

FAUNA OF THE CHILKA LAKE
THE MYSIDACEA OF THE LAKE, WITH THE DESCRIPTION OF
A SPECIES FROM THE COAST OF ORISSA.

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(With 1 text-figure.)

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MYSIDACEA.

By WALTER M. TATTERSALL.

Dr. Annandale and Mr. Kemp have continued to send me further collections of Mysidae made by them in various parts of the littoral of India, mainly in brackish water. In the present paper I describe two new species, belonging to the genus *Gastrosaccus*, and record a third one, *Rhopalophthalmus egregius*, Hansen (previously known from Japan and the East Indies) for the first time from the coast of India, where it appears to be an abundant form. The number of species of Indian brackish water Mysidae is now raised to five and Dr. Annandale and Mr. Kemp are to be congratulated on the success which has attended their work. My best thanks are due to them for the opportunity of examining and reporting on these specimens.

The majority of the specimens here recorded are from the Chilka Lake, a shallow lagoon on the east coast of India, some thirty miles long and ten miles broad, connected with the sea by a narrow mouth. The salinity of the water in this lake differs very greatly at different seasons of the year,¹ and Mr. Kemp informs me in a letter that "visiting the lake in September (1914) at a time when the water is at its highest, we found that a considerable part of the lake, including the outer channel as far as the sea-mouth, was filled with absolutely fresh water. A great part of the fauna of the lake is thus able for some two or three months each year to exist in perfectly fresh water, and many species exist in salinities ranging from fresh water to water as salt as the Bay of Bengal (sp. gr. 1.0265)." Among such species are all but one of the Mysidae here dealt with, and it is exceedingly interesting to find that they have adapted themselves to such a changing environment. In connection with one of the species, *Potamomysis assimilis*, I have suggested that the great changes in the salinity of the sea-water may account for the relatively great variation in the shape and armature of the telson, but in order to settle this question, a complete series of specimens, taken regularly throughout the year, with notes on the salinity of the water at the time of capture would be necessary. It is possible that the changes in salinity are too rapid to allow of correlated changes in the structure of the species. The other two abundant species, *Macropsis orientalis* and *Rhopalophthalmus egregius*, do not show evidence of such variation.

Of the five species of Mysidae now known from brackish water in India four occur in the Chilka Lake. Three of these (*Rhopalophthalmus egregius*, *Macropsis orientalis*

¹ See Introduction, p. 5.

and *Potamomysis assimilis*) are very abundant in all parts of the lake, the main area as well as the outer channel ; while one (*Gastrosaccus muticus*) has been found less commonly in the outer channel and adjacent parts of the main area. The fifth species (*Indomysis annandalei*) is at present known only from the neighbourhood of Bombay

The following key will serve for the identification of the known species of Indian brackish-water Mysidae.

KEY TO THE SPECIES OF INDIAN BRACKISH-WATER MYSIDAE.

1. Both rami of the uropods divided by a transverse joint distal to the centre.

Thoracic legs without terminal brush of setae : dactylus not developed ; pleopods of the male well developed, exopod of the second pair very elongated, rami of the third, fourth and fifth pairs subequal.

Telson entire, apex armed with four strong stout serrate spines : distal half of the lateral margins armed with about fifteen spines : antennal scale as long as the antennular peduncle with the outer margin entire (*i. e.*, without setae) and terminating in a spine, six times as long as broad : carapace very short : eyes large, black, on prominent stalks : eighth thoracic limb in both sexes with the endopod reduced and papilliform

.. *Rhopalophthalmus egregius*, Hansen.

2. Both of the uropods undivided.

- (a) Outer margin of the exopod of the uropods armed with more or fewer spines, but without setae between the spines and the base : third pair of pleopods of the male with the exopod elongated : first abdominal segment of the female with a pair of lateral lamellae : telson long, as compared with the uropods, cleft at the apex, the cleft armed with sharp serrations.

Lateral margins of the telson armed with about fourteen spines : no spine on the dorsal surface of the fifth segment of the pleon : posterior dorsal margin of the carapace with a fringe of from six to nine slender processes : exopod of the third pleopod of the male as described in this paper

.. *Gastrosaccus muticus*, W.M.T.

- (b) Outer margin of the exopod of the uropods setose, without spines : first abdominal segment of the female without lateral lamellae : telson short, entire, without apical cleft.

- (c) Apex of the telson between the terminal spines of the lateral margins truncate, armed with numerous short spines : first, second and third pleopods of the male rudimentary as in the female, exopod of the fourth pair elongate : antennal scale setose all round.

- (1) Antennal scale two-jointed, about seven times as long as broad ; lateral margin of the telson armed with 7-10 spines, apex with 12-17 spines not much shorter than the terminal spine of the lateral margin

Potamomysis assimilis, W.M.T.

- (2) Antennal scale unjointed, about $4\frac{1}{2}$ times as long as

broad ; lateral margins of the telson armed with 4-7 spines, apex with numerous quite small spines or teeth much shorter than the terminal spines of the lateral margins ..

Indomysis annandalei, W.M.T.

- (d) Apex of the telson between the terminal spines of the lateral margins produced into an obtuse serrated process ; third pleopod of the male biramous though small ; exopod of the fourth pair elongate ; antennal scale setose all round and two-jointed ; eyes rather large on long stalks

Macropsis orientalis, W.M.T.

One species (*Gastrosaccus simulans*) described in this paper, was not found in brackish water, but on the sea-shore a few miles up the coast from the mouth of the Chilka Lake.

Dr. Annandale and Mr. Kemp have supplied notes on the natural colouration, habits, etc., of the different species. These notes I have added in each case at the end of my own observations.

Family MYSIDAE.

Sub-family RHOPALOPHTHALMINAE, Hansen.

Genus RHOPALOPHTHALMUS, Illig.

Rhopalophthalmus egregius, Hansen.

R. egregius, Hansen, 1910. *R. egregius*, Nakazawa, 1910.

This interesting species was first described by Hansen (1910) from specimens taken on the Siboga expedition in the Sangkapoera Roads, Bawean Island, in the East Indies. It has since been recorded by Nakazawa (1910), from Port Shimizu, Suruga Bay, Japan. Its occurrence on the coast of India therefore marks a considerable extension in its known geographical range, and it is evidently an abundant and widely distributed form.

Hansen's description was based on mutilated specimens, and is therefore incomplete. I am able from the present material to supplement his description and to add some points not hitherto noticed.

The most interesting feature of the species, not noticed by Hansen but described and figured by Nakazawa, is the reduced condition of the endopod of the eighth pair of thoracic limbs in both sexes. In the female, the endopod of these limbs is hardly as long as the basal joint of the exopod, papilliform in shape, obscurely two-jointed, with one or two setae on the outer edge at the obscure junction of the two joints, but otherwise unarmed. In the male, the endopod is more distinctly two-jointed, and the basal joint bear six long setae on its outer margin.

The remainder of the thoracic legs are as described by Hansen. They increase in length and slenderness from the third to the seventh pair and have the sixth joint or tarsus four-jointed in the third pair, five-jointed in the fourth to the sixth pair and seven-jointed in the seventh pair. The carapace is exceedingly short, leaving entirely exposed the last three thoracic segments. The antennular peduncle appears to me to be somewhat stouter than shown in Hansen's figure and has the outer distal

corner of the basal joint more produced. The distal part of the outer margin of the basal joint is armed with numerous long plumose setae in the position indicated by the notches in Hansen's figure and as depicted by Nakazawa.

The antennal scale, which reaches to the distal end of the antennular peduncle, is as figured by Hansen, but the basal joint from which both the scale and antennal peduncle spring, is armed with three strong spines at the inner corner, at the base of the peduncle. These spines are not indicated by either Hansen or Nakazawa. The antennal peduncle is very short, not as long as the basal joint of the antennular peduncle. The Indian examples reach a length of 12 mm.

The natural colouration of this species is described as follows:—Transparent, with a large lateral patch of very pale mauve on each abdominal segment. Brood-pouch tinged with yellow. Two blood-red spots on the telson, one at the base and one near the apex. Eyes pale glaucous green.

Rhopalophthalmus egregius occurs abundantly all over the Chilka Lake, especially on a muddy bottom and among the weed *Halophila ovata*. It has, however, also been taken on clean sandy ground. Although taken at Barkuda Id. within a few yards of the shore, it was usually captured out in the lake in water from 4 to 12 ft. deep. It was never observed close in to the rocks or in very shallow water, and in this respect its habits differ markedly from those of *Macropsis orientalis* and *Potamomysis assimilis*. Apparently it lives mainly at some distance below the surface, perhaps only a few inches above the bottom. The species is gregarious.

Sub-family *GASTROSACCINAE*, Norman.

Genus *GASTROSACCUS*, Norman.

Gastrosaccus muticus, sp. nov.

Locality.—Outer parts of Chilka Lake, Orissa, E. coast of India.

Description.—Very closely allied to *Gastrosaccus spinifer*, Goës.

Dorsal posterior median emarginate border of the carapace with a fringe of from six to nine slender filaments.

Fifth segment of the pleon without a dorsal spine-like projection.

Antennules with three or four short strong spines on the outer edge of the second joint; a single similar spine on the outer edge of the third joint about one-quarter of the length of the joint from the distal end.

Antennal scale reaching to the distal end of the second joint of the antennular peduncle and slightly shorter than its own peduncle; slightly less than four times as long as broad, outer margin terminating in a strong spine beyond which the apex of the scale is not produced.

Telson less than three times as long as broad at its base, with about fourteen spines on its outer margin, only the terminal spines conspicuously larger than any of the remainder and equal in length to one-eighth of the length of the telson; telson cleft for one-sixth of its length.

Inner uropods equal in length to the telson plus its terminal spines, with four

somewhat distantly placed spines on its inner margin, the proximal one of which is on the statocyst.

Large epimeral plate of the first segment of the pleon in the female with its front margin microscopically serrulate.

Tarsi of the third to the eighth thoracic limbs composed of from seven joints in the third pair to eleven joints in the eighth pair. Basal joint of the exopodites of all the thoracic limbs with a prominent tooth at its outer distal corner, except in the eighth pair where this corner is rounded.

Pleopods of the female very similar to those in *G. spinifer* except that the two branches of the first pair are more nearly equal in size than shown in Stebbing's figure (1880).

First, second, fourth and fifth pleopods of the male agreeing closely with those figured by Sars (1877) for *G. sanctus*. With the exception that the exopod of the first pair is eight-jointed, both the exopod and the endopod of the second pair are eight-jointed, and the endopod of the fourth and fifth pairs is seven-jointed, Sars' figures would serve very well to illustrate the present species. The agreement in the general form and proportions is of the closest character.

The third pleopods of the male differ vastly from those of the male of *G. sanctus*. The endopod is similar to that of the preceding and succeeding pairs, seven-jointed, and extending about half way down the second joint of the exopod. The exopod is very elongate, reaching to the base of the telson and divided into five joints. The first joint shows three suture lines representing subsidiary joints, similar to those shown in Sars' figure (1877) of the same appendage of *G. sanctus*. The second joint is shorter than the first, and the third joint is as long as the first and second combined but more slender. The fourth joint is short and has the distal lower margin produced into an obtuse lobe. The terminal joint is longer than the fourth and broadens considerably to an obliquely truncate apex. At one corner of the apex are two short stout spines terminating in two processes, the outer one rather stout and blunt and microscopically ridged, the inner one slender and acutely pointed. At the other corner of the apex is placed a long, strong, slightly curved spine with about eleven spinules on the distal half of its margin. At the base of this long curved spine is situated a smaller, more slender and more sharply curved spine and between this latter spine and the two spines with the bifid apices, there is an obtusely pointed process, microscopically ridged at its apex, which arises from some way inside the distal margin of the fifth joint, on its lower face. The whole of the fifth joint resembles a sub-chelate "hand" with the bifid spines delimitating the palm on one corner, and the long curved spine as the "finger."

Length of an adult female, 7 mm. ; of an adult male, 6 mm.

This species is very closely allied to *G. spinifer*, Goës, but differs in the following points :—

- (1) The absence of the dorsal spiniform process on the fifth segment of the pleon.
- (2) The larger number of spines on the lateral margins of the telson, fourteen as against six to eight in *G. spinifer*.

(3) The fewer spines on the inner margin of the inner uropods, four as against nine to eleven in *G. spinifer*¹.

(4) In having four spines on the outer edge of the second joint of the antennular peduncle instead of three as in *G. spinifer*.

(5) In its smaller size, 7 mm., as against 20 mm.

(6) In the vastly different form of the exopod of the third pleopods of the male. The third pleopod of the male of *G. spinifer* has never been figured, but I find by examination of British specimens that it agrees closely with the same appendage in *G. sanctus* as figured by Sars (1877).

In the possession of a fringe of slender filaments on the central posterior dorsal margin of the carapace, *G. muticus* is at once distinguished from all other described species of the genus except *G. spinifer* and the following new form.

In life the species is described as being not very translucent, with a large brown spot at the base of the lower antenna and another, posterior to the first, near the hinder end of the carapace. Each of these dark spots was connected with a pale yellowish one situated above it. There were two small black spots on each side of the brood-pouch, consisting of single dendritic chromatophores. On the posterior margin of each of the abdominal segments there was a brown dendritic chromatophore on either side, connected with its fellow on the opposite side by a yellow line. The last abdominal segment bore a brown transverse bar at its posterior extremity. The telson was tipped with mingled brown and yellow. The tip of the antennal scale was brown. The eggs were quite colourless.

G. muticus occurs mainly in the outer channel of the Chilka Lake, but was also taken near Nalbano in the main area. It was invariably found either on a sandy bottom or on one in which the mud was mixed with a considerable amount of sand. Although considerable numbers of specimens were sometimes taken in a single haul of the \square -net, the species is perhaps less markedly gregarious than the others found in the lake.

The type specimens are preserved in the Indian Museum and are numbered 8664/10 in the Museum register.

Since this paper went to press, I have received specimens of this species from Madras, where they were collected by Dr. Annandale in the Ennur backwater, in water of specific gravity varying from 1.000 to 1.0045 (corrected). The species was apparently quite abundant in this locality.

Since this paper left my hands, I have received further material of this species from the Chilka Lake, and its examination necessitates the following additional notes. The material altogether comprised 24 males and 46 females. A point of perhaps minor importance is that the number of spines on the outer margin of the second joint of the antennular peduncle is not invariably four. Quite a number of the specimens in this additional material have only three spines in this position. The main interest centres in the form of the exopod of the third pleopods of the male.

¹ There is apparently some variation in this character.

Of the male specimens fifteen are adult and have the exopod of the third pleopods as I have described it above. This may for convenience be known as form A. Two of the males, while apparently adult (that is, they are quite as big as the other specimens and are apparently, therefore, fully grown) have the exopod of the third pleopods of a quite different form, which may be known as form B (fig. 1*d*, p. 157). The last two joints are longer and not so stout as in form A and the bifid spine-like processes are absent, being replaced by two simple spines. The single microscopically ridged process is present as in form A, and the terminal curved spine is of the same proportional length. In all other characters these two specimens conform to the type, and it is to be noted that even in the exopod of the third pleopods, the same parts are present on the last joint in both forms, *viz.*, two spines and a single ridged process on the inner lateral margin and a longer and a shorter spine at the apex. It is in the shape of the last two joints and the character of the two lateral spines that the two forms differ. Now the remaining seven males in this material are immature and the exopod of the third pleopods is of a form which will ultimately result in the form B of male pleopods, with further growth. It seems to me, therefore, that the two largest specimens of form B cannot be quite adult, in spite of their size compared with the size of form A and their mature look, and that the form B of male pleopods is a growth stage in the formation of the form A type. It cannot, I take it, be a case of "seasonal dimorphism" of the males (as for instance has been found by Wollebaek for the males of *Pandalus montagui*, in which the shape of the endopod of the first pleopods is of two forms, identified with the breeding and non-breeding seasons of the species) because forms A and B were found mixed together in the one bottle and therefore presumably captured together. It is possible that it is a case of definite dimorphism in the males but, if so, I cannot understand why the exopod of the third pleopods in the undoubtedly immature males should in all cases be of the form B type. A fourth explanation is possibly open, that we have here a case of high and low dimorphism among the males of this species, but the available data are insufficient to decide the question. I incline to the opinion that forms A and B are the final and penultimate stages in growth. It is unfortunate that the brush of setae on the antennules, which in most other Mysidae is well developed in adult males, should be feebly developed in *Gastrosaccus* so that this additional external mark of sexual maturity is not here available as a guide. Moreover the separation of species becomes more difficult because of the high systematic value hitherto set on the characters displayed by the pleopods of the male. At the same time, the form B of *G. muticus*, while resembling *G. simulans* more than form A in the shape of the exopod of the third pleopods of the male, offers no possibility of confusion with the latter because, apart from the differences in these appendages, the number of spines on the margins of the telson affords an additional distinguishing character.

***Gastrosaccus simulans*, sp. nov.**

Locality.—Puri Beach, Orissa coast, washed up on shore, January, 1911, coll. F. H. Gravely, three adult females, 7-8 mm., one adult male, 7.5 mm., one imma-

ture female, 6.5 mm., and four newly hatched young. TYPES.—Regd. No. 8433/10, Ind. Mus.

Description.—This species is intermediate in its characters between *G. spinifer*, Goës, and the species described above, *G. muticus*. Like both these species it possesses a fringe of from six to eight slender spine-like filaments on the central dorsal posterior margin of the carapace and is therefore distinguished from every other described species of the genus.

In the three adult females and single adult male, there is no spine-like process on the fifth segment of the pleon. But in the single immature female and in all the newly-hatched young, this spine-like process is present, well developed and exactly as seen in adult specimens of *G. spinifer*. The inference is naturally that in the present species, the spine-like process is characteristic of the young and immature forms, and disappears with the attainment of sexual maturity. My material is too scanty to be definite on this point, but either my inference is the correct interpretation of the facts, or there are two closely allied species present in the gathering. I have judged of the maturity of my specimens by the state of development of the marsupial lamellae in the female and of the third pleopods of the male. It is certainly suggestive that the single female with the marsupial lamellae just appearing and the four newly-hatched young should all have the spine-like process well developed, while the obviously adult male and females should be without that process. The value of the presence or absence of this process as a specific character is likewise very much impaired if the above interpretation of the facts is the correct one. More material of the species is greatly to be desired to settle this point. In the character of the antennules, antennal scale, inner and outer uropods, and thoracic limbs, *G. simulans* agrees exactly with the description given for *G. muticus* above. The telson, however, has only from eight to ten spines on its lateral margins and is thus intermediate in this respect between *G. spinifer*, where the number is six to eight, and *G. muticus* with fourteen.

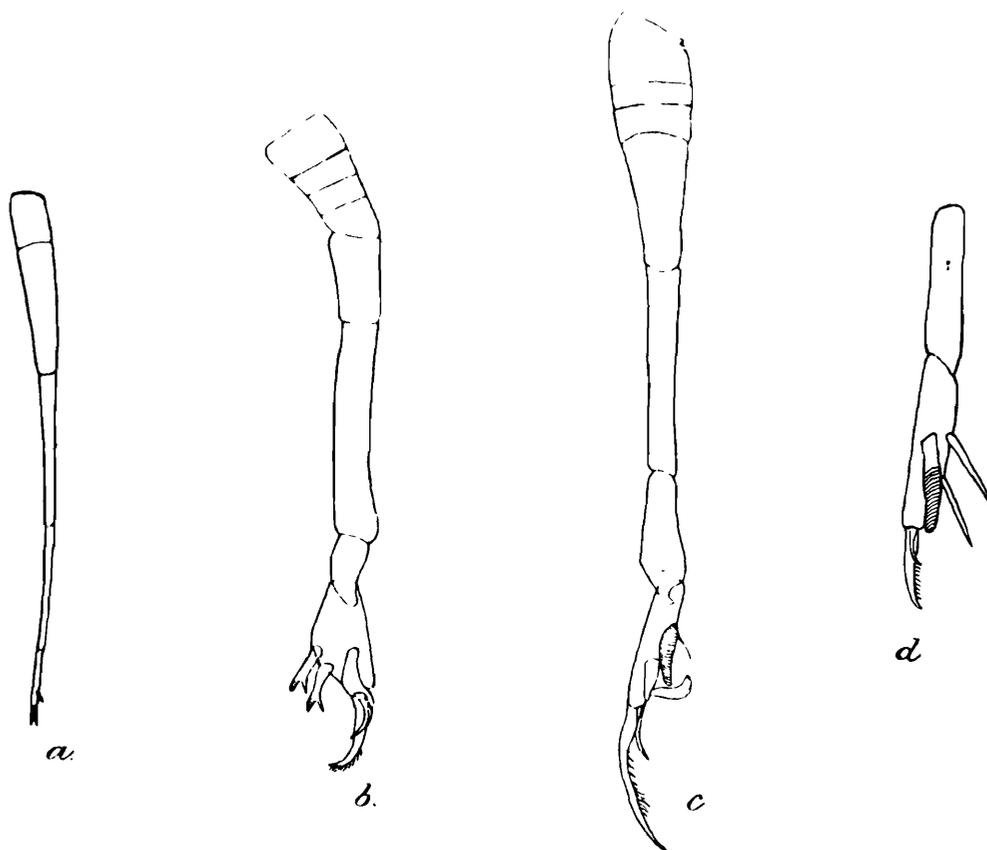
The pleopods of the male and female agree essentially with those described for *G. spinifer*, *G. sanctus* and *G. muticus*, except in the form of the exopod of the third pair in the male, and it is on the character of this appendage that I have relied for the institution of this new species.

The exopod of the third pair of pleopods of the male is elongate, reaching to the base of the telson. It is five-jointed, like the same appendage in both *G. muticus* and *G. spinifer*, but stouter than in the latter species, and perhaps slightly more slender than in the former. The first two joints are longer than the same joints in *G. muticus*, and combined are longer than the third joint instead of being equal to it as in *G. muticus*. The third joint is the longest and most slender. The fourth joint is markedly longer than in *G. muticus*, but has the lower distal margin produced into an obtuse lobe as in the latter species. The fifth joint is only slightly longer than the fourth, but more slender and not broadened out at its apex as in *G. muticus*. The apex of this joint bears a long slender curved spine minutely spinulated along the distal half of its inner margin. This spine is considerably longer than is the same

spine in *G. muticus* and bears at its base a similar shorter curved spine as in the latter species. The inner margin of the fifth joint bears two long obtusely-pointed and microscopically-ridged processes, but there are no signs of the prominent stout spines with the bifurcated tip so characteristic of *G. muticus*.

The length of adult male and females is 7-8 mm.

The following text-figures, showing the exopods of the third pleopod of the males of *G. spinifer*, *G. muticus* and *G. simulans*, will illustrate the fundamental differences in these organs in the three species and indicate the main characters on which the three forms are to be separated :—



TEXT-FIG. 1.—Exopod of third pleopod of male in three species of *Gastrosaccus*.

a. *G. spinifer*, Goës ($\times 25$). b. *G. muticus*, n. sp. ($\times 60$) Form A. c. *G. simulans*, n. sp. ($\times 60$).
d. *G. muticus*, n. sp. ($\times 90$) Form B.

I provisionally refer to this species, the specimens from the following locality :—
Estuary of the river Bassein, Burma, coll. Marine Survey of India, two adult females, 7 mm.

There are no adult males or immature specimens from the same locality, but these two females agree absolutely with the adult females of *G. simulans*, and I cannot see any reason for separating them at present.

The discovery of these two new species of *Gastrosaccus* illustrates, still further, the difficulty which exists in accurately discriminating the various species of the

genus. Hansen (1910 and 1912), who has in these publications instituted four new species of *Gastrosaccus*, frequently remarks on the close similarity between the females of the various species and the difficulty of separating them. As a result, however, of his researches on the genus he came to the conclusion that the character of the pleopods in the male afforded excellent specific characters and, following his lead, I have used these characters to separate the new species here described.

The genus now comprises the following twelve species :—

<i>G. sanctus</i> , van Beneden.	<i>G. bengalensis</i> , Hansen.
<i>G. spinifer</i> , Goës.	<i>G. pacificus</i> , Hansen.
<i>G. normani</i> , G. O. Sars.	<i>G. vulgaris</i> , Nakazawa.
<i>G. erythraeus</i> , Kossman.	<i>G. kojimaensis</i> , Nakazawa.
<i>G. indicus</i> , Hansen.	<i>G. muticus</i> , sp. nov.
<i>G. parvus</i> , Hansen.	<i>G. simulans</i> , sp. nov.

Of these twelve species, *G. spinifer* and the two species here instituted are immediately distinguished by the possession of a fringe of spine-like filaments on the central dorsal posterior margin of the carapace. The three species, *G. spinifer*, *G. muticus* and *G. simulans*, may be distinguished among themselves by the character of the exopod of the third pleopod of the male as shown in the text-figure and otherwise by the following characters :—

	<i>G. spinifer.</i>	<i>G. muticus.</i>	<i>G. simulans.</i>
Spine on fifth segment of the pleon.	Present at all sizes.	Absent.	Present in young, absent in adult.
Spines on the second joint of antennular peduncle. ..	3	3 or 4	4
Spines on lateral margin of telson ..	6-8	14	8-10
Spines on inner margin of inner uropod	9-11	4	4
Size of adult specimens	20 mm.	6-7 mm.	7-8 mm.

The species of the genus *Gastrosaccus* may be arranged in two groups, according to the structure of the pleopods of the male, as follows:—

I. Endopod of the third pair, either rudimentary or a simple unjointed lobe.—

G. indicus, *G. parvus*, *G. bengalensis*, *G. normani*, *G. pacificus*, *G. erythraeus*.

In this group the endopod, or both endopod and exopod of the second pair of pleopods in the male, are not normal in shape and more or less reduced.

II. Endopod of the third pair of pleopods in the male, normal in form and armature and multi-articulate.

G. spinifer, *G. sanctus*, *G. muticus*, *G. simulans*, *G. kojimaensis* (as far as can be gathered from Nakazawa's meagre description).

In this group the second pair of pleopods of the male has both the exopod and endopod of normal form and armature and multi-articulate.

Group I represents the old genus *Haplostylus* instituted by Kossmann for *G. normani* and later cancelled by Hansen (1910) and merged in the genus *Gastrosaccus*. Group II represents the old genus *Gastrosaccus*. *G. vulgaris* would seem to provide the connecting link, since, according to Nakazawa's figures, the endopod of the third pair of pleopods of the male is much reduced and only two-jointed, while the second pair of pleopods of the male have both the endopod and exopod normal in form and armature and multi-articulate.

From the point of view, therefore, of the pleopods of the male, *G. muticus* and *G. simulans* agree with *G. spinifer* and *G. sanctus* and are readily distinguished from all the Indo-pacific species except possibly *G. kojimaensis*, the description of which is somewhat meagre.

The specimens of *G. simulans*, obtained at Puri, were found at night at the water's edge on a sandy beach facing the open sea. Their presence was detected in the first instance owing to their brilliant luminosity, which was of a general nature.

Sub-family MYSINAE.

Genus **MACROPSIS**, G. O. Sars.

Macropsis orientalis, Tattersall.

M. orientalis, Tattersall, 1908, 1914.

Further records:—Chittagong, pond at N.E. end of the town near the river, January, 1913, coll. N. Annandale and S. W. Kemp. Abundant.

Chilka Lake, abundant everywhere.

Madras Harbour, 4-6 feet, October 1913, coll. N. Annandale. One.

Cochin backwater, near Ernakulam, September 1914, coll. F. H. Gravely.

Fifty-eight.

The last two records indicate an extension of the known distribution of this species in the littoral of India, and it has now been found at a number of localities situated at the head of the Bay of Bengal and on both sides of the Indian peninsula. At Chittagong in the Gangetic Delta, and apparently at all suitable localities as far south as Vizagapatam on the east coast, it is enormously abundant. It ascends some at any rate of the larger rivers on this coast for a great distance, at least 40 miles above tidal influence; but has not as yet been found in any isolated body of water. In many places it occurs in water that is permanently fresh; but it also occurs in sea-water.

In the Chilka Lake it is found everywhere, but most abundantly in the main area,

where the specific gravity of the water does not exceed 1.0150. Its presence is particularly noticeable at places where rocks rise out of comparatively deep water and masses of dead weed find lodgment and probably afford it food. Decaying algae seem to be attractive to it, and when it is in their vicinity its stomach and alimentary canal are filled with an opaque white substance that renders it relatively conspicuous.

Macropsis orientalis swims in large shoals a short distance below the surface. Each shoal, at any rate in the neighbourhood of rocks, has its own "beat" to which the majority of its members confine their movements. As a rule each individual swims for the whole length of the "beat" and turns when it comes to the end of it, but sometimes single members of the swarm turn halfway and there seems to be a tendency for all to move in an elongated figure-of-eight. The "beat" is never more than a foot wide and may be from 3 to 6 ft. long. Its limits are determined to some extent by the limits of the shadows cast by the rocks, for the animals evidently avoid strong light. A few adventurers occasionally break from the shoal and swim out sideways from it, but they always return to their company after a short trip. Similar movements were noticed in specimens captive in an aquarium.

Near the rocks at Ganta Sila at the south end of the lake a small cetacean, *Orcealla brevirostris*, was noticed swimming backwards and forwards among shoals of *M. orientalis* with its mouth open and apparently feeding upon them. Unfortunately opportunity for a post mortem examination of the animal was lacking.

Uriya fishermen of the lake catch large numbers of this Mysid by straining water through a cloth. They mix them with turmeric, boil and dry the mass, and eat it with rice. They say it is "very sweet" and the dish is known by the name of *netha*; the animals are called *sridhar*.

Genus **POTAMOMYSIS**, Czerniavsky.

Potamomysis assimilis, Tattersall.

P. assimilis, Tattersall, 1908, 1914.

Further records:—Chittagong, pond at N.E. end of town, near the river, January 1913, coll. N. Annandale and S. W. Kemp. Common.

Chilka Lake, abundant everywhere.

The telson of this species is subject to a considerable amount of variation. In the Chilka Lake, the apex of the telson tends to be much narrower than in the types and to have fewer spines, in some specimens as few as seven, which are larger than in the type specimens and not arranged in series at all. The spines on the lateral margins may be as many as thirteen. This range in variation naturally gives the shape of the telson a vastly different appearance in separate individuals, but all stages of intermediates may be found. The amount of variation in the telson may possibly be correlated with the enormous range in density of the water in the lake at different times.

Neomysis vulgaris in Britain is subject to variations in the arrangement of the armature of the telson, which Norman suggests is influenced by the quantity of

sewage in the water in which it lives. However this may be, it is a brackish water form and must live in water which is liable to great changes in salinity at different times and seasons of the year.

Potamomysis assimilis, which has not as yet been found on the west coast of India, is, as a rule, less abundant than *Macropsis orientalis* with which it usually occurs; but in pools at Chittagong it was actually the commoner of the two. In the Chilka Lake it is as widely distributed as the preceding species and has similar habits. It does not, however, form such large shoals and usually remains nearer the bottom. At the head of Rambha Bay it was found in comparatively large numbers among weeds growing in a few inches of water.

I have recently received specimens of this species from Madras where Dr. Annandale collected it in the Ennur backwater, in water of specific gravity varying from 1.000 to 1.0045 (corrected). This record represents an extension of the known geographical distribution of the species, which probably extends at least all down the west coast of India in suitable localities.

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