

ZOOLOGICAL RESULTS OF A TOUR IN THE FAR EAST¹

THE TANAIIDACEA AND ISOPODA OF TALÉ SAP.

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INTRODUCTION.

Of the Tanaidacea there is only one species represented in the collection, viz. :—*Apseudes sapensis* sp. nov., closely related to *A. chilkaensis* Chilton from Chilka Lake but showing certain differences and some puzzling unexplained variations. In all the specimens the eyes appear to be imperfect and in some they are completely absent.

Of the Isopoda there are only six species of which one, *Rocinela simplex* is, with some hesitation, described as new. Three, or perhaps four, of the species also occur at Chilka Lake and the others are known from places not far distant in Indo-Malayan Seas. The similarities in physical conditions between Chilka Lake and Talé Sap are clearly emphasized by the correspondence of the Isopodan faunas of the two districts.

One of the species, *Sphaeroma terebrans* Bate is of economic importance owing to its habit of boring into piles and other wooden structures in harbour works but the other species do not call for special notice here.

The illustrations which form so important a part of this paper have been prepared for me by one of my students, Miss Beryl I. Parlane, B.A.

¹ Previous papers in this series appeared in the *Memoirs of the Asiatic Society of Bengal*, Vol. VI (1916-1925).

LIST OF SPECIES WITH DISTRIBUTION.

TANAIDACEA.

Apseudes sapensis sp. nov. Talé Sap, various localities.

ISOPODA.

Cirolana pleonastica Stebbing : Talé Sap, Chilka Lake, New Britain.

Cirolana parva Hansen : Talé Sap, Chilka Lake, Ceylon, Gulf of Mexico, etc.

Rocinela simplex sp. nov. Talé Sap. ? Chilka Lake.

Nerocila phaeopleura Schiödte and Meinert : Talé Sap, Java Sea, Sumatra, etc.

Sphaeroma terebrans Bate : Talé Sap, Ceylon, East Coasts of Australia, etc.

Ligia exotica Roux : widely distributed on warmer shores of the Indian, Pacific and Atlantic Oceans.

LIST OF STATIONS WITH NAMES OF THE SPECIES FOUND THEREAT.

STATION 5.— $\frac{1}{2}$ mi. E. N. E. of mouth of Patalung R., Talé Sap, Siam.

Depth 2 metres : bottom soft brownish mud with some weed : water quite fresh.

Apseudes sapensis.

„ 6.— $\frac{1}{2}$ mi. E. of Patalung R., Talé Sap, Siam.

Open lake : bottom bare with much decayed vegetation and a few broken shells—water quite fresh.

Apseudes sapensis.

Rocinela simplex.

„ 8.— $\frac{1}{2}$ mi. off shore a little south of mouth of Patalung, R., Water quite fresh.

Apseudes sapensis.

Rocinela simplex.

„ 9.—Middle of inner lake, Talé Sap, Siam. 2 metres.

Bottom hard mud, water fresh.

Apseudes sapensis.

Rocinela simplex.

„ 11.—Koh Si Hah, Talé Sap, Siam.

Shore collecting : under bark of sodden logs and in burrows of *Martesia*. Water fresh.

Apseudes sapensis.

Sphaeroma terebrans.

Cirolana parva.

16.—From fishing nets at Singgora, inside mouth of outer lake, Talé Sap, Siam.

Nerocila phaeopleura.

„ 21.—Across channel from Singgora, Talé Sap, Siam, $4\frac{1}{2}$ metres.

Bottom mud with many dead shells.

Apseudes sapensis.

STATION 23.—Eastern channel between Koh Yaw and Mainland. Talé Sap, Siam. Bottom soft mud.

Apseudes sapensis.

Cirolana pleonastica.

Sphaeroma terebrans.

Rocinela simplex.

„ 25.—Ban Lein Chak on connecting channel, 6½ metres, Talé Sap, Siam. Bottom hard mud.

Rocinela simplex.

„ 31 —Pak Payun at inner end of connecting channel 3½—5½ metres, Talé Sap, Siam. Bottom soft mud overlying coarse sand.

Apseudes sapensis.

Cirolana parva.

Rocinela simplex.

„ 35.—Fishing-stake at inner end of Singgora channel 2 metres in dense mud, Talé Sap, Siam. Amphipods and Isopods in dead *Balanus* shells.

Cirolana pleonastica.

„ 37.—Inner end of Singgora Channel, Talé Sap, Siam.

Apseudes sapensis.

„ ?—Kaw Keoh, near Singgora, Talé Sap, Siam. 27-1-16.

Ligia exotica.

TANAIDACEA.

Apseudes sapensis, sp. nov.

(Fig. 1 a to 1 r.)

Localities.—Station 5.—Several specimens.

„ 6.—One.

„ 8.—Many.

„ 9.—Five.

„ 11.—One.

„ 21.—Five.

„ 23.—Several.

„ 31 —Five.

„ 37 —Several.

Male.—Similar to *A. chilkenis* Chilton in general shape of body, the antennæ, thoracic legs and uropods but differing in the following points :—rostrum narrower and acutely pointed anteriorly, eyes usually present but imperfect, chelipeds in male having basal joint much more swollen and produced into a rounded lobe beyond the attachment of the ischium, the propod and fixed finger also of slightly different shape ; second trunk legs stouter, fringed with long hairs and with the spinules usually stouter and more distinct.

Female.—Chelipeds very slender, the carpus greatly elongated and much longer than the propod, second trunk legs short and stout, spinules usually distinct.

Length about 8 mm. Colour—whitish.

Remarks—This species appears to be abundant at numerous localities in Talé Sap just as *A. chilensis* is in Chilka Lake. The two species are evidently closely allied and have probably only recently differentiated from the same stock. In *A. chilensis* I could find no sign of eyes, in *A. sapensis* they are usually represented by irregular patches of pigment but these vary in amount, sometimes being absent altogether and the eye is manifestly imperfect. Annandale says *A. chilensis*: “is very abundant in Chilka Lake on a bottom of bare mud, in which it probably buries itself.” *A. sapensis* probably has the same habit but in both species the numerous long hairs on the second trunk legs and other appendages appear to indicate that they are good swimmers, and most of the specimens collected are clean and free from particles of mud.

The general resemblance of the Talé Sap specimens to *A. chilensis* is so great that I at first thought they belonged to the same species

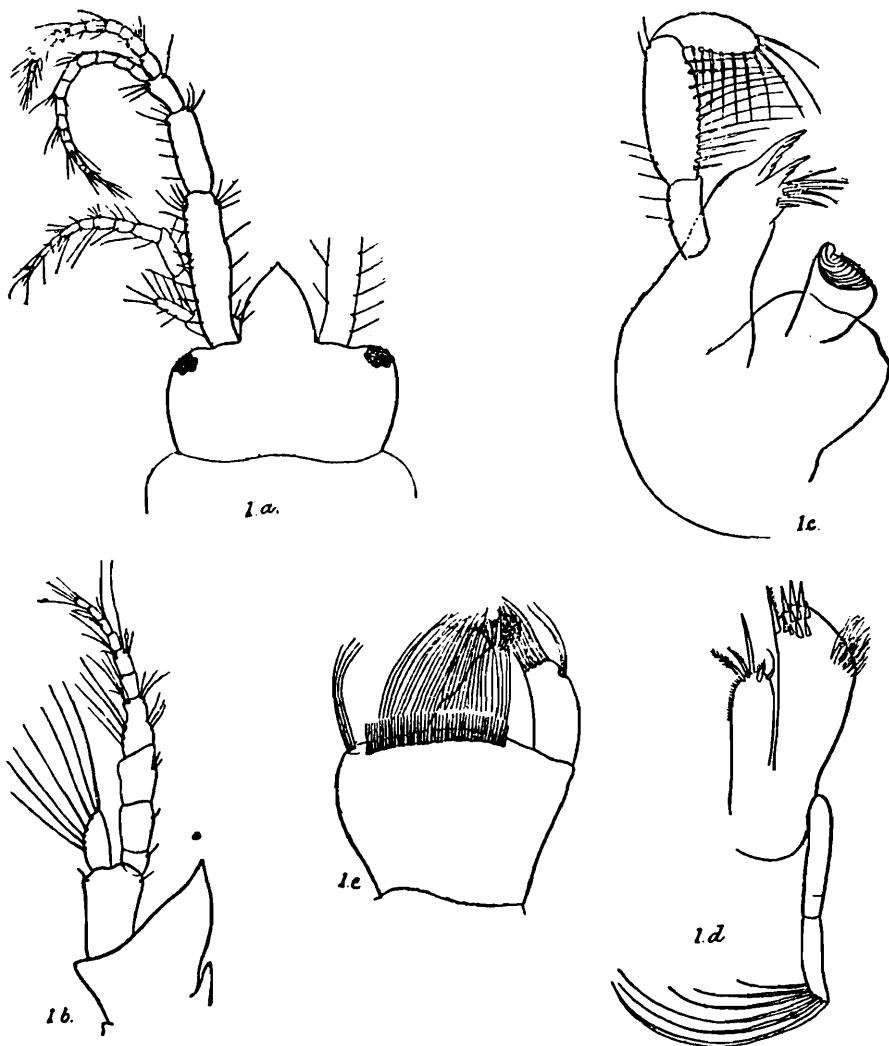


FIG. 1a.—*Aapseudes sapensis*, sp. nov. Head of male specimen, showing rostrum and antennæ.

FIG. 1b.—*Aapseudes sapensis*, sp. nov. Second antenna.

FIG. 1c.—*Aapseudes sapensis*, sp. nov. Mandible.

FIG. 1d.—*Aapseudes sapensis* sp. nov. First maxilla.

FIG. 1e.—*Aapseudes sapensis*, sp. nov. Second maxilla.

until dissection of the appendages revealed the differences mentioned above; the differences in the appendages are best marked in fully

matured males. In these the basal joint of the chelipeds is very narrow at the attachment to the body but rapidly expands into an ovoid shape about half as broad as long and projects as a rounded lobe fringed with a few hairs beyond the attachment of the slender ischium; the carpus is considerably longer than the propod, it is more than twice as long as

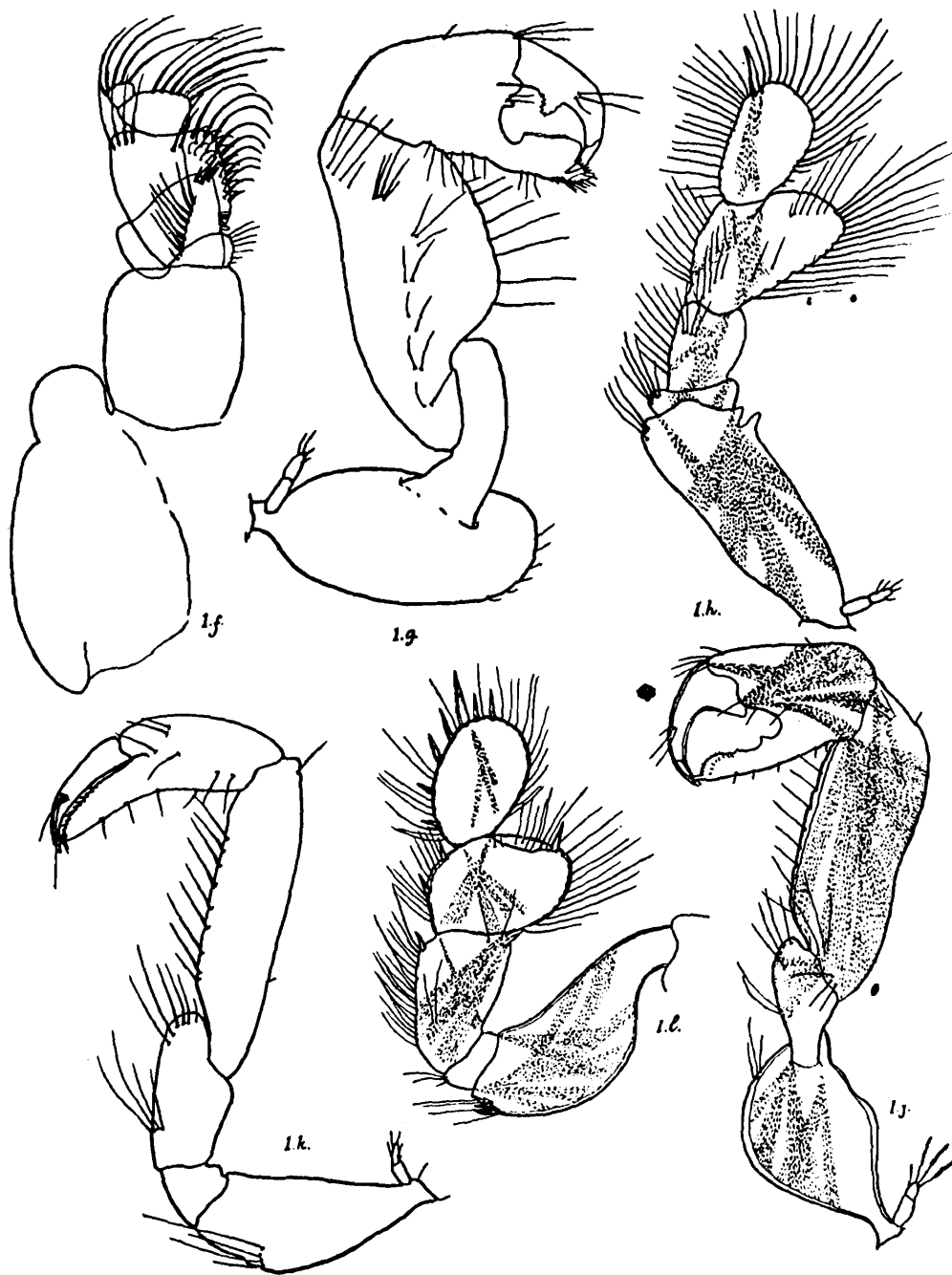


FIG. 1f.—*Apsuedes, sapensis*, sp. nov. Maxilliped.
 FIG. 1g.—*Apsuedes sapensis*, sp. nov. Cheliped of male.
 FIG. 1h.—*Apsuedes sapensis*, sp. nov. Second trunk leg of same specimen (fig. 1g)
 FIG. 1j.—*Apsuedes sapensis*, sp. nov. Cheliped of another male specimen.
 FIG. 1k.—*Apsuedes sapensis*, sp. nov. Cheliped of ovigerous female.
 FIG. 1l.—*Apsuedes sapensis*, sp. nov. Second trunk leg of same female (fig. 1k).

broad and has the expanded inner margin sparsely fringed with long setæ; the fixed finger is thickened except at the narrowed base and

near the tip, the movable finger much curved, very acute and with a triangular projection on its inner side near its base (fig. 1 *g*). The shape of the various joints of the cheliped varies greatly according to the stage of development and in younger specimens is much more like that of *A. chilkenensis*. The second trunk leg of the same male is shown in fig. 1 *h*, and is very stout, all the joints being much broadened and fringed with long hairs; in this specimen the terminal joint has the whole margin thickly fringed with long hairs and only the distal member of the stout setules is prominent, the others being small and almost indistinguishable among the long hairs.

In the female the cheliped is very slender and has quite a different appearance; a very slender one is shown in fig. 1 *m*, which was taken from a specimen presumably female though not actually bearing eggs. Fig. 1 *n*, from an ovigerous female is not quite so slender. The second trunk leg of this ovigerous female is shown in fig. 1 *l*, in which it will be noticed the usual stout setæ are very prominent and the long hairs scanty. The relative development of the setules and the long hairs appear to vary considerably in different specimens; apparently the hairs are more numerous and the setules smaller in the males while in the females the setules are more numerous and larger and the hairs more scanty. This may perhaps be associated with more active swimming habits of the male and more sluggish habit of the female especially when bearing eggs, the second trunk legs being then more fossorial in function. But observation of the living animals would be necessary to confirm this supposition and some of the specimens show exceptions to the general statements made above.

As in other species of *Apseudes* the remaining trunk limbs show a great variety of pattern in the arrangement of the setæ on the different joints. These will be better shown by figs. 1 *n*, *o*, *p*, *q*, than by a detailed description.

The head with rostrum and antennæ is shown in fig. 1 *a*, taken from a male specimen in which the eyes were fairly prominent, the second antenna is shown more clearly in fig. 1 *b*, from which it is seen that the basal joint is very broad and is produced at the inner distal angle to a very acute point.

The mouth parts are small in comparison with the size of the animal and not easy to dissect out satisfactorily but they appear to be of the normal structure more or less closely resembling those of *Apseudes spinosus* as described by Sars. In the mandible, (fig. 1 *c*) the cutting edges are narrow and sharp, the palp arises near the distal extremity and has the second joint much longer than the first or third, its inner margin and that of the third are fringed with long setæ; in the figure 1 *c*, the molar tubercle and basal portion of the mandible are not shown in their normal position but as displaced in mounting the specimen.

In the first maxilla (fig. 1 *d*) the outer lobe is much longer and broader than the inner but otherwise this appendage is not very different from that of *Apseudes spinosus*. The second maxilla (fig. 1 *e*) has the basal portion broad and long, its distal margin fringed with setæ which almost conceal the two small lobes,

The maxilliped (fig. 1 *f*) has the joints of the palpi broader than in *A. spinosus* but similarly fringed with long setæ.

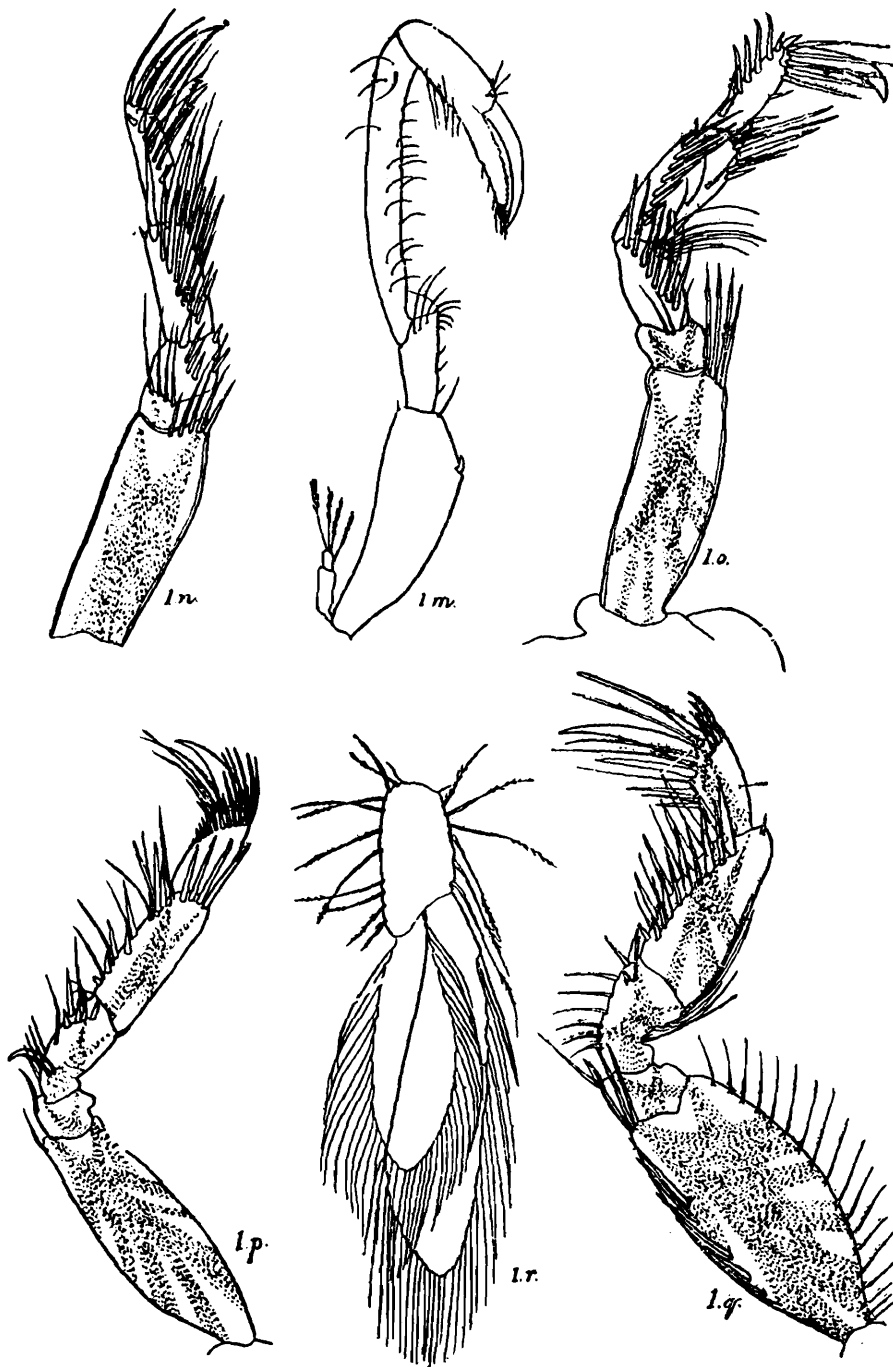


FIG. 1m.—*Apseudes sapensis*, sp. nov. Cheliped of another female.

FIG. 1n, o, p, q.—*Apseudes sapensis*, sp. nov. Third, fourth, fifth and seventh trunk legs of a female specimen, to show arrangement of setæ. The sixth leg is similar to the seventh but without the fringe of setæ on the basal joint.

FIG. 1r.—Uropod.

In the pleopods (fig. 1 *r*) the inner lobe is much longer than the outer, both are fringed with long hairs while the inner one has in addition a long stout seta on its inner side near the base.

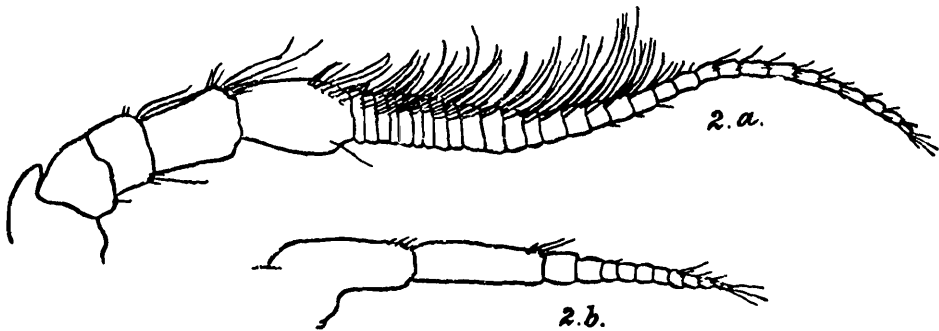
Both branches of the uropod are very slender, the outer being almost one-fourth the length of the inner.

ISOPODA.

Cirolana pleonastica Stebbing.(Fig. 2 *a* and *b*.)*Cirolana pleonastica*, Chilton, 1924, p. 883, figs. 4, *a*—*c*.*Localities* —Station 23.—Several.

,, 36.—Several.

Among the specimens are several males which can be distinguished from the females by the greater abundance of fine hairs on the second antennæ the uropoda. I give figures of the antennæ (fig. 2 *a* and *b*) of a male specimen showing the abundance of hairs on the second antenna

FIG. 2a.—*Cirolana pleonastica* Stebbing. First antenna of male.FIG. 2b.—*Cirolana pleonastica* Stebbing. Second antenna of male.

a character which was not so well developed in the male specimen from Chilka Lake that I examined.

Distribution.—Talé Sap ; Chilka Lake ; New Britain.

Cirolana parva Hansen.*Cirolana parva*, Chilton, 1924, p. 883.*Localities*.—Station 11.—Several.

,, 31.—One. Length about 9 mm.

These appear to belong to this somewhat ill-defined species.

Colour greyish. Sometimes with a darker median band in which is a longitudinal row of lighter patches and on each side a similar row of light patches more indistinctly defined.

This species is widely distributed in the warmer seas of Asia and America.

Nerocila phaeopleura Schiödte and Meinert.(Fig. 3 *a* and *b*.)*Nerocila phaeopleura*, Schiödte and Meinert, 1881, p. 13, pl. 1, figs. 6 and 7.*Nerocila phaeopleura*, Nierstrasz, 1915, p. 75, pl. 13, fig. 1, 2.*Nerocila phaeopleura*, Nierstrasz, 1918, p. 113, pl. 9, figs. 6, 7.*Locality*.—Station 16. One ovigerous female, two immature females.

The ovigerous female is somewhat narrower than the forms figured by Schiödte and Meinert and by Nierstrasz and perhaps not fully deve-

loped but agrees on the whole well with the descriptions given by them. The species seems to be well characterized by the horizontal expansions of the lower angles of the first two segments of the pleon, the narrow rami of the uropods and the lateral bands of pigmented dots on the posterior part of the body.

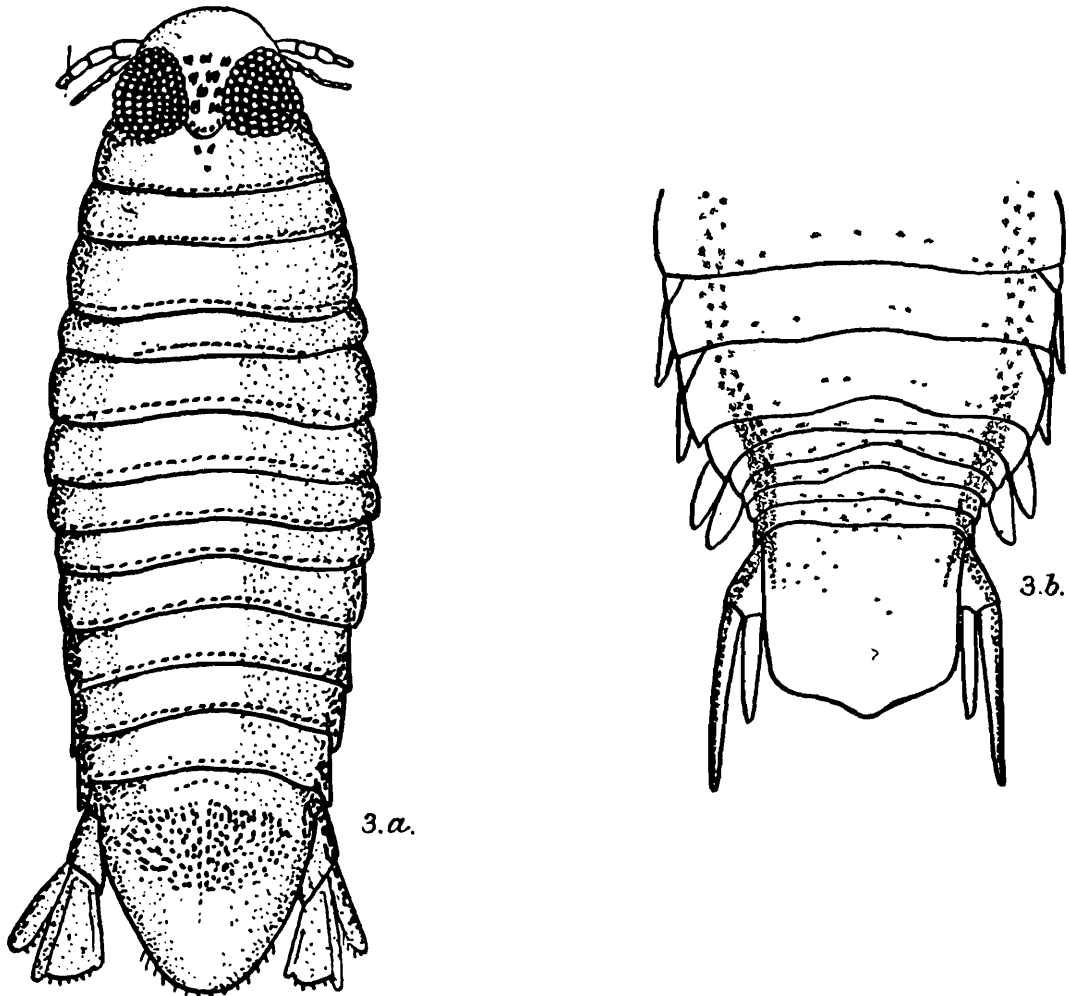


FIG. 3a.—*Nerocila phaeopleura* Schiödte and Meinert. Immature form.

FIG. 3b.—*Nerocila phaeopleura* Schiödte and Meinert. Posterior segments of thorax, pleon and pleotelson of adult female

For the purpose of comparison I give the following measurements of the Talé Sap specimens

Ovigerous female—Length 16 mm. (*i. e.*, head 2 mm. thorax 9, pleon 5); breadth 6 mm.

Immature females.—Length 16 mm. [*viz.*, Head 2, thorax 7, pleon (segments 1—5) 4, pleotelson 3]; greatest breadth 6 mm.

Distribution.—East Indian Archipelago. Specimens named by Meinert and Schiödte are in the Royal Museum of Natural History, Leiden.

Nierstrasz has recorded this species from the Java Sea and from the West Coast of Sumatra and has drawn attention to certain details in which his specimens differ from those described by Schiödte and Meinert.

Rocinela simplex sp. nov.

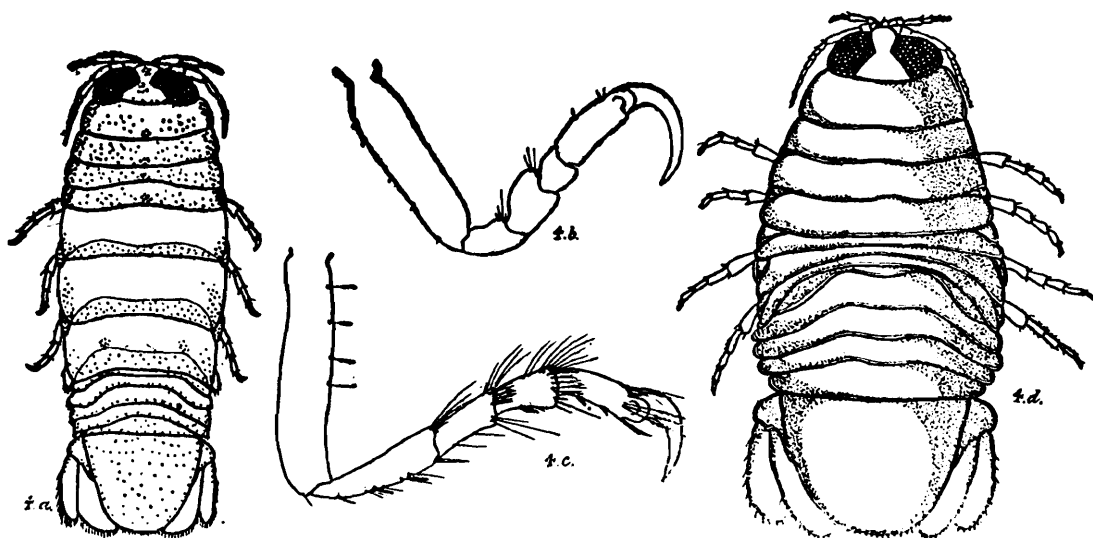
(Fig. 4 a to m.)

? *Rocinela orientalis*, Chilton, 1924, p. 886 (not of Schiödte and Meinert).

- Localities.*—Station 23.—One female 16 mm. long, one male, 13 mm. and several immature.
 ,, 6.—One female 14 mm long.
 ,, 8.—One immature.
 ,, 31.—Several, all immature, the smallest 5 mm. long, the largest 11 mm.
 ,, 25.—Three, immature.
 ,, 9.—One, immature, 4.5 mm. long, 2 mm. broad.

These specimens present a good series of immature forms. As I am unable to identify them with any known species I establish this as a new species but provisionally only as none of the specimens examined is fully mature. It appears to belong to Schiödte and Meinert's section II in which the flagellum of the second pair of antennæ contains about 11 joints; the eyes are very distinct and well separated and the propod of the first pair of legs is unarmed. It seems to be close to *R. signata* Sch. and M. with a specimen of which from the Bahamas I have been able to compare it. The Talé Sap forms differ from this specimen, however, in having the body longer and more slender, though the pleotelson is broader; the epimera especially the seventh, are less acute and there is no sign of the pair of pigmented semilunar bands, separated by a longitudinal stripe on the pleotelson which is characteristic of *R. signata*.

The following notes on the different specimens, with the figures, will perhaps be sufficient for identification:—From Station 23, young

FIG. 4a.—*Rocinela simplex*, sp. nov. Female, dorsal view.FIG. 4b.—*Rocinela simplex*, sp. nov. First peraeopod of the same.FIG. 4c.—*Rocinela simplex*, sp. nov. Seventh peraeopod.FIG. 4d.—*Rocinela simplex*, sp. nov. Immature form, male, dorsal view.

female, length 16 mm., *i.e.*, Head 1, Thorax 10 (1, $\frac{1}{2}$, $\frac{1}{2}$, $\frac{1}{2}$, $2\frac{1}{2}$, 3, 2), Abdomen $2\frac{1}{2}$, Pleotelson $2\frac{1}{2}$; greatest breadth 6 mm. (fig. 4 a). Station

6, young female, length 14 mm., *i.e.*, Head 1, Thorax 8 ($1, \frac{1}{2}, \frac{1}{2}, \frac{1}{2}, 2, 2\frac{1}{2}, \frac{1}{2}$), Abdomen $2\frac{1}{2}$, Pleotelson $2\frac{1}{2}$; greatest breadth 6 mm.

These two females have the body distended below, presumably by the enlarged ovaries, but the brood plates are not formed and apparently the final moult has not been completed. In the first specimen the 5th, 6th, and 7th segments of thorax are elongated as shown by the figures given the others being short as in the immature forms; in the second specimen only the 5th and 6th segments are elongated. The second specimen is greyish, the whole dorsal surface being covered with small pigmented markings; in the first the colour is lighter, the elon-

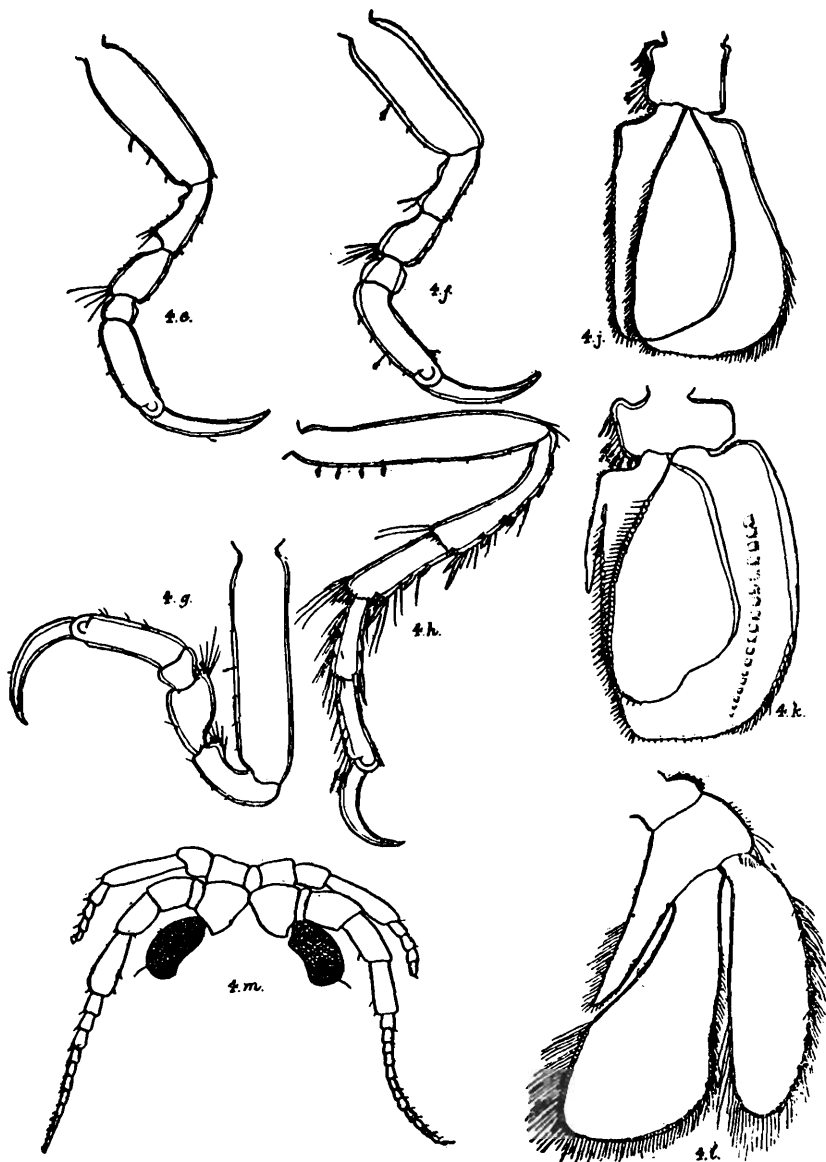


FIG. 4e, f, g, h.—*Rocinela simplex*, sp. nov. First, second, third and seventh pereopods of same specimen (fig. 4d).

FIG. 4j, k.—*Rocinela simplex*, sp. nov. First and second pleopoda of same (fig. 4d).

FIG. 4l.—*Rocinela simplex*, sp. nov. Uropod of same (fig. 4d).

FIG. 4m.—*Rocinela simplex*, sp. nov. Antennæ, etc. of immature specimen, 4.5 mm. long.

gated segments having a transverse band of pigmentation on the posterior portion only.

The pleotelson is broadly rounded posteriorly and, like the uropoda, fringed with hairs.

In the first pair of legs the propod are cylindrical and unarmed as shown in fig. 4 *b*; the seventh pair are much longer, more slender and provided with numerous long hairs on some of the joints (fig. 4 *c*).

The immature forms examined vary in length from 4.5 mm. up to 13 mm. They are all evidently free swimming forms and are much flatter and broader than the females described above. In the smallest the seventh segment of thorax was small and without appendages; various stages in the development of the seventh peraeopod were shown in the other specimens.

One from Station 23, a male as shown by the appendage on the endopod of pleopod 2, is about half as broad as long (13 mm. by 6.5 mm.) and is shown in fig. 4 *d*, from which the proportions of the segments may be seen. The whole body is very flat and depressed, the seventh peraeopods were well developed (see fig. 4 *h*). Other peraeopods and the uropoda are figured and do require detailed description. Fig. 4 *m* shows the antennæ of an immature form only 4.5 mm. long as seen from below.

The immature form from Chilka Lake probably belongs to this species rather than to *Rocinela orientalis* to which I doubtfully referred it (1924, p. 886).

Sphaeroma terebrans Bate.

Sphaeroma terebrans, Stebbing, 1904, p. 16, pl. 4.

Sphaeroma terebrans, Chilton, 1919, p. 12, footnote.

Localities.—Station 11.—6 specimens, some imperfect. Length about 7 mm.

„ 23.—One.

These specimens are smaller than some in my collection from the east coast of Australia but I think undoubtedly belong to this species which is a destructive boring Isopod widely distributed in the warmer seas of India, Australia, etc. It is closely allied to or perhaps the same as *S. destructor* Richardson which has done much damage in Florida, U. S. A. I have specimens from Brisbane River, Queensland, and other localities on the east coast of Australia, some of them being much smaller than the others and having the tubercles, etc., on the dorsal surface of the pleon less distinct.

Mr. E. Jacobson of Fort de Kock, Sumatra, has sent me specimens from Simalur Islands, Sumatra. These are white (in spirit) and only 3 mm. long but I think belong to this species, though owing to their small size the tubercles on the posterior segments of the body are very indistinct. They were found living in holes and crevices in submerged stems and roots of *Rhizophora* and with them was the commensal, *Iais pubescens* (Dana) var. *longistylis* Chilton, which is associated also with *S. quoyana* M. Edw., an Australian and New Zealand species which burrows into soft rock as well as into wood.

Sphaeroma felix Lanchester, locality unknown, is insufficiently described for identification and the size is not given but it is probably the same as *S. terebrans*,

S. terebrans, like *S. quoyana*, is capable of thriving in brackish or even in fresh water.

***Ligia exotica* Roux.**

Ligia exotica, Chilton, 1916, p. 462, figs. 1—22.

Ligia exotica, Chilton, 1924, p. 894.

Locality.—Station 20.

Three specimens, imperfect. One specimen is very small. Another is a male not fully mature and not showing the characteristic process on the propod of the first pair of legs.

This species is to be found on the sea-shore in all the warmer seas of the world. I have some particularly large specimens from Japan. A full account of its external anatomy is given in the first paper quoted above. The late Dr. N. Annandale has added some notes on the habit of the species to this and also to the paper published in 1924.

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