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ZOOLOGISCHEN STAATSSAMMLUNG

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Thalassinidea of Kenya collected by Dr. A. J. Bruce

(Crustacea, Decapoda)

1. Family Upogebiidae Borradaile, 1903

von

Katsushi Sakai

(Mit 15 Abbildungen im Text)

Veröff. Zool. Staatssamml. München	Band 18	S. 1—44	München, 1. März 1975

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This paper is dedicated to the Trustees of the Humboldt-Stiftung, Bonn, for recommending the author for the mission to his country, Germany, to carry out crustacean works, and for assistance in making this paper for print.

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[2]) Carcinological Society of Japan; 106 Tokyo, Minato-Ku, Azabu 10-Ban, 3-11-4.

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So far the Thalassinids from the east coast of Africa have received little attention. Since the end of 1970 the present author has been examining the Thalassinids from Kenya collected by Dr. A. J. Bruce of the East African Fisheries Research Organization in Kenya: this collection includes the species of the families Upogebiidae, Callianassidae and Axiidae. The present paper, the first of the series, is given as to the species of the family Upogebiidae.

Before entering the descriptions, the present author must express his gratitude to Dr. A. J. Bruce and his members, who have been engaged in collecting the valuable specimens and in supplying them to the author together with their data as soon as possible and in a perfect condition, to Dr. T. Tokioka, the professor of the Seto Marine Biological Station of Kyoto University, Japan, for his supervision of the work while this paper was being prepared, and for reading through the text, to Dr. I. Gordon of the British Museum for her generousity in sending to the author one of the most important references, the de Man's monograph in the "Siboga-Expeditie", to Dr. F. A. Chace of the Smithsonian Institution for his kindness in preparing for the author a number of copies on his request, and also to Dr. Des Griffin of the Australian Museum for his kind gift of some precious specimens for comparison.

This work is finished by me as a guest of the Zoologische Sammlung des Bayerischen Staates in Munich, supported by the Humboldt-Stiftung in Bonn, Germany. Finally the author should express his gratitude to Dr. W. Forster, the keeper of the Zoologische Staatssammlung in Munich for giving the opportunity of working in his Museum, to Drs. H. Fechter and L. Tiefenbacher for their interest in his work and encouragement, to Dr. G. Mauermayer for placing her library facilities at his disposal, and to Dr. F. Terofal for his assistance in making this paper ready for print.

As suggested by Dr. A. J. Bruce, the present type specimens are to be deposited in the Zoologische Sammlung des Bayerischen Staates in Munich, and the duplicates in the National Museum in Nairobi, Kenya.

I. Family Upogebiidae Borradaile, 1903

1) Genus Upogebia Leach, 1814

Two subgenera *Upogebia* Leach, 1814 and *Calliadne* Strahl, 1861 are for convenience' sake admitted in the genus *Upogebia* by de Man (1928, p. 35), though Saint-Laurent (1973, pp. 513—516) demonstrated that these subgenera are to be obsolete. The present collection contains seven species of the subgenus *Calliadne*, including four new species. It was found in this study that *U. (Calliadne) amboinensis* is valid for *U. (Calliadne) ancylodactyla*, because *U. (Calliadne) ancylodactyla* de Man, 1905 is proved to be synonymous with the variety *amboinensis* (= *Upogebia (Calliadne) ancylo-*

dactyla var. *amboinensis* de Man, 1928) of *Gebiopsis intermedia* de Man, 1888.

The Species collected by Dr. A. J. Bruce:

1. *Upogebia (Calliadne) amboinensis* de Man, 1888
   (=*U. (Calliadne) ancylodactyla* de Man, 1905)
2. *U. (Calliadne) bowerbankii* Miers, 1884
3. *U. (Calliadne) brucei* sp. nov.
4. *U. (Calliadne) rhadames* Nobili, 1904
5. *U. (Calliadne) spongium* sp. nov.
6. *U. (Calliadne) digitina* sp. nov.
7. *U. (Calliadne) longicauda* sp. nov.

Fauna:

No species of the subgenus *Calliadne* have ever been reported from the east coast of Africa, though seven species are counted from other parts of the Indian Ocean region (defined by Holthuis and Rosa, 1965). Thus, there are known at present eleven species, inclusive of four new species newly established in this paper, in the Indian Ocean region.

Their occurrences are recorded as follows:

1. *Upogebia (Calliadne) octoceras* Nobili, 1904 from Obock, Perim and Aden in the Red Sea (Nobili, 1904).

2. *Upogebia (Calliadne) rhadames* Nobili, 1904 from Soakin, Massawa and Djibouti (Nobili, 1904); South Africa (Barnard, 1946 and 1950); Shimoni and Wasin Is. in Kenya.

3. *Upogebia (Calliadne) savignii* (Strahl, 1861) from Red Sea (Ortmann, 1891): Suez (Tattersal, 1921); Suakin, Massawa and Djibouti in the Red Sea (Nobili, 1906[b]); South Africa (33 09' 30"S, 28 03' 00"E) (Stebbing, 1910); near East London and Plettenberg Bay (Barnard, 1950).

4. *Upogebia (Calliadne) cargadensis* Borradaile, 1910 from Cargados Carajos (Borradaile, 1910) in the Indian Ocean region (defined by Holthuis and Rosa, 1965).

5. *Upogebia (Calliadne) dawinii* (Miers, 1884) from Perim, Aden and Obock in the Red Sea (Nobili, 1906[a]); Saya de Malha Bank (Borradaile, 1910); Rameswaram, Tuticorin and Cheval Par (Henderson, 1893), the above-mentioned localities in the Indian Ocean region. Elphinstone Island (de Man, 1888[a]); Palau Bidan, Penang (Lanchester, 1901); Ambon (Ortmann, 1894: Zehntner, 1894); Port Dawin, North Australia (Miers, 1884) in the Indopacific Central region.

6. *Upogebia (Calliadne) hexaceras* (Ortmann, 1894) from Persian Gulf (Nobili, 1906[a]) in the Indian Ocean region. Salawati Is. (de Man, 1928) and Thursday Is. (Ortmann, 1894) in the Indopacific Central region.

7. *Upogebia (Calliadne) brucei* sp. nov. from South of Wasin Is., Kenya.
8. *Upogebia (Calliadne) spongium* sp. nov. from off Nossi Bé, Madagascar.
9. *Upogebia (Calliadne) digitina* sp. nov. from Ras Iwatine, Kenya.
10. *Upogebia (Calliadne) longicauda* sp. nov. from Port Tudor in Mombasa, Kenya.
11. *Upogebia (Calliadne) bowerbankii* (Miers, 1884) from Zanzibar and Wasin Is. in Kenya. This species was first recorded by Miers (1884) from Fremantle, S. W. Australia in the south eastern region of the Indian Ocean.

As compared with the Indian Ocean region in the Indopacific Central region the following five species have been recorded.

1. *Upogebia (Calliadne) dawinii* (Miers, 1884) from Port Dawin to the Red Sea.
2. *Upogebia (Calliadne) hexaceras* (Ortmann, 1894) from Thursday Is. to Persian Gulf, the latter locality in the Indian Ocean region.
3. *Upogebia (Calliadne) octoceras* var. *australiensis* de Man, 1927 from Sydney (de Man, 1927).
4. *Upogebia (Calliadne) kiiensis* Sakai, 1971 from Kii, Japan (Sakai, 1971).
5. *Upogebia (Calliadne) amboinensis* de Man, 1888 from Ambon (de Man, 1888[b]): Ternate (de Man, 1902) and Timor (de Man, 1905 and 1928). Fiji Is. is added in this paper as the eastern extremity of its distribution.

Although Nakazawa (1927, 1947) reported *Upogebia (Calliadne) isodactyla* Ortmann (= *U. (Calliadne) savignii* (Strahl)) from the Inland Sea of Japan, the present author is not sure about this record, as no specimen from the Inland Sea is left and then it is impossible to check Nakazawa's identification.

Morphology:

The morphological charactor of the examined species of the subgenus *Calliadne* was classified into the basic characters common to all species and the specific ones which are useful for the specific identification. These specific characters are found in the following parts of the body.

1. The form of the telson. The telson is variable in form, and the examined species may be divided into two groups by the ratio of the breadth of the length.

The first group includes such typical species with the telson broader than long as *Upogebia (Calliadne) amboinensis, bowerbankii, brucei* and *rhadames*. In *U. (Calliadne) rhadames,* however, this ratio is mostly found the same in the female, but reversed in the male. The second group contains such species with the telson longer than broad as *Upogebia (Calliadne) spongium, digitina* and *longicauda*. These new species must be exempted from the traditional definition that the genus *Upogebia* has the telson not longer than broad.

2. The form of the rostrum. The species are divided into two groups too, on this character. The first group includes such species with the

rostrum broader than long and of a broad triangle as *Upogebia (Calliadne) amboinensis, bowerbankii, brucei, digitina* and *longicauda.* In *Upogebia (Calliadne) bowerbankii* and *digitina* the distal margin of the rostrum in semicircular. In *U. (Calliadne) rhadames* the relation between the rostral width and length is reversed by sex; in the male the rostrum is broader than long, while longer than broad in the female.

The last group covers such species with the rostrum longer than broad as *U. (Calliadne) spongium.*

3. The lateral longitudinal grooves of the carapace. Usually the lateral longitudinal grooves of the carapace are represented each as an interspace, wide or narrow, between the dorsomedian region and the lateral longitudinal ridge. However, in *U. (Calliadne) amboinensis* the lateral longitudinal grooves are so narrow, that the apical tooth of each lateral longitudinal ridge approaches the anterolateral tooth of the gastric region. Further, in *U. (Calliadne) kiiensis* no lateral longitudinal grooves are definable.

4. The median interspace in the dorsomedian region of the carapace. Three types are distinguishable as to the median interspace in the dorsomedian region. The first is characterized by the median interspace extending onto both the rostral back and the anterior one fourth of the gastric region as seen in *U. (Calliadne) bowerbankii, brucei, rhadames, spongium* and *digitina.* In the second the median interspace is restricted to the anterior one fourth of the gastric region as in *U. (Calliadne) amboinensis.* And in the last type, practically no median interspace is definable as in *U. (Calliadne) longicauda.*

5. The relative situation and shape of the dactylus (Fig. 1). The dactylus is articulated to the palm about 45 degrees twisted outward, as seen in the species such as *Upogebia (Upogebia) major* (de Haan), *U. (Upogebia) yokoyai* Makarov, *U. (Upogebia) issaeffi* (Balss), and *Thalassina anomala* (Herbst). In the species belonging to the families Callianassidae, Axiidae and Laomediidae the dactylus is articulated to the palm in normal situation.

Examining the present material and the specimens of some other species mentioned above, it becomes clear that the shape of the dactylus is seemingly available as an additional generic criterion, as its cross section is nearly square in the subgenus *Calliadne,* triangular in the subgenus *Upogebia,* while it is conspicuously compressed in the genus *Thalassina.*

6. The interior median carina on the dactylus of the first pereiopods. The species may be classified into two groups by the feature of the interior median carina on the dactylus. In the first group of species bearing the interior median carina, *U. (Calliadne) digitina* has the carina consisting characteristically of a prominent row of triangular teeth and *U. (Calliadne) bowerbankii, brucei* and *rhadames* are provded with the carina of a row of rounded pearly tubercles. In *U. (Calliadne) spongium* the carina is constructed differently between both sexes; in the male it is tuber-

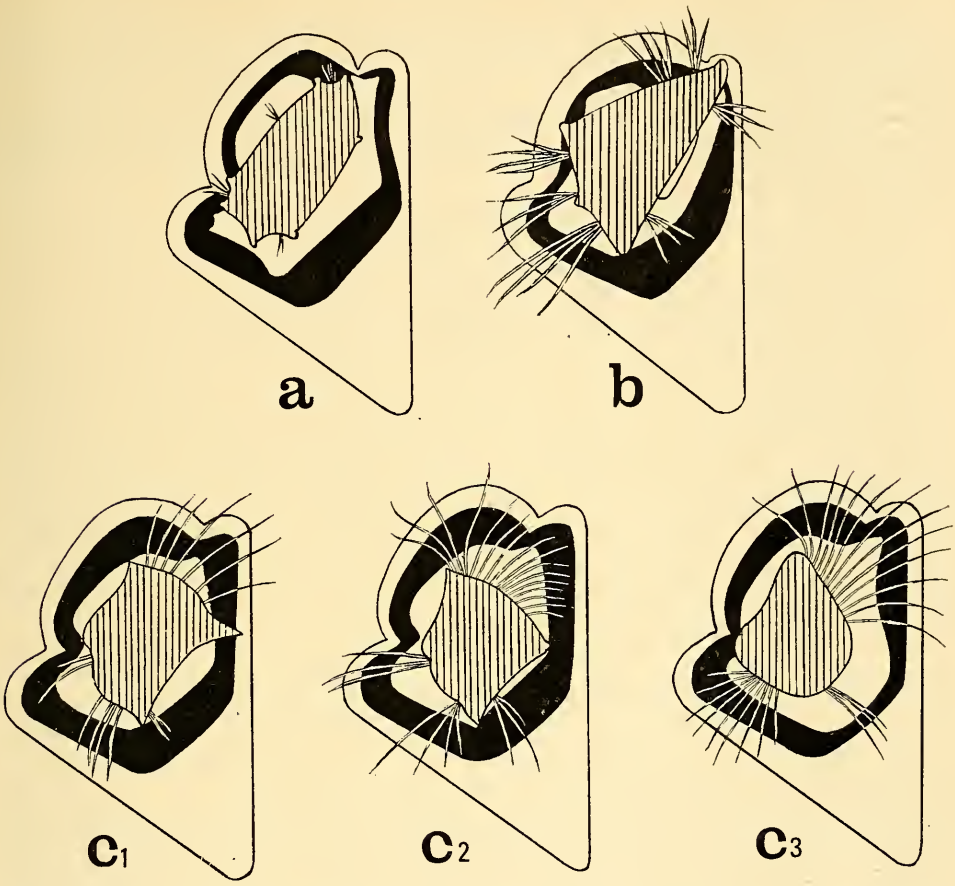

Fig. 1: Diagrammes showing proximal vertical section of dactylus (stripe) against palm (white) in the genera *Thalassina* and *Upogebia*.
a. *Thalassina anomala;* b. *Upogebia (Upogebia) major,* male; c—1. *Upogebia (Calliadne) digitina;* c—2. *Upogebia (Calliadne) rhadames;* c—3. *Upogebia (Calliadne) amboinensis.*

culous, but smooth in the female. In *U. (Calliadne) longicauda* the carina is smooth in the male, though it is uncertain in the female.

The last group is devoid of the interior median carina as seen in *U. (Calliadne) amboinensis,* in which the interior surface of the dactylus is longitudinally convex to its whole extent.

7. The ventral denticulation of the merus of the first pereiopods. Two groups of species may be defined according to the feature of the ventral teeth.

The first group comprises such species bearing the denticulation on the ventral outer margin of the merus as *U. (Calliadne) digitina* and *longicauda.* On the contrary, the last group includes the species which bear an usual row of denticles on the ventral inner margin but no denticulation on the ventral outer margin as seen in *U. (Calliadne) amboinensis, bowerbankii, brucei, rhadames* and *spongium.*

In addition to the above-mentioned significant features, it is admitted that the following eight characters are common to all members of the present material.

1. The first pereiopods are chelate. In *U. (Calliadne) amboinensis* and *brucei*, however, the fixed finger is shorter than the dactylus by one fourth of the length of the latter.
2. No teeth on the anterior margin of the carapace.
3. The telson is devoid of the median spine on the posterior margin.
4. The rostrum bears no teeth on the ventral surface.
5. The cervical groove bears no teeth on the posterior margin.
6. The exopod of the third maxillipeds consists of the proximal segment and the flagellum.
7. The first pleopods are absent in the male, while in the female those are represented by a pair of cylindrical and two-segmented appendages. The second to fifth pleopods are respectively foliaceous and biramous, bearing no appendix interna.
8. The first and second maxillae and the first to third maxillipeds are respectively constructed similarly.

Key to the Species of the Subgenus Calliadne

1. Lateral longitudinal groove of carapace more or less wide between dorsomedian region and lateral longitudinal ridge. 2
   Lateral longitudinal groove very narrow. Rostrum broader than long, with a pair of stout subterminal teeth. Median interspace of dorsomedian region limited to anterior one fourth of gastric region. Fixed finger shorter than dactylus by one fourth of the latter. Interior median carina of dactylus absent. . . . . *amboinensis* de Man
2. Telson broader than long. Exceptionally in *U. (Calliadne) rhadames*, it is broader than long in female, while longer than broad in male. Rostrum broad and triangular. 3
   Telson longer than broad. 5
3. Sixth abdominal somite smooth on posterior margin. 4
   Sixth abdominal somite spinulate on posterior margin. Rostrum semicircular on distal margin and armed with 7-9 marginal teeth. Merus with a row of microscopic spinules on ventral inner margin. . . . . *bowerbankii* Miers
4. Fixed finger shorter than dactylus by one fourth of the latter. Rostrum armed with 3-4 teeth on each lateral margin. Merus furnished with 5-11 spinules on ventral inner margin. . . . . *brucei* sp. nov.
   Fixed finger as long as dactylus. Rostrum broader than long in female, but longer than broad in male; armed with 5-8 teeth on each lateral margin. Merus furnished with 13-14 stout denticles on ventral inner margin. . . . . *rhadames* Nobili
5. Rostrum broader than long. Merus furnished with denticulation on ventral outer margin. 6
   Rostrum longer than broad, armed with five teeth on respective lateral margin. Merus furnished with 5-6 sharply-pointed spines on ventral inner margin. Interior median carina of dactylus tuberculate in male, while smooth in female. . . . . *spongium* sp. nov.
6. Interior median carina of dactylus furnished with a prominent row of triangular teeth. Median interspace of dorsomedian region of carapace extending from rostrum to anterior one furth of gastric region. Rostrum semicircular on distal margin, with

three teeth on each lateral margin. Merus furnished with 5-6 acute spines on ventral outer margin. . . . . *digitina* sp. nov.
Interior median carina of dactylus smooth. Median interspace of dorsomedian region of carapace undefinable. Rostrum armed with five teeth on each lateral margin. Merus furnished with three teeth on ventral outer margin. . . *longicauda* sp. nov.

DESCRIPTIONS

1. **Upogebia (Calliadne) amboinensis** de Man, 1888
(Fig. 2)

Gebiopsis intermedia var. *amboinensis* de Man, 1888, pp. 462—463 [type-locality: Ambon]. —, de Man, 1902, p. 759 [locality: Ternate].
Upogebia (Calliadne) ancylodactyla var. *amboinensis* de Man, 1928, p. 24 [listed habitat], p. 50 [key], pp. 89—90 [reference], pl. 10, fig. 14.
Upogebia (Gebiopsis) ancylodactyla de Man, 1905, pp. 599—600 [diagnosis], [type-locality: Samau Is. near Timor].
Upogebia (Calliadne) ancylodactyla de Man, 1928, p. 24 [listed habitat], p. 50 [key], pp. 87-90 [reference], pl. 9, figs. 13a-h, pl. 10, figs. 13i-j [localities: Samau Is.; Bawean Is.].

Materials examined. — ♂, TL. 23 mm; ovig. ♀, 30 mm; ♀ 14 mm. Sigatoga, Viti Levu, Fiji; 43.92 m deep; burrowing in live coral *Porites;* P. M. J. Woodhead coll.; July, 1969.

Diagnosis. — Rostrum broader than long, hirsute, and anteriorly with a pair of obtuse teeth. Anterolateral tooth of carapace short and lateral longitudinal groove narrow. Telson roughly rectangular, and broader than long; transverse and lateral carinae granulous; medial portion convex in the anterior one third and granulous anteriorly and laterally. Dactylus of first pereiopods small, noticeably well curved distally and without interior median carina; merus furnished with 4—10 spiny teeth on ventral inner margin.

Description. — The cervical groove extends to the posterior three sevenths of the carapace.

The rostrum (Fig. 2a) is broader, 0.75 times as long as broad and slightly overreaches the eye-stalk. The dorsal surface is attenuate in breadth, gently declined distally, without the median interspace and armed with a pair of stout upturned subterminal teeth; the tip is obtuse. The lower surface keeps the horizontal level in the male and the larger female but is slightly curved downward distally in the smaller female. The dorsomedian region of carapace is hirsute in the anterior half. The gastric region in the anterior one fourth is furnished with four distinct rows of stout teeth and with the median interspace shallow and narrow, while the region in the posterior three fourths is furnished with some irregularly distributed smaller teeth down to the cervical groove. The lateral longitudinal ridge bears a row of 9—12 teeth (8—9 in the larger female, 11 in the male and 12 in the smaller female) and diverges backward in a straight line; the anterior-

most tooth is very near to the anterolateral tooth on the gastric region. The lateral longitudinal groove is narrow and shallow, but slightly more concave outside the lateral ridge.

The telson (Fig. 2b) is distinctly broader than long, and roughly rectangular in dorsal view. The lateral margin is slightly stretched out at the proximal one third. The transverse and lateral carinae are respectively granulous. The medial portion bears a deep median groove, and is delimited by a shallow furrow from the above-mentioned carinae to form an elevation in the anterior one third with some granules along the anterior and respective lateral margins. The posterior two thirds of the medial portion is abruptly concave.

The antennules are about three fifths the length of the carapace. The dorsolateral flagellum is a little shorter than the ventromesial in the male and ovigerous female, but about equal in the smaller female, and consisting of 12—20 segments, — 18 (on the left)-19 (on the right) in the ovigerous female, 12—13 in the smaller female and 17—20 in the male. The ventromesial flagellum consists of 11—20 segments, — 19—20 in the ovigerous female, 9—11 in the smaller female and 15—16 in the male.

The antennae are about 1.3 times as long as the carapace and devoid of the scaphocerite.

The mandibles (Fig. 2c) are almost square in outer view and bear a three-segmented palp. The cutting edge is armed with a series of nine marginal teeth increasing the size proximally and a stout proximal tooth separated from them by a triangular notch. The distal margin is gently concave but with a slight elevation at the middle. The back margin is slightly concave, thus making the distal corner protrude a little.

The first pereiopods are chelate and symmetrical.

The dactylus is short and 1.3 times as long as broad at the basal part. The cutting edge is thickened proximally and conspicuously concave in most of

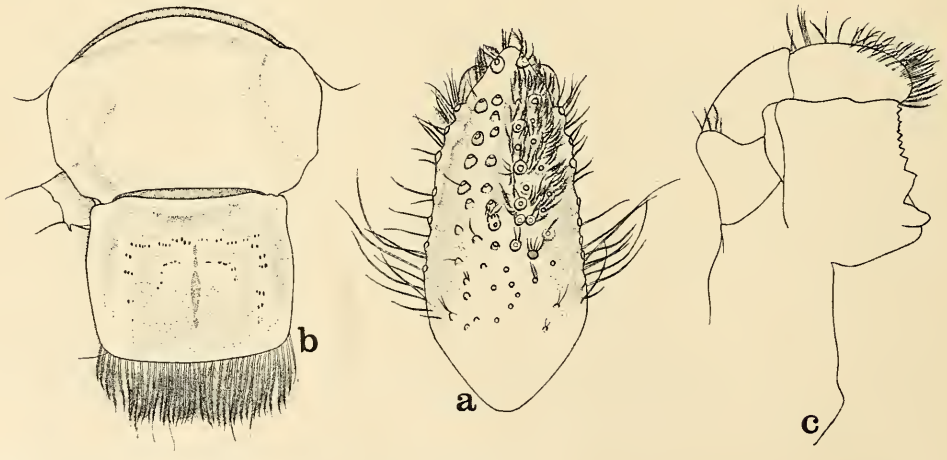

Fig. 2: *Upogebia (Calliadne) amboinensis* de Man.
a. Dorsomedian region of carapace; b. Telson; c. Mandible in outer view.

the middle part. The dorsal margin of the distal one third is declined sharply but not abruptly. The upper exterior surface is smooth, lamellar and furnished with a distinct hair tuft near the proximal margin. The lower exterior surface is medially beset with a broad hairy band. The interior surface is devoid of the median carina and is longitudinally convex. The upper interior surface is thickly scattered all over with long hairs. The lower interior surface is beset with a submarginal row of long hairs. The fixed finger is broad proximally and shorter than the dactylus by about one fourth of the latter's length. The cutting edge bears a swelling irregularly ridged and covering the proximal one third to half.

The palm is hairy, 1.5—2.0 times (1.6 in the smaller female, 2.0 in the ovigerous female and 1.75 in the male) as long as broad and 2.0—2.8 times (2.0 in the male and smaller female and 2.8 in the ovigerous female) as long as the dactylus. The lower margin, inclusive of that of the fixed finger, is distinctly declined in the distal one third. The outer surface is furnished with an oblique hirsute line extending from the upper proximal corner to around the middle of the distal margin.

The merus is 2.5 times as long as broad, twice the length of the carpus and a little longer than the palm. The ventral inner margin shows a small spiny denticulation; the teeth in the female consist of 4—5 small, while those in the male 9—10 distinct ones, of which the proximal two are minute. The dorsal surface is devoid of the subterminal tooth.

Remarks. — The present specimens conform exactly to *U. (Calliadne) ancylodactyla* de Man, 1928 or *U. (Calliadne) ancylodactyla* var. *amboinensis* de Man, 1928 except the following difference: in the present specimens the rostrum bears only one subterminal tooth on the lateral margin, instead of two or rarely three teeth in de Man's species and its variety. De Man distinguished var. *amboinensis* from the typical form of *U. (Calliadne) ancylodactyla,* because the former bears a spine on the protopod of the uropod and the granulate lateral carina on the telson, which are both missing in the latter, and the eggs in the former measure 0.6 mm in diameter, while 0.9 mm in the latter. The present specimens resemble the variety in the feature of the protopod of uropod and in the existence of the granulate lateral carina on the telson, but on the other hand the size of their eggs is rather common to typical *U. (Calliadne) ancylodactyla.*

For these reasons and also for the fact that the variety *amboinensis* was defined under *Gebiopsis intermedia* var. *amboinensis* de Man, 1888 earlier than *U. (Calliadne) ancylodactyla* de Man, 1928 the present author would like to admit the priority of the former over the latter and to treat the latter as a synonym of the species which should be called by the name of this variety. Features in the present specimens and those described so far as to *U. (Calliadne) ancylodactyla* and its variety are summarized in Table 1.

Table 1. Features of the specimens of *U. (Calliadne) amboinensis* collected from various localities.

Specimens from Fiji submitted to the present examination.	Specimens from Samau Is., described as *U. (C.) ancylodactyla.*	Specimens from Bawean Is., described as *U. (C.) ancylodactyla.*	Specimens from Ambon, described as the variety of *U. (C.) ancylodactyla.*
Ovig. ♀, 30 mm; ♀, 14 mm; ♂, 23 mm long.	Ovig. ♀, 18.5 mm; ♂, 17 mm.	♂, 17 mm.	7 specimens, 19-29 mm.
Eggs 0.84 mm in diameter.	0.9 mm.	— —	0.6 mm.
Rostrum, submarginal tooth 1-1.	2-2	2-3 (Posterior right tooth substituted by anterior two).	— —
Lateral carina on telson, granulate.	Lateral carina bears 4-5 granules.	Lateral carina smooth and without any granules.	Lateral carina bears some granules.
Transverse carina on telson, granulate.	Transverse carina smooth (from de MAN's figure 13a of Pl. 9, 1928).	Transverse carina smooth.	Transverse carina bears granules (from de MAN's figure 14 of Pl. 10, 1928).
Transverse and lateral carinae of medial portion on telson, granulate.	Transverse and lateral carinae undefinable.	— —	Transverse and lateral carinae with granules.
Antennules about three fifths the length of carapace.	Antennules about three fourths the length of carapace.	— —	Antennules about three fourths the length of carapace.
Antennular dorsolateral flagellum a little shorter than or about as long as peduncle, consisting of 12-20 segments.	Dorsolateral flagellum just as long as peduncle, consisting of 13 segments.	Dorsolateral flagellum a little shorter than peduncle, consisting of 14 segments.	Dorsolateral flagellum consisting of 15 segments.

Specimens from Fiji submitted to the present examination.	Specimens from Samau Is., described as *U. (C.) ancylodactyla.*	Specimens from Bawean Is., described as *U. (C.) ancylodactyla.*	Specimens from Ambon, described as the variety of *U. (C.) ancylodactyla.*
Antennular ventromesial flagellum a little shorter than or about equal to the dorsolateral, consisting of 11-20 segments.	Ventromesial flagellum longer than the dorsolateral, constisting of 13 segments.	Ventromesial flagellum subequal to the dorsomesial, consisting of 9 segments.	Ventromesial flagellum shorter than the dorsolateral, consisting of 16 segments.
Antennae 1.3 times as long as carapace.	Antennae 1.5 times as long as carapace.	— —	Antennae the same as the specimen from Samau Is.
Merus of 1st pereiopods with 4-8 spinules on ventral inner margin.	Merus with 7-8 spinules on ventral inner margin.	Merus without any spinules on ventral inner margin.	— —
Protopod of uropod with a spine.	Protopod of uropod with a rudimentary spine.	— —	Protopod of uropod with a spine.
Burrowing in live *Porites*, 43.92 m deep off Fiji.	Shore in Samau.	12 m deep off Bawean Is.	Ambon.

2. **Upogebia (Calliadne) bowerbankii** Miers, 1884
(Fig. 3)

Gebiopsis bowerbankii Miers, 1884, p. 284 [type-locality: Fremantle, S. W. Australia].
Upogebia (Calliadne) bowerbankii, de Man, 1927, pp. 9-12 [description of the type specimen from Fremantle], pl. 1, figs. 4a-f. —, de Man, 1928, p. 48 [key], p. 24 [listed and habitat], pp. 37-38 [discussion].

Materials examined. — ♂, 38 mm; ♀, 35 mm. Mazizini, Zanzibar; in littoral sponge; A. J. Bruce col.; Apr. 23, 1970. — ♂, 18 mm. Beit el Ras, Kibweni, Zanzibar, 6° 06' 93"S, 39° 12' 06"E, 1 m deep; in sponge (Host Catalogue AJB No. 75—1. Stn. 75); AJB col.; Apr. 21, 1970. — ♀, 22 mm. Wasin Is., Kenya, 4° 34' 02"S, 39° 20' 05"E, 1 m deep; in sponge (Stn. 128); AJB col.; Sept. 10, 1971.

Diagnosis. — Rostrum hirsute, semicircular on distal margin, with 7—9 marginal teeth. Telson slightly broader than long. Transverse carina

of telson minutely serrated as well as posterior margin of sixth abdominal somite. Dactylus of first pereiopods with an interior median carina consisting of a row of rounded pearly tubercles; merus minutely serrated on ventral inner margin.

Description. — The cervical groove reaches the posterior one third of the carapace. The rostrum (Fig. 3a) is slightly longer than the eye-stalk and broadly rounded on the distal margin, — 0.5—0.75 times (usually 0.6—0.75 times and 0.5 times in the larger female) as long as broad and bears a row of 7—9 distinct and regularly spaced marginal teeth (9 in the smaller female, 8 in the larger male and female, and 7 in the smaller male). The dorsal surface of the rostrum is slightly declined distally, hirsute, and provided with several irregularly-arranged teeth; the median interspace is narrow and smooth and extends to the anterior one fourth of the gastric region. The dorsomedian region of the carapace is separated from respective anterolateral teeth by a triangular intervening space, and scattered with denticles and hairs down to the posterior two-fifths of the gastric region, though these are beset more thickly in the anterior one fourth. In the larger male and female from Zanzibar the dorsomedian region is more densely covered with hairs than in the other specimens. The median interspace is definable on the rostrum and the anterior one fourth of the gastric region. The lateral longitudinal ridge is furnished usually with a row of 14—18 teeth (13—14 in the larger female, 18—17 in the larger male, 16—15 in the smaller female, 14—14 in the smaller male) and diverged posteriorly in a straight line. The lateral longitudinal groove is markedly concave and lamellar.

The sixth abdominal somite is about 1.5 times as broad as long; the lateral margin is furnished with an anterior lobule and noticeably concave in the posterior one third. The posterior margin is minutely serrated.

The telson (Fig. 3b) is almost rectangular in dorsal view, and broader than long by about one fifth of the breadth. The lateral margins are very slightly converged posteriorly. The dorsal surface bears a minutely-serrated transverse carina shortly interrupted at the middle, respective lateral carinae are furnished anteriorly with a few tubercles. The medial portion bears a distinctive median groove and an anterior elevation furnished with a row of a few insignificant tubercles. The posterior margin of the telson is a little convex.

The eye-stalks slightly fail to reach the tip of the rostrum.

The antennules overrreach the eye-stalk at the level of the proximal margin of the third segment of the peduncle. The dorsolateral flagellum of the antennules is about 1.5 times as long as the peduncle and slightly longer than the ventromesial.

The antennal peduncle overreaches the antennule peduncle at the level of the distal part of the penultimate segment. The scaphocerite is small and obtuse.

The mandibles (Fig. 3c) are almost square in outer view. The cutting edge is furnished with a row of eight irregular marginal teeth, increasing

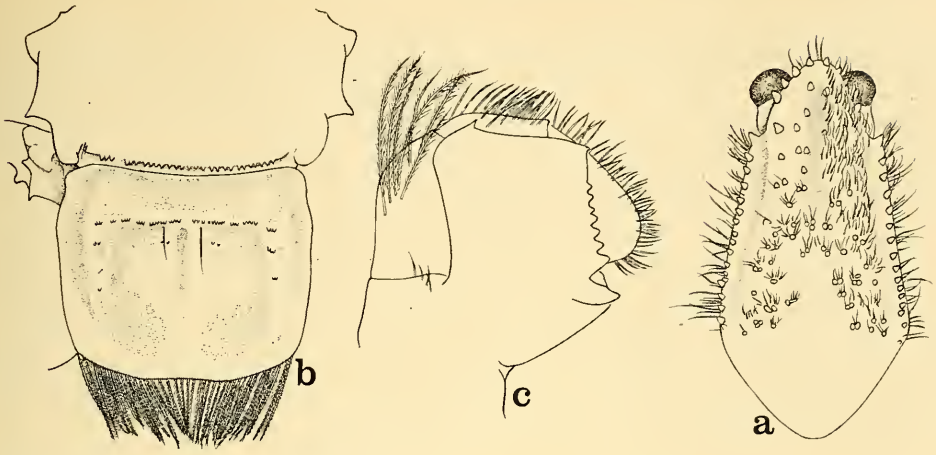

Fig. 3: *Upogebia (Calliadne) bowerbankii* Miers..
a. Dorsomedian region of carapace; b. Telson; c. Mandible in outer view.

the size proximally, and a thick proximal tooth separated from the marginal denticle row by a large notch. The distal margin is declined inwards and bears a small inward spine near the outer corner. The outer margin is prominently rounded around the distal corner and a little converged proximally.

The first pereiopods are chelate and symmetrical.

The dactylus is two times as long as broad. The dorsal margin is gently declined and sometimes bears 1—4 denticles near the proximal end. The upper exterior surface is lamellar and bears a few hair tufts near the proximal margin. The lower exterior surface bears two longitudinal hair rows merging into one at the distal one third. The intervening carina is distinct and extending to the midway. The cutting edge is rather blunt. The upper interior surface is interspersed with long hairs. The interior median carina is beset with a row of rounded, pearly tubercles. The lower interior surface bears a blunt tooth at the proximal one third on the cutting edge and a submarginal row of five or more hair tufts. The fixed finger is about as long as the dactylus, and its cutting edge is armed in the proximal two thirds with a row of 7—8 closely-set teeth obliquely directed distally.

The palm is about twice the dactylus length, and 1.8 times as long as broad. The lower margin to the tip of the fixed finger is concave near the middle. The outer surface bears 2—3 spines set transversely on the distal margin just along the finger cleft. The interior surface is hairy and bears 1—3 sharp spines, regularly spaced on the distal margin along the joint with the dactylus. The dorsal margin bears a stout subterminal spine.

The carpus is two fifths the length of the palm. The upper surface is beset with an oblique hirsute line extending from the proximal inner corner to the distal outer corner and armed with a stout inner distal tooth. There ist a rudimentary tubercle beneath the above-mentioned tooth. The ventral margin bears a blunt distal teeth.

The merus is 2.5 times as long as broad and 2.6 times as long as the carpus. The ventral surface bears a row of inconspicuous equidistant spinules along the whole interior margin and a row of scarce hairs on the exterior margin. Those ventral interior spinules are similar to those on the posterior margin of the sixth abdominal somite and on the transverse carinae of the telson. The dorsal margin is devoid of the subterminal spine.

Remarks. — De Man (1928) gave a detailed redescription of the male type from Fremantle, S. W. Australia, which was alluded by Miers (1884) to be a possible new species. Reference to de Man's description made it clear that the present specimens are to be identified with the Miers' species, though there are seen such differences as shown below between the specimen from Fremantly and those from Kenya.

In the male from Fremantle, S. W. Australia:

1. The rostrum bears ten marginal teeth.
2. The lateral longitudinal ridge of the carapace is armed with 20 teeth.
3. The anterior margin of the carapace bears a spine.
4. The antennal peduncle overreaches the antennular peduncle at the middle of the terminal segment.
5. The cutting edge of the fixed finger of the first pereiopods bears 10 teeth distally directed.
6. The ventral inner margin of the palm of the first pereiopods bears some teeth in the proximal half.
7. The dorsal inner margin of the palm bears 5—6 acute teeth arranged longitudinally near the distal end, besides the terminal tooth.
8. The inner surface of the palm bears 14—15 teeth, partly arranged in a longitudinal row, in the distal half just along the dorsal margin.
9. The carpus of the first pereiopods is beset with a row of 14—15 acute teeth on the dorsal inner margin.
10. The upper distal margin of the carpus bears 1—2 microscopic teeth in addition to the short tooth at the inner corner.
11. The dorsal margin of the merus bears a very small acute tooth near the distal end.
12. The transverse carina of the telson bears several small acute teeth.
13. The lateral margins of the telson bear respectively a microscopic movable spine at the posterior one-third.

In the male and female specimens from Kenya:

1. The rostrum is armed with 7—9 marginal teeth; these are fewer than in the type from Fremantle.
2. The lateral longitudinal ridge of the carapace bears 14—18 teeth, these are fewer than in the specimen from Fremantle.
3. The anterior margin of the carapace bears no spine as in most of the species of the subgenus *Calliadne*.

4. The antennal peduncle overreaches the antennular peduncle at the level of the distal part of the penultimate segment, but not at the middle of the terminal segment as in the type.

5. The cutting edge of the fixed finger of the first pereiopods bears 7—8 teeth distally directed, these are less than in the type.

6. The ventral inner margin of the palm forms a smooth inner carina in the proximal half.

7. The dorsal inner margin of the palm bears no row of acute teeth, but only a terminal tooth.

8. The interior surface of the palm is furnished with three longitudinal hairy rows in the upper half, but without any dental longitudinal row on the upper margin.

9. The dorsal inner margin of the carpus is smooth and devoid of a row of acute teeth described in the type.

10. The upper distal margin of the carpus is not armed with any spines but only a distal spine at the interior angle.

11. The dorsal margin of the merus is devoid of the subterminal spine.

12. The transverse carina of the telson is finely serrated as well as the posterior margin of the sixth abdominal somite.

13. The lateral margins of the telson are smooth and devoid of any movable spine.

Throughout the above-mentioned differences between the specimens from the two localities, it seems that the specimen from Fremantle has generally some more spines or teeth than the Kenya specimens as follows: — some teeth on the ventral inner margin of the palm, 5—6 acute teeth near the distal end on the dorsal inner margin of the palm, 14—15 teeth beneath the upper margin on the interior surface of the palm, 1—2 teeth on the upper distal margin of the carpus, 14—15 acute teeth on the dorsal inner margin of the carpus, a subterminal tooth on the dorsal margin of the merus, and a small movable spine on each lateral margin of the telson, which are missing in the specimens from Kenya. However, the denticulation on the inner distal margin of the palm is a distinguished characteristic common to the specimens from Fremantle and Kenya. In the specimen from Fremantle the inner distal margin of the palm bears two long spines, one just beneath the upper margin and the other between the fingers; in the specimens from Kenya, a spine beneath the upper margin and the other 1—2 a little distant from the upper spine and facing the proximal margin of the dactylus.

3. **Upogebia (Calliadne) brucei** sp. nov.
(Figs. 4—5)

Materials examined. — Holotype. ♀, 32 mm. South of Wasin Is., Kenya, 04° 43' 08"S, 39° 24' 09"E, 0.9 m deep; in sponge (Host Catalogue AJB No. 334-1), dredge.; N. Bruce (son of Dr. A. J. Bruce) col.; Jan. 12, 1972. Catalogue No. AJB. 334.

-Paratype. ♀, 20 mm. Data as for holotype.

Diagnosis. — Rostrum shorter than eye-stalk; lateral margin armed with 3—5 teeth. Cornea not facetted but with faint brown reticulate pattern. Dorsomedian region of carapace bears a broad and shallow median interspace. Telson almost trapezoid and a little broader than long; transverse and lateral carinae smooth. Antennular proximal segment and antennal second segment bear a ventrodistal spine respectively. Dactylus of first pereiopods longer than fixed finger by one fourth of the former and with a tuberculous interior median carina; palm smooth on dorsal margin and with a sharp distal spine on interior surface; merus furnished with 5—11 spinules on ventral inner margin.

Description. — The cervical groove reaches to the posterior three sevenths of the carapace.

The rostrum (Figs. 4b, 5a) is broad and triangular in dorsal view and 0.6 times as long as broad. The distal margin is obtuse. The outer ventral margin is fringed with pubescence. The dorsal surface is slightly declined distally, clothed in long hairs, and bears 3—5 erect, sharply-pointed teeth on respective lateral margins. The dorsomedian region of the carapace is scabrous and covered with hairs down to the posterior two fifths of the gastric region; the median interspace is characteristically broad and shallow, covering the rostrum to the anterior one fourth of the gastric region; posterior to the median interspace there is a smooth triangular portion beset with an obscure median carina. The lateral longitudinal groove is moderately deep. The anterolateral tooth is sharply-pointed and directed slightly outward. The lateral longitudinal ridge is much diverged in the anterior one third, extends backward to the posterior two fifths of the gastric region and is armed with a row of 12—14 small irregularly spaced teeth.

The sixth abdominal somite is broader than long; the lateral margin bears a median truncated lobe; the posterior margin is smooth.

The telson (Fig. 4c) is trapezoid and a little broader than long. The dorsal surface is provided with a transverse and a pair of lateral carinae which are smooth and without any spinules or tubercles. The medial portion is concave as a whole and marked with an indistinct median groove. The lateral margin in the larger female is furnished with a proximal lobule and posterior to it the margin is diverged to form a slight concavity in the proximal one third; then the margin converges posteriorly almost straight on the rigth, but with as slight convexity on the left; the posterior angle is

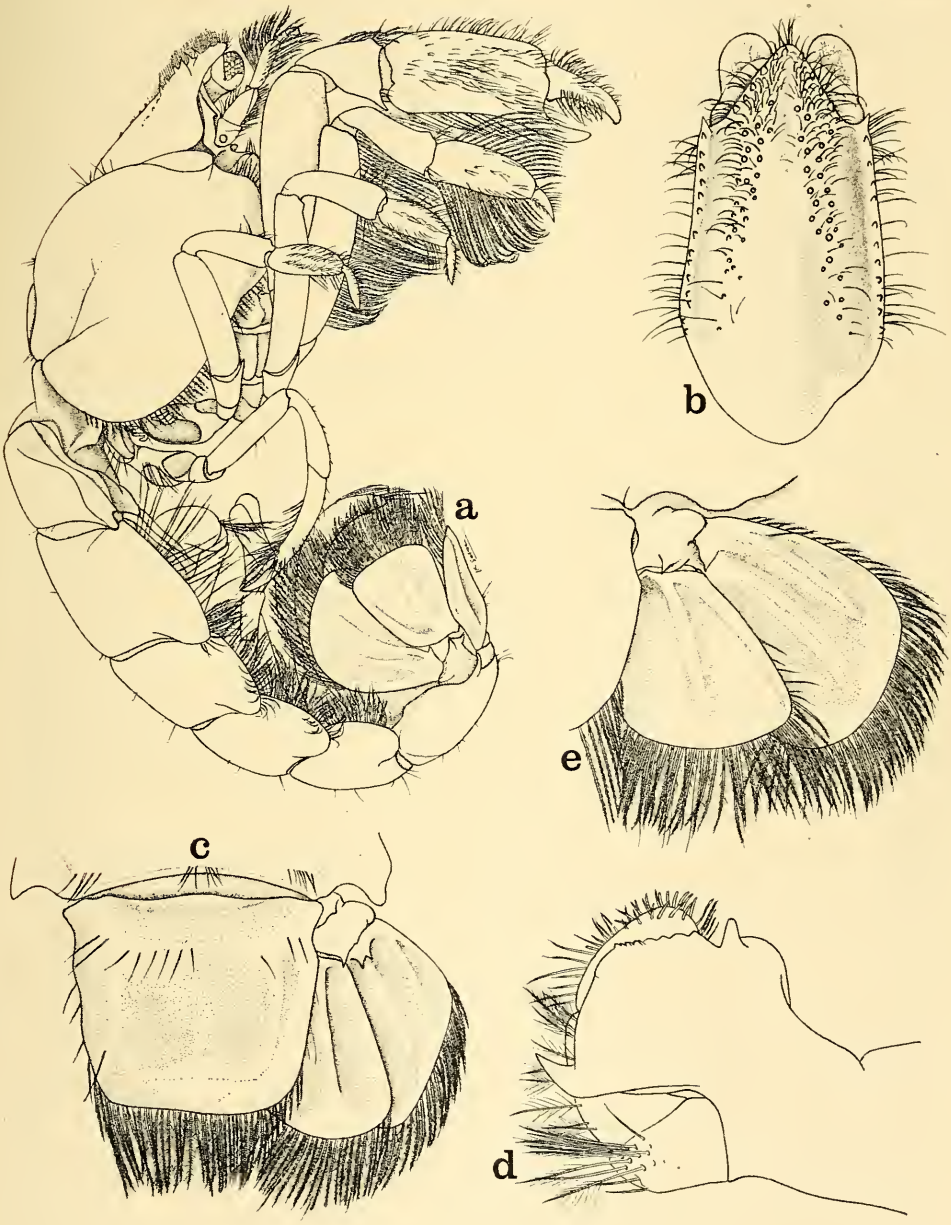

Fig. 4: *Upogebia (Calliadne) brucei* sp. nov.
a. Holotype, female in lateral view; b. Dorsomedian region of carapace;
c. Telson; d. Mandible in outer view; e. Uropod and protopod.
a, c, d, e. Holotype; b. Paratype.

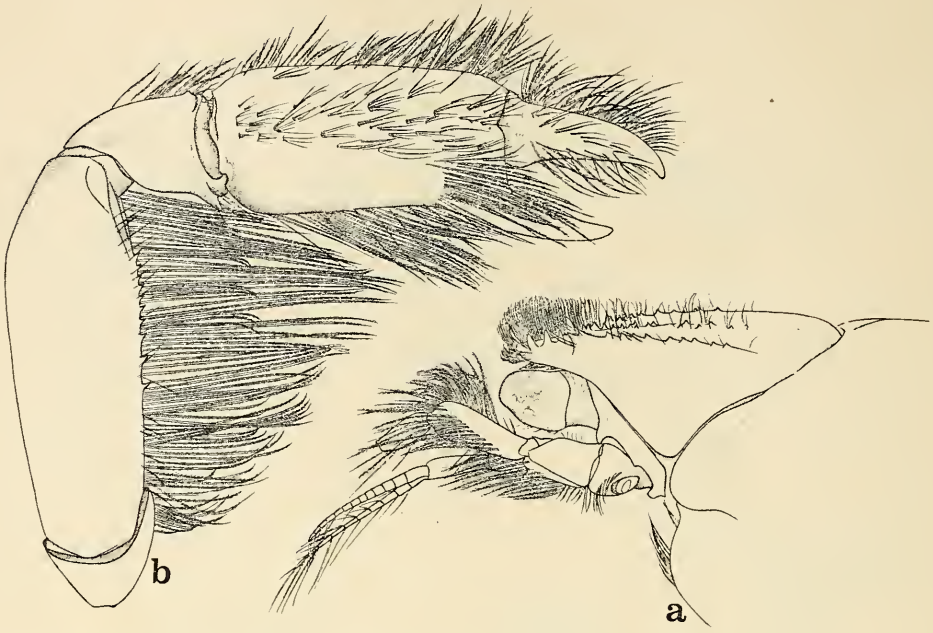

Fig. 5: *Upogebia (Calliadne) brucei* sp. nov.
a. First leg; b. Anterior part of carapace.
a, b. Holotype.

broadly rounded. The posterior margin is convex as a whole, though it is seemingly a little deformed in the left half. In the smaller female no formation of the proximal lobule is seen on the lateral margin, which is only a little diverged in the proximal one fourth but almost straight in the distal three fourths. The posterior margin is almost straight.

The eye-stalks are robust and slightly overreach the rostrum; the cornea occupies the distal three fourths of the stalk, not facetted but decorated with a faint-brown reticulate pattern.

The antennular peduncle overreaches the rostrum at the middle of the penultimate segment. The proximal segment is about three times as long as the penultimate and armed with a strong distal tooth on the lower margin. The distal segment is about twice the length of the penultimate. The dorsolateral flagellum is shorter than the ventromesial; the latter is about as long as the peduncle.

The antennal peduncle overreaches the rostrum by the penultimate and distal segments. The relative lengths of the distal, penultimate and second segments are 1.0, 2.8 and 1.8 respectively. The penultimate segment is implanted with a row of plumose hairs in the distal half of the upper margin and obliquely on the outer surface. The second segment bears a distinct distal spine on the lower margin. The scaphocerite is a small triangular lobule with a pointed tip and reaches as far as the distal margin of the second segment.

The mandibles (Fig. 4d) are almost square in outer view. The cutting edge is armed with a row of eight denticles and a stout elongated proximal tooth separated from the denticulation by a notch. The distal margin is a little convex medially and forms a stout, triangular, and inward tooth at the outer end. The outer margin is nearly straight in parallel with the cutting edge.

The first pereiopods (Fig. 5b) are chelate and symmetrical.

The dactylus in the larger female is three times as long as broad; its cutting edge is proximally broaden, nearly straight in the middle main part, and deflected distally. The dactylus in the smaller female is 2.3 times as long as broad; its cutting edge is largely concave to a whole extent. The upper exterior surface is lamellar and faintly carinate in the median line; there is a distinct hair tuft proximally on each side of the median carina in the larger female. The lower external surface bears a broad band of long hairs, which is extending to the distal one fifth in the larger female, but to the distal one third in the smaller female. The dorsal margin is smooth and without any teeth in the larger female, while with a small tooth near the proximal end in the smaller female. The upper interior surface is studded with long hairs. The interior median carina is beset with a row of distinct rounded tubercles in the larger female, though these tubercles are indistinct in the smaller female. The lower interior surface is a little concave in the midline and provided with a submarginal series of long hairs a little above the cutting edge, which bears a small tubercle at the proximal two fifths.

The fixed finger is shorter than the dactylus by one fourth of the latter and blunt at the tip. The cutting edge is smooth and concave as a whole. The outer surface is faintly reddish in the proximal part.

The palm is 1.8 times as long as broad and 1.8 times the length of the dactylus. The dorsal margin is quite unarmed. The interior surface is hairy in the upper half and around the distal margin, and bears just beneath the articulation with the dactylus a distal spine which is characteristically slender; the ventral inner margin bears a keel extending a little distant from the proximal corner to the distal one third of the palm. The ventral exterior margin in the larger female is provided with a row of 4—5 small spines, extending from the proximal one fourth to the midway. The lower margin is deflected in the range from the distal one fourth of the palm to the tip of the fixed finger.

The carpus is a little longer than half the length of the palm. The ventral outer margin bears a strong distal spine, and the dorsal inner margin bears a rudimentary distal tooth.

The merus is 2.7 times as long as broad and about three times as long as the carpus. The ventral inner margin is provided in the distal two thirds with a row of spinules which are 10—11 in the larger female but 6—5 in the smaller female. The dorsal margin is devoid of the subterminal tooth.

The second pereiopods are pediform. The relative lengths of the dactylus, propodus, carpus and merus are 1.0, 2.5, 2.3 and 5.5 respectively. The

dactylus is 2.5 times as long as broad at the base. The exterior surface is marked with a smooth median carina in the distal half. The dorsal margin and the lower exterior surface are hirsute. The propodus is 2.5 times as long as broad. The carpus bears a minute distal spine on the lower margin. The merus is unarmed on the dorsal margin.

The third pereiopods are simple. The relative lengths of the dactylus to the merus are 1.0, 1.8, 2.3 and 4.5 respectively. The dactylus is slender and five times as long as broad. The exterior surface is hirsute and bears a row of tubercles along the upper margin; the ventral margin is slightly carinate in the proximal half.

The fourth pereiopods resemble the third. The relative lengths of the dactylus to the merus are 1.0, 1.2, 1.8 and 2.8 respectively.

The fifth pereiopods are subchelate. The ventrodistal protrusion of the propodus reaches about the level of the proximal one third of the dactylus. The relative lengths of the dactylus, propodus, carpus and merus are 1.0, 2.5, 2.5 and 2.4 respectively.

The first pleopods in the female are pediform and each consist of two slender segments of an equal length. The third to fifth pleopods are respectively foliaceous. The endopods are small and about half the length of the expods.

The protopod of the uropod (Fig. 4e) bears a stout tooth at the posterior angle. The exopod is provided with a stout proximal tooth. The posterior margin of the endopod is parallel with that of the telson.

Remarks. — The present specimens are closely related with *Upogebia (Calliadne) hexaceras* (Ortmann, 1894) from Thursday Is. by the form of the rostrum and telson, the number of teeth on the lateral margin of the rostrum and on the lateral longitudinal ridge of the carapace, the form of the scaphocerite of the antennae, the form of the prehensile edge of the dactylus of the first pereiopods and the denticulation on the ventral inner margin of the merus, but still there is some important difference between the present new species and the Ortmann's alluded by de Man (1928). In the latter species, the posterior margin of the sixth abdominal segment is finely denticulated; the transverse carina of the telson is minutely granulate; the antennular and antennal peduncles are unarmed; the fixed finger of the first pereiopods is as long as the dactylus, denticulate on the cutting edge, and acuminate at the tip; the palm is finely denticulate on the lower margin by 14—15 small teeth; and the carpus bears 4—5 small teeth arranged longitudinally on the dorsal inner margin.

While in the present new species, the posterior margin of the sixth abdominal somite is smooth; the transverse carina of the telson is also smooth; the proximal segment of the antennular peduncle bears a ventrodistal spine and the second segment of the antennal peduncle bears a similar spine; the fixed finger of the first pereiopod is shorter than the dactylus by one fourth of the latter, with the smooth cutting edge and the blunt tip; the palm is

armed, but with not so many denticles on the lower margin; and the carpus is smooth on the dorsal inner margin.

The author takes a great pleasure in dedicating this new species to Dr. A. J. Bruce of the East African Marine Fisheries Research Organisation, Mombasa, Kenya.

4. **Upogebia (Calliadne) rhadames** Nobili, 1904
(Figs. 6—8)

Upogebia (Gebiopsis) rhadames Nobili, 1904, pp. 235-236 [type-locality: Souakim (in sponge), Djibouti and Massaouah in the Red-Sea].
Upogebia (Calliadne) rhadames, Nobili, 1906b, p. 100 [reference]. —, de Man, 1927, pp. 6-7 [description], pl. 1, fig. 2 [locality: Suakim, Red Sea].
Upogebia (Calliadne) cf. *rhadames,* Barnard, 1946, p. 381 [locality: Natal (in sponge)]. —, Barnard, 1950, pp. 523—524 [the same locality].

Materials examined. — ♂, 23 mm; ♂, 13 mm; ♀, 24 mm, ovig. ♀, 22 mm. Shimoni, Kenya, 04° 39′ 01"S, 39° 22′ 03"E; muddy flats, 30° C, in sponge; A. J. Bruce col.; Sept. 8, 1971. Catalogue No. AJB. 126. — ♂, 18 mm; ♂, 16.5 mm; ovig. ♀, 25.0 mm; ovig. ♀, 21.0 mm. Wasin Is., Kenya, 04° 40′ 05"S, 39° 20′ 00"E; 12.81 m, in sponge, dredge. Stn. 131; AJB col.; Sept. 23, 1971.

Diagnosis. — Rostrum a broad triangle in outline in female, but an elongated triangle in male. Dorsomedian region of carapace scabrous and with a median interspace. Telson a little longer than broad in male, while broader than long in female; posterior margin noticeably rounded. Antennular proximal segment and antennal second segment respectively with a minute ventrodistal spine. Dactylus of first pereiopods crossed with fixed finger; interior median carina tuberculous. Fixed finger attenuate distally; cutting edge with a ridged crest in the proximal one third. Propodus ridged on outer ventral margin in the proximal half.

Description. — The cervical groove extends to the posterior four fifths of the carapace.

The rostrum in the female shows a broad triangular outline (Fig. 7d) and is 0.7—0.8 times as long as broad, but shows an elongated triangular shape (Fig. 7a, b, c) and is 1.5 times (1.5 in a larger male from Shimoni and two small males from Washin Is., though 0.7 in a small male from Shimoni [Fig. 7e]) as long as wide in the male. The distal margin is blunt; the lateral margin of the ventral surface is beset with long plumose hairs. The dorsal surface of the rostrum is slightly declined distally and bears 5—8 spiny teeth on each lateral margin; it is scabrous and in the female covered with thick hair which are longer distally, while with thin hair in the male. The median interspace is definable; in the male and female spcimens from Washin Is. and the larger male from Shimoni it is narrow and restricted to the rostral back, however in the male and female specimens, but for the larger

male, from Shimoni it is broad, shallow, and extending to the anterior one fifth of the gastric region. Posterior to the median interspace, the scabrous part of the gastric region is divided into two lateral sections, each extending posteriorly to the posterior two fifths of the region; the median dorsal carina is well defined, extending from the anterior two fifths to the posterior two fifths in the larger specimens, though it is obscure in the smaller ones. The lateral longitudinal groove is broad and moderately deep. The anterolateral tooth is beset with a spinule anteriorly directed; the lateral longitudinal ridge bears 9—20 spinules (6 rudimentary ones in addition to 20—16 in the larger male from Shimoni, 16—14 in the larger female from Shimoni, 14—17 in the larger male from Washin Is., 9—9 in the smaller female from Shimoni) and is diverged posteriorly in a straight line.

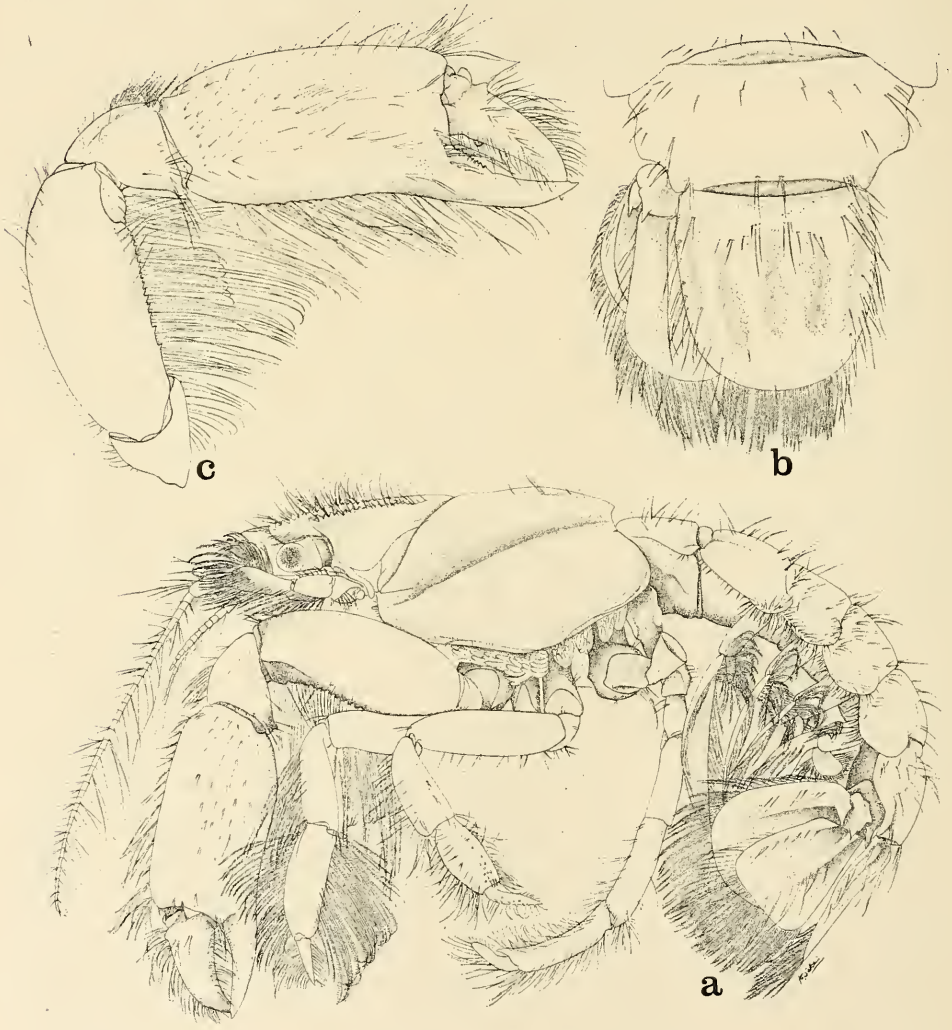

Fig. 6: *Upogebia (Calliadne) rhadames* Nobili.
a. Lateral view; b. Telson; c. First leg.
a, b, c. Larger male from Shimoni.

The abdomen is beset with scanty hairs on the surface. The relative lengths of the first to sixth abdominal somites are 1.0, 1.2, 0.9, 0.9, 1.1 and 1.3 respectively. The ventral margin of the first abdominal pleura is distinctly curved to form a rounded triangular posterior angle. The second abdominal pleuron is the broadest, the posterior margin is noticeably protruded posteriorly beyond the level of the posterior margin of the somite. The dense pubescence is found in the posterior one fourth of the second abdominal pleura and on successive pleura extending to the anterior half of the fifth. The sixth abdominal somite is about half as long as broad; the lateral margin is largely concave in the posterior one third; the posterior margin is smooth.

The telson (Fig. 6b) is about 1.3 times as long as the sixth abdominal somite. In the male it is longer than broad, but for the smaller male from Washin Is., while in the female it is broader than long, but for the larger female from Shimoni, in which it is longer than broad. The lateral margin is diverged in the proximal one fourth, but then posteriorly it is converged gradually to continue to the largely rounded posterior margin. The transverse carina is definable but obscurely as a broad elevation with a transverse row of some hair tufts and is connected at respective lateral ends to the distinct lateral carinae. The medial portion is defined conspicuously and marked with the median and lateral grooves.

The eye-stalks are slightly shorter than the rostrum in a larger male and a larger female from Shimoni and a larger female and two males from Washin Is., but slightly longer in a smaller male and a smaller female from Shimoni, or attain to the level of the rostral tip in the smaller female from Washin Is. The cornea is limited to the distal half, rounded, facetted and black in color.

The antennular peduncle extends to the tip of the eye-stalk at the level of the middle of the penultimate segment in the larger specimens, but at the level of the distal part of the proximal segment in the smaller specimens. The penultimate segment is short and about one third the length of the ultimate. The proximal segment is nearly as long as the ultimate and penultimate segments combined, and bears a minute ventrodistal tooth. The dorsolateral flagellum is about as long as the peduncle and consists of 13—16 particles. The ventromesial flagellum is slender and much longer than the dorsolateral.

The antennal peduncle overreaches the eye-stalk at the level of the proximal part of the penultimate segment. The penultimate segment is 1.3—1.4 times as long as the ultimate and slightly longer than the second, and is provided with a row of long plumose hairs in the distal half of the dorsal margin and obliquely on the outer surface. The second segment bears a rudimentary ventrodistal spine. The scaphocerite is a lobule with the rounded distal margin.

The mandibles (Fig. 8a, b) are almost square in outer view and bear a three-segmented palp. The cutting edge is crenulated by a row of about ten teeth, of which the proximal two are a little more prominent than

others, and another large elongate proximal tooth separated from the denticle row by a triangular notch. The distal margin is declined inwards in a smooth straight line. The outer margin is almost parallel to the cutting edge; its distal part is protruded broadly and roundly.

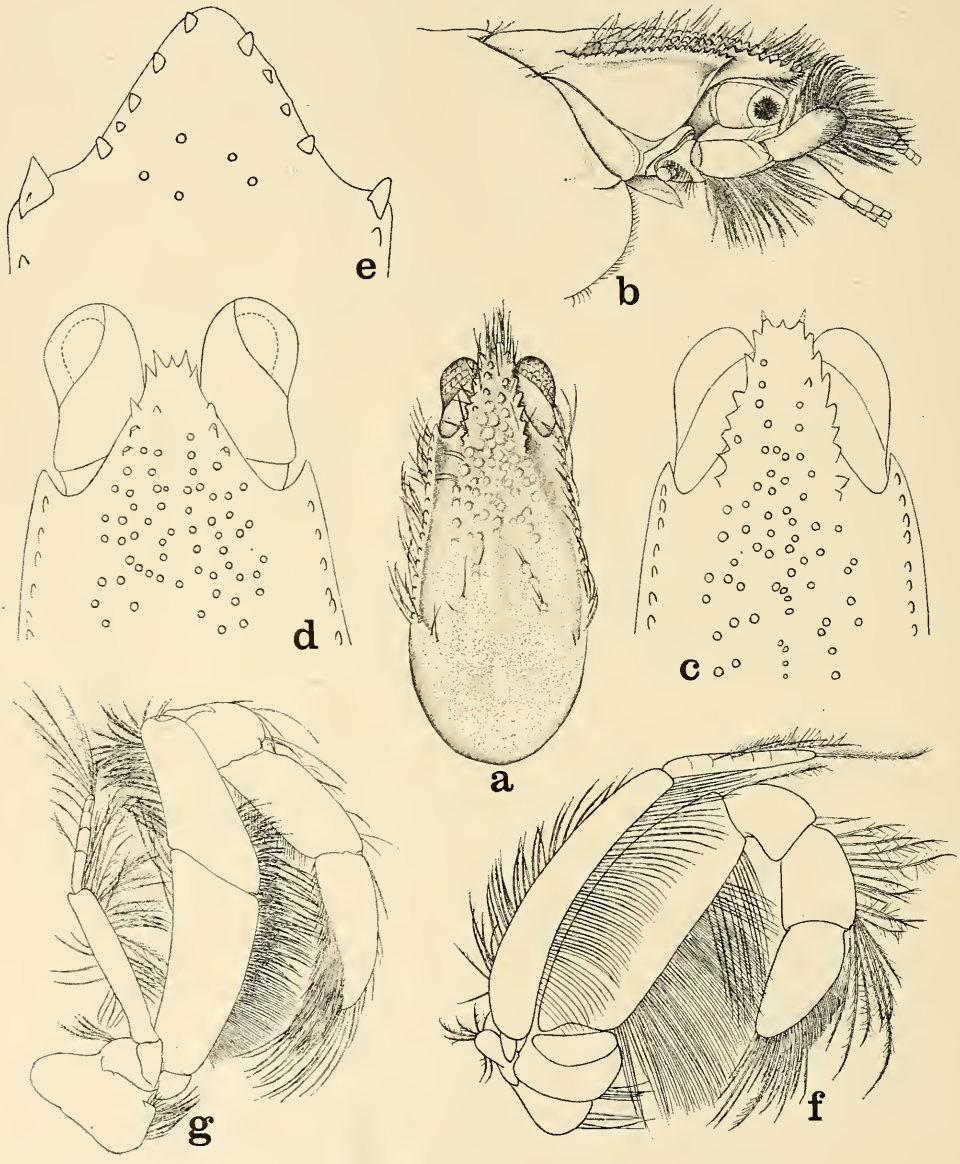

Fig. 7: *Upogebia (Calliadne) rhadames* Nobili.
a. Dorsomedian region of carapace of a male; b. Anterior part of carapace; c. Anterior part of dorsomedian region of a male; d. Anterior part of dorsomedian region of a male; e. Anterior part of dorsomedian region of a male; f. Second maxilliped; g. Third maxilliped.
a, b, c, f, g. Larger male from Shimoni; d. Larger female from the same locality; e. Smaller male from the same locality.

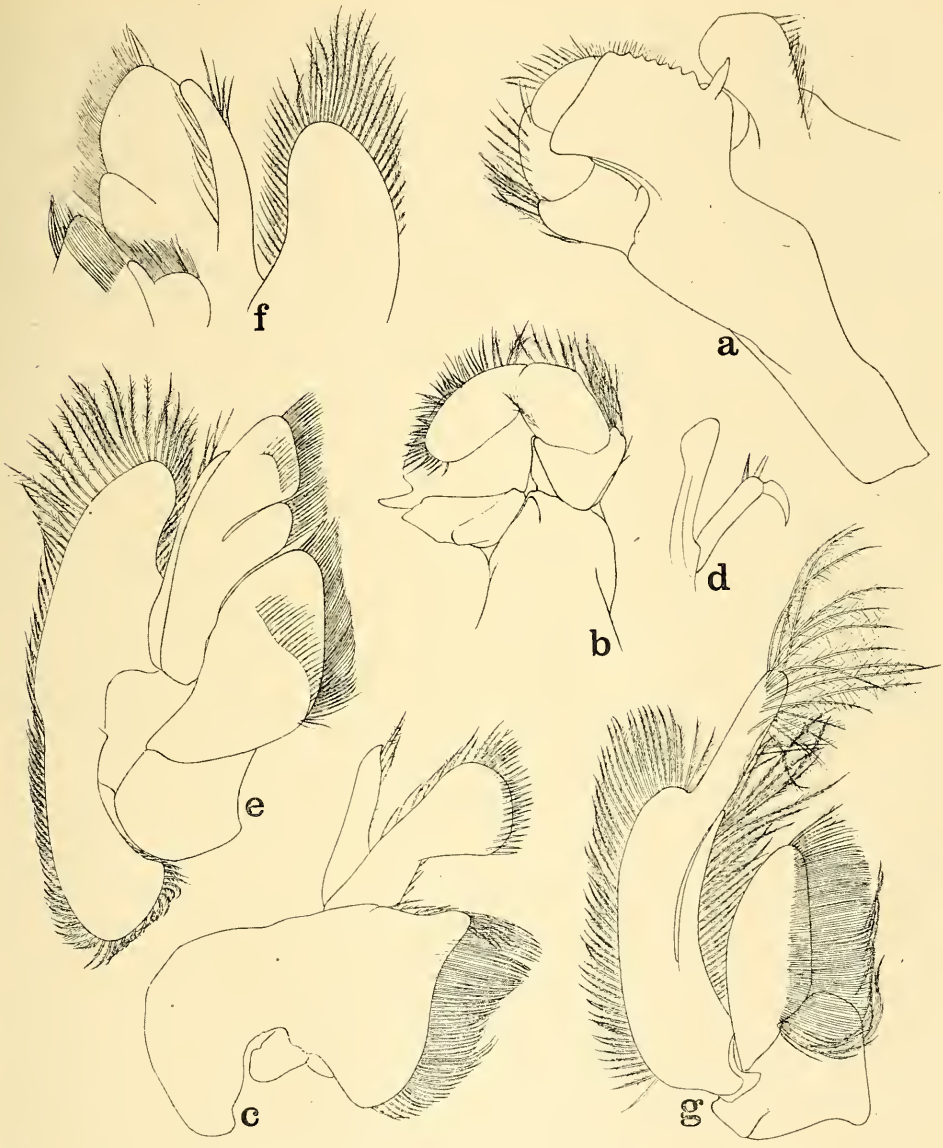

Fig. 8: *Upogebia (Calliadne) rhadames* Nobili
a. Mandible in outer view; b. Mandible in inner view; c. First maxilla in outer view; d. First maxilla in inner view; e. Second maxilla in outer view; f. Second maxilla in inner view; g. First maxilliped in outer view.

The second segment of the palp of the first maxillae (Fig. 8c, d) is sickle-shaped.

The second maxillae (Fig. 8e, f) bear the scaphognathite, whose outer margin is declined just posterior to the middle.

The first maxillipeds (Fig. 8g) bear the palp, whose apex reaches the level of the proximal margin of the distal protrusion of the exopod. The exopod of the second maxillipeds (Fig. 7f) fails to reach the end of the merus. The

proximal segment of the exopod of the third maxillipeds (Fig. 7g) reaches the level of the outer articulation between the ischium and merus; the flagellum is about two-thirds the length of the proximal segment.

The first pereiopods (Fig. 6c) are chelate and symmetrical.

The dactylus is attenuate and deflected distally. It is 2.3 times as long as broad at the base in the male, but 2.5 times in the female. The dorsal margin is smooth and sometimes bears a small stout tooth near the proximal end as seen in the larger male from Shimoni and the smaller male from Washin Is. The cutting edge is virtually concave distally. The upper exterior surface is lamellar and proximally furnished with a few hair tufts. The lower exterior surface bears a pair of hairy rows in the proximal three fourths; the intervening space is carinate in the proximal three fourths, the carina is smooth and distinct in the midline. The interior median carina is furnished with distinct pearly tubercles which are more distinct in the male than in the female. The upper interior surface is studded with long hairs. The lower interior surface is slightly sulcate and bears a submarginal row of hairs above the cutting edge. There is a brunt denticle between the cutting edge and the submarginal hair row at the proximal one fourth.

The fixed finger is attenuate distally, about as long as the dactylus, and crossed with the dactylus. The cutting edge is sinuous to the whole extent and characteristically armed with a crenulated carina in the proximal one third; in the larger male from Shimoni, the carina bears eight denticles, while in the smaller male and female denticles are indistinct.

The palm in the male is 1.6 times as long as the dactylus and 1.8 times as long as broad, while it is 1.8 times as long as the dactylus and 2.0 times as long as broad in the female. The lower margin extending to the tip of the fixed finger is slightly declined at about the distal three sevenths. The upper margin of the palm in the female sometimes bears a subterminal spine as seen in the larger female from Shimoni and the larger female from Washin Is. The interior surface bears no spine on the disal margin and is lined in the upper half with three longitudinal hairy rows, of which the median row is rather poor. The exterior surface is studded with hair tufts but obscurely. The outer ventral margin is rugose in the proximal half. The inner ventral margin is beset in the proximal half with a carina, with a row of long hairs running outside it.

The carpus is about two fifths the length of the palm; the dorsal surface bears a small inner distal tooth and a distinct distal tooth on the ventral margin.

The merus is 2.2 times as long as broad, about 2.5 times as long as the carpus and as long as the palm. The dorsal margin is devoid of the subterminal tooth. The ventral inner margin is armed with a row of 13—14 stout denticles, extending a little distant from the proximal corner to the distal end.

The first pleopods are absent in the male, while in the female they consist of two elongated segments, the distal segment is slightly longer than

the proximal. The following pleopods are leaf-like; the exopod is longer than the endopod.

The protopod of the uropod bears a sharp tooth at the posterior angle. Another similar tooth is found in the proximal part of the exopod.

The exopod of the uropod overreaches a little the level of the posterior margin of the telson; the exterior margin is straight and the distal margin is largely rounded; the outer surface is provided with two longitudinal median carinae in the outer half. The endopod extends to or fails just to reach the level of the posterior margin of the telson. The dorsal surface of the endopod is marked with a median carina.

The eggs are numerous and small, 0.8 mm in diameter.

Remarks. — Although Nobili (1906[b]) described this species on many specimens, — 9 males and 7 females from Souakim, 6 females from Djibouti, and 3 males and one female from Massaouah, he did not refer to any sexual differences found in the form of the rostrum and telson. Nobili (1904, 1906[b]) and de Man (1927) noticed that the rostrum is long. In the present specimens, it is shown that the rostrum is longer than broad in the male, but broader than long in the female. In addition, the present specimens show some morphological variations in the situation of the median interspace of the dorsomedian region, the relative position between the rostrum and eye-stalks, and in the ratios of the length to breadth of the dactylus and of the length of the dactylus to that of the palm.

Type-locality. — Souakim, Red Sea.

Distribution. — Red Sea (Souajim; Djibouti; Massaouah), Kenya (Shimoni; Washin Is.) and Natal.

5. **Upogebia (Calliadne) spongium** sp. nov.

(Figs. 9—10)

Materials examined. — Holotype. ♂, 11 mm. Off Nossi Bé, Madagascar, 13°27′00″S, 47°56′00″E; 21.96 m deep, rock, in encrusting sponge (Host Catalogue AJB No. 1253); handlined by R. V. Manihine; July 8, 1971. Cat. No. AJB. Cr. 328.

— Paratype. ♀, 11 mm. Data as for holotype.

Diagnosis. — Rostrum narrow and with five thin teeth on respective lateral margins. Lateral longitudinal groove of carapace broad. Telson slightly longer than broad; posterior margin largely convex. Dactylus of first pereiopods attenuate and curved downward distally; interior median carina obscurely tuberculate in male, but smooth in female. Fixed finger slightly shorter than dactylus; cutting edge notched proximally and minutely ridged in the proximal one third. Merus with an intermitting row of 5—6 distinct spines on ventral inner margin, in addition subterminal tooth on upper margin.

Fig. 9: *Upogebia (Calliadne) spongium* sp. nov.
Paratype, female.

Description. — The cervical groove extends backward to the posterior two fifths of the carapace.

The rostrum (Fig. 10a, b) shows a narrow triangular outline, with a brunt tip, about 1.2 times as long as broad at the base, and armed with five thin triangular teeth on respective lateral margins. The lower surface is proximally beset with hairs scantily on respective lateral margins. The dorsal surface is deflected distally. The median interspace is noticeable and extends to the anterior one fourth of the gastric region. The dorsomedian region from the proximal part of the rostrum to the anterior one third of the gastric region is sparsely spinulate. The lateral longitudinal groove is broad and well concave. The anterolateral tooth is stout and triangular; the lateral longitudinal ridge is slightly converged in the anterior one third and sparsely beset with a row of 5—6 small, triangular teeth.

The telson (Fig. 10c) is slightly longer than broad. The dorsal surface is provided with a smooth transverse and longitudinal carinae; the transverse carina bears a few hairs. The medial portion surrounded by the above-mentioned carinae shows a shallow concavity; the median groove is faintly discernible in the male, but undefinable in the female. The posterior margin is largely rounded. The lateral margin is different between the male and female specimens; in the male both margins are straight and almost parallel with each other and continue gradually to the rounded posterolateral angles, while in the female they form a small proximal lobule on each and then posteriorly are largely convex and continue smoothly to the rounded

posterior corners, with the greatest breadth of the telson a little posterior to the middle.

The eye-stalks are a little shorter than the rostrum in the male, but seemingly a little longer in the female which is preserved in alcohol and somewhat deformed. The cornea occupies more than the distal half of the eye-stalk, facetted and black in colour.

The antennular peduncle overreaches the eye-stalk at the level of the proximal part of the penultimate segment. The proximal segments is about as long as the second and distal segment combined, and the distal segment is twice as long as the penultimate. The ventrodistal spine is absent in the proximal segment. The dorsolateral flagellum is much longer than the peduncle and consists of 12—13 particles. The ventromesial flagellum is a little longer than the dorsolateral.

The antennal peduncle overreaches the eye-stalk at the level of the proximal two fifths of the penultimate segment. The relative lengths of the ultimate, penultimate and second segments are 1.0, 1.5 and 1.3 respectively. The scaphocerite is absent.

The mandibles (Fig. 10d) are almost square in outer view. The cutting edge is armed with a row of denticles and a very prominent proximal tooth. The distal margin is declined inwards and a little convex medially. The outer margin is straight and parallel to the cutting edge.

The first pereiopods (Fig. 10e) are chelate and symmetrical.

The dactylus is attenuate and 2.2 times as long as broad. The dorsal margin is collared by a proximal swelling. The cutting edge is entire and conspicuously deflected distally. The upper exterior surface is lamellar and bears a few hairs proximally. The lower exterior surface is beset in the proximal two thirds with two rows of sparse hairs, of which the lower row is thicker than the upper one; the intervening space is smooth and more convex in the proximal one third. The upper interior surface is sparsely beset with long hairs. The interior median carina in the male is indistinctly tuberculate, while it is smooth in the female. The lower interior surface bears a submarginal hair row above the cutting edge, and there is a triangular spiny tooth at the proximal one fourth between the cutting edge and the submarginal hair row.

The fixed finger is slightly shorter than the dactylus. The outer surface is sulcate proximally along the cutting edge. The cutting edge is largely concave and marked with a simall proximal notch which is followed distally in the proximal one third by a row of minute teeth diminishing the size distally.

The palm is 1.8 times as long as broad and 2.0 times the length of the dactylus in the male, while it is 2.0 times as long as broad and 2.8 times the dactylus length in the female. The outer and inner surfaces are scarsely hairy. The lower margin extending to the tip of the fixed finger is slightly declined at the distal two fifths.

The carpus is about one third the length of the palm; the upper surface bears a subterminal tooth on the inner margin. The outer surface bears a sharp distal tooth on the ventral margin.

The merus is slightly more than three times the length of the carpus and about as long as the palm. The dorsal margin bears a sharp subterminal tooth a little apart from the distal end. The ventral inner margin bears characteristically a row of 5—6 distinct, sharp and intermitted spines, of which the proximal one is the longest and the following ones diminish the size distally.

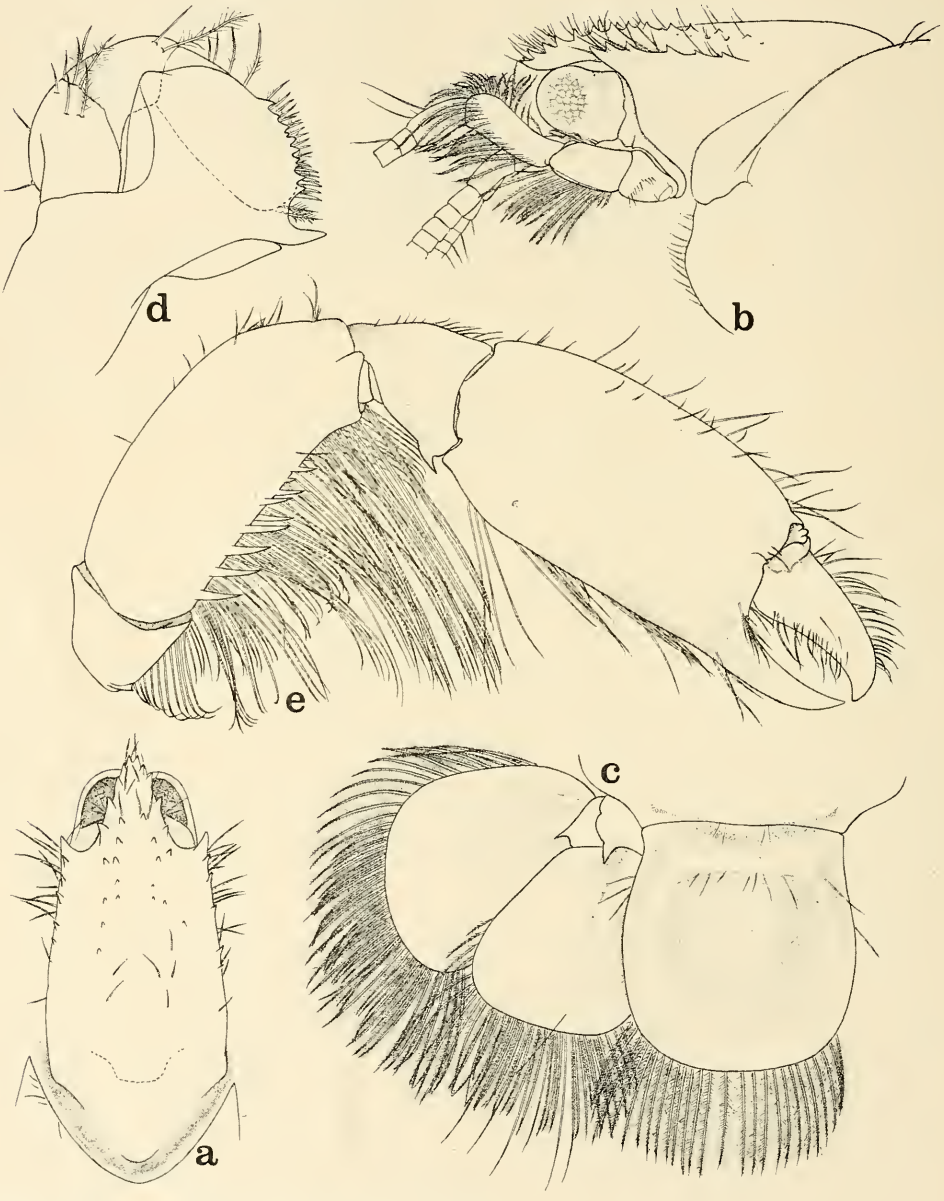

Fig. 10: *Upogebia (Calliadne) spongium* sp. nov.
a. Dorsomedian region of carapace; b. Anterior part of carapace; c. Telson and uropod; d. Mandible; e. First leg.
a, b, d, e. Holotype, male; c. Paratype, female.

The second pereiopods are simple. The relative lengths of the dactylus to the merus are 1.0, 1.5, 1.4 and 3.4 respectively. The dactylus shows an elongated triangular shape, with its lower margin almost straight; the exterior surface is very slightly swollen medially. The propodus is distinct and two times as long as broad; the whole lower margin is almost straight, while the upper is largely convex.

The third pereiopods are also simple. The relative lengths of the dactylus to the merus is 1.0, 1.3, 1.8 and 3.0 respectively. The dactylus bears an intermitting row of yellowish tubercles on the dorsal outer margin. The propodus is two times as long as broad; the lower margin is spinulate in the distal half.

The fourth pereiopods are similar to the third pair. The relative lengths of the dactylus to the merus are 1.0, 1.4, 1.5 and 2.6 respectively. The dactylus is furnished with a median longitudinal hair row on the exterior surface; the interior surface bears thick bristles distally.

The fifth pereiopods are subchelate. The relative lengths of the dactylus to the merus are 1.0, 2.3, 2.0 and 2.0 respectively. The dactylus is twisted in the distal half. The ventrodistal projection of the propodus is stout and reaches the middle of the dactylus.

The first pleopods in the female are pediform and each consist of two-segments, of which the distal segment is slightly shorter than the proximal. The first pleopods are absent in the male. The second to the fifth pleopods are respectively biramous and foliaceous; the exopod is broad and distinct, while the endopod is small and one-third the length of the exopod.

The protopod of the uropod is provided with a small but strong spine in addition to another spine produced from the proximal part of the exopod.

Remarks. — The present new species seemingly resembles *U. (Calliadne) rhadames* Nobili, 1904 from the Red Sea in many features. Both species have the stout eye-stalks with black and facetted cornea, the narrow triangular rostrum, the same number of the marginal teeth on the rostrum, the broad lateral longitudinal groove of the carapace, and the subterminal tooth on the upper margin of the merus. However, the former differs from the latter in that the dorsomedian region of the carapace is less scabrous and the antennular and antennal ventrodistal spines are missing. In the new species the merus bears on the ventral inner margin a row of 5—6 sharp spine instead of a row of 13—14 stout denticles in *U. (Calliadne) rhadames*.

The species is named from the Latin *spongia*, showing its that burrowing habit in encrusting sponge.

Type-locality. — Off Nossi Bé, Madagascar, 13°27′00″S, 47°56′00″ E. 21.96 m deep.

Distribution. — So far only from the type locality.

6. **Upogebia (Calliadne) digitina** sp. nov.

(Figs. 11—13)

Material examined. — Holotype. Ovig. ♀, 16 mm. Off Ras Iwatine, Kenya, 02°28′00″S, 41°04′05″E; 146.40 m deep, dredged by R. V. Manihine; P. S. Sandhu col.; Jun. 17, 1971. Catalogue No. AJB. Cr. 327.

Diagnosis. — Small species only 16 mm in total length. Rostrum semicircular on distal margin and with three tubercles on each lateral margin. Dorsomedian region of carapace scabrous in anterior half. Lateral longitudinal ridge smooth and broadened in anterior one fourth, and with an apical tooth. Telson broadened posteriorly, with the maximum width at posterior one third; posterior margin largely rounded. Dactylus of first pereiopods with a series of three stout teeth on cutting edge; interior median carina characterized by a series of prominent triangular teeth.

Description. — The cervical groove extends to the midway of the carapace.

The rostrum (Figs. 11, 12a) is broad triangular in dorsal view and semicircular on the distal margin. The dorsal surface is slightly deflected distally,

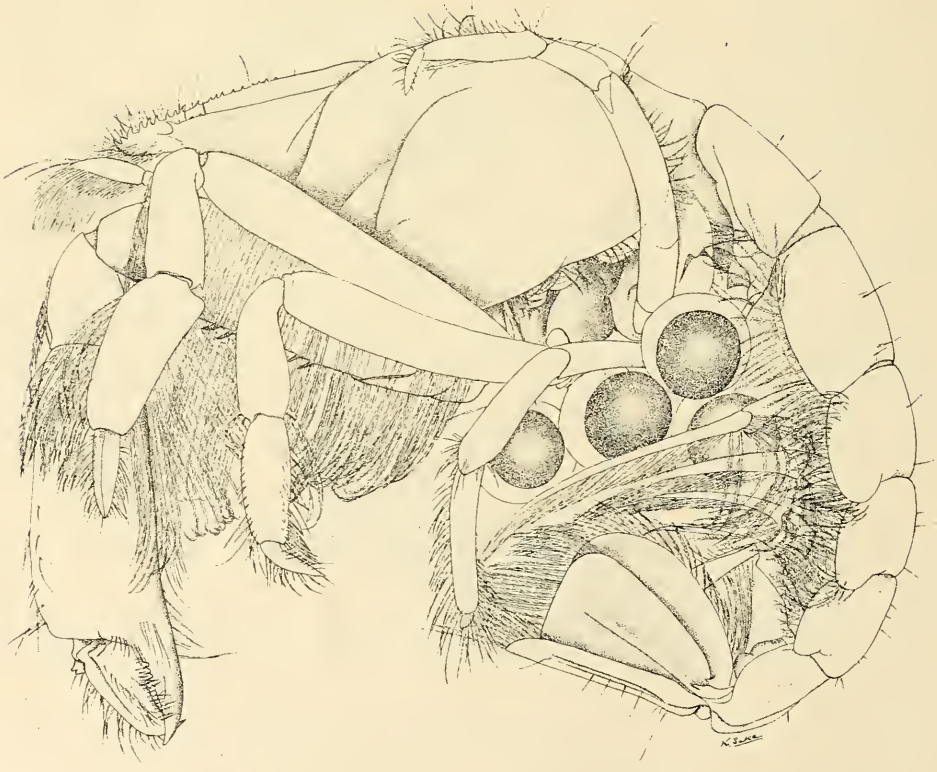

Fig. 11: *Upogebia (Calliadne) digitina* sp. nov.
Holotype, ovig. female.

furnished with hairs more distinctly near the tip, and bears three tubercles on respective lateral margins. The median interspace is broad and shallow, extending to the anterior one fifth of the gastric region. The lower surface of the rostrum is beset with plumose hairs on respective lateral margins. The dorsomedian region is interspersed with tubercles down to the posterior two fifths of the gastric region, and respective lateral margins are once slightly converged posterior to the rostrum but then diverged posteriorly. The lateral longitudinal groove is noticeable broad and deep in the anterior one fourth, but then diminishes posteriorly. The lateral longitudinal ridge is represented in the anterior one fourth by a smooth and broad carina scantily with hairs, and further posteriorly by a slender divergent carina diminishing posteriorly. The anterolateral tooth is small and apical.

The abdomen is smooth on the surface. The relative lengths of the abdominal somites are 1.0, 1.1, 0.6, 0.6, 0.5 and 0.7 in the midline. The first abdominal pleuron forms a broad triangular lobe with a submarginal line in the posterior two thirds. The second abdominal pleuron is broadly convex on the ventral margin; the posterior margin is noticeably convex and overlaps the third abdominal pleura beyond the articulation between the second and third abdominal somites. The ventral margin forms the anterior part of the second abdominal pleura to the middle of the fifth is fringed with long plumose hairs. The sixth abdominal somite is nearly two times as long as broad, smooth and corneous on the dorsal surface; the whole ventral margin is broadly truncate, and the posterior margin is smooth.

The telson (Fig. 13b) is about 1.8 times the sixth abdominal somite in the middle line and a little longer than broad. The lateral margin is slightly sinuous proximally, but posteriorly it is gently divergent so that the maximum breadth is seen at the posterior one third. The posterior margin is broad and rounded. The dorsal surface is furnished with obscure transverse and lateral carinae. In the medial portion, there are defined a median broad and shallow interspace and two lateral grooves more obscure than the median interspace.

The eye-stalks slightly fail to reach the rostral tip; the cornea is rounded, facetted, black in colour, and situated in the distal half of the stalk.

The antennular peduncle overreaches the eye-stalk at the level of the middle of the penultimate segment. The ultimate and penultimate segments are slender; the former is as long as the latter and proximal segments combined. The dorsolateral flagellum consists of eight particles. The ventromesial flagellum is longer than the dorsolateral and about as long as the peduncle.

The antennal peduncle overreaches the eye-stalk at the level of the distal part of the second segment. The relative lengths of the ultimate, penultimate and second segments are 1.0, 1.3 and 1.2 respectively. The scaphocerite is absent. The penultimate segment is lined with long hairs in the distal half on the dorsal margin and obliquely on the outer surface. The second segment also bears long hairs on the ventral margin. The flagellum is about one and three fourths times as long as the peduncle.

The mandibles (Fig. 12b) are subsquare in outer view and bear a three-segmented palp. The cutting edge is armed with a row of denticles and a much larger proximal tooth. The distal margin is inclined toward the axis. The outer margin is gently diverged proximally.

The palp of the second maxillae (Fig. 12c) bears the distal part broadened.

The palp of the first maxillipeds reaches the level of the proximal part of the terminal prolongation of the exopod. The second maxillipeds are pediform; the exopod slightly fails to reach the distal margin of the merus, its flagellum is half the length of the proximal segment and the tip reaches the exterior margin of the carpus when the flagellum is bent inwards.

The third maxillipeds (Fig. 13c) are pediform and extensively furnished with a series of brush-like hair on the flexor margin of respective segments but the carpus. The ischium and the merus are slender; the merus is three fifths the length of the ischium, and the carpus is small. The propodus is shorter than twice the length of the carpus, or than the dactylus. The proximal segment of the exopod extends to the level of the distal three fourths of the ischium; the flagellum is two-segmented, and its tip overreaches the articulation between the ischium and merus.

The first pereiopods (Fig. 13d) are chelate and symmetrical.

The dactylus is 2.2 times as long as broad. The dorsal margin is collared by a proximal swelling which is separated by a distinct notch from its extention; the notch is brimmed with a distal straight slope. The cutting edge (Fig. 13e) is curved distally, carinate and furnished with a series of three

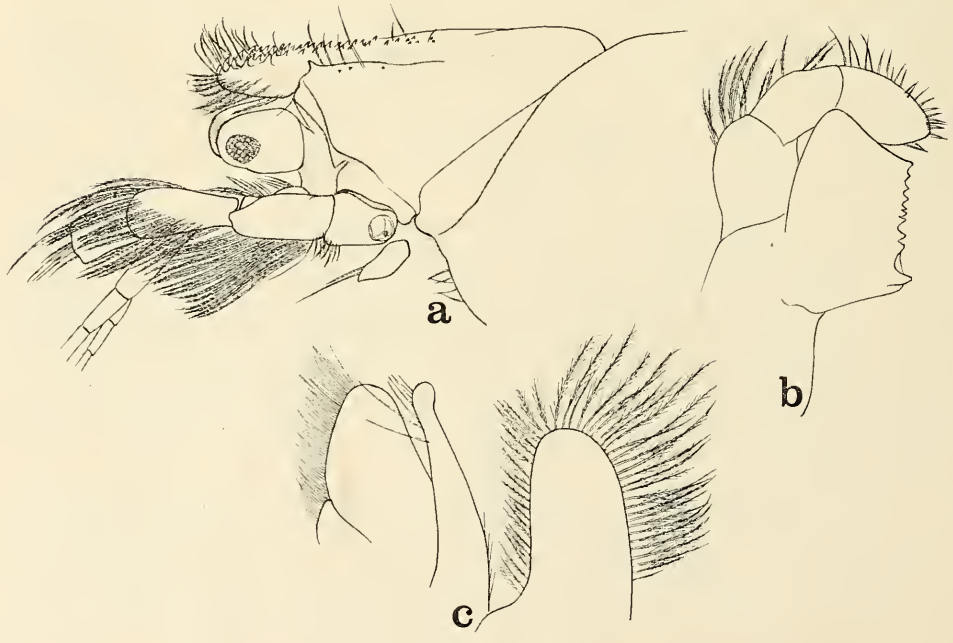

Fig. 12: *Upogebia (Calliadne) digitina* sp. nov.
a. Anterior part of carapace; b. Mandible; c. Second maxillae in inner view.

stout closely-set teeth a little distant from the proximal end. The upper exterior surface is lamellar and a little concave longitudinally. The lower exterior surface is studded with hairs more thickly in the lower part; the intervening space is slightly convex. The upper interior surface is cattered with bristles and proximally bears 2—4 tubercles. The interior median carina

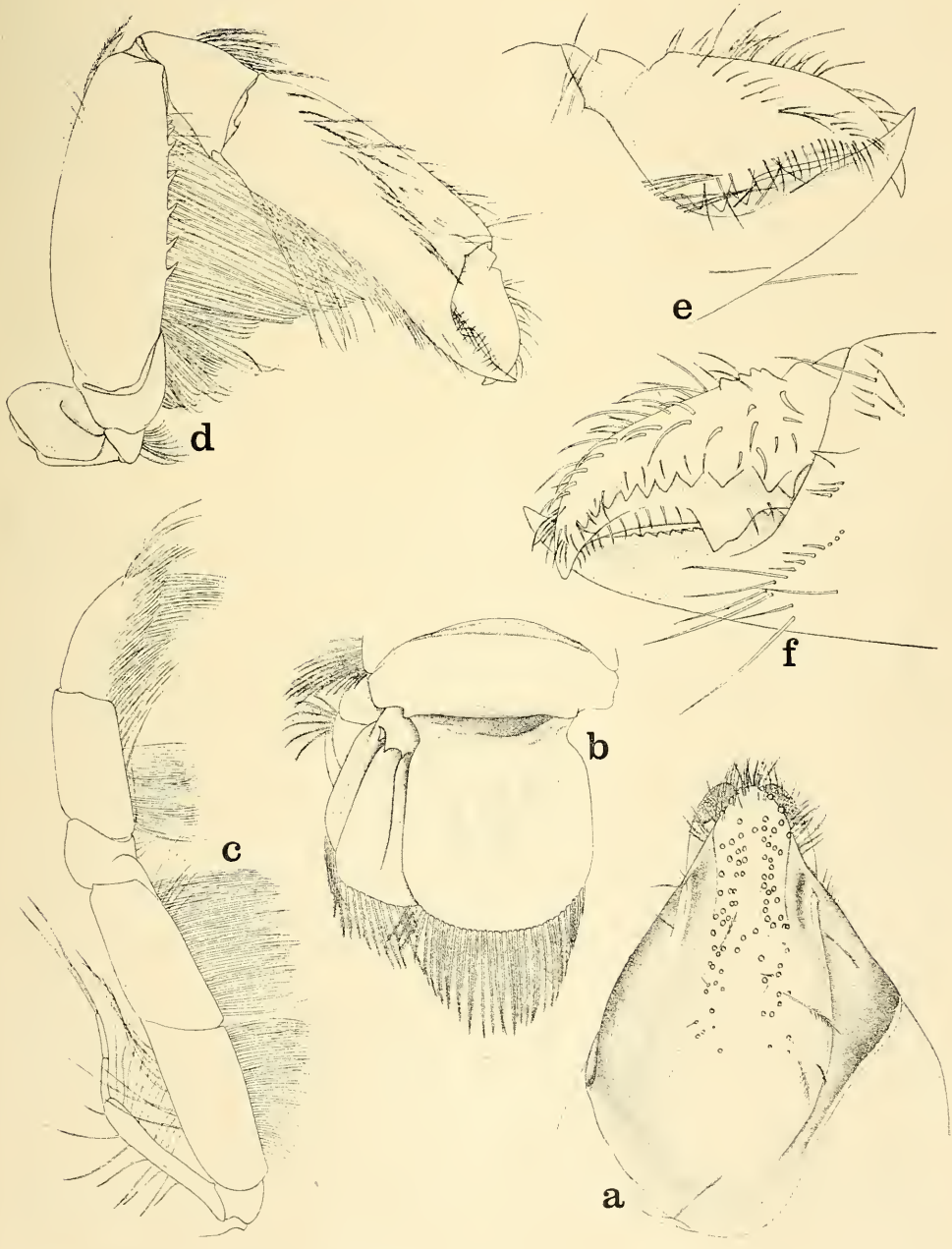

Fig. 13: *Upogebia (Calliadne) digitina* sp. nov.
a. Dorsomedian region of carapace; b. Telson; c. Third maxilliped; d. First leg; e. Distal part of first leg in outer view; f. Distal part of first leg in inner view.

(Fig. 13f) is characterized by a prominent series of ten triangular teeth reducing the size distally. The lower interior surface bears a submarginal hair row and a large stout tooth at the proximal one third.

The fixed finger is slightly shorter than the dactylus. The cutting edge is notched proximally by a narrow slit and provided in the proximal half with a row of denticles which reduce the size distally.

The palm is 2.3 times as long as broad and 2.3 times as long as the dactylus. The lower margin extending to the tip of the fixed finger is slightly declined at about the middle. The interior surface bears a distal spine just below the articulation to the dactylus and is furnished with three longitudinal rows of hairs in the upper half; in addition a transverse row of bristles is seen a little posterior to the upper proximal corner of the fixed finger.

The carpus is a little less than half the length of the palm. The dorsal surface bears a slender inner distal spine and the outer surface bears also a slender ventrodistal spine.

The merus is 2.5 times as long as broad and 2.8 times as long as the carpus. The ventral surface is armed with an intermitting row of 5—6 acute teeth on the exterior margin from the proximal one third to near the distal end and distally with another row of 2—3 small teeth in the midline. The dorsal margin is devoid of the subterminal spine.

The second pereiopods are simple. The relative lengths of the dactylus to the merus are 1.0, 1.8, 1.7 and 3.0 respectively. The dactylus is elongate and triangular; the exterior surface is carinate in the midline and the outer ventral surface is hairy.

The third pereiopods are proportionately smaller than the second. The relative lengths of the dactylus to the merus are 1.0, 1.8, 1.9 and 3.5 respectively. The dactylus is provided with yellow curved spinules spaced regularly on the dorsal margin. The propodus is spinulate on the ventral margin.

The fourth pereiopods are similar to the third. The relative lengths of the dactylus to the merus are 1.0, 1.7, 1.5 and 2.7 respectively.

The fifth pereiopods are subchelate. The relative lengths of the dactylus to the merus are 1.0, 3.0, 2.5 and 3.0 respectively. The propodus bears a ventrodistal prolongation extending to the level of about the middle of the dactylus.

The first pleopods in the female are pediform and two-segmented; the distal segment is slightly shorter than the proximal. The second to fifth pleopods are foliaceous, the endopod is small and about half as long as the exopod.

The protopod of the uropod bears a blunt tooth at the posterior angle. There is another small tooth in the proximal part of the exopod, paired with the above-mentioned tooth. The exopod bears two median longitudinal carinae on the surface. The endopod is a little shorter than the telson and about as long as the exopod, and bears a median longitudinal carina.

The eggs are few, but comparatively large measuring 0.9 mm in diameter.

Remarks. — The present species closely resembles *Upogebia (Calliadne) rugosa* (Lockington, 1878) from the Gulf of California in some features. In both species, the rostrum is obtuse at the tip, the dorsomedian region of the carapace is scabrous in the anterior half, and the telson has its maximum breadth near the posterior margin. However, the present species differs from Lockington's species in having the posterior three abdominal somites with the smooth dorsal surface and the telson longer than broad. In *U. (Calliadne) rugosa,* the fifth and sixth abdominal somites and the telson are complexly wrinkled, and the telson is broader than long.

It is impossible to compare the two species with each other in detail in the morphology of the first pereiopods in defect of the description of this part of the Lockington's species.

The present new species is named from the Latin *digitus* to express its characteristic finger, the dactylus of the first pereiopods, bearing uniquely a prominent row of triangular teeth.

Type-locality. — Off Ras Iwatin, Kenya, 02°28'00"S, 41°04'05"E, 146.40 m deep.

Distribution. — So far from only the type locality.

7. **Upogebia (Calliadne) longicauda** sp. nov.

(Figs. 14—15)

Material examined. — Holotype. ♂, 5.5 mm. Port Tudor, Mombasa, Kenya, off Ras Junda; 34.77 m deep, in sponge, dredge.; N. Bruce and P. S. Sandra col.; Oct. 1, 1971.

Diagnosis. — Small species. Rostrum broad triangular in shape, and with five sharply-pointed teeth on respective lateral margins. Dorsomedian region scantily with tubercles in the anterior half and separated by a wide interspace from rostrum. Lateral longitudinal ridge with a stout sharp apical tooth. Telson longer than broad, lateral margins convergent. Dactylus of first pereiopods slightly shorter than fixed finger; interior median carina smooth. Merus with an intermitting row of three spines on ventral outer margin, but without subterminal spine on dorsal margin.

Description. — The cervical groove extends posteriorly to the posterior three-sevenths of the carapace.

The rostrum (Fig. 15a, b) shows a broad triangular outline with an obtuse tip, and is 0.6 times as long as broad. Respective lateral margins bear a row of five triangular sharp teeth. The dorsal surface is strongly deflected distally. The ventral surface is smooth.

The dorsomedian region of the carapace is slightly convex and the median interspace is undefinable; it is sparsely tuberculate and hairy from the proximal part of the rostrum to the midway of the gastric region; the tuberculate

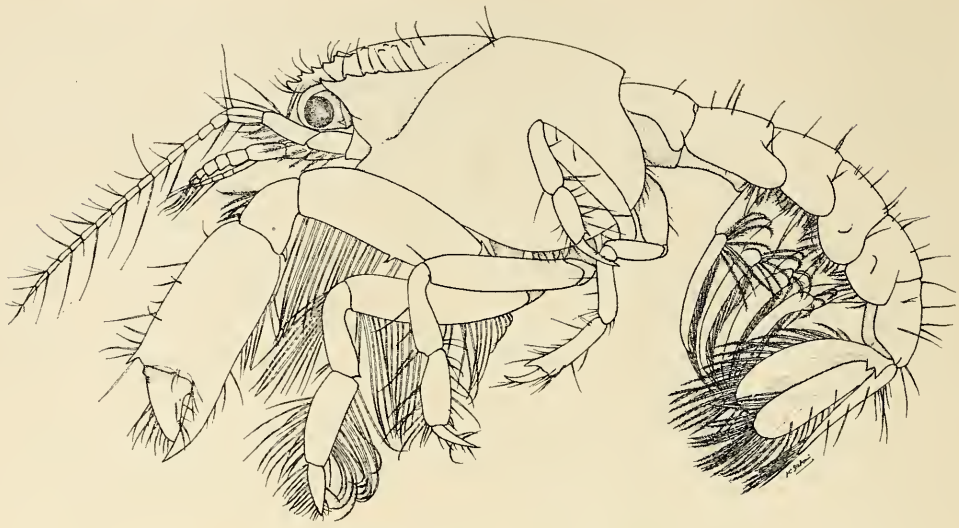

Fig. 14: *Upogebia (Calliadne) longicauda* sp. nov.
Holotype, male.

area is branched into a pair of inner divergent lines extending from the anterior one fourth to the midway of the gastric region. The lateral longitudinal groove is broad and shallow. The lateral longitudinal ridge is furnished with a series of 8—9 spinules, of which the anterior four are more prominent than others; the anterolateral tooth is simple and stout on the left, while bifurcate at the tip on the right.

The abdomen is smooth and sparsely hairy on the surface. The relative lengths of the abdominal somites are 1.0, 1.1, 1.0, 1.0, 0.9 and 1.1 respectively. The first abdominal pleura are declined in the posterior half of the ventral margin. The ventral margin from the posterior part oft the second abdominal pleuron to the anterior half of the fifth is lined with a row of plumose hairs. The sixth abdominal somite is 1.6 times as long as broad; the pleura are broadly truncate on the ventral margin and smooth on the posterior margin.

The telson (Fig. 15c) is about 1.2 times as long as broad, and the lateral margins are largely converged to the posterior margin. The dorsal surface bears an obscure transverse carina with a few hairs and a pair of obscure lateral carinae. The medial portion is smooth and devoid of the median groove.

The eye-stalks are stout and slightly shorter than the rostrum. The cornea is large, facetted and coloured in black.

The antennules overreach the eye-stalk at the level of the distal margin of the proximal segment. The ultimate segment is about twice the length of the penultimate; the proximal segment is slightly longer than the ultimate and penultimate segment combined and devoid of the distal spine on the ventral margin. The dorsolateral flagellum consists of six particles, thick, about three fourths the length of the peduncle and about as long as the ventromesial.

The antennae overreach the eye-stalk at the level of the proximal one third of the penultimate segment; the ultimate segment is three fourths the length of the penultimate which is about as long as the second segment. The scaphocerite is absent.

The mandibles (Fig. 15d) are almost square in outer view. The cutting edge is furnished with a row of denticles and a proximal thick tooth. The distal margin is entire and slightly inclined toward the axis. The outer margin is entire and almost parallel to the cutting edge.

The first pereiopods (Fig. 15e) are chelate and symmetrical.

The dactylus is 1.3 times as long as broad at the base and acute at the tip.

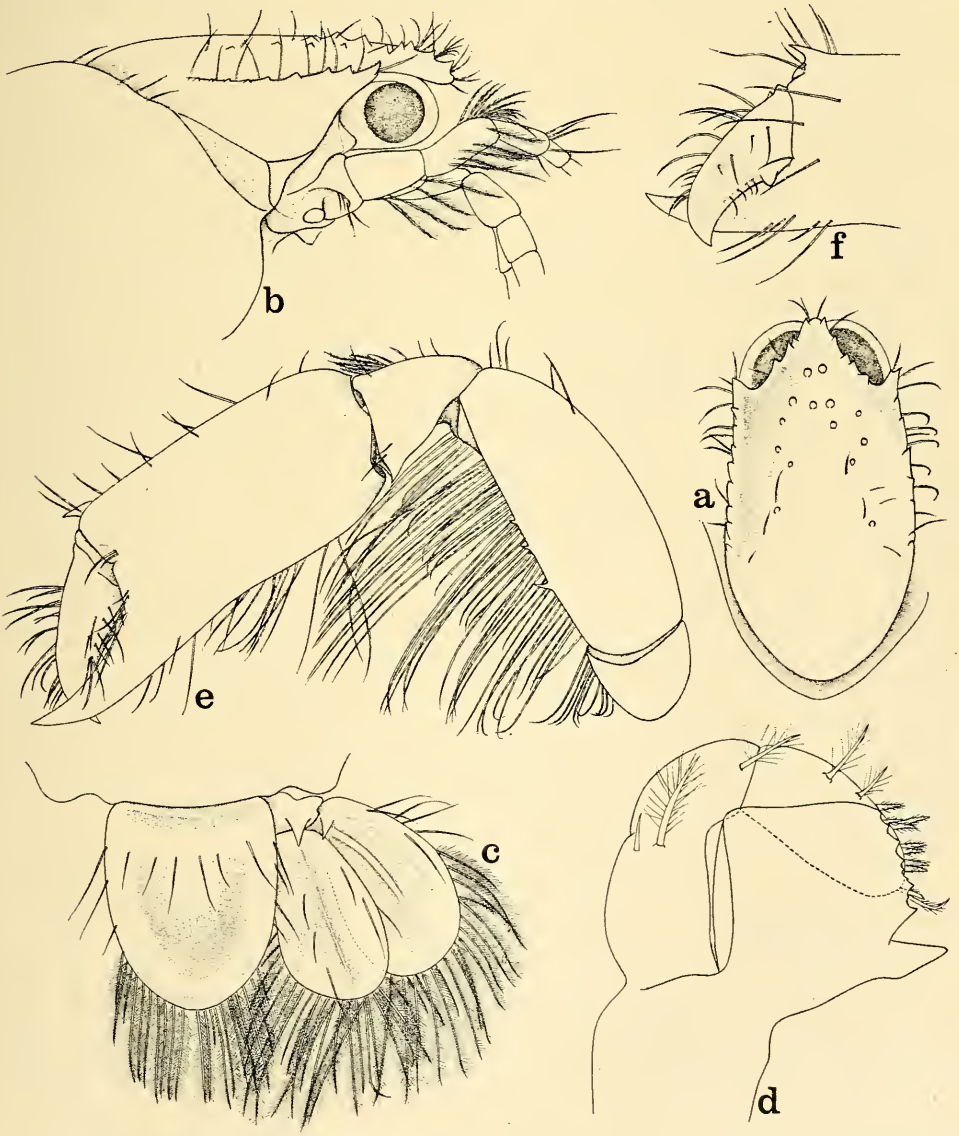

Fig. 15: *Upogebia (Calliadne) longicauda* sp. nov.
a. Dorsomedian region of carapace; b. Anterior part of carapace; c. Telson and uropod; d. Mandible; e. First leg; f. Distal part of first leg in inner view.

The dorsal margin is largely curved downward. The cutting edge is entire. The upper exterior surface is lamellar. The lower exterior surface bears in the proximal three fifths the intervening carina, of which the lower and upper margins are each implanted with a few hairs. The upper interior surface (Fig. 15f) ist studded with some hairs. The interior median carina is smooth. The lower interior surface bears a stout triangular proximal tooth at the proximal one third above the submarginal hair line.

The fixed finger slightly overreaches the tip of the dactylus, when they are crossed with each other, and is pointed at the tip. The cutting edge is carinate and bears a small triangular swelling at the proximal corner.

The palm is 1.7 times as long as broad and 1.8 times as long as the dactylus. The lower margin extending to the tip of the fixed finger is slightly declined at about the middle. The upper margin bears a sharp terminal tooth.

The carpus is about 0.4 times as long as the palm. The upper surface bears an inner distal spinule, and the outer surface bears a ventrodistal spine as usual.

The merus is about 2.7 times as long as broad and 2.7 times as long as the carpus. The ventral outer margin bears three small teeth spaced one another, the proximal one is more distinct than the others, acute, distally-directed, and situated at the proximal one third of the margin. There is no dorsal subterminal tooth.

The second pereiopods are simple. The relative lengths of the dactylus to the merus are 1.0, 1.6, 1.6 and 3.2 respectively.

The third pereiopods are proportionately as long as the second pereiopods. The relative lengths of the dactylus to the merus are 1.0, 1.2, 1.4 and 2.8 respectively. The dactylus bears a row of five sickle-like spines on the upper margin.

The fourth pereiopods are very similar to the preceding pair. The relative lengths of the dactylus to the merus are 1.0, 1.7, 1.8 and 2.9 respectively. The dactylus bears a row of five tubercles on the upper margin.

The fifth pereiopods are subchelate. The relative lengths of the dactylus to the merus are 1.0, 2.2, 1.8 and 2.0 respectively. The ventrodistal protrusion reaches the level of the proximal one fourth of the dactylus.

The first pleopods are absent in the male. The second to fifth pleopods are foliaceous; the exopod is three times as long as the endopod.

The protopod and exopod of the uropod bear respectively a sharply-pointed tooth. The endopod is oval, a little longer than the exopod and about as long as the telson.

Remarks. — The present new species is unique in the morphology of the telson and so far has not any partner in the subgenus *Calliadne,* though it rather resembles *U. (Calliadne) savignii* (Strahl, 1861) from the east coast of Africa and its surroundings in some points.

Both species bear the broad rostrum, with a row of five teeth on respective lateral margins, and the wide opening between the rostrum and the anterolateral tooth of the carapace, though the marginal teeth of the rostrum in the

present new species are sharply-pointed instead of granuliform in the Strahl's species. It is probable that the above-mentioned difference in the shape of the rostral marginal teeth is not attributable to the size difference of the specimens but specific.

The new species is named from the Latin *longus* and *cauda* to show that the telson is longer than broad.

Type-locality. — Port Tudor, Mombasa, Kenya, off Ras Junda, 34.77 m deep.

Distribution. — So far only from the type locality.

Zusammenfassung

Die hier behandelten 7 Arten der Gattung *Upogebia* entstammen einer Ausbeute von der Küste Kenias, die Dr. A. J. Bruce von der East African Marine Research Organization in Mombasa erworben hat.

4 Arten davon wurden als neu erkannt. Diese Arten sind: *U. (Calliadne) brucei* sp. nov., *U. (C.) spongium* sp. nov., *U. (C.) digitina* sp. nov., und *C. (C.) longicauda* sp. nov. Der Vergleich der Merkmale von *U. (C.) ancylodactyla* de Man, 1905 und *U. (C.) ancylodactyla* var. *amboinensis* de Man, 1928 mit *U. (U.) amboinensis* macht es wahrscheinlich, daß es sich um die gleiche Art handelt. Für Kenia wurden *U. (C.) bowerbankii* Miers, 1884 und *U. (C.) rhadames* Nobili, 1904 erstmals festgestellt.

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