the other and consisting of 22 joints, that are all longer than thick, though those of the proximal half are shorter than the rest; the thicker flagellum appears there where it is thickest, 2,5-times as broad as the other; the thinner flagellum tapers also distally, the 1st or proximal joint being 0,22 mm. long, 0,14 mm. broad, the terminal joint 0,28 mm. long, 0,055 mm. broad at its base. The segments of the antennular peduncle are provided with many long setae, especially the 2nd and the 3rd. In the male the two flagella seem to be of equal length, the upper also composed of 26 or 27, the lower or thinner of 18 joints. The scaphocerite of the antennal peduncle ends in an acuminate spine.

Chelipeds (Fig. 15c, 15d) equal, both in the male and in the female. Coxa with a spine curved forward on the middle of the lower border, ischium with a spine at the distal end of the same. Merus in the male 3.4-times as long as broad in the middle, exclusive of the spines, with a spine near the distal end of the upper border, lower border with a row of 10 or 11 spines, on the inner side, lower border of the outer side with 5 or 6 sharp granules in the middle. Carpus half as long as the merus,  $1\frac{1}{2}$ -times as long as broad, with a longitudinal groove on the outer surface; the carpus is armed with 2 rather small spines of equal size, one at the distal end of the upper, the other at that of the lower border, lower border of outer surface carinate, carina rather sharp. Propodus, measured along the straight upper border, barely longer than the merus, 3.5-times as long as broad or high in the middle; upper border with a smooth, little prominent ridge on the outer side, below and near which a hairy shallow groove runs along the whole length of the border; a small spine is placed (Fig. 15d) near the distal end of this ridge at the inner side, another exists just beyond the middle and a third at the distal extremity of the border at the inner side, a fourth spine, finally, is observed just below the dactylus on the distal border of the outer side of the palm; this fourth spine, however, is wanting on the right chela. Lower border of the palm hairy, unarmed, carinate from its proximal end to near the middle, then rounded, both the outer and inner surface smooth, the outer with a row of hairs on the lower part, running obliquely from the proximal border to the fixed finger, inner surface with a longitudinal line of hairs just below the upper border; fixed finger short, pointed, directed obliquely downward, not inward, barely projecting by its distal half beyond the border of the palm; prehensile edge straight, *unarmed*, tip not curved upward, lower border also smooth. Dactylus *elongate*, only  $\frac{1}{5}$  shorter than the upper border of the palm, *slightly arcuate*, *slender*, tapering, about 5-times as long as high or thick at its base, pointed; upper surface *flattened*, *smooth*, bounded on each side by a *smooth* ridge, outer and inner side clothed with yellow-brown hairs; lower surface smooth, unarmed; dactylus nearly 4-times as long as the prehensile edge of the fixed finger.

The chelipeds of the female resemble those of the male, the merus is, however, 3.6-times as long as broad in the middle, the carpus presents near and at the outer side of the upper spine another that is much smaller, the propodus is  $\frac{1}{3}$  shorter than the merus and its upper surface is not armed with 3 but with 5 spines, two smaller spines of equal size being placed, immediately behind the middle, near and behind one another, at the inner side; the prehensile edge of the immobile finger is armed on its proximal half with 8 or 9 subequal small teeth, the dactylus, finally, is comparatively a little shorter, being  $\frac{1}{3}$  shorter than the palm.

Coxa of 2nd legs of the male with a strong spine near the proximal end of the lower border, merus almost 6-times as long as broad, inner border fringed with long hairs and beset with small spines, of which the 1st or proximal is larger than the others, upper border with a spine near the distal end; carpus almost half as long as the merus, with a small spine at the distal end of the upper border and another of the same size at that of the lower; propodus just half as long as the merus, very hairy, dactylus shorter.

Merus of 3rd legs in the male with 2, in the female with 3 small spines on the lower border, upper border unarmed, carpus with a very small spinule at the distal end of lower border.

Fifth legs in the female subcheliform, dactylus strongly excavate, almost 3-times as long as the



fixed finger; lateral borders of the prehensile surface of the immobile finger beset with many small, sharp teeth.

*Upog. littoralis* (Risso) is perhaps a species of larger size, attaining the length of 6 centim. and may easily be distinguished from *Upog. gracilipes*. The cephalic region appears in *Upog. littoralis* comparatively broader, the rostrum is shorter and broader,  $1\frac{1}{2}$ -times as long as broad, the eyestalks extend almost to the anterior pair of rostral teeth and the inner antennae show some slight differences as regards their measurements; the telson is broader, almost  $1\frac{1}{2}$ -times as broad as long, the uropods present a different form, the outer appearing circular, as long as broad. All the legs are of a less slender shape and show different characters and measurements. The chela has a characteristic stout shape, quite different, the upper border bears two prominent ridges, of which the outer is smooth, the inner rather coarsely denticulate, with a large spine at the distal inner angle and a much smaller one inward of the distal end of the outer smooth ridge; the lower border is flattened, triangular, fixed finger half as long as the less slender dactylus etc.

### UPOGEBIA (UPOGEBIA) BALSSI n. sp.

Fig. 16—16f.

*Upogebia hirtifrons* H. Balss, Die Decapoden des Roten Meeres. II Anomuren, Dromiaceen und Oxy-stomen. Wien 1915, p. 2 (Denkschriften der Kais. Akad. der Wiss. in Wien, Mathem. Naturw. Klasse. 92. Band) (nec White).

*Upogebia hirtifrons* G. Nobili, in: Bull. Scientif. France et Belgique. T. XL, 1906, p. 61, Pl. IV, fig. 13 (nec White).

Confer: *Upogebia hirtifrons* Ch. Chilton, in: Transact. New Zealand Institute, Vol. XXXIX, 1906, Wellington 1907, p. 457. (ubi literatura).

Among the species of *Upogebia* kindly intrusted to me for examination by the Direction of the Museum at Munich, I received the specimen, collected Oct. 25th. 1895 by the Pola Expedition in Suez, which was considered by Prof. Balss to be a female and to belong to *Upog. hirtifrons* (White). This specimen is only about 17 mm. long, the tip of the rostrum is 3,7 mm. distant from the cervical groove, the distance between this groove and the posterior border of the cephalothorax measures 1,8 mm., the latter is thus 5,5 mm. long, while the abdomen is nearly twice as long. In *Upog. hirtifrons* (White) the front is barely trilobed, in the specimen from Suez, however, the anterior tooth of the lateral ridges is much larger than the following, still a little larger than the anterior pair of rostral teeth and directed obliquely forward and outward (Fig. 16). The rostrum, rounded anteriorly, is triangular,  $1\frac{1}{2}$ -times as broad at the base as long and bears 3 teeth on each border, of which the anterior is a little larger than the two others; the interspaces between the teeth are subequal. The rostrum is 0,58 mm. long and 0,66 mm. broad at the level of the posterior pair of lateral teeth, it is but little longer than the eyes; on the upper surface only two microscopical teeth were observed. Lower border of the rostrum unarmed. The lateral ridges of the cephalothorax are armed behind the large anterior tooth with 13 acute teeth, all nearly of the same size and much smaller than that tooth which is as far distant from the 2nd as the 2nd from the 5th; the lateral ridges reach

to the cervical groove. The anterior teeth of the two lateral ridges are 1,22 mm. distant from one another. The gastric region bears at each side about 20 sharp tubercles, one is placed in the midline just in the middle; these tubercles reach as far backward as those of the lateral ridges, so that the posterior *smooth* and *glabrous* part of the gastric region measures  $\frac{1}{4}$  the distance between the tip of the rostrum and the median part of the cervical groove. The posterior border of the cervical groove is smooth. I suppose to have observed a small spine on the antero-lateral border of the carapace, immediately before the anterior border of the 1st segment of the antennal peduncle, but this remained uncertain.

Telson 1,9 mm. long, 2,4 mm. broad,  $\frac{1}{4}$  broader than long; the greatest width is found just behind the anterior fourth part of the surface; along the anterior fourth the lateral margins are a little concave, the remaining part of them is straight and converging they curve into the straight posterior margin which is not emarginate, so that the exact length of this margin could not be measured; transverse and lateral carinae present, a little setose, the latter close by the lateral margins, median furrow also present. Sixth segment as long as the telson and 2,75 mm. broad, almost  $1\frac{1}{2}$ -times as broad as long, convex in both directions. Basal joint of uropods with a spine, also a spine at the base of the outer uropod; the uropods, which are a little longer than the telson, when directed backward, bear the usual ribs or ridges and their apical borders are beset with microscopical spinules.

The eyestalks, of which the distal half is occupied by the cornea, extend to near the anterior pair of rostral teeth.

First and 2nd segment of the antennular peduncle together about 0,8 mm. long, 3rd segment also 0,8 mm. long, 0,16 mm. broad in a lateral view, 5-times as long as broad; a spine at the distal end of the lower border of 1st segment. Thicker flagellum 1,32 mm. long, a little more than  $1\frac{1}{2}$ -times as long as the 3rd segment, composed of 13 or 14 joints, of which the 1st is a little longer than broad, the following about as long as broad, the terminal joint conical; the thinner flagellum consists of 11 joints and is 1,4 mm. long, a little longer than the other, the joints all longer than thick. Scaphocerite of antennal peduncle terminating into an acute spine.

Chelipeds (Fig. 16a—16e) equal. Lower border of the ischium with conical tooth at the proximal end, followed by a row of 5 sharp small teeth. Merus 2,9 mm. long, 1,1 mm. broad, 2,6-times as long as broad, with *two* acute, comparatively small teeth, placed close by and behind one another (Fig. 16a, 16c) near the distal end of the upper border, distance between the posterior tooth and the distal end  $\frac{1}{7}$  the length of the merus; *lower border of the outer surface beset with a row of 25—30 small acute teeth*. Carpus 1,1 mm. long, 0,8 mm. broad,  $1\frac{1}{2}$ -times as long as broad, with a *very small* spine at the distal end of the lower border; a *smaller* spine occurs at the distal end of the upper border at the inner side and a still smaller one near it on the outer side. Upper border of the propodus 2,5 mm. long, lower border until the apex of the immovable finger 2,9 mm.; propodus 1 mm. broad in the middle, about 3-times as long as broad, agreeing with Nobili's description. On the inner surface of the propodus a hairy *denticulate* crest runs near and parallel with the slightly arcuate upper border (Fig. 16b), parallel with this crest at the inner side a line of long hairs; outward of this crest, parallel with it, on the upper border a *smooth* ridge (Fig. 16a, 16b), near the distal extremity of which is placed just near the finger-cleft a *small acute tooth* and immediately behind it *another*. The fixed finger (Fig. 16a, 16d), 0,4 mm. long, measures about  $\frac{1}{7}$  the length of the propodus, it is rather slender, turned down-

ward and inward, tapering, and terminating in an acute, slightly upturned tip; the proximal half of the prehensile edge bears 6 or 7 very small teeth (Fig. 16*d*), of which the 3 distal ones are somewhat larger than the preceding. The rather stout-shaped dactylus, 3-times as long as thick at base, is 1,55 mm. long, a little more than half as long as the propodus; the upper side is smooth, both borders fringed with long hairs and there are 4 acute teeth, gradually increasing in size, on the inner border of the distal third part of the finger (Fig. 16*e*); the lower or prehensile surface is undulate and bears in the middle a low rounded tooth and the lower border of the inner surface bears moreover a row of small conical teeth.

Merus of 2nd legs 3,3 mm. long, 5-times as long as broad, with a *microscopical* acute tooth (Fig. 16*f*) near the distal end of the upper border at the inner side, at  $\frac{1}{13}$  the whole length distant from the distal extremity; carpus with a tooth at the far end of lower border.

Merus of 3rd legs 2,7 mm. long, 4,3-times as long as broad in the middle, with 2 or 3 small teeth on the proximal half of the lower border.

In the female from the Persian Gulf described by Nobili (l. c.) the rostrum did not project beyond the eyes, the merus of chelipeds was quite destitute of spines and there were no teeth on the upper border of the carpus. This female, of which the eggs were barely 0,35 mm. broad, had *nearly the same size* as the specimen described above: Nobili indeed does not indicate the length, but the figured cheliped was exactly just as long as in the specimen from Suez. It appears to me probable that both specimens belong to the same species, for which I propose the name of *Upog. (Upog.) Balssi* dedicating it to the experienced carcinologist of Munich.

Besides *by a much smaller size* this species may be distinguished from *Upog. (Upog.) hirtifrons* (White) by the scabrous surface of the gastric region not extending in the middle *as far backward*, by the existence of *two* small teeth on the upper border of the merus of chelipeds, instead of one, and of a row of *25—30 small sharp teeth* on the lower border, by the small size of the teeth on the upper border of the carpus and probably by still other differences.

### UPOGEBIA (UPOGEBIA) HIRTIFRONS (White)

Fig. 17—17*b*.

*Upogebia hirtifrons* (White), Ch. Chilton, Notes on the Callianassidae of New Zealand. Wellington 1907, p. 457 (Trans. New Zealand Institute, Vol. XXXIX, 1906).

Though Professor Chilton has published a good and detailed description of this rare species, there were, however, still a few characters about which I was uncertain and I therefore took the liberty to apply to that New Zealand carcinologist with the request to send me a specimen of White's *Gebia*. I then had the pleasure to receive a full-grown male, nearly 70 mm. long, from Kenepuru, for which I tender my cordial thanks to Professor Chilton. Of this species we possess an excellent figure of the whole animal in a lateral aspect and also of the caudal fan looked at from above, in: The Zoology of the Voyage of H. M. S. Erebus and Terror, Crustacea, London 1874, Tab. 3, fig. 5, 5*a*, but other figures do not exist, as far as I know, so that I have availed myself of this opportunity for drawing still three figures.

The nearest allied species of *Upog. hirtifrons* (White) are *Upog. (Upog.) littoralis* (Risso), *stellata* (Montagu), *Issaeffi* (Balss), *Balssi* n. sp., *neglecta* n. sp., *carinicauda* (Stimps.) with its variety *gracilipes* and a species collected by the Siboga Expedition at Stat. 174 closely related to *Upog. carinicauda*. *Upog. hirtifrons*, however, may, besides by many other characters, be distinguished from the five first named species at first sight by the front *being hardly at all trilobed*, the anterior extremities of the lateral ridges of the cephalic region *barely projecting* beyond the level of the base of the rostrum (Fig. 17); it agrees in this character with *Upog. carinicauda*, its variety and the species from Stat. 174, but in these species the lower border of the merus of the 1st legs is armed with teeth or small spines. I will, however, remark that in the specimen from Kenepuru the lower margin of the outer surface bears 4 or 5 subacute granules, though no spines.

The rostrum (Fig. 17, 17a), that extends horizontally forward, appears just as long as broad at its base and each border bears 4 or 5 subacute tubercles, the tip of which is brown coloured; the lateral ridges of the cephalic region present a dozen similar tubercles of which the anterior is a little larger than the second and that gradually decrease in size backward. The upper surface of the rostrum and of the gastric region is covered with similar tubercles and in front of all these tubercles a tuft of hairs is implanted; the posterior fourth part of the gastric region is smooth and glabrous. Though this species belongs to those in which the lateral portions of the cervical groove are not bordered behind by one or more spines, one observes here, however, by means of a magnifying-glass 6 or 7 subacute granules, that decrease in size towards the antero-lateral border of the carapace.

Telson  $1\frac{1}{2}$ -times as broad as long, its greatest width at the anterior third.

The eyestalks hardly reach to the middle of rostrum.

Third joint of antennular peduncle slender, about as long as the 1st and 2nd taken together, 1st apparently without a spine; flagella a little longer than the peduncle. Merus of 1st legs (Fig. 17b) 11 mm. long and 4 mm. broad in the middle, almost 3-times as long as broad; spine near the distal end of the upper border small, only 0.5 mm. long, measured dorsally; the proximal half of the lower border bears 3 small conical tubercles of equal size, the 1st near the articulation with the ischium; outer surface transversely rugose. Spine at the distal end of the upper inner margin of the carpus also small, measuring only  $\frac{1}{4}$  the length of the joint; on the outer side of the spine, on the distal border of the carpus, one observes a very small acute tooth, below the spine on the distal border of the inner surface another smaller spine; no spine on lower border. Palmar portion of the chela about as long as the merus, *rather slender*, a little broader or higher, measured on the outer side, than the carpus, the greatest height, not far from the carpus, almost half the length; the palmar portion, looked at at the outer side, distinctly narrows towards the distal end. Upper border with two parallel longitudinal ridges, of which the inner is granular, the outer smooth, both with small tufts of hair along their whole length; both the outer and the inner surface are *smooth*, though with transverse impressions, the outer also punctate, lower border rounded, *not denticulate*, but with a fringe of long hairs that from the distal end runs backward on the outer side of the palm until near the carpus. Fixed finger turned inward, short, measuring  $\frac{1}{6}$  the length of the upper border of the palm and  $\frac{1}{4}$  the length of the dactylus; from the proximal end of the lower border of the palm a ridge or crest, fringed with hairs, runs on the inner side almost to the middle, not reaching to the fixed finger; the lower border of this finger is rounded, while the prehensile edge bears a low truncate

tooth at the base. The inner surface of the palm presents a well-marked line of hairs just below the granulated ridge of the upper border and several small tufts of hair, a longitudinal line of hairs occurs also on the middle of the outer surface. The dactylus measures  $\frac{2}{3}$  the length of the upper border of the palm, upper surface *smooth*, though appearing transversely rugose under a lens; both the inner and the outer surface very hairy, prehensile edge smooth, without teeth.

Merus of 2nd legs a little ( $\frac{1}{11}$ ) longer than that of 1st, almost 4-times as long as broad in the middle; a small, curved spine near the distal end of the upper border, lower border, like also the upper and lower border of the propodus and dactylus, fringed with long hairs; the upper border of the carpus bears 3 microscopical spines, 2 close together in the middle, the 3rd, somewhat larger, at the distal end.

Following legs unarmed, those of the 5th pair cheliform, dactylus and fixed finger of equal length.

Pleopods of 1st abdominal somite wanting.

*Upogebia (Upogebia) hirtifrons* (White) is still only known from the coasts of New Zealand (Auckland and Manukau Harbours (Chilton), Kenepuru (Chilton).)

### UPOGEBIA (UPOGEBIA) MAJOR (de Haan)

Fig. 18.

*Gebia major* W. de Haan, Fauna Japonica, Crustacea, 1849, p. 165, Tab. XXXV, fig. 7.

*Gebia major* A. Ortmann, Zoolog. Jahrb. VI. Abth. f. Syst. 1891, p. 54, Taf. I, fig. 7.

Confer: H. Balss, in: Zoolog. und anthropolog. Ergebnisse einer Forschungsreise im westl. und zentralen Südafrika. Bd. V. 2. Lief. Jena 1913, p. 108 (62), fig. 7.

I am owing to the kind and courteous assistance of Professor H. Balss of Munich for being now able to examine two full-grown male specimens of de Haan's *Gebia major*: they were collected by Doflein in the Bay of Tokio. Though both Ortmann and Balss have dealt with this species and mentioned the differences that exist between it and *Upog. littoralis* respectively *Upog. capensis*, a more detailed description will, nevertheless, I trust, be welcome.

The specimens are 97 mm. respectively 87 mm. long. In the larger specimen the rostrum that reaches to the middle of 3rd antennular article, appears just as long as broad at its base, triangular, with rounded obtuse tip; the lateral borders are armed each with 4 acute, though rather short teeth or spines, no teeth on the upper side of the rostrum. Lateral ridges of the gastric region armed with 13 or 14 rather small sharp teeth, which decrease in size backward; the subacute anterior teeth, i. e. the lateral frontal teeth, measure hardly more than  $\frac{1}{4}$  the length of the rostrum, which is longitudinally grooved in the midline. According to Dr. Ortmann the rostrum should be less than 3-times as long as the lateral frontal teeth. The small teeth or tubercles on the gastric region, each of which is tipped with a tuft of hair, extend as far backward as the lateral ridges, so that the posterior fifth part of the gastric region is smooth and glabrous; as is clearly visible in de Haan's figure, only the rostrum and the anterior third of the gastric region are thickly covered with hairs, but the lateral grooves and the middle line are glabrous. As well above as below the linea thalassinica the posterior border of the cervical groove bears 3 or 4 acute granules, below the linea they are followed by many

other smaller granules until the lower margin of the carapace. The lateral sides of the gastric region are in the middle beset with a few granules and a few exist on the antero-lateral border of the carapace posterior to the antero-lateral spine at the level of the eyes.

Sixth somite of abdomen 11 mm. long, 18 mm. broad, the lateral borders with a truncate lobe in the middle, the upper surface with a semicircular groove at either side. The telson has a characteristic form, the lateral margins, indeed, do not converge, but *diverge slightly posteriorly*; it is 12 mm. long, 15 mm. broad anteriorly, 15,5 mm. posteriorly, the posterior margin is slightly arcuate and the postero-lateral angles are *rounded*. The transverse and the lateral carinae on the upper surface are flattened, little prominent, the median furrow feeble and there are coarse punctations on each side of it. The basal joint of the outer uropods bears posteriorly on the left side one, on the right two acute teeth, of which the outer is a little larger than the other; a small acute tooth at the base of the outer uropod, apical border of the uropods finely denticulate, the teeth on the inner larger than on the outer.

The eyestalks reach to the middle of the rostrum.

The inner antennae, measured to the distal extremity of the thinner flagellum, are 18 mm. long,  $\frac{1}{5}$  the length of the body. The peduncle, 9 mm. long, is just as long as the thinner flagellum, 1st segment unarmed, 3,5 mm. long, 2nd 1 mm. long and nearly just as broad; 3rd joint 4,5 mm. long, 0,7 mm. broad in the middle, when looked at laterally, being thus 6-times as long as broad and *more than 4-times as long as the 2nd segment*; both margins of it are provided with long simple setae. Thicker flagellum 7,8 mm. long, little shorter than the peduncle and composed of 30 joints; the 1st or proximal joint is 0,8 mm. long, 0,48 mm. thick,  $1\frac{1}{2}$ -times as long as thick, the following all broader than long, terminal joint conical. Thinner flagellum 8,6 mm. long, a little longer than the other and composed of 21 or 22 joints, that are all more or less longer than thick.

Scaphocerite of antennal peduncle transverse, much broader than long, truncate, unarmed. Antennal flagellum 36 mm. long, nearly  $\frac{1}{3}$  the length of the body.

Ischium of anterior legs with an acute spine near the distal end of the lower margin. Merus 16 mm. long, its outer surface  $7\frac{1}{4}$  mm. broad, 2,2-times as long as broad; a rather short spine (Fig. 18) near the distal end of the curved upper border of the inner surface that does not reach to that end, preceded by two sharp equal teeth which are much smaller and placed at the anterior fourth part of this border; lower border of inner surface armed with 6, somewhat unequal spines, nearly of the same size as the spine on the ischium, middle third part of the lower border of the outer surface bearing 15 or 16 nearly contiguous, small obtuse denticles, that are much smaller than the spines on the inner border. Upper border of the carpus with 5 or 6 small acute spines, preceded by a spine of the same size midway between the proximal end of the border and the 1st of the 5 or 6 spines; near the inner side of the distal end a strong spine, measuring about  $\frac{1}{3}$  the length of the carpus, with another that is but little smaller just below it on the distal margin of the *inner* surface; on the *outer* side of the strong spine are still 3 smaller spines, gradually decreasing in size, on the distal margin of the outer surface of the carpus, between the upper border and the oblique hairy furrow; the lower border of the outer surface is armed with 11 or 12 sharp teeth, that slightly grow longer distally; a strong spine, finally, at the distal end of the lower border of the inner surface, this spine measuring  $\frac{2}{3}$  the length of the spine at the distal end of the upper border. Palmar portion

(Fig. 18), measured near the upper border, 15 mm. long, 9 mm. high or broad,  $1\frac{2}{3}$ -times as long as high; upper border with two parallel, denticulate ridges, fringed with long hairs, the inner with 24 or 25 small subacute denticles, the denticles of the outer ridge in the middle smaller than on the rest of the ridge, but with a much larger spine at the distal extremity, which is also visible in de Haan's figure. As in other species of this genus the immobile finger is somewhat turned inward; from the proximal extremity of the lower border an oblique row of spines and sharp teeth runs on the outer surface to a little below the middle of the distal margin of the palm, the first three are large spines, then follow 7 or 8 smaller sharp teeth, while at the distal end a larger tooth is observed, below the row still a few smaller teeth (the first larger spines and some of the last named are still visible in Fig. 18, which represents the *inner* surface of the chela); above this oblique row many acute teeth also exist on the outer surface, between which long hairs are implanted, proximally these teeth become smaller and disappear at some distance from the carpus, while they also do not extend to the distal margin of the palm. The two upper third parts of the palm are smooth, there is, however, a hairy shallow, longitudinal groove nearly on the middle of the outer surface and one observes also a few small tufts of setae. The prehensile border of the short fixed finger is hollowed out at its base and this concavity is followed by a small tooth; the lower part of the distal margin of the inner surface of the palm presents 8 small teeth (Fig. 18); the outer side of the finger is smooth, the lower border is preceded by a row of 5 small teeth, while the proximal half of the lower border of the palm is carinate (as in many other species), the carina fringed with long hairs on the outer side. The inner surface (Fig. 18) of the palm is *smooth*, excepting a concave row of small granules near and parallel with the proximal border that articulates with the carpus. At each side of the distal end of the upper border of the palm a tuft of long hairs is implanted. The straight dactylus is 15 mm. long, just as long as the palm; its upper surface bears a row of 10 flattened, oblique, *unguiform* tubercles, the outer border is a ridge, fringed with long hairs, that bears 3 or 4 sharp granules proximally, but which for the rest is smooth; the compressed inner border appears very finely crenulate along its whole length and has therefore the appearance of a "musical ridge", like in *Upog. Issaeffi*; between this inner border and the row of unguiform tubercles there is still a finely serrulate ridge with 3 larger granules at the proximal end. The outer border of the lower surface of the dactylus presents a small obtuse tooth a little nearer to the finger-cleft than to the tip of the finger, the lower surface is flattened and bears *three* longitudinal carinae (Fig. 18) which from the 1st or proximal to the 3rd rapidly increase in length; beyond the third one observes near the tip in the larger specimen still a fourth very small carina, in the smaller, however, two or three small granules.

De Haan does not describe the female. According to Dr. Ortmann (l.c.) the adult female presents on the upper side of the dactylus, instead of the flattened, oblique, unguiform prominences, a deep longitudinal furrow of which the margins are finely crenulate; in young females this furrow is wanting. In young male specimens the unguiform prominences exist only on the distal half of the finger.

Coxa of 2nd legs with an acute tooth on the lower end of the distal border, articulating with the 2nd joint, of the inner surface, 2nd and 3rd joint unarmed. Merus 16 mm. long,  $4\frac{2}{3}$  mm. broad, 3,4-times as long as broad, with a spine near the distal end of the upper border, lower border of the outer surface with 15 or 16 very small, subacute teeth, that of the inner with two larger spines,

one at the proximal extremity articulating with the ischium, the other, smaller, a little before it. Carpus with a spine at the distal end of the upper and with another of the same size at that of the lower border.

Coxa of 3rd legs with a spine at the same place as on that of 2nd. Merus 13 mm. long, presenting its greatest width of 4 mm. at the anterior third, a little more than 3-times as long as broad; upper border unarmed, lower with 4 sharp teeth and a few smaller ones on the outer side. The legs of the 4th and 5th pair are unarmed, 5th subcheliform, immobile finger not yet half as long as the dactylus.

No pleopods on 1st somite of abdomen. Exopodite of the others lanceolate, endopodite obovate without stylamblys, nor is there an appendix masculina on the 2nd; endopodite half as long as the exopodite.

Geographical distribution: Japan (de Haan, Parisi); Japan (Kanagawa (Parisi), Katsuma and Kada Bay (Miers), Yokohama (Doflein, Parisi), Bay of Tokio (Ortmann, Balss), Sagami Bay (Ortmann, Balss), Province of Bingo (Balss), Hiroshima (Balss), Tsu (Ise) (Balss), Kiu (Balss).

### UPOGEBIA (UPOGEBIA) AFFINIS (Say)

Fig. 19—19g.

*Gebia affinis* Th. Say, An Account of the Crustacea of the United States, in: Journal of the Academy of Natural Sciences of Philadelphia. Vol. I. Part II. Philadelphia 1818, p. 241.

*Upogebia affinis* A. E. Verrill, Report upon the Invertebrate animals of Vineyard Sound and the adjacent Waters, with an account of the physical characters of the region, in: United States Commission of Fish and Fisheries. Part I. Report on the condition of the Sea Fisheries of the South Coast of New England in 1871 and 1872. Wash. 1873, pp. 368, 530 and 549, Pl. II, fig. 7.

*Upogebia affinis* W. P. Hay and C. A. Shore, The Decapod Crustaceans of Beaufort, N. C., and the surrounding region, in: Bulletin of the Bureau of Fisheries, Vol. XXXV, 1915—16. Document No. 859. Issued April 6, 1918. Wash. 1918, p. 408, Pl. XXIX, fig. 9.

Upon my request Mr. Samuel F. Hildebrand, Director of the Biological Station at Beaufort, N. C., has been so kind to send me 6 well-preserved specimens of *Upog. (Upog.) affinis* (Say), viz. 3 males one of which is full-grown and 3 ova-bearing females, collected June 4, 1926 at Sallants Point near Beaufort; I received moreover two younger females without eggs from Charleston Bay, S. Carolina, which I owe to Dr. W. T. Calman of the British Museum. I beg both gentlemen to accept my cordial thanks for their courteous assistance.

The full-grown male is 61 mm. long, the largest and the smallest egg-bearing female respectively 57 mm. and 45 mm. from tip of rostrum to end of telson; these numbers agree with those mentioned by Say and Hay and Shore. In the largest male the rostrum that reaches to the middle of the 3rd article of antennular peduncle, appears triangular, barely longer than broad at its base, grooved in the midline and with obtuse tip; each lateral border of the upper surface, that slopes obliquely downward, bears 3 acute teeth or spines, nearly at equal distances, the anterior just before the middle of the rostrum. The lower surface of the rostrum (Fig. 19b) is armed with a sharp spine, that is



directed downward and almost half as long as the height of the rostrum in a lateral aspect; it is placed just in front of the anterior pair of spines on the upper surface and half as long as the spine on the antero-lateral border of the carapace. The acute lateral frontal teeth or lobes are separated by a rather narrow interspace from the rostrum and measure barely more than  $\frac{1}{3}$  the length of the latter. Lateral ridges of the cephalic region armed with 10 acute teeth, that gradually decrease in size backward; gastric region anteriorly and laterally with sharp tubercles that in the midline only extend to the anterior third of the distance between tip of rostrum and cervical groove, laterally as far as the lateral ridges. Rostrum, lateral ridges and denticulate part of the upper surface covered with short rigid hairs as in the other species. In this full-grown male the eyestalks extend to the middle of the rostrum, not yet reaching the spine on the lower border, in the youngest male, 45 mm. long, they almost reach to the spine which is here smaller, but the rostrum barely reaches beyond the 2nd segment of the antennular peduncle. In the third male from Beaufort the spine is very small, the rostrum agrees with that of the largest female; in this female and in another which is egg-bearing the lower border (Fig. 19c) bears a row of 3 small spines of equal size, in the former the eyestalks extend almost to the tip, in the other female to the middle of the rostrum, in the third egg-bearing female the lower border bears *no* spines and the eyestalks reach to the tip. In the larger female from Charleston (Fig. 19a), long 43 mm., the lower border is also armed with 3 spines, the anterior close to the tip, the second a little smaller, immediately behind it; the posterior, the smallest of all, on the middle of the border, in the other female from the same locality, finally, the lower border is *unarmed*, and in both the eyestalks extend to the middle of the rostrum. The preceding lines prove that the armature of the lower border of the rostrum is rather *variable* in this species. In the younger specimens (Fig. 19) the interspace between rostrum and lateral frontal teeth is comparatively broader than in the adult. The posterior border of the oblique lateral portions of the cervical groove, immediately below the *linea thalassinica*, bears in the 6 specimens from Beaufort *one*, in the two young females from Charleston *two* very small, sharp spines: these spines are also characteristic of this species.

Lateral parts of 3rd and 4th abdominal somites densely hairy, all the pleura marked off by an impressed line. Sixth somite longer than all the preceding, one and a half as broad as long, much *convex* transversely, slightly also longitudinally; the upper surface presents on each side a rather deep furrow, which from the anterior border runs first backward and then curves towards the lateral, on the middle of which one observes therefore a truncate lobule. Telson a little shorter than the 6th somite, one and a half as broad as long, *presenting its greatest width quite posteriorly*; lateral margins at first parallel to just before the middle, then very slightly divergent, postero-lateral angles rounded, posterior margin slightly concave in the middle; transverse carina situated at the anterior fifth of the telson, rather sharp, lateral carinae rounded, almost reaching to the posterior margin, upper surface coarsely punctate on each side of the quite distinct median groove, that extends to the posterior border. Basal joint of uropods with a small sharp spine posteriorly, another at the base of the outer uropod, inner uropod (Fig. 19d) as long as the telson, outer slightly longer, when directed backward.

Of the full-grown male the inner antennae are 10 mm. long,  $\frac{1}{6}$  the length of the body, peduncle one and a half as long as the thinner longer flagellum; 1st or basal segment 2.4 mm. long, with a

small sharp spine near the distal extremity of the lower border; 2nd segment 0,8 mm. long,  $\frac{1}{3}$  the length of 1st, and 0,64 mm. thick,  $\frac{4}{5}$  the length; 3rd segment 3,5 mm. long, nearly one and a half as long as 1st, 0,42 mm. broad in the middle when looked at laterally, a little more than 8-times as long as broad; thicker flagellum 3,36 mm. long, almost as long as the 3rd segment of the peduncle and composed of 20 or 21 joints of which the 1st or proximal is the longest, 0,6 mm. long and half as thick (0,28 mm.), the following nearly all broader than long, the last conical; the thinner flagellum is 3,9 mm. long,  $\frac{1}{6}$  longer than the other, and consists of 16 joints, of which the 1st or proximal is the longest, as long as the 1st joint of the other flagellum, but 3-times as long as thick; the following are but little longer than thick or as long as thick, excepting the two or three terminal ones that are more elongate, the penultimate being 0,24 mm. long, 0,08 mm. thick, 3-times as long as thick, the terminal joint as long as the penultimate and of the same shape.

Outer antennae a little more than half as long as the body, scaphocerite appearing as a lamella, placed obliquely on the distal end of the 2nd segment, twice as broad as long, narrowing backward, rounded distally.

Chelipeds equal (Fig. 19e—g). Lower border of ischium of the adult male with a rather small spine, twice as far from the proximal as from the distal extremity. Merus a little more than twice as long as broad, upper border curved, rounded, with a spine of the same size as that of the ischium, at  $\frac{1}{5}$  the length of the border from its distal extremity at the inner side; lower inner border on the right leg with 7, on the left with 5 spines, of which the first three have the same size as the spine on the ischium, the following gradually smaller. Upper border of the carpus with a row of 5 very small obtuse teeth at the inner side, with a spine at the proximal extremity that has the same size as the spine on the upper border of the merus and with 5 or 6 spines on the distal margin of the upper surface (Fig. 19f), of which the three inner ones are twice as large as the spines of the merus, the two or three outer ones as large as the latter, in a younger male there were four small spines on the outer side; a longitudinal furrow as usual on the outer surface, the lower border of which bears 3 spines, that grow longer distally (Fig. 19e); at the distal end of the lower surface a spine of the same size as the 3 large spines on the distal border of the upper surface. Chela, measured along the upper border from the carpal articulation to the tip of the dactylus, in the adult male 17 mm. long, palm 10,5 mm. long, the greatest height, not far from the carpus, 6,25 mm., the palm little more than one and a half as long as high; upper border with two parallel ridges, the outer rather sharp, somewhat uneven, with a small spine at the proximal extremity, for the rest smooth (Fig. 19f), the inner spinulose along its whole extent, the four proximal and two or three distal spines of the same size as the spine at the proximal end of the outer ridge, the rest very small, though also sharp. A third ridge, obscurely denticulate and hairy, runs parallel with the spinulose inner ridge on the inner surface, as far distant from the latter as the latter from the outer ridge, A finely granular ridge as usual near the proximal margin of the inner surface, 4 sharp teeth on the distal margin opposite to the finger-cleft and 3 (on the left leg 2) sharp teeth at the base of the rounded lower border of the immobile finger. This finger as usual turned downward and inward, measures  $\frac{3}{5}$  the length of the dactylus, the prehensile edge bears 4 small subequal teeth on its proximal half, while the pointed tip is not curved upward. The dactylus that measures  $\frac{2}{3}$  the length of the palm, is slightly arcuate; upper border faintly grooved or concave, on each side with a ridge, the inner ridge granulated along its proximal third, the outer

along its proximal fourth; the inner surface of this finger bears 2 rows of granules, the upper extending from the articulation to the extremity of the finger, the lower only along the proximal half, all the ridges are fringed with hair, the outer surface also hairy. The prehensile edge of the dactylus is armed with a conical tooth not far from the base and nearly twice as large as the teeth of the immobile finger; this tooth is followed by 5 smaller ones, then by a larger tooth, though smaller than the first and, finally, by two very small ones.

In the female (Fig. 19e—g) the chelipeds are *feebler and more slender*. So in the largest egg-bearing female the merus is 3-times as long (9 mm.) as broad (3 mm.); the chela, 10,5 mm. long from the carpus to the tip of the dactylus horizontally stretched forward, measures about  $\frac{1}{5}$  the length of the body, the palmar portion, 6,5 mm. long and 3 mm. high, is twice as long as high. The spinulation is nearly as in the adult male, but the rows of granules on the dactylus are wanting, except a few of the proximal half of the upper row on the inner side. The prehensile edge of the dactylus carries a sharp conical tooth just in the middle, preceded by 2 or 3 smaller teeth, immobile finger only half as long as the dactylus.

The 2nd legs of the adult male bear at the distal extremity of the lower border both of coxa and base a sharp spine, merus 3-times as long (10 mm.) as broad (3,25 mm.), with a strong spine at the proximal end of the lower border which is fringed with long hairs, and with a feebler spine near the distal end of the upper; carpus with a small spine at the distal end of the upper border, propodus a little longer (4,5 mm.) than broad or high (4 mm.); in the female the spines on coxa and base are rudimentary.

The 3rd legs of the adult male have a spine on the lower border of the coxa, ischium unarmed as in the 2nd legs, merus 3-times as long as broad, upper border unarmed, lower with 3 spines of equal size on the middle, the anterior spine one and a half, in the female twice, as far distant from the 2nd as the 2nd from the 1st; from the 1st a transverse row of 3 acute granules passes on to the outer surface and in front of this row are situated three short, transverse rows of hairs, while near the spines hairs are implanted.

Fourth and 5th legs unarmed.

Pleopods on 1st somite wanting in the male, well developed in the female. Of the following pleopods the exopodite is elliptical, pointed, the endopodite half as long, rounded at the tip.

Eggs very numerous, globular, diameter 0,5 mm.

Geographical distribution: From Long Island Sound to Sarasota Bay, Florida (Kingsley); Pelican Island, Barbados, shallow (Schmitt); coast of Brazil, Mamanguape stone reef, Parahyba river, mangroves, Maceio coral reef (Rathbun).

#### UPOGEBIA (UPOGEBIA) SPINIFRONS (Haswell)

Fig. 20—20e.

*Gebia spinifrons* W. A. Haswell, Proc. Linn. Soc. N. S. Wales. Sydney 1881, Vol. VI, p. 762 and Catalogue Australian Stalk- and Sessile-eyed Crustacea. Sydney 1882, p. 165, Pl. III, fig. 5.

In February 1926 I applied to the Direction of the Australian Museum, Sydney, with the request

to send me for examination one or more specimens of the two species, described by W. A. Haswell (l. c.) under the names of *Gebia hirtifrons* White and *Gebia spinifrons* Haswell. Very courteously, indeed, the Direction has complied with my wishes by sending me not only 6 specimens of the former species but also 3 of the latter, for which I beg the Direction to accept my cordial thanks. The three specimens of *Gebia spinifrons* are 1° the smaller of two specimens designated "Types" in the "Records" at the Australian Museum and 2° two damaged specimens of about the same size as the larger type specimen of the species. Mr. W. T. Wells, the Secretary of the Australian Museum, wrote me about these two specimens that they appear in the "Records" as from Port Stephens?, but are correct identifications of the form, agreeing in all details with the larger type specimen. At my great astonishment, however, the specimen named sub 1° proved to belong — not to *Upog. spinifrons* — but to a quite different new species, allied to the European *Upog. (Upog.) stellata*, and described above under the name of *Upog. (Upog.) neglecta* n. sp.

The larger of the two damaged specimens, which indeed belong to *Upog. spinifrons* Hasw., is 69 mm. long, the carapace 22 mm. long, the abdomen 47 mm. Among the numerous species of the subgenus *Upogebia Upog. spinifrons* appears most closely related to *Upog. (Upog.) Talismani* Bouv. from the west coast of Africa, the lower border of the rostrum being armed *with several spines of unequal length*, a character of great importance, mentioned not at all in the original description. As in *Upog. Danai* (Miers) the front (Fig. 20, 20a) is distinctly *trilobed*, the middle lobe or rostrum the longest, the lateral lobes that extend straight forward and run parallel, half as long; the rostrum which is  $1\frac{1}{2}$ -times as long as broad at its base, appears triangular, the tip subacute; the distal half of the lateral borders is unarmed, smooth, the proximal half bears 4 or 5 subacute teeth or tubercles. The upper surface of the rostrum presents a narrow mesial longitudinal groove, and is smooth excepting at the base that bears on either side one or two tubercles. The tubercles on the lateral borders of the rostrum are continued to near the rather deep cervical groove, the lateral borders of the gastric region presenting 6 or 7 tubercles and a few occur on the anterior part of this region and these latter are followed backward by numerous transverse scabrous lines beset with hairs; from midway between the apex of the rostrum and the cervical groove the gastric region appears smooth in the middle and the posterior fourth part of that region also.

The lower border of the rostrum is armed *with 4 of 5 sharp spines of unequal length*.

In the smaller of the two specimens (Fig. 20d) the upper or 1st spine at the apex of the rostrum is the smallest of all, the posterior or 5th, placed just before the eyes, the longest, as long as the rostrum is high at this place, the 3rd spine but little shorter than the 5th, while the 2nd and the 4th that are of equal length, are half as long as the 5th and barely longer than the 1st; in the larger specimen (Fig. 20c) the apex of the rostrum is damaged, the two posterior spines are the largest of all, of equal length, the penultimate, however, a little broader than the posterior. The incisions by which the rostrum is separated from the lateral lobes, are not sharp but concave at their base. The lateral lobes bear a small tubercle at their apex, below which they are armed with two small spines of equal length; the upper surface, however, of the lateral ridges of the cephalic region, that in most other species bear small teeth or tubercles, appears in *Upog. spinifrons* quite smooth, though hairy, without trace of granules or tubercles, just as in *Upog. (Upog.) heterocheir* Kemp from the Chilka Lake. The grooves between the lateral ridges and the gastric region, are rather deep. Antero-lateral border of

the carapace (Fig. 20b) armed with 3 or 4 prominent spines, of which the upper one is placed just below the lateral frontal lobe, the following behind the base of the antenna; there is a longitudinal row of 3 smaller spines, placed close near one another, on the upper part of the hepatic region, parallel with and close below the lateral ridge of the cephalic region; 2—10 smaller spines, finally, border the lateral portions of the cervical groove behind, decreasing in size from behind forward.

In the larger specimen the 6th abdominal somite is 8,5 mm. long and 10,5 mm. broad, posteriorly; telson 7 mm. long, 8,5 mm. broad, a little broader than long and a little shorter than the 6th somite, rectangular, postero-lateral angles rounded, posterior margin straight; the usual transverse and lateral carinae of the upper surface little prominent, smooth, mesial longitudinal furrow distinct. Basal joint of uropods with a small posterior spine; inner uropod as long as the telson, with the posterior margin straight and a small, rounded, tooth near the proximal end of the anterior border; outer uropod a little longer than telson; on both uropods the ridges are rather prominent.

The eyestalks reach as far forward as the lateral lobes of the front.

In the smaller specimen the 1st segment of the antennular peduncle is 2,6 mm. long and armed at the distal end of its lower border with a small spine, long 0,26 mm., just  $\frac{1}{10}$  the length of the segment; the 2nd segment is 0,7 mm. long and just as broad, measuring  $\frac{1}{4}$  the length of the 1st; the slender 3rd segment is 2,5 mm. long, nearly as long as 1st and, being 0,36 mm. broad in the middle in a lateral view, proves to be 7-times as long as broad in the middle, while it slightly thickens towards both extremities. The thicker flagellum is 5,85 mm. long, *just as long as the peduncle* and *2,3-times as long as the 3rd segment of the latter*; it is composed of 31 joints that are of a different form, some being longer than thick, other ones as long as thick, while the 11 or 12 last joints are broader than long, excepting the terminal joint, that, as usual, has a conical shape. So e. g. the 1st or proximal joint is 0,36 mm. long, 0,24 mm. broad, the 2nd also 0,24 mm. broad, but only 0,2 mm. long, the 3rd 0,23 mm. broad and only 0,16 mm. long, the 8th 0,38 mm. long, 0,22 mm. broad, this joint being the longest of all, the 20th 0,12 mm. long and 0,2 mm. broad. The thinner flagellum measures 5,5 mm., being slightly shorter than the other and consists of 20 joints, all longer than thick but of unequal length; the 1st or proximal is 0,3 mm. long, 0,16 mm. thick, the 2nd 0,4 mm. long, in the middle 0,15 mm. thick, the two following resemble the 1st, the 12th joint is 0,38 mm. long, 0,1 mm. thick, the terminal joint 0,12 mm. long and 0,04 mm. thick at base.

Ischium of 1st legs with 4 acute spines on the lower border, merus 3-times as long as broad, compressed, with a spine on upper border at  $\frac{1}{5}$  its length from the distal extremity, lower margin of the outer side with 9 or 10 spines, of which the 5 proximal ones are much larger than the following that decrease in length; lower margin of inner side fringed with long hairs. Carpus with 6 or 7 spines, rather irregularly placed, on its upper border, of rather unequal length and one of which occurs at the distal end on the inner surface; a much larger spine at the distal end of the lower border. Palmar portion of the chela of the female  $\frac{1}{5}$  shorter than the merus, rather slender, presenting its greatest height near the carpal articulation and slightly narrowing distally; exclusive of the spines of the upper border the palm appears 3-times as long as high near the carpus. The upper border of the palm is armed with a longitudinal row of 7 spines, of which the 1st is placed at the proximal end, the 7th at the distal and twice as far distant from the 6th as the 6th from the 5th, while the distances between the others are subequal; just below this row the inner surface bears a fringe of long hairs,

near the rounded lower border one observes on the inner surface a longitudinal crest, as in other species, running from the proximal end about to the middle of the surface and below this crest the lower border is fringed with long hairs; the outer surface of the palm is smooth, excepting a small spine at the distal margin just below the finger-cleft and it presents a few longitudinal lines of hairs. Fixed finger slender, with the prehensile edge smooth and entire, the finger measuring only  $\frac{1}{5}$  the length of the dactylus; dactylus measuring about  $\frac{3}{4}$  the length of the palm, almost straight, upper border faintly grooved longitudinally, outer surface with a longitudinal ridge between which and the upper border long hairs are implanted; prehensile edge with two rounded teeth at the base, of which the second is larger than the first near the articulation.

Coxa of 2nd legs (Fig. 20e) with 2 spines close together on the lower border. Merus about 4-times as long as broad, exclusive of the spines, with a small spine at the distal end of the upper border preceded by another of the same size; lower margin of the outer surface with 11 sharp spines, of which the 4 proximal, larger than the following that gradually decrease in size, are placed on a processus directed backward of the proximal extremity; lower margin of the inner surface fringed with long hairs. Carpus almost half as long as the merus,  $2\frac{1}{2}$ -times as long as broad, upper border with a spine just before the middle, lower with one or two spines of the same size at the distal end; propodus barely longer the carpus, with the borders fringed with long hairs, like the dactylus that measures  $\frac{2}{3}$  the length of the propodus.

Coxa of 3rd legs with a tooth on lower border. The merus measures about  $\frac{2}{3}$  the length of that of 2nd legs and is 3-times as long as broad in the middle; lower margin with 4 spines that decrease in length from the 1st or proximal to the distal one; following joints unarmed, fringed with long hairs. The legs of 4th pair are wanting, those of 5th subcheliform, fixed finger half as long as the dactylus.

In both females the pleopods on 1st somite are well developed.

The smaller specimen bears still a few eggs, that are globular, diameter 0,9—1 mm.

In the original description in: Bulletin Mus. Nat. d'Hist. Nat. Paris 1915, p. 184 of *Upog. Talismani* Bouv. one reads: "la carène gastrique qui délimite de chaque côté cette aire (the scabrous surface of the gastric region) ne fait pas saillie en pointe à la base du rostre", so that we may conclude that in this species, which was collected at a depth of 65 fathoms off Cape Blanco, west coast of Africa, the front is not trilobed, different from *Upog. spinifrons*. *Upog. Talismani* differs moreover by the carpus of the 2nd legs, on the upper border of which one observes a row of 4 or 5 spines, and by the telson, of which the posterior border is emarginate. *Upog. Talismani*, finally, is a much smaller species, the fullgrown female being only 20—30 mm. long.

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## EXPLANATION OF THE FIGURES

- Fig. 1. *Upogebia (Calliadne) Savignii* (Strahl). Egg-bearing female, long 27 mm., from Massaua. Frontal region and eyestalks,  $\times 33$ .
- „ 2. *Upogebia (Calliadne) rhadames* Nobili. Female without eggs, long 17 mm., from Suakim. Frontal region and eyestalks,  $\times 33$ .
- „ 3—3b. *Upogebia (Calliadne) furcata* (Aurivillius). Egg-bearing female, long 12 mm., from the river near Bibundi, Cameroon. Type. — 3. Lateral view of gastric region, left eyestalk and part of antennal peduncle;  $\alpha$  scaphocerite,  $\beta$  cervical groove,  $\times 22$ ; 3a left cheliped of this female, outer view,  $\times 17$ , hairs not drawn; 3b fingers of right cheliped of this female, outer side,  $\times 22$ .
- „ 4—4e. *Upogebia (Calliadne) Bowerbankii* (Miers). Male, long 21,4 mm., from Fremantle, S. W. Australia. Type. — 4. Frontal region,  $\times 33$ ; 4a the same, lateral view, with left eyestalk,  $\times 33$ ; 4b right lateral border of 6th segment of abdomen,  $\times 13$ ,  $\times$  spinules of posterior margin; 4c telson,  $\times 13$ ; 4d right cheliped, outer side,  $\times 10$ ; the small tooth on the upper border of the merus and the row of acute teeth on the inner border of the upper surface of the carpus are invisible; 4e distal portion of propodus and fingers of the left cheliped, looked at from the inner side,  $\times 17$ .
- „ 4f. Cotype of *Upogebia (Calliadne) intermedia* (de Man) = *Darwinii* (Miers), a male long 35 mm. from the Mergui Archipelago. Right lateral border of 6th segment of abdomen,  $\times 10$ .
- „ 5. *Upogebia (Calliadne) cargadensis* Borr. Cotype from Cargados Carajos. Frontal region, magnified. Drawing made by Mr. L. A. Borradaile.
- „ 6—6e. *Upogebia (Calliadne) octoceras* Nobili. Females, cotypes, from Aden or Obock or Perim. 6. Frontal region with eyestalks of the female of which the carapace is 10 mm. long,  $\times 17$ , hairs omitted; 6a lateral view of the rostrum of this female, right border,  $\times 17$ ; 6b frontal region with eyestalks of an ova-bearing female, long 41 mm.,  $\times 17$ , hairs omitted; 6c lateral view of the left border of this rostrum, distal half,  $\times 17$ ; 6d antennule of this female,  $\times 17$ ; 6e inner side of the finger-cleft of the right chela of this female, presenting the spine long 0,4 mm.,  $\times 33$ .
- „ 7—7c. *Upogebia (Calliadne) octoceras* Nobili var. *australiensis* de Man. Cotypes from the interior of sponges, Port Jackson. 7 Antennule of a female, long 44 mm.,  $\times 10$ ; 7a part of the thinner flagellum at the level of the greatest width of the other,  $\times 33$ ; 7b part of the thicker flagellum at the level of its greatest width, both 7a and 7b taken from the female long 44 mm.; 7c fingers of right cheliped of a female, long 48 mm., outer side,  $\times 10$ .
- „ 8—8b. *Upogebia (Calliadne) deltaura* Leach. Male long 55 mm. from Plymouth. 8 Frontal region,  $\times 10$ ; 8a right antennule, lateral view,  $\times 10$ ; 8b right cheliped, outer side,  $\times 3\frac{1}{3}$ .
- „ 9—9d. *Upogebia (Upogebia) Danai* (Miers). Male long 33 mm. from Opoulu, Kaifara H<sup>f</sup>. 9 Sixth segment of abdomen and telson,  $\times 6\frac{2}{3}$ ; 9a antennule,  $\times 17$ ; 9b left cheliped, outer side,  $\times 6\frac{2}{3}$ , spine at the distal end of upper carina of carpus only partly visible; 9c small teeth between the fixed finger and the finger-cleft of the dactylus,  $\times 17$ ; 9d proximal part of the dactylus of this cheliped,  $\times 17$ .
- „ 10—10b. *Upogebia (Upogebia) Osiridis* Nobili. Egg-bearing female from Aden, cotype. 10 Frontal region,  $\times 17$ , hairs omitted; 10a the same, lateral view,  $\times 17$ ; 10b antennule,  $\times 13$ .
- „ 11—11b. *Upogebia (Upogebia) littoralis* (Risso). Male long 47 mm. from the Gulf of Naples. 11 Chela, carpus and part of merus of right cheliped, outer side,  $\times 4$ ; 11a the same, looked at from above,  $\times 4$ ; 11b the same, looked at from below,  $\times 4$ .
- „ 12. *Upogebia (Upogebia) capensis* (Krauss). Egg-bearing female long 66 mm. from Lüderitz Bay, S. W. Africa. Telson,  $\times 4$ .
- „ 13—13e. *Upogebia (Upogebia) neglecta* n. sp. Female without eggs, type, from Port Stephens, long 45,5 mm. 13 Frontal region,  $\times 17$ , hairs for the greater part omitted; 13a the same, lateral view,  $\times 17$ ; 13b telson and right uropods,  $\times 4$ ; 13c left cheliped, outer side,  $\times 4$ , of the two spines near the distal end of the upper border of the palm only the outer is visible, hairs partially omitted; 13d fixed finger, outer side,  $\times 22$ ; 13e part of dactylus in the middle of its length, outer side,  $\times 22$ ,  $\alpha$  teeth of the inner border of its upper surface.

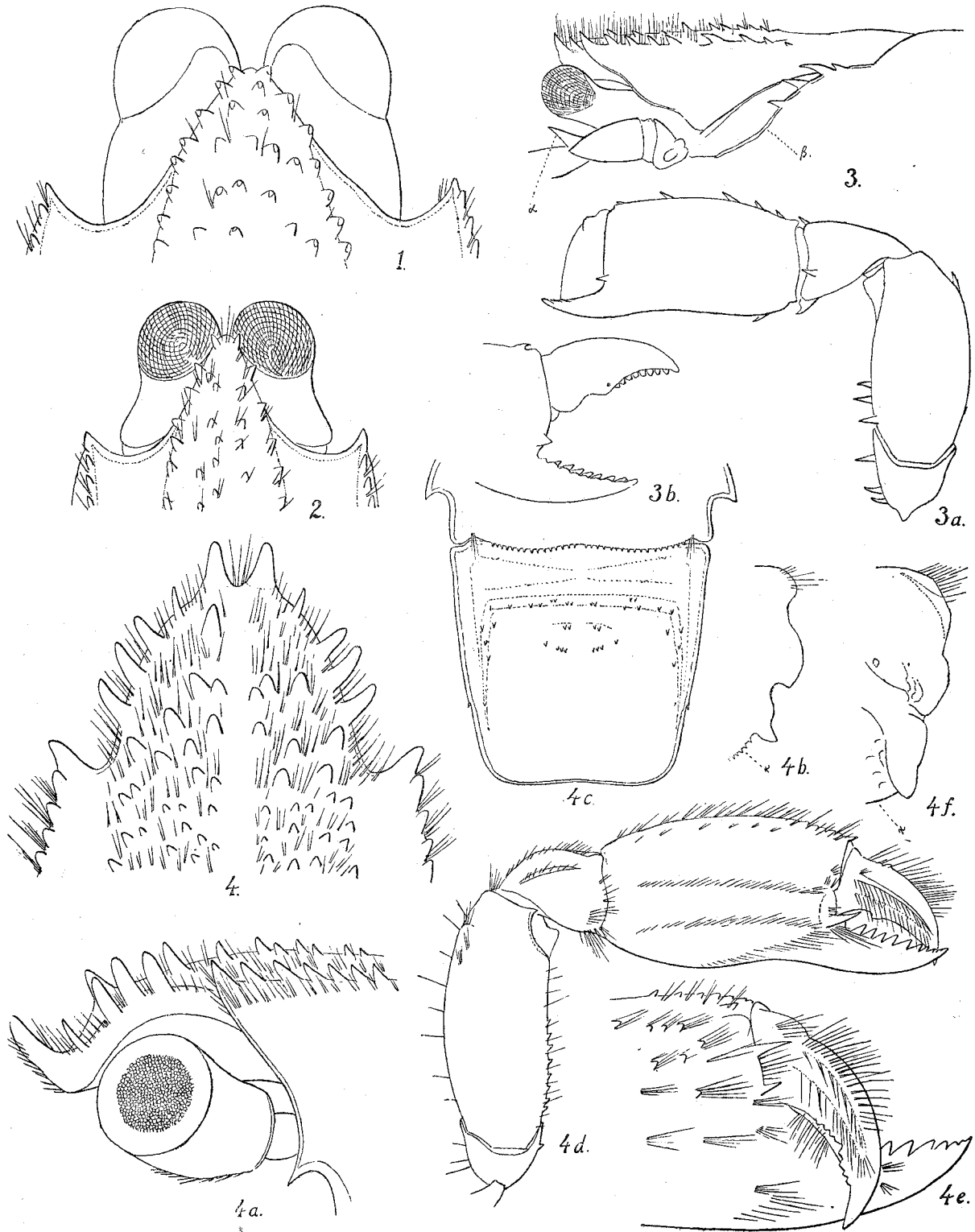
- Fig. 14—14*d*. *Upogebia* (*Upogebia*) *stellata* (Montagu). Adult male, long 44 mm., from Plymouth. 14 Sixth segment of abdomen and telson,  $\times 4$ ; 14*a* right cheliped, outer side,  $\times 4$ ; 14*b* the same looked at from below,  $\times 4$ ; 14*c* dactylus looked at from above,  $\times 8$ ; 14*d* dactylus looked at somewhat obliquely from below,  $\times 8$ .
- „ 15—15*d*. *Upogebia* (*Upogebia*) *gracilipes* n. sp. Male, long 40 mm., female long 44 mm. from the Adriatic. 15 Frontal region of the female,  $\times 17$ ; 15*a* the same, lateral view,  $\times 17$ ; 15*b* telson and right uropods of the female,  $\times 5\frac{1}{3}$ ; 15*c* left cheliped of the male, outer side,  $\times 4$ , hairs on the merus omitted; 15*d* distal part of propodus and proximal part of dactylus looked at obliquely from above,  $\times 4$ .
- „ 16—16*f*. *Upogebia* (*Upogebia*) *Balssi* n. sp. Female long 17 mm. from Suez. 16 Frontal region with eyes,  $\times 33$ ; 16*a* right cheliped, outer side,  $\times 13$ , the long hairs on the lower border of the propodus are not drawn; 16*b* the same looked at from above,  $\times 13$ ; 16*c* distal part of upper border of merus,  $\times 33$ ; 16*d* fixed finger  $\times 33$ ; 16*e* terminal part of dactylus,  $\times 33$ ; 16*f* distal part of merus and adjacent part of carpus of 2nd leg, looked at from the inner side,  $\times 33$ .
- „ 17—17*b*. *Upogebia* (*Upogebia*) *hirtifrons* (White). Adult male from Kenepuru, New Zealand. 17 Frontal region,  $\times 8$ ; 17*a* the same lateral view, with the right eyestalk,  $\times 8$ ; 17*b* left cheliped, outer side,  $\times 4$ .
- „ 18. *Upogebia* (*Upogebia*) *major* (de Haan). Adult male long 87 mm. from the Bay of Tokio. Left cheliped, viewed from the inner side,  $\times 2\frac{2}{3}$ .
- „ 19—19*g*. *Upogebia* (*Upogebia*) *affinis* (Say). Semi-adult female from Charleston Bay, S. Carolina, full-grown ova-bearing female and adult male from Beaufort, N. Carolina. 19 Frontal region and eyes of the semi-adult female,  $\times 17$ ; 19*a* the same, lateral view,  $\times 17$ ; 19*b* lateral view of terminal part of rostrum of the adult male, 19*c* of the full-grown female,  $\times 17$ ; 19*d* right inner uropod of the semi-adult female,  $\times 8\frac{1}{3}$ ; 19*e* right cheliped of this female, outer side,  $\times 6\frac{2}{3}$ ; 19*f* carpus and contiguous parts of merus and propodus of this cheliped, looked at from above,  $\times 8\frac{1}{3}$ ; 19*g* fingers of this cheliped, inner side,  $\times 6\frac{2}{3}$ .
- „ 20—20*e*. *Upogebia* (*Upogebia*) *spiniifrons* (Haswell). Two females respectively 69 mm. and 65 mm. long, the latter with eggs, from Port Stephens. 20 Gastric and frontal region of the larger female,  $\times 4$ ; 20*a* frontal region of this specimen,  $\times 8$ ; 20*b* gastric and frontal region of this female, with right eye and right antennal peduncle, lateral view,  $\times 4$ ; 20*c* lateral view of rostrum of the same specimen,  $\times 8$ ; 20*d* lateral view of rostrum of the other specimen,  $\times 8$ ; 20*e* right leg of the 2nd pair of the larger female, outer side, hairs not drawn,  $\times 4$ .



# PLATES

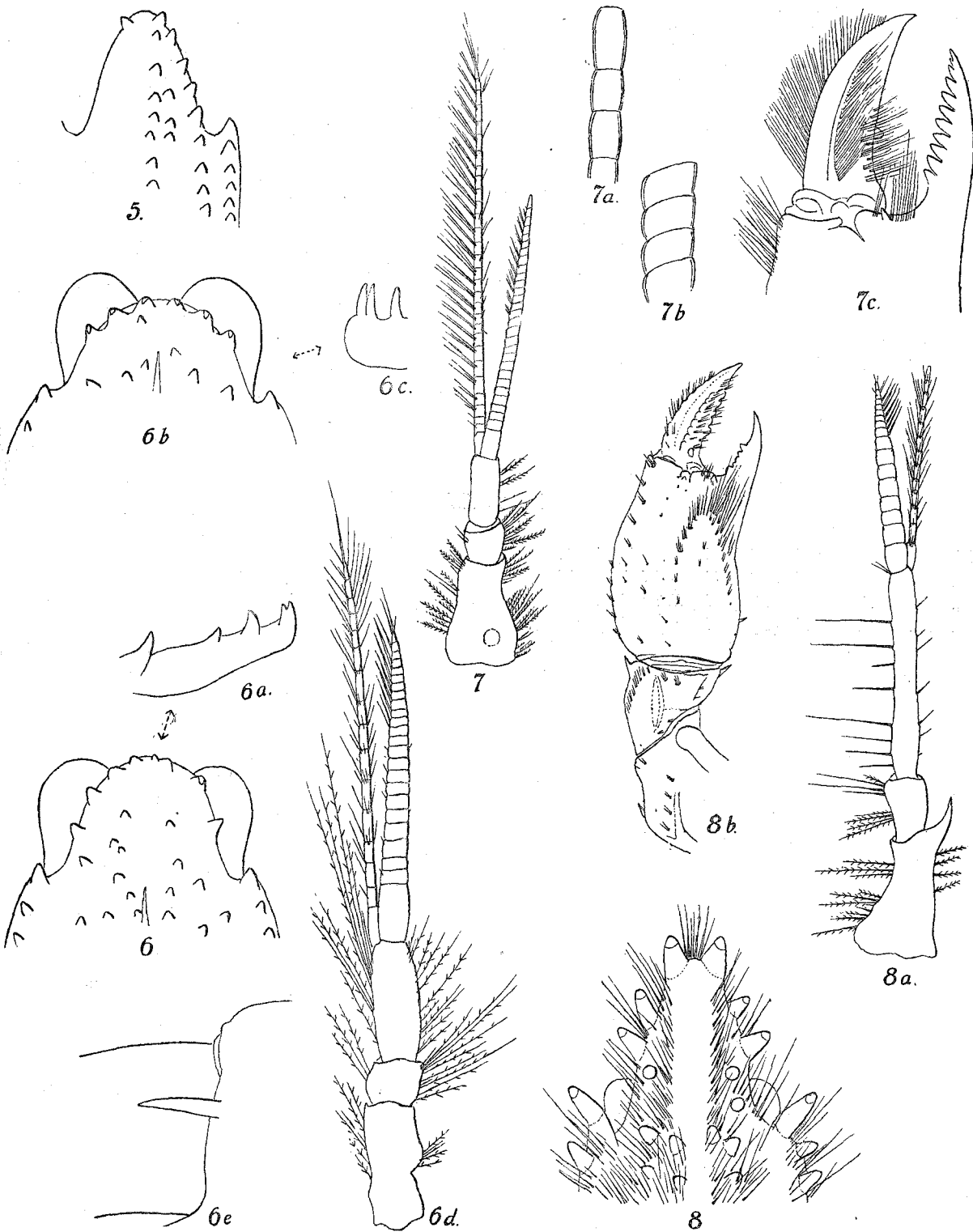
## Plate I

- Fig. 1.     *Upogebia (Calliadne) Savignii* (Strahl).  
  „ 2.     *Upogebia (Calliadne) rhadames* Nobili.  
  „ 3—3b. *Upogebia (Calliadne) furcata* (Aurivillius).  
  „ 4—4e. *Upogebia (Calliadne) Bowerbankii* (Miers).  
  „ 4f.     *Upogebia (Calliadne) intermedia* (de Man).



## Plate II

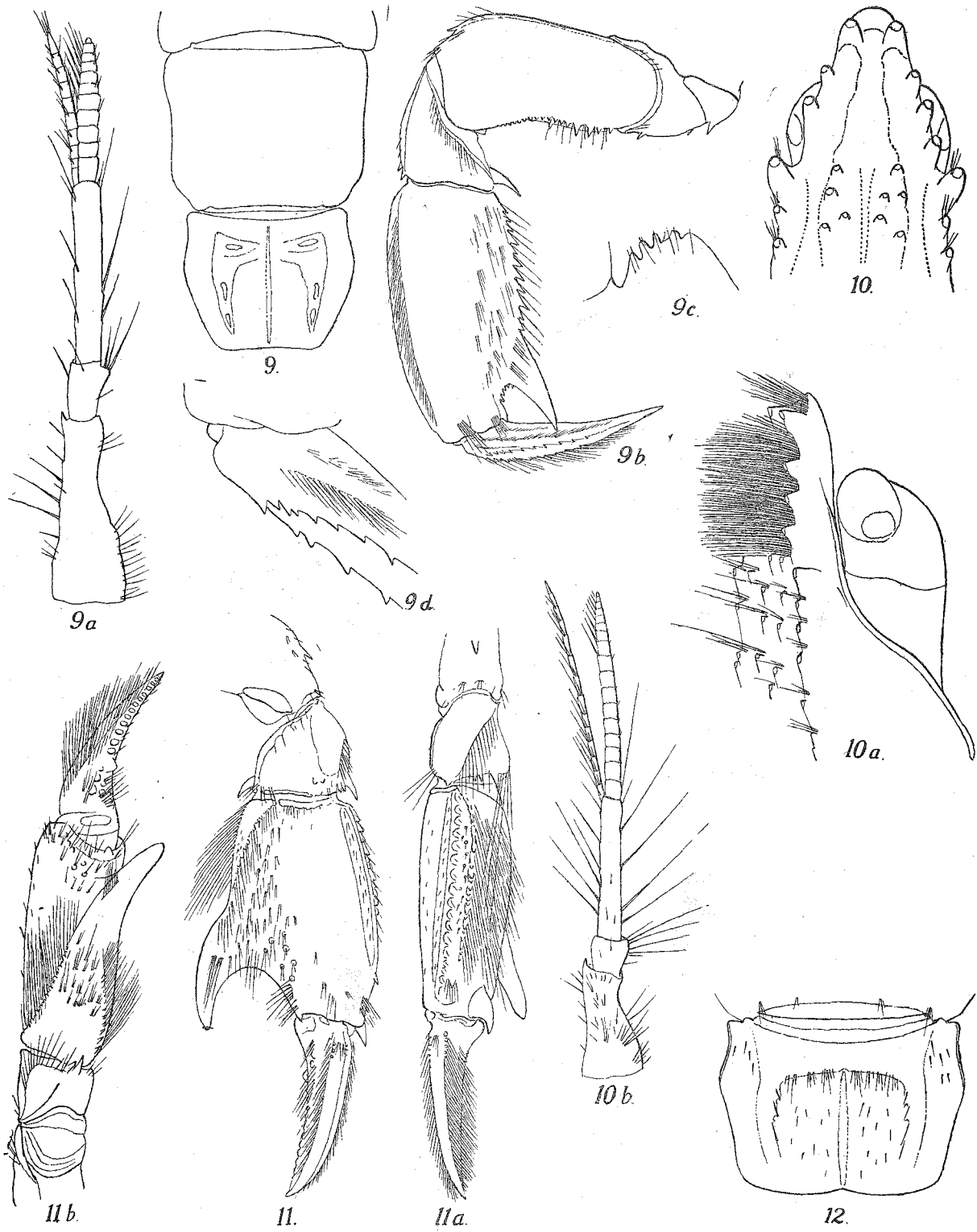
- Fig. 5. *Upogebia (Calliadne) cargadensis* Borr.  
„ 6—6e. *Upogebia (Calliadne) octoceras* Nobili.  
„ 7—7c. *Upogebia (Calliadne) octoceras* Nobili, var. *australiensis* de Man.  
„ 8—8b. *Upogebia (Calliadne) deltaura* Leach.



J. G. DE MAN del.

**Plate III**

- Fig. 9—9d. *Upogebia (Upogebia) Danai* (Miers).  
„ 10—10b. *Upogebia (Upogebia) Osiridis* Nobili.  
„ 11—11b. *Upogebia (Upogebia) littoralis* (Risso).  
„ 12. *Upogebia (Upogebia) capensis* (Krauss).



J. G. DE MAN del.

**Plate IV**

- Fig. 13-13e. *Upogebia (Upogebia) neglecta* de Man.  
„ 14-14d. *Upogebia (Upogebia) stellata* (Montagu).  
„ 15, 15a. *Upogebia (Upogebia) gracilipes* de Man.



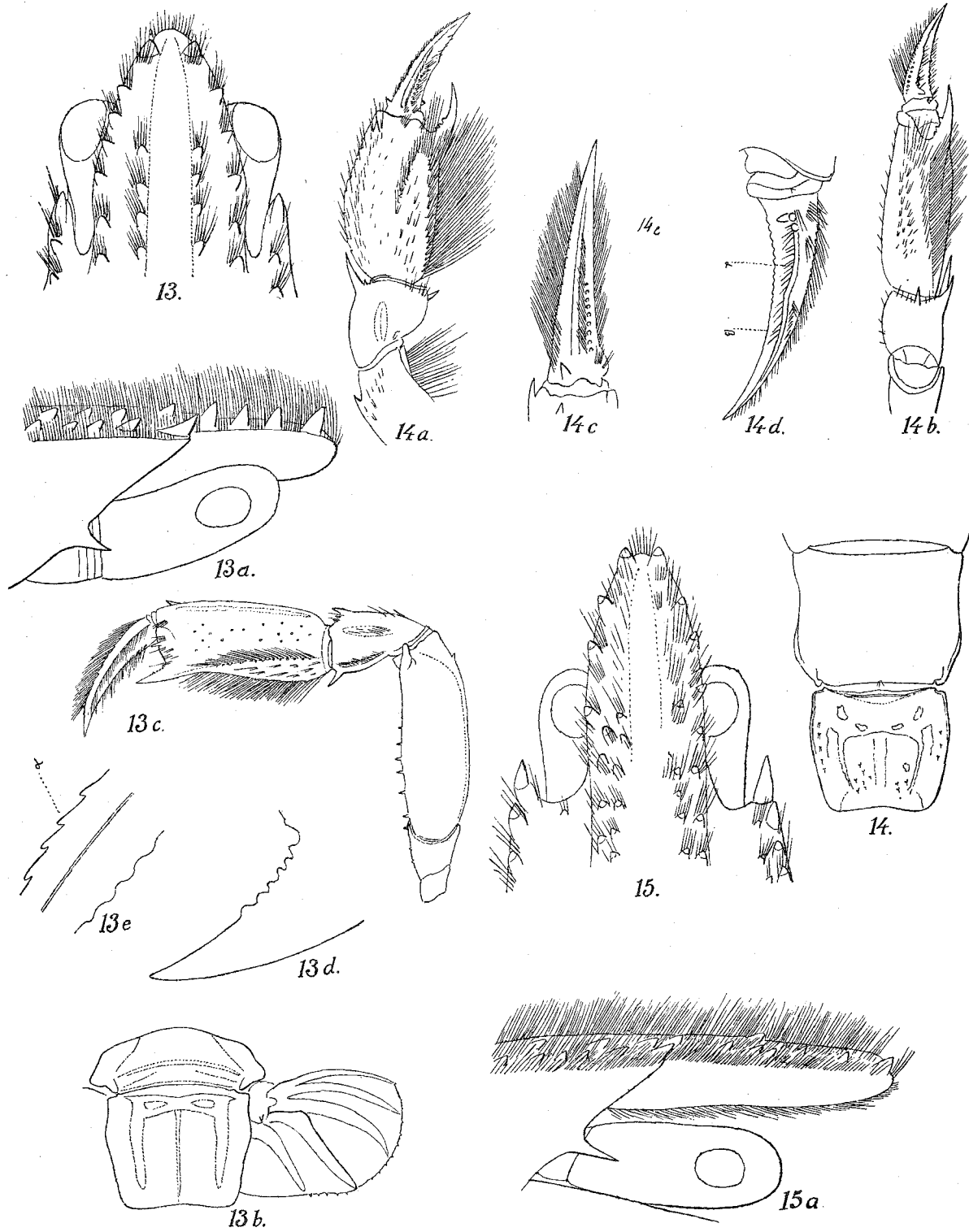
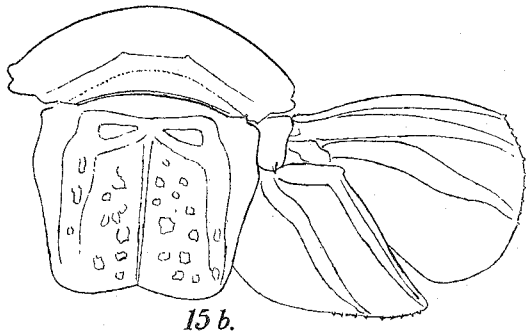
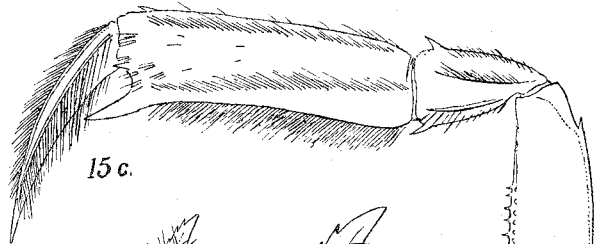


Plate V

- Fig. 15b-15d. *Upogebia* (*Upogebia*) *gracilipes* de Man.  
„ 16-16f. *Upogebia* (*Upogebia*) *Balssi* de Man.  
„ 17-17b. *Upogebia* (*Upogebia*) *hirtifrons* (White).



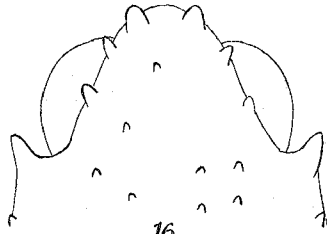
15 b.



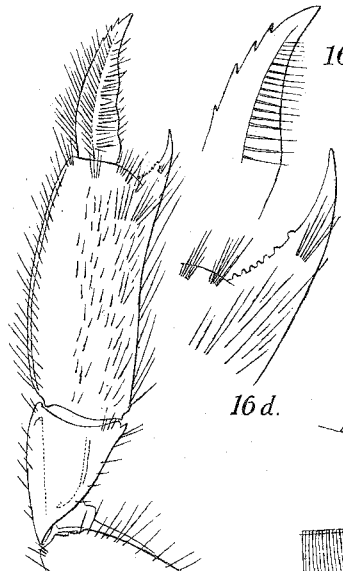
15 c.



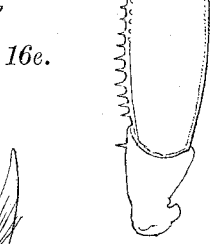
15 d.



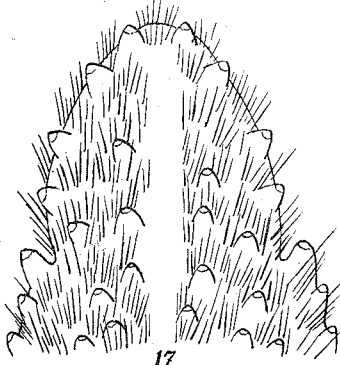
16



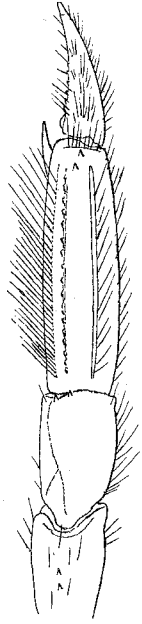
16 d.



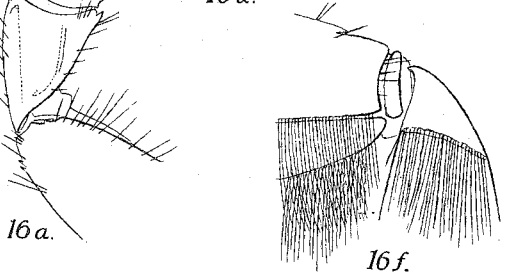
16 e.



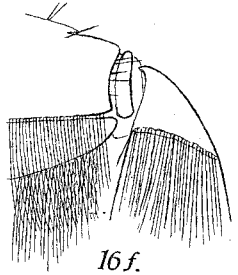
17.



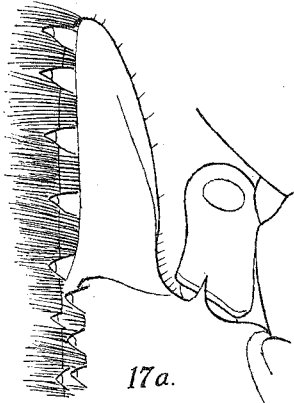
16 b.



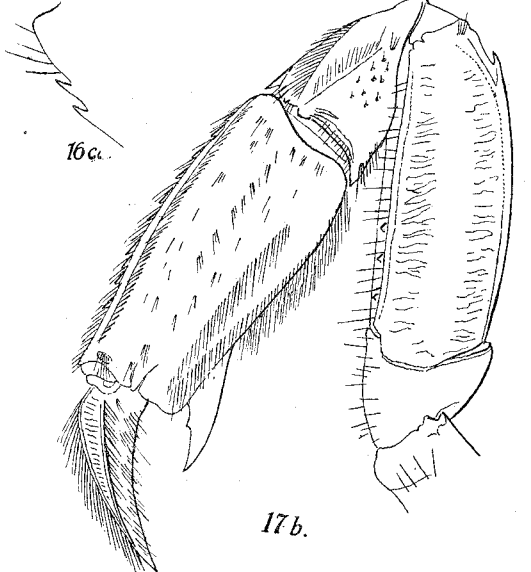
16 a.



16 f.



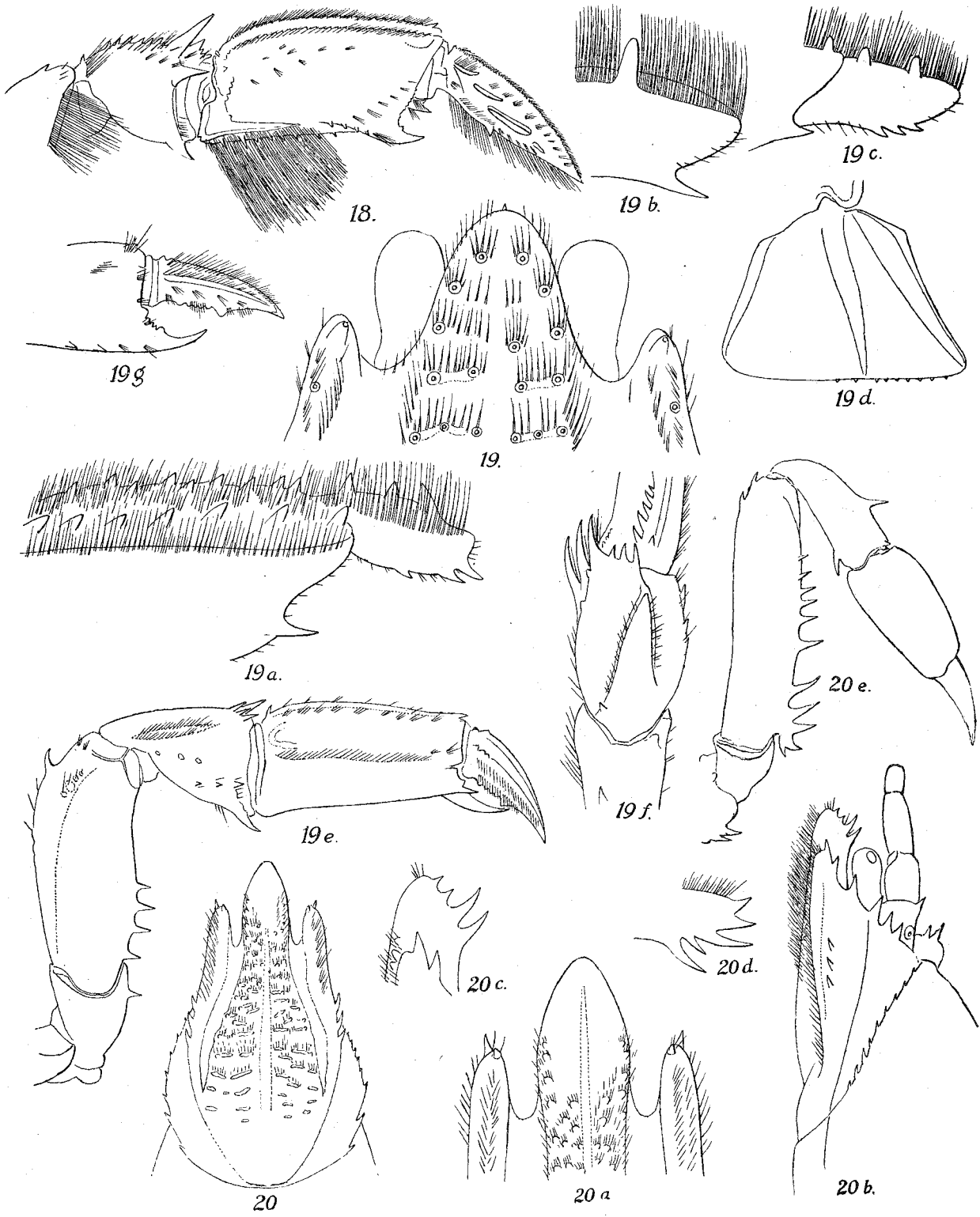
17 a.



17 b.

**Plate VI**

- Fig. 18. *Upogebia (Upogebia) major* (de Haan).  
" 19-19g. *Upogebia (Upogebia) affinis* (Say).  
" 20-20e. *Upogebia (Upogebia) spinifrons* (Haswell).



J. G. DE MAN del.