# *ALLANASPIDES HELONOMUS* GEN. ET SP. NOV. (CRUSTACEA: SYNCARIDA) FROM TASMANIA

by

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## ABSTRACT

An account of *Allanaspides helonomus* gen. et sp. nov. obtained from the burrows of *Parastacoides tasmanicus* Erichson and from pools on the buttongrass plain near Lake Pedder in south-west Tasmania is given. External features are illustrated.

## INTRODUCTION

The known genera of the extant Anaspididae, *Anaspides* Thomson and *Paranaspides* Smith have been found only in Tasmania. While collecting the burrowing crayfish, *Parastacoides tasmanicus* Erichson, from the vicinity of Lake Pedder in south-west Tasmania in November 1969, two of the authors (R.S., I.S.W.) obtained specimens of an anaspid syncarid, which proved to be sufficiently different from the existing genera to require the erection of a new genus. A description of the species and the diagnosis of the genus are given below.

## MATERIAL AND METHODS

Sixty-six specimens were obtained from the buttongrass plain about one hundred yards behind the Hydro-Electric Commission hut at Lake Pedder. Pits were dug to a depth of about two feet to drain the water from the burrows of *Parastacoides tasmanicus*. The water and debris from the pits were then carefully sieved, yielding 63 of the syncarids. The other three specimens were collected from the surface waters of flooded burrows without any preliminary digging. The animals were either immediately fixed in 5% formalin or brought back alive in water to the laboratory.

The animals were first studied whole. Structures requiring detailed investigation were dissected off and cleared in either lactophenol plus acetic acid or in clove oil. The orientation of structures was examined at this stage, prior to final mounting in polyvinyl alcohol or Canada balsam. Complete series of appendages and tergites of both sexes were prepared. Finally, in order to confirm details of segmentation, some appendages were boiled in 10% KOH and stained in acid fuchsin.

## *ALLANASPIDES HELONOMUS* GEN. ET SP. NOV.

### BODY FORM AND SEGMENTATION

Of the 66 animals obtained, one was a juvenile male, 26 were mature males and 39 were mature females. Size ranges (rostral tip to end of telson) are

shown below.

| | Minimum length (mm.) | Maximum length (mm.) | Mean length ± S.D. |
|---|---|---|---|
| Juvenile ♂ | | 4.4 | |
| Mature ♂ | 7.0 | 13.6 | 9.91 ± 2.14 |
| Mature ♀ | 5.7 | 13.3 | 8.65 ± 1.75 |

The general appearance of the animal, particularly the placement of the appendages, is shown in plate 1. In both living and fixed specimens there is a slight dorsal flexure of the body which involves all the thoracic and most of the abdominal segments. This flexure reaches its peak about the seventh thoracic segment in the male and the fifth thoracic segment in the female.

The body is divided into three tagmata: the cephalothorax (derived from the somites of the head and first thoracic segment), the remainder of the thorax, and the abdomen (plus telson).

The cephalothorax is divided dorsally and laterally by a clearly demarcated mandibular groove. The two regions so formed are unequal, the anterior being twice the length of the posterior. In the anterior region a very reduced rostrum is present which bears a few small setae on its lateral margins (fig. 1). The four-celled sense organ is very conspicuous and is visible medially in front of the mandibular furrow. The first region carries the following appendages: eyes, antennules, antennae, and mandibles. The second region bears the maxillules, the maxillae, and the first thoracic limbs. On each side of this region a poorly developed horizontal groove is present. Dorsally there is a large, clearly demarcated, transparent oval area which occupies about half of the dorsal surface (plate 2 and fig. 1). The term *fenestra dorsalis* is proposed for this area.

The seven segments which follow the cephalothorax are the free thoracic segments. Each bears a pair of limbs ventrally. The tergites lack lateral (pleural) lobes and increase in length anterio-posteriorly. The first three overlap considerably and consequently tend to accentuate the dorsal flexure of the body. The greatest width of the body is reached in the latter half of the thorax.

There are six segments to the abdomen. Each of the first five bears a pair of pleopods. The tergites of these segments are subequal in length, the first two being slightly longer than those following and equal to the last thoracic segment. Each tergite is extended laterally to form a pleural lobe on each side. The sixth abdominal segment is elongated, being nearly twice the length of the fifth. The setation of the third to sixth abdominal tergites is illustrated in fig. 21. The telson is elongated and pointed; it has between 60 and 70 stout, toothed setae on the posterior margin (fig. 22). The sixth abdominal tergite plus the telson are together longer than the three preceding segments.

## THE APPENDAGES

### Eyes:

The eyes are pedunculate with the eyestalks directed anteriorly, diverging at an angle of only 25 - 30°. The eyestalks project considerably beyond the rostrum (fig. 1). The eyes are situated medio-laterally. The inner margin of each eyestalk terminates distally in a small but conspicuous tubercle and carries a row of seven setae around the dorsal margin of the cornea.

### Antennules:

The two rami of the antennules arise from a basal peduncle consisting of

three podomeres with a distinct flexure between the second and third (fig. 2). The distal podomere is somewhat elongated. An otocyst is clearly visible through the upper surface of the basal podomere. The inner flagellum is more than half the length of the outer flagellum and consists of between 50 and 60 segments. The outer flagellum is longer than the endopodite of the antenna.

Antennae:

The antennae (fig. 3) consist of a scale-like exopodite and a flagellate endopodite, borne on a two-segmented protopodite. The expodite is slightly longer than the first two segments of the endopodite combined.

Mandibles:

The mandibles are illustrated in fig. 4. The mandibular palp is three-segmented with the middle segment greatly elongated. The incisor process is well developed and carries five single teeth plus a large bifurcated apical tooth. An accessory incisor lobe bearing serrated setae is present between the incisor and molar processes.

Maxillules:

The maxillules consist of two rami borne on a basal podomere (fig. 5). The outer ramus possesses mainly serrated setae distally and a prominent conical palp on the epiaxial margin. The palp fits behind the body of the mandible. There are no setae on the epiaxial margin. The inner ramus extends slightly behind the outer ramus and carries brush setae, some of which terminate in combs; its epiaxial margin is fringed with clusters of simple setae.

Maxillae:

The two rami of the maxillae are bilobed and borne on a basal podomere (figs. 6 and 7). The innermost lobe is enlarged and extends in front of the next two lobes. The four lobes bear many long comb and brush setae. There are no setae on the outer margin of the maxilla.

Thoracic limbs - male:

There are no epipodites on the first thoracic appendages (fig. 8). Each limb consists of a two-segmented protopodite, the basipodite of which is not quite complete ventrally and bears a reduced simple exopodite dorsally and an endopodite ventrally. There are two gnathobasic lobes on the coxopodite, each consisting of a large setose preaxial lobe and a reduced post-axial lobe with few setae. Several types of setae are found on the lobes. The preischial segment of the endopodite forms an expanded setose lobe on the ventral surface. The dactylopodite of the first and all subsequent thoracic limbs bears a variable number of terminal claws (usually four or five).

The coxopodite of the second thoracic limb carries a pair of epipodites dorsally and a small coxal lobe ventrally (fig. 9). The basipodite is distinct from the preischium of the endopodite only on the preaxial and dorsal surface; it bears a well developed setose exopodite.

The limbs of the third to sixth thoracic segments are similar to those of the second except that the fusion of the preischium with the basipodite becomes progressively more complete (fig. 10).

The seventh thoracic limb is without an exopodite and the fusion between the basipodite and the preischium is complete (fig. 12). The coxopodite carries a setose coxal lobe distally and a non-setose papilla basally.

The eighth thoracic limb possesses neither an exopodite nor epipodites (fig. 14). The fusion between the basipodite and preischium is complete and no coxal lobes are present. The sternum is expanded ventrally and there is a single genital aperture in the midline, into which the vasa deferentia open.

Thoracic limbs - female:

The female thoracic limbs (figs. 11, 13 and 15) differ from those of the male in that:

a. the coxal lobes of the sixth and seventh appendages are well developed and prominent,

b. there is no coxal papilla on the seventh appendage,

c. the eighth limbs possess coxal lobes,

d. a large conical spermatheca is present between the eighth appendages,

e. the oviducts open on the inner postaxial margin of the coxopodites of the sixth thoracic limbs at the base of the coxal lobes.

Abdominal limbs:

Except for the first and second abdominal appendages in the male, the abdominal appendages of both sexes are uniramous; there are no endopodites (fig. 16). Each limb consists of a single-segmented protopodite and a long, segmented setose exopodite.

Endopodites are present on both the first and second abdominal appendages of the male, where they are modified to form complex copulatory styles. In the living animal they are directed anteriorly and are carried against the mid-ventral surface of the animal between the last thoracic limbs.

The endopodites of the first abdominal segment are elongated and unsegmented (figs. 17 and 18). Basally each is grooved to provide a sleeve for the proximal segment of the corresponding endopodite of the second abdominal limb; terminally each provides an extensive covering for the distal segment of the succeeding endopodite. The margins of the endopodite are expanded distally into two flanges, one on the external margin (figs. 17, 18 - e.fl.), the other on the distal margin of the internal surface (figs. 17, 18 -i.fl.). That of the external margin is large and curved postaxially to enclose the bifurcated flange of the distal margin which itself curves inwards to form a terminal hood. The external flange also possesses a prominent proximally-directed flap postaxially (fig. 17 - f.), about halfway along the length of the endopodite, which meets the corresponding flap of the other first endopodite in the midline. Midway along the inner surface of the endopodite there is a raised plate possessing many small recurved hooks. These hooks interlock with those on the opposite limb and couple the two endopodites together. The postaxial surface of the inner margin bears a number of brush setae.

The endopodites of the second abdominal appendages consist of two segments, the proximal segment being about twice the length of the distal (figs. 19 and 20). On the postaxial surface of the proximal segment there is a prominent longitudinal ridge and a large basal projection. Basally, the inner margin bears a well developed flange; distally it possesses an extensive coupling plate, consisting of a raised pad of many small recurved hooks. Both the flange and the basal projection articulate with large sternal processes whilst the coupling plate locks firmly with the corresponding structure of the opposite limb. There is a large spur preaxially at the level of the coupling plate. A row of brush setae extends along the inner surface of the proximal segment, between the spur and the coupling plate. It extends throughout the terminal two-thirds of the segment. The distal segment is truncated; it possesses a shallow preaxial depression terminally, in which runs a longitudinal row of recurved hooks. Arising as a preaxial articulation with the proximal segment is a ridge which runs forwards and terminates in the depression.

Uropods:

The uropods are elongated with rather pointed tips. The arrangement of setae and spines is illustrated in fig. 23.

## TYPE MATERIAL

Holotype: 1 adult ♂. Allotype: 1 adult ♀.

Collected from buttongrass plain near Lake Pedder in Tasmania (300 metres above sea level, approximately 146° 12' E and 42° 58' S) on 25th and 26th November 1969, by R. Swain and I. S. Wilson. Deposited in the Australian Museum, Sydney, Australia (reg. nos. P17619 and P17620).

Paratypes: 2 adult ♂♂ and 2 adult ♀♀ collected from type locality on 25th and 26th November 1969. Deposited in Queen Victoria Museum, Launceston, Tasmania (reg. nos. 1970.10.2 and 1970.10.3).

2 adult ♂♂ and 2 adult ♀♀ collected from type locality on 25th and 26th November 1969, deposited in Tasmanian Museum and Art Gallery, Hobart, Tasmania (reg. nos. G1299 and G1300).

## *ALLANASPIDES* GEN. NOV.

Diagnosis:

*Allanaspides* gen. nov. may be differentiated from the other genera in the Anaspididae by the possession of the following characters:

1. the tergites of the thoracic segments increase in length from anterior to posterior,
2. the tergites of the first five abdominal segments are subequal in length and approximately equal to the posterior thoracic segments,
3. the sixth abdominal tergite plus telson are together longer than the preceding three segments,
4. there is a slight dorsal flexure to the body,
5. a large *fenestra dorsalis* is present in the cephalo-thoracic tergite,
6. the antennal exopodite is at least equal to the combined length of the first two segments of the endopodite,
7. the first thoracic appendages possess two gnathobasic lobes plus a setose expansion of the inner surface of the preischium of the endopodite,
8. the first thoracic appendages lack epipodites,
9. the seventh thoracic appendages lack exopodites,
10. abdominal endopodites are absent, except on the first and second abdominal appendages of the male.

Type species: *Allanaspides helonomus* sp. nov.

## DISCUSSION

In the diagnosis of *Allanaspides* gen. nov. we have included those characters previously employed at the generic level in the Anaspididae (Smith 1909). Thus reference is made to the presence of a dorsal flexure, the lengths of the thoracic and abdominal tergites, the length of the antennal exopodite, the combined length of the sixth abdominal tergite and telson, and the presence of a preischial expansion on the first thoracic appendages. In all of these characters *Allanaspides* may be considered as occupying a position intermediate between *Anaspides* and *Paranaspides*. We have omitted reference to the mandibular palp, which, since the correction by Gordon (1961) to the description of *Paranaspides*, can no longer constitute a generic character. Smith (1909) also included the fact that the telson is shorter than the uropods, but since this is a feature shared by both existing genera and by *Allanaspides* gen. nov. it hardly seems a useful character at this level.

In addition to the existing criteria, four new characters are given generic status; namely, the absence of epipodites on the first thoracic appendages, the absence of an exopodite on the seventh thoracic appendages, the absence, except for the male copulatory styles, of endopodites on the abdominal limbs, and the presence of a *fenestra dorsalis*. This latter structure is of considerable interest since it immediately distinguishes *Allanaspides* gen. nov. from other genera and has no obvious counterpart in other crustacean groups. At this stage no suggestion as to its possible function(s) can be made, but anatomical investigations concerned with this point are in progress at both the light microscope and ultrastructural levels.

In the course of this study specimens of *Anaspides* and *Paranaspides* from their respective type localities were examined for comparative purposes. *Anaspides tasmaniae* was first reported by Thomson (1893) with a fuller description being provided a year later (Thomson 1894). Further information was added by Smith (1909) who also included a more detailed description of *Paranaspides lacustris* following his preliminary account (Smith 1908). These descriptions were found to be incomplete in certain respects, and it is apparent that detailed redescriptions are required. The Family Anaspididae was first diagnosed by Thomson (1893); this diagnosis was amended by Smith (1909). Siewing (1959) followed Thomson, but misquoted the date of his paper, giving it as 1886 which precedes the discovery of *Anaspides*. The discovery of the Genus *Allanaspides* necessitates a revision of the diagnosis of the Family, as provided by Smith (1909), since the presence of epipodites on the first thoracic appendages and of biramous abdominal appendages will no longer be valid at this level. The necessary revision and redescriptions are in progress.

Since the original discovery of *Allanaspides helonomus* was made in an area which is soon to be flooded for hydro-electric purposes, an extensive search is being conducted in order to ascertain the extent of the distribution of the animal. It is not yet known whether it is restricted to the burrows of *Parastacoides tasmanicus*, nor indeed whether it is confined to areas of buttongrass plain. Since preparing this account of *Allanaspides helonomus*, specimens have been obtained from one other locality (about ½ mile east of the McPartlan Pass; approximately 146° 12' S, 42° 52' E). This locality has also yielded 39 adult specimens of a second, sympatric, species of *Allanaspides*. A description of this second species is in preparation.

With the addition of *Allanaspides* gen. nov., the Family *Anaspididae* now comprises the following genera and species:

Genus *Anaspides* Thomson, 1894 (= *Anaspis* Thomson, 1893)
*Anaspides tasmaniae* Thomson, 1893
*Anaspides spinulae* Williams 1965

Genus *Paranaspides* Smith, 1908
*Paranaspides lacustris* Smith, 1908

Genus *Anaspidites* Brooks 1962 (extinct genus)
*Anaspidites antiquus* (Chilton 1929)

Genus *Allanaspides* gen. nov.
*Allanaspides helonomus* sp. nov.

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_____ 1909. On the Anaspidacea, living and fossil. *Quart. J. micr. Sci.* 53(3): 489-578.

THOMSON, G. M. 1893. Notes on Tasmanian crustacea, with descriptions of new species. *Proc. Roy. Soc. Tasm.* 1892: 45-76.

_____ 1894. On a freshwater Schizopod from Tasmania. *Trans. Linn. Soc. Lond. (Zool.)* 6: 285-303.

# Illustrations

All scales indicate 0.25 mm., except where otherwise indicated.

Figure 1. Anterior tergites and eyes of mature ♂. The tergites have been flattened to demonstrate the marginal setae.
fen. dors. = *fenestra dorsalis*.

Figure 2. Dorsal view of base of right antennule of mature ♂.

Figure 3. Dorsal view of base of left antenna of mature ♂.
end. = endopodite; ex. = exopodite.

Figure 4. Preaxial view of left mandible of mature ♂.
a.in. = accessory incisor process; in. = incisor process; mol. = molar process; plp. = palp.

Figure 5. Postaxial view of left maxillule of mature ♂.

Figure 6. Postaxial view of right maxilla of mature ♂.

Figure 7. Preaxial view of left maxilla of mature ♂.

Figure 8. Preaxial view of first thoracic appendage (right) of mature ♂. No attempt has been made to show the form of all the setae.
bas. = basipodite; g. = gnathobasic lobe; pre. = preischium.

Figure 9. Preaxial view of second thoracic limb (left) of mature ♂.
cox. l. = coxal lobe; ep. = epipodite.

Figure 10. Preaxial view of sixth thoracic limb (left) of mature ♂.

Figure 11. Postaxial view of base of sixth thoracic limb (right) of mature ♀.
gon. = gonopore.

Figure 12. Preaxial view of seventh thoracic limb (right) of mature ♂.
pap. = coxal papilla.

Figure 13. Preaxial view of base of seventh thoracic limb (right) of mature ♀.

Figure 14. Postaxial view of eighth thoracic limb (left) and sternum of mature ♂.
cox. = coxopodite; st. = sternum.

Figure 15. Preaxial view of base of eighth thoracic limb (left) and sternum of mature ♀.

Figure 16. Postaxial view of third abdominal pleopod (left) of mature ♂.
pro. = protopodite.

Figure 17a. Postaxial view of endopodites of first abdominal limbs of mature ♂.
e.fl. = external flange; f. = flap.

b. Diagrammatic representation of distal end of left first endopodite of fig. 17a with lobes unfolded.
i.fl. = internal flange.

Figure 18. Preaxial view of endopodites of first abdominal limbs of mature ♂.
c.pl. = coupling plate.

Figure 19. Postaxial view of endopodites of second abdominal limbs of mature ♂.
fl. = flange; b.p. = basal projection; l.r. = longitudinal ridge; st.p. = sternal processes.

Figure 20. Preaxial view of endopodites of second abdominal limbs of mature ♂.
r. = ridge; s. = spur.

Figure 21. Posterior abdominal tergites of mature ♂, flattened to include setation of pleural lobes.
III, IV, V, VI = segment numbers.

Figure 22. Dorsal view of telson of mature ♂.

Figure 23a. Dorsal view of left exopodite of the uropod of mature ♂.

b. Dorsal view of left endopodite of the uropod of mature ♂.

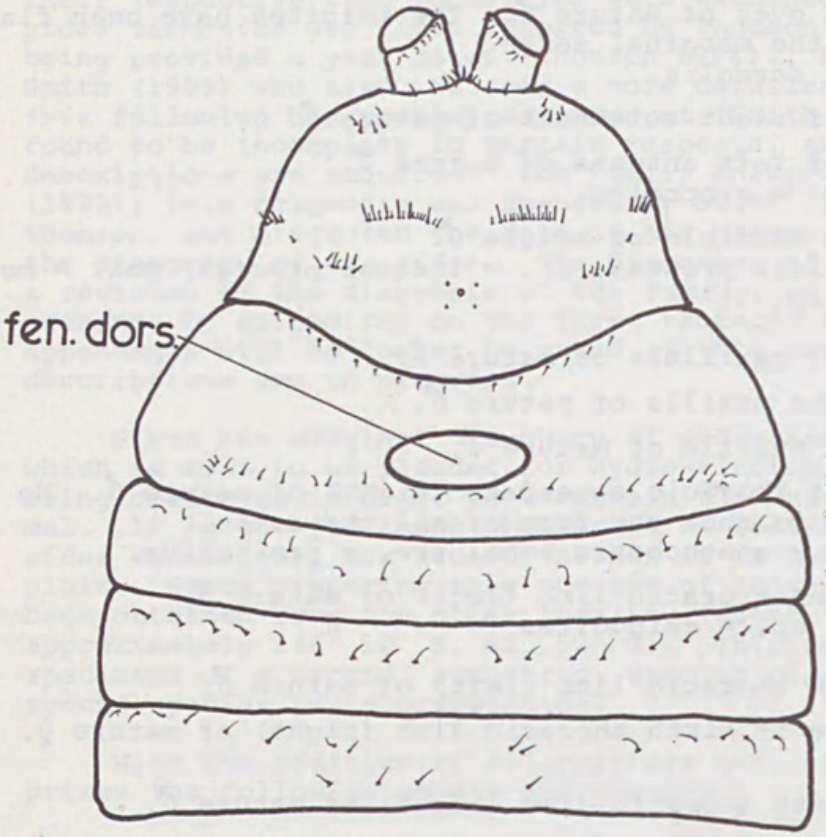



Fig. 1

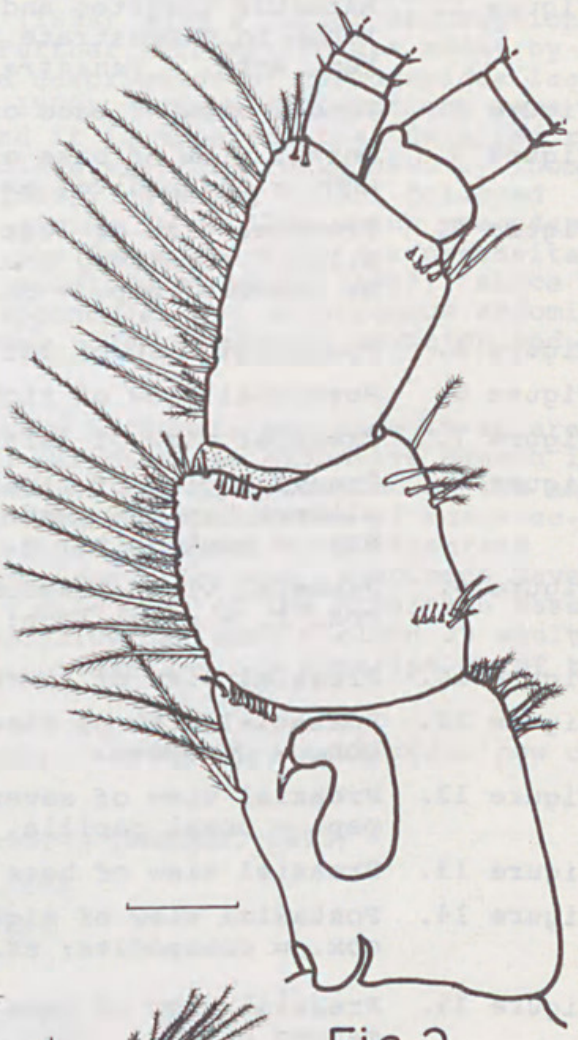


Fig. 2

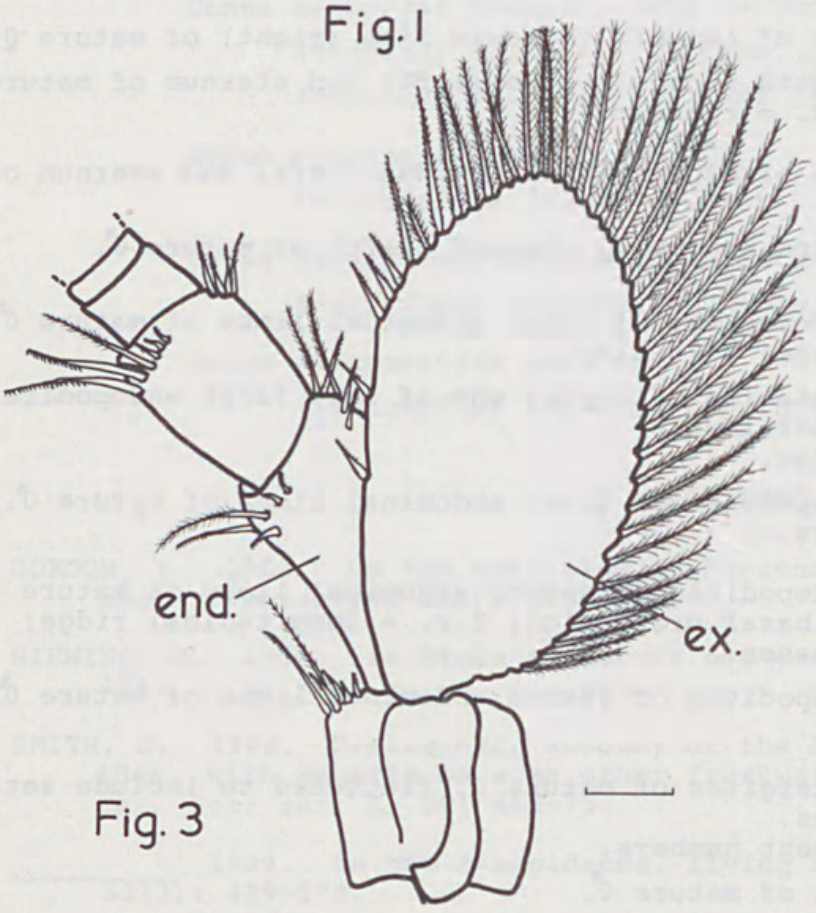



Fig. 3

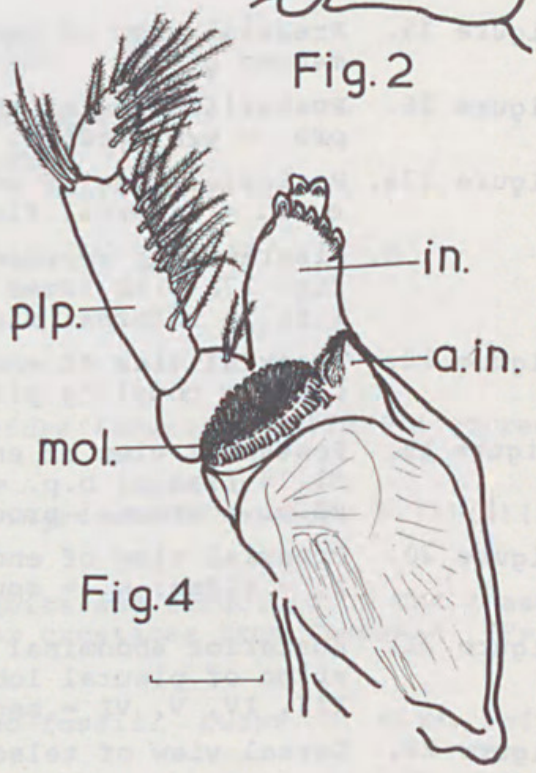



Fig. 4

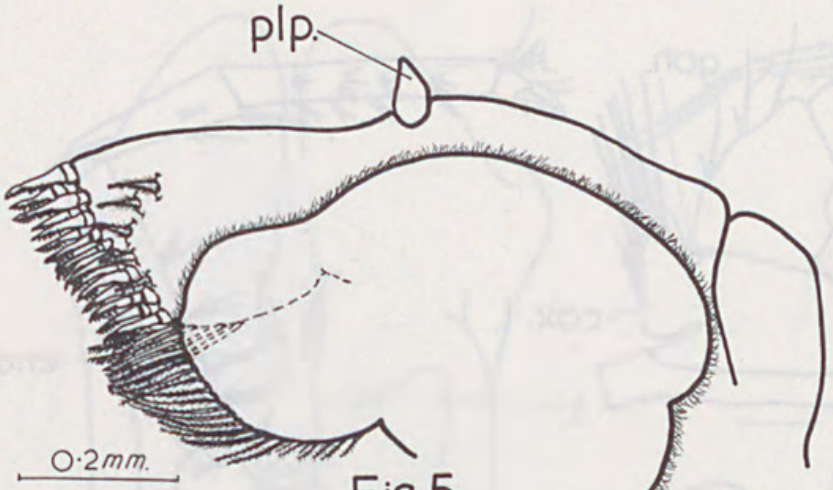



Fig.5

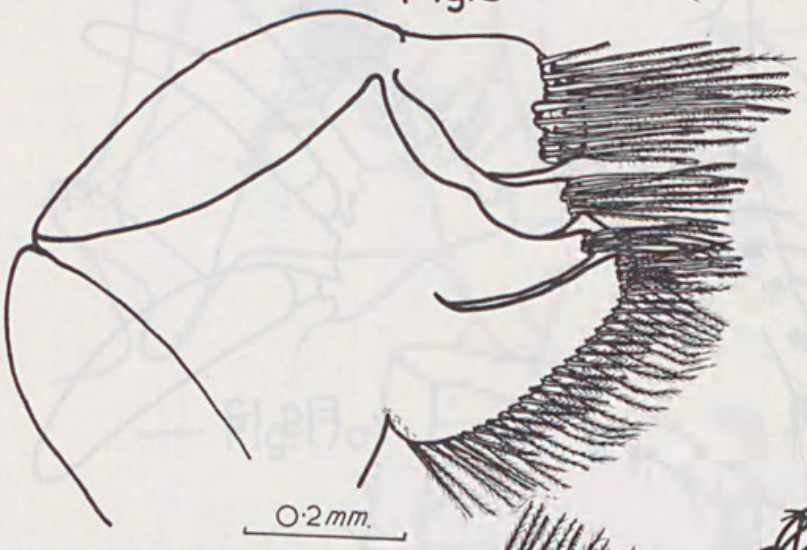



Fig.6


Fig.7

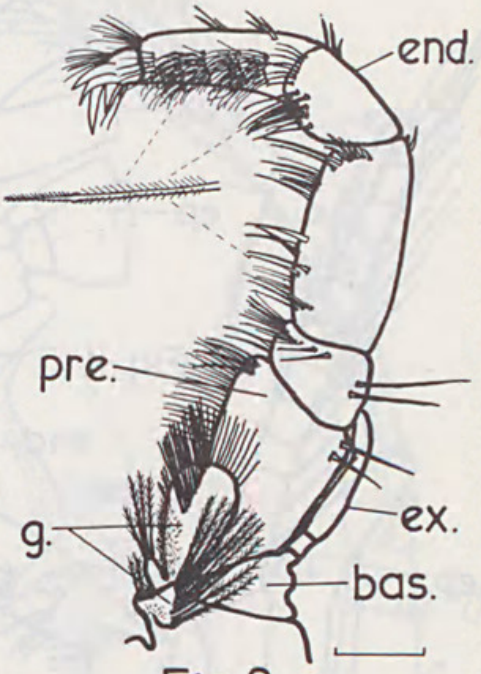



Fig.8

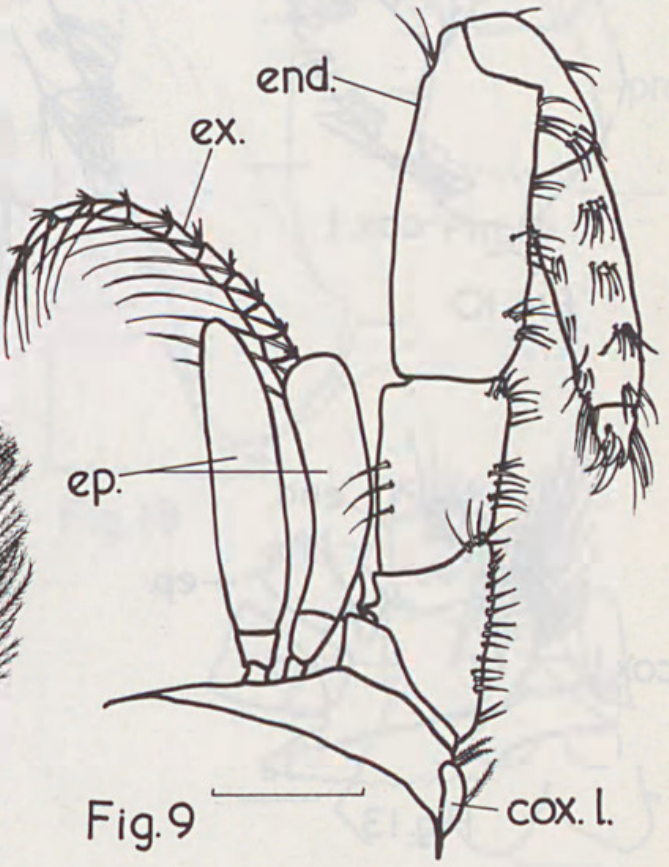
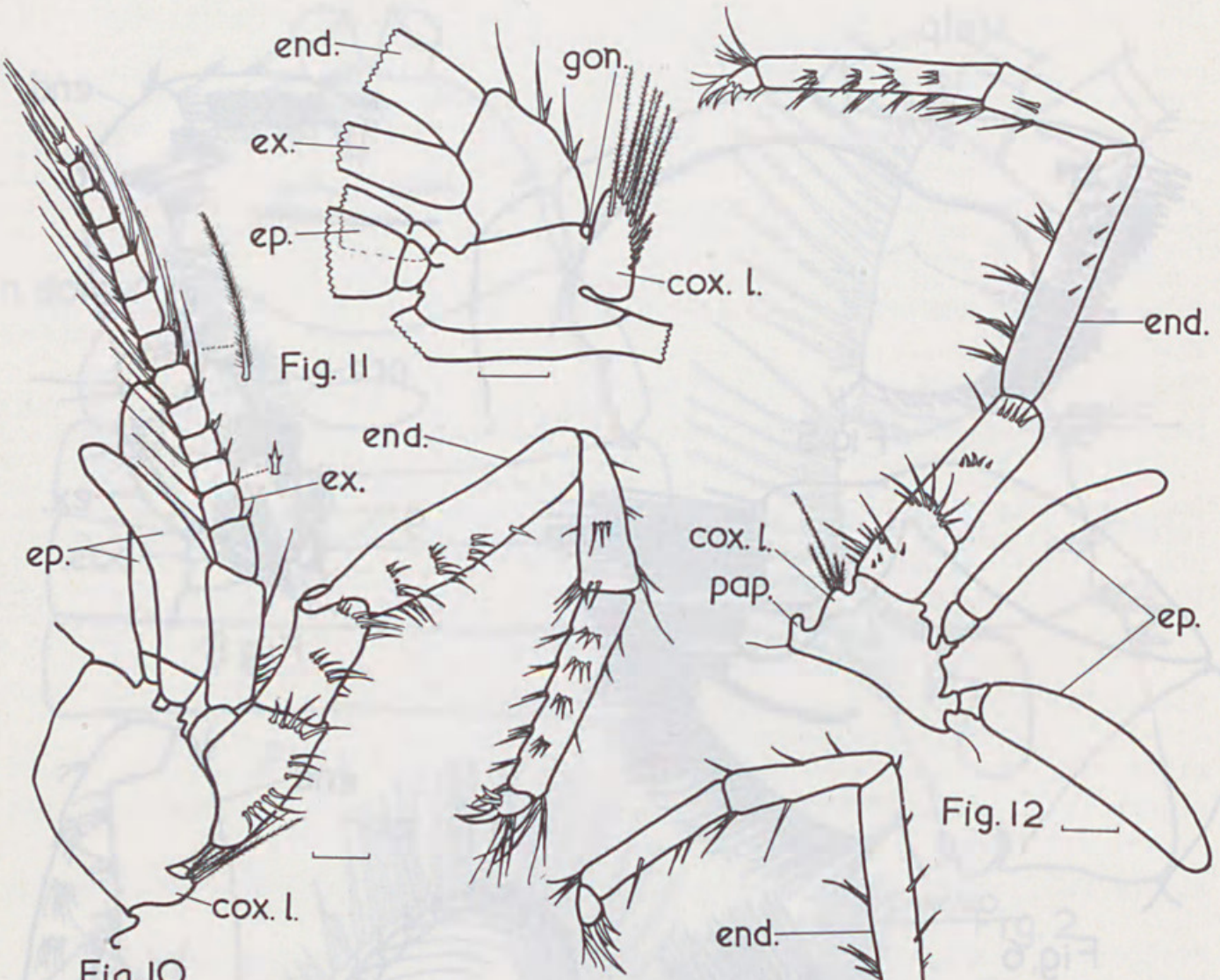



Fig.9


end.
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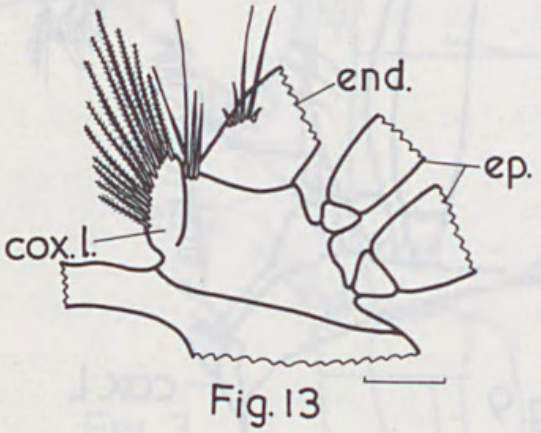
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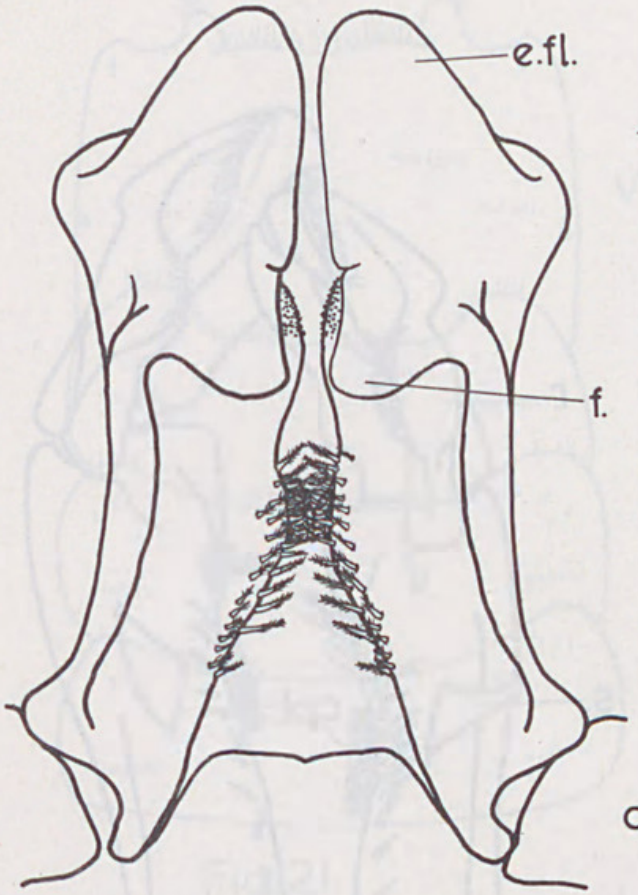



Fig. 17a

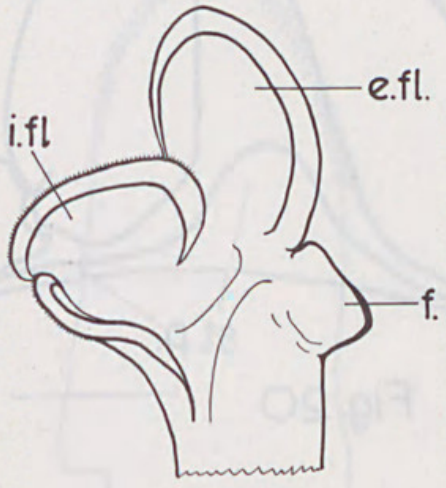



Fig. 17b

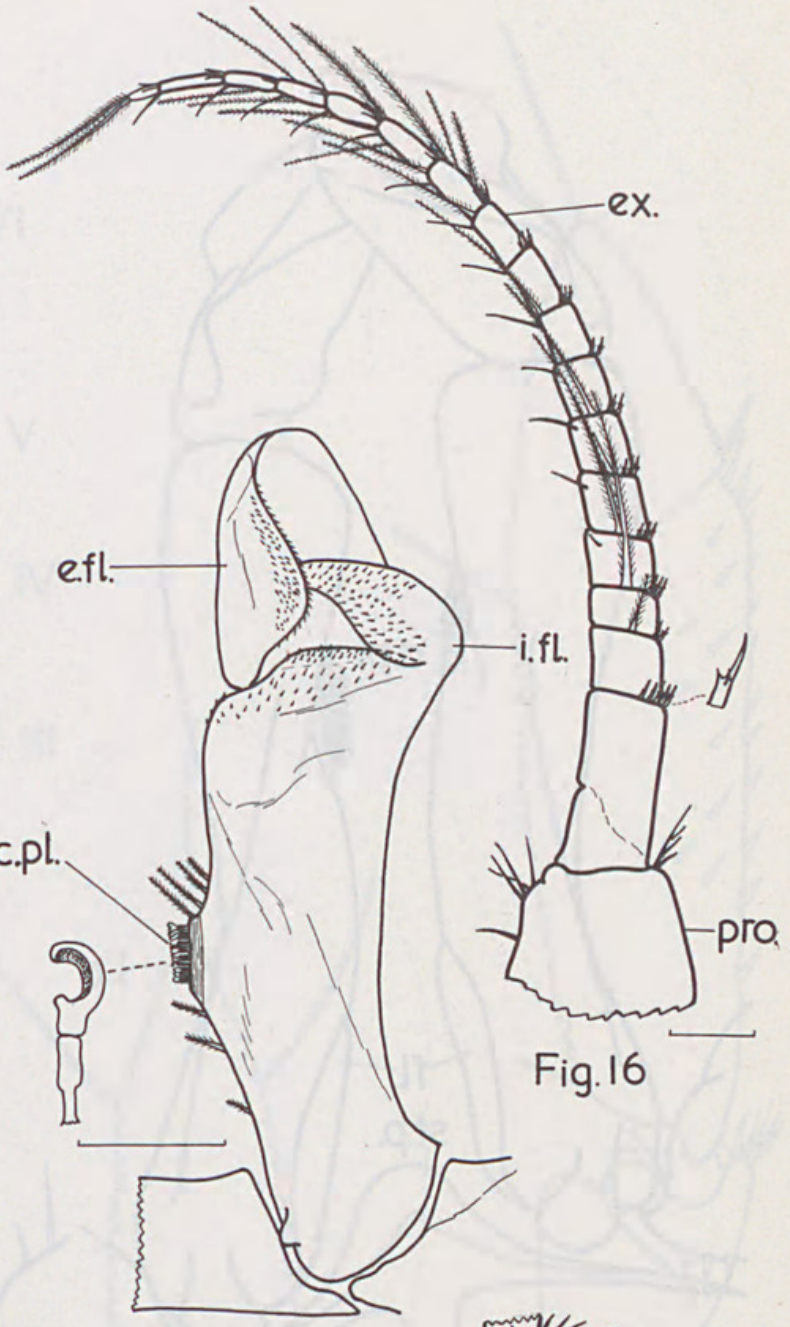



Fig. 16

Fig. 18

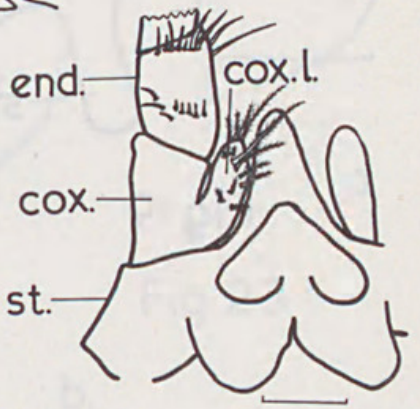



Fig. 15

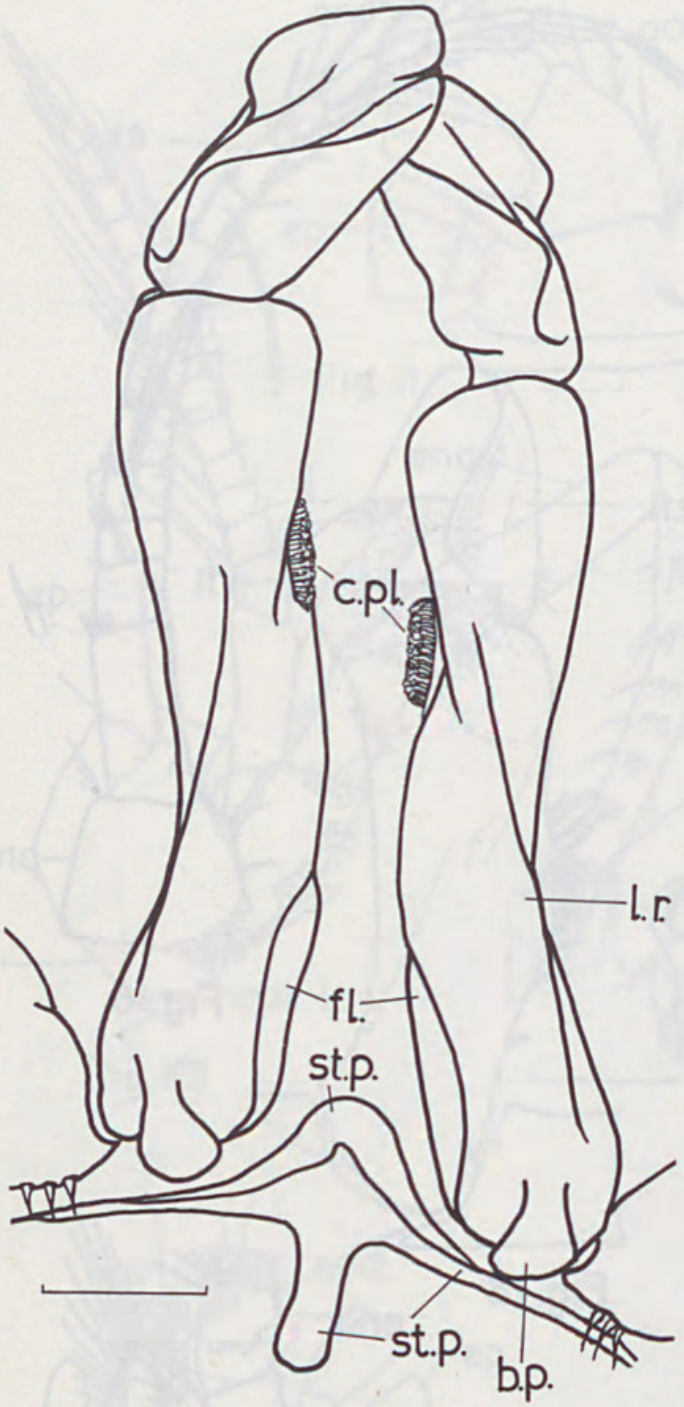



Fig. 19

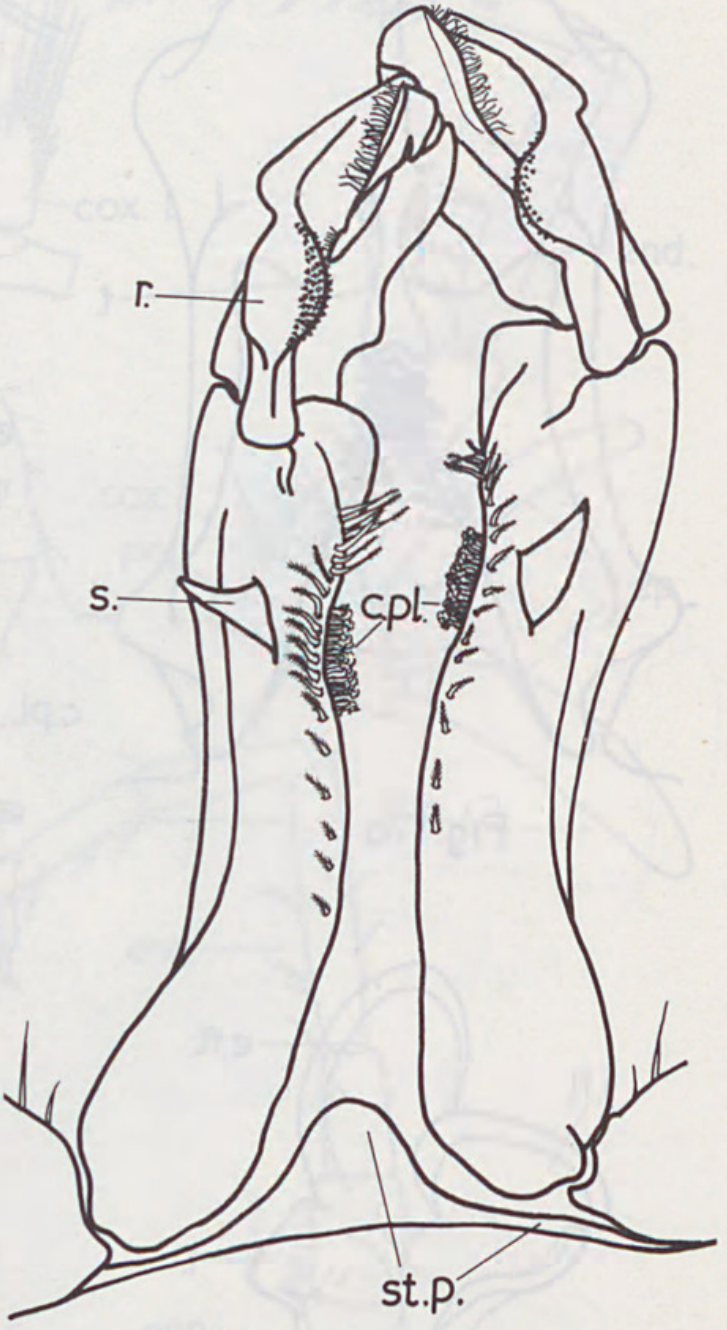



Fig. 20

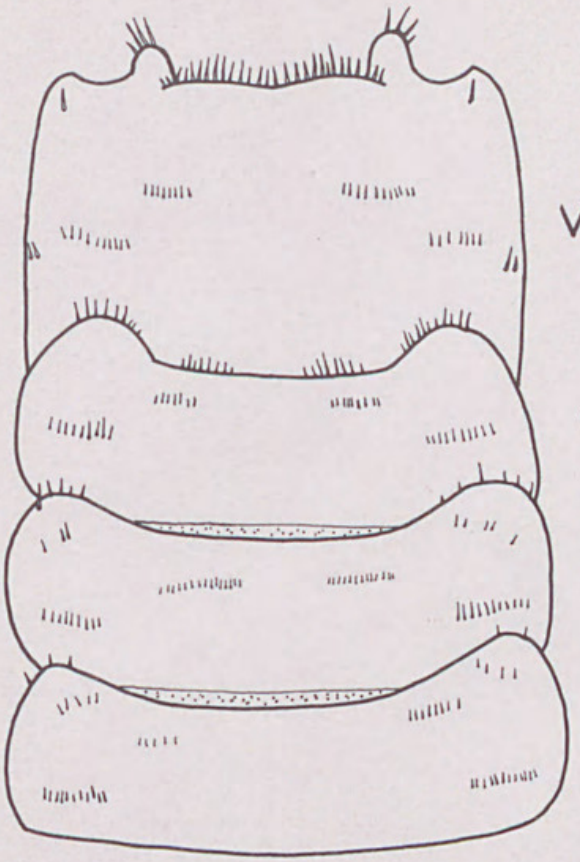



Fig. 21

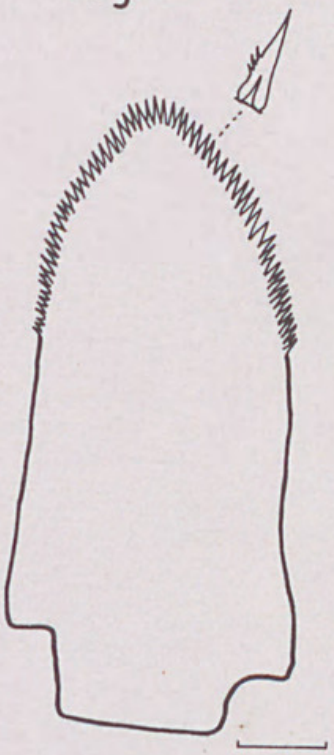
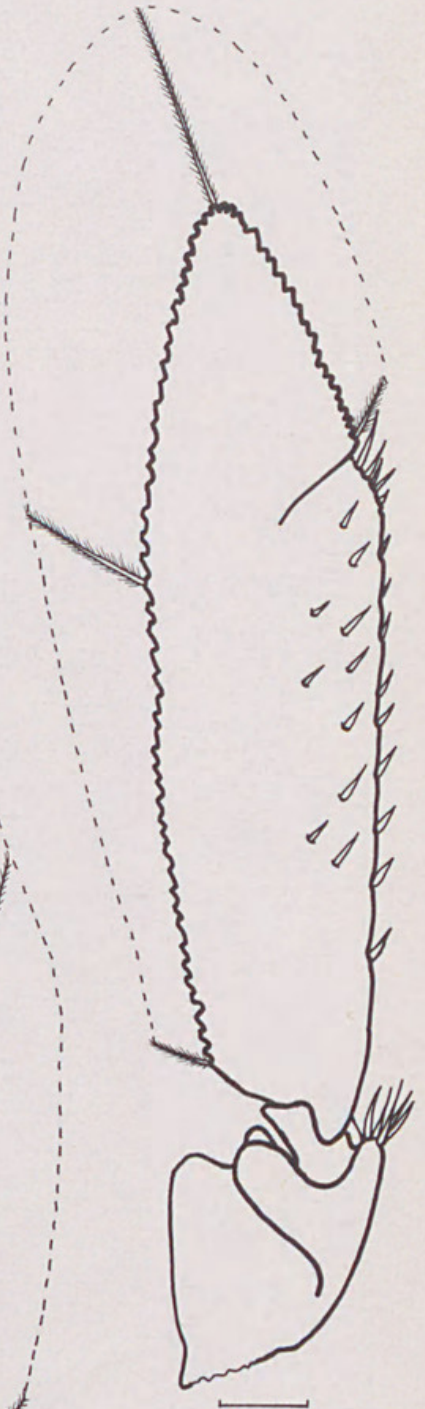


Fig. 22

b.



a.

Fig. 23