

*Skull*: condylo-basilar length 39.3; diastema 12.9; upper molar series (alveolar) 6.9; palatal foramina 6.3 × 3.3; palatilar length 19.5; least interorbital breadth 7.2; zygomatic breadth (app.) 20.8; median length of nasals 18.8; breadth of nasals anteriorly 5.0 mm.

*Specimens examined*.—One, the type.

XXXI. — *Two new British Entomostraca: Alona protzi, Hartwig, and a new Species of Mesochra in Norfolk.* By ROBERT GURNEY, M.A.

*Alona protzi*, Hartwig.

*Alona protzi*, Hartwig, Sitzber. Ges. Naturf. Freunde, 1900, p. 228; Keilhack, Arch. f. Hydrob. u. Hydrog. vi. 1911, p. 467.

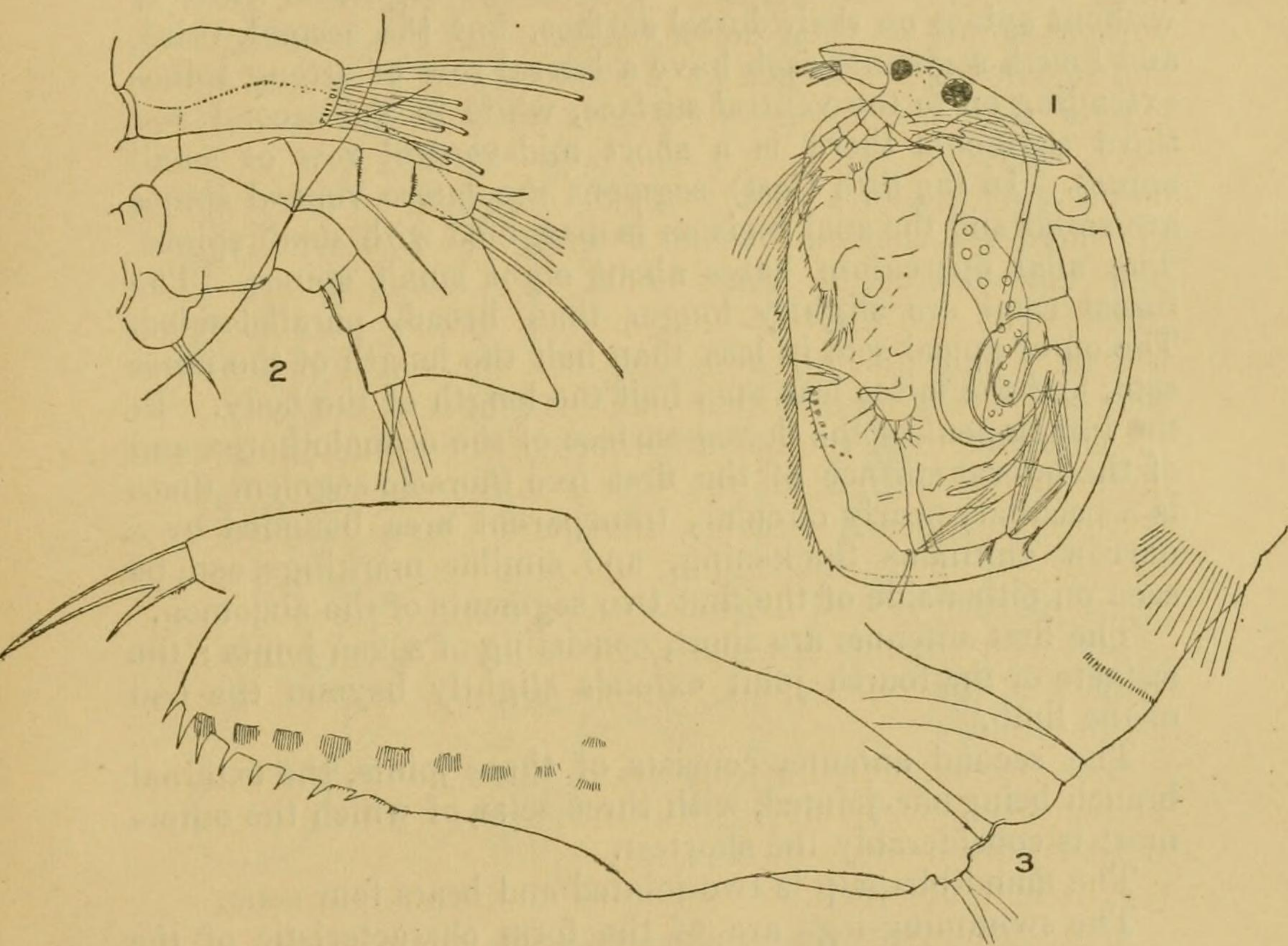
A number of specimens of this *Alona* were obtained on September 12, 1920, by washing masses of *Cordylophora* detached from the woodwork of Ludham Bridge, on the River Ant, in Norfolk. A strong current runs through this narrow bridge, and the water, in normal circumstances, is quite fresh, but the species of Entomostraca found in the collection included *Nannopus palustris*, *Tachidius littoralis*, and *Mesochra rapiens*—all species characteristic of more or less brackish water. *Cordylophora* grows in luxuriance on this woodwork, and I have on several occasions investigated the Entomostraca living in its shelter without previously meeting with *A. protzi*, neither have I found it in any other locality. Nine days later only a very few individuals were to be found, and on November 17 the species had entirely disappeared. It would hardly be supposed that *Cordylophora* would provide a suitable habitat for Entomostraca; but six species of Cladocera and ten of Copepoda were found in collections made on Sept. 12 and 21.

*Alona protzi* resembles *A. guttata*, Sars, but is readily distinguished by the presence of three denticles on the posterior ventral angle of the shell and by the structure of the postabdomen. The latter has a marked backward prolongation, but the apex is rounded and not angular as in *A. guttata*. The dorsal margin is armed with a double row of eight to ten small spines, and there are a number of lateral groups of very delicate hairs which do not quite reach the margin of the postabdomen. The basal spine of the terminal claw is very long, exceeding half the length of the claw, and

at its base there are two or three small hairs. The two posterior thoracic segments are distinctly marked off, and each bears a dorsal fringe of very long delicate hairs.

In the descriptions given by Hartwig and by Keilhack no mention is made of the lateral groups of hairs on the post-abdomen, and, though these are only visible under a high magnification, it is most unlikely that they would be overlooked. The presence of these groups of hairs and of the

Fig. 1.



*Alona protzi*, Hartwig.

1. Side-view of female.
2. Antennæ and upper lip.
3. Postabdomen.

long dorsal thoracic fringes distinguish my specimens rather markedly from the type, but the agreement in other respects is so exact that there can be no doubt that they belong to this species. The labrum is acutely pointed, which is most unusual in the genus *Alona*, and serves alone to distinguish it from the species most closely resembling it. Keilhack considers that *A. protzi* is most nearly related to *A. cambouei*,

Guerne and Richard, and to *A. mülleri*, Richard, but in my opinion there is little resemblance and no relationship between these species.

So far as I am aware, *A. protzi* has not hitherto been found outside the Province of Brandenburg.

*Mesochra æstuarii*, sp. n.

*Female*.—Body robust, the abdomen considerably shorter than the cephalothorax. Rostrum large and broad. Eye large and of a red colour. Abdominal segments entirely without spines on their dorsal surface, but the second, third, and fourth segments each have a lateral row of strong spines extending on to the ventral surface, while in the second and third segments there is a short mid-ventral row of small spines. In the fifth (last) segment the latero-ventral spines are small and the anal incision is margined with small spines. The anal operculum bears about eight small spines. The furcal rami are slightly longer than broad, parallel-sided. The outer apical seta is less than half the length of the inner seta, and the latter less than half the length of the body. In the integument of the dorsal surface of the cephalothorax and of the lateral surface of the first free thoracic segment there is a peculiar, nearly circular, transparent area bounded by a narrow chitinous thickening, and similar markings can be seen on either side of the first two segments of the abdomen.

The first antennæ are short, consisting of seven joints; the æsthete of the fourth joint extends slightly beyond the end of the limb.

The second antenna consists of three joints, the external branch being one-jointed, with three setæ, of which the outermost is considerably the shortest.

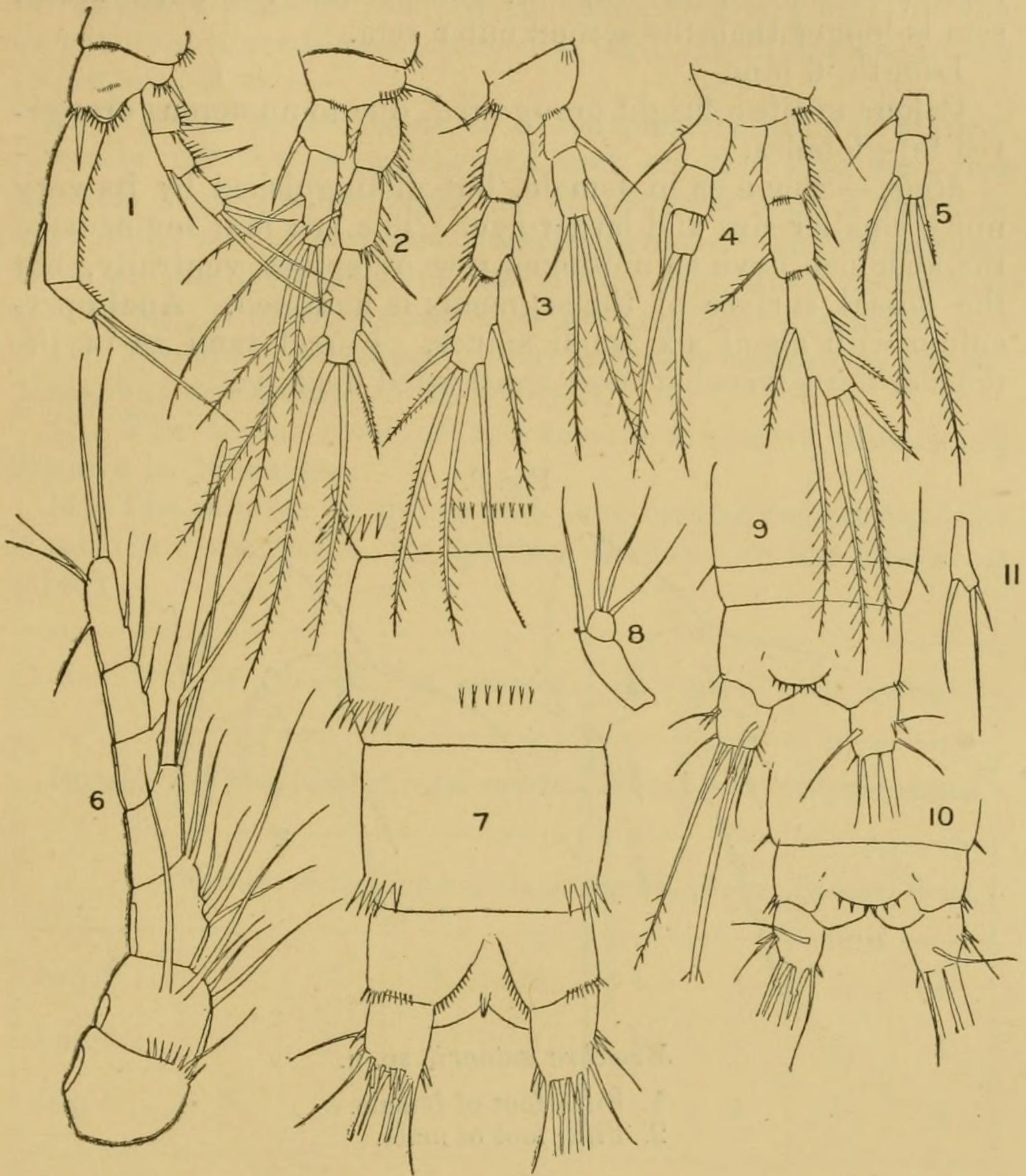
The mandible-palp is two-jointed and bears four setæ.

The swimming-legs are of the form characteristic of the genus, with two-jointed inner branches.

*First leg*.—The first joint of the internal branch is longer than the whole of the outer branch, and its second joint bears an inner spine and two setæ, of which one is very short and slender. The arrangement of the spines and setæ of the external branch in this and the following legs is shown in the figures and accompanying table (p. 241). In the fourth leg the second inner seta of the last joint is spiniform and without cilia.

*Fifth leg*.—The basal joint extends beyond the second joint and bears six setæ, of which the inner two are smooth. The

Fig. 2.



*Mesochra æstuarii*, sp. n.

1. First leg of female.
2. Third leg of female.
3. Fourth leg of female.
4. Third leg of male.
5. Fourth leg of male, inner branch.
6. First antenna of female.
7. Abdomen of female, ventral view.
8. Mandible-palp.
9. Last abdominal segment of female, dorsal view.
10. Last abdominal segment of male, dorsal view.
11. Second antenna, outer branch.

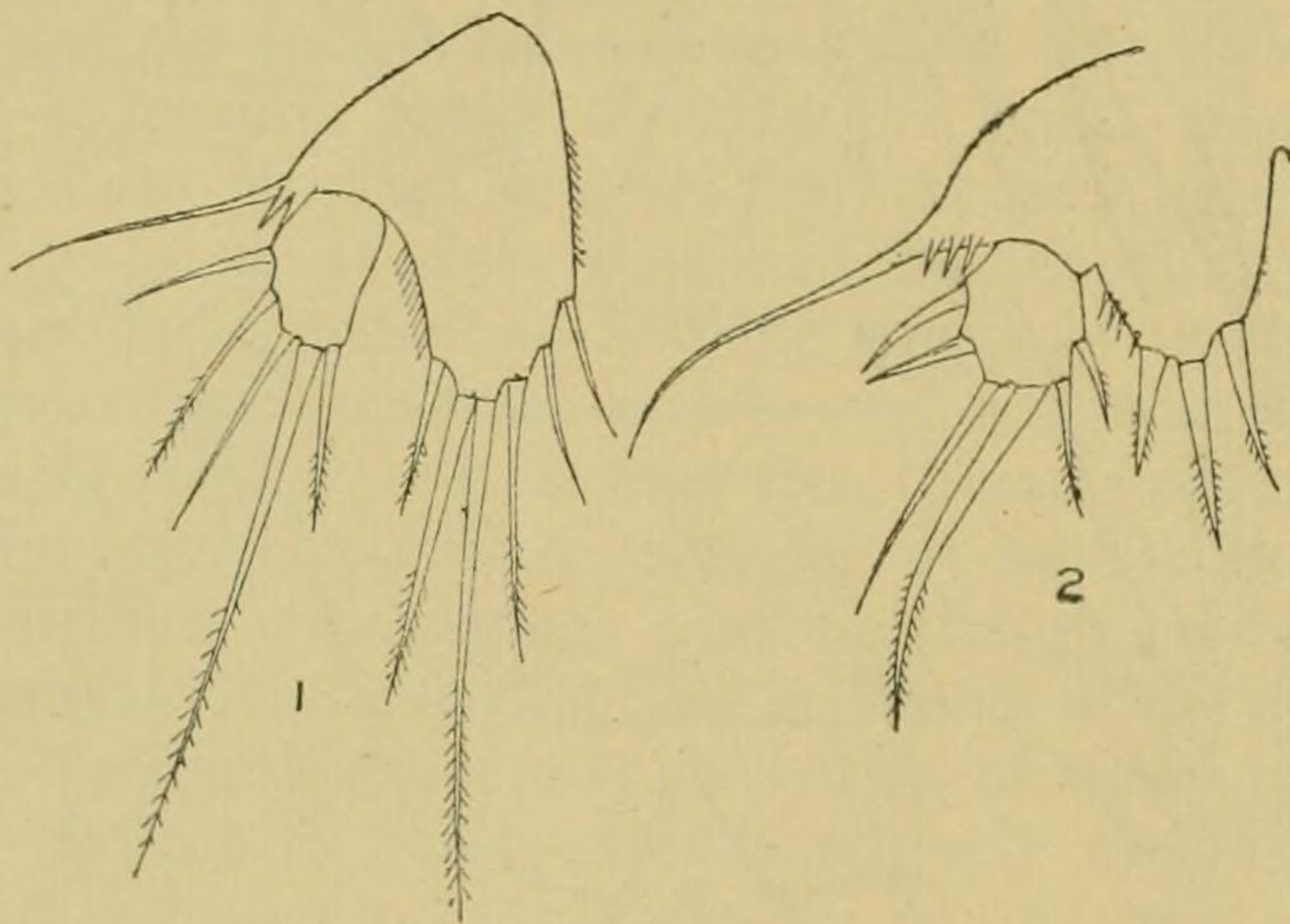
second joint is small, bearing five setæ, of which the outermost and the outer apical seta are smooth. This leg exactly resembles that of *M. rapiens*, except that the outer apical seta is longer than the second outer seta.

Length .6 mm.

Colour in life a bright orange-red, due to numerous orange-red fat-globules.

*Male*.—Shape as in female, but distinguished by its very much smaller size and larger eye. The last four segments of the abdomen have an unbroken row of spines ventrally, but the dorsal surface of the segments is unarmed. Anal operculum with about six small spines. Furcal rami as in the female, but somewhat more constricted distally.

Fig. 3.



*Mesochra aestuarii*, sp. n.

1. Fifth foot of female.
2. Fifth foot of male.

The swimming-legs do not differ from those of the female except in respect of the third pair. In this leg the inner branch consists of three joints, the second joint bearing a stout curved spine somewhat longer than the third joint, while the third joint bears two subequal setæ. The external branch is not modified. In the fourth leg the inner branch bears only three setæ instead of four as in the female.

The fifth legs have the basal joint not produced to the extremity of the second joint, and bearing three strong spines of nearly equal length. The second joint is quadrate, with six setæ, of which the three inner ones are ciliated.

Length .33 mm.

Colour as in female.

This species resembles *M. rapiens* (Schmeil) very closely, but is easily distinguished by its greater activity and by the two-jointed inner ramus of the first leg. It differs also in the following points:—

(1) In *M. rapiens* there is a conspicuous circular mark\* laterally on the cephalothorax and on the first two free thoracic segments, whereas in *M. æstuarii* such a mark is only found on the first free thoracic segment. In both species there are similar marks on the second and third abdominal segments, but in *M. rapiens* they are confluent ventrally.

(2) The anal operculum of the female is smooth in *M. rapiens*, but denticulate in *M. æstuarii*.

(3) The furcal rami of the female are more constricted distally in *M. rapiens*.

(4) The number of spines and setæ on the swimming-legs is not the same in the two species, as shown in the following table:—

Female.	<i>M. rapiens.</i>		<i>M. æstuarii.</i>		<i>M. rapiens.</i>		<i>M. æstuarii.</i>	
	Third joint of outer ramus.				Second joint of inner ramus.			
	Spines.	Setæ.	Spines.	Setæ.	Spines.	Setæ.	Spines.	Setæ.
Leg 2....	3	2	2	2	1	4	..	4
Leg 3....	3	4	2	4	1	4	1	4
Leg 4....	3	4	2	4	1	4	1	4

(5) In the third leg of the male of *M. rapiens* the outer ramus is considerably modified, whereas in *M. æstuarii* it does not differ from that of the female.

(6) The fifth legs of the female are scarcely distinguishable, but those of the male are quite distinct.

A number of individuals of this new form were met with in mud scraped from wooden piles near Acle Bridge in the River Bure in Norfolk. The great activity of the animal was very noticeable. The majority of the individuals taken

\* My attention was first drawn to these striking "species marks" by Mr. D. J. Scourfield.

were females, some of which bore eggs, the few males met with being mostly attached to females, the prehensile antenna clasping the base of the furcal setæ. It is curious that in all cases the females so selected were immature and showed no sign of developing ova. In one case the female was so far from maturity that all the branches of the swimming-legs were two-jointed. It is commonly the case among Harpacticids and *Cyclops* that the male should attach himself to the female before the last moult, but I think it is most unusual for such attachment to take place when at least two moults must intervene before copulation can be effective.

In the same collection were found *Mesochra rapiens*, *Nannopus palustris*, *Tachidius littoralis*, Poppe, and *Heterotanais gurneyi*, Norman, but, though these are all "brackish-water" species, a number of freshwater Entomostraca such as *Nitocra hibernica* also occurred, and the plankton at this point in the river was that of pure fresh water. Although at the time when the collection was made the tide was flowing and nearly at high water, the salinity was only .09 grms. chlorine per litre. At Acle, about 11 miles from Yarmouth, the water is usually fresh at all states of the tide, but it is very near the upper limit to which salt water penetrates, and no doubt it does reach this point fairly often. The locality is therefore of some special interest, since it is the meeting-place of salt- and freshwater species and has a very mixed fauna. *M. æstuarii* probably belongs to the brackish fauna, and will no doubt be found to be common in the lower reaches of the river.

The genus *Mesochra*, as defined by Prof. Sars ('Crustacea of Norway'), differs from *Canthocamptus* in the reduced number of joints in the first antenna, the absence of spines on the operculum, and the possession of two well-developed joints in the inner branch of legs 2, 3, and 4. Further, the swimming-legs of the male are scarcely modified. The absence of spines on the operculum is not a constant character, since such spines are present in the male of *M. rapiens*, in both sexes of *M. æstuarii*, and in *M. lybica*, Richard, *M. pro-wazeki*, Daday, and *M. deitersi*, Rich., all of which seem properly to belong to the genus. The species of the genus found in Britain are as follows:—

- M. lilljeborgii*.
- M. rapiens* (Schmeil).
- M. inconspicua* (Scott).
- M. macintoshi*, Scott.
- M. parva* (T. and A. Scott).

*M. parva* is regarded by Prof. Sars as identical with *M. pygmæa* (Claus), but there are differences in the structure of the third and fifth feet of the male and of the fourth feet of the female which make such an identification doubtful.

*M. robertsoni*, Brady \*, is not a genuine species. Through the kindness of Prof. Meek I have been able to examine slides of this species made by Prof. Brady, and I find that they contain dissections of *Canthocamptus pygmæus*, Sars, and *C. crassus*, Sars. Brady's figures of the male are apparently taken from the latter species, and those of the female from the former.

The genus is one of littoral habit, and certain species are found in fresh water. *M. rapiens* is commonly met with in water with but slight traces of salt, and I have myself taken it inland in perfectly fresh water †. *M. deitersi* and *M. pro-wazeki* are apparently freshwater species, while *M. lilljeborgii* is characteristic of brackish water of high salinity, and may even be found in rock-pools by the sea-shore. *M. æstuarii*, though so far only found in fresh water, will probably prove to be an estuarine species with a preference for high salinity.

XXXII.—On a new Genus and Species of Shrew, and some new Muridæ from the East-Indian Archipelago. By OLDFIELD THOMAS.

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IN connection with the determination of some rats and shrews sent to me for naming by Dr. K. W. Dammerman, the Director of the Zoological Museum at Buitenzorg, I find that the following, some of which have been long in the British Museum collection, prove to need description as new:—

CROSSOGALE, gen. nov.

Nearly allied to *Chimarrogale*.

Shape of skull comparatively normal, the brain-case not excessively broadened and flattened. Anterior incisors as broad terminally as proximally, the internal accessory notch and cusp much more developed, so that the two incisor-tips are some way apart. In *Chimarrogale* these teeth are sharply

\* Monog. of British Copepoda, ii. p. 64.

† Ann. & Mag. Nat. Hist. (9) v. 1920, p. 359.