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THE THALASSINOIDEA (CRUSTACEA, ANOMURA) OF MAHARASHTRA.

By K. N. Sankolli. (*With two text-figures*)

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The Thalassinoidea (Crustacea, Anomura) of Maharashtra

BY

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(With two text-figures)

[*Continued from Vol.* **68** (1): 106]

Sub-family: Upogebiinae

Remarks: In Maharashtra, this sub-family is represented by a single genus *Upogebia* Leach.

4. **Upogebia (Upogebia) kempi** n.sp. (Figs. 9 & 10)

Description: (Fig. 9, a and b)

Rostrum fairly large, bluntly triangular, its length being slightly larger than its breadth at base and reaches more than half way or just falls short of reaching the distal end of the penultimate joint of the antennal peduncle. Length twice that of the ocular peduncle. Each lateral margin of the rostrum armed with two strong, upstanding, more or less conical spines of which the anterior ones are closely situated near the tip. Distance between the two anterior spines less than that between anterior and posterior spines of each side. Dorsal surface of rostrum, anterior portion of the dorso-median region and the latero-frontal margin of the carapace beset with tufted hairs and tubercles. Hairs densely arranged in anterior part, almost encircling the tubercles and posteriorly present much less densely, along the lateral margin leaving the mid-dorsal region more or less plain. Tubercles arranged in about 4-5 indistinct longitudinal rows, the number of the rows gradually increasing posteriorly but becoming a bit oblique. Also the tubercles and hairs become less and less sharp and prominent. Hairs arise from inner angles of the tubercles and especially in the posterior part of this tuberculated area, the hairs are arranged in a sort of semicircle in front of the bases of the tubercles. Lateral frontal margin anteriorly

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extends just beyond the base of the rostrum and posteriorly by more than the distal $\frac{3}{4}$ length of the carapace; ridged with longitudinal row of 13-14 tubercles, of which the anterior ones are strong and more spine-like and the posterior ones low and less prominent. This row of tubercles is separated from the tubercles of the post-rostral median region by a smooth groove which fades away posteriorly near the proximal $\frac{1}{4}$ distance from the cervical groove. Cervical groove deep and well defined, with several, minute transverse rugae on the inner side. No spinules or tubercles present behind the cervical groove, only a few tufts of setae. The *linea thalassinica*, is quite distinct. Ventral surface of rostrum unarmed. A well developed ocular spine present on the anterior margin of carapace at the level of the ocular peduncle. About 4-5 granular tubercles on antennal margin below ocular spine; generally rudimentary in smaller specimens (32 mm).

The ocular peduncle extends more or less to the middle of the rostrum ; corneal portion fairly large and latero-distally situated.

Antennule (Fig. 9, c): Peduncle extends beyond rostrum by more than $\frac{1}{2}$ the length of its terminal segment. Basal segment swollen, in length slightly less than the third segment and bears distally a slender, rudimentary tooth on the lower border. Median tooth of the upper margin absent in all specimens examined so far, unlike as in *U.* (*U.*) *carinicauda* where it is present. Third segment about 3 times the length of the second.

Antenna (Fig. 9, d) : Distinctly longer than antennule. Antennal gland-opening clearly seen on the coxopodite. Second segment has the scaphocerite situated distally on the upper margin and an accuminate thorn at the distal end of the ventral border. Scaphocerite or the scale roughly oval, terminating in a sharp but minute tooth-like point. Third segment $1\frac{1}{2}$ times the second, widening out a bit distally; fourth segment more slender than second though it is more or less of the same length. Scaphocerite and thorn present in all specimens examined.

Mandible (Fig. 9, e) : With segmented palp ; cutting edge armed with one large and eight minute teeth. Below cutting edge are two large teeth visible from above.

First maxilla (Fig. 9, f) : Consists of two endites—lower and upper—and a well developed palp. Lower endite large ; upper endite narrow with its distal part rounded. Tip of the palp bent or deflexed.

Second maxilla (Fig. 9, g) : It has two bilobed endites. Upper lobe of the lower endite is very small and narrow. Endopodite well developed, slightly broad at base, narrowing distally. Scaphognathite

larger with the lateral notch situated at 3/5 the distance from the anterior end.

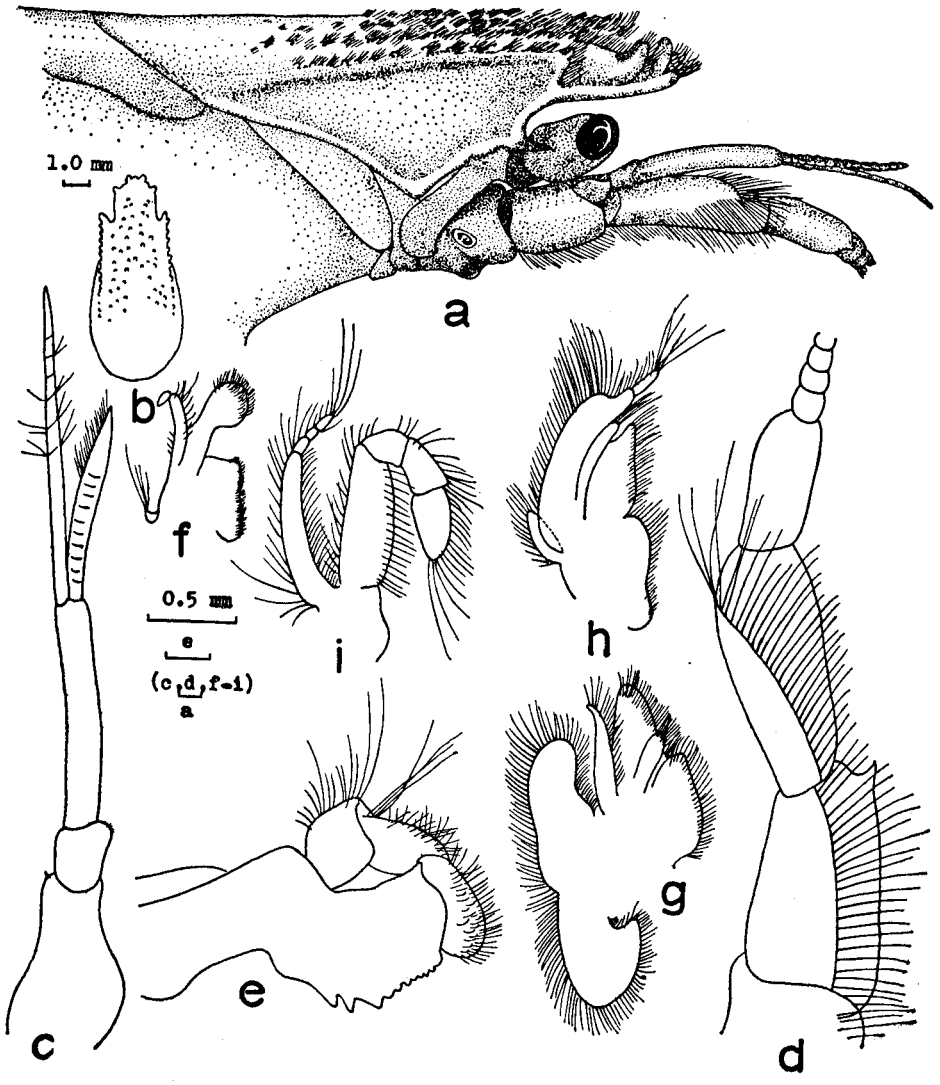

FIG. 9. *Upogebia* (*Upogebia*) *kempi* n. sp. a—lateral view of the anterior part of the body, b—anterior part of carapace (dorsal view, denuded), c—antennule, d—antenna, e—mandible, f—first maxilla, g—second maxilla, h—first maxilliped, i—second maxilliped.

First maxilliped (Fig. 9, h) : The two endites are separated by a notch. Distal part of upper endite rather pointed and that of lower endite more or less rounded. Palp well developed but narrow.

Flagellum of the exopodite is much narrower and shorter than the basal part. Epipod small and oval.

Second maxilliped (Fig. 9, i): Flagellum of exopodite sub-divided into four joints. A small but slightly elongated epipod is present.

Third maxilliped (Fig. 10, a): Dactylus of endopodite more or less as long as the propodus and nearly $2\frac{1}{2}$ times the length of the carpus. Merus slightly smaller than the ischium which in turn is as long as the dactylus. Exopod jointed in the distal part and reaches nearly to half the length of the merus. A small narrow epipod is present.

Pereipods :

First pair (Fig. 10, b and c): Heavy and well-formed, similar in size and shape. Distal end of the merus just extends beyond the rostral tip.

Ischium bears 2-3 spines on lower margin, the middle spine is generally large.

Merus slightly less than the propodus in length and its upper margin at some distance behind the distal end bears a distinct, anteriorly directed spine which is sometimes broken. Outer lower margin proximally armed with 3-5 spine-like, well-spaced teeth ; rest of the margin smooth; the inner lower margin bears about 12-18 minute tubercle-like distinct teeth of which the proximal 4-5 are well-spaced, these two margins meet near the proximal most tooth of the inner margin.

Carpus slightly more than half the length of the palm and narrows proximally. It has at the middle of the outer surface a longitudinal groove. In the upper half of its outer surface, there is an oblique row of hairs which originate from the inner surface near the meral articulation and then continue on the proximal part of the upper border from where it slopes down to meet the longitudinal groove distally on the outer surface. Upper margin in the proximal part, i.e., behind the oblique row of hairs, plain and then onwards with 6-8 distinct, anteriorly curved spines which increase in size distally. In males and smaller specimens of both sexes the teeth are much less pronounced. The distal margin in the upper half of the outer surface bears 5-6 unequal small spines of which the upper 3 are well-spaced. In a few specimens, near the middle of the lower half of the external surface, there is a longitudinal ridge-like elevation provided with a few minute, low tubercles at random. Outer lower margin shows about 6 very low, flat tubercle-like elevations from the inner angles of which the setae arise. The inner lower margin distally bears, near the propodal articulation, 2 distinct spines of which the distal one is very small. The distal margin of the inner surface, almost dorsally, bears a large spine which is as large as those of the dorsal and ventral surfaces.

The propodus is half as high as long. The upper outer border of palm is armed with small spine-like teeth all along the border. These are quite sharp and pointed in the proximal half and lose their sharpness distally and are interspersed throughout with long setae. Upper inner border often provided with very minute, flat tubercle-like elevations from the base of which the long setae arise. This border is proximally armed with 3 long, slightly curved spines. Between the borders and near the carpal articulation, there is sometimes a distinct spine-like tubercle. The outer surface has distally just near the articulation with the dactylus a small but distinct elevation which is generally tipped with a tooth-like tubercle. Distal margin of the inner surface bears a spine-like tooth on an elevated ridge, at the articulation of the dactylus, and 3-4 smaller closely arranged tubercles just below the elevation. Proximal margin of inner surface has compactly beaded tubercles, thicker, in the upper middle half and continuing with the upper inner tuberculated ridge. Lower margin, bears a long, curved spine on the inner side away from the fixed finger as in *carinicauda*. Inner lower surface proximally has a faint thin and shallow groove fringed with setae, which in its basal part bears 3-4 minute, granular tubercles. In males and small specimens of both the sexes, the tubercular proximal margin and the tubercles of the groove of the inner surface, are very pronounced. The lower half of the inner surface near its ventral spine, has 3-5 equal sized sharp spines, often much smaller than the ventral one and 2-5 similar spines along the middle, near the fixed finger. Tufts of hairs arise, from the inner angles of these spines. These spines often appear to be situated almost in a longitudinal row, parallel to the lower margin, except the 1-2 spines near the large ventral spine. These spines are usually absent in males and are very few in number in small females. On the outer surface of the palm, there is an oblique row of setae running downwards from the upper proximal margin to join the outer lower fringed border.

Dactylus nearly twice the length of the fixed finger and slightly longer than or as long as, carpus or a little more than one-half the length of palm. Outer cutting edge has 10-12 tubercle-like teeth of which the proximal most is the largest and is separated from the rest which decrease in size distally; the inner edge is provided with about 12 blunt but round tubercles which are larger than those on the outer edge. There are 3 longitudinal crests, one near and along the upper margin, the second along the middle of the outer surface and the third which is the shortest of the three, situated between the second and the outer cutting edge but in the proximal part only. These crests are followed by 3 rows of tufted hairs. The cutting edge of the fixed finger bears 6-9 tubercular teeth of which the proximal 3-5 are larger than the remaining ones.

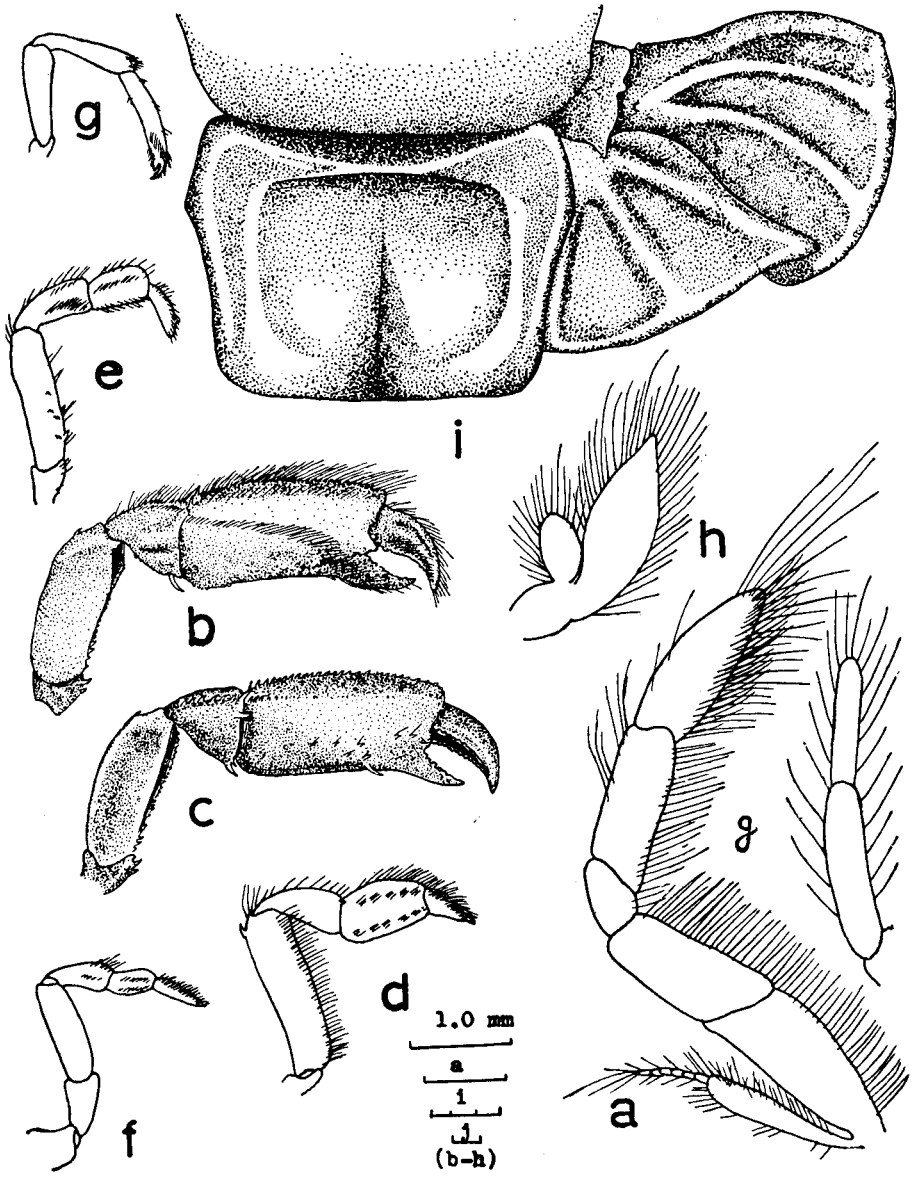

FIG. 10. *Upogebia* (*Upogebia*) *kempi* n. sp. a—third maxilliped, b—outer view of cheliped, c—inner view of cheliped, d—second leg, e—third leg, f—fourth leg, g—fifth leg, h—first pleopod of male, i—telson with uropod magnified, j—first pleopod of female.

Second pair (Fig. 10, d): Simple and equal; the distal end of its merus, almost reaches the level of the rostrum. Merus twice the length of the propodus and bears a sharp tooth on the anterior margin at some distance behind the distal margin. Carpus slightly shorter than propodus but slightly larger than the dactylus, narrowing proximally; with a spine situated almost dorsally on the distal margin of its external surface. Inner distal margin bears a spine ventrally, which is not visible dorsally. Propodus roughly quadrangular, broadening proximally.

Third pair (Fig. 10, e): Distal end of carpus just extends beyond the rostrum. Dactylus as long as propodus; propodus broader than the dactylus, its outer surface with 3 distinct longitudinal rows of hairs; carpus almost of the same length as propodus; the merus is slightly more than twice the length of the carpus and has two distinct spines in the proximal part of the posterior margin and a few tubercles on the lower half of outer lateral surface, in groups of 1-3, 2-4 and 2-3 in line with the spines of the posterior margin.

Fourth pair (Fig. 10, f): More or less similar to the third pair. Dactylus longer than propodus; carpus $1\frac{1}{2}$ times the length of the propodus; merus almost as long as carpus and propodus combined. There are no tubercles on any of the segments.

Fifth pair (Fig. 10, g): Dactylus slender, curved and spoon-shaped. Propodus nearly 5 times the length of the dactylus and its anterior portion is produced to form a process resembling a fixed finger which reaches almost the middle of the dactylus. The carpus is slightly smaller than the propodus and the merus in turn, is also smaller than the propodus.

The coxopodite of the first leg generally bears one spine-like tubercle, that of the second two—one proximal and the other distal, whereas on the third leg, there is a single proximal tubercle which in case of females, is situated above the gonadial aperture.

The thoracic sternite of the fourth pair of legs is little concave and posteriorly incised.

Abdomen:

It is normal in shape; the furrows dividing the tergal and pleural portions are quite deep and well-formed, even in the smaller individuals. Pleuron of the first segment is elongated and bluntly triangular, that of the second roughly elongatedly rectangular, those of the third and fourth parallelogram-shaped and that of the fifth broadly triangular with rounded angles. The sixth segment is peculiarly shaped. Dense pubescence on the lower margin extends, from the first to the fifth segments, but in

second to fourth it extends also to the posterior margin and the distal half of the lower margin of the fifth pleuron. Slight pubescence is also present on the lower margin of the sixth segment. The abdominal terga are slightly broader in females than in the males examined so far.

Pleopods: In males, 4 biramous pairs (Fig. 10, h) present from 2nd to 5th abdominal segments. The basal stalk is slightly smaller than the endopod which in turn, is less than $\frac{1}{2}$ the length of the exopod. Both the endo-and exo-pods are membranous and leaf-like. All the pleopods are similar in size and shape.

In females, 5 pairs (Fig. 10, j) on 1st-5th abdominal segments, the 1st pair being uniramous and styliform. The remaining pairs are more or less similar to the pleopods of the male. The eggs are borne on 1st to 4th pleopods and that too, on the endopods only in 2nd to 4th, whereas eggs are not borne on either rami of the 5th pleopods.

Telson (Fig. 10, i): It is somewhat broader than long and generally widens slightly just before the middle and then narrows posteriorly to end in a broad posterior margin, which is more or less straight. There is a shallow longitudinal furrow in the middle, from about the middle of the telson to almost the posterior margin. A high and distinct carina of the shape as shown in the figure is present on the anterior raised portion of the telson. There is also an indistinct crest-like elevation on either side of the mid-dorsal furrow, just near and along the lateral margin.

Uropods (Fig. 10, i): Protopodite of the uropod with a well developed spine-like tooth extending to the base of the endopod. The basal part of the exopod has a small, blunt tubercle. Anterior margin more or less straight in the basal as well in the distal parts except about the middle where it is convex; distal margin is convex bearing several teeth-like tubercles along the margin. There are 3 distinct longitudinal carinae on the dorsal surface, 2 about the middle and the 3rd along the anterior margin of the exopod. The anterior margin of the endopod is angular with rounded or blunt angle in the basal part and is slightly concave in the distal part. The antero-distal corner is not rounded but is drawn out and angular and the distal margin bears about one-half the number of teeth-like tubercles borne on that of the exopod. The dorsal surface has two longitudinal carinae, one about the middle and the other along the anterior margin.

Material examined:

Several specimens were collected from Bombay (Chowpatty and Cuffe-parade) and one from Ratnagiri.

The holotype (female; type-locality—Chowpatty, Bombay) and

paratype specimens will, in due course, be deposited in the Zoological Survey of India, Museum, Calcutta.

Measurements:

Of the material examined for the present study, the males ranged from 27 to 58 mm., non-ovigerous females from 30 to 56 mm. and ovigerous females from 47 to 58 mm., in length.

Ecology:

An intertidal species commonly found in the admixture of sand, mud and stones in the intertidal zone of Chowpatty and Cuffe-parade Bays in Bombay. The burrows are generally found under loose stones, their openings measuring about *c.* 10 mm. in diameter. These are quite characteristic since their inner wall is finely cemented and quite rigid and has a smooth, shiny surface. The burrows run more or less obliquely downwards among and in between the stones and have generally 3-4 side-tunnels and 2-3 blind, broad, semi-circular ends where the animal turns. These are also usually observed to run closely and almost parallel to the tubes of the tube-worm *Loimia medusa* (Savigny).

The ovigerous females could be collected from September to December.

So far no commensals have been noticed.

Discussion:

The new species, differs from *Upogebia* (*U.*) *carinicauda* (Stimps.), in the following characters.

1. *Rostrum*: Short, reaching but little beyond the ocular peduncle in *carinicauda* whereas in *kempi* it is fairly large reaching well beyond the ocular peduncle and measures twice the length of the ocular peduncles. In smaller specimens, however, the rostrum extends a little beyond the ocular peduncle as in *carinicauda*.

2. *Carapace*: The two species agree but for the presence of 4-5 granular tubercles on the antennal margin in *kempi* which is neither mentioned (de Man 1928 b) nor present in *carinicauda* (ovigerous specimen, Siboga Station 213).

3. *Antennule*: In *carinicauda*, the peduncle extends beyond the rostrum by only $\frac{1}{2}$ its terminal joint and the first joint has a distal spine and a much smaller acute tooth in the middle of its lower border. In *kempi* the peduncle extends by more than $\frac{1}{2}$ its terminal joint and the first joint bears only a minute and rudimentary distal tooth; the median tooth of the lower margin is invariably absent.

4. *Cheliped*:

Merus: With 10-12 teeth on the lower border in *carinicauda* and in *kempi* there are 12-18 on the inner lower and 2-3 on the outer lower borders.

Carpus: Upper border is smooth except for a single, strong distal spine in *carinicauda*, whereas in *kempi* species, it is edged with 6-8 curved spines which increase in size distally.

Propodus: In *carinicauda*, the upper border and the inner lateral surface are not armed but smooth; cutting edge of fixed finger with 6 unequal small teeth in the proximal half only; in *kempi*, the upper border is dentate and the inner surface is armed with 7-10 sharp spines in its lower half. The cutting edge of the fixed finger has 6-9 tubercular teeth, the proximal 3-5 being larger. The proximal margin of the inner surface also bears bead-like tubercles.

Upogebia (*U.*) *kempi* exhibits the following variations, sexual dimorphisms and size variations unknown in *carinicauda*.

Chelipeds:

Carpus: The teeth on the upper border are well pronounced in larger females only. In males and smaller females, these teeth are much less pronounced i.e., smaller in size and less in number, but *invariably at least* 3-4 *are present*.

Propodus: (a) Upper border: The teeth are well developed in larger females, but very small in males of all sizes and smaller females.

(b) Lower half of inner lateral surface: The spine-like teeth are well developed in larger females, but practically absent in males and very few in number (1-3) in smaller females.

(c) Proximal margin of inner lateral surface: The bead-like granules are more prominent in males than in females.

My observations on *carinicauda* are based on the descriptions given by Stimpson (1860), Miers (1884b), de Man (1888, 1927 a & b) etc. and on actual examination of one ovigerous specimen of Siboga Station 213 sent to me by Dr. Stock from the Amsterdam Museum.

The only apparent resemblance of *carinicauda* (ovigerous specimen 22·5 mm., Siboga Station 213, Amsterdam Museum) to the smaller specimens (28-30 mm.) of *kempi* is in respect of the relative length of the ocular peduncle and rostrum, and absence of granular tubercles on the antennal margin of the carapace.

Although, the two species are identical in possessing a spine at some distance from the fixed finger on the lower margin of propodus of chelipeds, the new species can be easily distinguished by its dentate upper border. I, however, recommend that specimens larger than

40 mm., especially the females, of *carinicauda* may be examined in greater detail with reference to the characters of *kempi*, since I have no access to the larger material of *carinicauda*.

Remarks :

In the Indian Museum at the Zoological Survey of India, Calcutta, there is a jar containing several vials of *Upogebia* specimens, ranging from 22 to 60 mm., collected by 'Investigator' (shore collection, Stn. 414, locality—Fisher Bay, Port Owen, Tavoy Island and Stn. 593, locality Paye or Paway Island, 11°, 25′ 00″ N, 98°, 51′ .00″ E). The jar carries a printed label of *carinicauda* and unfortunately this material has not been published. The material almost tallies with *U. kempi*, especially the two non-ovigerous females (58 and 60 mm.) kept in a separate vial. I understand from Dr. K. K. Tiwari of the Zoological Survey of India, Calcutta, that judging from the handwriting of the locality label, that the late Dr. Stanley Kemp, probably wanted to study this 'Investigator' material and hence these two females could have been kept separately by him for future study. Hence, I take pleasure in naming the new species as *U.* (*U.*) *kempi* n. sp., in honour of Dr. Kemp who contributed so much to the study of Indian carcinology.

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