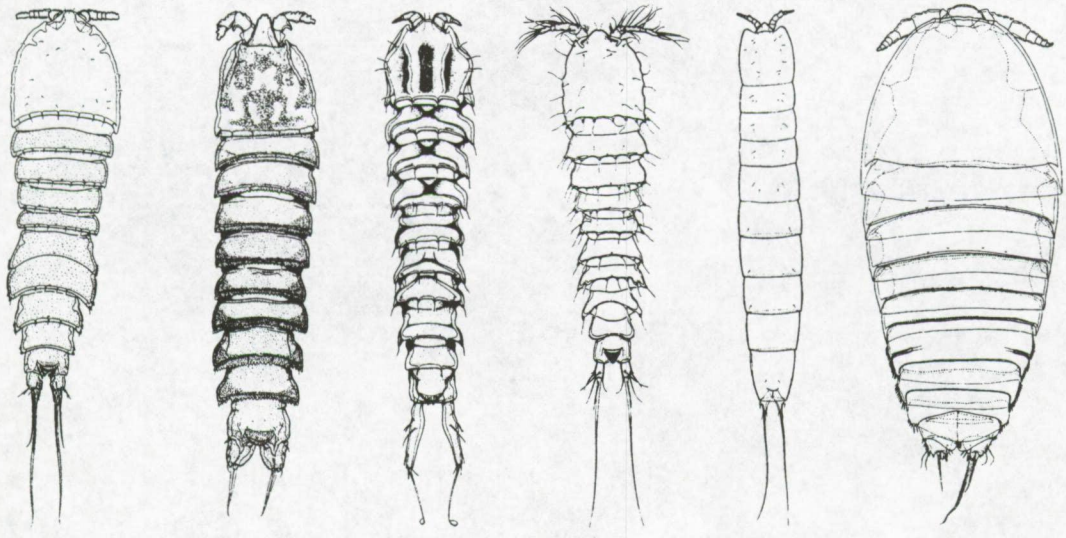
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SYSTEMATICS AND SOME DATA ON THE ECOLOGY OF THE HARPACTICOID FAUNA (COPEPODA, HARPACTICOIDA) FROM A SUBTROPICAL COASTAL LAGOON IN THE SOUTH-EASTERN GULF OF CALIFORNIA (MEXICO)

by

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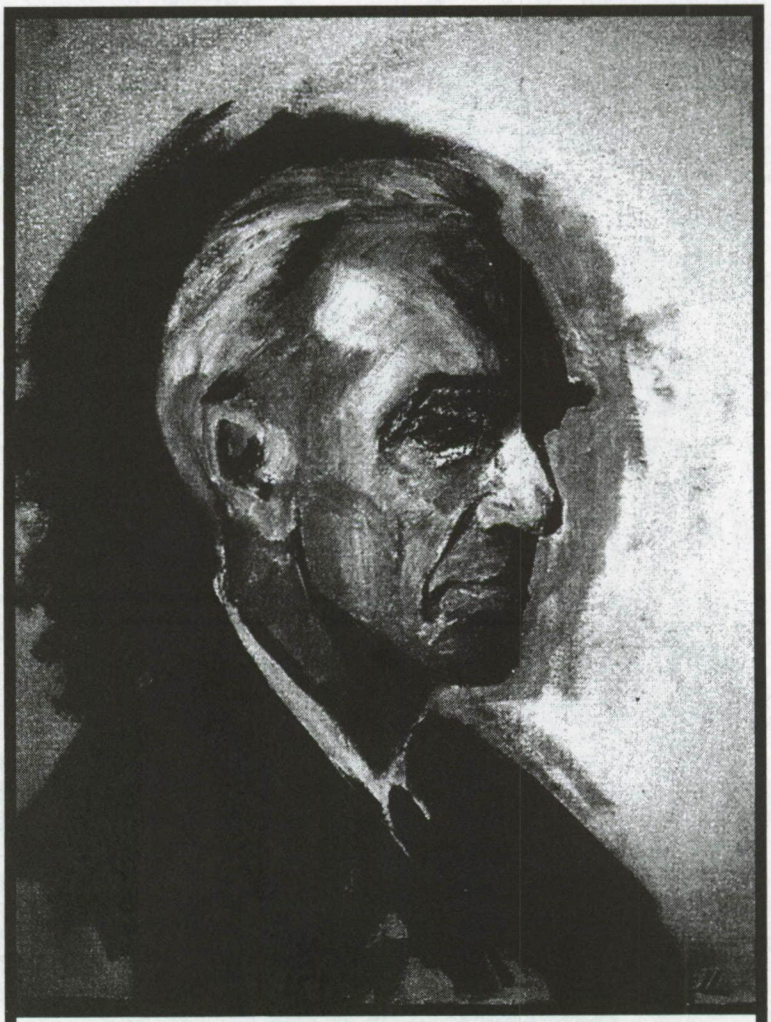
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Karl Georg Herman Lang
1901-1976

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Abstract

To improve the management of the coastal ecosystems in North-western Mexico, a study on the biology, chemistry and physical properties of these important aquifers was initiated in 1990. One of the systems to be studied in detail was the *Altata-Ensenada del Pabellón* lagoon (Sinaloa, Mexico), whose benthic communities were analized by the Benthic Invertebrates Research Group of the *Instituto de Ciencias del Mar y Limnología, Estación Mazatlán (ICMyL-UNAM)*.

The study of the benthic communities involved the analysis of the distribution and abundance of meiofauna, of which no data were available for the Mexican Pacific coast.

From this study, the numeric dominance of harpacticoids, only outnumbered by the nematodes, was observed. In order to continue the analysis of harpacticoids, unknown from the Mexican Pacific coast so far, and indepth study on its systematics and ecology started in 1995, and constitutes the main body of the present thesis.

Detailed comparison and careful description of the encountered harpacticoids revealed the presence of 20 families. In total 63 species were identified, of which 57% are new to science.

In addition, the subspecies *Longipedia helgolandica santacruzensis* Mielke is raised to the species rank, *Longipedia santacruzensis* Mielke *comb. nov.*, *Eoschizopera (Praeoschizopera) indica* Rao & Ganapati is transferred to *Eoschizopera (s. str.)*, while *Eoschizopera* spec. B Mielke 1995 is allocated to *Eoschizopera (Praeoschizopera)*, and *Schizopera osana* Mielke and *Schizopera* spec. A Mielke 1995a are attributed to a new subgenus, here defined.

Pseudostenhelia wellsi Coull & Fleeger is fully redescribed and compared with specimens from the type-region. Based on these observations, the setal formula of the natatorial legs as was presented by Coull & Fleeger (1972), Wells (1967) and Ranga & Reddy (1984) is amended.

In chapter V, a brief discussion of the most relevant biogeographic models of meiofauna is presented. Additionally, a brief biogeographic analysis of a species-group of the genus *Longipedia* (Longipediidae) and the genus *Scottolana* (Canuellidae) have been included under the form of work hypotheses which should be tested in future studies.

The analysis of abundance and distribution of harpacticoids in *Ensenada del Pabellón* lagoon have been presented elsewhere (Gómez Noguera & Hendrickx, 1997). Only some additional comments are included herein.

Finally, the analysis of the diversity of 4 communities is presented and discussed. It is concluded that the diversity of the harpacticoid communities in the four stations are negatively affected by organic enrichment through the sewage outlets of agro-indiustrial activities in the north-eastern part of this ecosystem.

Samenvatting

Om het beheer van de kust-ecosystemen in noordwest Mexico te verbeteren, werd in 1990 een onderzoek gestart naar de biologische, scheikundige en fysische aspecten van deze aquatische systemen. Eén van de te bestuderen systemen was de *Altata-Ensenada del Pabellón* lagune (Sinaloa, Mexico), waarvan de benthische gemeenschappen geanalyseerd werden door de onderzoeksgroep Benthische Invertebraten van het *Instituto de Ciencias del Mar y Limnología, Estación Mazatlan (ICMyL-UNAM)*.

Tot de studie van de benthische gemeenschappen behoorde ook de analyse van de verspreiding en densiteit van de meiofauna, waarvan tot voorheen geen gegevens beschikbaar waren voor de Mexicaanse westkust.

Uit deze studie bleek de numerieke dominantie van de harpacticoiden die, na de Nematoda, het belangrijkste vertegenwoordigende taxon vormden. Om de studie van de harpacticoidenfauna , tot op heden onbekend van de Mexicaanse westkust, verder te zetten, werd in 1995 gestart met een grondige studie van de systematiek en de ecologie van deze groep. Deze studie vormt het belangrijkste deel van de hier voorgelegde verhandeling.

Nauwkeurige identificatie en gedetailleerde beschrijving van de verzamelde harpacticoiden bracht het totaal van aanwezige families op 20 met 63 geidentificeerde soorten, waarvan 57% nieuw zijn voor de wetenschap.

Verder werd de ondersoort *Longipedia helgolandica santacruzensis* Mielke verheven tot op soortsniveau, *Longipedia santacruzensis* Mielke *comb. nov. Eoschizopera (Praeoschizopera) indica* Rao & Ganapati werd overgebracht naar het geslacht *Eoschizopera (s. str.)*. Eoschizopera spec. B Mielke 1995 werd ondergebracht in *Eoschizopera (Praeoschizopera)*. *Schizopera osana* Mielke en *Schizopera* spec. A Mielke 19995a werden overgebracht naar een nieuw subgenus, hier gedefinieerd.

Van *Pseudostenhelia wellsi* Coull & Fleeger werd een volledige herbeschrijving gegeven, en het Mexicaans materiaal werd grondig vergeleken met specimens atkomstig van de typestreek. Op basis van deze gegevens werd de chaetotaxie van de poten zoals die werd voorgesteld door Coull &Fleeger (1972), Wells (1967) en Ranga & Reddy (1984), aangepast.

In hoofdstuk V wordt een korte bespreking gegeven van de tot nu toe meest relevante biogeografische modellen voor meiofauna. Bovendien wordt een korte biogeografische analyse gegeven van het genus *Scottolana* (Canuellidae) en een soortsgroep in het genus *Longipedia* (Longipediidae). Dit wordt voorgesteld in de vorm van werkhypothesen die in de toekomst getest moeten worden.

De densiteits- en verspreidingsanalyse van de harpacticoiden in *Ensenada del Pabellón* lagune werd reeds elders gepubliceerd (Gómez Noguera & Hendrickx, 1997), bijgevolg worden hier slechts enkele aantekeningen gemaakt.

Tenslotte wordt een biodiversiteitsanalyse van 4 gemeenschappen besproken. Na grondig onderzoek werd vooropgesteld dat de biodiversiteit van de harpacticoidengemeenschappen van de vier stations negatief beïnvloed worden door organische aanrijking, afkomstig van agro-industriële activiteiten in het noordoostelijke deel van het systeem.

Résumé

Afin d'améliorer la gestion des écosystèmes côtiers situés au nord-ouest du Mexique, une étude approfondie concernant les propriétés biologiques, chimiques et physiques de ces systèmes, a vu le jour en 1990. Parmi les systèmes à étudier en détails figurait le système lagunaire *Altata-Ensenada del Pabellón* (Sinaloa, Mexico), dont les communautés benthiques furent analysées par l'équipe du Laboratoire des Invertébrés Benthiques de l'*Instituto de Ciencias del Mar y Limnología, Estación Mazatlán (ICMyL-UNAM)*. L'étude des communautés benthiques impliquait une analyse de la densité de la meiofaune ainsi que sa distribution, de telles données n'étant pas disponibles pour la côte Pacifique du Mexique.

Grâce à cette étude, la dominance numérique des harpacticoides, surpassés uniquement par les nématodes, a été observée. Dans le but de poursuivre l'analyse des harpacticoides, inconnus à ce jour pour la côte Pacifique du Mexique, une étude approfondie sur la systématique et l'écologie de ces animaux a débuté en 1995 et constitue le corps de la présente thèse.

La description détaillée et l'identification des espèces d'harpacticoides recontrés dans les échantillons a permis de révéler la présence de représentants de 20 familles différentes. Au total, 63 espèces ont été identifiées dont 57% étaient nouvelles pour la science.

Par surcroît, la sous-espèce *Longipedia helgolandica santacruzensis* Mielke a été élevée au rang d'espèce, *Longipedia santacruzensis* Mielke *comb. nov. Eoschizopera (Praeoschizopera) indica* Rao & Ganapati a été transférée chez *Eoschizopera (s. str.)*, tandis que *Eoschizopera* spec. B Mielke 1995 a été allouée à *Eoschizopera (Praeoschizopera)*, et enfin *Schizopera osana* Mielke ainsi que *Schizopera* spec. A Mielke 1995a ont été attribuées à un nouveau sous-genre, défini ici.

Pseudostenhelia wellsi Coull & Fleeger a été complétement redécrite et comparée acev les spécimens de la 'egion type. A la suite de ces observations, la chétotaxie des pattes natatoires présentée respectivement par Coull & Fleeger (1972), Wells (1967) et Ranga & Reddy (1984) a été corrigée.

Dans le chapitre V une brève discussion concernant les différents modèles biogéographiques de la meiofaune est presentée. De plus, une analyse biogéographique consice d'un groupe d'espèces du genre *Longipedia* (Longipediidae) et du genre *Scottolana* (Canuellidae) ont abouti à des hypothèses de travail qui pourront être testées dans des études ultérieures.

L'analyse de l'abondance et de la distribution des copépodes harpacticoides d'*Ensenada del Pabellón* a été présentée dans un article antérieur (Gómez Noguera & Hendrickx, 1997). Seulement quelques commentaires récapitulatifs ont été inclus dans le présent travail.

En fin, l'analyse de la diversité de 4 communautés d'harpacticoi est présentée et discutée. Il est conclu que la diversité des communautés d'harpacticoides dans les 4 stations sont négativement affectées par l'enrichissement organique provoqué par le déversement de déchets provenant d'activités agro-industrielles localisées principalement au nord-est de cet ecosystème.

Resúmen

Con el propósito de lograr un mejor manejo de los sistemas costeros del noroeste de Mexico, en 1990 comenzó un proyecto multidisciplinario acerca del estudio de las propiedades biológicas, químicas y físicas de estos ecosistemas. Uno de los sistemas contemplados en ese proyecto fue el sistema de lagunas costeras Altata-Ensenada del Paoellón, cuyas comunidades bentónicas fueron estudiadas en el Laboratorio de Invertebrados Bentónicos del Instituto de Ciencias del Mar y Limnología, Estación Mazatlán (ICMyL-UNAM).

Parte del estudio de las comunidades bentónicas correspondió al analisis de la abundancia y distribución de la meiofauna, de la cual no habian reportes para el Pacífico mexicano.

Entre otras cosas, se observó la importancia numérica de los copépodos harpacticoides en la meiofauna, siendo superados solamente por los nemátodos. Con el objeto de dar continuidad al estudio de este grupo de crustaceos de esta región, el cual no había sido abordado hasta la fecha, se decidió realizar estudios taxonómicos y ecológicos más profundos, cuyos resultados forman parte integral de la presente tesis.

La detallada descripción e identificación de las especies de copépodos harpacticoides reveló la presencia de un total de 20 familias. Un total de 63 especies fueron identificadas, de las cuales 57% son nuevas para la ciencia.

Adicionalmente una subespecie, *Longipedia helgolandica santacruzensis* Mielke, fue elevada a la categoría de especie, *Longipedia santacruzensis* Mielke *comb. nov. Eoschizopera (P.) indica* Rao & Ganapati fue transferida a *Eoschizopera (s. str.)*, *Eoschizopera* spec. B Mielke 1995 fue colocada en *Eoschizopera (Praeoschizopera)*, y *Schizopera osana* Mielke y *Schizopera* spec. A 1995a fueron transferidas a un nuevo subgenero, el cual ha sido descrito en el presente estudio.

Pseudostenhelia wellsi Coull & Fleeger fue completamente redescrita, y las tablas en las que se muestran las formulas setales presentadas por Coull & Fleeger (1972), Wells (1967) y Ranga & Reddy (1984) fueron corregidas.

En el capítulo V se presenta una breve discusión de los modelos biogeográficos mas relevantes hasta la fecha. Adicionalmente se ha incluido un breve análisis biogeográfico de un grupo de especies del género *Longipedia* (Longipediidae) y del género *Scottolana* (Canuellidae), cuyos resultados y conclusiones se han presentado como hipótesis de trabajo que deberán ser comprobadas en estudios futuros.

El análisis de la abundancia de los copépodos harpacticoides de Ensenada del Pabellón ya ha sido tratado anteriormente (Gómez Noguera & Hendrickx, 1997), y solo se presentan algunos comentarios.

Finalmente, se presenta el análisis y discusión de la diversidad de las comunidades de copépodos harpacticoides de 4 estaciones. Se concluye que la diversidad de las comunidades de copépodos harpacticoides es afectada negativamente por el enriquecimiento orgánico producido por las acitividades agro-industriales que se desarrollan en la parte noreste de este ecosystema.

I. INTRODUCTION

I.1. BACKGROUND

To improve the management of the most important brackish systems in northwestern Mexico, a multidisciplinary study was initiated in 1990 by Dr. Arenas Fuentes and Dr. Flores Verdugo (Arenas Fuentes & Flores Verdugo, 1991) of the Institute of Marine Sciences and Limnology of the National Autonomous University of Mexico (ICMyL-UNAM). One of the systems to be studied was the Altata-Ensenada del Pabellón lagoon in Sinaloa State (Mexico). So far, a number of reports showing the negative effects of the agro-industrial sewage outlets on water and soil quality (Conde Gómez, 1991; de la Lanza *et al.*, 1991a, 1991b; Gómez Noguera, 1992a, 1992b; Páez Osuna *et al.*, 1992; Gómez Aguirre & Gómez Noguera, 1993; Green Ruiz, 1996), heavy metal bioaccumulation in fishes (Izaguirre Fierro *et al.*, 1992), oysters (Páez Osuna *et al.*, 1993a), clams (Páez Osuna *et al.*, 1993 b) and mussels (Páez Osuna *et al.*, 1994), and on the distribution and abundance of macrofauna (Hendrickx *et al.*, 1991), and meiofauna (Gómez Noguera, 1993; Gómez Noguera & Hendrickx, 1997) have been published. With regard to this last subject, the abundance of this community was observed to be higher in the NE part of the lagoon, which is subject to the influence of organic matter from the mangrove forest and agro-industrial drainages. The accumulation of organic matter was observed to be favoured by low speed tidal currents. However, the increase in abundance of nematodes was found to be the principal cause for the increase in total meiofauna, since this taxon exhibits a higher tolerance to high levels of nitrogen compounds than some other taxa, such as harpacticoid copepods, foraminiferans and ostracods.

As will be seen later, the meiobenthic communities of harpacticoid copepods from the Mexican Pacific coast remain still uknown. The main goal of the present thesis is, therefore, the systematic analysis of the harpacticoid copepods gathered during a short-term study of the meiofauna from a subtropical coastal lagoon in the South-Eastern Gulf of California (Mexico). Additionally, some work hypotheses on the biogeography of some selected taxa, and some ecological aspects of these communities are presented as a first and necessary step towards an in-depth study of these communities.

I.2. RESEARCH ON HARPACTICOIDS (COPEPODA, HARPACTICOIDA) IN AMERICA
-a brief overview-

In America, ecological and/or taxonomical surveys on harpacticoids have been carried out in specific regions. This is the result, to some extent, of the nearness of research facilities to a given area. With regard to the West Atlantic American coasts, the majority of the studies, either ecological or taxonomical, are those from the Northamerican coast of the Gulf of Mexico, *e. g.* North Carolina (*e. g.* Coull & Lindgren, 1969; Tietjen, 1971; Volkmann-Rocco, 1972a, 1972b; Lindgren, 1972, 1975, 1976; Hamond, 1973d; Coull *et al.*, 1977; Coull *et al.*, 1982; Coull, 1971a, 1973a, 1973b, 1973c, 1973d; Pequegnat & Sikora, 1979; Murrell & Fleeger, 1989; Pequegnat *et al.*, 1990; Fiers, 1996a), South Carolina (*e. g.* Coull, 1975, 1976b; Coull & Fleeger, 1977; Coull & Hogue, 1978; Coull & Bell, 1979a; Coull & Zo, 1980), Louisiana (*e. g.* Fleeger & Clark, 1979; Fleeger, 1980; Chandler & Fleeger, 1984; Gee, 1988; Fiers & Rutledge, 1990; Lotufo & Fleeger, 1995), Florida (*e. g.* Bell & Kern, 1983; Fiers, 1992b), and Texas (*e. g.* Gee & Burgess, 1997), whereas only a very small proportion of reports corresponds to the north-eastern coast of Northamerica (*e. g.* Wilson, 1932b; Pennak, 1942a, 1942b; Chappuis, 1958; Rosenfield, 1967; Bowman, 1972; Coull, 1977; Yeatman, 1980), and Alaska (*e. g.* Gee & Fleeger, 1990). Similarly, the West Indian Islands have received much attention since the beginning of the twentieth century (*e. g.* Wilson, 1913; Willey, 1930, 1935; Kiefer, 1936; Humes, 1958; González & Bowman, 1965; Coull, 1969, 1970, 1971b; Coull & Herman, 1970; Yeatman, 1976; Petkovski, 1973, 1977, 1978; Renaud-Mornant & Gourbault, 1981; Renaud-Mornant *et al.*, 1981; Fiers, 1984, 1986a, 1986b, 1990b, 1991a, 1995; Mielke, 1988).

In the Atlantic coasts of mainland South and Central America, the generalized lack of information regarding harpacticoid taxonomy and/or ecology is noteworthy (Fernando & Smith, 1982; George, 1996). The better known areas are, to some extent, Brazil (*e. g.* Jakobi, 1953, 1954a, 1954b, 1955, 1956; Nogueira, 1961; Reid, 1993a, 1993b, 1993c, 1994), and Argentina (*e. g.* Pallares, 1968a, 1968b, 1970, 1975a, 1975b, 1979, 1982; Mielke, 1990a), followed by Panama (*e. g.* Mielke, 1981a, 1982a, 1984a, 1990b), Costa Rica (*e. g.* Mielke, 1992b, 1993, 1994) Nicaragua (*e. g.* Herbst, 1960), and Venezuela (*e. g.* Mielke, 1995b).

In the case of Pacific localities, the most extensive surveys on ecology and/or taxonomy of Harpacticoida have been carried out along the coast of California (*e. g.* Baker, 1912; Monk, 1941; Fahrenbach, 1954; Lang, 1965; Thistle & Coull, 1979; Watkins, 1983; Eckman & Thistle, 1988; Fiers, 1991b; Montagna, 1991, 1995a; Dybdahl, 1995), whilst in South America, the best known harpacticoid fauna is that from Galapagos (*e. g.* Mielke, 1979, 1981b, 1982b, 1984b, 1997), followed by that of Chile (for a revision see George, 1996), Panama (Mielke, 1981a, 1982a, 1984a, 1990b, 1990c), Costa Rica (Mielke, 1992b, 1993, 1995a), Peru and Nicaragua (Herbst, 1960).

Particularly in Mexico, despite the advantages of using meiofauna (*i. e.* those small benthic animals able to pass through a 0.5-2 mm mesh but retained on a mesh of 40-100 µm; see Mare, 1942 and McIntyre, 1969), and harpacticoids in particular, to tackle problems of theoretical ecology and environmental monitoring (*cf.* Ivester & Coull, 1977, Coull, 1988; Dahms, 1992, Gómez Noguera, 1993, Gómez Noguera & Hendrickx, 1997), the study of these communities have been so far disregarded due to a large extent to the misunderstanding of its scientific, ecological and/or economical significance. To my knowledge, the best known area so far, is the Mexican Caribbean Sea and Gulf of Mexico (*e. g.* Wilson, 1936; Comita, 1951; Cottarelli, 1977; Suárez-Morales *et al.*, 1996; Fiers, 1993, 1995, 1996b, 1997), whereas for the Mexican Pacific coast only some data on the ecology of meiofauna and the description of some new harpacticoid species are available (Gómez Noguera & Hendrickx, 1997; Gómez Noguera & Fiers, 1997, Gómez Noguera & Fiers, in prep.).

The significance of taxonomic studies on harpacticoids seems, at first glance, an unjustifiable scientific enterprise by itself. It becomes justifiable, however, when one considers their numerical and functional significance within meiofauna and their specific relationships with other macrofauna and nekton taxa, though their treatment as distinct from meiofauna has not been performed yet. Therefore, for the best understanding of the role played by this taxon in a wider range of localities, the accurate description of their inter- and intraspecific relationships is necessary, and can be achieved only through taxonomical studies (*e. g.* Ivester & Coull, 1977; Hendrickx, 1996).

I.3. SUBCLASS COPEPODA Milne Edwards 1840

The history of copepod classification is composed, as noticed by Huys & Boxshall (1991), by at least, two stages of development. The first phase, from the times of Linnaeus to the middle of the nineteenth century, is characterized by the classification of free-living and parasitic copepods into two separate taxa, in which non-copepod representatives were often included. It was Thorell in 1859, that for the first time considered the free-living and parasitic forms as a single group, thus marking the beginning of the second phase of copepod classification, the search for the natural classification and phylogenetic relationships between the copepodan taxa. Since then many new taxa of harpacticoids have been described, some species turned out to be junior synonyms or remain doubtful, whereas some species have been completely redescribed or amended (for a revision see Huys & Boxshall, 1991 and Bodin, 1997).

The most recent systematic concepts of the subclass Copepoda (term derived from the Greek words 'kope' (=oar) and 'podos' (=foot), literally meaning 'oar-footed' in reference to their paddle-like swimming legs), states that this taxon is composed of two infraclasses, the Progymnoplea Lang and the Neocopepoda Huys & Boxshall. The former contains only one order, the Platycopioida Fosshagen with one family, the Platycopiidae Sars, and the latter includes two superorders, the Gymnoplea Giesbrecht, with only one order, the Calanoida Sars, and the Podoplea Giesbrecht with the remaining eight orders (Huys & Boxshall, 1991).

Due to the high morphological plasticity shown by copepods (for a comparison of the different forms of copepodan taxa see Huys & Boxshall, 1991), regarded as the result of its ecological radiation, it is extremely difficult to formulate a diagnosis of the subclass, being the presence of a flat sclerite connecting the coxae of each pair of swimming legs (see Fig. 1c, 1d), its only true apomorphy (Huys & Boxshall, 1991; Huys, 1995). Other useful characters for the recognition of a copepod are: (i) the fusion of the maxilliped bearing, first thoracic somite into the cephalosome (see Fig. 1b) (although this condition is also found primitively in the Remipedia Yager 1981), (ii) the presence of uniramous antennules composed of up to 27 segments (see Fig. 1b, 2a) (though in many groups the number of segments is remarkably reduced), and (iii) the presence of egg sacs (although egg sacs can be secondarily lost in some highly derived parasitic taxa).

In general, the body of copepods is composed of a prosome (*i. e.* cephalosome consisting of five cephalic somites plus the first thoracic somite which bears the maxillipeds, plus the second to fifth thoracic somites), and an urosome (*i. e.* fifth leg-bearing somite plus genital somite where the genital opening is located in both sexes, and three limbless postgenital somites plus the caudal rami-bearing

anal somite) (Fig. 1a). In some orders (*e. g.* Harpacticoida) the second thoracic somite (*i. e.* the P1 bearing-somite) is fused to the cephalosome, and is then called cephalothorax. The cephalosome fused-somites (see Fig. 1b, 2, 3) bear a pair of uniramous antennules of up to 27 segments, a pair of typically biramous antennae with a 2-segmented protopod bearing an exopodite and endopodite composed of up to 10 and 4 segments respectively (though in some cases the exopodite is missing), and a pair of biramous mandibles, with a 2-segmented protopod bearing a large gnathobase on the coxa, with an exopodite and endopodite of up to 5 and 2 segments respectively. Next to the mandibles are located a pair of biramous maxillules consisting of a 3-segmented protopod bearing a praecoxal arthrite, 1 coxal and 2 basal endites, a coxal and/or basal exite, a 1-segmented exopodite and a 3-segmented endopodite. Next to the maxillules are located a pair of uniramous and up to 7-segmented maxillae, whose protopod comprises praecoxa and coxa with 2 endites each, and a basis with 1 endite, and exhibits a 4-segmented endopodite that in some cases is lost. Finally, next to the pair of maxillae are located a pair of maxillipeds. This last component is sometimes reduced or missing, but when present, it is typically uniramous and comprises praecoxa with 1 endite, coxa with 3 endites, and a 6-segmented basis bearing up to 3 setae. Additionally, the mouth opening is covered by a labrum which is directed posteroventrally, and between the bases of the mandibles and maxillules are located a pair of paragnaths, sometimes fused to form the labium.

The second to sixth thoracic somites bears a pair of typically biramous swimming legs (Fig. 1c, 1d) with a 3-segmented protopod (composed of a praecoxa, coxa and basis, the former reduced to a lateral plate at the base of the leg), and 3-segmented endo- and exopodite, joined medially by a rigid intercoxal sclerite (the latter is missing in the two non-parasitic species of the genus *Gelyella* Rouch & Lescher-Moutoué) (Huys, 1988; Moeschler & Rouch, 1988). The first four swimming legs are often reduced and sometimes missing (*e. g.* parasitic forms), whilst the fifth leg (Fig. 1d) is often modified by reduction or loss of the endopodite or by fusion of the endopodite to the basis, and can be absent in some species. The sixth legs are reduced, forming the apparatus that closes off the genital openings in both sexes.

In Copepoda, two basic plans of tagmosis can be found (Fig. 4). These two plans of body organization are differentiated by the position of the major body articulation, either behind the fifth pedigerous somite (gymnoplean), found in Platycopioida Fosshagen and Calanoida Sars, or between the fourth and fifth pedigerous somites (podoplean), found in the Harpacticoida Sars and remaining orders of Copepoda.

The life cycle of copepods includes generally, 6 naupliar and metanaupliar stages and 5 copepodid stages prior to the adult, though in parasitic species this development is abbreviated. Sperm is transferred by means of spermatophores that are placed by the male onto the female during copulation (for a revision on mating behavior of several harpacticoid taxa and some other relevant data, *e. g.* precopulatory and postcopulatory mate guarding, see Dürbaum, 1995, Glatzel, 1988, 1990, Glatzel & Schminke, 1996). The spermatophores discharge the sperm via paired copulatory pores into paired seminal receptacles within the genital somite of the female, where they are stored.

Eggs are typically carried in paired egg sacs, but in some groups there is a single sac or a loose egg mass and in others the eggs are released directly and are not carried by the female.

I.4. ORDER HARPACTICOIDA Sars 1903

The order Harpacticoida Sars, is one of the eight orders of the superorder Podoplea Giesbrecht, and along with Poecilostomatoida Thorell, Siphonostomatoida Thorell, and Calanoida, it is one of the most diversified orders within Copepoda. At the moment, the order contains well over 3,000 species belonging to 460 genera in 50 families (see Bodin, 1997).

Harpacticoida is primitively a marine epibenthic order, but at least four families (*e. g.* Parastenocarididae Chappuis, Canthocamptidae Sars, Monard, Lang, Phyllognathopodidae Gurney, and Chappuisiidae Chappuis) and several representatives of some other families secondarily invaded freshwater habitats (*e. g.* Ameiridae Monard, Lang, Cletodidae T. Scott, Por, Diosaccidae Sars, Ectinosomatidae Sars, Olofsson, Harpacticidae Sars, Laophontidae T. Scott and Thalestridae Sars, Lang).

The first records of Harpacticoida correspond to the descriptions of *Cyclops chelifer* (=*Harpacticus chelifer*) and *Cyclops brevicornis* (=*Tigriopus brevicornis*) by the Danish naturalist O. F. Müller in the late 1700s. Later, in September, 1935, Wilson coined the term 'terraqueous' for the small-sized harpacticoids found firstly by N. A. Cobb. In August, 1935, however, Nicholls introduced the term 'interstitial' for the microfauna inhabiting the interstitial water between sediment particles,

definition that has come into general use (for a revision on the history of harpacticoid research see Huys, 1995).

Harpacticoida, along with other seven orders of Copepoda can be distinguished from Platycopioida and Calanoida by their tagmosis (see Fig. 4), being podoplean in the former and gymnoplean in the latter. The antennule length is also a useful character in the recognition of Harpacticoida. In calanoids, the antennule is composed of more than 22 segments, between 10 and 22 in Cyclopoida Burmeister, and less than 10 in harpacticoids. The structure of the antenna is another useful character to distinguish between calanoids and harpacticoids (which exhibit a biramous antenna), and cyclopoids (with an antenna lacking the exopodite, *i. e.* uniramous).

I.5. CONTRIBUTION OF HARPACTICOIDA TO THE BENTHIC REALM

The study of harpacticoids covers a wide range of ecological and taxonomic subjects, some of which are beyond the scope of the present thesis. In this section I will stress the importance of harpacticoids in the benthic realm as one of the most abundant taxa within meiofauna, and I will refer only to those subjects related, to some extent, with this study. Therefore, the reader is referred to Hicks & Coull (1983) and Coull (1988) for a revision on other relevant subjects on harpacticoid research.

The harpacticoids have invaded several habitats, thus adopting different modes of existence, which is clearly reflected in the wide variety of body shapes and appendage modifications. The wide ecological radiation within harpacticoids is well illustrated with the example of the phyllognathopodid copepod *Phyllognathopus viguieri* Maupas, found in the bottom sediments of lakes, in the interstitial area of sandy beaches, in pools, springs, subterranean waters, sloughs, aquaria, in bromeliads and pineapple leaf axils, in semi-terrestrial soils, mosses and decomposing organic vegetation (*cf.* Lehman & Reid, 1993; Kikuchi, 1994), or by the Family Canthocamptidae, whose representatives are known from marine, brackish and freshwater systems and from the water contained in epiphytic bromeliads (*e. g.* Reid, 1990).

The body shape shared among harpacticoids have lead specific species assemblages for each habitat (=isocommunities *sensu* Thorson, 1957), where sediment granulometry (*e. g.* pore diameter and silt/clay content) and salinity play an important role (Mielke, 1976; Moore, 1979b, 1979c; Bodin, 1992). In fine to medium sands, where the median diameter and associated granulometry allows for an interstitial existence, three groups of harpacticoids may occur: (a) those adapted to the interstitial or mesopsammic life (*i. e.* occupy the interstices of sands by wriggling around and between the particles), typically small, vermiform and elongate (*e. g.* vermiform Ectinosomatidae Sars, Olofsson, and Ameiridae, Cylindropsyllidae Sars, Lang, and Paramesochridae Lang, and some miniature Cletodidae, and Laophontidae), (b) those adapted to endopsammic (*i. e.* burrowing) life, generally with larger fusiform bodies, broadened at the cephalothorax, and additionally equipped with modified appendages for digging in muddy sediments, and (c) those taxa inhabiting the surface of the sediment (*i. e.* epibenthic or epipsammic), of various body shapes (except vermiform), and often able to swim (*e. g.* Ectinosomatidae, Tachidiidae Sars, Lang, Harpacticidae, Laophontidae and perhaps some Diosaccidae and Cletodidae), and eventually equipped for life in the deep-sea (*e. g.* the Family Cerviniidae Sars, Lang) (Por, 1964b; Montagna, 1982).

A distinctive harpacticoid assemblage, composed commonly of some genera of the Family Tetragonicipitidae Lang (*e. g. Phyllopodopsyllus* T. Scott), and some genera of Diosaccidae, Laophontidae, Paramesochridae, Orthopsyllidae Brady & Robertson, and Cylindropsyllidae is typical of coarse shell-gravels habitats (see Por, 1964b, Coull & Herman, 1970, Coull, 1970, Hicks & Coull, 1983).

The phytal or epiphytic species, living on aquatic macroalgae and angiosperms are either free-swimming and cyclopoid-like, flattened, shield-shaped or laterally compressed and amphipod-like, or fusiform prehensile with strongly prehensile first legs or mouth parts adapted for life on fronds and leaves (*e. g. Amonardia normani* Brady, *Amphiascus undosus* Lank, *Dactylopodia crassipes* Lang (=*Dactylopusia crassipes*), *Mesochra pygmaea* Claus, *Tisbe cf. furcata* Baird, *Harpacticus compressus* Frost, *Heterolaophonte variabilis* Lang, and *Ectinosoma melaniceps* Boeck) (Webb, 1990).

Some species, *e. g. Stenhelia (D.) palustris* and *Pseudostenhelia wellsi* are known to be true tube-builders, thus displaying some morphological, ethological and physiological adaptations for tube-dwelling life (Lorenzen, 1969; Chandler & Fleeger, 1984; Williams-Howze & Fleeger, 1987; Williams-Howze *et al.*, 1987).

However, some species of certain genera (*e. g. Ectinosoma* Boeck, *Halectinosoma* Lang, *Pseudobradya* Sars, etc.), cannot be easily classified as epibenthic, burrowers or epiphytic, as they occur in sandy, muddy and phytal habitats. Some other taxa typically found in muds include some

genera of Cletodidae, Diosacccidae, Tachidiidae, Canuellidae Lang, and Longipediidae Sars, Lang (*cf.* Hicks & Coull, 1983).

Soyer (1970) united all mud associations into one group (*Haloschizopera* Lang, *Typhlamphiascus* Lang, *Cletodes* Brady), similar to the community of sublittoral muds found by Por (1964b) and Coull (1970), but with three subcommunities: (i) a coastal muddy bottom assemblage characterized by *Robertsonia* Brady and *Stenhelia* Boeck, (ii) a detritic muddy bottom primarily of *Enhydrosoma* Boeck, and (iii) an offshore muddy community characterized by *Eurycletodes* Sars. Moore (1979a) found and described for the Irish Sea, the harpacticoid subcommunities from pure mud, coarse muddy sands, fine muddy sands, sandy-mud and coarse sands, and Moore (1979b) described three groups or associations of harpacticoids: the group I generally composed of non-interstitial forms inhabiting sites with fine sand at the bottom of beaches, that turned out to be the sublittoral fringe fine sand association described by him earlier (Moore, 1979a), composed of *Thompsonula hyaenae* I. C. Thompson, *Harpacticus flexus* Brady & Robertson, *Rhizothrix minuta* T. Scott, *Halectinosoma herdmani* T. & A. Scott, *H. propinquum* T. & A. Scott, and *H. pterinum* Moore (the latter replaces *H. herdmani* in coarser deposits), and similar to Noodt's (1957) 'surf sand zone' (additionally represented by *Arenosetella tenuissima* Klie, *Asellopsis intermedia* T. Scott, *Cannuela perplexa* T. & A. Scott, *Paraleptastacus spinicauda* T. & A. Scott, and *Pseudobradya minor* T. & A. Scott), and to the associations found by Geddes (1967), O'Riordan (1971) and Bodin (1977); the group II, composed of true eulittoral forms like *Kliopsyllus constrictus* Nicholls, and *Asellopsis intermedia*, distributed on the lower shore and intolerant to salinities below 15-25 ‰, also components of Noodt's (1957) 'surf sand zone', with *Arenocaris bifida* Nicholls as intermediate between Groups I and II, and *Arenosetella tenuissima* between Groups II and III; the group III, characteristic of the upper shore and mostly euryhaline with a lower tolerance limit of between 3 and 15 ‰ (Noodt, 1957), includes *Paraleptastacus spinicauda*, *Stenocaris minuta* Nicholls, *Arenopontia subterranea* Kunz, *Psammotopa phyllosetosa* Noodt, and *Tryphoema lusitanica* Wells & Clark, and is similar to the association observed by Bodin (1977) in his 'facies of high level sands' of the Charentaise coast, similar to Noodt's (1957) subcommunity of the 'steep sand slope' above the 'surf sand zone', and Mielke's (1976). Bodin (1992) described the species assemblages from North Brittany (France), where he found an intertidal fine sand assemblage similar to that of Moore (1979a, 1979b), and a subtidal estuarine assemblage subdivided into a shallow fine sand assemblage with *Ectinosoma normani* T. & A. Scott, *Halectinosoma herdmani*, *H. propinquum*, *Tachidiella minuta* Sars, *Enhydrosoma propinquum* Brady, *Tryphoema porca* Monard, and *Harpacticus flexus*, and a large heterogeneous more or less muddy-sand assemblage with several facies like (i) a medium badly sorted muddy-sand facies with *Arenotopa* Chappuis & Rouch (=*Psammastacus* Nicholls) sp., *Leptastacus laticaudatus* Nicholls, *Kliopsyllus* Kunz sp. 1, *Apodopsyllus littoralis* Nicholls, *Halectinosoma herdmani*, *Haloschizopera pygmaea* Norman & T. Scott, *Normanella mucronata* Sars, *Parevansula* Guille & Soyer sp., and *Asellopsis hispida* Brady & Robertson, (ii) a very muddy-sand facies with eurytopous, muddy and phytophilous species such as *Haloschizopera pygmaea*, *Cletodes tenuipes* T. Scott, *Enhydrosoma propinquum*, *Normanella incerta* Lang, *Dactylopodella flava* Claus, *Stenhelia (D.) giesbrechti* T. & A. Scott, *Mesochra pygmaea* and *Halectinosoma cooperatum* Bodin, Bodiou & Soyer, and (iii) a very heterogeneous coarse muddy-sand facies with *Amphiascus propinquus* Sars, *A. longarticulatus* Marcus, *Cletodes spinulipes* Por, *Diarthrodes andrewi* T. Scott, *Psammocamptus axi* Mielke, *Haloschizopera pygmaea*, but also *Scottopsyllus (I.) intermedius* T. & A. Scott, *Sc. (Sc.) robertsoni* T. & A. Scott, *Hastigerella bozici* Soyer, and *Kliopsyllus* sp. 2.

Truly planktonic harpacticoids (*e. g. Microsetella* Brady & Robertson, *Euterpina* Norman, *Clytemnestra* Dana, *Macrosetella* A. Scott), generally displaying elongate seta and body shapes to stay afloat, comprise a very small proportion of the order but some are among the largest known harpacticoids (*cf.* Huys & Böttger-Schnack, 1994).

There is one harpacticoid family, the Balaenophilidae Aurivillius, that can be found as commensal on the baleen plates of whales, whilst several other taxa can be found in association with marine invertebrates like isopods (Stephensen, 1936; Wells, 1964; Pinkster, 1968; Coull & Lindgren, 1969; Bowman, 1972; Sleeter & Coull, 1973), spider crabs (Jakubisiak, 1932; Sewell, 1940; Petkovski, 1964a; Raibaut, 1961, 1968; Ingle, 1983; Fiers, 1992a), beach-dwelling and terrestrial crabs (Wilson, 1913; Pearse, 1930; Nicholls, 1957; Fiers, 1990a), decapod crustaceans of the genus *Pilumnus* (Fiers, 1992b), echinoderms (Humes & Gelerman, 1926; Humes, 1986), sponges (Ho, 1984; Huys, 1990a); bryozoans and cnidarians (Ho, 1984; Humes, 1985), holothuroids (*cf.* Fiers, 1992b), tunicates (Ho, 1984), polychaetes (*cf.* Boxshall, 1976), and cephalopods (Farran, 1914; Bresciani, 1970; Avdeev, 1982, 1983, 1986; Bresciani & Lützen, 1994). However, as pointed out by Fiers (1992b) and Huys

(1990a), not all the harpacticoids recovered from their supposed hosts are proof for a specific association, but only for the habitat where those species are suspected to be found. Such is the case for a number of laophontids found on terrestrial crabs and sponges, and some Diosaccidae, Harpacticidae, Thalestridae, Lang, Metidae Sars, Orthopsyllidae, Cletopsyllinae, Peltidiidae Sars, Argestidae Por, and Canthocamptidae, also collected from washings of sponges (*cf.* Hicks & Coull, 1983, Fiers, 1992b, Huys, 1990a).

Harpacticoid densities are reported from 0 to 6037 ind $10cm^{-2}$, with a mean of 100 ind $10cm^{-2}$ in shallow water systems and from 1 to 10 ind $10cm^{-2}$ in the deep-sea (see Hicks & Coull, 1983, Table I:71; Iwasaki, 1993). Within meibenthic communities, harpacticoids constitutes usually from 4-95% and 11-60% of the total sediment and phytal meiobenthos respectively, outnumbered only by nematodes, and occasionally some other taxa such as gastrotriches and isopods (*cf.* Hicks & Coull, 1983).

Harpacticoids are one of the most abundant taxa within meiofauna, so that their contribution to the benthos realm is significant. As many meiofauna taxa, harpacticoids can alter the physical and/or chemical properties of the sediments (Cullen, 1973; Rhoads *et al.*, 1977; Reichelt, 1991; Aller & Aller, 1992) through bioturbation, either by burrowing activities and/or mucus secretion (Eckman *et al.*, 1981) like in the case of the harpacticoid copepods *Stenhelia (D.) palustris* Brady, and *Pseudostenhelia wellsi* Coull & Fleeger (Lorenzen, 1969; Chandler & Fleeger, 1984; Williams-Howze & Fleeger, 1987; Williams-Howze *et al.*, 1987). Harpacticoids are known to contribute to control bacteria, ciliate and/or diatom assemblages (Montagna, 1984; Epstein & Gallagher, 1992; Montagna, 1995b; Montagna *et al.*, 1995), by means of selective grazing through the secretion of mucus (=mucus trap feeding, Riemann & Schrage, 1978) (Fahrenbach, 1962; Hicks & Grahame, 1979; Warwick, 1981).

Meiofauna is known to be subject to various types of predation by fishes, shrimps, etc. (Anderes, 1982; St. John *et al.*, 1989; Coull, 1990; Escaravage & Castel, 1990; Gayosso Vargas, 1993; Coull *et al.*, 1995; Feller & Coull, 1995), thus making particulate organic matter (POM), microbial and algal biomass available to higher trophic levels (Tenore *et al.*, 1977), or by other meiofauna taxa such as turbellarians (Watzin, 1983, 1985, 1986) and harpacticoid copepods (Marcotte, 1977; Rocha & Bjornberg, 1988; Reversat *et al.*, 1992; Lehman & Reid, 1993). Within meiofauna, harpacticoids are well known as food for bottom or phytal feeding larval and juvenile fishes especially in muddy sediments and vegetation where they are easier preys for potential predators than in sandy bottoms (Coull & Bell, 1979b; Hicks & Coull, 1983).

In terms of benthic metabolism it has been proved that meiofauna is responsible for approximately 5 times of the total metabolism of benthic macrofauna (Gerlach, 1971), and that by coupling meiofaunal annual turnover rate (estimated to approximate 10 by McIntyre, 1964, and Gerlach, 1971, 1978), with standing crop, it can be shown that meiofaunal and foraminiferan production is about equal to the production of the eventually dominant deposit feeding macrofauna, but will be dominated by meiofauna in the deep-sea and in very shallow water ecosystems (Gerlach, 1971, 1978; Thiel, 1975, 1983). However, the role of harpacticoids in the remineralization of organic matter and their contribution to total benthic metabolism remains unknown, and should be the main goal of future research on energy transfer to the demersal-pelagic realm.

The interaction of meiofauna with various components of the benthos (*e. g.* meiofaunal bottleneck theory *sensu* Neill, 1975), is well documented too. It has been shown its impact on the populations of recently-settled larvae and juveniles of macrofauna (=temporary meiofauna, McIntyre, 1964) (Thorson, 1966; Watzin, 1983, 1985, 1986; Yingst & Rhoads, 1978; Yingst, 1978; Bell, 1979; Coull & Bell, 1979b; Gómez Aguirre, 1993). However, Zobrist & Coull (1992, 1994), found no significant effect of dominant meiofaunal taxa (*e. g.* nematodes and copepods) on the settlement and survivorship of the larvae and juveniles of the polychaete *Streblospio benedicti* and the bivalve *Mercenaria mercenaria*, suggesting predaceous turbellarians as responsibles for the reduction in recruitment success of temporary meiofauna.

With regard to environmental studies, meiofauna has proved to be a reliable tool in the study of pollution in marine and brackish systems because of their large numbers, relatively stationary life habits, short generation times, benthic larvae and intimate association with sediments (Marcotte & Coull, 1974; Paasivirta & Särkkä, 1978; Govaere *et al.*, 1980; Poizat *et al.*, 1980; Kansanen, 1981; Gee & Warwick, 1985; Lambshead, 1986; Widbom & Elmgren, 1988; Bodin, 1988; Gregor & Munawar, 1989; Sandulli & de Nicola-Giudici, 1989, 1990; Radziejewska & Drzycimski, 1990; Coull & Chandler, 1992; Gómez Noguera, 1993; Somerfield *et al.*, 1994; Gómez Noguera & Hendrickx, 1997). At the present, little is known about the effects of pollution on harpacticoids as different from meiofauna, and only a few papers are available on the chronic toxicity of industrial effluents and its

effects on some species of Harpacticoida (*e. g.* Hutchinson & Williams, 1989, Moore & Stevenson, 1991).

II. STUDY AREA

Ensenada del Pabellón lagoon (24°19'-24°35' N and 107°28'-107°45' W) is located in the south-eastern region of the Altata-Ensenada del Pabellón coastal system, 40 km S-W of the city of Los Mochis, Sinaloa (south-eastern Gulf of California, Mexico) (Fig. 6). This system covers 126 km^2, and has a maximum depth of 15 m in La Tonina mouth and along Lucenilla peninsula, and less than 2 m in the N-E and N-W. Mangrove forest is well developed along the inner margin and in the inlets (Flores Verdugo *et al.*, 1991). Sediments are distributed as follows: medium to fine sands are found near la Tonina outlet, very fine sands along part of the sand bars, and muddy sediments dominate elsewhere in the lagoon (Peraza-Vizcarra, 1973; Ayala Castañares *et al.*, 1994; Green Ruiz, 1996). A well defined salinity gradient ranging from mesohaline brackish in the N-W region to polyhaline marine close to the inlets has been reported by Gómez Aguirre & Gómez Noguera (1993).

Geologically, Ensenada del Pabellón lagoon has been classified in several provinces or regions (see Inmann & Nordstrom, 1971, Shepard, 1973, Carranza-Edwards *et al.*, 1975, Lankford, 1977; López Ramos, 1980). Zoogeographycally, this system is located within the Californian-Cortez Transition Zone (*cf.* Brusca & Wallerstein, 1979), or in Hendrickx's "Area II" (Hendrickx, 1993) or "Southern Sinaloa" (Hendrickx, 1996), and is well known for its high species diversity and endemism. This area is under the influence of the warm tropical Mexican Current from May to September when temperature of shallow coastal water increases, and under the effects of southwards flowing currents north of Cape Corrientes from October to April, when temperature decreases. These water currents are well known to limit the distribution of diverse marine organisms (Brusca & Wallerstein, 1979; Hendrikx & Estrada-Navarrete, 1994; Hendrickx, 1996).

Ensenada del Pabellón, one of the largest lagoonal systems along the Mexican Pacific coast, is subject to the bulk of sewage outlets from two major sugar mills and the drainage from one of the most extensive agriculture complexes in north-western Mexico, that enters the system virtually untreated leading to the deterioration not only of water and soil quality, but also of the commercial fisheries that support the economy of the region (Conde Gómez, 1991; de la Lanza *et al.*, 1991a, 1991b; Izaguirre Fierro *et al.*, 1992; Gómez Noguera, 1992a, 1992b; Páez Osuna *et al.*, 1992, 1993a, 1993b, 1994; Gómez Aguirre & Gómez Noguera, 1993; Gómez Noguera, 1993; Green Ruiz, 1996; Gómez Noguera & Hendrickx, 1997).

In the following lines, a brief description of the sampling sites referred to in the next section of this thesis, is presented.

Station 1.- This sampling site is located in the inner margin of Peninsula of Lucenilla, close to the mouth of the Culiacan River and La Tonina inlet. The salinity of this site is influenced by tidal currents and fresh water, ranging from polyhaline to mesohaline. This site is characterized by the sandy sediments and the lack of mangroove. This station receives low amounts of organic matter and heavy metals through the Culiacan River but is not influenced directly by the agro-industrial activities in the north-east of the system.

Station 2.- This site is located in the nearby of the mouth of the Culiacan River, and alike station 1, salinity is determined by tidal currents and fresh water from the Culiacan River and seasonal streams. This is a rather shallow locality and is characterized by clayish sediments, and also receives low amounts of organic matter and heavy metals through the Culiacan River but is not affected by the agro-industrial activities carried out in the N-E part of the lagoon.

Station 3.- This locality is similar to station 1, but is located far away from La Tonina inlet.

Station 4-5.- This stations are located along an estuary known as El Pericón. The salinity of this estuary is defined by the evaporation rate and by fresh water through some seasonal streams. The sediment present in this locality is composed of clay and lime. Organic and inorganic pollution led by agro-industrial activities is evident in this locality from the smell and dark colour of the sediments. The denisty of mangroove is higher than in the preceding stations.

Station 6.- This locality is similar to stations 1 and 3, but is characterized by slower tidal currents and a relatively higher density of mangroove. This locality is not affected by organic or inorganic enrichment.

Station 7.- This site is located in a small island with limish and sandy sediments. The salinity of this locality is defined principally by tidal currents, and a high density of mangroove can be observed. This station is slightly influenced by sewage outlets from agro-industrial activities.

Station 8.- This site is located in an estuary known as Carnevaca, Here, the salinity is determined by the evaporation rate and by fresh water through seasonal streams. This is a very shallow station with limish sediments. Here, organic and inorganic enrichment is evident from the smell and colour of the sediment.

Station 9.- This station is located close to station 8, and is stronlgy influenced by the sewage outlets from two major sugar mills and drainage from one of the most extensive agriculture complexes in north-western Mexico. Here, dark muddy sediments and a high density of mangroove can be observed.

Stations 10, 11 and 12.- These sites are similar to station 9.

Station 13.- This station resembles stations 1, 3 and 6, though a higher density of mangroove can be observed. This station is not affected by sewage outlets.

Station 14 and 15.- These two stations are located in the south-east part of the lagoon, and are characterized by muddy sediments and a slightly higher density of mangroove than that observed in station 13. These two localities are slightly infulenced by the sewage outlets from the sugar mills and the agriculture complex in the north-east of the lagoon.

III. MATERIAL AND METHODS

Triplicate sediment cores were taken in the intertidal zone at 15 stations (see Fig. 6), in January, April and June 1991, and in March 1992, using a 3 cm diameter plastic corer. Each corer was then subdivided into upper (0-3cm depth), middle (3-6 cm depth) and inferior (6-9 cm depth) layer. It has to be noted that, due to financial constraints, the sampling effort decreased considerably troughout the study period, so that only four stations (2, 6, 7 and 8) can be considered as comparable in terms of species diversity.

Each subsample was stored separately and preserved in a 70% ethanol solution of Rose Bengal. Samples were pre-sieved through 500 and 63 µm sieves to separate macrofauna and large particles from meiofauna. Among animals retained in the 63 µm sieve, harpacticoids were picked out under a dissecting microscope and stored in 70% ethanol for further identification at the specific level through detailed observation of whole and dissected animals. Dissected parts were mounted in glycerin with sealed coverglasses. Observations and drawings were made at 1250X on a Leitz Periplan phase contrast light microscope equipped with a drawing tube.

Terminology and abbreviations following Lang (1948) except for nuccal organ (=Nackenorgan), named herein "integumental window". Abbreviations used in the text and tables: A, adult; CI-CV, first to fifth copepodid; Diss., dissected; Alc., alcohol preserved; F, female; M, male; A1, antennule; A2, antenna; Md, mandible; Mxl, maxillule; Mx, maxilla; Mxp, maxilliped; P1-P6, first to sixth leg; EXP, exopodite; ENP, endopodite; P# ENP/EXP #, endo- or exopodal segment of a given leg. Chaetotaxy of legs are shown briefly in the respective tables for each species. The number and/or position of armature in each segment either exo- or endopodite are indicated with numbers. For example, the chaetotaxy formula of an hipothetical exopodite being "1.1.123" means that the first and second segments bear 1 inner seta, and the third segment bears 1 inner, 2 apical and 3 outer setae/spines. The same applies in for coxa and basis.

All families and genera have been classified following Lang's order in his monograph and Bodin's catalogue, edition 1997. New taxa have been placed at the end of the description its respective taxa (new species at the end of the respective genus, new genera at the end of its respective family, and so on).

The examined material was provided with a provisional catalogue number (EMUCOP) and deposited in my own collection until appropriate publication. The depository and label of the material so far published is referred to in the description of the respective material.

As stipulated in the International Code of Zoological Nomenclature, Article 9, this thesis does not constitute a publication for the purposes of taxonomic literature, and any reference to it or part of its contents should be firstly discussed with the present author.

IV. TAXONOMICAL ACCOUNT

"An ocean without its unnamed monsters would be like a dreamless sleep."
John Steinbeck

FAMILY Longipediidae Sars 1903 (part.) *sensu* Lang 1944

GENUS *Longipedia* Claus 1863

Longipedia n. sp. 1
(Figs. 7-15)

Material examined:

SEX	STAGE	# IND.	STORED AS	# CATALOGUE	STATION	DEPTH	DATE
F	A	2	Alc.	EMUCOP-518-E	4-5	0-3 cm	01/MAY/91
F	A	1	Alc.	EMUCOP-276-A	15	0-3 cm	24/JUN/91
?	CII	1	Alc.	EMUCOP-552-A	4-5	0-3 cm	04/MAY/91
F	A	1	Diss.	EMUCOP-207-A	9	0-3 cm	03/JAN/92
M	A	1	Diss.	EMUCOP-210-A	9	0-3 cm	03/JAN/92
F	A	1	Diss.	EMUCOP-206-A	9	0-3 cm	03/JAN/92
F	A	1	Diss.	EMUCOP-205-A	9	0-3 cm	03/JAN/92
F	A	1	Diss.	EMUCOP-209-A	9	0-3 cm	03/JAN/92
M	A	1	Diss.	EMUCOP-208-A	9	0-3 cm	03/JAN/92
F	A	1	Alc.	EMUCOP-712-C	6	0-3 cm	03/JAN/92
M	A	1	Alc.	EMUCOP-732-D	14	0-3 cm	03/JAN/92
M	A	1	Alc.	EMUCOP-413-A	7	0-3 cm	03/JAN/92
M	A	1	Alc.	EMUCOP-733-G	14	0-3 cm	03/JAN/92
F	A	1	Diss.	EMUCOP-704-A	6	0-3 cm	03/JAN/92
F	A	1	Alc.	EMUCOP-705-A	6	0-3 cm	03/JAN/92

Female

Habitus (Fig. 7a, 7b): body length ranging from 595 to 764 μm including tip of rostrum and caudal rami, tapering from posterior edge of headshield. Rostrum (Fig. 10f) articulated with cephalosome, with broad base and rounded apex, with 2 small subdistal sensillae. Cephalic shield furnished with setules along ventrolateral margin; with tubular internal structures laterally; posterior edge with finely serrated hyaline frill. Surface of prosomites smooth; lateral tubular structures and frill as in cephalosome. Major body articulation between third prosomite and first urosomite, latter with acutely produced posterolateral corner. Genital double-somite (Fig. 8a, 8b) with complete suture dorsally; first segment with pair of lateral sharp epimeral lappets ventrally, second one with serrated hyaline frill, more accentuated in ventral view, and with row of small spinules close to caudal margin ventrally. Fourth urosomite with serrated frill, latter somewhat more accentuated ventrally. Fifth urosomite relatively small; seemingly longer dorsally than ventrally, with finely serrated hyaline frill. Anal segment with long median spine flanked on either side by pair of smaller elements (outermost serrated), and a sensilla. Anal rounded operculum set with fringing setules. Caudal rami about twice as long as broad; with 7 elements.

Antennule (Fig. 9), with six indistinctly separated segments; integument of segments smooth except for 2 rows of long spinules and 1 row of small elements on first segment. Third and fourth segment with 1, ultimate segment with 2 aesthetascs.

Antenna (Fig. 10a): basis ornamented with fragile elements close to joint with endopodite, latter three-segmented. First endopodal segment with 2, second one with 4, third one with 6 setae. Exopodite eight-segmented; from first to seventh segment with 1, ultimate component with 4 setae.

Mandible (Fig. 10b), with multi-dentate chewing edge. Coxa-basis with 2 setae, and furnished with delicate setules. Endopodite two-segmented; first segment with 3, second one with 6 setae. Exopodite four-segmented; first segment with 2, second and third ones with 1, ultimate segment with 2 setae.

Maxillule (Fig. 10c): praecoxal arthrite with 7 distal spines, 2 subdistal elements, 1 lateral bipinnate strong and 1 lateral spine, and 2 surface setae; coxa with 5 inner and 5 long outer setae; inner edge of basis with 8 setae; endopodite with 4 setae in the base and 5 in the distal portion; exopodite rounded, with seven setae.

Maxilla (Fig. 10d): praecoxa with 2 endites, proximal one with 6 feathered setae, distal one with 3 spinulose elements; coxa with 2 endites, each with 3 elements ornamented as in distal praecoxal endite; basis with a claw and 6 setae. Endopodite three-segmented; first and second segments seeminlgy fused, with 2 setae each; terminal segment with four elements.

Maxilliped (Fig. 10e), not prehensil. Praecoxa and coxa fused, with 1 long setae basally, 2 median elements, 5 subdistal and 2 distal setae; basis with 2, endopodite with 11 setae.

P1 (Fig. 11a): coxa ornamented with some rows of small spinules and group of strong spinules and fragile elements close to outer edge, and armed with a long pinnate seta downwards directed; basis smooth except for some fragile elements between rami and for some small spinules at base of inner spine, armed with outer long plumose seta. Rami three-segmented; exopodite reaching proximal third of last endopodal segment. Chaetotaxy as in Table 1.

P2 (Fig. 11b): coxa ornamented with several groups of spinules and fragile elements, and armed with a very small seta close to inner edge; basis with spinules close to joint with endopodite, with outer feathered seta. Rami three segmented; third endopodal segment about 2.3 times as long as preceding segments combined, and about 18 times as long as broad. Chaetotaxy as in Table 1.

P3-P4 (Fig. 12a, 12b): coxa furnished with several transverse rows of spinules and with additional row of minute ones close to joint with basis, the latter smooth, with inner and median acute projections, and with outer feathered seta. Rami three segmented; exopodite of P3 reaching about 2/3 of third endopodal segment, of P4 as long as entire endopodite. Chaetotaxy as in Table 1.

P5 (Fig. 13a): the pair of P5, distinct. Baseoendopodite seemingly articulated; outer seta arising from long cylindrical projection furnished with spinules. If articulated, endopodite two-segmented; first segment without armature; second segment with a long whip-lash shaped element and an inner seta at its base. Exopodite with 6 setae.

Male

Habitus (not illustrated), as in female, except for genital double-somite (Fig. 14a, 14b). Length, 527 to 550 µm including rostrum and caudal rami. Third and fourth urosomite with continous row of spinules ventrally. Fifth urosomite, anal segment and caudal rami as in female.

Antennule (Fig. 15a), five-segmented, chirocer; third and fourth segment with 1, ultimate segment with 2 aesthetascs.

Mouth parts and P1-P4 (not illustrated) as in female.

P5 (Fig. 15b): the pair of P5 confluent. Baseoendopodite clearly not articulated; baseoendopodal lobe as in female, though relatively smaller and accessory seta is very reduced. Exopodite with 6 setae

P6 (Fig. 15c), represented by a lappet with inner spine and 2 outer setae.

Variability

The only variability observed consists of the structure of the anal segment (Fig. 13b, 13c).

Table 1. Chaetotaxy of *Longipedia n. sp. 1.*

	P1	P2	P3	P4
COXA	1.0	1.0	1.0	1.0
BASIS	1.1	0.1	0.1	0.1
EXP	1.1.123	1.1.222	1.1.222	1.1.122
ENP	1.1.122	1.2.231	1.2.321	1.2.022

Comparison and discussion

Klie (1949) originally described *L. minor helgolandica* from Helgoland, but provided a rather incomplete description of his specimens, and remained silent about the lack of the outer spine of the male third endopodal segment of P2 (to my knowledge, this feature is also present in *L. minor* T. & A. Scott 1893, *L. andamanica* Wells 1980, and *L. scotti* Sars 1903). Later on, González & Bowman (1965), based on the incomplete original description of the type species by Klie (1949), and probably assuming that Klie's type material should present the outer spine of the male third endopodal segment of P2 (although *L. minor* lacks this spine), identified their specimens from North America with *L. minor helgolandica*, and

raised this subspecies to the species level as *L. helgolandica* Klie 1949. In 1975, Mielke reported this species from the North Sea island of Sylt, and was able to point some differences between his material and the description of the North American population earlier provided by González & Bowman (1965), the most striking difference being the lack of the outer spine on P2 ENP 3 in his material. In his outstanding revision of the genus, Wells (1980) proved, based on the analyses of Klie's, González & Bowman's and Mielke's specimens, that the North American population is in fact a new species, *L. americana* Wells 1980, that can be separated from the European population based on the differences pointed out in the same paper (Wells, 1980, Table 1: 156). Additionally, Wells (1980) suggested that *L. americana* could be represented also by a subspecies earlier described by Mielke (1979) from the Galapagos Islands as a subspecies of *L. helgolandica* (*L. helgolandica santacruzensis* Mielke 1979).

I agree completely with Wells' criteria to separate *L. helgolandica* from *L. americana* with respect to the abdominal ornamentation, armature and ornamentation of coxa of P2, armature of male third endopodal segment, and size of the proximal seta of P4 ENP 2. However I'm reluctant with regard to the unguiform projection of P2 EXP 1 "normally developed" or "massive", and the form of the spinule rows on the coxa of P3 and P4, as the written description seems rather subjective. On the other hand, the presence/absence of the tubercle on the female and male P5 exopodite, is sometimes difficult to observe, and the ornamentation on the posterior surface of the female P5 exopodite is often overlooked.

The Mexican new species herein described showed to be more closely related to *L. helgolandica santacruzensis*, than to *L. helgolandica* and/or *L. americana* (see Table 2).

The most striking differences between both pairs of species are: (i) P4 ENP 1.- *L. helgolandica santacruzensis* and *Longipedia n. sp. 1* lack the inner seta of P4 ENP 1 found in *L. helgolandica* and *L. americana*, (ii) P4 EXP/ENP relative length.- both rami of P4 are of about the same length in *L. helgolandica santacruzensis* and *Longipedia n. sp. 1*, while in the two other species, the endopodite is slightly smaller than the exopodite, (iii) female P5.- the baseoendopodal lobe, the exopodite and the outer cylindrical extension bearing the outer seta, seem to be articulated in *L. helgolandica santacruzensis* and *Longipedia n. sp. 1* (to my knowledge, these are the only species within the genus with such articulation), and (iv) P4 EXP/ENP 2.- the proximal seta of P4 ENP 2 is reduced in the four species; however the distal element of *L. helgolandica santacruzensis* and *Longipedia n. sp. 1* reaches the tip of the following segment, while in the other two species, the same structure hardly reaches 2/3 of the P4 ENP 3; similarly, the inner spine of P4 EXP 2 reaches the tip of the following segment *in L. helgolandica santacruzensis* and *Longipedia n. sp. 1*, while in *L. helgolandica* and *L. americana*, it reaches 2/3 of P4 EXP 3.

Since *L. helgolandica santacruzensis* and *Longipedia n. sp. 1* share some features with *L. americana*, that are not exhibited by *L. helgolandica*, it can be assumed that *L. helgolandica santacruzensis* and *Longipedia n. sp. 1* are more closely related to the former. Such features are: (i) the presence of the outer spine on the male P2 ENP 3, (ii) a reduced inner seta on the coxa of P2, (iii) a small outer unguiform projection on the female P2 ENP 1, and (iv) a proximal and distal seta of P3 ENP 2 as long or longer than the supporting segment. Therefore, I conclude that *L. helgolandica santacruzensis* is in fact a different taxon from those above mentioned, and that the attempt to allocate that species as a subspecies of *L. americana*, as suggested by Wells (1980), lacks sufficient grounds, and should be quoted as *L. santacruzensis* Mielke 1979 *comb. nov.*

L. santacruzensis and *Longipedia n. sp. 1* can be easily mistaken one for each other. However both species can be separated by the inner seta of coxa of P2 (relatively well developed in *L. santacruzensis*, and very reduced in *Longipedia n. sp. 1*).

Table 2. Part I. Salient features of the species of *Longipedia* Claus 1863 (after Wells, 1980). *Longipedia* spec.[1] of Fiers (1984), *L. mourei*[1] of Jakobi(1954a), *L. pontica*[1] and *L. ferox*[1] of Krichagin (1873), *L. rosea*[2] of Sars (1903) and *L. pirgos*[3] of Apostolov (1972) have been excluded from the present table in agreement with Wells (1980). Only the certain or very probable records cited by Wells (1980) have been taken into account.

	coronata[5-16] Claus 1863	*kikuchii*[6, 11, 17] Itô 1980	*nichollsi*[5, 11, 18] Wells 1980	*scotti*[12, 19, 20] Sars 1903	*andamanica* Wells 1980
P1					
EXP	1.1.123	1.1.123	1.1.123	1.1.123	1.1.123
ENP	1.1.122	1.1.122	1.1.122	1.1.122	1.1.122
P2					
EXP	1.1.222	1.1.222	1.1.222	1.1.222	1.1.222
ENPfemale	1.2.231	1.2.231	1.2.231	1.2.231	1.2.231
ENPmale	1.2.231	1.2.231	1.2.231	1.2.230	1.2.230
P3					
EXP	1.1.222	1.1.222	1.1.222	1.1.222	1.1.222
ENP	1.2.321	1.2.321	1.2.321	1.2.321	1.2.321
P4					
EXP	1.1.122	1.1.122	1.1.122	1.1.122	1.1.122
ENP	1.2.022	1.2.022	1.2.022	1.2.022	1.2.022
P5 female					
EXP	6	6	6	6	6
ENP	2	2	2	2	2
P5 male					
EXP	8	7	8	6	6
ENP	2	2	2	2	2
Genital somite	With large epimeral lappets	With small epimeral lappets	With small epimeral lappets	With large epimeral lappets	With large epimeral lappets
P2 COXA	With well developed inner element	With well developed inner element	With well developed inner element	With a reduced inner seta	Without inner seta
P2 ENP 1 female	With a long outer unguiform projection	With a long outer unguiform projection	With a long outer unguiform projection	With a long outer unguiform projection	With a long outer unguiform projection
P2 ENP 1 male	Without outer unguiform projection	Without outer unguiform projection	Without outer unguiform projection	With a small outer unguiform projection	With a small outer unguiform projection
P2 ENP 2	With 2 small setae	With 2 small setae	With 2 small setae	With 2 small setae	With 2 small setae
P3 ENP 1	With a small or moderately well developed inner seta	With well developed inner seta	With a small or moderately well developed inner seta	With a small or moderately well developed inner seta	With a well developed inner seta
P3 ENP 2	Proximal seta small, distal one as long or longer than supporting segment	Proximal and distal seta as long or longer than supporting segment	Proximal and distal seta as long or longer than supporting segment	Proximal and distal seta as long or longer than supporting segment	Proximal and distal seta as long or longer than supporting segment

Table 2.Part I. Cont.

P4 EXP 3	Innermost seta smaller than supporting segment	Innermost seta as long or longer than supporting segment	Innermost seta smaller than supporting segment	Innermost seta as long or longer than supporting segment	Innermost seta as long or longer than supporting segment
P4 EXP 2	Inner spine reaching middle of P4 EXP 3	Inner spine reaching middle of P4 EXP 3	Inner spine reaching middle of P4 EXP 3	Inner spine reaching almost tip of P4 EXP 3	Inner spine reaching middle of P4 EXP 3
P4 EXP 1	With a very small inner seta	With a very small inner seta	With a very small inner seta	With a very small inner seta	With a very small inner seta
P4 ENP 1	With inner spine	With inner spine	With inner spine	With inner spine	With inner spine
P4 ENP 2	Proximal seta very reduced, distal one reaching 2/3 of P4 ENP 3	Proximal seta very reduced, distal one almost reaching tip of P4 ENP 3	Proximal seta very reduced, distal one almost reaching tip of P4 ENP 3	Proximal seta very reduced, distal one almost reaching tip of P4 ENP 3	Proximal seta very reduced, distal one reaching tip of P4 ENP 3
P4 ENP/EXP	ENP slightly shorter than EXP	ENP slightly shorter than EXP	ENP slightly shorter than EXP	Both rami of about the same length	ENP slightly shorter than EXP
P5 female	ENP and outer seta seemingly not articulated	ENP and outer seta seemingly not articulated	ENP and outer seta seemingly not articulated	ENP and outer seta seemingly not articulated	ENP and outer seta seemingly not articulated

Table 2. Part II.

	spinulosa Itô 1981	*andamanica nipponica* Itô 1985	*minor*[8, 13, 14, 21-24] T. & A. Scott 1893	*weberi*[9, 16, 17, 23, 25, 26, 27] A. Scott 1909	*brevispinosa* Gurney 1927b
P1					
EXP	1.1.123	1.1.123	1.1.123	1.1.123	1.1.123
ENP	1.1.122	1.1.122	1.1.122	1.1.122	1.1.122
P2					
EXP	1.1.222	1.1.222	1.1.222	1.1.222	1.1.222
ENPfemale	1.1.231	1.1.231	1.0-1.231	1.1-2.231	1.1.231
ENPmale	1.2.321	1.1.230	1.0-1.230	UNKNOWN	1.1.231
P3					
EXP	1.1.222	1.1.222	1.1.222	1.1.222	1.1.222
ENP	1.2.321	1.2.321	1.2.321	1.2.321	1.2.221
P4					
EXP	1.1.122	1.1.122	1.1.122	1.1.122	1.1.122
ENP	1.2.022	1.2.022	1.2.022	1.2.022	1.2.022
P5 female					
EXP	6	6	6	6	6
ENP	2	2	2	2	2
P5 male					
EXP	8	6	7	8	UNKNOWN
ENP	2	2	2	2	
Genital somite	With large epimeral lappets	With large epimeral lappets	With large epimeral lappets	With very large epimeral lappets	With very large epimeral lappets
P2 COXA	With well developed inner element	Without inner element	With well developed inner element	With well developed inner element	With well developed inner element
P2 ENP 1 female	With a long outer unguiform projection	With a long outer unguiform projection	With a small outer unguiform projection	With a long outer unguiform projection	With a long outer unguiform projection
P2 ENP 1 male	Without outer unguiform projection	Without outer unguiform projection	Without outer unguiform projection	With a small outer unguiform projection	UNKNOWN
P2 ENP 2	With 1-2 small setae	With 1 small seta	With 1 small seta	With 1 seta	With 1 seta
P3 ENP 1	With a small inner seta	With a small or moderately well developed inner seta	With a small or moderately well developed inner seta	With a small or moderately well developed inner seta	With a small inner seta
P3 ENP 2	Proximal and distal seta as long or longer than supporting segment	Proximal and distal seta as long or longer than supporting segment	Proximal seta small, distal one as long or longer than supporting segment	Proximal and distal seta as long or longer than supporting segment	Proximal seta small, distal one as long or longer than supporting segment
P4 EXP 3	Innermost seta as long or longer than supporting segment	Innermost seta as long or longer than supporting segment	Innermost seta as long or longer than supporting segment	Innermost seta as long or longer than supporting segment	Innermost seta as long or longer than supporting segment

Table 2. Part II. Cont.

P4 EXP 2	Inner spine reaching middle of P4 EXP 3	Inner spine reaching 2/3 of P4 EXP 3	Inner spine reaching middle of P4 EXP 3	Inner spine reaching middle of P4 EXP 3	Inner spine reaching middle of P4 EXP 3
P4 EXP 1	With a very small inner seta	With a very small inner seta	With a very small inner seta	Without inner seta	With a very small inner seta
P4 ENP 1	With inner spine	With inner spine	With inner spine	With inner spine	With inner spine
P4 ENP 2	Proximal seta very reduced, distal one almost reaching tip of P4 ENP 3	Proximal seta very reduced, distal one almost reaching tip of P4 ENP 3	Proximal seta very reduced, distal one almost reaching tip of P4 ENP 3	With only 1 distal element almost reaching tip of P4 ENP 3	Proximal seta very reduced, distal one reaching 2/3 of P4 ENP 3
P4 ENP/EXP	ENP slightly shorter than EXP	ENP slightly shorter than EXP	ENP slightly shorter than EXP	ENP slightly shorter than EXP	ENP slightly shorter than EXP
P5 female	ENP and outer seta seemingly not articulated	ENP and outer seta seemingly not articulated	ENP and outer seta seemingly not articulated	ENP and outer seta seemingly not articulated	ENP and outer seta seemingly not articulated

Table 2. Part III.

	helgoladica [10, 24, 27-31] Klie 1949	*americana*[4, 7, 28] Wells 1980	*santacruzensis*[4, 32, 33, 34] Mielke 1979 *comb. nov.*	*n. sp. 1*[32, 34] present study
P1 EXP ENP	 1.1.123 1.1.122	 1.1.123 1.1.122	 1.1.123 1.1.122	 1.1.123 1.1.122
P2 EXP ENPfemale ENPmale	 1.1.222 1.2.231 1.2.230	 1.1.222 1.2.231	 1.1.222 1.1.231	 1.1.222 1.2.231
P3 EXP ENP	 1.1.222 1.2.321	 1.1.222 1.2.321	 1.1.222 1.2.321	 1.1.222 1.2.321
P4 EXP ENP	 1.1.122 1.2.022	 1.1.122 1.2.022	 1.1.122 1.2.121	 1.1.122 1.2.022
P5 female EXP ENP	 6 2	 6 2	 6 2	 6 2
P5 male EXP ENP	 6 2	 6 2	 UNKNOWN	 6 2
Genital somite	With large epimeral lappets	With large epimeral lappets	With large epimeral lappets	With large epimeral lappets
P2 COXA	With well developed inner element	With a reduced inner seta	With inner slender seta	With a very reduced seta
P2 ENP 1 female	Without outer unguiform projection	With a small outer unguiform projection	With a small outer unguiform projection	With a small outer unguiform projection
P2 ENP 1 male	Without outer unguiform projection	Without outer unguiform projection	UNKNOWN	Without outer unguiform projection
P2 ENP 2	With 2 small setae	With 2 small setae	With 1-2 small setae	With 2 small setae
P3 ENP 1	With a well developed inner seta	With a well developed inner seta	With a well developed inner seta	With a well developed inner seta
P3 ENP 2	Proximal seta small, distal one as long or longer than supporting segment	Proximal and distal seta as long or longer than supporting segment	Proximal and distal seta as long or longer than supporting segment	Proximal and distal seta as long or longer than supporting segment
P4 EXP 3	Innermost seta as long or longer than supporting segment	Innermost seta as long or longer than supporting segment	Innermost seta as long or longer than supporting segment	Innermost seta as long or longer than supporting segment

Table 2. Part III. Cont.

P4 EXP 2	Inner spine reaching 2/3 of P4 EXP 3	Inner spine reaching 2/3 of P4 EXP 3	Inner spine reaching tip of P4 EXP 3	Inner spine reaching tip of P4 EXP 3
P4 EXP 1	With a very small inner seta	With a very small inner seta	With a very small inner seta	With a very small inner seta
P4 ENP 1	With inner seta	With inner seta	Without inner spine	Without inner spine
P4 ENP 2	Proximal seta very reduced, distal one reaching 2/3 of P4 ENP 3	Proximal seta smaller than in *L. helgolandica*, distal one reaching 2/3 of P4 ENP 3	Proximal seta very reduced, distal one almost reaching tip of P4 ENP 3	Proximal seta very reduced, distal one almost reaching tip of P4 ENP 3
P4 ENP/EXP	ENP slightly shorter than EXP	ENP slightly shorter than EXP	Both rami of about the same length	Both rami of about the same length
P5 female	ENP and outer seta seemingly not articulated	ENP and outer seta seemingly not articulated	ENP and outer seta seemingly articulated	ENP and outer seta seemingly articulatted

[1] *incertae sedis* (after Wells, 1980, and Bodin, 1997)
[2] *nomen dubium* (after Wells, 1980)
[3] *L. pontica* Apostolov 1969 is synonym of *L. pirgos* Apostolov 1972 , and is considered as *incertae sedis* (after Wells, 1980)
[4] *L. helgolandica santacruzensis* Mielke 1979, is probably a subspecies of *L. americana* Wells 1980 (after Wells, 1980), but this suggestion lacks sufficient grounds and therefore, this subspecies is ranked to the specific level as *L. santacruzensis* Mielke 1979 *comb. nov.* (present study).
[5] *L coronata* of Nicholls, 1935, is synonym of *L. nichollsi* Wells 1980 (after Wells, 1980)
[6] *L. coronata* of A. Scott, 1909, may be *L. kikuchii* Itô 1980 (after Itô, 1980)
[7] *L. coronata* of Fish, 1925, of Williams, 1906, and of Wilson, 1932b is synonym of *L. americana* Wells 1980; *L. coronata* of Carvalho, 1952, possibly is *L. americana* Wells 1980; *L. coronata* of King, 1950, almost certainly is *L. americana* Wells 1980 (after Wells, 1980)
[8] *L. coronata* of Norman, 1869, and Pesta, 1959, may be *L. minor* (after Wells, 1980)
[9] *L. weberi* of Monard, 1928a, probably is *L. coronata* (after Wells, 1980)
[10] *L. coronata* of Moore, 1973, may be *L. helgolandica* Klie 1949 (after Wells, 1980)
[11] *L. coronata*, *L. kikuchii* and *L. nichollsi* are closely related (after Wells, 1980)
[12] *L. coronata* of Brady, 1880, T. Scott, 1893, 1896, and T. & A. Scott 1893, are synonyms of *L. scotti* (after Wells, 1980)
[13] *L. coronata* of T. Scott, 1894, and Giesbrecht, 1881, 1882, probably are *L. minor* (after Wells, 1980)
[14] *L. coronata var. minor* of T. Scott, 1893, T. & A. Scott, 1893, is synonym of *L. minor* (after Wells, 1980)
[15] *L. coronata* of Gurney, 1927b, is *L. weberi* (after Wells, 1980)
[16] *L. weberi* of Wells, 1965, 1970, is *L. coronata* (after Wells, 1980)
[17] *L. weberi* of Itô, 1973, is synonym of L. kikuchii (after Itô, 1980)
[18] *Longipedia* sp. of Wells, 1978, is synonym of *L. nichollsi* Wells 1980 (after Wells, 1980)
[19] *L. australica* Nicholls 1941a, *L. longispina* Monard 1928a, 1937, *L. weberi* of Wells, 1964, 1967, *Longipedia* (pink form) of Gurney, 1930, are synonyms of *L. scotti* (after Wells, 1980)
[20] *L. scotti* of A. Scott, 1909, is in doubt (after Wells, 1980)
[21] *L. longispina* of Marques, 1947, is considered as a doubtful record of *L. minor* (after Wells, 1980)
[22] *L. pontica* of Apostolov, 1971, 1973, and *Longipedia* sp. of Vilela, 1965, are synonyms of *L. minor* (after Wells, 1980).
[23] *L. minor* of Gurney, 1927b, is *L. weberi* (after Wells, 1980)
[24] *L. minor* of Klie, 1927, and Roe, 1958, are synonyms of *L. helgolandica* Klie 1949 (after Wells, 1980)
[25] *L. weberi* of Wells, 1964, 1967, is synonym of *L. scotti* (after Wells, 1980)
[26] *L. longispina* Monard 1928a, synoymized with *L. weberi* by Lang, 1948, is synonym of *L. scotti* (after Wells, 1980)
[27] *L. weberi* of Bodin, 1970, 1976, 1977, Crothers, 1966, O'Riordan, 1966, 1971, and Roe, 1958, 1960, are synonyms of *L. helgolandica* Klie 1949 (after Wells, 1980)
[28] *L. helgolandica* of Coull, 1969a, 1970, 1971a, 1972, Coull & Vernberg, 1970, 1975, González & Bowman, 1965, Hartzband & Hummon, 1974, Yeatman, 1964, 1976, are synonyms of *L. americana* Wells 1980 (after Wells, 1980)
[29] *L. minor helgolandica* Klie 1949, is synonym of *L. helgolandica* Klie 1949 (after González & Bowman, 1965)
[30] The males described by Mielke, 1975, are the males of *L. helgolandica* Klie 1949 (after Wells, 1980)
[31] *L. minor helgolandica* of Noodt, 1956, 1957, is *L. helgolandica* Klie 1949 (after Wells, 1980)
[32] *L. santacruzensis* Mielke 1979 *comb. nov.*, and *Longipedia n. sp. 1* are closely related (present study)
[33] *L. helgolandica santacruzensis* Mielke 1979, should be raised to the species level as *L. santacruzensis* Mielke 1979 *comb. nov.* (present study)
[34] *L. santacruzensis* Mielke 1979 *comb. nov.*, and *Longipedia n. sp. 1* are more related to *L. americana* Wells 1980, than to *L. helgolandica* Klie 1949 (present study)

FAMILY Canuellidae Lang 1944

GENUS *Scottolana* Por 1967

Scottolana sp.1
(Figs. 16-23)

Material examined:

One dissected female (EMUCOP-503-D), found in station 4-5 at a depth of 0-3 cm, on 01/MAY/91.

Female

Habitus (Fig. 16a, 16b; 17): length, 942 µm including tip of rostrum and caudal rami; body tapering posteriorly from caudal edge of cephalosome. Rostrum (Fig. 18c) articulated with cephalosome, with broad base and rounded apex, with 2 small subdistal sensillae. Cephalosome about 1/4 of total body length. Surface of pro- and urosomites ornamented with small pustules; with hyaline frill unincised, but ornamented as the rest of the somite. First prosomite not fused to cephalosome. First urosomite distinctly shorter than preceding ones. Genital double-somite longer than wide; with dorsolateral cuticular band at the height of fusion; entirely fused ventrally; genital field (Fig. 17, 23c), as in *Scottolana antillensis* Fiers 1984. Anal segment (Fig. 16a, 16b, 17) shorter than preceding urosomite; with rounded anal operculum flanked by fragile elements. Caudal rami slightly longer than the two preceding segments combined; external margin almost straight, internal edge convex; with seven elements, all implanted on or nearby the caudal margin.

Antennule (Fig. 18a, 18b), with 6 indistinctly separated segments; integument of segments smooth; fourth and fifth segment with an aesthetasc.

Antenna (Fig. 19a): basis subsquarish, with row of small spinules and fragile elements close to proximal and distal inner corner respectively. Endopodite three-segmented; first segment as long as following segments combined, with 2 median inner setae; second segment with 4, ultimate one with 6 (or 7?) setae. Exopodite eight segmented; from first to seventh segment with 1, ultimate component with 4 setae.

Mandible (Fig. 19b): gnathobasis with several rows of teeth of different shapes and with a pinnate seta; basis of coxa with 2 setae. Endopodite two-segmented; first segment with 3, ultimate one with 8 setae. Exopodite three-segmented; first segment about 1/2 as long as following segment, with 1 feathered seta; second segment about twice as long as wide, with 2 setae; ultimate segment small, with 3 setae.

Maxillule (Fig. 19c-h): separation between coxa, praecoxa and arthrite not very distinct; the latter with 7 spines and 3 setae; with 2 surface elements; coxa with 2 epipodal setae and 6 endital elements; basis with 7 setae and ornamented with fragile elements. Exopodite one-segmented, rounded, with 10 setae, outermost very small. Endopodite two-segmented; first segment with 5, second one with 6 setae.

Maxilla (Fig. 20a): praecoxa and coxa distinct; the former furnished with small spinules on outer distal corner, and with fragile short elements proximaly on outer edge and on inner margin near joint with coxa; with 2 median endites, proximal one with 5, distal one with 2 setae; coxa with 2 endites, proximal one close to joint with praecoxa, distal one close to joint with basis, both endites ornamented with subapical spinules and with 3 setae each; basis prolonged into an armed claw, with a strong seta on each side, and with 4 slender additional setae. Endopodite two (or three?)-segmented; first segment with 1, second segment with 7 setae.

Maxilliped (Fig. 20b): separation between praecoxa and coxa not very evident; the former without setae; the latter with 1 proximal seta, 2 groups of median pinnate setae with 2 elements each, and 4 subapical setae (one of them longer than supporting segment); basis ornamented with small spinules on outer margin, with 3 setae. Endopodite two-segmented; first segment with 4 inner and 1 outer seta; second segment with 5 setae.

P1 (Fig. 21): coxa rectangular, ornamented with minute pustules and some rows of small spinules close to inner distal corner, and with median fragile long elements; with row of small spinules close to joint with following protopodal element; with long inner bipinnate seta. Basis seemingly without pustules; furnished with small spinules on anterior face close to joint with endopodite, and in posterior face close to joint with exopodite and close to inner distal corner; with inner bipinnate spine and outer seta. Rami three-segmented. Chaetotaxy as in Table 3.

P2 (Fig. 22a): protopodal components and entire rami ornamented with small pustules. Coxa rectangular; ornamented with small spinules close to insertion of inner bipinnate seta; with median row of small spinules and group of strong elements; with row of small spinules close to joint with following protopodal segment. Basis ornamented with small spinules close to joint with endopodite and with fragile elements on posterior face. Rami three-segmented (third endopodal segment unkown). Chaetotaxy as in Table 3.

P3 (Fig. 22b): protopodal segments and rami as in preceding leg, except for somewhat less massive coxa and basis. Rami three-segmented. Chaetotaxy as in Table 3.

P4 (Fig. 23a): although there is some evidence of the presence of an inner coxal seta, this element was missing. Therefore I'm reluctant to assure its presence. Basis as in P3. Rami three-segmented (though the third segment of both rami remain unknown). First and second exopodal segment as in P3 except for inner spine on second one. First endopodal segment as in P3, except for inner spine, and somewhat less protruded outer distal corner; second segment without inner seta. Chaetotaxy as in Table 3.

P5 (Fig. 23b): the pair of small P5 are located rather ventrally (see Fig. 17). Each leg represented by 4 setae: outermost seta arising separately, 3 innermost seta arising from distinct lobe.

Table 3. Chaetotaxy of *Scottolana sp. 1.*

	P1	P2	P3	P4
COXA	1.0	1.0	1.0	?.0
BASIS	1.1	0.1	0.1	0.1
EXP	0.1.7	1.1.7	0.1.5	0.1.?
ENP	1.1.6	1.1.?	1.1.4	1.0.?

Comparison and discussion

Given the state of conservation of the only specimen gathered from Ensenada del Pabellón lagoon, the difficulties to allocate it to a given genus (it resulted simply impossible, indeed, either to allocate this specimen to a known species or create a new taxon based on its description), within the Canuellidae are obvious (*i. e.* I'm not certain about the number of setae of A2 ENP 3; and the chaetotaxy of P2 ENP 3, P4 ENP 3 and EXP 3, and coxa of P4 remain unknown). Through thorough comparison of the 17 genera presently belonging to the Canuellidae, however, I decided to allocate this specimen to the genus *Scottolana*, based on the following reasonings.

Within the Canuellidae, 3 genera (*Ellucana* Sewell, *Parasunaristes* Fiers and *Intersunaristes* Huys), seem to constitute a distinct clade given their 2-segmented endopodite of P4. On the other hand, within the clade with a 3-segmented endopodite of P4 (rest of the genera), only the genus *Canuellopsis* Lang exhibits a 2-segmented exopodite of P1 and 2 or 3-segmented endopodite of the same leg. Although the P2 ENP 3 and P4 ENP 3 and EXP 3 are missing in the Mexican specimen, it is clear that these legs do possess 3-segmented rami.

Mielke (1994a) described a new genus and species from the Costa Rican Pacific coast, *Microcanuella bisetosa* Mielke, probably related to *Galapacanuella* Mielke (Mielke, 1994a). In agreement with Mielke (19994a), the so far monotypic genus *Microcanuella* is unique within the Canuellidae given its reduced armature of P1 (EXP= 0.1.113; ENP= 1.1.112), P4 (EXP=0.0.011; ENP= 1.0.011) and P5 (with 3 setae).

So far, only one genus has been found with 3-segmented rami of P1-P4 in combination with 6 and 4 setae/spines in P1 EXP 3 and ENP 3, the monotypic genus *Galapacanuella* Mielke. On this matter, the Mexican specimen, possesses 7 and 6 setae in P1 EXP 3 and ENP 3, respectively, like in *Canuellina* Gurney and *Sunaristes* Hesse. However, *Canuellina* possesses 4 setae in both rami of P3 and lacks inner seta in P4 EXP 2 (the latter present in the Mexican specimen), so that the Mexican specimen resembles more the genera *Sunaristes* and *Echinosunaristes* Huys, except for the inner seta of coxa which is present in the former and missing in the two latter genera.

The Mexican specimen shares several features with *Brianola* Monard, *Nathaniella* Por, *Ifanella* Vervoort and *Intercanuella* Becker & Schriever, but can be easily separated by the chaetotaxy of P3 EXP 3 (with 5 setae in the Mexican specimen, and 4 in the other genera).

The systematics and identification of the genera *Coullana* Por, *Scottolana* Por, *Elanella* Por, and *Canuella* T. & A. Scott, is based largely in the chaetotaxy of P4, and shape of caudal ramus. Given the loss of the ultimate segments of both rami of P4 in the Mexican specimen, it is therefore difficult to assign my material to one of these genera. However I'm convinced that the Mexican specimen does not belong

neither to *Coullana* nor *Elanella*. *Coullana* is characterized by the fusion of the first pedigerous somite to the cephalosome and absence of inner seta in P4 EXP 2, and *Elanella* possesses an inner element in P4 ENP 2, features not shared by the Mexican specimen.

The distinction between *Canuella* and *Scottolana*, without taking into account the complete setal formula is a very difficult task, and other features need to be compared. *Canuella* is typically characterized by a clearly longer than wide caudal ramus. The caudal ramus of the Mexican specimen showed to be at most 1.5 times longer than wide, thus resembling more some species of *Scottolana* than any species of *Canuella*.

Within *Scottolana*, 9 valid species are presently recognized. In my opinion, the structure of the female caudal ramus is a good criterion in trying to understand the phylogenetical relationships among the species of *Scottolana*, and I propose four species-groups within the genus. It has to be noted that such groups can be rather un-natural and its naturaleness must be tested in future studies.

The *longipes*-group

Thompson & A. Scott (1903), gave a rather rudimentary description of a new species, *Scottolana longipes* (Thompson & A. Scott 1903) Por 1967, from Ceylon, based only in a single female of which they only illustrated the lateral habitus, P4 and fifth urosomite, anal segment and caudal rami. Later, Por (1964b) found a great number of females and males in Israel, and from this material, he described for the first time the male of the species and gave a brief redescription of the female. It has to be noted that Por (1964b) reported a dimorphic male P4, and later Wells (1967) would consider Por's (1964b) material as a special Mediterranean race different from the representatives from Ceylon and Mozambique. It is possible, however, that Por's (1964b) specimen is more related to *S. dissimilis* Fiers 1982 and *S. tumidiseta* Wells & Rao 1987, given the inner pear-shaped seta of the female caudal rami and the presence of a dimorphic inner seta on the male caudal rami, at least in *S. dissimilis* (the male of *S. tumidiseta* remains unknown). If this happens to be true, then Por's (1964b) specimens could be a new species and could constitue part of another clade, the *dissimilis*-group (see below). If Por's (1964b) specimens turn out to represent a different species, then, the male of *S. longipes* would remain unknown, and no statements can be made regarding the sexual dimorphic seta of the male caudal rami of this species. Such dimorphism has already been observed in the *dissimilis*-group (Por's (1964b) specimens, *S. dissimlis* Fiers, *S. bulbifera* Chislenko, *S. antillensis* Fiers, and probably it is also present in *S. tumidiseta* Wells & Rao and *S. sp. 1* -the males of the two latter species remain unknown-). In the *oleosa*-group (*S. oleosa* Wells & Rao) and the *uxoris*-group (*S. uxoris* Por, *S. glabra* Fiers, and *S. rostrata* Wells & Rao), there seems to be no dimorphic inner setae on the male caudal rami.

S. longipes has been reported also from Inhaca (Mozambique) (Wells, 1967) and Andaman Islands (Wells & Rao, 1987). In the original description, Thompson & A. Scott (1903), depicted the female caudal ramus (Plate III, Fig. 11) without the quite obvious inner proximal hook-like projection illustrated by Wells & Rao (1987). Curiously, Wells (1967) also failed to observe such projection as shown in his illustration (Fig. 11-H) and description (:213). Despite the differences in the shape of the caudal ramus (among others) observed between the description by Thompson & A. Scott's (1903) and Wells' (1967), and Por's (1964b) (the latter has been included into the *dissimilis*-group in the present study as a probable new species) and Wells & Rao's (1987), Wells & Rao (1987) suggested to place, provisionally, these four sets of specimens within *S. longipes*, and argued that the differences observed among the different sets of specimens could be attributed to geographical variability.

The *oleosa*-group

Wells & Rao (1987) described *S. oleosa* from the Andaman and Nicobar Islands, and could represent an early off shoot from the ancestral population. This species resembles *S. longipes* in the general shape of caudal rami and lack of sexual dimorphic setae on the male caudal rami. However, it can be observed certain trend towards the reduction of the inner projection of the caudal rami.

The *uxoris*-group

Por (1983a) descibed *S. uxoris* from the Gulf of Elat (Red Sea), but unfortunately he gave only a poor description of the female caudal rami, suggesting that the female and male caudal rami were alike. Although it is rather short, as can be observed from Por's (1983a) illustrations, the caudal rami resembles that of *S. longipes* in the inner proximal projection. If *S. longipes* turns out to lack sexual dimorphism in the inner seta of the male caudal ramus, this latter species could be even more related to *S. uxoris*.

Fiers (1982) described *S. glabra* from Papua New Guinea, and later, from Andaman Islands, Wells & Rao (1987) described *S. rostrata*. These two species share with *S. uxoris*, the lack of inner

dimorphic seta of the male caudal rami, the conical shape of caudal rami and the rather distal location of its setae, but these species showed certain reduction of the inner projection of the caudal rami. Fiers (1982) suggested certain relationship between *S. glabra* and *Sunaristes bulbosus* and *Intersunaristes curticaudatus* (Thompson & A. Scott 1903) Huys 1995a.

The *dissimilis*-group

Por (1964b) described, from Israel, a great number of females and males that he identified with *S. longipes*, and described, for the first time the male of this species. Por (1964b) pointed out the presence of an inner dimorphic spine in the male P4, and later Wells (1967) would consider Por's (1964b) material as a special Mediterranean race. As stated above, it is possible that Por's (1964b) specimens are in fact more related to *S. dissimilis* Fiers 1982 from Papua New Guinea and *S. tumidiseta* Wells & Rao 1987 from Andaman and Nicobar Islands, given the inner pear-shaped seta of the female caudal rami, the presence of a dimorphic inner seta on the male caudal rami and a hook-like inner projection in the caudal rami of both sexes. If this happens to be true, then Por's (1964b) specimens could be in fact a new species, that could represent an early off-shoot of the *longipes*-clade. It seems reasonable to assume that Por's (1964b) specimens are comparatively more plesiomorphic than *S. dissimilis* and *S. tumidiseta* given the proximal situation of the inner pear-shaped seta in Por's (1964b) specimens.

Within this group, *S. tumidiseta*, *S. bulbifera* (Chislenko 1971) Wells 1976, *S. antillensis* Fiers 1984 and *Scottolana sp. 1*, share the presence of two inner modified setae on the female caudal rami, though in *S. bulbifera*, *S. antillensis* and *S. sp. 1*, these two pear-shaped setae have migrated to a rather distal situation. In the American species, one of these setae has undergone remarkable thikening.

It would not be surprising if the American species were in fact the same species (I did not find any differences between Fier's (1984) description of *S. antillensis* and the Mexican specimen). Unfortunatelly, as seen above, some appendages are missing in the only female gathered from Ensenada del Pabellón lagoon and the male remains unknown, thus making its identification with *S. antillensis* nearly impossible. Therefore, the herein described specimen should be considered as *species inquirenda* within the genus.

FAMILY Ectinosomatidae Sars 1903 (part.), Olofsson 1917

GENUS *Ectinosoma* Boeck 1865

Ectinosoma n. sp. 1
(Figs. 24-28)

Material examined:

One dissected female (EMUCOP-947-D), found in station 3 at 0-3 cm depth, on 02/MAY/91.

Female

Habitus (Fig. 24a, 24b, 28a), fusiform. Length, 773 µm including tip of rostrum and caudal rami. Rostrum (see Fig. 24a) relatively large, fused with cephalothorax, the latter (rostrum included), about 1/3 of total body length, with serrated hyaline frill and ornamented with tiny depressions arranged longitudinally, giving the appearance of grooves. Surface of prosomites ornamented as cephalothorax. P2 bearing-somite without surface spinules, P3 and P4 bearing-somites with 2 and 3 transverse rows of surface spinules; P2 and P3 bearing-somite with finely serrated frill, of P4 bearing-somite deeper. P5 bearing-somite ornamented as previous one, but with tiny depressions evenly distributed. Genital double-somite (Fig. 24a, 24b, 28a): W/L ratio, 1.19 (width measured in the proximal wider part of first somite); with remainder of division and ornamented with transverse rows of spinules and evenly distributed depressions dorsally; ventrally plain except for P6 represented by 2 setae, genital pore and remainder of division in proximal and distal half respectively; caudal frill as in preceding somite. Fourth and fifth urosomite ornamented as previous one; fifth urosomite with rounded pseudoperculum, medially protruded, reaching distal third of anal segment. Caudal rami about 1.5 times as long as greatest width; with 7 elements. Posterior edge of rami terminating as an acuminate lappet dorsally and ventrally, the ventral one slightly longer than the dorsal one; rami with 1 proximal row of small spinules, and a series of ventrolateral spinules at base of insertion of lateral spine.

Antennule (Fig. 25a), six-segmented. Surface of segments smooth; with aesthetasc on third and ultimate segments.

Antenna (Fig. 25b): basis massive, with 2 inner long setae. Endopodite two-segmented; first segment bare; second segment ornamented with strong spines proximally, subdistally and close to base of 2 inner strong spines; with 6 distal elements. Exopodite three segmented; first segment as long as third one and about 2.3 times longer than second one, with 1 seta; second segment with 1 and third segment with 2 spines, latter ornamented with subapical spinules (one of them very strong).

Mandible (Fig. 25c): praecoxa with strong spine at base of pars incisiva, with 4 dentate lacinia; coxabasis large with 2 long and slender and 1 thickened and spinulose seta. Endopodite with 8 setae. Exopodite small bearing 1 lateral and 2 distal elements.

Maxillule (Fig. 25d): arthrite with 4 terminal spines and 2 surface setae; basis with 3, exopodite with 2, endopodite with 6 setae.

Maxilla (Fig. 25e): syncoxa with 3 endites, proximal endite with 4, median with 2, distal one with 4 elements; basis with 2 setae. Endopodite with 2 long spines and 5 setae.

Maxilliped, unknown.

P1 (Fig. 26a): coxa massive, ornamented with spinules close to joint with basis, the latter with outer small seta and inner strong spine; with spines close to joint with exo- and endopodite, and close to outer spine. Rami three-segmented, ornamented with strong spinules; exopodite reaching proximal fourth of third endopodal segment. Chaetotaxy as in Table 4.

P2-P4 (Fig. 26b, 27a, 27b): coxa massive and bare except for row of spinules close to joint with basis, the latter ornamented with spines close to outer seta, base of exo- and endopodite and near outer edge. Rami three-segmented, ornamented with spinules as in P1. Exopodite of P2 reaching proximal fourth, of P3 and P4 reaching middle of third endopodal segment. Chaetotaxy as in Table 4.

P5 (Fig. 28b): baseoendopodite with 2 normal seta, innermost about 1.8 times longer; furnished with fine spinules at base of both setae, and with strong ones along inner margin of posterior face; with 1 median anterior, 1 distal and 1 median posterior pore; inner baseoendopodal expansion reaching middle of exopodite. The latter with 4 marginal setae and ornamented with row of long spinules in the middle and at base of the largest marginal elements; outermost seta about 3 times longer than adjacent one; innermost but one seta about 1.8 times longer than innermost element, latter about 1.2 times longer than outermost seta of baseoendopodite.

Table 4. Chaetotaxy of *Ectinosoma n. sp. 1.*

	P1	P2	P3	P4
EXP	0.1.123	1.1.223	1.1.323	1.1.323
ENP	1.1.221	1.1.221	1.1.221	1.1.221

Comparison and discussion

Within the genus *Ectinosoma*, 12 species apart from *Ectinosoma n. sp. 1* (*E. melaniceps* Boeck 1865, *E. normani* T. & A. Scott 1894, *E. tenuipes* T. & A. Scott 1894, *E. obtusum* Sars 1920, *E. dentatum* Steuer 1940, *E. ghardaqense* Noodt 1964, *E. breviarticulatum* Lang 1965, *E. virginensis* Coull 1971b, *E. vervoorti* Soyer 1972, *E. pectinatum* Mielke 1979, *E. nonpectinatum* Mielke 1979, and *E. andamanica* Rao 1993), share the same chaetotaxy of P1-P4.

The taxonomy of this genus is not easy to deal with, and often includes the comparison of relative length between diverse appendages.

The Mexican representative herein described keys out to *E. obtusum* in Lang's key (1965:18). These two species share a very small apendicular sata of the exopodite of P5, feature not shared by any other species within he genus, but differ in the number of segments of A1 (7 in *E. obtusum*, 6 in *Ectinosoma n. sp. 1*), and in the relative size of the two innermost baseoendopodal lobes of P5 (of about the same size in *E. obtusum*, and the innermost smaller in *Ectinosoma n. sp. 1*). Moreover, *E. obtusum* has only been reported from Norway (Sars, 1920; Wells, 1964) and Germany (Kunz, 1935). Thus, the relationship between the Mexican species and one or more of the species reported from America would be more likely.

To my knowledge, 12 species have been reported from American localities, sharing the same chaetotaxy as in the Mexican *Ectinosoma n. sp. 1*: *E. melaniceps* have been reported from Monterey Bay (California, U. S. A.), Dillon Beach (California, U. S. A.) and Santa Catharina Island (Brazil) (Lang, 1965), from James Bay (Canada) (Willey, 1923), and from Argentina (Pallares, 1970); *E. normani* has been reported from Rhode Island (U. S. A.) (Williams, 1906), from Woodshole (U. S. A.) (Wilson, 1932b), and from Chesapeake Bay (Wilson, 1932a); *E. paranormani* and *E. breviarticulatum* have been reported from California (Lang, 1965); *E. pectinatum*, *E. nonpectinatum*, *Ectinosoma spec. I*, *Ectinosoma spec. II*, *Ectinosoma spec. III*, *Ectinosoma spec. IV* and *Ectinosoma spec. V* have been reported from Galapagos Islands by Mielke (1979), and *E. virginensis* has been reported from St. Thomas U. S. Virgin Islands by Coull (1971b).

Six of these species share a six-segmented antenna (since the only specimen of Mielke's (1979) *Ectinosoma spec. II* is a male, it has been omitted from the present analysis): *E. breviarticulatum*, *E. nonpectinatum*, *Ectinosoma spec. III*, *Ectinosoma spec. IV*, *Ectinosoma spec. V*, and *E. virginensis*, and probably *Ectinosoma spec. I* (Mielke (1979) omitted any comment on A1 segmentation). *Ectinosoma n. sp. 1* showed to be more closely related, to *E. nonpectinatum*, reported from the Galapagos Islands by Mielke (1979), and probably to *Ectinosoma spec. II* and *Ectinosoma spec III* (Mielke (1979) gave no further data on the P1-P4, mandible and maxilla). *E. nonpectinatum* and *Ectinosoma n. sp. 1* share some salient features: (i) a six-segmented antenna, (ii) mandible with reduced number of dentate lacinia, and (iii) a more or less similar length ratio of ENP/EXP of P2-P4 and between several setae of P5 (see Table 5a, 5b, 5c). However, in terms of the number of setae on the syncoxal endites of Mx, it resembles more *Ectinosoma spec. V* (see Table 5c).

These two species can be easily differentiated by the inner distal element of the caudal rami (a long seta in *E. nonpectinatum* and a strong spine in *Ectinosoma n. sp.1*), length ratio of P1 EXP/ENP (1.42 in *E. nonpectinatum* and 1.29 in *Ectinosoma n. sp. 1*), length ratio of P5 F/E (2 in *E. nonpectinatum* and 3.4 in *Ectinosoma n. sp. 1*) and the number of seta in the syncoxal endites of maxilla.

Table 5a. Length ratio of endopodite/exopodite of P1-P4 of the *Ectinosoma* species reported from American localities, sharing the same chaetotaxy of P1-P5 as in the Mexican *Ectinosoma n. sp. 1.*

	P1 ENP/EXP	P2 ENP/EXP	P3 ENP/EXP	P4 ENP/EXP
melaniceps	1.28	1.22	1.10	1.00
paranormani	1.46	1.15	1.21	1.11
normani	1.44	-	-	1.25
breviart.	1.31	1.28	1.17	1.17
virginensis	1.5	1.46	1.41	1.20
pectinatum	1.25	1.24	1.07	0.90
spec. I	-	-	-	-
spec. III	-	-	-	-
spec. IV	-	-	-	-
spec. V	-	-	-	-
nonpectinatum	1.42	1.30	1.22	1.12
n. sp. 1	1.29	1.28	1.23	1.12

-, Data not available

Table 5b. Length ratio of the setae of the *Ectinosoma* species reported from American localities, sharing the same chaetotaxy of P1-P5 as in the Mexican *Ectinosoma n. sp. 1.*

	A/B	F/E	D/C	C/B
melaniceps	1.28	1.22	1.10	1.00
paranormani	1.46	1.15	1.21	1.11
normani	1.44	-	-	1.25
breviart.	1.31	1.28	1.17	1.17
virginensis	1.5	1.46	1.41	1.20
pectinatum	1.25	1.24	1.07	0.90
spec. I	-	-	-	-
spec. III	-	-	-	-
spec. IV	-	-	-	-
spec. V	-	-	-	-
nonpectinatum	-	-	-	-
n. sp. 1	-	-	-	-

A, Inner baseoendopodal seta
B, Outer baseoendopodal seta
C, Innermost exopodal seta
D, Innermost but one exopodal seta
E, Outermost but one exopodal seta
F, Outermost exopodal seta
-, Data not available

Table 5c. Salient data on antenna, mandible and maxilla of the *Ectinosoma* species reported from American localities, sharing the same chaetotaxy of P1-P5 as in the Mexican *Ectinosoma n. sp. 1.*

	# of segments of A1	# setae on EXP of Md	# of lacinia on praecoxa of Md	# of setae on syncoxal endites of Mx
melaniceps	7	3	-	-
paranormani	7	3	6	3.1.2
normani	7	3	2	3.1.2
breviart.	6	2	10	3.3
virginensis	6	3	6	3.2
pectinatum	7	3	5	4.3
spec. I	-	-	5	-
spec. III	6	-	-	-
spec. IV	6	-	-	-
spec. V	6	-	-	4.2.3
nonpectinatum	6	3	3	4.1.3
n. sp. 1	6	3	4	4.2.4

-, data not available

GENUS *Halectinosoma* Lang 1944, 1965

Halectinosoma n. sp. 1
(Figs. 29-34)

Material examined:

SEX	STAGE	# IND.	STORED AS	# CATALOGUE	STATION	DEPTH	DATE
M	A	1	Diss.	EMUCOP-424-A	3	3-6 cm	02/MAY/91
F	A	1	Diss.	EMUCOIP-953-A	3	3-6 cm	02/MAY/91
F	A	1	Diss.	EMUCOP-954-A	3	3-6 cm	02/MAY/91

Female

Habitus (Fig. 29a, 29b, 33a), fusiform; length, 460 µm from tip of rostrum to caudal rami; without distinct articulation between prosome and urosome, gradualy tapering from posterior margin of cephalothorax to caudal rami; maximum width near posterior margin of cephalothorax, the latter about 1/3 of entire body length; rostrum partially fused to cephalothorax, the latter ornamented with minute pustules evenly distributed; cephalothorax and prosomites with finely serrated frill; first prosomite ornamented only with very scarce patterns of pustules-free gaps; second and third prosomites with several additional transverse rows of fragile elements. First urosomite ornamented as preceding segment, but with posterior frill more deeply indented. Genital double-somite with remaining of division dorsolaterally; ornamented with patterns of pustules-free gaps but without spinules; ventrally plain, with only a median chitinous stripe; genital pore located in proximal half; with posterior frill more deeply indented; without spinules or scales close to caudal edge; genital field as in Fig. 33a. Fourth urosomite with scarce pattern of pustules-free gaps dorsally and ventrally; frill more deeply indented ventrally. Fifth urosomite with convex pseudoperculum; caudal margin ornamented with fringing spinules dorsally and ventrally; with more pattterns of pustules-free gaps ventrally than dorsally. Anal segment with dorsal and ventral small spinules close to joint with caudal rami, the latter as long or slightly longer than broad, with 6 setae; posterior ventral and dorsal edge of rami terminating as an acuminate lappet, the ventral one slightly longer.

Antennule (Fig. 30a), six-segmented; surface of segments smooth; with aesthetasc on third and sixth segment.

Antenna (Fig. 30c): basis 2 times longer than broad; furnished with long setules on inner margin. Endopodite two-segmented; first segment about 2 times longer than wide, bare; second segment ornamented with spinules on inner proximal third, with 2 median and 6 terminal spines. Exopodite three-segmented; first segment without ornamentation, about two times longer than broad, with 1 seta; second segment slightly shorter than first one, with 1 element; third component about four times longer than wide, and as long as preceding segments combined, with 2 spines.

Mandible: gnathobase, unknown. Basis (Fig. 30d) with 3 setae. Expodite small, one-segmented, with 1 lateral and 2 apical setae. Endopodite one-segmented, with 7 setae.

Maxillule: arthrite, unknown. Basis (Fig. 30e) with 3, endopodite with 6, exopodite with 2 setae.

Maxilla (Fig. 30f), with broad syncoxa bearing 3 endites; proximal and distal endites with 3 setae. Basis seemingly larger than syncoxa, with 1 median element and 2 long setae subdistally. Endopodite three-segmented; first and second segment armed with a geniculate seta, distal segment with 3 confluent components.

Maxilliped, unknown.

P1 (Fig. 31a): coxa rectangular, furnished with spinules along outer distal corner; basis with long slender spinules close to inner spine and with stronger elements at base of exopodite. Rami three-segmented; length ratio of ENP/EXP, 1.4. Chaetotaxy as in Table 6.

P2-P4 (Fig. 31b, 32a, 32b): coxa rectangular, with strong spinules on outer distal corner close to joint with basis; the latter with small spinules at base of endopodite, on inner edge, and with stronger elements at base of exopodite. Rami three-segmented; length ratio of P2-P4 ENP/EXP, 1.4, 1.3, and 1.2. Chaetotaxy as in Table 6.

P5 (Fig. 33b), with subtriangular baseoendopodite furnished with spinules along inner margin and close to base of exopodite. Baseoendopodal lobe hardly reaching middle of exopodite; outer baseoendopodal lobe slightly longer than inner one. Exopodite confluent with baseoendopodite anteriorly. Exopodal lobes reaching the same level; outermost lobe separated from remaining lobes by a light fold extending beyond middle of exopodite (incision?); surface seta at base of exopodite.

P6 (Fig. 33a), represented by a quitinized transverse area, with 1 small smooth seta in each side.

Male

Habitus (Fig. 34a, 34b): length, 346 μm including tip of rostrum and caudal rami. Shape as in female except for genital double-somite and ornamentation of first urosomite. Third and fourth urosomite with median row of small spinules close to caudal margin and with more deeply dentated frill ventrally. Fifth urosomite, anal segment and caudal rami as in female.

Antennule (Fig. 30b), five-segmented, subchirocer; surface of segments smooth.

Mouth parts and P1-P4 (not illustrated) as in female.

P5 (Fig. 34b): rami distinct. Baseoendopodites fused forming a common plate, each part with 2 apical elements of about the same length; baseoendopodal lobe reaching middle of exopodite; the latter with 3 terminal and 1 surface seta, the latter close to base of ramus; outermost exopodal seta separated from the rest as in female.

P6 (Fig. 34b), represented by 2 ventral plates furnished with fringing spinules; with 2 seta each, outer one about 2.3 times longer than inner one.

Table 6. Chaetotaxy of *Halectinosoma n. sp. 1.*

	P1	P2	P3	P4
EXP	0.1.123	1.1.223	1.1.323	1.1.323
ENP	1.1.221	1.1.221	1.1.221	1.1.221

Comparison and discussion

See below.

Halectinosoma n. sp. 2
(Figs. 35-44)

Material examined:

SEX	STAGE	# IND.	STORED AS	# CATALOGUE	STATION	DEPTH	DATE
F	A	1	Diss.	EMUCOP-844-F	15	0-3 cm	24/JUN/91
F	A	1	Diss.	EMUCOP-845-F	15	0-3 cm	24/JUN/91
F	A	1	Diss.	EMUCOP-843-F	15	0-3 cm	24/JUN/91
F	A	1	Diss.	EMUCOP-837-A	15	0-3 cm	24/JUN/91
F	A	1	Diss.	EMUCOP-945-E	10	0-3 cm	23/JUN/91
F	A	1	Diss.	EMUCOP-946-E	10	0-3 cm	23/JUN/91
F	A	1	Diss.	EMUCOP-89-B	4-5	0-3 cm	03/JAN/92
F	A	1	Diss.	EMUCOP-836-F	15	0-3 cm	24/JUN/91
F	A	1	Diss.	EMUCOP-838-A	15	0-3 cm	24/JUN/91
F	A	1	Diss.	EMUCOP-839-A	15	0-3 cm	24/JUN/91
F	A	1	Diss.	EMUCOP-840-A	15	0-3 cm	24/JUN/91
F	CIV	1	Diss.	EMUCOP-842-A	15	0-3 cm	24/JUN/91
F	A	1	Diss.	EMUCOP-8-A	15	0-3 cm	24/JUN/91
F	A	1	Diss.	EMUCOP-53-C	4-5	0-3 cm	30/MAR/92
F	A	6	Alc.	EMUCOP-332-P	12	3-6 cm	23/JUN/91
F	A	1	Alc.	EMUCOP-307-H	12	0-3 cm	23/JUN/91
F	A	5	Alc.	EMUCOP-177-B	2	0-3 cm	03/JAN/92
F	A	5	Alc.	EMUCOP-180-D	2	0-3 cm	03/JAN/92
F	A	11	Alc.	EMUCOP-119-A	2	0-3 cm	01/MAY/91
F	A	1	Alc.	EMUCOP-404-H	7	0-3 cm	30/MAR/92
F	A	2	Alc.	EMUCOP-399-G	7	0-3 cm	30/MAR/92
F	A	14	Alc.	EMUCOP-164-F	2	0-3 cm	01/MAY/91
F	A	2	Alc.	EMUCOP-900-D	2	0-3 cm	01/MAY/91
F	A	9	Alc.	EMUCOP-899-C	2	0-3 cm	01/MAY/91

F	A	7	Alc.	EMUCOP-176-A	2	0-3 cm	03/JAN/92
F	A	1	Alc.	EMUCOP-314-J	12	0-3 cm	23/JUN/91
F	A	1	Alc.	EMUCOP-283-A	12	3-6 cm	23/JUN/91
F	A	4	Alc.	EMUCOP-326-O	12	6-9 cm	23/JUN/91
F	A	2	Alc.	EMUCOP-304-G	12	0-3 cm	23/JUN/91
F	A	6	Alc.	EMUCOP-316-K	12	0-3 cm	23/JUN/91
F	A	1	Alc.	EMUCOP-300-F	12	0-3 cm	23/JUN/91
F	A	3	Alc.	EMUCOP-318-L	12	3-6 cm	23/JUN/91
F	A	62	Alc.	EMUCOP-901-B	2	0-3 cm	01/MAY/91
F	A	10	Alc.	EMUCOP-310-I	12	6-9 cm	23/JUN/91
F	A	8	Alc.	EMUCOP-287-B	12	0-3 cm	23/JUN/91
F	A	3	Alc.	EMUCOP-377-D	7	0-3 cm	30/MAR/92
F	A	1	Alc.	EMUCOP-261-B	9	3-6 cm	24/JUN/91
F	A	53	Alc.	EMUCOP-204-A	9	0-3 cm	03/JAN/92
F	A	1	Alc.	EMUCOP-260-A	9	0-3 cm	24/JUN/91
F	A	1	Alc.	EMUCOP-395-E	7	0-3 cm	30/MAR/92
F	A	31	Alc.	EMUCOP-245-B	9	0-3 cm	03/JAN/92
F	A	22	Alc.	EMUCOP-779-I	10	0-3 cm	23/JUN/91
F	A	2	Alc.	EMUCOP-611-C	10	0-3 cm	30/APR/91
F	A	9	Alc.	EMUCOP-579-E	10	0-3 cm	23/JUN/91
F	A	1	Alc.	EMUCOP-76-B	4-5	0-3 cm	23/JUN/91
F	A	16	Alc.	EMUCOP-575-D	10	0-3 cm	23/JUN/91
F	A	4	Alc.	EMUCOP-807-C	4-5	0-3 cm	30/MAR/92
F	A	1	Alc.	EMUCOP-559-A	10	3-6 cm	23/JUN/91
F	A	7	Alc.	EMUCOP-565-C	10	0-3 cm	23/JUN/91
F	A	1	Alc.	EMUCOP-417-A	13	0-3 cm	30/APR/91
F	A	2	Alc.	EMUCOP-788-F	10	3-6 cm	30/APR/91
F	A	1	Alc.	EMUCOP-627-D	10	0-3 cm	30/APR/91
F	A	4	Alc.	EMUCOP-802-H	14	6-9 cm	24/JUN/91
F	A	2	Alc.	EMUCOP-500-D	4-5	0-3 cm	01/MAY/91
F	A	1	Alc.	EMUCOP-512-E	4-5	0-3 cm	01/MAY/91
F	A	3	Alc.	EMUCOP-682-C	6	0-3 cm	30/MAR/92
F	A	2	Alc.	EMUCOP-671-B	6	0-3 cm	30/MAR/92
F	A	3	Alc.	EMUCOP-555-B	4-5	0-3 cm	30/MAR/92
F	A	1	Alc.	EMUCOP-723-E	6	0-3 cm	22/JUN/91
F	A	48	Alc.	EMUCOP-847-A	15	0-3 cm	24/JUN/91
F	A	3	Alc.	EMUCOP-849-F	15	0-3 cm	24/JUN/91
F	A	1	Alc.	EMUCOP-557-A	4-5	0-3 cm	30/MAR/92
F	A	2	Alc.	EMUCOP-763-B	14	6-9 cm	24/JUN/91
F	A	1	Alc.	EMUCOP-762-A	14	6-9 cm	24/JUN/91
F	A	4	Alc.	EMUCOP-936-G	14	0-3 cm	24/JUN/91
F	A	16	Alc.	EMUCOP-768-G	14	0-3 cm	24/JUN/91
F	A	1	Alc.	EMUCOP-868-E	15	3-6 cm	24/JUN/91
F	A	1	Alc.	EMUCOP-862-C	15	6-9 cm	24/JUN/91
F	A	37	Alc.	EMUCOP-858-B	15	0-3 cm	24/JUN/91
F	A	1	Alc.	EMUCOP-863-D	15	0-3 cm	24/JUN/91
?	CIII	1	Alc.	EMUCOP-55-C	4-5	0-3 cm	30/MAR/92
?	CIII	1	Alc.	EMUCOP-56-C	4-5	0-3 cm	30/MAR/92
F	CIV	1	Alc.	EMUCOP-894-F	2	0-3 cm	01/MAY/91
F	CIV	1	Alc.	EMUCOP-887-B	12	0-3 cm	23/JUN/91
F	CIV	1	Alc.	EMUCOP-883-P	12	3-6 cm	23/JUN/91
F	CIV	1	Alc.	EMUCOP-915-I	10	0-3 cm	23/JUN/91
F	CIV	2	Alc.	EMUCOP-928-E	10	0-3 cm	23/JUN/91

F	CIV	1	Alc.	EMUCOP-78-B	4-5	0-3 cm	23/JUN/91
F	CV	2	Alc.	EMUCOP-885-B	12	0-3 cm	23/JUN/91
F	CV	1	Alc.	EMUCOP-876-F	12	0-3 cm	23/JUN/91
F	CV	1	Alc.	EMUCOP-879-O	12	6-9 cm	23/JUN/91
F	CV	2	Alc.	EMUCOP-913-I	10	0-3 cm	23/JUN/91
F	CV	1	Alc.	EMUCOP-194-B	9	0-3 cm	30/APR/91
F	CV	1	Alc.	EMUCOP-875-G	7	0-3 cm	30/MAR/92
F	CV	6	Alc.	EMUCOP-854-A	15	0-3 cm	24/JUN/91
F	CV	1	Alc.	EMUCOP-766-E	14	0-3 cm	24/JUN/91
F	CV	1	Alc.	EMUCOP-941-F	14	6-9 cm	24/JUN/91
F	CV	2	Alc.	EMUCOP-935-G	14	0-3 cm	24/JUN/91
F	CV	1	Alc.	EMUCOP-870-G	15	0-3 cm	24/JUN/91
F	CV	1	Alc.	EMUCOP-893-K	12	0-3 cm	23/JUN/91
F	CV	1	Alc.	EMUCOP-891-I	12	6-9 cm	23/JUN/91
?	CI	1	Alc.	EMUCOP-904-B	2	0-3 cm	01/MAY/91
?	CI	3	Alc.	EMUCOP-919-I	10	0-3 cm	23/JUN/91
?	CI	1	Alc.	EMUCOP-923-C	10	0-3 cm	23/JUN/91
?	CI	4	Alc.	EMUCOP-932-E	10	0-3 cm	23/JUN/91
?	CI	2	Alc.	EMUCOP-940-G	14	0-3 cm	24/JUN/91
?	CI	1	Alc.	EMUCOP-867-D	15	0-3 cm	24/JUN/91
?	CII	1	Alc.	EMUCOP-897-A	2	0-3 cm	01/MAY/91
?	CII	1	Alc.	EMUCOP-880-O	12	6-9 cm	23/JUN/91
?	CII	1	Alc.	EMUCOP-884-P	12	3-6 cm	23/JUN/91
?	CII	8	Alc.	EMUCOP-918-I	10	0-3 cm	23/JUN/91
?	CII	1	Alc.	EMUCOP-922-C	10	0-3 cm	23/JUN/91
?	CII	8	Alc.	EMUCOP-931-E	10	0-3 cm	23/JUN/91
?	CII	3	Alc.	EMUCOP-856-A	15	0-3 cm	24/JUN/91
?	CII	1	Alc.	EMUCOP-939-G	14	0-3 cm	24/JUN/91
?	CII	1	Alc.	EMUCOP-77-B	4-5	0-3 cm	23/JUN/91
?	CIII	1	Alc.	EMUCOP-888-B	12	0-3 cm	23/JUN/91
?	CIII	1	Alc.	EMUCOP-877-F	12	0-3 cm	23/JUN/91
?	CIII	1	Alc.	EMUCOP-903-B	2	0-3 cm	01/MAY/91
?	CIII	1	Alc.	EMUCOP-296-C	12	0-3 cm	23/JUN/91
?	CIII	6	Alc.	EMUCOP-917-I	10	0-3 cm	23/JUN/91
?	CIII	11	Alc.	EMUCOP-930-E	10	0-3 cm	23/JUN/91
?	CIII	1	Alc.	EMUCOP-907-B	6	0-3 cm	30/MAR/92
?	CIII	6	Alc.	EMUCOP-855-A	15	0-3 cm	24/JUN/91
?	CIII	1	Alc.	EMUCOP-852-F	15	0-3 cm	24/JUN/91
?	CIII	2	Alc.	EMUCOP-938-G	14	0-3 cm	24/JUN/91
?	CIII	1	Alc.	EMUCOP-892-K	12	0-3 cm	23/JUN/91
?	CIII	1	Alc.	EMUCOP-866-D	15	0-3 cm	24/JUN/91
M	A	1	Diss.	EMUCOP-846-F	15	0-3 cm	24/JUN/91
M	A	1	Diss.	EMUCOP-58-C	4-5	0-3 cm	30/MAR/92
M	A	1	Diss.	EMUCOP-95-C	4-5	0-3 cm	03/JAN/92
M	A	1	Diss.	EMUCOP-59-C	4-5	0-3 cm	30/MAR/92
M	A	1	Diss.	EMUCOP-54-C	4-5	0-3 cm	30/MAR/92
M	A	1	Diss.	EMUCOP-841-A	15	0-3 cm	24/JUN/91
M	A	6	Alc.	EMUCOP-942-A	2	0-3 cm	03/JAN/92
M	A	2	Alc.	EMUCOP-943-D	2	0-3 cm	03/JAN/92
M	A	1	Alc.	EMUCOP-147-C	2	0-3 cm	01/MAY/91
M	A	5	Alc.	EMUCOP-156-D	2	0-3 cm	01/MAY/91
M	A	2	Alc.	EMUCOP-896-A	2	0-3 cm	01/MAY/91
M	A	8	Alc.	EMUCOP-895-F	2	0-3 cm	01/MAY/91

M	A	4	Alc.	EMUCOP-886-B	12	0-3 cm	23/JUN/91
M	A	1	Alc.	EMUCOP-889-H	12	0-3 cm	23/JUN/91
M	A	2	Alc.	EMUCOP-882-P	12	3-6 cm	23/JUN/91
M	A	4	Alc.	EMUCOP-881-O	12	6-9 cm	23/JUN/91
M	A	1	Alc.	EMUCOP-878-F	12	0-3 cm	23/JUN/91
M	A	12	Alc.	EMUCOP-872-A	9	0-3 cm	03/JAN/92
M	A	14	Alc.	EMUCOP-873-B	9	0-3 cm	03/JAN/92
M	A	8	Alc.	EMUCOP-911-D	10	0-3 cm	23/JUN/91
M	A	7	Alc.	EMUCOP-912-I	10	0-3 cm	23/JUN/91
M	A	1	Alc.	EMUCOP-871-B	9	0-3 cm	30/APR/91
M	A	6	Alc.	EMUCOP-139-B	2	0-3 cm	01/MAY/91
M	A	16	Alc.	EMUCOP-925-E	10	0-3 cm	23/JUN/91
M	A	2	Alc.	EMUCOP-920-C	10	0-3 cm	23/JUN/91
M	A	1	Alc.	EMUCOP-908-D	10	0-3 cm	30/APR/91
M	A	1	Alc.	EMUCOP-782-E	10	0-3 cm	30/APR/91
M	A	1	Alc.	EMUCOP-803-I	3	6-9 cm	02/MAY/91
M	A	1	Alc.	EMUCOP-75-B	4-5	0-3 cm	23/JUN/91
M	A	2	Alc.	EMUCOP-926-B	4-5	0-3 cm	30/MAR/92
M	A	1	Alc.	EMUCOP-906-B	6	0-3 cm	30/MAR/92
M	A	12	Alc.	EMUCOP-859-B	15	0-3 cm	24/JUN/91
M	A	2	Alc.	EMUCOP-850-F	15	0-3 cm	24/JUN/91
M	A	17	Alc.	EMUCOP-848-A	15	0-3 cm	24/JUN/91
M	A	1	Alc.	EMUCOP-767-F	14	6-9 cm	24/JUN/91
M	A	1	Alc.	EMUCOP-933-H	14	6-9 cm	24/JUN/91
M	A	9	Alc.	EMUCOP-934-G	14	0-3 cm	24/JUN/91
M	A	3	Alc.	EMUCOP-944-B	2	0-3 cm	03/JAN/92
M	A	1	Alc.	EMUCOP-890-I	12	6-9 cm	23/JUN/91
M	A	4	Alc.	EMUCOP-864-D	15	0-3 cm	24/JUN/91
M	CIV	1	Alc.	EMUCOP-898-A	2	0-3 cm	01/MAY/91
M	CIV	1	Alc.	EMUCOP-902-B	2	0-3 cm	01/MAY/91
M	CIV	4	Alc.	EMUCOP-916-I	10	0-3 cm	23/JUN/91
M	CIV	3	Alc.	EMUCOP-929-E	10	0-3 cm	23/JUN/91
M	CIV	1	Alc.	EMUCOP-905-C	6	0-3 cm	30/MAR/92
M	CIV	4	Alc.	EMUCOP-857-A	15	0-3 cm	24/JUN/91
M	CIV	1	Alc.	EMUCOP-851-F	15	0-3 cm	24/JUN/91
M	CIV	2	Alc.	EMUCOP-937-G	14	0-3 cm	24/JUN/91
M	CIV	1	Alc.	EMUCOP-865-D	15	0-3 cm	24/JUN/91
M	CIV	3	Alc.	EMUCOP-861-B	15	0-3 cm	24/JUN/91
M	CV	1	Alc.	EMUCOP-914-I	10	0-3 cm	23/JUN/91
M	CV	7	Alc.	EMUCOP-927-E	10	0-3 cm	23/JUN/91
M	CV	1	Alc.	EMUCOP-921-C	10	0-3 cm	23/JUN/91
M	CV	1	Alc.	EMUCOP-909-E	10	0-3 cm	30/APR/91
M	CV	3	Alc.	EMUCOP-853-A	15	0-3 cm	24/JUN/91
M	CV	1	Alc.	EMUCOP-869-G	15	0-3 cm	24/JUN/91
M	CV	2	Alc.	EMUCOP-860-B	15	0-3 cm	24/JUN/91
M/F	A/CIV	2	Alc.	EMUCOP-924-E	10	0-3 cm	23/JUN/91
M/F	A/CV	2	Alc.	EMUCOP-874-D	7	0-3 cm	30/MAR/92

Female

Habitus (Fig. 35a, 35b, 36), fusiform; length, 444 to 489 μm from tip of rostrum to caudal rami; general shape as in *Halectinosoma n. sp. 1.* Rostrum partially fused to cephalothorax and downwards directed. Integument of cephalothorax, pro- and urosomites furnished with minute pustules evenly distributed. Cephalothorax and first and second prosomite with finely serrated frill, of third prosomite more deeply serrated; surface of prosomites with pattern of transverse pustules-free gaps, and longitudinal

rows of fragile elements. First urosomite ornamented as preceding segment, but with posterior frill somewhat more deeply indented. Genital double-somite completely fused dorsally, ornamented as in preceding somite; ventrally plain, with only a median chitinous stripe in distal half; with posterior frill more deeply indented than dorsally; genital field as in Fig. 36; genital pore in proximal half. Fourth urosomite ornamented as preceding somite dorsally, ventrally with transverse row of tiny spinules and pattern of pustules-free gaps, frill more deeply indented than dorsally; penultimate somite with convex pseudoperculum, ventrally plain except for row of fragile spinules close to posterior edge; anal segment with small spinules close to joint with caudal rami dorsally and ventrally, and with a dorsolateral row of fine spinules close to joint with preceding somite. Caudal rami about 1.5 times as long as greatest width; with 6 setae; posterior edge of rami dorsally and ventrally terminating as an acuminate lappet, the ventral one slightly longer; surface of rami densely covered with fine hair-like elements.

Antennule (Fig. 37a), six-segmented; surface of segments smooth; typically with aesthetasc on third and sixth segment.

Antenna (Fig. 37b): basis longer than wide and furnished with long setules on inner margin. Endopodite two-segmented; first segment about 3 times longer than wide, bare; second segment with proximal and median set of spinules linked to supporting segment by membranous structure, spinules of the proximal set smaller than those of the distal one, with fine spinules between both sets of spinules, with a subdistal row of long spinules and only 1 long median inner spine, with 5 distal elements. Exopodite three-segmented; first segment bare, about two times longer than wide, with 1 seta; second segment small, with 1 spine; third component as long as preceding segments combined, with 2 spines.

Mandible (Fig. 38a), with robust and heavily sclerotized gnathobase; biting edge with unidentate *pars incisiva*, accompanied by a stout curved spine; basis with 3 setae. Expodite small, one-segmented, with 3 setae. Endopodite one-segmented, slightly longer than basis, with 8 setae.

Maxillule (Fig. 38b, 38c): praecoxal arthrite with 3 distal unguiform spines and 2 setae; basis with 2 slender setae and 2 piriform elements. Division between endopodite and basis not evident. Endopodite with 6 setae. Exopodite one-segmented, with 2 elements.

Maxilla (Fig.39a), with broad syncoxa bearing 3 endites, proximal endite with 3, middle and distal ones with 2 and 3 setae respectively; basis slightly smaller than syncoxa, with 2 median elements and 2 long setae subdistally. Endopodite three-segmented; the first and second segment armed with a geniculate seta; distal segment represented by 1 lateral and 3 confluent slender elements.

Maxilliped (Fig. 39b-d), with short syncoxa, the latter armed with one long seta and furnished with fragile elements proximally; basis long, broader in the middle and tapering distally, furnished with long setules and 2 rows of spinules. Endopodal segment short, with 1 proximal, 1 subdistal and 2 apical setae.

P1 (Fig. 40a): coxa rectangular, furnished with some transverse rows of small spinules on anterior surface, and along joint with basis. The latter with small spinules along articulation with endopodite, and stronger elements at base of exopodite and in the middle; with inner strong spinulose spine and slender outer seta. Rami three-segmented; exopodite hardly reaching joint between second and third endopodal segments. Chaetotaxy as in Table 7.

P2-P4 (Fig. 40b, 40c, 41a): coxa rectangular, ornamented with spinules along outer distal corner and in the middle of anterior face; basis with spinules on inner distal corner, joint with endopodite and exopodite, with plumose slender outer seta. Rami three-segmented; exopodite of P2 reaching tip of second endopodal segment, of P3 and of P4 reaching proximal third of ultimate endopodal segment. Chaetotaxy as in Table 7.

P5 (Fig. 41b), with subtriangular baseoendopodite furnished with several short transverse rows of spinules close to base, in the middle, near the base of exopodite and subdistally on both endopodal lobes, the latter reaching about middle of exopodite and bearing 2 spinulose setae. Exopodite fused to baseoendopodite on anterior surface, but separated by a suture posteriorly; with surface seta issuing on anterior face near base; with 3 setae arising from distinct lobes; middle seta about 2 times as long as innermost element; outermost exopodal lobe slightly separated from the rest as in *Halectinosoma* n. sp. 1.

P6 (Fig. 36), represented by a quitinized transverse area, with 1 small smooth seta in each side.

Male

Habitus (Fig. 42a, 42b): length ranging from 311 to 342 µm from tip of rostrum to caudal rami. Shape as in female except for genital double-somite, and for longer semicylindrical surface elements on second to fourth urosomites. Second urosomite with dorsolateral row of long spinules; third and fourth urosomites with dorsolateral row of long spinules, with median row of strong spinules close to posterior edge, and deeply indented frill. Penultimate somite, anal segment and caudal rami as in female.

Antennule (Fig. 43), seven-segmented, subchirocer; surface of segments smooth.

Mouth parts and P1-P4 (not illustrated) as in female.

P5 (Fig. 42b): baseoendopodites fused forming a common plate; rami of each limb fused; furnished with transverse row of spinules close to base and in the middle; with 2 innermost setae corresponding to endopodal lobe, outermost one about 2 times as long as innermost; exopodal lobe with 3 apical and 1 surface seta; all elements with bifid apex except for surface seta.

P6 (Fig. 42b), represented by 2 ventral plates furnished with fringing spinules; with 1 seta each.

Variability

Two female specimens were found displaying aberrant swimming legs. One of them (EMUCOP-945-E), exhibited aberrant rami of both the rigth and left limbs of P1 (Fig. 44a, 44b), an aberrant endopodite of P2 (Fig. 44c), and an aberrant endopodite of P4 (Fig. 44d). Another female (EMUCOP-946-E) was foun exhibiting an aberrant P3 (Fig. 44e).

Table. 7. Chaetotaxy of *Halectinosoma n. sp. 2.*

	P1	P2	P3	P4
EXP	0.1.122	1.1.222	1.1.222	1.1.222
ENP	1.1.221	1.1.221	1.1.221	1.1.221

Comparison and discussion

See below.

Halectinosoma n. sp. 3
(Figs. 45-51)

Material examined:

SEX	STAGE	# IND.	STORED AS	# CATALOGUE	STATION	DEPTH	DATE
F	A	1	Diss.	EMUCOP-456-D	3	0-3 cm	02/MAY/91
M	A	1	Diss.	EMUCOP-910-I	3	6-9 cm	02/MAY/91
F	A	1	Diss.	EMUCOP-948-D	3	0-3 cm	02/MAY/91
F	A	1	Diss.	EMUCOP-949-A	3	3-6 cm	02/MAY/91
M	A	1	Diss.	EMUCOP-950-A	3	3-6 cm	02/MAY/91
M	A	1	Diss.	EMUCOP-951-A	3	3-6 cm	02/MAY/91

Female

Habitus (Fig. 45a, 45b, 46): length, 528-540 µm from tip of rostrum to caudal rami; general shape as *Halectinosoma n. sp 1.* Rostrum partially fused to cephalothorax, the latter with finely serrated hyaline frill. Surface of cephalothorax and prosomites ornamented with minute pustules distributed longitudinally as in *Ectinosoma* n. sp. 1. First prosomite without, second with 1, and third one with several transverse rows of spinules; first and second prosomites with finely serrated frill, of third one more deeply indented. First urosomite with more transverse rows of spinules than in preceding segment. Genital double-somite with remaining of division dorsolaterally; ornamented as in preceding somite; ventrally plain, with median chitinous stripe and with posterior frill more deeply indented than dorsally; without spinules or scales; genital field as in Fig. 46. Fourth urosomite ornamented as preceding one dorsally; ventrally with less patterns of pustules-free gaps and frill more deeply indented. Penultimate somite with convex pseudoperculum; ornamented with spinules on caudal margin dorsally and ventrally. Anal segment with proximal spinules dorsally; ventrally with small spinules along caudal edge. Caudal rami slightly broader than long, with 7 setae; posterior edge of rami dorsally and ventrally terminating as an acuminate lappet, the ventral one slightly longer.

Antennule (Fig. 47a), six-segmented; surface of segments smooth; with aesthetasc on third and sixth segment.

Antenna (Fig. 47b): endopodite two-segmented; first segment about 2 times longer than wide, with set of spinules on inner distal corner; second segment ornamented with proximal strong spinules at base of 2 strong inner spines and subdistally; with 6 terminal elements. Exopodite three-segmented; first

segment with row of spinules, about three times longer than broad, with 1 seta; second segment small, with 1 element; third component about four times longer than wide, and three times longer than preceding segment, with 2 spines and ornamented with strong spinules.

Mandible (Fig. 47c): gnathobase with 3 strong teeth; basis with 3 spinulose setae. Expodite small, one-segmented, with 3 setae and some lateral spinules. Endopodite one-segmented, with 8 setae.

Maxillule (Fig. 47d): arthrite with 3 terminal spines and 1 subdistal element; basis with 3 setae. Division between basis and endopodite not evident. Endopodite with 9, exopodite with 2 setae.

Maxilla, unknown.

Maxilliped (Fig. 47e), with short syncoxa armed with one long seta; basis long, broader proximally and furnished with 2 rows of spinules. Endopodal segment short, with 1 proximal, 1 subdistal and 2 apical setae.

P1 (Fig. 48a): basis with spinules close to inner spine and at base of exopodite, and with very small spinules along base of endopodite. Rami three-segmented; exopodite hardly reaching beyond second endopodal segment. Chaetotaxy as in Table 8.

P2-P4 (Fig. 48b, 49a, 49b): coxa rectangular, with spinules along outer distal corner; basis with small spinules at base of endopodite, and with strong elements at base of exopodite. Rami three-segmented; exopodite reaching typically the proximal third of ENP 3. Chaetotaxy as in Table 8.

P5 (Fig. 46), with subtriangular baseoendopodite furnished with spinules on inner margin, close to base of exopodite and distally on outermost baseoendopodal lobe. Baseoendopodal lobe reaching distal third of exopodite. Exopodal lobes at different levels; surface seta at base of exopodite; outermost exopodal lobe separated from the rest as in the previous species.

P6 (Fig. 45b, 46), represented by a quitinized transverse area, with 1 seta in each side.

Male

Habitus (Fig. 50a, 51): length ranging from 373-457 μm including tip of rostrum and caudal rami. Shape as in female except for genital double-somite. Surface of urosomites furnished with transverse rows of spinules and pattern of pustules-free gaps. Third and fourth urosomite with more deeply dentated frill ventrally; fifth urosomite, anal segment and caudal rami as in female.

Antennule (Fig. 50b), six-segmented, subchirocer; surface of segments smooth.

Mouth parts and P1-P4 (not illustrated), as in female.

P5 (Fig. 51): baseoendopodites fused forming a common plate, each part with 2 apical long elements. Exopodite with 3 terminal setae and 1 surface element close to base of ramus.

P6 (Fig. 51), represented by 2 ventral plates furnished with fringing spinules; with 2 setae each.

Table 8. Chaetotaxy of *Halectinosoma n. sp. 3.*

	P1	P2	P3	P4
EXP	0.1.123	1.1.223	1.1.323	1.1.323
ENP	1.1.221	1.1.221	1.1.221	1.1.221

Comparison and discussion

Although the genus *Halectinosoma* is one of the most dominant taxa within harpacticoid communities, its systematics and taxonomy has been always problematic due to the lack of detail of most the descriptions. It is well known the importance of surface ornamentation of pro- and urosomites, features that have proved to be a reliable tool in distinguishing between species of *Halectinosoma* (Lang, 1965; Clément & Moore, 1995).

So far, 58 species have been allocated to the genus *Halectinosoma*. Most species hitherto described belong to the clade possessing a typical chaetotaxy of 2.2.3, 3.2.3, 3.2.3 for the exopodite of P2-P4. Among these species, *Halectinosoma n. sp. 1* is unique for lack of ventral ornamentation, either scales or fine spinules, on the caudal margin of the genital segment.

Bodin (1968) described *H. abyssicola* from the Gulf of Gascogne, based on a single female. Strictly speaking, *H. abyssicola* would belong to the curticorne-group, being closely related to *H. curticorne* Boeck, by the chaetotaxy of P1, P2, P3 ENP and P4 ENP, and to *H. littorale* and *H. intermedium* Nicholls, by the absence of armature on the first segment of A2 EXP (*cf.* Bodin, 1968), but turned out to be unique within the genus given its particular chaetotaxy of P3 EXP and P4 EXP. *Halectinosmoa n. sp 2* showed to be closely related to *H. abyssicola* as these two species share the same particular chaetotaxy of P1-P4 (unique within the genus). Although Bodin's description of *H. abyssicola* lacks detail, *Halectinosoma n. sp. 2* can be easily separated from the former principally by the chaetotaxy

of A2 EXP 1 (with 1 seta in *Halectinosoma n. sp. 2*, without armature in *H. abyssicola*), A 2 ENP 2 (*Halectinosoma n. sp. 2* with 1, *H. abyssicola* with 2 median spines; *Halectinosoma n. sp. 2* with 5, *H. abyssicola* with 6 apical setae/spines), Mxp ENP 2 (4 setae in *Halectinosoma n. sp. 2*, 3 in *H. abyssicola*), and relative length of P1-P4 EXP and setae of P5.

In 1962, Rouch published the description of some material gathered from the coasts of Brazil and Argentina by C. Delamare Deboutteville. In that paper, Rouch (1962) gave a brief and undetailed description of *Halectinosoma arenicola*. Later, in 1973, Itô gave a more detailed redescription of this same species collected from Japan, and in 1995, Clément & Moore included this species into thier revision and key to the females of the genus *Halectinosoma*. The Mexican species herein described and referred to as *Halectinosoma n. sp. 3*, agrees with *H. arenicola* in Clement & Moore's key. In fact, this species and the Mexican representative are the only two species bearing spinules on the A2 EXP 1. However, *Halectinosoma n. sp. 3* can be separated from *H. arenicola* by very obvious differences: general shape of P5 and length ratio of endopodite and exopodite of P1-P4.

GENUS *Hastigerella* Nicholls 1935

Hastigerella leptoderma Klie 1929
(Figs. 52-55)

Original description: *Ectinosoma leptoderma* n. sp. Klie 1929, :335, 382, Fig. 3-11.

Synonym: *cum* Lang, 1948; *Pararenosetella leptoderma* Klie 1929 (Kunz, 1949, :57, Figs. 33-36); *Hastigerella grandimandibularis* Wells 1967 (Wells & Rao, 1987, :25-26).

Distribution: *cum* Lang, 1948; Bay of Bengal: Andaman and Nicobar Islands (Wells & Rao, 1987); England: Isles of Scilly (Wells, 1968); France: Banyuls (Soyer, 1974), Biscay coast (Noodt, 1955b); Germany:, Helgoland (Kunz, 1949), Island of Sylt (Noodt, 1952; Mielke, 1975); Mexico: South-eastern Gulf of California (present study); Mozambique: Inhaca Island (Wells, 1967); United States of America: South Carolina (*cf.* Wells & Rao, 1987).

Material examined:

SEX	STAGE	# IND.	STORED AS	# CATALOGUE	STATION	DEPTH	DATE
M	A	1	Diss.	EMUCOP-659-E	6	0-3 cm	01/MAY/91
F	A	1	Diss.	EMUCOP-955-D	6	0-3 cm	01/MAY/91
F	A	1	Diss.	EMUCOP-956-D	6	0-3 cm	01/MAY/91
M	A	1	Alc.	EMUCOP-991-G	14	0-3 cm	03/JAN/92
F	A	5	Alc.	EMUCOP-660-E	6	0-3 cm	01/MAY/91
F	A	1	Alc.	EMUCOP-635-B	6	0-3 cm	01/MAY/91
F	A	1	Alc.	EMUCOP-648-D	6	0-3 cm	01/MAY/91
F	A	1	Alc.	EMUCOP-632-A	6	0-3 cm	01/MAY/91

Comparison and discussion

The specimens gathered from Ensenada del Pabellón lagoon (Mexico) agree well with the previous descriptions by Klie (1929) and Wells & Rao (1987). As this species has been fully described and reported previously from a variety of localities, only the illustrations of the Mexican specimens are shown in the present thesis.

GENUS *Pseudectinosoma* Kunz 1935

Pseudectinosoma minor Kunz 1935
(Figs. 56-61)

Original description: *Pseudectinosoma minor* n. gen. n. sp. Kunz 1935, :87, 91, 106, 108, 125, Fig. 29-32.

Synonym: *cum* Lang, 1948.

Distribution: *cum* Lang, 1948; Mexico: South-eastern Gulf of California (present study).

Material examined:

SEX	STAGE	# IND.	STORED AS	# CATALOGUE	STATION	DEPTH	DATE
F	A	1	Diss.	EMUCOP-274-C	9	6-9 cm	24/JUN/91
F	A	1	Diss.	EMUCOP-952-C	9	6-9 cm	24/JUN/91

Comparison and discussion

The specimens gathered from Ensenada del Pabellón lagoon (Mexico) agree well with the previous descriptions by Kunz (1935) and Lang (1948). Therefore, only the illustrations of the Mexican specimens are shown in the present thesis.

FAMILY Darcythompsoniidae Lang 1944

GENUS *Darcythompsonia* T. Scott 1906

Darcythompsonia fairliensis T. Scott 1899
(Figs. 62-67)

Original description: *Cylindropsyllus fairliensis* sp. n. T. Scott, 1899, :258, Fig. 1-4, 11-14.

Synonym: *cum* Lang, 1948; *Darcythompsonia scotti* Gurney 1920 (Huys *et al.*, 1996, :210).

Distribution: *cum* Lang, 1948; Galapagos Islands (Mielke, 1982b); Germany: Venedig (Kunz, 1960); Italy: "Valli di Comacchio" (Adriatic Coast) (Ceccherelli & Rossin, 1979); Mexico: South-eastern Gulf of California (present study).

Material examined:

SEX	STAGE	# IND.	STORED AS	# CATALOGUE	STATION	DEPTH	DATE
F	A	1	Diss.	EMUCOP-716-B	6	0-3 cm	22/JUN/91
F	A	17	Alc.	EMUCOP-584-F	10	3-6 cm	23/JUN/91
M	A	5	Alc.	EMUCOP-585-F	10	3-6 cm	23/JUN/91
F	A	1	Diss.	EMUCOP-957-F	10	3-6 cm	23/JUN/91
F	A	1	Diss.	EMUCOP-958-F	10	3-6 cm	23/JUN/91
F	A	1	Diss.	EMUCOP-959-F	10	3-6 cm	23/JUN/91
F	A	1	Diss.	EMUCOP-960-F	10	3-6 cm	23/JUN/91
F	A	1	Diss.	EMUCOP-961-F	10	3-6 cm	23/JUN/91
F	A	1	Diss.	EMUCOP-962-F	10	3-6 cm	23/JUN/91
M	A	1	Diss.	EMUCOP-963-F	10	3-6 cm	23/JUN/91
M	A	1	Diss.	EMUCOP-964-F	10	3-6 cm	23/JUN/91
F	A	1	Diss.	EMUCOP-965-F	10	3-6 cm	23/JUN/91

Comparison and discussion

The material examined agree with the previous descriptions of the species. Therefore, only the illustrations are shown in the present thesis.

GENUS *N. gen. 1*

Diagnosis

Darcythompsoniidae. Habitus and mouth parts, *Darcythompsonia*-like. Anal operculum with serrated and upwards directed caudal fold. Caudal rami with inner distal corner protruded into an extension upwards directed. Female antennule seven-segmented. Chaetotaxy of P1-P4 as in Table 9. Sexual dimorphism present in male antennule (six-segmented, subchirocer), P1 (dimorphic inner spine of basis and smaller outer element of same protopodal component, and comparatively larger ENP), P2 ENP, P3 (comparatively smaller inner spine of ENP 1, ENP 2 and EXP 2, and presence of a hyaline proximal spine on EXP 3), and P4 (with comparatively smaller dimorphic inner spine on ENP 1).

Type species

Darcythompsonia N. gen. 1 n. sp. 1, by monotypy.

N. gen. 1 n. sp. 1
(Figs. 68-73)

Material examined:

SEX	STAGE	# IND.	STORED AS	# CATALOGUE	STATION	DEPTH	DATE
M	A	1	Diss.	EMUCOP-598-B	10	0-3 cm	30/APR/91
F	A	1	Diss.	EMUCOP-966-F	10	0-3 cm	23/JUN/91
F	A	1	Diss.	EMUCOP-967-F	10	0-3 cm	23/JUN/91
F	A	1	Diss.	EMUCOP-968-F	10	0-3 cm	23/JUN/91
F	A	1	Diss.	EMUCOP-969-F	10	0-3 cm	23/JUN/91
M	A	1	Diss.	EMUCOP-970-F	10	0-3 cm	23/JUN/91

Female

Habitus (Fig. 68a) as in *D. fairliensis*; length including rostrum and caudal rami, from 0.9 to 1.13 µm. Anal segment (Fig. 68a, 68b, 68d) with bilobed caudal margin; rounded operculum with serrated and upward directed caudal fold. Caudal rami about 2 times as broad as long, with inner margin convex and outer edge slightly concave; inner distal corner protruded into an extension upwards directed; with 5 setae. Copulatory pore as in Fig. 68e.

Antennule (Fig. 69a), seven-segmented, with aesthetasc on fourth component.

Antenna (Fig. 69b): allobasis about 2 times longer than broad, ornamented with row of small spinules proximally on inner edge and with 1 small seta on proximal third. Exopodite small, arising in proximal third, one-segmented, with 1 seta. Endopodal segment ornamented with proximal and median set of spinules, with 2 strong spines and 1 seta, and with 5 distal elements.

Mandible (Fig. 69c, 69d): sclerotized gnathobase furnished with 2 rows of small spinules; division between coxa-basis and endopodite not evident; coxa-basis with 1, endopodite with 1 lateral and 3 apical setae.

Maxillule (Fig. 69e), with massive arthrite bearing 6 small apical elements, 1 subdistal thickened spine, and 1 lateral short seta, with 2 surface elements. Division between basis, endo- and exopodite not clear; basis with 3, endo- and exopodite with 2 setae each.

Maxilla (Fig. 69f, 69g): syncoxa furnished with some small spinules; with 1 endite bearing 2 slender and 1 plumose short seta; basis as illustrated, with 1 seta. Endopodite represented by 3 setae.

Maxilliped (Fig. 69h): endopodal segment with 1 median seta, 1 subapical and 1 distal claw; furnished with 1 median and 1 apical row of spinules on inner edge.

Labrum and paragnaths as in Fig. 69i.

P1 (Fig. 70a): praecoxa furnished with 2 rows of small spinules close to outer distal corner; coxa ornamented with row of small spinules and strong elements in middle; basis with row of small spinules on posterior face, with strong spinules at base of outer element and at base of exopodite anteriorly. Exopodite three-, endopodite two-segmented, the latter reaching joint between second and third exopodal segment. Chaetotaxy as in Table 9.

P2-P4 (Fig. 70b, 71a, 71b): coxa of P2 massive and larger than that of P3 and P4, not ornamented on anterior face; basis of P2 ornamented with small spinules on the middle and at base of exopodite on anterior face, of P3 and P4 seemingly not ornamented. Exopodite three-, endopodite two-segmented, the latter reaching tip of second exopodal segment; first endopodal segment reaching tip of first exopodal segment at most. Chaetotaxy as in Table 9.

Male

Habitus and mouth parts (not illustrated) as in female.

Antennule (Fig. 72a), six segmented, subchirocer.

P1 (Fig. 72b): protopodal components as in female, except for dimorphic inner spine and smaller outer element of basis. General structure of rami as in female, but endopodite reaching proximal fourth of third exopodal segment.

P2 (Fig. 73a): protopodal components and exopodite as in female. Endopodite two-segmented; first endopodal segment reaching proximal third of first exopodal component; second segment as long as entire exopodite, terminating in acute dentate process, with 1 inner and 1 apical seta.

P3 (Fig. 73b), as in female, except for relatively smaller inner spine of first and second endopodal and second exopodal component; with hyaline proximal spine on third exopodal segment.

P4 (Fig. 73c), as in female, except for relatively smaller inner spine of first endopodal segment

Table 9. Chaetotaxy of Darcythompsoniidae *N. gen. 1 n. sp. 1.*

	P1	P2	P3	P4
EXP	0.0.121	0.1.121	0.0.121	0.0.121
ENP	0.111	0.121	1.111	1.121

Comparison and discussion

At the time of publication of Lang's Monographie der Harpacticiden (vorläufige Mitteilung) (1944), 3 genera were recognised as representatives of the family Darcythompsoniidae: *Leptocaris* T. Scott, *Horsiella* Gurney, and *Darcythompsonia* T. Scott. Kunz (1961) and Lang (1965), considered the genera *Leptocaris* and *Horsiella* as synonyms, and the species of these two genera were united in the genus *Leptocaris* T. Scott.

Presently, the genus *Leptocaris* is defined principally by lack of maxilliped (or if present, it is reduced to small triangular lobe), presence of an anteriorly directed inner seta with comb tip in P1 ENP 1 (in some cases the only segment of P1 ENP), mandible without palp (or represented by a single seta), semi-circular anal operculum and cylindrical caudal rami in both sexes (*i. e.* nondimorphic), and lack of any dimorphic feature on second and third male urosomite.

On the other hand, the genus *Darcythompsonia* exhibits a moderately well developed maxilliped, lacks inner seta on P1 ENP 1, exhibits a relatively well developed mandibular palp, and displays dimorphic male P2 ENP 2, anal operculum (semi-circular in female, markedly bifid in male), caudal rami (expanded laterally in proximal half in female; cylindrical in male), and second and third male urosomites (with a fan-shaped dorsal organ).

Recently, Por (1983) defined the so far monotypic genus *Kristensenia*, closely related to *Darcythompsonia*. This genus, with its only representative, *K. pallida* Por lacks dimorphic male P2 ENP 2, as well as dimorphic caudal rami, anal operculum and second and third male urosomites, while its maxilliped and mandible, and P1 ENP 1 (the latter lacks inner seta), are *Darcythompsonia*-like.

The Mexican representatives clearly belong to the *Darcythompsonia-Kristensenia* clade as shown by the shape of the maxilliped and mandibular palp, and lack of inner element on P1 ENP 1. The new genus and species herein described turned out to be intermediate between *Darcythompsonia* and *Kristensenia*. It shares the dimorphic male P2 ENP 2 with *Darcythompsonia* (though this dimorphism is different for each genus). On the other hand, this new genus and species share some other features with *Kristensenia*, such as lack of any dimorphic feature in caudal rami, anal operculum and urosomites.

FAMILY Tachidiidae Sars 1909, Lang 1944, 1948

GENUS *Microarthridion* Lang 1944

Microarthridion n. sp. 1
(Figs. 74-78)

Material examined:

SEX	STAGE	# IND.	STORED AS	# CATALOGUE	STATION	DEPTH	DATE
F	A	1	Diss.	EMUCOP-62-D	8	0-3 cm	30/MAR/92
F	A	1	Diss.	EMUCOP-40-A	8	0-3 cm	30/MAR/92
F	A	1	Diss.	EMUCOP-375-D	7	0-3 cm	30/MAR/92
F	A	1	Diss.	EMUCOP-39-A	8	0-3 cm	30/MAR/92
F	A	1	Diss.	EMUCOP-7-A	2	0-3 cm	01/MAY/91
F	A	1	Diss.	EMUCOP-183-A	2	0-3 cm	30/MAR/92
F	A	3	Alc.	EMUCOP-357-B*	8	3-6 cm	30/MAR/92
F	A	1	Alc.	EMUCOP-778-I	10	0-3 cm	23/JUN/91
F	A	1	Alc.	EMUCOP-22-B	8	0-3 cm	02/MAY/92
F	A	2	Alc.	EMUCOP-806-C	4-5	0-3 cm	30/MAR/92
F	A	1	Alc.	EMUCOP-790-F	10	0-3 cm	30/ABR/91
F	A	2	Alc.	EMUCOP-71-B	8	0-3 cm	23/JUN/91
F	A	1	Alc.	EMUCOP-354-C	8	0-3 cm	30/MAR/92
F	A	2	Alc.	EMUCOP-722-E	6	0-3 cm	22/JUN/91
F	A	2	Alc.	EMUCOP-37-B	8	3-6 cm	30/MAR/92
F	A	1	Alc.	EMUCOP-41-A*	8	0-3 cm	30/MAR/92
F	A	5	Alc.	EMUCOP-47-C	8	0-3 cm	30/MAR/92
F	A	1	Alc.	EMUCOP-362-C**	2	0-3 cm	01/MAY/91
F	A	3	Alc.	EMUCOP-99-A	2	0-3 cm	01/MAY/91
F	A	4	Alc.	EMUCOP-138-B	2	0-3 cm	01/MAY/91
F	A	1	Alc.	EMUCOP-305-G	12	0-3 cm	23/JUN/91
F	A	3	Alc.	EMUCOP-358-I*	12	6-9 cm	23/JUN/91
F	A	2	Alc.	EMUCOP-328-O	12	6-9 cm	23/JUN/91
F	A	2	Alc.	EMUCOP-308-H**	12	0-3 cm	23/JUN/91
F	A	1	Alc.	EMUCOP-312-I	12	6-9 cm	23/JUN/91
F	A	1	Alc.	EMUCOP-320-L	12	3-6 cm	23/JUN/91
F	A	1	Alc.	EMUCOP-315-J	12	0-3 cm	23/JUN/91
F	A	2	Alc.	EMUCOP-295-B**	12	0-3 cm	23/JUN/91
F	A	6	Alc.	EMUCOP-612-C	10	0-3 cm	30/ABR/91
F	A	1	Alc.	EMUCOP-576-D	10	0-3 cm	23/JUN/91
F	A	1	Alc.	EMUCOP-405-H	7	0-3 cm	30/MAR/92
F	A	3	Alc.	EMUCOP-401-G	7	0-3 cm	30/MAR/92
F	A	4	Alc.	EMUCOP-389-B	7	0-3 cm	30/MAR/92
F	A	1	Alc.	EMUCOP-631-D	10	0-3 cm	30/ABR/91
F	A	1	Alc.	EMUCOP-171-F	2	0-3 cm	01/MAY/91
F	A	5	Alc.	EMUCOP-359-O**	12	6-9 cm	23/JUN/91
F	A	5	Alc.	EMUCOP-145-C	2	0-3 cm	01/MAY/91
M	A	1	Diss.	EMUCOP-96-A	2	0-3 cm	01/MAY/91
M	A	1	Diss.	EMUCOP-130-B	2	0-3 cm	01/MAY/91
M	A	1	Diss.	EMUCOP-129-B	2	0-3 cm	01/MAY/91
M	A	1	Diss.	EMUCOP-132-B	2	0-3 cm	01/MAY/91
M	A	1	Diss.	EMUCOP-98-A	2	0-3 cm	01/MAY/91
M	A	1	Diss.	EMUCOP-131-B	2	0-3 cm	01/MAY/91
M	A	1	Diss.	EMUCOP-170-F	2	0-3 cm	01/MAY/91

M	A	1	Diss.	EMUCOP-83-C	8	0-3 cm	23/JUN/91
M	A	1	Alc.	EMUCOP-783-E	10	0-3 cm	30/ABR/91
M	A	1	Alc.	EMUCOP-670-B	6	0-3 cm	30/MAR/92
M	A	1	Alc.	EMUCOP-558-A	4-5	0-3 cm	30/MAR/92
M	A	1	Alc.	EMUCOP-721-E	6	0-3 cm	22/JUN/91
M	A	3	Alc.	EMUCOP-100-A	2	0-3 cm	01/MAY/91
M	A	1	Alc.	EMUCOP-146-C	2	0-3 cm	01/MAY/91
M	A	1	Alc.	EMUCOP-361-B	12	0-3 cm	23/JUN/91
M	A	1	Alc.	EMUCOP-309-H	12	0-3 cm	23/JUN/91
M	A	4	Alc.	EMUCOP-311-I	12	6-9 cm	23/JUN/91
M	A	1	Alc.	EMUCOP-327-O	12	6-9 cm	23/JUN/91
M	A	1	Alc.	EMUCOP-284-A	12	3-6 cm	23/JUN/91
M	A	1	Alc.	EMUCOP-319-L	12	3-6 cm	23/JUN/91
M	A	1	Alc.	EMUCOP-158-D	2	0-3 cm	01/MAY/91
M	A	4	Alc.	EMUCOP-294-B	12	0-3 cm	23/JUN/91
M	A	1	Alc.	EMUCOP-390-B	7	0-3 cm	30/MAR/92
M	A	1	Alc.	EMUCOP-615-C	10	0-3 cm	30/ABR/91
M	A	1	Alc.	EMUCOP-402-G	7	0-3 cm	30/MAR/92
M	A	2	Alc.	EMUCOP-135-B	2	0-3 cm	01/MAY/91
M	A	3	Alc.	EMUCOP-599-B	10	0-3 cm	30/ABR/91
M	A	1	Alc.	EMUCOP-360-H*	12	0-3 cm	23/JUN/91
F	CV	1	Diss.	EMUCOP-356-C	8	0-3 cm	30/MAR/92
F	CV	1	Diss.	EMUCOP-355-C	8	0-3 cm	30/MAR/92
F	CV	1	Diss.	EMUCOP-353-C	2	0-3 cm	01/MAY/91
F	CV	1	Alc.	EMUCOP-669-B	6	0-3 cm	30/MAR/92
F	CV	1	Alc.	EMUCOP-142-C	2	0-3 cm	01/MAY/91
M	CV	1	Diss.	EMUCOP-42-B	8	3-6 cm	30/MAR/92
M	CV	1	Diss.	EMUCOP-69-B	8	0-3 cm	23/JUN/91
M	CV	1	Diss.	EMUCOP-43-B	8	3-6 cm	30/MAR/92
M	CV	1	Diss.	EMUCOP-70-C	8	0-3 cm	30/MAR/92
M	CV	1	Diss.	EMUCOP-352-C	2	0-3 cm	01/MAY/91
M	CV	1	Diss.	EMUCOP-351-A	2	0-3 cm	01/MAY/91
M	CV	1	Diss.	EMUCOP-350-A	2	0-3 cm	01/MAY/91
M	CV	1	Alc.	EMUCOP-48-C	8	0-3 cm	30/MAR/92
M	CV	1	Alc.	EMUCOP-789-F	10	3-6 cm	30/ABR/91
M	CV	2	Alc.	EMUCOP-101-A	2	0-3 cm	01/MAY/91
M	CV	1	Alc.	EMUCOP-136-B	2	0-3 cm	01/MAY/91
M	CV	1	Alc.	EMUCOP-137-B	2	0-3 cm	01/MAY/91
M	CV	1	Alc.	EMUCOP-285-A	12	3-6 cm	23/JUN/91
M	CV	3	Alc.	EMUCOP-322-L	12	3-6 cm	23/JUN/91
M	CV	1	Alc.	EMUCOP-613-C	10	0-3 cm	30/ABR/91
M	CV	1	Alc.	EMUCOP-376-D	7	0-3 cm	30/MAR/92
M	CV	2	Alc.	EMUCOP-144-C	2	0-3 cm	01/MAY/91
M	CV	1	Alc.	EMUCOP-330-O	12	6-9 cm	23/JUN/91
M	CIV	1	Diss.	EMUCOP-347-L	12	3-6 cm	23/JUN/91
M	CIV	1	Diss.	EMUCOP-346-A	12	3-6 cm	23/JUN/91
M	CIV	1	Diss.	EMUCOP-348-O	12	6-9 cm	23/JUN/91
M	CIV	3	Alc.	EMUCOP-49-C	8	0-3 cm	30/MAR/92
M	CIV	4	Alc.	EMUCOP-329-O	12	6-9 cm	23/JUN/91
M	CIV	1	Alc.	EMUCOP-403-G	7	0-3 cm	30/MAR/92
M	CIV	1	Alc.	EMUCOP-349-A	2	0-3 cm	01/MAY/91
M	CIV	1	Alc.	EMUCOP-614-C	10	0-3 cm	30/ABR/91
M	CIV	1	Alc.	EMUCOP-286-A	12	3-6 cm	23/JUN/91

M	CIV	1	Alc.	EMUCOP-321-L	12	3-6 cm	23/JUN/91
?	CIII	1	Diss.	EMUCOP-343-C	2	0-3 cm	01/MAY/91
?	CIII	1	Diss.	EMUCOP-345-C	8	0-3 cm	30/MAR/92
?	CIII	1	Diss.	EMUCOP-344-B	8	3-6 cm	30/MAR/92
?	CIII	1	Alc.	EMUCOP-50-C	8	0-3 cm	30/MAR/92
?	CIII	1	Alc.	EMUCOP-38-B	8	3-6 cm	30/MAR/92
?	CIII	1	Alc.	EMUCOP-143-C	2	0-3 cm	01/MAY/91
?	CII	1	Diss.	EMUCOP-342-C	2	0-3 cm	01/MAY/91
?	CII	1	Diss.	EMUCOP-340-A	2	0-3 cm	01/MAY/91
?	CII	1	Diss.	EMUCOP-341-A	2	0-3 cm	01/MAY/91
?	CII	1	Alc.	EMUCOP-141-C	2	0-3 cm	01/MAY/91
?	CII	2	Alc.	EMUCOP-117-A	2	0-3 cm	01/MAY/91
?	CI	1	Diss.	EMUCOP-412-H	7	0-3 cm	30/MAR/92
?	CI	1	Diss.	EMUCOP-409-H	7	0-3 cm	30/MAR/92
?	CI	1	Alc.	EMUCOP-140-B	2	0-3 cm	01/MAY/91

* Material deposited in the collection of the Koninklijk Belgisch Instituut voor Natuurwetenschappen/Institut Royal des Sciences Naturelles de Belgique: COP-4220, COP-4221, COP-4222, COP-4223.
** Material deposited in the collection of the United States Natural History Museum: USNM-282629, USNM-282630.

Female

Habitus (Fig. 74a, 74b, 74c, 74d), fusiform, with largest width near posterior margin of cephalothorax, and slender urosome. Length from 456 to 470 µm including rostrum and caudal rami. Rostrum triangular, rounded at tip, fused to cephalothorax, bearing two pairs of sensillae. Cephalothorax nearly as long as one third of the entire body length, bell-shaped in dorsal view; posterior and lateral margins ornamented with long and slender spinules; surface smooth, except for discontinuous transversal row of spinules near posterior margin. Integument of prosomites and urosomites with pattern of transversal rows of minute spinules. First and second prosomite with long and slender spinules on posterior and lateral margins; first to third prosomites with discontinuous row of spinules near caudal edge. First urosomite with lateral seta; following urosomal somites with long and slender spinules on posterior margin, and furnished dorsally with transversal rows of minute spinules and some long elements on lateral surface. Genital double somite divided dorsally, fused ventrally; ventral surface plain, with P6 vestige on anterior half; posteroventral margin furnished with slender spinules and fragile long elements. Ventral surface of following urosomites with transversal row of spinules in anterior half, some spinules near lateral margins, and long elements along posterior edge. Anal somite distinctly shorter than preceding urosomite and ornamented with a median row of spinules along posteroventral margin. Rounded anal operculum furnished with long slender spinules along posterior margin and an irregular pattern of spinules on its surface. Caudal rami about 1.5 times as long as wide, slightly tapering posteriorly, bearing 7 elements. Dorsal surface of rami with row of long spinules on inner half; distally with spinules on both dorsal and ventral sides.

Antennule (Fig. 75a), typically robust, six-segmented, all setae bipinnate, except for an unipinnate element on fourth segment, and for 5 smooth elements on ultimate segment. Integument of segments smooth except for two rows of spinules on first one. Second, fourth and fifth segments narrow, about twice as wide as long.

Antenna (Fig. 75b), with basis. Two-segmented endopodite and exopodite. Basis short, with long and slender spinules near distal abexopodal corner and some minute ones near outer proximal edge. First exopodal segment 1.5 times longer than second one, bearing two setae, proximal one smooth, distal one bipinnate; second exopodal segment with two apical bipinnate setae. First endopodal segment without setae, furnished with row of spinules along abexopodal margin. Inner margin of second endopodal segment with three median elements and 6 distal seta/spines.

Mandible (Fig. 75c), with rounded pars molaris. Biting edge with robust teeth and single plumose seta. Coxa-basis with row of minute spinules and one seta. Exopodite one-segmented, with three apical setae and some slender and long spinules along outer margin. Endopodite one-segmented, with two plumose setae in middle of inner margin, and 7 (1 plumose and 6 smooth) on distal corner.

Maxillule (Fig. 75d), with surface of praecoxal arthrite bearing 1 strong spinulose spine, and an anterior and a posterior angular and naked curved spine, distally with 7 strong spines and 1 plumose distal seta; on anterior surface with two slender setae. Coxal endite with three setae. Basis with 2 lateral and 5 terminal elements.

Maxilla (Fig. 75e), without trace of separation between coxae. Praecoxa furnished with two outer rows of spinules, and with one endite bearing three setae (one spinulose). Coxa with two endites, each with three setae (1 spinulose, 2 smooth). Basis with one spinulose claw and two setae (1 claw-shaped and 1 slender seta). Endopodite with two lateral and two distal setae.

Maxilliped (Fig. 75f): basis with three (or four?) slender spinules arising close to proximal margin; inner and outer margins with long spinules, with small ones distally. First endopodal segment with outer row of long spinules. Second endopodal segment with a strong geniculate spinulose claw and single accompanying seta.

P1 (Fig. 76a): intercoxal sclerite with row of strong spinules; praecoxa and coxa with some rows of spinules near articulation with adjoining elements; basis with, on anterior surface, spinules at base of implantation of both inner and outer spines, and between articulations with rami, on posterior surface furnished with some spinules. Rami three segmented. Endopodite reaching middle of third exopodal segment; first segment small, only half as high as wide. Chaetotaxy as in Table 10.

P2-P4 (Fig. 76b, 76c, 76d): intercoxal sclerite with row of spinules on anterior and posterior surface. Basis with long spinules on inner margin close to intercoxal coupler and between rami, and with some small spinules on articulation with first exopodal segment; outer seta of basis long and slender with spinules surrounding its base. Rami three segmented. First endopodal segment small; second segment with 1 inner seta; third segment of P2 and P4 with 5 elements in all, P3 with 6; subdistal inner seta of P2 and P4 and distal innermost element of P3 robust, with distal part feathered. Chaetotaxy as in Table 10.

P5 (Fig. 76e), represented as a well defined single lobe; with four bipinnate elements in all; outer seta of obsolete basis situated laterally on somite and arising from minute socle; integument of lobe smooth except for some minute spinules near distal margin and along inner edge.

P6 and genital field (Fig. 74d): vestiges represented by a median ovate plate with a small triangular lobe on each side; genital pore distinct, leading to a short but strongly sclerotized duct.

Male

Habitus (Fig. 77a, 77b, 77c), fusiform, general shape (except for separate genital somites) and dorsal integumental ornamentation as in female; length from 490-506 μm from tip of rostrum to caudal rami. Ventral surface of first urosomite smooth except for some short lateral rows of spinules; ventral surface and posteroventral margin of following urosomites furnished with several transversal rows of spinules.

Antennule (Fig. 78a), six-segmented, chirocer; second segment narrow.

Antenna (Fig. 78c), as in female, though more slender in shape and with comparatively longer elements.

P1 (not illustrated), as in female.

P2 (Fig. 78f), differs from female's in strenght, in the armature and strenght of subdistal and distal elements on third exopodal segment, and in second subdistal modified spine of third endopodal segment.

P3 (Fig. 78g), differs from female's in strenght and in the armature of the two distal spines on third exopodal segment.

P4 (not illustrated), as in female.

P5 (Fig. 77c), with basis, exopodite and endopodite fused to somite; with five elements in all: two small and naked inner setae, two outer bipinnate ones, and one outer seta of obsolete basis laterally on somite.

P6 (Fig. 77c), with basis, exopodite and endopodite fused; with three bipinnate elements in all: one inner strong seta about 2.5 times longer than the median element, and 1.5 times longer than the outermost one.

Table 10. Chaetotaxy of *Microarthridion n. sp. 1.*

	P1	P2	P3	P4
EXP	0.1.123	0.1.222	0.1.222	0.1.122
ENP	0.1.221	0.1.221	0.1.321	0.1.221

Variability

With respect to the chaetotaxy of the first exopodal segment of the antenna, one male (EMU-4131-A) was found having only one seta (Fig. 78d), and a second male (EMU-4133-A) was found possessing a proximal plumose element on this segment (Fig. 78e).

Comparison and discussion

Since Lang (1948) defined the genus *Microarthridion* to accommodate *Tachidius littoralis* Poppe 1881, *T. berberus* Monard 1935a and *T. reductus* Monard 1935b, only two species were added: *M. fallax* Perkins 1956 and *M. perkinsi* Bodin 1970. That *Tachidius laurenticus* described by Nicholls (1940), was in fact a member of the genus *Microarthridion* has long been disregarded until Bodin (1988a) formally allocated the species to the present genus.

The members of the genus *Microarthridion* are common species of the Atlantic and Mediterranean coasts where they occupy a wide range of coastal marine and brakish water habitats. Although *M. littorale* has been reported from Pacific localities: Suifen Ho in Russia (Borutsky, 1952), Port Valdez in Alaska (Feder and Paul, 1980), Nanaimo Estuary in Canada (Kask *et al.*, 1982), and Chorro Creek Salt Marsh in California (Watkins, 1983), some differences have been found when comparing dissected specimens from Alaska with those of Europe (Fiers, *in litt.*). Hence the existence of a new species closely related to *M. littorale* is presumed in agreement with J. W. Fleeger (*in litt.*). *M. littorale* have been reported by Coull and Vernberg (1975) from South Carolina, and by Chandler and Fleeger (1983) and Sun and Fleeger (1991) from Louisiana. However, after comparing some specimens from Louisiana provided by J. W. Fleeger, with those belonging to the new species here described, it is clear that the species from Louisiana (and probably that of South Carolina) is not related to *M. littorale*, but is the sister-species of *Microarthridion n. sp. 1*.

Microarthridion n. sp. 1 is unique because of the chaetotaxy of the antennal exopodite, with two setae on both proximal and distal segments. Although *Microarthridion n. sp. 1* shares the presence of two elements on the first exopodal segment of the antenna with *M. fallax*, *M. reductum*, *M. perkinsi* and *M. laurenticum*, the Mexican species possesses only two setae on the second segment, whereas the latter group of species bear three elements. *M. reductum*, *M. perkinsi* and *M. laurenticum* differ from *Microarthridion n. sp. 1* and *M. fallax* that the first three species present two inner setae on the second endopodal segment of P2 and P3 as in *M. littorale*, whilst *Microarthridion n. sp. 1* and *M. fallax* bear only one element. Although *M. fallax* and *Microarthridion n. sp. 1* share the same chaetotaxy, there are other minor differences between these species such as the relative length of exopodite and endopodite of P1, elements of male P5 and P6, and the general structure of female P5. *M. berberum* differs from *Microarthridion n. sp. 1* in the setation formula of the antennal exopodite (1,3 and 2,2, respectively), in the setation formula of the exopodite of P3 (0-1-223 in *M. berberum* and 0-1-222 in *Microarthridion n. sp. 1*), relative length of the exopodite and endopodite of P1 and relative length of the setae of male P5 and P6. Although *M. littorale* is quite different from *Microarthridion n. sp. 1* in both chaetotaxy of the antennal exopodite and setation formula of P2 and P3, and relative length of the setae of female P5 and male P6, the resemblance of the male P5 in both species is noteworthy. Indeed, these species are unique with respect to the armature of the male P5, with 2 small and naked inner setae, 2 outer pinnate ones, and 1 outer seta of obsolete basis situated laterally on somite.

FAMILY Harpacticidae Sars 1904

SUBFAMILY Zausodiinae Lang 1944

GENUS *Zausodes* C. B. Willson 1932b

Zausodes sextus Lang 1965
(Figs. 79-85)

Original description: *Zausodes sextus* Lang 1965, :137-141, Fig.75-76.

Distribution: Mexico: South-eastern Gulf of California (present study); United States of America: California (Lang, 1965).

Material examined:

SEX	STAGE	# IND.	STORED AS	# CATALOGUE	STATION	DEPTH	DATE
F	A	1	Diss.	EMUCOP-453-A	3	3-6 cm	02/MAY/91
M	A	1	Diss.	EMUCOP-452-A	3	3-6 cm	02/MAY/91

Comparison and discussion

The Mexican representatives of *Zausodes sextus* showed to be identical to those described from the coast of California by Lang (1965). Since Lang (1965) provided a detailed description of this species, only the illustrations of the Mexican representatives are presented.

Zausodes septimus Lang 1965
(Figs. 86-91)

Original description: *Zausodes septimus* Lang 1965, :142-145, Fig. 77-78.

Distribution: Mexico: South-eastern Gulf of California (present study); United States of America: California (Lang, 1965); Panama: Isla Naos, Isla Perico and Isla Flamenco (Pacific coast) and Isla Nalunega (Atlantic coast) (Mielke, 1990b).

Material examined:

SEX	STAGE	# IND.	STORED AS	# CATALOGUE	STATION	DEPTH	DATE
F	A	1	Diss.	EMUCOP-647-D	6	0-3 cm	01/MAY/91
F	A	1	Alc.	EMUCOP-734-E	14	0-3 cm	03/JAN/92
M	A	1	Alc.	EMUCOP-646-D	6	0-3 cm	01/MAY/91
F	A	1	Diss.	EMUCOP-693-C	6	0-3 cm	30/MAR/92
M	A	1	Diss.	EMUCOP-298-D	12	3-6 cm	23/JUN/91
M	A	1	Diss.	EMUCOP-681-B	6	0-3 cm	30/MAR/92
F	A	2	Alc.	EMUCOP-735-G	14	0-3 cm	03/JAN/92
F	A	1	Diss.	EMUCOP-715-D	6	0-3 cm	03/JAN/92
M	A	1	Diss.	EMUCOP-971-E	14	0-3 cm	03/JAN/92

Comparison and discussion

The Mexican representatives of *Zausodes septimus* agree with the descriptions provided by Lang (1965) and Mielke (1990b). Therefore, only the illustrations of the Mexican representatives are provided.

FAMILY Tisbidae Stebbing 1910, Lang 1944, 1948

SUBFAMILY Tisbinae Lang 1944

GENUS *Tisbe* Lilljeborg 1853

Tisbe sp. 1
(Figs. 92-93)

Material examined:

Two dissected males (EMUCOP-104-A, EMUCOP-105-A) from station 2 found at 0-3 cm depth, on 01/MAY/91.

Female

Unknown.

Male

The only two males found were badly damaged and the measurement of body length was not possible. Several appendages are missing (P4, P5, P6, Mxl).

Antennule (Fig. 92a), haplocer, nine-segmented, with aesthetasc on fifth and ultimate segment.

Antenna (Fig. 92b): basis seemingly without inner seta. Exopodite four-segmented; first, second and third segment with 1, last segment with 3 setae. First endopodal segment as long as basis, with short bare inner seta; second segment barely with some spinules midway the inner margin, with 1 inner bare and 5 distal spines.

Mandible (Fig. 92c): biting edge with multidentate pars incisiva and 1 seta. Coxa-basis with 1 small seta apically. Exo- and endopodite of about the same length, with 3 and 7 elements respectively.

Maxillule, unknown.

Maxilla (Fig. 92d): syncoxa ornamented with long setules close to outer distal corner; with 1 distal endite bearing only 1 seta. Basis with strong claw, with 1 accompanying seta as shown.

Maxilliped (Fig. 92e): palm with longitudinal row of spinules along inner edge. Endopodal segment with 1 claw and 1 (2?) accompanying seta.

P1 (Fig. 93a): coxa ornamented with some short rows of small spinules and longer elements on crescentic outer distal corner. Basis with spinules between rami and at base of inner and outer spine. Rami typically three-segmented. Second exopodal segment enlarged and with inner seta. First endopodal segment shorter than second one (ENP2/ENP1 length ratio, 1.3), with inner seta hardly reaching tip of supporting segment; third segment very small with 1 claw-like element, 1 longer spine with tuftlike comb, and 1 minute seta. Chaetotaxy as in Table 11.

P2-P3 (Fig. 93b, 93c): coxa ornamented with some short transverse rows of small spinules and with longer elements close to outer distal corner. Basis bare with only few spinules close to outer seta and with long fragile elements along inner distal edge. Rami three-segmented, located on the outer half of basis. Exopodite with inner seta on first and second segment; last segment with 3 inner setae. Endopodite with 1 and 2 inner setae on first and second segment respectively; third segment with 2 inner elements. Chaetotaxy as in Table 11.

Table 11. Chaetotaxy of *Tisbe* sp. 1

	P1	P2	P3
EXP	0.1.123	1.1.223	1.1.323
ENP	1.1.111	1.2.221	1.2.321

Comparison and discussion

Not much can be said on the relationship of the Mexican representatives with other species of the genus given the loss of taxonomically important appendages and lack of female specimens. This will be done when the female and more specimens are examined.

FAMILY Thalestridae Sars 1905 *sensu* Lang 1948

SUBFAMILY Dactylopusiinae Lang 1936a

GENUS *Diarthrodes* Thomson 1882

Diarthrodes n. sp. 1
(Figs. 94-97)

Material examined:

One dissected female, labeled EMUCOP-515-E, found in station 4-5 at o-3 cm depth, on 01/MAY/91.

Female

Habitus (Fig. 94), as in *D. unisetosus* Lang 1965. Length, 324 µm including rostrum and caudal rami. Cephalothorax as large as succeeding somites combined. Rostrum (not illustrated) as *D. unisetosus*. Prosomites, and first to fifth urosomites with hyaline frill; dorsal and ventral surface of urosomites plain except for row of spinules along caudal margin of anal segment ventrally. Genital double-somite completely fused dorsally and ventrally; genital field as in Fig. 95. Caudal rami short, as *D. unisetosus*, about 1.5 times broader than long; with 7 elements.

Antennule (Fig. 96a), six-segmented, with aesthetasc on fourth segments; surface of first segment with row of spinules, of succeeding components smooth.

Antenna (Fig. 96b), in general as in *D. unisetosus*, except for stronger apical spine on uni-segmented exopodite in *Diarthrodes n. sp. 1*, and endopodal segment with 8 elements instead of 7.

Mandible and maxillule, unknown.

Maxilla and maxilliped (Fig. 96c, 96d) as in *D. unisetosus*.

P1 (Fig. 97a), as in *D. unisetosus*, except for longer inner seta of ENP 1 in *Diarthrodes n. sp. 1*. Chaetotaxy as in Table 12.

P2-P3 (Fig. 97, b, 97c), as in *D. unisetosus*, except for relatively larger endopodite. Chaetotaxy as in Table 12.

P4 (97d), as in *D. unisetosus*, except for relatively smaller endopodite and third exopodal segment with only 7 elements (only 2 outer spines). Chaetotaxy as in Table 12.

P5 (Fig. 97e): General shape as in *D. unisetosus*, except for relative length of exo- and endopodal setae.

Table 12. Chaetotaxy of *Diarthrodes n. sp. 1*.

	P1	P2	P3	P4
EXP	0.113	1.1.223	1.1.323	1.1.322
ENP	1.0.11	1.2.221	1.1.321	1.1.221

Comparison and discussion

Diarthrodes n. sp. 1 showed to be closely related to *D. unisetosus* described by Lang (1965) from California. In fact, these two species share the one-segmented exopodite of A2, and the three-segmented exo- and two-segmented endopodite of of P1, combination that is unique within the genus.

However, these two species exhibit some striking differences, being easily differentiated principally by the relative length of the inner seta of P1 ENP 1 (not reaching tip of endopodite in *D. unisetosus*, and reaching tip of third endopodal segment in *Diarthrodes n. sp. 1*), number of setae/spines on endopodal segment of A2 (7 in *D. unisetosus*, 8 in *Diarthrodes n. sp. 1*), chaetotaxy of third exopodal segment of P4 (with 3 outer spines in *D. unisetosus* and only 2 in *Diarthrodes n. sp.* 1), and relative length of the setae of P5.

GENUS *Paradactylopodia* Lang 1944

Paradactylopodia n. sp. 1
(Figs. 98-104)

Material examined:

SEX	STAGE	# IND.	STORED AS	# CATALOGUE	STATION	DEPTH	DATE
?	CI	1	Alc.	EMUCOP-86-C	8	0-3 cm	23/JUN/91
?	CI	1	Alc.	EMUCOP-772-I	10	0-3 cm	23/JUN/91
?	CII	2	Alc.	EMUCOP-74-B	8	0-3 cm	23/JUN/91
?	CIII	1	Alc.	EMUCOP-777-I	10	0-3 cm	23/JUN/91
F	A	6	Alc.	EMUCOP-578-D	10	0-3 cm	23/JUN/91
F	A	7	Alc.	EMUCOP-774-I	10	0-3 cm	23/JUN/91
F	A	1	Diss.	EMUCOP-67-A	8	0-3 cm	23/JUN/91
F	A	1	Diss.	EMUCOP-84-C	8	0-3 cm	23/JUN/91
F	A	1	Diss.	EMUCOP-972-I	10	0-3 cm	23/JUN/91
F	A	1	Diss.	EMUCOP-973-I	10	0-3 cm	23/JUN/91
F	A	1	Diss.	EMUCOP-974-I	10	0-3 cm	23/JUN/91
F	A	1	Diss.	EMUCOP-975-I	10	0-3 cm	23/JUN/91
F	A	1	Diss.	EMUCOP-976-I	10	0-3 cm	23/JUN/91
F	A	1	Diss.	EMUCOP-977-I	10	0-3 cm	23/JUN/91
M	A	4	Alc.	EMUCOP-775-I	10	0-3 cm	23/JUN/91
M	A	1	Diss.	EMUCOP-79-C	8	0-3 cm	23/JUN/91
M	A	1	Diss.	EMUCOP-978-I	10	0-3 cm	23/JUN/91
M	CIV	1	Alc.	EMUCOP-580-E	10	0-3 cm	23/JUN/91
M	CIV	2	Alc.	EMUCOP-776-I	10	0-3 cm	23/JUN/91
M	CV	1	Alc.	EMUCOP-85-C	8	0-3 cm	23/JUN/91

Female

Habitus (Fig. 98a, 98b, 99): length, including rostrum and caudal rami, ranging from 536 to 608 μm; tapering posteriorly; with maximum width in distal part of cephalothorax, the latter about 1/3 of entire body length, with hyaline posterior frill. Surface of prosomites smooth, with caudal hyaline frill. First urosomite smooth and proportionately small. Genital double-somite with lateroventral chitinized strip, the latter interrupted dorsally; with caudal hyaline frill finely serrated and set of spinules laterally; ventrally plain, except for genital field and P6. Fourth urosomite as previous one; fifth urosomite with 2 additional sets of ventral spinules close to caudal margin. Anal segment with rounded operculum; dorsal surface smooth, lateroventrally with spinules along border with caudal rami, the latter about as long as broad, with 7 elements.

Antennule (Fig. 100b), five-segmented, typically with aesthetasc on third and ultimate segment; surface of segments smooth, except for two sets of spinules on first one.

Antenna (Fig. 100c): allobasis about 2 times longer than broad, with 1 inner seta. Exopodite three-segmented; first segment with 2 setae; second segment small, broader than long, with 1 seta; third segment as long as first one and about 5 times longer than second one, with 1 lateral and 2 apical elements, and furnished with subapical row of spinules. Endopodal segment with 9 setae/spines.

Mandible (Fig. 100d): praecoxa with dentate *pars incisiva*; coxa-basis ornamented with small spinules in the middle; with 1 apical seta. Exopodite seemingly one-segmented, with 6 setae. Endopodite with 2 lateral and 4 apical setae.

Maxillule (Fig. 100g): arthrite of praecoxa with 2 surface setae, 2 lateral setae and 4 apical spines. Coxa with 4 apical setae and one more long seta arising posteriorly close to basis, the latter with 2 lateral and 4 apical setae. Endopodite with 4, exopodite with 3 setae.

Maxilla (Fig. 100e): syncoxa with 3 endites, proximal one with 1 setae, median and distal one with 2 setae each. Basis with a strong claw, seemingly without setae.

Maxilliped (Fig. 100f): basis with 3 subdistal and 2 apical setae. First endopodal segment with 2 setae and ornamented with small spinules along inner edge; last endopodal segment with a strong claw accompanied by a small seta.

P1 (Fig. 101a, 101b): coxa rectangular, ornamented with several short transverse rows of small spinules and longer elements close to outer distal corner; basis with slender setules along inner edge, and strong spinules at base of inner spine, endopodite and exopodite. Rami three-segmented; exopodite reaching 2/3 of first endopodal segment. Chaetotaxy as in Table 13.

P2-P4 (Fig. 101c, 102a, 102b): coxa with row of spinules close to outer distal corner; basis with spinules at base of outer seta and between rami. Rami three-segmented. Endopodite of P2 almost reaching tip of exopodite; endopodite of P3 and P4 reaching distal third and middle of third exopodal segment respectively. Chaetotaxy as in Table 13.

P5 (Fig. 103a): baseoendopodite broad, extending to tip of exopodite, with 5 marginal setae and a marginal conspicuous pore; ornamented with minute spinules along outer edge. Exopodite oval, with small spinules along outer edge; with 6 marginal setae.

Male

Body length, 421 to 454 µm. Habitus (not illustrated), as in female dorsally, except for genital double-somite; ventrally ornamented with short rows of spinules close to caudal margin of third to fifth urosomite (Fig. 104e).

Anal segment and caudal rami as in female.

P1, as in female, except for inner dimorphic spine of basis, which is smooth and blunt at tip (Fig. 104b).

P2: Exopodite (not illustrated) as in female. Endopodite (Fig. 104c) two-segmented; first segment short with 1 inner seta; second segment dimorphic, with 2 lateral inner setae, 1 subapical inner element, 1 apical setae, and 2 outer elements (one of them modified into a spine).

P3-P4 (not illustrated) as in female.

P5 (Fig. 104d): baseoendopodites confluent, with 3 setae and a conspicuous pore, reaching tip of exopodite. Exopodite with 5 setae/spines.

P6 (Fig. 104e), represented by two plates confluent in the middle; with 3 setae.

Variability

One female (EMUCOP-977-I) was found exhibiting an aberrant P3 ENP 3 with only 5 setae/spines (Fig. 102b), and one female (EMUCOP-67-A) was found with a P5 BENP bearing only 4 setae (Fig. 103c) and a P1 EXP 3 with aberrant innermost seta (Fig. 101a). Five females (EMUCOP-972-I, EMUCOP-974-I, EMUCOP-975-I, EMUCOP-976-I, and EMUCOP-977-I) were found displaying only 5 setae on P5 EXP (Fig. 103b). Some differences regarding the maxillular chaetotaxy were also observed.

Table 13. Chaetotaxy of *Paradactylopodia n. sp. 1.*

	P1	P2	P3	P4
EXP	0.1.122	1.1.223	1.1.323	1.1.323
ENP	1.0.111	1.2.221	1.2.321	1.2.221

Comparison and discussion

Since the publication of the last key to the species of *Paradactylopodia* by Kunz (1983) only *Paradactylopodia trioculata* Hicks 1988 (apart from the Mexican representatives herein described) has been added.

As pointed out by Wells & Rao (1987), the structure of the outer dimorphic spine of male P2 ENP 2 is probably the most useful character to differentiate the species of the genus *Paradactylopodia* as shown for *P. brevicornis* Claus 1866, and *P. latipes* Boeck 1865, since some species display great variability not only in body size, but also in chaetotaxy of natatorial legs, female and even male P5.

The Mexican species *Paradactylopodia n. sp. 1*, showed to be more closely related to *P. brevicornis*, and *P. striata* Kunz 1983, given the shape of caudal rami (broader than long), inner terminal seta of caudal rami (not swollen at base), chaetotaxy of P4 EXP 3 (with 8 setae/spines), shape of rostrum, and chaetotaxy of female P2 ENP 2. *P. brevicornis* can be differentiated from *P. striata* principally by the shape and size of the outer dimorphic spine of the male P2 ENP 2 (very strong and outwards directed in *P. brevicornis* and rather slender and not outwards directed in *P. striata*). On the other hand, *Paradactylopodia n.. sp. 1*, is unique among these species given the chaetotaxy of male P2 ENP 2 (with 4 setae in *P. brevicornis*, and *P. striata*, and 6 in *Paradactylopodia n. sp. 1*), shape and size of the dimorphic outer spine on male P2 ENP 2 (strong and hardly reaching the tip of supporting

segment and slightly outwards directed in *Paradactylopodia n. sp. 1*), and length ratio of P1 ENP/EXP (about 1 in *P. brevicornis* and *P. striata*, and 1.3 in *Paradactylopodia n. sp 1*).

FAMILY Diosaccidae Sars 1906

GENUS *Stenhelia* Boeck 1865

SUBGENUS *Stenhelia s. str.* Boeck 1865

Stenhelia (s. str.) n. sp. 1
(Figs. 105-112)

Material examined:

SEX	STAGE	# IND.	STORED AS	# CATALOGUE	STATION	DEPTH	DATE
F	A	1	Diss.	EMUCOP-123-B	2	0-3 cm	01/MAY/91
F	A	1	Diss.	EMUCOP-234-A	9	0-3 cm	03/JAN/92
F	A	1	Diss.	EMUCOP-110-A	2	0-3 cm	01/MAY/91
F	A	1	Diss.	EMUCOP-122-B	2	0-3 cm	01/MAY/91
F	A	1	Diss.	EMUCOP-148-C	2	0-3 cm	01/MAY/91
F	A	1	Diss.	EMUCOP-280-A	12	3-6 cm	01/MAY/91
F	A	1	Diss.	EMUCOP-233-A	9	0-3 cm	03/JAN/92
F	A	1	Diss.	EMUCOP-232-A	9	0-3 cm	03/JAN/92
F	A	1	Alc.	EMUCOP-465-D	3	0-3 cm	02/MAY/91
F	A	1	Alc.	EMUCOP-534-E	4-5	0-3 cm	01/MAY/91
F	A	1	Alc.	EMUCOP-243-A	9	0-3 cm	03/JAN/92
F	A	1	Alc.	EMUCOP-823-A	9	0-3 cm	03/JAN/92
F	CIV	1	Alc.	EMUCOP-535-E	4-5	0-3 cm	01/MAY/91
F	CIV	1	Alc.	EMUCOP-162-D	2	0-3 cm	01/MAY/91
M	A	1	Diss.	EMUCOP-159-D	2	0-3 cm	01/MAY/91
M	CV	1	Alc.	EMUCOP-751-E	14	0-3 cm	03/JAN/92

Female

Habitus (Fig, 105a, 105b, 106), length ranging from 450 to 482 µm from tip of rostrum to caudal rami; fusiform, with distinct articulation between prosome and urosome, gradually tapering from posterior margin of cephalothorax to third prosomite and from first urosomite to caudal rami. Maximum width near posterior margin of cephalothorax, the latter about 1/3 of entire body length. Cephalothorax and prosomites with smooth hyaline caudal frill. Rostrum (Fig. 108a) set off, bell shaped, with pair of subapical setules. Integument of cephalothorax and prosomites smooth. First urosomite smooth. Genital double-somite with dorsal trace of division between somites; first segment smooth, second one with small spinules close to posterior margin dorsally and with hyaline frill. Fourth and fifth urosomite as preceding one, except for lack of ornamentation on fifth one. Anal segment with indented rounded anal operculum; with lateroventral spinules close to joint with caudal rami, the latter cylindrical, about 2 times as long as wide, with 7 setae.

Antennule (Fig. 108b), seven-segmented; integument of segments smooth except for some spinules on first one; fifth segment narrow.

Antenna (Fig. 108c), with allobasis bearing three-segmented exopodite, and long bipinnate abexopodal seta. Endopodal segment with 2 lateral spines and 2 slender surface setae; with 7 distal elements. First exopodal segment ornamented with spinules, with 1 seta; second segment with 1, third one with 1 proximal and 3 apical setae and furnished with spinules.

Mandible (Fig. 108d), with robust and heavily sclerotized praecoxa; biting edge with strong teeth, and 2 inner setae distally. Coxa-basis ornamented with short transverse rows of spinules and 3 apical setae. Exopodite with 4 subapical and 3 distal setae. Endopodite with 4 setae, one of them very long and strong.

Maxillule (Fig. 108e): praecoxal arthrite ornamented with some spinules and 2 surface setae, 8 distal spines and 1 bipinnate strong inner element; coxal endite with 2 setae; basis with 3, 2, 2 and 1 subdistal setae. Exo- and endopodite one-segmented, apparently fused at base, with 2 and 4 setae respectively.

Maxilla (Fig. 108f), with compact syncoxal element furnished with some small spinules on outer margin, with 3 endites bearing 3 setae each; basis with 3 surface seta and a claw. Endopodite one-segmented, with armed claw as long as basal one and 5 setae.

Maxilliped (Fig. 108g), with long basis ornamented with median row of spinules and with 3 pinnate inner distal setae. First endopodal segment with row of spinules along inner margin and on outer edge, with 2 subdistal setae; second segment bearing a distal claw with accompanying seta.

P1 (Fig. 109a), with smooth praecoxa; coxa furnished with some transverse rows of spinules on anterior surface; basis with spinules close to articulation with outer and inner elements and between rami; with fragile inner elements; outer seta bipinnate and long, inner one bipinnate and spiniform. Exopodite three-segmented, reaching middle of second endopodal segment; ultimate segment slightly shorter than preceding one. Endopodite three-segmented; first segment reaching the middle of third exopodal segment, and longer than following segments combined; second and ultimate segments subequal in size. Chaetotaxy as in Table 14.

P2-P4 (Fig. 109b, 109c, 110a), with praecoxa as in preceding limb; coxa furnished with 2 rows of outward spinules; of P2 with sibdistal inner set of long and fragile elements; basis with long slender elements close to inner margin, with spinules at base of outer seta and minute ones close to joint with endopodite; with inner distal corner acutely produced. Rami three-segmented. Endopodite of P2 and P3 of about the same length as exopodite, of P4 hardly reaching articulation between second and third exopodal segment. Chaetotaxy as in Table 14.

P5 (Fig. 110b), with distinct rami. Baseoendopodal lobe elongated, bearing 1-1-1-2 normal setae, outermost smooth. Exopodite ovate, furnished with proximal spinules along inner and outer edge; with 6 elements.

P6 (Fig. 106), represented by a transverse area, with 1 small smooth seta arising from cylindrical protuberance.

Male

Habitus (Fig. 111a, 111b), as in female dorsally; ventrally with a continous row of spinules close to posterior caudal margin of third and fourth urosomite; fifth urosomite with 2 dorsolateral and 1 median row of spinules ventrally. Length, 410-420 μm from tip of rostrum to caudal rami.

Caudal rami as in female.

Antennule (Fig. 112a), nine-segmented, haplocer.

Mouth parts, P1 and P3 (not illustrated) as in female.

P2 (Fig. 112b), with coxa, basis and exopodite as in female. Endopodite typically modified; two-segmented; first segment as in female; second segment piriform, with 2 inner feathered setae and 2 apical pinnate spines, outermost curved.

P4 (Fig. 112c), as in female, except for outer proximal curved apophysis on EXP 2.

P5 (Fig. 112d): baseoendopodites fused, each with 1 inner bipinnate spine and 1 outer smooth seta. Exopodite small, with 2 outer spines, 1 apical and 1 inner smooth seta.

P6 (Fig. 112e), represented by a elongated plate fused to somite; with 3 setae.

Variability

Two females (EMUCOP-232-A, EMUCOP-233-A) were found exhibiting inner and outer terminal setae of caudal rami swollen proximally, with smooth anal operculum and dorsal and ventral spinules on genital double-somite (Fig. 107a, 107b). Another female (EMUCOP-465-D) was observed with ventral ornamentation (not illustrated) as in the above mentioned specimens.

Table 14. Chaetotaxy of *Stenhelia (s. str.) n. sp. 1.*

	P1	P2	P3	P4
EXP	0-0-022	1-1-123	1-1-223	1-1-323
ENP	1-1-111	1-2-211	1-1-321	1-1-221

Comparison and discussion

So far, ten species, apart from the Mexican representative herein described, have been allocated to the subgenus *Stenhelia (s. str)* Boeck: *St. (s. str.) gibba* Boeck 1865, *St. (s. str.) aemula* T. Scott 1893, *St. (s. str.) proxima* Sars 1906, *St. (s. str) curviseta* Lang 1936b, *St. (s. str.) divergens* Nicholls 1940, *St. (s. str.) peniculata* Lang 1965, *St. (s. str.) pubescens* Chislenko 1978, *St. (s. str.) diegensis* Thistle & Coull 1979, *St. (s. str.) asetosa* Thistle & Coull 1979 and *St. (s. str.) xylophila* Hicks 1988.

Within this subgenus, *St. (s. str.) proxima*, *St. (s. str.) curviseta*, and *Stenhelia (s. str.) n. sp. 1* share the first endopodal segment of P1 being shorter than exopodite, a terminal endopodal segment of P1 with 3 elements, an inner seta on first exopodal segment of P2-P4, a terminal exopodal segment of P2 and P3 with 1 and 2 inner setae respectively, a second exopodal segment of P1 without inner seta, and a third endopodal segment of P2 with 4 elements. However, *Stenhelia (s. str.) n. sp. 1* can be distinguished from *St. (s. str.) proxima* and *St. (s. str.) curviseta* by the setation of the terminal endopodal segment of P3 (5 setae in *St. (s. str.) proxima* and *St. (s. str.) curviseta*, and 6 setae in *Stenhelia (s. str.) n. sp. 1*), and by the presence of only normal setae on the baseoendopodite of female P5 in *Stenhelia n. sp. 1*.

To my knowledge, the male of *St. (s. str.) curviseta* remains unknown. However, in the case of *St. (s. str.) proxima*, it should be noted that some differences exist in the shape of the male P2 ENP 2. Additionally, *Stenhelia (s. str.) n sp. 1* is unique within the subgenus by the outer proximal curved spine found in the male second exopodal segment of P4.

SUBGENUS *Delavalia* Brady 1868

Stenhelia (D.) n. sp. 1
(Figs. 113-118)

Material examined:

SEX	STAGE	# IND.	STORED AS	# CATALOGUE	STATION	DEPTH	DATE
M	A	1	Alc.	EMUCOP-238-A	9	0-3 cm	03/JAN/92
M	A	1	Alc.	EMUCOP-822-A	9	0-3 cm	03/JAN/92
F	A	8	Alc.	EMUCOP-247-B	9	0-3 cm	03/JAN/92
M	A	1	Diss.	EMUCOP-237-A	9	0-3 cm	03/JAN/92
F	A	1	Diss.	EMUCOP-236-A	9	0-3 cm	03/JAN/92
M	A	1	Diss.	EMUCOP-235-A	9	0-3 cm	03/JAN/92
F	A	6	Alc.	EMUCOP-239-A	9	0-3 cm	03/JAN/92
F	A	1	Alc.	EMUCOP-821-A	9	0-3 cm	03/JAN/92
M	A	1	Diss.	EMUCOP-199-B	9	0-3 cm	30/APR/91
M	CIV	1	Alc.	EMUCOP-242-A	9	0-3 cm	03/JAN/92
M	CV	1	Alc.	EMUCOP-240-A	9	0-3 cm	03/JAN/92
F	A	1	Diss.	EMUCOP-196-B	9	0-3 cm	30/APR/91
M	A	3	Alc.	EMUCOP-248-B	9	0-3 cm	03/JAN/92
F	CV	1	Alc.	EMUCOP-241-A	9	0-3 cm	03/JAN/92
F	A	1	Diss.	EMUCOP-198-B	9	0-3 cm	30/APR/91
M	A	1	Diss.	EMUCOP-200-B	9	0-3 cm	30/APR/91
F	A	1	Diss.	EMUCOP-197-B	9	0-3 cm	30/APR/91

Female

Habitus (Fig. 113a, 113b, 114a, 114b), fusiform; length from 388 to 445 µm including tip of rostrum and caudal rami; with distinct articulation between prosome and urosome, gradualy tapering from posterior margin of cephalothorax to third prosomite and from first urosomite to caudal rami. Maximum width near posterior margin of cephalothorax, later about 1/3 of entire body length. Rostrum (Fig. 115a) set off, bell shaped, with a pair of subapical setules. Integument of cephalothorax and prosomites smooth, with posterior hyaline frill. First urosomite and genital double-somite smooth, former apparently without, later with hyaline frill. Genital double-somite with schlerotized lateral parts bearing vestige P6 represented by small setae. Fourth urosomite with some spinules laterally and hyaline frill; following somite without ornamentation and with hyaline fringe. Anal segment with indented rounded anal operculum; with lateroventral spinules close to joint with caudal rami. Caudal rami cylindrical, from 3 to 4 times as long as wide; with 7 setae.

Antennule (Fig. 115a), six-segmented; integument of segments smooth except for some spinules on first one.

Antenna (Fig. 115b), with allobasis bearing three-segmented exopodite, and bipinnate abexopodal seta, and furnished with spinules on abexopodal margin proximally. First exopodal segment

ornamented with spinules, with 1 seta; second segment with 1, and third one with 1 proximal and 3 apical setae and furnished with subapical and distal row of spinules. Endopodal segment with 2 lateral spines and 2 slender surface setae; with 7 distal elements.

Mandible (Fig. 115c), with robust and heavily sclerotized praecoxa; biting edge with strong teeth, and 1 seta at inner distal corner; coxa-basis ornamented with groups of spinules and 2 apical setae. Exopodite with 4 subapical and 3 distal setae. Endopodite with 2 lateral and 4 distal setae, one of them very long and strong.

Maxillule (Fig. 115d): praecoxal arthrite ornamented with some spinules and 2 surface setae, 8 distal spines and 1 bipinnate strong inner downwards directed element; coxal endite with 2 setae; basis with 6 and 3 setae. Exo- and endopodite one-segmented, with 2 and 4 setae respectively.

Maxilla (Fig. 115e), with compact syncoxa furnished with some small spinules on outer margin, with 3 endites bearing 3 setae each; basis with 3 surface seta and a claw. Endopodite two-segmented, with armed claw as long as basal one and 6 setae.

Maxilliped (Fig. 115f), non-prehensil; basis ornamented with longitudinal row of spinules along inner margin and on inner distal corner; with 3 distal inner setae, and 1 outer element of hyaline aspect. Endopodite one-segmented, ornamented with spinules on inner and outer margin; with 2 and 2 distal setae.

P1 (Fig. 116a): coxa with 2 rows of spinules close to outer edge; basis furnished with spinules at base of outer and inner spines and between rami. Exopodite three-, endopodite two-segmented, of about the same size; second endopodal segment about 1.3 times longer than first one. Chaetotaxy as in Table 15.

P2-P4 (Fig. 116b, 116c, 116d), with smooth praecoxa; coxa furnished with proximal and distal row of spinules close to outer edge; basis furnished with spinules at base of outer seta, close to inner margin proximally, and with minute elements close to joint with endopodite; with acute projection on inner margin and between rami. Rami three-segmented; exopodite of P2 and P4 reaching middle of third endopodal segment; exo- and endopodite of P3 of about the same length. Chaetotaxy as in Table 15.

P5 (Fig. 116e), with distinct rami. Baseondopodal lobe elongated, bearing 1 setae. Exopodite ovate, furnished with proximal spinules along inner and outer edge; with 5 elements.

P6 (Fig. 114b), represented by 2 quitinized lateroventral areas, with 1 small smooth seta each.

Male

Habitus (Fig. 117a, 117b), as in female dorsally, except for ornamentation of penultimate urosomite, and for genital double-somite and ornamentation of fourth and fifth urosomite. Length ranging from 359 to 390 μm.

Caudal rami as in female.

Antennule (Fig. 118a), nine- (or ten?) segmented, haplocer.

Mouth parts, P1 and P3 (not illustrated), as in female.

P2 (Fig. 118b), with coxa, basis and exopodite as in female. Endopodite two-segmented; proximal segment as in female; distal segment reaching beyond exopodite, ornamented with spinules along outer margin; with hyaline small element on outer edge; with 5 elements.

P4 (Fig. 118c), as in female, except for outer spine of second exopodal segment, and shape of inner element on proximal endopodal segment.

P5 (Fig. 118d), with both baseoendopodites fused, ornamented with spinules close to exopodite; with 1 inner bipinnate strong spine each. Exopodite small, with 1 distal strong spine, and 1 subdistal and 2 inner setae.

P6 (Fig. 118e), represented by elongated plate with 3 setae.

Table 15. Chaetotaxy of *Stenhelia (D.) n. sp. 1.*

	P1	P2	P3	P4
EXP	0-1-022	0-1-123	0-1-223	0-1-122
ENP	1-211	1-2-121	1-1-121	1-0-121

Comparison and discussion

So far, 48 species have been allocated to the subgenus Stenhelia (Delavalia).

Stenhelia (D.) n. sp. 1 showed to be closely related to *St. (D.) unisetosa* Wells 1967. These two species share several features such as the non-prehensil maxilliped and chaetotaxy of P2-P4 (to my knowledge these species are unique with regard to P2-P4 chaetotaxy). Additionally, these species are unique in that the male second exopodal segment of P4 do exhibit a sickle-shaped and heavily chitinized

outer spine. However, *Stenhelia (D.) n. sp. 1* is distinguishable from *St. (D.) unisetosa* by the number of setae on female and male baseoendopod (3 and 2, respectively in *St. (D.) unisetosa*, and 1 and 1 respectively in *Stenhelia (D.) n. sp. 1*, and by the setation of the antennal exopodite (1.1.13 in *Stenhelia (D.) n. sp.1* and 1.1.12 in *St. (D.) unisetosa*).

GENUS *Robertsonia* Brady 1880

Robertsonia propinqua T. Scott 1894
(Figs. 119-123)

Original description: *Dactylopus propinquus* n. sp. T. Scott 1894, :99, Fig. 42-52.

Synonym: *cum* Lang, 1948; *Robertsonia cf. knoxi* Thompson & A. Scott 1903 (*sensu* Bayly & Williams, 1966) and *Robertsonia* sp. nov. Bayly 1970 (after Hamond, 1973a, :426).

Distribution: *cum* Lang, 1948; Africa: Angola (Candeias, 1959); Australia: south-eastern Australia (Bayly & Williams, 1966; Bayly, 1970; Hamond, 1973a); Argentina: Ria Deseado (Santa Cruz) (Pallares, 1970); India: Andaman and Nicobar Islands (Wells & Rao, 1987); Mexico: South-eastern Gulf of California (present study); New Zealand (*cf.* COULL, 1977); United States of America: North Scituate, (Mass.) (Coull, 1977); Bermuda, Ghana, Mediterranean France, Suez Canal, Mozambique, Aldabra, Maldive Islands, Puget Sound (U. S. A.), South Carolina (U. S. A.) (*cf.* Wells & Rao, 1987).

Material examined:

Two dissected males (EMUCOP-573-C, EMUCOP-87-D), collected from station 10 and 8 at 0-3 and 3-6 cm depth respectively, on 23/JUN/91.

Comparison and discussion

This species has been described, in full or in part, several times (T.Scott, 1894; Sewell, 1924; Candeias, 1959, Wells & Rao, 1987; Pallares, 1970; Hamond, 1973a). Wells & Rao (1987) questioned the identity of *R. propinqua* described by Sewell (1924), Candeias (1959), Pallares (1970) and Hamond (1973a), on the basis of differences found in such descriptions, and suggested that such differences in mouth parts and leg setation could be due to local (geographical) variation. However, suggested that Sewell's descriptions must be considered cautiously, inferring probably that at least in this case, the variation in some characters are due mostly to misinterpretations.

The antennule exhibited by the Mexican male of *R. propinqua* turned out to be nine-segmented. With regard to the segmentation of this appendage, Wells & Rao (1987) omited any comment, Pallares (1970) showed a male nine-segmented antennule, whereas Sewell (1924) and Hamond (1973a) showed an eight segmented antennule.

The illustrations of the antennal structure provided by the above mentioned authors do not present great differences with respect to the description of the Mexican specimens.

The mandibule agrees completely with Hamond (1973a), except that maybe he overlooked some fine spinules close to the innermost distal seta of basis, and with Wells & Rao (1987) except for the number of distal setae on endopodite. On the other hand, the ornamentation-setation of this appendage in the Mexican specimens showed to be completely in conflict with those presented by Sewell (1924) (without exopodite, with 2 basal and 3 distal endopodal setae) and Pallares (1970) (with 5 distal seta on basis, exopodite with 3 and endopodite with 5 distal setae).

The maxillule of the Mexican specimens agrees well with those presented by Pallares (1970) and Hamond (1973a) except for the number of apical seta of basis. The description provided by Sewell (1924) lacks detail and must be considered cautiously.

The maxilla agrees with the descriptions by Hamond (1973a), Pallares (1970) and Wells & Rao (1987) with regard to the armature of endites, and with Pallares (1970) and Wells & Rao (1987) with respect to the number of slender setae on the endopodite. However, the Mexican specimens are the only ones that showed an additional strong pinnate spine on the endopodite, as long as basal claw.

The maxilliped agrees with that depicted by Wells & Rao (1987), except for the number of accompanying setae and drowned inner distal corner of endopodal segment into a blunt projection, the latter also illustrated by Pallares (1970), Hamond (1973a) and Sewell (1924). Basically, the difference

among T. Scott (1894) and Hamond (1973a), Pallares (1970), and Sewell (1924) is the number and position of the setae on basis. With regard to this feature, any of these authors agree with the maxillipedal structure observed in the Mexican specimens as Wells & Rao (1987) do.

The P1 of the Mexican specimens resembles that depicted by Hamond (1973a), except for the inner knob, which seems to be flat at the tip, while that observed for the Mexican specimens is rather sharp. The P1 represented by Pallares (1970) also resembles that of the Mexican species, except also for the inner flat knob, and additionally, for the innermost seta on the third endopodal segment that seems to be relatively shorter. The male P1 depicted by T. Scott (1894) is in conlflict with the previous authors and with the Mexican specimens in that it shows a first endopodal segment with 2 setae, and seems to be relatively longer.

The second limb agrees completely with that depicted by Pallares (1970). Unfortunately she did not illustrate the relative length of the endopodite with respect to the exopodite. The only difference between the male P2 depicted by Hamond (1973a) and those of the Mexican specimens, is the site in which one of the subdistal inner setae of the endopodite is implanted. The male P2 depicted by T. Scott (1894) and Sewell (1924), is in conflict with that observed by the rest of the authors, since they depicted the third exopodal segment with only 1 inner seta, and an endopodal ramus comparatively longer than those depicted by the rest of the authors. Additionally, these authors show the first and second exopodal segment respectively, without inner seta, and Sewell (1924) illustrated a male P2 with a three-segmented endopodite.

The P3 observed for the Mexican specimens agrees completely with Hamond (1973a). It should be noted that Scott mistaked P3 for P4 (1894, Pl. 11-2).

The P4 agrees with those observed by T. Scott (1894), Pallares (1970) and Hamond (1973a), but differs radically from that by Candeias (1959).

The P5 agrees with those depicted by Sewell (1924), Pallares (1970), Hamond (1973), and Wells & Rao (1987), and the only difference is in the shape of the exopodite, of which Sewell (1924) showed some variation.

The P6 agrees with Pallares (1970), and the only difference with that of Hamond (1973) is the relative length of the inner- and outermost seta.

The Mexican species do present some differences with respect to the previous descriptions. However, besides the fact that I did not find females, and that probably this species does present a wide range of geographical variation, I was inclined to allocate the Mexican specimens to *R. propinqua* T. Scott.

Robertsonia n . sp. 1
(Figs. 124-131)

Material examined:

SEX	STAGE	# IND.	STORED AS	# CATALOGUE	STATION	DEPTH	DATE
?	CII	2	Alc.	EMU-4189-A1	15	0-3 cm	24/JUN/91
?	CII	1	Alc.	EMUCOP-710-A	6	0-3 cm	03/JAN/92
?	CIII	2	Alc.	EMU-4189-A2	15	0-3 cm	24/JUN/91
?	CIII	1	Alc.	EMU-4191-B2	9	0-3 cm	30/APR/91
?	CIII	1	Alc.	EMU-4183-A5	9	0-3 cm	03/JAN/92
?	CIII	1	Alc.	EMUCOP-752-E	14	0-3 cm	03/JAN/92
?	CIII	2	Alc.	EMUCOP-696-C	6	0-3 cm	30/MAR/92
F	A	2	Alc.	EMU-4183-B1	9	0-3 cm	03/JAN/92
F	A	1	Alc.	EMUCOP-825-B	9	0-3 cm	03/JAN/92
F	A	3	Alc.	EMUCOP-444-A	3	3-6 cm	02/MAY/91
F	A	2	Alc.	EMU-4177-D2	2	0-3 cm	01/MAY/91
F	A	3	Alc.	EMU-4190-A1	15	0-3 cm	24/JUN/91
F	A	2	Alc.	EMU-4190-B1	15	0-3 cm	24/JUN/91
F	A	2	Alc.	EMU-4190-F1	15	0-3 cm	24/JUN/91
F	A	6	Alc.	EMU-4183-A4	9	0-3 cm	03/JAN/92
F	A	1	Alc.	EMUCOP-703-D	6	0-3 cm	30/MAR/92

F	A	1	Diss.	EMUCOP-507-D	4-5	0-3 cm	01/MAY/91
F	A	1	Diss.	EMUCOP-527-E	4-5	0-3 cm	01/MAY/91
F	A	1	Diss.	EMUCOP-824-E	4-5	0-3 cm	01/MAY/91
F	A	1	Diss.	EMU-4197-C1	7	0-3 cm	30/MAR/92
F	A	1	Diss.	EMU-4175-A	2	0-3 cm	01/MAY/91
F	A	1	Diss.	EMU-4179-A	9	0-3 cm	03/JAN/92
F	A	1	Diss.	EMU-4173-C	2	0-3 cm	01/MAY/91
F	A	1	Diss.	EMUCOP-443-A	3	3-6 cm	02/MAY/91
F	A	1	Diss.	EMU-4188-A	15	0-3 cm	24/JUN/91
F	A	1	Diss.	EMU-4187-A	15	0-3 cm	24/JUN/91
F	A	1	Diss.	EMU-4180-A	9	0-3 cm	03/JAN/92
F	CIV	1	Alc.	EMU-4182-B1	9	0-3 cm	03/JAN/92
F	CV	2	Alc.	EMUCOP-450-A	3	3-6 cm	02/MAY/91
F	CV	1	Alc.	EMU-4177-C1	2	0-3 cm	01/MAY/91
F	CV	1	Alc.	EMU-4183-A1	9	0-3 cm	03/JAN/92
F	CV	1	Alc.	EMUCOP-759-G	14	0-3 cm	03/JAN/92
M	A	1	Alc.	EMU-4191-B1	9	0-3 cm	30/APR/91
M	A	2	Alc.	EMUCOP-108-A	2	0-3 cm	01/MAY/91
M	A	1	Alc.	EMU-4178	2	0-3 cm	01/MAY/91
M	A	1	Alc.	EMU-4176-C1	2	0-3 cm	01/MAY/91
M	A	1	Alc.	EMU-4177-D1	2	0-3 cm	01/MAY/91
M	A	9	Alc.	EMUCOP-447-A	3	3-6 cm	02/MAY/91
M	A	1	Alc.	EMUCOP-467-D	3	0-3 cm	02/MAY/91
M	A	14	Alc.	EMU-4183-A3	9	0-3 cm	03/JAN/92
M	A	1	Alc.	EMU-4190-E1	15	3-6 cm	24/JUN/91
M	A	4	Alc.	EMU-4183-B2	9	0-3 cm	03/JAN/92
M	A	1	Alc.	EMU-4190-F2	15	0-3 cm	24/JUN/91
M	A	3	Alc.	EMU-4189-B1	15	0-3 cm	24/JUN/91
M	A	1	Alc.	EMUCOP-708-A	6	0-3 cm	03/JAN/92
M	A	1	Alc.	EMUCOP-745-D	14	0-3 cm	03/JAN/92
M	A	1	Alc.	EMUCOP-750-E	14	0-3 cm	03/JAN/92
M	A	1	Alc.	EMUCOP-700-D	6	0-3 cm	30/MAR/92
M	A	1	Alc.	EMUCOP-699-C	6	0-3 cm	30/MAR/92
M	A	1	Diss.	EMUCOP-509-D	4-5	0-3 cm	01/MAY/91
M	A	1	Diss.	EMUCOP-528-E	4-5	0-3 cm	01/MAY/91
M	A	1	Diss.	EMUCOP-529-E	4-5	0-3 cm	01/MAY/91
M	A	1	Diss.	EMU-4172-A	2	0-3 cm	01/MAY/91
M	A	1	Diss.	EMU-4174-F	2	0-3 cm	01/MAY/91
M	A	1	Diss.	EMUCOP-446-A	3	3-6 cm	02/MAY/91
M	A	1	Diss.	EMUCOP-445-A	3	3-6 cm	02/MAY/91
M	A	1	Diss.	EMU-4186-A	15	0-3 cm	24/JUN/91
M	A	1	Diss.	EMU-4185-A	15	0-3 cm	24/JUN/91
M	A	1	Diss.	EMU-4181-A	9	0-3 cm	03/JAN/92
M	A	1	Diss.	EMUCOP-831-A	6	0-3 cm	03/JAN/92
M	A	1	Diss.	EMUCOP-707-A	6	0-3 cm	03/JAN/92
M	A	1	Diss.	EMUCOP-828-C	6	0-3 cm	30/MAR/92
M	CIII	1	Alc.	EMUCOP-114-A	2	0-3 cm	01/MAY/91
M	CIV	1	Alc.	EMUCOP-533-E	4-5	0-3 cm	01/MAY/91
M	CIV	1	Alc.	EMUCOP-115-A	2	0-3 cm	01/MAY/91
M	CIV	1	Alc.	EMU-4183-A2	9	0-3 cm	03/JAN/92
M	CIV	2	Alc.	EMUCOP-709-A	6	0-3 cm	03/JAN/92
M	CV	1	Alc.	EMUCOP-116-A	2	0-3 cm	01/MAY/91
M	CV	4	Alc.	EMUCOP-449-A	3	3-6 cm	02/MAY/91

M	CV	1	Alc.	EMU-4189-A3	15	0-3 cm	24/JUN/91
M	CV	2	Alc.	EMU-4183-A6	9	0-3 cm	03/JAN/92
M	CV	1	Alc.	EMUCOP-713-C	6	0-3 cm	03/JAN/92

Female

Habitus (Fig. 124a, 124b, 125): length ranging from 485 to 589 μm from tip of rostrum tu caudal rami; slightly depressed, fusiform, with distinct articulation between prosome and urosome, gradualy tapering from posterior margin of cephalothorax to third prosomite and from first urosomite to caudal rami. Maximum width near posterior margin of cephalothorax, latter about 1/3 of entire body length. Rostrum (Fig. 126a) set off, triangular, bell shaped, with pair of setules in the distal fourth. Integument of cephalothorax smooth, of prosomites ornamented with transverse rows of minute spinules and with smooth hyaline fringe. First urosomite ornamented with dorsal ondulating rows of minute spinules and two rows of longer elements dorsolaterally, with finely serrated frill. Genital double-somite entirely fused, with only a small lateral trace of division; with 2-3 dorsal transverse rows of minute spinules, and 2 rows of longer elements close to fusion line and to posterior edge; with finely serrated frill; ventrally plain except for vestige P6. Fourth urosomite ornamented as preceding somite dorsally; ventrally with continous row of spinules close to posterior margin; fifth urosomite ornamented as in preceding somite, with additional caudal dorsal margin bulging thus forming a finely serrated pseudoperculum covering anal operculum. Anal segment with rounded anal operculum set with fringing hairs; with spines close to joint with caudal rami, the latter cylindrical, about 3 times as wide as long dorsally and with 7 setae located along distal margin (Fig. 129d).

Antennule (Fig. 126b), five-segmented; integument of segments smooth except for some spinules on first one; third segment about 1.5 times longer than wide, bearing an aesthetasc.

Antenna (Fig. 126c), with allobasis bearing three-segmented exopodite, and stronlgy armed abexopodal seta. Endopodal segment with 2 lateral flagellated spines and 2 slender surface setae; with 7 distal elements. First exopodal segment with 1, second without, and third with 1 proximal and 3 apical setae (one of them smooth and very short).

Mandible (Fig. 126d), with robust and heavily sclerotized coxa; biting edge with rounded non-articulating teeth, and a pinnate seta at inner distal corner. Basis ornamented with spinules close to joint with exopodite; with 3 distal setae. Exopodite and endopodite one-segmented, former with 2 (or 3?) lateral and 2 distal setae. Endopodite with 2 lateral, 2 subdistal and 2 apical setae.

Maxillule (Fig. 126e): praecoxal arthrite with 2 surface setae, and 9 spines distally; coxal endite with 3 setae; basis with 3 and 2 subdistal setae, and with a strong pinnate element distally. Exo- and endopodite one-segmented, apparently fused at base, with 2 and 4 feathered setae respectively.

Maxilla (Fig. 126f), with large syncoxa furnished with spinnules along outer margin; with 3 endites, proximal one with 3, median one with 2, distal one with 3 pinnate elements; basis with a surface seta and a claw. Endopodite one-segmented, with armed claw, 2 slender and 1 strong seta

Maxilliped (Fig. 126g): syncoxa with concave and convex inner and outer margin respectively; furnished with some median spinules, with some elements on outer margin, and with spinules along inner edge; with 2 strong bipinnate setae on inner distal corner. Basis with some spinules on outer margin, and two longitudinal rows of spinules along inner edge; with a median and a subdistal seta. Endopodal segment with a claw and 3 accompanying setae.

P1 (Fig. 127a), with smooth praecoxa; coxa furnished with 4 transverse rows of spinules on anterior surface; basis with spinules close to articulation with outer and inner spines and between rami. Rami three-segmented; exopodite reaching tip of second endopodal segment; first endopodal segment about 1.3 longer than second one. Chaetotaxy as in Table 16.

P2-P4 (Fig. 127b, 128a, 128b), with praecoxa as in preceding limb; coxa furnished with 5 rows of spinules and 1 median group of longer elements on anterior surface; basis with long elements close to inner margin, with spinules at base of outer seta and between rami, and with minute spinules close to joint with endopodite; with inner distal corner acutely produced. Rami three-segmented; endopodite of P2 and P3 reaching middle of third exopodal segment, of P4 about proximal fifth of third exopodal segment. Chaetotaxy as in Table 16.

P5 (Fig. 129a), with large baseoendopodal lobe, bearing 5 setae/spines; furnished with spinules along baseoendopodal process between insertion of elements and near base of outer seta. Exopodite ovate, with 6 elements; with spinules at base of armature and along inner margin.

P6 (Fig. 125), represented by a rectangular extension, with 1 outer short bipinnate, and 1 median and 1 inner long slender seta.

Male

Habitus (Fig. 130a, 130b), as in female dorsally, except for genital double-segment; ventral ornamentation of urosome stronger than in female. Length ranging from 465 to 514 µm from tip of rostrum to caudal rami. Caudal rami as in female, except for one smaller outer distal elemented.

Antennule (Fig. 131a), eight-segmented, subchirocer.

Antenna, mandible, maxillule, maxilla and maxilliped (not illustrated) as in female.

P1 (Fig. 131e), as in female, except for inner ovate and striated upward knob of basis.

P2 (Fig. 131f), with coxa and basis as in female. Exopodite as in female except for outer spine of second segment and proximal and median spine of third one less armed. Endopodite two-segmented and typically transformed; proximal segment with inner dwarfed seta and outer and inner distal corner acutely produced; second segment with 1 inner, 1 subapical and 1 apical seta; outer armature arising subapically; outer structure forming slit enveloping inner structure.

P3-P4 (not illustrated) as in female.

P5 (Fig. 131c), with both baseoendopodites fused, with 2 armed spines. Exopodite ovate, with 3 outer spinulose spines, 1 apical smooth and 2 inner bipinnate setae.

P6 (Fig. 131d), represented by a elongated plate nearly fused to somite; with 3 setae.

Variability

A male (EMU-4186-A) was found exhibiting an aberrant endopodite of P2 (Fig. 131g), and a female (EMUCOP-824-E) presented an aberrant endo- and exopodite of P4 (Fig. 129b, 129c).

Table 16. Chaetotaxy of *Robertsonia n. sp. 1.*

	P1	P2	P3	P4
EXP	0.1.023	1.1.223	1.1.223	1.1.323
ENP	1.1.111	1.1.121	1.1.321	1.1.221

Comparison and Discussion

See below.

Robertsonia n. sp. 2
(Figs. 132-137)

Material examined:

SEX	STAGE	# IND.	STORED AS	# CATALOGUE	STATION	DEPTH	DATE
F	A	1	Alc.	EMUCOP-827-D	4-5	0-3 cm	01/MAY/91
F	A	1	Alc.	EMUCOP-829-D	4-5	0-3 cm	01/MAY/91
F	A	1	Alc.	EMUCOP-834-A	3	3-6 cm	02/MAY/91
F	A	1	Alc.	EMUCOP-832-B	15	0-3 cm	24/JUN/91
F	A	2	Alc.	EMUCOP-833-A	9	0-3 cm	03/JAN/92
F	A	1	Diss.	EMUCOP-826-D	4-5	0-3 cm	01/MAY/91
F	A	1	Diss.	EMUCOP-828-D	4-5	0-3 cm	01/MAY/91
F	A	1	Diss.	EMUCOP-481-H	3	6-9 cm	02/MAY/91
F	A	1	Diss.	EMUCOP-691-C	6	0-3 cm	30/MAR/92

Female

Habitus (Fig. 132a, 133), resembles *Robertsonia n. sp. 1*, except for more robust rostrum (Fig. 134a). Length ranging from 534 to 588 mµ from tip of rostrum tu caudal rami. Anal segment and caudal rami (Fig. 132b, 132c) as *in Robertsonia n. sp. 1*, except for median dorsal seta.

Antennule (Fig. 134b), five-segmented; integument of segments smooth except for some spinules on first one; third segment about 1.5 times longer than wide, bearing an aesthetasc.

Antenna (Fig. 134c), with allobasis bearing three-segmented exopodite, and stronlgy armed abexopodal seta. Endopodal segment with 2 lateral flagellated spines; with 7 distal elements. First exopodal segment with 1, second without, and third with 1 proximal and 3 apical setae (one of them smooth and short).

Mandible (Fig. 134d), with robust and heavily sclerotized coxa; biting edge with rounded non-articulating teeth, and a pinnate seta at inner distal corner. Basis ornamented with spinules close to joint with exopodite; with 3 distal setae. Exopodite and endopodite one-segmented, former with 2 lateral and 2 distal setae. Endopodite with 2 lateral, 2 subdistal and 3 apical setae.

Maxillule (Fig. 134e): praecoxal arthrite with 2 surface setae, and 9 spines distally. Coxal endite with 3 setae; basis with 3 and 2 subdistal setae, and with strong pinnate element distally. Exo- and endopodite one-segmented, apparently fused at base, with 2 and 4 feathered setae respectively.

Maxilla (Fig. 134f): large syncoxal element furnished with spinnules on outer margin; with 3 endites, proximal one with 3, median one with 2, distal one with 3 pinnate elements. Basis with a surface seta on anterior and posterior surface, and a claw. Endopodite one-segmented, with armed claw, 5 slender and 1 strong seta.

Maxilliped (Fig. 134g): syncoxa with concave and convex inner and outer margin respectively; furnished with spinules, along inner edge; with an inner median element and 2 strong bipinnate setae on inner distal corner; basis with some spinules on outer margin, and along inner edge; with 1 median and 1 subdistal seta. Endopodal segment with a claw and 3 accompanying setae.

P1 (Fig. 135a), as in *Robertsonia n. sp. 1.* Chaetotaxy as in Table 17.

P2-P6 (Fig. 135b, 136a, 136b, 137, 133), as in *Robertsonia n. sp. 1*, except for shape of third endopodal segment of P2 and outermost distal modified spine of hyaline aspect on same segment. Chaetotaxy as in Table 17.

Male

Unknown.

Table 17. Chaetotaxy of *Robertsonia n. sp. 2.*

	P1	P2	P3	P4
EXP	0-1-023	1-1-223	1-1-223	1-1-323
ENP	1-1-111	1-1-121	1-1-321	1-1-221

Comparison and discussion

So far, 17 species are recognized within the genus *Robertsonia* (Fiers, 1996a). Given the chaetotaxy of P2-P4, two groups of species are clearly recognized within this genus (Fiers, 1996a, Table 1:127). The most plesiomorphic group of species (*R. propinqua* T. Scott 1894, *R. barnesi* Hamond 1973a, *R. knoxi* Thompson & A. Scott 1903, *R. salsa* Gurney 1927a, and *R. glomerata* Fiers 1996a), is characterized primarily by the presence of an inner seta on the first exopodal segment of P2-P4, while the rest are characterized by the loss of such seta.

Gurney (1927a) described *R. salsa* from the Brine-pools at Kabret, and in the same year (Gurney, 1927b), considered that *R. salsa* could be merely the "Form B" of *R. knoxi*, at that time described and reported from Ceylon by Thompson & A. Scott (1903). Lang (1948) accepted Gurney's view, and equated this species with *R. knoxi*. More than two decades later, Por (1973) mentioned the finding of these species in samples from the Suez Canal, and reported both species from the Sirbonian Lagoon (Sinai), from which he established the validity of *R. salsa* on the basis of morphological and ecological differences (*e. g.* salinity preferences). However, probably the most reliable criterion to distinguish between *R. knoxi* and *R. salsa* is the structure of female P6: with 2 long inner and 1 short outer setae in *R. knoxi*, and 1 long inner and 2 short outer seta in *R. salsa* (Por, 1973; Fiers, 1996a). It should be noted that Por (1973) reversed the female abdomen of *R. knoxi* for that of *R. salsa* (Tab. V: 99). Por (1973), suggested that both species could be distinguished by the structure of the seminal receptacles (also considered by Fiers, 1996a, in his key to the species of *Robertsonia*, :128-129). On this matter, it is likely that the spirally curled seminal receptacle is the normal condition within the genus, and should not be used as a diagnostic character. With respect to the setation of female P6 illustrated by Por (1973) for *R. salsa*, I'm of the opinion that this may not be the case. Gurney (1927a, :177) illustrated the genital field, spirally curled indeed, but with only 1 outer short and 1 inner long element. Additionally, he illustrated something that, in my opinion, could be the innermost long element masked either by the median element or by an integumental fold. If this is the case, the species with 2 outer short setae and 1 inner long element described by Por (1973), could be a new representative of *Robertsonia*, while *R. salsa* could probably be equated with *R. knoxi*, following Gurney's and Lang's criteria. Unfortunatelly, the structure of the female genital field and P6 of the species of *Robertsonia* has either been overlooked (Thompson & A. Scott, 1903, Sewell, 1940, Krishnaswamy, 1957, Marinov, 1971, Yeatman, 1976, and Wells & Rao, 1987 for *R.*

knoxi; T. Scott, 1894, Pallares, 1970 and Wells & Rao, 1987 for *R. propinqua*; Brady, 1878, Lang, 1935, Arlt, 1983 and Chislenko, 1977, for *R. tenuis*; Marques, 1961 for *R. angolensis*; Monard, 1935b for *R. irrasa*), or poorly illustrated (Gurney, 1927a for *R. salsa*; Hamond, 1973a for *R. propinqua*; Krishnaswamy, 1957 for *R. adduensis*; Wells & Rao, 1987 for *R. robusta* and R. barnesi; Nogueira, 1961 for *R. mourei*; Greenwood & Tucker, 1982 for *R. curtisii*; Nicholls, 1945 for *R. monardi*; Roe, 1958 for *R. celtica*; Monard, 1926 for *R. diademata*; Willey, 1932 for *R. hamata* and *R. flavidula*), and only Por (1973), Wells & Rao (1987) and Fiers (1996a) provided detailed descriptions of the genital field for *R. salsa* (*sensu* Por, 1973) and *R. knoxi*, *R. adduensis*, and *R. glomerata* respectively. Of the papers in which some comment and/or illustration on the female P6 was provided, only Gurney (1927a), Roe (1958), Nogueira (1961), Hamond (1973a), and Greenwood & Tucker (1982) provided some usefull information on some species (*R. salsa*, *R. celtica*, *R. mourei*, *R. propinqua* and *R. curtisii* respectively). It is clear that the setal structures on the female genital field have been overlooked. In most descriptions (Nogueira, 1961, Hamond, 1973a, and Greenwood & Tucker, 1982), only 2 long setae were observed, while the outer small element was surely omited. In the case of the description of *R. celtica* by Roe (1958) and *R. propinqua* by Wells & Rao (1987), 2 elements were illustrated, an innermost long seta and the outermost short element. In my opinion it is possible either that one of the inner long elements was mistaked for the inner or outer wall of each other, or that one of them was masked by either the inner- or the outermost element or by an integumental fold. This can be supported by the fact that the setation pattern of the accurately described species *R. glomerata* by Fiers (1996a), *R. adduensis* by Wells & Rao (1987) and *R. knoxi* by Por (1973), and additionally *Robertsonia n. sp. 1* and *Robertosnia n. sp. 2*, do exhibit 1 outer short element and 2 inner long setae, that in my opinion is the common condition to be found for the female P6 within the genus.

Given the chaetotaxy of P2-P4, *Robertsonia n. sp. 1* and *Robertsonia n. sp. 2* can be added to the group of plesiomorphic species of *Robertsonia.* These species showed to be closely related to *R. knoxi* and *R. salsa* (*sensu* Por, 1973) but can be separated from the latter, on the basis of the structure of female P6 (with 1 short outer element and 2 long inner setae). *Robertsonia n. sp. 2* is easily distinguishable from *R. knoxi* and *Robertsonia n. sp. 1*, by the bizarrre shape of the third endopodal segment of P2 bearing a very strong distal spine. On the contrary, *Robertsonia n. sp. 1* can be separated from *R. knoxi* only by the relative length of the inner element on the first endopodal segment of P1.

GENUS *Amphiascopsis* Gurney 1927b (part.)

Amphiascopsis thalestroides Sars 1911a
(Figs. 138-141)

Synonym: *cum* Lang, 1948.

Distribution: *cum* Lang, 1948; Bulgaria (Apostolov & Marinov, 1988); England: Isle of Man (Port Erin Bay) (Moore, 1976); Mexico: South-eastern Gulf of California (present study); Portugal: (Petkovski, 1964b).

Material examined:

One dissected male labeled EMUCOP-480-H, collected from station 3 at 6-9 cm depth, on 02/MAY/91.

Comparison and discussion

Two clades can be distinguished within the genus *Amphiascopsis*: The clade with 1 seta on A2 EXP 2 (*A. cinctus* Claus, *A. agrapequensis* Pesta, and probably *A. coralicola* Sewell) and the clade without such element (*A. thalestroides* and *A. southgeorgiensis* Lang).

The Mexican specimen turned out to belong to *A. thalestroides*, and in fact agrees well with Moore's description. Moore (1976) pointed out some differences between his specimens and the description provided by Sars (1911a), regarding the chaetotaxy of the mandibular exopodite and endopodite, and shape of the palp. Additionally, he did not find the lateral seta on P1 ENP 3, depicted by Sars (1911a). The Mexican specimens also showed some differences regarding the chaetotaxy of mandible (exopodite with 1 lateral and 2 distal setae, endopodite with 4 subapical and 4 apical seta), but agree with Moore's description of P1 ENP 3 (without lateral seta).

Additionally, Apostolov & Marinov (1988, :164, Fig. 60a-f), reported also *A. thalestroides*, but according with their drawings, their specimens could belong in fact to *A. cinctus*, since they observed 1 seta on A2 EXP 2, and broader than long caudal rami.

GENUS *Robertgurneya* Lang 1944

Robertgurneya rostrata Gurney 1927b (Figs. 142-146)

Original description: *Amphiascus rostratus* sp. n. Gurney 1927b, :527, Fig. 144.

Synonym: *cum* Lang, 1948, *Amphiascus ctenophorus* (Sewell, 1940, : 282-285, Fig. 64), *Amphiascus rostratus* and *Amphiascus ctenophorus* (Klie, 1942, :464-467, Fig. 11-12).

Distribution: *cum* Lang, 1948; Caroline Islands: Ifaluk Atoll (Vervoort, 1964); India: Nicobar Islands (Nankauri Harbour) (Sewell, 1940), Andaman and Nicobar Islands (Wells & Rao, 1987); Italy: Rovigno (Klie, 1942); Mexico: South-eastern Gulf of California (present study); Mozambique: Inhaca Island (Wells, 1967); Turkey: Sea of Marmara (Noodt, 1955a); Yugoslavia: Split (Klie, 1942).

Material examined:

SEX	STAGE	# IND.	STORED AS	# CATALOGUE	STATION	DEPTH	DATE
F	A	6	Alc.	EMUCOP-461-D	3	0-3 cm	02/MAY/91
F	A	1	Alc.	EMUCOP-473-F	3	3-6 cm	02/MAY/91
F	A	3	Alc.	EMUCOP-440-A	3	3-6 cm	02/MAY/91
F	A	1	Diss.	EMUCOP-436-A	3	3-6 cm	02/MAY/91
F	A	1	Diss.	EMUCOP-435-A	3	3-6 cm	02/MAY/91
F	A	1	Diss.	EMUCOP-442-A	3	3-6 cm	02/MAY/91
F	A	1	Diss.	EMUCOP-508-D	4-5	0-3 cm	01/MAY/91
F	A	1	Diss.	EMUCOP-649-D	6	0-3 cm	01/MAY/91
M	A	4	Alc.	EMUCOP-462-D	3	0-3 cm	02/MAY/91
M	A	6	Alc.	EMUCOP-439-A	3	3-6 cm	02/MAY/91
M	A	1	Diss.	EMUCOP-492-H	3	6-9 cm	02/MAY/91
M	A	1	Diss.	EMUCOP-438-A	3	3-6 cm	02/MAY/91
M	A	1	Diss.	EMUCOP-437-A	3	3-6 cm	02/MAY/91
M	A	1	Diss.	EMUCOP-979-A	3	3-6 cm	02/MAY/91
M	A	1	Diss.	EMUCOP-830-A	6	0-3 cm	03/JAN/92
M	CIV	1	Alc.	EMUCOP-464-D	3	0-3 cm	02/MAY/91
M	CV	1	Alc.	EMUCOP-451-A	3	3-6 cm	02/MAY/91
M	CV	2	Alc.	EMUCOP-463-D	3	0-3 cm	02/MAY/91

Comparison and discussion

Robertgurneya rostrata has been reported and described previously by Gurney (1927b) from Egypt, Monard (1928a) from France, Willey (1935) from Bermuda, Sewell (1940) and Wells & Rao (1987) from India, Klie (1942) from Italy and Yugoslavia, Noodt (1955a) from Turkey, and Vervoort (1964) from the Caroline Islands.

The Mexican representatives agree with Gurney's description, and differ from Monard's, only in subtle differences regarding the relative length of the setae of female and male P5 EXP and female P5 BENP, and length of the inner seta on P1 ENP 1. With respect to Willey's description, the only difference is the relative length of the setae of male P5 EXP, and size of the inner seta of male P2 ENP 2 in the case of Klie's description. The Mexican specimens differ with Sewell's description in the chaetotaxy of P3 EXP 3 (with three setae as shown by Sewell, 1940, Fig. 64H), and relative length of the setae of female P5 EXP and BENP. Noodt (1955a) described the A2 EXP 3 with 3 setae (intraspecific variability), whereas the rest of the descriptions show the A2 EXP 3 with only 2 elements.

Some variability (not illustrated) was observed in one female (EMUCOP-442-A) with only 2 outer spines on P2 EXP 3, basis of P2 without inner distal produced corner, and inner seta of P1 ENP 1 not reaching beyond P1 ENP 3 and implanted a little more proximally.

Robertgurneya falklandiensis Lang 1936a
(Figs. 147-149)

Original description: *Amphiascus falklandiensis* Lang 1936a, :54-55, Fig. 38-45.

Distribution: Argentina: Ria Deseado (Santa Cruz) (Pallares, 1968a); Falkland Islands: Berkeley Sund (Port Louise) (Lang, 1936a); Mexico: South-eastern Gulf of California (present study); South Georgia: Grytviken (Cumberland Bay) (Lang, 1936a).

Material examined:

One dissected male, labeled EMUCOP-468-D, found in station 3 at 0-3 cm depth, on 02/MAY/91.

Comparison and discussion.

The Mexican representatives agree completely with Lang's original description. Therefore, only the illustrations of this species is presented.

Robertgurneya n. sp. 1
(Figs. 150-155)

Material examined:

SEX	STAGE	# IND.	STORED AS	# CATALOGUE	STATION	DEPTH	DATE
M	A	1	Diss.	EMUCOP-530-E	4-5	0-3 cm	01/MAY/91
F	A	1	Diss.	EMUCOP-650-D	6	0-3 cm	01/MAY/91

Female

The only female recovered was badly damaged, making the habitus difficult to measure. Only the first to fourth urosomite are known. Genital double-somite (Fig. 150) with complete suture dorsally, ventrally interrupted; with spinules at heihght of suture and close to caudal edge; with hyaline frill finely indented; genital field as shown, with vestige P6 represented by two setae. Fourth urosomite ornamented as preceding one.

Antennule (Fig. 151a), eight-segmented, surface of segments smooth except for 2 short rows of spinules on first one.

Antenna (Fig. 151b), with allobasis (a weak trace of division between basis and first endopodal segment was observed), bearing slender abexopodal seta and three-segmented exopodite, the latter with 1 seta on first segment, second segment with 1, and third with 1 lateral and 2 apical elements.

Mandible (Fig. 151c), with strong praecoxa with pars incisiva and several lacinia mobilis, with subdistal pinnate seta; coxa-basis ornamented with long spinules subdistally, with 3 apical setae. Exopodite two-segmented; first segment with 1 lateral and 1 subapical seta, second component with 3 setae. Endopodite with 2 lateral and 6 apical setae.

Maxillue (Fig. 151d): arthrite with 2 surface setae, 8 distal spines and 1 curved element; coxa with 1 (or 2?) setae; basis with 2 lateral and 3 apical setae. Exopodite one-segmented, small, with 2 setae. Endopodite longer than broad, with 4 setae.

Maxilla (Fig. 151e): syncoxa with three endites, proximal one bearing 1, median 2 and distal one 3 setae; basis with 1 strong spine, accompanied by one strong seta almost as long as spine, and with 1 slender seta, additionally furnished with small spinules at base of spine of basis. Endopodite with 4 setae.

Maxilliped (Fig. 151f): basis ornamented with small spinules proximally and with long ones subdistally, with 1 small subapical and 2 apical setae. First endopodal segment with 2 setae; second endopodal segment long and slender, with apical claw accompanied by 3 setae.

P1 (Fig. 152a): coxa furnished with spinules close to outer margin, and with long and slender elements in the middle; basis with small spinules at base of outer spine and close to inner edge, and with stronger ones between rami and at base of inner spine. Rami three-segmented; first endopodal segment about 6 times longer than broad, and about 2.4 times longer than succeeding segments combined; third endopodal segment about 2 times longer than wide and two times longer than second segment. Exopodite reaching 2/3 of ENP 1. Length ratio of EXP/ENP 1, 1.2. Chaetotaxy as in Table 18.

P2-P4 (Fig. 152b, 152c, 153a): praecoxa furnished with row of small spinules; coxa of P2 with some spinules close to outer margin and transverse row of spinules in the middle, the latter seemingly absent in P3; protopodal elements of P4, unknown. Rami three-segmented, of P2 and P3 of about the same size, endopodite of P4 reaching middle of third exopodal segment. Chaetotaxy as in Table 18.

P5 (Fig. 153b): baseoendopodite triangular, ornamented with spinules along outer and inner margin; with 5 setae, innermost well developed. Exopodite ovate, with long and fragile spinules along outer edge and small ones along inner margin; about 1.5 times longer than wide; with 6 setae.

Male

Habitus (not illustrated), as in female, except for genital double-somite and ventral row of strong spinules close to caudal edge of third and fourth urosomite (Fig. 154b, 154c). Length, unknown.

Antennule (Fig. 154a), nine-segmented, haplocer.

Mouth parts (not illustrated), as in female.

P1: exopodite, praecoxa and coxa (not illustrated) as in female. Basis (Fig. 155a) ornamented with spinules at base of inner and outer setae and between rami; outer setae strong and long, inwards directed. Endopodite 1.3 times longer than inner spine of basis.

P2: protopodal components and exopodite (not illustrated) as in female. Endopodite (Fig. 155b) typically modified, two-segmented, reaching middle of third exopodal segment.

P3-P4 (not illustrated) as in female.

P5 (Fig. 155c): baseoendopodites of both legs fused, each part with 2 setae of about the same length, though innermost is implanted at a lower level. Exopodite reaching slightly beyond endopodal lobe, with 5 seta.

P6 (Fig. 155d): represented by a plate bearing 3 setae, innermost bipinnate and about the same length as outermost slender setae, middle one about 1.5 times longer than innermost element.

Table 18. Chaetotaxy of *Robertgurneya n. sp. 1*.

	P1	P2	P3	P4
EXP	0.0.022	0.1.123	0.1.123	0.1.223
ENP	1.1.111	1.1.121	1.1.221	1.1.121

Comparison and discussion

Robertgurneya n. sp. 1 showed to be closely related to *R. rostrata*. In fact, following Hamond's key (Hamond, 1973b, :75, Table 4), the Mexican specimens of *Robertgurneya n. sp. 1* keys out to *R. rostrata*. However, *Robertgurneya n. sp. 1* is distinguishable from *R. rostrata* by the relative length of the setae of female P5 BENP (*e. g.* innermost spine small in *R. rostrata*, well developed in *Robertgurneya n. sp. 1*), and shape of two of the outer setae of female P5 EXP (smooth in *R. rostrata*, bipinnate in *Robertgurneya n. sp. 1*). The most striking differences, however, are: (i) P1 EXP reaching tip of P1 ENP 1 in *R. rostrata*, and about 2/3 in *Robertgurneya n. sp. 1*, (ii) the ventral ornamentation of the fourth urosomite of female (with spinules in *R. rostrata*, without ornamentation in *Robertgurneya n. sp.1*), (iii) male A1 eight segmented in *R. rostrata* and nine-segmented in *Robertgurneya n. sp. 1*, (iv) some subtle differences regarding ornamentation of mandibular coxa-basis, (v) shape of some setae on the second segment of female A1 (with smooth setae only in *Robertgurneya n. sp. 1*, with at least 2 pinnate setae in *R. rostrata*), (vi) male baseoendopodal spines longer than baseoendopodite in *Robertgurneya n. sp. 1*, shorter in *R. rostrata*, (vii) male P5 BENP reaching beyond EXP in *R. rostrata*, hardly reaching tip of EXP in *Robertgurneya n. sp. 1*, (viii) inner

spine of basis of male P1 as long as supporting segment in *R. rostrata*, and about 2 times longer in *Robertgurneya n. sp. 1*, similar as in *R. similis* A. Scott and *R. falklandiensis* Lang, 1936a.

Robertgurneya n. sp. 2
(Figs. 156-161)

Material examined:

SEX	STAGE	# IND.	STORED AS	# CATALOGUE	STATION	DEPTH	DATE
F	A	1	Diss.	EMUCOP-490-D	3	0-3 cm	02/MAY/91
M	A	1	Diss.	EMUCOP-491-H	3	6-9 cm	02/MAY/91
M	CIV	1	Alc.	EMUCOP-663-E	6	0-3 cm	01/MAY/91
?	CII	1	Alc.	EMUCOP-652-B	6	0-3 cm	01/MAY/91
?	CIII	1	Alc.	EMUCOP-664-E	6	0-3 cm	01/MAY/91
M	CIV	1	Alc.	EMUCOP-651-B	6	0-3 cm	01/MAY/91
F	A	2	Alc.	EMUCOP-714-C	6	0-3 cm	03/JAN/92

Female

Habitus (Fig. 156a, 156c, 156d), ranging from 292 to 310 µm rostrum and caudal rami included. General shape and ornamentation as in *R. diversa* Lang except for lateral oblique rows of spinules close to caudal margin of second genital segment, fourth and fifth urosomite. Caudal rami (Fig. 156b) as in *R. diversa*, except distal outer and inner setae (about twice as long as ramus in *R. diversa*, shorter in *Robertgurneya n. sp. 2*).

Antennule (Fig. 157b), as in *R. diversa*, except for 1 and 4 plumose (pinnate?) setae on first and second segment in *R. diversa*, and only smooth elements in *Robertgurneya n. sp. 2*.

Antenna (Fig. 157c): with allobasis bearing smooth abexopodal seta and three-segmented exopodite, the latter proportionately shorter than in *R. hopkinsi* Lang; first segment about four times longer than second one, bearing 1 seta; second segment with 1, third with 1 lateral and 2 apical elements. Endopodal segment with 8 setae/spines.

Mandible (Fig. 157d, 157e): praecoxa with pars incisiva and several lacinia mobilis, and 1 smooth seta. Coxa basis with 3 apical setae. Exopodite tow-segmented, first segment with 1, second component with 2 setae. Endopodite, unknown.

Maxillule (Fig. 157f): arthrite with pair of surface setae, 6 apical spines and 1 subapical seta; coxa with 1 strong seta; basis with 6, one-segmented exo- and endopodite with 2 and 3 setae respectively.

Maxilla (Fig. 157g): syncoxa with 3 endites bearing 2 setae each. Basis with 1 strong claw accompanied by 1 strong element as long as spine. Endopodite with 3 setae.

Maxilliped (Fig. 157h): first endopodal segment with 2 short setae; second segment long and slender with 1 long claw accompanied by 1 seta.

P1 (Fig. 158a), as in *R. diversa*. Chaetotaxy as in Table 19.

P2-P4 (Fig. 158b, 158c, 158d), as in *R diversa* except for more proximal implantation of inner setae of EXP and ENP 3, and relative length of rami of P3 and P4 (P3 ENP slightly longer than EXP in *R. diversa*, EXP reaching distal fourth of ultimate endopodal segment in *Robertgurneya n. sp. 2*; P4 ENP reaching middle of third exopodal segment in *R. diversa*, and about distal fourth in the Mexican representatives).

P5 (Fig. 158e): relative size of the setae of EXP and BENP as in *R. diversa*. Rami elongated, exopodite about 3.3 times longer than wide; BENP extending slightly beyond middle of EXP.

Male

Length including tip of rostrum and caudal rami, 244 µm; dorsally (not illustrated) as in female, except for genital double-somite. Third and fourth urosomite with strong spinules ventrally (Fig. 159). Caudal rami as in female.

Antennule (Fig. 160), nine segmented, haplocer.

A2, Md, Mx, Mxl and Mxp (not illustrated) as in female.

P1 (Fig. 161a), as in female, except for inner spine of basis that resembles that of *R. diversa*.

P2 as in female, except for two-segmented endopodite (Fig. 161b); first segment with 1 seta, second one with four elements.

P3-P4 (not illustrated) as in female.

P5 (Fig. 161c): BENP 1.3 times longer than baseoendopodal spines, reaching tip of exopodite, the latter with 6 setae.

P6 (Fig. 161d), represented by two plates with 3 setae each.

Table 19. Chaetotaxy of *Robertgurneya n. sp. 2.*

	P1	P2	P3	P4
EXP	0.0.022	0.1.123	0.1.123	0.1.222
ENP	1.1.111	1.2.121	1.1.221	1.1.121

Comparison and discussion

To my knowledge, *R simulans* Norman & T. Scott, *R. remanei* Klie, *R. falklandiensis* Lang, *R. similis similis* A. Scott, *R. similis bulbamphiascoides* Noodt, *R. hopkinsi* Lang, *R. smithi* Hamond, *R. brevipes* Wells & Rao, and *R. diversa* Lang share 2 setae on P2 ENP 2. *Robertgurneya n. sp. 2* turned out to be closely related to *R diversa* and can be easily mistaken one for each other. However these species can be separated by the shape of the outer spine of male P2 ENP 2, shape of female P5, chaetotaxy of male P5, and length ratio of P3-P4 EXP/ENP.

GENUS *Typhlamphiascus* Lang 1944

Typhlamphiascus lamellifer Sars 1911a, 1911b (Figs. 162-167)

Original description: *Amphiascus lamellifer* Sars 1911, :391, Fig. 24.

Synonym: *cum* Lang, 1948; *Amphiascus lamellifer* G. O. Sars (Klie, 1941, :26-27, Fig.20-22).

Distribution: *cum* Lang, 1948; Afrika: South Afrika (Kunz, 1975 *-A. lamelllifer capensis-*); Island (Klie, 1941); Mexico: South-eastern Gulf of California (present study).

Material examined:

SEX	STAGE	# IND.	STORED AS	# CATALOGUE	STATION	DEPTH	DATE
?	CII	1	Alc.	EMUCOP-497-A	4-5	0-3 cm	01/MAY/91
F	A	1	Alc.	EMUCOP-472-F	3	3-6 cm	02/MAY/91
F	A	1	Alc.	EMUCOP-541-F	4-5	0-3 cm	01/MAY/91
F	A	1	Diss.	EMUCOP-425-A	3	3-6 cm	02/MAY/91
F	A	1	Diss.	EMUCOP-470-E	3	0-3 cm	02/MAY/91
F	A	1	Diss.	EMUCOP-540-F	4-5	0-3 cm	01/MAY/91
M	A	1	Alc.	EMUCOP-498-B	4-5	0-3 cm	01/MAY/91
M	A	2	Alc.	EMUCOP-471-F	3	3-6 cm	02/MAY/91
M	A	1	Alc.	EMUCOP-502-D	4-5	0-3 cm	01/MAY/91
M	A	1	Alc.	EMUCOP-542-F	4-5	0-3 cm	01/MAY/91
M	A	1	Diss.	EMUCOP-501-D	4-5	0-3 cm	01/MAY/91
M	CV	1	Alc.	EMUCOP-496-A	4-5	0-3 cm	01/MAY/91

Comparison and discussion

The Mexican specimens of *T. lamellifer* agree completely with Sars (1911) and Klie (1941), and with the analysis and description provided by Kunz (1975). Only the illustrations are shown in the present study.

GENUS *Amphiascoides* Nicholls 1941a, 1941b

Amphiascoides subdebilis Willey 1935
(Figs. 168-173)

Original description: *Amphiascus subdebilis* sp. n. Willey 1935, :64-65, Fig. 49-52.

Synonym: *cum* Lang, 1948; *Amphiascoides subdebilis* var. *intermixtus* Willey 1935, :64-65, Fig. 48; *Amphiascoides intermixtus* Willey 1935 (Nicholls, 1941a, :415-416, Fig. 18, 1941b, :81-82); *Amphiascella subdebilis* Willey 1935 (Chislenko, 1967, :152-153, Fig. 52; Drzycimski, 1969, :28, Fig. 9).

Distribution: *cum* Lang, 1948; Argentina : Ria Deseado (Santa Cruz) (Pallares, 1975a); Australia: St. Vincent and Spencer Gulfs (Nicholls, 1941a); Bermuda (Willey, 1935); Bulgaria (Apostololv & Marinov, 1988); Caroline Islands (Vervoort, 1964); France: Golf of Marseille (Bodin, 1964); India: Andaman and Nicobar Islands (Wells & Rao, 1987); Mexico: South-eastern Gulf of California (present study); Mozambique: Inhaca Island (Wells, 1967); Norway: Bergen (Drzycimski, 1969); Rusia: Karelian coast (Chislenko, 1967); Scotland: Loch Nevis (Wells, 1965); Turkey: Sea of Marmara (Noodt, 1955a); U. S. A.: California (Wells, ined.).

Material examined:

SEX	STAGE	# IND.	STORED AS	# CATALOGUE	STATION	DEPTH	DATE
M	A	1	Alc.	EMUCOP-992-A	3	3-6 cm	02/MAY/91
F	A	1	Diss.	EMUCOP-531-E	4-5	0-3 cm	01/MAY/91
F	A	1	Diss.	EMUCOP-441-A	3	3-6 cm	02/MAY/91
F	A	1	Diss.	EMUCOP-980-B	9	0-3 cm	03/JAN/92
M	A	1	Diss.	EMUCOP-747-D	14	0-3 cm	03/JAN/92
M	A	1	Diss.	EMUCOP-982-A	3	3-6 cm	02/MAY/91
M	A	1	Diss.	EMUCOP-981-C	7	3-6 cm	03/JAN/92

Comparison and discussion

Willey (1935) described *Amphiascoides subdebilis* (=*Amphiascus subdebilis*) from Bermuda. Unfortunately, he only provided a rather brief and not very detailed description of this species and omited any comment on the mouth parts and swimming legs, probably because, as pointed out by Lang (1965), *A. subdebilis* agrees in these respects with *A. debilis* Giesbrecht with which he compared his specimens (see also Wells & Rao, 1987).

Monard (1928a) reported *Amphiascus debilis* Giesbrecht from Banyuls (France) and Willey (1935) described *Amphiascus subdebilis* var. *intermixtus* from Bermuda, the latter, raised to the rank of species by Nicholls (1941a). Later, Lang (1948, 1965) equated these representatives with *Amphiascoides subdebilis*, thus accepting intraspecific variability at least in the ventral ornamentation and female P5 (the male of *A. subdebilis* var. *intermixtus* remains unknown). Since then, *Amphiascoides subdebilis sensu* Lang 1948, 1965, has been reported from diverse localities, but only brief comments on some structures have been provided for each representative (*e. g.* Drzycimski, 1969; Bodin, 1964; Noodt, 1955b), and some times even the illustrations have been omited (*e. g.* Wells, 1965, 1967; Wells & Rao, 1987).

In their report, Wells & Rao (1987) showed to be reluctant to accept that *Amphiascoides debilis sensu* Monard (1928a) (and thus *Amphiascella subdebilis* Willey 1935 *sensu* Bodin, 1964, :137, Fig. V-28) and *A. subdebilis* are the same species based on the differences observed between the male P2 ENP 2 of both species. I agree completely with these authors. Monard (1928a) pointed out the fact that "End II à 2 articles, le distal allongé, prolongé par une longue protubérance épineuse à l'apex, **avec seulement 2 soies internes**", as in the original description of the species by Giesbrecht (1881) and further descriptions, and different from *A. subdebilis* with 3 inner setae. Moreover, it is possible that *Amphiascoides debilis* could be in fact a complex of species involving at least two different taxa (Bodin, 1977).

Wells & Rao (1987) pointed out some differences between thier specimens and those reported by Pallares (1975a), Vervoort (1964); Wells (1965, 1967) and Wells (ined.), Drzycimski (1969),

Chislenko (1967) and Noodt (1955a). However, I did not find any comment on *A. subdebilis* in Wells (1967), and I assume that those observations were made from unpublished material.

Unfortunately, Wells & Rao (1987) omited any illustration and description of their specimens, thus making difficult the comparison with the Mexican representatives. They assure (i) that Chislenko's (1967) female fourth antennular segment is rather (barely?) longer than broad, but this is also the case for Apostolov & Marinov's (1988), and the Mexican representatives, whilst the fourth segment of A1 in their specimens is twice as long as broad; (ii) that the male ENP depicted by Noodt (1955a), Pallares (1975a) and Drzycimski (1969) are "barely distinguishable from that of *A. debilis*" (with only 2 inner setae on ENP 2), however, this is clearly not the case, since *A. subdebilis* as depicted by these authors do exhibit 3 inner setae in ENP 2, alike the Mexican specimens.

With respect to the ventral ornamentation of the female, Wells & Rao (1987) showed notorious variability, either without spinules in the specimens from the Caroline Islands, with spinules on fourth urosomite only in those specimens from Bermuda, on fourth to fifth urosomite in the representatives from Scotland, Mozambique and India, or on second genital somite, fourth and fifth urosomites as in the specimens from California (Wells, ined.). In this respect, the Mexican specimens showed to share the presence of ventral spinules on fourth and fifth female urosomite with the specimens from Scotland, Mozambique and India.

Finally, it has been shown that as a rule, the P1 ENP 1 is longer than the entire exopodite. In the Mexican specimens, however, both rami turned out to be of the same length.

Probably *A. subdebilis* and *A. debilis*, are in fact complexes of species involving two or more taxa. This can only be achieved as suggested by Nicholls (1941a) and Wells & Rao (1987) through genetic bases or through a thorough revision of the genus.

GENUS *Haloschizopera* Lang 1944

Haloschizopera n. sp. 1
(Figs. 174-179)

Material examined:

SEX	STAGE	# IND.	STORED AS	# CATALOGUE	STATION	DEPTH	DATE
M	CIV	1	Alc.	EMUCOP-754-E	14	0-3 cm	03/JAN/92
F	A	1	Diss.	EMUCOP-746-D	14	0-3 cm	03/JAN/92
F	A	1	Diss.	EMUCOP-224-A	9	0-3 cm	03/JAN/92
M	A	1	Diss.	EMUCOP-448A	3	3-6 cm	02/MAY/91
M	A	1	Diss.	EMUCOP-753-E	14	0-3 cm	03/JAN/92

Female

Habitus, as in the genus. Length, 372 µm, rostrum and caudal rami included. Rostrum as in Fig. 175e. Surface of prosomites smooth. Genital double-somite (Fig. 174a, 174b) with suture dorsally; ventrally fused; with serrated hyaline frill; ornamented with spinules on caudal edge of first and second genital somites dorsolaterally, and ventrolaterally only on second one. Fourth and fifth urosomite ornamented as previous one, except for additional ventral set of median spinules on caudal margin of fifth urosomite, the latter with dorsal hyaline frill as in Fig. 174a. Anal segment as in *H. ruthorum* Por; caudal rami slightly broader than long, with 7 normal setae.

Antennule (Fig. 175a), eight-segmented; surface of segments smooth except from 2 short rows of small spinules on first one; all setae smooth and slender except for some pinnate elements on second component and 1 pinnate seta on ultimate segment.

Antenna (Fig. 175b): with allobasis bearing abexopodal seta which arises in distal half. Exopodite three-segmented; first and third segment of about the same length, second one very small; first and second segments with 1, third one with 3 setae. Endopodal segment ornamented with fine spinules along inner margin and with 2 spines and 1 small seta; distally with 6 elements.

Mandible (Fig. 175c): with compact gnathobase bearing pars incisiva and several lacinia, with subdistal slender seta; coxa-basis with set of subdistal long spinules and armed with 3 apical setae. Exopodite two-segmented; first segment with 1 lateral, second segment with 3 apical setae. Endopodite one-segmented; about twice as long as entire exopodite; with 2 lateral and 4 apical setae.

Maxillule and maxilla, unknown.

Maxilliped (Fig. 175d): basis ornamented with spinules on outer distal corner and armed with 4 distal inner setae. First endopodal segment with row of spinules along inner edge, and with 2 setae; second endopodal segment with a claw and 2 accompanying setae.

P1 (Fig. 176a): coxa rectangular, ornamented with small spinules close to proximal outer corner and with long and slender elements along inner edge and close to distal outer corner; basis with strong spinules at base of inner spine and between rami. Rami three-segmented; first endopodal segment reaching tip of second exopodal segment; exopodite reaching tip of second endopodal segment. Chaetotaxy as in Table 20.

P2-P4 (Fig. 176b, 176, c, 176d): coxa with transverse row of slender spinules close to the middle of inner edge, and near outer distal corner; basis ornamented with spinules at base of outer seta and between rami, and with slender elements close to inner corner proximally and with minute spinules at base of endopodite, with acute produced inner distal corner. Rami three-segmented. Exopodite of P2 reaching the middle, of P3 reaching distal third of third endopodal segment. Endopodite of P4 reaching the middle of third exopodal segment. Chaetotaxy as in Table 20.

P5 (Fig. 176e): baseoendopodite ornamented with some spinules along outer edge of inner espansion, hardly reachin the middle of exopodite; with 4 setae. Exopodite about twice as long as broad, with 5 setae.

P6 (Fig. 174b), represented by chitinized transverse area with 3 setae; copulatory pore in proximal half of first genital somite.

Male

Habitus as in female, except for genital double-somite (Fig. 177a, 177b, 177c). Length, ranging from 312 to 332 µm from rostrum to caudal rami.

Antennule (Fig. 178), nine-segmented, haplocer.

Mouth parts (not illustrated) as in female.

P1 (Fig. 179a), as in female, except for inner distal projection of basis close to inner spine.

P2 (Fig. 179b): protopodal components and exopodite as in female. Endopodite typically modified; two-segmentd; first segment without setae; second segment with an inner lateral hyaline knob, and 4 setae in all; apically produced into acute projection.

P3-P4 (not illustrated) as in female, except for tubular pore on posterior face of P3 EXP 3 (Fig. 179e).

P5 (Fig. 179c): inner baseoendopodal lobes fused; with 2 setae each. Exo- and baseoendopodite of about the same length. Exopodite with 5 setae/spines.

P6 (Fig. 179d), represented by two lamellae with 1 outer seta and 2 inner spines.

Table 20. Chaetotaxy of *Haloschizopera n. sp. 1.*

	P1	P2	P3	P4
EXP	0.0.022	0.1.023	0.1.123	0.1.223
ENP	1.1.021	0.2.121	1.1.121	1.1.121

Comparison and discussion

Por (1964a) recognized two groups of species based on the chaetotaxy of P3-P4 EXP 3. The first group included *H. exigua* Sars, *H. pauciseta* Por, *H. conspicua* Por and *H. minima* Por, whereas the second group would be constituted by *H. junodi* Lang, *H. pontarchis* Por, *H. mathoi* Monard, *H. bulbifera* (=*bulbifer*) Sars, *H. marmarae* Noodt and *H pygmaea* (?) Norman & T. Scott. Since then, 11 new species (*Haloschizopera n. sp. 1* included) have been described and some species turned out to be junior syonyms. As shown in Table 19, of all the known species of Haloschizopera, 3 main groups can be observed following Por's (1964a) criteria, each group being composed of several subgroups according to the particular chaetotaxy of each species or group of species. The first group is characterized by the presence of 1 inner seta on P3 EXP 3 and 2 inner elements on P4 EXP 3, and is composed of four subgroups: *H. marmarae*, *H. latisetifera*, the *pygmaea*-group and the *clotensis-nuditerga*-complex. The second group recognized by Por (1964a) is that without inner setae on P3 EXP 3 and with 1 inner element on P4 EXP 3, presently composed by 6 subgroups. Since Por's (1964a) revision, four species have been described that turned out to compose two intermediate groups. The first one, composed of *H. abyssi* and *H. lima* differs from the first group only by the absence of

inner seta on P3 EXP 3, whilst the second intermediate group (*H. aegyptica* and *H. noddti*) is characterized by an inner seta on P3 EXP 3 and on P4 EXP 3.

Table 21. Chaetotaxy of the species of *Haloschizopera* Lang. Differences with respect to the *pygmaea*-group are highlighted.

	P 1		P 2		P 3		P 4	
	EXP	ENP	EXP	ENP	EXP	ENP	EXP	ENP
marmarae[12]	0.0.022	1.1.021	0.**2**.023	0.2.121	0.1.123	1.1.121	0.1.223	1.1.121
latisetifera[14]	0.0.022	1.1.021	0.1.023	0.2.121	0.1.123	1.1.121	0.1.223	1.1.**0**21
pygmaea[1]	0.0.022	1.1.021	0.1.023	0.2.121	0.1.123	1.1.121	0.1.223	1.1.121
bulbifera[10]	0.0.022	1.1.021	0.1.023	0.2.121	0.1.123	1.1.121	0.1.223	1.1.121
mathoi[2]	0.0.022	1.1.021	0.1.023	0.2.121	0.1.123	1.1.121	0.1.223	1.1.121
ruthorum[11]	0.0.022	1.1.0(1?)21	0.1.023	0.2.121	0.1.123	1.1.121	0.1.223	1.1.121
lionensis[10]	0.0.022	1.1.021	0.1.023	0.2.121	0.1.123	1.1.121	0.1.223	1.1.121
n. sp. 1[17]	0.0.022	1.1.021	0.1.023	0.2.121	0.1.123	1.1.121	0.1.223	1.1.121
tenuipes[8]	0.0.022	1.1.021	0.1.023	0.2.121	0.1.123	1.1.121	0.1.223	1.1.121
clotensis[10]	0.0.022	1.1.**0**11	0.1.023	0.2.121	0.1.123	1.1.121	0.1.223	1.1.121
nuditerga[10]	0.0.022	1.1.**0**11	0.1.023	0.2.121	0.1.123	1.1.121	0.1.223	1.1.121
abyssi[15]	0.0.022	1.1.021	0.1.023	0.2.121	0.1.**0**23	1.1.121	0.1.223	1.1.121
lima[15]	0.0.022	1.1.021	0.1.023	0.2.121	0.1.**0**23	1.1.121	0.1.223	1.1.121
aegyptica[8]	0.0.022	1.1.021	0.1.**1**23	0(?).2.121	0.1.123	1.1.121	0.1.**1**23	1.1.121
noodti[13]	0.0.022	1.1.**1**21	0.1.023	-	0.1.123	1.1.121	0.1.**1**23	1.1.121
apprisea[16]	0.0.022	1.1.021	0.1.0**2**2	0.2.121	0.1.**0**22	1.1.121	0.1.**1**22	1.1.121
pauciseta[5,6,7]	0.0.022	**0**.1.0**2**0	0.1.023	0.2.121	0.1.**0**23	1.1.121	0.1.**1**23	1.1.121
conspicua[7]	0.0.022	**0**.1.021	0.1.023	0.2.121	0.1.**0**23	1.1.121	0.1.**1**23	1.**0**.121
phyllura[8]	0.0.022	1.1.020	0.1.023	0(?).2.121	0.1.**0**23	1.1.121	0.1.**1**23	1.1.121
exigua[4,7]	0.0.022	1.1.021	0.1.023	**1**.2.121	0.1.**0**23	1.1.121	0.1.**1**23	1.1.121
minima[7]	0.0.022	1.1.021	0.1.023	0.2.121	0.1.**0**23	1.1.121	0.1.**1**23	1.**0**.121
exigua[3]	0.0.022	1.1.021	0.1.023	0.2.121	0.1.**0**23	1.1.121	0.1.**1**23	1.1.121
bathyallis[9]	0.0.022	1.1.021	0.1.023	0.2.121	0.1.**0**23	1.1.121	0.1.**1**23	1.1.121

[1] After Moore & O'Reilly, 1989; [2] after Moore & O'Reilly, 1989; [3] *sensu* Por, 1964a; [4] *sensu* Sars, 1906; [5] *sensu* Por, 1959; [6] *sensu* Por, 1964b; [7] after Por, 1964a; [8] after Noodt, 1964; [9] after Schriever, 1984; [10] after Moore & O'Reilly, 1993; [11] after Por, 1967; [12] after Noodt, 1955a; [13] after Bodin, 1968; [14] after Marinov, 1973; [15] after Becker, 1974; [16] after Gee & Fleeger, 1990; [17] present study.

Haloschizopera n. sp. 1 clearly belongs to the *pygmaea*-group given its chaetotaxy. The taxonomy of this group is not very simple, and comparison of subtle details are often required. The main difference found in this group is the number of segments of female A1. *H. bulbifera* and *H. lionensis* can be distinguished from the rest by their seven-segmented antenna and by the P1 ENP 1/P1 EXP length ratio (of about 0.5 in *H. bulbifera* and 0.8 in *H. lionensis*) (Table 22).

The length ratio of P1 ENP 1/P1 EXP is a very useful criterion to separate *H. pygmeae*, *H. mathoi* and *Haloschizopera n. sp 1* from *H. ruthorum* and *H. tenuipes*. The first group exhibts a P1 ENP 1/P1 EXP ratio of about 0.4 to 0.5, whilst in *H. tenuipes* and *H. ruthorum* is of about 1.4 and 0.9 respectively.

The comparison of ventral somitic ornamentation is another useful criterion to distinguish *H. mathoi* from *H. pygmaea* and *Haloschizopera n. sp. 1*, being stronger and somewhat more dense in *H. mathoi*. *H. pygmaea*, *H. mathoi* and *Haloschizopera n. sp. 1* can be distinguished by the relative length of male P5 baseoendopodal spines. In *H. pygmaea*, the outermost spine is about 1.6 times longer than the innermost; in *Haloschizopera n. sp. 1*, the innermost spine is about 1.4 times longer than the outermost one; in *H. mathoi* both spines are nearly equal in size.

Table 22. Salient features of the *pygmaea*-group.

	FEMALE P5		A1	P1ENP1/P1EXP
	EXP	ENP	FEMALE	L RATIO
bulbifera[10]	5	4	7	0.5
lionensis[10]	5	4	7	0.80
ruthorum[11]	5	4	8	0.91
tenuipes[8]	5	4	8	1.42
pygmaea[1]	5	4	8	0.40
mathoi[2]	5	4	8	0.45
n. sp. 1[17]	5	4	8	0.48

Notes as in Table 19.

GENUS *Eoschizopera* Wells & Rao 1976

SUBGENUS *Praeoschizopera* Apostolov 1982

Eoschizopera (Praeoschizopera) n. sp. 1 (Figs. 180-182)

Material examined:

One dissected female labeled EMUCOP-262-B, found in station 9 at 3-6 cm depth, on 24/JUN/91.

Female

Habitus: length, 525 μm from tip of rostrum tu caudal rami; gradualy tapering posteriorly, with maximum width about middle of cephalothorax, the latter with smooth posterior margin. Rostrum (Fig. 181a) set off, somewhat elongated, broad at base, with one setule on each side medially. Dorsal surface of first to third prosomite smooth except for transverse row of small spinules close to caudal margin of first and second prosomites. Dorsal surface of first urosomite smooth, with posterior serrated frill. Genital double-somite (Fig. 180a, 180b) with dorsolateral trace of subdivision, ventrally fused completely; dorsal surface of first genital segment smooth except for short row of small spinules, of second one with pattern of transverse rows of spinules and posterior serrated frill; ventrally plain, except for vestige P6 and genital field. Fourth urosomite with pattern of transverse rows of minute spinules dorsally and ventrally, with serrated hyaline frill; dorsal surface of fifth urosomite as preceding one, caudal dorsal margin bulging thus forming a finely serrated pseudoperculum. Anal segment smooth dorsally, except for spinules close to caudal rami; ventrally with row of spinules on anterior third and on posterior edge close to joint with caudal rami; anal operculum set with fringing spinules. Caudal rami about 1.3 times as long as broad and tapering posteriorly; furnished with inner fragile elements; with 6 setae/spines.

Antennule (Fig. 181b): eight-segmented; second segment about 1.5 times longer than wide; surface of segments smooth; all setae smooth.

Antenna (Fig. 181c), with well-defined basis ornamented with rows of spinules on abexopodal margin and on outer edge proximally. First endopodal segment with abexopodal seta; second endopodal segment with inner row of spinules, with 2 slender setae arising close to pair of subdistal spines, and 7 distal elements in all. Exopodite two-segmented, first segment with 1 seta, second segment with 2 elements and some spinules apically.

Mandible (Fig. 181d): chewing edge with 2 dentated pasr incisiva and several lacinia, with 1 seta; coxa-basis with 3 setae distally. Endopodite one-segmented, with lateral 2 setae and 6 distal elements. Exopodite represented by a single seta.

Maxillule (Fig. 181e): precoxal arthrite with 7 distal spines and 2 setae, with 2 surface elements; coxa with 1 strong and 1 slender seta; basis with 5 elements. Endopodite one-segmented, with 2 setae, exopodite consisting of 2 elements.

Maxilla (Fig. 181f): syncoxa with 3 endites, proximal and distal one with 3, that in middle with 2 setae. Basis with 1 claw, 1 strong and 3 slender setae. Endopodite with 5 elements.

Maxilliped (Fig. 181g): first endopodal segment with inner row of small spinules, with 2 inner setae; second segment with a strong claw and 3 accompanying setae.

P1 (Fig. 182a): coxa with short transverse rows of spinules; basis ornamented with spinules between rami and at base of outer and inner spine. Exopodite three-segmented, reaching proximal fourth of second endopodal segment; all segments of about the same length. Enodopodite two-segmented; first segment about 1.5 times longer than second one, reaching middle of third exopodal segment; inner seta of first endopodal segment arising in distal fourth. Chaetotaxy as in Table 23.

P2-P4 (Fig. 182b, 182c, 182d): coxa with rows of spinules close to outer edge; basis smooth except for minute spinules at base of endopodite and longer elements at base of outer seta, later spiniform in P2 and slender in P3 and P4. Rami three-segmented. Endopodite of P2 and P3 slightly smaller than exopodite, of P4 reachin middle of third exopodal segment. Chaetotaxy as in Table 23.

P5 (Fig. 182e): rami fused; baseoendopodal lobe reaching about middle of exopodal lobe, with 2 inner and 2 distal bipinnate setae; exopodal lobe with 5 setae of different length.

Male

Unknown.

Table 23. Chaetotaxy of *Eoschizopera. (Praeoschizopera.) n. sp. 1.*

	P1	P2	P3	P4
EXP	0-0-022	0-1-022	0-1-022	0-1-022
ENP	1-111	0-1-121	1-1-121	1-1-021

Comparison and discussion

See below.

GENUS *Eoschizopera* Wells & Rao 1976

SUBGENUS *N. subgen. 1*

Diagnosis

Diosaccidae, *Eoschizopera* Wells & Rao 1976. Habitus, *Eoschizopera*-like. Antennule eight-segmented. Antenna with basis and two-segmented exopodite. Remaining mouth parts, *Eoschizopera*-like. P1 with three-segmented endopodite. Chaetotaxy of P2-P4 as follows:

	P2	P3	P4
EXP	0.0-1.022	0.0-1.022	0.0-1.022
ENP	0.1.121	1.1.121	1.1.021

Dimorphism: male antennule (haplocer, eight-segmented), inner spine of basis of P1 (modified), P2 ENP, P3 EXP 3 (with hyaline spine), P5 (both legs discrete in female, fused in male medially), P6 (with 2 setae in female; represented by a smooth and bare plate in male).

Type species

Eoschizopera (N. subgen. 1) osana Mielke 1995a, by designation.

Other species

E. (N. subgen. 1) mielkei n. sp.; *E. (N. subgen. 1) n. sp. 1.*

Eoschizopera (N. subgen. 1) n. sp. 1
(Figs. 183-189)

Material examined:

SEX	STAGE	# IND.	STORED AS	# CATALOGUE	STATION	DEPTH	DATE
?	CI	3	Alc.	EMUCOP-687-C	6	0-3 cm	30/MAR/92
?	CII	1	Alc.	EMUCOP-244-A	9	0-3 cm	03/JAN/92
?	CII	8	Alc.	EMUCOP-686-C	6	0-3 cm	30/MAR/92
?	CII	6	Alc.	EMUCOP-674-B	6	0-3 cm	30/MAR/92
?	CIII	1	Alc.	EMUCOP-386-C	7	0-3 cm	30/MAR/92
?	CIII	10	Alc.	EMUCOP-685-C	6	0-3 cm	30/MAR/92
?	CIII	6	Alc.	EMUCOP-673-B	6	0-3 cm	30/MAR/92
F	A	1	Alc.	EMUCOP-483-A	10	3-6 cm	30/APR/91
F	A	2	Alc.	EMUCOP-228-A	9	0-3 cm	03/JAN/92
F	A	1	Alc.	EMUCOP-289-B	12	0-3 cm	23/JUN/91
F	A	3	Alc.	EMUCOP-397-F	7	0-3 cm	30/MAR/92
F	A	9	Alc.	EMUCOP-381-C	7	0-3 cm	30/MAR/92
F	A	6	Alc.	EMUCOP-406-H	7	0-3 cm	30/MAR/92
F	A	1	Alc.	EMUCOP-391-E	7	0-3 cm	30/MAR/92
F	A	2	Alc.	EMUCOP-251-B	9	0-3 cm	03/JAN/92
F	A	18	Alc.	EMUCOP-684-C	6	0-3 cm	30/MAR/92
F	A	10	Alc.	EMUCOP-666-B	6	0-3 cm	30/MAR/92
F	A	1	Alc.	EMUCOP-620-C	10	0-3 cm	30/APR/91
F	A	1	Diss.	EMUCOP-225-A	9	0-3 cm	03/JAN/92
F	A	1	Diss.	EMU-4266C	7	0-3 cm	30/MAR/92
F	A	1	Diss.	EMU-4267-B	7	0-3 cm	30/MAR/92
F	A	1	Diss.	EMUCOP-250-B	9	0-3 cm	03/JAN/92
F	CIV	1	Alc.	EMUCOP-396-F	7	0-3 cm	30/MAR/92
F	CIV	2	Alc.	EMUCOP-675-B	6	0-3 cm	30/MAR/92
F	CV	1	Alc.	EMUCOP-385-C	7	0-3 cm	30/MAR/92
F	CV	3	Alc.	EMUCOP-668-B	6	0-3 cm	30/MAR/92
F	CV	2	Alc.	EMUCOP-689-C	6	0-3 cm	30/MAR/92
M	A	1	Alc.	EMUCOP-227-A	9	0-3 cm	03/JAN/92
M	A	8	Alc.	EMUCOP-407-H	7	0-3 cm	30/MAR/92
M	A	1	Alc.	EMUCOP-290-B	12	0-3 cm	23/JUN/91
M	A	2	Alc.	EMUCOP-392-E	7	0-3 cm	30/MAR/92
M	A	1	Alc.	EMUCOP-398-F	7	0-3 cm	30/MAR/92
M	A	2	Alc.	EMUCOP-388-B	7	0-3 cm	30/MAR/92
M	A	1	Alc.	EMUCOP-383-C	7	0-3 cm	30/MAR/92
M	A	1	Alc.	EMUCOP-484-C	7	0-3 cm	30/MAR/92
M	A	3	Alc.	EMUCOP-252-B	9	0-3 cm	03/JAN/92
M	A	12	Alc.	EMUCOP-667-B	6	0-3 cm	30/MAR/92
M	A	19	Alc.	EMUCOP-683-C	6	0-3 cm	30/MAR/92
M	A	1	Alc.	EMUCOP-805-C	4-5	0-3 cm	30/MAR/92
M	A	1	Alc.	EMUCOP-702-D	6	0-3 cm	30/MAR/92
M	A	1	Diss.	EMUCOP-299-E	12	0-3 cm	23/JUN/91
M	A	1	Diss.	EMUCOP-151-C	2	0-3 cm	01/MAY/91
M	A	1	Diss.	EMU-4268-C	7	0-3 cm	30/MAR/92
M	A	1	Diss.	EMUCOP-193-B	9	0-3 cm	30/APR/91
M	A	1	Diss.	EMUCOP-275-A	9	0-3 cm	30/MAR/92
M	CIV	1	Alc.	EMUCOP-701-D	6	0-3 cm	30/MAR/92
M	CIV	2	Alc.	EMUCOP-688-C	6	0-3 cm	30/MAR/92
M	CV	1	Alc.	EMUCOP-384-C	7	0-3 cm	30/MAR/92

M	CV	1	Alc.	EMUCOP-229-A	9	0-3 cm	03/JAN/92
M	CV	2	Alc.	EMUCOP-690-C	6	0-3 cm	30/MAR/92

Female

Habitus (Fig. 183a): length ranging from 520 to 534 μm from tip of rostrum tu caudal rami; gradualy tapering posteriorly, with maximum width about middle of cephalothorax, the latter with smooth posterior margin. Rostrum (Fig. 185a) set off, somewhat elongated, broad at base, with one setule on each side medially, rounded at tip. Dorsal surface of first to third prosomite smooth except for one transverse row of minute spinules close to posterior margin of first and second somite. First urosomite smooth, with posterior serrated frill. Genital double-somite (Fig. 183a, 184) with dorsolateral trace of subdivision, ventrally fused completely; dorsal surface of first genital segment smooth with posterior serrated frill, of second segment with some transversal rows of spinules interrupted medially, and with posterior frill; ventrally plain, except for vestige P6 and genital field. Ornamentation of fourth urosomite as in previous one, ventrally with two transverse rows of spinules; dorsal surface of fifth urosomite with some transverse rows of minute spinules; caudal dorsal margin bulging thus forming a finely serrated pseudoperculum. Anal segment with several transverse rows of minute spinules dorsally; anal operculum set with fringing spinules; with long spinules close to articulation with caudal rami; ventrally with row of spinules on anterior third and on posterior edge. Caudal rami about 1.3 times as long as broad and tapering posteriorly; with 6 elements.

Antennule (Fig. 185c): eight-segmented; second segment about 2 times longer than wide; surface of segments smooth; all setae smooth except for 2 pinnate elements on second and seventh segment.

Antenna (Fig. 185d), with ill-defined basis ornamented with rows of spinules. First endopodal segment with abexopodal seta; second endopodal segment with inner row of long spinules, with 2 slender setae arising close to pair of subdistal spines, and 7 distal elements in all. Exopodite two-segmented, first segment with 1, second segment with 2 setae and some spinules apically.

Mandible (Fig. 185e): gnathobasis with dentated pars incisiva, several lacinia and 2 setae; coxa-basis with spinules proximally, distally and along outer edge; with 3 plumose setae distally. Endopodite one-segmented, with 2 setae laterally and 2+3 elements distally. Exopodite consisting of a small segment with 2 plumose setae, one of them short.

Maxillule (Fig. 185f): precoxal arthrite with 7 strong distal spines and 3 short setae; with 2 surface elements. Division between coxa and basis not evident. Coxa with 1 strong geniculate and 1 slender seta; basis with 5 elements; endopodite with 3, exopodite with 2 setae.

Maxilla (Fig. 185g): syncoxa with 3 endites, proximal and middle ones with 2 setae each, distal one with 3 setae; basis with 1 claw, 1 strong and 3 slender setae. Endopodite with 5 elements.

Maxilliped (Fig. 185h): basis furnished with spinules and 1 subdistal and 2 apical bipinnate setae on inner edge. First endopodal segment with some outer spinules proximally, and inner row of small ones along inner margin; with 2 inner setae; second segment with a strong claw and 2 accompanying setae.

P1 (Fig. 186a): intercoxal sclerite smooth; coxa with several transverse rows of spinules; basis ornamented with rows of spinules close to proximal inner corner, at base of outer and inner spine and between rami. Rami three-segmented; exopodite reaching tip of first endopodal segment. Chaetotaxy as in Table 24.

P2-P4 (Fig. 186b, 186c, 187a): intercoxal sclerite smooth, protruded into two spiniform processes; praecoxa with spinules close to articulation with coxa, the latter furnished as in P1; basis with spinules at base of endopodite and at base of outer seta, the latter spiniform in P2 and slender in P3 and P4. Rami three-segmented. Exopodite of P2 and P3 slightly smaller than endopodite, of P4 reaching middle of third endopodal segment. Chaetotaxy as in Table 24.

P5 (Fig. 187b): rami defined. Baseoendopodal lobe with 2 inner and 2 distal bipinnnate setae. Exopodite reaching beyond baseoendopodite; with 6 setae of different length.

Male

Habitus (Fig. 188a, 188b, 188c): general dorsal shape as in female, except for genital double somite; length ranging from 518 to 528 μm from tip of rostrum to caudal rami; pro- and urosomites somewhat more ornamented than in female; anal segment and caudal rami as in female, except for normal shape of terminal distal setae.

Antennule (Fig. 189a): haplocer, eight-segmented; third segment narrow, fourth segment somewhat globulos, seventh segment small.

Mouth parts (not illustrated) as in female.

P1 (Fig. 189b), as in female, except for inner digitiform process of basis.

P2 (Fig. 189c): protopodal elements and exopodite as in female. Endopodite two-segmented; proximal segment with slender spinules on inner and outer margin; distal segment terminating in an outer thorn, with 1 slender seta subdistally, and 3 elements distally, one of which is pinnate in distal part.

P3: protopodal elements and endopodite as in female. Exopodite three-segmented; first and second segment as in female; third segment with hyaline subdistal spine (Fig. 189d).

P4 (not illustrated), as in female.

P5 (Fig. 189e): with fused baseoendopodites, with 2 strong pinnate spines of about the same length. Exopodite reaching tip of baseoendopodite, with 5 elements of different length and ornamentation.

P6 (see Fig. 188d): represented by a smooth plate without setae.

Variability

One female (EMU-4267-B) was found having a seven-segmented antennule, third and fourth segments being partially fused (Fig. 185b).

Table 24. Chaetotaxy of *Eoschizopera (N. subgen. 1) n. sp. 1.*

	P1	P2	P3	P4
EXP	0-0-022	0-1-022	0-1-022	0-1-022
ENP	1-0-111	0-1-121	1-1-121	1-1-021

Comparison and discussion

Since its creation to allocate *Schizopera longicauda* Sars, the genus *Schizopera* Sars has been subject of discussions on its phylogenetical relationships (Lang, 1948, 1965; Apostolov, 1982; Mielke, 1992a). In Lang's monograph (1948), 38 species were accepted to belong to the genus *Schizopera*, and in Lang (1965), after reallocation of the species at that time described, the number of species belonging to the genus *Schizopera* raised to 42 (Lang, 1965, :324-326). Lang (1965) was of the opinion that this genus was monophyletic in origin on the basis of the presence of some features, such as a modified hyaline spine on the inner edge of the third exopodal segment of the male P3 (the "universal" presence of this hyaline spine within the genus and related genera was later confirmed by Wells & Rao, 1976, even for the species for which this information was not available), the uniform transformation of the inner spine of basis of the first leg in the males, the conformity of the female genital area, the loss of the proximal outer spine on the terminal exopodal segment of P1-P4, and antenna with allobasis and two-segmented exopodite. However by 1976, 5 species have had been reported showing some departure from the *Schizopera* antennal plan. Wells & Rao (1976) were of the opinion that one of those species, *S. anomala* Coull, could be regarded as a minor departure from the *Schizopera* plan, since it has an allobasis but a one-segmented exopodite, and suggested that the group of species composed of *S. arenicola* Chappuis & Serban, *S. gauldi* Chapppuis & Rouch 1961 and *S. varnensis* Apostolov, which have a two-segmented endopodite of P4, and the several species with two-segmented endopodite of P1, could represent an advanced evolutionary trend within the genus. On the other hand, and in agreement with Wells & Rao (1976), with such a simple model could not be explained the more primitive antenna (with basis and a two- or three-segmented exopodite), and setation of P2-P4 of some other species. Therefore, these authors coined the name for the genus *Eoschizopera* to allocate the species *E. (=S.). crassispinata* Chappuis 1954, *E. (=S.) gligici* Petkovski 1957, *E. (=S.) indica* Rao & Ganapati 1969, *E. (=S.) syltensis* Mielke 1973, *E. reducta* Wells & Rao 1976, and *E. (=S.) marlaieri* Rouch & Chappuis 1960, the latter considered as *incertae sedis*, as the state of its antenna was in doubt. At that time, several genera have had been erected, and were supposed to be related to some extent to the group of *Schizopera* (*Psammotopa* Pennak, *Actopsyllus* Wells, *Protopsammotopa* Geddes, *Balucopsylla* Rao, *Helmutkunzia* Wells & Rao, *Paraschizopera* Wells, and questionably *Goffinella* Wilson, and *Schizoperoides* Por).

In an attempt to clarify the identity of the species belonging to the groups related to *Schizopera*, Apostolov (1982) divided the species of the genus *Eoschizopera* into two subgenera: *Eoschizopera s. str.* Wells & Rao (*E. (s. str.) syltensis*) and *Praeoschizopera* subgen. n. (*E. (P.) indica*, *E. (P.) crassipinata*, *E. (P.) marlieri* and *E. (P.) gligici*), principally on the basis of the differences between the endopodite of P1 (three-segmented in *Eoschizopera (s. str.)* and two-segmented in *E. (Praeoschizopera)*), antennal exopodite (three- and two-segmented in *Eoschizopera (s. str.)* and *E.*

(Praeoschizopera) respectively), and chaetotaxy of female P5 exopodite (with 5 and 6 setae in *Eoschizopera (s. str)* and *Eoschizopera (Praeoschizopera)* respectively). Additionaly, Apostolov (1982) coined the name for the genus *Schizoperopsis* (characterized primarily by a two-segmented endopodite of P4), with two subgenera: *Schizoperpsis s. str.* and *Sch. (Psammoschizoperopsis)* subgen. n., on the basis of the presence of a two-segmented endopodite of P1 and P4; and created two subgenera of the genus *Schizopera* (characterized primarily by an antenna with allobasis and a two segmented antennal exopodite): *Schizopera s. str.* Sars and *Neoschizopera* subgen n., on the basis of the structure of the endopodite of P1 (three- and two-segmented in *Sch. (s. str.)* and *Sch. (N.)* respectively).

According to Mielke (1992a, 1995a) and Ax (1987), the erection of the genus *Eoschizopera* Wells & Rao, *Schizoperopsis* Apostolov, and of all the subgenera created by Apostolov (1982), should be refused on the basis that they probably represents paraphyla based on symplesiomorphies, while Mielke's group B (1992a :90) (*Eoschizopera*, *Schizopera* and *Schizoperopsis*), has to be interpreted as a monophylum as the hyaline spine on distal segment of the male exopodite of P3 is restricted to this group, and can be equated with the genus *Schizopera*. However, the division of the *Schizopera* species by Apostolov (1982) is at least of diagnostic value, and should be taken into account, until an apomorphy is found for each of these taxa, or the genus *Schizopera* is raised to the family level.

So far, 10 species belonging to the genus *Eoschizopera* have been described, four of them have been allocated to *Eoschizopera s. str.* (*E. (s. str.) syltensis*, *E. (s. str.) reducta*, *E. (s. str.) chiloensis* Mielke 1992a, *E. (s. str.) nicoyana* Mielke 1995a), three with *E. (Praeoschizopera)* (*E. (P.) crassipinata*, *E. (P.) gligici*, *E. (P.) indica*), and three species remain as incertae sedis (*E. (P.) marlieri*, *Sch. issykkulica* Mauyilova, *Sch. elatensis* Kahan & Bar-El). It has to be noted that Apostolov (1982) included *Schizopera indica* in *Eoschizopera (Praeoschizopera)*, but as shown by Rao & Ganapati (1969, :11, Fig.9), this species displays a three-segmented endopodite of P1, and 4 and 5 setae on female P5 BENP and EXP respectively, and should be reallocated to *Eoschizopera (s. str)* Wells & Rao.

The first species herein described from Ensenada del Pabellón lagoon, Sinaloa (Mexico), can be easily allocated to *Eoschizopera (Praeoschizopera)*, principally by the antenna with basis and two-segmented exopodite, and a two-segmented endopodite of P1. Nevertheless, the diagnosis of the subgenus given by Apostolov (1982, :39) should be amended since he stated that the species of *E. (Praeoschizopera)* should bear 4 and 6 setae on the female P5 BENP and EXP respectively, both rami being distinct, and *Eoschizopera (P.) n. sp. 1* displays 5 setae on female P5 EXP and both rami are clearly fused; and *E. (P.) crassispinata* as depicted originally by Chappuis (1954, :48, Fig. 13) bears only 3 setae on female P5 BENP.

Mielke (1995a) described, based on a single female, *?Schizopera* spec. B, which is also a representative of *Eoschizopera*. However, he was reluctant to allocate his specimen to *Eoschizopera*, given the reduced armature of female P5 BENP (with only 2 setae). Given the obvious variability so far observed within the subgenus (Chappuis, 1954, found a female specimen of *E. (P.) crassispinata* exhibiting an aberrant female P5 BENP with only 2 setae), and that the chaetotaxy of Mielke's *?Schizopera* spec. B correspond with *E. (P.) gligici*, Mielke's species should be quoted as *Eoschizopera (Praeoschizopera) spec. B* Mielke 1995.

The second species described in this section can be easily identified to *Eoschizopera* as it exhibits an antenna with basis (though ill-defined), a plesiomorphic feature recognized for the genus. Within the genus, this species seems to be intermediate between the subgenera *E. (s. str.) and E. (Praeoschizopera)*, given the unique combination of a two-segmented antennal exopodite and three-segmented endopodite of P1. For this new species I propose the creation of a new subgenus of *Eoschizopera*, and should be quoted as *Eoschizopera (N. subgen. 1) n. sp.1.*

Mielke (1995a) described *Schizopera osana* from the Pacific coast of Costa Rica. However, if Wells & Rao's (1976) and Apostolov's (1982) criteria are to be followed, it is clear that this species belongs to the genus *Eoschizopera (N. subgen. 1)*, as it does present a primitive antenna with basis and a two-segmented exopodite, and a three-segmented endopodite of P1. Therefore I suggest to reallocate this species as *Eoschizopera (N. subgen. 1) osana* Mielke 1995. Additionally, in the same paper, Mielke (1995a), described a female and two male specimens quoted as *Schizopera* spec A, as he had no elements other than the morphological comparison of length of setae to allocate this species to one of the species previously known. *Schizopera* spec A showed to be closely related to *Eoschizopera (N. subgen. 1) n. sp. 1*, since both species share the same antennal structure, segmentation of endopodite of P1, setation of P2-P5, and structure of male P6, and can be therefore considered as a new species of

Eoschizopera (N. subgen. 1) and should be quoted as *Eoschizopera (N. subgen. 1) mielkei* n. sp. in honour of Dr. W. Mielke for his outstanding work on Southamerican marine harpacticoid copepods.

Among the subgenera of the genus *Eoschizopera*, *E. (s. str.)* can be regarded as the most plesiomorphic group, with a three-segmented antennnal exopodite and endopodite of P1. *E. (Praeoschizopera)* can be considered as the most apomorphic as it exhibits a two-segmented antennal exopodite and endopodite of P1, and *E. (N. subgen. 1)* represents an intermediate state between both subgenera, with a two-segmented antennal endopodite and a three-segmented endopodite of P1.

Three species are recognized to belong to the subgenus *Eoschizopera (N. subgen. 1)*: *E. (N. subgen. 1) osana* Mielke, *E. (N. subgen. 1) mielkei* n. sp. and *E. (N. subgen. 1) n. sp. 1*. Among these species it seems that *E. (N. subgen. 1) mielkei* and *E. (N. subgen. 1) n. sp. 1* are the most plesiomorphic species as can be seen from: (i) the chaetotaxy of the exopodite of P2-P4 (0.1.022 for *E. (N. subgen. 1) mielkei* and *E. (N. subgen. 1) n. sp. 1*, and 0.0.022 for *E. (N. subgen. 1) osana*); and (ii) the number of setae on the female exopodite of P5 (6 for *E. (N. subgen. 1) mielkei* and *E. (N. subgen. 1) n. sp. 1*, and 5-6 for *E. (N. subgen. 1) osana*).

GENUS *Pseudostenhelia* Wells 1967

Pseudostenhelia wellsi Coull & Fleeger 1977 (Figs. 190-197)

Original description: *Pseudostenhelia wellsi* n. sp. Coull & Fleeger 1977, :332-337, Fig. 1-3, Table I.

Distribution: Mexico: South-eastern Gulf of California (present study); U. S. A.: South Carolina (Coull & Fleeger, 1977), Louisiana (Chandler & Fleeger, 1983, 1984; Fleeger *et al.*, 1984; Sun & Fleeger, 1991).

Material examined:

SEX	STAGE	# IND.	STORED AS	# CATALOGUE	STATION	DEPTH	DATE
?	CII	1	Alc.	EMUCOP-569-C	10	0-3 cm	23/JUN/91
?	CII	3	Alc.	EMUCOP-581-E	10	0-3 cm	23/JUN/91
?	CII	2	Alc.	EMUCOP-202-B	9	0-3 cm	30/APR/91
?	CIII	5	Alc.	EMUCOP-570-C	10	0-3 cm	23/JUN/91
?	CIII	1	Alc.	EMUCOP-475-F	3	3-6 cm	02/MAY/91
?	CIII	1	Alc.	EMUCOP-786-F	10	3-6 cm	30/APR/91
?	CIII	2	Alc.	EMUCOP-797-D	13	0-3 cm	24/JUN/91
?	CIII	2	Alc.	EMUCOP-203-B	9	0-3 cm	30/APR/91
?	CIII	1	Alc.	EMUCOP-72-B	8	0-3 cm	23/JUN/91
?	CIV	1	Alc.	EMUCOP-293-B	12	0-3 cm	23/JUN/91
?	CIV	1	Alc.	EMUCOP-113-A	2	0-3 cm	01/MAY/91
F	A	1	Alc.	EMUCOP-191-B	9	0-3 cm	30/APR/91
F	A	1	Alc.	EMUCOP-562-A	10	3-6 cm	23/JUN/91
F	A	8	Alc.	EMUCOP-567-C	10	0-3 cm	23/JUN/91
F	A	2	Alc.	EMUCOP-186-A	9	0-3 cm	30/APR/91
F	A	2	Alc.	EMUCOP-400-G	7	0-3 cm	30/MAR/92
F	A	2	Alc.	EMUCOP-577-D	10	0-3 cm	23/JUN/91
F	A	25	Alc.	EMUCOP-607-B	10	0-3 cm	30/APR/91
F	A	1	Alc.	EMUCOP-474-F	3	3-6 cm	02/MAY/91
F	A	1	Alc.	EMUCOP-373-B	11	0-3 cm	30/APR/91
F	A	6	Alc.	EMUCOP-793-D	13	0-3 cm	24/JUN/91
F	A	1	Alc.	EMUCOP-629-D	10	0-3 cm	30/APR/91
F	A	17	Alc.	EMUCOP-621-C	10	0-3 cm	30/APR/91
F	A	3	Alc.	EMUCOP-368-A	11	0-3 cm	30/APR/91
F	A	1	Alc.	EMUCOP-121-B	2	0-3 cm	01/MAY/91

F	A	1	Alc.	EMUCOP-798-E	13	0-3 cm	24/JUN/91
F	A	2	Alc.	EMUCOP-331-O	12	6-9 cm	23/JUN/91
F	A	2	Alc.	EMUCOP-92-C	8	0-3 cm	03/JAN/92
F	A	1	Alc.	EMUCOP-27-C1	8	0-3 cm	02/MAY/92
F	A	1	Alc.	EMUCOP-28-A1	8	0-3 cm	02/MAY/92
F	A	1	Alc.	EMUCOP-770-I	10	0-3 cm	23/JUN/91
F	A	1	Alc.	EMUCOP-66-A	8	0-3 cm	23/JUN/91
F	A	1	Diss.	EMUCOP-90-B	8	0-3 cm	03/JAN/92
F	A	1	Diss.	EMUCOP-33-A	8	0-3 cm	30/MAR/92
F	A	1	Diss.	EMUCOP-133-B	2	0-3 cm	01/MAY/91
F	A	1	Diss.	EMUCOP-291-B	12	0-3 cm	23/JUN/91
F	A	1	Diss.	EMUCOP-88-A	8	0-3 cm	03/JAN/92
F	A	1	Diss.	EMUCOP-91-B	8	0-3 cm	03/JAN/92
F	A	1	Diss.	EMUCOP-184-B	2	3-6 cm	30/MAR/92
F	A	1	Diss.	EMUCOP-367-A	11	0-3 cm	30/APR/91
F	A	1	Diss.	EMUCOP-185-A	9	0-3 cm	30/APR/91
F	A	1	Diss.	EMUCOP-190-B	9	0-3 cm	30/APR/91
F	CIV	1	Alc.	EMUCOP-393-E	7	0-3 cm	30/MAR/92
F	CIV	2	Alc.	EMUCOP-771-I	10	0-3 cm	23/JUN/91
F	CIV	3	Alc.	EMUCOP-796-D	13	0-3 cm	24/JUN/91
F	CV	1	Alc.	EMUCOP-795-D	13	0-3 cm	24/JUN/91
F	CV	1	Alc.	EMUCOP-610-B	10	0-3 cm	30/APR/91
F	CV	3	Alc.	EMUCOP-622-C	10	0-3 cm	30/APR/91
F	CV	1	Alc.	EMUCOP-799-E	13	0-3 cm	24/JUN/91
F	CV	1	Alc.	EMUCOP-302-F	12	0-3 cm	23/JUN/91
F	CV	1	Alc.	EMUCOP-369-A	11	0-3 cm	30/APR/91
Inter.*	A	1	Diss.	EMUCOP-118-A	2	0-3 cm	01/MAY/91
M	A	2	Alc.	EMUCOP-568-C	10	0-3 cm	23/JUN/91
M	A	3	Alc.	EMUCOP-624-C	10	0-3 cm	30/APR/91
M	A	2	Alc.	EMUCOP-794-D	13	0-3 cm	24/JUN/91
M	A	7	Alc.	EMUCOP-608-B	10	0-3 cm	30/APR/91
M	A	1	Alc.	EMUCOP-292-B	12	0-3 cm	23/JUN/91
M	A	1	Alc.	EMUCOP-303-F	12	0-3 cm	23/JUN/91
M	A	2	Alc.	EMUCOP-784-E	10	0-3 cm	30/APR/91
M	A	1	Diss.	EMUCOP-19-A-(I-VI)	8	0-3 cm	02/MAY/92
M	A	1	Diss.	EMUCOP-246-B	9	0-3 cm	03/JAN/92
M	CIII	1	Alc.	EMUCOP-626-C	10	0-3 cm	30/APR/91
M	CIV	1	Alc.	EMUCOP-563-A	10	3-6 cm	23/JUN/91
M	CIV	1	Alc.	EMUCOP-571-C	10	0-3 cm	23/JUN/91
M	CIV	7	Alc.	EMUCOP-609-B	10	0-3 cm	30/APR/91
M	CIV	2	Alc.	EMUCOP-623-C	10	0-3 cm	30/APR/91
M	CIV	1	Alc.	EMUCOP-791-C	13	0-3 cm	24/JUN/91
M	CV	1	Alc.	EMUCOP-628-D	10	0-3 cm	30/APR/91
M	CV	1	Alc.	EMUCOP-625-C	10	0-3 cm	30/APR/91
M	CV	1	Alc.	EMUCOP-73-B	8	0-3 cm	23/JUN/91

* Intersexual

Female

Habitus (Fig. 190a, 190b), ranging from 482 to 596 μm from tip of rostrum to posterior edge of caudal rami; gradually tapering posteriorly; with maximum width about the middle of cephalothorax, the latter nearly as large as 1/3 of body length. Rostrum (Fig. 192a) set off, triangular, with trifid apex and a pair of sensory sensilla. First three pedigerous somites smooth, except for short median transverse row of minute spinules on third somite. First urosomite with some transverse rows of spinules, with additional row of small spinules near posterior edge. Genital double-somite (Fig. 190a, 190b, 191) with suture

represented by a chitinous strip dorsolaterally; with some transverse rows of spinules on dorsal surface of genital somites close to suture and posterior margin of second genital somite; ventrally plain, with two unconnected and highly chitinized lateral parts. Fourth urosomal somite with 2 median rows of spinules dorsally, and 2 rows of longer elements near posterior margin dorsolaterally. Fifth urosomal somite smooth except for some transverse rows of spinules; ventrally with long spinules close to posterior margin. Anal somite with spinules close to articulation with caudal rami; anal operculum "lancet-like", furnished with minute fringing elements on posterior margin; ventrally with long spinules along posterior edge. Caudal rami about 3 times as long as broad, with 7 smooth elements, except for outer and inner terminal setae.

Antennule (Fig. 192b), five-segmented; segments smooth except for two rows of spinules on first one; third segment about twice as long as wide; fourth segment narrow; all setae smooth except for one feathered element on ultimate segment.

Antenna (Fig. 192c), typically with allobasis. Latter ornamented with rows of long spinules near base of exopodite and articulation with coxa, with one inner smooth seta. Second endopodal segment with inner row of long spinules, 2 subdistal flagelate spines and a small element (arrow in Fig. 192c); with 7 distal elements. Exopodite three-segmented; first segment with row of strong spinules and 1 seta, second segment with 1 seta, third segment with 1 subdistal and 3 distal elements; all elements bipinnate and with thickened proximal part.

Mandible (Fig. 192d): biting edge with strong teeth and a smooth seta; coxa-basis elongate with surface rows of spinules and three terminal setae. Endopodite with 2 inner and 6 terminal setae (2 confluent at base). Exopodite with 1 proximal, 1 subdistal and 2 terminal elements. All elements smooth except for one of the confluent terminal setae of endopodite.

Maxillule (Fig. 192e): praecoxal arthrite with two surface setae, 6 terminal strong curved spines and 2 innermost "brush-like" elements; coxa small with three terminal setae; basis massive, with 7 elements. Exopodite and endopodite confluent at base, with two and four elements respectively. All elements smooth except for 1 arising in coxa and 1 in exopodite.

Maxilla (Fig. 192f): syncoxa with 2 endites, bearing 3 setae each; basis with strong terminal claw armed with fine spinules, with 3 accompanying setae. Endopodite with 3 setae.

Maxilliped (Fig. 192g): basis with some spinules and 2 distal setae. First endopodal segment with 2 outer rows of spinules and 2 terminal setae; second segment small with 2 accompanying setae and a smooth slender distal claw. All elements smooth except for bipinnate element on basis.

P1 (Fig. 193a): coxa with row of spinules near inner edge and close to articulation with basis, the latter with long geniculate outer and inner seta, each with spinules at base and between rami. Exopodite three- endopodite two-segmented, both rami of about the same length. Chaetotaxy as in Table 25.

P2-P4 (Fig. 193b, 193c, 194a): praecoxa smooth; coxa with transverse row of outward spinules; basis with long and smooth outer seta, with inner distal corner acutely produced, with some spinules close to joint with endopodite. Exopodite three-segmented; of P2 and P3 slightly longer than endopodite, of P4 little more than two times longer than endopodite, the latter two-segmented. Chaetotaxy as in Table 25.

P5 (Fig. 194b): baseoendopodite with 1 proximal setulose element, 1 subapical and 2 apical setae. Exopodite large, with 6 setae.

Male

Habitus (Fig. 195a, 195b, 196a): length ranging from 372 to 450 μm, including tip of rostrum and caudal rami. General dorsal shape as in female, except for genital double-somite and P5. First to sixth urosomites plain ventrally, except for long spinules close to posterior edge of third to sixth somite. Anal segment and caudal rami as in female.

Antennule (Fig. 196b), six-segmented, haplocer; surface of segments smooth except for first segment with row of spinules. All setae smooth except for 2 bipinnate elements on fourth and ultimate segment.

Mouth parts (not illustrated) as in female.

P1 (Fig. 197a), as in female, though smaller. With dimorphic inner seta of ENP 1 and outer spines of exopodite.

P2 (Fig. 197b), as in female, except for second endopodal segment with outer distal corner acutely produced reaching end of third exopodal segment (see also Fig. 197h).

P3 (Fig. 197c), as in female, except for dimorphic inner spine of ENP 2.

P4 (Fig. 197d), as in female, except for inner seta of ENP 1 and EXP 2-3, and outer apophysis of EXP 2 (Fig. 197e).

P5-P6 (Fig. 197f, 197g), resembles one each other; with only two smooth setae.

Comparison and discussion:

Since the creation of the genus *Pseudostenhelia* Wells 1967, to allocate *P. prima* from Mozambique, two species have been added: *P. secunda* Wells 1971, from the Vellar river near Porto Novo, Madras State (India), and *P. wellsi* Coull & Fleeger 1977, from an intertidal zone of mud flats associated with *Spartina alterniflora* marshes in North Inlet, Georgetown (South Carolina). Although the former description of *P. secunda* was based only on male specimens and the female remained unknown for more than a decade, Ranga Reddy (1984) provided a more detailed description of both male and female from Lake Kolleru, east coast of India.

The three known species of *Pseudostenhelia* have been found to constitute part of the meiobenthic communities in localities characterized by brackish conditions and organic enriched substrates (Wells, 1967, 1971; Coull & Fleeger, 1977; Chandler & Fleeger, 1983, 1984; Fleeger *et al.*, 1984; Sun & Fleeger, 1991). Noteworthy, Ranga Reddy (1984) gathered some specimens of *P. secunda* from surface and subsurface plankton samples from a predominantly freshwater lake.

In the present study, *P. wellsi* was found to constitute a relatively important part of the meiobenthic community in muddy organic enriched sediments.

Although the Mexican specimens clearly belong to *P. wellsi*, some disagreement was found when compared with the illustrations presented by Coull & Fleeger (1977). In order to verify such differences, the type material (Holotype USNM-168183 and paratypes USNM-168184) was borrowed from the United States Natural History Museum.

After detailed analysis, it was concluded that the Mexican specimens are identical to those from which Coull & Fleeger (1977) based their description. It has to be noted that Wells (1967) mixed up P3 and P4 both in his description of *P. prima* (:270, Fig. 42 C, D) and in the setal formula (: 272). This error was kept and presented also by Coull & Fleeger (1977, :335, Table I) and Ranga Reddy (1984, :155, Table I). Therefore it was necessary the redescription of *P. wellsi* and amendment of the tables presented by the above mentioned authors (Table 26).

Table 26. Comparison between the description of *Pseudostenhelia wellsi* after Coull & Fleeger (1977), and the herein presented observations, and amendment of the tables presented by Wells (1967), Coull & Fleeger (1977) and Ranga Reddy (1984), with additional data on antennal and maxillar chaetotaxy.

Pseudostenhelia wellsi	Coull & Fleeger 1977	Present redescription
Antenna	Second endopodal segment with five terminal and two inner setae; allobasis without seta.	Second endopodal segment with seven distal elements, and three inner flagelate spines; allobasis with one smooth seta.
Mandibule	Coxa basis without, endopodite with six setae.	Coxa basis with three apical setae, endopodite with seven elements.
Maxillule	Syncoxa with three endites.	Syncoxa with two endites.
Maxilliped	Basis with one seta; first segment with one element; second segment with one accompanying seta.	Basis with two setae; first segment with two elements; second segment with two accompanying setae.
P1 female	Outermost element on third exopodal segment spiniform; element on first endopodal segment ornamented with fine setules.	Outermost element on third exopodal segment seta-like; element on first endopodal segment ornamented with long spinules.
P2 female	Outermost apical element of third exopodal segment seta-like.	Outermost apical element of third exopodal segment spiniform.
P4 female	Third exopodal segment with two outer spines, three	Third exopodal segment with three outer spines,

	apical setae and two inner elements.	two apical setae and two inner elements.
P5 female	Baseoendopodite with two groups of setae, with two elements each.	Baseoendopodite with three groups of setae, the first two gropus composed by a single seta each, the second group by two elements.
P1 male	No differences were observed between males and females	Some slight differences were observed between males and females.
P3 male	No sexual dimorphism was observed in endopodite.	Sexual dimorphism was observed in endopodite.
P4 male	No sexual dimorphism was observed in exopodite.	Sexual dimorphism was observed in exopodite.
Caudal rami	With five elements in all.	With seven elements in all.

		P. prima	*P. secunda*	*P. wellsi*
	Antennal exopodite	1-1-3	1-1-3	1-1-4
	Maxilla	three endites	three endites	two endites
P1	EXP	0-1-1,2,1	0-1-1,2,1	1-1-1,2,1
	ENP	1-1,1,1	1-1,1,1	1-1,1,1
P2 female	EXP	0-0-2,2,2	0-0-1,2,2	0-1-2,2,2
	ENP	0-1,2,1	1-1,2,1	0-1,2,1
P2 male	EXP	0.0.222	0.0.122	0.1.222
	ENP	0.120	1.120	0.120
P3 female	EXP	0.0.232	0.0.222	0.1.232
	ENP	1.221	1.221	0.221
P3 male	EXP	0.0.232	0.0.222	0.1.232
	ENP	1.220	1.221	0.221
P4 female	EXP	0.1.222	0.0.222	0.1.223
	ENP	1.221	1.221	1.221
P4 male	EXP	0.1.222	0.0.122	0.1.223
	ENP	1.221	1.221	1.221

P5 female	EXP	6	6	6
	ENP	2	4	4
P5 male		3	3	3
P6 male		2	2	2

It is interesting to point out the presence of one intersexual individual. This phenomenon is rare in harpacticoids. To my knowledge, it has only been observed twice: in a single specimen of *Amphiascoides debilis* Giesbrecht (Klie, 1944) and in 28 out of 30 specimens of *Paramphiascella hyperborea* T. Scott, and some specimens of *Stenhelia gibba* Boeck and *Halectinosoma similidistinctum* Lang (Moore & Stevenson, 1991). The massive occurrence of intersexuality could be due, as sugggested by Moore & Stevenson (1991) to pollution and probably by parasitism. Pollution as the causal agent of intersexuality, could be also the most possible hypothesis to explain the occurrence of this phenomenon in Ensenada del Pabellón lagoon, as this system is subject to agro-industrial sewage discharges.

GENUS *N. gen. 1*

Diagnosis

Diosaccidae. Body with marked division between prosome and urosome. P1 bearing-somite fused to cephalosome. Rostrum set off, triangular, with rounded tip. Exopodite of female P5 and P6 visible from dorsal view. Genital double-somite completely fused. Fifth urosomite with bulging hyaline caudal frill, thus forming a pseudoperculum. Caudal rami twice as long as broad, with principal setae fused at base, outer principal seta swollen at base. Female antennule five-segmented, with aesthetasc on third segment. Antenna with allobasis and bearing a slender abexopodal seta, exopodite one-segmented with 2 setae. Mandible with one-segmented exopodite and endopodite. Maxillule with one-segmented exopodite and endopodite. Maxilla with 2 endites, basis with strong claw, without endopodite. Maxilliped small, *Stenhelia*-like. Exopodite of P1-P4 three-segmented. Endopodite of P1 and P2 two-segmented, of P3 and P4 three-segmented. Chaetotaxy of swimming legs as in Table 27. Female P6 represented by 2 setae arising dorsolaterally from sclerotized area, resembling Stenhelia (Delavalia) n. sp. 1 (described in the present study). Dimorphism: male genital somites not fused; male antennule subchirocer, seven-segmented; basis of male P1 with dimorphic inner knob, *Robertsonia*-like, P2 ENP (*Robertsonia*-like); male P5 (with discrete pair of legs and rami in female, both baseoendopodites and rami fused in male).

Type species

Diosaccidae N. gen. 1 n. sp. 1, by monotypy.

N. gen. 1 n. sp. 1
(Figs. 198-204)

Material examined:

SEX	STAGE	# IND.	STORED AS	# CATALOGUE	STATION	DEPTH	DATE
F	A	1	Diss.	EMUCOP-230-A	9	0-3 cm	03/JAN/92
M	A	1	Diss.	EMUCOP-231-A	9	0-3 cm	03/JAN/92
F	A	1	Alc.	EMUCOP-256-B	9	0-3 cm	03/JAN/92
M	A	1	Alc.	EMUCOP-255-B	9	0-3 cm	03/JAN/92

Female

Habitus (Fig. 198, 199, 200a, 200b): length, 468 µm including rostrum and caudal rami; maximum width in posterior margin of cephalothorax; tapering from first to third prosomite, and from third urosomite to caudal rami; ornamented with minute pustules evenly distributed. Rostrum (Fig. 201a), set off, triangular, with subapical sensillae at both sides on distal half. Surface of cephalothorax, prosomites and first urosomite, smooth. Exopodite of P5 located rather laterally, resembling the genus

Stenhelia. Genital double segment completely fused; from dorsal view two small setae (P6) arising from distinct protuberance laterally can be seen in proximal third, resembling *Stenhelia* and *Pseudostenhelia*; second genital somite with caudal hyaline frill finely dentated and set of long spinules laterally; ventrally plain except for genital field as in Fig. 199, 200a, 200b. Fourth and fifth urosomites smooth, except for ventral row of long spinules close to caudal margin; hyaline frill of fifth urosomite bulging dorsally thus forming a pseudoperculum, of fourth urosomite normal. Anal segment about three times broader than long, ornamented with small lateroventral spinules close to caudal rami, the latter about twice as long as broad, with 7 setae/spines, principal setae fused at base, outer one swollen at base and short.

Antennule (Fig. 201b), five-segmented; surface of segments smooth except for 1 median and 1 distal row of spinules on first segment, fourth segment narrow, all setae smooth, with aesthetasc on third segment.

Antenna (Fig. 201c): with allobasis bearing slender abexopodal seta arising in distal third. Exopodite one-segmented, with 1 lateral and 1 distal setae; ornamented with spinules apically. Endopodal segment with proximal and subdistal set of spinules on inner margin and with 2 spines; distally with only 5 spines/setae.

Mandible (Fig. 201d): with elongated gnathobase. The only armature observed distally on gnathobase were some small spinules arranged into two longitudinal short sets and a serrated chewing edge. Basis with 3 apical setae. Exopodite small, one-segmented, with 1 lateral and 3 distal setae. Endopodite about twice as long as exopodite; with 2 lateral, 3 subdistal and 3 apical setae.

Maxillule (Fig. 201e): arthrite compact, ornamented with long spinles, armed with a massive structure armed with long spinules and 6 spines, with 2 surface setae; coxa with 2, basis with 6 setae. Exopodite small, one-segmented, with 2 long setae. Endopodite with 2 lateral thickened setae and 2 distal slender elements.

Maxilla (Fig. 201f): syncoxa rather long an somewhat slender, ornamented with long and fragile spinules on outer edge, with 2 endites, proximal one with 1, distal one with 3 setae; basis with strong unarmed claw and 2 accompanying setae, with a thickened seta accompanied by 2 small elements. Seemingly without endopodite.

Maxilliped (Fig. 201g): small; basis compact, with 2 strong apical spines. Endopodal segment compact, ornamented with longitudinal row of spinules along outer edge, with 2 subapical and 1 apical (claw?) strong setae. Resembling that of *Stenhelia*.

P1 (Fig. 202a): praecoxa smooth; coxa ornamented with spinules in the middle and close to outer distal corner; basis with long elements along inner edge and spinules at base of inner and outer spine and between rami. Endopodite two-segmented, of about the same length as exopodite; first segment robust, second segment proportionately small. Exopodite three-segmented, all segments of about the same size. Chaetotaxy as in Table 27.

P2 (Fig. 202b): coxa furnished as in P1; basis smooth except for slender inner elements, and outer spine. Endopodite two-segmented, reachin about the middle of third exopodal segment. Exopodite three-segmented. Chaetotaxy as in Table 27.

P3-P4 (Fig. 202c, 202d): coxa ornamented with a short row of spinules in the middle; basis smooth, with outer plumose seta. Rami three-segmented; endopodite of P3 slightly beyond second exopodal segment, of P4 shorter than EXP 1 and EXP 2 combined. Chaetotaxy as in Table 27.

P5 (Fig. 202e): rami distinct. Baseoendopodal lobe extended transversally, with 5 spines, three innermost bifurcated at tip. Exopodite rounded and small, with 5 setae. Resembling that of *Stenhelia*.

P6 (Fig. 199, 200a, 200b), represented by 2 dorsolateral small setae arising in heavily sclerotized area, resembling *Stenhelia (Delavalia) n. sp. 1*.

Male

Habitus as in female dorsally, except for genital double-somite (Fig. 203).

Anal somite and caudal rami as in female (not illustrated).

Antennule (Fig. 204a), seven-segmented, subchirocer; first segment ornamented as in female; with small spinules on fourth and fifth segment; fourth segment swollen; with aesthetasc on third and fourth segment.

P1, as in female, except for dimorphic basis with inner knob (Fig. 204b), resembling that of the genus *Robertsonia*.

P2 (Fig. 204c): protopodal components and exopodite as in female. Endopodite two-segmented; first segment as in female; second segment shorter than that of female and modified like in the genus *Robertsonia*.

P3 and P4 (not illustrated) as in female.

P5 (Fig. 204d): both BENP fused; rami fused; BENP wiith 2 elements, exopodite with 4 setae/spines.

Without P6.

Table 27. Chaetotaxy of Diosaccidae *N. gen. 1 n. sp. 1.*

	P1	P2	P3	P4
EXP	0.1.022	1.1.123	1.1.123	1.1.223
ENP	1.121	1.220	1.1.320	1.1.220

Comparison and discussion

At first glance, the identification of this species could seem tricky. Following tha last key to the families of Harpacticoida (Huys *et al.*, 1996), and given the shape and chaetotaxy of P1 and the presence of an inner seta on P2-P4 EXP 1, the Mexican specimens could belong to the familiy Argestidae, resembling *Dizahavia halophila* Por and *Odiliacletodes gracilis* Soyer, but differing in the rest of characters. I allocated the Mexican specimens into the Diosaccidae given the close resemblance to some genera belonging to this familiy. Particularly, Diosaccidae *N. gen. 1 n. sp. 1* resembles closely *Ialysus rufus* Brian 1927, both in general shape and chaetotaxy of female P1 (except for ENP 2), female P5 and male P5, antennal structure (with allobasis and one-segmented exopodite with 2 setae only), presence of an inner seta on P2-P4 EXP 1, chaetotaxy of P4 EXP, and shape of maxilla (see also Nicholls, 1944, :491, Fig. 3), but differs in shape of maxilliped and mandibular palp (uniramous in *I. rufus*, biramous in the Mexican specimens), in number of segments and location of aesthetascs of female A1 (8-segmented with aesthetasc on third and fourth segment in *I. rufus*, and 5-segmented with aesthetasc on third segment only in Diosaccidae *N. gen 1. n. sp. 1*; only the male of Diosaccidae *N. gen. 1 n. sp. 1* displays an aesthetasc on third and fourth segment of A1), segmentation of female P2 ENP (three-segmented in *I. rufus*, two-segmented in Diosaccidae *N. gen. 1 n. sp. 1*), and particularly in the dimorphism of male basis of P1 (with an inner and very long modified spine in *I. rufus*, and with a directed ovate and striated knob in Diosaccidae *N. gen. 1 n. sp.1*).

Probably, Diosaccidae *N. gen. 1 n. sp. 1* is even more related to *Tydemanella typica* A. Scott 1909, given the structure and chaetotaxy of female P1, A2 EXP one-segmented with only two setae, lateral location and general shape of female P5, and mandibular palp (biramous), but differing in segmentation of female P2 (three-segmented in *T. typica*, two-segmented in Diosaccidae *N. gen 1 n. sp. 1*), in number of segments of female A1 (eight segmented in *T. typica*, five-segmented in the Mexican species), and shape of maxillule and maxilliped. Unfortunately, this species has not been reported again since its original description, and the chaetotaxy of the swimming legs, female genital field and the male remain unknown.

The sexual dimorphism exhibited by the male of Diosaccidae *N. gen. 1 n. sp. 1*, showed to be similar to that displayed by *Robertsonia n. sp. 1* (with aesthetasc on third and fourth segment of A1), and by the genus *Robertsonia* in general (basis of P1 with inner ovate striated knob, and general shape of P2 ENP 2). On the other hand, the female of Diosaccidae *N. gen. 1 n. sp. 1* showed some resemblance to the genera *Stenhelia* and *Pseudostenhelia* regarding the maxilliped and female genital field.

GENUS *N. gen. 2*

Diagnosis

Diosaccidae. Body with marked division between prosome and urosome. P1 bearing-somite fused to cephalosome. Rostrum set off, elongated and pointed and curving downwards. Female genital double-somite with complete suture dorsally, and medially interrupted ventrally. Caudal rami broder than long. Female antennule eight-segmented, with aesthetasc on fourth segment. Antenna with allobasis and abexopodal seta; with three-segmented exopodite. Mandible and maxillule with one-segmented exopodite and endopodite. Maxilla with 3 endites, basis with strong claw, one element as strong as claw and 2 slender setae, endopodite one-segmented. Maxilliped prehensil. Female endopodite and exopodite of P1-P4 with three-segmented rami, chaetotaxy as in Table 28. Female P5

with discrete rami. Vestige female P6 with 3 setae. Dimorphism: male genital somite, male antennule (haplocer, nine-segmented), basis of male P1, P2 ENP (modified), male P5 (both legs fused medially, rami discrete), male P6 represented as a small plate with 3 setae.

Type species

Diosaccidae N. gen. 2 n. sp. 1, by monotypy.

N. gen. 2 n. sp. 1
(Figs. 205-213)

Material examined:

SEX	STAGE	# IND.	STORED AS	# CATALOGUE	STATION	DEPTH	DATE
F	A	1	Diss.	EMUCOP-493-A	4-5	0-3 cm	01/MAY/91
F	A	1	Diss.	EMUCOP-525-E	4-5	0-3 cm	01/MAY/91
F	A	1	Diss.	EMUCOP-526-E	4-5	0-3 cm	01/MAY/91
F	CV	1	Diss.	EMUCOP-548-A	4-5	0-3 cm	04/MAY/91
M	A	1	Diss.	EMUCOP-546-A	4-5	0-3 cm	04/MAY/91
M	A	1	Diss.	EMUCOP-510-D	4-5	0-3 cm	01/MAY/91
M	A	1	Diss.	EMUCOP-511-D	4-5	0-3 cm	01/MAY/91
M	A	1	Alc.	EMUCOP-547-A	4-5	0-3 cm	04/MAY/91
F	A	1	Alc.	EMUCOP-494-A	4-5	0-3 cm	01/MAY/91
M	CV	1	Alc.	EMUCOP-495-A	4-5	0-3 cm	01/MAY/91
M	CV	1	Alc.	EMUCOP-532-E	4-5	0-3 cm	01/MAY/91

Female

Habitus (Fig. 205a, 206): length ranging from 545 to 596 µm including rostrum and caudal rami, with obvious major body articulation between third pro- and first urosomite. Rostrum long, pointed and curving downwards. Prosome tapering from caudal margin of cephalothorax; urosome tapering only slightly from first urosomite to caudal rami. Surface of pro- and urosomites smooth, without ornamentation dorsally; ventrolaterally with fine spinules on caudal margin of fourth urosomite. Genital double-somite (Fig. 206) with complete suture dorsally, and medially interrupted ventrally; genital field in proximal half. Caudal rami (Fig. 205b, 206) broader than long; with 6 setae.

Antennule (Fig. 207a): eight-segmented; surface of segments smooth, except for 1 proximal and 1 distal row of small spinules on first component; all setae smooth.

Antenna (Fig. 207b): allobasis with some trace of division between basis and first endopodal segment; with abexopodal seta not reachin beyond tip of allobasis and implanted halfway of inner margin. Exopodite three-segmented; first and third segment of about the same length, second one very small; first and second segment with 1, third segment with 1 lateral and 2 apical elements and ornamented with spinules.

Mandible (Fig. 207c): praecoxa with pars incisiva and several lacinia mobilis and subdistal pinnate seta; coxa-basis bare, with 3 apical setae. Exopodite small, one-segmented, with 4 (or 5?) setae. Endopodite large with 2 lateral and 2 apical sets of setae with 3 elements each.

Maxillule (Fig. 208a): arthrite with 6 smooth and 2 pinnate distal spines and 1 subdistal seta, with 2 surface setae; coxa with 1 seta; basis with 3 supapical and 4 distal setae. Exopodite small with 2 setae. Endopodite with 4 elements.

Maxilla (Fig. 208b): syncoxa with 3 endites, proximal and middle one with 2, distal endite with 3 setae; basis with 1 strong spine accompanied by 1 strong element as long as spine and 2 slender seta. Endopodite with 5 (or 7?) setae.

Maxilliped (Fig. 208c): outer edge of basis ornamented with spinules subdistally; with 2 inner distal setae. First endopodal segment with 2 setae; second endopodal segment long and slender, with apical claw accompanied by 3 small setae.

P1 (Fig. 209a): coxa furnished with slender elements proximally close to inner edge and with spinules near joint with basis, the latter with small spinules at base of inner spine and strong spinules between rami. Rami three-segmented; exopodite reaching tip of ENP 1, but about 1.4 times longer; ENP 1 about 1.5 times longer than succeeding segments combined. Chaetotaxy as in Table 28.

P2-P4 (Fig. 209b, 209c, 210a): coxa furnished with some transverse row of spinules; basis of P2 and P3 with, of P4 seemingly without slender elements close to inner edge; of P2-P4 ornamented with small spinules at base of outer seta, with strong ones between rami, and with tiny spinules at base of endopodite. Rami three-segmented; exopodite of P2 reaching about proximal third of third endopodal segment, of P3 and P4 about distal third. Chaetotaxy as in Table 28.

P5 (Fig. 210b): baseoendopodite with 5 setae; 2 innermost elements shorter than BENP, following seta about as long as BENP, outermost but one seta about 1.5 times longer than BENP, outermost seta about the same size than innermost element; BENP reaching beyond the middle of EXP, the latter about 2 times longer than broad; with 6 setae.

P6 (Fig. 206), represented by 3 setae.

Male

Habitus (not illustrated) as in female, except for genital double-somite and ventral ornamentation of third urosomite (Fig. 211).

Antennule (Fig. 212b), nine-segmented, haplocer.

Mouth parts (not illustrated) as in female.

P1 (not illustrated) as in female, except for inner spine of basis and accompanying apophysis (Fig. 213a).

P2-P4 (not illustrated) as in female, except for two-segmented P2 ENP (Fig. 212a, 213b).

P5 (Fig. 213c): BENP of bothy legs fused forming a common plate. Each BENP with 2 elements shaped as illustrated, and smaller than BENP, the latter reaching about middle of EXP. Exopodite with 6 elements.

P6 (Fig. 213d) represented by 3 setae.

Table 28. Chaetotaxy of Diosaccidae *N. gen. 2 n. sp. 1.*

	P1	P2	P3	P4
EXP	0.0.122	0.1.223	0.1.223	0.1.323
ENP	1.1.111	1.2.121	1.1.221	1.1.121

Comparison and discussion

The new genus herein described showed to share several features with other genera. At first glance, and following Lang's key to the genera of Diosaccidae (1965, : 227-228) and Hamond's key to the species of *Robertgurneya* (1973b, :75, Table 1), the Mexican specimens described in this section could be identified to to *Robertgurneya diversa* Lang, with which seems to be related. However, Diosaccidae *N. gen. 2 n. sp. 1* differs from *R. diversa* and showed to be more closely related to *Bulbamphiascus cibimae* Pallares, 1982, by the chaetotaxy of P1-P4 (except for lack of armature on P2-P4 EXP 1 in the case of Diosaccidae *N. gen. 2 n. sp. 1*) and shape/chaetotaxy of female P5. On the other hand, the male P5 resembles more that of the genus *Bulbamphiascus* than *Robertgurneya*. Given the resemblance of both the Mexican Diosaccidae *N. gen. 2 n. sp. 1* and the Argentinian *Bulbamphiascus cibimae* and their distribution, and the notorious differences in chaetotaxy of P2-P4 between *B. cibimae* and the rest of species of *Bulbamphiascus*, these two species should be united into the same genus, as Diosaccidae *N gen 2 cibimae* Pallares 1982 *comb. nov.* and Diosaccidae *N. gen. 2 n. sp. 1*, wich additionally could be related to the genus *Robertsonia* given the chaetotaxy of P2-P4 EXP 3.

FAMILY AMEIRIDAE Monard 1928 (part.), Lang 1936c

SUBFAMILY AMEIRINAE Lang 1944

GENUS *Ameira* Boeck 1865

Ameira parvula f. *nana* Willey 1935
(Figs. 214-220)

Original description: *Ameira parvula* f. *nana* Willey, 1935, : 52.

Distribution: Bermuda (Willey, 1935); France: Marseille (Dinet, 1971); Mexico: Souht-eastern Gulf of California (present study).

Material examined:

SEX	STAGE	# IND.	STORED AS	# CATALOGUE	STATION	DEPTH	DATE
M	A	1	Alc.	EMUCOP-636-B	6	0-3 cm	01/MAY/91
F	A	1	Diss.	EMUCOP-645-C	6	3-6 cm	01/MAY/91
F	A	1	Diss.	EMUCOP-983-C	6	3-6 cm	01/MAY/91
M	A	1	Diss.	EMUCOP-662-E	6	0-3 cm	01/MAY/91

Comparison and discussion:

Willey (1935) gave a very brief description of *A. parvula* f. *nana*, along with another subspecies quoted as *A. parvula* f. *simpliciseta* from Bermuda. Later, Dinet (1971) reported and redescribed *A. parvula* f. *nana* from Marseille. The only differences found between Dinet's and the Mexican specimens concern the relative length of the outermost seta of female P5 BENP and innermost seta of EXP compared with the outermost but one seta of BENP, and the state and chaetotaxy of the mandibular palp (".... réduit, d'une seule pièce, et porte trois soies distales, une soie subterminale et une soie externe" in Dinet's specimens, and with basis bearing 2 setae, and a clearly separated endopodite with 1 lateral and 4 distal setae in the Mexican representatives).

Dinet (1971) depicted ".... deux soies au niveau d'insertion de l'EXP" of A2. These "setae" have been observed also in the Mexican specimens but are not a pair of setae but a pair of fine setules.

Ameira parvuloides Lang 1965
(Figs. 221-227)

Original description: *Ameira parvuloides* n. sp. Lang 1965, :347-352, Fig. 189-191.

Distribution: Mexico: South-eastern Gulf of California (present study); U. S. A.: Monterey Bay (California) (Lang, 1965).

Material examined:

SEX	STAGE	# IND.	STORED AS	# CATALOGUE	STATION	DEPTH	DATE
M	A	1	Diss.	EMUCOP-804-I	3	6-9 cm	02/MAY/91
F	A	1	Diss.	EMUCOP-337-P	12	3-6 cm	23/JUN/91
F	A	1	Diss.	EMUCOP-317-K	12	0-3 cm	23/JUN/91

The Mexican specimens agree completely with Lang's original description Therefore, only the drawings are presented in this study.

GENUS *Psyllocamptus* T. Scott 1899

SUBGENUS *Psyllocamptus* Kunz 1975

Psyllocamptus (P.) n. sp. 1
(Figs. 228-236)

Material examined:

SEX	STAGE	# IND.	STORED AS	# CATALOGUE	STATION	DEPTH	DATE
M	A	1	Diss.	EMUCOP-661-E	6	0-3 cm	01/MAY/91
F	A	1	Alc.	EMUCOP-489-H	3	6-9 cm	02/MAY/91
F	A	1	Alc.	EMUCOP-744-D	14	0-3 cm	03/JAN/92
F	A	1	Diss.	EMUCOP-545-A	4-5	0-3 cm	04/MAY/91
F	A	1	Diss.	EMUCOP-756-F	14	0-3 cm	03/JAN/92
F	A	1	Diss.	EMUCOP-760-G	14	0-3 cm	03/JAN/92
F	A	1	Diss.	EMUCOP-339-Q	12	0-3 cm	23/JUN/91

Female

Habitus (Fig. 228), subcylindrical, slightly tapering from caudal margin of cephalothorax to caudal rami. Length, rostrum and caudal rami included, from 308 to 380 µm. Rostrum very small, lancet-like. Surface of cephalothorax and prosomites and first urosomite smooth, with hyaline frill. Genital double-somite (Fig. 229a, 229b) divided dorsolaterally, fused ventrally; dorsal surface smooth, ventrally with 2 sets of spinules close to caudal edge and near P6, the latter represented by 2 setae; genital field as in Fig. 229b. Dorsally and ventrally with dentated hyaline frill. Fourth and fifth urosomite smooth dorsally, with median row of spinules ventrally. Anal segment squarish; smooth dorsally; ventrally with transverse row of small spinules on anterior third. With small spinules along joint with caudal rami, the latter sligthly longer than wide, with 6 setae, and ornamented with some spinules on inner and outer distal corner ventrally. Anal operculum almost squarish and ornamented with minutes denticles along caudal margin.

Antennule (Fig. 230a): eight-segmented; with row of long spinules only on first segment; typically with aesthetasc on fourth and ultimate segment.

Antenna (Fig. 230b): with basis. Exopodite one-segmented, with 2 setae. First endopodal segment bare, second one ornamented with spinules along inner margin, with 2 inner and 6 apical elements.

Mandible (Fig. 230c): gnathobasis armed distally with pars incisiva, several lacinia and 1 seta; basis with 2 apical setae. Endopodite small, one-segmented, with 1 lateral and 3 distal setae.

Maxillule (Fig. 230d): arthrite rather elongated, ornamented with ventral row of spinules and 2 stronger elements, with 2 apical spines and 1 small seta, with 2 surface elements. Coxa-basis with 2 setae. Exopodite represented by single minute segment with 1, endopodite with 4 distal setae.

Maxilla (Fig. 230e): Syncoxa with 2 endites, each with 2 setae; elements of proximal endite as in Fig. 230e.

Maxilliped (Fig. 230f): basis ornamented with several transverse rows of small spinules and armed with 1 distal seta. First endopodal segment furnished with longitudinal row of tiny spinules along inner margin and longer elements on outer distal corner; second segment with strong claw and accompanying seta.

P1 (Fig. 231a): praecoxa furnished with row of spinules close to joint with coxa, the latter with 1 oblique row of spinules close to outer distal corner; basis with stout spinules at base of inner spine, outer seta and between rami. Exopodite three-segmented, reaching proximal third of second endopodal segment. Endopodite two-segmented, first segment about twice as long as second one. Chaetotaxy as in Table 29.

P2 (Fig. 231b): praecoxa as in P1; coxa with transverse row of small spinules in the middle, and set of spinules on posterior face; basis with long setules on inner distal corner and stout spinules at base of outer seta. Rami three-segmented. Endopodite reaching distal third of second exopodal segment; first segment typically dwarfed. Chaetotaxy as in Table 29.

P3-P4 (Fig. 231c, 232a): praecoxa as in preceding legs; coxa with transverse row of spinules located rather close to inner distal corner, with set of spinules in the middle close to outer edge; basis

with strong spinules at base of outer seta. Rami as in P2. Endopodite of P2 reaching the middle of second exopodal segment, of P4 reaching the proximal third. Chaetotaxy as in Table 29.

P5 (Fig. 232b): baseoendopodite not reaching tip of exopodite; with 4 setae/spines. Exopodite with 4 setae and 1 obvious tubular pore midway of base and outermost seta.

Male

Habitus as in female, except for genital double-somite (Fig. 233). Length, 403 μm including rostrum and caudal rami; ventrally with spinules along caudal edge of third to fifth urosomites. Anal segment and caudal rami as in female.

Antennule (Fig. 234), haplocer, eight-segmented; with aesthetasc on fourth and ultimate component.

Antenna, mandible, maxillule, maxilla and maxilliped (not illustrated) as in female.

P1 as in female, except for basis with modified outer spine (Fig. 235a).

P2 and P4 (not illustrated), as in female.

P3 as in female, except for dimorphic third endopodal segment (Fig. 235b).

P5 (Fig. 236a): both baseoendopodites fused, each with 2 strong inner spines and 2 outer setae, outermost very small. Exopodite with 4 setae and an obvious tubular pore between two outermost setae.

P6 (Fig. 236b): represented by 2 plates with 1 long setae, flanked by 2 minute elements (spinules?).

Table 29. Chaetotaxy of *Psyllocamptus (P.) n. sp. 1.*

	P1	P2	P3	P4
EXP	0.0.023	0.0.023	0.0.023	0.0.223
ENP	1.111	0.0.111	0.0.111	0.0.111

Comparison and discussion

Psyllocamptus (P.) n. sp. from Ensenada del Pabellón lagoon showed to be closely related to *P. (P.) bermudae* Willey 1930, by the chaetotaxy of P2-P4 and female P5. However, *P. (P.) n. sp. 1* can be differentiated from *P. (P.) bermudae* by the chatetotaxy of male P5 EXP, with 4 setae in *P. (P.) bermudae* and 5 setae in *P. (P.) n. sp. 1*. Unfortunately the description of Willey (1930) is rather brief and incomplete and no further comparisons can be made.

FAMILY Paramesochridae Lang 1944

SUBFAMILY Paramesochrinae Huys 1987

GENUS *Apodopsyllus* Kunz 1962

Apodopsyllus vermiculiformis Lang 1965
(Fig. 237)

Original description: *Apodopsyllus vermiculiformis* n. sp. Lang 1965, :383-386, Fig. 210-211.

Distribution: Canada: Nanaimo (British Columbia) (Coull & Hogue, 1978); Mexico: South-eastern Gulf of California (present study); U. S. A.: Monterey Bay, Point Pinos (California) (Lang, 1965).

Material examined:

SEX	STAGE	# IND.	STORED AS	# CATALOGUE	STATION	DEPTH	DATE
F	A	3	Alc.	EMUCOP-423-C	1	3-6 cm	02/MAY/91
F	A	1	Alc.	EMUCOP-988-F	6	3-6 cm	22/JUN/91
F	A	1	Alc.	EMUCOP-422-B	1	6-9 cm	02/MAY/91
F	A	1	Diss.	EMUCOP-984-B	1	6-9 cm	02/MAY/91
M	A	7	Alc.	EMUCOP-986-B	1	3-6 cm	02/MAY/91
M	A	2	Alc.	EMUCOP-987-C	1	3-6 cm	02/MAY/91
M	A	1	Alc.	EMUCOP-728-C	14	6-9 cm	03/JAN/92
M	A	2	Alc.	EMUCOP-725-F	6	3-6 cm	22/JUN/91
M	A	2	Alc.	EMUCOP-720-D	6	6-9 cm	22/JUN/91
M	A	1	Alc.	EMUCOP-717-C	6	3-6 cm	22/JUN/91
M	A	1	Diss.	EMUCOP-985-B	1	6-9 cm	02/MAY/91

Comparison and discussion

The Mexican representatives agree completely with Lang's original description (1965) except for A2 EXP and A1. These two appendages have been amended by Coull & Hogue (1978), with which my specimens agree completely.

Apodopsyllus n. sp. 1
(Figs. 238-240)

Material examined:

SEX	STAGE	# IND.	STORED AS	# CATALOGUE	STATION	DEPTH	DATE
F	A	1	Diss.	EMUCOP-988-A	7	0-3 cm	03/JAN/92
F	A	1	Diss.	EMUCOP-990-D	6	6-9 cm	22/JUN/91
F	A	1	Alc.	EMUCOP-729-D	14	0-3 cm	03/JAN/92
F	A	1	Alc.	EMUCOP-730-F	14	6-9 cm	03/JAN/92
M	A	2	Alc.	EMUCOP-726-A	14	3-6 cm	03/JAN/92

Female

Habitus (Fig. 238a): length from tip of rostrum to caudal rami: from 261 to 326 µm; body slender; rostrum very small; surface of cephalothorax smooth; prosomites with plate-like structures. Dorsal surface of first urosomite smooth, with plate-like structures as in preceding somite. Genital double-somite (Fig. 238b) fused completely; with 2 dorsolateral plates; smooth dorsally; and with with P6 represented by 2 slender setae ventrally. Fourth and fifth urosomite as pcededing somite dorsally; pitted ventrally and seeminlgy with longitudinal remaining of division of plate-like structures in the middle. Anal segment seemingly without plate-like structures; dorsally smooth and pitted ventrally. Caudal rami about 3 times as long as broad, with a pointed end; with 6 setae.

Antennule (Fig. 239a), seven-segmented; with some small spinules only on first segment; with aesthetasc on fourth and ultimate segment.

Antenna (Fig. 239b): with unarmed basis. Exopodite one-segmented; with 1 normal and 1 bifid seta, and 2 bifid distal setae.

Md, Mxl, Mx and Mxp, unknown.

P1 (Fig. 240a): coxa bare; basis with inner seta and some spinules on outer edge. Exopodite two-segmented; first segment with 1 long seta; second segment with 4 setae in all. Endopodite two-segmented, about 1.8 times as long as entire exopodite; with 2 setae of different length.

P2-P4 (Fig. 240b, 240c, 240d): coxa and basis distinct, the former small; basis of P2 and P3 with outer slender and long seta, of P4 with additional inner tiny seta. Exopodite three-segmented; first and second segment with an outer spine on distal corner; distal inner corner of second segment with some spinules (acute projection?); third segment with 2 outer spines.

P5 (Fig. 240e): both legs fused, forming a common lamella backwards directed, resembling that of *A. cubensis* Mielke, but not reaching tip of outer lobe, with 4 setae. Outer lobe ending in acute projection, wiith 4 outer setae, proximal one belonging to BENP.

Male

The only differences between male and female are the modified haplocer antennule (Fig. 239c), P5 and P6 (240f, 240g). Length, including rostrum and caudal rami, 280 µm.

Comparison and discussion

There are four states regarding the habitus of the species belonging to the genus *Apodopsyllus*. Some species do exhibit a completely fused habitus, while some other species display a partially or completely divided body (see Coull & Hogue, 1978, :153, Table I).

On the other hand *A. arcuatus* Mielke 1984b, *A. chilensis* Mielke 1987, and A. cubensis Mielke 1988, reported from neotropical localities, are the only species (apart from *Apodopsyllus n. sp. 1*) with a body ornamented with plate-like well-definde structures. Provided the narrow resemblance of most appendages among the species of *Apodopsyllus*, only the state of P1, and structure of female P5 and male P5 and P6 are useful to discriminate between species. *A. chilensis* turned out to be unique within this clade by the female P5 with 1 seta on the inner margin of the outer lobe. Such seta is not present in *A. cubensis*, *A. arcuatus* and *Apodopsyllus n. sp. 1*. *A. arcuatus* can be separated from *A. cubensis* by the state of P1 EXP (clearly two-segmented in *A. arcuatus*, and one- or indistinctly two-segmented in *A. cubensis*), armature of P1 ENP 2, female P5 (both legs are distinct in *A. arcuatus*, and fused in *A. cubensis*), and by the shape of male P6 (see Meilke, 1984b, :70, Fig. 3-E, and Mielke, 1988, :160, Fig. 3-D). On the other hand, *A. arcuatus* can be distinguished from *A. n. sp. 1* only by the state of female P5 (simlilar to *A. cubensis* in *A. n. sp. 1*) and strength of the apical elements on P1 ENP 2.
A. cubensis can be separated from *A. n. sp. 1* only by the relative length of P1 EXP, relative length of the inner projection of female P5 (reaching beyond the outer lobe in *A. cubensis*, and hardly reaching the heigh of the outer seta of BENP in the Mexican species), the state of P1 EXP (one-segmented or indistinctly two-segmented in *A. cubensis* and clearly two-segmented in *A. n. sp. 1*), and shape of male P6 (similar to *A. arcuatus* in *A. n. sp. 1*).

FAMILY Tetragonicipitidae Lang 1944

Genus Phyllopodopsyllus T. Scott 1906

Phyllopodopsyllus sp. 1
(Figs. 241-244)

Material examined

One dissected male labeled EMUCOP-478-G, found in station 3 at 6-9 cm depth, on 02/MAY/91.

Female

Unknown.

Male

This organism was badly damaged, and the measurement of the body length was not possible. Some appendages are missing and other are badly dissected.

Urosome (Fig. 241a, 241b) smooth dorsally; ventrally with spinules along caudal margin of third and fourth somite. Anal segment smooth dorsally except for anal operculum with fringing spinules; ventrally with small spinules along border with caudal rami. Caudal rami tapering posteriorly; surface smooth; outer distal corner acutely produced; with 7 setae.

Antennule (Fig. 242a), six-segmented, haplocer; with aesthetasc on fourth and ultimate segment.

Antenna (Fig. 242b), with basis ornamented with small spinules along inner edge. Exopodite unisegmented with 1 lateral and 2 distal setae. First endopodal segment bare; second segment with 2 lateral spines and 1 slender seta, and 6 terminal elements.

Mandible, unknown.

Maxillule (Fig. 242c): arthrite with 2 surface setae; distally with 5 spines and 1 seta; subdistally with 4 setae. Coxa with 3, basis with 6 setae. Exopodite and endopodite one-segmented, seemingly with 3 setae each.

Maxilla (Fig. 242d): syncoxa ornamented with some spinules proximally on outer edge; with 3 endites, proximal and middle with 3, distal one with 2 setae. Basis with strong claw accompanied by strong and slender seta. Endopodite two-segmented; first segment with 2, second one with 5 setae.

Maxilliped (Fig. 242e): basis elongated and ornamented with several rows of small spinules, armed with 1 subapical and 2 distal setae. First endopodal segment without ornamentation and armed with 2 slender setae; second segment with long and almost straight claw with 2 accompanying setae.

P1 (Fig. 243a): coxa smooth except for row of spinules in middle of proximal half; basis bare, with inner and outer spine. Exopodite three-segmented and reaching tip of first endopodal segment. Endopodite two-segmented; first segment as long as entire exopodite and about 2.4 times longer than second component. Chaetotaxy as in Table 30.

P3 (not illustrated), with three-segmented exopodite and two-segmented endopodite. Chaetotaxy as in Table 30.

P2 and P4 (Fig. 243b, 244): coxa and basis bare except for outer spine of P2 and outer seta of P4; basis with acute projections on inner distal corner and between rami. Exopodite three-segmented. Endopodite two-segmented, of P2 reaching slightly beyond, of P4 reaching proximal part of second exopodal segment.

Table 30. Chaetotaxy of *Phyllopodopsyllus* sp. 1.

	P1	P2	P3	P4
EXP	0.0.022	1.1.122	1.1.122	1.1.222
ENP	1.020	1.021	1.021	1.021

Comparison and discussion

In his key to the species of *Phyllopodopsyllus*, Lang (1965, :388-389) recognized 20 valid species, and supported Kunz's (1963) view that *Paraphyllopodopsyllus trichophorus* Kunz was a synonym of *Phyllopodopsyllus mossmani* T. Scott, and suggested, additionally, that *Ph. intermedius*

Noodt was synonym of *Ph. thiebaudi* Petkovski (later, Fiers (1986c), based on the implantation places of the setae of the female P5 and the loss of sexual dimorphism in the setation of the P4 EXP, would consider *Ph. intermedius* as a distinct species from *Ph. thiebaudi*,). In the same paper, Lang (1965, :387) subdivided the species of *Phyllopodopsyllus* by that time known, into three groups based on the shape of the second antennular segment, *i. e.* with a conspicous unguiform projection, with a small but not unguiform projection and without any projection at all. In the group of species without unguiform projection he unified *Ph. aegypticus* Nicholls, *Ph. thiebaudi*, *Ph. mossmani*, *Ph. paramossmani* Lang, *Ph. berrieri* Monard, *Ph. hibernicus* Roe, *Ph. xenus* Kunz and *Ph. longipalpatus* Chappuis.

Later, in his analysis on the systematics of the Tetragonicipitidae, Kunz (1984) made a second division of the family. This time, based on the shape on the antennule and chaetotaxy of the swimming legs he divided the family into 9 groups: *bradyi*, *furciger*, *aegypticus*, *borutzkyi*, *pauli*, *opistoceratus*, *mossmani*, *xenus* and *longipalpatus*. Kunz (1984) transferred *Ph. mossmani*, *Ph. paramossmani*, *Ph. berrieri* and *Ph. hibernicus* to a new species-group, the *mossmani*-group, and *Ph. xenus* and *Ph. longipalpatus* to the *xenus*-group and *longipalpatus*-group, respectively, so that Kunz's (1984) *aegypticus*-group would be composed of *Ph. aegypticus* and *Ph. thiebaudi* along with two other species described by Kunz the same year, *Ph. angolensis* Kunz 1984a and *Ph. gertrudi* Kunz 1984b.

Fiers (1995), in his revision of the genus *Diagoniceps* Willey, pointed out the similarity between Lang's (1965) and Kunz's (1984) definitions of species-groups, and suggested, given those similarities, that the genus *Paraphyllopodopsyllus* (withdrawn by Lang (1965)), could be re-established after a detailed revision of the genus *Phyllopodopsyllus*. In the same paper, Fiers (1995) defined the genera *Aigondiceps*, *Nidiagoceps*, *Odaginiceps* and *Godianiceps* to accommodate some new species and to reallocate some taxa formerly placed into *Diagoniceps*, so that Fiers (1995, :233) recognized 11 valid genera in his key to the Tetragonicipitidae.

That same year, Huys (1995b), probably unaware of Fiers' (1995) paper, suggested that Kunz's (1984) *menaiensis*-group, composed of *Ph. menaiensis* Geddes and *Ph. trifidus* (which were reallocated within *Nidiagoceps* by Fiers (1995)), should be allocated within *Paraschizopera* along with *P. beckeri* Wells, and renamed Bodin's (1979) *Diagoniceps* sp. as *Paraschizopera brevicauda* Huys n. sp., but was allocated within *Aigondiceps* by Fiers (1995) thus being named *Aigondiceps brevicauda* Huys (after Bodin, 1997). In his key to the genera of Tetragonicipitidae, Huys (1995b) recognized only 8 valid genera.

Following Fiers' (1995) key, the first representative of the Tetragonicipitidae herein described, keys out to *Phyllopodopsyllus*, and following Kunz's (1984) criteria, it falls within the *aegypticus*-group, given the shape of the antennule and setal complements of the swimming legs. Presently this species-group is composed of *Ph. aegypticus*, *Ph. angolensis*, *Ph. thiebaudi*, *Ph. thiebaudi santacruzensis* Mielke, *Ph. gertrudi*, *Ph. gertrudi costaricensis* Mielke, *Ph alatus* Fiers, *Ph. intermedius* and *Ph. gracilipes* Wells & Rao.

The female of the Mexican representative remains unknown. Nevertheless, if a female chaetotaxy similar to that of *Ph. intermedius* is assumed, the Mexican representative *Phyllopodopsyllus* sp. 1, should be more related to the former than to any other species of the *aegypticus*-group given, above all, the lack of sexual dimorphism (regarding the setal complement of swimming legs), and absence of any projection on the antennule. *Phyllopodopsyllus* sp. 1 can be differentiated from the remaining species, and especially from *Ph. intermedius* by the presence of an inner seta on P2 EXP 2, feature that seems to be unique within the *aegypticus*-clade. Despite the present knowledge on the Mexican representative of *Phyllopodopsyllus*, I suggest to keep it as *species inquirenda* until more male specimens are examined and the female of the species described.

Sp. 2
(Figs. 245-248)

Material examined:

One dissected male labeled EMUCOP-179-C, found in station 2 at 3-6 cm depth, on 03/JAN/92, and one alcohol preserved male labeled EMUCOP-499-C, from station 4-5, found at 3-6 cm depth, on 01/MAY/91.

Female

Unknown.

Male

Habitus: length, 669 µm including rostrum and caudal rami, the former small and bended ventrally (Fig. 246f, 246g); dorsal surface smooth, ventrally furnished with fine and short hairs and with set of conspicuous elements on third and fourth urosomite (Fig. 245b); somites with hyaline caudal frill finely serrated. Anal segment tapering posteriorly, with rounded anal operculum ornamented with finrging spinules (Fig. 245a); ventrally with spinules along joint with caudal rami. Caudal rami about seven times longer than wide, slightly wider at base and ornamented with small spinules on inner part dorsally; with seven setae.

Antennule (Fig. 246a), composed of eleven segments, with aesthetasc on fourth and ultimate segment; without any projection on first or second segment; haplocer.

Antenna (Fig. 246b): coxa small; basis about as long as first endopodal segment, and ornamented with longitudinal row of small spinules along inner edge. Exopodite one-segmented, ornamented with spinules and armed with 1 lateral slender and long seta, and 2 distal stout elements (one of them seemingly fused to supporting segment). First endopodal segment with long and slender abexopodal seta proximally; second segment with 2 subdistal and 7 distal spines/setae.

Mandible (Fig. 246c): biting edge of gnathobasis with distal strong teeth and slender seta on corner; coxa-basis ornamented with 3 rows of spinules and armed with 3 apical setae. Rami one-segmented; endopodite with 2 lateral and 5 distal setae; exopodite with 2 proximal, 2 subdistal and 2 apical setae.

Maxillule (Fig. 246d): arthrite with 2 surface setae; apically with 6 spines, 1 small and 1 pinnate seta; subdistally with 3 setae. Coxa with 3, basis with 6 setae. Exopodite and endopodite with 4 setae each.

Maxilla, unknown.

Maxilliped (Fig. 246e): basis elongated, ornamented with several rows of spinules and armed with 2 subapical and 2 distal setae. Endopodal segment slightly longer than basis, with 1 inner seta in the middle. Claw accompanied by 2 setae.

P1 (Fig. 247a): coxa furnished with spinules of different size; basis ornamented with some rows of spinules close to inner border and in the middle; with outer and inner seta. Exopodite three-segmented, reaching about the middle of first endopodal segment. Endopodite two-segmented; first segment with inner spine on distal half; second segment with 2 long and geniculate setae. Chaetotaxy as in Table 31.

P2-P4 (Fig. 247b, 247c, 248a): coxa rectangular, ornamented with transverse rows of spinules; basis with long elements on inner edge, and with spinules at base of outer seta and endopodite; on posterior face ornamented with some spinules on the middle and close to inner margin. Exopodite three-segmented; first segment of P1 with stout frill; third segment of P2 and P3 with 3 curved outer spines; spines/setae of P4 normal; second segment of P2 and P3 with, of P4 without inner seta. Endopodite two-segmented; of P2 and P3 reaching about the middle of third exopodal segment, of P4 hardly reaching beyond EXP 1. Chaetotaxy as in Table 31.

P5 (Fig. 248b): baseoendopodite of both legs fused; each part with 1 inner and 2 distal elements. Exopodite with 5 setae/spines.

P6 (Fig. 248c): represented by a plate bearing 3 elements.

Table 31. Chaetotaxy of Tetragonicipitidae sp. 2

	P1	P2	P3	P4
EXP	0.0.022	0.1.113	0.1.123	1.0.223
ENP	1.020	1.021	1.121	1.121

Comparison and dicussion

See below.

Sp. 3
(Figs. 249-255)

Material examined:

Two dissected males (EMUCOP-476-G, EMUCOP-477-G), from station 3, found at 6-9 cm depth on 02/MAY/91.

Female

Unknown.

Male

Habitus (Fig. 249), fusiform, nearly cylindrical; length ranging from 697 to 713 µm including rostrum and caudal rami. Rostrum prominent, reaching beyond firts antennular segment. Dorsal surface of pro- and urosomites smooth, with crenulated caudal edge (Fig. 249, 250a, 250b); third and fourth urosomite with spinules along caudal margin ventrally (Fig. 250b). Anal segment with rounded anal operculum ornameted with small and blunt spinules on caudal margin. Caudal rami cylindrical, about 3.3 times longer than wide; with 6 setae (I did not find one of the lateral setae; instead I observed what appears to be a tubular pore).

Antennule (Fig. 251a), nine- (or ten?) segmented, haplocer; with aesthetasc on fourth and ultimate segment.

Antenna (Fig. 251b), with allobasis, with weak remnant of division between basis and first endopodal segment; with spinules on first segment only.

Mandible (Fig. 251c), with strong gnathobasis; biting edge set with 5 dentate teeth, 2 spines and 1 seta; coxa-basis barely furnished with some slender spinules, and armed with 3 apical setae. Exopodite three-segmented, with 1, 2 and 3 setae respectively. Endopodite one-segmented, with 2 lateral and 6 apical setae.

Maxillule (Fig. 251d): arthrite with 2 surface setae, eight distal strong spines accompanyed by 1 slender seta, and with 2 subdistal pinnate spines; coxa with 5 setae and 1 plumose element at base; basis with 5 slender elements. Exopodite and endopodite bearing 3 and 4 setae respectively.

Maxilla (Fig. 251e): syncoxa ornamented with small spinules on outer margin and proximally on inner edge; with 3 endites bearing 4, 3 and 3 setae respectively; basis with strong claw accompanyied by 3 setae and ornamented with spinules at base. Endopodite two-segmented; first segment with 1, second component with 3 setae.

Maxilliped (Fig. 251f): coxa smaller than basis, and ornamented with spinules on the middle and on inner distal corner, armed with 2 subdistal and 1 apical seta. Endopodal segment with 2 slender setae; distally with strong and almost straight claw accompanyied by 2 slender setae.

P1 (Fig. 252a): coxa ornamented with minute spinules on the proximal middle, and with longer and slender elements on outer and distal proximal corner and apically, with stronger spinules on outer distal corner; basis with spinules at base of outer and inner spine and between rami. Exopodite three-segmented; first and second segment without inner seta. Endopodite two-segmented; first segment as long as entire exopodite and 1.5 times longer than second segment. Chaetotaxy as in Table 32.

P2-P4 (Fig. 252b, 252c, 253a): coxa furnished with slender elements on proximal half, and with strong spinules on outer distal corner; basis ornamented with several row of long and slender spinules and with stronger elements between rami. Exopodite three-segmented, without inner setae. Endopodite two-segmented; first segment of P2 and P3 without, of P4 with inner seta; second segment of P2 and P3 with 3, of P4 with only 2 setae; of P2 reaching slightly and of P3 reaching the middle of second exopodal segment, of P4 barely reaching tip of first exopodal segment. P2 and P3 EXP 3 exhibit somewhat swollen outer spines, that are assumed to be sexually dimorphic. The same can be said of the inner and outer spine of P4 ENP 2. Chaetotaxy as in Table 32.

P5 (Fig. 253b), with fused baseoendopodites, reaching middle of EXP, with 2 setae each. Exopodite with 2 outer, 2 inner and 2 apical setae.

P6 (Fig. 253c), with 3 long setae, one of them bipinnate.

Variability

The specimen EMUCOP-477-G was found with a P5 bearing one inner element on BENP (Fig. 255b), and a curved outer spine on P1 EXP 1 (Fig. 254a), otherwise, as in specimen EMUCOP-476-G (Fig. 254, 255a, 255c).

Table 32. Chaetotaxy of Tetragonicipitidae Sp. 3.

	P1	P2	P3	P4
EXP	0.0.022	0.0.022	0.0.022	0.0.222
ENP	1.021	0.021	0.021	1.020

Comparison and discussion

Fiers (1995), dismanteled the ancient genus *Diagoniceps*, and coined the name for a new genus, *Aigondiceps* Fiers, in which he reallocated *Diagoniceps bocki* Lang (as type species), *D. kunzi* Marinov and *D. bodini* (=*Diagoniceps* spec. Bodin 1979) Fiers. That same year, Huys (1995b) carried out a revision of the genus *Paraschizopera* and renamed, unaware of Fier's (1995) paper, Bodin's (1979) *Diagoniceps* spec. as *Paraschizopera brevicauda* Huys, and later, Bodin (1997) allocated this species to the genus *Aigondiceps* as *Aigondiceps brevicauda* Huys. Fiers (1995) also created the genus *Nidiagoceps* Fiers in which he placed *Diagoniceps menaiensis* Geddes and *D. trifidus* Yeatman, but that same year, Huys (1995b) reallocated these species within *Paraschizopera* Wells along with *P. beckeri* Wells. *D. monodi* remains as *species inquirenda* (after Fiers, 1995). Presently, the genus *Diagoniceps sensu* Fiers (1995) is composed of two species only, *Diagoniceps laevis* Willey and *D. mexicana* Fiers.

Following Fiers' (1995) key to the genera of Tetragonicipitidae, the Mexican Tetragonicipitidae sp. 2 keys out to *Nidiagoceps*, in which Fiers (1995) himself included *Diagoniceps menaiensis* and *D. trifidus*. These species were equated with *Paraschizopera* by Huys (1995b), nevertheless. Given the character state of the P1 of the Mexican specimen (with three-segmented exopodite and two-segmented endopodite), it is clear that this species can not be assigned to the genus *Paraschizopera sensu* Huys (1995b), since this genus has been diagnosed by the presence of three-segmented rami (both exopodite and endopodite) of P1.

On the other hand, following Huys' (1995b) and Coull's (1973e) key to the tetragonicipitid genera, the Mexican Tetragonicipitidae sp. 2 keys out to *Diagoniceps*. It is clear, however, that these specimens can not be included into this genus either, given the amended diagnosis by Fiers (1995). In fact, they seem to be excluded from *Diagoniceps sensu* Fiers (1995) principally by the armature of distal segment of P1 ENP (with 3 setae in *Diagoniceps sensu* Fiers, 2 in the Mexican specimens), shape of inner seta on proximal segment of P2-P4 ENP, shape of armature of the male antennular fourth segment, and above all, the assumed sexual dimorphism of the outer spines on P2 and P3 EXP 3 (the female remains unknown and no further comparison can be made).

The herein described specimen referred to as Tetragonicipitidae sp. 3, keys out to *Paraschizopera* (=*Nidiagoceps*) in Fiers' (1995) key. However, these specimens can not be included into this genus given, as in Tetragonicipitidae sp. 2, the state of P1 ENP. Following Huys' (1995b) and Coull's (1973e) keys, these specimens key out to *Protogoniceps* Por. Tetragonicipitidae sp. 3 can not be assigned to this genus, nevertheless, given the diagnosis, though preliminary, by Por (1964b), in which he diagnosed the genus by the presence of a strong curved spur on the second antennular segment (the presence/absence of a spur on the second antennular segment seems to be of no taxonomical generic value since in *Phyllopodopsyllus* at least three character states regarding the shape of A1 can be observed), and chaetotaxy of the proximal segment of P2-P4 ENP.

Despite all the efforts trying to clearify the phylogeny of the Tetragonicipitidae, the taxonomy of this family is still obscure. Therefore, to avoid further confusions, I suggest that the herein described specimens, referred to as Tetragonicipitidae sp. 2 and Tetragonicipitidae sp 3 should be considered as *species inquirenda* within the Tetragonicipitidae until the females are described.

FAMILY Canthocamptidae Sars 1906 (part.), Monard 1928 (part.), Lang 1948

GENUS *Mesochra* Boeck 1865 [1]

Mesochra pacifica n. sp.
(Figs. 256-262)

Material examined:

SEX	STAGE	# IND.	STORED AS	# CATALOGUE	MATERIAL	STATION	DEPTH	DATE
F	A	1	Diss.	EMU-4645-H	PARATYPE	7	0-3 cm	30/MAR/92
F	A	1	Diss.	EMU-4641-C	PARATYPE	7	0-3 cm	30/MAR/92
F	A	1	Diss.	EMU-4640-C	PARATYPE	7	0-3 cm	30/MAR/92
F	A	1	Alc.	EMU-4646-H1	HOLOTYPE	7	0-3 cm	30/MAR/92
M	A	1	Diss.	EMU-4642-C	ALLOTYPE	7	0-3 cm	30/MAR/92
M	A	1	Diss.	EMU-4643-E	PARATYPE	7	0-3 cm	30/MAR/92
M	A	1	Diss.	EMU-4644-A	PARATYPE	1	0-3 cm	22/JUN/91

Etymology

The specific name refers to the Pacific Ocean, type region of the species.

Female

Habitus (Fig. 256a, 256b): body fusiform compressed, with clear demarcation beteween prosome and narrow urosome. Length, including rostrum tip and caudal rami, ranging from 390 to 507 mm (holotype 507.8 mm). No integumental windows observed. Largest width near posterior edge of cephalothorax, latter nearly equalling 1/3 of total body length; hyaline frill of cephalothorax and body somites, except P5 bearing somite, minutely incised; surface of prosomal somites smooth. P5 bearing somite with two short lateral combs of minute spinules. Genital double-somite (Fig. 257b) and succeeding somites ornamented with slender spinules along postero-lateral and/or postero-ventral margins. Anal somite (Fig. 257a), short, with spinules present around ventral hind margin. Anal operculum rounded and furnished with minute spinules. Caudal rami nearly as long as wide, with 6 setae; anterolateral seta arising at midlength of outer margin; posterolateral seta arising from a ventral position near outer distal corner, being distinctly longer than ramus; inner distal seta 1.5 times longer than ramus; dorsal seta implanted close to inner margin, articulating on two basal parts. All setae smooth except for pinnate principal terminal setae. Rostrum (Fig. 258g), demarcated at base, bell-shaped, with rounded tip; with a single pair of sub-distal sensilla.

Antennule (Fig. 258a), six-segmented. Segment I with 2 spinules rows, and segment II with 1 spinule row; third segment about 1.5 times longer than wide, with aesthetasc. Majority of setae smooth, segments III and VI with a pinnate element. Setal armament: I(0)-II(8)-III(6+aesth)-IV(1)-V(2)-VI(9=aesth).

Antenna (Fig. 258b): allobasis with 1 proximal spinulose and 1 distal bare inner seta along abexopodal margin. Exopodite one-segmented with 2 plumose and 1 smaller bare seta apically. Endopod inner margin with spinule row proximally; lateral armature consisting of 2 spines and one small seta; row of fine outer spinules distally; apical armature consisting of 5 elements: 2 spines, 2 geniculate bare setae, and 1 geniculate seta armed with spinules.

Mandible (Fig. 258c): with biting edge formed by strong teeth and one plumose seta; basis apparently fused to endopodite, with long spinules and 1 seta. Endopodal lobe with 3 distal and one lateral setae.

Maxillule (Fig. 258d): praecoxal arthrite ornamented with some minute spinules posteriorly; with 2 setae anteriorly; distal margin with 5 strong curved spines and 3 setae (one smooth); coxa apparently fused with basis; coxal endite bearing some spinules alon inner margin, with 1 slender and 1 strong setae, distally. Exopodite and endopodite obsolete, apparently represented by 3 and 2 setae respectively. Basis with 2 lateral, 2 subdistal setae and a distal pectinate element.

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[1]The description of both species of *Mesochra* found in the present study have been published in: GOMEZ NOGUERA, S. E & F. Fiers, 1997. Two new species of *Mesochra* Boeck, 1864 (Copepoda: Harpacticoida) from a coastal lagoon in Sinaloa State, Mexico. *Bull. Inst. Sci. r. Be.*, 67:39-56.

Maxilla (Fig. 258e): syncoxa ornamented with spinule rows close to inner and outer margins, two endites, each with 2 plumose and one smooth setae; basis produced into strong claw accompanied with 2 slender setae. Endopodite not well defined, with 3 setae (of which two are fused basally).

Maxilliped (Fig. 258f): syncoxal part with 2 rows of spinules and 1 distal seta; basis particularly spinulose along both anterior and posterior rims of palm, having a small group of spinules near middle and distal edge of outer margin. Endopodite minute, bearing smooth claw and a single accompanying seta.

P1 (Fig. 259a): protopod components ornamented with several spinule rows; basis with strong unipinnate outer and inner spine. Exopodite 3-segmented, bearing inner seta on second segment, and reaching not quite to insertion of inner seta on first endopodal segment. Endopodite 2-segmented, with first segment reaching far beyond exopodite, about 6 times as long as wide; inner seta on first segment pectinate, and inserted in distal third; second segment with an inner short smooth sub-terminal seta, a distal geniculated long seta, and a distal claw. Chaetotaxy as in Table 33.

P2-P3 (Fig. 259b, 259c): praecoxa as in P1; coxa with on both sides a row of spinules near outer distal corner; basis with fine spinules near articulation with endopodite, and stronger elements near joint with exopodite; outer seta of basis slender and plumose. Exopodite 3-segmented, all ornamented with strong spinules along outer margin, and with fragil distal inner fringe; inner exopodal setae on terminal segment plumose in P2, pectinate in P3. Endopodite two-segmented, reaching just beyond second exopodal segment; first segment with outer distal corner acute; second segment with proximal inner seta pectinate. Chaetotaxy as in Table 33.

P4 (Fig. 260a): anterior surface of protopodite as in P3, posterior surface lacking spinule row. Exopodite 3-segmented; third exopodal segment with large and strong pectinate inner sub-distal seta. Endopodite two-segmented, reaching not quite to middle of second exopodal segment; endopodal seta plumose. Chaetotaxy as in Table 33.

P5 (Table 260b), with distinct exopodite and baseoendopodite; the latter extending beyond distal edge of the former, and bearing 5 elements; hyaline tube pore present on inner margin (arrowed). Exopodite small, roughly ovate; outer (3) and distal (1) setae slender and smooth, inner sub-distal element rigid and bipinnate.

P6 vestiges (Fig. 257b) represented by a small crescent shaped lobe, bearing 2 setae, and ornamented with minute spinules. Copulatory pore situated in anterior half of genital somite, flanked by pair of pores posteriorly; copulatory duct distinct, leading to paired small seminal receptacles.

Male

Habitus (Fig. 261a) closely resembling that of female, but with narrrower prosome, and without genital double somite. Length ranging from 319 to 326 μm (allotype 326 μm). Ventral spinules near posterior margins of urosomites, markedly coarser than in female (Fig. 261b). Anal somite as in female, but somewhat more ornamented. Caudal rami as in female.

Antennule (Fig. 261a), sub-chirocer and eight-segmented; ornamentation of proximal segments less dense than in female. Segments IV and VIII with aesthetasc. Armature smooth with following distribution: I(0)-II(9)-III(4+aesth)-IV(0)-V(0)-VI(0?)-VII(0)-VIII(7+aesth).

Mouthparts, P1, P2, and P4 (not illustrated) as in female.

P3 (Fig. 261b): With protopodite and exopodite as in female. Endopodite three-segmented; first segment without inner seta, and outer distal corner acute; inner distal corner of second segment with sinuous inner apophysis, reaching nearly to apical margin of terminal segment; third segment reaching to proximal third of third exopodal segment.

P5 (Fig. 261b, 262c), with medially fused baseoendopodites. Exopodite distinct, reaching slightly beyond distal edge of endopodal lobe, with 5 naked setae, and 1 bipinnate strong seta. Endopodal lobe ornamented with spinules along inner and outer margins, with 2 bipinnate robust spines of unequal length distally.

P6 (Fig. 261b, 262c), symmetrical, lacking ornamentation and armature.

Table 33. Chaetotaxy of *Mesochra pacifica* n. sp.

	P1	P2	P3	P4
EXP	0.1.022	0.1.122	0.1.222	0.1.222
ENP	1.111	1.221	1.221	1.221

Comparison and discussion

See below.

Mesochra pseudoparva n. sp.
(Figs. 263-268)

Material examined:

SEX	STAGE	# IND.	STORED AS	# CATALOGUE	MATERIAL	STATION	DEPTH	DATE
?	CII	1	Alc.	EMU-4654-B2	PARATYPE	6	0-3 cm	30/MAR/92
F	A	1	Alc.	EMU-4653-H1	HOLOTYPE	7	0-3 cm	30/MAR/92
F	A	5	Alc.	EMU-4652-B2	PARATYPE	10	0-3 cm	30/APR/91
F	A	3	Alc.	EMU-4654-B1	PARATYPE	6	0-3 cm	30/MAR/92
F	A	1	Alc.	EMU-4654-C3	PARATYPE	6	0-3 cm	30/MAR/92
F	A	1	Diss.	EMU-4647-A	PARATYPE	10	3-6 cm	30/APR/91
F	A	1	Diss.	EMU-4648-B	PARATYPE	4-5	0-3 cm	30/MAR/92
F	CV	3	Alc.	EMU-4654-B4	PARATYPE	6	0-3 cm	30/MAR/92
M	A	1	Alc.	EMU-4655-C1	ALLOTYPE	6	0-3 cm	30/MAR/92
M	A	1	Alc.	EMU-4652-B1	PARATYPE	10	0-3 cm	30/APR/91
M	A	1	Diss.	EMU-4650-C	PARATYPE	10	0-3 cm	30/APR/91
M	A	1	Diss.	EMU-4649-C	PARATYPE	6	0-3 cm	30/MAR/92
M	A	1	Diss.	EMU-4651-B	PARATYPE	6	0-3 cm	30/MAR/92
M	CIV	2	Alc.	EMU-4654-B3	PARATYPE	6	0-3 cm	30/MAR/92
M	CIV	1	Alc.	EMU-4654-C1	PARATYPE	6	0-3 cm	30/MAR/92
M	CV	1	Alc.	EMU-4654-C2	PARATYPE	6	0-3 cm	30/MAR/92
M	CV	1	Alc.	EMU-4652-B3	PARATYPE	10	0-3 cm	30/APR/91

Etymology

The specific name refers to the close resemblance of the present species to *M. parva* Thomson, 1946.

Female

Habitus (Fig. 263a, 263b, 266c): length, including rostrum and caudal rami, ranging from 370 to 482 µm (holotype 443 µm). General shape as in *M. pacifica*, but less marked demarcation between prosome and urosome. Dorsal ornamentation of urosomites as in previous species, spinule row along posterior margin of genital double-somite not interrupted ventromediallly; without integumental windows. Anal operculum rounded and smooth. Caudal rami, bearing 6 setae, resembling closely that of *M. pacifica*, but inner apical seta at least twice as long as ramus.

Antennule (Fig. 264a), closely resembling that of *M. pacifica*, differing in the following spects: segment II with 9 setae, segment VI furnished with 8 setae and an aesthetsac, and slender and smooth aspect of antero-lateral seta on segment VI.

Antenna (Fig. 264b), as in *M. pacifica*, except for the sub-distal position of a seta on the exopodite.

Maxillule (Fig. 264d), with coarser spinules on posterior surface of arthrite, and a robust recurved sub-distal pinnate seta.

Mandible and maxilliped (Fig. 264c, 264f), as in *M. pacifica*.

Maxilla (Fig. 264e), with only a few spinules on syncoxa.

P1 (Fig. 265a) with protopodite ornamented as in preceding species. Three-segmented exopodite reaching slightly beyond insertion point of inner setao on first endopodal segment; the latter only 5.5 times as long as wide, bearing inner seta in median third of inner margin. Second endopodal segment with 3 elements, inner sub-distal one 1.5 times as long as segment. Chaetotaxy as in *M. pacifica* n. sp.

P2-P4 resembling legs of *M. pacifica*, except for outer corner of first endopodal segment less acute. P2 endopodite (Fig. 265b), reaching not quite to middle of distal exopodal segment, P3 endopodite (Fig. 265d) reaching just beyond second exopodal segment, and P4 endopodite (Fig. 266a) to middle of second exopodal segment. Sub-distal seta on third exopodal segment rigid and pectinate in P4. Chaetotaxy as in *M. pacifica* n. sp.

P5 (Fig. 266b), with robust, almost quadrate exopodite reaching nearly to apical edge of endopodal lobe. Both rami with 5 elelemnts: all pinnate on baseoendopodite, 4 smooth and 1 pinnate on exopodite. Neither hyaline tube pore nor pore observed along inner margin of baseoendopodite.

P6 vestiges (Fig. 266c), with ornamentation as in previous species. Copulatory pore situated in proximal half of genital double-somite. Short copulatory duct. No associated pores observed.

Male

Habitus closely resembling that of female (Fig. 267a), with separate genital somites; ventral spinule ornamentation along posterior margins of urosomite rather long (Fig. 267b). Body length ranging from 290 to 314 μm (allotype 290 μm).

Antennule (Fig. 268e), similar to that of *M. pacifica*.

Mouth parts, P1, P2 and P4 (not illustrated), as in female.

P3 (Fig. 268a): Protopodite as in female. Exopodite with somewhat more robust outer spines. Endopodite three-segmented; first segment without inner seta, and outer distal corner acute; median segment without inner seta but with inner sinuous apophysis, reaching to apical margin of third segment; third endopodal segment with two apical plumose setae, and with 2 short, strongly curved "spine-like" structures sub-distally.

P5 (Fig. 267b, 268c), similar to that of *M. pacifica*, but more densely ornamented along the margins of the endopodal lobe.

Right P6 somewhat larger than left one, both without armature (Fig. 267b).

Variability

One female was found which possessed an aberrant two-segmented exopodite in the P2 (second and third segments fused). The two outer spines were inserted at midlength of the outer margin (Fig. 265c).

Comparison and discussion

Both presently described species occured in the same lagoonal area and are not easy to distinguish under a dissecting microscope. Only the general body shape (more robust shape in *M. pacifica*, more slender in *M. pseudoparva*) and the length of the inner apical seta on the caudal rami (1.5 times longer than ramus in *M. pacifica*, more than twice the ramus length in *M. pseudoparva*) may be useful in separating them. However more detailed observations reveal many differences to distinguish both species. The most important are: the position of the copulatory pore in the females (median in *M pacifica*, far anterior in *M. pseudoparva*); number of armature elements of antennule and in particular the morphology of the lateral element on the VI-th antennal segment (robust and pinnate in *M pacifica*, smooth and slender in *M. pseudoparva*); insertion point of the inner seta on the first endopodal segment of the P1 (in distal third of segment in *M. pacifica*, in median third for *M. pseudoparva*); the general shape of the female P5 exopodite (small ovate in *M. pacifica*, square and more robust in *M. pseudoparva*). Further differences can be found in the relative lengths of the endopodites of P2-P4, the maxillulary arthrite, antennal exopodite (position and morphology of the setae), and in the length of the inner sub-distal seta on the second endopodal segment of P1.

Among the 34 currently recognized species of the genus *Mesochra*, 9 are characterized by a 2-segmented P1 endopodite in conjunction with a 222 spine formula of the exopodites of P2-P4 (see Fiers & Rutledge, 1990). Both new species described above, *M. pseudoparva* and *M. pacifica*, belong to this group, and key out to *M. parva* Thomson and *M. sewelli* Lang.

Mesochra pacifica is easily to distinguish from *M. sewelli* and *M. parva* by the distal position of the inner seta on the first endopodal segment of the P1, and the small sized exopodite of the female P5, bearing 4 slender and smooth setae and only 1 pinnate element.

Differences between *M. parva* and the here described *M. pseudoparva* are less pronounced. The Mexican specimens were initially assigned to *M. parva*, however the marked differences in the detailed morphology of the male P3 endopodite in *M. parva* (as shown by Hamond, 1971) in comparison to the Mexican specimens forced us to consider the latter as a distinct species. In. *M. parva*, the second segment of the male possess a short curved apophysis reaching hardly to the middle of the distal segment. In contrast, males of *M. pseudoparva* have a large sinuous apophysis reaching to the distal margin of the terminal endopodal segment.

M. pseudoparva differs also from its congener in the following aspects: (i) sub-distal inner seta on second endopodal segment of P1 considerably longer, (ii) shorter endopodal rami in P3 and P4 reaching only to the distal margin of the median exopodal segment in P3, and only halfway the middle

exopodal segment in the P4, and (iii) the number of exopodal elements of the male P5 (5 in *M. parva*, 6 in *M. pseudoparva*).

Of particular interest is the presence of two small "elements" on the anterior face of the third endopodal segment of the male P3 in *M. pseudoparva*, which appears to be absent in *M. parva* as far we can deduce from the illustration in Hamond (1971). The two flame-shaped elements are inserted close to the inner edge of the segment (Fig. 268b), and form a small recurved fork. The tip of the apophysis seems to lie in close contact with these structures.

These structures are minute and have been probably often been overlooked or misinterpreted. Reviewing the existing literature, comparable elements were found only in *M. wolskii* Jakubisiak 1932 (in Fiers & Rutledge, 1990, see Fig. 268d, herein) and *M. pontica* Marcus 1965 (in Bodin, 1972, Fig. 1). But whether the two slender elements on the terminal P3 segment in *M. inconspiqua* (T. Scott, 1899) illustrated by Mielke (1975, Fig. 62c) or in *M. lilljeborgi* Boeck 1865 as shown by Gurney (1932, Fig. 1001) are homologous can not be ascertained. In contrast, the sub-distal elements illustrated for *M. flava* in Soyer (1977, Fig. 5f) and *M. pallaresi* Soyer 1977 in Pallares (1968b, Fig. 26:3), are considered not to be homologous as they occur on the outer sub-distal edge of the segment. Although the presence of these structures can easily be overlooked, not all species possess such elements. For instance the here described *M. pacifica*, and examination of *M. pygmaea* (Claus, 1863) from Corpus Christi Bay (USA), and the Boulonnais (France) also clearly revealed that the male third endopodal segment lacked comparable structures.

It seems a general feature for Canthocamptidae and related families that those species with one or two setae on the inner margin of the second endopodal segment of the female P3, lack those elements in the P3 endopodite of the male. But, whether the two tiny elements observed here on the male P3 endopodite of *M. pseudoparva* are homologous with the two inner setae on the female P3 endopodite or they are novel structures, is impossible to conclude at this point.

Both structures arise in the distal third, near the inner margin of the segment with their insertion point closely set. Such position does not resemble the insertion point or the inner seta of the female P3 and leads us to presume that both male elements in question are novel in origin. However, observations (by the second author) on the development of *Canthocamptus staphylinus* Jurine 1820 revealed that the two inner setae on the distal endopodal segment of the P3 appear in the third copepodid stage of both female and male juveniles. These setae gradually develop through successive stages in the female whereas in the male their development is arrested in the subsequent stages. Thus in *C. staphylinus* both these spinule/setule-like elements found on the inner margin of the distal segment of the adult male P3, are homologous with the two inner seta on the distal segment of the female P3 endopodite.

Based upon these developmental observations in *C. staphylinus*, we infer that the two minute elements found in the male and the two inner setae in the female of *M. pseudoparva* (and *M. wolskii*) are homologous structures. The novelty here is that the male elements have migrated in position, and seem to form a functional unit with the apophysis which arises from the median segment.

That the family Canthocamptidae *sensu* Lang 1948 is a phylogenetic assemblage has been argued previously (*i. e.* in Por, 1986). An urgently needed, indepth revision of the family will undoubtedly lead to the removal of the genus *Mesochra* (and *Amphibiterita* Fiers & Rutledge, 1990) from this family. Moreover, splitting up the genus *Mesochra* will be necessary as it constitutes an unnatural grouping. In conjunction with characters such as the morphology of appendages, the presence or absence of integumental windows, and general shape of the male P3 endopodite, the presence or absence of the minute elements on the terminal segment of the male P3 endopodite may turn out to be of quite some importance to reveal the phylogenetic relationships within this taxon.

Canthocamptidae *incertae sedis* Por 1986

GENUS *Cletocamptus* Schmankevitch 1875

Cletocamptus deitersi Richard 1897
(Figs. 269-277)

Original description: *Mesochra deitersi* n. sp. Richard 1897, :268, Fig. 5-11.

Synonym: *cum* Lang, 1948.

Distribution: *cum* Lang, 1948; Australia (Hamond, 1973c); Ecuador (Löffler, 1963); Ethiopia (Dussart, 1974); Mexico: South-eastern Gulf of California (present study), Yucatán Peninsula and throughout the Caribbean Sea (Fiers, *in litt.*); Nicaragua (Herbst, 1960); U. S. A.: Louisiana (Bayou Fourchon) (Fleeger, 1980), Massachusetts (Yeatman, 1963).

Material examined:

SEX	STAGE	# IND.	STORED AS	# CATALOGUE	STATION	DEPTH	DATE
?	CI	2	Alc.	EMUCOP-63-D	4-5	0-3 cm	30/MAR/92
?	CII	1	Alc.	EMUCOP-32-A	4-5	0-3 cm	30/MAR/92
?	CII	1	Alc.	EMUCOP-787-F	10	3-6 cm	30/APR/91
?	CIII	1	Alc.	EMUCOP-31-A	4-5	0-3 cm	30/MAR/92
?	CIII	1	Alc.	EMUCOP-594-B	10	0-3 cm	30/APR/91
?	CIII	1	Alc.	EMUCOP-20-A	4-5	0-3 cm	02/MAY/92
?	CIII	1	Alc.	EMUCOP-64-D	4-5	0-3 cm	30/MAR/92
?	CIII	1	Alc.	EMUCOP-36-B	4-5	3-6 cm	30/MAR/92
F	A	3	Alc.	EMUCOP-51-C	4-5	0-3 cm	30/MAR/92
F	A	6	Alc.	EMUCOP-30-A	4-5	0-3 cm	30/MAR/92
F	A	10	Alc.	EMUCOP-371-B	11	0-3 cm	30/APR/91
F	A	1	Alc.	EMUCOP-630-D	10	0-3 cm	30/APR/91
F	A	8	Alc.	EMUCOP-616-C	10	0-3 cm	30/APR/91
F	A	9	Alc.	EMUCOP-365-A	11	0-3 cm	30/APR/91
F	A	1	Alc.	EMUCOP-57-D	4-5	0-3 cm	30/MAR/92
F	A	1	Alc.	EMUCOP-25-C	4-5	0-3 cm	02/MAY/92
F	A	6	Alc.	EMUCOP-16-A	4-5	0-3 cm	02/MAY/92
F	A	1	Alc.	EMUCOP-21-B	4-5	0-3 cm	02/MAY/92
F	A	16	Alc.	EMUCOP-590-B	10	0-3 cm	30/APR/91
F	A	1	Alc.	EMUCOP-65-E	4-5	3-6 cm	30/MAR/92
F	A	1	Diss.	EMUCOP-1-A-PA1	4-5	0-3 cm	30/MAR/92
F	A	1	Diss.	EMUCOP-364-A	11	0-3 cm	30/APR/91
F	A	1	Diss.	EMUCOP-94-C	4-5	0-3 cm	03/JAN/92
F	A	1	Diss.	EMUCOP-34-B	4-5	3-6 cm	30/MAR/92
F	A	1	Diss.	EMUCOP-61-D	4-5	0-3 cm	30/MAR/92
F	CIV	1	Alc.	EMUCOP-589-A	10	0-3 cm	30/APR/91
F	CIV	5	Alc.	EMUCOP-593-B	10	0-3 cm	30/APR/91
F	CV	3	Alc.	EMUCOP-591-B	10	0-3 cm	30/APR/91
F	CV	1	Alc.	EMUCOP-617-C	10	0-3 cm	30/APR/91
F	CV	1	Alc.	EMUCOP-17-A	4-5	0-3 cm	02/MAY/92
M	A	1	Alc.	EMUCOP-35-B	4-5	3-6 cm	30/MAR/92
M	A	2	Alc.	EMUCOP-374-C	11	0-3 cm	30/APR/91
M	A	3	Alc.	EMUCOP-592-B	10	0-3 cm	30/APR/91
M	A	3	Alc.	EMUCOP-619-C	10	0-3 cm	30/APR/91
M	A	2	Alc.	EMUCOP-372-B	11	0-3 cm	30/APR/91

M	A	3	Alc.	EMUCOP-366-A	11	0-3 cm	30/APR/91
M	A	1	Alc.	EMUCOP-26-C	4-5	0-3 cm	02/MAY/92
M	A	1	Alc.	EMUCOP-29-A	4-5	0-3 cm	30/MAR/92
M	A	1	Diss.	EMUCOP-1-A-PA2	4-5	0-3 cm	30/MAR/92
M	A	1	Diss.	EMUCOP-323-L	12	3-6 cm	23/JUN/91
M	A	1	Diss.	EMUCOP-60-D	4-5	0-3 cm	30/MAR/92
M	A	1	Diss.	EMUCOP-277-G	15	0-3 cm	24/JUN/91
M	CV	1	Alc.	EMUCOP-52-C	4-5	0-3 cm	30/MAR/92
M	CV	1	Alc.	EMUCOP-618-C	10	0-3 cm	30/APR/91
M	CV	1	Alc.	EMUCOP-18-A	4-5	0-3 cm	02/MAY/92

Comparison and discussion

The genus Cletocamptus was originally created by Schmankevitch (1875) to allocate a new species from the lagoon of Odessa (Black Sea), *Cletocamptus retrogresus*, and was allocated within the Cletodidae. This concept of the newly created genus *Cletocamptus* persisted through Monard's (1928) synopsis of the Harpacticoida (though he pointed out the lack of detail and information of Schmankevitch's original description), Lang's (1948) "Monographie der Harpacticiden" and Lang's (1965) "Copepoda Harpacticoidea from the Californian Pacific Coast", until Por's (1986) re-evaluation of the Cletodidae.

Between the time of creation of the genus *Cletocamptus* by Schmankevitch in 1875 and the time of publication of Lang's (1948) monograph, several species originally described either as new genera and new species or just as new species (marine, brackish and freshwater taxa recognized by Monard (1928) as representatives of the Canthocamptidae), have had been equated already to the genus *Cletocamptus*, and two species, *C. kummleri* Delachaux and *C. trichotus* Kiefer have had been originally described as representatives of *Cletocamptus*. So that in his monograph, Lang (1948) recognized 7 valid species: *C. retrogresus* Schmankevitch, *C. albuquerquensis* (Herrick) Chappuis, *C. confluens* (Schmeil) Gurney, *C. deitersi* (Richard) Brehm, *C. kummleri* Delachaux, *C. trichotus* Kiefer and *C. bicolor* (Wilson) Chappuis.

Before Por's (1986) revision of the Cletodidae, 6 more species of *Cletocamptus* were added: *C. gabrieli* Löffler, *C. xennus* Por, *C. feei* Shen, *C. gravihiatus* Shen & Sung, *C. affinis* Kiefer and *C. helobius* Fleeger. From these species, *C. xenuus* was reallocated into a new genus, *Dahlakia* Por, as *D. xennus* (Por) Por (Por, 1986).

The taxonomy of the genus *Cletocamptus* has been a difficult task to deal with since its creation during the ninetheenth century, due to its great morphological plasticity (Lang, 1948; Wells & McKenzie, 1973; Yeatman, 1963).

Por (1986), carried out a re-evaluation of the family Cletodidae and decided to place *Cletocamptus*, along with other genera, into a new family, the Canthocamptidae *incertae sedis*, probably being aware of certain relationship with the Canthocamptidae. Presently, most genera allocated to the Canthocamptidae *incertae sedis* by Por (1986) have been reallocated into other taxa, so that only the genus *Cletocamptus* and *Heteropsyllus serratus* Schriever remain as representatives of this familiy.

Fleeger (1980) sumarized the variability observed in *Cletocamptus deitersi*, and based on its wide range of variability, suggested that *C. gabrieli* should be considered a junior synonym of *C. deitersi*, since the variability of the former fell into the variability range of the latter.

With regard to the Mexican specimens gathered from Ensenada del Pabellón lagoon, they belong, undoubtedly, to *C. deitersi* since their morphological features fall into the range of variability of this species (Fleeger, 1980, :29-30, Table I and II). In fact the only deviation from the general plan of variability of *C. deitersi* as compiled by Fleeger (1980), corresponds to the antennal exopodite, which in the Mexican specimens exhibits only one seta on the second segment, thus extending the range of variability of this species from 1 to 4 setae on the antennal exopodite.

FAMILY Orthopsyllidae Huys 1990b

GENUS Orthopsyllus Brady & Robertson 1873

Orthopsyllus linearis Claus 1866

Original description: *Liljeborgia linearis* n. sp. Claus 1866, :22.

Synonym: *cum* Lang, 1948.

Orthopsyllus linearis n. spp. 1
(Figs. 278-284)

Material examined:

One dissected male labeled EMUCOP-706-A, from station 6, found at 0-3 cm depth, on 03/JAN/92, and one dissected female labeled EMUCOP-455-C, from station 3, found at 6-9 cm depth, on 02/MAY/91.

Female

Habitus (Fig. 278a, 278b, 278c): body cylindrical; length, including rostrum and caudal rami, 772 µm. Rostrum (Fig. 278a, 281a), triangular, with pair of subapical sensillae. Cephalothorax with pattern of depressions, and about 1/5 of entire body length; lateral borders slightly irregular; with posterior margin somewhat ondulate. Dorsal surface of pro- and urosomites ornamented with minute spinules; with caudal margin markedely ondulate; ventrally ornamented with spinules as dorsally; without ondulate caudal margin. Genital double-somite completely separated dorsally and partially fused ventrally; genital field located on first genital somite. Anal somite furnished with spinules as in preceding somites; with rounded and dentate anal operculum reaching end of somite and flanked by backwards directed acute projections reaching the middle of caudal rami, the latter about 1.3 times longer than wide, conical, ornamented with minute spinules as preceding somites and with coarser spinules along inner edge. With 7 setae.

Antennule (Fig. 281), four-segmented; first segment with 2 short rows of spinules (proximal ones blunt), second segment with tooth-like projection on distal outer corner, third segment with aesthetasc; all setae smooth except for 2 pinnate elements on third segment and 2 curiously armed strong spines on terminal segment.

Antenna (Fig. 279b): allobasis with pinnate short abexopodal seta. Endopodal segment with sharp spinules proximally and blunt elements subdistally; with 3 lateral and 1 distal spine, 2 geniculate setae and 1 strong spine with small seta fused at base. Exopodite one-segmented; with 1 lateral, 1 subdistal, and 2 apical setae.

Mandible (Fig. 279c): chewing edge armed with several teeth and 1 pinnate seta; coxa-basis with 2 setae, proximal one reduced. Endo- and exopodite furnished with 3 and 1 seta respectively.

Maxillule (Fig. 279d): praecoxal arthrite ornamented with some spinules and 1 short surface setae, 7 distal spines and 3 setae; coxal endite with 2 setae; basis with 2 slender and 1 strong seta. Endopodite represented by 2 setae of equal length. Exopodite consisting of 2 setae of unequal length (or 1 seta + 1 small setule?).

Maxilla (Fig. 279e): syncoxa furnished with several rows of spinules; with 3 endites; proximal endite with 1, median and distal ones with 3 setae. Basis with a strong claw and 3 surface setae. Endopodite with 3 elements.

Maxilliped (Fig. 279f): basis ornamented with median row of spinules and 1 bipinnate subdistal seta. First endopodal segment with longitudinal row of spinules along inner margin; second segment with a claw and 1 accompanying seta.

P1 (Fig. 283b): coxa with seemingly outer edge dentate; basis with spinules at base of outer and inner setae and between rami. Exopodite three-segmented, reaching distal third of second endopodal segment. Endopodite two-segmented, slightly longer than exopodite; first segment reaching joint between second and third exopodal segment. Chaetotaxy as in Table 35.

P2: exopodite as in male (Fig. 283c). Endopodite (Fig. 280a), two-segmented; first segment without armature; second segment with 1 lateral and 2 apical setae (one of them small). Chaetotaxy as in Table 35.

P3 (Fig. 281b), with bare coxa and basis only with some spinules close to outer seta. Exopodite three-segmented, without inner setae and ornamented with blunt spinules. Endopodite two-segmented and reaching tip of first exopodal segment. Chaetotaxy as in Table 35.

P4: exopodite as in male (Fig. 284b). Endopodite (Fig. 280b), two-segmented; first segment without, second segment with 1 lateral and 2 apical setae. Chaetotaxy as in Table 35.

P5 (Fig. 281d), with triangular baseoendopodite bearing 1 innermost spine and 2 inner setae, and 2 apical elements. Exopodite slightly reaching beyond baseoendopodal lobe; with inner edge almost straight and bearing 6 setae in all.

P6 (Fig. 278c), represented by 2 setae of similar length.

Male

Habitus (282a, 282b, 283a): general shape as in female, except for genital double-somite and ondulated caudal margin of urosomites ventrally; length, including rostrum and caudal rami, 725 μm. Anal somite without acute projections flanking anal operculum and with row of small spinules close to joint with caudal rami, the latter almost twice as lon as broad, ovate, with coarser spinules along inner edge and outer ungiform projection subdistally, with 7 setae.

Antennule (Fig. 279a), subchirocer; six-segmented. Integument of segments smooth except for some sharp and some blunt spinules on first one; fourth segment globulous; all seta smooth except for a curiously armed and robust element on second segment, and 2 thickened setae on fourth one.

P1, as in female.

P2 (Fig. 283c): coxa fused with intercoxal element; basis with some small spinules at base of outer seta. Exopodite three-segmented. Endopodite two-segmented; first segment small, as long as broad, without ornamentation; second segment reaching joint between second and third exopodal segments. Chaetotaxy as in Table 36.

P3 (Fig. 284a): coxa as in preceding limb; basis smooth, except for some spinules between rami. Exopodite three-segmented, as in P2. Endopodite two-segmented, strongly modified; proximal segment without ornamentation; distal component prolonged and reaching middle of third exopodal segment, with 1 proximal pinnate setae, and 1 pinnate and 1 small seta distally. Chaetotaxy as in Table 36.

P4 (Fig. 284b): coxa, intercoxal sclerite and basis as in P3. Exopodite as in P3, except for apical blunt spinules on third segment. Endopodite two-segmented, reaching about the middle of first exopodal segment; first segment small, nearly as long as wide; second segment with 4 elements in all. Chaetotaxy as in Table 36.

P5 (Fig. 283a): ornamented with spinules between rami; baseoendopodal lobe of both limbs fused, each represented by an inner strong pinnate spine and a small outer seta. Exopodite nearly rectangular, with 3 outer small setae, 1 distal strong spine and 1 inner small element.

P6 (Fig. 283a), represented 2 asymmetrical plates with 2 slender setae each.

Variability

The only female studied showed an aberrant endopodite of P3 (Fig. 281c).

Table 35. Chaetotaxy of the female of *O. linearis n. spp. 1.*

	P1	P2	P3	P4
EXP	0-0-022	0.0.122	0.0.122	0.0.122
ENP	0.020	0.120	0.121	0.111

Table 36. Chaetotaxy of the male of *O. linearis n. spp. 1.*

	P1	P2	P3	P4
EXP	0-0-022	0.0.122	0.0.122	0.0.122
ENP	0.020	0.120	0.120	0.121

Comparison and discussion

The taxonomy of this genus has proved to be very confusing because of the lack of type material, innacurate description of the type species *Orthopsyllus linearis* (=*Lilljeborgia linearis*) by Claus (1866), the quite different identifications made by Brady (1880) and Sars (1909), "on the basis of which almost every finding of *Orthopsyllus* made before 1941 was assigned to *linearis*" (Lang, 1965), the omission of

any description on a given structure, presentation of sketchy figures, descriptions based on later copedodid stages, and finally, because of intraspecific variability (Lang, 1965; Wells, 1968; Boer, 1971). Kunz (1971), following Lang's view, suggested that the specimens of *Orthopsyllus* collected before 1971 in Helgoland should be allocated with *O. linearis*. That same year, Boer (1971) carried out a revision of the genus, and concluded that only four species of *Orthopsyllus* should be considered valid, namely *O. linearis* Claus 1866, *O. spinicaudatus* Krishnaswamy 1957, *O. sarsi* Klie 1941, and *O. wallini* Lang 1934, and subdivided *O. linearis* into five groups: *O. linearis s. str.* Claus 1866 *O. linearis major* Klie 1939, 1941, *O. linearis improportionatus* Jakobi 1954b, *O. linearis illgi* Chappuis 1958, and *O. linearis setosus* Boer 1971. Since Boer's revision, one valid species (*O. coralliophilus* Fiers 1987), and two subspecies of the *linearis*-group (*O. linearis setosus* Boer 1971, and *O. linearis curvaspina* Mielke 1993) have been added.

Huys (1990b), announced the creation of two new genera of Orthopsyllidae, *Dionyx* Huys and *Infrapedia* Huys in a paper that has not appeared yet (Huys, R., in press. Marine biological investigations in the Bahamas. Orthopsyllidae fam. nov. (Copepoda: Harpacticoida), a new family of the laophontoidean core. *Sarsia*). In his paper, Huys (1990b) makes reference to a species described by Fiers (1987), *Orthopsyllus coralliophilus*, as *Infrapedia coralliophila* Fiers. From this, I assume that in Huys' unpublished paper, *O. coralliophilus* was transferred, by some obscure reasons, to the genus *Infrapedia*. Unfortunately, Huys (1990b) does not mention the genus Dionyx, so that is impossible to acertain the identity of the species that compose this genus as well as the rest of species that constitute the genus *Infrapedia*. These two genera, *Dionyx* and *Infrapedia* are currently treated as *nomina nuda* (Bodin, 1997), since they have not been diagnosed yet.

The Mexican representatives here described can easily be excluded from *O. wallini*, *O. coralliophilus*, *O. spinicaudatus* and *O. sarsi* given their exclusive features (*i. e.* only two outer spines on third exopodal segment of P2-P4 in *O. wallini*, *O. littoralis* (=*O. wallini*, after Boer, 1971) and *O. coralliophilus*; an inner seta on the second exopodal segment of P2-P4 in *O. spinicaudatus*; an inner seta on the first exopodal segment of P1 in *O. sarsi*).

Originally, Chappuis (1958, :417-4119, Fig. 12-22) described, based on a number of male and female specimens, a new species, *Enhydrosoma illgi* (=*Orthopsyllus linearis illgi*) from Seattle (Washington, U. S. A.), partly founded upon the last copepodid stage (after Lang, 1965). This species has been reported as *Orthopsyllus sp.* (m) (Sewell, 1940, :341-343, Fig. 84) (probably the male of *O. rugosus* Nicholls, after Vervoort, 1964), *O. rugosus* (Nicholls, 1941a :420-422, Fig. 21), *O. similis* (Nicholls, 1942: 167-168, Fig. 4), *O. pectinicauda* (Vervoort, 1964), and *O. dubius* (Vervoort, 1964). Lang (1965, :403-411, Fig. 222-227) redescribed the species from Monterey Bay (Califoirnia U. S. A.), and later, Marinov & Apostolov (1985, :173, Fig.6) and Apostolov & Marinov (1988, :272-273, Fig. 108) reported this species from the Spanish Sahara and Bulgaria respectively. All the above mentioned descriptions agree well one with each other, although some differences can be found when comparing the existing literature cautiously.

Sewell's (1940) description was based in all probability on a immature male as shown by the imperfect separation of the segments of A1, rami of P5, and P3 ENP, and will not be considered in the present analysis.

The original description by Chappuis (1958) and Nicholls (1941a), are almost identical. In fact the only differences found when comparing both descriptions are (i) the relative length of the innermost seta of P1 EXP 3 (as long as innermost seta of ENP 2 in Nicholls' description, and shorter in Chappuis'), (ii) insertion of the inner seta of female P2 ENP 2 (rather proximally in Chappuis' description, subdistally in Nicholls'), (iii) the proportional length of the third inner seta of female P5 BENP (about as long as the apical setae in Nicholls' description, and shorter in Chappuis'), (iv) chaetotaxy of female P5 EXP (innermost small seta probably overlooked by Chappuis), female P3 and P4 ENP (the inner seta of P4 ENP 1 of *O. rugosus* is depicted as a spinule or a cuticular hair in Lang, 1965, :408, Fig. 225b). It has to be noted that the relative length of the setae of female P4 ENP 2 agrees well in both descriptions.

Nicholls (1942) agrees in every respect with his former description (Nicholls, 1941a), except for the implantation of the inner seta of female P2 ENP 2, which resembles more that of Chappuis' (1958). Differs from Chapppuis (1958) in the shape of male P3 ENP, insertion of the seta of male P3 ENP 2 (on the outer margin in Chappuis', and on inner margin in Nicholls' illustration), and chaetotaxy of swimming legs.

Lang (1965) reported and redescribed this species from Monterey Bay (California, U. S. A.). The original description by Chappuis (1958) and the description of the Californian representatives by Lang (1965) are almost identical. In fact, the only differences found when comparing both descriptions are: (i) the proportional length of the innermost seta of P1 EXP, (ii) the presence of a small outer seta on the

female P2 ENP 2 in Lang's description (probably overlooked by Chappuis), (iii) relative length of the seta of female P4 ENP 2, (iv) relative length of male P5 EXP and number of setae on baseoendopodal lobe (innermost seta probably overlooked by Chappuis), (v) most apical small seta of male P3 ENP 2 (present in Lang's description, missing in Chappuis'), and (vi) number of setae of female P5 EXP. Additionally, Lang (1965) illustrated in detail the variability of the anal segment and caudal rami of seven Californian females, some of them resembling Chappuis' illustration. Nicholls (1941a) differs from Lang (1965) in the chaetotaxy of female P3 ENP 2 (with inner seta as depicted by Lang, without this element in Nicholls's description), and relative length of the seta of female P4 ENP 2, while Nicholls (1942) differs from Lang (1965) in the position of the seta of male P3 ENP 2, that resembles more that of Chappuis (1958). The description of the representatives found by Apostolov & Marinov (1988) agrees completely with Lang's description of the species.

Boer (1971) stated that the *O. illgi*-group can be distinguished from the rest of species and species-groups by the length of the two longest setae of the female P5 BENP (of about the same length and shorter than the longest seta of EXP) and shortness of the two innermost setae of BENP. However *O. linearis illgi sensu* Marinov & Apostolov (1985), whose female P5 is depicted bearing two equally long apical setae of BENP as long or longer than the longest seta of EXP, and with the innermost but one seta of BENP of comparable size as those apically, can well belong to the *linearis*-group.

The *improportionatus*-group as defined by Boer (1971) can be separated from the other groups only by the length ratio of P1 ENP 1/P1 ENP 2. In fact, the range of this group (ENP 1 from 1.6 to 1.8 times longer than ENP 2) can encompass some individuals of the *illgi*-group. With respect to the descriptions of *O. linearis improportionatus* by Pesta (1959, = *O. linearis* Claus), the presently described new subspecies differs by the male one-segmented endopodite P4 (in all probability a misinterpretation) and by the relatively long element of male P5 exopodite (?). The differences found between the description of *O. linearis improportionatus* by Lang (1965, = *O. linearis* Claus) and T. SCOTT (1912; = *O. linearis* Claus), and the description herein provided are the relative length ratios of P1ENP1/P1ENP2 and the relative length of the endopodite of P3. Unfortunately, the only male limbs depicted by T. SCOTT (1894; = *Cletodes linearis* Claus) are P5 and P6.

The mexican specimens can be separated from the *major*-group basically by the length ratio of P1 ENP 2/P1 ENP 2, shape of the setae of female P3 ENP 2 and P4 ENP 2, male P4 ENP 2 and P5.

Boer (1971) described, based on a single female specimen, *O. linearis f. setosus*, and characterized primarily by an outer broadened-at-base terminal seta of caudal rami, and stated that this subspecies exhibits certain features by means of which can be separated from the remaining subspecies. These features are: (i) unusual number of outer setae on caudal rami, and (ii) two longest "ramified" setae on both the exo- and baseoendopodite of P5. Boer (1971) assured that those structures could not be but setae, as they were distributed in a more or less even manner. However, since it is difficult to accept the existence of more than seven setae on the caudal rami and "ramified" setae, and since these structures can be protozoans or algae, these features should be taken prudently.

O. linearis curvaspina Mielke 1993 differs from the presently described new subspecies. primarily in the sharp spinules furnishing the male P2-P4, shape of female P3 ENP and P4 ENP, male P4 ENP, male P3 ENP and bent distal spine of P3 EXP 3

Undoubtedly the Mexican specimens belong to *O. linearis*, and showed to resemble more *O. linearis s. str.* than any other subspecies, as shown when compared with the illustrations by Brady (1880) (probably based on a juvenile), Pesta (1916), Lang (1935), Klie (1950; = *O. agnatus*), Noodt (1955a, = *O. linearis f. bulbosus*), Bodin (1964, = *O. propinquus* Monard 1926), Wells (1968) and Hamond (1970) (= *Orthopsyllus* sp), primarily in the P1 ENP 1/P1 ENP 2 length ratio (though the male P2 depicted by Hamond (1970) exhibits a distal outward bent element on P2 EXP 3, and a relatively longer P2 ENP). In fact, when I first examined the male of the Mexican specimens I was of the opinion that it should belong to *Orthopsyllus linearis s. str.* given the close resemblance to other descriptions. However with the female at hand, I decided to erect a new subspecies given the markedely differences in the shape of the female anal segment, feature not shared with any other subspecies or species-group and by the apparently dimorphic caudal rami.

The taxonomy of this genus is quite complicated and the relationships of all the species within it need to be clarified. This can only be achieved through a thorough revision of the genus and redescription of the species so far assigned to *Orthopsyllus* and the appropriate diagnosis of the taxa considered as *nomina nuda*, *Dionyx* Huys and *Infrapedia* Huys.

FAMILY Leptastacidae Lang 1948 *sensu* Huys 1992

GENUS *Belemnopontia* Huys 1992

Belemnopontia panamensis Mielke 1983
(Figs. 285-288)

Original description: *Leptastacus dispinosus panamensis* nov. subspec. Mielke 1983, :296-298, Fig. 5-6.

Synonym: *Leptastacus dispinosus panamensis* Mielke 1983 (after Huys, 1992).

Distribution: Mexico: South-eastern Gulf of California (present study); Panama: Isla Naos, Isla Flamenco, Playa Punta Chame (Pacific coast) (Mielke, 1983).

Material examined:

SEX	STAGE	# IND.	STORED AS	# CATALOGUE	STATION	DEPTH	DATE
F	A	2	Alc.	EMUCOP-731-G	14	0-3 cm	03/JAN/92
F	A	5	Alc.	EMUCOP-995-F	14	6 -9cm	03/JAN/92
F	A	1	Alc.	EMUCOP-996-D	14	0-3 cm	03/JAN/92
F	A	2	Alc.	EMUCOP-997-A	14	3-6 cm	03/JAN/92
F	A	1	Diss.	EMUCOP-644-C	6	3-6 cm	01/MAY/91
F	A	1	Diss.	EMUCOP-727-B	14	3-6 cm	03/JAN/92
F	A	1	Diss.	EMUCOP-993-B	14	3-6 cm	03/JAN/92
M	A	1	Diss.	EMUCOP-994-B	14	3-6 cm	03/JAN/92

Comparison and discussion

Mielke (1982b) described a new species of *Leptastacus* (*L. dispinosus*) from Galapagos, and one year later (Mielke, 1983), he found one subspecies, *L. dispinosus panamensis*, in the Pacific coast of Panama. Huys (1992) elevated *L. dispinosus panamensis* to the species rank, based on several distinctive features, and created the genus *Belemnopontia* to accommodate both species described earlier by Mielke (1982, 1983), that, along with the genera *Schizotrix* Huys, *Cerconeotes* Huys and *Psammastacus* Nicholls represent the monophyletic sistergroup of *Leptastacus* (Huys, 1992). To my knowledge, this is the second record of *Belemnopontia panamensis* Mielke from Pacific localities. The Mexican representatives agree well with the original description provided by Mielke (1983). In fact, the only differences found between both populations are the innermost spine of the female P3 ENP (Fig. 287c), that in my opinion, is not fused to the supporting segment, and shape of the inner spine of the male P3 ENP (Fig. 288c).

GENUS *Cerconeotes* Huys 1992

Cerconeotes n. sp. 1
(Figs. 289-293)

Material examined:

Two dissected females (EMUCOP-486-A, EMUCOP-487-A), and one dissected male (EMUCOP-488-B) from station 7, found at 0-3 cm depth, on 03/JAN/92.

Female

Habitus (Fig. 289a): length, including rostrum and caudal rami, 300 µm; body slender and cylindrical, slightly tapering from genital double-somite to caudal rami; somites well defined; dorsal surface smooth; hyaline frill of somites vestigial. Cephalothorax tapering anteriorly, as long as first two pedigerous somites; with elongated rostrum not reaching end of first antennulary segment. First and second prosomite clearly shorter than third one; P5 bearing-somite as long as preceding somite, and slightly shorter than genital double-somite. Genital double-somite (Fig. 289a, 289b) completely fused

dorsally and ventrally; vestige P6 represented by two slender seta; genital field located in the middle, copulatory pore located posteriorly. Fourth and fifth urosomoite shorter than preceding somite and as long as first and second prosomite. Anal somite narrow, with anal operculum weakly developed; ventrally with median spinules close to caudal rami, the latter cylindrical, about twice as long as wide, smooth except for some spinules ventrally at heigh of dorsal seta and on caudal margin; distal tip rounded without spinous process, with 5 setae (I did not find the small seta fused to seta V observed in other species of the genus).

Antennule (Fig. 290a), slender, seven-segmented; surface of segments smooth; with aesthtetasc on fourth segment and last segment.

Antenna (Fig. 290b), with allobasis about twice as long as endopodal segment. Exopodite small, one-segmented, bearing 2 small setae. Endopodal segment with some small spinules proximally on inner margin; subdistally with some stronger spinules and 1 spine; distally armed with 6 elements, outtermost minute seta fused to next geniculate element.

Mandible and maxillule, unknown.

Maxilla (Fig. 290c): syncoxa massive, with 3 endites, proximal one with 1, median and distal endites with 2 setae each; basis with strong unarmed claw with 1 accompanying seta. Endopodite composed of 1 long and slender segment bearing 4 setae.

Maxilliped (Fig. 290d), as for the family.

P1 (Fig. 291a): coxa and basis smooth. Exopodite three-sgmented, hardly reaching the middle of second endopodal segment; segments without inner armature; third segment with 3 setae/spines in all. Endopodite two-segmented; first and second segment of about the same length; first segment with 1 inner small setae; second segment with 2 elements apically. Chaetotaxy as in Table 38.

P2-P4 (Fig. 291b, 291c, 291d): coxa and basis smooth. Basis of P2 seemingly without outer seta. Exopodite three-segmented; first segment without armature; second segment of P2 and P3 without, of P4 with inner seta; third segment of P2 without, of P3 and P4 with inner seta. Endopodite two-segmented without inner seta; of P2 reaching about the middle of third exopodal segment, of P3 hardly reaching heigh of outer spine of second endopodal segment, of P4 reaching proximal fifth of third exopodal segment. Chaetotaxy as in Table 38.

P5 (Fig. 291e), triangular, with exopodal and endopodal lobes completely fused; with 4 setae in all; outer distal corner with small acute projection.

Vestige P6 (Fig. 289b), represented by two slender setae.

Male

General body shape as in female; length including tip of rostrum and caudal rami, 275 µm.

The sexual dimorphism orbeserved, as in the genus, in A1, P3 ENP, genital segmentation, P5 and P6

Antennule (Fig. 293a), eight-segmented, haplocer, with slender aesthetasc on fourth and ultimate segment.

Mouth parts, P1, P2 and P4 (not illustrated) as in female.

P3: protopodal coomponents and exopodite as in female. Endopodite (Fig. 293b), two-segmented; first segment without armature and ornamented only with some spinules; second component with 1 smooth setae apparently fused to segment and 1 apical pinnate seta (apparently not fused to apical tip of segment).

P5 (Fig. 292b): resembling that of female, but somewhat more slender and with spinules along inner margin and larger acute process distally.

P6 (Fig. 292b): slightly asymmetrical, with 2 setae each.

Table 38. Chaetotaxy of *Cerconeotes n. sp. 1.*

	P1	P2	P3	P4
EXP	0.0.021	0.0.021	0.0.121	0.1.121
ENP	1.020	0.010	0.011	0.110

Comparison and discussion

Huys (1992, :156-157) erected the genus *Cerconeotes* to reallocate some closely related species formerly placed in the genus *Leptastacus* T. Scott. Presently, the genus *Cerconeotes* is composed of 5 well defined species (the Mexican representatives included) and four *species inquirendae*. The Mexican representatives showed to be closely related to *C. japonicus* Itô, 1968 and

C. constrictus Lang, 1965 (both species probably synonymous, after Huys, 1992), sharing the lack of the inner distal acute projection of caudal rami as shown in the original drawings, but differs basically in the presence of spinules on the posterior margin of caudal rami, at base of inner dorsal seta, and on ventral posterior edge of anal segment, and in the shape of female P5 (with acute projection distally in *Cercoenotes n. sp. 1*, without such projection in *C. mozambicus* and *C. japonicus*) . The ventral ornamentation of the anal segment is also present in *C. mozambicus* as shown by Huys (1992).

FAMILY Cletodidae T. Scott 1905 (part.) *sensu* Por 1986

Note

T. Scott (1905) coined the term Cletodidae to designate a family for which he gave no diagnosis, and was represented only by one species, *Cletodes sarsi* T. Scott, and it was Sars (1909) who gave the first diagnosis for the family.

By 1928, the number of genera belonging to this family raised to 16 (Monard, 1928), and Lang (1936c), after reallocation of a number of taxa, recognized 86 species in 25 genera distributed into four "Entwicklungsreihen" (Argestigens, Leimia, Heteropsyllus and Paranannopus) within the Cletodidae.

Lang's (1936c) concept of the Cletodidae was accepted for almost five decades. By 1984, well over 40 genera were recognized within the family Cletodidae, at that time considered as one of the most heterogeneous families of the Harpacticoida (Por, 1986).

A second attempt to clarify the identity of the Cletodidae, was carried out by Por (1986). He dismantled the "artificial" family Cletodidae by redistributing its over 40 genera into new families. Thus, he coined the names for the Paranannopidae, Huntemannidae, Rhizothricidae, Argestidae and Cletodidae *s. str.*, and allocated several genera into the new subfamily Hemimesochrinae of the Canthocamptidae and into the Canthocamptidae *incertae sedis*.

Within the Cletodidae *sensu strictu*, Por (1986) recognized 9 genera: *Enhydrosoma* Boeck, *Cletodes* Brady, *Enhydrosomella* Monard, *Acrenhydrosoma* Lang, *Stylicletodes* Lang, *Australonannopus* Hamond, *Barbaracletodes* Becker, Noodt & Schriever, *Scintis* Por and *Limnocletodes* Borutzky. One year later, Fiers (1987) assigned the genus *Monocletodes* Lang to the Cletodidae *sensu* Por (Por (1986) had removed *M. spinosus* Klie to the genus *Metahuntemannia* -family Huntemanniidae- but omited to assign *Monocletodes* to a family). This concept of the Cletodidae have been accepted for a decade, and some taxa have been added (see below).

In 1872, two new genera were erected, *Enydrosoma* Boeck 1872 and *Cletodes* Brady 1872. The former was created to accomodate two new species from Oslofjorden, *E. curticauda* Boeck and *E. longicaudata* Boeck, whilst the term for the genus *Cletodes* was coined to allocate one new species, *C. limicola* Brady. Unfortunately, the genus *Enhydrosoma* was insufficiently diagnosed by Boeck so that succeeding investigators could not recognise it as different from the genus *Cletodes* (Sars, 1909), and some confusion arose surrounding the concept of these genera (for a brief revision see Gee, 1994).

The confusion surrounding the genus *Enhydrosoma* increased when Brady (1880) withdrew the genus name *Rhizothrix* Brady & Robertson, and described the species for which this genus name was coined, as *Enhydrosoma curvatum*. Brady (1880) was of the opinion that his newly described *E. curvatum* agreed with Boeck's description of *Enhydrosoma*. Later, T. Scott (1896, 1903) following Brady's concept of *Enhydrosoma* and *Cletodes* described *Cletodes hirsutipes* T. scott, *Enhydrosoma minutum* T. Scott and *E. gracile* T. Scott.

Sars (1909), after formally diagnosing the genus *Rhizothrix*, attempted to clarify the confusion about the identity of the genus *Enhydrosoma* and *Cletodes*. He (Sars, 1909) transferred *E. curvata*, *E. minutum* and *E. gracile* to the genus *Rhizothix*, and characterized *Enhydrosoma* by the presence of a well defined antennal exopod segment bearing two well developed setae, a slender mandibular gnathobase with delicate flattened teeth, normally developed maxillae and maxillipeds, comparatively short swimming legs in which the exopods bear long slender outer spines and no inner setae, and a robust P5 exopod armed with strong spiniform setae, while the genus *Cletodes* was diagnosed by the presence of a rudimentary antennal exopod represented by one seta, robust maxillae but small maxillipeds and a P5 with a slender elongate exopod and a reduced endopodal lobe bearing slender setae. To *Enhydrosoma* he assigned *E. curticauda* Boeck, *E. longifurcatum* Sars and *E. propinquum* Brady, while *Cletodes* was composed of *C. limicola*, *C. tenuipes* T. Scott, *C. curvirostre* T. Scott. *C. buchholtzi* Boeck and *C. longicaudatus* Boeck.

Later, Lang (1936c) argued that the differences between *Cletodes* and *Enhydrosoma* outlined by Sars (1909) with respect to the mouthparts and P5 were inconsistent, and characterized *Cletodes* as having an elongate distal segment of P3 and P4 exopodite bearing four elements and E*nhydrosoma* with a short segment bearing five elements. In his revision of the Cletodidae, Lang (1936c, :465-466, 467-469) recognized 6 species within *Cletodes* and 15 species within *Enhydrosoma*, and adopted the same concept in his monograph (Lang, 1948), except that *E. perplexa* was removed to a new genus, *Acrenhydrosoma* Lang 1948.

Since the publication of Lang's (1948) monograph, 47 species have been added to the genus *Enhydrosoma*. Of these, *E. minutum*, *E. gracile* and *E. curvata* were transferred to the genus *Rhizothrix*,

and the six Brazilian species described by Jakobi (1955) (*E. ivittae*, *E. minimum*, *E. guaratubae*, *E. cananeiae*, *E. gerlachi*, and *E. mangroviae*) have been omited from the literature and keys because of the inacurate original descriptions (Lang, 1965). As stated earlier, Lang's (1936c, 1948) concept of *Enhydrosoma* and *Cletodes* has been the only criterion to distinguish between both genera hitherto, whereas other taxonomically important morphological features have been disregarded (Gee, 1994), being the most striking result the expansion of the diagnosis of these genera to accomodate new forms leading, in the case of *Enhydrosoma*, a very heterogeneous and probably paraphyletic taxon (Fiers, 1987; Mielke, 1990b; Gee & Huys, 1996).

Coull (1975) suggested that *E. vicinum* Por, is in fact synonym of *E. hopkinsi* Lang, but after detailed revision of the description presented by Por (1967) it became clear that *E. vicinum* is in fact another species different from *E. hopkinsi*. *Enhydrosoma* sp Griga 1961 and *E. tunisensis* Monard have also been omited from most of the keys, the latter, because of some difficulties when determining this species, leading the unreliable report of this species by Petkovski (1964b) and Bodin (1964). Later, Fiers (1987) coined the name for the genus *Intercletodes* Fiers to allocate *I. interita* Fiers from Papua New Guinea.

In a contemporary attempt to define more precisely the genus *Enhydrosoma*, Gee (1994), based on the material on which Sars (1909) based his description of *E. curticauda* Boeck, his own material off Northumberland coast of Britain, and the description of *E. curticauda* from the White Sea by Chislenko (1967), carried out a detailed redescription of *E. curticauda*. Gee (1994) confirmed Sars' (1909) view that *Cletodes hirsutipes* was indeed a synonym of *E. curticauda*, and gave a provisional diagnosis of the genus *Enhydrosoma* with especial reference to some features so far disregarded such as the female genital field, male P6 (vestigial, without setae), mouth parts, pore pattern of P5, and sexual dimorphism.

Based on his analysis, Gee (1994) created the genus *Kollerua* in which he allocated five species formerly identified with the genus *Enhydrosoma*: *Kollerua radhakrishnai* Ranga Reddy, *K. uniarticulatum* Borutzky, *K. breviarticulatum* Shen & Tai, *K. birsteni* Borutsky, and *K. longum* Shen & Tai; and suggested that *E. franklini* Thistle, should be placed in the genus *Enhydrosomella* Monard, while *E. buchholtzi* and *E. curvirostre* along with the *buchholzi*-species group *sensu* Gee (1994) (*E. barnishi* Wells, *E. vervoorti* Fiers, and *E. bifurcarostratum* Shen & Tai) should be removed to new generaLater, Gee & Huys (1996) created the genera *Strongylacron* Gee & Huys (to accommodate *E. buchholzi*, as *Strongylacron buchholzi* Boeck 1872) and *Schizacron* Gee & Huys (in which they accommodate *Schizacron barnishi* (Wells) Gee & Huys, *S. bifurcarostratus* (Shen & Tai) Gee & Huys, *S. vervoorti* (Fiers) Gee & Huys and *S. intermedius* Gee & Huys), and suggested that the genera *Scintis* Por, *Australonannopus* Hamond and *Barbarocletodes* Becker should be regarded as *incertae sedis* in the Cletodidae.

Recently, Fiers (1996b) considered *E. gerlachi* and *E. mangroviae* along with *E. woodini* Thistle, as synonyms of *E. lacunae* Jakubisiak, recognized the specimens determined as *E. propinquum* by Ivester & Coull (1977) from South Carolina as an undescribed species (*Enhydrosoma* sp. Ivester & Coull), proved that *E. propinquum* described by Pallares (1975a) was in fact a new species (*Enhydrosoma rosae* Fiers 1996), and allocated *Cletodes stylicaudatus* Willey, to the genus *Stylicletodes* as *Stylicletodes stylicaudatus* Willey.

Gee & Burgess (1997) allocated *E. nicobarica* Sewell to a new genus, *Triathrix* Gee & Burgess along with two new species, *T. monatgni* Gee & Burgess and *T. kalki* Gee & Burgess, and Fiers (1997) added one new species to the genus *Triathrix*, *T. mayae*, and created a new genus, *Sphingothrix* Fiers, to accomodate a new species, *S. goldi* Fiers, and reallocated *T. kalki* to the newly created genus *Sphingothrix* as *S. kalki* Gee & Burgess.

Genus *Cletodes* Brady 1872

Cletodes n. sp. 1
(Figs. 294-301)

Material examined:

SEX	STAGE	# IND.	STORED AS	# CATALOGUE	STATION	DEPTH	DATE
F	A	1	Alc.	EMUCOP-215-A	9	0-3 cm	03/JAN/92
F	A	1	Alc.	EMUCOP-808-A	9	0-3 cm	03/JAN/92

F	A	1	Diss.	EMUCOP-258-B	9	0-3 cm	03/JAN/92
F	A	1	Diss.	EMUCOP-11-A	15	0-3 cm	24/JUN/91
F	A	1	Diss.	EMUCOP-214-A	9	0-3 cm	03/JAN/92
M	A	1	Alc.	EMUCOP-736-G	14	0-3 cm	03/JAN/92
M	A	1	Diss.	EMUCOP-460-D	3	0-3 cm	02/MAY/91
M	A	1	Diss.	EMUCOP-212-A	9	0-3 cm	03/JAN/92
M	A	1	Diss.	EMUCOP-213-A	9	0-3 cm	03/JAN/92

Female

Habitus (Fig. 294a, 294b), fusiform, tapering from posterior margin of cephalothorax towards anal segment. Length ranging from 408.6 to 422.4 μm, including tip of rostrum and caudal rami. Body length/length of cephalothorax ratio of 5.4; greatest width near posterior edge of cephalothorax and first prosomite, former with folded lateral sides and dorsal pair of longitudinal ridges; posterior margin with sensillae. Rostrum (Fig. 295i), fused to cephalothorax; with curved tip, set with fragile hairs. Surface of pro- and first to third urosomites smooth except for number of sensillae (6-8) on posterior margin; second to fourth urosomite with lateral sensilla arising from lateral bulbous structure, with rounded pleurites; surface of fourth and fifth urosomite smooth, the former with only four dorsal sensillae on posterior edge, latter only with 2 dorsal pores. Ventral surface of genital double-somite (Fig. 296a) smooth except for fine elements close to posterior margin of second genital somite, spinules on bulbous lateral structures and vestige P6. Fourth and fifth urosomites plain ventrally except for spinules close to posterior margin and for spinules on bulbous lateral structure of fourth urosomite. Dorsal and ventral surface of anal somite smooth except for spinules close to joint with caudal rami; with serrate operculum, the latter with a sensilla on each side. Caudal rami (Fig. 294c), twice as long as anal segment, L/W ratio ranging from 3.7 to 5.6, nearly cilindrical; narrow at base and somewhat swollen in proximal half; with minute spinules near posterior edge; with 7 elements in all.

Antennule (Fig. 295a), five-segmented; surface of segments smooth except for spinules on first one; second segment about 1.5 times longer than wide; fourth segment narrow; with aesthetasc on third and ultimate segment; all setae smooth except for 1 spinulose seta on first segment, 2 plumose setae on second one, 1 spinulose and 1 plumose element on third segment and 4 spinulose setae on ultimate component.

Antenna (Fig. 295b), with allobasis, the latter with spinules along inner edge; with abexopodal seta. Exopodite one-segmented, with 1 distal seta. Endopodal segment with spinules along inner margin and subdistally; with 7 distal elements.

Mandible (Fig. 295d, 295e): biting edge with six distal teeth, and two subdistal elements; palp short, ornamented with some spinules, with 1 lateral, 1 subdistal and 3 apical elements.

Maxillule (Fig. 295f): arthrite ornamented with 6 terminal spines, 2 lateral setae and 2 surface elements; coxa with 2 slender setae; basis with 6 apical and 5 lateral setae.

Maxilla (Fig. 295g): syncoxa ornamented with spinules on inner and outer edges, with two endites bearing three setae each; basis with unarmed claw and 4 setae. Endopodite represented by 2 elements.

Maxilliped (Fig. 295h), prehensil; basis ornamented with spinules, with one distal seta. Endopodal segment with spinules along inner margin; claw unarmed, with 1 accompanying seta.

P1 (Fig. 296b): coxa ornamented with some median spinules. Basis ornamented with some spinules at base of inner and outer seta, and between rami. Exopodite three-segmented, reaching tip of endopodite, the latter two-segmented, first segment small slightly broader than long, second segment about five times longer than first one. Chaetotaxy as in Table 39.

P2-P4 (Fig. 296c, 297a, 297b): coxa with row of spinules in the middle and close to outer distal corner; basis of P2 and P3 with, of P4 without spinules at base of endopodite. Exopodite three-, endopodite two-segmented. Endopodite of P2 and P3 hardly reaching tip of second exopodal segment, of P4 slightly beyond EXP 1. Chaetotaxy as in Table 39.

P5 (Fig. 297c): subsquarish baseoendopodite with long cylindrical outer extension bearing outer seta. Endopodal lobe represented by a single seta; with an inner hyaline pore. Exopodite long, with 1 lateral and 1 subapical outer seta, 1 inner subdistal element and 2 apical setae; with a long distal pore.

P6 (Fig. 296a): represented by median plate in the middle of first genital somite; each vestigial leg represented by a single seta.

Male

Habitus (Fig. 298, 299a, 299b, 300), as in female dorsally, except for genital double-somite; length ranging from 425 to 450 µm, including tip of rostrum and caudal rami; ventral surface of fourth to fifth urosomites smooth except for spinules close to posterior edge; caudal rami more cylindrical than in female.

Antennule (Fig. 301c), six-segmented, sub-chirocer; fourth segment globulous, with longitudinal row of spinules; with aesthetasc on third and ultimate segment (?).

Mouth parts, P1 and P2 (not illustrated), as in female.

P3 (Fig. 301a): coxa, basis and first exopodal segment as in female. Second exopodal segment with robust outer spine; third segment narrower than in female. Endopodite three-segmented; first segment as in female, second one with long inner hyaline distal apophysis, third segment small with 1 seta.

With regard to P4 (Fig. 301b), the second endopodal segment showed to be somewhat thicker than in female.

P5 (Fig. 301d): baseoendopodite as in female except for seta representing endopodal lobe. Exopodite with four elements.

Variability

The only variability observed was on the L/W ratio of caudal rami, from 3.8 to 5.6 for females and from 6.69 to 7.69 for males.

Table 39. Chaetotaxy of *Cletodes n. sp. 1.*

	P1	P2	P3	P4
EXP	0-0-022	0-0-022	0-0-022	0-0-022
ENP	0-011	0-020	0-010	0-010

Comparison and discussion

Cletodes n. sp. 1 resembles *C. tenuipes* T. Scott 1896 in most respects, and can be easily mistaked one for the other if only the swimming legs are compared. However, *Cletodes n. sp. 1* differs from *C. tenuipes* in the shape of caudal rami and in the position of caudal setae. Whereas *C. tenuipes* exhibits a caudal rami broader at base (see Sars, 1909; Por, 1959; Bodin, 1970), *Cletodes n. sp. 1* presents much more slender caudal rami, somewhat thickened in the middle. Furthermore, in *C. tenuipes*, the dorsal, anterolateral and anterolateral accessory seta arises in the proximal third of the ramus, and the posterolateral seta arises distally on second third, whereas in *Cletodes n. sp. 1* all these setae are located more distally.

Recently, it has been demonstrated the polyphily of the genus *Enhydrosoma*, and through detailed examination of the type species and related taxa, and the creation of new taxa (see above), this problem has been partially clarified. The same applies for the genus *Cletodes*, that in all probability is, as many other taxa of the Harpacticoida, paraphyletic, thus an urgent revision of the genus is needed.

Cletodes n. sp. 2
(Figs. 302-307)

Material examined:

SEX	STAGE	# IND.	STORED AS	# CATALOGUE	STATION	DEPTH	DATE
?	CIII	1	Alc.	EMUCOP-551-A	4-5	0-3 cm	04/MAY/91
F	A	1	Diss.	EMUCOP-431-A	3	3-6 cm	02/MAY/91
F	A	1	Diss.	EMUCOP-459-D	3	0-3 cm	02/MAY/91
F	CIV	1	Alc.	EMUCOP-517-E	4-5	0-3 cm	01/MAY/91
M	A	1	Alc.	EMUCOP-516-E	4-5	0-3 cm	01/MAY/91
M	A	2	Alc.	EMUCOP-428-A	3	3-6 cm	02/MAY/91
M	A	2	Alc.	EMUCOP-457-D	3	0-3 cm	02/MAY/91

M	A	1	Diss.	EMUCOP-504-D	4-5	0-3 cm	01/MAY/91
M	A	1	Diss.	EMUCOP-427-A	3	3-6 cm	02/MAY/91

Female

Habitus (Fig. 302a, 302b), fusiform, tapering from posterior margin of cephalothorax towards anal segment; length ranging from 589.9 to 607 µm including tip of rostrum and caudal rami. Cephalothorax about 1/5 of total body length; greatest width in the middle and posterior edge of cephalothorax and in first prosomite, the former with folded lateral sides, posterior margin with 8 sensillae arising from distinct cones. Rostrum (Fig. 303a), fused to cephalothorax; pitted; with slightly bilobed tip set with fragile hairs and two lateral sensillae. Surface of prosomites pitted, with 8, 10 and 10 sensillae arising from distinct cones on posterior margin. Urosomites pitted; first to third urosomite with 6, fourth with 4 cones bearing 1 sensilla each. Fifth urosomite with four cones with one pore each. Genital double-somite and fourth and fifth urosomites (Fig. 305c) plain ventrally, except for tiny spinules close to posterior edge of second genital somite, and for groups of long spinules close to posterior margin of fourth and fifth urosomite. Dorsal surface of anal segment pitted (Fig. 302a, 302b, 305a), with minute spinules close to joint with caudal rami; rounded spinulose anal operculum with a sensilla-bearing cone at each side. Caudal rami piriform, nearly as long as wide at the widest part, and as long as anal segment; outer proximal edge convex, concave distally; with dorsal keen at about 1/2 the length; with 7 elements in all.

Antennule (Fig. 303b), four segmented; surface of segments smooth except for spinules on first segment; third segment about 1.5 times longer than broad; with aesthetasc on third and last segment.

Antenna (Fig. 303c): allobasis ornamented with spinules along inner edge; with abexopodal seta. Exopodite represented by one feathered seta. Endopodal segment with spinules along inner margin and subdistally on outer edge; with 8 elements.

Mandible (Fig. 303d): biting edge with bidentate pars incisiva and a row of teeth behind; palp with 6 setae.

Maxillule (Fig. 303e): arthrite ornamented with 7 terminal spines, two lateral setae (one of them piriform), and two surface elements; coxa with 2 slender setae and basis with 7 (or 6?) apical and 5 lateral setae.

Maxilla (Fig. 303f): syncoxa ornamented with spinules on outer edge; with two endites, proximal endite bifurcate, with three slender small setae, distal one with 2 smooth and 1 spinulose element; basis with claw, with 2 slender and 1 strong spinulose setae. Endopodite represented by 2 smooth elements.

Maxilliped (Fig. 303g), prehensil; basis ornamented with spinules, without seta. Endopodal segment with spinules along inner margin; claw armed with minute spinules, without accompanying seta.

P1 (Fig. 304a): basis smooth. Exopodite three-, endopodite two-segmented. First endopodal segment smaller than second one, the latter with an inner seta and 2 apical elements, reaching tip of exopodite. Chaetotaxy as in Table 40.

P2-P4 (Fig. 304b, 304c, 304d): precoxa with spinules close to joint with coxa, the latter ornamented with spinules close to inner proximal and outer distal corner; basis of P2 and P3 with spinules between rami and at base of outer seta, of P4 only between rami. Exopodite three-segmented; first and third segment without, second with inner seta. Endopodite two-segmented, reaching heigh of inner seta of EXP 2; first segment smaller than second one; of P2 and P3 without, of P4 with an inner seta on ENP 2. Chaetotaxy as in Table 40.

P5 (Fig. 305b): baseoendopoal lobe subtriangular, with 1 inner short strong spine, 1 apical and 1 outer seta; with cylindrical outer extension bearing outer seta and furnished with fragile elements. Exopodite long, ornamented with spinules and fragile elements along inner and outer margin; with 1 median lateral outer seta, 1 subdistal outer seta, 2 apical elements, and 1 inner feathered seta.

P6 (Fig. 305c): represented by median pitted plate in middle of first genital somite. Each vestigial leg represented by a single seta; with median row of tiny spinules.

Male

Habitus (Fig. 306a, 306b, 306c), as in female dorsally, except for genital double-somite and caudal rami; length ranging from 496 to 533µm including tip of rostrum and caudal rami, the latter cylindrical and from 3.1 to 3.3 times longer than wide and 1.5 times longer than anal somite.

Antennule (Fig. 307a), six-segmented, sub-chirocer; fourth segment globulous, pitted, with longitudinal row of spinules on dorsal surface; with aesthetasc on third and ultimate segment.

Mouth parts, and P1-P2 and P4 (not illustrated) as in female.

P3 (Fig. 307b) as in female.

P5 (Fig. 307c): baseoendopodite without seta; outer seta of basis as in female, except for ornamentation. Exopodite with 1 lateral small seta and 2 apical elements (outermost smaller).

Table 40. Chaetotaxy of *Cletodes n. sp. 2.*

	P1	P2	P3	P4
EXP	0-0-022	0-1-022	0-1-022	0-1-022
ENP	0-111	0-020	0-021	0-121

Comparison and discussion

Within *Cletodes*, four species share the setal formula 234 on the terminal segments of the endopodite of P2-P4 respectively: *C. dissimilis* Willey 1935, *C. spinulipes* Por 1967, *C. pseudodissimilis* Coull 1971a, and *Cletodes n. sp. 2*. *C. pseudodissimilis* and *Cletodes n. sp. 2* differ from *C. dissimilis* and *C. spinulipes* primarily in the shape of the female caudal rami. *C. longifurca* Lang was known to exhibit some sexual dimorphism in the furca, whereas *C. pseudodissimilis* and *C. proximus* do exhibit a much more notable dimorphism, being completely piriform in the female and more cylindrical in the male. Although *Cletodes n. sp. 2* does fit well with the description of *C. pseudodissimilis* provided by Coull (1971a), these species differ in the following features: female P5 exopodite of *C. pseudodissimilis* is about 4.8 times longer than wide, and 6.6 times in *Cletodes n. sp. 2*, the ventral spinules on fourth, fifth and anal somite of *C. pseudodissimilis* are stronger and more abundant than in *Cletodes n. sp. 2*.

Genus *Enhydrosoma* Boeck 1872

Enhydrosoma lacunae Jakubisiak 1933 (Figs. 308-312)

Original description: *Enhydrosoma lacunae* nov. spec. Jakubisiak 1933, :93-94, Fig. 1-8.

Synonym: *Enhydrosoma woodini* Thistle 1980, :388-392, Fig. 3, 4; *Enhydrosoma gerlachi* Jakobi 1955, :91-92, Fig. 3; *Enhydrosoma mangroviae* (?) Jakobi, 1955, :90, Fig. 2 (after Fiers, 1996b; Fiers *in litt.*).

Distribution: Brazil: Cananeia (Sao Paulo) (Jakobi, 1955); Cuba: Matanzas (Jakubisiak, 1933); Mexico: Celestún Lagoon (Yucatán Peninsula) (Fiers, 1996b), South-eastern Gulf of California (present study); U. S. A.: Belle Creek (Beaufort, North Carolina) (Thistle, 1980), Cocodrie (Louisiana) (Decho & Fleeger, 1988).

Material examined:

SEX	STAGE	# IND.	STORED AS	# CATALOGUE	STATION	DEPTH	DATE
F	A	2	Alc.	EMUCOP-370-A	11	0-3 cm	30/APR/91
F	A	1	Alc.	EMUCOP-785-F	10	3-6 cm	30/APR/91
F	A	1	Diss.	EMUCOP-809-A	11	0-3 cm	30/APR/91
F	A	1	Diss.	EMUCOP-12-F	15	0-3 cm	24/JUN/91
F	A	1	Diss.	EMUCOP-15-A	8	0-3 cm	02/MAY/92
F	A	1	Diss.	EMUCOP-93-C	8	0-3 cm	03/JAN/92
M	A	1	Diss.	EMUCOP-588-A	10	0-3 cm	30/APR/91

Comparison and discussion

Jakubisiak (1933) gave a rather brief description of *Enhydrosoma lacunae* from a lagoon near Matanzas in the north coast of Cuba. Besides, he dealt mainly with the gross morphology of the natatorial legs and caudal rami, and only a brief description of the antennule and antenna was provided. The remaining buccal appendages were regarded as resembling those of the type. This species was redescribed by Fiers (1996b) from Celestún Lagoon, an estuary in the northwest corner of the Yucatan Peninsula. In the present study, *E. lacunae* is reported again, but this time from Ensenada del Pabellón Lagoon, a coastal system in south-eastern Gulf of California, Mexico.

The specimens presented in this paper showed to be identical to those from which Fiers (1996b) based his redescription. Therefore the full description, comparison and discussion of the material gathered in this study is omitted, and only the figures are presented.

The length of the female specimens gathered from Enseneda del Pabellón Lagoon ranges from 335 to 388 μm, and the only male reported in this study measures 392 μm from tip of rostrum to posterior edge of caudal rami.

No variability was observed among the female specimens regarding the shape of furcal rami.

Enhydrosoma n. sp. 1
(Figs. 313-317)

Material examined:

One dissected female labeled EMUCOP-5-B from station 15, found at 0-3 cm depth, on 24/JUN/91.

Female

Habitus (Fig. 313a, 313b), tapering from posterior margin of cephalothorax towards anal segment. Body curved in lateral view. Lenght, 476 μm, including tip of rostrum and caudal rami; greatest width near posterior edge of cephalothorax, the latter nearly as large as 1/4 of body length, with strongly folded lateral sides, and dorsal pair of longitudinal ridges. Rostrum (Fig. 317g), triangular, fused to cephalothorax; with produced rounded tip; with one subdistal sensilla on each side. Surface of prosomites ornamented with transverse rows of minute spinules; with rounded pleurites and medio-lateral sclerotized longitudinal ridges; with 8 sensillae arising from distinct cones. First urosomite ornamented as in prosomites; with posteriorly directed triangular lateral edges; with 6 sensillae arising as in preceding somites. Genital double-somite (Fig. 314a) ornamented as preceding somite; first and second genital somite with 4 sensillae arising from distinct cones plus 1 sensilla arising from bulbous structure on each side; ventral surface plain except for two rows of small spinules on genital field, two setae representing vestige of P6, and median row of small spinules close to posterior edge of second genital somite. Fourth urosomite ornamented as preceding one, except for two dorsal sensillae arising from distinct cones; fifth urosomite ornamented with spinules as in preceding somites; with two dorsal and two lateral pores, latter arising from bulbous lateral structures. Anal somite (Fig. 315a) ornamented with small spinules; with rounded lateral margins and crescentic spinulose operculum, the latter with a sensilla-bearing cone on each side. Caudal rami cylindrical; slightly longer than anal segment in dorsal view; L/W ratio of 4.6; with minute spinules distally; with 7 elements in all.

Antennule (Fig. 316a), five-segmented; surface of segments smooth except for 2 and 1 row of spinules on first and second segment, respectively; the latter about 1.5 times longer than wide; fourth segment narrow; with aesthetasc on third and ultimate segment; all setae smooth except for 1 spinulose seta on first and third segment, and three spinulose elements on ultimate one.

Antenna (Fig. 316b), ornamented with spinules along inner edge of allobasis; without abexopodal seta. Exopodite one-segmented, with 1 subdistal and 1 distal spinulose seta. Endopodal segment with proximal and subdistal group of spinules on inner edge, and two subdistal rows of smaller spinules on outer margin; with 7 elements.

Mandible (Fig. 316c), with slender medial part of gnathobasis; biting edge with 6 spines and a single spinule; palp short with three plumose setae.

Maxillule (Fig. 316d): arthrite ornamented with 5 terminal spines, 2 lateral and 1 surface element; coxa basis furnished with 3 apical and 1 lateral setae; endopodite represented by a single element.

Maxilla (Fig. 316e), with spinules on inner and outer edges of syncoxa; with a single endite (proximal one) bearing 2 slender and 1 spinulose element; distal endite with a spinulose and a smooth seta; claw of basis unarmed, with two accompanying setae; endopodite represented by two slender elements fused at base.

Maxilliped (Fig. 316f), prehensil; syncoxa short, furnished with spinules close to outer distal corner; basis with spinules paralel to inner margin of palm; claw slender and curved distally, without accessory seta.

P1 (Fig. 317a), with two median rows of small spinules and two rows of long elements set close to outer and inner corner of coxa; basis with long spinules at base of inner and outer setae, and between

rami. Exopodite three-segmented, slightly longer than endopodite, the latter two-segmented; first segment small, about as long as wide. Chaetotaxy as in Table 41.

P2-P4 (Fig. 317b, 317c, 317d): coxa wiith small spinules in the middle and with longer elements close to inner proximal corner and near outer margin; basis with spinules on inner distal corner, between rami and at base of outer seta. Exopodite three-segmented, typically longer than endopodite, the latter two-segmented, of P2 reaching about the middle of EXP 3, of P2 hardly beyond tip of EXP 2, of P4 not reaching tip of EXP 3; first endopodal segment smalll, about as long as wide, second segment of P2 without, of P3 and P4 with inner element. Chaetotaxy as in Table 41.

P5 (Fig. 317e), with subsquarish baseoendopodite ornamented with median row of small spinules, and outer seta arising from long cylindrical outer extension. Produced endopodal lobe about 1/4 the length of exopodite, and ornamented with row of long elements at base and tip of lobe; with 3 setae (apical element lost during dissection). Exopodite long, with irregular lateral margins; with 1 lateral seta arising in distal third, 1 subapical and 1 apical element, the latter about 1.3 times longer than exopodite.

P6 (Fig. 314a): median plate in middle of first genital somite; furnished with two rows of small spinules at each side; each leg represented by a single seta thickened at base; copulatory pore in posterior half of genital double-somite.

Male

Unknown.

Table 41. Chaetotaxy of *Enhydrosoma n. sp. 1.*

	P1	P2	P3	P4
EXP	0-0-022	0-0-022	0-0-122	0-0-122
ENP	0-011	0-020	0-021	0-021

Comparison and discussion

See below.

Enhydrosoma n. sp. 2
(Figs. 314-315, 317)

Material examined:

One dissected female (EMUCOP-259-B) found in station 9 at 0-3 cm depth, on 03/JAN/92.

Female

Habitus (not illustrated), as in *E. n sp. 1* dorsally. Length including tip of rostrum and caudal rami: 356 µm. Genital double-somite (Fig. 314b) plain ventrally except for two setae representing vestige of P6, and for long spinules along posterior edge of second genital somite. Ventral surface of fourth and fifth urosimite plain except for long spinules close to posterior margin. Anal somite (Fig. 315b) and caudal rami as in *E. n. sp. 1*. L/W of caudal rami 4.1; with 7 elements in all.

Mouth parts, and P1-P4 (not illustrated) as in *E. n. sp. 1*, though smaller.

P5 (Fig. 317f), with baseoendopodite as in *E. n. sp. 1*, except for longer row of median spinules and long elements on outer distal corner close to articulation with exopodite; produced endopodal lobe abouth 1/5 of length of exopodite, with row of spinules at tip of lobe; with 3 elements in all. Exopodite long with irregular margins; with 1 lateral seta arising midway, 1 subapical and 1 apical strong element, latter about 1.3 times longer than exopodite; with a long subdistal inner pore.

P6 (Fig. 314b): represented by median plate in middle of first genital somite; without ornamentation; each vestigial leg represented by a single smooth seta; copulatory pore in posterior half of genital double-somite.

Male

Unknown.

Table 42. Chaetotaxy of *Enhydrosoma n. sp. 2.*

	P1	P2	P3	P4
EXP	0-0-022	0-0-022	0-0-122	0-0-122
ENP	0-011	0-020	0-021	0-021

Comparison and discussion

See below.

Enhydrosoma n. sp. 3
(Figs. 318-323)

Material examined:

SEX	STAGE	# IND.	STORED AS	# CATALOGUE	STATION	DEPTH	DATE
F	A	1	Alc.	EMUCOP-765-D	14	0-3 cm	24/JUN/91
F	A	1	Alc.	EMUCOP-421-B2	13	0-3 cm	24/JUN/91
F	A	1	Alc.	EMUCOP-418-A	13	3-6 cm	24/JUN/91
F	A	1	Alc.	EMUCOP-810-E	4-5	0-3 cm	01/MAY/91
F	A	3	Alc.	EMUCOP-513-E	4-5	0-3 cm	01/MAY/91
F	A	2	Alc.	EMUCOP-814-A	3	3-6 cm	02/MAY/91
F	A	2	Alc.	EMUCOP-282-B	12	0-3 cm	01/MAY/91
F	A	1	Diss.	EMUCOP-169-F	2	0-3 cm	01/MAY/91
F	A	1	Diss.	EMUCOP-297-C	12	0-3 cm	23/JUN/91
F	A	1	Diss.	EMUCOP-812-B2	13	0-3 cm	24/JUN/91
F	A	1	Diss.	EMUCOP-811-E	4-5	0-3 cm	01/MAY/91
F	A	1	Diss.	EMUCOP-187-B	9	0-3 cm	30/APR/91
F	A	1	Diss.	EMUCOP-815-A	3	3-6 cm	02/MAY/91
M	A	1	Alc.	EMUCOP-514-E	4-5	0-3 cm	01/MAY/91
M	A	1	Alc.	EMUCOP-813-E	4-5	0-3 cm	01/MAY/91
M	A	1	Alc.	EMUCOP-479-G	3	6-9 cm	02/MAY/91
M	A	1	Diss.	EMUCOP-189-B	9	0-3 cm	30/APR/91
M	A	1	Diss.	EMUCOP-188-B	9	0-3 cm	30/APR/91
M	CV	1	Alc.	EMUCOP-420-B1	13	0-3 cm	24/JUN/91

Female

Habitus (Fig. 313a, 313b), tapering from posterior margin of cephalothorax towards anal segment; body curved in lateral view; length ranging from 383 to 486.7 µm including tip of rostrum and caudal rami; greatest width near posterior edge of cephalothorax, the latter nearly as large as 1/4 of body length, with strongly folded lateral sides, a dorsal pair of longitudinal ridges and serrate posterior margin. Rostrum (Fig. 320g), triangular, fused to cephalothorax; with produced bilobed tip; with a subdistal sensilla on each side. Surface of prosomites ornamented with tiny spinules; with posterior edge serrate; with rounded pleurites; with 6 sensillae arising from distinct cones, and 2 median sensillae arising from socles. First urosomite ornamented as in prosomites but with only 6 sensillae arising from distinct cones. Surface and posterior edge of genital double-somite and subsequent urosomites as in first urosomite; first and second genital somite with 4 sensillae arising from distinct cones plus 1 sensilla arising from bulbous lateral structure; ventral surface plain except for row of spinules on genital field, 2 setae representing vestige of P6, and spinules close to posterior edge of second genital somite (Fig. 319b). Fourth urosomite ornamented as preceding one except for 2 dorsal sensillae arising from distinct cones; ventrally plain except for median row of spinules close to posterior margin; fifth urosomite ornamented without dorsal sensillae; with lateral pores arising from bulbous lateral structures. Anal somite ornamented with small spinules dorsally; with rounded lateral margins and spinulose operculum, later with a sensilla-bearing cone on each side (Fig. 319a, 319b, 319c); caudal rami as long as anal segment; proximal half ovate, distal half cylindrical, L/W ratio ranging from 3.1 to 5; with minute spinules near posterior edge, with 7 elements in all.

Antennule (Fig. 320a), five-segmented; surface of segments smooth except for three rows of spinules on first segment and some spinules on third one; second segment twice as long as wide; fourth segment narrow; with aesthetasc on third and ultimate segment.

Antenna (Fig. 320b), with spinules along inner edge of allobasis; with abexopodal seta. Exopodite one-segmented, with 1 subdistal and 1 distal spinulose seta. Endopodal segment with spinules on inner margin and on outer distal corner; with 7 distal elements.

Mandible (Fig. 320c), with slender gnathobasis; biting edge with 6 spines and a single spinule; palp short, ornamented with spinules, with three setae.

Maxillule (Fig. 320d): arthrite ornamented with three terminal spines, two lateral setae and two surface elements; coxa basis furnished with 2 apical and 1 lateral seta; endopodite represented by a single element.

Maxilla (Fig. 320e), with spinules on inner and outer edge of syncoxa; proximal endite with 1 spinulose element and 2 smooth setae; distal endite with 1 spinulose seta and a strong smooth element. Claw of basis unarmed, with 2 accompanying setae. Endopodite represented by 2 slender elements fused at base.

Maxilliped (Fig. 320f), prehensil, with short syncoxa furnished with spinules; basis with spinules close to inner margin of palm; claw slender and curved distally, without accessory seta.

P1-P4 (Fig. 321a, 321b, 321d; 321e): coxa ornamented with two rows of long spinules; basis ornamented with spinules between rami, at base of outer distal seta and on inner distal corner (in P1 at base of inner seta). Exopodite three-segmented. Endopodite two-segmented. Both rami similar to preceding species. Chaetotaxy as in Table 43.

P5 (Fig. 321f), with subsquarish baseoendopodite with long cylindrical outer extension bearing outer seta; with produced endopodal lobe abouth 1/3 of length of exopodite, and ornamented with 3 rows of long spinules, with 3 elements in all. Exopodite long, with irregular lateral margins; with 1 lateral seta arising in proximal half, 1 lateral seta medially on distal half, 1 subapical seta and 1 apical spinulose element about 1.3 times longer than exopodite.

P6 (Fig. 319d): represented by median plate in middle of first genital somite; furnished with row of spinules on each side. Each vestigial leg represented by a single seta. Copulatory pore in posterior half of genital double-somite.

Male

Habitus (Fig. 322a), as in female dorsally, except for genital double-somite. Length ranging from 402 to 417.8 μm including tip of rostrum and caudal rami. Ventral surface of second urosomite plain except for vestige of P6; third urosomite with spinules close to posterior margin; fourth and fifth urosomite with median and lateral rows of long spinules near posterior edge (Fig. 322b, 322c).

Antennule (Fig. 323a), six-segmented, sub-chirocer; fourth segment globulous, with longitudinal row of spinules on dorsal surface; with aesthetasc on third and last segment.

Mouth parts, P1, P2 and P4 (not illustrated), as in female.

P3 (Fig. 323b): coxa and basis, and first and third exopodal segment as in female. Second exopodal segment with robust outer spine. Endopodite two (or three?)-segmented; first segment as in female; second one with a broad long outer distal process with hyaline aspect reaching end of third exopodal segment; third(?) segment with 2 distal setae.

P5 (Fig. 323c): baseoendopodite as in female except for 2 strong spines. Exopodite long with irregular lateral margins; with 1 subdistal plumose seta and 1 apical spinulose element.

P6 (Fig. 322c): Represented by 2 ventral plates close to posterior margin of somite, ornamented with long spinules.

Variability

The caudal rami L/W ratio of female specimens were found to range from 3.1 to 5 (see caudal rami of Fig. 319). One female was found having an aberrant genital field (Fig. 319d), one female showed the third exopodal segment of P2 with only 3 elements (Fig. 321c), one female exhibited an aberrant exopodite of P5 (Fig. 321g), and another female showed aberrant left and right P5 (Fig. 321h).

Table 43. Chaetotaxy of Enhydrosoma n. sp. 3.

	P1	P2	P3	P4
EXP	0-0-022	0-0-022	0-0-122	0-0-122
ENP	0-011	0-020	0-021	0-021

Comparison and discussion

Por (1967) described a new form of *Enhydrosoma*, *E. vicinum* from Elat (Red Sea), closely related to *E. hopkinsi* Lang 1965 and *E. propinquum* Brady 1880. Por (1967) pointed out that this new species could be differentiated from *E. hopkinsi* and *E. propinquum* by comparison of the rostrum, furca and setation of P5. Later, Coull (1975) refused these differences and suggested that *E. vicinum* was in fact a junior synonym of *E. hopkinsi*, since "*E. hopkinsi*, however, shows minor, and surely not species specific differences; *e. g.* both rostra are similarly shaped (gradually tapering with bulbous tip); the P5's (both male and female) differ only in hair-like setule position and the caudal rami although at first glance appearing very different, differ only slightly in length/width ratio (2.6 for *E. vicinum*; 2.3 for *E. hopkinsi*) and minor spinule setation." However, Coull (1975) failed to see the differences in maxilliped armature. *E. hopkinsi* presents a maxilliped typical for *Enhydrosoma* (*sensu* Gee, 1994), with one seta on distal margin of the syncoxa, basis without seta on the palmar margin, and endopod represented by a claw with an accessory seta; while *E. vicinum* lacks seta on syncoxa and accessory seta on endopod. Besides, the structure of caudal rami are different indeed. In agreement with Coull (1975), at first glance, the most striking difference is in shape. However, other differences become clear when comparing the situation of setae (specially dorsal seta). This suggest *that E. vicinum* is in fact a valid species, as suggested by Gee (1994), and showed to share the absence of abexopodal seta of antenna with *E. curticauda*, *E. gariene*, *E. hopkinsi* and *E. variable* Wells Hicks & Coull 1982, and the absence of setae on maxilliped syncoxa with the *littorale* group (*sensu* Gee, 1994). With respect to female and male P5, and in agreement with Coull (1975), the only difference with *E. hopkinsi* is in L/W ratio.

The first two new species herein described clearly belong to the genus *Enhydrosoma sensu* Gee (1994). *Enhydrosoma n. sp. 1* and *Enhydrosoma n. sp. 2* showed to be closely related to *E. vicinum*. Unfortunately, the only report available on this species is the original description provided by Por (1967), in which he gave no comment on mandibular structure, and the description of remaining buccal appendages and of caudal rami is rather brief and poor in detail. However, from his illustrations, it seems clear that these three species share some features: (i) lack accessory seta, setae on syncoxa and on basis of maxilliped, (ii) presence of spinulose setae on third and fifth antennular segments, (iii) lack of abexopodal seta of antenna, and (iv) structure and setation of female's P5. This last feature seems to be unique for the group of species composed by *E. hopkinsi*, *E. vicinum*, *Enhydrosoma n. sp. 1* and *Enhydrosoma n. sp. 2*. Unfortunately the males of *Enhydrosoma n. sp. 1* and *Enhydrosoma n. sp. 2* were not found and no comment on the dimorphism of endopodite of P3 is given.

Enhydrosoma n. sp. 3 showed to be closely related to *E. propinquum*. Unfortunately, the descriptions of *E. propinquum* are poor in detail or deal only with female caudal rami, P1, P2 and P5 (see Brady, 1880; Por, 1960; Marinov, 1971; Apostolov, 1973; Mielke, 1975), exceptionally with buccal appendages (see Sars, 1909), and only Por (1960) shows the genital field of the species, though poor in detail. Besides, Brady (1880) stated that the "mouth-organs" of *E. propinquum* are as in *Stylicletodes longicaudatus* (which is clearly a misinterpretation, Fiers *in litt.*), and *Cletodes limicola*. However, these authors agree in the subovate shape of caudal rami and in the rather broad female's P5 exopodite, and Sars (1909) shows a maxilliped with a seta on syncoxa and an armed claw. *Enhydrosoma n. sp. 3* can be easily separated from *E. propinquum* based on the above mentioned features. *Enhydrosoma n. sp. 3* exhibits a rather cilindrical caudal rami, maxilliped lacks the seta on syncoxa and exhibits a bare slender claw, and the female P5 exopodite is somewhat less broad. The male P3 endopod of *E. propinquum* has not been documented. In agreement with Gee (1994), only few species have been reported bearing one or more enlarged outer spines on the exopodite of P3. This is the case of *E. latipes*, *E. gariene*, *E. pericoense* and *Enhydrosoma n. sp. 3*. With regard to the segmentation of the male endopodite of P3, Gee (1994) proposed three states: (i) a two-segmented endopod with second segment having the same number and form of armature elements as in female, and the outer spine (when present) articulating with the segment; (ii) as above except that the outer spine (homologue to female's second endopodal segment of P3 outer spine?) is enlarged, fused to the outer margin of the second endopodal segment, and with ornamentation pattern different to that of the outer spine in the female; and iii) the ramus is distinctly three-segmented, second endopodal segment bears a strong recurved apophysis at the anterior or inner (not outer) distal margin and the third endopodal segment bears at most two setae. Additionaly, this same author pointed out that some species *(E. stylicaudatum* Willey, 1935 *E. hopkinsi*, *E. vicinum*, *E. littorale* Wells, 1967, *E. baruchi* Coull, 1975, *E. herrerai* Bell & Kern, 1983, and *E. pericoense* Mielke, 1990b) have been reported having a three-segmented endopodite of P3, and suggests the possibility that this can, in fact, be a misinterpretation as the presence of the fused spine may make it appear from certain viewing angles that

the distal portion of the segment is separate even though there is no true articulation present. This can be also the case for *Enhydrosoma n. sp. 3*, that at first glance appears to be three-segmented.

Genus *Stylicletodes* Lang 1936c

Stylicletodes longicaudatus Brady & Robertson 1876, Brady, 1880 (Figs. 324-329)

Original description: *Cletodes longicaudata* Brady & Robertson 1876, :92, Fig. 13-19.

Synonym: *cum* Lang, 1948; *Cletodes (=Stylicletodes) numidicus* Monard 1935a, :79-80, Fig. 114-118, 120-124 (after Por, 1959; Lang, 1965); *St. numidicus* Monard (m) *sensu* Petkovski, 1955b (after Bodin, 1967).

Distribution: *cum* Lang, 1948; Argentina: Ria Deseado (Santa Cruz) (Pallares, 1975a); Black Sea (Por, 1959); Bulgaria (Marinov, 1971); Crimea and Caucasus (Griga, 1963); Eastern Central Atlantic coast (Marinov, 1977); Mexico: South-eastern Gulf of California (present study); U. S. A.: Santa Maria Basin (Fiers, *in litt.*); Yugoslavia: Adriatic coast (Petkovski, 1955b).

Material examined:

Two dissected females (EMUCOP-168-F, EMUCOP-178-B) from station 2, found at 0-3 cm depth, on 01/MAY/91 and 03/JAN/92, and one dissected male (EMUCOP-211-A) found in station 9 at 0-3 cm depth, on 03/JAN/92.

Comparison and discussion

So far, six species of the genus *Stylicletodes* have been described: *S. longicaudatus* Brady & Roberston 1880, *S. (=Cletodes) stylicaudatus* Willey, 1929, *S. reductus* Wells 1965, *S. verisimilis* Lang 1965, *S. oligochaeta* Bodin 1968 and *S. minutus* Bodin 1968. Although *S. reductus* and *S. minutus* do not share the same chaetotaxy, these species are unique within the genus as they exhibit a very particular elongated operculum. On the other hand, *S. oligochaeta* and *S. stylicaudatus* seem to be closely related as these two species share tha same chaetotaxy at least of P1-P4 (the male of *S. ologichaeta* and the female of *S. stylicaudatus* remain unknown), and only some differences can be found in regard with the caudal rami chaetotaxy. The remainig group of species composed by *S. longicaudatus* and *S. verisimilis* showed to be closely related. These species share the same chaetotaxy of P1-P5. The species here described does fit well with the previous descriptions of *S. longicaudatus* presented by Griga (1963) from the southern coast of the Crimea and Caucasus, Marinov (1971) from the Bulgarian Black Coast Sea, Pallares (1975a) from Argentina, Marinov (1977) from the Eastern Central Atlantic Coast, Petkovski (1955b) from the Adriatic Coast of Yugoslavia and Por (1959) from the Black Sea. Additionally, Lang (1965) pointed out that the most striking differences between the european species *S. longicaudatus* from the Gullmar Fjord (Bohus, Sweden), and the Californian species *S. verisimilis* can be found only when comparing the structure of caudal rami.

FAMILY Huntemaniidae Por 1986

GENUS *Nannopus* Brady 1880

Nannopus palustris Brady 1880
(Figs. 330-336)

Original description: *Nannopus palustris* n. sp. Brady 1880, :101, Fig. 18-20.

Synonym: *cum* Lang, 1948; *Nannopus brasiliensis* Jakobi, 1956, :165-166, Fig. 5; *Nannopus* sp. (f) Hemsen, 1952; *Nannopus tiberiadis* Por, 1968, :40-42, Plate IV, Fig. 1-5 (after Wells, 1971).

Distribution: *cum* Lang, 1948; Brazil: Sáo Paulo (Paraná) (Jakobi, 1956); India: Vellar river (Porto Novo, Madras State) (Wells, 1971); Israel: Lake Tiberias (Por, 1968); Mexico: South-eastern Gulf of California (present study); Persia (Hemsen, 1952); Rumania: Sinoe Lagoon (Black Sea coast) (Marcus & Por, 1961); (U. S. A.: North Inlet (South Carolina) (Coull & Fleeger, 1977); U. S. S. R. (Borutskii, 1952; Veldre & Maemets, 1956), Karelian coast of the White Sea (Chislenko, 1967).

Material examined:

SEX	STAGE	# IND.	STORED AS	# CATALOGUE	STATION	DEPTH	DATE
?	CIII	1	Alc.	EMUCOP-606-B	10	0-3 cm	30/APR/91
F	A	6	Alc.	EMUCOP-603-B	10	0-3 cm	30/APR/91
F	A	1	Diss.	EMUCOP-80-C	8	0-3 cm	23/JUN/91
F	A	1	Diss.	EMUCOP-81-C	8	0-3 cm	23/JUN/91
F	A	1	Diss.	EMUCOP-998-B	10	0-3 cm	30/APR/91
F	CIV	1	Alc.	EMUCOP-605-B	10	0-3 cm	30/APR/91
M	A	1	Diss.	EMUCOP-82-C	8	0-3 cm	23/JUN/91
M	CV	1	Alc.	EMUCOP-604-B	10	0-3 cm	30/APR/91

Comparison and discussion

Nannopus palustris has been reported from diverse localities inhabiting marine, brackish and fresh water habitats. Its high tolerance to environmental conditions such as salinity and temperature can be a reasonable explanation of its great and well known inter- and intra-population variability (Wells, 1971; Coull & Fleeger, 1977). On this matter, I'm reluctanct to accept that all the reports of the specimens so far assigned to *N. palustris* are one and the same species, even if this species shows great small and large scale variablity, specially for the case of those populations completely isolated, such as *N. palustris tiberiadis*. As an example, Por (1968) pointed out that the isolation of Lake Tanganyika led to the formation of *N. perplexus*. However, at this point it is not possible to make any other assumptions and some molecular work has to be done before the specific identity of all these species is clearified.

The Mexican specimens agree well with the descriptions found in the literature, and fall within the range of variation of *N. palustris* as compiled by Wells (1971) and Coull & Fleeger (1977), except for the female four-segmented A1.

FAMILY Laophontidae T. Scott 1905

GENUS *Laophonte* Philippi 1840

Laophonte n. sp. 1
(Figs. 337-341)

Material examined:

Two dissected females (EMUCOP-429-A, EMUCOP-458-D) from station 3, found at 3-6 and 0-3 cm depth on 02/MAY/91, and one dissected male labeled EMUCOP-430-A, from station 3 found at 3-6 cm depth, on 02/MAY/91.

Female

Length, including rostrum and caudal rami, from 585 to 619 μm. Genital double-somite (Fig. 337a, 337c) fused dorsally; with only trace of division ventrally; both somites with laterally extended margins ornamented with surface spinules; first genital somite with spinules on distal corner ventrally; vestige P6 represented by 2 setae; copulatory pore located in proximal half. Fourth urosomite as preceding segment, but with minute spinules along posterior edge; fifth urosomite without laterally extended margins, with ondulate posterior edge dorsally. Anal segment as long as precedig somite; rounded anal operculum with dentate posterior margin; ventrally with small spinules close to joint with caudal rami and internally. Caudal rami (Fig. 337b) about 2.5 times longer than broad, slightly tapering posteriorly; with 7 elements, and ornamented with spinules posteroventrally; dorsal seta located on distal fifth of ramus; principal distal seta about 4.4 times longer than ramus.

Antennule (Fig. 338a): four-segmented; first segment with blunt process close to outer distal corner and ornamented with median and distal spinules internally; second segment with blunt process much more smaller than width of segment; third segment 2.3 times longer than broad (socle of aesthetasc excluded) and ornamented with transverse rows of spinules on outer edge; fourth segment with slender aesthetasc.

Antenna (Fig. 338b): allobasis ornamented with spinules along abexopodal edge; with slender abexopodal seta not reaching beyond allobasis. Exopodite one-segmented, with 1 slender lateral seta, 1 subapical and 2 apical bipinnate setae. Endopodal segment with longitudinal row of fragile spinules along inner margin; with nine setae/spines in all.

Mandible (Fig. 338c), with strong gnathobasis armed with dentate pars incisiva, 2 strong lacinia and 1 seta. Palp with 3 setae (one of them missing).

Maxillule (Fig. 338d): arthrite armed with 5 distal spines and 2 lateral setae; coxa with 1 strong seta; basis with 3 apical elements. Exo- and endopodite with 2 setae.

Maxilla (Fig. 338e): syncoxa ornamented with minute spinules proximally on inner margin and on outer edge; with 3 endites, first one represented by single seta, middle and distal ones with 3 setae each; basis with stron armed claw with 1 accompanying seta. Endopodite obsolete, represented by 2 setae. No setae related to exopodite were observed.

Maxilliped (Fig. 338f): basis with 2 rows of spinules proximally and distally, armed with 1 apical seta. Endopodal segment ornamented with longitudinal row of small spinules along inner margin; endopodal ,claw unarmed and accompanied by 1 slender small seta.

P1 (Fig. 339a): coxa massive and ornamented with oblique rows of spinules close to outer edge; basis rectangular, visibly longer than broad; ornamented with spinules obliquely in the middle and close to outer and inner edges; outer seta midway of outer margin, and inner element at base of endopodite. Exopodite two-segmented, not reaching the middle of first endopodal segment an without inner armature. Endopodite two-segmented; first segment about 4 times longer than broad, smooth; second segment about 2.5 times longer than broad, with 1 smal slender seta and a strong claw. Chaetotaxy as in Table 44.

P2-P4 (339b, 339d, 340a): praecoxa smooth; coxa ornamented with small spinules close to inner proximal corner and close to outer margin; basis with spinules between rami and close to outer seta. Exopodite three-segmented; first segment without, second segment with 1 and third segment with 2 inner setae. Endopodite two-segmented; first segment with inner seta; of P2 and P3 reaching heigh of inner seta of EXP 2, of P4 hardly reaching tip of EXP 1. Chaetotaxy as in Table 44.

P5 (Fig. 340b): baseoendopodite ornamented with fragile elements along inner proximal margin and along outer edge close to exopodite; armed with 5 setae/spines of unequal length. Exopodite ovate, with 6 setae and ornamented with fine elements along outer and inner margins.

Male

Length, including rostrum and caudal rami, 600 µm. The habitus and some appendages (A1, P5 and P6) of the only male found were severely damaged. The general shape resembles the female, except for genital double-somite, and ventral ornamentation (with row of spinules alon posterior edge of third, fourth and fifth urosomites). Anal segment, caudal rami, mouth parts, P1, P2 and P4 (not illustrated), as in female.

P3 (Fig. 341): protopodal components and exopodite as in female. Endopodite dimorphic, three-segmented; first segment with inner seta; second segment with inner seta and acute outer apophysis reaching beyond third segment, the latter with 2 lateral and 2 apical setae and reaching heigh of inner seta od EXP 2.

Table 44. Chaetotaxy of *Laophonte n. sp. 1.*

	P1	P2	P3	P4
EXP	0.023	0.1.123	0.1.223	0.1.223
ENP	0.020	1.220	1.321	1.221

Variability:

One female (EMUCOP--429-A) was found with an aberrant second endopodal segment of P2 (Fig. 336c).

Comparison and discussion

See below.

Laophonte n. sp. 2
(Figs. 342-345)

Material examined:

One dissected female (EMUCOP-757-G) from station 14, found at 0-3 cm depth, on 03/JAN/91, and one alcohol preserved female CIV from station 3, found at 3-6 cm depth on 02/MAY/91.

Female

Total length, 780 µm, rostrum and caudal rami included. General dorsal shape as in *Laophonte n. sp. 1*, except for small spinules along caudal edge of urosomites, lateral extension of fifth urosomite, and more marked division of posterior part of anal somite. Ventrally also as in *Laophonte n. sp. 1*, except for bare caudal margin of second genital somite, comparatively more simple genital field, and ornamentation of caudal margin of fifth urosomite (Fig. 342a, 342b). Caudal rami about 1.5 longer than wide; with 7 setea; dorsal seta located almost at heigh of lateral seta; principal distal seta about 2.6 longer than ramus.

Antennule (Fig. 343a), as in *Laophonte n. sp. 1*, except for less spinules on surface of first segment, comparatively smaller hook of second segment, lack of aesthetasc of ultimate segment and 3 comparatively stronger setae on inner margin of fourth segment.

Mouth parts (Fig. 343b-f), resembling those of *Laophonte n. sp. 1*, except for accompanying seta of maxillar basis (Fig. 343e), and 2 distal seta of basis of maxilliped instead of 1 (Fig. 343f).

P1-P4 (Fig. 344a, 344b, 344c, 345a): shape and chaetotaxy as in *Laophonte n. sp. 1*, except for relative length of claw of P1 ENP 2.

P5 (Fig. 345b): the only differences found when comparing *Laophonte n. sp. 1* and *Laophonte n. sp. 2* were the exopodite/baseoendopodite length ratio (BENP not reaching heigh of third outermost seta of EXP in *Laophonte n. sp. 1*, and reaching beyond of third outermost seta of EXP in *Laophonte n. sp. 2*), and relative length of the exopodal setae.

Male

Unknown.

Comparison and discussion

The Mexican species here described undoubtedly belongs to the *cornuta*-group of species of *Laophonte*. Both *Laophonte n. sp. 1* and *Laophonte n. sp. 2* showed marked reduction of the hook of the second antennular segment, being much more shorter than the width of the supporting segment. This hook is strongly curved and larger than the width of supporting segment in *L. expansa* Fiers 1986a, *L. plana* Fiers 1986a and *L. cornuta* Philippi 1840, but is absent in *L. adduensis* Sewell 1940.

The Mexican representatives presently described are undoubtedly more related to *L. expansa*, *L. plana* and *L. cornuta* by the presence of the hook on second antennular segment (although it has a reduced appearance), chaetotaxy of P2 EXP (with 3 outer spines), and anal operculum. Both Mexican species can be easily mistaken one for each other given their close resemblance, and can be distinguished only by fine details such as the location of the dorsal seta of caudal rami, L/W ratio of caudal rami, ratio between length of principal seta of caudal rami and length of ramus, shape of fifth urosomite, and relative length of P5 exopodal setae.

Unfortunately, the male of *Laophonte n. sp. 2* remains unknown and no comments can be given on the differences in dimorphic features between both Mexican species.

GENUS *Paralaophonte* Lang 1944

Paralaophonte brevirostris Claus 1863
(Figs. 346-353)

Original description: *Cleta brevirostris* n. sp. Claus 1863, :124.

Synonym: *cum* Lang, 1948.

Distribution: *cum* Lang, 1948; Africa: Angola (Candeias, 1959); Bulgaria: Black Sea coast (Marinov, 1971; Apostolov, 1973; Apostolov & Marinov, 1988); England: West Runton (Norfolk) (Hamond, 1969, 1972); India: Andaman and Nicobar Islands (Wells & Rao, 1987); Mexico: South-eastern Gulf of California (present study); Naples: Cape Sorrent (Pesta, 1959); Turkey: Sea of Marmara (Noodt, 1955a); U. S. A.: Chesapeake Bay (Yeatman, 1970); Yugoslavia: Split and Bar (Petkovski, 1955a).

Material examined:

SEX	STAGE	# IND.	STORED AS	# CATALOGUE	STATION	DEPTH	DATE
F	A	1	Alc.	EMUCOP-157-D	2	0-3 cm	01/MAY/91
F	A	1	Alc.	EMUCOP-519-E	4-5	0-3 cm	01/MAY/91
F	A	2	Alc.	EMUCOP-506-D	4-5	0-3 cm	01/MAY/91
F	A	1	Alc.	EMUCOP-1000-A	4-5	0-3 cm	01/MAY/91
F	A	1	Alc.	EMUCOP-154-C	2	0-3 cm	01/MAY/91
F	A	3	Alc.	EMUCOP-334-P	12	3-6 cm	23/JUN/91
F	A	3	Alc.	EMUCOP-433-A	3	3-6 cm	02/MAY/91
F	A	1	Alc.	EMUCOP-281-B	12	0-3 cm	01/MAY/91
F	A	1	Alc.	EMUCOP-769-G	14	0-3 cm	24/JUN/91
F	A	1	Diss.	EMUCOP-124-B	2	0-3 cm	01/MAY/91
F	A	1	Diss.	EMUCOP-109-A	2	0-3 cm	01/MAY/91
F	A	1	Diss.	EMUCOP-125-B	2	0-3 cm	01/MAY/91
F	A	1	Diss.	EMUCOP-127-B	2	0-3 cm	01/MAY/91
M	A	1	Alc.	EMUCOP-333-P	12	3-6 cm	23/JUN/91
M	A	1	Alc.	EMUCOP-482-H	3	6-9 cm	02/MAY/91
M	A	1	Alc.	EMUCOP-434-A	3	3-6 cm	02/MAY/91
M	A	1	Diss.	EMUCOP-134-B	2	0-3 cm	01/MAY/91
M	A	1	Diss.	EMUCOP-128-B	2	0-3 cm	01/MAY/91

M	A	1	Diss.	EMUCOP-155-D	2	0-3 cm	01/MAY/91
M	A	1	Diss.	EMUCOP-173-F	2	0-3 cm	01/MAY/91
M	A	1	Diss.	EMUCOP-469-E	3	0-3 cm	02/MAY/91
M	A	1	Diss.	EMUCOP-999-A	4-5	0-3 cm	01/MAY/91
M	A	1	Diss.	EMUCOP-172-F	2	0-3 cm	01/MAY/91
M	CIV	1	Alc.	EMUCOP-335-P	12	3-6 cm	23/JUN/91
M	CIV	1	Diss.	EMUCOP-174-F	2	0-3 cm	01/MAY/91
M	CV	1	Alc.	EMUCOP-153-C	2	0-3 cm	01/MAY/91
M	CV	1	Alc.	EMUCOP-336-P	12	3-6 cm	23/JUN/91
M	CV	1	Alc.	EMUCOP-112-A	2	0-3 cm	01/MAY/91
M	CV	1	Diss.	EMUCOP-111-A	2	0-3 cm	01/MAY/91

Comparison and discussion

Mielke (1981b) questioned the identity of Apostolov's (1973) Marinov's (1971) and Yeatman's (1970) material assigned to *P. brevirostris*, and pointed out that this species could be in fact a complex composed of several species. Similarly, Fiers (1988) suggested the same for Wells' (1967) material from Mozambique, and Wells and Rao (1987) reported wide variability of several appendages of specimens from India.

The Mexican specimens agree well with previous descriptions and with Fiers' (1988) observations, and differs from the latter only by the length of the outer spines and inner seta of male P3 EXP 3. The differences found between the Mexican specimens and Sewell's (1940) illustrations are the number of setae of P1 EXP 3, 3 in Sewell's specimens (undoubtedly a misinterpretation) and 4 in the Mexican representatives, and the relative length of female P5 EXP/BENP. My specimens differ with Sars' (1911b) and Pestas' (1959) only in relative length of female P5 EXP/BENP and relative length of male and female P2 ENP 2, and with Noodt's (1955a) and Apostolov's (1973) in the relative length of the rami of female P5.

With respect to the female P5, the Mexican species could be equated with *P. meinerti* Brady 1899, but as the male P5 of that species is typically about twice as long as broad, I decided to keep the Mexican representative as *P. brevirostris*.

Paralaophonte pacifica Lang 1965
(Figs. 354-360)

Original description: *Paralaophonte pacifica* n. sp. Lang 1965, :497-503, Fig. 272-275.

Distribution: Ecuador: Galapagos Islands (*P. pacifica galapagoensis* Mielke) (Mielke, 1981b); Mexico: South-eastern Gulf of California (present study); U. S. A: Monterey Bay (California) (Lang, 1965).

Material examined:

SEX	STAGE	# IND.	STORED AS	# CATALOGUE	STATION	DEPTH	DATE
?	CI	1	Alc.	EMUCOP-536-E	4-5	0-3 cm	01/MAY/91
?	CIII	2	Alc.	EMUCOP-523-E	4-5	0-3 cm	01/MAY/91
F	A	1	Diss.	EMUCOP-1001-A	4-5	0-3 cm	01/MAY/91
F	A	1	Diss.	EMUCOP-505-D	4-5	0-3 cm	01/MAY/91
F	CV	1	Alc.	EMUCOP-522-E	4-5	0-3 cm	01/MAY/91
M	A	1	Alc.	EMUCOP-520-E	4-5	0-3 cm	01/MAY/91
M	A	1	Diss.	EMUCOP-544-A	4-5	0-3 cm	04/MAY/91
M	A	1	Diss.	EMUCOP-1002-E	4-5	0-3 cm	04/MAY/91
M	CIV	1	Alc.	EMUCOP-524-E	4-5	0-3 cm	01/MAY/91
M	CIV	1	Alc.	EMUCOP-550-A	4-5	0-3 cm	04/MAY/91
M	CV	1	Alc.	EMUCOP-549-A	4-5	0-3 cm	04/MAY/91
M	CV	3	Alc.	EMUCOP-521-E	4-5	0-3 cm	01/MAY/91

Variability

One female (EMUCOP-505-D) was found exhibiting an aberrant P2 EXP (Fig. 360b), and one male (EMUCOP-1002-E) was found with an aberrant P5 without baseoendopodal seta and only 4 exopodal elements (Fig. 363e).

Comparison and discussion

To my knowledge, this is the second report of this species, originally described by Lang (1965) from Californian coasts, though Mielke (1981b) described a subspecies of *P. pacifica*, *P. pacifica galapagoensis* from the Galapagos Islands.

The Mexican specimens agree almost entirely with Lang's description. The differences found between both populations are: (i) the relative length of male P2 ENP (reaching heigh of inner seta of P2 EXP 2 in Lang's illustrations, and proximal part of P2 EXP 3 in the Mexican specimens, and (ii) shape of the second inner dimporphic seta of male P2 ENP 2 (probably broken or aberrant in the Mexican material).

GENUS *Quinquelaophonte* Wells, Hicks & Coull 1982

Quinquelaophonte n. sp. 1
(Figs. 361-366)

Material examined:

SEX	STAGE	# IND.	STORED AS	# CATALOGUE	STATION	DEPTH	DATE
F	A	1	Diss.	EMUCOP-419-B	13	3-6 cm	24/JUN/91
F	CIV	1	Alc.	EMUCOP-758-G	14	0-3 cm	03/JAN/92
F	CV	1	Alc.	EMUCOP-637-B	6	0-3 cm	01/MAY/91
?	CI	1	Alc.	EMUCOP-658-D	6	0-3 cm	01/MAY/91
?	CII	1	Alc.	EMUCOP-638-B	6	0-3 cm	01/MAY/91
M	A	1	Diss.	EMUCOP-656-E	6	0-3 cm	01/MAY/91
M	CIV	1	Alc.	EMUCOP-657-E	6	0-3 cm	01/MAY/91

Female

Length, inluding rostrum and caudal rami, 590 µm. Body elongate and tapering posteriorly, slightly depressed. Rostrum fused to cephalothorax; borad at base. All the body was covered with detritus and the somitic ornamentation could not be observed. Genital double-somite (Fig. 361a, 361b) with dorsal division between somites; ventrally fused; caudal margin of both genital somites finely dentated dorsally; second segment with dentate caudal margin ventrally; genital field located in anterior half of first somite, with vestige P6 represented by 2 small setae. Fourth and fifth urosomite with caudal margin finely dentated. Anal segment slightly longer than precedin somite; with minute spinules ventrally close to caudal rami; anal operculum set with fringing hairs. Caudal rami about 2.7 times longer than wide; almost cylindrical, tapering slightly posteriorly; with 7 elements.

Antennule (Fig. 362a), six-segmented; without any projection on first and/or second segment; all setae smooth; with aesthetasc on fourth and terminal segment.

Antenna (Fig. 362b): allobasis with slender abexopodal seta, and ornamented with spinules along inner margin proximally. Exopodite one-segmented, with 2 lateral and 1 slender and small seta. Endopodal segment ornamented proximally with 2 paralel rows of spinules; with 2 subdistal bare spines and 5 distal elements.

Mandible (Fig. 362c): long gnathobasis; chewing edge armed with several teeth and 1 seta. Palp uni-segmented with 1 proximal, 2 subdistal and 1 apical seta.

Maxillule and maxilla lost during dissection.

Maxilliped (Fig. 362d): basis proportionately small and ornamented with spinules proximally and on outer distal corner, and armed with 1 seta. First endopodal segment bare, second one distinct (though very small) with strong and long claw with accompanying seta.

P1 (Fig. 363a): coxa with proximal outer corner expanded and ornamented with spinules; basis with inner fragile elements and ornamented with spinules in the middle, close to base of outer spine and at base of endopodite. Exopodite two-segmented, without inner setae, and reaching about

proximal third of endopodite. The latter two-segmented; first segment about 5.6 times longer than wide; second segment about 3 times as long as broad, with apical seta smaller than claw. Chaetotaxy as in Table 45.

P2-P4 (Fig. 363b, 363c, 364a): praecoxa with row of spinules along joint with coxa, the latter bare except for spinules close to outer margin; basis ornamented with spinules close to base of outer elements only; of P2 with outer spine, of P3 and P4 with outer seta. Exopodite three-segmented; first segment without, second segment with an inner seta; third segment with 222 setae/spines in all for P2, P3, and P4 respectively; of P4 comparatively smaller. Endopodite two-segmented; first segment without inner seta; second segment with 353 setae for P2, P3 and P4 respectively; of P2 and P3 slightly beyond EXP 2, of P4 not reachin heigh of inner seta of EXP 2. Chaetotaxy as in Table 45.

P5 (Fig. 364b): the surface ornamentation was obscured by particles of detritus attachet to surface of limb. Exopodite angular, with 6 setae. Baseoendopodite massive, ornamented with spinules along inner border and distal part or outer margin; with 5 setae in all.

Male

The only male found was comparatively bigger than the female (Fig. 365a, 365b), with 626 µm from rostrum to caudal rami.

Differs from the female in several respects.

Antennule (Fig. 362e), subchirocer, apparently composed of 7 segments.

P2-P4 (Fig. 366a, 366b, 366c): protopodal elements as in female. First and second exopodal segments much larger; third segment comparatively smaller and setae either reduced or modified to spines, of P4 with 5 instead of 6 elements. Endopodites two-segmented, strongly dimorphic; of P2 as in female, but comparatively longer; first segment of P3 ENP much smaller than that of female, reaching about middle of EXP 1, second segment reaching beyond EXP 1; P4 ENP 1 very small, about as long as wide, second segment hardly beyond EXP 1. Chaetotaxy as in Table 45.

P5 (Fig. 366d), reduced to 4 setae (outer seta of basis included), on a small plate fused to somite.

P6 (Fig. 366e), reduced to a small plate with 2 setae (innermost stronger).

Variability

One female was observed with a P3 ENP 2 with the innermost seta situated more proximally (Fig. 363d).

Table 45. Chaetotaxy of (a) female and (b) male of *Quinquelaophonte n. sp. 1.*

(a)	P1	P2	P3	P4
EXP	0.023	0.1.123	0.1.123	0.1.123
ENP	0.110	0.120	0.221	0.120

(b)	P1	P2	P3	P4
EXP	0.023	0.1.123	0.1.123	0.1.122
ENP	0.110	0.120	0.221	0.120

Comparison and discussion

The Mexican species turned out to be intermediate of *Q. capillata* Wilson 1932b, and *Q. parasigmoides* Bozic 1969, as it shares several features with both species.

The validity of *Q. capillata* has been questioned by Coull (1976a), but afterwards, Wells, Hicks & Coull (1982) decided to keep the validity of this species based on the presence of 6 setae on P3 EXP 3, condition never found in any species of *Q. quinquespinosa*, the only species with which *Q. capillata* could be synonymized (after Wells, Hicks & Coull, 1982).

The Mexican species share the antennary exopod with 3 setae with *Q. parasigmoides*, but differs by the number of setae of female P3 ENP 2 (6 in *Q. parasigmoides*, 5 in *Quinquelaophonte n. sp.1*), and male P4 EXP 3 (6 in *Q. parasigmoides*, 5 in *Quinquelaophonte n. sp. 1*). *Q. capillata* and the Mexican representative of the genus differ in the chaetotaxy of A2 EXP (with 2 setae only in *Q. capillata*, 3 in *Quinquelaophonte n. sp. 1*), male P3 EXP 3 (with 2 inner setae in *Q. capillata*, with 1 inner element only in *Quinquelaophonte n. sp. 1*) and male P4 EXP 3 (with 6 setae/spines in *Q. capillata*, and 5 in *Quinquelaophonte n. sp. 1*).

GENUS *Onychocamaptus* Daday 1903

Onychocamptus krusensterni Schizas & Shirley 1994
(Figs. 364-367)

Original description: *Onychocamptus krusensterni* Schizas & Shirley 1994, :228-234, Fig. 2-7.

Distribution: Alaska: Cape Krusenstern (Schizas & Shirley, 1994); Mexico: South-eastern Gulf of California (present study).

Material examined:

One dissected (EMUCOP-2-B) and one alcohol preserved female (EMUCOP-14-A) from station 8 found at 3-6 and 0-3 cm depth on 30/MAR/92 and 02/MAY/91 respectively.

Comparison and discussion

Presently, and after the creation of the genera *Echinolaophonte* Nicholls, *Klieonychocamptus* Noodt and *Folioquinpes* Fiers & Rutledge (in which the former *horridus*-group, *kliei*-group, and *Onychocamptus chathamensis* Sars and Mielke's (1981b) *Onychocamptus* sp. were reallocated), is represented by 3 marine (*O. mohammed* Blanchard & Richard, *O. bengalensis* Sewell and *O. krusensterni*), and one freshwater species (*O. taifensis* Kikuchi, Dai & Itô).

Jakobi (1954b) described a new species from Brazil, *O. besnardi* Jakobi, and later, Lang (1965) without any argument suggested the possibility that Jakobi's *O. besnardi* is a form of *O. mohammed*, probably because of the poor illustrations given by Jakobi (1954b, Plate VI, Figs. 1-15), and the wide distribution of *O. mohammed*. If Lang's (1965) view is to be accepted, the difference in setal armament between *O. besnardi* (presently regarded as *incertae sedis* within *Onychocamptus*), and the *mohammed*-group (see Jakobi, 1954b, :198), should be attributed to geographical variability, that seems to be "normal" in a wide distributed species like *O. mohammed*. On this last matter, it has to be noted that some geographical variability do exists within *O. mohammed* since Apostolov & Marinov (1988) showed a P2 EXP without inner seta *i. e.* only with 5 setae in all instead of 6 as normally depicted.

Recently, Schizas & Shirley (1994) described a new species from Cape Krusenstern (Alaska), *O. krusensterni*, probably more closely related to *O. mohammed* than to *O. bengalensis* Sewell 1934 (redescribed by Hamond, 1973c), given the fusion of the rami of the female P5 in the latter. In fact, the only feature by which *O. krusensterni* can be separated from *O. mohammed* is the presence of five setae on the female P4 EXP 3 (6 in *O. mohammed*) and the unusual (?) ornamentation of the male A1 (Schizas & Shirley, 1994). If Lang's (1965) view is to be followed in this case, *O. krusensterni* could validly be referred to as a form of *O. mohammed*. However, since Jakobi (1954b) and Shizas & Shirley (1994) did not observed any variability in a reasonable number of male and female specimens of *O. besnardi* and *O. krusensterni*, I'm inclined to consider these two species as different taxa from *O. mohammed*. Therefore, I assigned the Mexican specimens to *O. krusensterni* given the fact that (though in a small sample), I did not find any variability and that they turned out to be identical to the Alaskan species as originally depicted by Schizas & Shirley (1994).

FAMILY Normanellidae Lang 1944 *sensu* Huys & Willems 1989

SUBFAMILY N. subfam. 1

Diagnosis

Normanellidae. Rostrum set off, broad at base and with bilobed tip. Caudal edge of cephalothorax, prosomites and urosomites ondulate. Anal operculum semi-circular and set with fringing spinules. P1 EXP 3 with 4, P2 ENP 2 with 6 setae. Dimorphic male P3 ENP without real apophysis. Non-dimorphic P2 ENP, P3 EXP, P4 EXP and/or caudal rami. Female antennule five-segmented, without any kind of projection and with numerous smooth setae and few pinnate elements. Antenna with basis, with one-segmented exopodite, first endopodal segment with abexopodal seta. Rami of female and male P5 distinct. Male P6 with three setae.

GENUS *N. gen. 1*

Diagnosis

Normanellidae, N. subfam. 1. Rostrum not fused to cephalothorax, broad at base, with bilobed apex. Cephalothorax ornamented with pattern of cuticular depresions. Cephalothoraz, prosomites and urosomites with crenulate caudal edge. Female genital double-somite divided dorsally. With rounded anal operculum. Female antennule, five-segmented, without thorns, with aesthetasc on third segment, all setae smooth except for few strong pinnate elements. Antenna with basis, exopodite one-segmented with 4 setae, first endopodal segment with short abexopodal seta. Maxilla with 3 endites, basis with strong claw, endopodite two-segmented. Exopodites of swimming legs three-segmented, endopodites two-segmented. Chaetotaxy of swimming legs as in Table 46. Exopodite and baseoendopodite of female and male P5 discrete. Dimorphism: male antennule subchirocer (five-segmented?), male P3 ENP (with dimorphic apical setae and inner spine), male P5 and P6.

Type species

N. subfam. 1 *n. gen. 1 n. sp. 1*, by monotypy.

N. gen. 1 n. sp. 1
(Figs. 371-374)

Material examined:

One dissected female (EMUCOP-426-A) and male (EMUCOP-466-D), from station 3, found at 3-6 and 0-3 cm depth respectively, on 02/MAY/91.

Female

Body length, 416 µm including rostrum and caudal rami; maximum width at posterior edge of cephalothorax. Rostrum not fused to cephalothorax, broad at base, with bifid apex, with pair of tiny sensillae. Cephalothorax ornamented with pattern of cuticular depressions, with crenulate caudal margin. Pro- and urosomites ornamented with minute spinules dorsally, and with crenulated caudal edge. Genital double-somite (Fig. 371a, 371b) divided dorsally; first genital somite with crenulated caudal edge; ventrally completely fused, second genital somite ornamented with small spinules along caudal margin and with one group of longer elements on posterior corner of somite, P6 without seta, in all probability lost during dissection. Fourth and fifth urosomite with ventral ornamentation somewhat stronger than preceding somite. Anal segment furnished with surface spinules dorsally, with rounded dentated anal operculum reaching almost half of caudal rami; ventrally ornamented with spinules. Caudal rami about twice as long as broad; inner margin ornamented with transverse row of spinules at heigh of dorsal seta and on outer distal corner dorsally and ventrally; with 7 elements.

Antennule (Fig. 372a), five segmented; without thorns on first or second segment; surface of segments smooth, except for 2 rows of spinules on first one; second segment about as long as broad; third segment twice as long as broad, bearing an aesthetasc; four segment narrow; all setae smooth except for 1 strong pinnate seta on fourth and ultimate segment.

Antenna (Fig. 372b): basis almost squarish, without ornamentation. Exopodite one-segmented, slightly longer than basis; with 2 lateral and 2 distal setae. First endopodal segment about

three times longer than basis; with short abexopodal seta not reaching tip of supporting segment; second segment ornamented with longitudinal row of spinules along inner margin; with 2 bare lateral spines; distally with 6 elements (outermost seta very small and fused to geniculate element).

Md, Mxl, Mxp, unknown.

Maxilla (Fig. 372c): massive syncoxa ornamented with long and short spinules proximally and distally on outer edge; with 3 endites, proximal one with 1, following endites with 2 setae; basis with strong claw accompanyied by 1 small seta; endopodite apparently two-segmented, each component with 2 setae.

P1 (Fig. 373a): praecoxa ornamented with spinules along border with coxa, the latter with several groups of spinules close to outer margin and with long and slender elements transversally close to inner edge; basis without ornamentation except for spinules between rami. Exopodite three-segmented, reaching half of ENP 1; first segment without, second one with inner seta; third segment with 4 elements in all. Endopodite two-segmented; first segment rather slender, about 8.5 times longer than broad, with short spine-like inner element; second segment about 3 times longer than broad, with an inner slender seta halfway of inner edge, and 2 apical elements (1 spine and 1 slender geniculate seta). Chaetotaxy as in Table 46.

P2-P4 (Fig. 373b, 373c, 373d): praecoxa and coxa as in P1; basis ornamented with long and slender elements on inner margin, with spinules in the middle and between rami, with outer slender seta. Exopodite three-segmented; first segment without, second segment with inner seta; third segment with 2 outer spines; third exopodal segment of P2 with 5, of P3 and P4 with 6 elements in all. Endopodite two-segmented; first segment small and with inner seta; second segment of P2 and P3 with 6, of P4 with 5 setae. Chaetotaxy as in Table 46.

P5 (Fig. 373e): pair of legs distinct, not fused medially; baseoendopodite slightly beyond exopodite, ornamented with long setules along inner and outer margin, with 3 inner seta, 2 apical elements (innermost very small), and 1 outer element. Exopodite elongate with 6 setae in all.

Male

Habitus (Fig. 374a): body length, 346 μm from tip of rostrum to caudal rami. General shape as in female, except for genital double-somite. Somitic ornamentation as in female, though somewhat stronger.

The antennules were badly damaged during dissection. However, they are, apparently, five-segmented, with fourth segment swollen and bearing an aesthetasc.

Mouth parts, P1, P2 and P4 (not illustrated), as in female.

P3: Exopodite (not illustrated), as in female. Endopodite (Fig. 373f), two-segmented; differs from that of the female by the outer stronger element and 2 apical small setae.

P5 (Fig. 374b): baseoendopods of both pair of legs not fused medially, reaching only proximal part of exopodite and armed with 2 setae and ornamented with some spinules at base of setae. Exopodite with 4 setae.

P6 (Fig. 374b): assymetrical; represented in both sides by a small plate bearing 3 slender setae.

Table. 46. Chaetotaxy of Normanellidae N. subfam. 1 *n. gen. 1 n. sp. 1.*

	P1	P2	P3	P4
EXP	0.1.121	0.1.122	0.1.222	0.1.222
ENP	1.120	1.321	1.321	1.221

Comparison and discussion

Presently, the family Normanellidae Lang is composed of two subfamilies, the Normanellinae Lang 1944 and Cletopsyllinae Huys & Willems 1989, defined principally by: i) the chaetotaxy of P1 EXP 3 (with 5 setae in the Normanellinae, and 4 in the Cletopsyllinae); ii) chaetotaxy of P2 ENP 2 (with 6 setae in the Normanellinae, and 7 in the Cletopsyllinae); iii) dimorphic male P3 ENP 2 (without real apophysis in the Normanellinae, and with apophyisis in the Cletopsyllinae); iv) dimorphic male P2 ENP in the Normanellinae, and dimorphic male P3 EXP, P4 EXP and caudal rami in the Cletopsyllinae; v) number of segments of female antennule (5-6 in the Normanellinae, 4 in the Cletopsyllinae); vi) without any kind of conical projections on the antennule of the Normanellinae, and with 1 or 2 projections on first and/or second antennular segment for the case of the Cletopsyllinae; vii) antennule with numerous pinnate and few smooth setae and spines in the Normanellinae, with

numerous smooth and few pinnate setae and spines in the Cletopsyllinae; viii) antenna with abexopodal seta in the Normanellinae, without seta in the Cletopsyllinae; ix) antenna with one-segmented exopod bearing 3-4 seta in the Normanellinae, and with minute one-segmented with 1-2 setae and sometimes missing exopodite in the Cletopsyllinae; x) P1 ENP 2 with 1 lateral seta in the Normanellinae, and with 0-2 setae in the Cletopsyllinae; xi) male P5 fused medially in the Normanellinae, disctinct in the Cletopsyllinae; xii) structure of female genital field; xiii) male P6 (with 3 setae in the Normanellinae, and 1 in the Cletopsyllinae), not fused in the Normanellinae, and fused to ventral wall of supporting somite in the Cletopsyllinae.

The Mexican representatives share several features with the Normanellinae and Cletopsyllinae: (i) chaetotaxy of P1 EXP 3 (with 4 setae as in the Cletopsyllinae); (ii) chaetotaxy of P2 ENP 2 (with 6 setae as in the Normanellinae); (iii) dimorphic male P3 ENP without real apophysis as in the Normanellinae; (iv) absence of any dimorphic feature either in the P2 ENP, P3 EXP, P4 EXP and/or caudal rami; (v) five-segmented antennule without conical projections as in the Normanellinae; (vi) antennule with numerous smooth setae and few pinnate seta/spines as in the Cletopsyllinae; (vii) antenna with abexopodal seta and one-segmented exopodite bearing 4 setae as in the Normanellinae; (viii) P1 ENP 2 with 1 inner seta as in the Normanellinae; (viii) male P5 distinct as in the Cletopsyllinae; (ix) male P6 with 3 setae as in the Normanellinae. Given all the differences found between the Normanellinae, Cletopsyllinae and the Mexican specimens I suggest the creation of a new subfamily of the Normanellidae to allocate the new Mexican species herein quoted as Normanellidae N. subfam. 1 *n. gen. 1. n. sp 1*. The Mexican representatives showed to be intermediate between the two previously known evolutionary lineages, as defined by Huys and Willems (1989), and probably could represent an early offshoot of the Normanellinae.

Conclusions

63 species of harpacticoids were identified. 36 species (57%) (and one subspecies), turned out to be new to science and 21 species (33.3%) are new records for the Mexican Pacific coast. The identification of 3 taxa was possible only at the family level, and 3 other taxa were identified only at the generic level.

The 57 taxa identified at the specific level and the 3 taxa identified only at the generic level belong to 41 genera, of which 4 genera (9.8%) are new to science. Within the genera identified, 5 subgenera were recognized (1 subgenus is new to science). The genera identified are distribuetd in 20 families and 4 subfamilies (1 of them is new to science). In the following table, a list of all the taxa identified is presented.

FAMILY	SUBFAMILY	GENUS	SUBGENUS	SPECIES	SPP.
Ameiridae	Ameirinae	*Ameira*		*parvuloides*	
Ameiridae	Ameirinae	*Ameira*		*parvula*	*f. nana*
Ameiridae	Ameirinae	*Psyllocamptus*	*Psyllocamptus*	*n. sp. 1*	
Canthocamptidae		*Mesochra*		*pacifica n. sp.*	
Canthocamptidae		*Mesochra*		*pseudoparva n. sp.*	
Canthocamptidae		*Cletocamptus*		*deitersi*	
incertae sedis Canuellidae		*Scottolana*		*sp. 1*	
Cletodidae		*Cletodes*		*n. sp. 1*	
Cletodidae		*Cletodes*		*n. sp. 2*	
Cletodidae		*Enhydrosoma*		*lacunae*	
Cletodidae		*Enhydrosoma*		*n. sp. 1*	
Cletodidae		*Enhydrosoma*		*n. sp. 2*	
Cletodidae		*Enhydrosoma*		*n. sp. 3*	
Cletodidae		*Stylicletodes*		*longicaudatus*	
Darcythompsoniidae		*Darcythompsonia*		*fairliensis*	
Darcythompsoniidae		*N. gen. 1*		*n. sp. 1*	
Diosaccidae		*Amphiascoides*		*subdebilis*	
Diosaccidae		*Haloschizopera*		*n. sp. 1*	
Diosaccidae		*Amphiascopsis*		*thalestroides*	
Diosaccidae		*Pseudostenhelia*		*wellsi*	
Diosaccidae		*Robertgurneya*		*rostrata*	
Diosaccidae		*Robertgurneya*		*falklandiensis*	
Diosaccidae		*Robertgurneya*		*n. sp. 1*	
Diosaccidae		*Robertgurneya*		*n. sp. 2*	
Diosaccidae		*Robertsonia*		*propinqua*	
Diosaccidae		*Robertsonia*		*n. sp. 1*	
Diosaccidae		*Robertsonia*		*n. sp. 2*	
Diosaccidae		*Eoschizopera*	*N. subgen. 1*	*n. sp. 1*	
Diosaccidae		*Eoschizopera*	*Praeoschizopera*	*n. sp. 1*	
Diosaccidae		*Stenhelia*	*Delavalia*	*n. sp. 1*	
Diosaccidae		*Stenhelia*	*Stenhelia*	*n. sp. 1*	
Diosaccidae		*Typhlamphiascus*		*lamellifer*	
Diosaccidae		*N. gen. 1*		*n. sp. 1*	
Diosaccidae		*N. gen. 2*		*n. sp. 1*	
Ectinosomatidae		*Halectinosoma*		*n. sp. 1*	
Ectinosomatidae		*Halectinosoma*		*n. sp. 2*	
Ectinosomatidae		*Halectinosoma*		*n. sp. 3*	
Ectinosomatidae		*Hastigerella*		*leptoderma*	
Ectinosomatidae		*Pseudoectinosoma*		*n. sp. 1*	
Ectinosomatidae		*Ectinosoma*		*n. sp. 1*	
Harpacticidae		*Zausodes*		*septimus*	
Harpacticidae		*Zausodes*		*sextus*	

Huntemanniidae		*Nannopus*		*palustris*	
Laophontidae		*Laophonte*		*n. sp. 1*	
Laophontidae		*Laophonte*		*n. sp. 2*	
Laophontidae		*Quinquelaophonte*		*n. sp. 1*	
Laophontidae		*Onychocamptus*		*krusensterni*	
Laophontidae		*Paralaophonte*		*brevirostris*	
Laophontidae		*Paralaophonte*		*pacifica*	
Orthopsyllidae		*Orthopsyllus*		*linearis*	*n. spp. 1*
Paramesochridae	Paramesochrinae	*Apodopsyllus*		*vermiculiformis*	
Paramesochridae	Paramesochrinae	*Apodopsyllus*		*n. sp. 1*	
Leptastacidae		*Cerconeotes*		*n. sp. 1*	
Leptastacidae		*Belemnopontia*		*n. sp. 1*	
Longipediidae		*Longipedia*		*n. sp. 1*	
Normanellidae		*N. gen. 1*		*n. sp. 1*	
Tachidiidae		*Microarthridion*		*n. sp. 1*	
Tetragonicipitidae				*sp. 1*	
Tetragonicipitidae				*sp. 2*	
Tetragonicipitidae				*sp. 3*	
Thalestridae	Dactylopusiinae	*Diarthrodes*		*n. sp. 1*	
Thalestridae	Dactylopussinae	*Paradactylopodia*		*n. sp. 1*	
Tisbidae		*Tisbe*		*sp. 1*	

Ectinosomatidae and Diosaccidae were the most abundant families (with 39.42 and 29.62%, respectively), followed by Tachidiidae (8.51%), Canthocamptidae *incertae sedis* (5.53%), Laophontidae (3.14%), Cletodidae (2.79%), Darcythompsoniidae (1.89%), Thalestridae (1.84%), Canthocamptidae (1.64%), Paramesochridae (1.39%), Leptastacidae (0.85%), Longipediidae (0.80%), Ameiridae (0.70%), Huntemanniidae (0.60%), Harpacticidae (0.60%), Tetragonicipitidae (0.30%), Tisbidae (0.10%), Orthopsyllidae (0.10%), Normanellidae (0.10%), and Canuellidae (0.05%). As can be observed in the previous table, the best represented family is Diosaccidae (with 11 genera and 18 species), followed by Ectinosomatidae (with 4 genera and 6 species), Laophontidae (with 4 genera and 5 species), and Cletodidae (with 3 genera and 7 species).

Extensive studies on the species composition and systematic analysis of the harpacticoids inhabiting a certain region are scarce and the majority of these studies constitute postgraduate theses (*e. g.* Krishnaswamy, 1957; Watkins, 1983), short- and/or long-term research projects (*e. g.* Coull, 1977, Montagna, 1995), and the data contained in them are seldom known by the scientific community. On the other hand, the majority of published papers on systematics of harpacticoid copepods from a certain region deal only with one or few species, often of the same genus and from qualitative samples. Thus, the comparison of the species composition between remote sites becomes difficult, as one has to wait until the totality of species found during a sampling campaign are described. For example, during the early 70's, an extensive survey on the interstitial fauna from Galapagos was carried out (see Ax & Schmidt, 1973). The systematic analysis and description of the 56 species of Harpacticoida from the Galapagaos, has taken a little more than one decade, nevertheless (see Mielke, 1979, 1981b, 1982b, 1984b, 1989a, 1989b, 1997, 1997a), and probably, more species will be described in coming years.

The totality of species found in such surveys can not be described in a single contribution. It would be useful, however, if before the detailed description of the species, the investigator could provide a general overview of the generic composition of the community under study, and even more useful in making comparisons between communities, if some clues about the diversity of those communities were given (it has been proved that diversity analyses of communities whose individuals are identified at the generic level can give quite interesting results, see Magurran, 1988).

Except for the "endemic" taxa of tropical and subtropical localities in which extensive surveys on harpacticoid copepods have taken place (*e. g.* Andaman and Nicobar islands [Wells & Rao, 1987] and Madras State [Krishnaswamy, 1957] in India, the Galapagos Islands [for references see above], the California continental shelf [Lang, 1965; Montagna, 1995] and the North-eastern coast of the U. S. [Coull, 1977], among others), there seems to be a great similarity in generic and/or species composition. This is not new, and the fact that two or more remote sites exhibit similar communities is known since the 1950's (see the introduction to this thesis).

Several species found in Ensenada del Pabellón lagoon are well known for their wide distribution (*e. g. Hastigerella leptoderma*, *Pseudectinosoma minor*, *Robertsonia propinqua*, *Amphiascopsis thalestroides*, *Robertgurneya rostrata*, *Typhlamphiascus lamellifer*, *Amphiascoides subdebilis*, *Ameira parvula* f. *nana*, *Cletocamptus deitersi*, *Orthopsyllus linearis* spp., *Stylicletodes longicaudatus*, *Nannopus palustris*, *Paralaophonte brevirostris*), while the range of other species are markedly more restricted (*e. g. Zausodes sextus*, *Z. septimus*, *Robertgurneya falklandiensis*, *Pseudostenhelia wellsi*, *Ameira parvuloides*, *Apodopsyllus vermiculiformis*, the genus *Belemnopontia*, *Belemnopontia panamensis*, the genus *Cerconeotes*, *Enhydrosoma lacunae*, *Paralaophonte pacifica*, *Onychocamptus krusensterni*), and can be considered as truly American.

In my opinion, the fact that two or more remote sites share similar faunas, tells us that: i) in the case of, for example, amphiatlantic taxa, there must have been a vicariance event that split apart an ancestral population, and that both trans-allopatric taxa might have always inhabited the same type of ecosystem influenced by similar conditions (Wieser, 1953), ii), and/or ii) if the presence of the same species or of two closely related species in two sites located, for example, along the American Pacific Coast, or in the Caribbean and in the Galapagos, is assumed to be the result of short-range dispersal, that means that after colonization, the invader or colonizing species succeeded in coping with the environmental constraints imposed by the newly colonized habitat. In the first case, we are dealing with vicariance biogeography, but, as will be shown later in this study, biogeography of harpacticoid copepods is not an easy thing to deal with as the definition of monophyletic taxa is a compulsory requisite and it has been achieved only for few of them. With respect to the second point, the biogeographic analysis of the distribution of, for example, *Ameira parvuloides* (reported only from Ensenada del Pabellón lagoon and from the coast of California), *Paralaophonte pacifica* (known from California, the Mexican Pacific coast and the Galapagos), or *Pseudostenhelia wellsi* (known from the Atlantic coast of the U. S. and from the Mexican Pacific coast), is, in my opinion, worthless, since it tells us only that those species must have, somehow, dispersed along the coast line and that they managed to cope with the environmental constraints imposed by the newly invaded habitat or that such habitat is similar to the habitat where the colonizing taxon comes from. A third case concerns cosmopolitan taxa (those inhabiting one or more oceanic basins and adjoining seas, as opposed to amphiatlantic taxa or taxa found in both sides of an oceanic basin). Such is the case of, for example, *Cletocamptus deitersi*, *Onychocamptus mohammed* and *Orthopsyllus linearis* spp., whose systematic analysis and phylogenetic position has caused so much controversy. In other words, our present knowledge about the systematic position and phylogenetic relationships of several "cosmopolitan" taxa prevent us from doing any assumption about their biogeography.

V. BIOGEOGRAPHY OF SOME SELECTED TAXA OF HARPACTICOIDA -SOME WORK HYPOTHESES-

"... no theory can be proved true no matter how many observations support it, but a single observation may show it to be false."
Ball, 1975.

"Anyone familiar with the history of science knows it is done in the most astonishing ways by the most improbable people and that its only real rules are honesty and validity of logic, and that even these are open to public scrutiny and correction"
MacArthur, 1972.

"Incorporating criticism can stimulate research; otherwise it paralyses it."
Hengeveld, 1990.

"A science of dispersal is at bottom a philosophy of evolution over space through time.... Biogeography, if correctly used, is, in sum, a primary science in its own right..."
Croizat, 1968.

The zoogeography of marine meiofauna has been so far disregarded when compared with some other disparate and comparatively better known (both ecologically and systematically) taxa such as benthic macrofauna, birds, fishes, insects and mammals.

The lack of studies on zoogeography of meiofauna, and on harpacticoids in particular, is understandable, nevertheless, when we consider the poor accuracy of the contemporary knowledge about the distribution of Harpacticoida (see Abele, 1982, Wells, 1986), led up by the scarcity of detailed research on their phylogenetic relationships, and also by the lack of data from large areas (Wells, 1986; Fiers, 1990b).

The systematic problems inherent to meiofauna taxa (specially for the case of Harpacticoida), that eventually prevent any systematic and phylogenetic analysis, arise from inaccurate original descriptions of new species and lack of sound diagnoses of higher taxa, that in turn lead up to questioning about their supposed monophyly. It has to be stressed that the monophyletic status of a given taxon or group of taxa (in the sense of phylogenetic systematics), along with the accurate knowledge of the direction in which they evolve, are necessary prerequisites for sound biogeographic analyses through its own methods (for a revision see Hennig, 1966; Brundin, 1972; Nelson, 1974; Ball, 1975; Rosen, 1975; Wiley, 1981; Hengeveld, 1990).

Despite all the problems related to the biogeography of harpacticoids (see Wells, 1986), Ho (1988) and Fiers (1990b) have shown that with the present knowledge on the phylogenetic relationships among some taxa, it is possible to perform sound biogeographical analyses, nevertheless.

The term "biogeography" has different meanings depending upon our own biases. In fact, it is sometimes difficult to distinguish between biogeography at its empirical or descriptive inductively biased phase (Ball, 1975; Wiley, 1981), and ecology. For example, it is common among biogeographers to define biotic provinces based on the presence/absence of certain, often endemic, taxa in a region commonly associated with a climatic zone, and characterized by special environmental conditions and/or prominent topographic boundaries, which, in turn, restrict the distribution of the biota. Without taking into account the historical reasons by which the species inhabit that province, the study and/or definition of biotic provinces takes the risk of being regarded as a part of ecology, which in general terms, seek the relationships between the biota and its environment. However, it is the search for the historical reason(s) by which a given biota inhabits a given area, that defines biogeography as an independent discipline (Ekman, 1953).

In the following pages I shall discuss first some biogeographic theories about the distribution of meiofauna and Harpacticoida, mainly Yeatman's (1962), Sterrer's (1973) and Huys' (1992). Additionally, I shall propose an alternative vicariance biogeographic model to Huys' (1992) theory about the present-day distribution of the *macronyx*-group of the genus *Leptastacidae* (Harpacticoida). Following this first part, and assuming the monophyletic status of the *helgolandica*-group of the genus *Longipedia* and *Scottolana*, I will discuss their present distribution based on vicariance grounds.

The detailed phylogenetical analysis of the taxa found in Ensenada del Pabellón lagoon is beyond the scopes of the present study. Since I cannot take for granted the monophyletic status of these taxa and the directionality of their evolution, I will avoid any comment on their biogeography. The distribution of these taxa, however, can be found in the systematic description of each of them in the first part of this study.

Finally, it has to be said that the ideas presented herewith are rather work hypotheses that should be tested in future studies and that little of what is presented here is original with me. What I have done is just to use somebody else's models to explain the distribution of some harpacticoid taxa.

V.1. Yeatman's (1962) ecological biogeographic model of harpacticoid copepods

In an attempt to explain the amphiatlantic distribution of some species of copepods, Yeatman (1962), based on finds by Monk (1941) of the littoral copepod *Alteutha langi* Monk attached to drifting algae, and Johnson & Olson (1948) that found that nauplii of *Tisbe furcata* cling to the particles upon which they are feeding, (thus making clear the fact that copepods are continually breeding generation after generation within the *Sargassum* microhabitat -the same applies for several species of nematodes [Micoletzky, 1922]-), carried out a study on the copepod fauna attached to *Sargassum* and presented a theory of the colonization of European waters by Caribbean fauna.

He stated that the present pattern of North Atlantic currents and those within the Mediterranean have probably remained unchanged since the appearance of Panama, that eventually deflected the North Equatorial Current northward to form the Gulf Stream. He suggested that probably some species evolved in the littoral regions of the Caribbean Sea, and have been borne on *Sargassum* from there to Bermuda and European and Mediterranean coasts by currents and stated that this littoral copepod transport may be still taking place since, for example, *Dactylopodia tisboides* Claus (=*Dactylopusia tisboides*) and *Amonardia phyllopus* Sars from Florida do not differ from those of the Sargasso Sea and Europe, and some Bermuda species have been found inhabiting systems from Egypt and the Suez Canal region (Willey, 1930). This theory seems to be supported by Sterrer's (1973) find of a Caribbean coconut in Bermuda, in which fibrous coat were found turbellarians, nematodes, copepods, polychaetes, amphipods and isopods, of which all nematodes turned out to be truly cosmopolitan species and the isopod could be found wherever floating *Sargassum* is present.

Some other means of meiofauna dispersal have been observed, including birds (though the only direct evidence is for the case of terrestrial nematodes), insects, drifting ice, ballast of sailing vessels, active dispersal, and by suspension in the water or attached to suspended sediment during periods of stormy weather (for a thorough revision see Gerlach, 1977).

Yeatman's (1962) model, along with other theories about the means of meiofauna dispersal refered to by Gerlach (1977) (see also Ball, 1975, for some examples considering other taxa), claims that the present-day amphiatlantic distribution of meiofauna is a result of passive dispersal with a minimum vicariant element. Yeatman (1962), for example, stated that "in past geologic times, **perhaps** land connections or islands and/or shallow areas existed between North America and Europe, and these **may** have been acted as stepping stones for European invasions by some marine organisms from America". It is clear that such model, as many others, is based mostly on inductive reasoning and they call on no hypotheses of relationships within the taxa considered, and therefore, no predictions can be made. Ball (1975), following Popper's (1968) view, enfatically stated that "the criterion of potential falsifiability is very important, for any hypothesis that cannot theoretically be refuted is at best pseudo-cientific".

Yeatman (1962) offers several conjectures about a) the effect of the appearance of the Panamanian land barrier on the oceanic currents, b) a Caribbean center of origin of European and Mediterranean communities of, at least, harpacticoid copepods, and c) the existence of an hypothetical land-barrier that might have connected North America and Europe. With respect to point (a), several models have been proposed to describe what did the oceanic patterns look like in the past (for a revision see Schopf, 1980), but these are just models based on present-day laws that govern the oceanic currents, and their testability suggests serious difficulties. In point (b), it is clear that Yeatman (1962) chose the Caribbean region as a center of origin of the Bermudan, European and Mediterranean faunas (*i. e.* single origin-multiple destination theory), based only on the assumption that the Caribbean currents could have transported meiofauna taxa through drifting objects to Bremudan, European and Mediterranean habitats and made no reference to the distribution of the ancestral and derived taxa, either Hennig's (1966) phylogenetic progression rule, or its alternative evolutionary counterpart. With respect to the single origin-multiple destination theory, Rosen (1975) stated that the Gondwanian distributional patterns, for example, will cause to reject it, and that its counterpart, the multiple origin-single destination theory, "is the one usually portrayed as explaining the present-day distribution of the Caribbean biota", but is rather complicated, as it incorporates the coordinate movements via active migration and chance dispersal of countless organisms with different mobilities and biological requirements that would have had responded to some directional pressures that affected all equally, and one must still postulate also prior or subsequent dispersals for those distributions that do not conform

to the general patterns. The hipothetical "bridge" connecting North America and Europe refered to in point (c), was barely considered by Yeatman (1962). In fact, at the time of publication of his paper, there was no evidence of such bridge. Such evidence would appear later (Strauch, 1970, 1983; McKenna, 1972). Moreover, suggesting this model to be, strictly speeking, testable, it does not explain why meiofauna taxa did not cross the Atlantic in the southern emisphere. It is clear that some passive dispersal of meiofauna taxa do exist (Yeatman, 1962; White, 1973; Nelson, 1974; Gerlach, 1977; Wells, 1986; Eckman, 1990; Scheltema, 1996; McNair *et al.*, 1997), but this does not explain their present (amphiatlantic) distribution (Nelson, 1974), though for the case of harpacticoid copepods, the magnitude and zoogeographic significance of short distance alongshore colonization are probably much greater than previously believed (Wells, 1986). With regard to the concept of centres of origin, it has to be noted that it has been rejected as a necessary initial premise of all biogeographical enquiries since it is difficult to decide *a priori* between the two possibilities refered to some lines above (for a brief revision see Nelson, 1974; Ball, 1975). Ball (1975) concluded, from the fact that Croizat *et al* (1974) and Nelson (1974) rejected also dispersal or migration as a prior basis for biogeography, that taxa which are known to be distributed by passive dispersal should not constitute the main part of general biogeographical hypotheses, since it leads to poorly formulated and usually untestable hypotheses. Moreover, it has to be said that the progression rule cannot be taken as a methodological tool if other models of speciation than peripheral isolation are allowed (Nelson, 1974; Wiley, 1981).

V.2. Sterrer's (1973) historical vicariance biogeographic model of meiofauna

In an attempt to explain the cosmopolitanism and amphiatlantic distribution of interstitial fauna, Sterrer (1973), presented an historical explanation for the presence of similar species of meiofauna in opposite sides of the Atlantic. He starts his analysis by stating that dispersal of meiofauna is possible only within short distances, specially for the case of island colonization, for chances for colonization and maintenance of gene flow of those organisms dispersed within a long range by means such as air, water, or attached to sand grains, should be infinitely small given the intrinsic characteristics of meiofauna taxa.

According to Sterrer's model, species of meiofauna inhabiting the shallow and warm proto-Atlantic, 200 millions years ago, were split apart by continental drift, leading to two identical populations, whose different taxa started to speciate at their own rates, giving birth to trans-allopatric sister-species through gene flow interruption. Sterrer, based on some of Wieser's (1953) ideas, recognized the possibility that within meiofauna, speciation could have taken place along the homogeneous continental shorelines by the establishment of a distance barrier. However, speciation within meiofauna should be at a very slow rate an this can explain its high global similarity. The low evolutionary rate of meiofauna can be explained principally by i) the low numbers of progeny in meiofauna, ii) if continental drift accounts for the origin of trans-allopatric sister-species, this implies that the species of the two resultant populations remain in its environment, thus preventing adaptive speciation, and iii) given that interstitial taxa seem to be very old, it seems reasonable to assume that their speciation rates should be slow (Sterrrer, 1973).

Sterrers generalized model of biogeography of interstitial fauna satisfactorily explains the cosmopolitanism and amphiatlantic distribution of meiofauna taxa and since this model suggests continental drift as the principal responsible for the present-day distribution of interstitial fauna, and permits further short-range dispersal, it meet the criteria set by modern vicariance biogeography.

V.3. Huys' (1992) phylogenetic vicariance model of the *macronyx*-group (Leptastacidae, *Leptastacus* T. Scott)

Amphiatlantic distribution is not uncommon among harpacticoids, but often it is not but the consecuence of lack of attention to structural details and ignorance of unexpected diversity within the interstitial habitat (Huys 1992).

Leptastacus macronyx T. Scott was supposed to be an amphiatlantic species distributed in the coast of Scotland and the eastern Atlantic coast of the U. S. A.. Huys (1992; see also Huys, 1995), in his revision of *L. macronyx* and related taxa, concluded that the alleged amphiatlantic distribution of this species was erroneous and that this species was, in fact, a species complex composed of three related but clearly different taxa, *L. pygmaeus* Huys whose present distribution is restricted to Hoek van Holland (North Sea coast of The Netherlands), *L. macronyx* whose distribution is known to be restricted to the Scotish coasts, and *L. coulli* Huys distributed along the coast of Massachusetts and South Carolina (Atlantic coast of North America). These species showed to be related to *L. spatuliseta* Mielke 1982a, described from the Galapagos Islands, that in turn is related to *L. laticaudatus*

laticaudatus Nicholls and *L. laticaudatus intermedius* Kunz (after Mielke, 1982a) (these two latter species are synonymous of *L. laticaudatus* Nicholls, after Huys, 1987a). The distribution of *L. laticaudatus* is restricted to the west coast of Scotland, Hoek van Holland and Delta region in The Netherlands, along the Belgian coast and Pas de Calais (France). Huys (1987a) suggested also certain similarity between *L. macronyx* and *L. spatuliseta*, and *L. ctenatus* Mielke, but the latter species was reallocated in a new genus, *Schizotryx* Huys (Huys, 1992). Huys (1992), based on the evidence gathered by Strauch (1970, 1983), McKenna (1972) and Friedrich & Simonarson (1981), on the existence of a bridge (Thule-Land-bridge) that might have connected Europe and North America during the Eocene (McKenna, 1972) or during the transition Pliocene-Pleistocene (Strauch, 1983) through Scotland, the Faroes, Iceland and Greenland, presented an explanation of the amphiatlantic distribution of the *macronyx*- (Huys, 1987a) or *spatuliseta*-group (Huys, 1992). He suggested that the Thule-Land-bridge could enhance the divergence of some European ancestral populations into several transallopatric species-groups, and presented the hypothesis that during the existence of the Thule-Land-bridge, some representatives of the *spatuliseta*-group, at that time restricted to the North Sea, colonized first the Atlantic coast of North America through Scotland, the Faroes and Iceland, and then, by obscure means, reached the Galapagos. According to Huys (1992), "this scenario of speciation would conform to the slight morphological differences found between *L. coulli* and *L. spatuliseta* since their separation from the North American stem species perhaps dates back to only 2 mill. years ago".

In the framework of the phylogenetic status of *L. macronyx*, the information presented in Huys' (1992) paper is relevant in that he falsified the so far alleged amphiatlantic distribution of this species and recognized the possibility that the American representatives of *Leptastacus* could have had a common European ancestor whose distribution was restricted to the North Sea, *i. e.* the *macronyx*-group is monophyletic. Huys' (1992) hypothesis suffers of some weakness in several respects, nonetheless:

a) following Huys (1992) hypothesis, the assumed track of the *macronyx*-group is shown in Fig. 375. According to Huys (1992), some representatives of the ancestral population, theoretically distributed in the North Sea, colonized first the Faroes, Iceland and Greenland, and then reached North America. This follows to some extent, however, some inductive reasoning, probably based on the fact that the present-day *Leptastacus* inhabits shallow waters. In other words, if the colonization of American systems is assumed to have occurred after the genesis of the Atlantic (*i. e.* when the Thule-Land-bridge was still working), the most probable (or only) route for shallow-water species to reach American coasts is through some sort of bridge (islands) that could provide them with some refuge. However, there is no evidence to support the existence of the *macronyx*-group in Iceland or Greenland. Moreover, these suggestions necessarily invoke dispersal and/or migration, which in my opinion are the principal explanation of the present distribution of the *macronyx*-group as exposed by Huys (1992).

b) although implicitly, Huys (1992) suggests as centre of origin of the *macronyx*-clade, the North Sea. In my opinion, the choice of this centre of origin has been made following the old criterion of maximum biodiversity. Moreover, the assumed gradual colonization of America by European fauna, implies that Huys (1992) accepted Hennig's (1966) progression rule. In other words, the most plesiomorphic species should be located in the North Sea (centre of origin), while the most derived or apomorphic species should be found in the most peripheral locality (in this case, the Galapagos). Huys (1992) however, gave no reasons to choose Hennig's (1966) progression rule over its evolutionary counterpart.

c) Huys' (1992) evolutionary biogeographic model does not explain how the oceanic gap between the Galapagos and Central America could have been bridged, nor it makes any prediction about what may be found in future investigations, and implicitly discards the possibility of vicariance.

d) the only way to test Huys (1992) model is to falsify the implicit assumption that the European representatives of the *macronyx*-clade are the most plesiomorphic ones, and that the American species are the most apomorphic or derived ones within the clade.

V. 3.1. An alternative vicariance biogeographic model of the *macronyx*-group (Leptastacidae, *Leptastacus* T. Scott)

In the following lines I shall present an alternative vicariance biogeographic model, including a minor dispersal element, to explain the distribution of the *macronyx*-group of the genus *Leptastacus*.

Assuming that the monophyletic status of the *macronyx*-group is true, in Fig. 375 I have drawn an alternative and more strict track for this clade, along with the track derived from Huys' (1992) dispersal model through the Thule-Land-bridge.

Firstly, I assume a Laurasian origin for this species-group, which could explain why there are no records of this clade in the southern emisphere. This ancestral population, by continental drift, could have had split apart into two sub-populations, one of them located in the North Sea and the other located in what would be the Atlantic coast of North America, thus forming two trans-allopatric populations, of which, the American one would constitute the present-day *L. coulli*.

From here, we are concerned with the problem about how did the American population reach the South-eastern Pacific coast of South America, and how this resulting population colonized the Galapagos Islands. It becomes necessary, therefore, to consider Rosen's (1975) historical reconstruction of Caribbean biogeographic patterns based on Malfait & Dinkelman's (1972), Holden & Dietz's (1972) and Tedford's (1974) models. The description of these models is beyond the scopes of the present study, and the reader is refered to the above mentioned authors for more detailed information.

I shall start from the premises that the vicariance model a) provides that the main components of present distributions in the Caribbean region are derived from a southern Gondwanian and a Laurasian biota; and therefore, b) admits the reality of dispersal to allow sympatric speciation; in other words, the occurrence of sympatric speciation is evidence of dispersal; and c) provides that in the Caribbean region (Central America and the Antilles), the general tracks of northern and southern biotas overlap, and therefore, probably much of the faunal mixing of the northern and southern elements occurred prior to the vicariant events that took place in this region, and thus, the histories of dispersal and vicariant events of the different elements might be similar.

According to Rosen's (1975) account, the North American original population of the *macronyx*-group, should have had dispersed southward and reached the proto-Antilles during the Jurassic (late Mesozoic), before any vicariant event took place (*e. g.* series of decoupling faults and eastward movement of proto-Greater Antilles and proto-Lesser Antilles). Afterwards, the population reached the west coast of northern South America well before the tectonically active western Southern Mexico Trench closed off the engulfed component of the East Pacific Plate and originated a new western archipelago that would consolidate into the present Central American Isthmus. Later, during late Oligocene-early Miocene, a collision of an ancestral Carnegie Ridge with north-western South America gave rise to a spreading centre along the Galapagos Rift Zone, that, connected with lower Central America, brought about the final closure of the western boundary of the Caribbean plate. With regard to the Galapagos, Holden & Dietz (1972), suggested that "the modern Galapagos islands may have inherited faunas from a whole series of ancestral "Galapagos islands" which existed over a span of 40 m. y. Presumably the animals could have had little difficulty negotiating the short span of water to a new volcanic island as an older extinct volcanic island drifted eastward and subsided beneath the sea (a subsiding "stepping stone"), adding itself to the end of the Cocos and Carnegie ridges. To date, no guyots have been reported from either the Carnegie or Cocos chains, but there is still not conclusive evidence that these ridges were not subareal at some time in their history (McBirney & Williams, 1969)." These stepping stones, could enhance the colonization of the peresent-day Galapagos within a period of 40 m. y., instead of the several million years if some kind of evolution in isolation is assumed.

This alternative model allows us to make the following:

Predictions

a) if more species of *Leptastacus* are found in America, these will belong to the *macronyx*-group,

b) if more species of *Leptastacus* are found in the Pacific coast of Northern Mexico and North America, they will be more closely related to their southern congeners, provided that they could have had dispersed after the closing-off of the Panamanian barrier,

c) if more species of *Leptastacus* are found in the Pacific coast of northern Mexico and North America, they will be more closely related to their Atlantic and Caribbean congeners, provided that the Atlantic and Caribbean species could have had dispersed northward along the Mexican Pacific coast, well before the closing-off of the Panamanian barrier,

d) if more species of *Leptastacus* are found in Caribbean waters, they will be more closely related to their congeners from the North American Atlantic coast and Caribbean Sea than to any other Pacific or European species,

e) I assumed that the American *macronyx*-clade reached proto-Caribbean waters well before any vicariant event. It is possible, however, that some individuals reached the same region during or after the time all or part of the vicariant events took place. If this happens to be true, then the phylogenetic relationships of the Caribbean fauna should reflect the vicariant events by which they vicariated,

f) if more representatives of the *macronyx*-group are found in the Greater Antilles, these species will be more closely related to *L. coulli* than to any other Caribbean species,
g) provided that I chose the North American Atlantic coast as centre of origin of the Caribbean and Pacific species of the *macronyx*-group under the criterion of maximum plesiomorphy, I assumed that i) *L coulli* is the most plesiomorphic species of the *macronyx*-group in America, and ii) *Leptastacus spatuliseta* is more apomorphic than *Leptastacus coulli*, provided Hennig's (1966) progression rule,

Tests
a) the find of taxa related to the European *macronyx*-calde in the Faeroes, Iceland and/or Greenland, would suggest that the Thule-Land-bridge was indeed a stepping stone for the colonization of North American systems, and the vicariant model by which I explained the amphiatlantic distribution of this group of species would be falsified,
c) the find of representatives of the *macronyx*-group along the Atlantic coast of South America and Africa would suggest the rejection of the theory of a Laurasian origin of this clade,
c) the vicariant model in general would be falsified if the supposed monophyletic status of the taxa involved turns out to be false,
d) if Hennig's progression rule is falsified, in other words, if *Leptastacus spatuliseta* proves to be as or more plesiomorphic than *Leptastacus coulli*, then the dispersal model should be rejected.

V. 4. A vicariance biogeographic model of the *helgolandica*-group of the genus *Longipedia* Claus

Firstly, I shall give some comments on the phylogenetical and systematic status of the species-groups of *Longipedia* without trying to explain their present-day distribution. Afterwards, I will go deeply into the analysis of the biogeography of the *helgolandica*-group in particular. The justification of analyzing only the biogeography, in this case, of the *helgolandica*-group of *Longipedia*, resides in that i) I did find a new species closely related to this group, thus extending its range in the Eastern Pacific from the Galapagos to the mouth of the Gulf of California (Mexico), and ii) because, except for *L. minor*, the *helgolandica*-group as defined here is in all probability a monophyletic group, characterized by, at least, the synapomorphy consisting of a marked reduction of the inner element of P4 ENP 1. Similarly, the american species, *L. americana*, *L. santacruzensis* and *Longipedia n. sp. 1* can be subdivided into two more groups: the *santacruzensis*-group composed of *L. santacruzensis* and *Longipedia n. sp. 1* and the so far monotypic *americana*-group. The *santacruzensis*-group is here defined by a number of synapomorphies: i) reduction of the inner seta of coxa of P2, ii) loss of inner element of P4 ENP 1, and iii) the presence of a seemingly articulated female P5. Similarly, *L. americana* can be separated from the European population by a further reduction of the inner element of coxa of P2. An hypothetical cladogram of this four species at least, *L. helgolandica*, *L. americana*, *L. santacruzensis* and *Longipedia n. sp. 1* would agree completely with the respective area cladogram in which the main vicariance events would be shown. However, the resultant cladogram would be very simple, so that, the information provided by such analysis would be worthless.

Such an analysis would be worth if all the species could be included. However, our present knowledge of the phylogenetic relationships within *Longipedia* prevent us to make further assumptions. It would have to be demonstrated through a thorough study of the genus that several groups could be defined based on synapomorphies.

Within the genus *Longipedia*, several species have been suggested to be closely related. This is the case for three of them: *L. coronata* Claus, *L. kikuchii* Itô and *L. nichollsi* Wells. This group of species can be differentiated from all other species by the plain nature of the abdominal hyaline frill and the relative simplicity of the anal operculum (except for *L. weberi* A Scott), and can be separated one from each other by a series of differential features (for a throrough revision see Wells, 1980).

In his revision of the genus, Wells (1980), recognized the formerly unsuspected variability of the anal operculum within *L. scotti* Sars, and given these variability suggested *L. australica* Nicholls to be a subjective synonym of the former as the differences found by Nicholls (1941a) regarding the female P5, anal operculum, and male antennule, fall within the range of variability of *L. scotti*. The same applies for the case of *L. longispina* Monard. Additionally, Wells (1980) suggested a slight similarity between *L. scotti* and *L. andamanica* Wells that could indicate some relationship between both species. Later, Itô (1985) described a new subspecies of *L. andamanica*, *L. andamanica nipponica* from Shirahama (Japan), whose male P5 turned out to be more similar to that of *L. scotti*.

L. weberi A. Scott, *L. brevispinosa* Gurney and *L. spinulosa* Itô, are probably related, but this relationship is still obscure.

V.4.1. The *helgolandica*-group of *Longipedia* Claus

L. minor T. & A. Scott was originally described as a subspecies of *L. coronata* by T. & A. Scott (1893) and T. Scott (1893). A. Scott (1896) and T. Scott (1896) elevated this taxon to the species rank, whose description was complemented by Sars (1903). In 1949, Klie described a new subspecies of *L. minor*, *L. minor helgolandica*, which González & Bowman (1965) elevated to the species level. Presently, these species are considered sympatric, inhabiting waters of the East Atlantic coast (*L. helgolandica* has not been reported from Mediterranean coasts). González & Bowman (1965), identified the Northamerican populations with Klie's (1949) *L. helgolandica*, and Mielke (1975) pointed out some differences between his material from the Island of Sylt (North Sea) and González & Bowman's material from the Atlantic coast of North America. Later, Wells (1980), compared González & Bowman's and other American material with Mielke's and other European material, and based on a number of differences between *L. minor* and *L. minor helgolandica* (=*helgolandica*), suggested that *L. helgolandica* of González & Bowman is in fact a new and closely related species, *L. americana*. Mielke (1979) decribed a new subspecies of *L. helgolandica*, *L. helgolandica santacruzensis* Mielke, from the Galapagos Islands, clearly related to *L. helgolandica*. In the present study, *L. helgolandica santacruzensis* was elevated to the specific level as *L. santacruzensis* Mielke. In Ensenada del Pabellón lagoon (Mexico), I found one more species, *Longipedia n. sp. 1*, that showed to be closely related to *L. santacruzensis*. Both species are in turn related to *L. americana*, and all these species showed some relationship with *L. helgolandica*.

It is of general acceptance, to seek the phylogenetic relationships among the species of a given genus according to the reduction in segmentation and/or armature of the mouth parts, legs and/or somitic ornamentation among other characters. In Table 2 (Parts II and III), I gave a list of salient features of the species of the *helgolandica*-group. However, the state of some of these features is rather subjective (*e. g.* with "large" epimeral lapets vs. "very large" epimeral lapets), and should be taken cautiously. As in many taxa, the reduction of chaetotaxy and segmentation seems to occur at random, leading a weird assemblance of apomorphic and plesiomorphic character states for each species that makes difficult their phylogenetical analysis.

In Fig. 376, following the above ideas about the phylogenetic relationships among the species of the *helgolandica*-group, I have drawn its track based only on the certain and very probable records given by Lang (1948) and Wells (1980). Of all the indeterminable records refered to by the two former authors, I only included Marques' (1947, 1955) record of *L. longispina* from Guinea-Bissau (considered as a probable record of *L. minor*, after Wells, 1980), and Jakobi's (1954a) record of *L. mourei* from Brazil (probably synonym of *L. americana*, after Wells, 1980).

Firstly, it has to be stressed the fact that, of the *helgolandica*-group, *L. helgolandica* has not been reported from the Mediterranean, where only *L. minor* seems to be present. I assume, therefore, that the *helgolandica*-group (and probably other species and/or species-groups that presently are distributed in the Indian Ocean and Western Pacific), was originated in the ancient Tethys Sea before any vicariant event took place. The closure of the Tethys Sea by a counter-clockwise (north-eastward) movement of eastern Africa, could then, constitute the first vicariant event, by which the eastern populations were separated from the western ones, leading allopatric speciation. Subsequent vicariant events are supposed to have been occurred along the Indo-Pacific Ocean. The same counter-clockwise movement of Africa that closed the Tethys Sea, opened the Central Tethys (present-day Mediterranean Sea), so that the Central Tethys was in contact with the Western Tethys or proto-Atlantic, whose basin begun to separate Western Laurasia and Gondwana from their eastern counterparts (for a brief review on the paleoceanography and paleoclimatology of the Mediterranean Sea, see also Por, 1975, and Widmark & Speijer, 1997). It was through this opening that the ancient *helgolandica*-group displaced northward and southward well before the Atlantic coast of Africa and South America, and Europe and North America, were completely separated. Since *L. minor* and *L. helgolandica* have been reported from the North Atlantic coast of Europe and the west coast of Africa, I assume that sympatric speciation occurred before any dispersal event, and afterwards both sympatric species migrated northward and southward. If it is assumed that sympatric speciation took place after dispersal, it would imply an a priotistic approach of dispersal to explain the present-day distribution of these two species. The second vicariant event is assumed to be the separation, by continental drift, of the ancient *helgolandica*-group into two trans-allopatric populations along both sides of the Atlantic. From here, the distribution pattern (track) of the North American population coincides, in general, with that of the *spatuliseta*-group of the genus *Leptastacus*. It can be assumed, therefore, that these two species-groups share similar geographic histories, with only some minor variations, (*e. g.* the *spatuliseta*-group has not been reported from the Antilles, but this can be only the result of the lack of collecting in that region):

a) the original North American population should have had reached the proto-Antilles after the appearance of the first two decoupling faults bordering the proto-Antilles archipelago (that separated North and South America), and the second vicariant event that divided the proto-Antilles into Ancestral Greater and Lesser Antillean subregions, and that eventually led up to the formation of the Cayman Trough, Cuba and the Aves Arc. The latter gave rise to the today's Lesser Antilles,
b) the colonization of the west coast of northern South America and the Galapagos must be similar to that of the *spatuliseta*-group, provided that the tracks overlap,
c) an additional dispersal event must have had taken place either before or after the closing-off of the Central American Isthmus to allow some representatives to reach the South-east Gulf of California.

From this model, it can be predicted that a) if more species of *Longipedia* are found in America, these will belong to the *macronyx*-group, b) if more species of *Longipedia* are found in the Pacific coast of Northern Mexico and North America, they will be more closely related to their southern congeners, provided that they could have dispersed after the closing-off of the Panamanian barrier, c) if more species of *Longipedia* are found in the Pacific coast of northern Mexico and North America, they will be more closely related to their Atlantic and Caribbean congeners, provided that the Atlantic and Caribbean species could have dispersed northward along the Mexican Pacific coast, well before the closing-off of the Panamanian barrier, d) if more species of *Longipedia* are found in Caribbean waters, they will be more closely related to their congeners from the North American Atlantic coast and Caribbean Sea than to any other Pacific or European species, e) I assumed that the American *helgolandica*-group reached proto-Caribbean waters well before any vicariant event. It is possible, however, that some individuals reached the same region during or after the time all or part of the vicariant events took place. If this happens to be true, then the phylogenetic relationships of the Caribbean fauna should reflect the vicariant events by which they vicariated, f) provided that I chose the North American Atlantic coast as centre of origin of the Caribbean and Pacific species of the *helgolandica*-group under the criterion of maximum plesiomorphy, I assumed that *L. americana* is the most plesiomorphic species of the *helgolandica*-group in America, and ii) *Longipedia santacruzensis* and *Longipedia n. sp. 1*, are more apomorphic than *Longipedia americana* provided Hennig's (1966) progression rule, g) given the presence of both *Longipedia minor* and *L. helgolandica* along the Atlantic coast of Africa, it is possible, that after thorough examination of Jakobi's (1954a) material, *L. mourei* will be found to be more closely related to the former two species than to any American representative. Thus, Wells' (1980) view that *L. mourei* could be equated with *L. americana* would be rejected, and h) if *L. helgolandica* is not found to inhabit Mediterranean waters, further detailed analysis and comparison of *L. minor* and *L. helgolandica*, could prove that the former is relatively more plesiomorphic than the latter.

On the other hand, this model can be tested in several ways such as: a) the find of *Longipedia helgolandica* in the Mediterranean, would falsify the supposed Mediterranean origin of the *helgolandica*-group by rejecting the sympatric speciation along the Atlantic coast of Europe and Africa, as a product of northward and southward dispersal, b) the vicariant model in general would be falsified if the supposed monophyletic status of the taxa involved turns out to be false, c) if Hennig's progression rule is falsified, in other words, if *Longipedia santacruzensis* and *L. n. sp.1* prove to be as or more plesiomorphic than *Longipedia americana*, respectively, the dispersal model should be rejected.

V.5. A vicariance biogeographic model for the genus *Scottolana* Por

In the discussion and comparison of the Mexican specimen of *Scottolana*, I arranged the 9 presently known species of *Scottolana* and *Scottolana sp. 1*, into 4 species-groups defined by the structure of the caudal rami, shape and location of its setae and sexual dimorphism. It is possible, however, that these species-groups are rather un-natural, thus the ideas presented here should be taken only as work hypothesis that should be tested in future studies. The track for each species, species-group and the hypothetic generalized track for the genus is shown in Fig. 377.

As can be observed, the genus Scottolana shows a pantropical distribution (except for the record of *S. bulbifera* Chislenko from the Sea of Japan), and is represented, except for the Atlantic, in each oceanic basin and in the Mediterranean Sea. A similar type of distribution has already been observed for the genus *Sunaristes* (Canuellidae) (Ho, 1988), and for the genus *Afrolaophonte* Chappuis (Laophontidae) (Fiers, 1990b), and since their tracks overlap in some regions, these three genera must share, to some extent, similar biogeographic histories.

By extrapolation of Fiers' (1990b) model, the ancestral Indo-Pacific population of Scottolana, probably characterized among other features, by the lack of sexual dimorphism on the setae of caudal

rami and presence of a hook-like inner projection in the probably, longer than broad caudal rami, could have inhabited the warm waters of the circum-global aequatorial Tethys Sea. This ancestral population must have vicariated by closure of the present-day Mediterranean Sea, leading up to two populations, one that dispersed in the Eastern Mediterranean and another that dispersed through the Indo-Pacific.

The indopacific ancestral population could have undergone sympatric speciation, leading up to the present-day species-groups, of which the *dissimilis*-group had already a representative inhabiting the east coast of the Mediterranean (the today's Por's (1964b) specimens). The *longipes*-group, the *uxoris*-group and the *oleosa*-group kept the ancestral condition regarding the absence of any sexual dimorphic seta in the caudal rami. The *longipes*-group could have kept some other ancestral features like the general shape of the caudal rami and the inner hook-like projection. On the other hand, the *oleosa*-group lost the inner projection and the setae of the caudal rami migrated to a rather distal position. The *uxorys*-group udergone a remarkable reduction in the size of the caudal rami and kept the inner projection (present in *S. uxorys*), but as a result of dispersal through the Indo-Pacific, this group could have undergone sympatric speciation leading up to the present-day *S. glabra* and *S. rostrata* with further loss of the inner projection of caudal rami and migration of the setae to a distal position. The assumed sympatric speciation and the resultant overlaping tracks of the species in the region, could have been caused by several eustatic sea level changes that eventually remodeled the archipelago through the creation of landlocked basins and sorting of the sediments (Potts, 1984). The same was suggested by Fiers (1990b) to explain the distribution of some species-group of the genus *Afrolaophonte* T. Scott (Laophontidae). However, as in the genus *Afrolaophonte*, the question remains as to how the species reached the papuan-australian land mass that has been always separated from the Indonesian arc by a deep sea way (Potts, 1984), as well as to how, in this case, the *dissimilis*-group of *Longipedia* reached the Pacific coast of Mexico.

The only way to understand the distribution of these species in New Guinea is to envisage some sort of land connections between New Guinea and the Indonesian arc.

On the other hand, it is possible, following Cracraft's (1973) view, that the permian retreat of the seas in the Northern Hemisphere could have enabled part of the *dissimilis*-group to spread through the Paleartic and Neartic region. Another part of this group could have migrated northward to the Sea of Japan, where today we can find *S. bulbifera*. Schminke (1974) suggested the retreat of the seas during the Permian to explain the distribution of some bathynellid taxa. Of course, there are no reports of taxa related to the genus *Scottolana* from Antartica, but this may be due to the lack of work in that region.

The distribution of *S. antillensis* and *Scottolana sp. 1* in both sides of America can be explained following Rosen's (1975) account for Caribbean biogeography referred above.

The model above presented explains the abscence of representatives of *Scottolana* in both sides of the Atlantic and the relationships between the Caribbean and Mexican species and the Indo-Pacific and Japanese species. Additionally, the distribution of *S. antillensis* in the Caribbean Sea supports the hypothesis about the origin of the Antilles. In other words, if it is assumed that the ancestral *S. antillensis* reached the proto-Antilles before its northwestward desplacement, this would support the proto-Antillean origin of Jamaica, where *S. antillensis* can be found presently.

This model can be falsifed, nevertheless, if representatives of the genus are found in both sides of the Atlantic, specially if those representatives turn out to be more related to *S. antillensis* than to any other species.

VI. SOME DATA ON THE ECOLOGY OF THE HARPACTICOID COMMUNITIES FROM ENSENADA DEL PABELLON LAGOON

VI.1. Abundance of harpacticoid copepods

The analysis of the abundance of the harpacticoid copepods and other meiofauna taxa from Ensenada del Pabellón lagoon has been reported elsewhere (Gómez-Noguera & Hendrickx, 1997). It was shown that, in general, the highest densities of copepods were observed in those communities affected by organic enrichment either through the sewage outlets of the agro-industrial activities in the north-east part of the lagoon (sations 10, 12 and 15 in the present thesis) or through the Culiacan River and seasonal streams in stations 2 and 4-5, all characterized by muddy sediments and high densities of mangroove.

VI. 2. On the diversity of four harpacticoid communities

Since the publication of Fisher's *et al.* (1943) paper in which they derived for the first time a diversity measure, it has become very common among ecologists, to describe a community using diversity and/or evenness indices, among other reasons, because measures of diversity are frequently seen as indicators of the well being of ecological systems.

Most people have an intuitive grasp of what diversity means. However, viewed from different perspectives, diversity seems to have different meanings. In fact, the diversity of methods to measure diversity (by recording the number of species, by describing their relative abundances or by using a measure which combines these two components) is a reflect that "'species diversity' has been defined in various and disparate ways that it now conveys no information other than 'something to do with community structure'; species diversity has become a nonconcept" (Hurlbert, 1971). On the contrary Hill (1973) stated that diversity can be as unequivocal as any other ecological parameter if it is carefully defined according to an appropriate notation. On the other hand, as pointed out by Lambshead *et al.* (1983), suggesting how a measure of diversity should behave is not the best way to define diversity itself. Probably, as suggested by Magurran (1988), the difficulties in defining species diversity lie in the fact that the intuitive concept of diversity is composed of two main aspects, richness and evenness, and since different opinions can favour a stronger weighting of either evenness or species richness, several indices can and have been created.

Just by reviewing the literature available on diversity idices, one can realize that there is a bewildering range of them (species richness indices, species abundance models and indices based on the proportional abundance of species). All these indices, however, seek in general to characterize the diversity of a sample or community.

With so many methods to choose from, some times is difficult to decide which is the most suitable way of measuring diversity. On this last matter, several criteria have been proposed such as whether they fulfil some properties of the normal distribution (*e. g.* skewness and kurtosis), and whether the total diversity of all the samples lumped together conforms with the mean diversity index calculated from the indices of a set of replicas (Heip & Engels, 1974), dependence on sample size (Magurran, 1988; Soetaert & Heip, 1990), their ability to discriminate between sites, what component of diversity is being measured, and whether the index is widely used and understood (*c. f.* Magurran, 1988).

As stated in the section "Material and Methods", it was necessary to reduce progressively the sampling effort during the study period due to financial and technical constraints, in such a way that at the end only four stations (2, 6, 7 and 8, see Fig. 6) can be compared in terms of diversity.

It has been repeteadely advised the analysis of k-dominance, Lorenz and rarefraction curves before any attempt of making comparisons between sites in terms of diversity (Lambshead *et al.*, 1983; Magurran, 1988). The reason for the necessity of analyzing the k-dominance curve, is that some times the different intrinsic diversity indices (those indices that order a set of assemblages in the same way, according to their intrinsic diversity), can give different orderings of the communities under study, becoming a difficult task to decide which index has to be followed. As shown by Lambshead *et al.* (1983), by plotting the k-dominance curves (percentage cumulative abundance against species rank), it is possible to decide which communities are comparable in terms of diversity. They clearly showed that those communities whose curves do intersect are not comparable and that the different intrinsic diversity indices will give different orderings of those intersecting curves (communities). The same can

be said for the necessity of plotting also the Lorenz curve (k/sx100 against cumulative abundance) to analyze equitability. With regard to the Sanders' rarefraction curves, it is well known that they share a similar shape with the k-dominance curves, though they do not have any mathematical relationship. However some times these two methods give similar results suggesting that both are measuring diversity (Lamabshead *et al.*, 1983). Nevertheless, given a number of advantages of k-dominance curves, this technique is often preferred to rarefraction techniques for comparing diversity.

From the k-dominance curve presented in Fig. 378, it can be concluded that the only comparison possible is among stations 2, 6 and 7 (these curves do not intersect), while any comparison with station 8 is prevented by the fact that this curve intersects the remaining components of the graph. The Lorenz curve (not shown) gave the same ordering of communities, suggesting that both diversity and evenness indices should give the same ordering for those curves that do not intersect. From here, it can be suggested that station 7 is more diverse than station 6 and 2, following Lambshead's *et al.* (1983) criteria.

As stated above, there is a bewildering diversity of diversity indices. It is not my intention to describe or discuss the mathematical reasoning and/or implications behind each one of these indices and the reader is referred to the above mentioned literature for more detailed information. In Table 47, the values of 8 diversity indices and three evenness indices arbitrarily chosen, are presented.

As can be observed, the ordering given by the diversity indices (except for N_0 and $N\infty$) is the same as depicted in the k-dominance curve, *i. e.* station 7 is more diverse than station 6 and station 2. The effect of the intersection of the curve of station 8 with the others is reflected in the different orderings given by all these diversity and evenness indices.

Now, we face the problem of which index should be chosen to describe these harpacticoid communities. On this matter, as stated above, several criteria have been hitherto provided. Heip & Engels (1974), based on the fact that the diversity indices are based on the normal distribution of the data, used some properties of this distribution to choose the best diversity and evenness index to describe a low-diversity copepod community from the coast of Belgium. They concluded that Shannon's diversity index and Heip's evenness index are the best descriptors of that low-diversity community. The choice of the best index involves a choice between compromises, nevertheless. In other words, the index chosen can have a good variability but a poor conformity with the total population, for example (Heip & Engels, 1974).

Table 47. Diversity and evenness indices calculated for the harpacticoid communities from four stations in Ensenada del Pabellón lagoon (Mexico). The results are based on overall means of the replicas for each station.

	Station	2	6	7	8
Diversity indices					
Margalef	$Ma=(S-1)/\ln N$	2.39	3.08	4.09	1.72
Simpson(a)	$1-SI=1-\sum[n_i(n_i-1)]/[N(N-1)]$	0.28	0.54	0.83	0.70
Simpson(b)	$1/SI=[N(N-1)]/\sum[n_i(n_i-1)]$	1.39	2.15	5.91	3.35
Shannon	$H=-\sum(p_i \ln p_i)$	0.55	2.22	1.76	1.13
Hill's N_0	$N_0=S$	5	11	11	5
Hill's N_1	$N_1=e^H$	1.74	3.37	5.79	3.09
Hill's N_2	$N_2=1/\sum(p_i^2)$	1.29	2.06	4.14	2.72
Hill's $N\infty$	$N\infty=1/p_i$	0.21	0.06	0.21	0.23
Evenness indices					
Pielou	$E=H/H_{max}=H/\log_2 S$	0.24	0.35	0.51	0.49
Sheldon	$E=e^H/S$	0.35	0.31	0.53	0.62
Heip's	$E=e^H-1/S-1$	0.18	0.24	0.48	0.52

S= Number of species
ni= Number of individuals of the ith species
N= Total number of individuals
pi= ni/N

As can be observed from Table 48, the best variability is that calculated for N_2 and Simpson (a) (from 52 to 56%), regular for N_1 and Margalef's index (from 60 to 71%) and worst for the remaining indices (from 84 to 97%). With regard to the level of kurtosis and skewness it can be observed that the best values are for Simpson (a), N_1 and $N\infty$, regular for Margalef's, Shannon's, N_0 and N_2, while the worst is the value calculated for Simpson (b). Despite the good level of kurtosis and skewness shown by N_0 and $N\infty$, these indices are not considered as good descriptors of the diversity of the harpacticoid communities under studyas their orderings do not agree with the result of the k-dominance curve. As stated above, and in agreement with Heip & Engels (1974), the choice of the best

index to describe the harpacticoid community from four stations in Ensenada el Pabellón lagoon, necessarily involves, to some extent, certain arbitrary criteria that can, of course, vary from investigator to investigator.

Table. 48. Standard deviation, variability, kurtosis and skewness calculated for some diversity and evenness indices from the data of the different replicas. P<0.05

	s	s/mean	kurtosis	skewness
Diversity indices				
Margalef	0.73	0.71	-1.11	-0.15
Simpson(a)	0.38	0.56	-0.95	-0.69
Simpson(b)	2.41	0.84	4.89	2.03
Shannon	0.59	0.95	-1.37	0.31
Hill's N_0	2.26	0.84	-1.14	0.49
Hill's N_1	1.32	0.60	-0.34	0.89
Hill's N_2	1.12	0.52	-1.06	0.63
Hill's N_∞	0.37	0.97	-0.74	0.88
Evenness indices				
Pielou	0.14	0.25	-0.32	-0.97
Sheldon	0.22	0.25	0.78	-1.34
Heip	0.39	0.69	-1.48	-0.37

In other words, the selection of the best index lies on whether we consider the variability or skewness and kurtosis as the most relevant properties of the normal distribution. In the present case, and in my opinion, the best descriptor is Simpson's (a) index, as it possesses the best variability, kurtosis and skewness, followed by N_1. Based on the same criteria, it can be concluded that, for the case of the evenness indices, the best descriptor is Pielou's, followed by Sheldon's and Heip's indices. On this latter matter, it has to be noted that, contrary to the fact that Pielou's evenness index is too strongly affected by H, and thus is not consistent with the Lorenz oredering (Lambshead *et al.*, 1983), the ordering given by Pielou's index agrees well with Simpson's (a) and N1, and the k-dominance curve (and with Lorenz curve as well). Heip's index gave more or less the same results, whilst Sheldon's index does not conform with the results given by the k-dominance curve.

Another criterion to choose the best index lies on its capability of differentiating between sites. One way to compare and test the capability of an index to discriminate between sites is by performing an analysis of variance (One Way ANOVA) when a number of replica are available. This method has been succesfully used to discriminate between sites.

In the present study, from the available replicas taken at each station during the study period, it has been possible to calculate their diversity and evenness indices, and from these data, assuming a normal distribution, a classical One Way ANOVA has been performed to determine which index is the best in discriminating between sites, given the Sum of Squares Effect, principally.

Table. 49. Results of the analysis of variance (One Way ANOVA) calculated from the diversity and evenness data calculated for the different replicas.

Diversity	SS Effect	df Effect	MS Effect	SS Error	df Error	p-level
Margalef's	2.141540	3	0.713847	6.878794	15	<0.05
Simpson's (a)	0.394022	3	0.131341	2.784740	20	<0.05
Simpson's (b)	41.44075	3	13.81358	41.50842	12	<0.05
Shannon's	1.478340	3	0.492780	6.099678	20	<0.05
No	21.79167	3	7.263889	91.16667	20	<0.05
N1	8.214049	3	2.738016	30.22424	20	<0.05
N2	5.904226	3	1.968075	17.13074	16	<0.05
N∞	0.155077	3	0.005026	2.480697	16	<0.05
Evenness						
Pielou's	0.039315	3	0.013105	0.247208	11	<0.05
Sheldon's	0.130650	3	0.043550	0.743114	16	<0.05
Heip's	0.481260	3	0.160420	2.156134	15	<0.05

As can be concluded from the Sum of Squares Effect, the best descriptor of the harpacticoid communities from Ensenada del Pabellón lagoon is by far Simpson's (b) diversity index and Heip's

evenness index. However, in my opinion, Simpson's (b) diversity index should not be chosen as the best index, as its variability, skewness and kurtosis proved to be the less suitable among all diversity indices. It can be observed that N_0 do possesses a high SS Effect as well, but as its diversity ordering of the four communities does not conform with the results given by the k-dominance curve, this index should not be regarded as a good index either to describe the harpacticoid communities under study.

Above it was suggested that Simpson's (a) index and N_1 could be the best descriptors in terms of variability, kurtosis and skewness. However, from Table 49, it can be concluded that N_1 index is a better descriptor of the communities under study as it showed an SS Effect higher than that of Simpson's (a) index. With respect to the evenness indices, above I suggested that Pielou's and Heip's indices were better descriptors than Sheldon's index, and that given the variability, kurtosis and skewness, Pielou's index should be, at least theoretically, better than Heip's index in describing the communities under study. As shown in Table 49, it is clear that Heip's index possesses the best capability of differentiating among sites (it possesses the highest SS Effect), nevertheless.

Summarizing, and given all the above reasons, I conclude that the best diversity and evenness index to describe the harpacticoid communities from Ensenada del Pabellón lagoon are Hill's N_1 and Heip's index, respectively. Hill's diversity numbers are a very usefull way to measure diversity as they are progresively sensitive to changes in the rare and common species. The lower-order numbers give more weight to the rare species, whilst the higher-order ones gave more weight to the more common species. Thus by using Hill's numbers is is possible to estimate the importance of rare and common species. Thus, given the fact that after conscientious analysis, Hill's diversity index of first order (N_1) was chosen as the best index to describe the harpacticoid communities from Ensenada del Pabellón lagoon, it seems reasonable to suggest that rare species are comparatively more important in structuring these comunities.

The ordering, in terms of diversity and evenness, of the stations 7, 6 and 2 can be explained in terms of a gradient of organic, and to some extent, inorganic (heavy metals) pollution. Station 7 and 6, where the highest diversity was observed, are characterized by fine sand with very low levels of nitrogen and organic carbon (Páez Osuna *et al.*, 1992; Gómez-Noguera & Hendrickx, 1997). Besides, these sites are located far from the areas affected by sewage outlets from the sugar mills and agricultural complexes. On the other hand, station 2, as all the localities in the nearby of the mouth of the Culiacán River are subject to the input of organic matter and heavy metals carried by the Culiacan River from the agro-industrial areas (Izaguirre Fierro *et al.*, 1992, Páez Osuna *et al.*, 1993a, 1993b, 1994; Gómez Noguera & Hendrickx, 1997), that could, at least to some extent, negatively affect the diversity, in this case of the harpacticoid communities.

It has to be said that this has not been proved under laboratory conditions, and therefore, rather than a conclusion, the negative effects of organic and inorganic pollution on the diversity of the harpacticoid communities from Ensenada del Pabellón lagoon, constitutes a work hypothesis that should be tested in the future.

There are four basic models that have proved to be useful in describing diversity: the geometric series, the logarithmic series, the log normal distribution and MacArthur's broken stick model.

In the geometric series (also known as the niche pre-emption model), a few species are dominant with the remainder fairly uncommon, and has been found mostly in species-poor systems or in the very early stages of succession (*c. f.* Magurran, 1988). This model occurs when the abundance of species is in some way equivalent to the portion of niche space it has occupied and its shape on a rank/abundance plot is that of a stright line with steep gradient. This model can be better visualized if one imagines a situation in which the dominant species occupies a proportional amount k of some limiting resource, the second most abundant species occupies also a proportional amount k of the same limiting resource, and so on.

In the log series and lognormal distriution, species of intermediate abundance become more common. The log series, as in the case of the geometric series has a steep gradient, but the line is only approximately linear, and is mostly applicabe in cases where only few factors determine the ecology of a given community. It is said that this model would be predicted to occur in situations in which species arrived at an unsaturated habitat at regular intervals of time, and occupied fractions of remaining niche hyperspace (*c. f.* Magurran, 1988).

The log normal distribution, by its shape, can be located in between the log series and the broken stick model, and is said to be characterisric for large, mature and varied natural communities. Perhaps the strongest argument against this model is that a log normal distribution is a statistical property of large numbers and of the Central Limit Theorem that states that when a large number of

factors (all the processes which govern community ecology) acts to determine the amount of a variable (number of individuals per species), random variation in those factors will result in that variable being normally distributed (*c. f.* Magurran, 1988).

In the broken stick model all the species are equally abundant, and contrary to the nich pre-emption model, reflects a case of minimal pre-emption with resources much more equally divided. Its shape is by far the flattest of all the models mentioned above.

In the present study, a goodnes of fit (x^2) was performed for the abundance values of each station following the methodology suggested by Magurran (1988, :130-141) for the four models. It was found that, with a $p<0.05$, the four communities fitted a log normal distribution with a typical shape corresponding to imporverished communities (*i. e.* with out the typical sigmoid shape). It has to be noted that the possibility does exist that, as stated above, the resultant log normal distribution is not but an artifact, in this case of the presence of only a few species in the sample, so that it would suffice the presence of only one very abundant species and one very rare one for the data to be fitted to the log normal distribution. On the other hand, the log normal distribution found in the four communities can reflect the importance, for the case of stations 7 6 and 2 (station 8 is not comparable with the remainder stations), of the rare species in the structure of those communities.

It would be interesting to assign certain importance to a given species in its community, according to its abundance. However, as stated by Hurlbert (1971), diversity indices "do not assume that the more abundant a particular species, the more important (in terms of productivity, for example) it is in the community". On this last matter, Hurlbert (1971) suggested that perhaps the importance of a species could be best defined by:

$$\text{Importance of jth species} = \sum_{i=1}^{S} | P_{i,t=1} - P_{i,t=0} |$$

where P_i= productivity of the ith species before (t=0) and after (t=1) removal of the particular (j_{th}) species being evaluated. In other words, by the sum, over all species, of the changes in productivity which would occur on removal of the particular species from the community.

To my knowledge no data have been published so far on the diversity of harpacticoid copepods. One very promising project on this matter is presently beeing carried out at the University of Gent (Belgium), and I do not exaggerate when I say that the community of meiobenthologists (and copepodologists in particular) will receive eagerly all the information that Drs. Marleen Detroch could gather on the diversity of harpacticoid copepods from Yucatan (Mexico), Kenya and Philipines.

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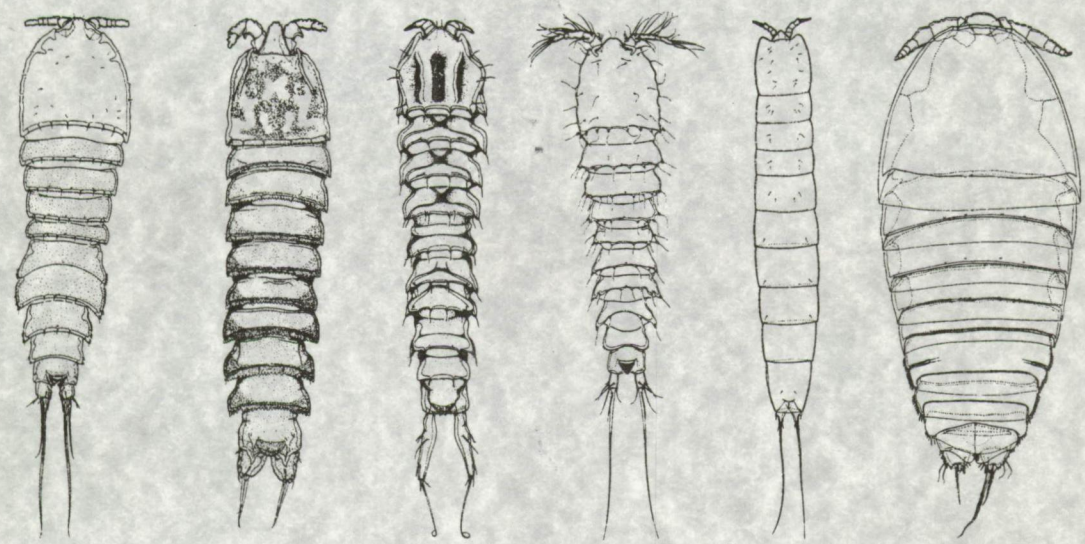
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by

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Thesis presented for the degree of
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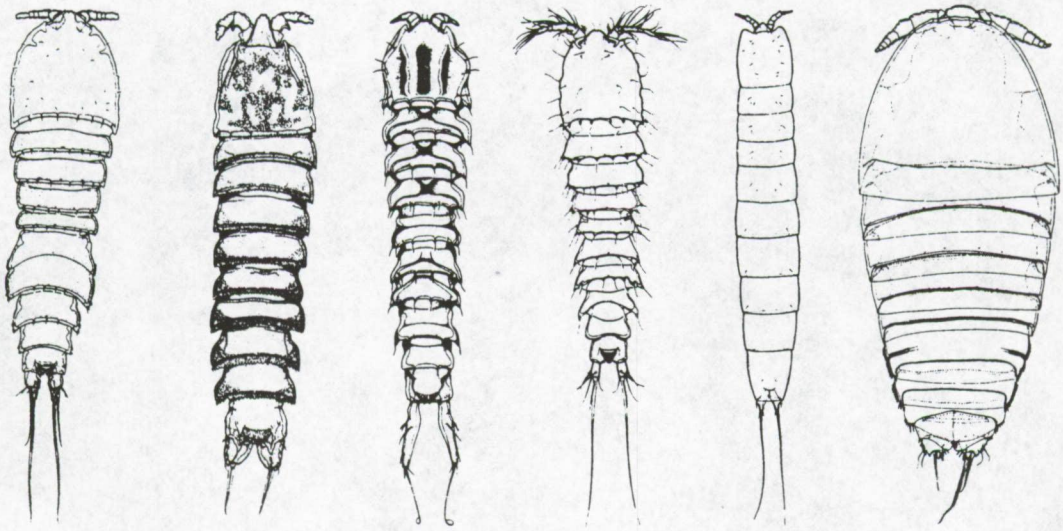
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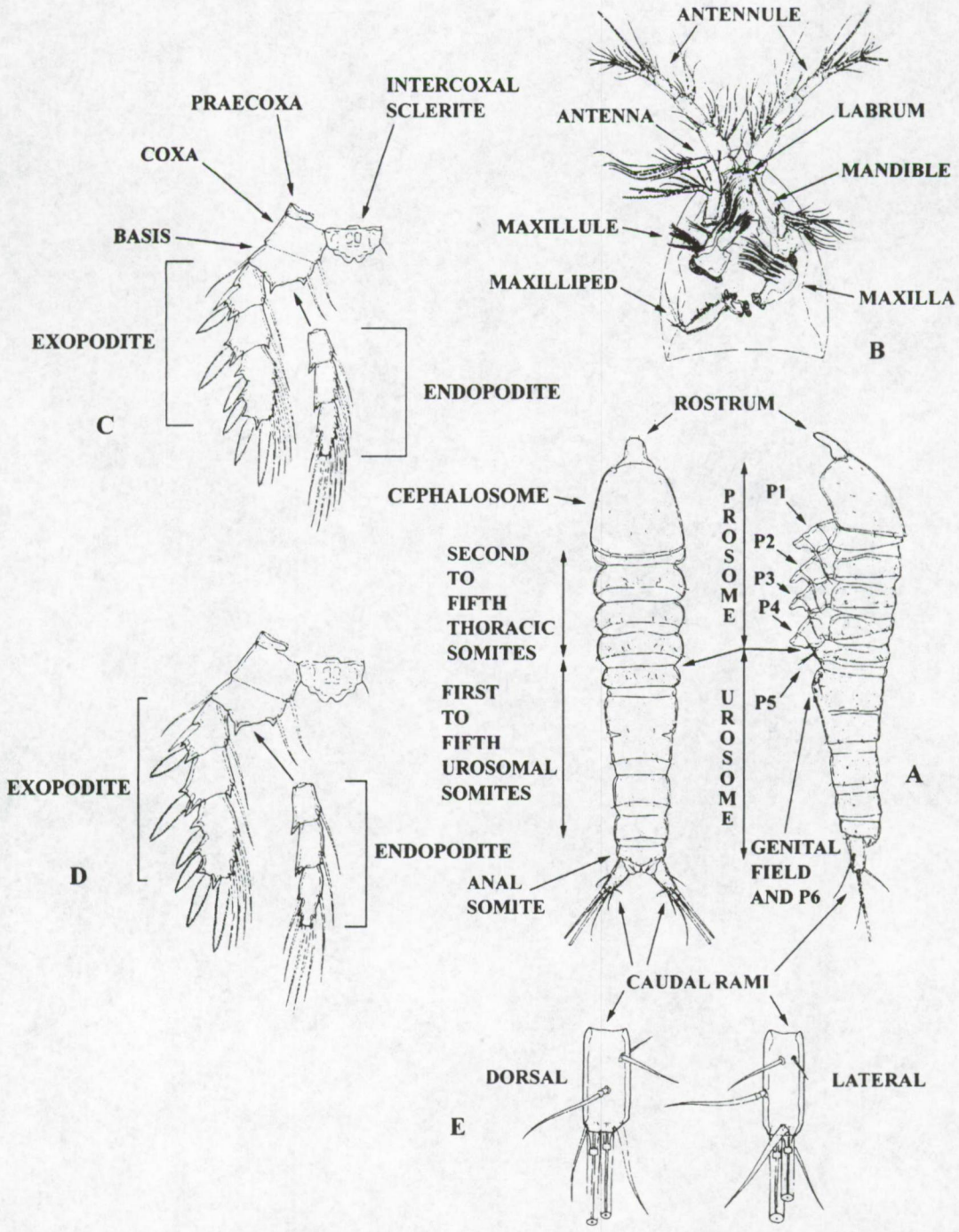


Fig. 1. Basic body plan of Copepoda. A, *Canuella* sp., habitus, dorsal and lateral; B, cephalothorax, ventral, showing appendages, only both antennules, right antenna, maxillule and maxilliped, and only left mandible and maxilla have been illustrated, P1 omitted; C, basic copepod swimming leg; D, basic copepod fifth swimming leg; E, basic copepod caudal ramus (A and B modified after Huys *et al.*,1996; C-E modified after Huys & Boxshall, 1991).

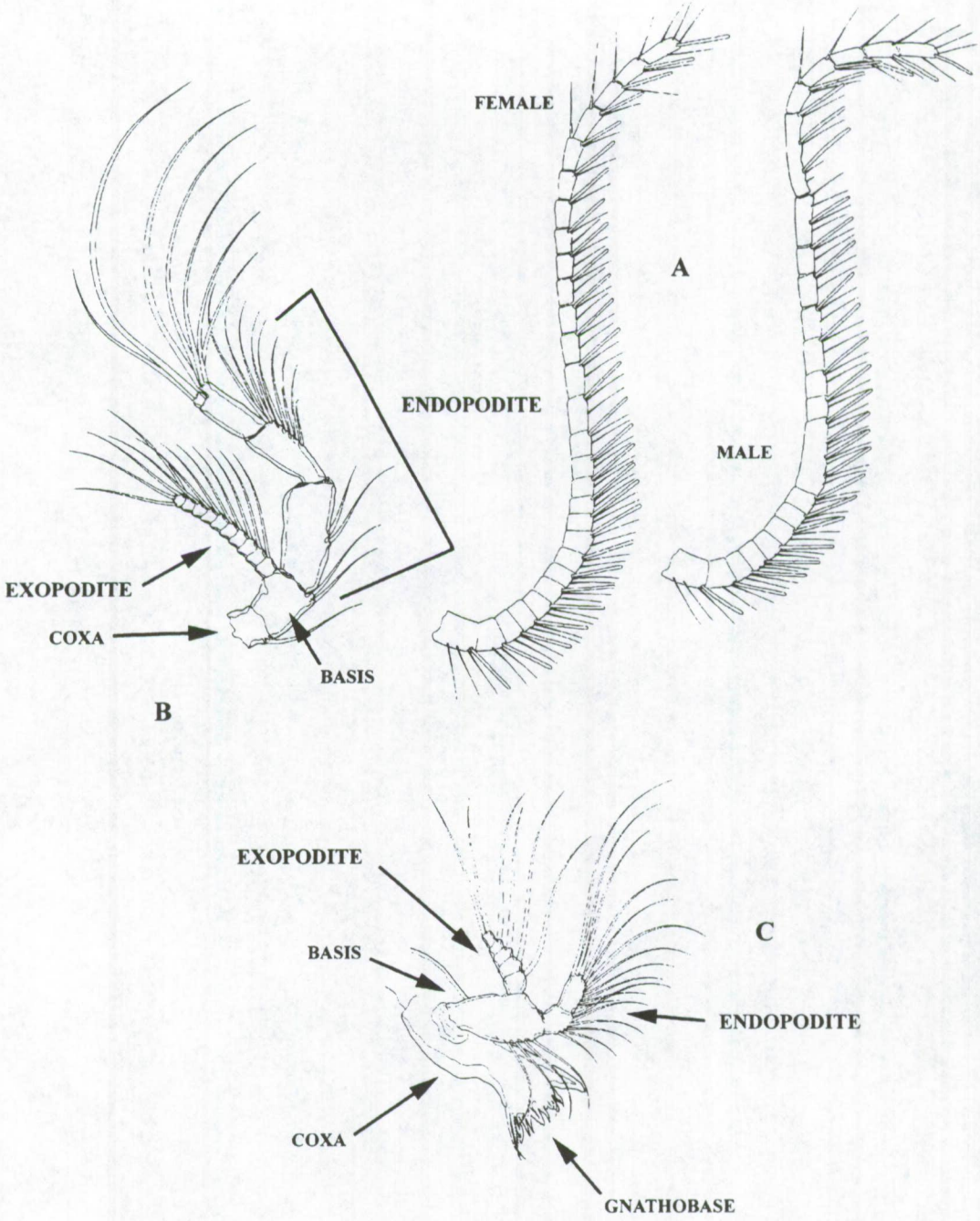


Fig. 2. Basic copepod antennule and mouth parts. A, antennule, male and female; B, antenna; C, mandible (modified after Huys & Boxshall, 1991).

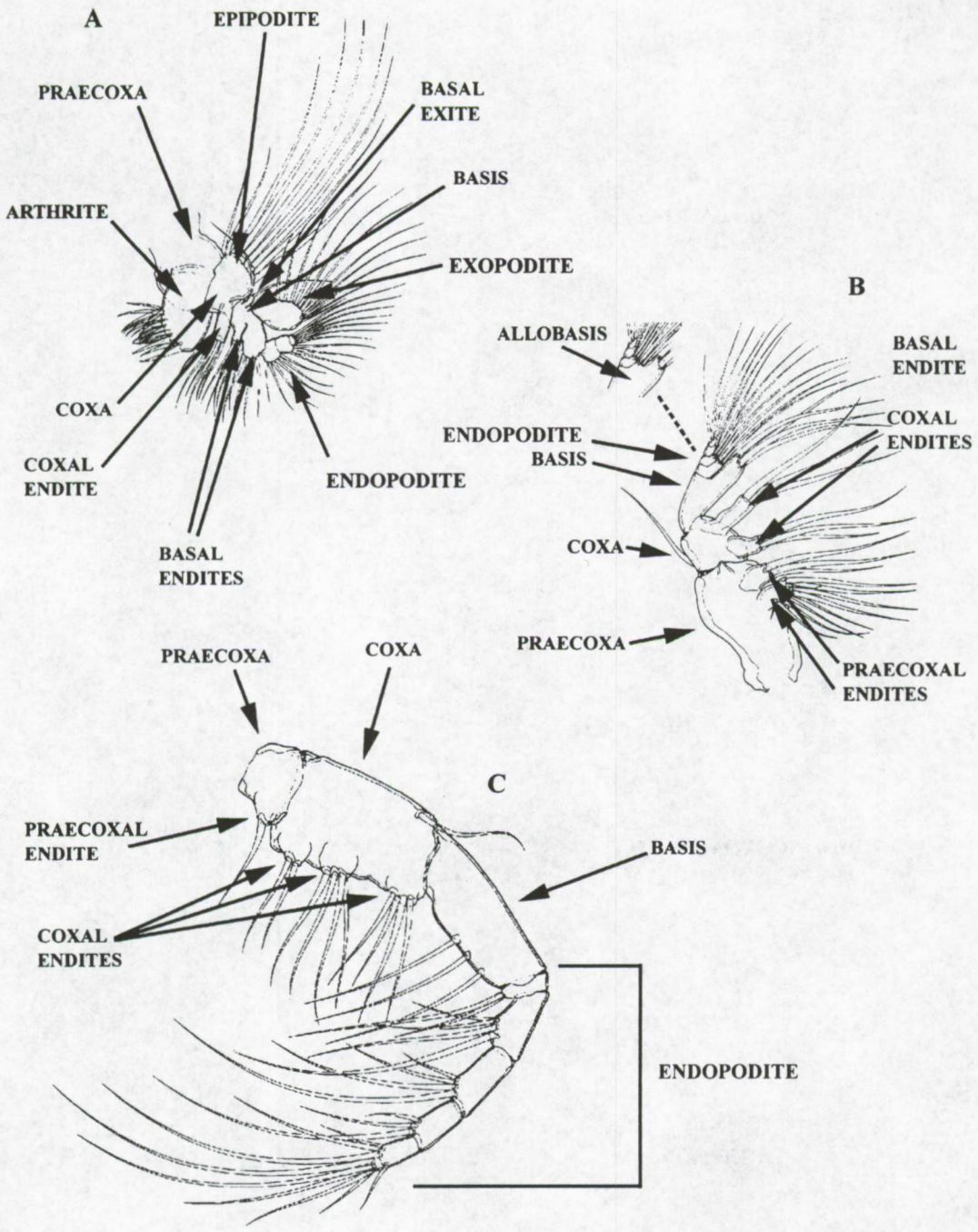


Fig. 3. Basic copepod mouth parts. A, maxillule; B, maxilla; C, maxilliped (modified after Huys & Boxshall, 1991).

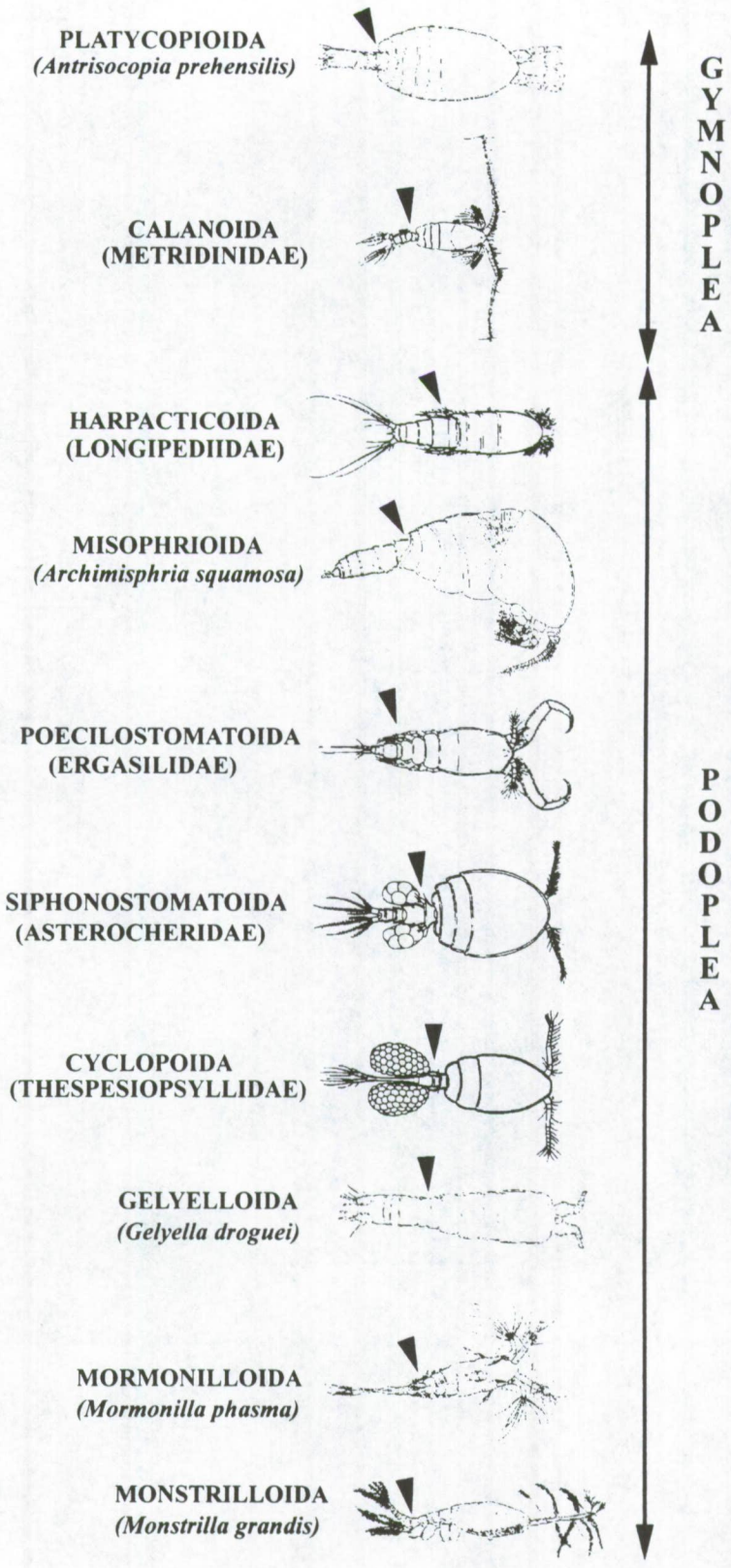


Fig. 4. Tagmosis among Copepoda (modified after Huys & Boxshall, 1991).

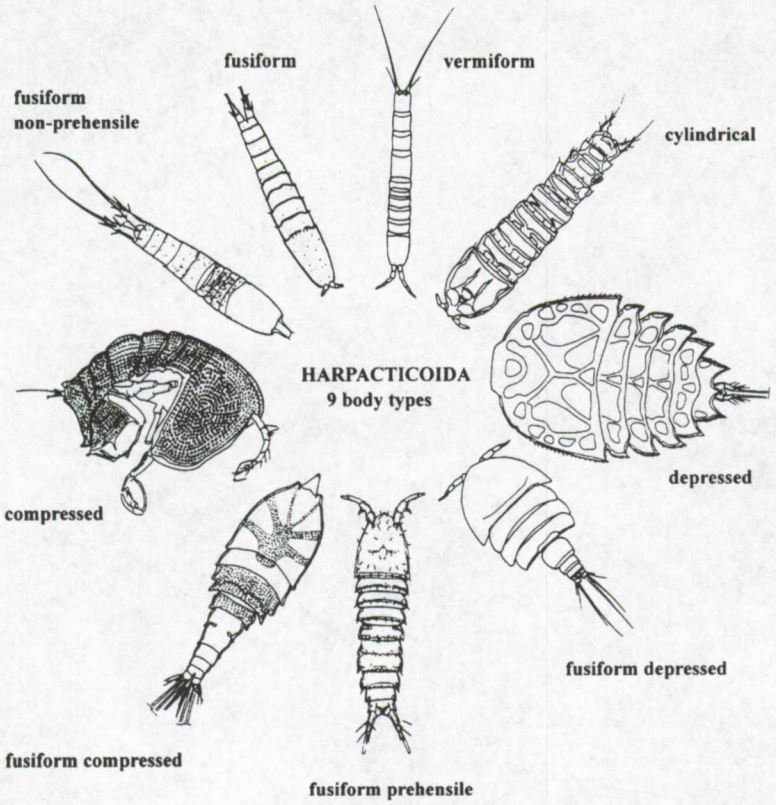


Fig. 5. Most common body shapes within Harpacticoida (modified after Coull, 1977).

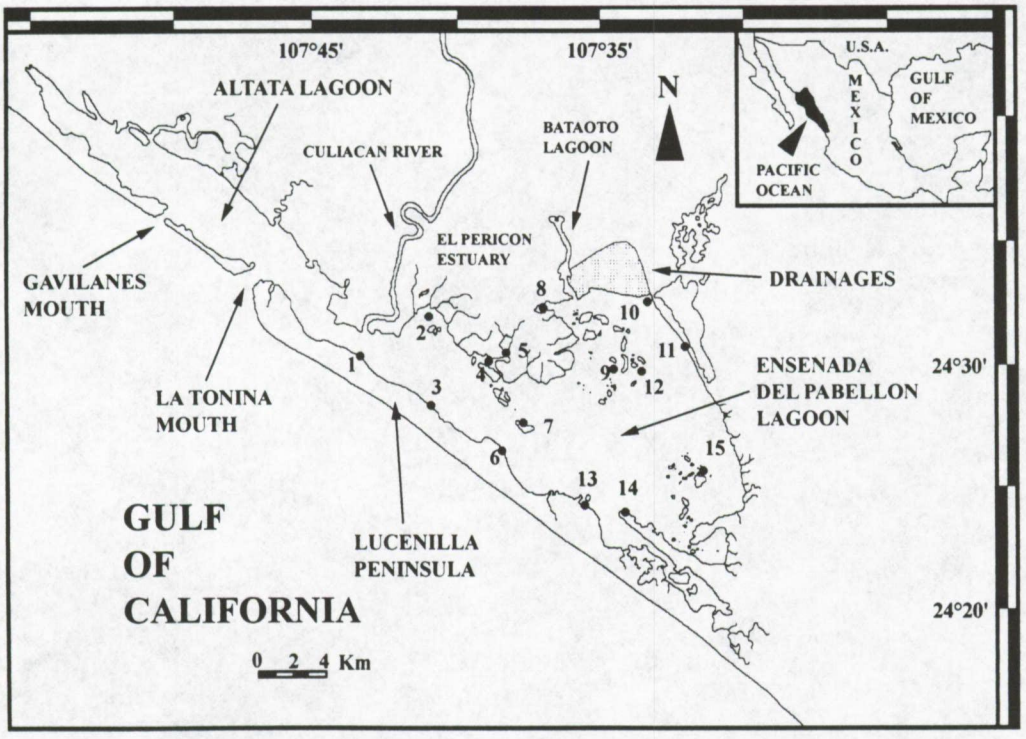


Fig. 6. Study area and sampling sites (modified after Gómez Noguera & Hendrickx, 1997)

Fig. 7. *Longipedia n. sp. 1*, female. a, habitus, dorsal; b, habitus, lateral.

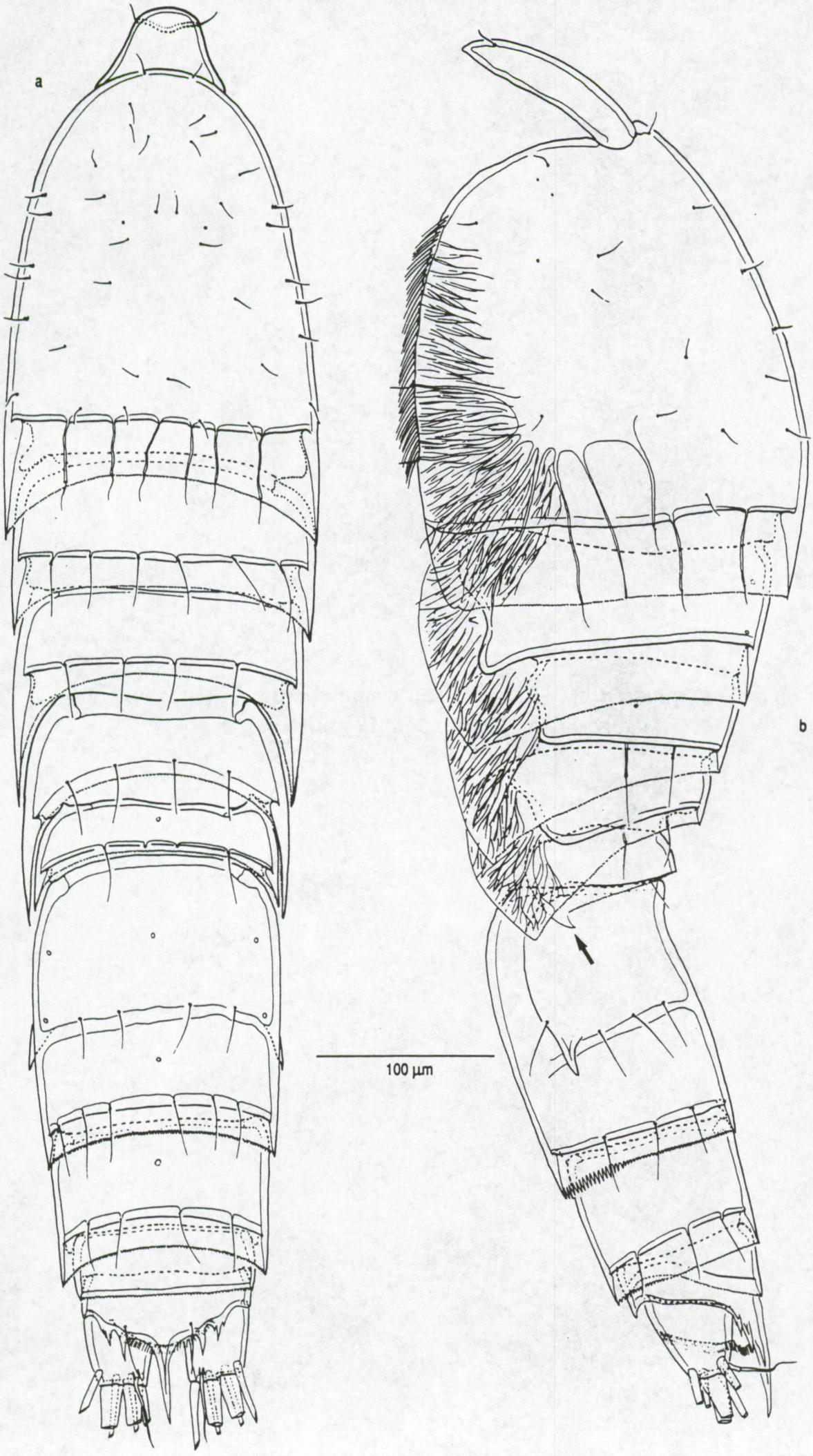

a
b
100 µm

Fig. 8. ***Longipedia n. sp. 1*****, female. a, urosome, dorsal; b, urosome, ventral (P5 bearing-somite omited).**

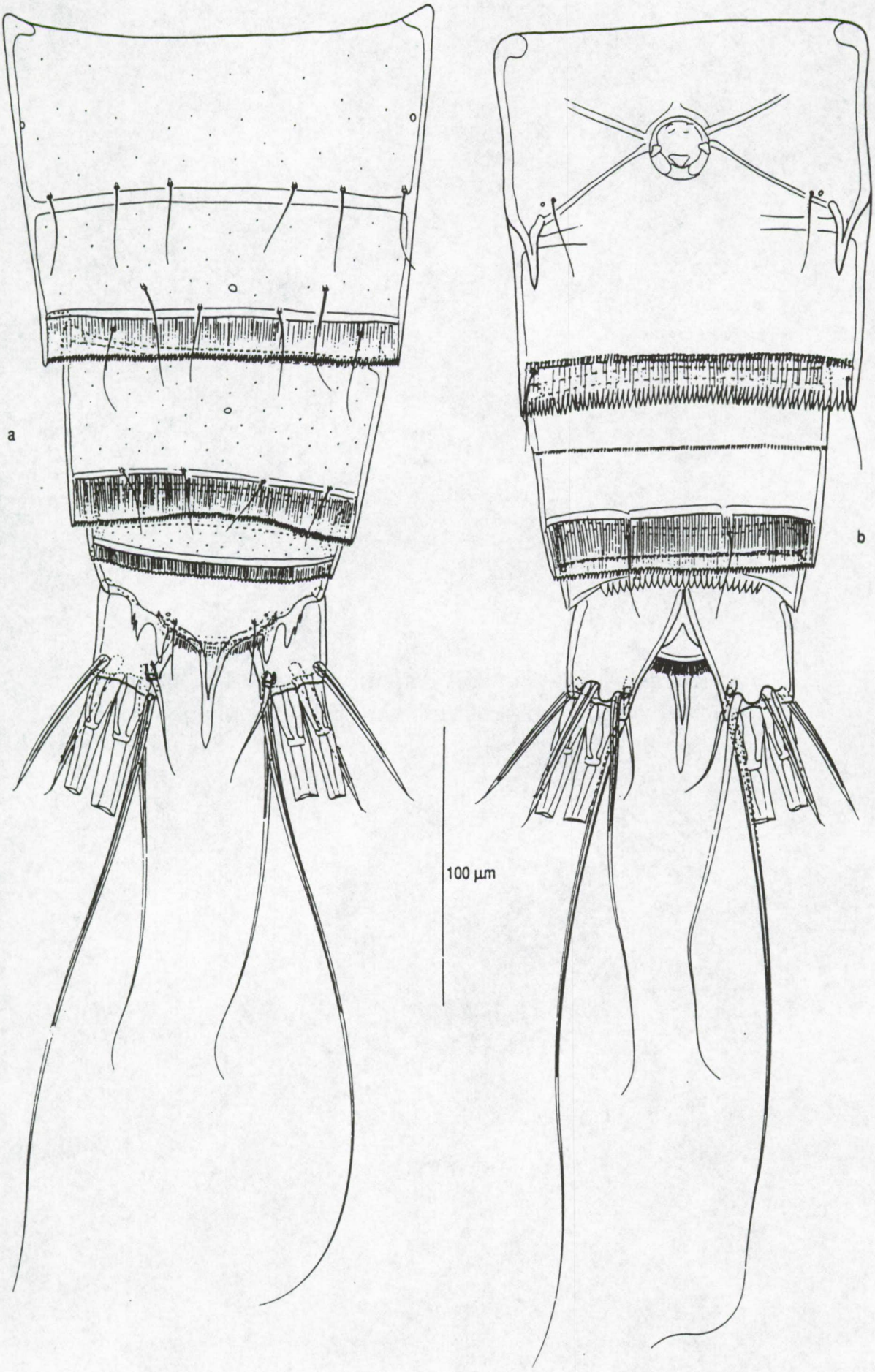

a
b
100 µm

Fig. 9. *Longipedia n. sp. 1*, female. Antennule, exploded, showing oposite armature of proximal and distal segments.

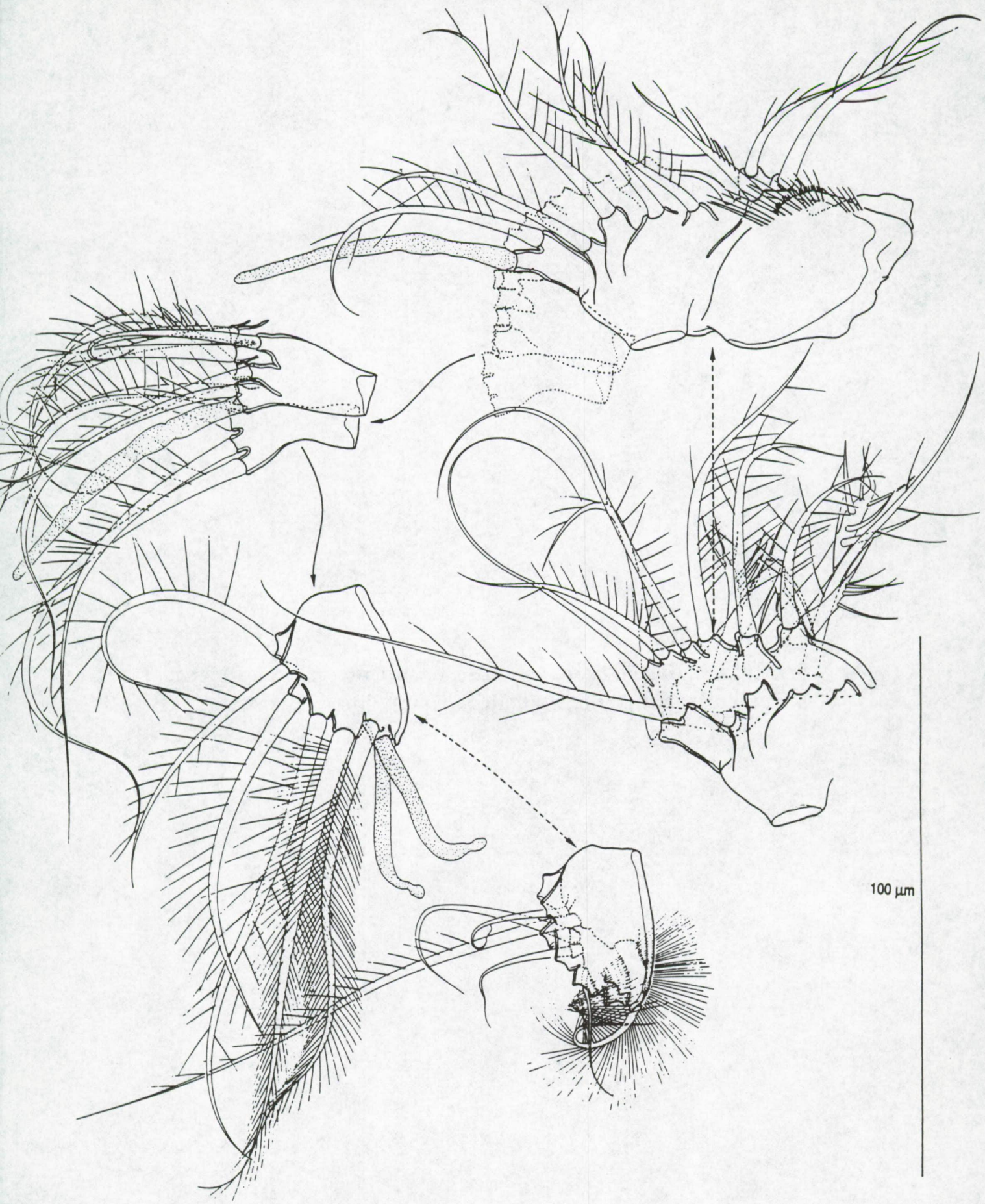
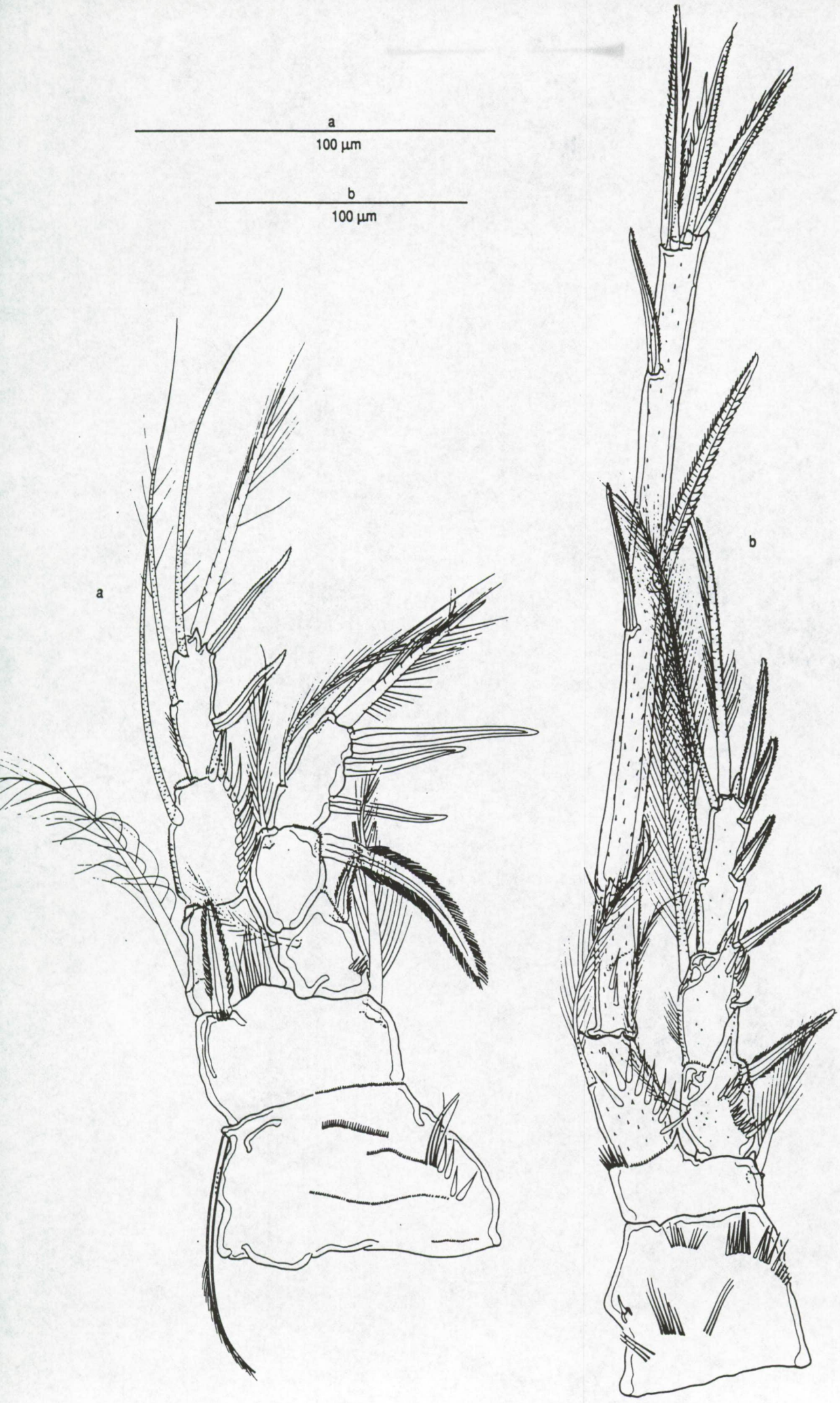

100 µm

Fig. 10. ***Longipedia n. sp. 1*****, female. a, antenna; b, mandible; c, maxillule; d, maxilla, exploded; e, maxilliped; f, rostrum.**


a
b
c
d
e
f
a–e
100 µm
f
100 µm


a
100 µm
b
100 µm
a
b

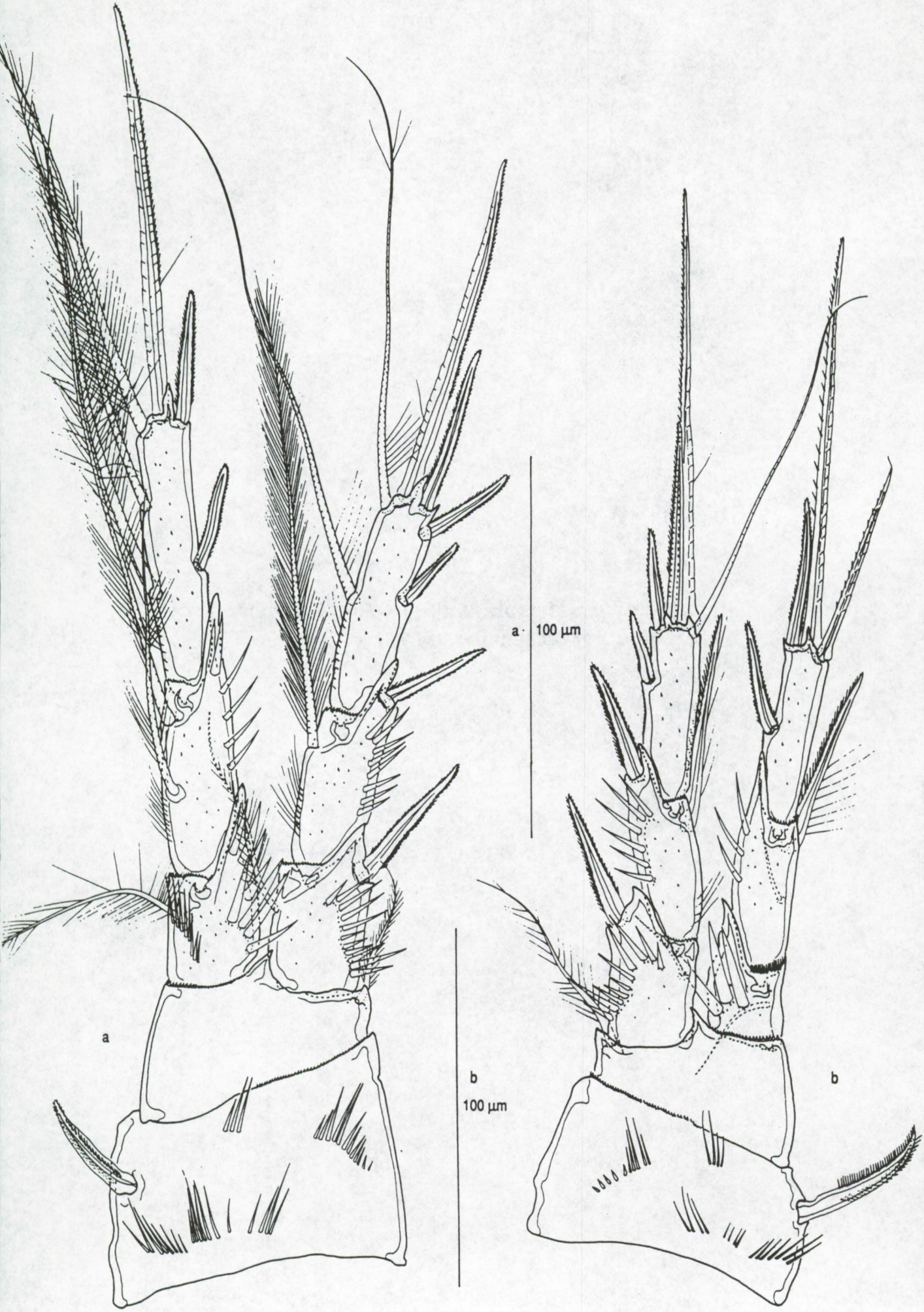

a
100 µm
b
100 µm
b

Fig. 13. ***Longipedia n. sp. 1*****, female. a, P5; b-c, anal segment of two different females, dorsal.**

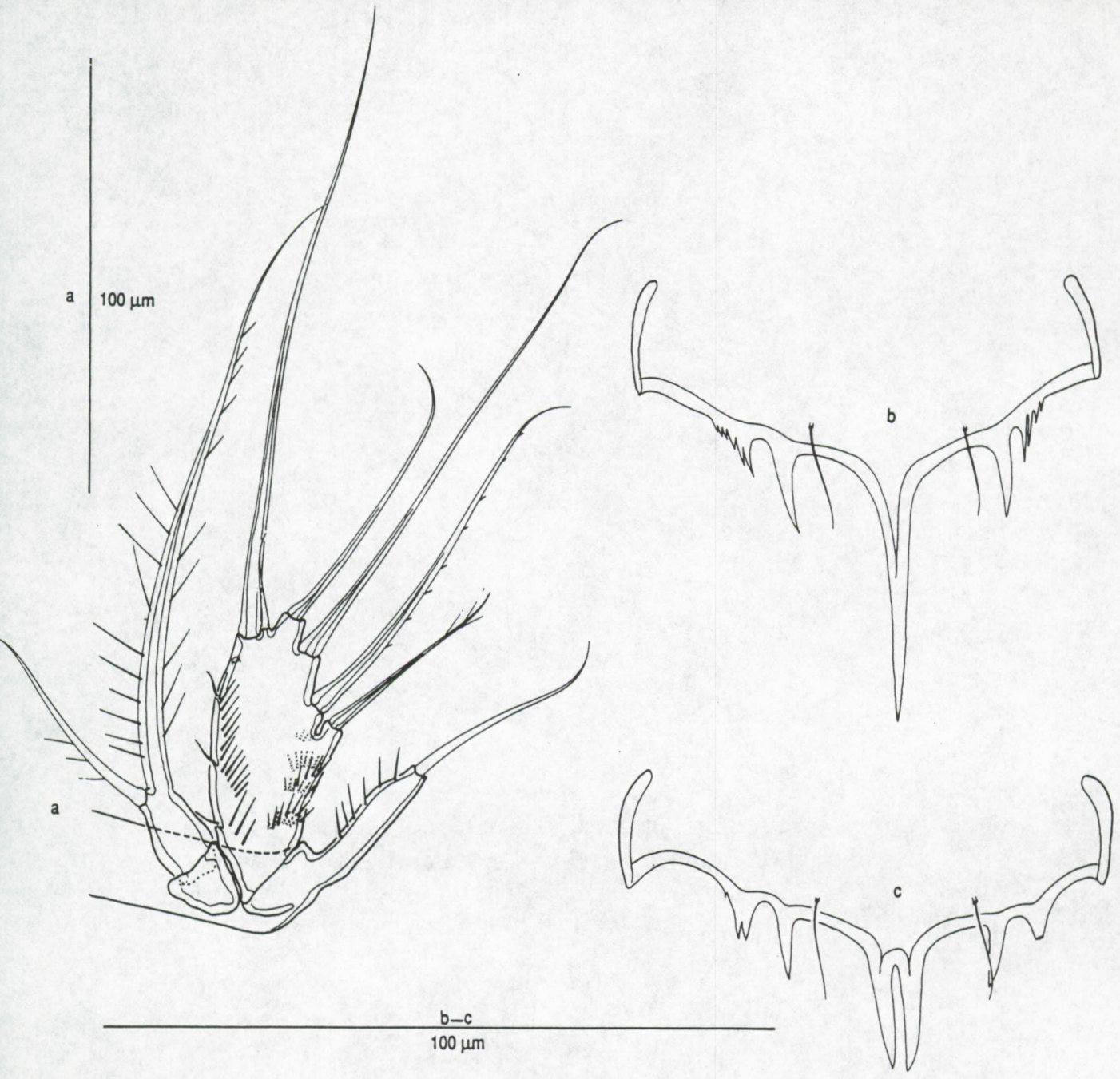

a
100 µm
a
b
c
b—c
100 µm

Fig. 14. ***Longipedia n. sp. 1*****, male. a, urosome, dorsal; b, urosome, ventral (P5 and P6 bearing-somite omited).**

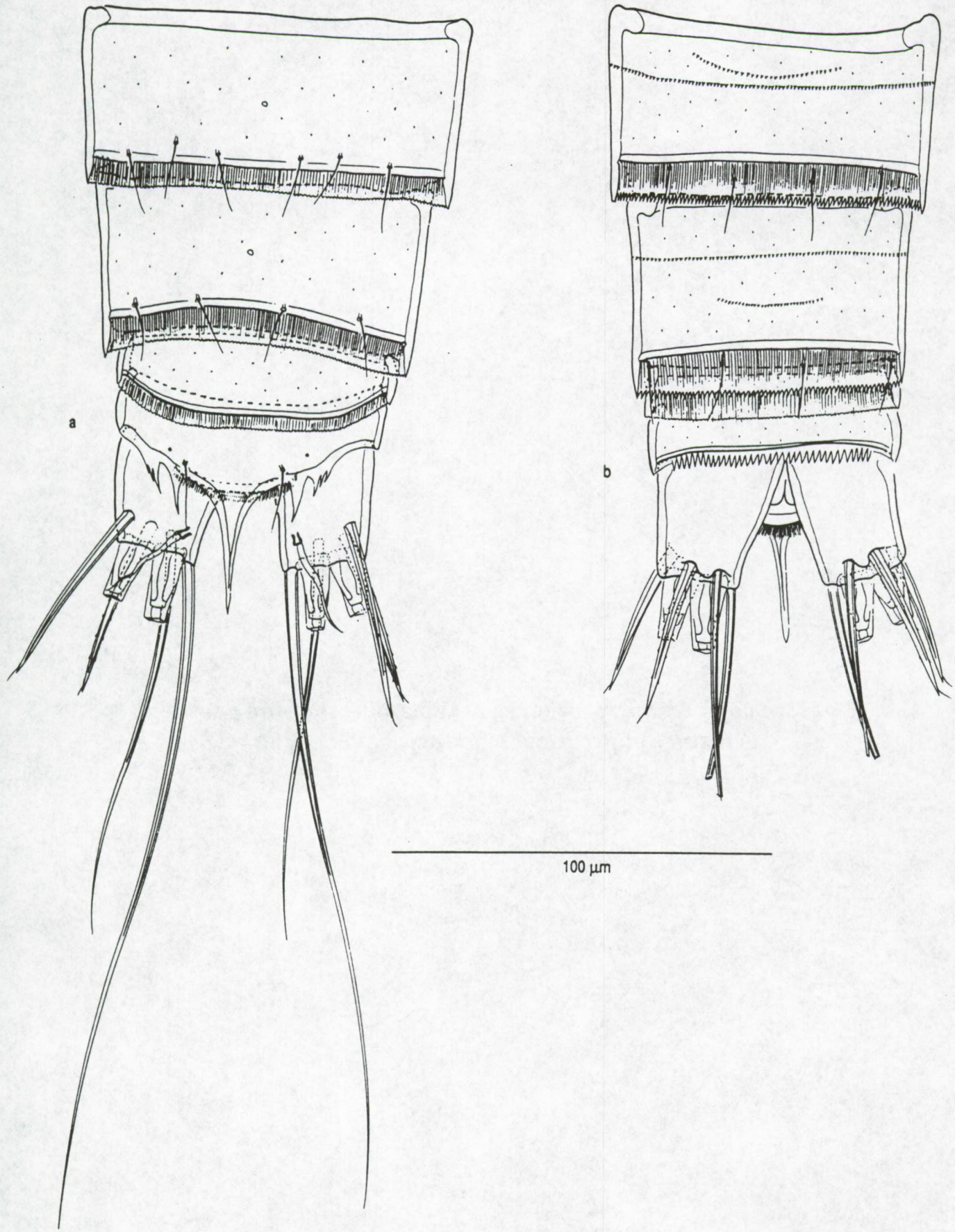

a
b
100 µm

Fig. 15. ***Longipedia n. sp. 1***, **male. a, antennule, showing oposite armature of proximal segments; b, P5; c, P6.**

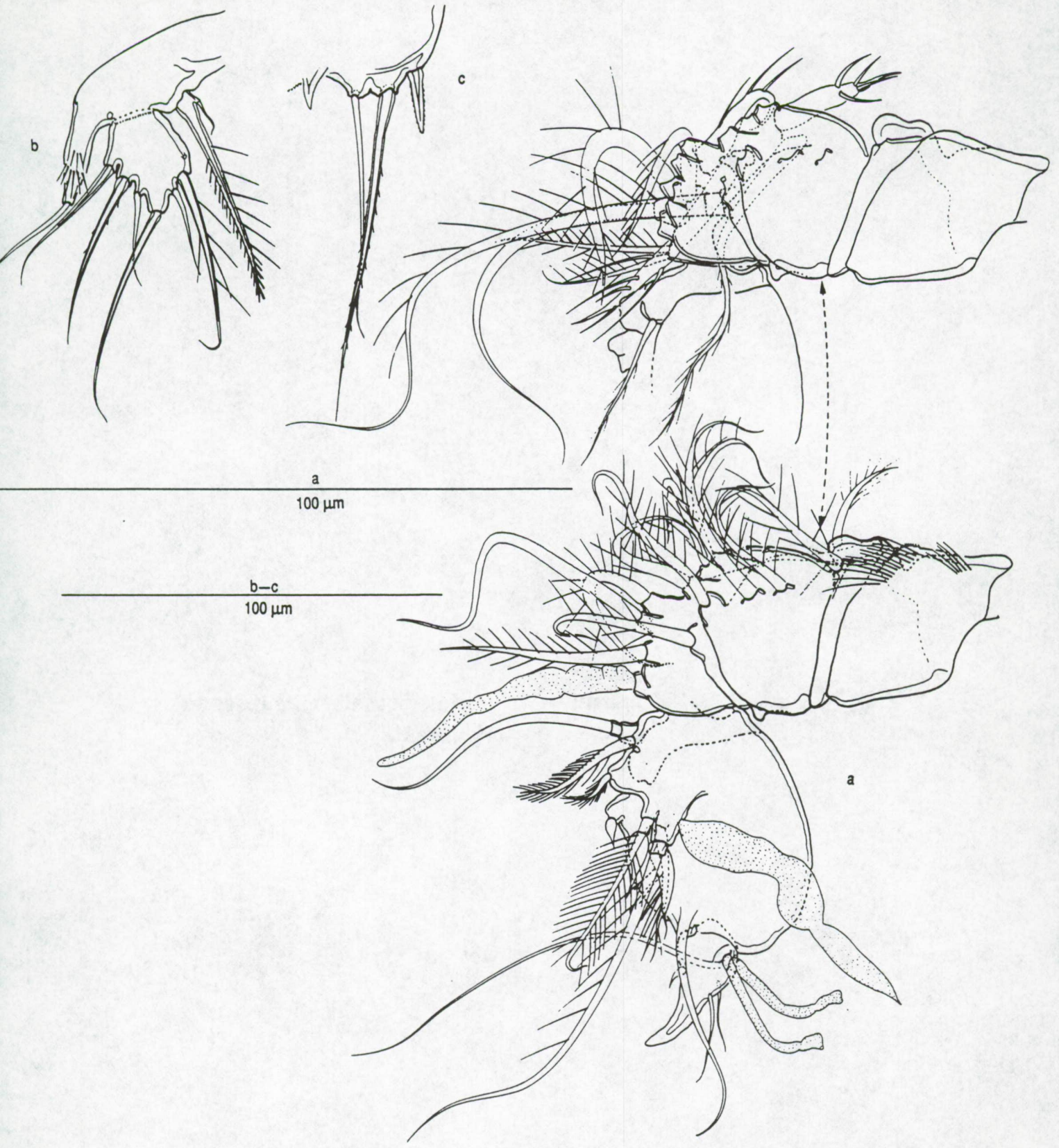
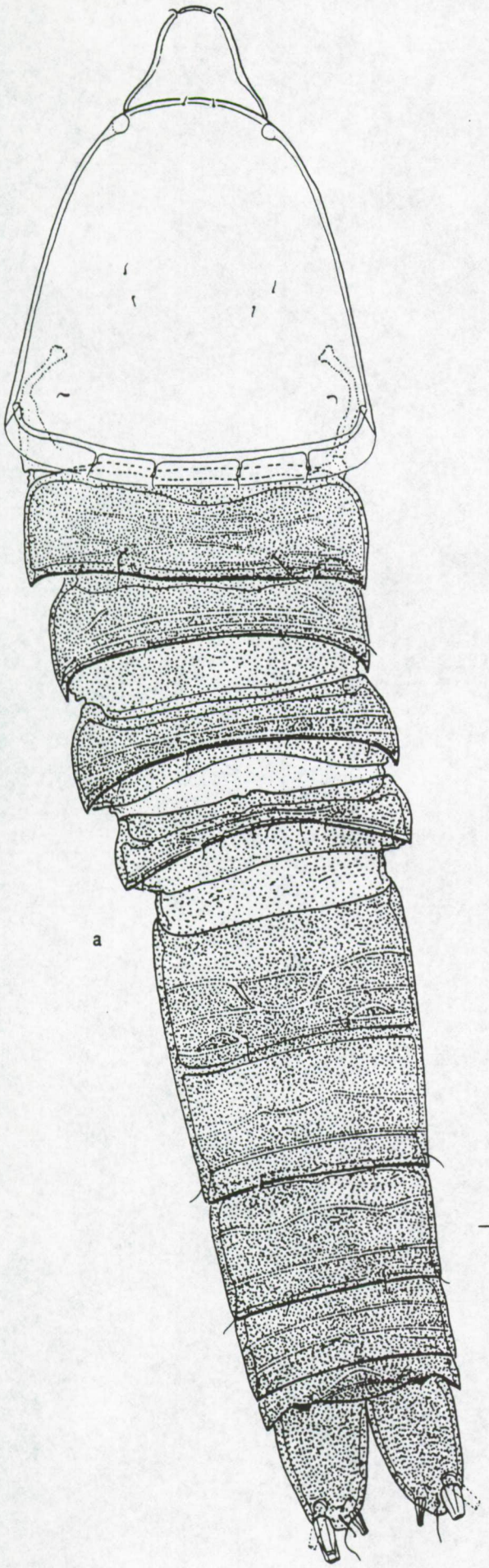
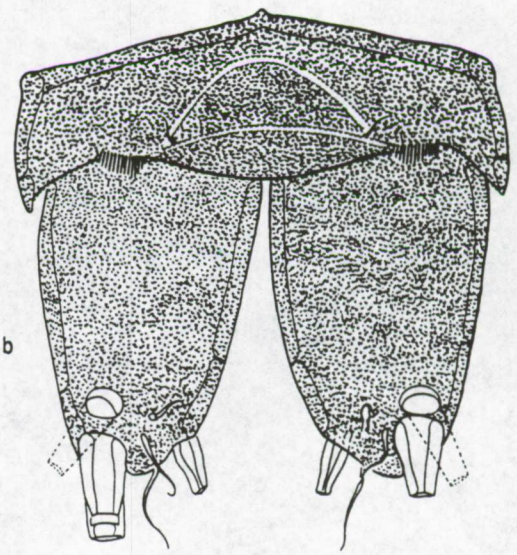

b
c
a
100 µm
b—c
100 µm
a

Fig. 16. *Scottolana* sp. 1, female. a, habitus, dorsal; b, anal segment and caudal rami, dorsal.



a



b

a
100 µm

b
100 µm

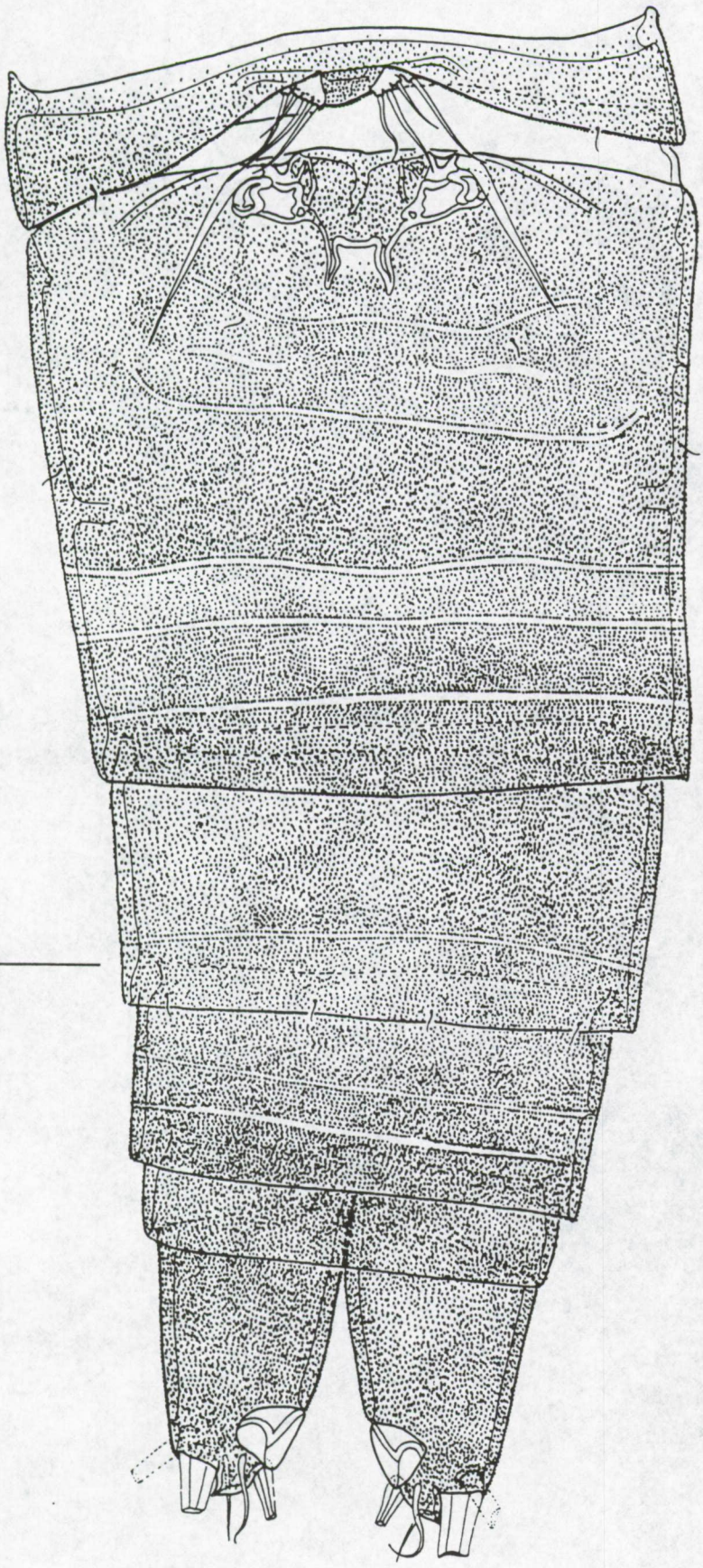
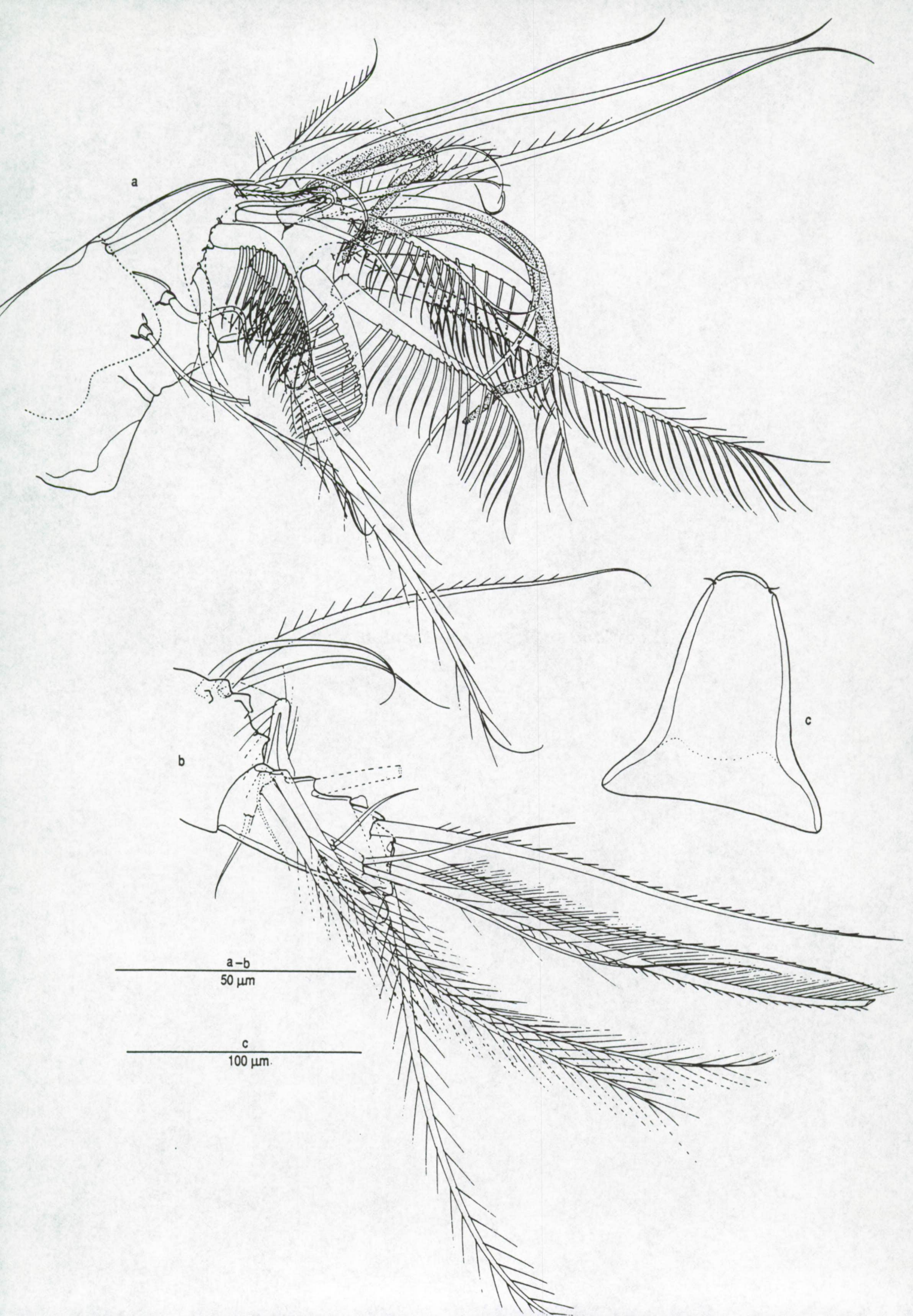
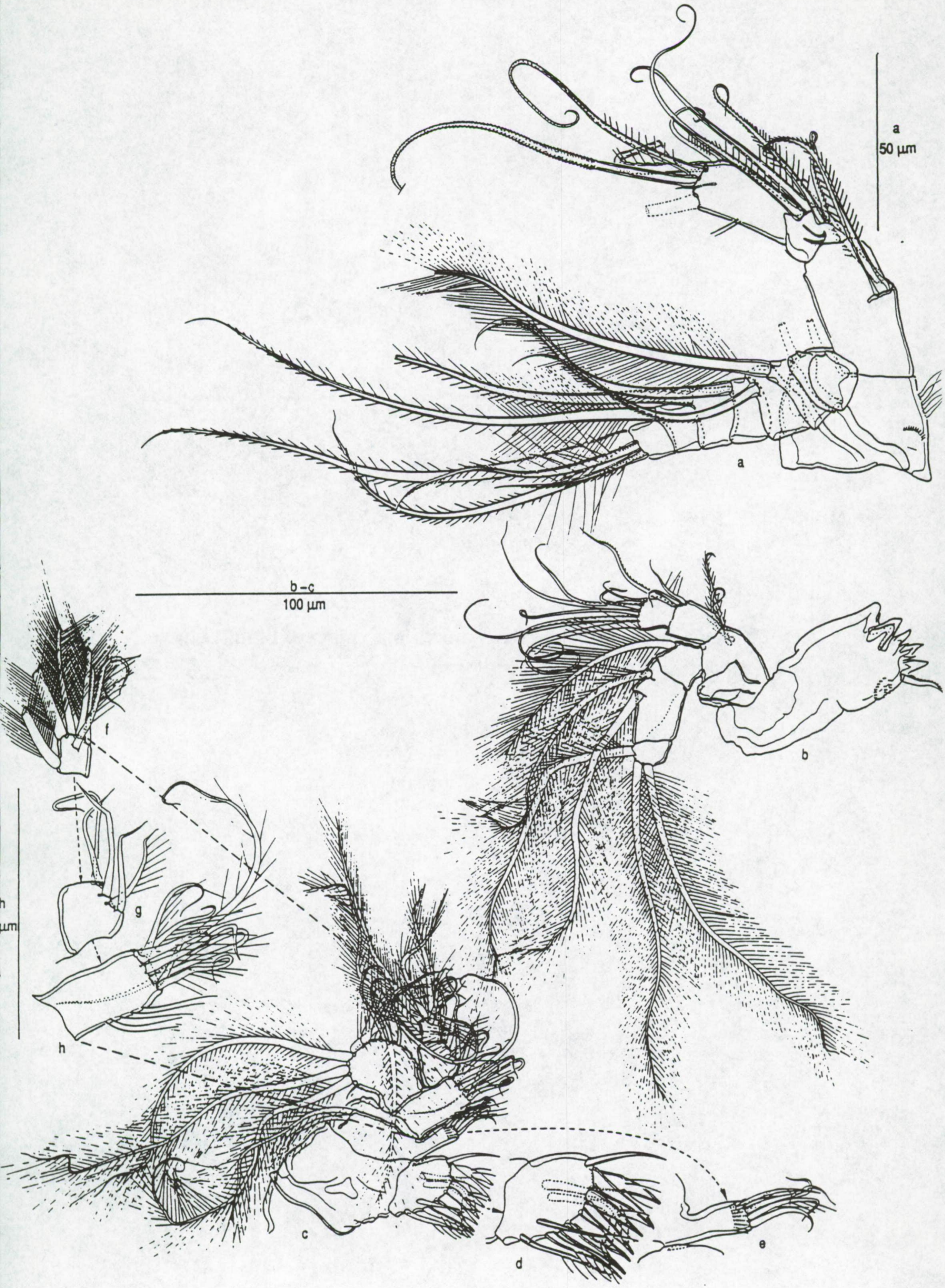

100 µm

Fig. 18. ***Scottolana*** **sp. 1, female. a, antennule, proximal segments; b, antennule, distal segment, showing oposite armature of preceding component; c, rostrum.**


a
b
c
a–b
50 µm
c
100 µm

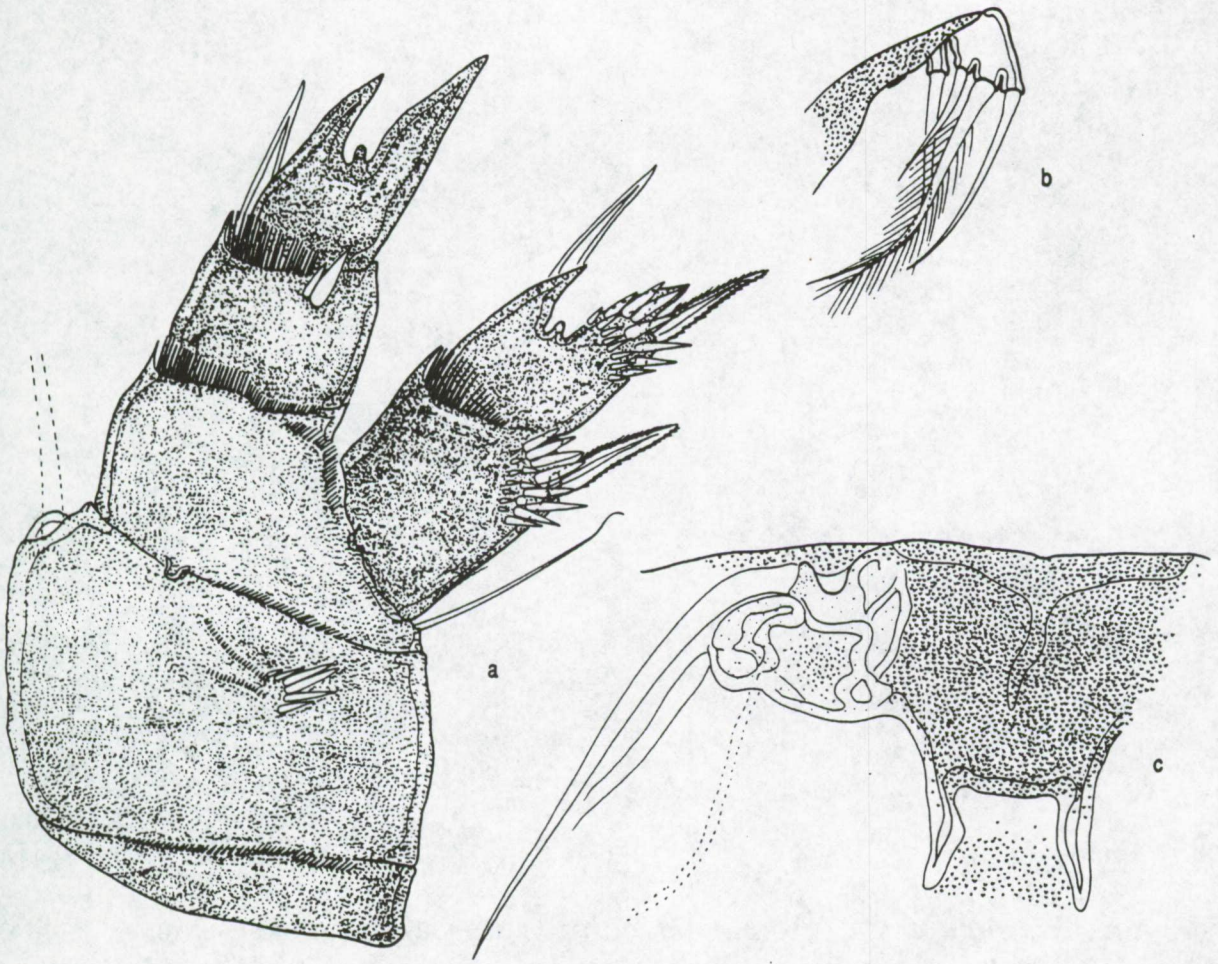

a
50 µm
a
b–c
100 µm
b
f
g
h
c
d
e


50 µm
a
b

Fig. 21. *Scottolana* sp. 1, female. P1, exopodite exploded (dashed line represents the original position of exopodite).


50 µm


a
b
50 µm



a
50 µm

b–c
50 µm

Fig. 24. ***Ectinosoma n. sp. 1*****, female. a, habitus, dorsal; b, urosome, lateral (P5 bearing-somite omited).**

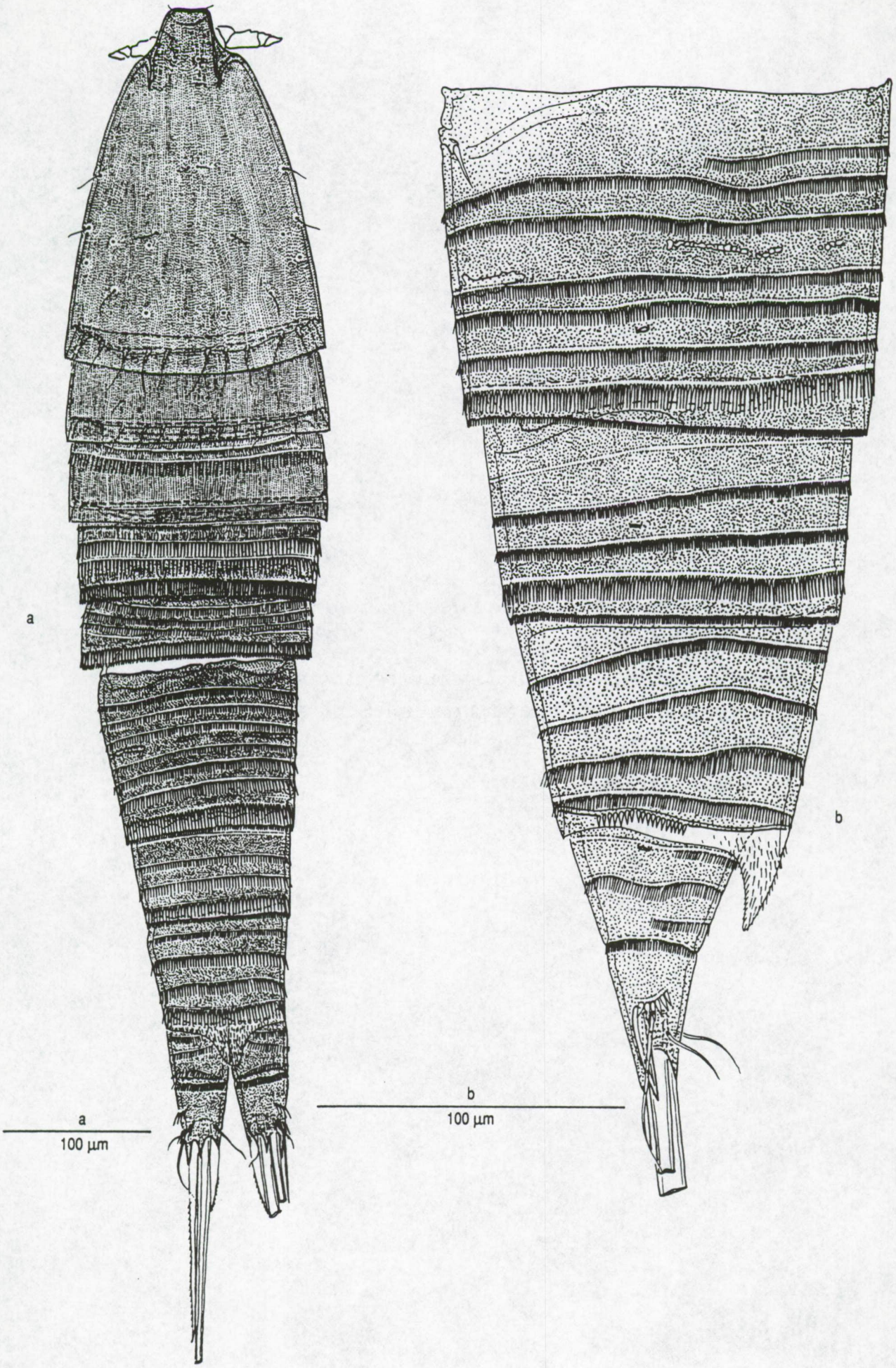
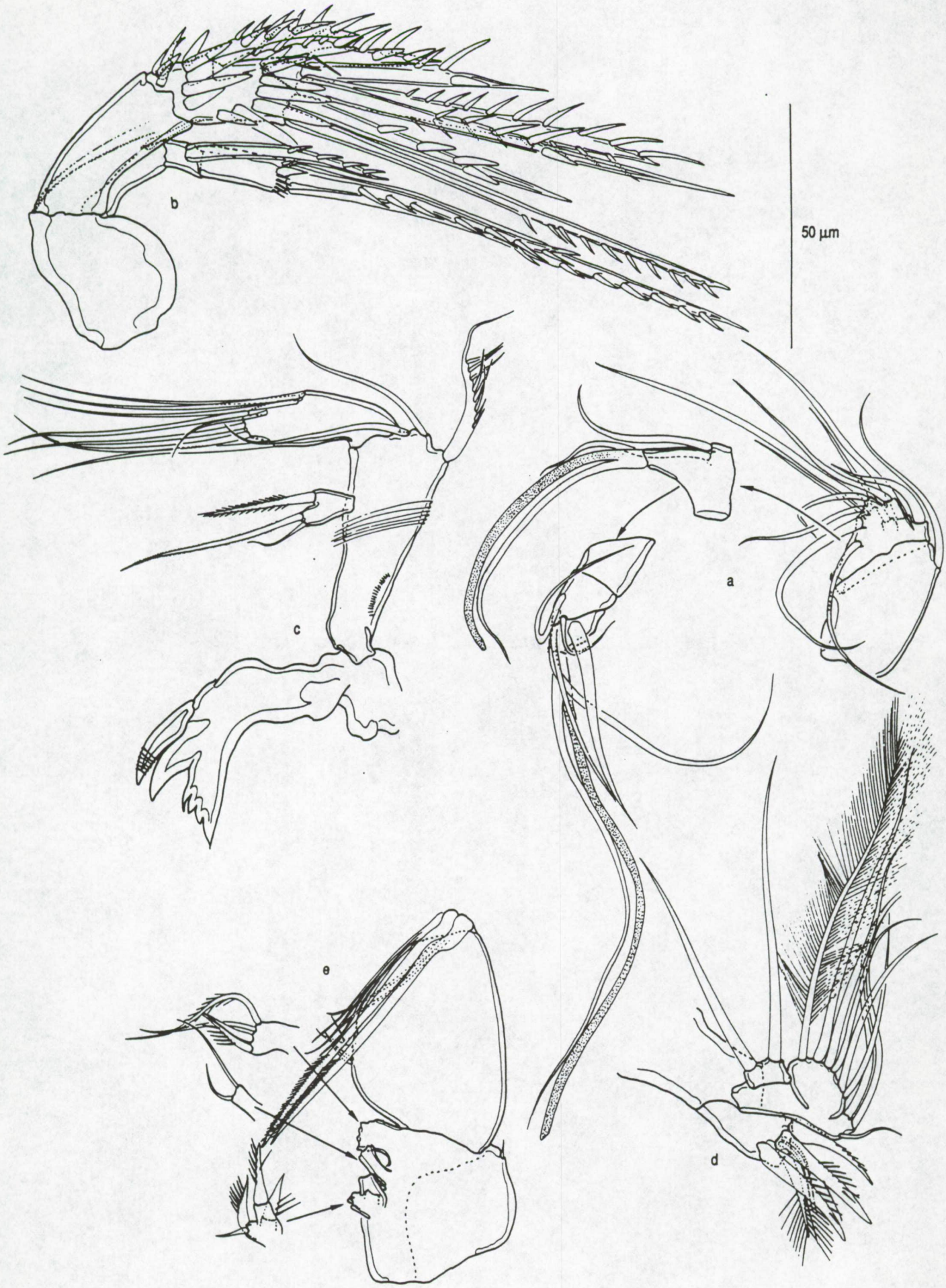

a
a
100 µm
b
b
100 µm

Fig. 25. ***Ectinosoma n. sp. 1***, **female. a, antennule, exploded; b, antenna; c, mandible; d, maxillule; e, maxilla, exploded.**


b
50 µm
c
a
e
d

a
b
50 µm

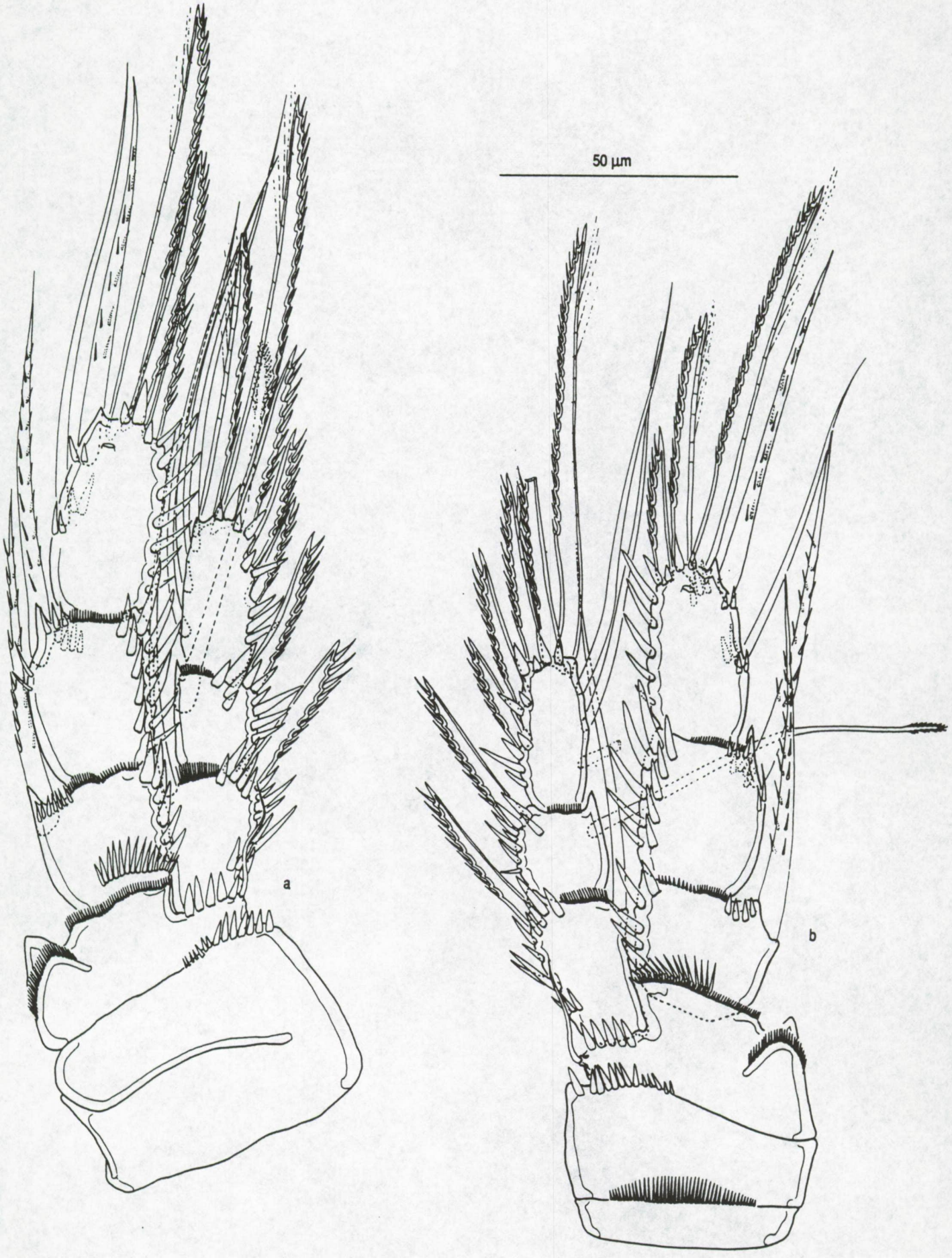
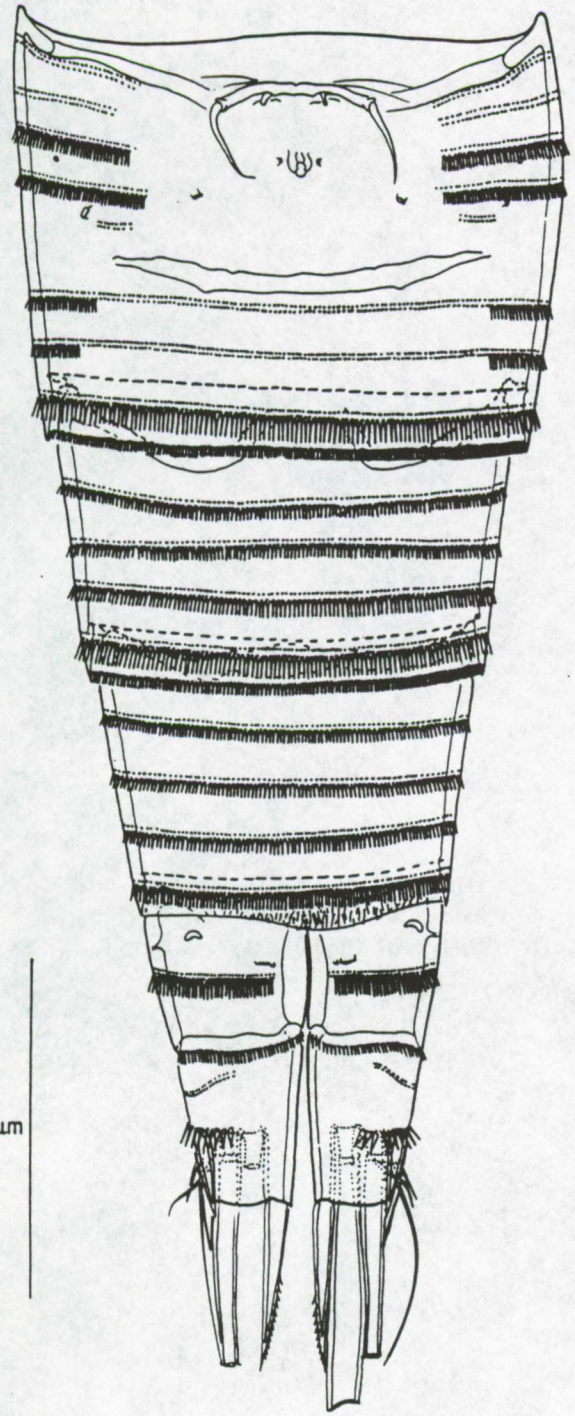

50 µm
a
b

Fig. 28. ***Ectinosoma n. sp. 1*****, female. a, urosome, ventral (P5 bearing-somite omited); b, P5.**



a

a
100 µm

b
50 µm



b

Fig. 29. ***Halectinosoma n. sp. 1*****, female. a, habitus, dorsal; b, urosome, dorsal (surface ornamentation omited).**

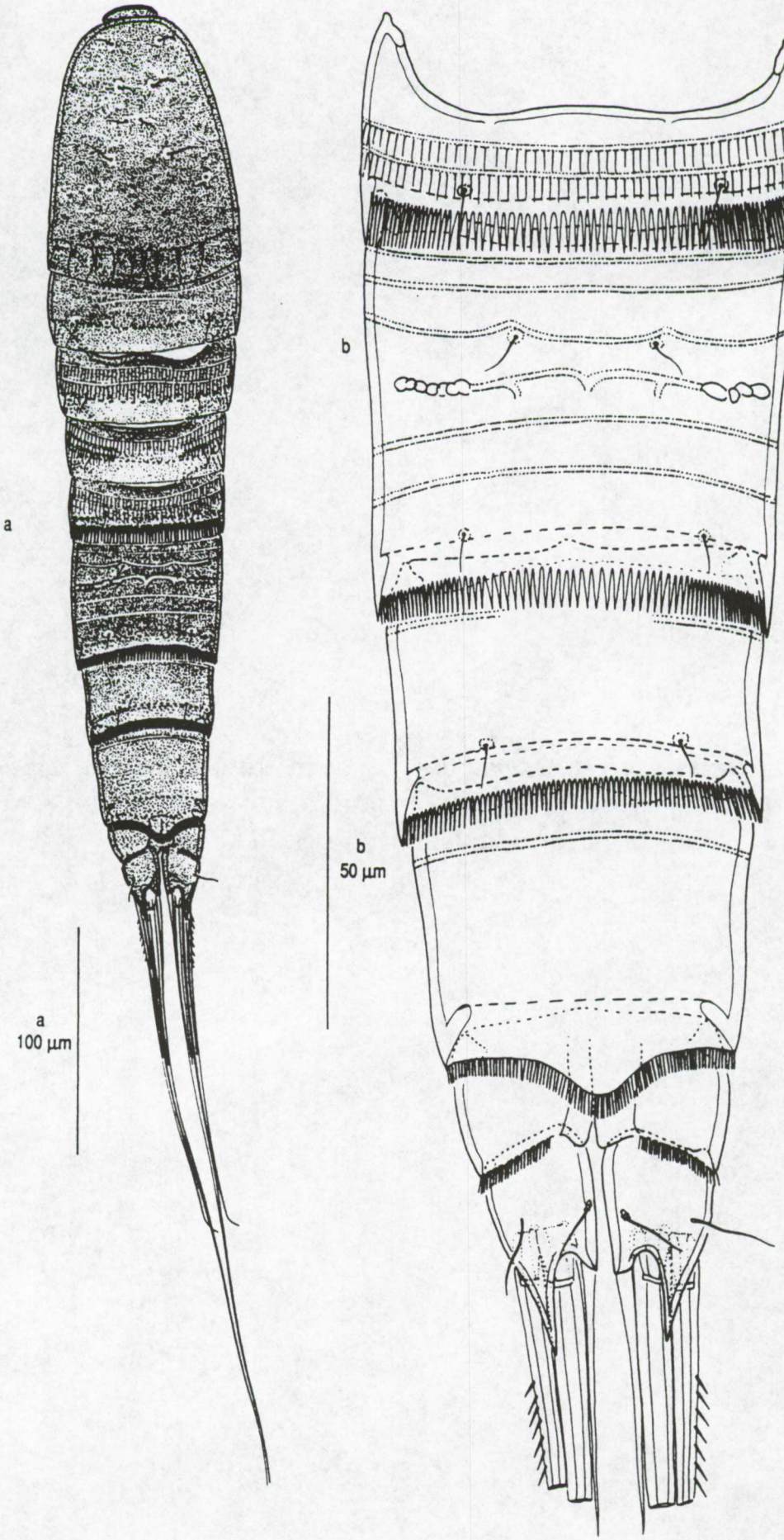
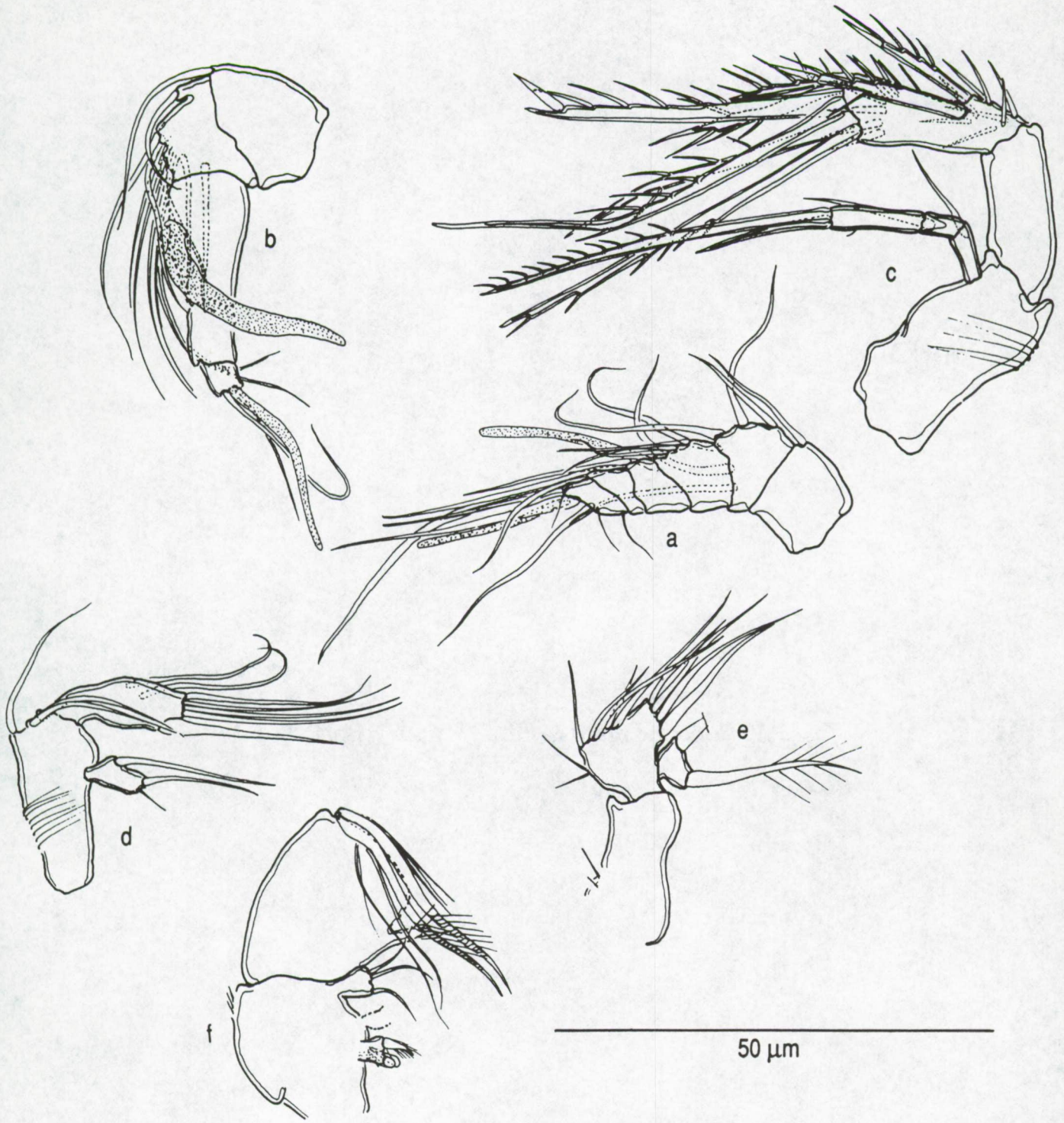

a
a
100 µm
b
b
50 µm

Fig. 30. ***Halectinosoma n. sp. 1.*** **a, antennule, female; b, antennule, male; c, antenna, female; d, mandibular palp, female; e, maxillular palp, female; f, maxilla, female.**


b
c
a
d
e
f
50 µm


50 µm
a
b

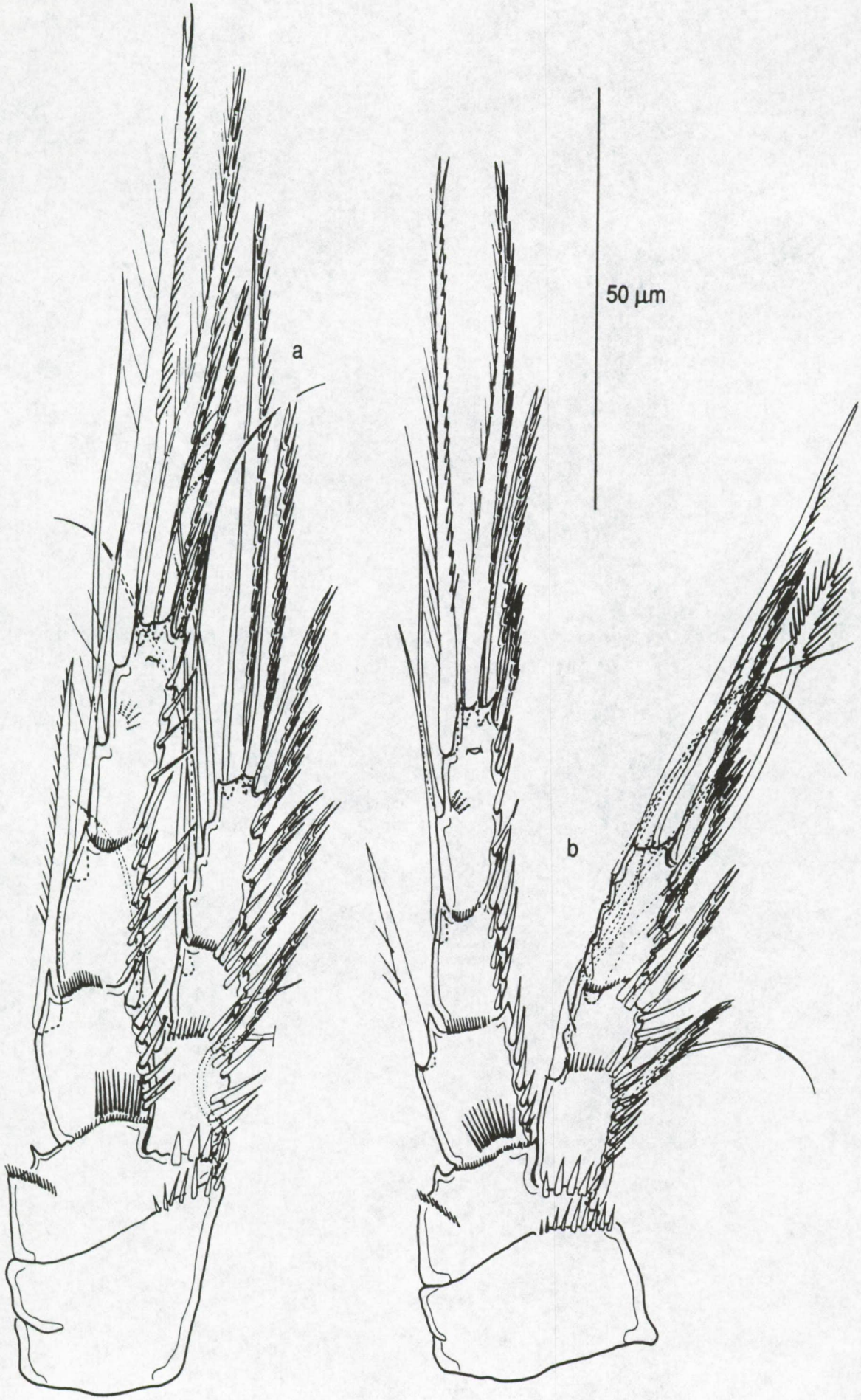
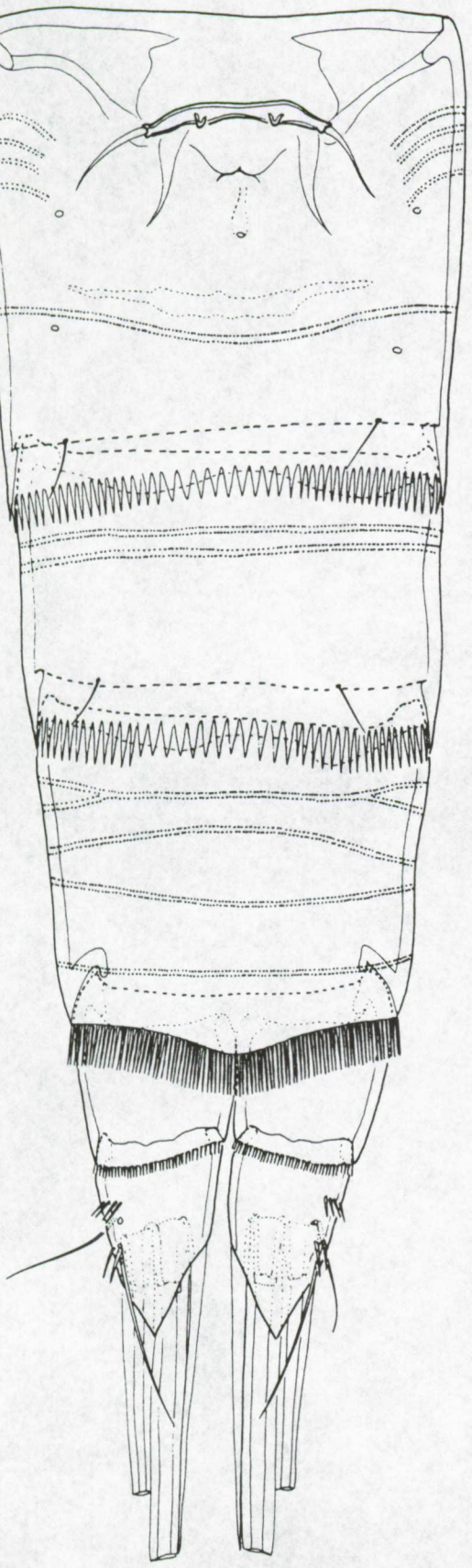
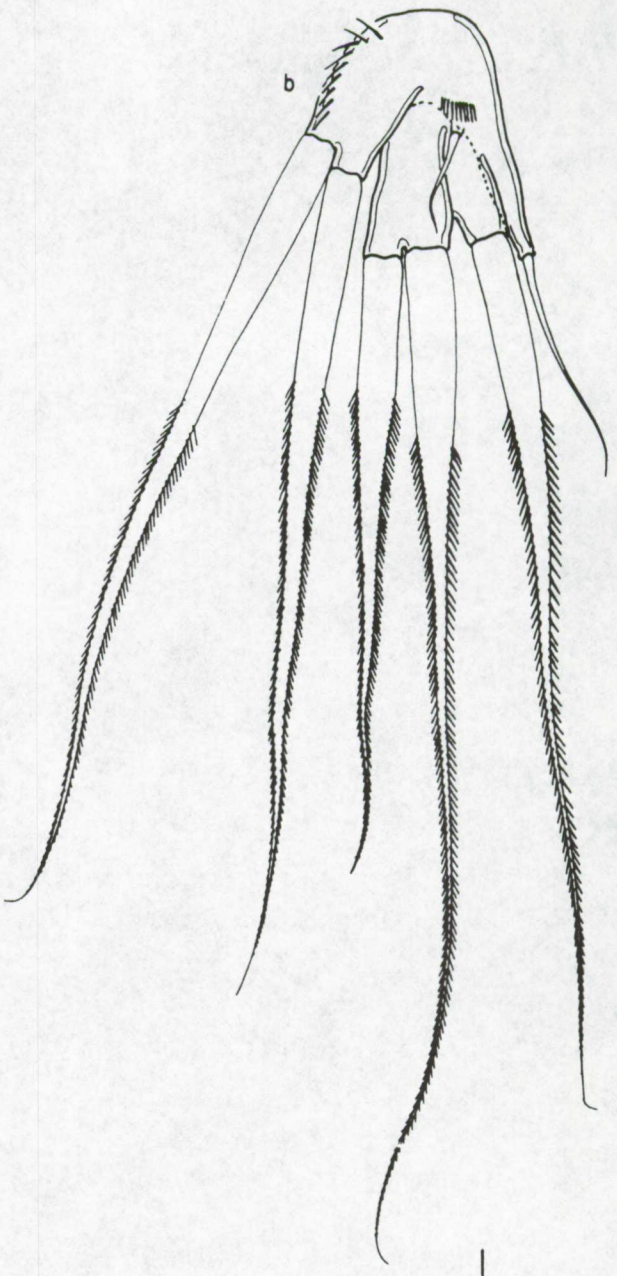

50 µm
a
b

Fig. 33. ***Halectinosoma n. sp. 1*****, female. a, urosome, ventral (surface ornamentation omited); b, P5.**





b
50 µm

Fig. 34. ***Halectinosoma n. sp. 1*****, male. a, urosome, dorsal; b, urosome, ventral, showing P5 and P6 (surface ornamentation omited).**

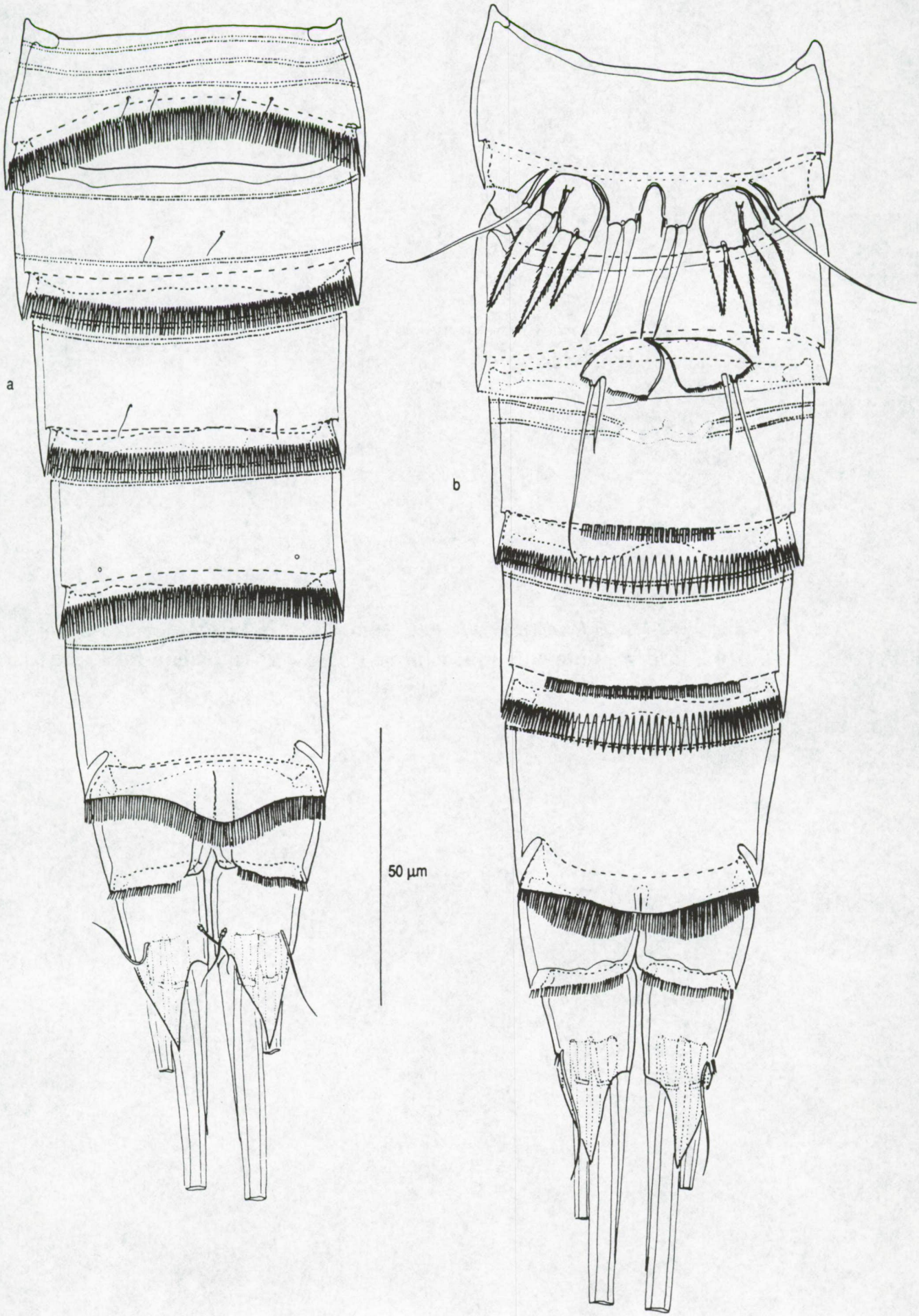

a
b
50 µm

Fig. 35. ***Halectinosoma n. sp. 2*****, female. a, habitus, dorsal; b, habitus, lateral; c, left caudal ramus, dorsal; d, right caudal ramus, lateral.**

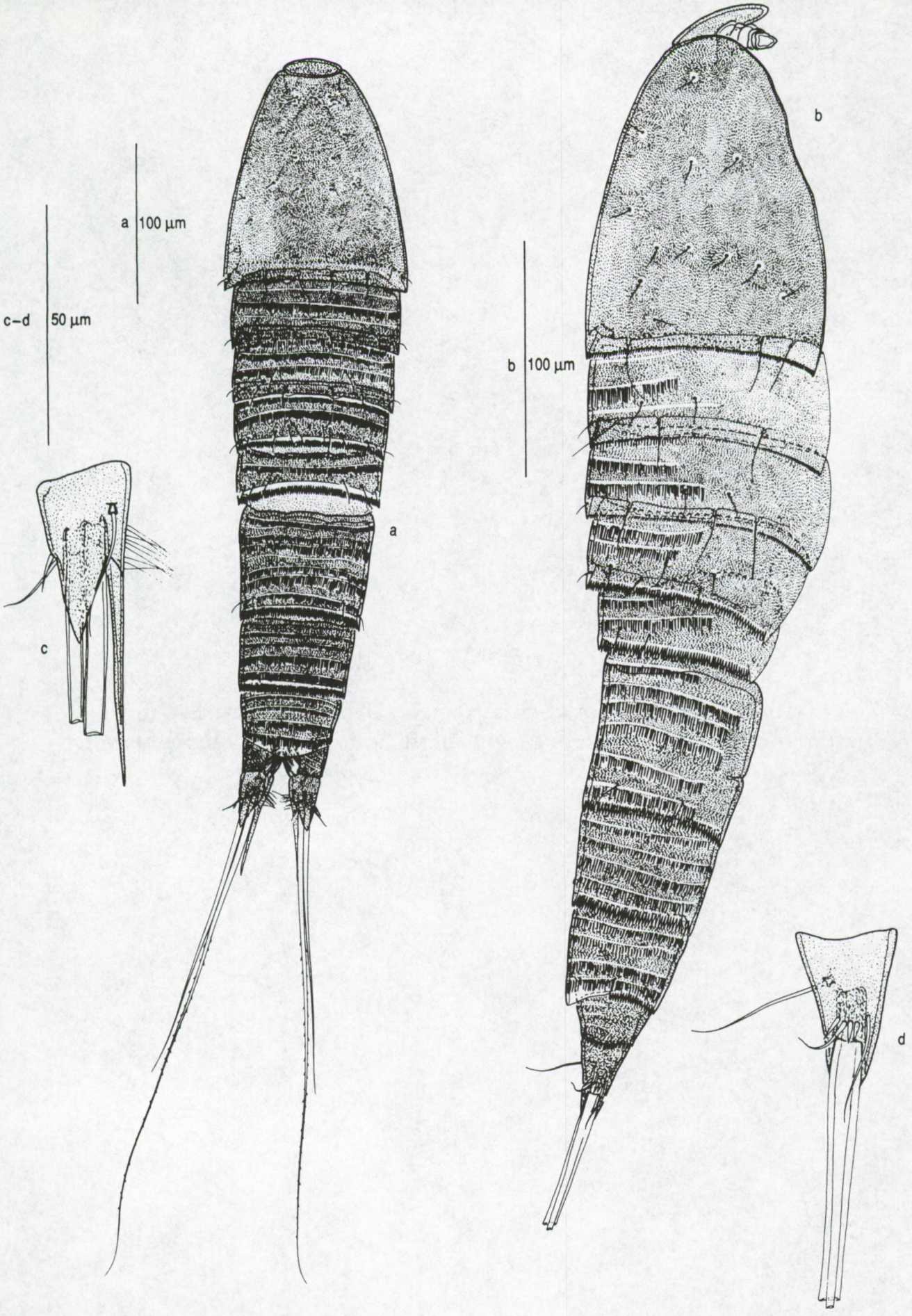
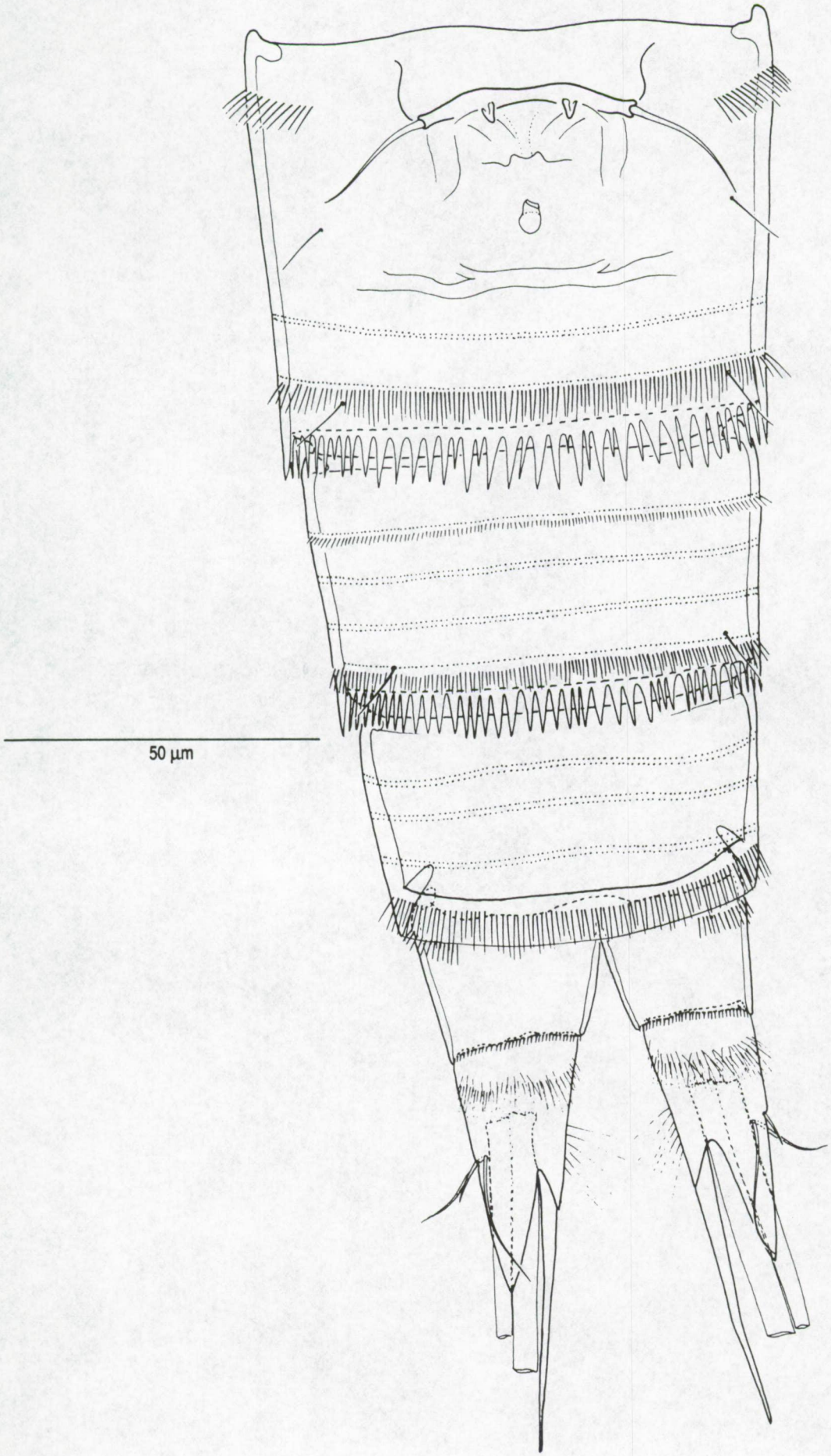

a 100 µm
c–d 50 µm
a
b
b 100 µm
c
d

Fig. 36. *Halectinosoma n. sp. 2*, female. Urosome, ventral, showing P6 and genital field (P5 bearing-somite and surface ornamentation omited).


50 µm

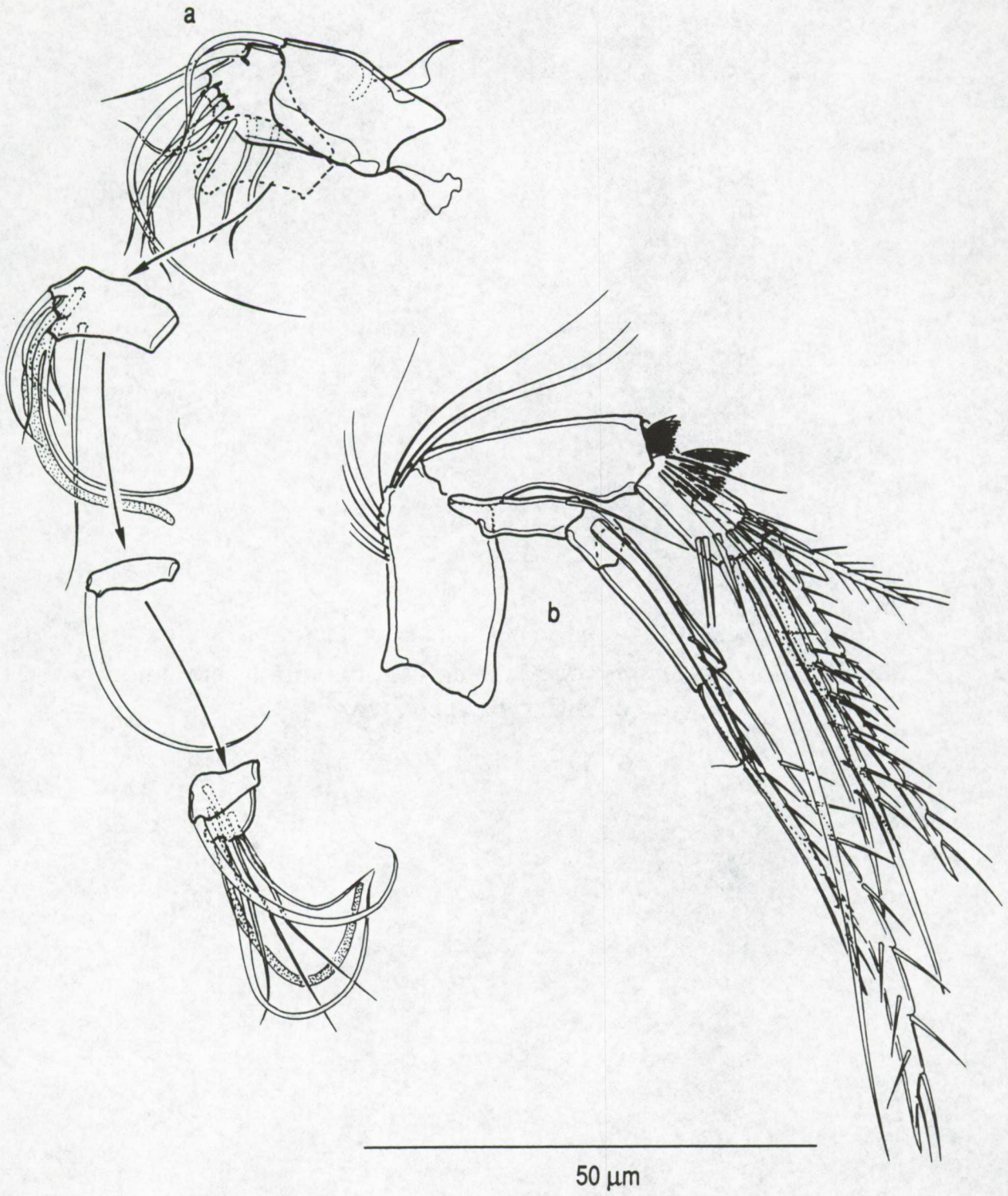

a
b
50 µm

Fig. 38. ***Halectinosoma n. sp. 2*****, female. a, mandible; b-c, maxillule of different specimens.**

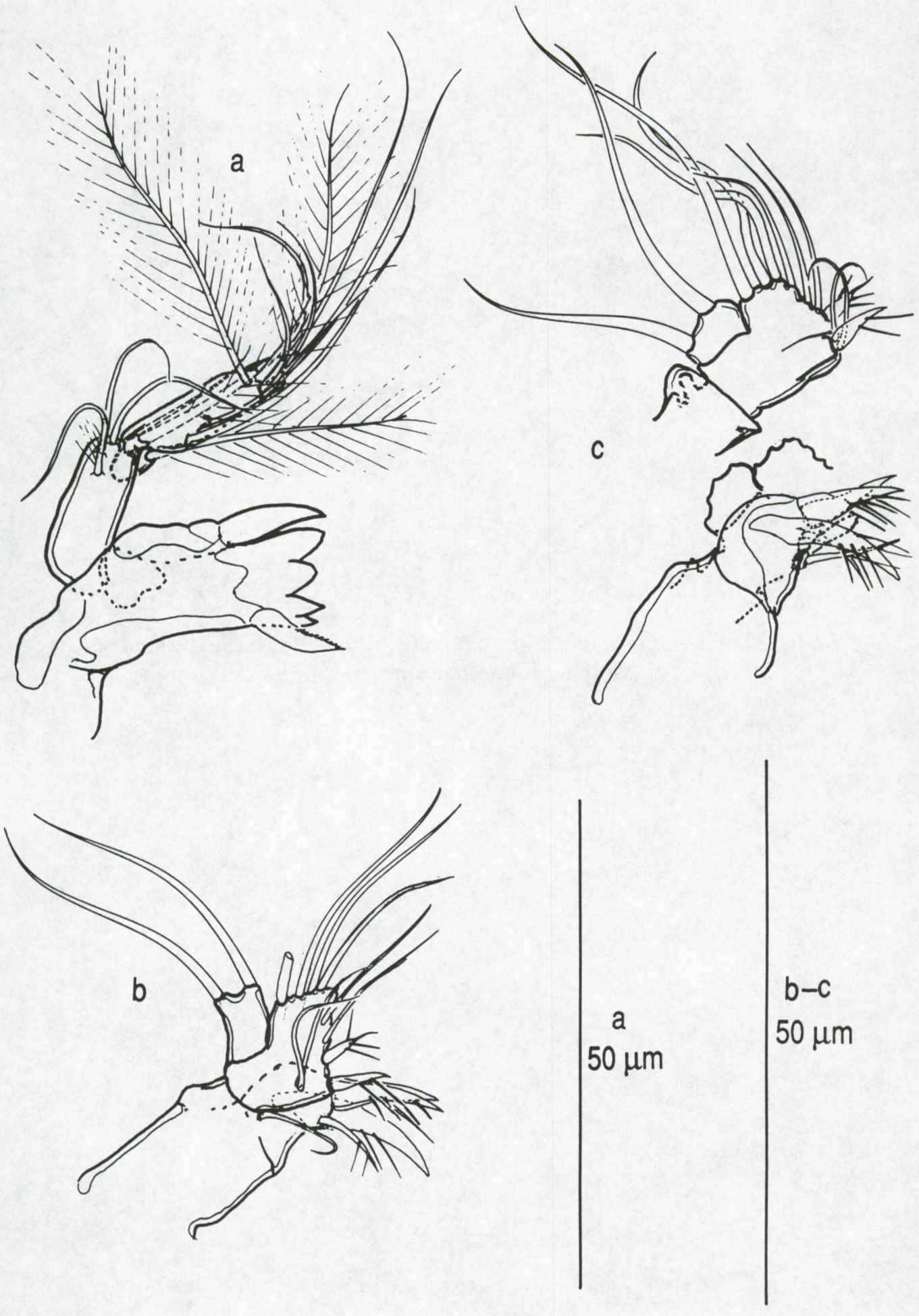
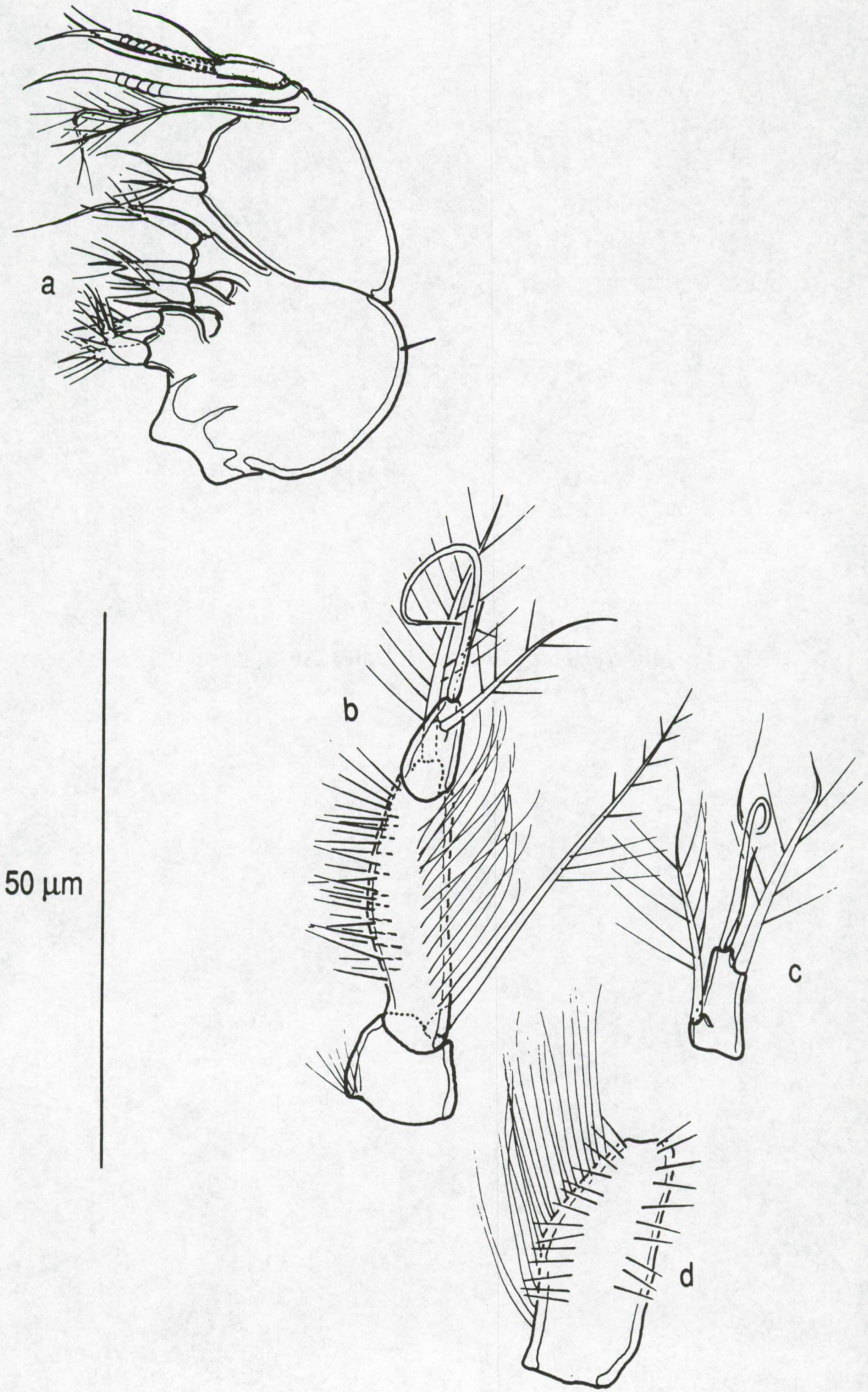

a
c
b
a
50 µm
b–c
50 µm

Fig. 39. ***Halectinosoma n. sp. 2*****, female. a, maxilla; b, maxilliped; c-d, maxilliped of another specimen, exploded.**


a
b
c
d
50 µm


a
b
c
50 µm

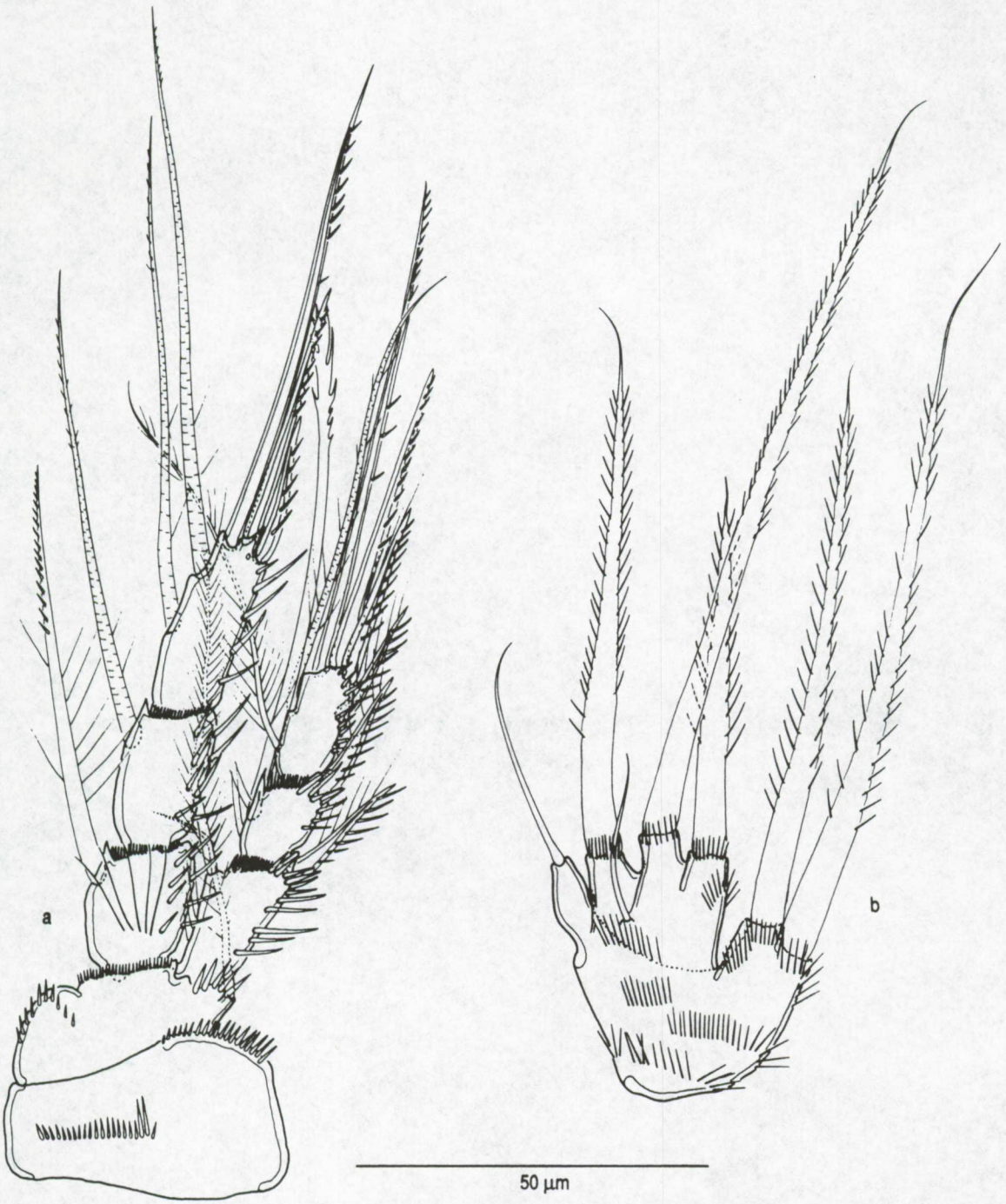
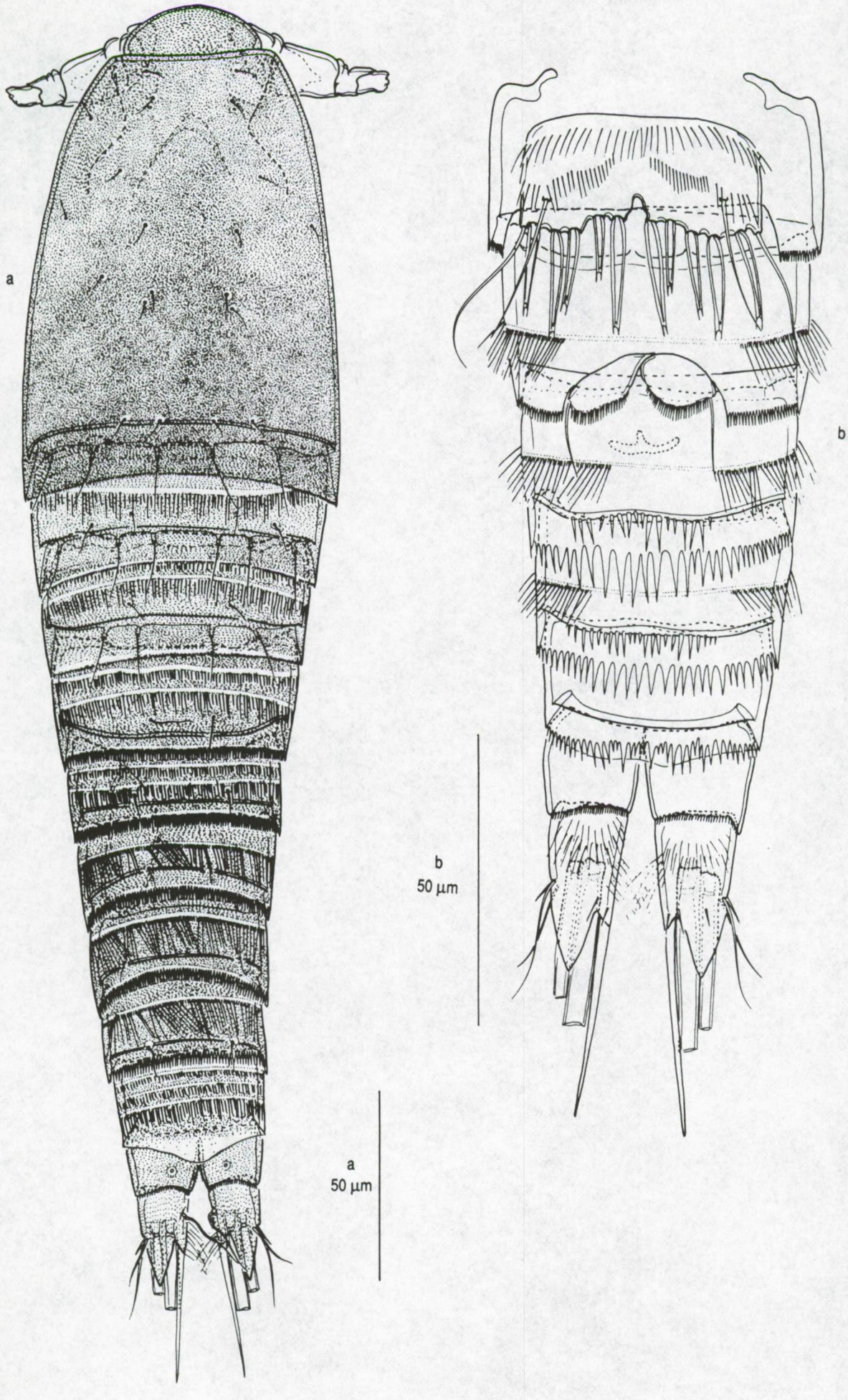

a
b
50 µm

Fig. 42. ***Halectinosoma n. sp. 2*****, male. a, habitus, dorsal; b, urosome, ventral, showing P5 and P6.**


a
b
b
50 µm
a
50 µm

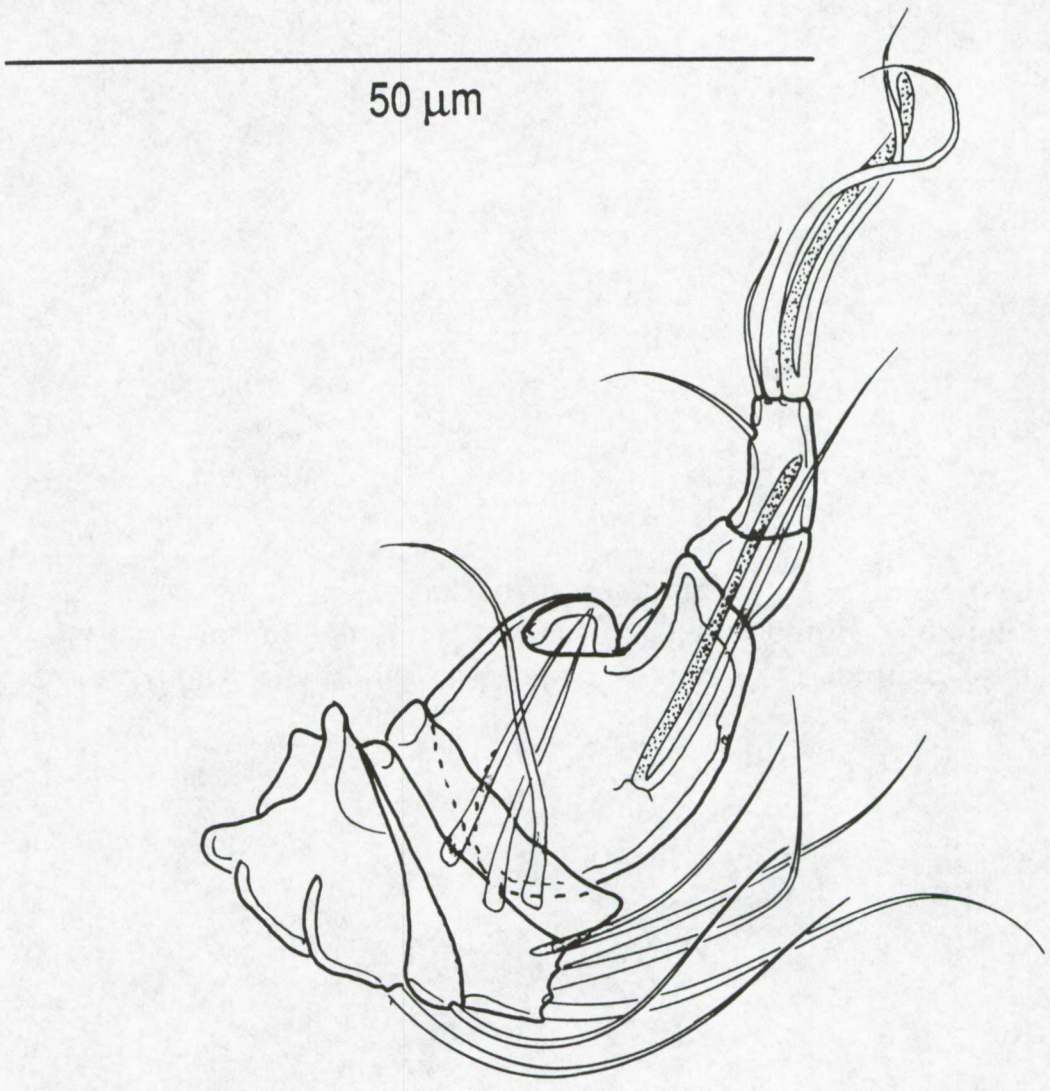

50 µm

Fig. 44. ***Halectinosoma n. sp. 2.*** **a-b, aberrant P1, female; c, aberrant P2 endopodite, female; d, aberrant P4 endopodite, female; e, aberrant P3, female.**

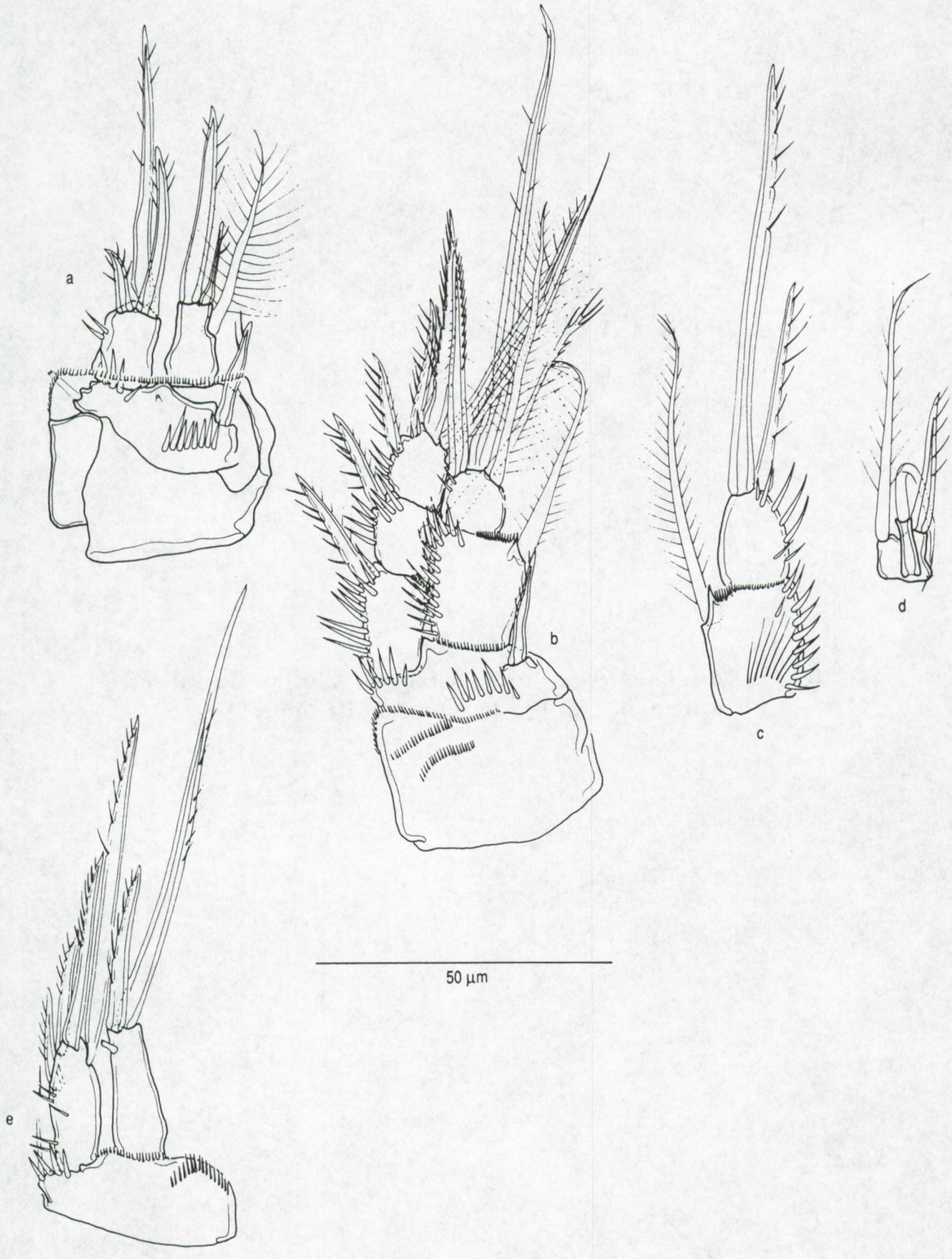

a
b
c
d
e
50 µm

Fig. 45. ***Halectinosoma n. sp. 3*****, female. a, habitus, dorsal; b, urosome, lateral (P5 bearing-somite omited).**

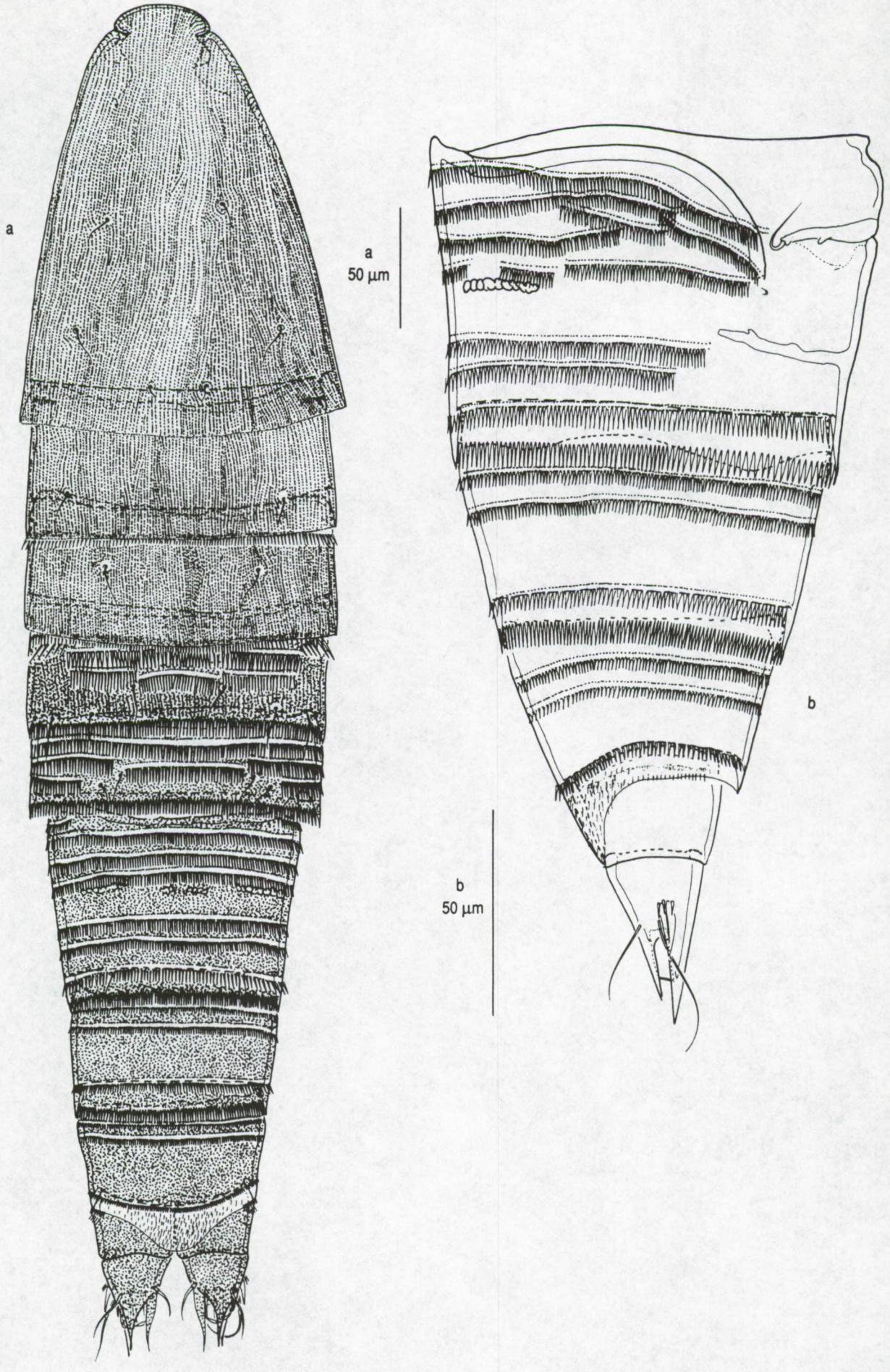

a
a
50 µm
b
b
50 µm

Fig. 46. ***Halectinosoma n. sp. 3*****, female. Urosome, showing P5 and genital field.**

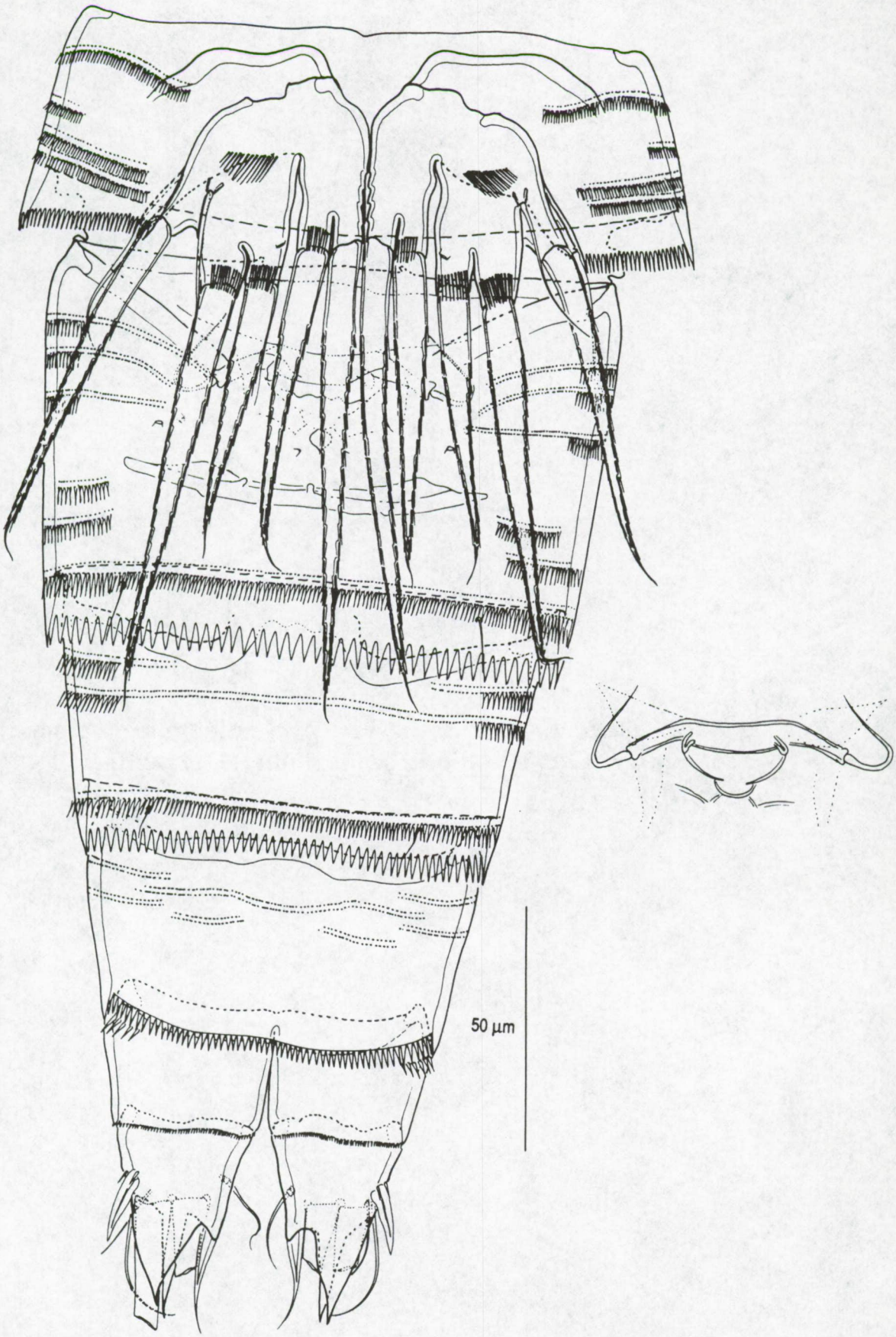
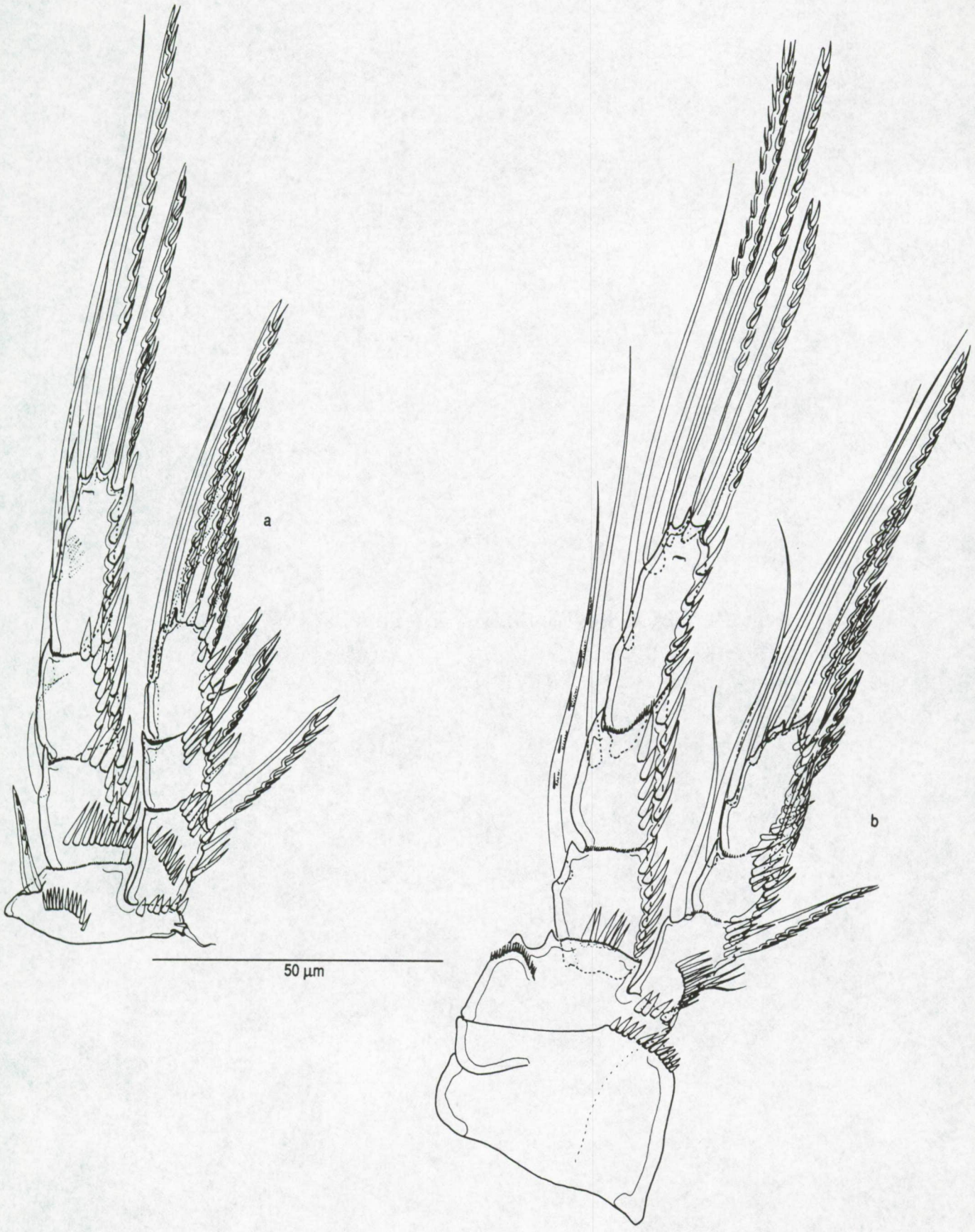
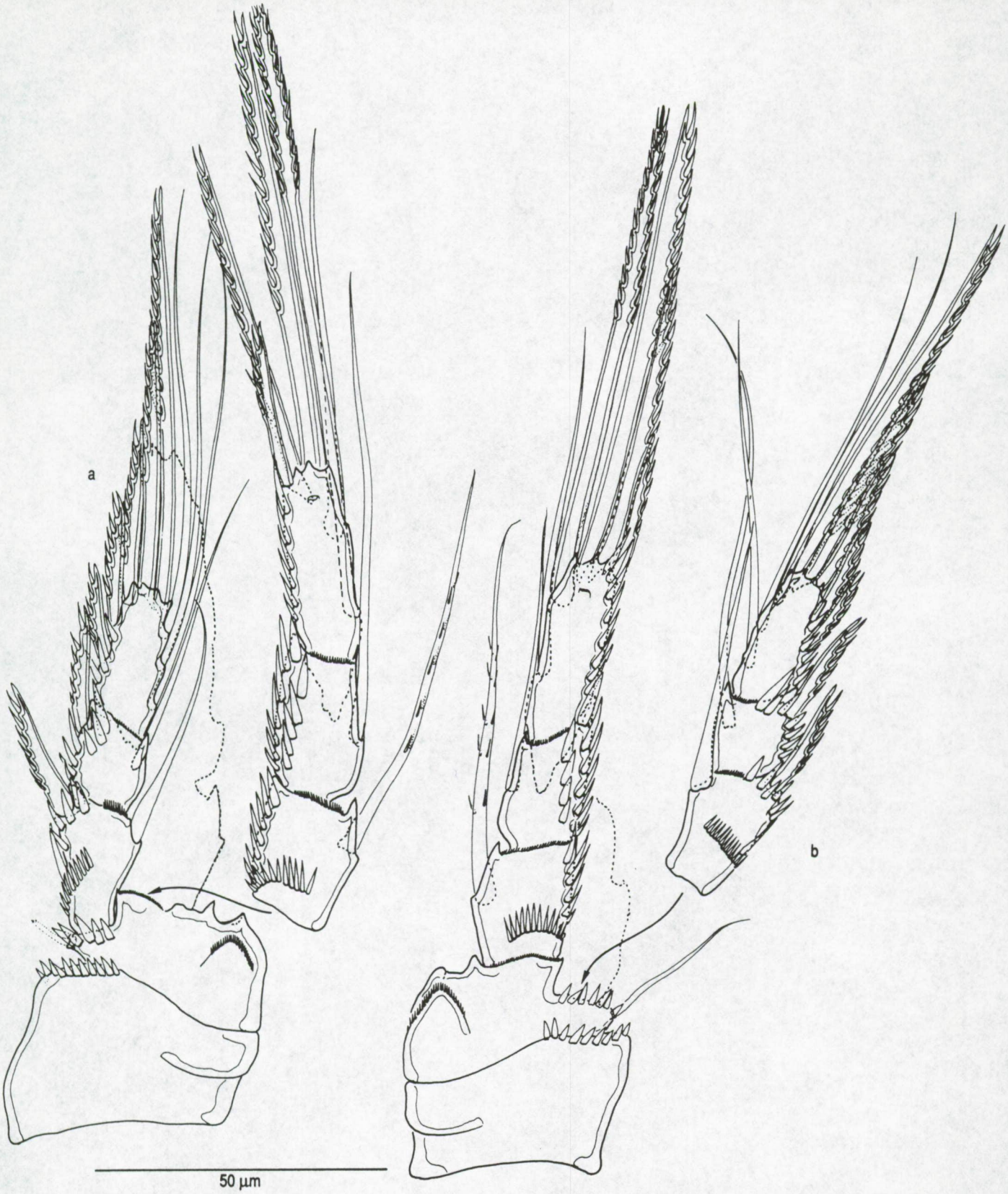
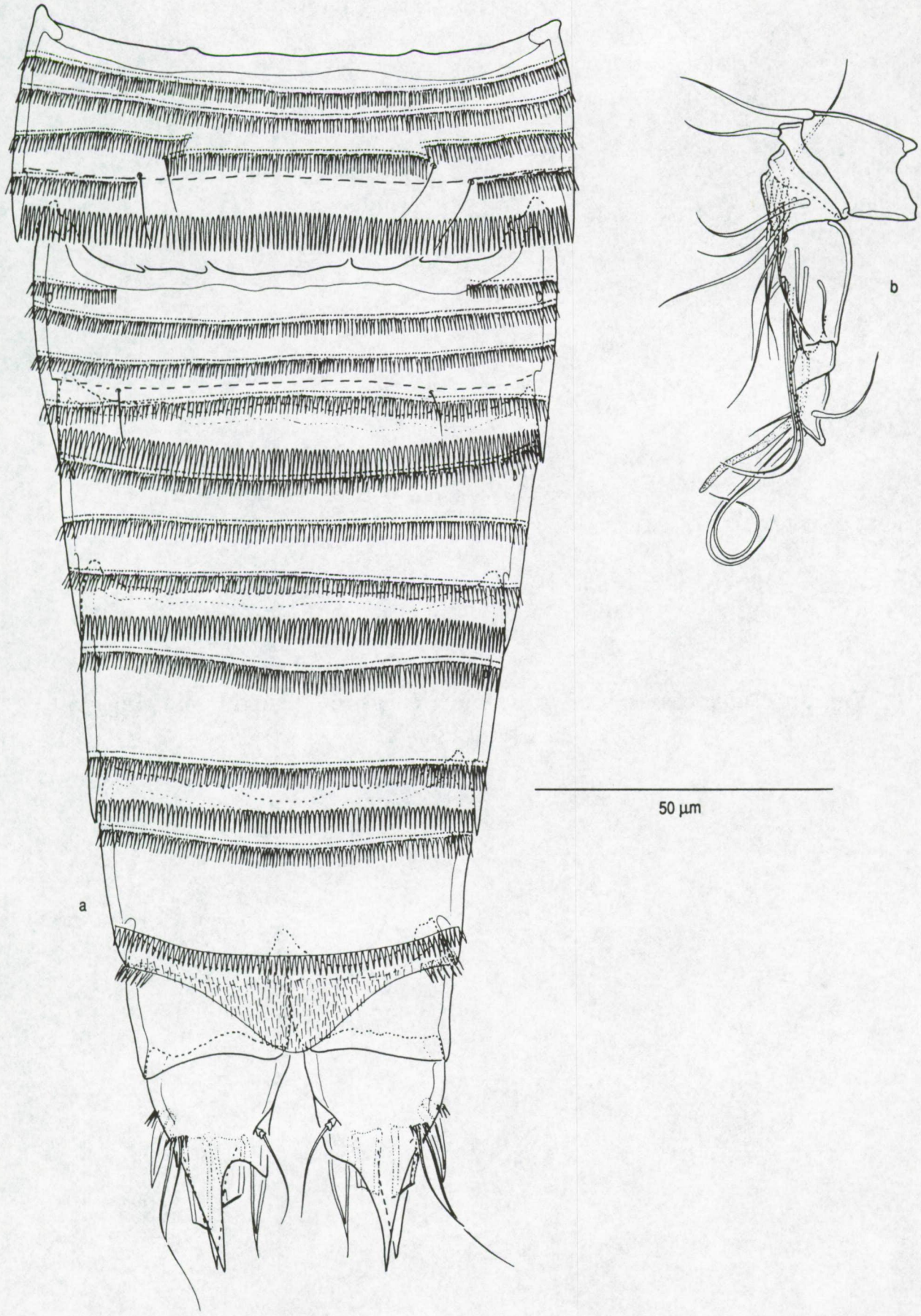

50 µm

Fig. 47. ***Halectinosoma n. sp. 3*****, female. a, antennule, exploded; b, antenna; c, mandible; d, maxillule; e, maxilliped.**


a
b
c
d
e
50 µm


a
b
50 µm


a
b
50 µm


a
b
50 µm

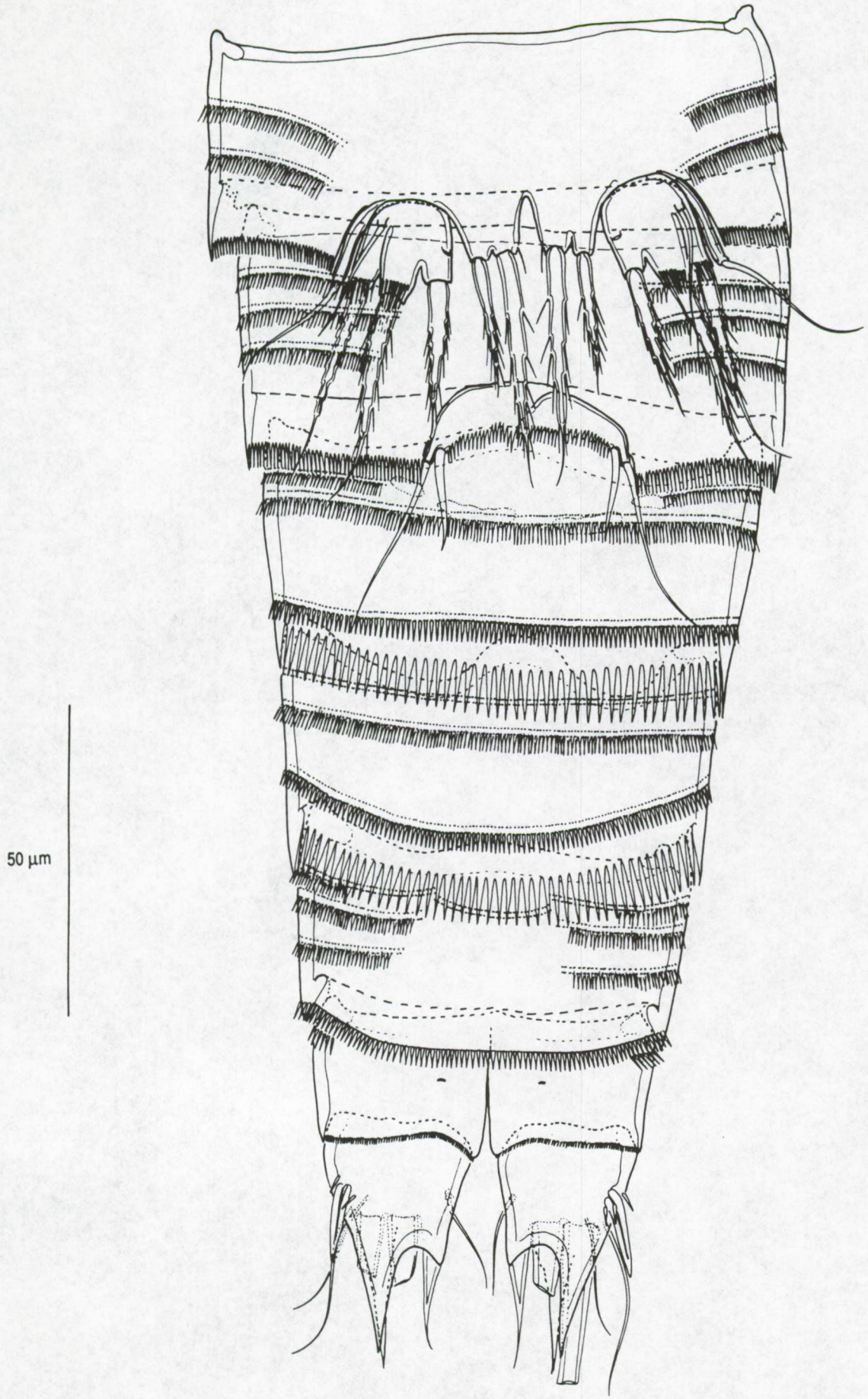
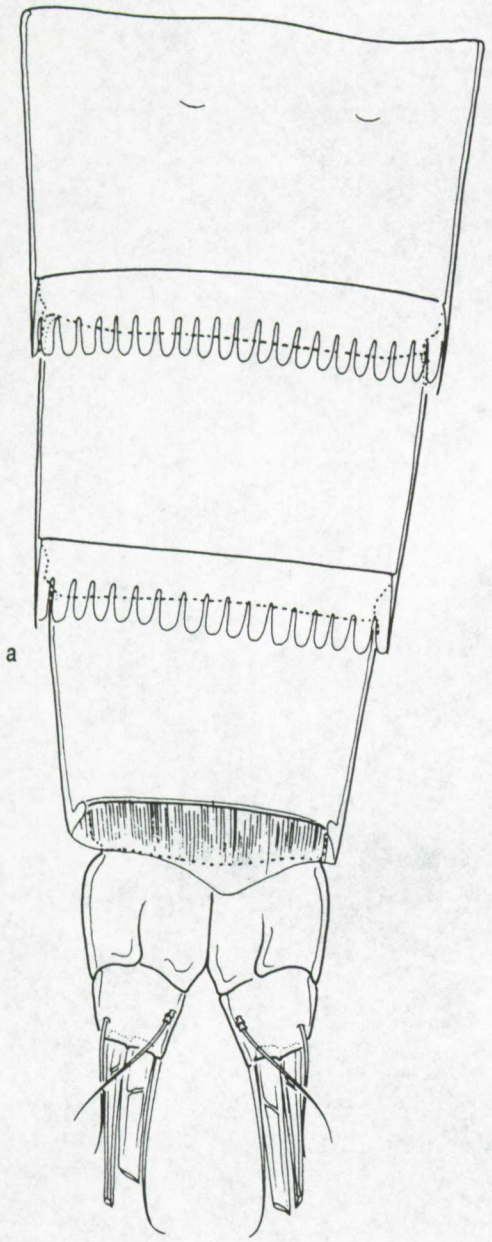
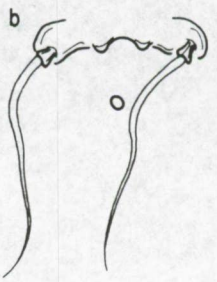

50 µm

Fig. 52. ***Hastigerella leptoderma*** **Klie, female. a, urosome, dorsal (P5 bearing-somite omited); b, P6.**


a


b

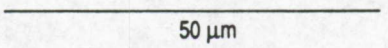
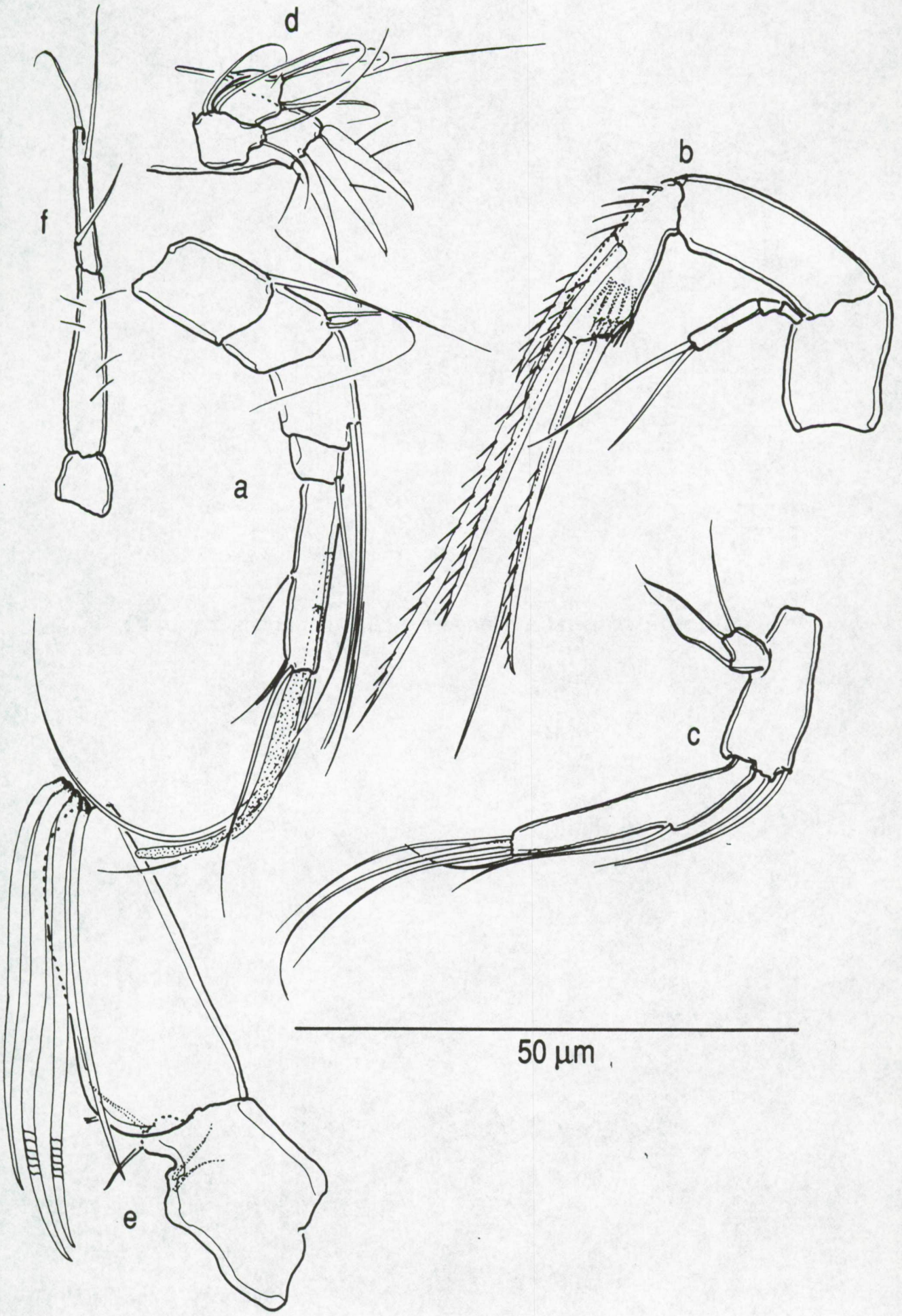

50 µm

Fig. 53. ***Hastigerella leptoderma*** **Klie, female. a, antennule; b, antenna; c, mandibular palp; d, maxillule; e, maxilla; f, maxilliped.**


d
f
b
a
c
50 µm
e

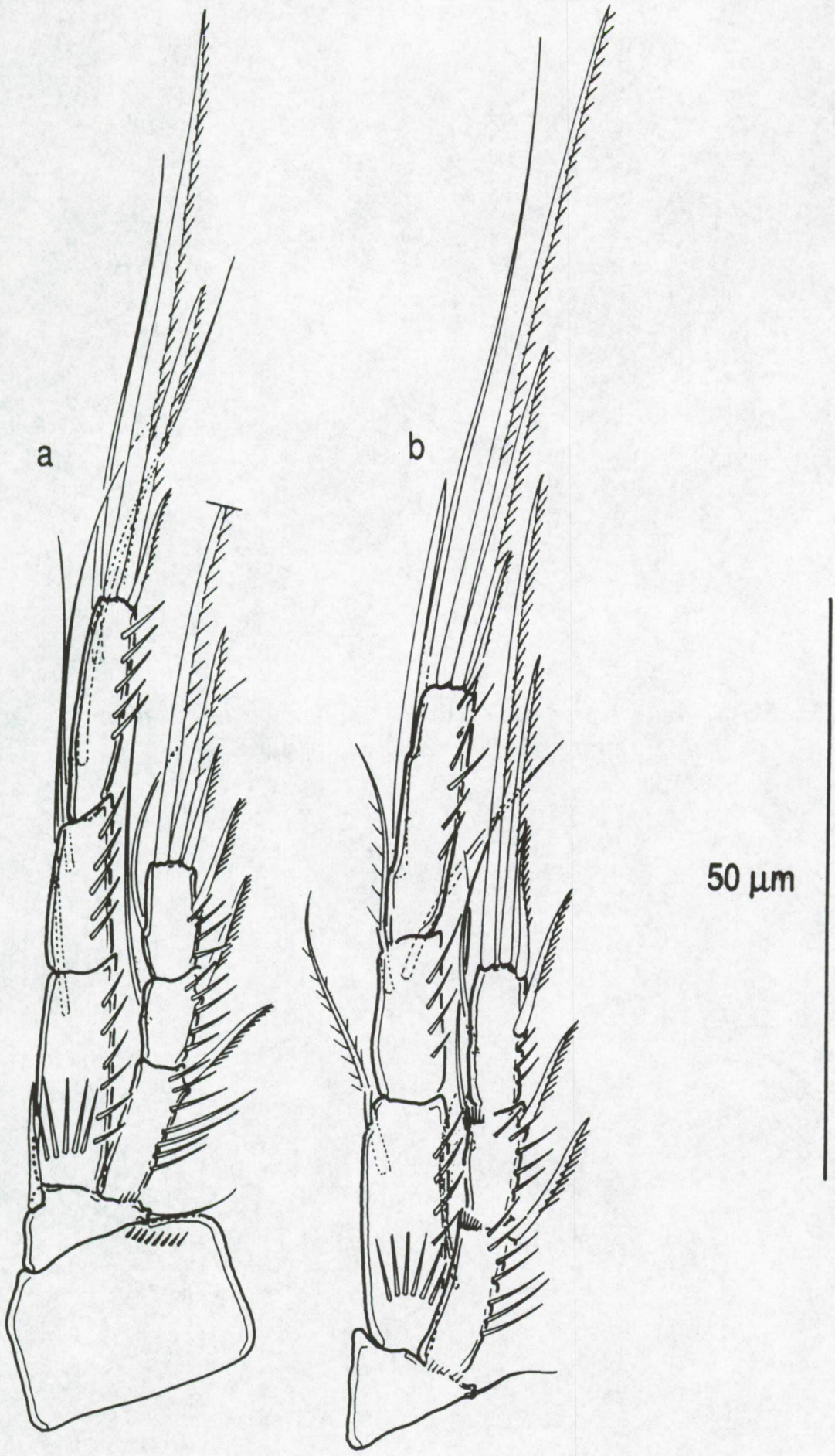

a
b
50 µm

Fig. 55. ***Hastigerella leptoderma*** **Klie. a, P3, female; b, P4, female; c, P5, female; d, P5, male; e, P6, male.**

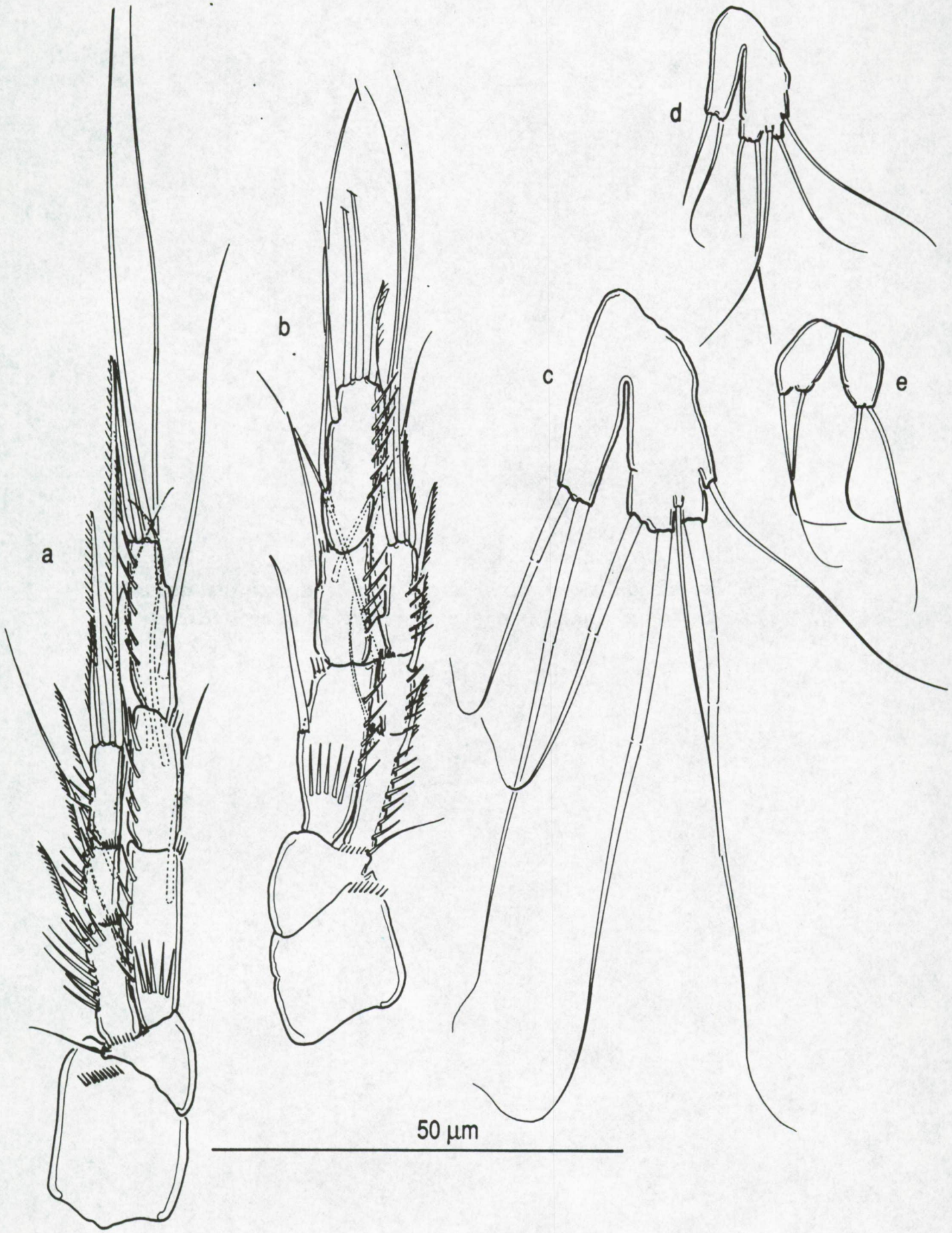
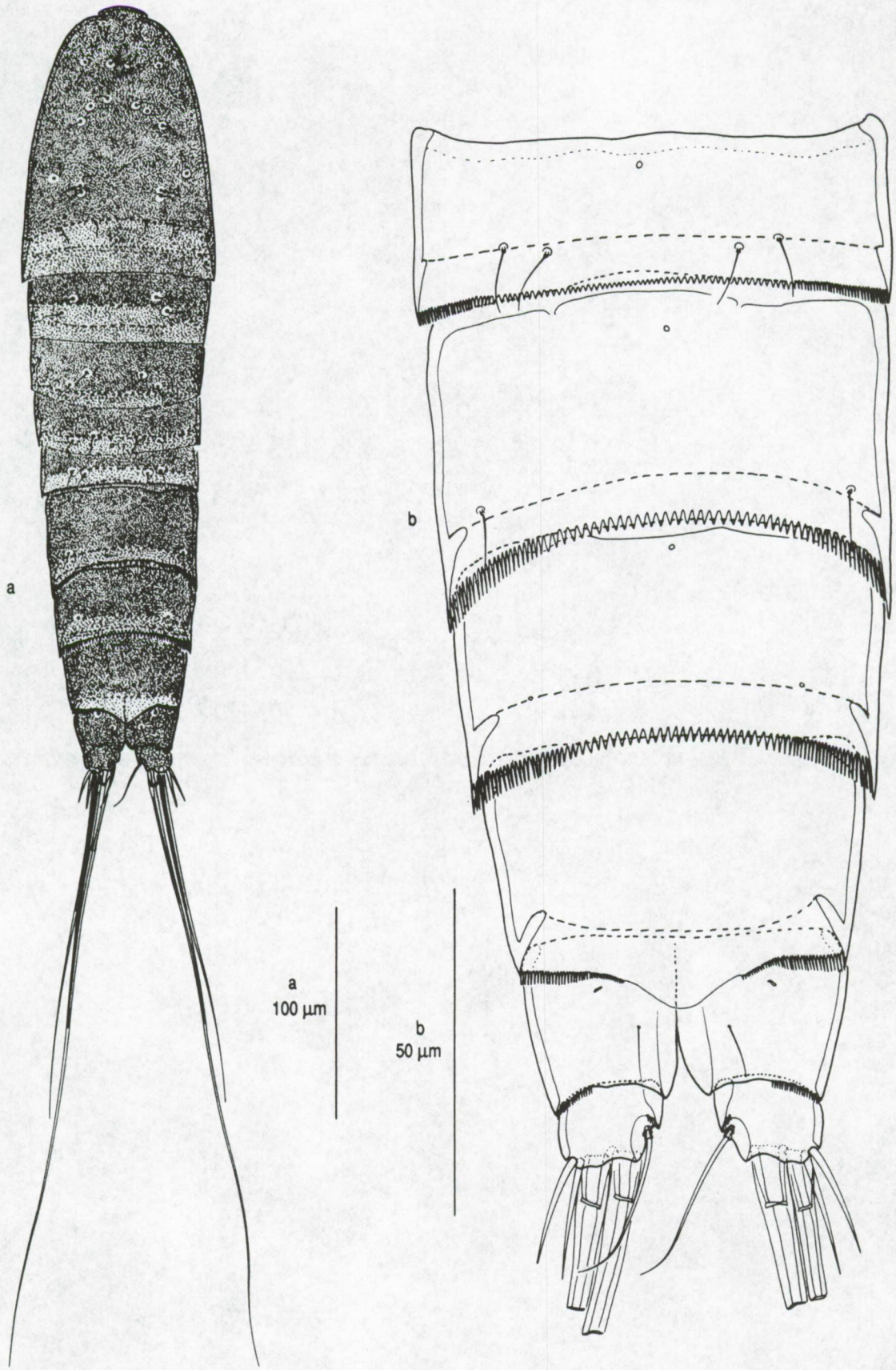

a
b
c
d
e
50 µm

Fig. 56. ***Pseudectinosoma minor*** **Kunz, female. a, habitus, dorsal; b, urosome, dorsal (surface ornamentation omited).**


a
b
a
100 µm
b
50 µm

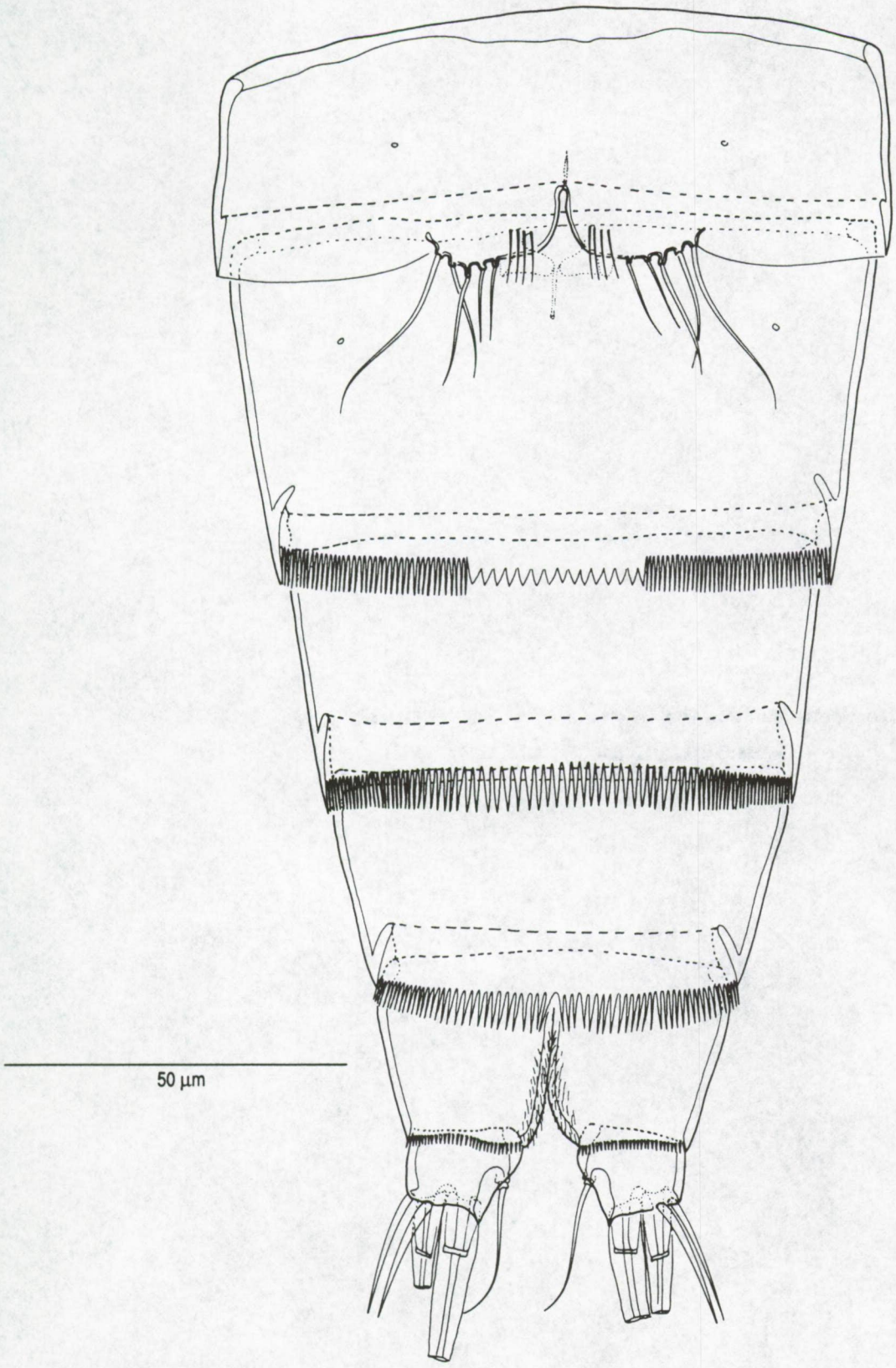
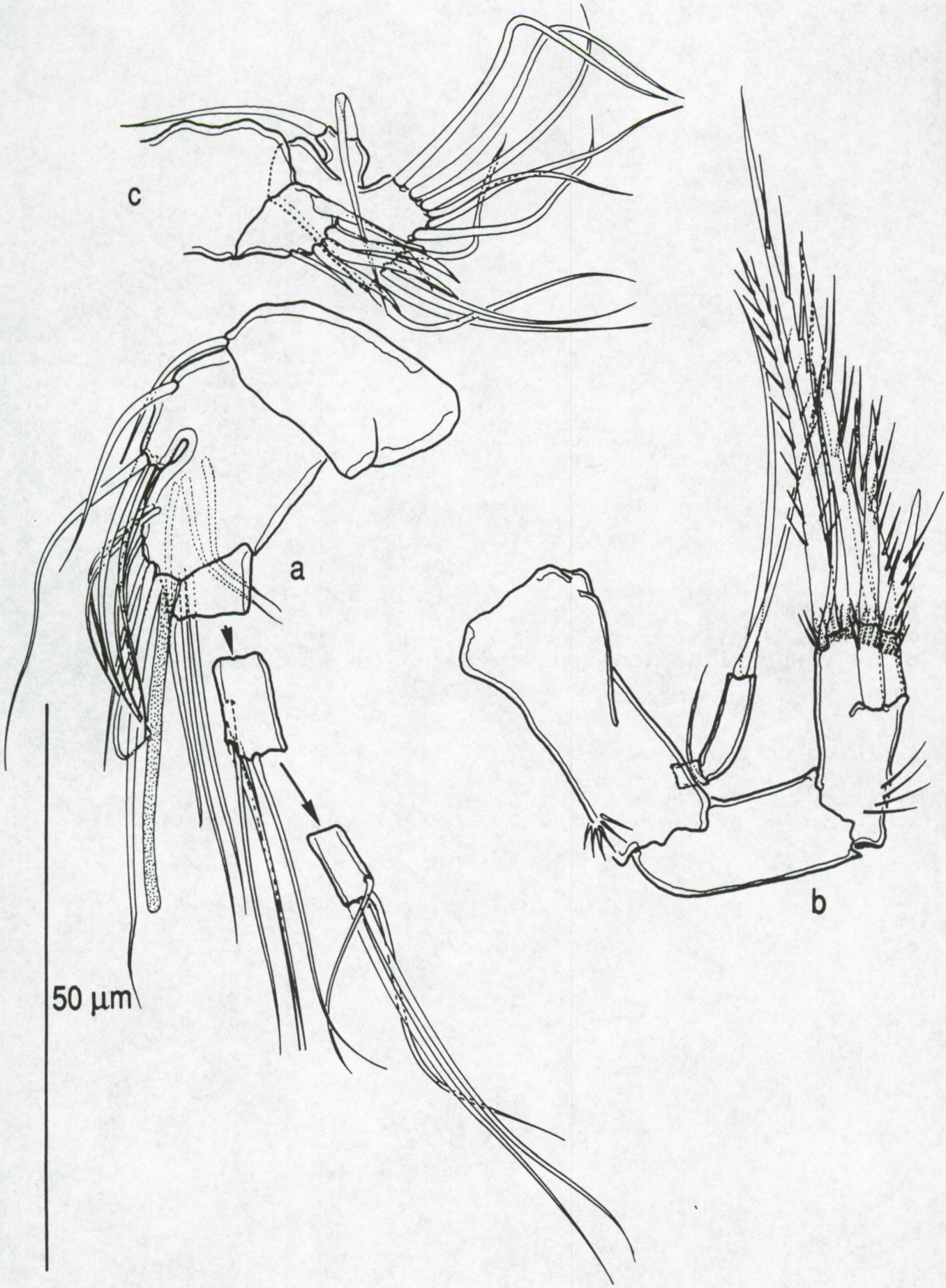
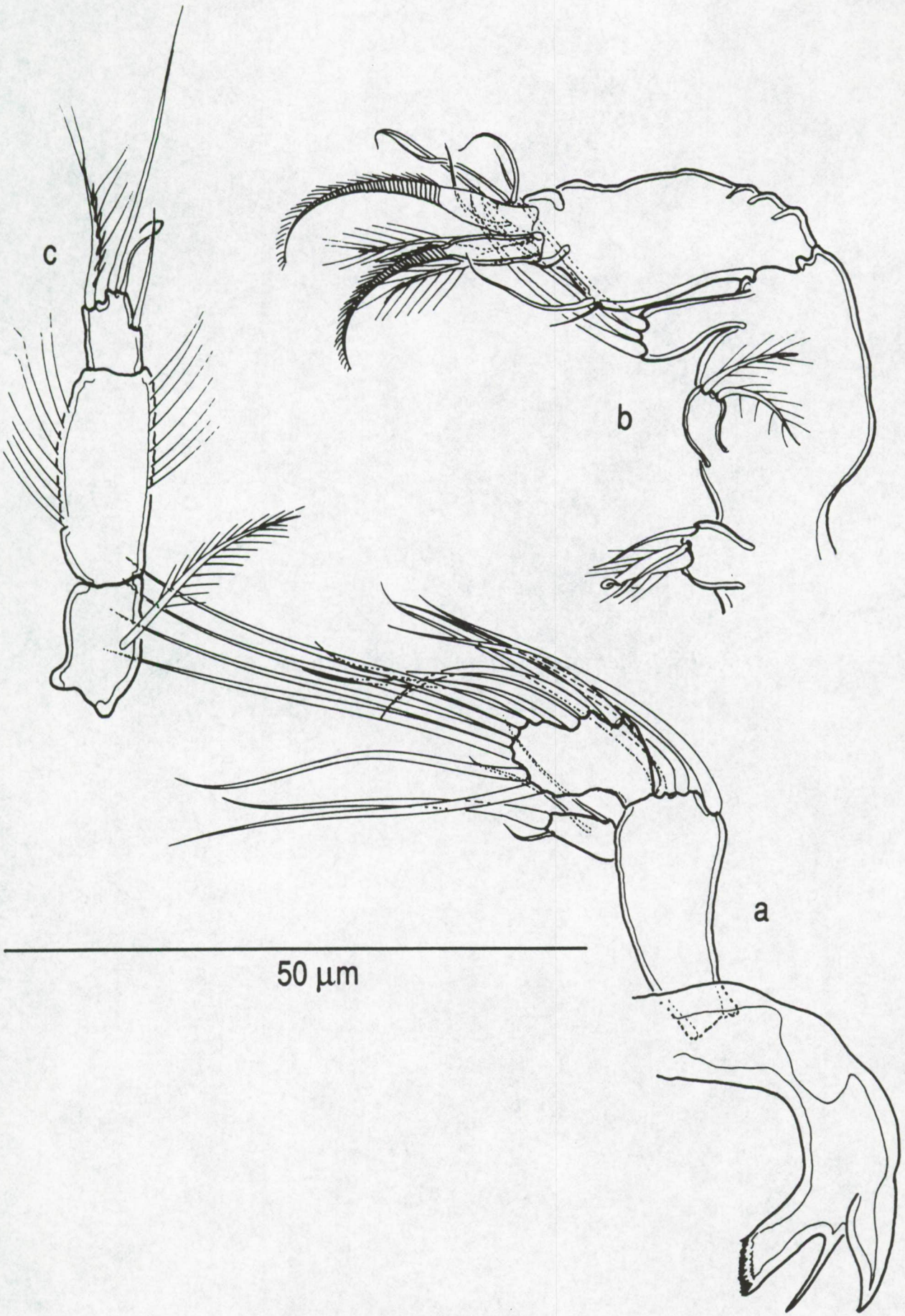
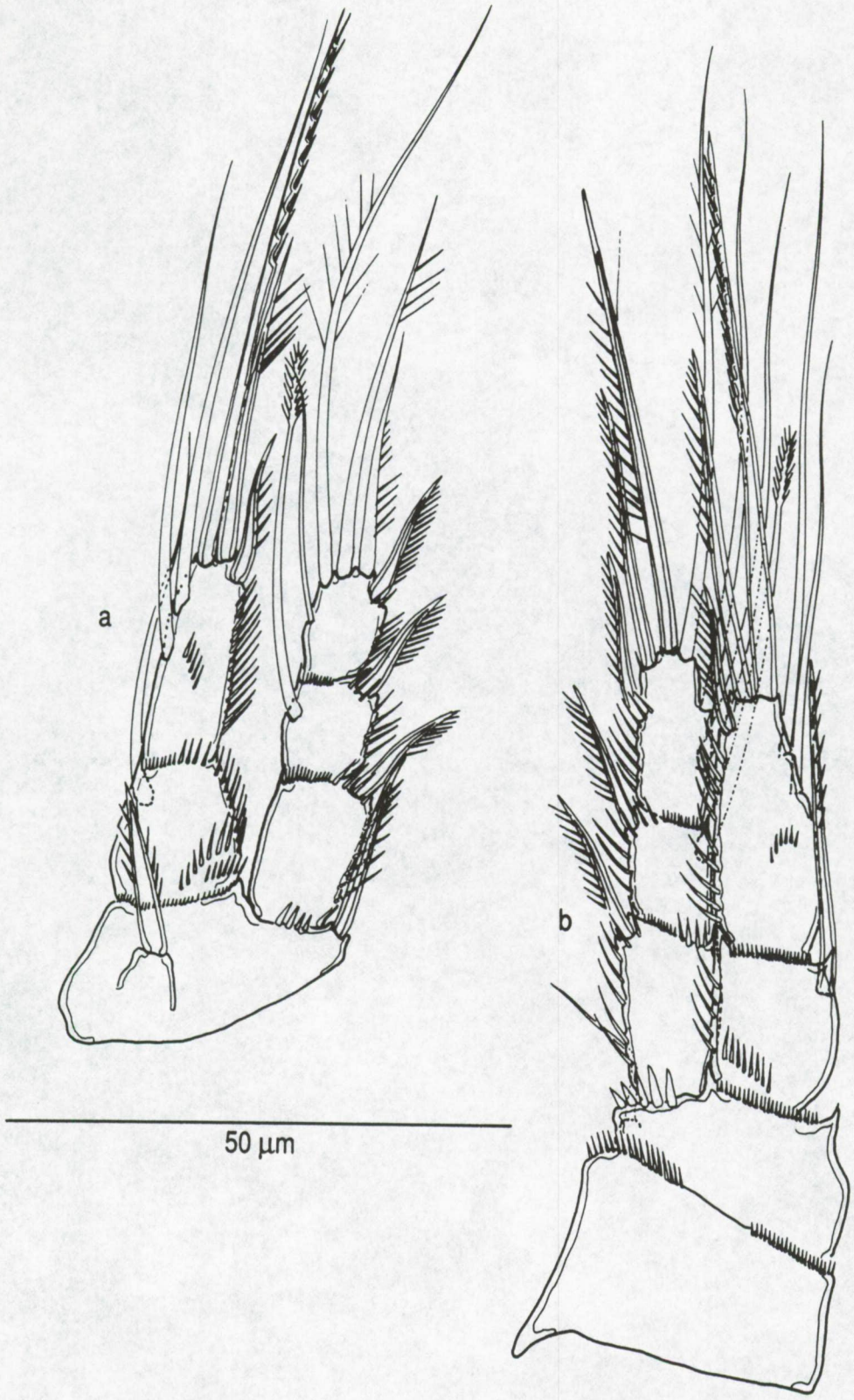
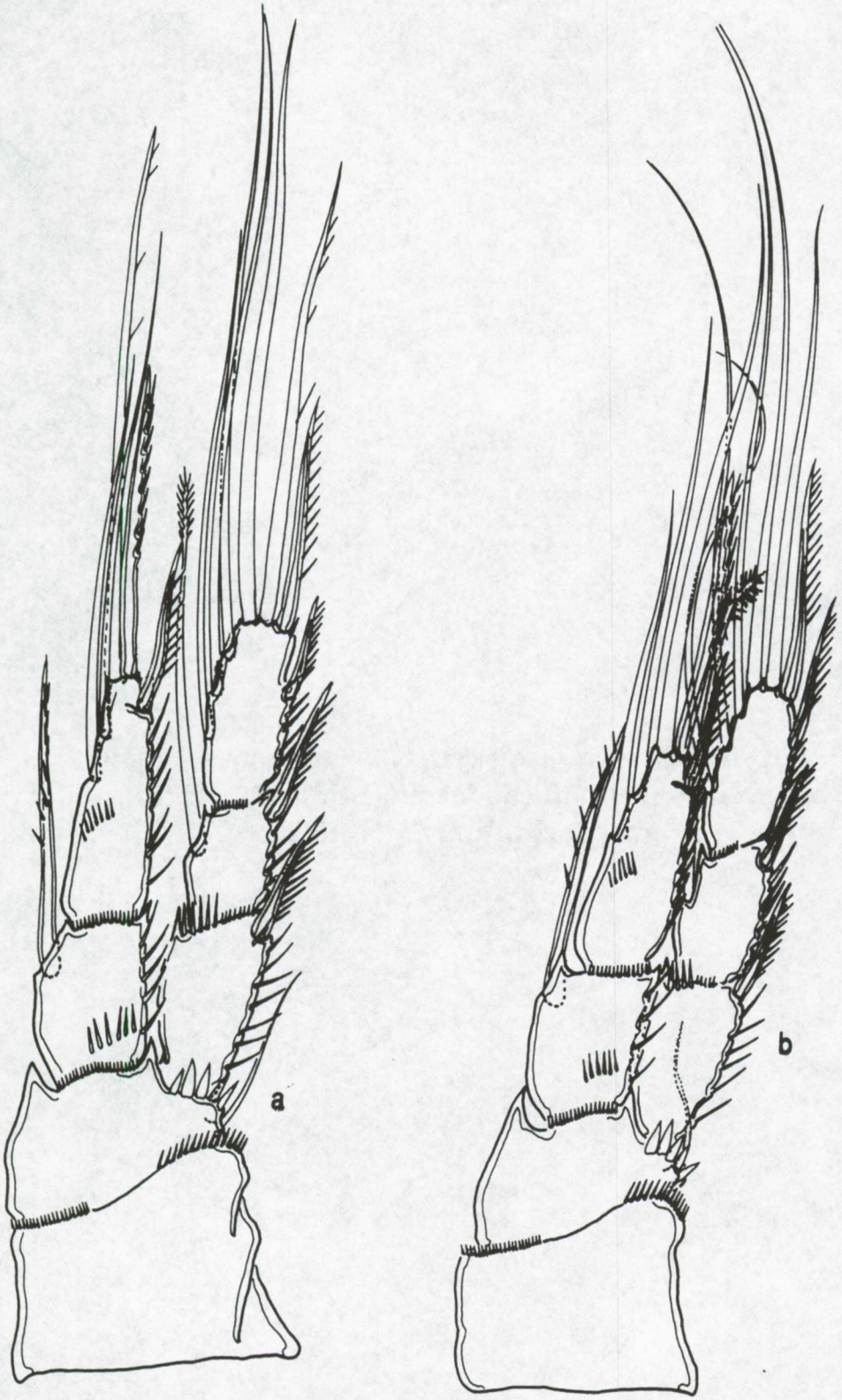

50 µm

Fig. 58. ***Pseudectinosoma minor*** **Kunz, female. a, antennule, exploded; b, antenna; c, maxillule.**


c
a
b
50 µm


c
b
a
50 µm


a
b
50 µm



50 µm

Fig. 62. ***Darcythompsonia fairliensis*** **T. Scott, female. a, habitus, dorsal; b, anal segment and caudal rami, dorsal; c, right caudal ramus, dorsal; d, genital field.**

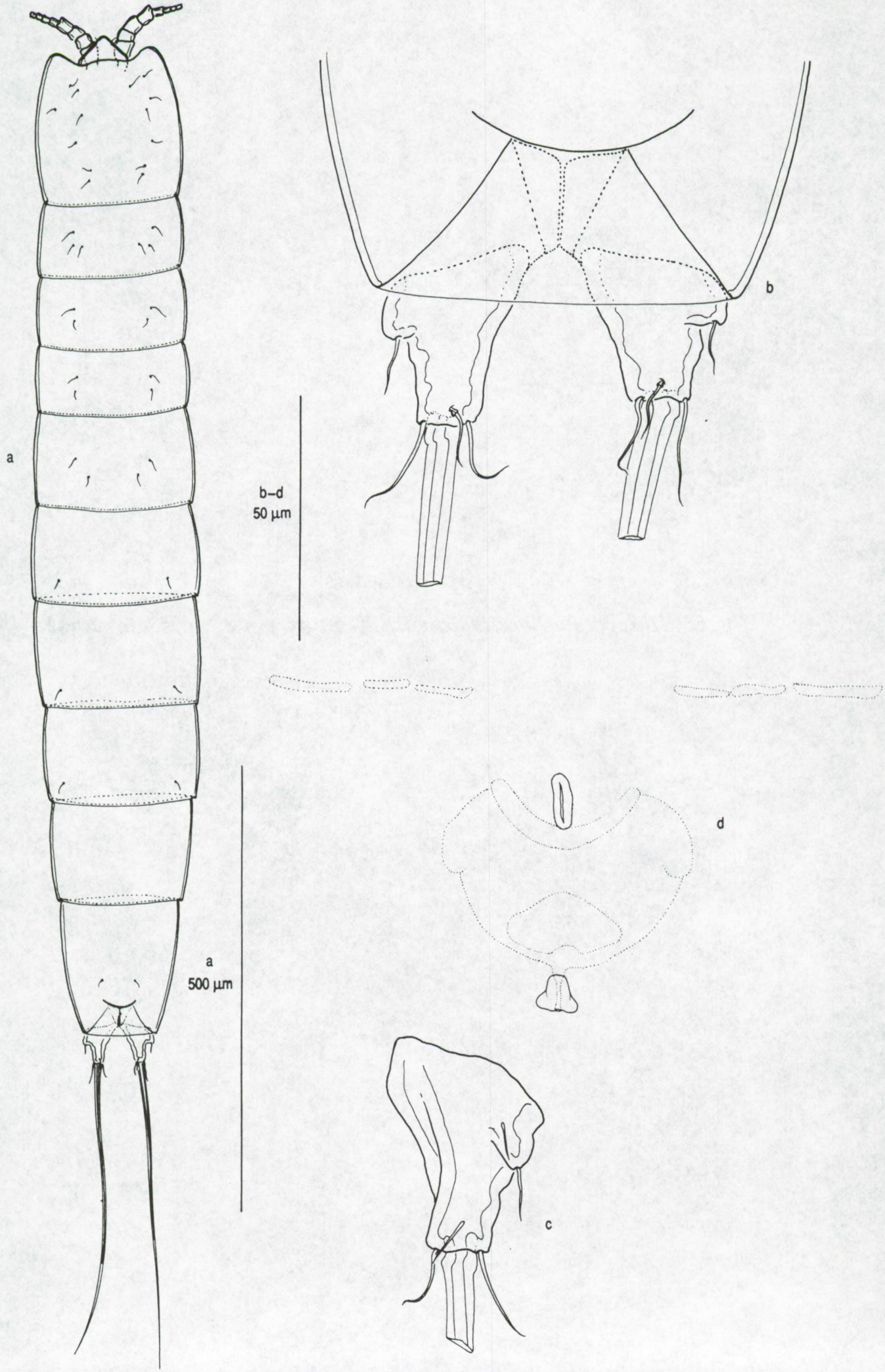

a
b
b–d
50 µm
a
500 µm
d
c

Fig. 63. ***Darcythompsonia fairliensis*** **T. Scott, male. Urosome, dorsal.**

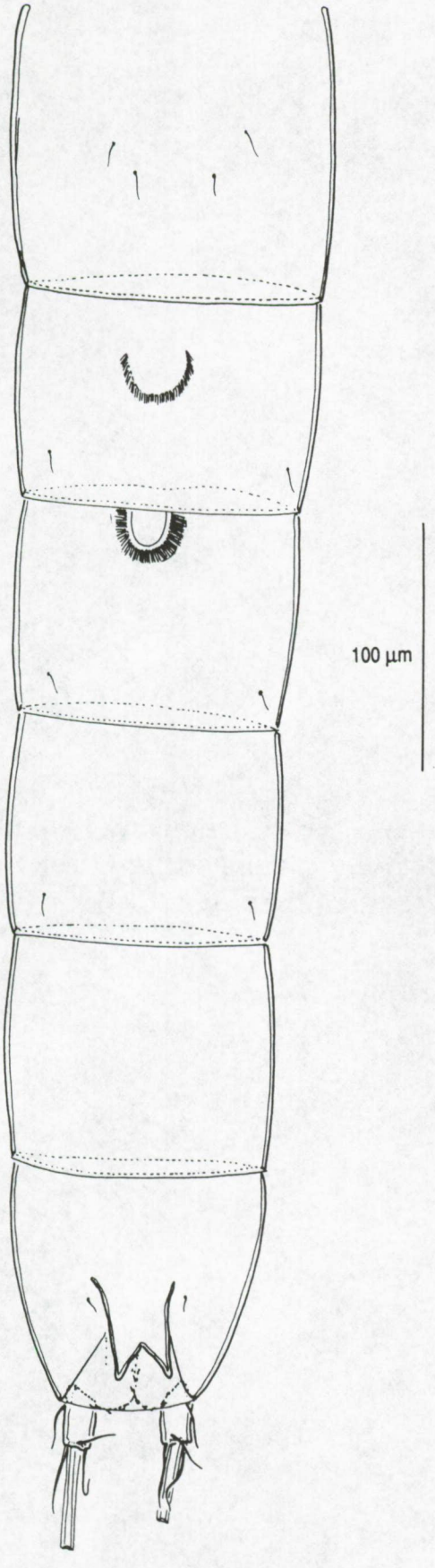

100 µm

Fig. 64. ***Darcythompsonia fairliensis*** **T. Scott, female. a, rostrum and antennule, the latter exploded; b, antenna; c, mandible; d, maxillule; e, maxilla; f, maxilliped; g, labrum.**

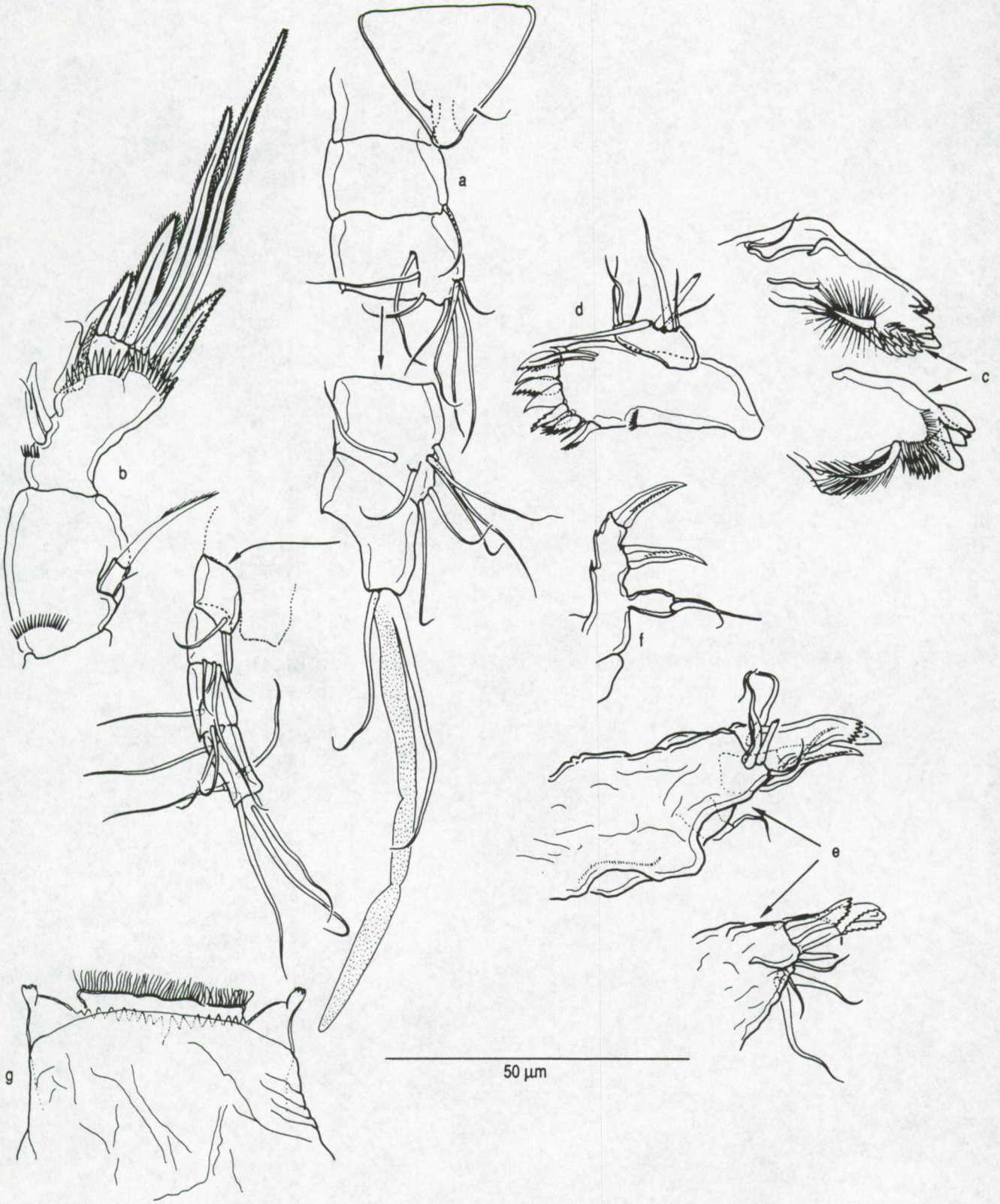
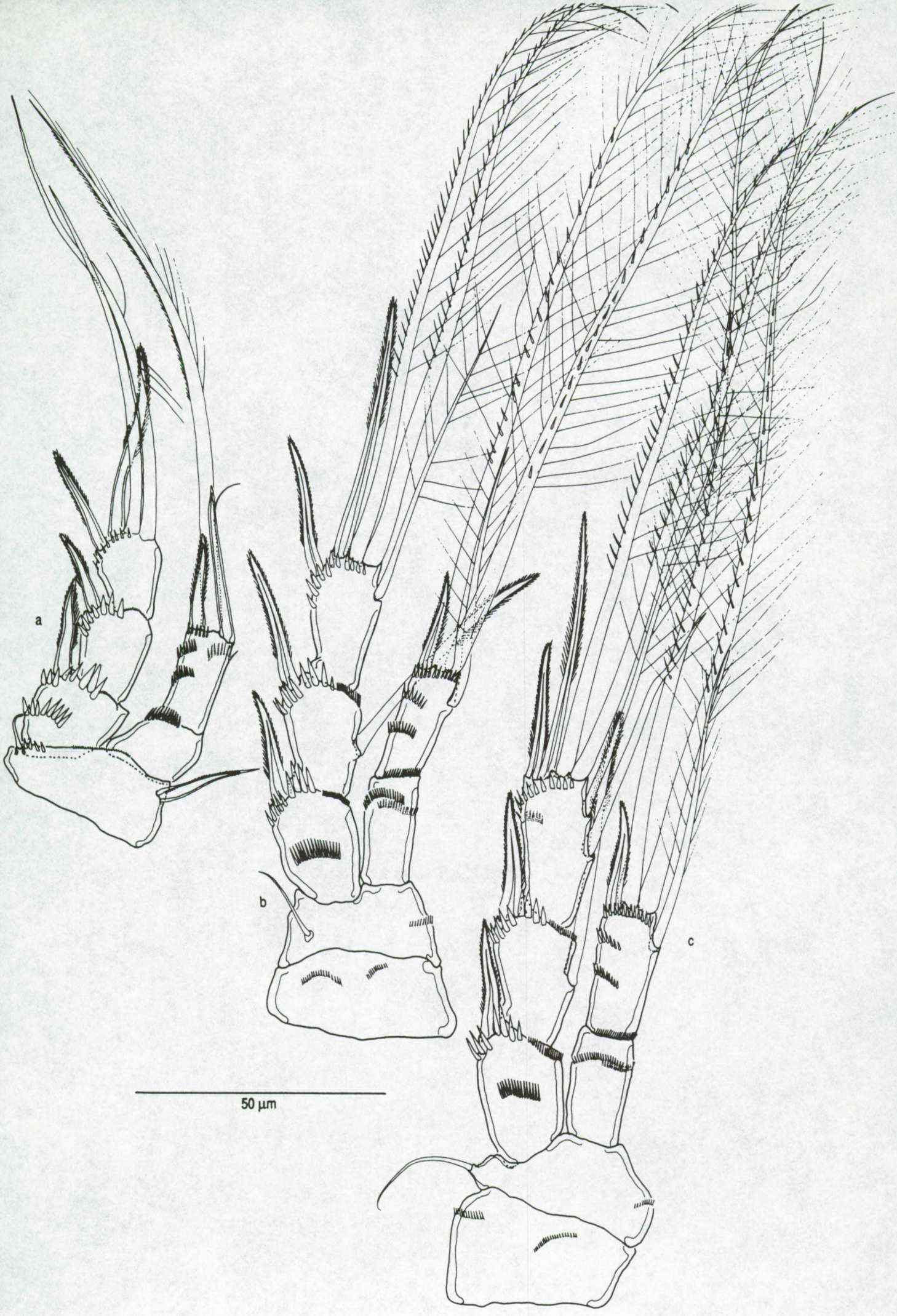

a
b
c
d
e
f
g
50 µm

Fig. 65. ***Darcythompsonia fairliensis*** **T. Scott, female. a, P1; b, P2; c, P3.**


a
b
c
50 µm


a
b
50 µm

Fig. 67. ***Darcythompsonia fairliensis*** **T. Scott, male. a, P2 ENP 2; b, P5; c, P6; d, antennule.**

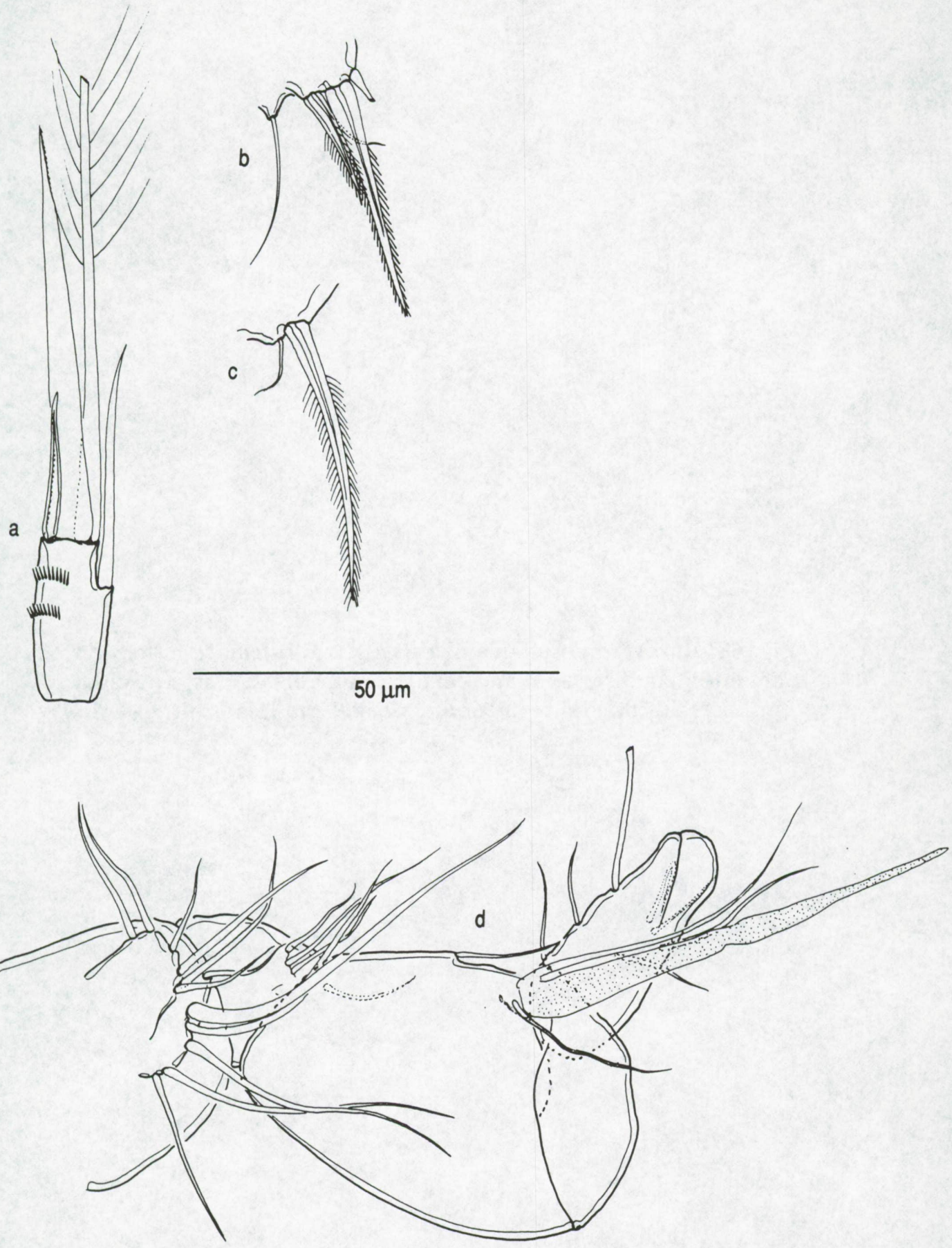

a
b
c
50 µm
d

Fig. 68. Darcythompsonidae *N. gen. 1 n. sp. 1*, female. a, habitus, dorsal; b, anal segment and caudal rami, dorsal; c, right caudal rami, lateral; d, anal segment and caudal rami, lateral; e, genital pore.

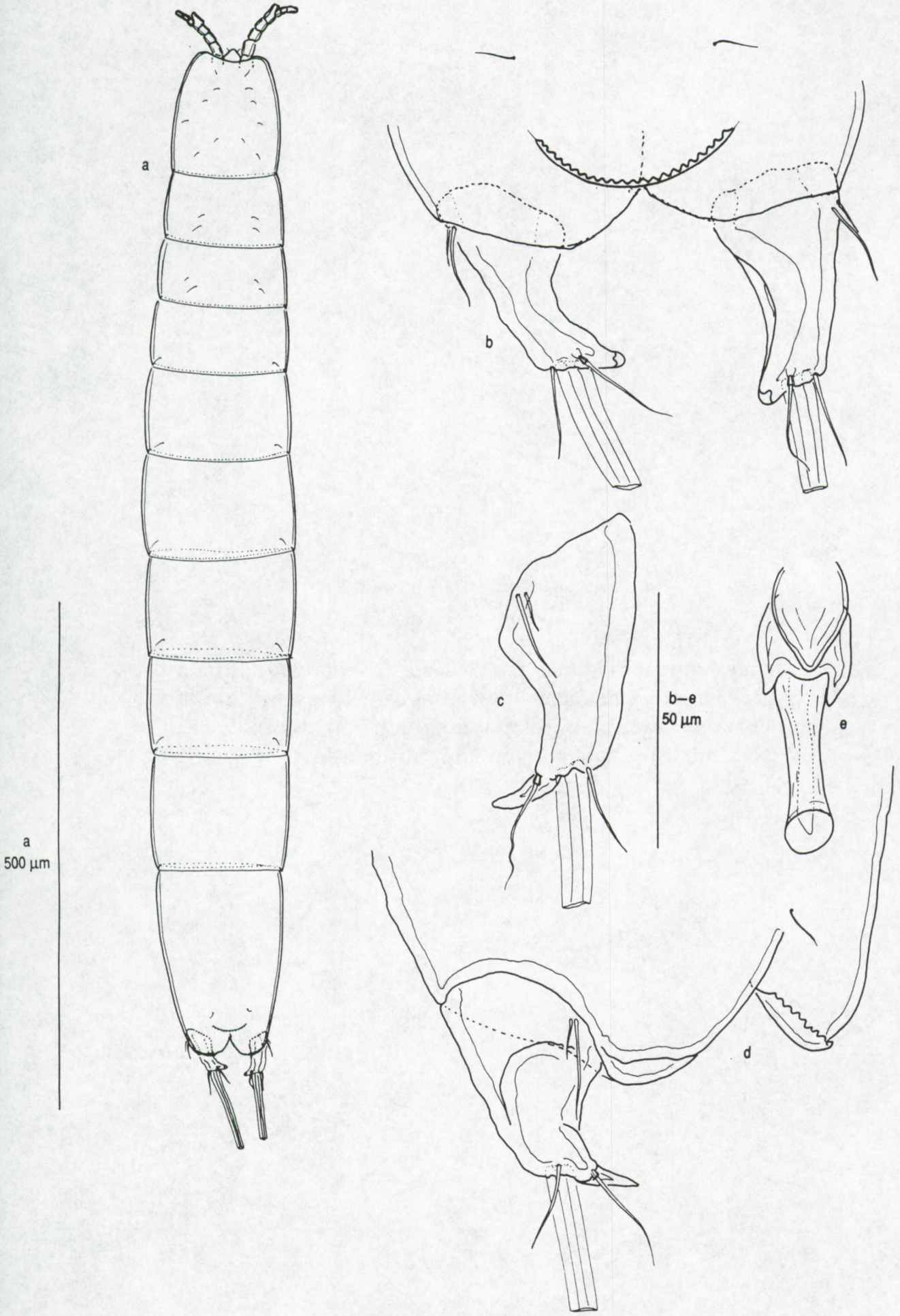
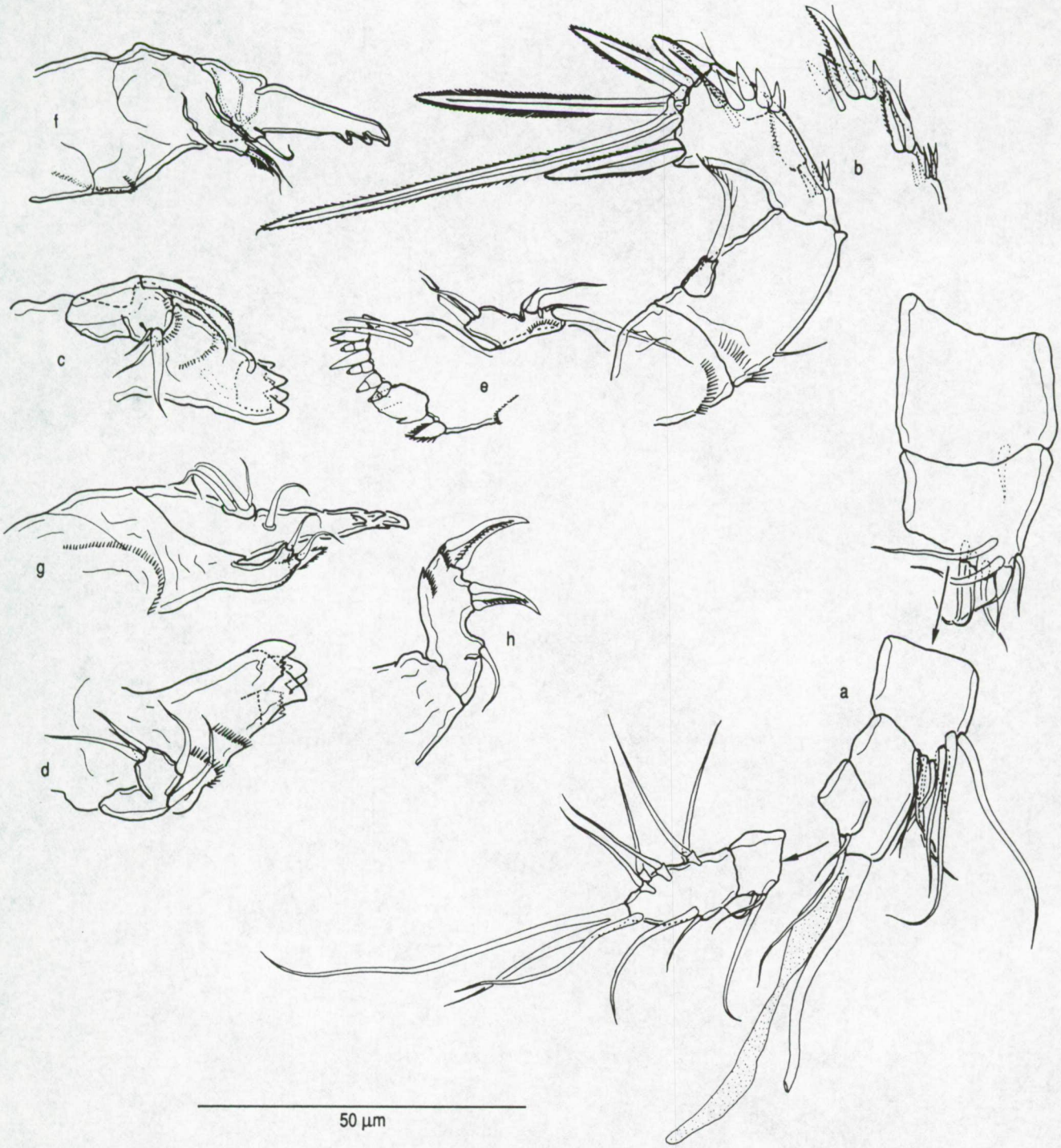

a
b
c
d
e
a
500 µm
b–e
50 µm

Fig. 69. Darcythompsonidae *N. gen. 1 n. sp. 1*, female. a, antennule, exploded; b, antenna, also showing oposite armature and ornamentation; c-d, mandible; e, maxillule; f,-g, maxilla; h, maxilliped; i, labrum and paragnaths.


f
b
c
e
g
h
d
a
50 µm

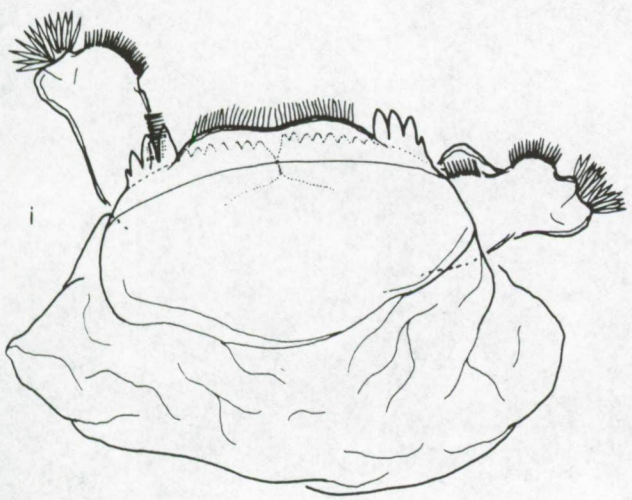

i

Fig. 70. Darcythompsonidae *N. gen. 1 n. sp. 1*, female. a, P1; b, P2.

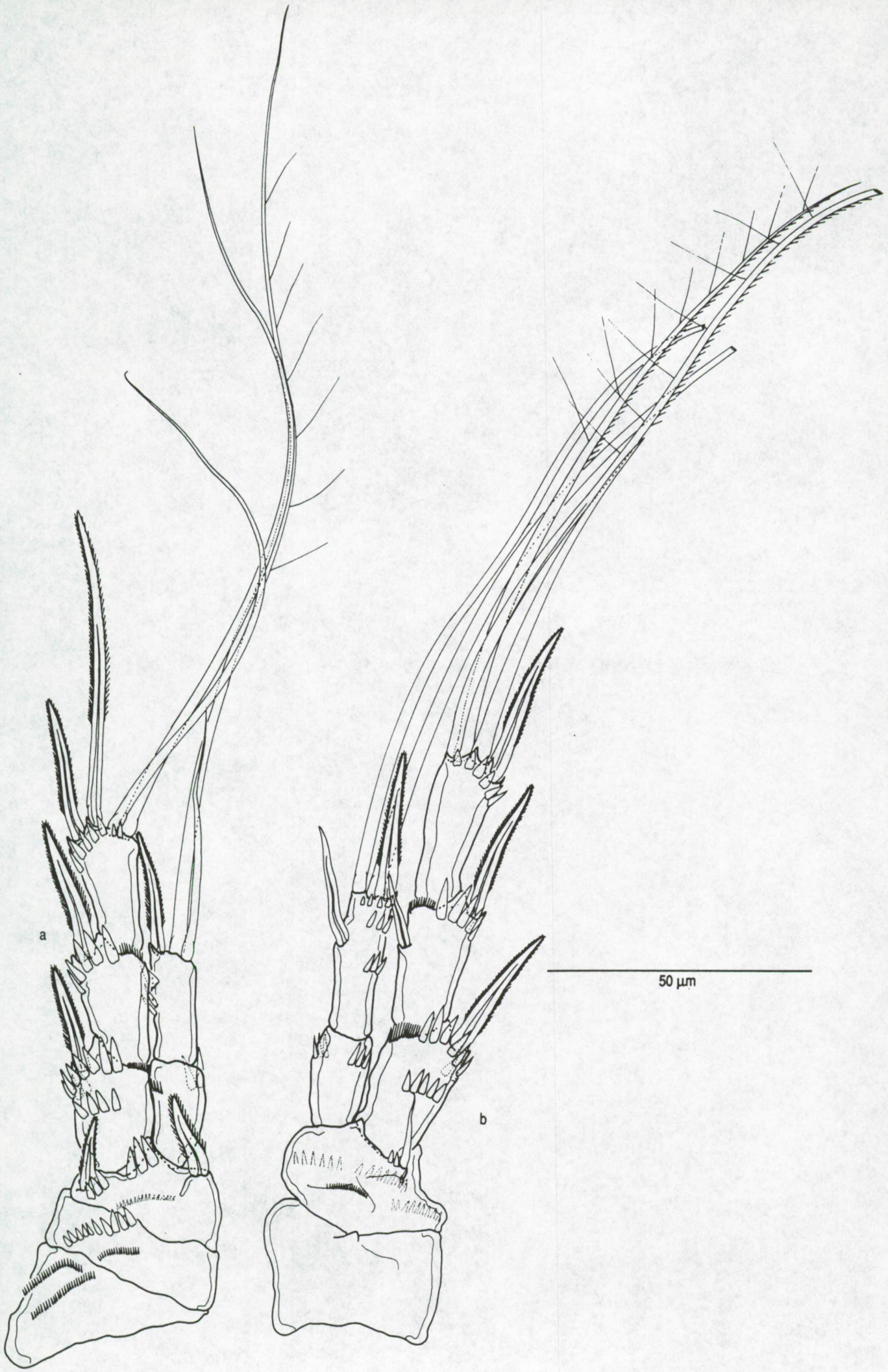

a
b
50 µm

Fig. 71. Darcythompsonidae *N. gen. 1 n. sp. 1*, female. a, P3; b, P4.

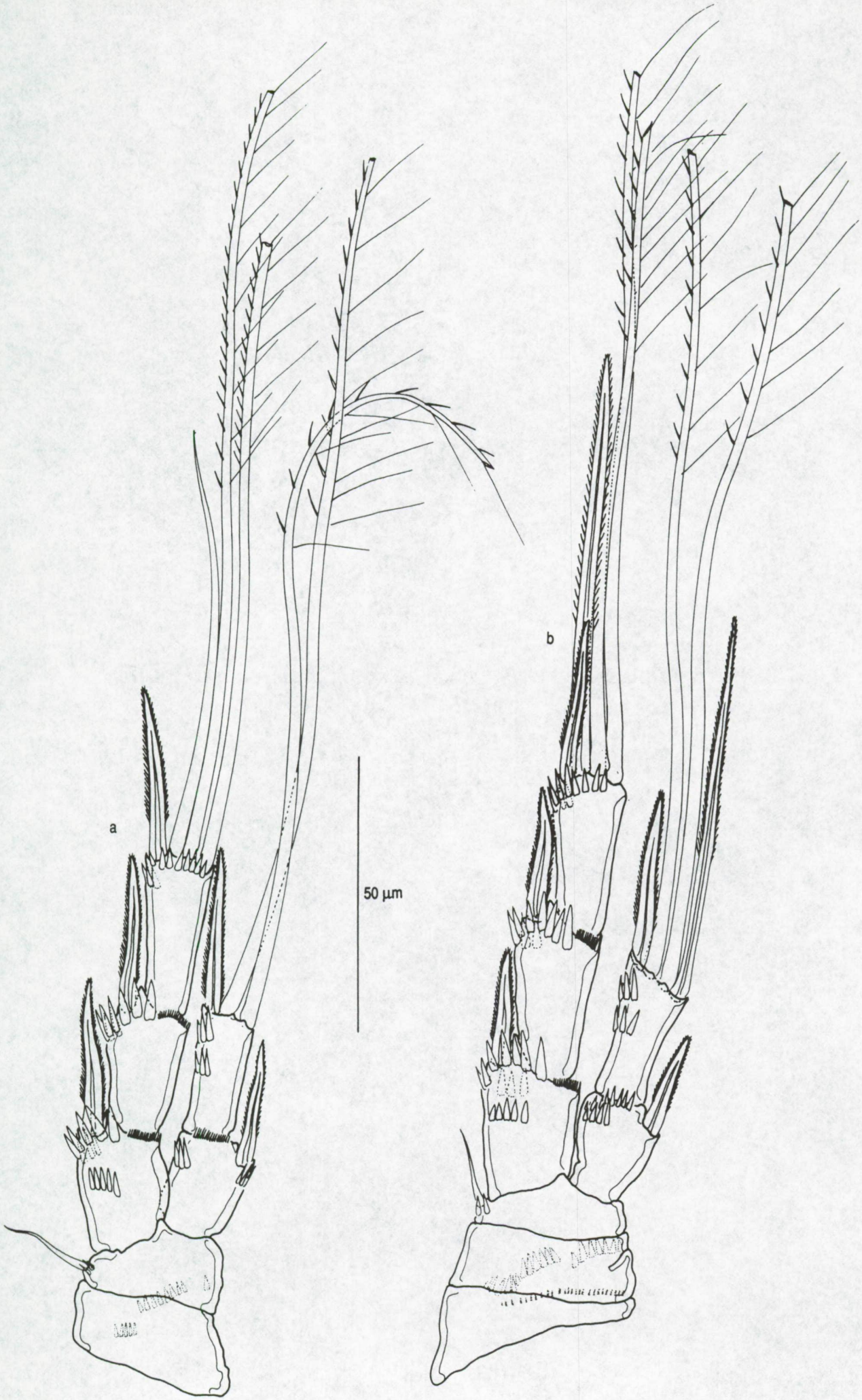

a
b
50 µm

Fig. 72. Darcythompsonidae *N. gen. 1 n. sp. 1*, male. a, antennule; b, P1.

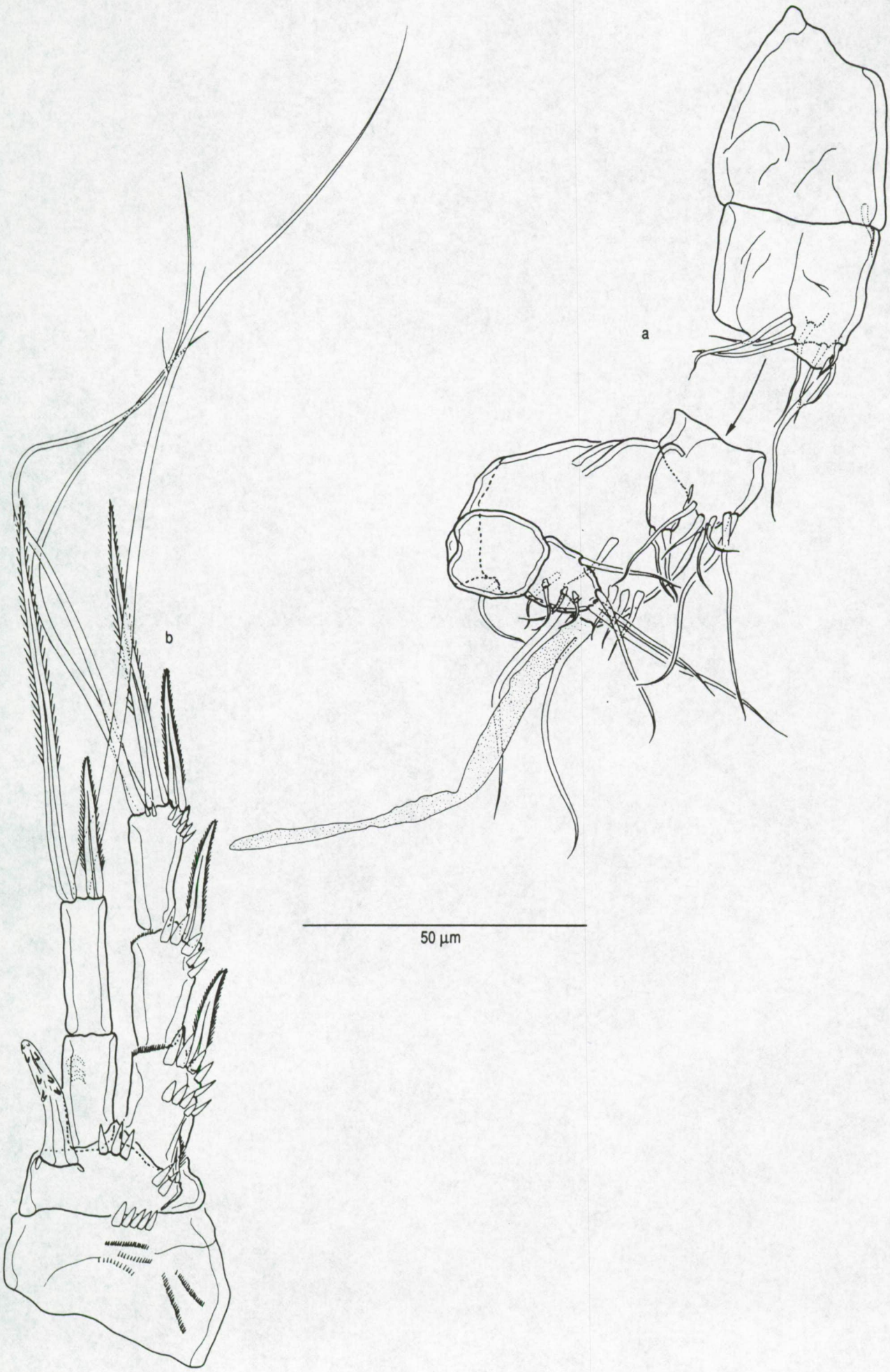

a
b
50 µm

Fig. 73. Darcythompsonidae *N. gen. 1 n. sp. 1*, male. a, P2; b, P3; c, P4.

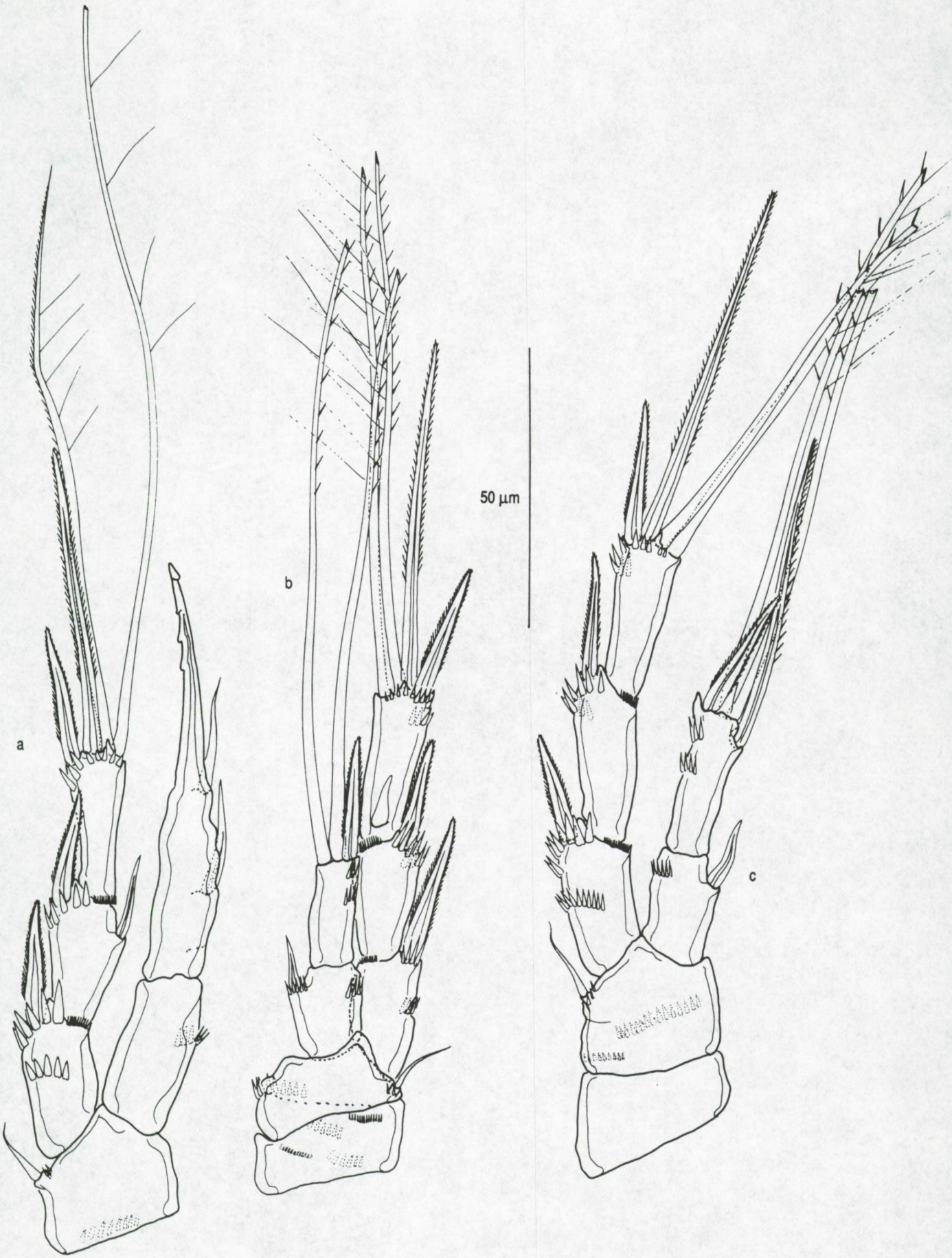

a
b
c
50 µm

Fig. 74. ***Microarthridion n. sp. 1*****, female. a, habitus, dorsal; b, habitus, lateral; c, anal segment and caudal rami, dorsal; d, urosome, ventral (p5 bearing-somite omited).**

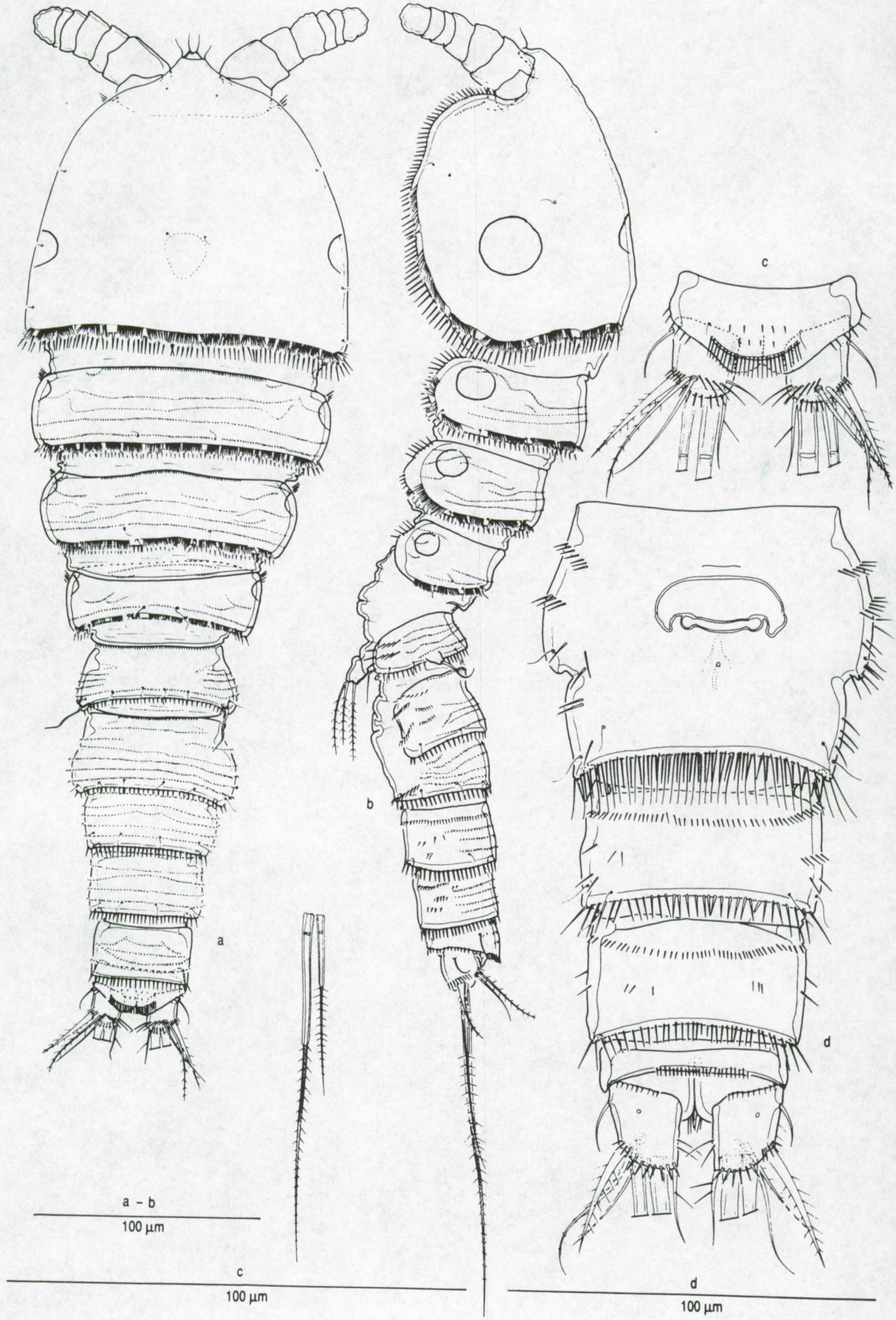

a
b
c
d
a – b
100 µm
c
100 µm
d
100 µm

Fig. 75. ***Microarthridion n. sp. 1,*** **female. a, antennule, exploded; b, antenna; c, mandible; d, maxillule; e, maxilla; f, maxilliped.**

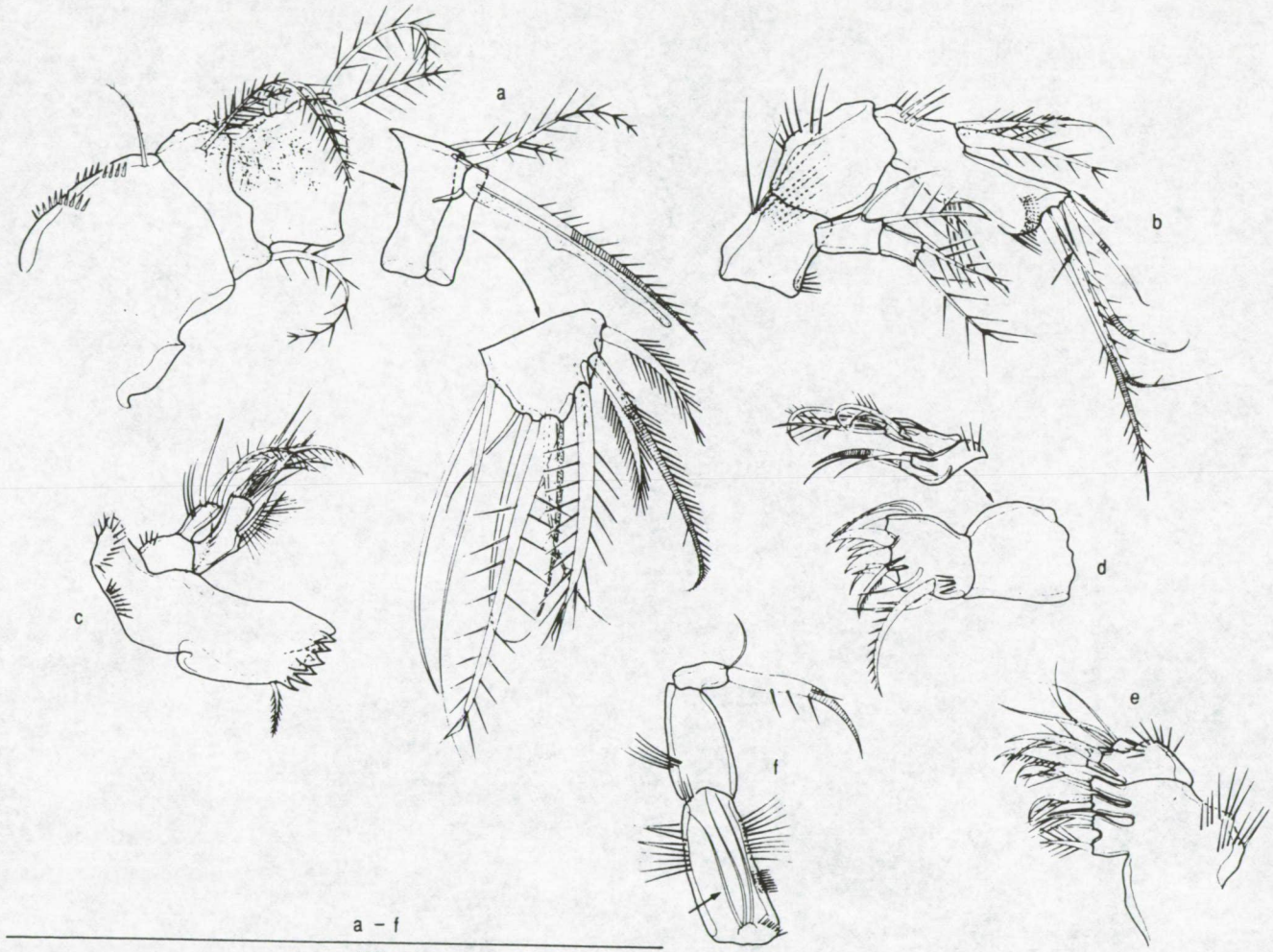

a
b
c
d
e
f
a – f
100 µm

Fig. 76. ***Microarthridion n. sp. 1,*** **female. a, P1; b, P2; c, P3; d, P4; e, P5. Exopodite of P1-P3 exploded.**

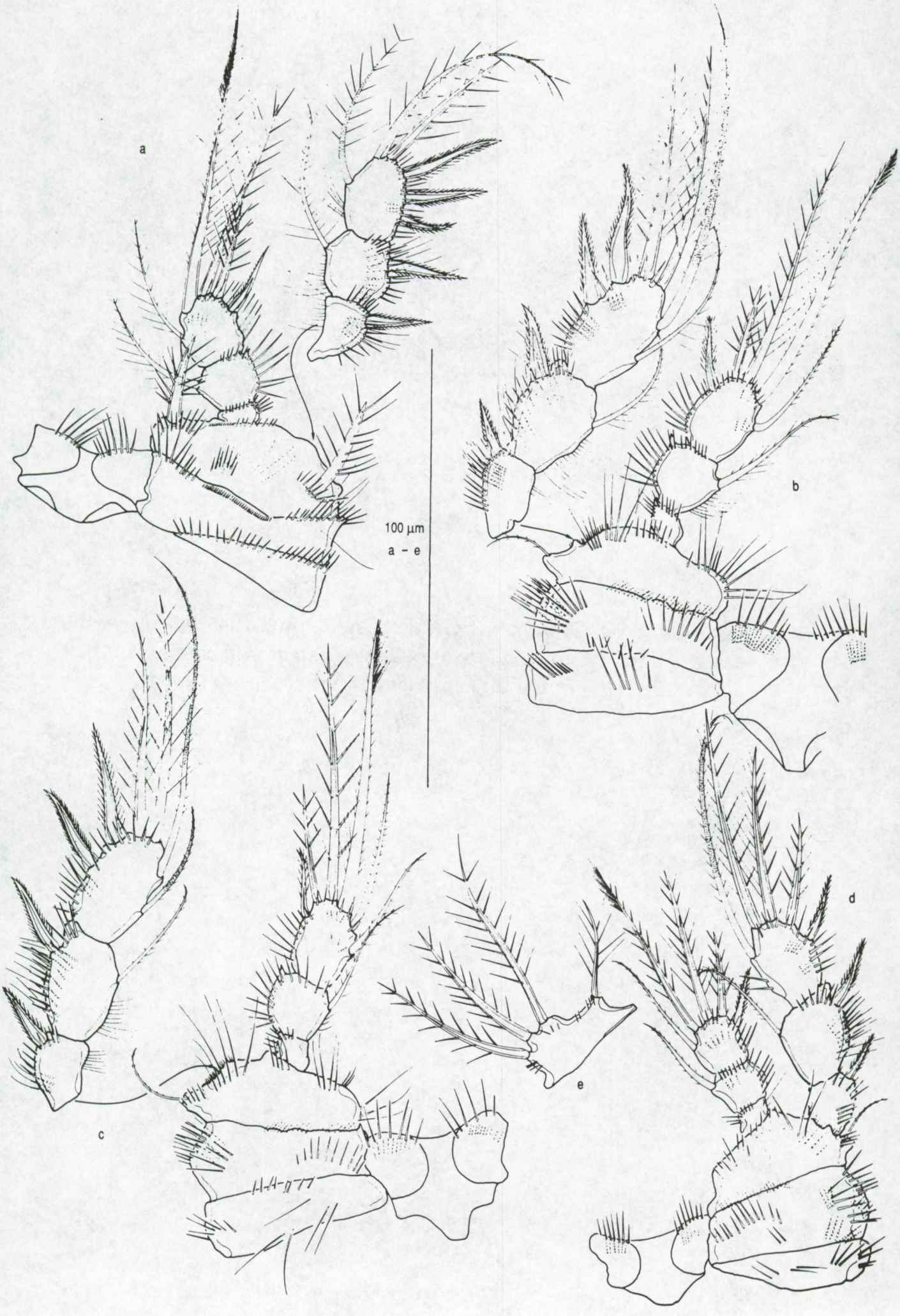

a
b
100 µm
a - e
c
d
e

Fig. 77. ***Microarthridion n. sp. 1*****, male. a, habitus, dorsal, principal setae of caudal rami exploded; b, anal segment and caudal rami, dorsal; c, urosome, ventral.**

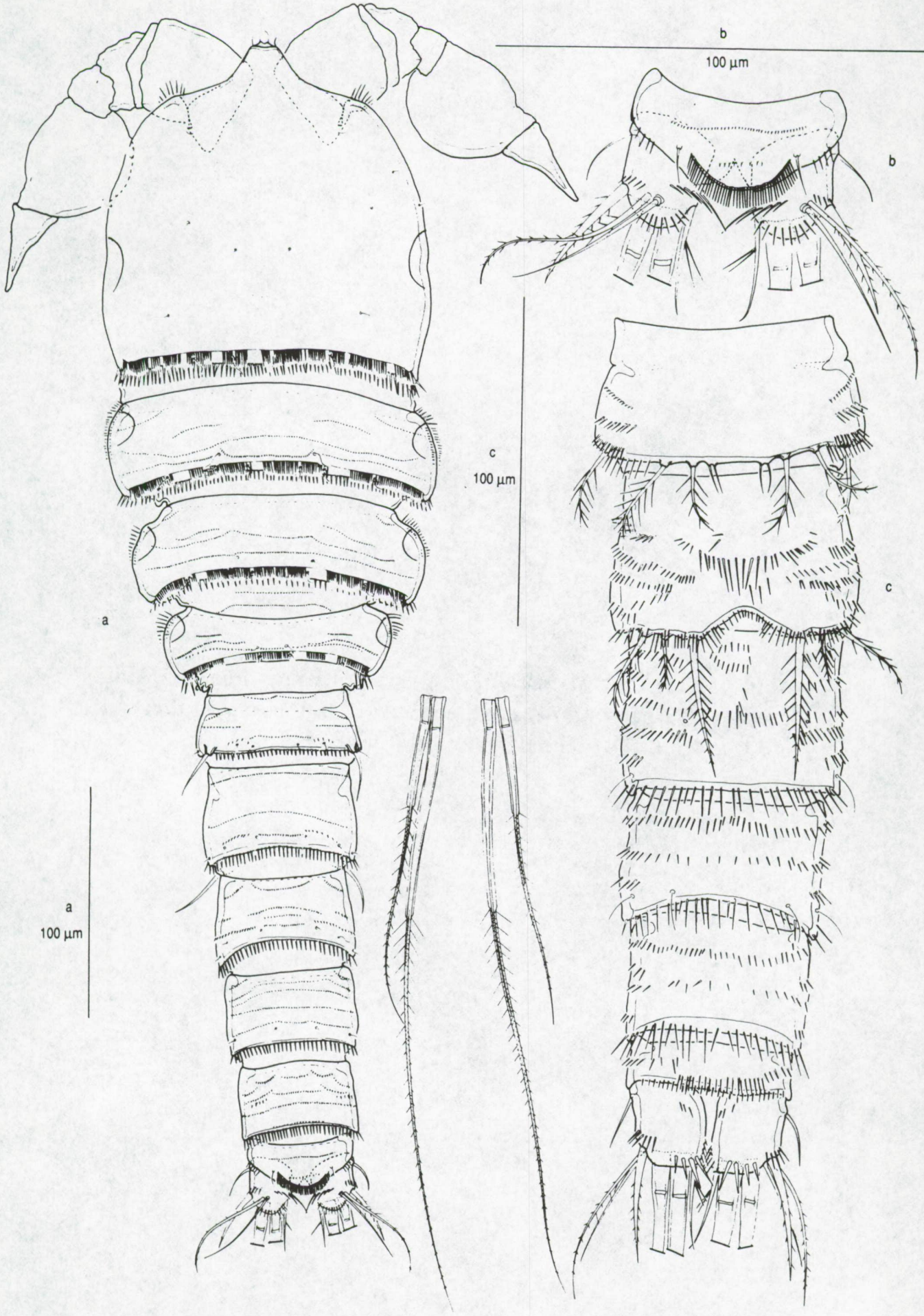

b
100 µm
b
c
100 µm
c
a
a
100 µm

Fig. 78. ***Microarthridion n. sp. 1*****, male. a, antennule; b, distal segments of antennule, another view; c, antenna; d-e, aberrant antennal exopodites; f, P2; g, P3.**



f – g

100 µm

a – e

100 µm

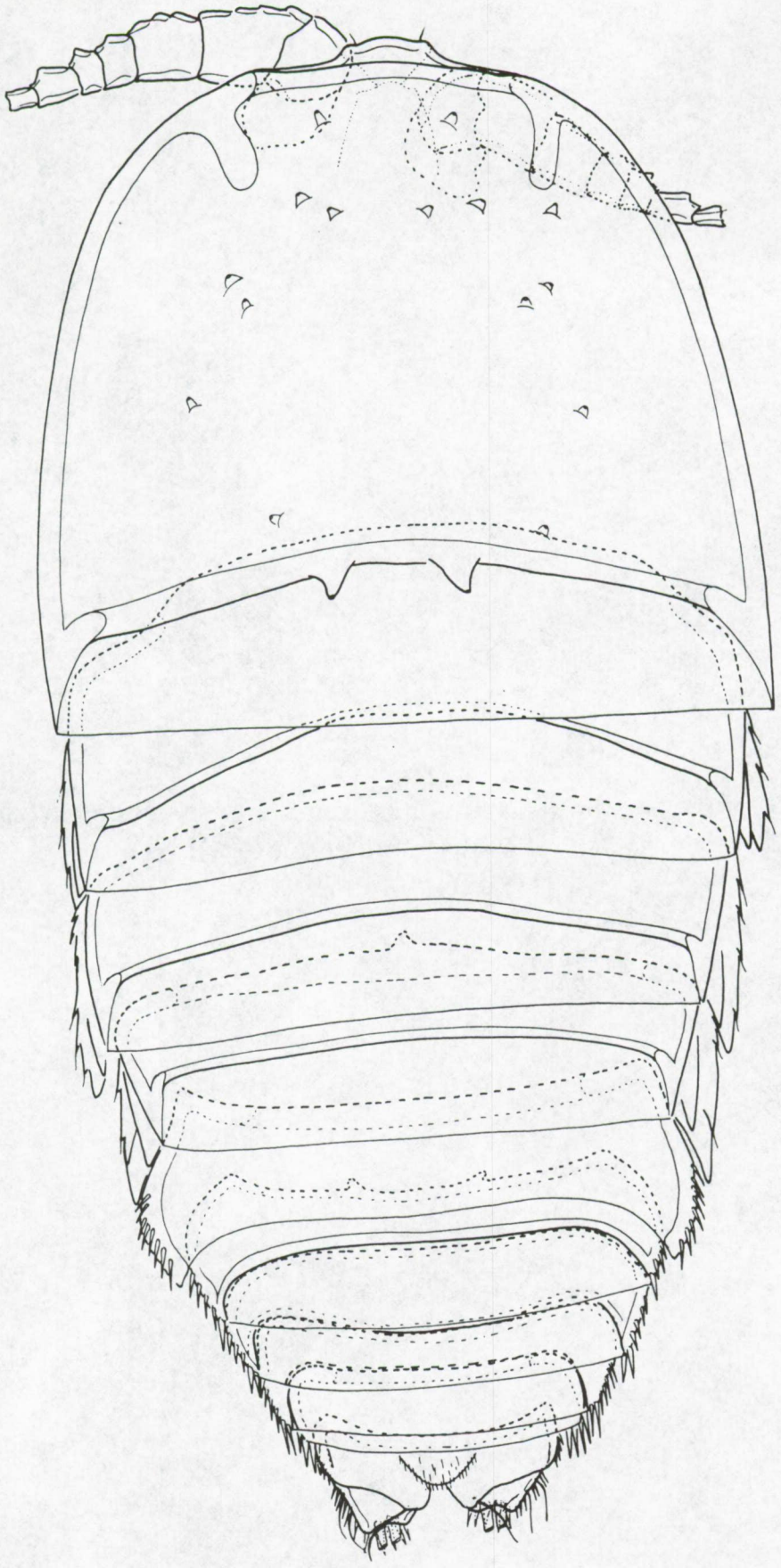

50 µm

Fig. 80. *Zausodes sextus* Lang, female. Urosome, ventral (P5 bearing-somite omited).

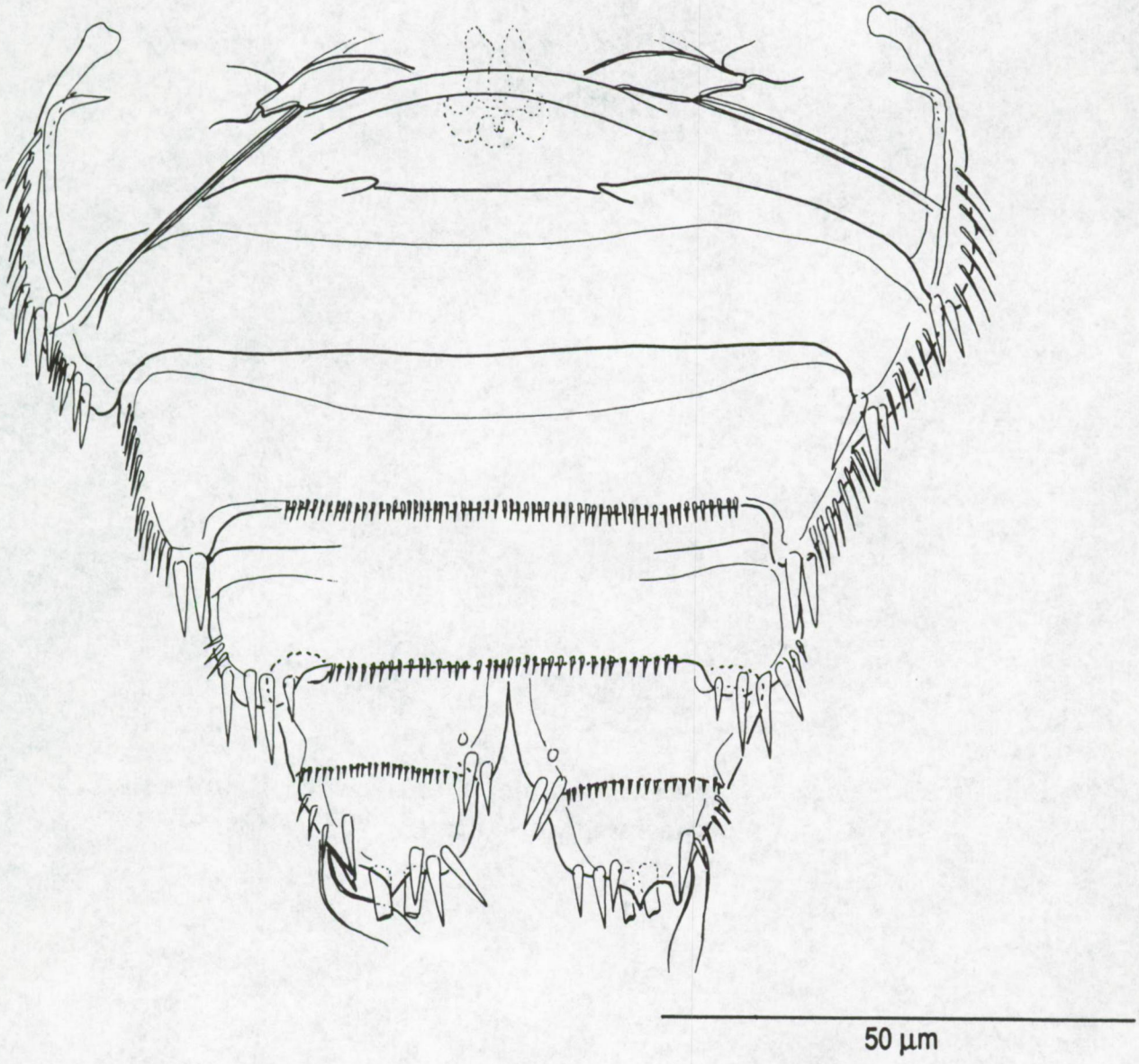

50 µm

Fig. 81. ***Zausodes sextus*** **Lang, female. a, antennule; b, antenna; c, mandible; d, maxilliped.**

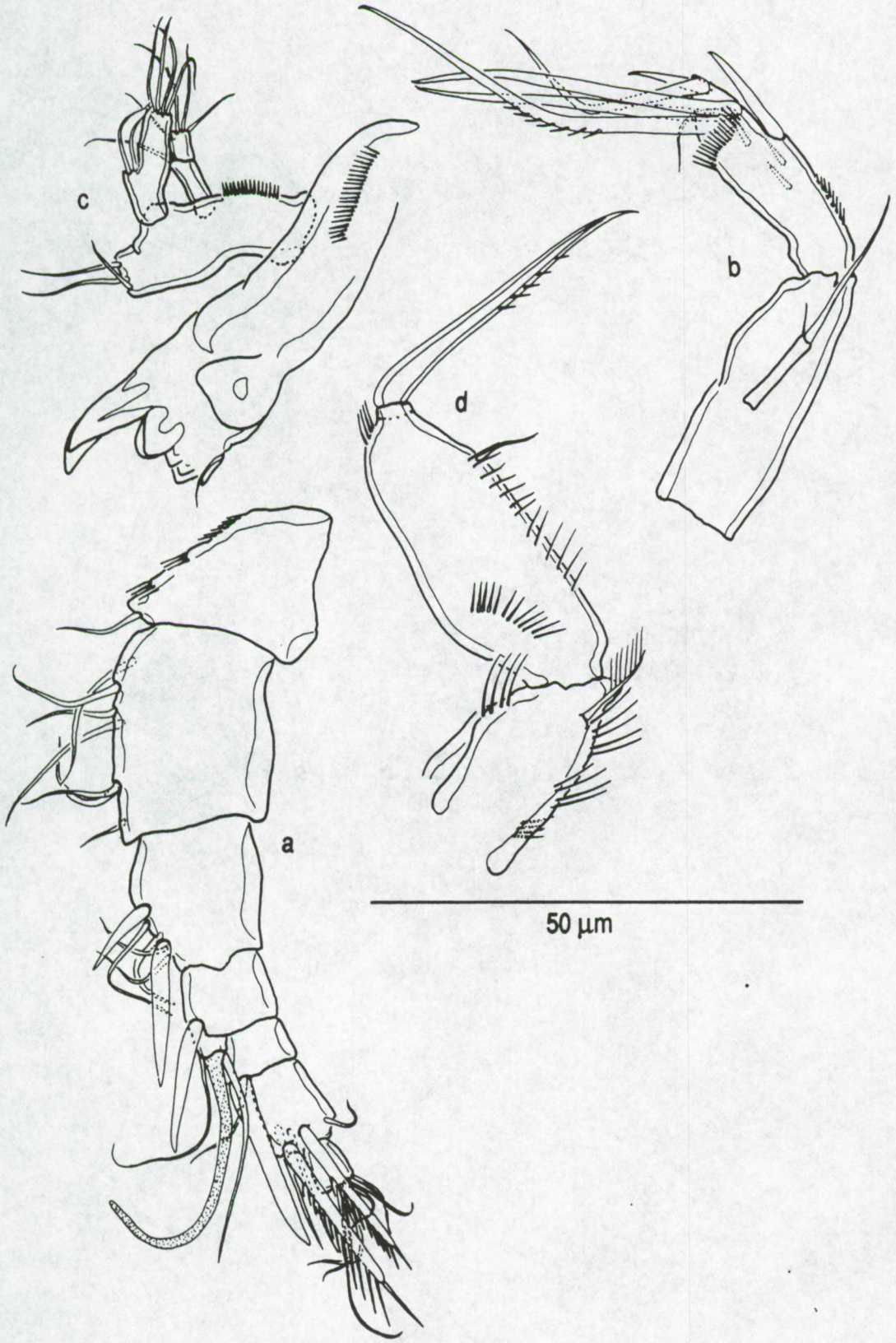

c
b
d
a
50 µm

Fig. 82. *Zausodes sextus* Lang, female. a, P1; b, P2.

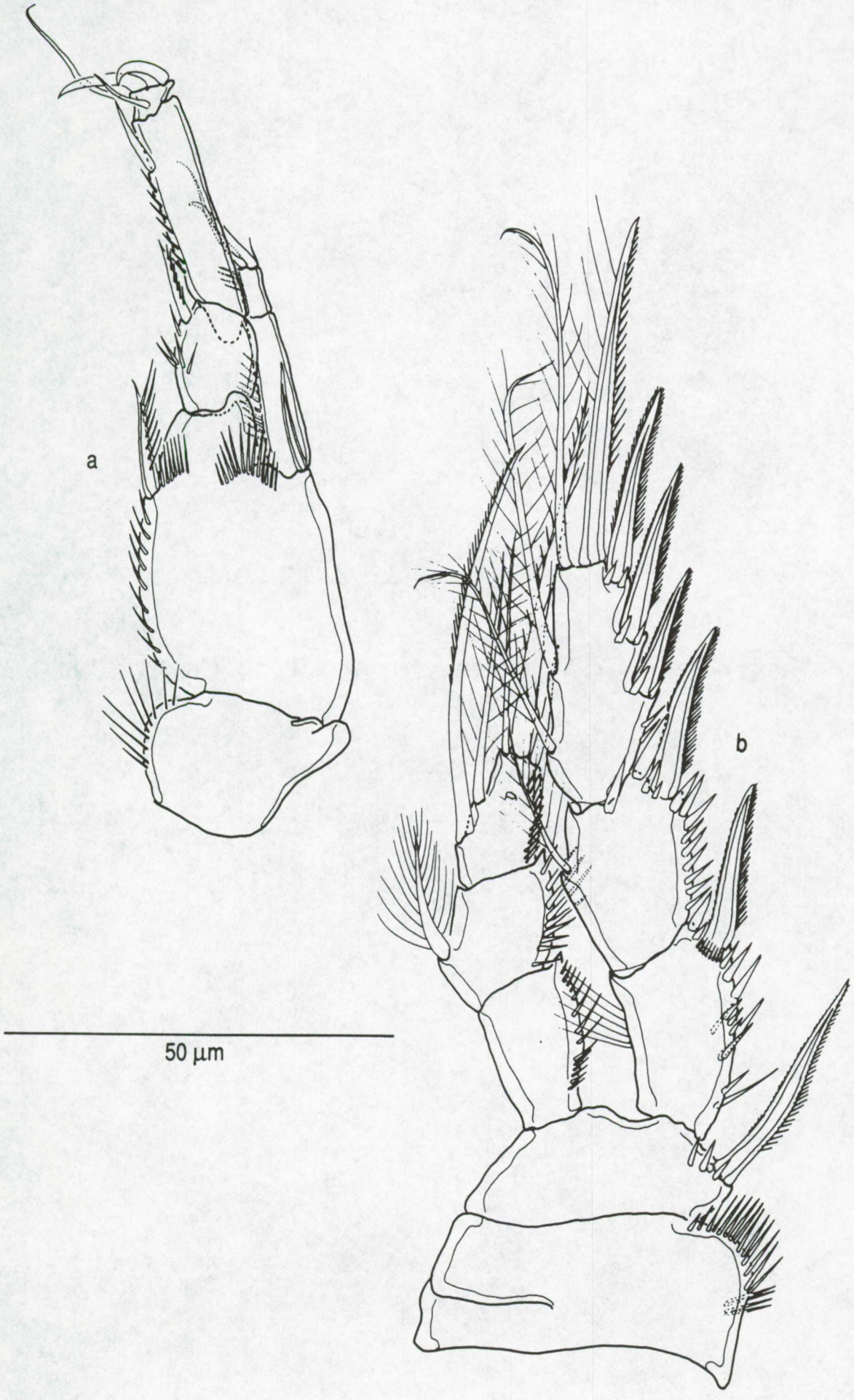
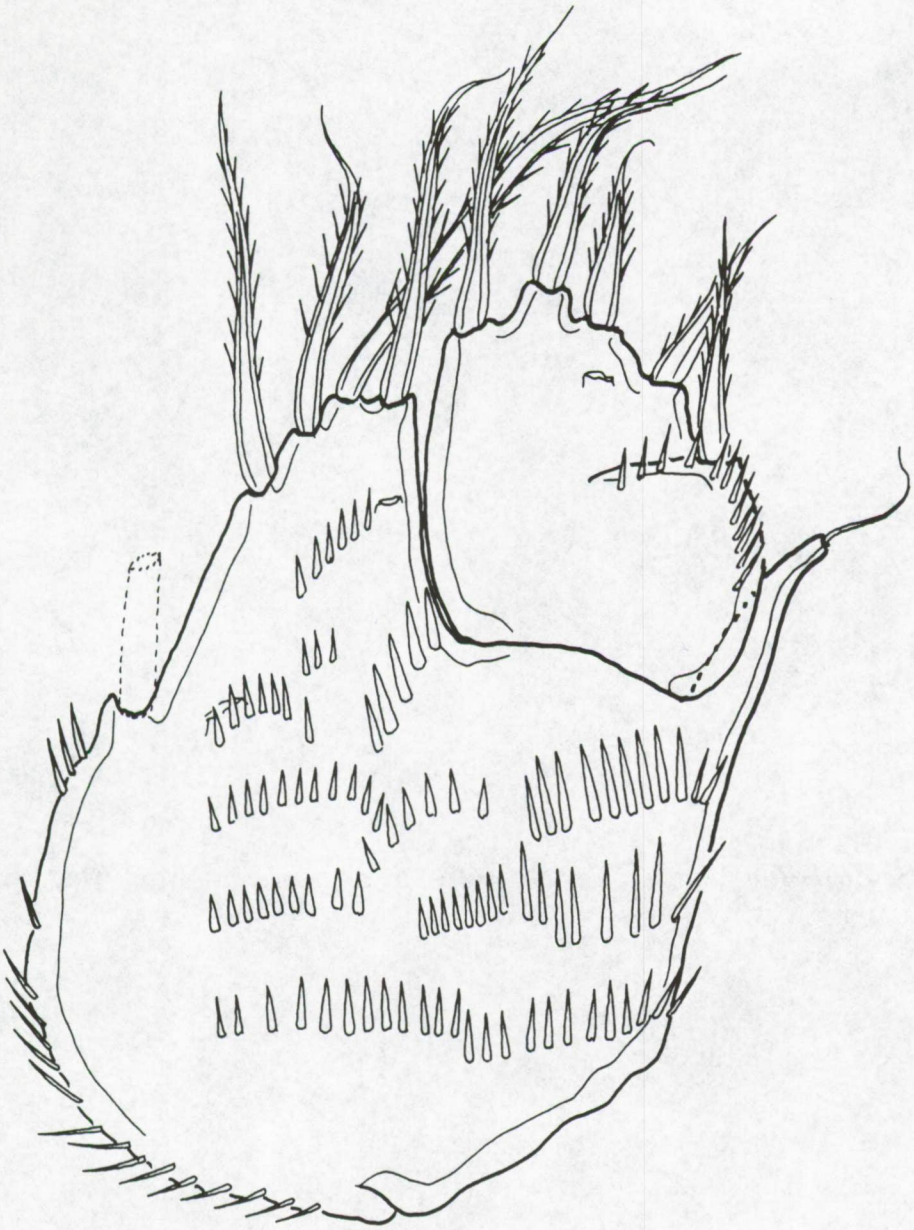

a
b
50 µm

Fig. 83. *Zausodes sextus* Lang, female. a, P3; b, P4.

50 µm
a
b



50 µm

Fig. 85. ***Zausodes sextus*** **Lang, male. a, antennule; b, P5; c, P6.**

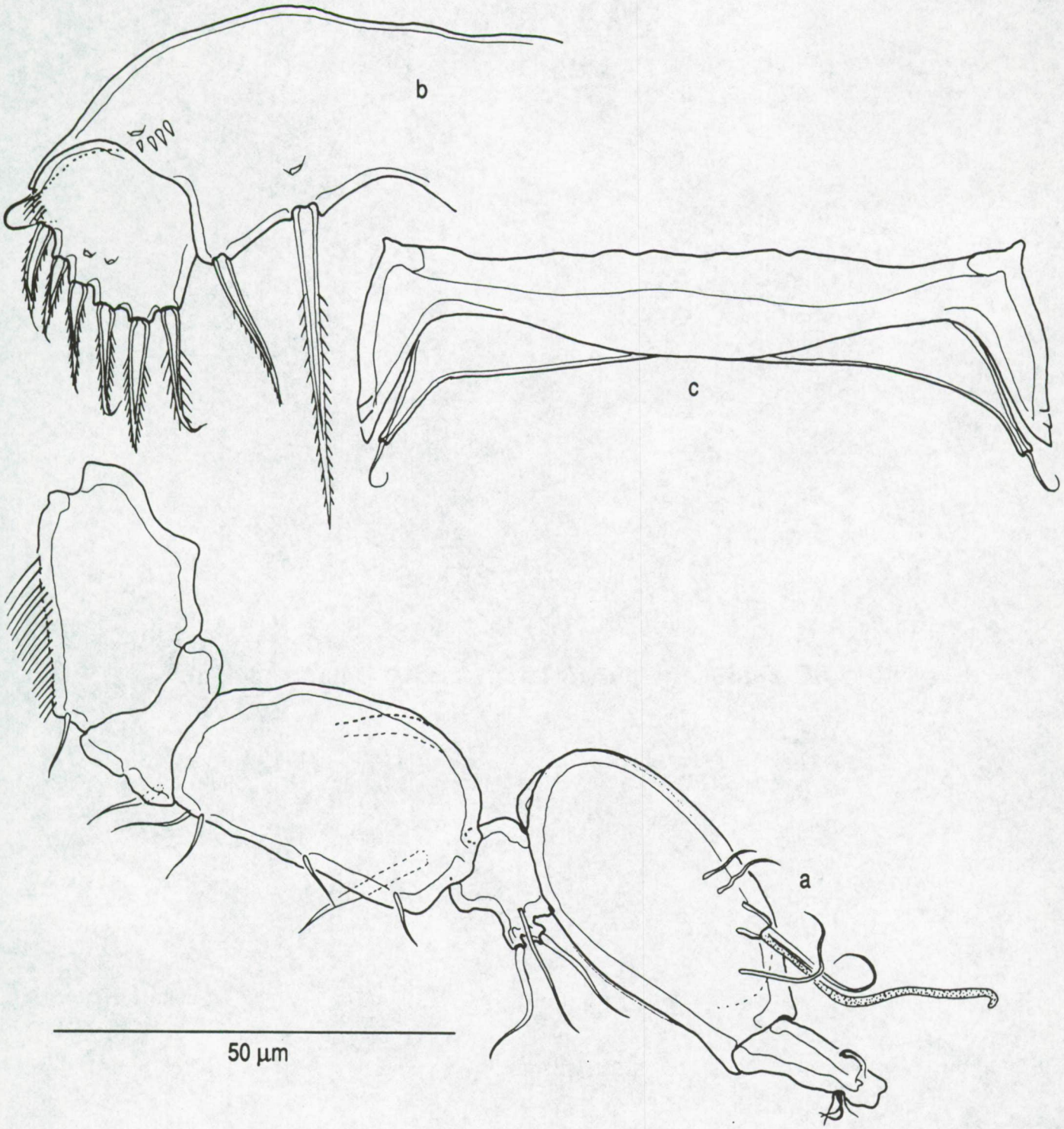

b
c
a
50 µm

Fig. 86. *Zausodes septimus* Lang, female. Habitus, dorsal.

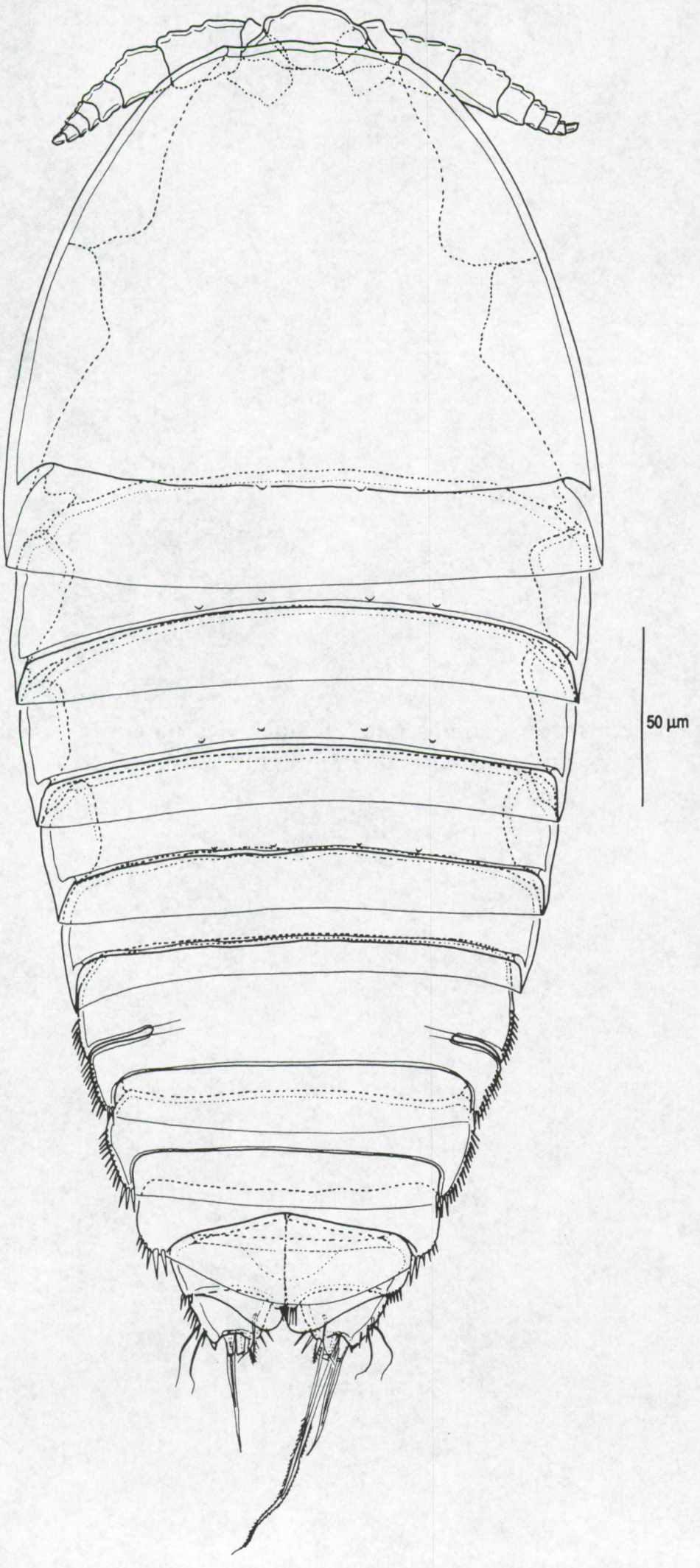

50 µm

Fig. 87. *Zausodes septimus* Lang, female. Urosome, ventral, showing P6 and genital field (P5 bearing-somite omited).

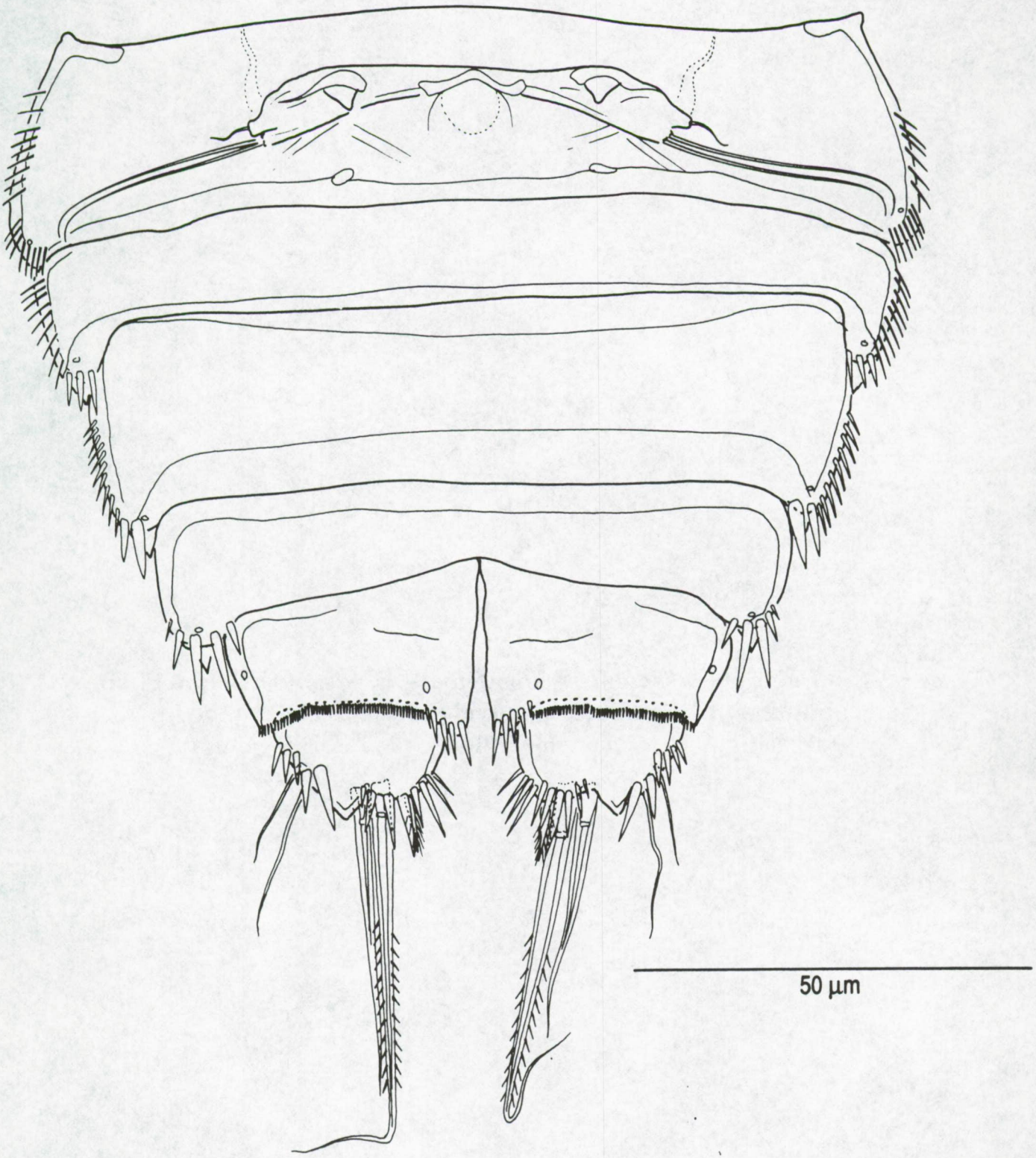

50 µm

Fig. 88. ***Zausodes septimus*** **Lang, female. a, rostrum; b, antennule; c, antenna; c, mandible; e, maxillule; f, maxilla, exploded; g, maxilliped.**

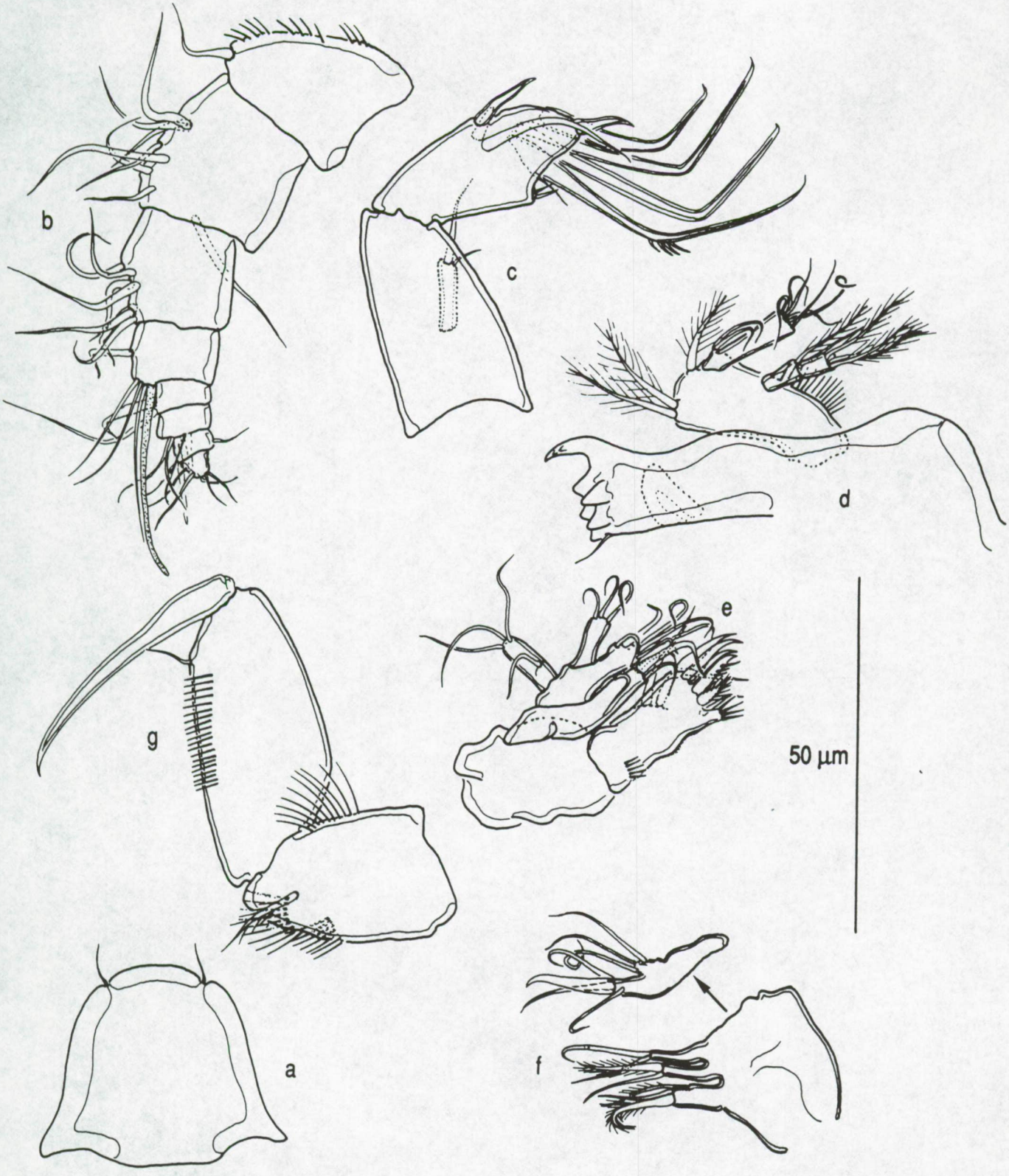

b
c
d
e
g
50 µm
a
f

Fig. 89. *Zausodes septimus* Lang, female. a, P1; b, P2; c, P3; d, P4; e, P5.

a
b
c
d
e
50 µm

Fig. 90. ***Zausodes septimus*** **Lang, male. a, habitus, dorsal; b, urosome, ventral, showing P6 (P5 bearing-somite omited).**

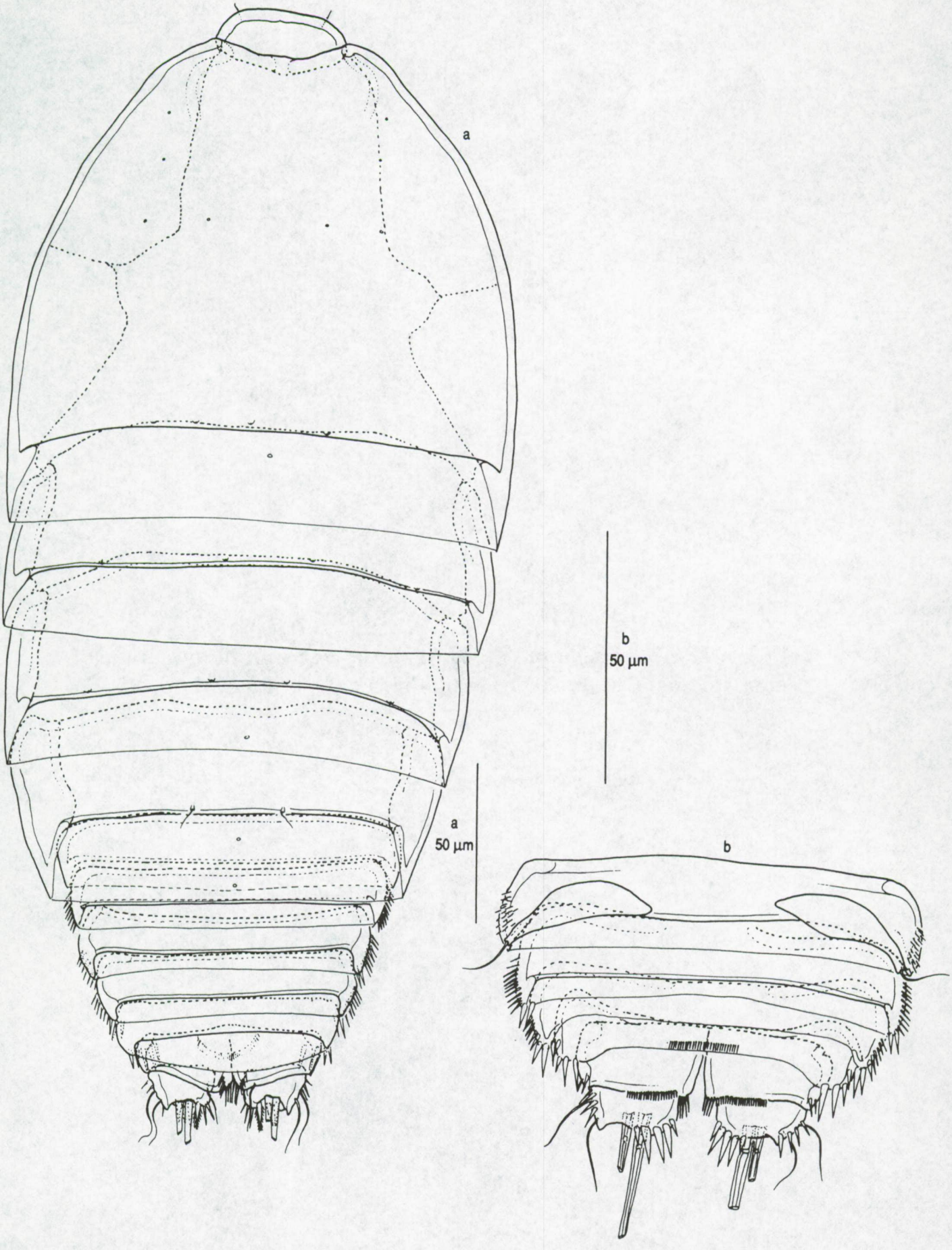
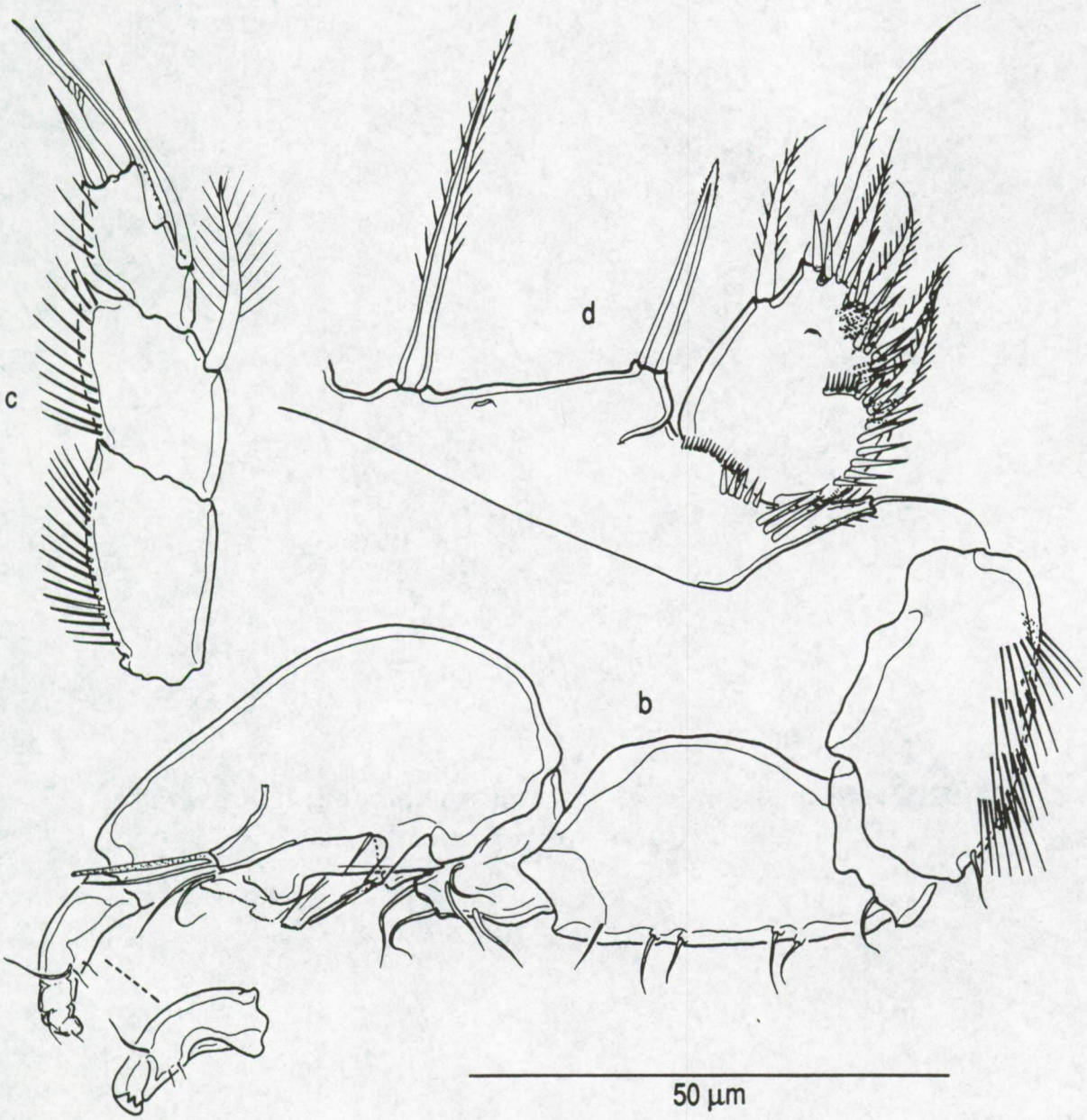

a
a
50 µm
b
50 µm
b

Fig. 91. *Zausodes septimus* Lang, male. a, rostrum; b, antennule, showing distal segment from another angle; c, P2 ENP; d, P5.


c
d
b
50 µm

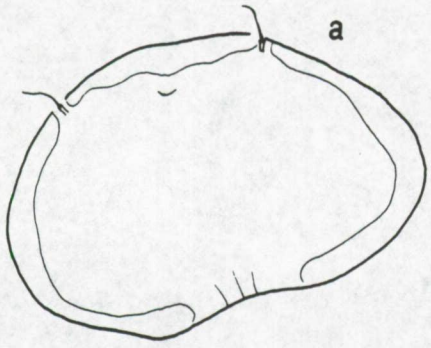
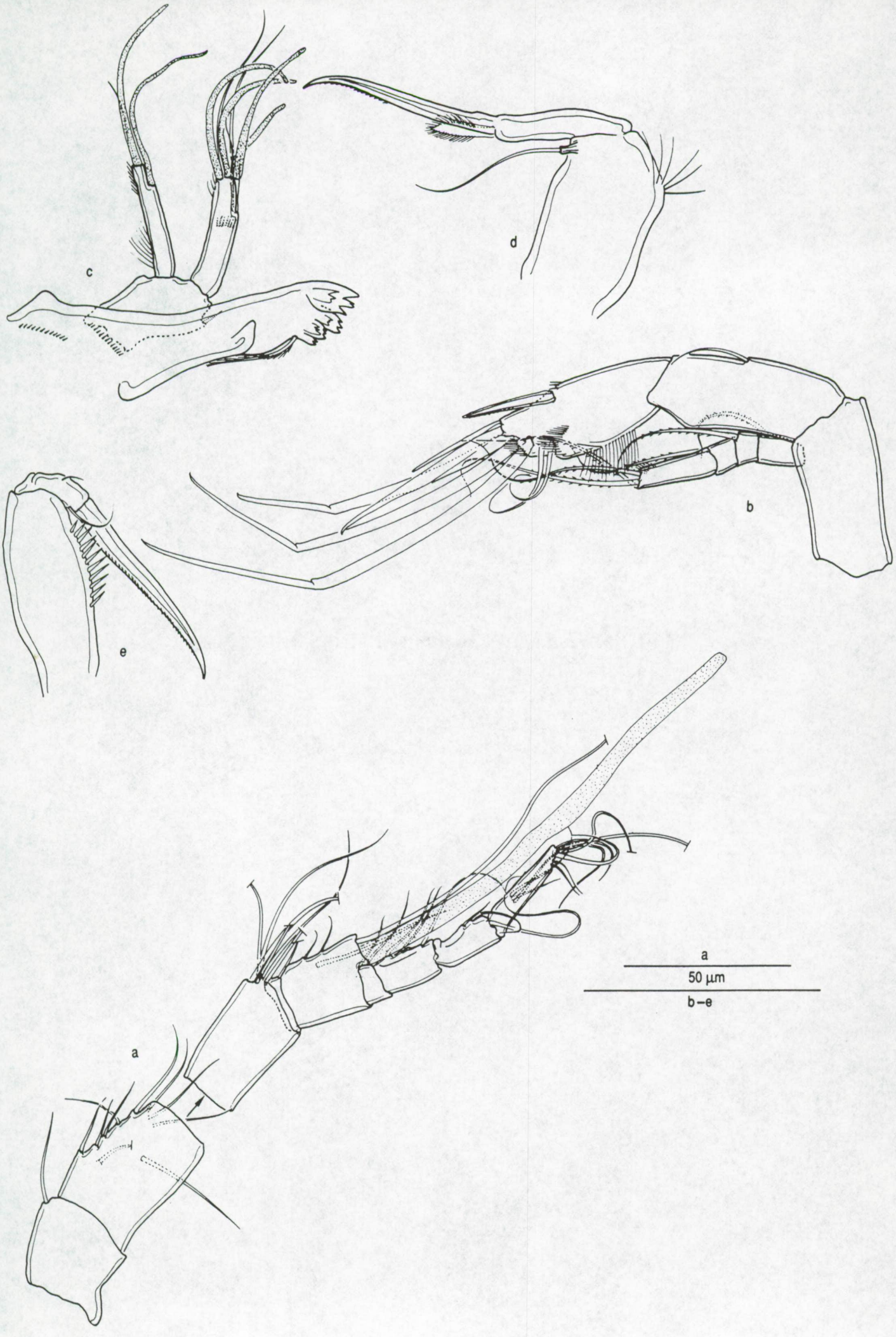
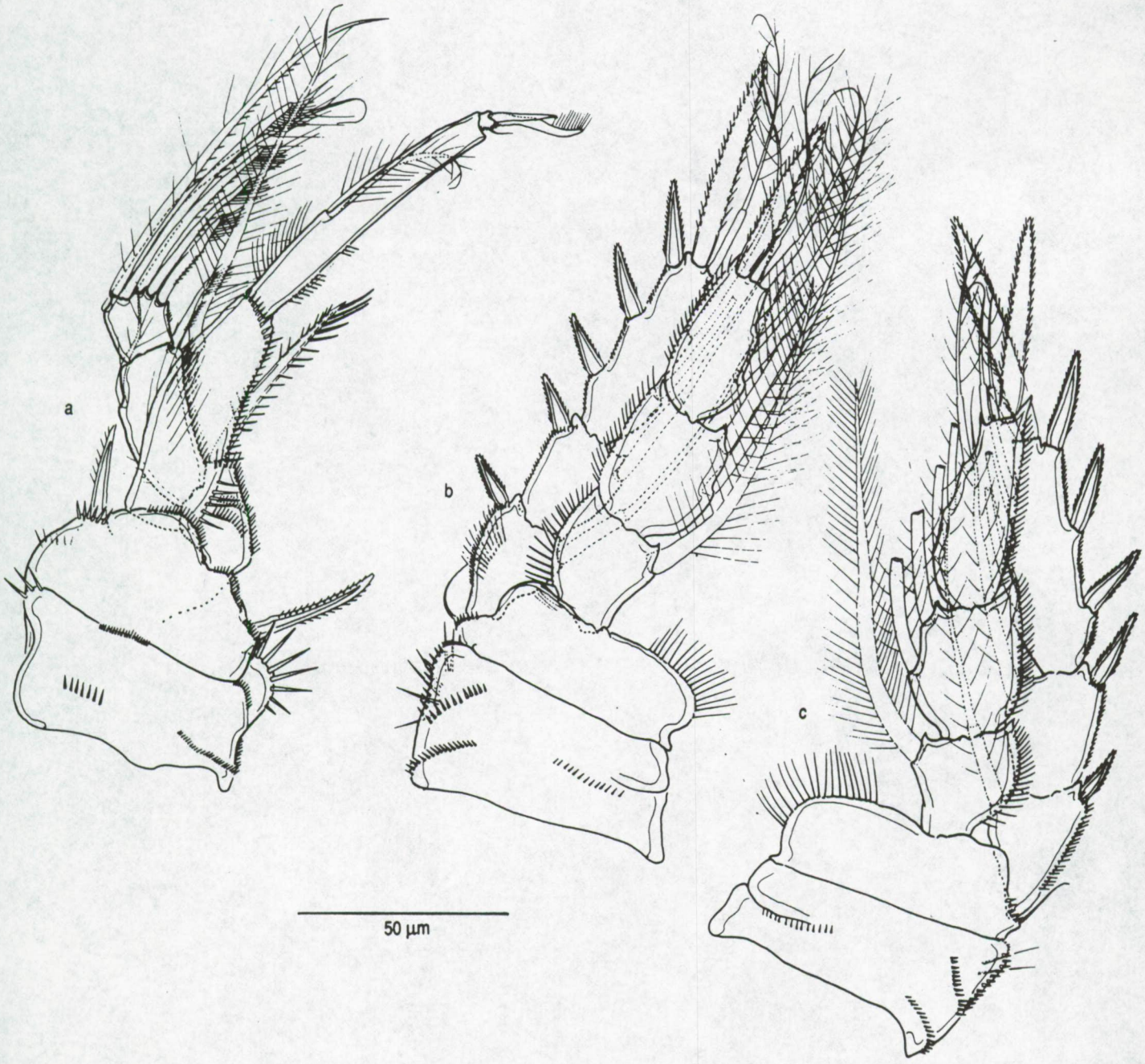

a

Fig. 92. ***Tisbe*** **sp. 1, male. a, antennule, exploded; b,antenna; c, mandible; d, maxilla; e, maxilliped.**


c
d
b
e
a
a
50 µm
b–e


a
b
c
50 µm

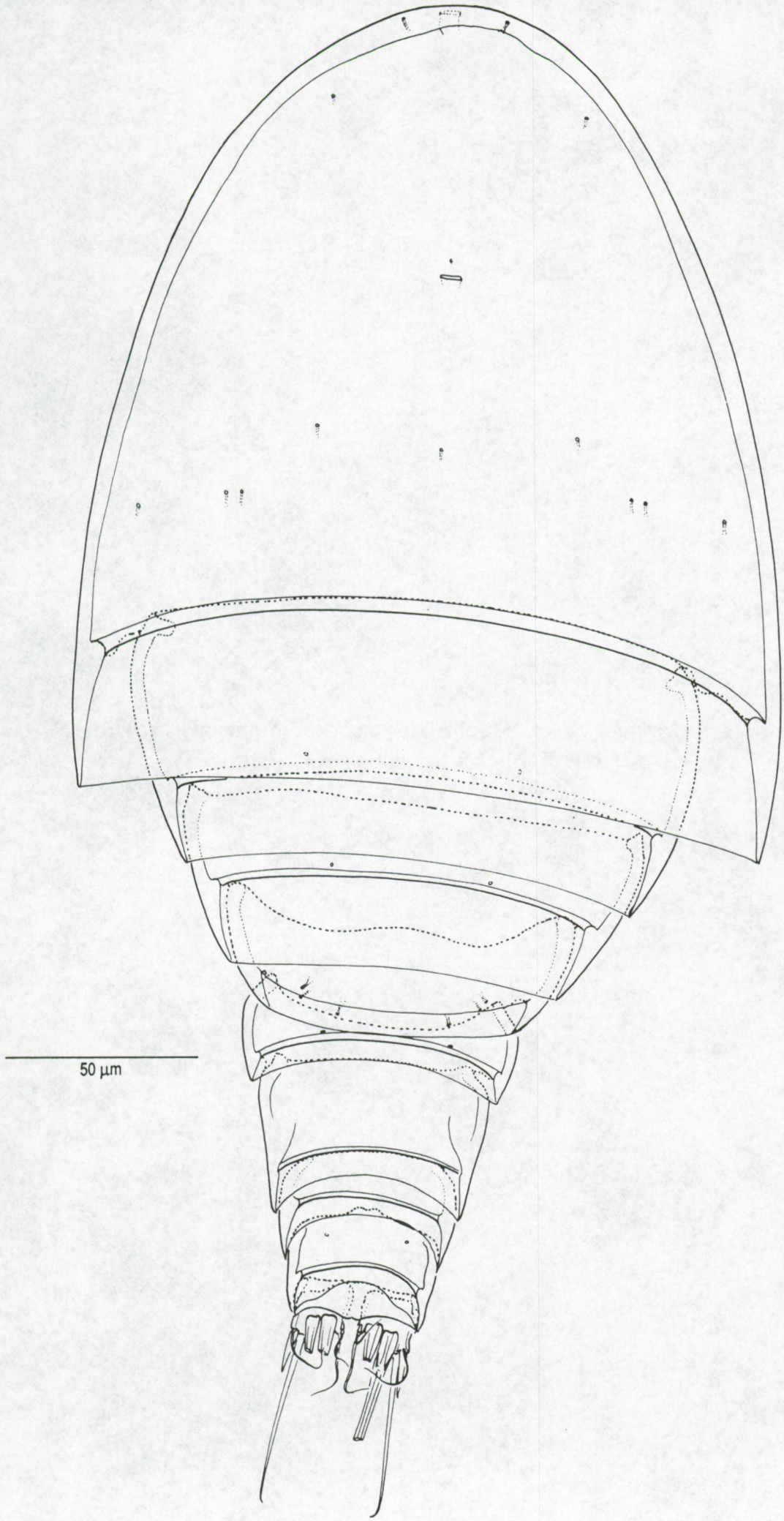

50 µm

Fig. 95. ***Diarthrodes n. sp. 1*****, female. Urosome, ventral, showing P6 and genital field (P5 bearing-somite omited).**

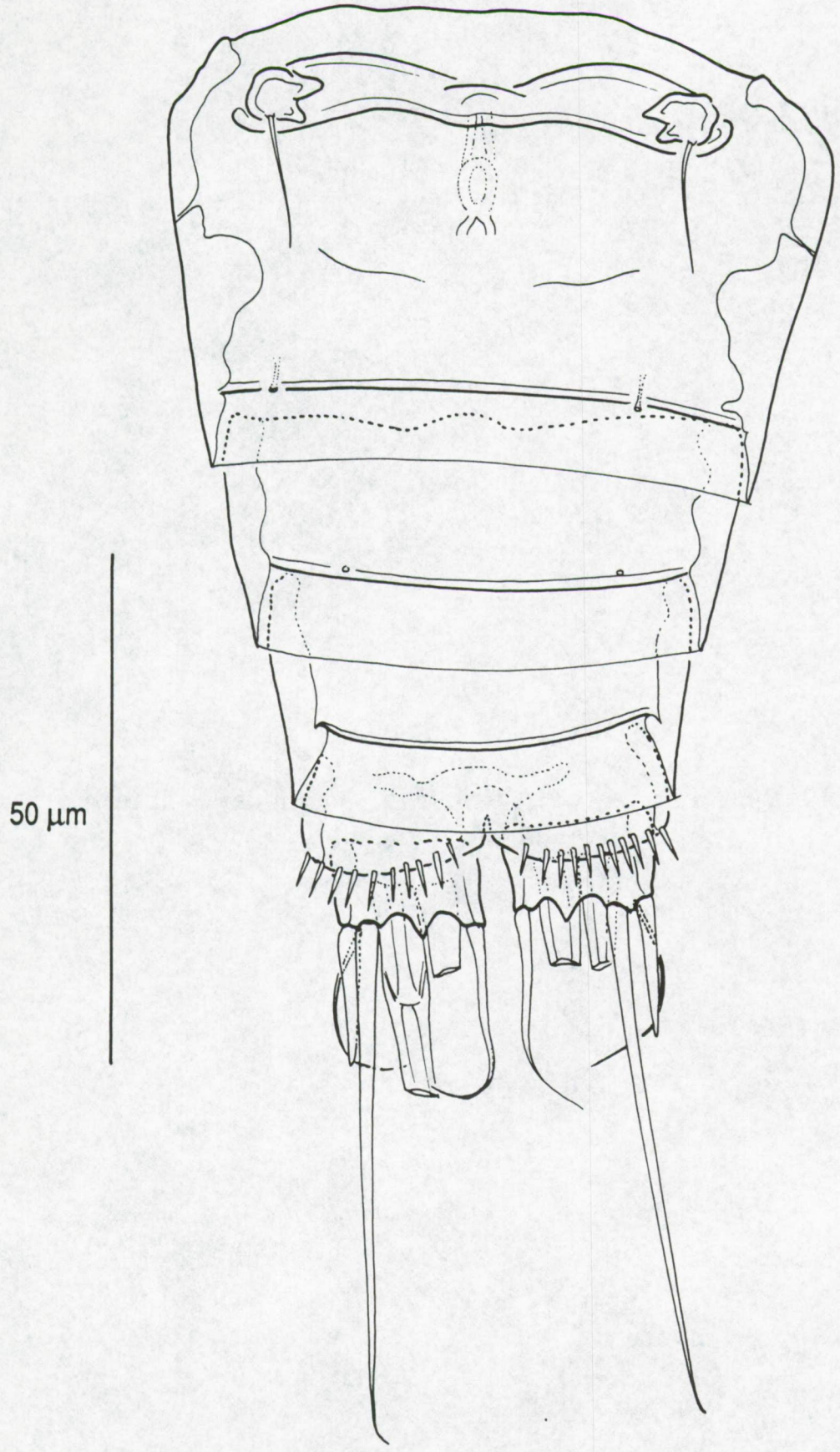

50 µm

Fig. 96. ***Diarthrodes n. sp. 1*****, female. a, antennule; b, antenna; c, maxilliped; d, maxilla.**

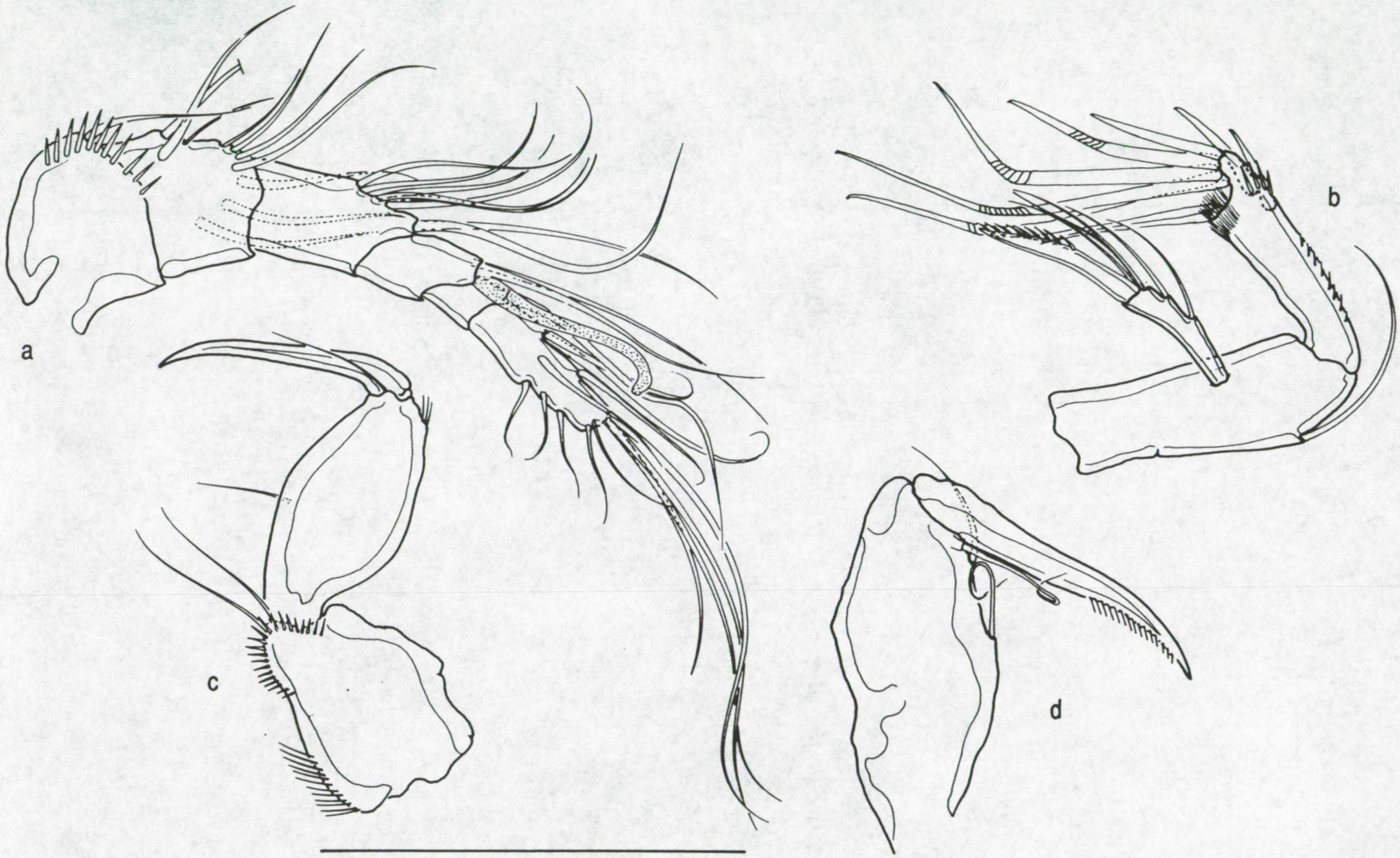

a
b
c
d
50 µm

Fig. 97. ***Diarthrodes n. sp. 1***, **female. a, P1; b, P2; c, P3; d, P4; e, P5.**

a
b
c
d
e
50 µm

Fig. 98. ***Paradactylopodia n. sp. 1*****, female. a, habitus, dorsal; b, urosome, lateral, showing P5.**

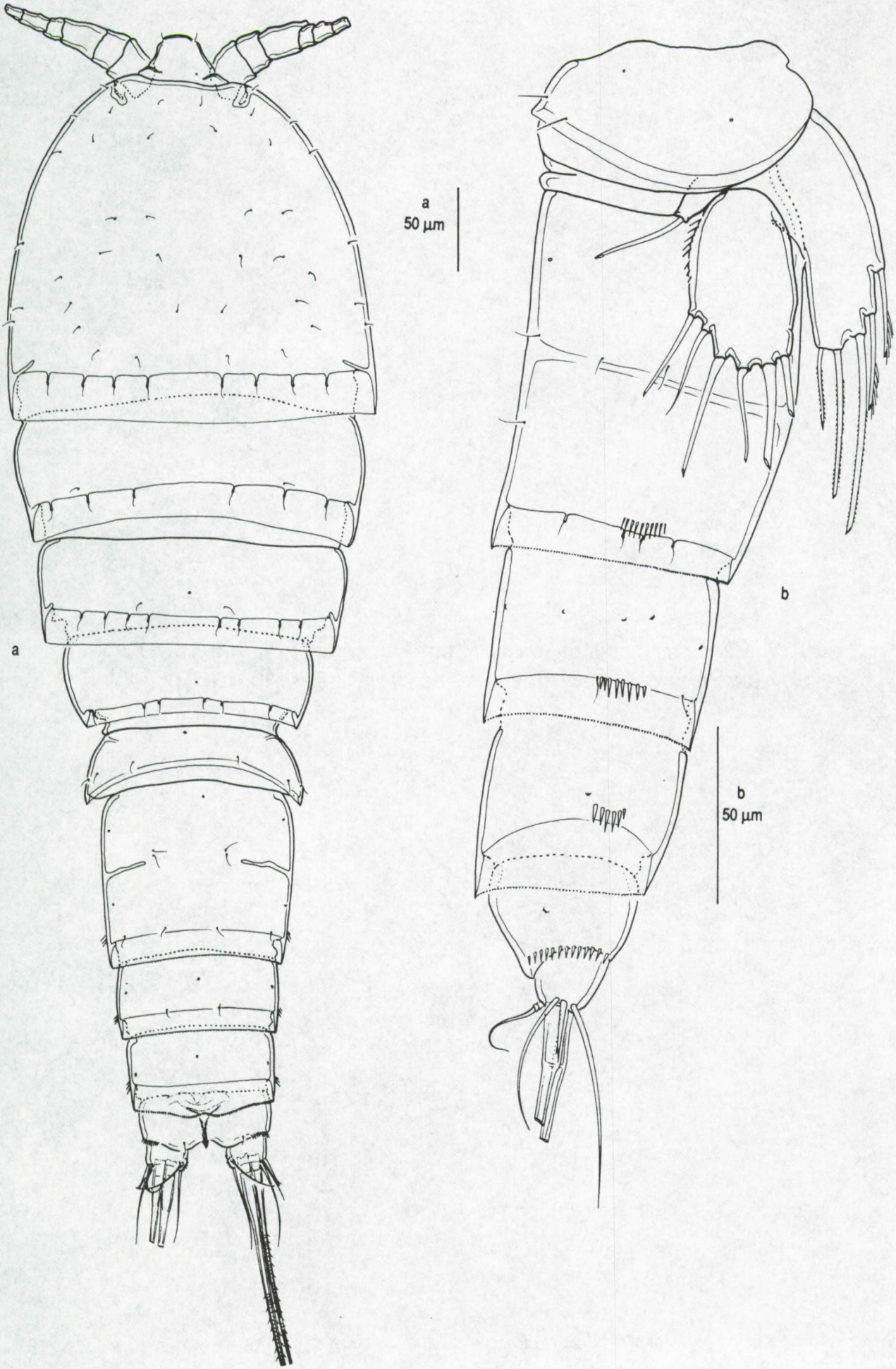

a
50 µm
b
b
50 µm

Fig. 99. ***Paradactylopodia n. sp. 1*****, female. Urosome, ventral, showing P6 and genital field (P5 bearing-somite omited).**

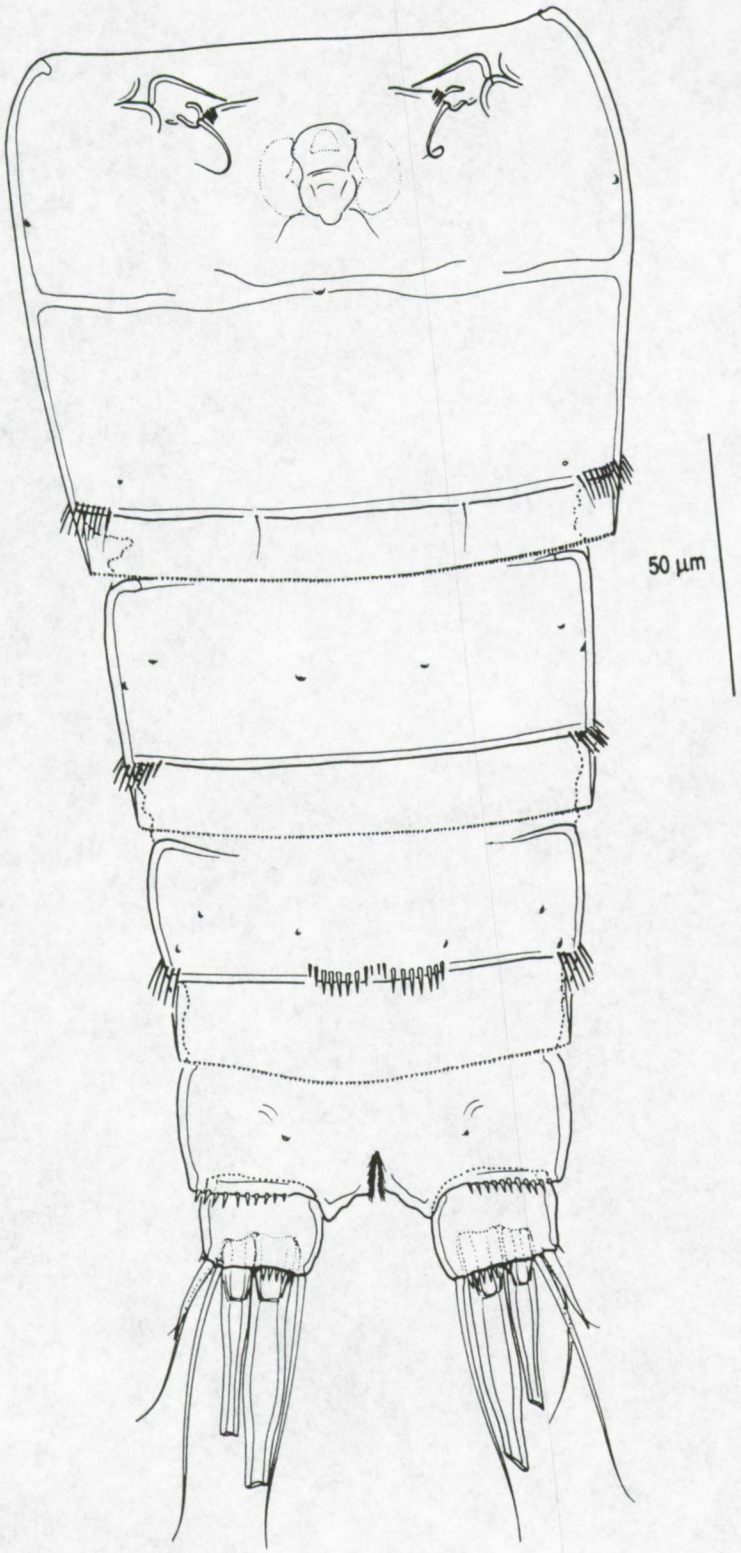

50 µm

Fig. 100. ***Paradactylopodia n. sp. 1*****, female. a, rostrum; b, antennule, exploded; c, antenna; d, mandible; e, maxilla; f, maxilliped; g, maxillule.**

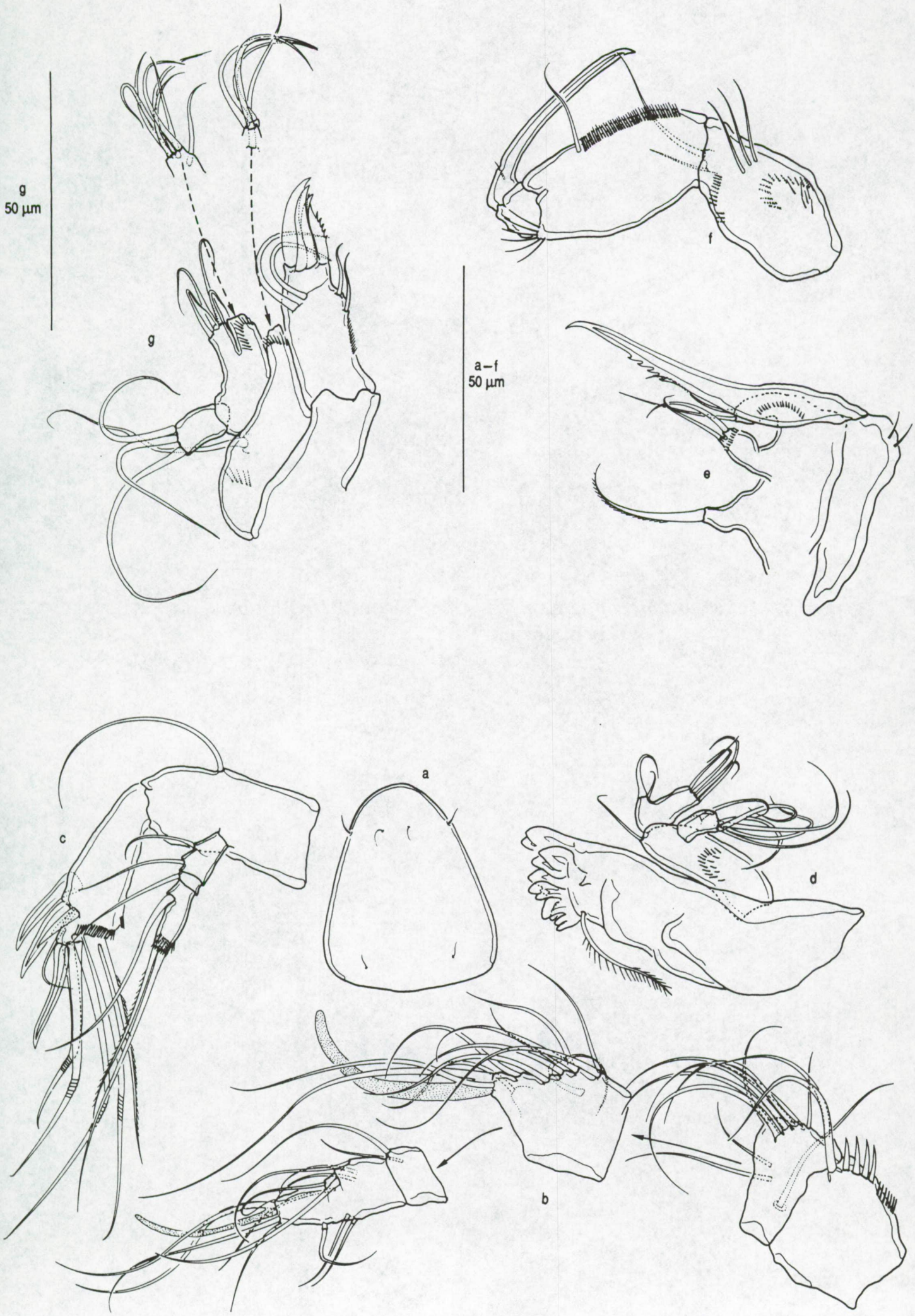
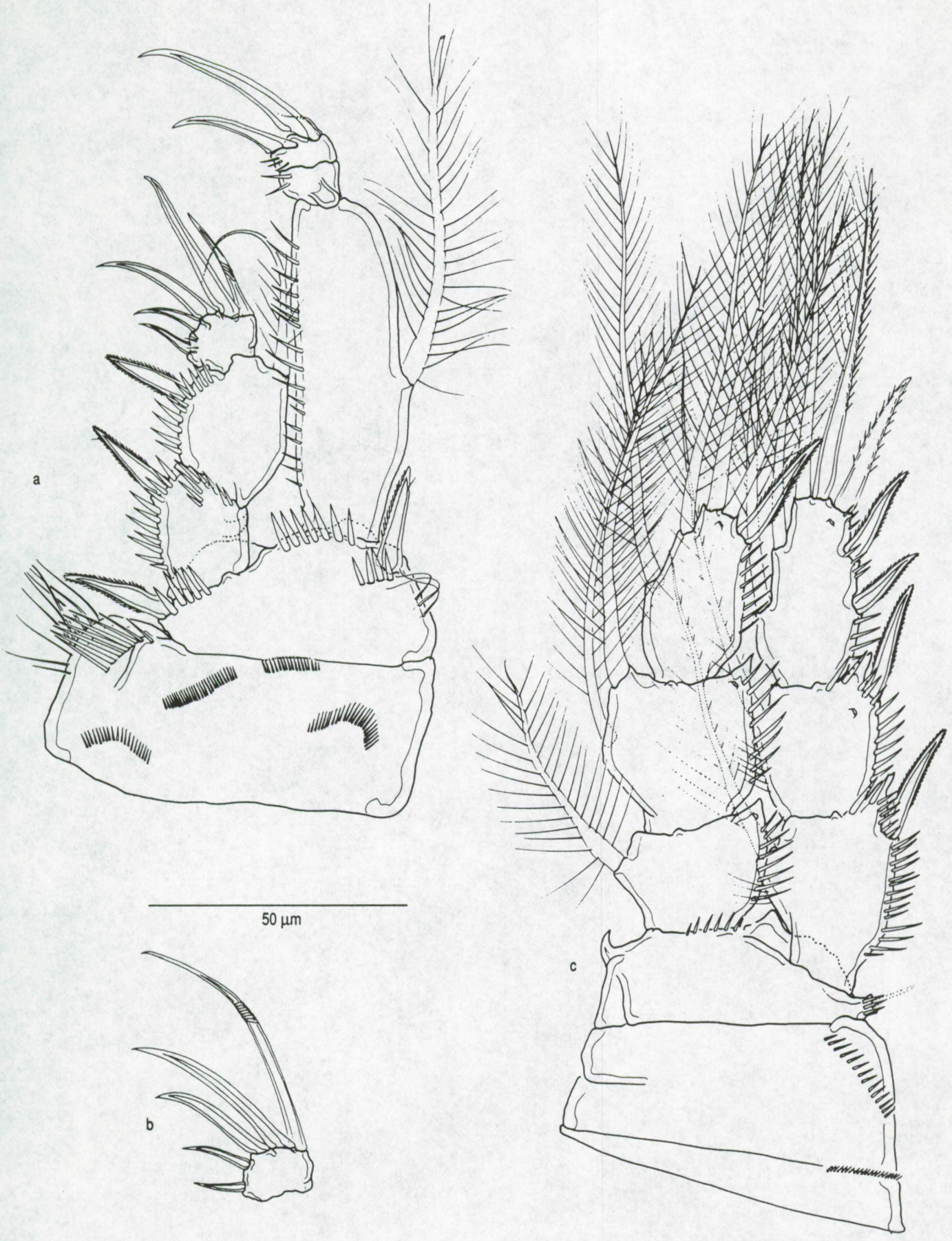

g
50 µm
g
a–f
50 µm
f
e
a
c
d
b

Fig. 101. ***Paradactylopodia n. sp. 1*****, female. a, P1 with aberrant EXP 3; b, normal P1 EXP 3; c, P2.**


a
50 µm
b
c

a
b
c
50 µm

Fig. 103. ***Paradactylopodia n. sp. 1*****, female. a, P5; b; P5 with aberrant EXP; c, P5 with aberrant BENP.**

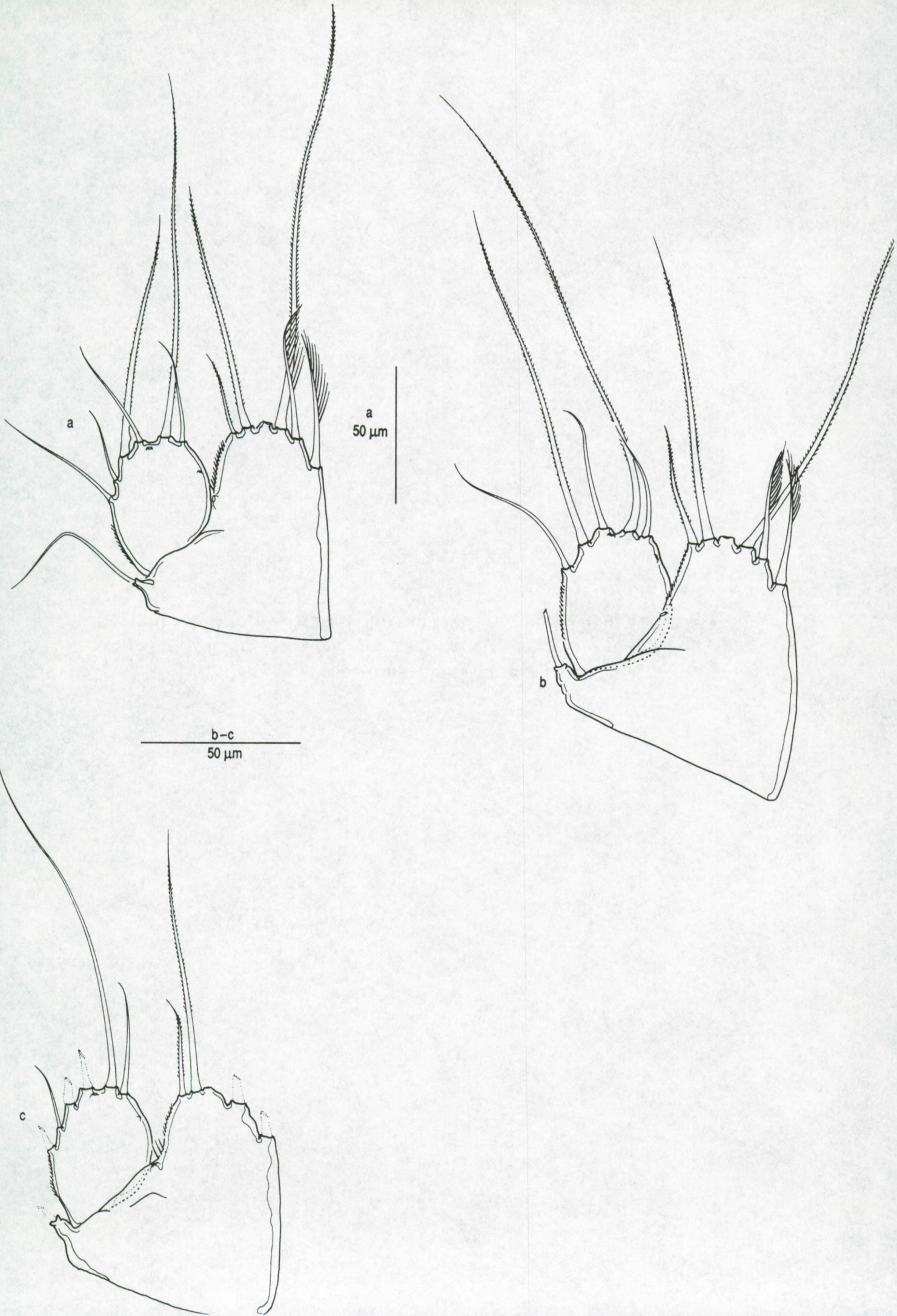
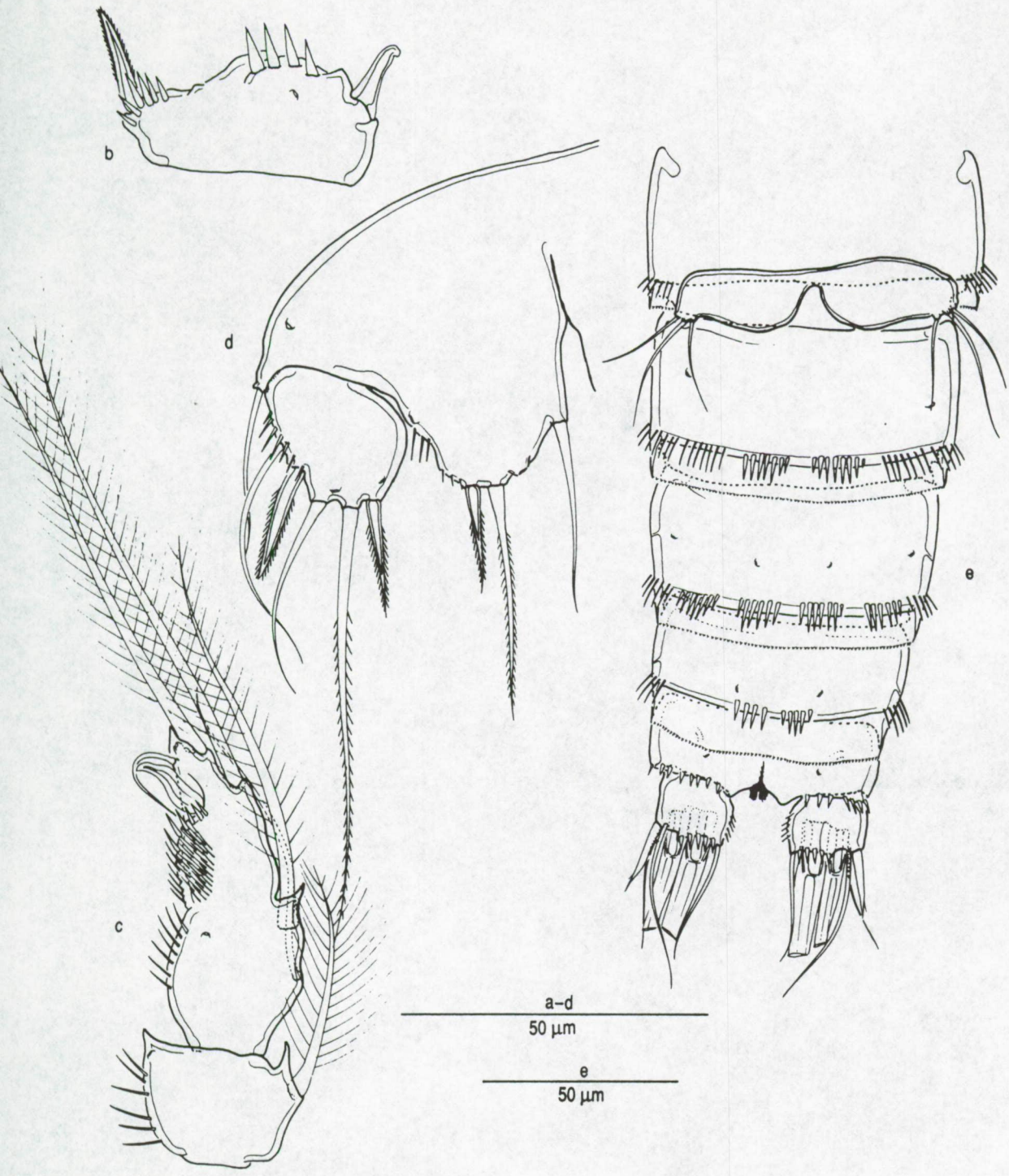

a
a
50 µm
b
b–c
50 µm
c

Fig. 104. ***Paradactylopodia n. sp. 1*****, male. a, antennule, exploded; b, basis of P1; c, P2 ENP; d, P5; e, urosome, ventral, showing P6 (P5 bearing-somite omited).**


b
d
e
c
a–d
50 µm
e
50 µm

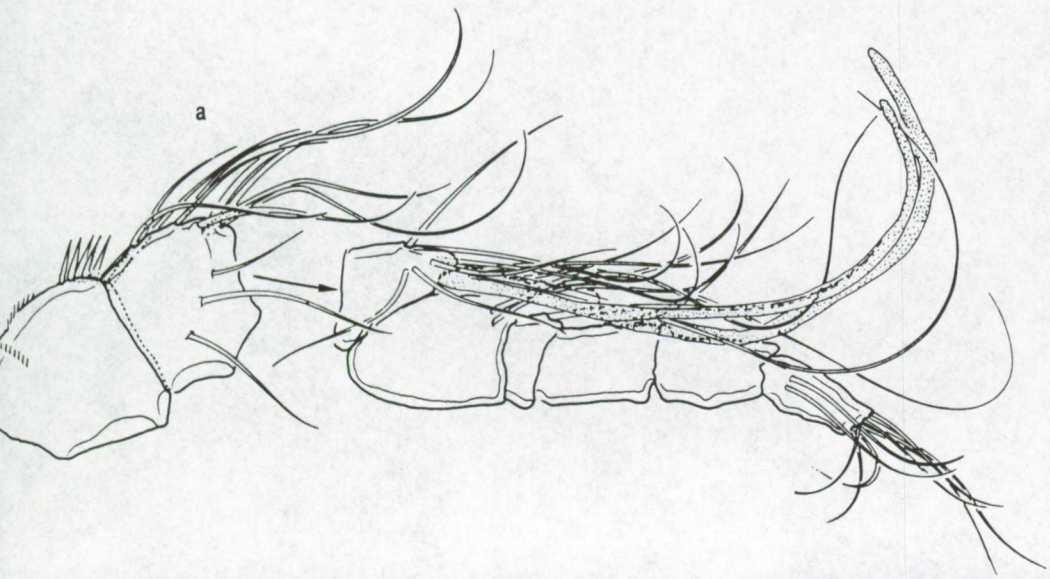

a

Fig. 105. ***Stenhelia (s. str.) n. sp. 1*****, female. a, habitus, dorsal; b, habitus, lateral.**

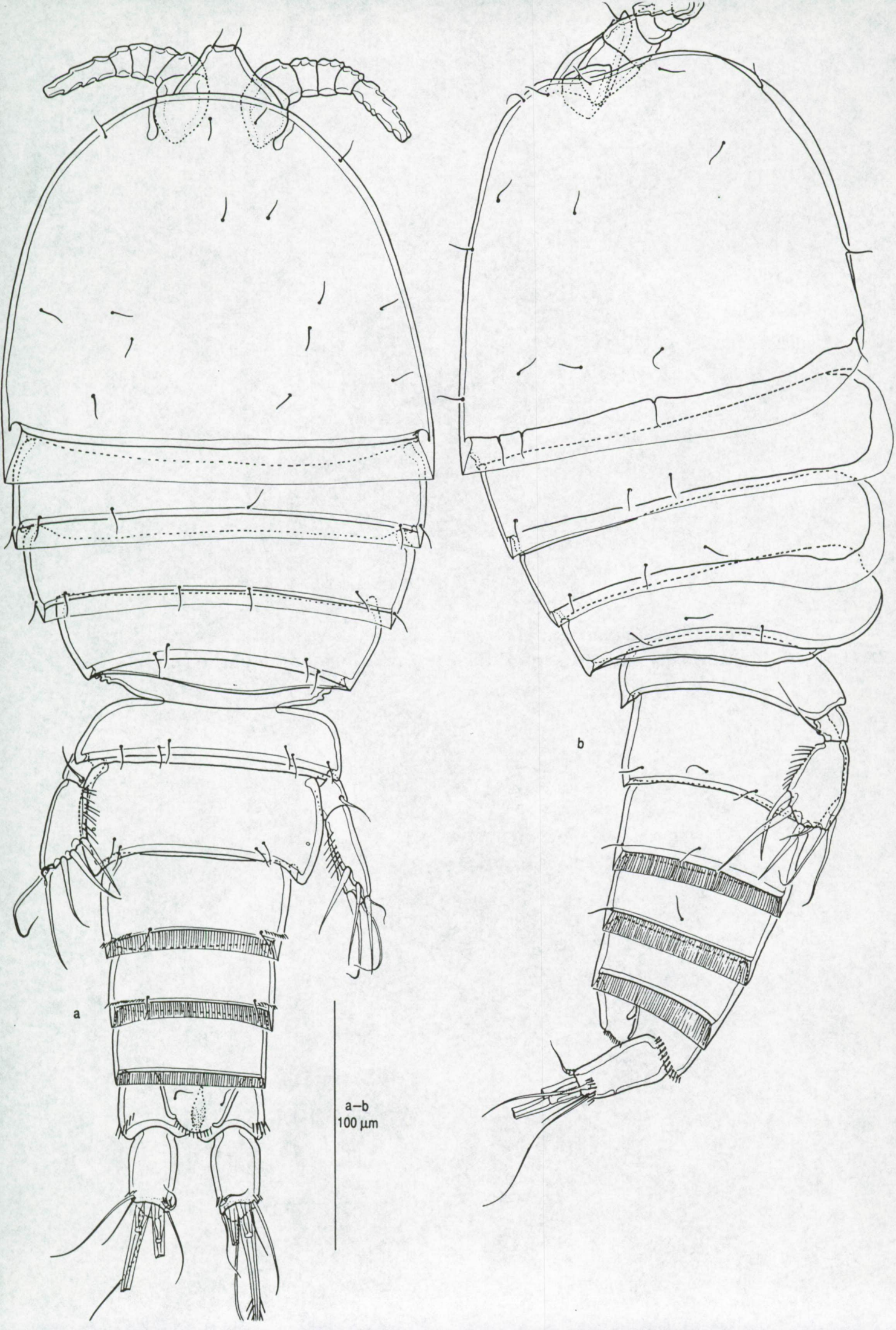

a
b
a–b
100 µm

Fig. 106. ***Stenhelia (s. str.) n. sp. 1*****, female. Urosome, ventral, showing P6 and genital field (P5 bearing-somite omited).**

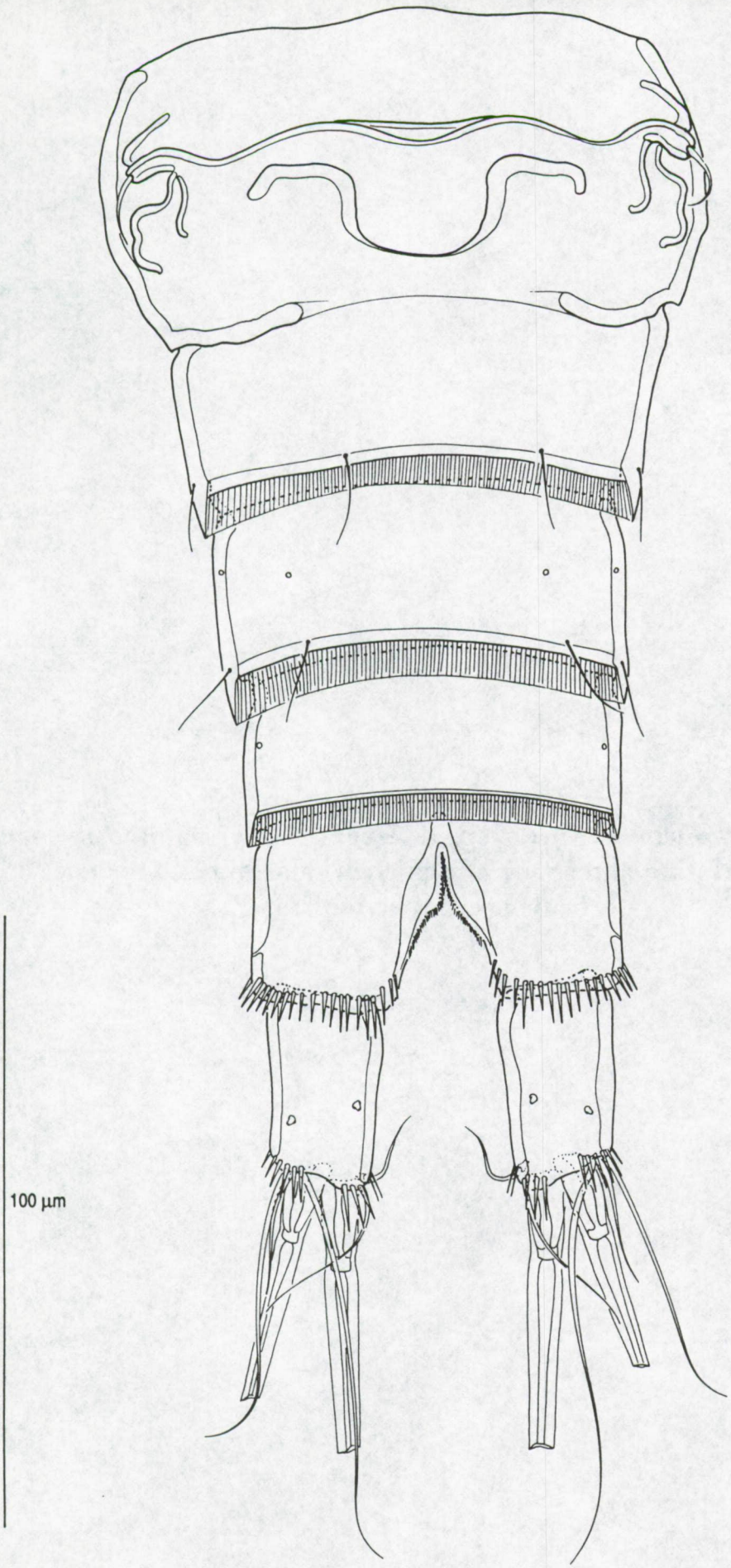

100 µm

Fig. 107. ***Stenhelia (s. str.) n. sp. 1*****, female. a-b, variability in somitic ornamentation and shape of principal setae of caudal rami (P5 bearing-somites omited).**

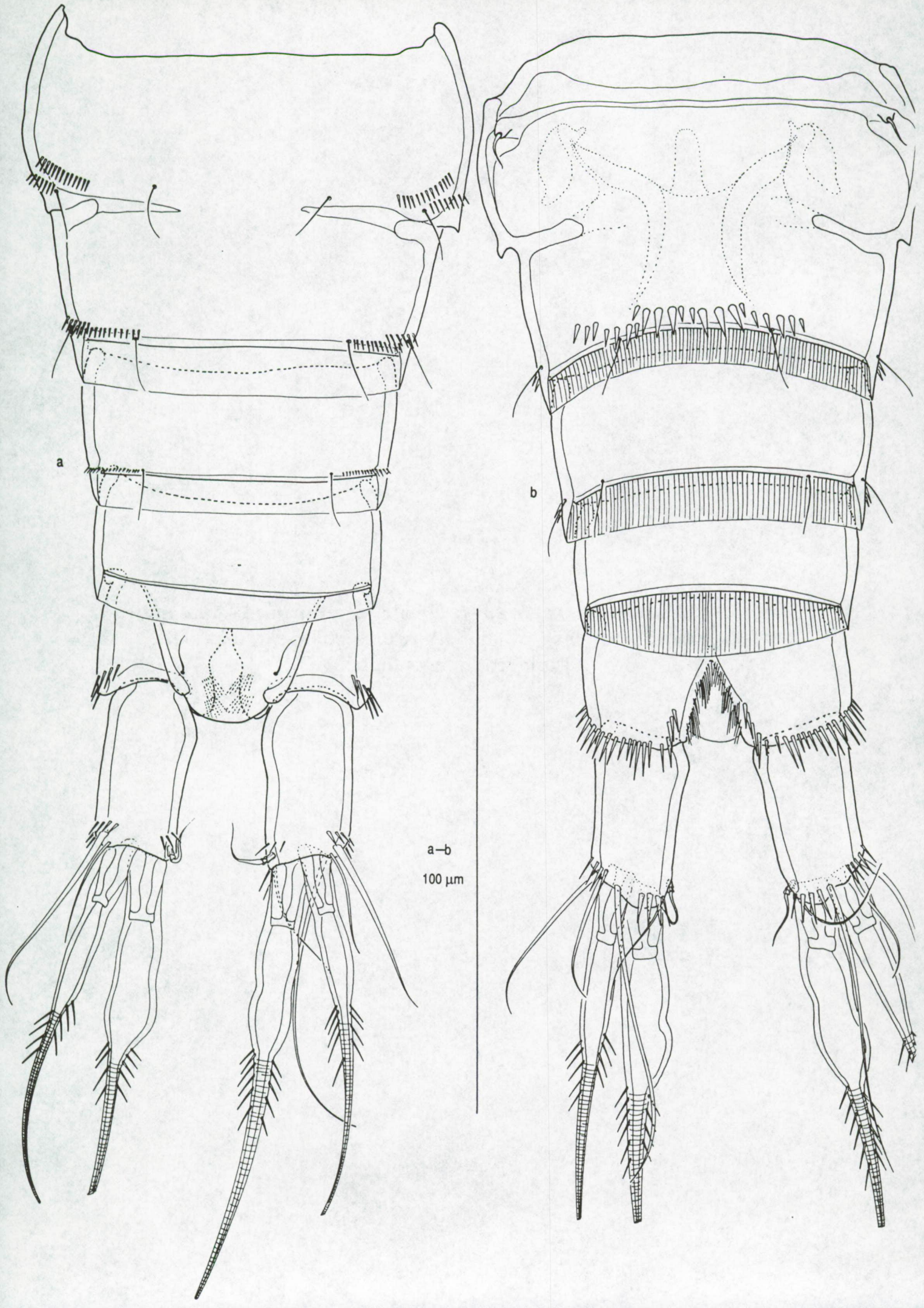

a
b
a–b
100 µm

Fig. 108. ***Stenhelia (s. str.) n. sp. 1***, **female. a, rsotrum; b, antennule, exploded; c, antenna; d, mandible; e, maxillule; f, maxilla, exploded; g, maxilliped.**

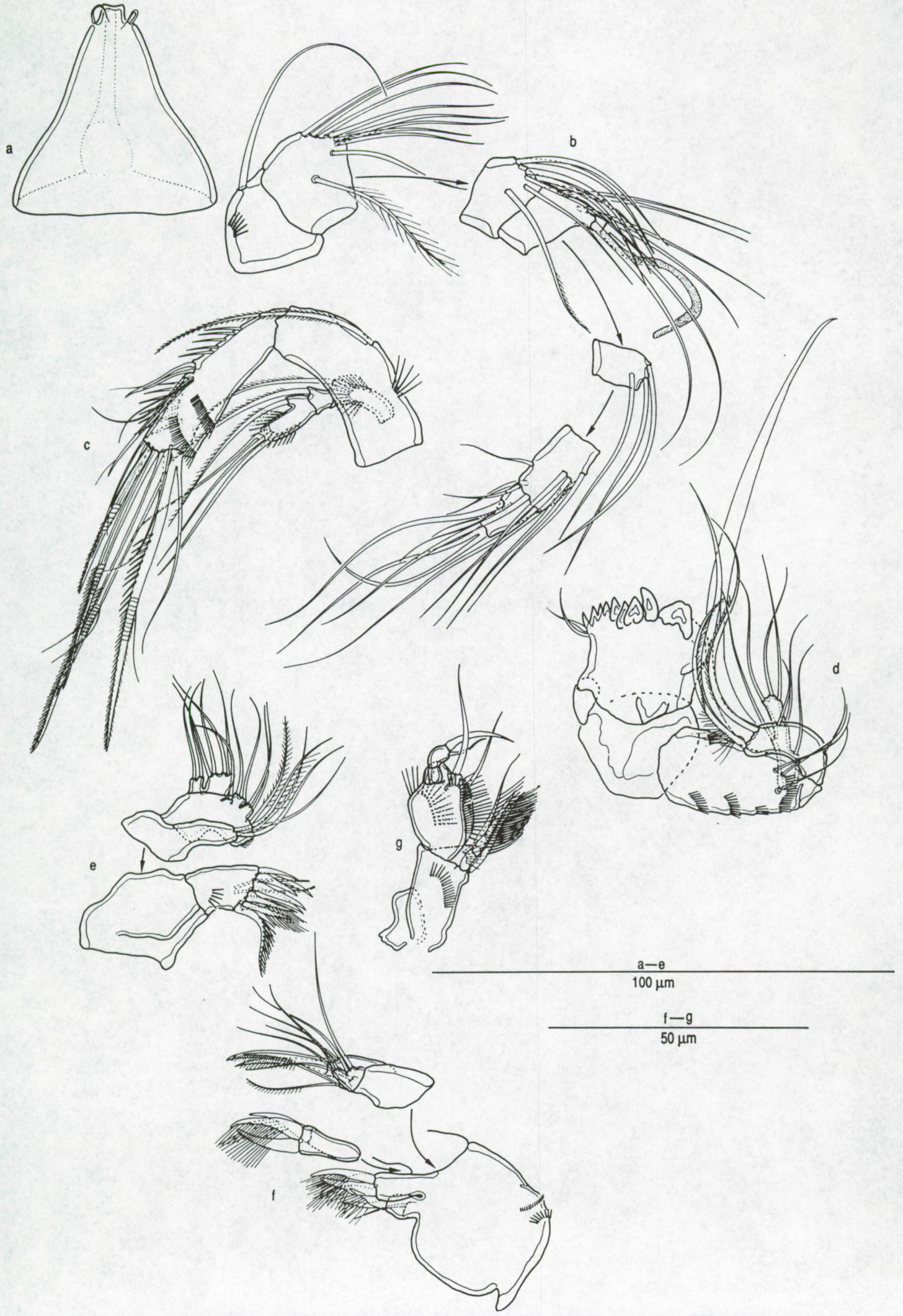

a
b
c
d
e
f
g
a—e
100 µm
f—g
50 µm

Fig. 109. ***Stenhelia (s. str.) n. sp. 1*****, female. a, P1; b, P2; c, P3.**

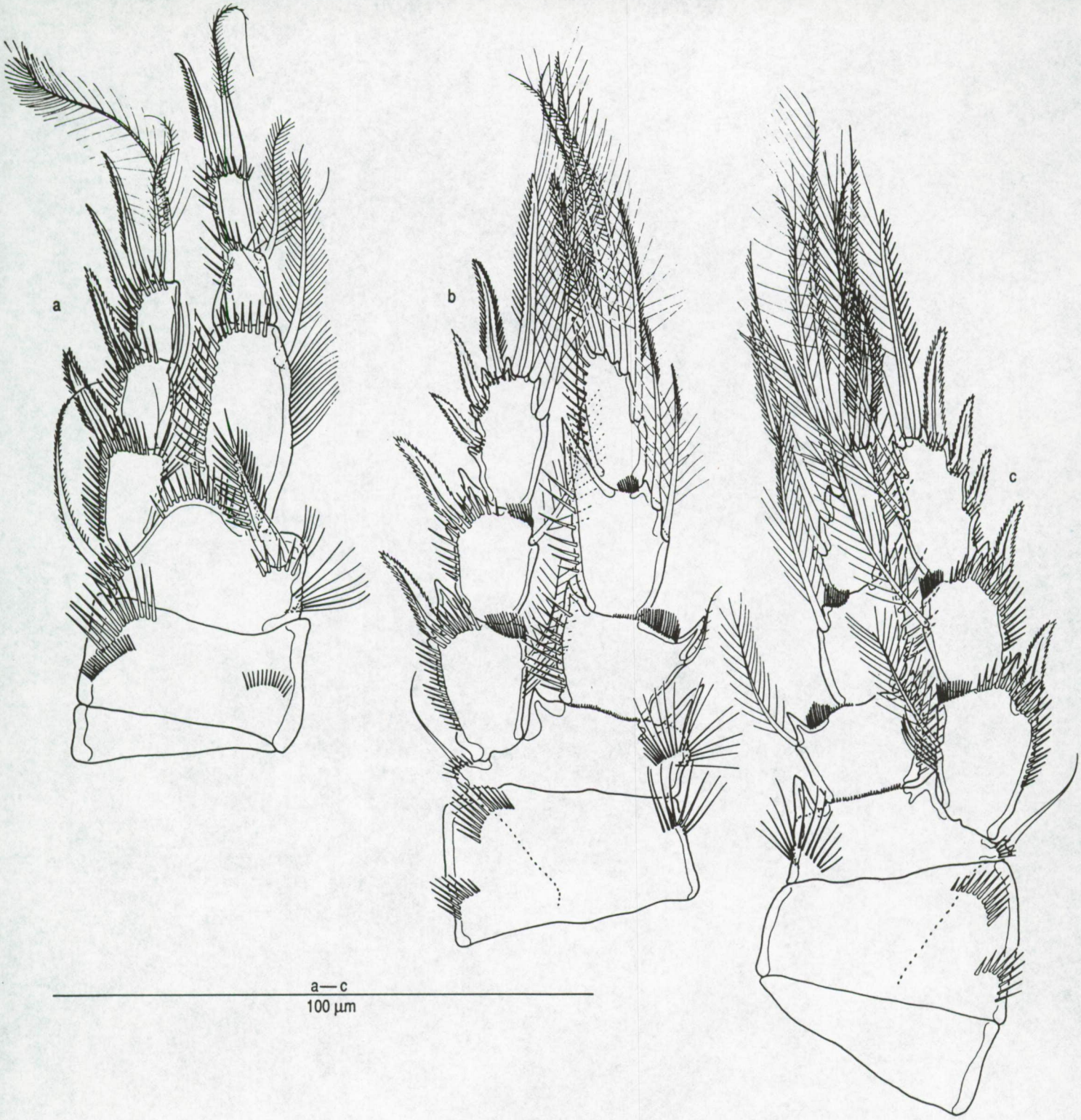

a
b
c
a—c
100 µm

Fig. 110. ***Stenhelia (s. str.) n. sp. 1*****, female. a, P4; b, P5.**

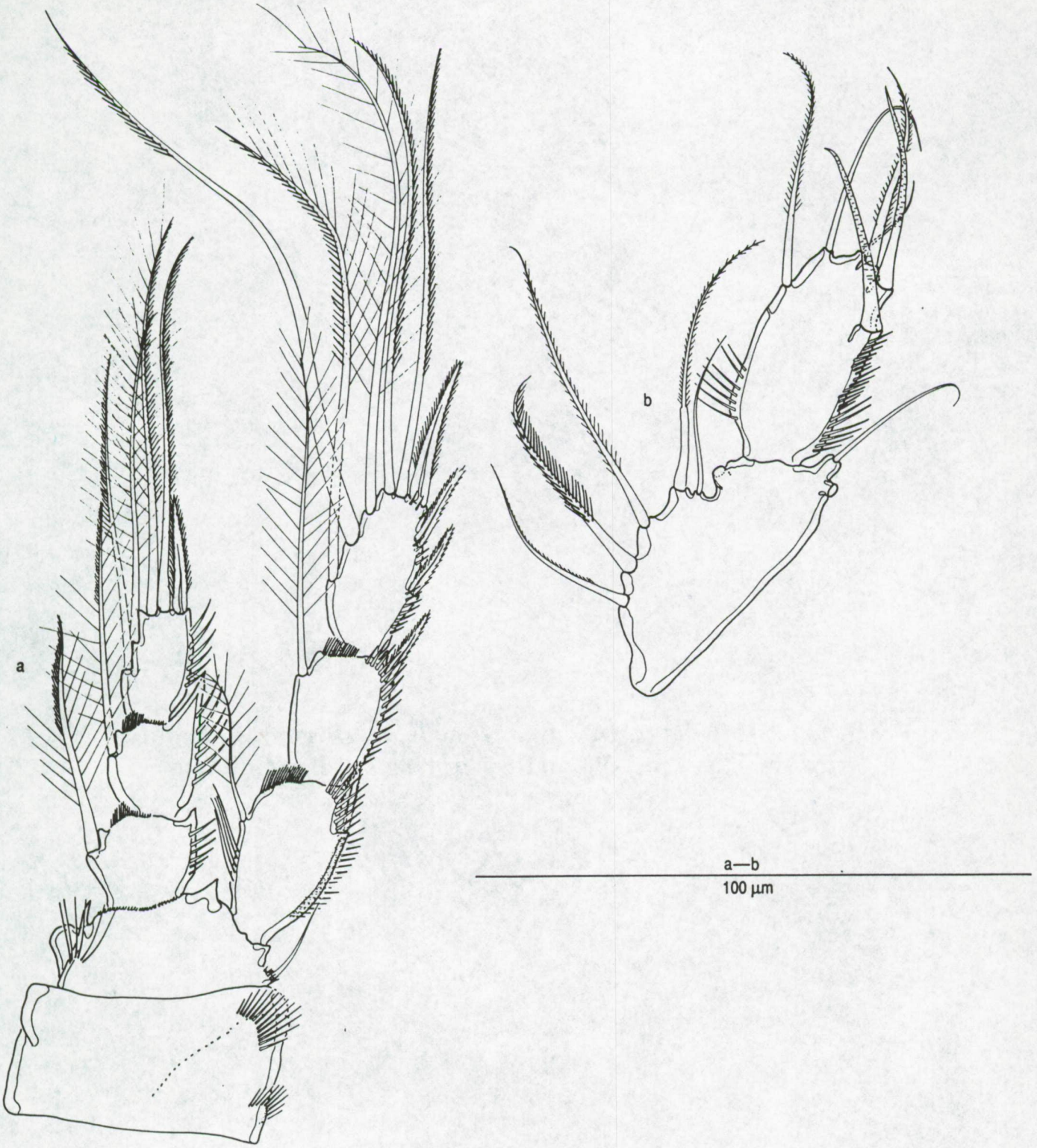

a
b
a—b
100 µm

Fig. 111. ***Stenhelia (s. str.) n. sp. 1*****, male. a, urosome, dorsal; b, urosome, ventral (P5 and P6 bearing-somites omited).**

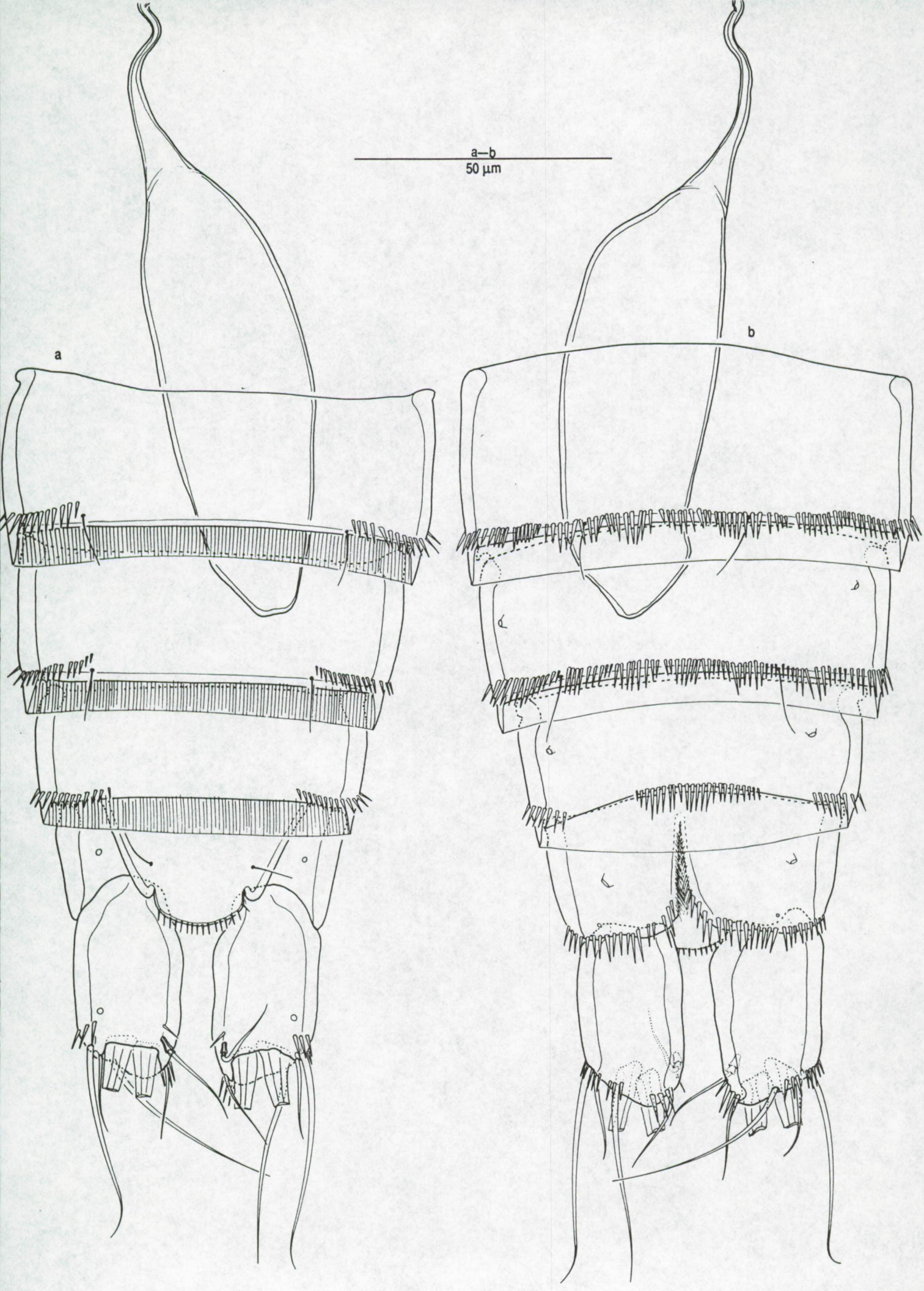

a—b
50 µm
a
b

Fig. 112. ***Stenhelia (s. str.) n. sp. 1*****, male. a, antennule, exploded; b, P2; c, P4; d, P5; e, P6.**

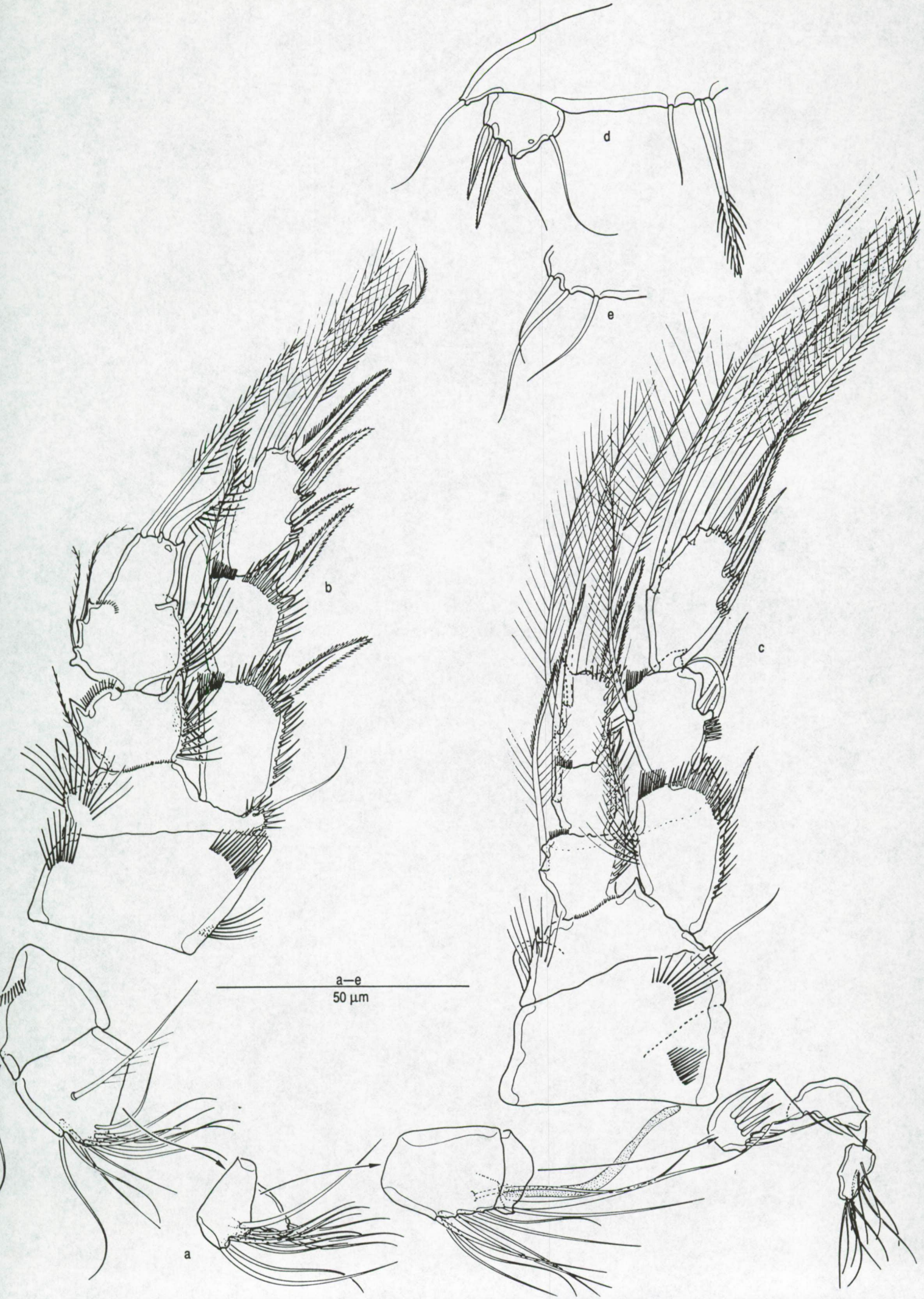

d
e
b
c
a—e
50 µm
a

Fig. 113. ***Stenhelia (D.) n. sp. 1*****, female. a, habitus, dorsal; b, habitus, lateral.**

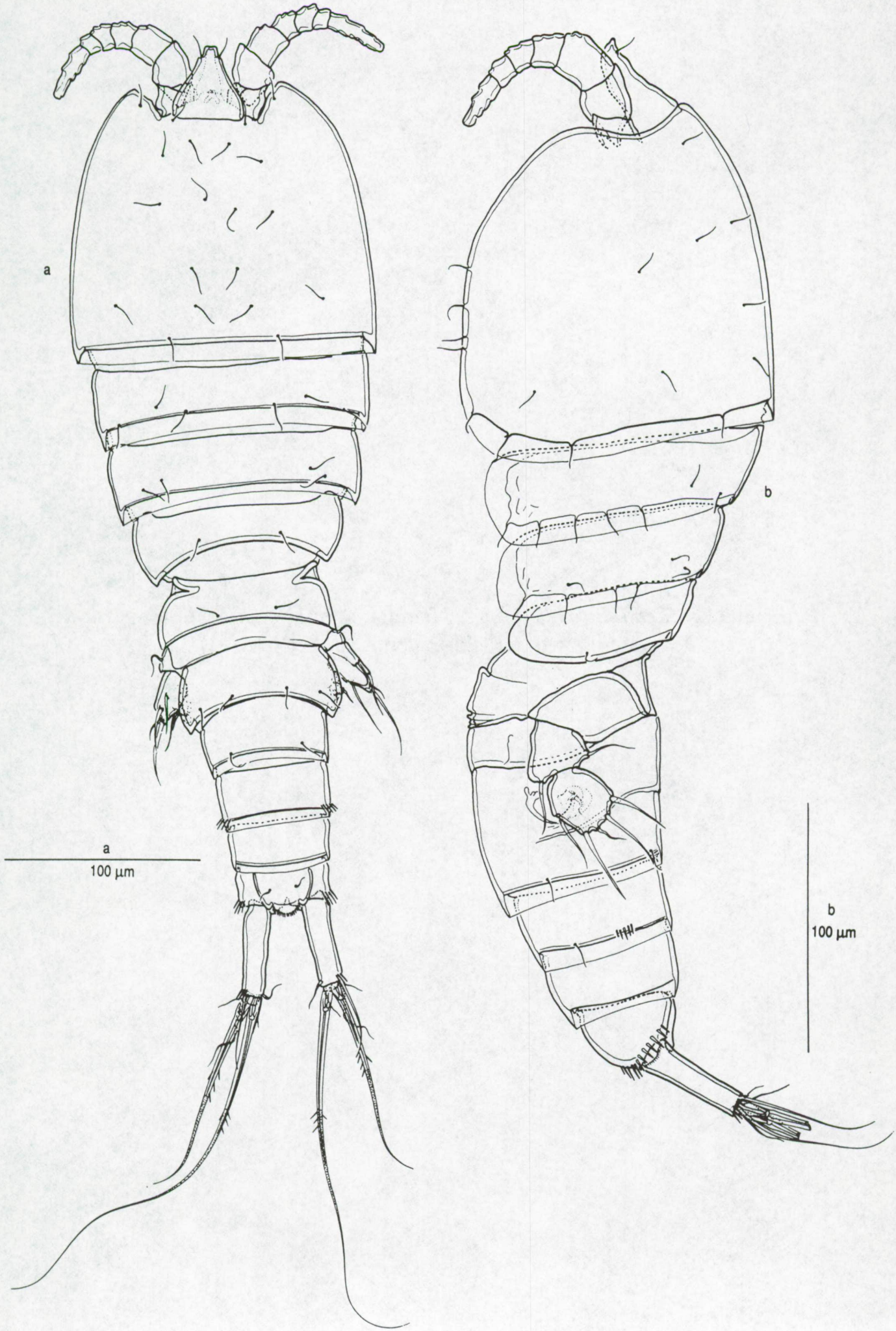
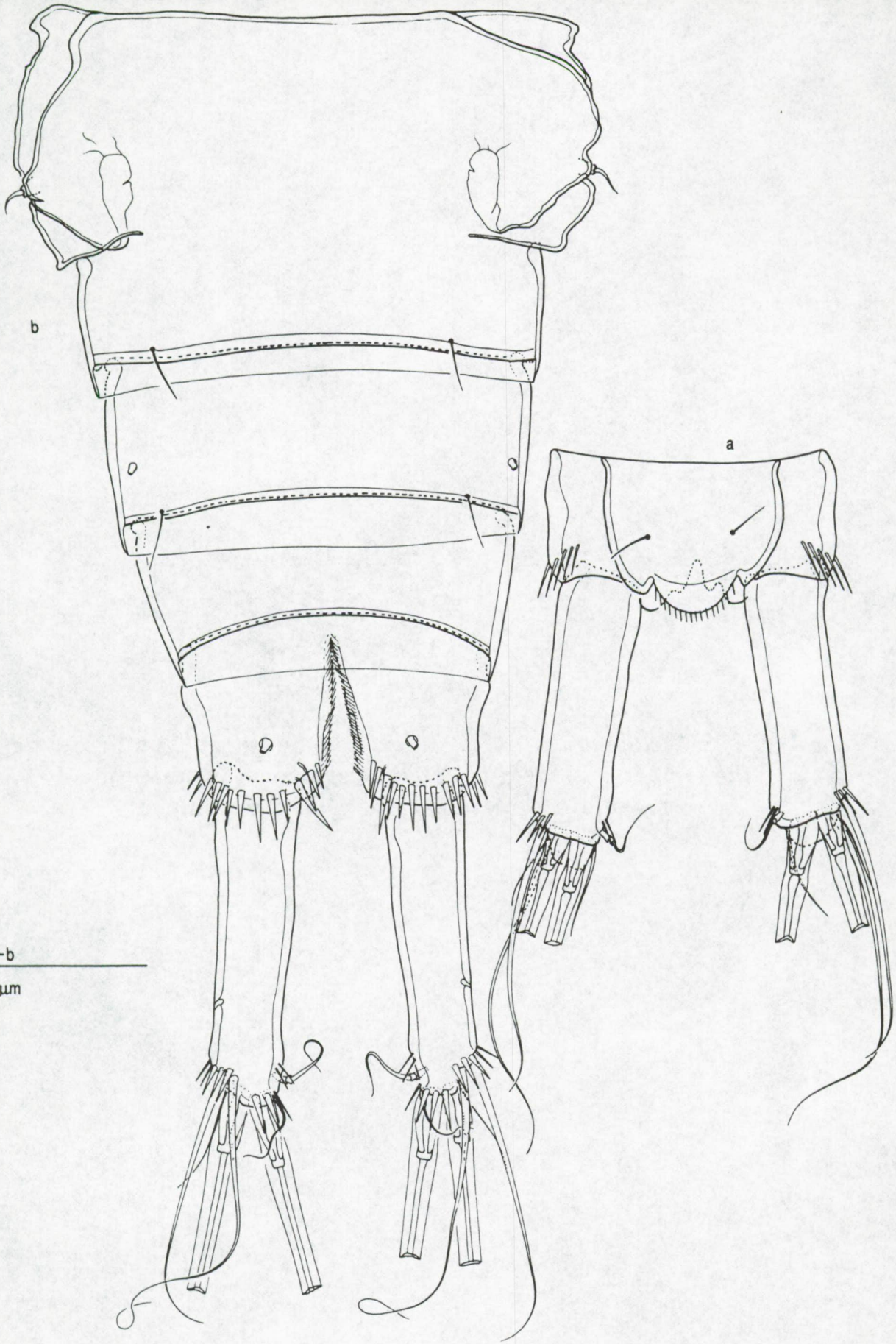

a
a
100 µm
b
b
100 µm

Fig. 114. ***Stenhelia (D.) n. sp. 1*****, female. a, anal somite, dorsal; b, urosome, ventral (P5-bearing somite omited).**



a—b

50 µm

Fig. 115. ***Stenhelia (D.) n. sp. 1*****, female. a, antennule and rostrum, the former exploded; b, antenna, exploded; c, mandible; d, maxillule, exploded; e, maxilla; f, maxilliped.**

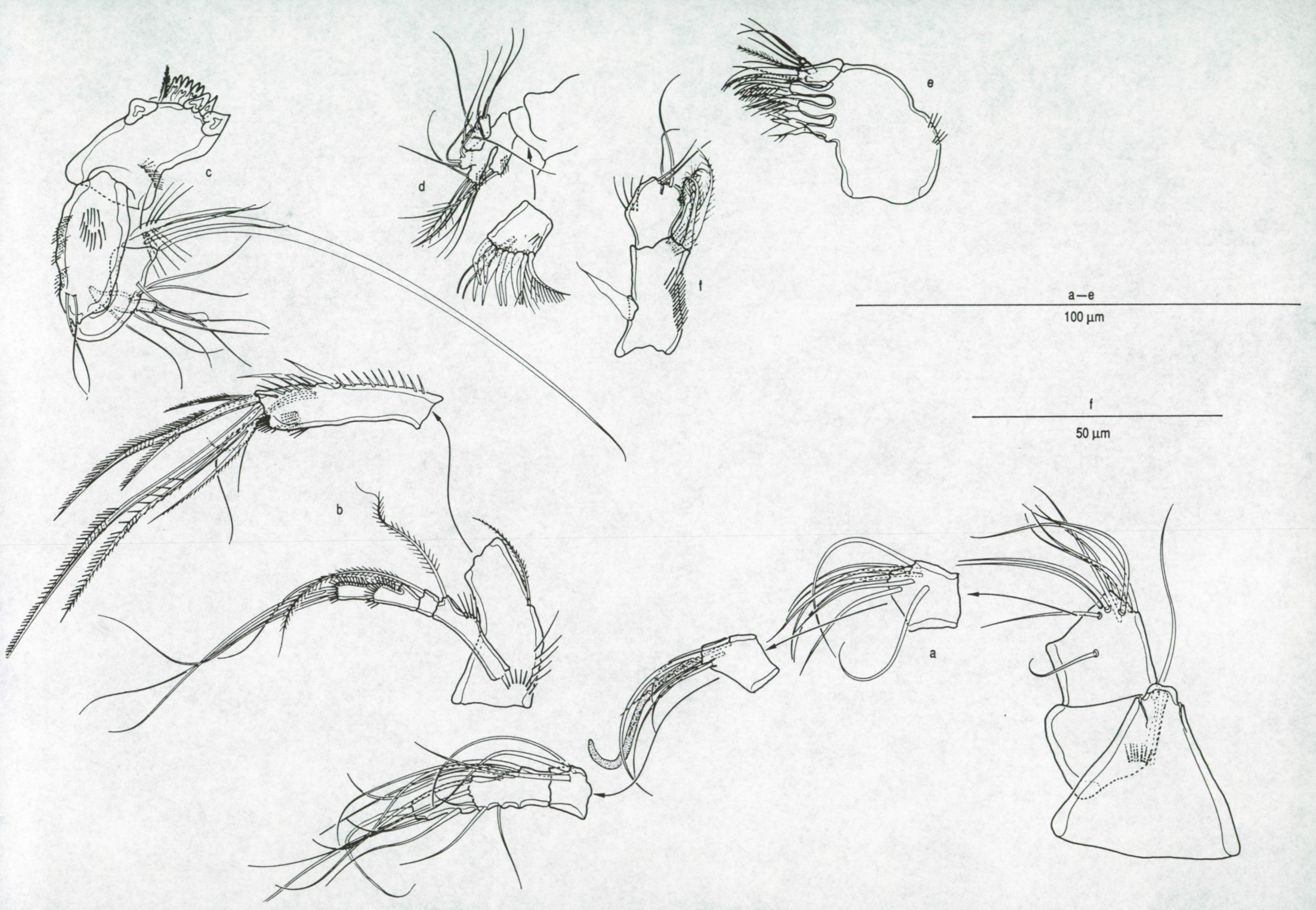

c
d
e
f
a—e
100 µm
f
50 µm
b
a

Fig. 116. ***Stenhelia (D.) n. sp. 1*****, female. a, P1; b, P2; c, P3; d, P4; e, P5.**


a
b
c
d
e
a—e
100 µm

Fig. 117. ***Stenhelia (D.) n. sp. 1*****, male. a, habitus, dorsal; b, urosome, ventral (P5- and P6 bearing-somites omited).**

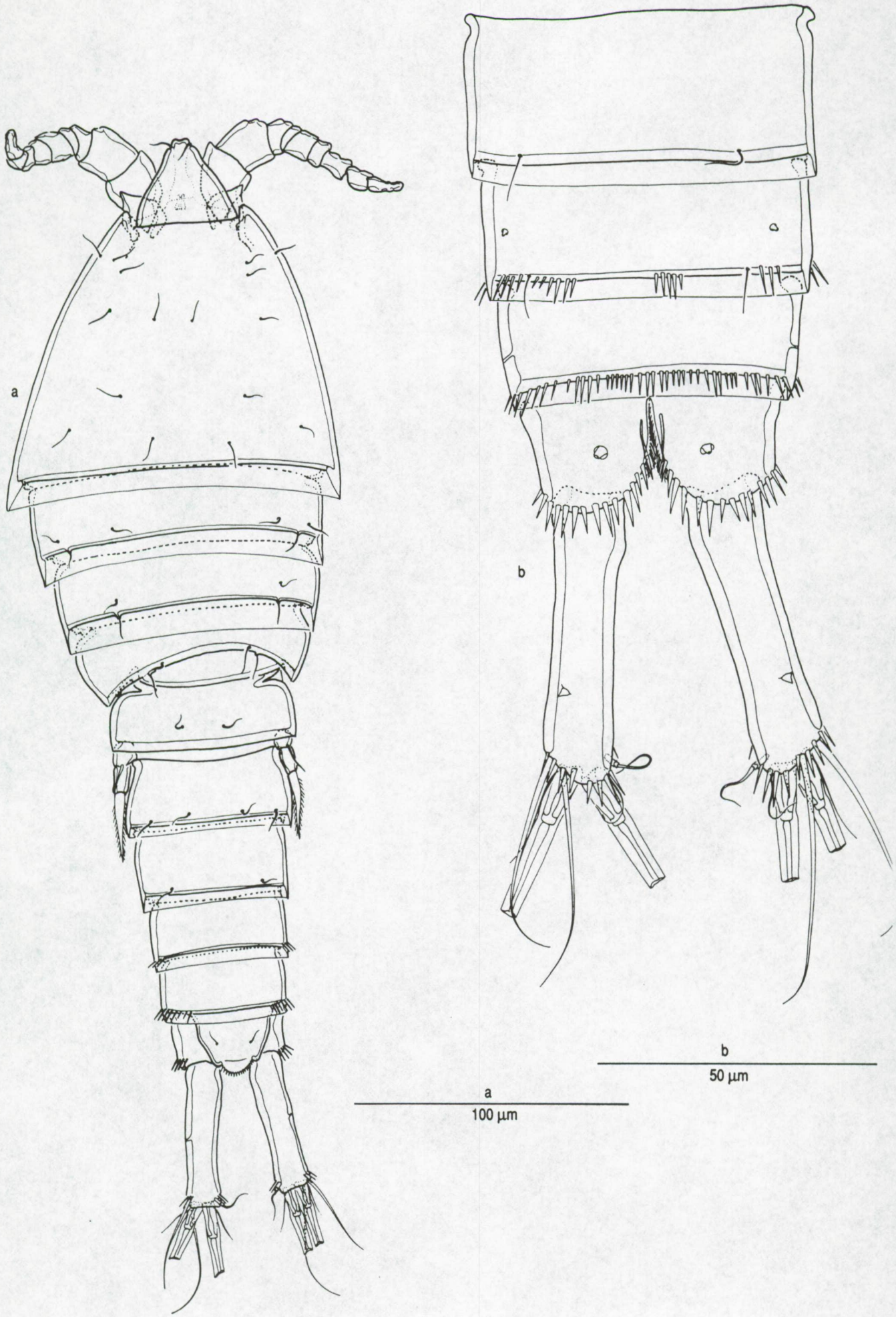

a
b
a
100 µm
b
50 µm

Fig. 118. ***Stenhelia (D.) n. sp. 1*****, male. a, antennule, exploded; b, P2; c, P4; d, P5; e, P6.**

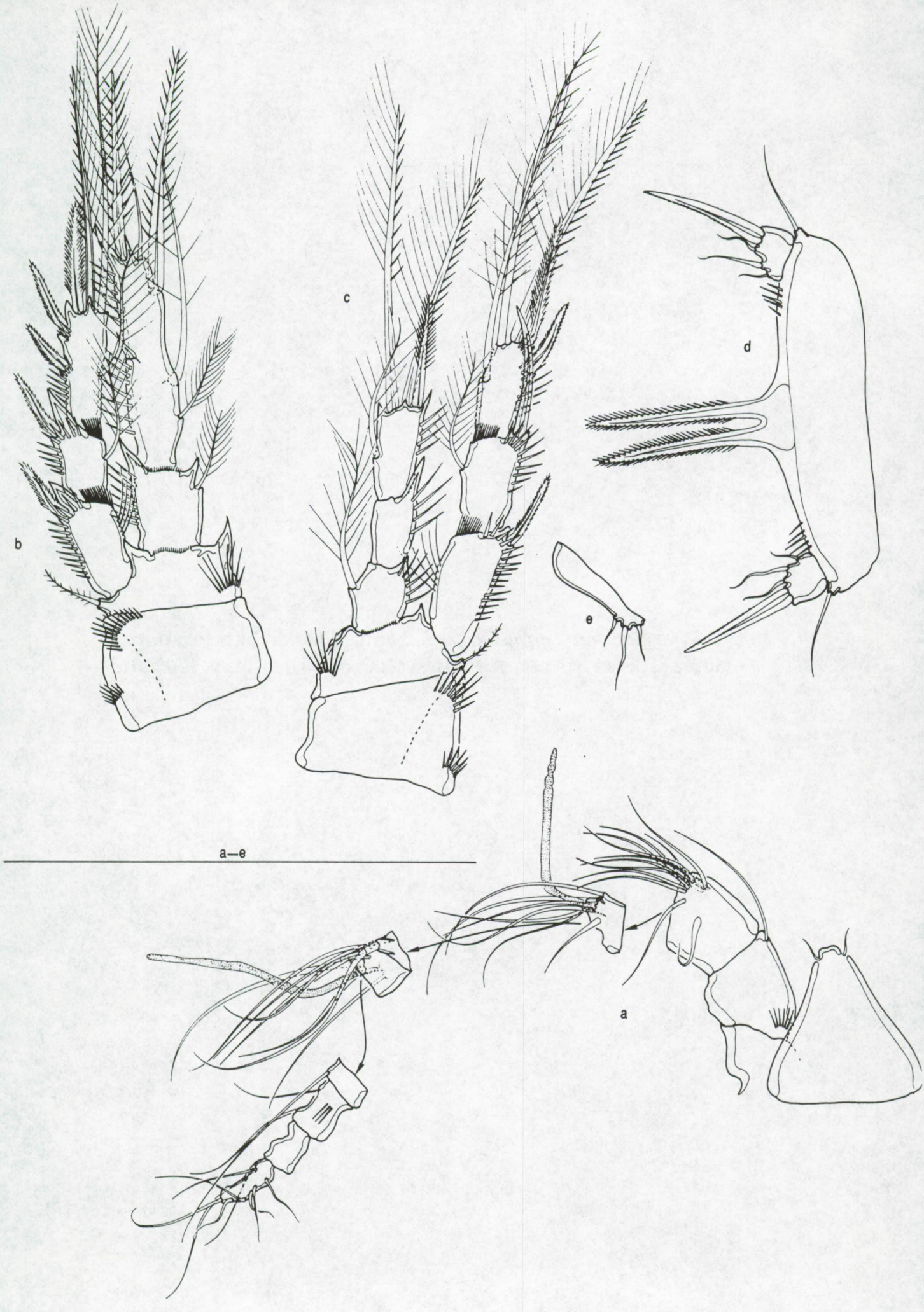

b
c
d
e
a—e
a

Fig. 119. ***Robertsonia propinqua*** **T. Scott, male. a, habitus, dorsal, principal setae of caudal rami exploded; b, urosome, lateral.**

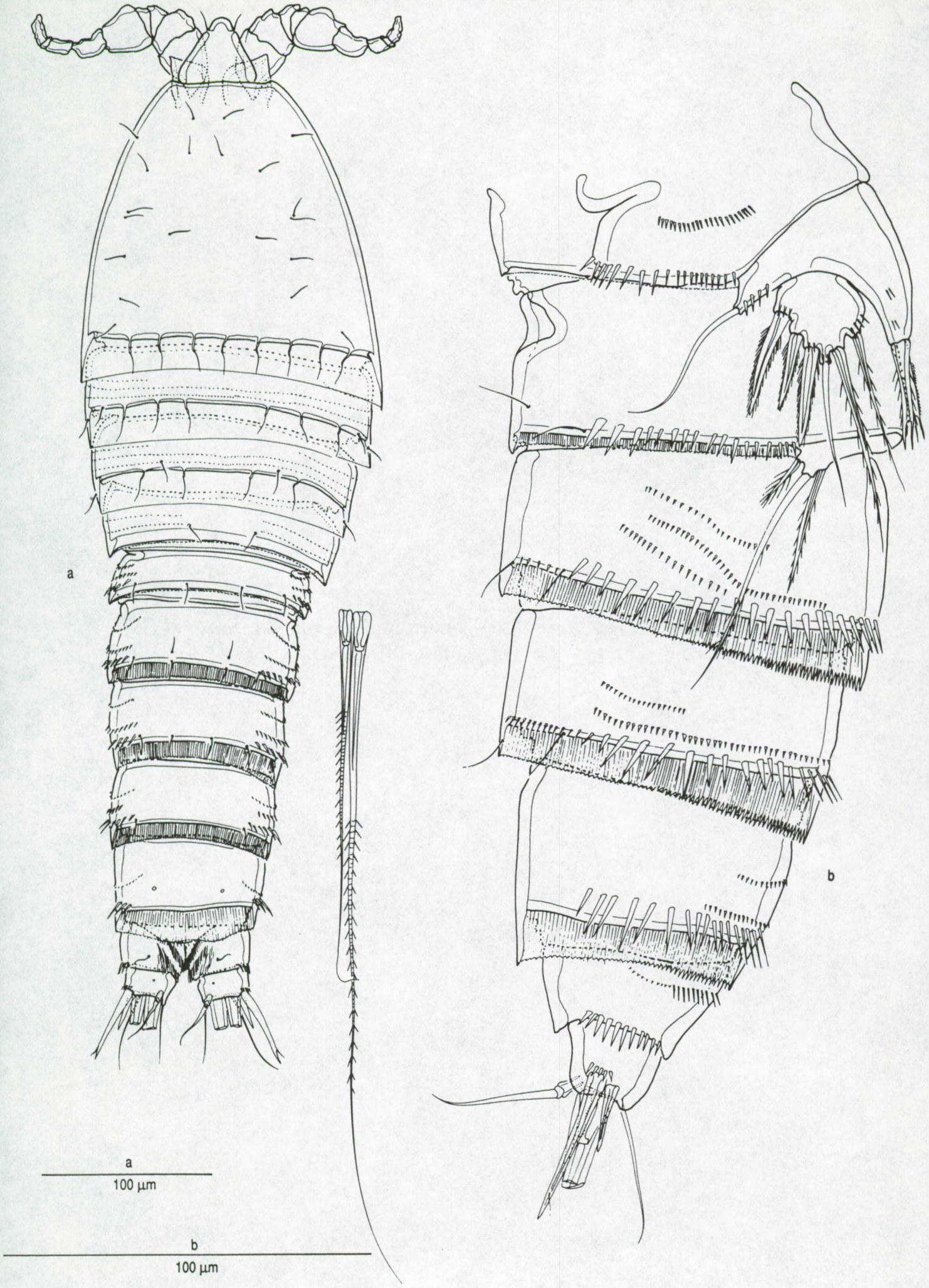

a
b
a
100 µm
b
100 µm

Fig. 120. ***Robertsonia propinqua*** **T. Scott, male. Urosome, ventral (P5 and P6 bearing-somites omited).**

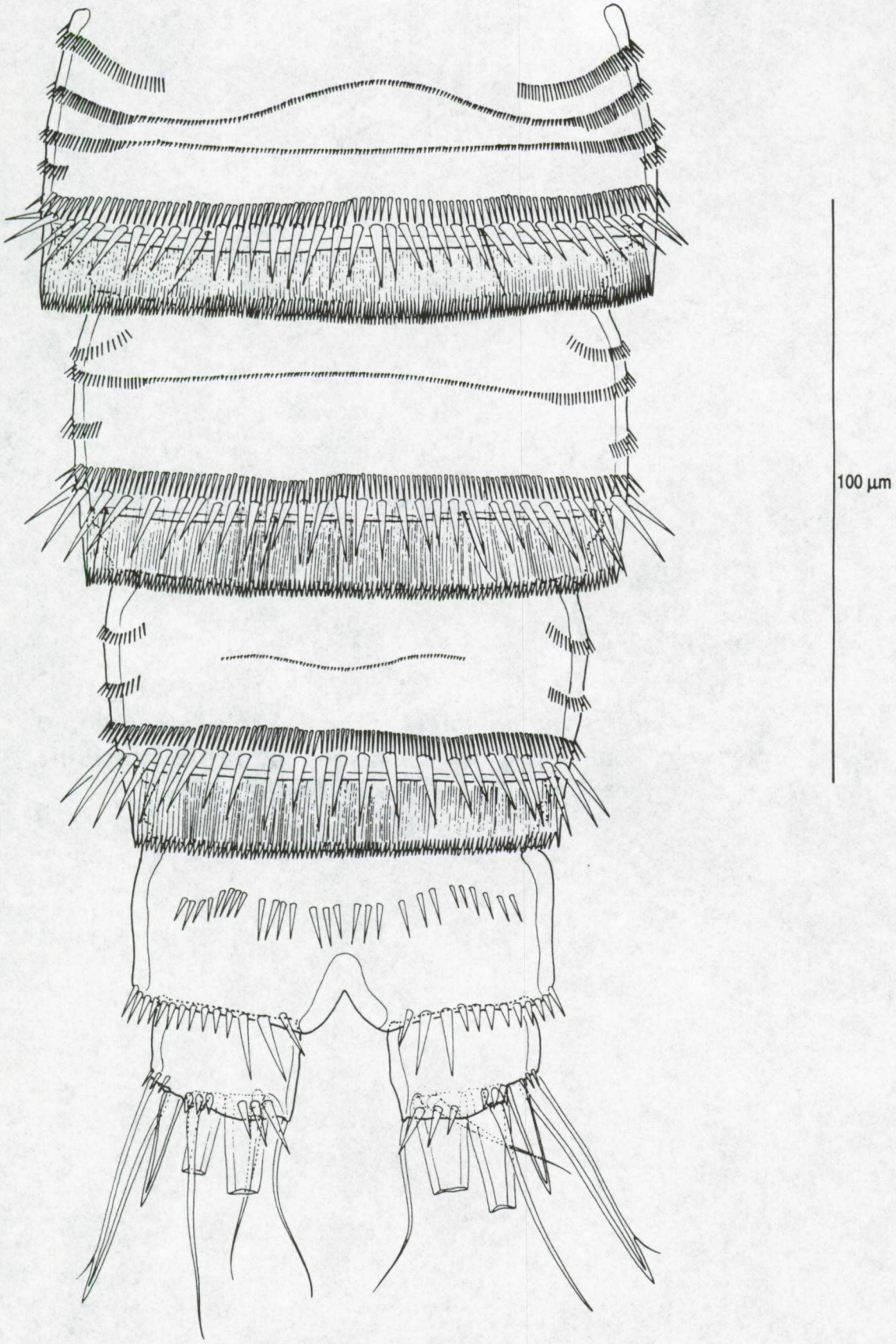

100 µm

Fig. 121. ***Robertsonia propinqua*** **T. Scott, male. a, rostrum; b, antennule, exploded; c, antenna; d, mandible; e, maxillule, exploded; f, maxilla; g, maxilliped.**

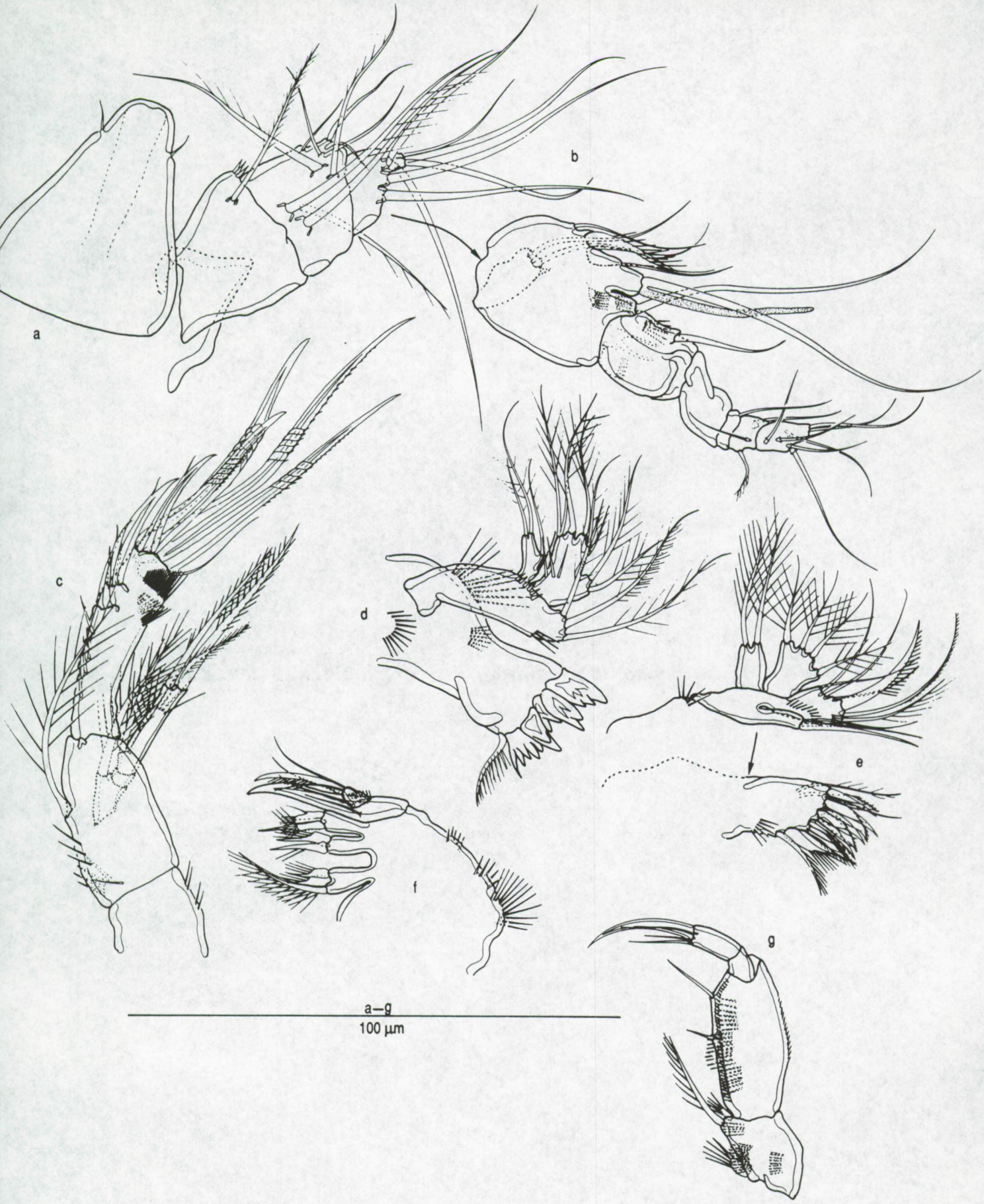

a
b
c
d
e
f
g
a–g
100 µm

Fig. 122. *Robertsonia propinqua* T. Scott, male. a, P1; b, P2.

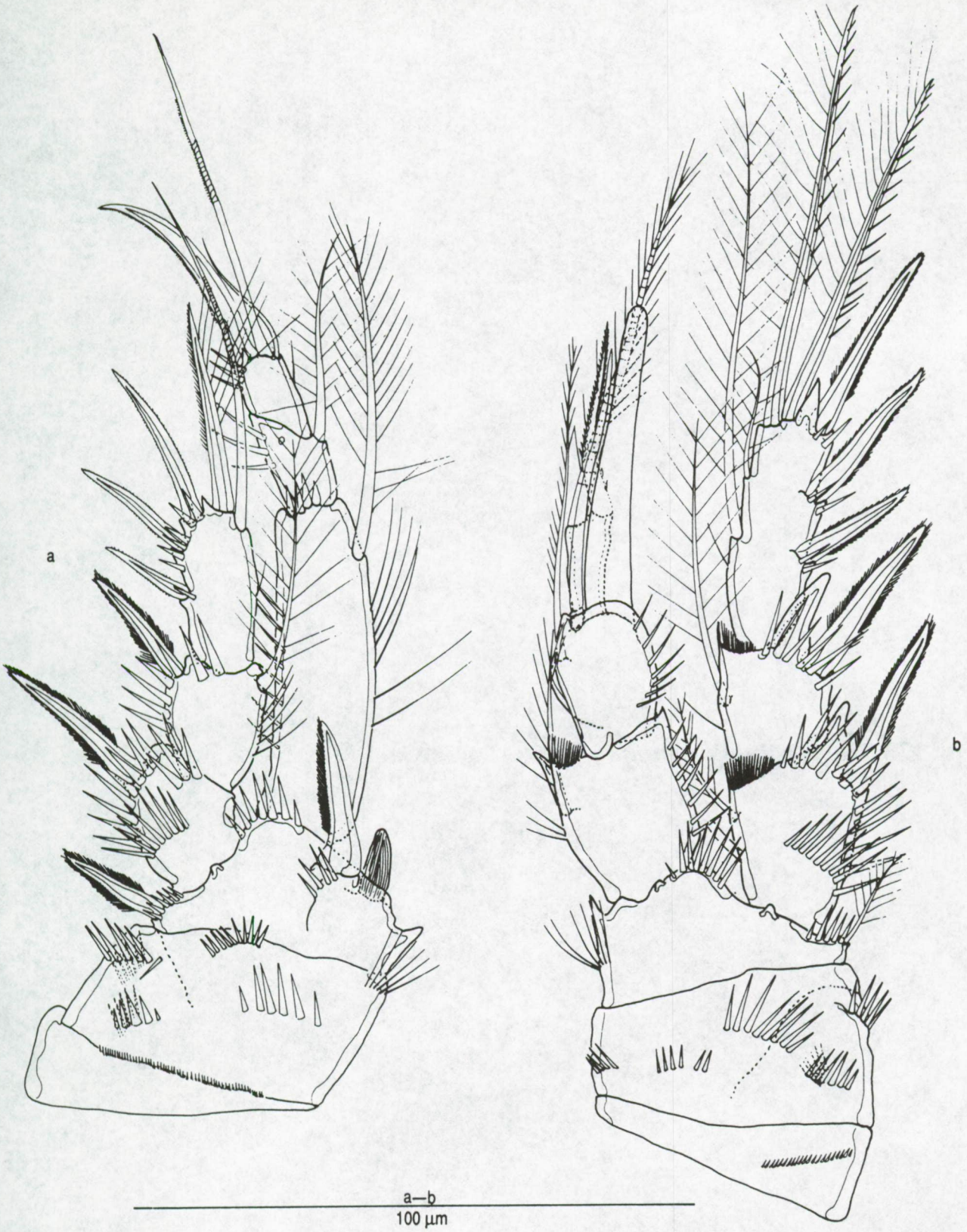

a
b
a—b
100 µm

Fig. 123. ***Robertsonia propinqua*** **T. Scott, male. a, P3; b, P4; c, P5; d, P6.**

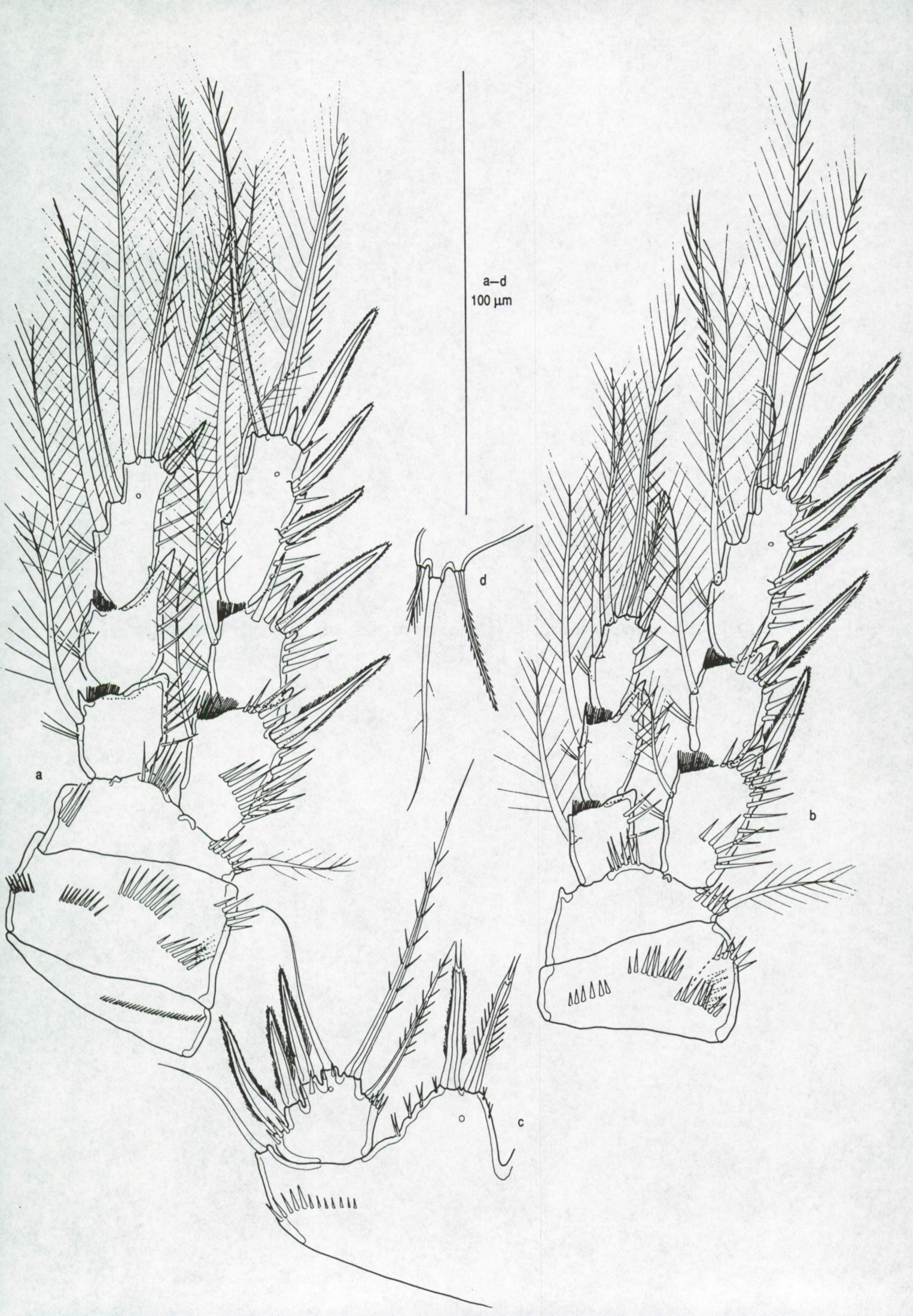

a–d
100 µm
a
b
c
d

Fig. 124. ***Robertsonia n. sp. 1*****, female. a, habitus, dorsal; b, habitus, lateral.**

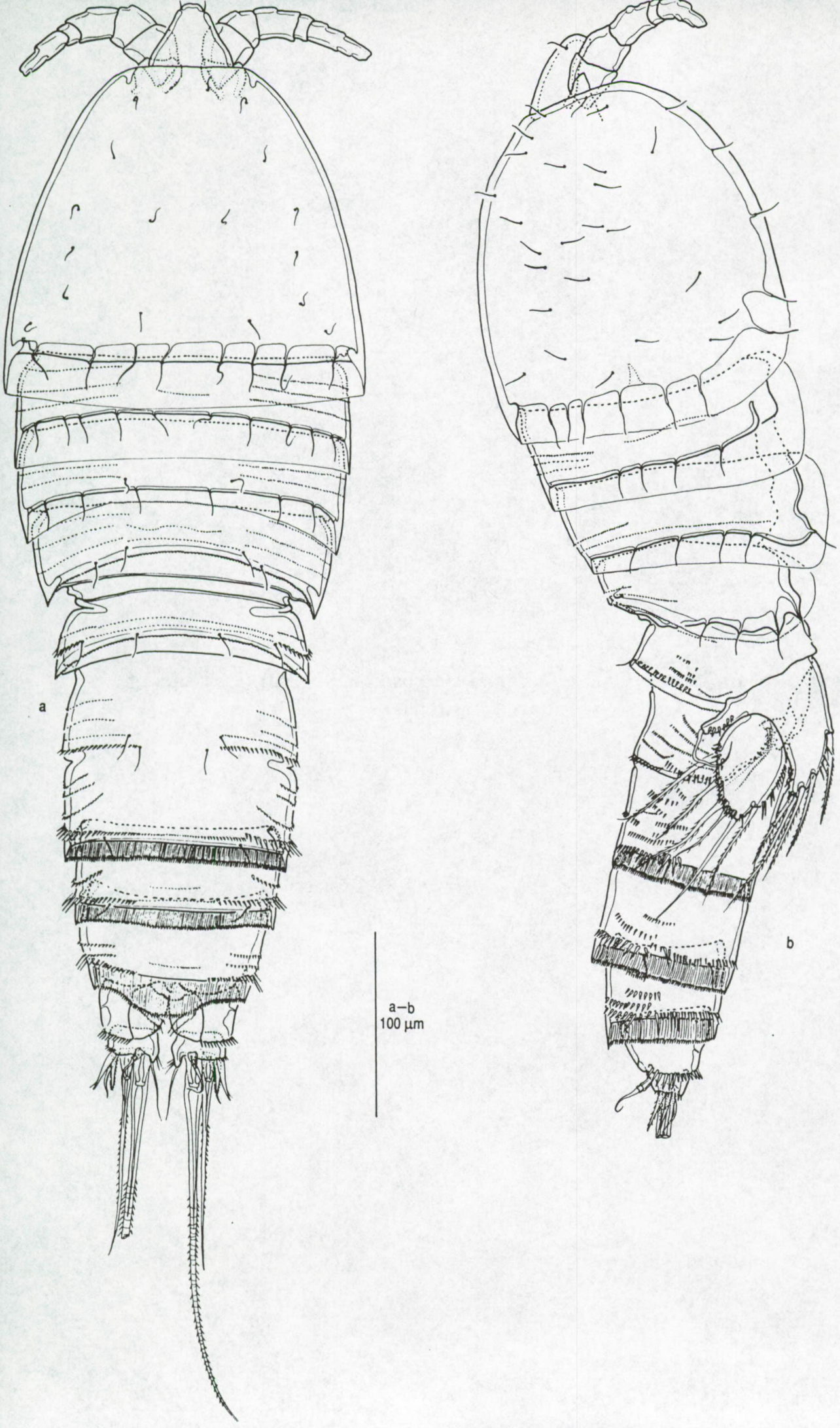

a
b
a–b
100 µm

Fig. 125. ***Robertsonia n. sp. 1*****, female. Urosome, ventral (P5 bearing-somite omited).**

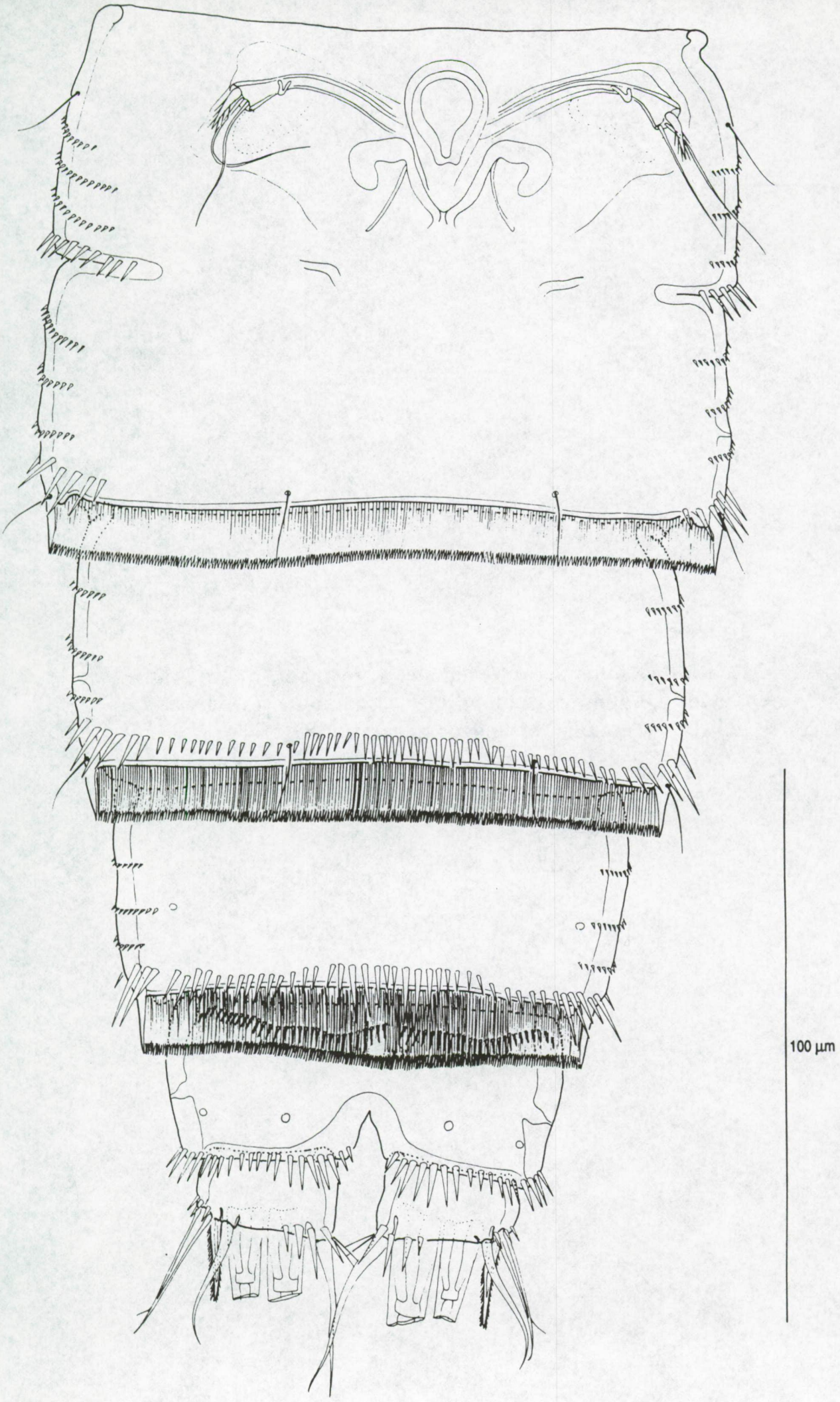
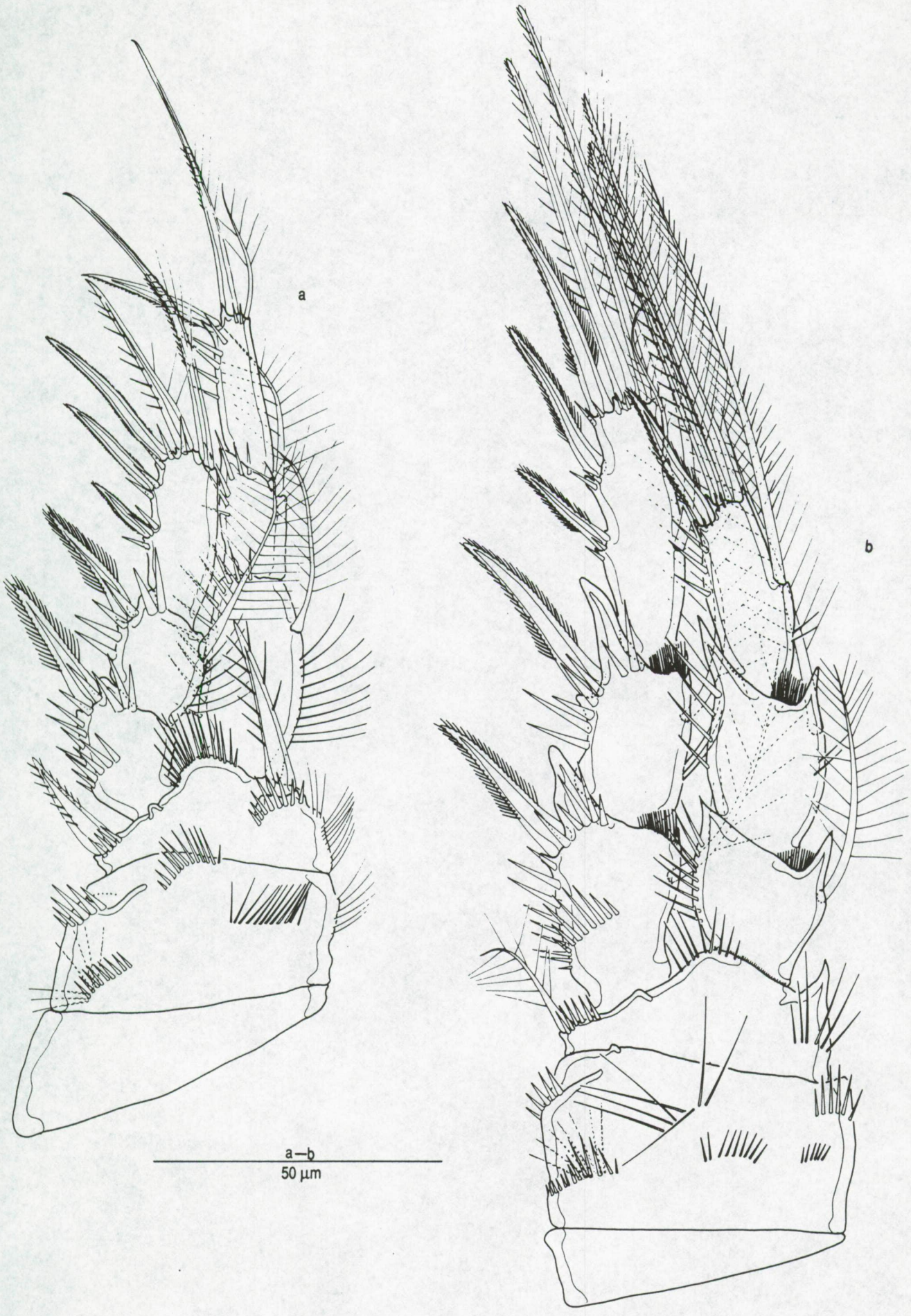

100 µm

Fig. 126. ***Robertsonia n. sp. 1***, **female. a, rostrum; b, antennule, exploded; c, antenna; d, mandible; e, maxillule, exploded; f, maxilla, exploded; g, maxilliped.**


a
b
c
d
e
f
g
a–g
50 µm

Fig. 127. *Robertsonia n. sp. 1*, female. a, P1; b, P2.


a
b
a—b
50 µm


a—b
50 µm
a
b

Fig. 129. ***Robertsonia n. sp. 1*****, female. a, P5; b-c, aberrant P4 ENP and EXP; d, anal segment and caudal rami, dorsal.**

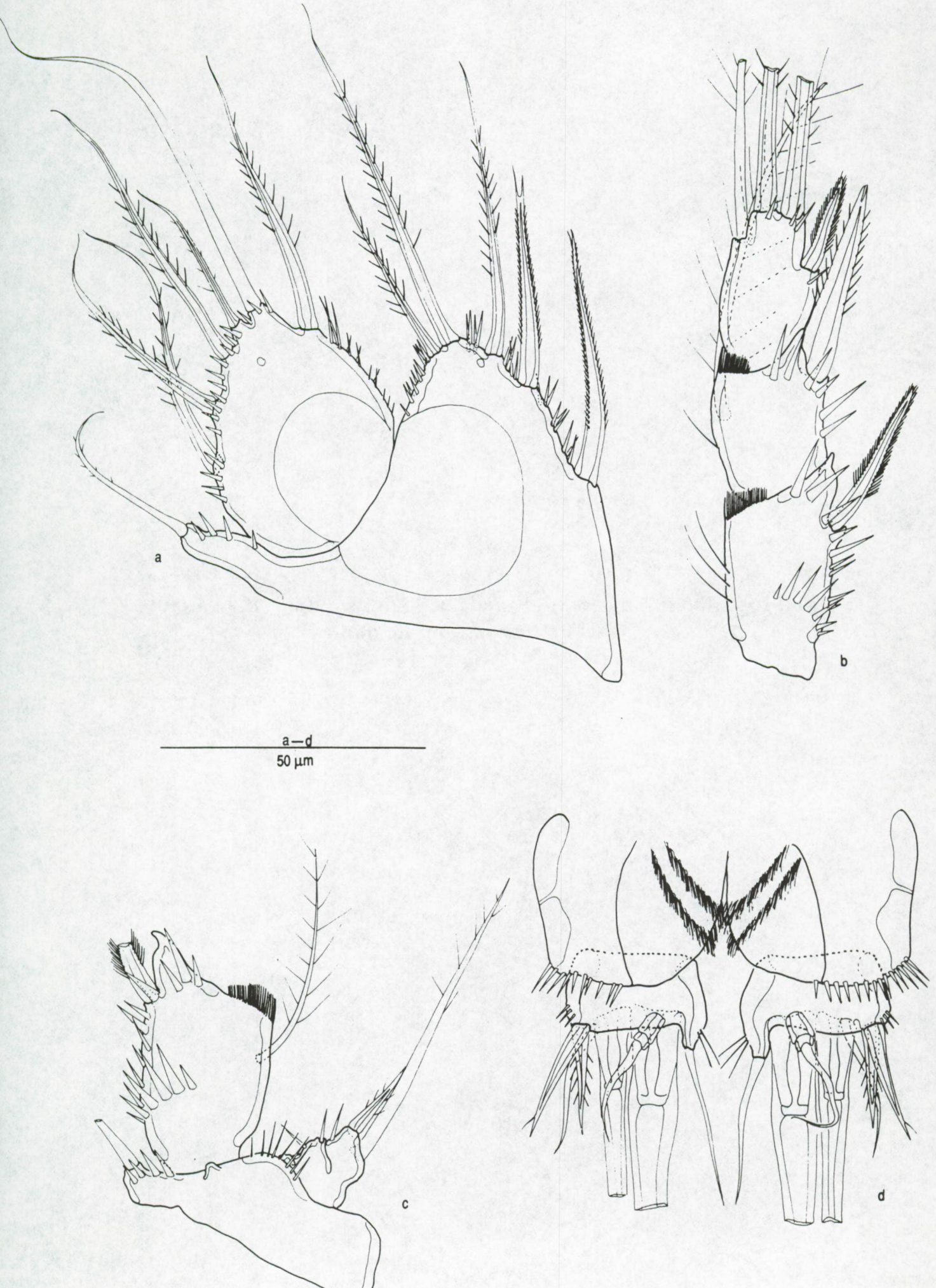

a
b
a—d
50 µm
c
d

Fig. 130. ***Robertsonia n. sp. 1***, **male. a, habitus dorsal; b, urosome, ventral (P5 bearing-somite omited).**

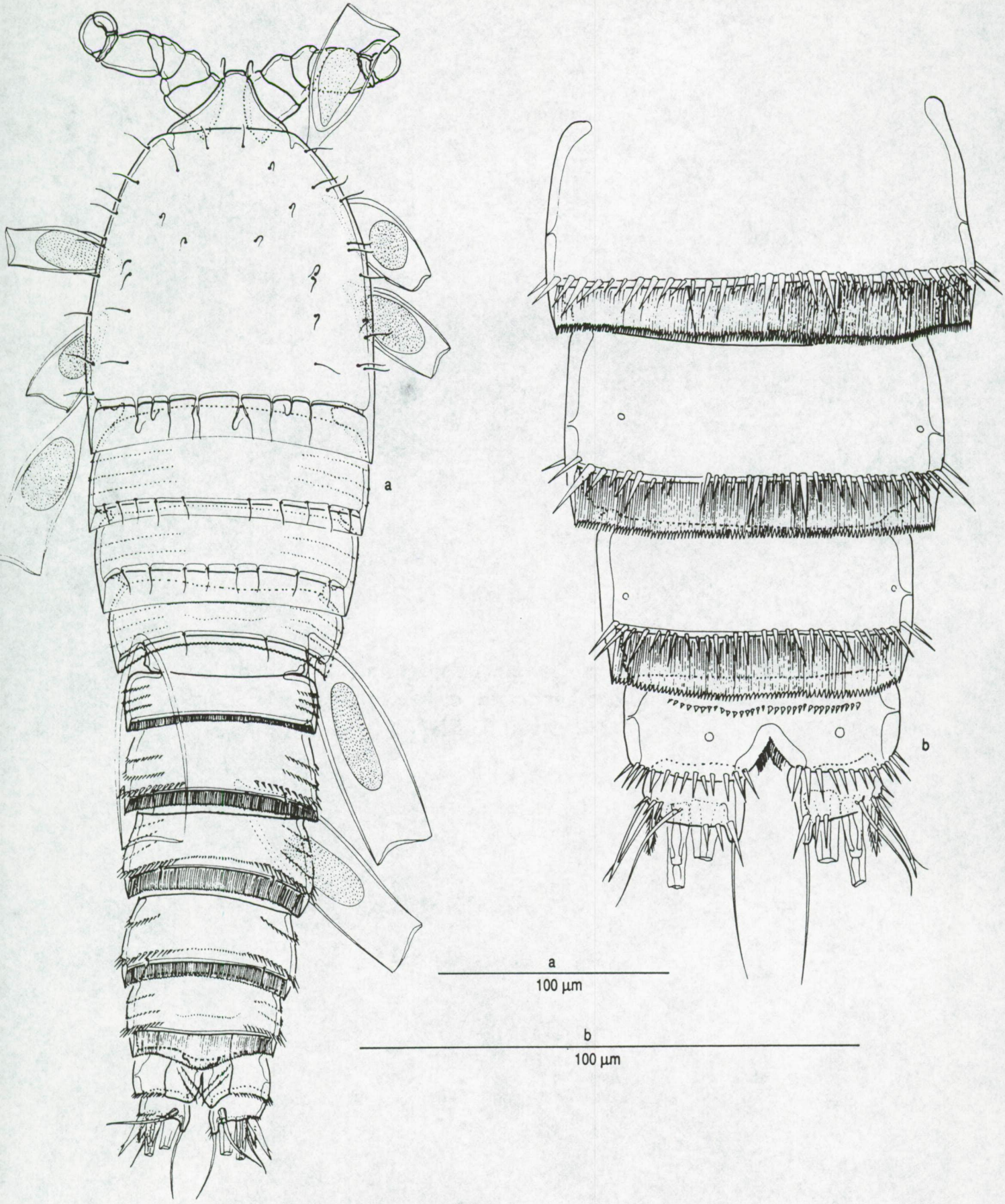

a
b
a
100 µm
b
100 µm

Fig. 131. ***Robertsonia n. sp. 1*****, male. a, antennule, exploded; b; third antennulary segment, other angle; c; P5; d, P6; e, P1; f, P2; g, aberrant P2 ENP.**

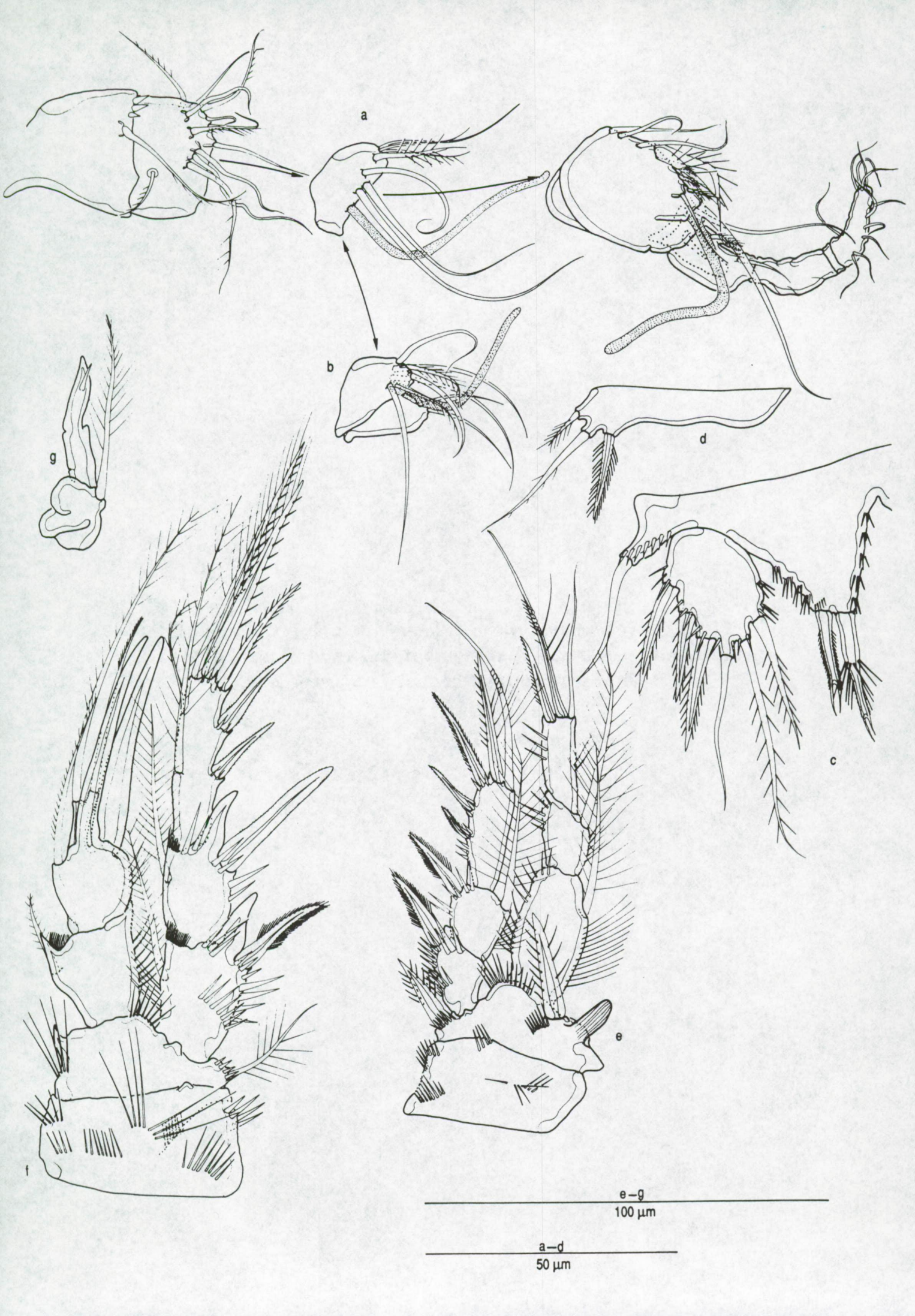

a
b
c
d
e
f
g
e–g
100 µm
a–d
50 µm

Fig. 132. ***Robertsonia n. sp. 2*****, female. a, habitus, dorsal; b; penultimate urosomite, anal segment and caudal rami, dorsal; c, anal segment and caudal rami, ventral.**

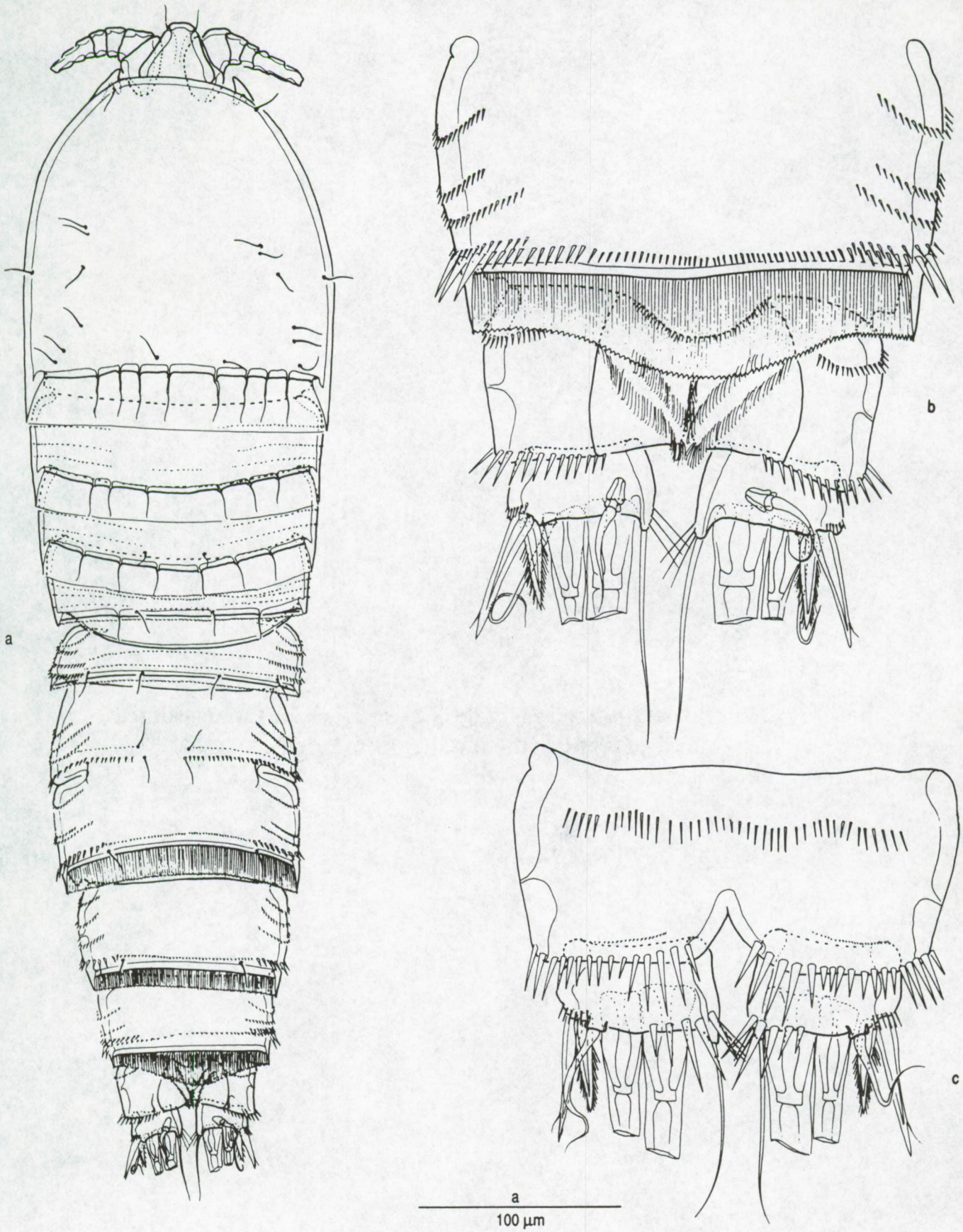

a
b
c
a
100 µm
b—c
100 µm

Fig. 133. ***Robertsonia n. sp. 2*****, female. Urosome (P5 bearing-somite, anal segment and caudal rami omited).**

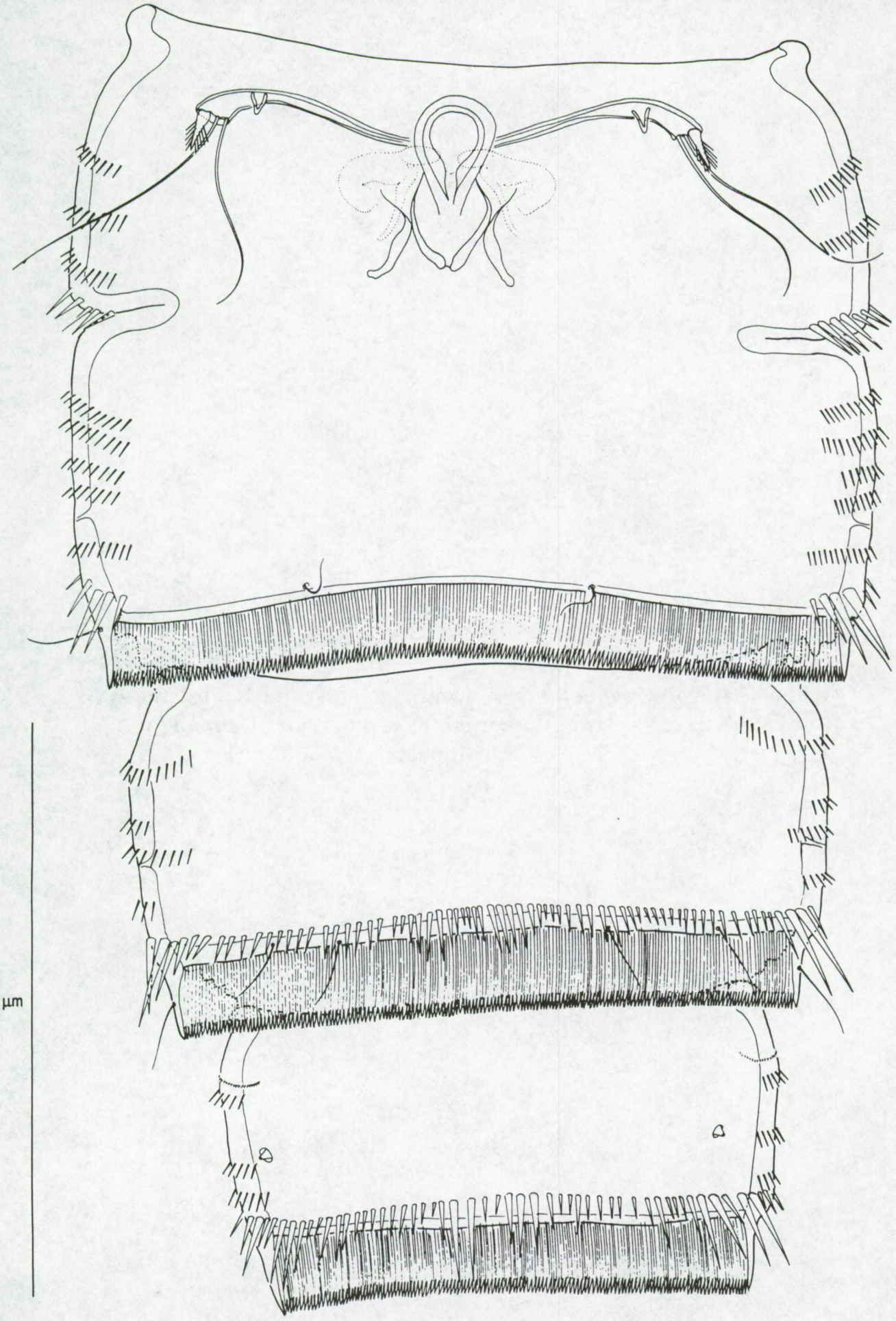
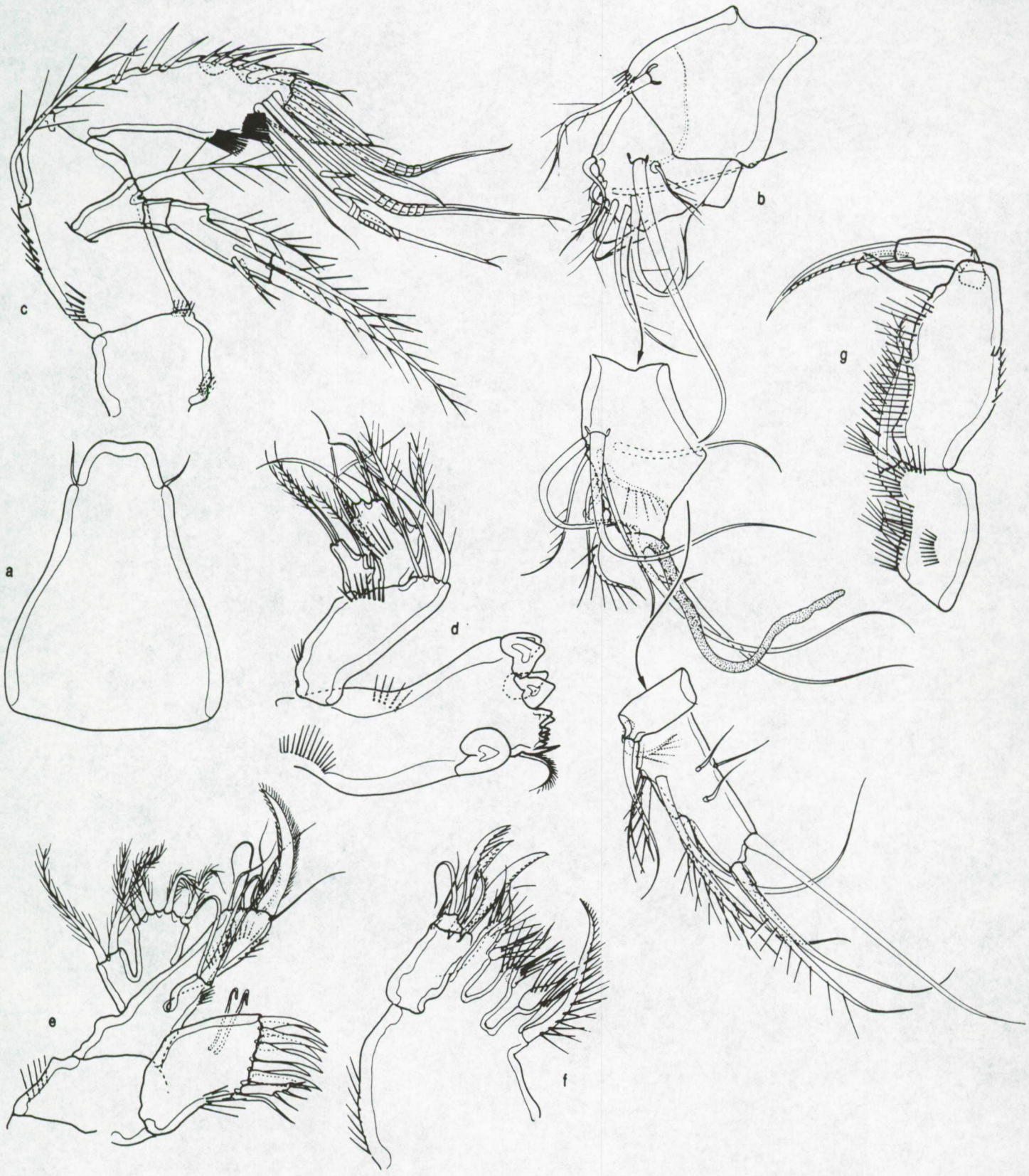

100 µm

Fig. 134. ***Robertsonia n. sp. 2***, **female. a, rostrum; b, antennule, exploded; c, antenna; d, mandible; e, maxillule; f, maxilla; g, maxilliped.**



a–g

100 µm

Fig. 135. *Robertsonia n. sp. 2*, female. a, P1; b, P2.


a
b
a—b
50 µm

Fig. 136. *Robertsonia n. sp.2*, female. a, P3; b, P4.


a—b
50 µm
a
b


50 µm

Fig. 138. ***Amphiascopsis thalestroides*** **Sars, male. a, urosome, dorsal; b, urosome, ventral (P5 and P6 bearing-somites omited).**

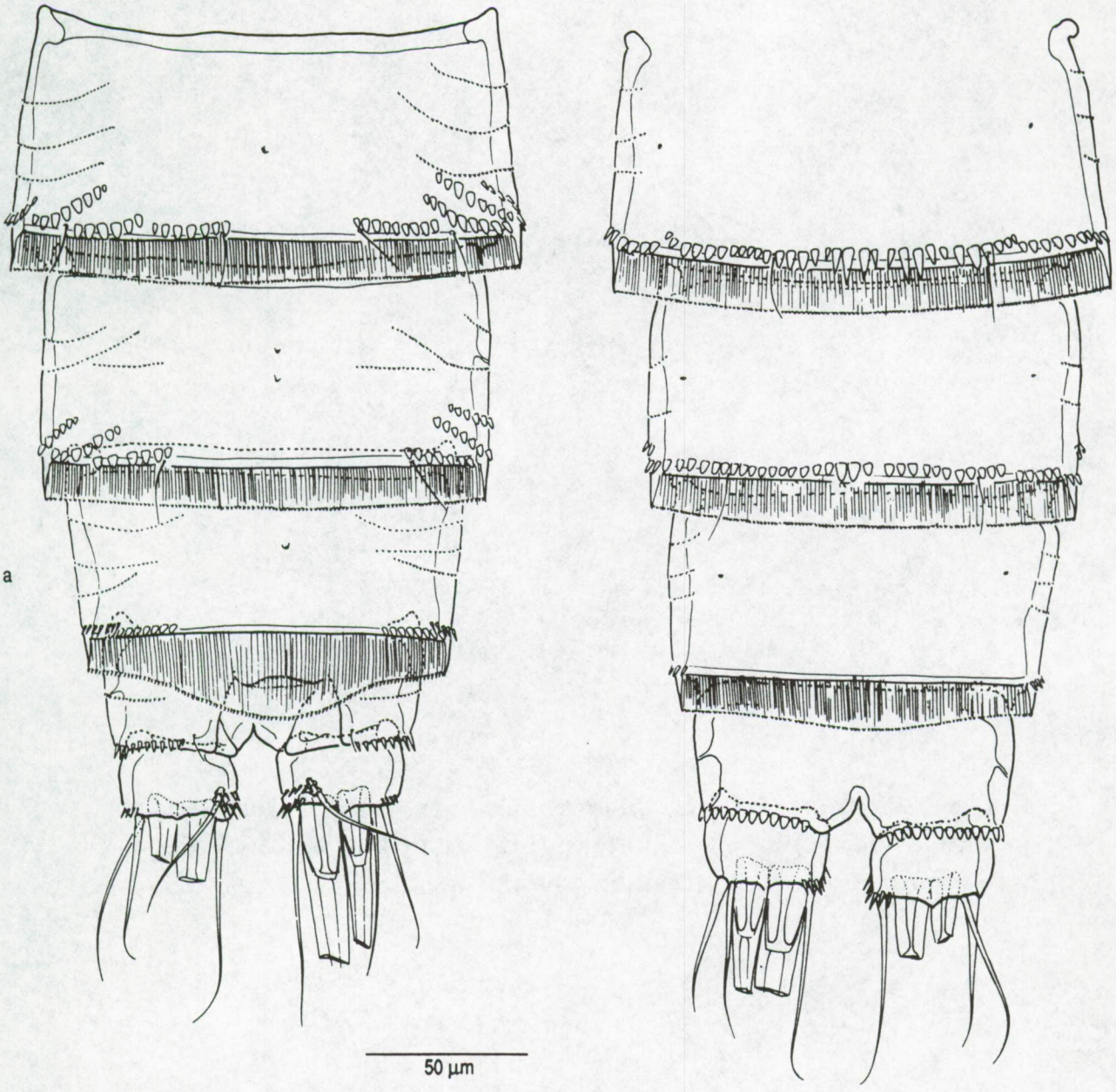

a
50 µm

Fig. 139. ***Amphiascopsis thalestroides*** **Sars, male. a, rostrum; b, antennule, exploded; c, antenna; d, mandible; e, maxillule; f, maxilla; g, maxilliped.**

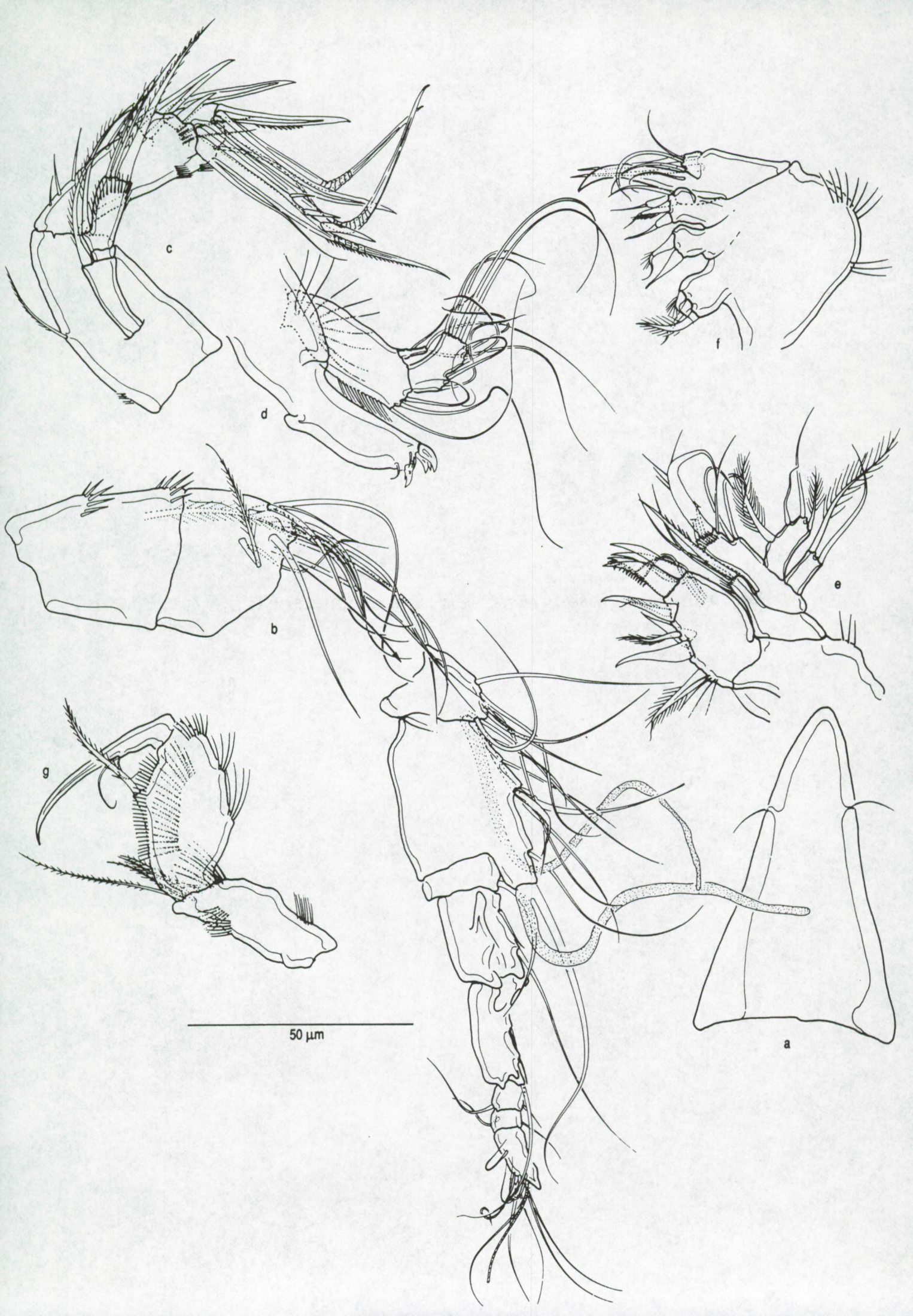

c
d
f
b
e
g
50 µm
a

Fig. 140. ***Amphiascopsis thalestroides*** **Sars, male. a, P1; b, P2; c, P3.**

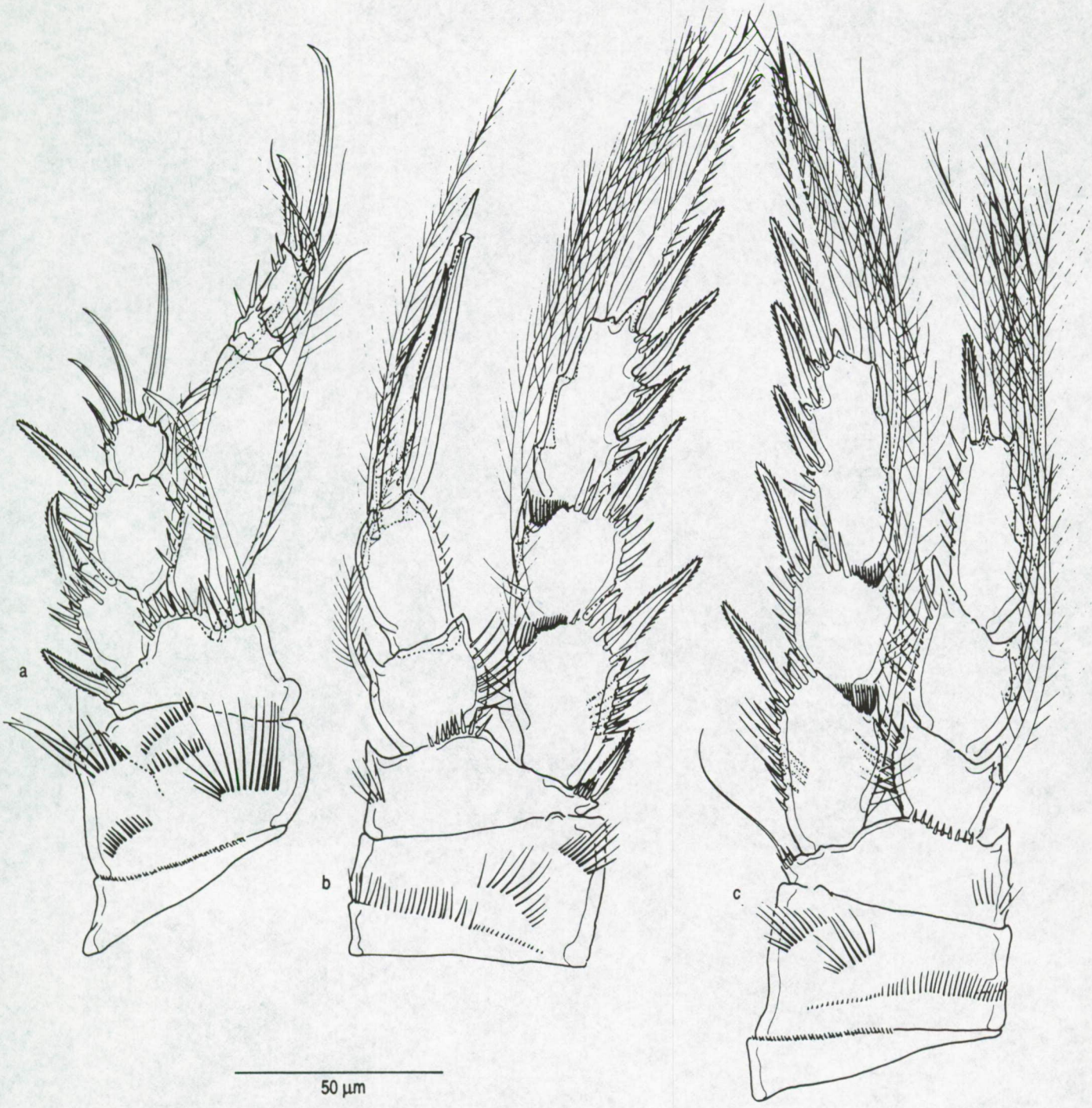

a
b
c
50 µm

Fig. 141. ***Amphiascopsis thalestroides*** **Sars, male. a, P4; b, P5; c, P6.**

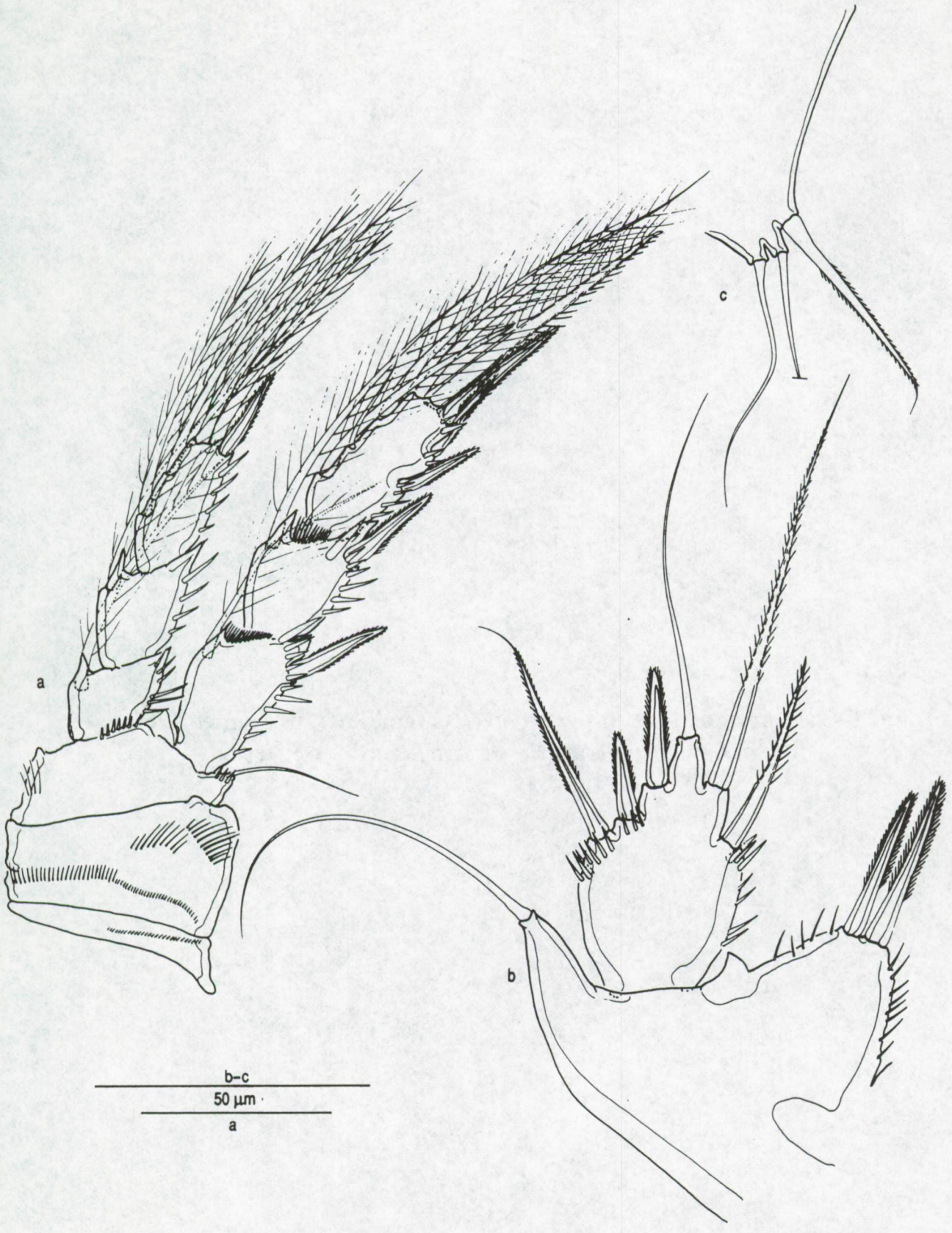

a
b
c
b–c
50 µm
a

Fig. 142. ***Robertgurneya rostrata*** **Gurney, female. a, urosome, dorsal; b, urosome, ventral (P5 bearing-somite omited).**

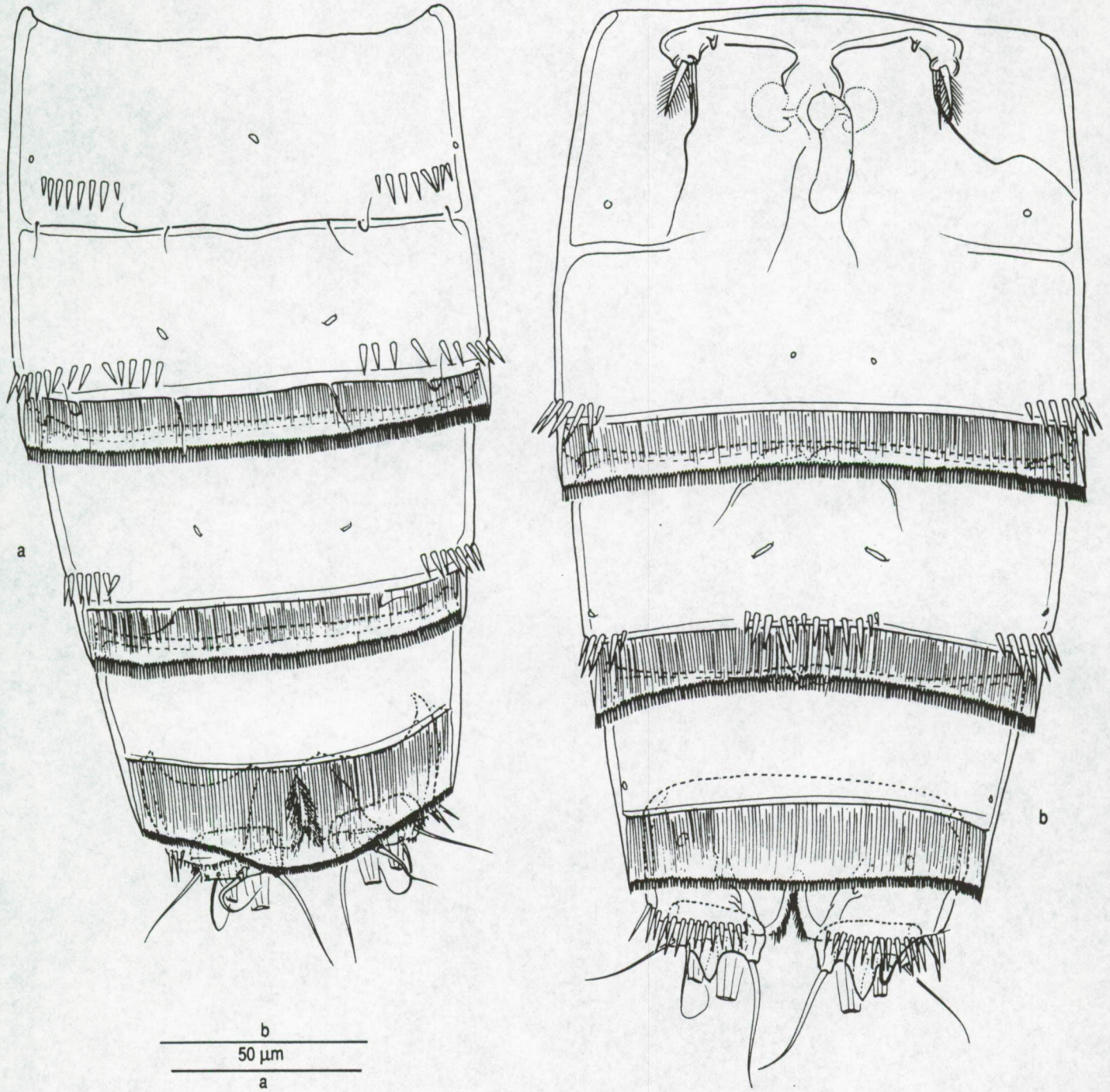

a
b
b
50 µm
a

Fig. 143. ***Robertgurneya rostrata*** **Gurney, female. a, antennule, exploded; b, antenna; c, mandible; d, maxillule; e, maxilla, exploded; f, maxilliped.**

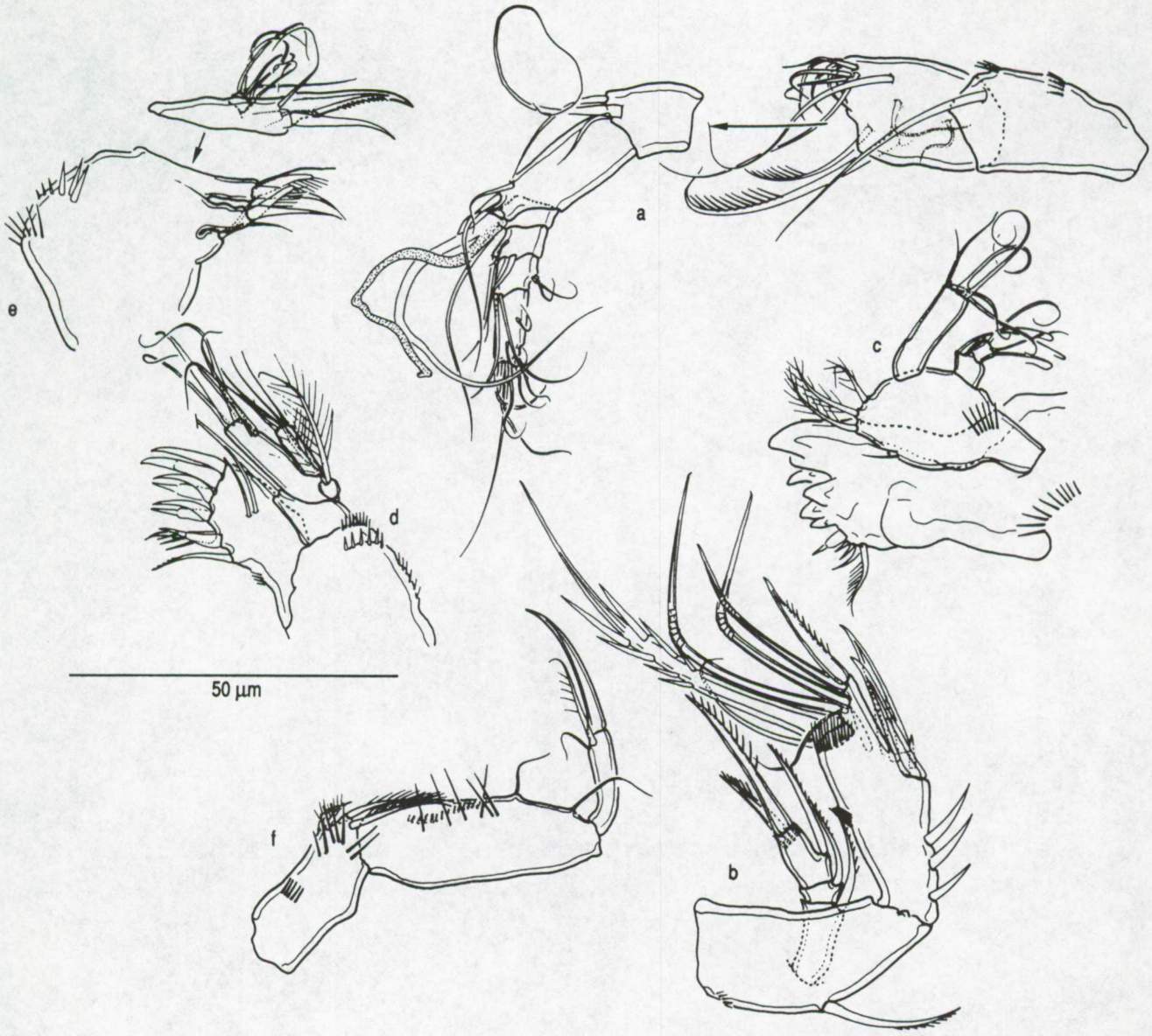

a
b
c
d
e
f
50 µm

Fig. 144. ***Robertgurneya rostrata*** **Gurney, female. a, P1; b, P2; c, P3; d, P4; e, P5.**

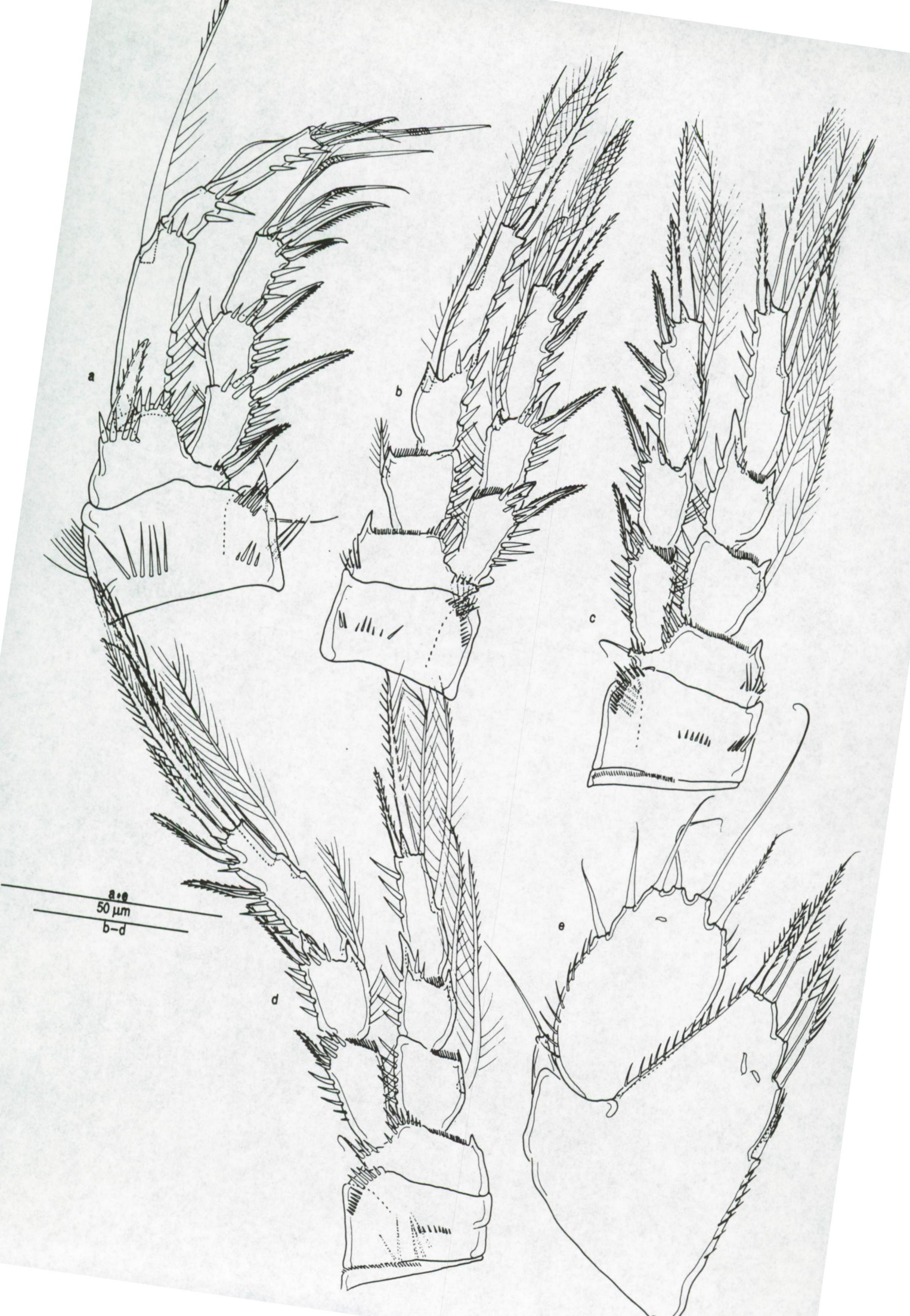

a
b
c
d
e
a–e
50 µm
b–d

Fig. 145. ***Robertgurneya rostrata*** **Gurney, male. a, habitus, dorsal; b, urosome, ventral (P5 bearing-somite omited).**

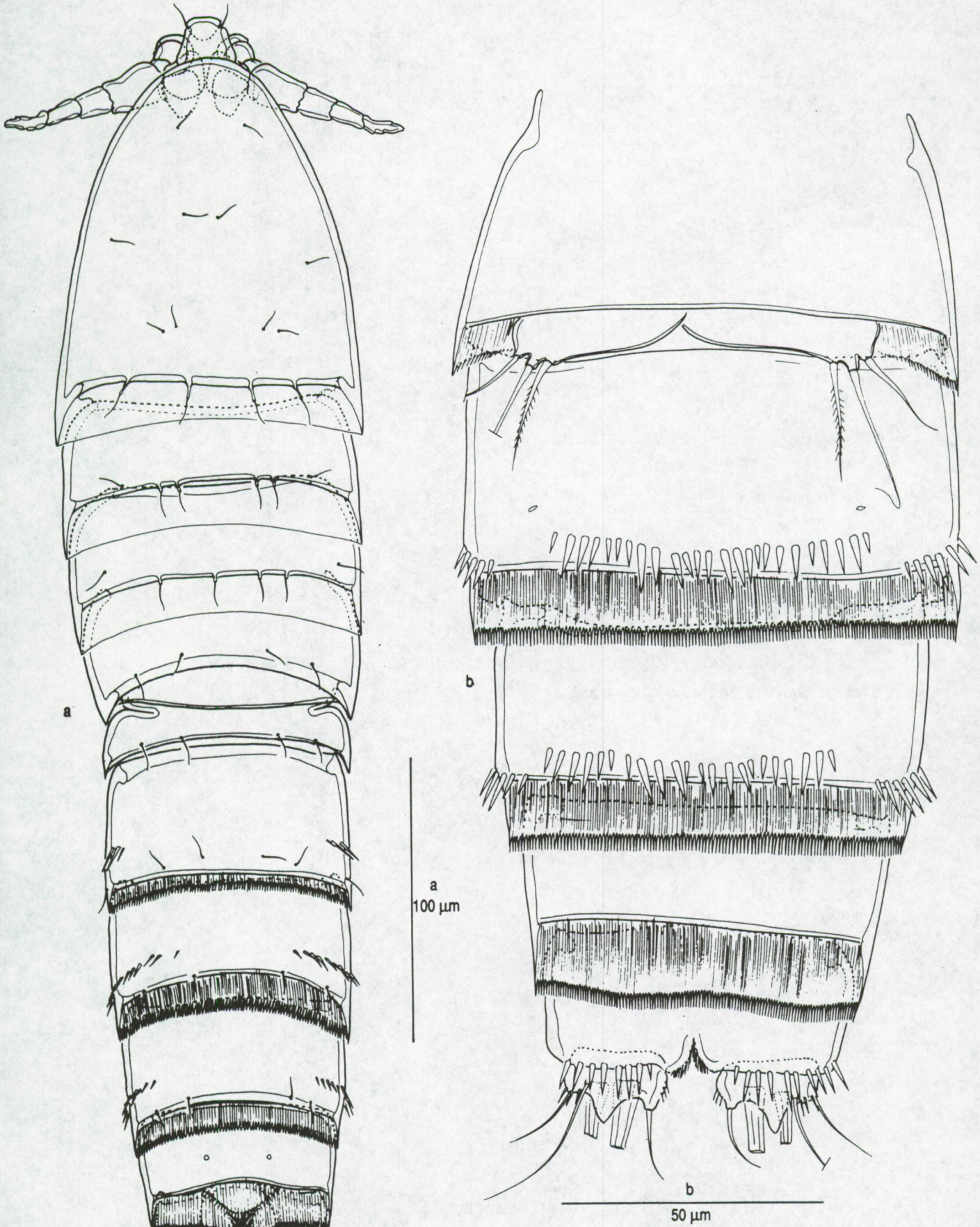

a
b
a
100 µm
b
50 µm

Fig. 146. ***Robertgurneya rostrata*** **Gurney, male. a, rostrum; b, antennule, exploded; c, basis of P1; d, P2 ENP; e, P5; f, EXP of P5, another view.**

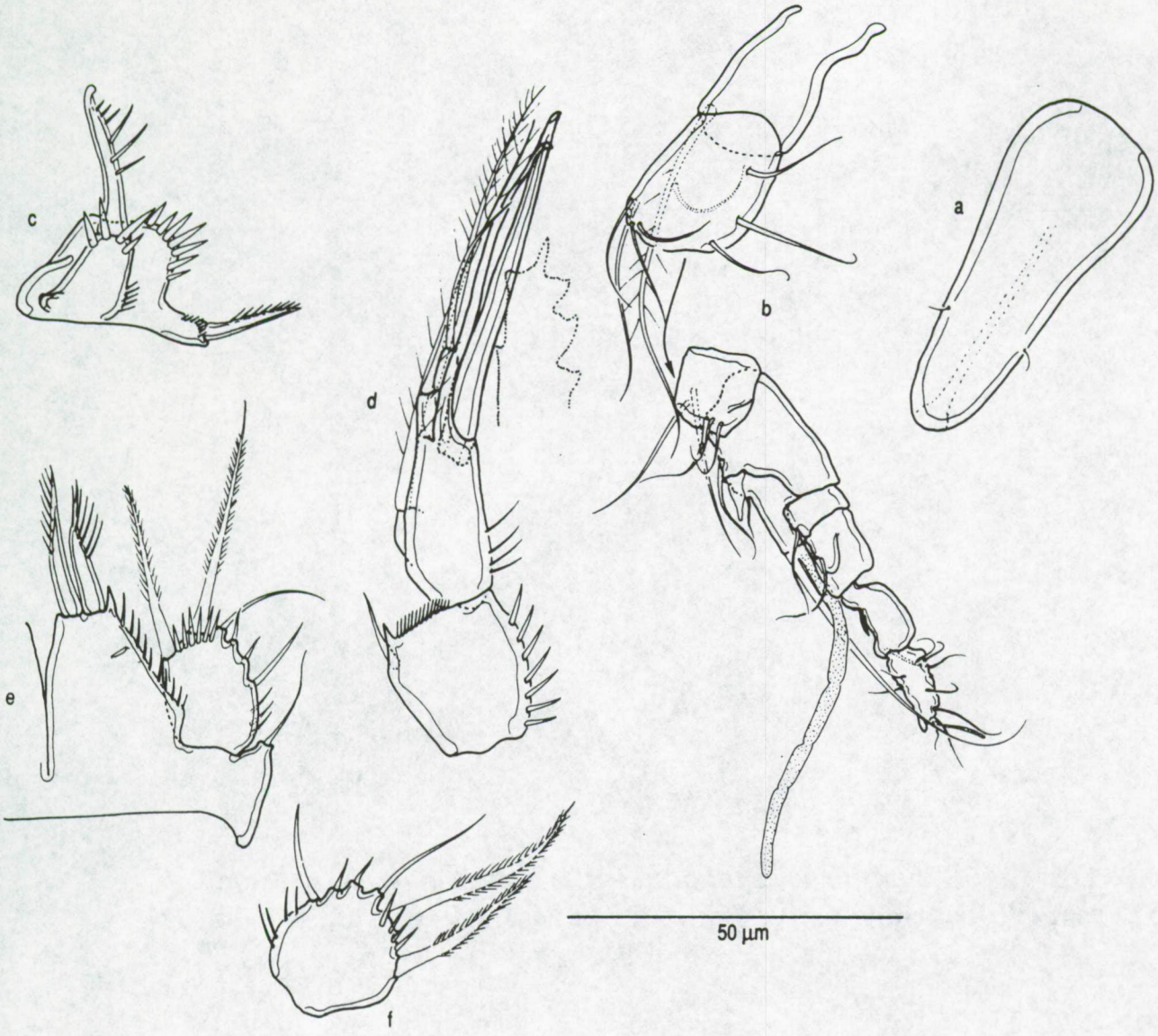

a
b
c
d
e
f
50 µm

Fig. 147. ***Robertgurneya falklandiensis*** **Lang, male. a, urosome, dorsal (P5 bearing-somite omited); b, urosome, ventral, showing P5 and P6.**

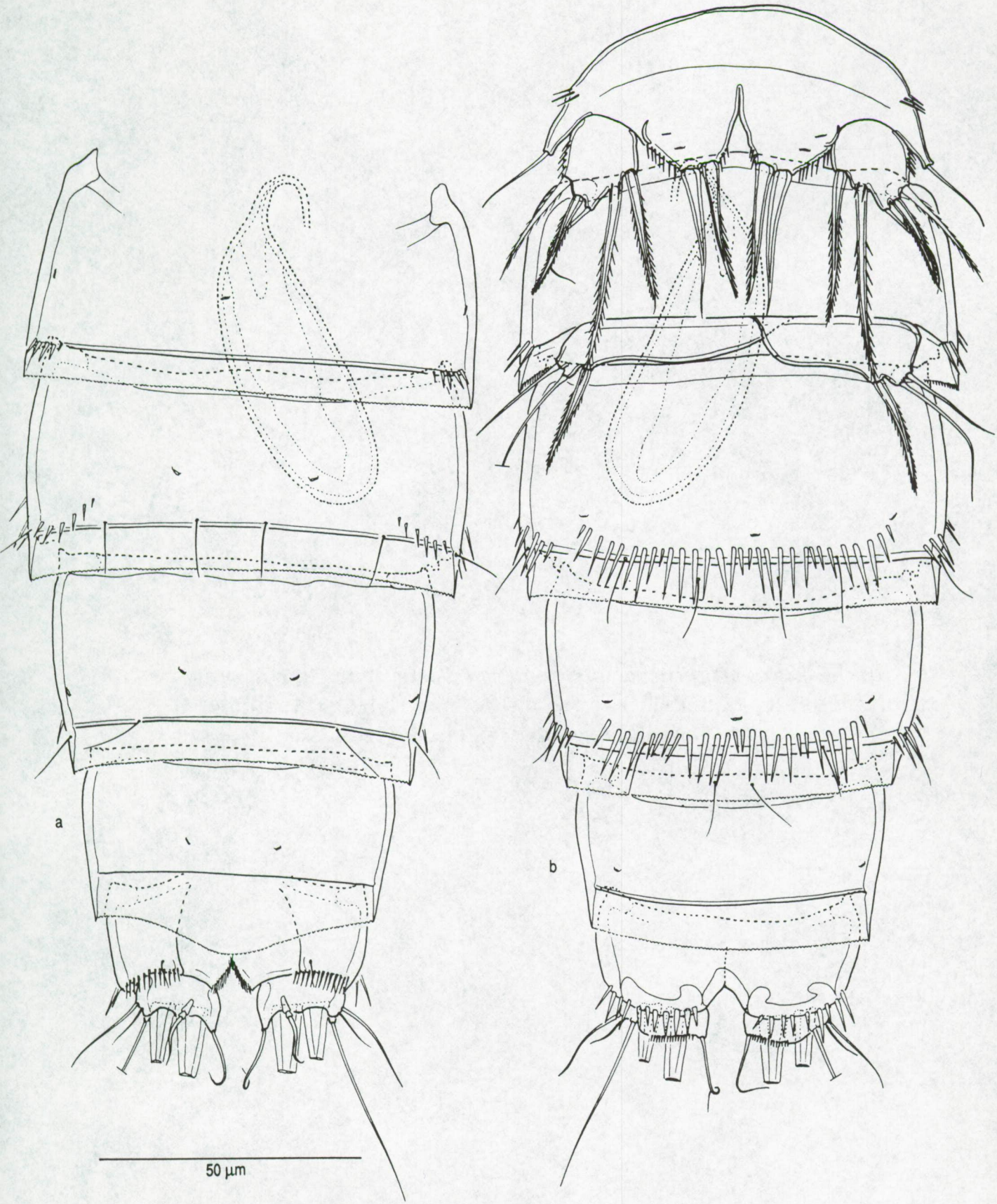
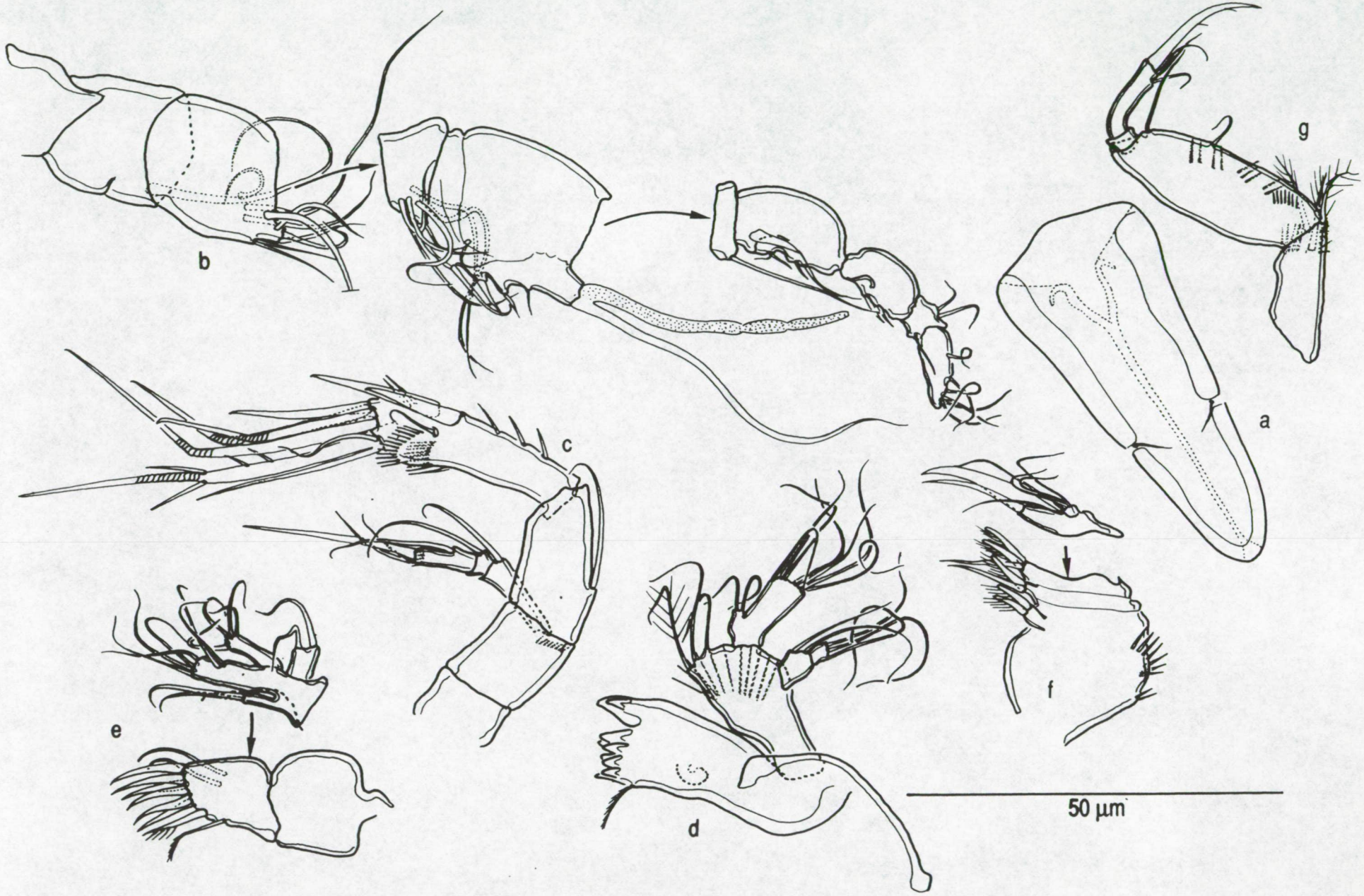

a
b
50 µm

Fig. 148. ***Robertgurneya falklandiensis*** **Lang, male. a, rostrum; b, antennule, exploded; c, antenna; d, mandible; e, maxillule; f, maxilla, exploded; g, maxilliped.**


b
c
a
g
e
d
f
50 µm

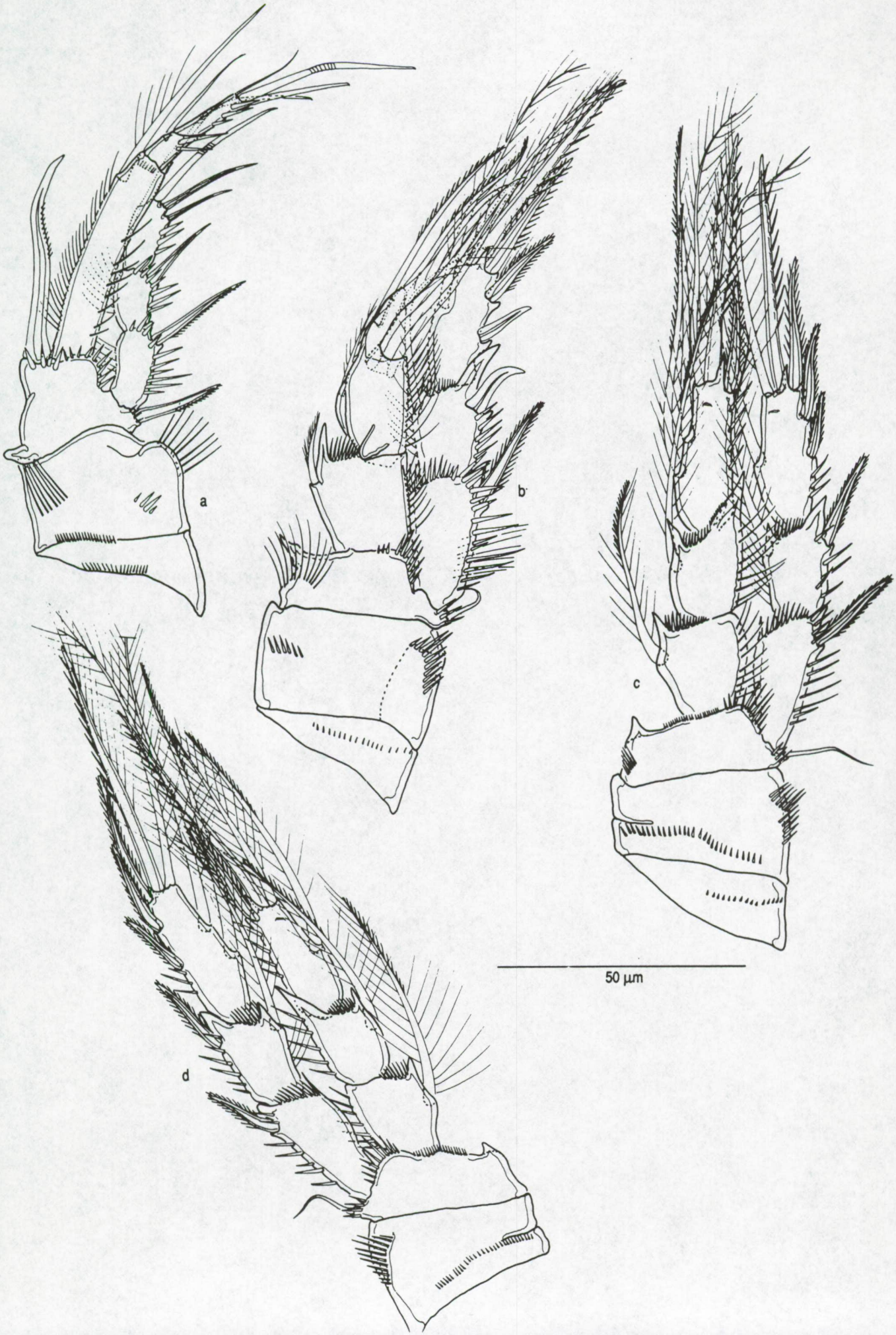

a
b
c
d
50 µm

Fig. 150. ***Robertgurneya n. sp. 1*****, female. Double genital somite and fourth urosomite, ventral.**

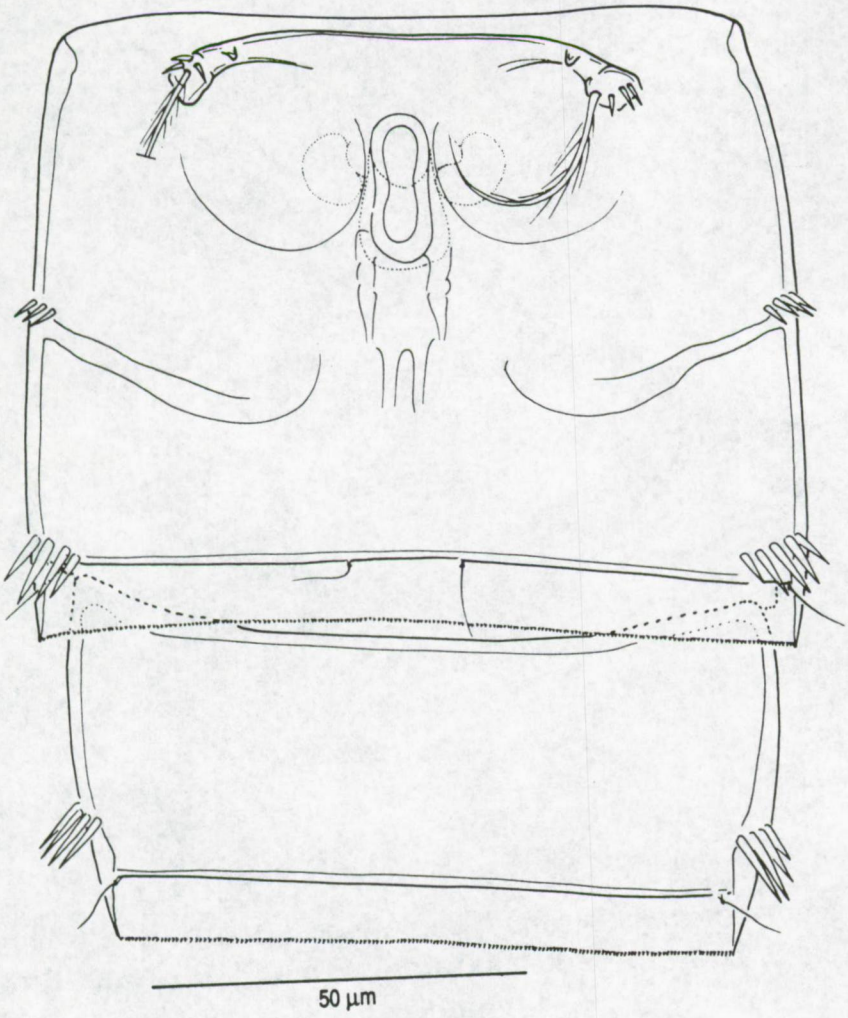

50 µm

Fig. 151. ***Robertgurneya n. sp. 1*****, female. a, antennule, exploded; b, antenna; c, mandible; d, maxillule; e, maxilla; f, maxilliped, exploded.**


a
b
c
d
e
f
50 µm

Fig. 152. *Robertgurneya n. sp. 1*, female. a, P1; b, P2; c, P3.

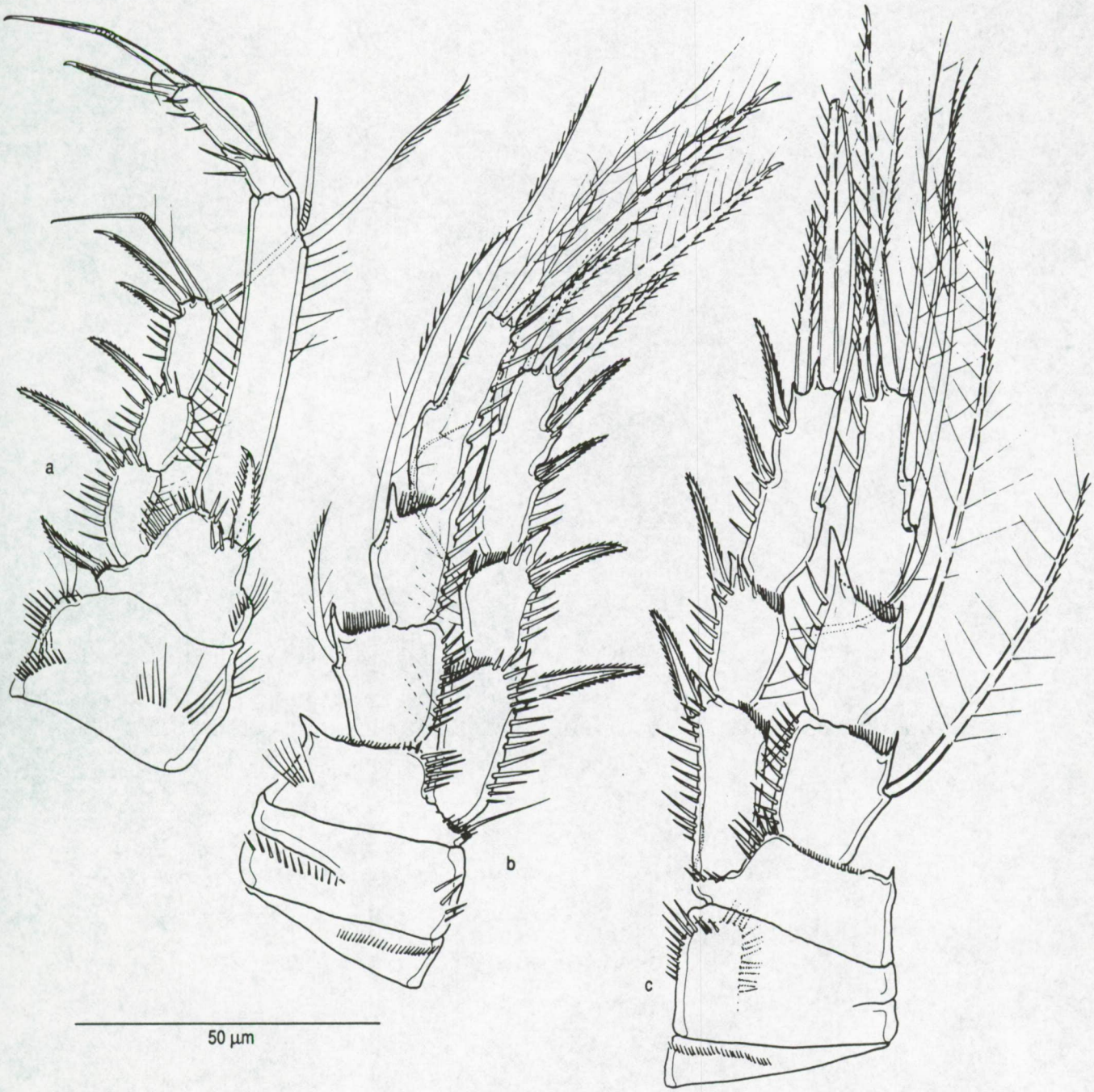

a
b
c
50 µm

Fig. 153. ***Robertgurneya n. sp. 1*****, female. a, P4 (protopodal elements omited); b, P5.**

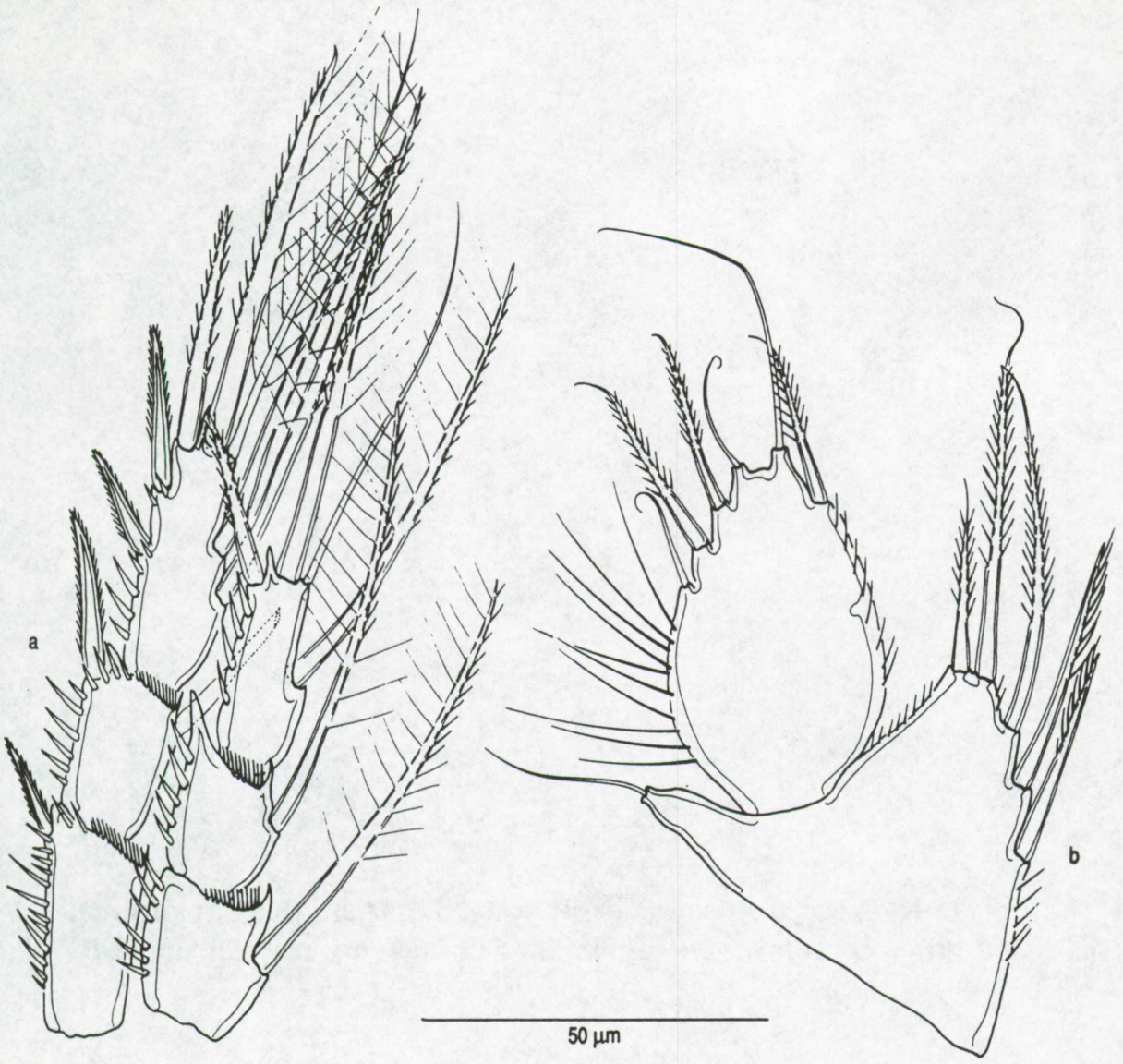

a
b
50 µm

Fig. 154. ***Robertgurneya n. sp. 1***, **male. a, antennule; b, urosome, dorsal; c, urosome, ventral (P5 and P6 bearing somites omited).**

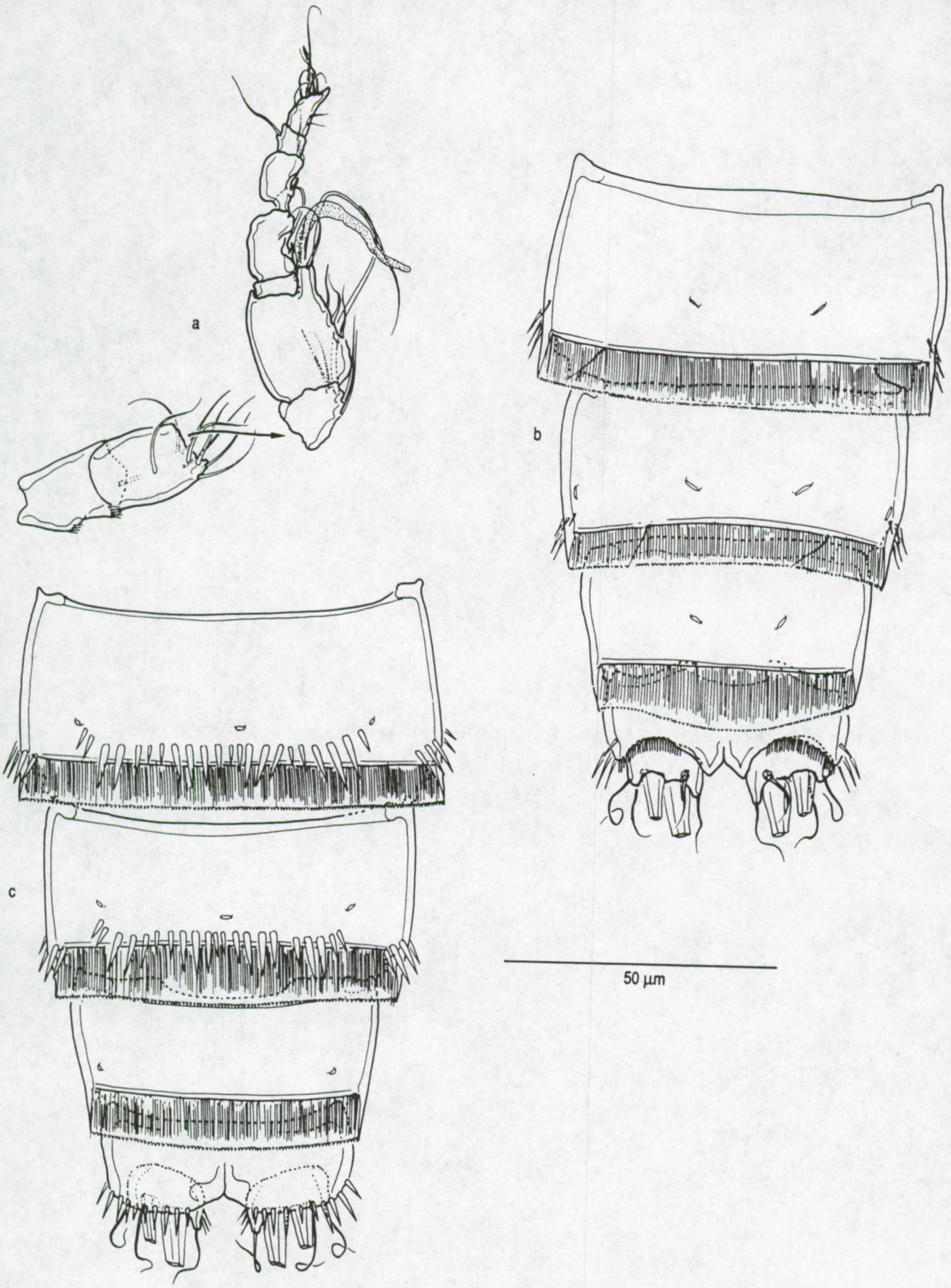

a
b
c
50 µm

Fig. 155. ***Robertgurneya n. sp. 1***, **male. a, basis of P1, dashed line indicates position of ENP 1 and EXP 3; b, P2 ENP, dashed line indicates EXP 3; c, P5; d, P6.**

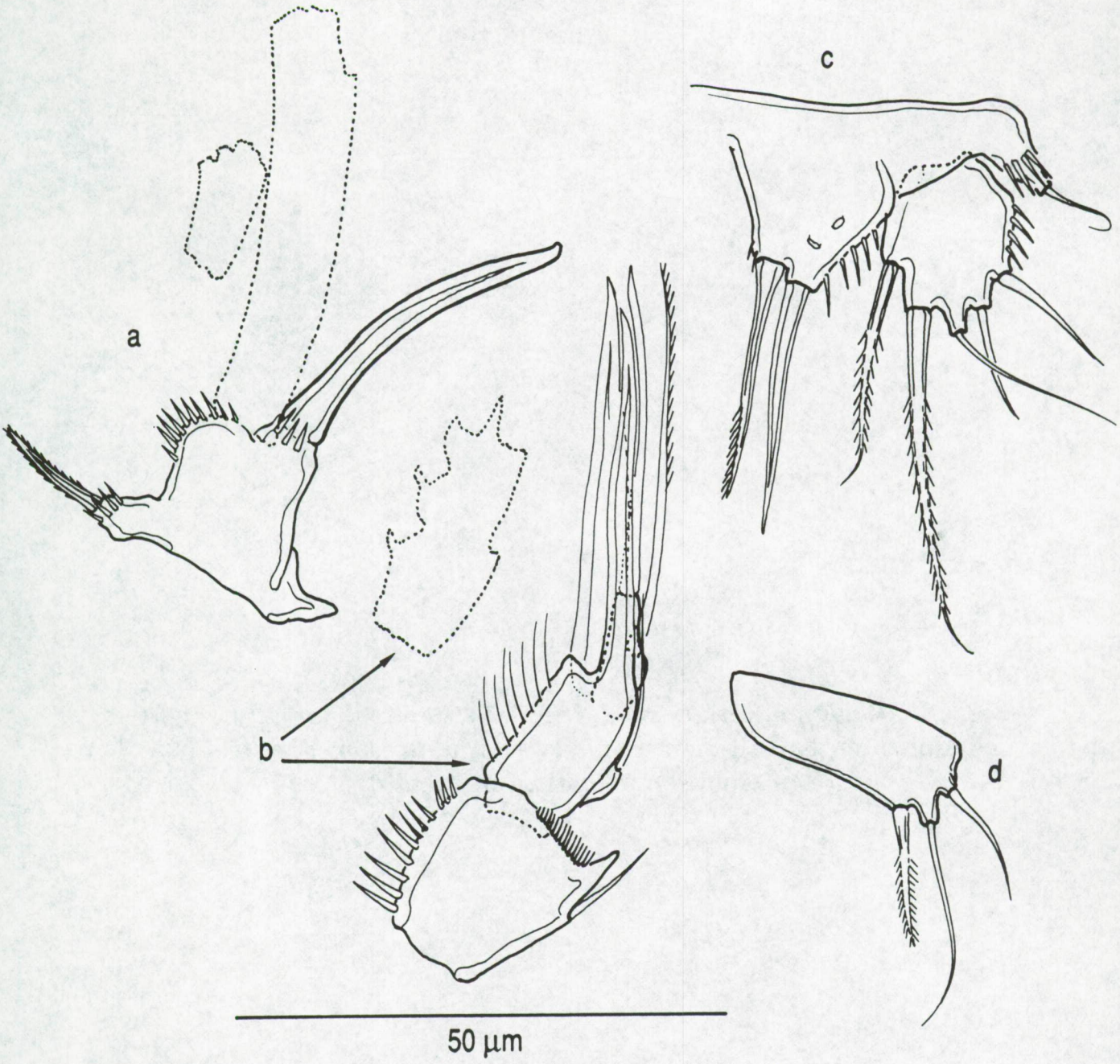

a
b
c
d
50 µm

Fig. 156. ***Robertgurneya n. sp. 2*****, female. a, habitus, dorsal; b, right caudal rami, dorsal; c, urosome, lateral; d, urosome, ventral (P5 bearing-somite omited in c and d).**

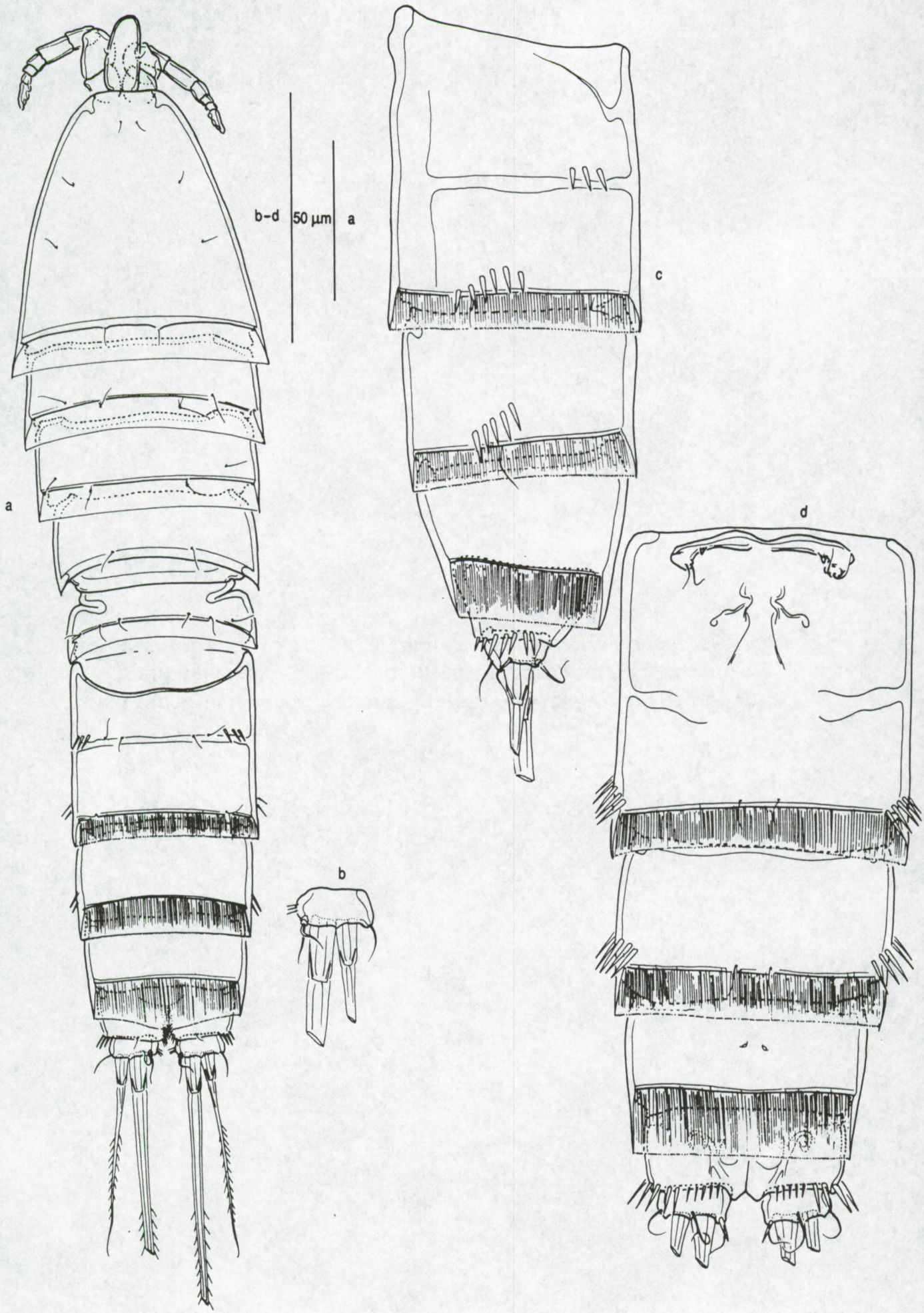

b-d
50 µm
a
a
b
c
d

Fig. 157. ***Robertgurneya n. sp. 2*****, female. a, rostrum; b, antennule; c, antenna; d, mandibular gnathobasis; e, mandibular palp, endopodite missing; f, maxillule; g, maxilla; h, maxillipedal palm.**

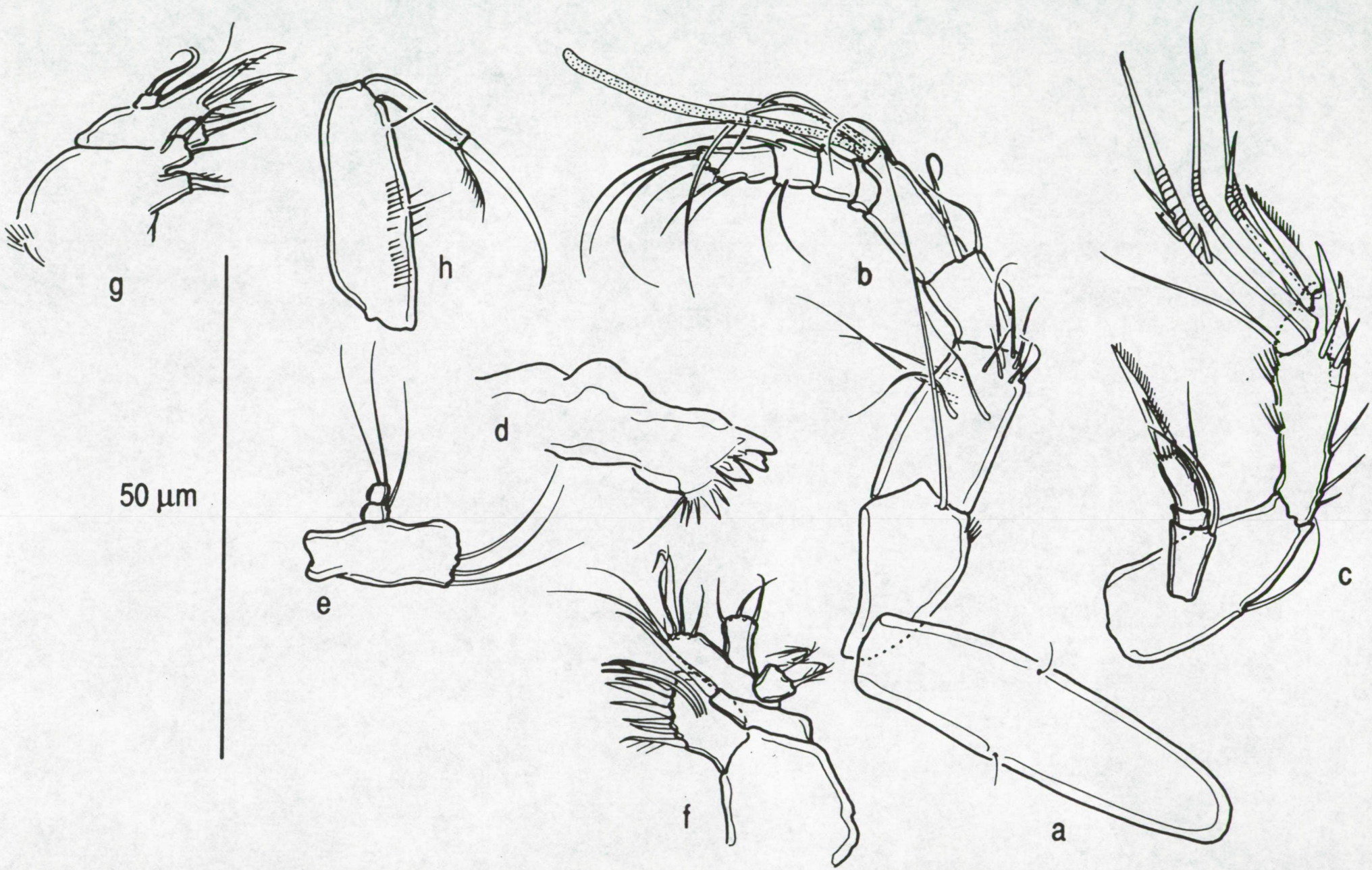

g
h
b
c
d
50 µm
e
f
a

Fig. 158. ***Robertgurneya n. sp. 2*****, female. a, P1; b, P2; c, P3; d, P4; e, P5.**

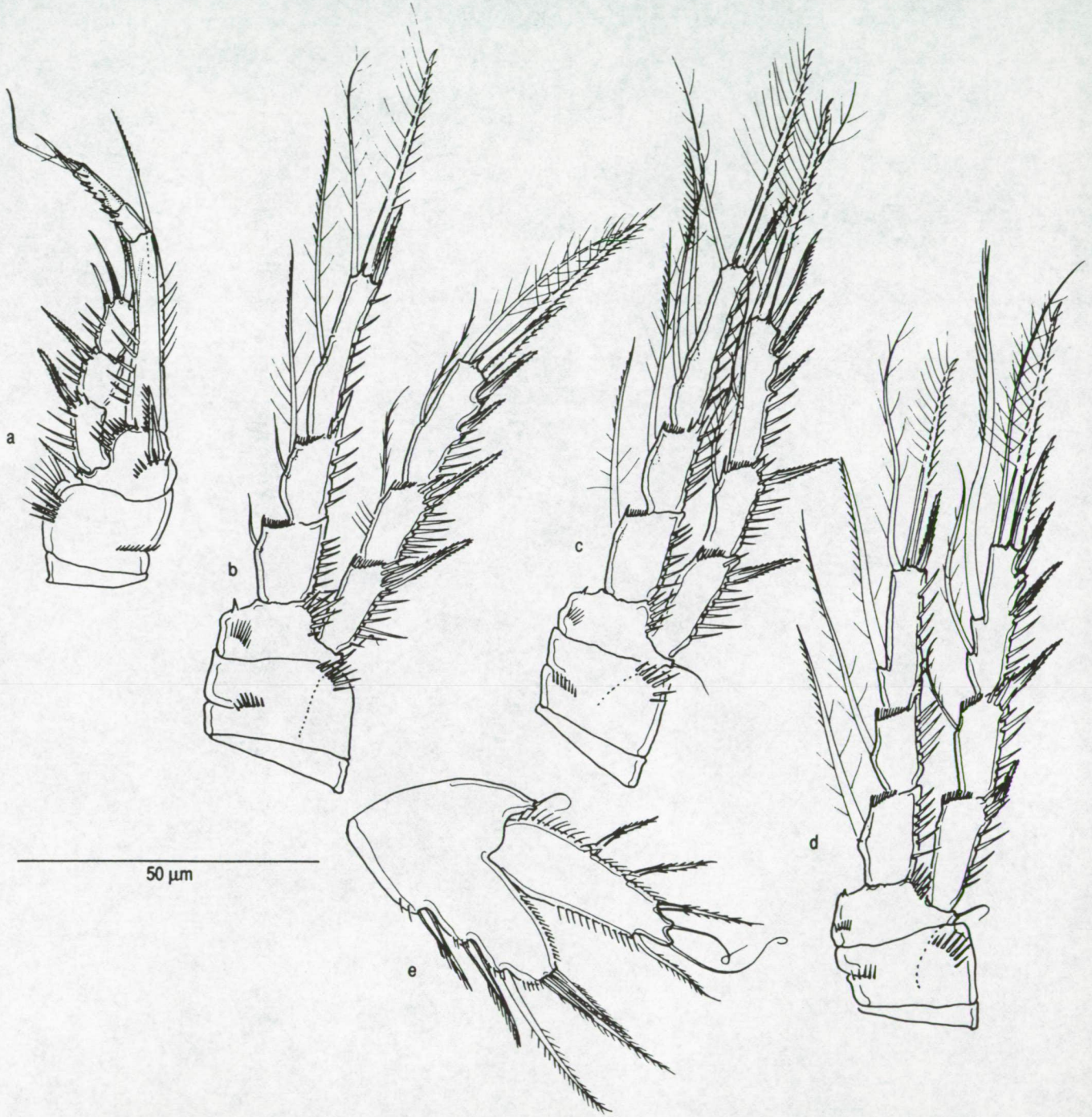
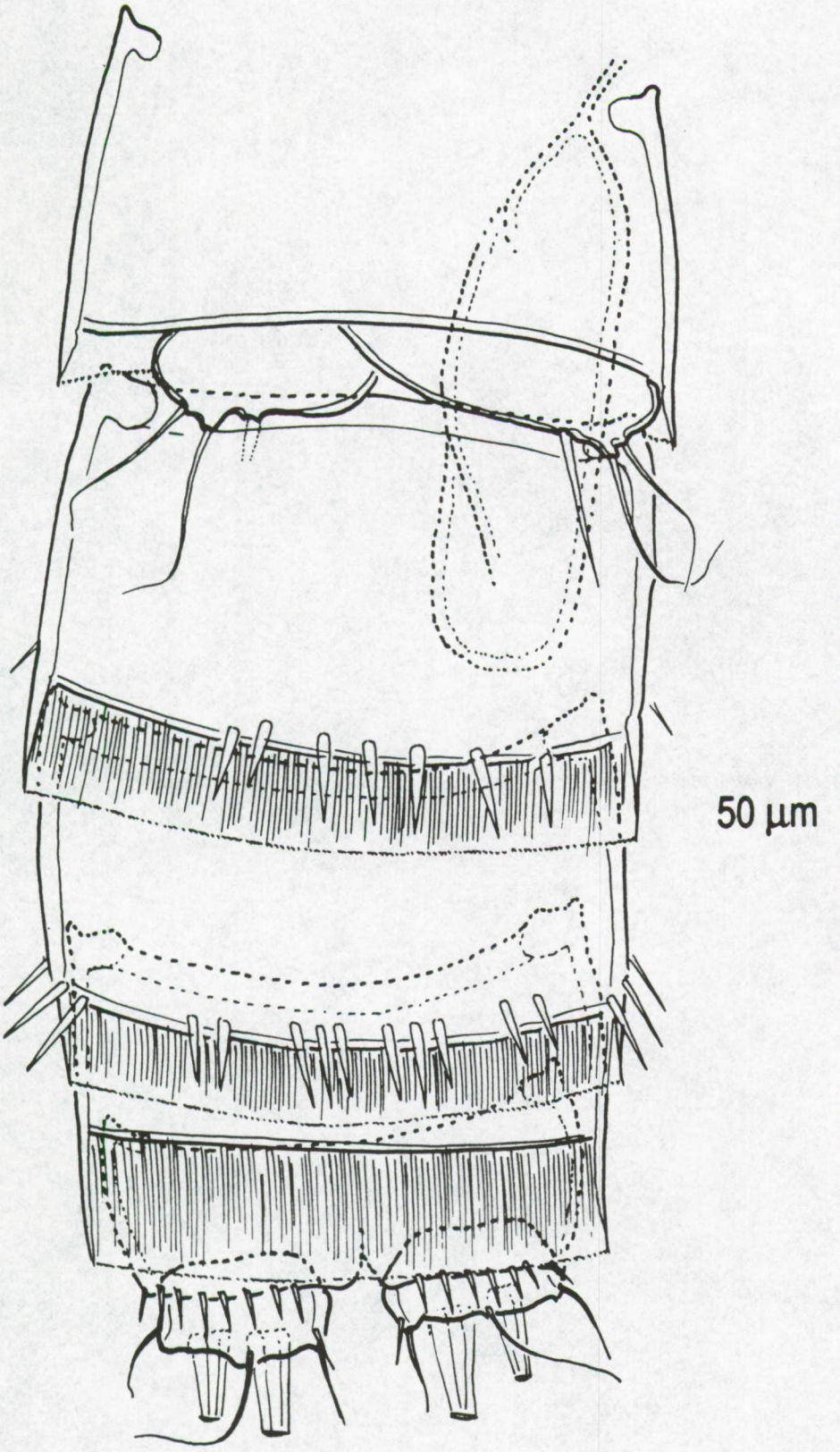

a
b
c
d
e
50 µm

Fig. 159. *Robertgurneya n. sp. 2*, male. Urosome, ventral, showing P6 (P5 bearing somite omited).


50 µm

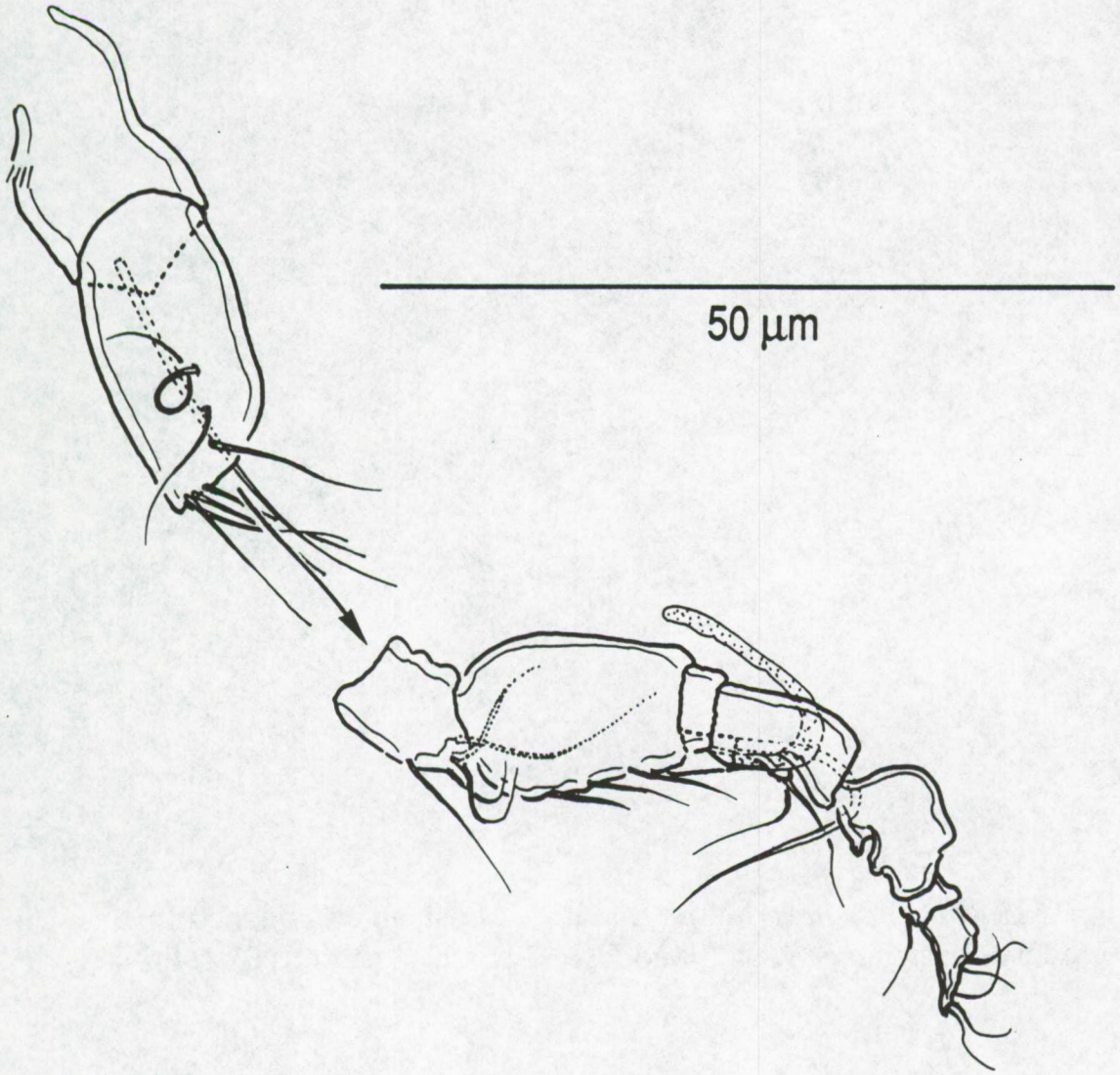

50 µm

Fig. 161. ***Robertgurneya n. sp. 2*****, male. a, basis of P1, dashed line indicates position of EXP 3 and ENP 1; b, P2 ENP; c, P5; d, P6.**

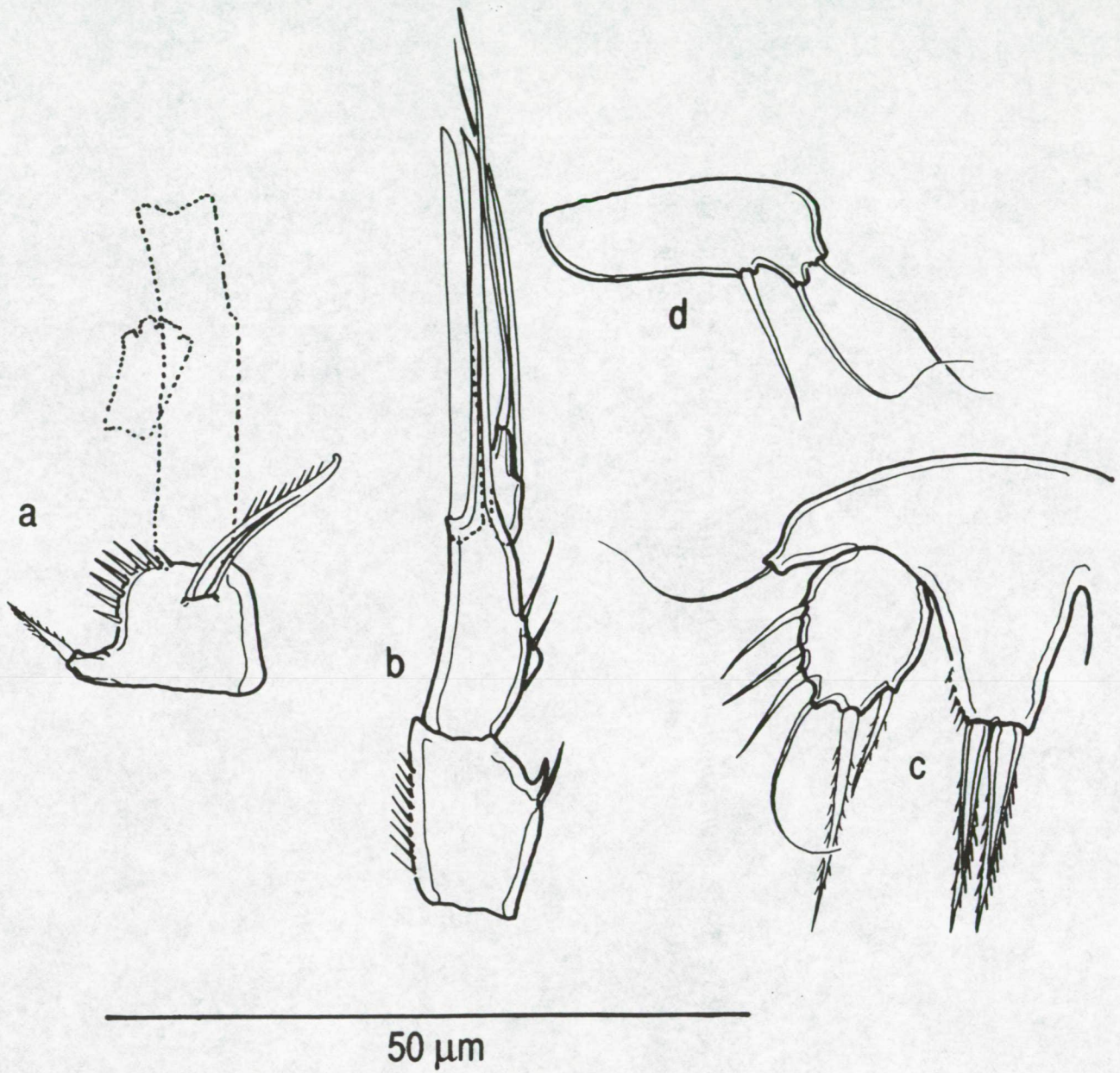

a
b
c
d
50 µm

Fig. 162. ***Typhlamphiascus lamellifer*** **Sars, female. a, urosome, dorsal; b, urosome ventral (P5 bearing-somite omited).**

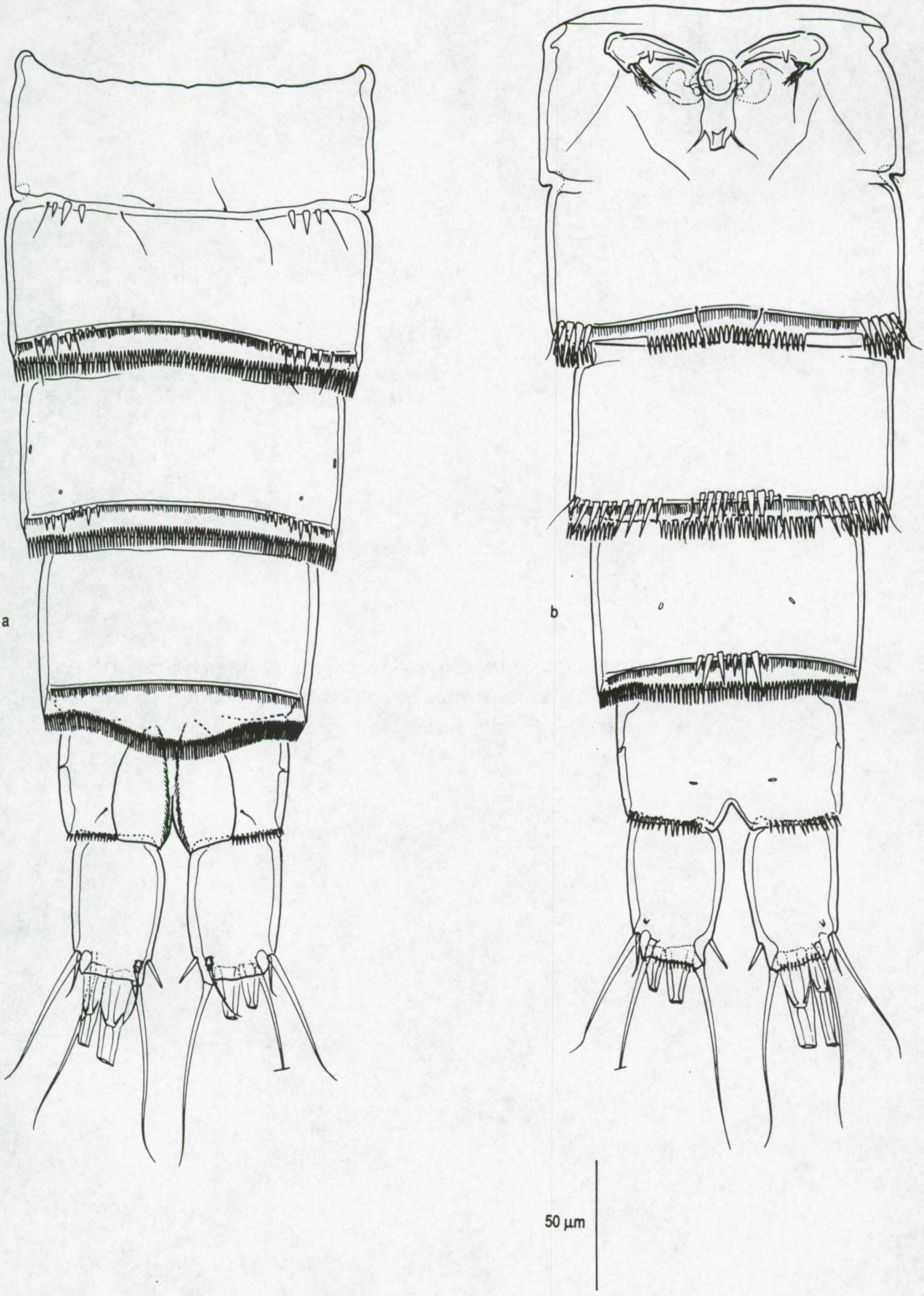

a
b
50 µm

Fig. 163. ***Typhlamphiascus lamellifer*** **Sars, female. a, rostrum; b, antennule, exploded; c, antenna; d, mandible, exploded; e, maxillule; f, maxilla; g, maxilliped.**


a
b
c
d
e
f
g
50 µm

Fig. 164. ***Typhlamphiascus lamellifer*** **Sars, female. a, P1; b, P2; c, P3.**


a
b
c
50 µm

Fig. 165. *Typhlamphiascus lamellifer* Sars, female. a, P4; b, P5.

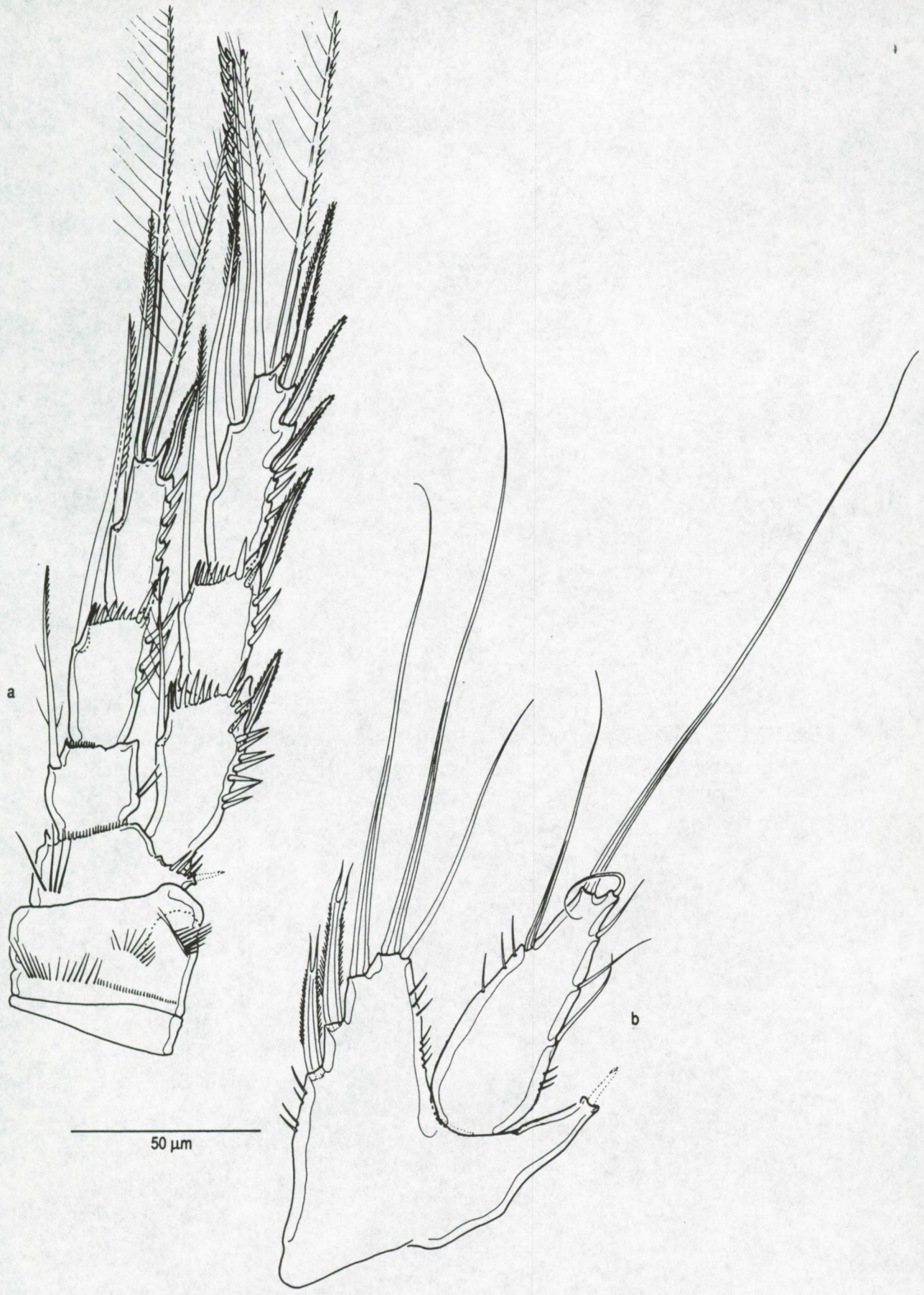

a
b
50 µm

Fig. 166. ***Typhlamphiascus lamellifer*** **Sars, male. a, urosome, ventral (P5 bearing-somite omited); b, antennule (armature omited).**

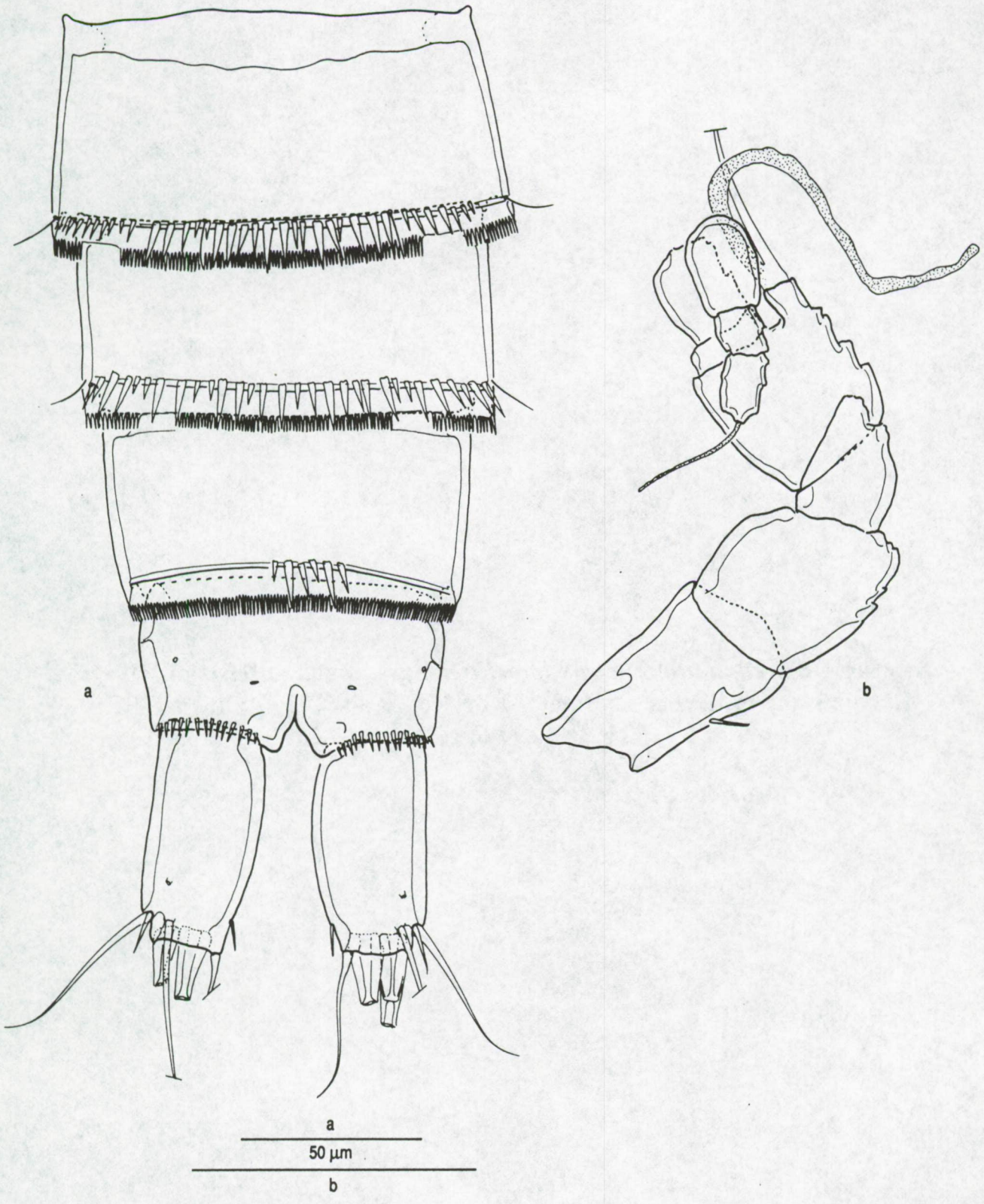

a
b
a
50 µm
b

Fig. 167. ***Typhlamphiascus lamellifer*** **Sars, male. a, basis of P1 (dashed line indicates position of P1 ENP 1 and EXP 3); b, P2 ENP; c, P5; d, P6; e, P3.**

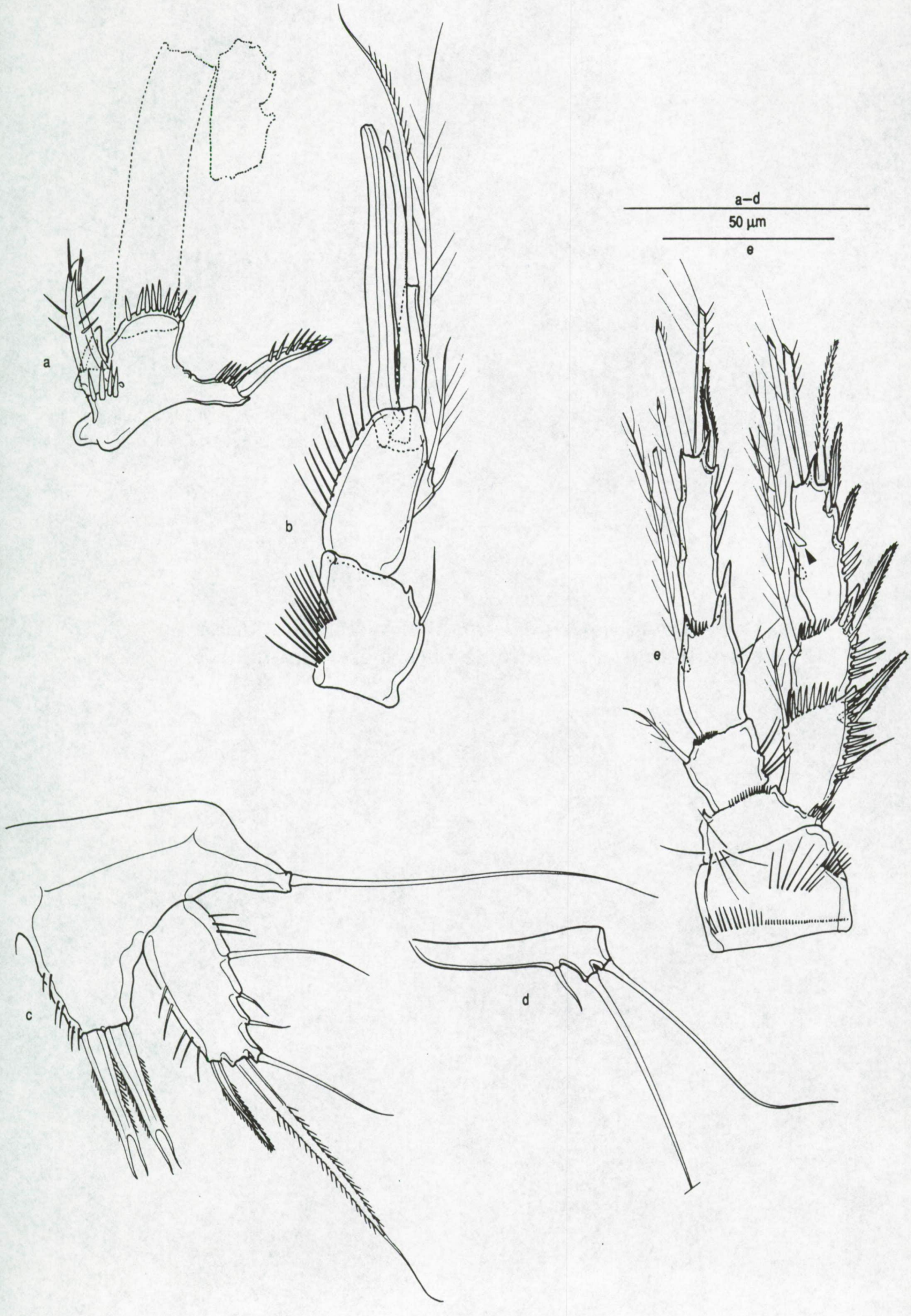

a–d
50 µm
e
a
b
c
d
e

Fig. 168. ***Amphiascoides subdebilis*** **Willey, female. a, urosome, dorsal; b, urosome, ventral (P5 bearing-somite omited)**

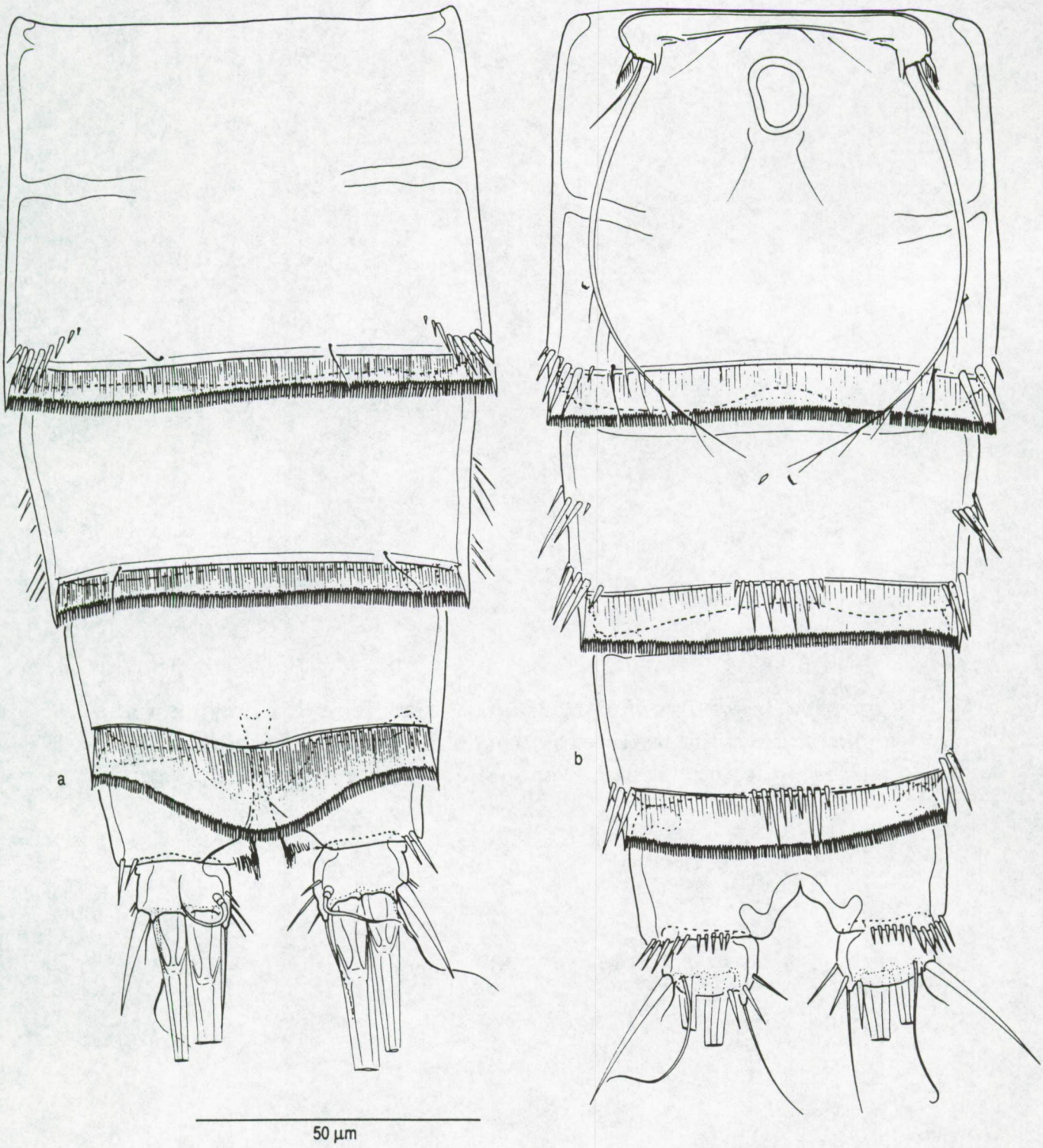

a
b
50 µm

Fig. 169. ***Amphiascoides subdebilis*** **Willey, female. a, rostrum and antennule, the latter exploded; b, antenna; c, mandible; d, maxillile; e, maxilla; f, endopodal segment of maxilliped.**

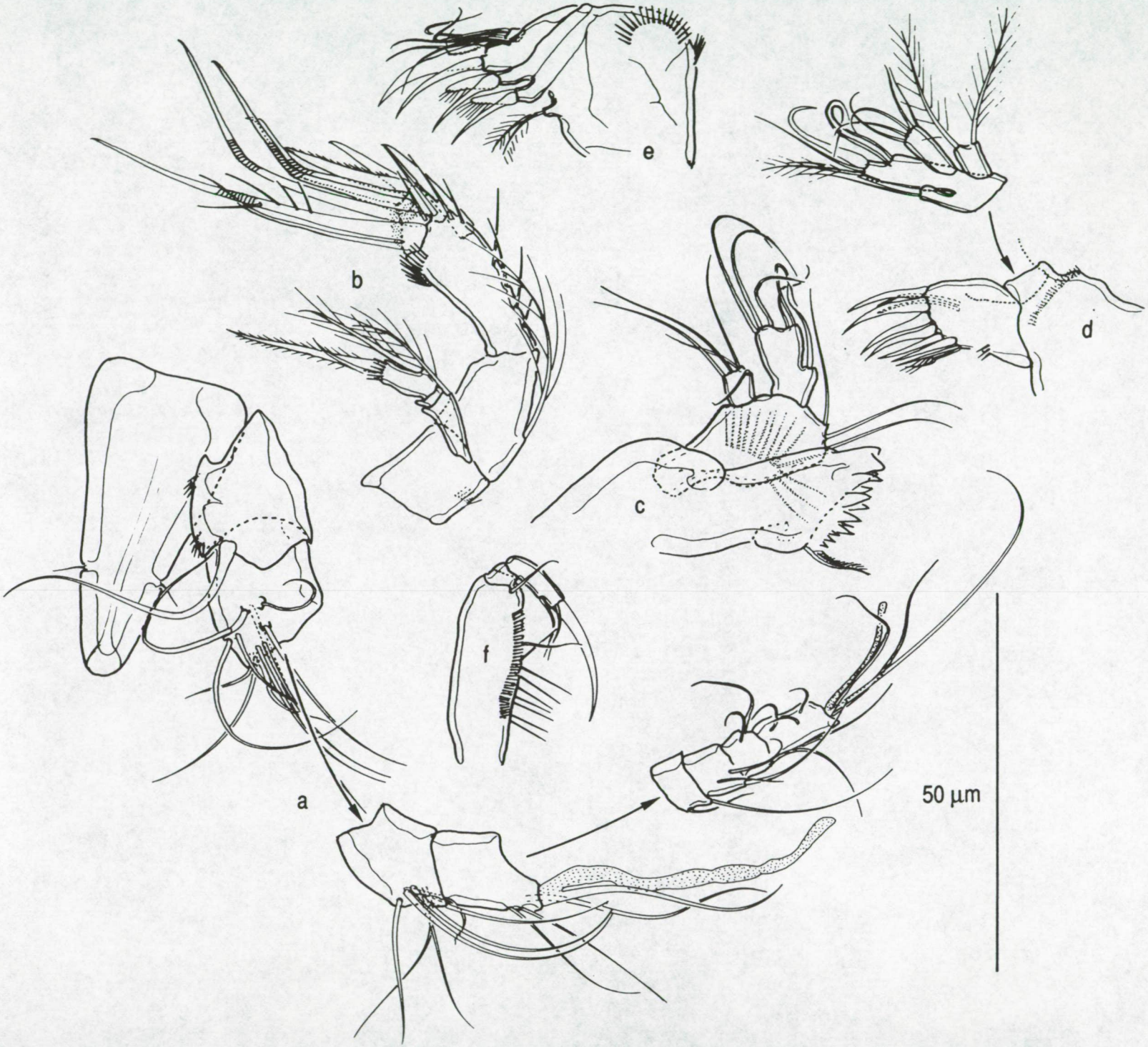

a
b
c
d
e
f
50 µm

Fig. 170. ***Amphiascoides subdebilis*** **Willey, female. a, P1; b, P2; c, P3; d, P4; e, P5.**

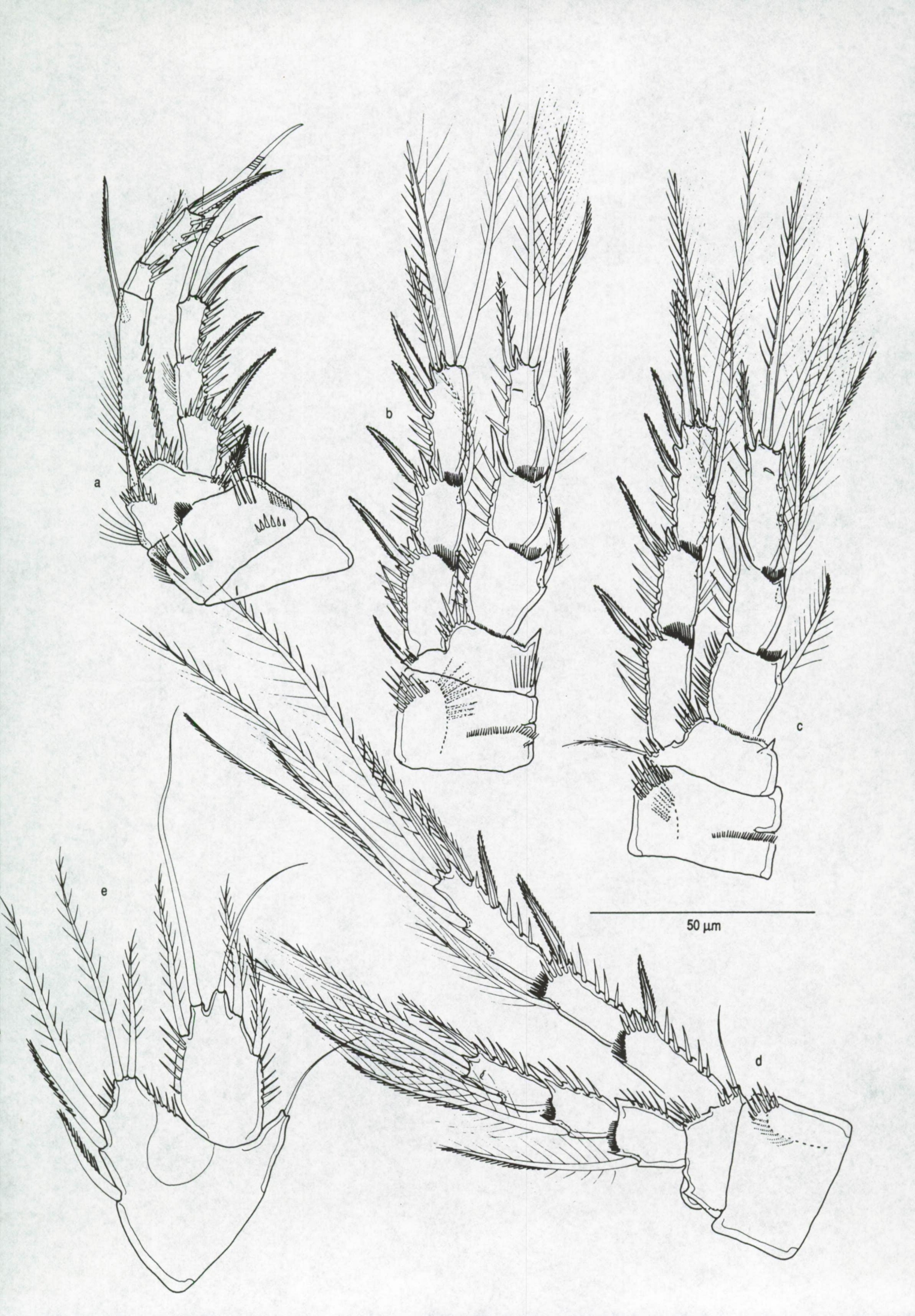

a
b
c
d
e
50 µm

Fig. 171. ***Amphiascoides subdebilis*** **Willey, male. a, habitus, dorsal..**

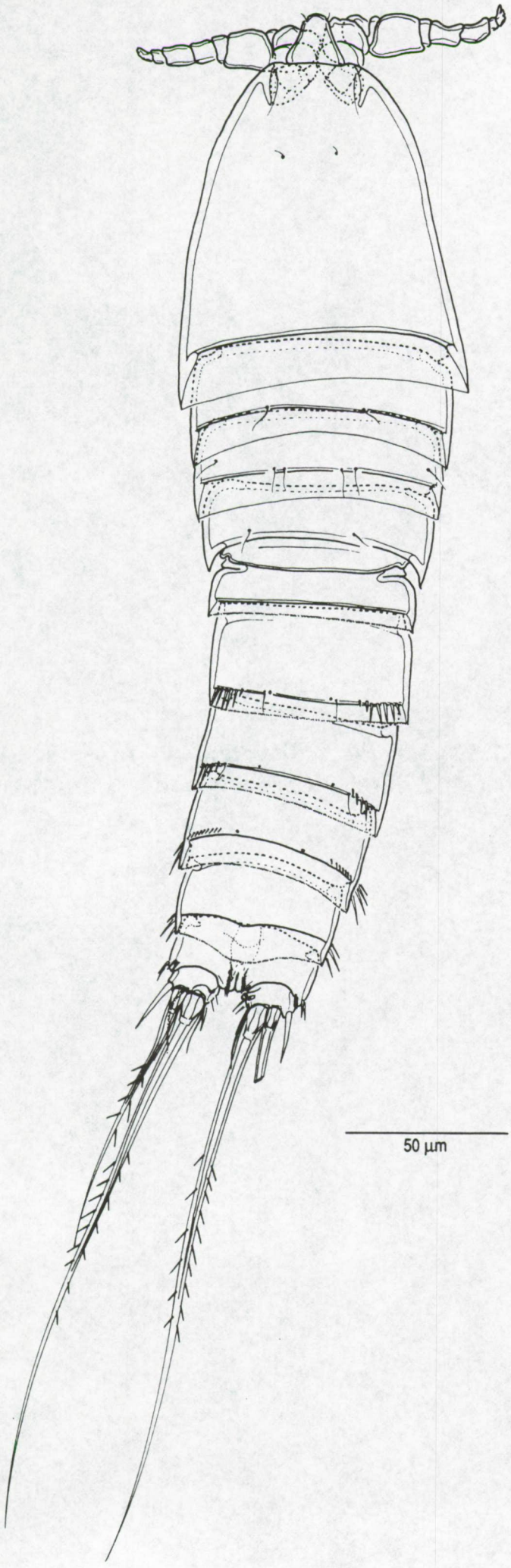

50 µm

Fig. 172. ***Amphiascoides subdebilis*** **Willey, male. a, urosome, dorsal; b, urosome, ventral (P5 and P6 bearing-somites omited).**

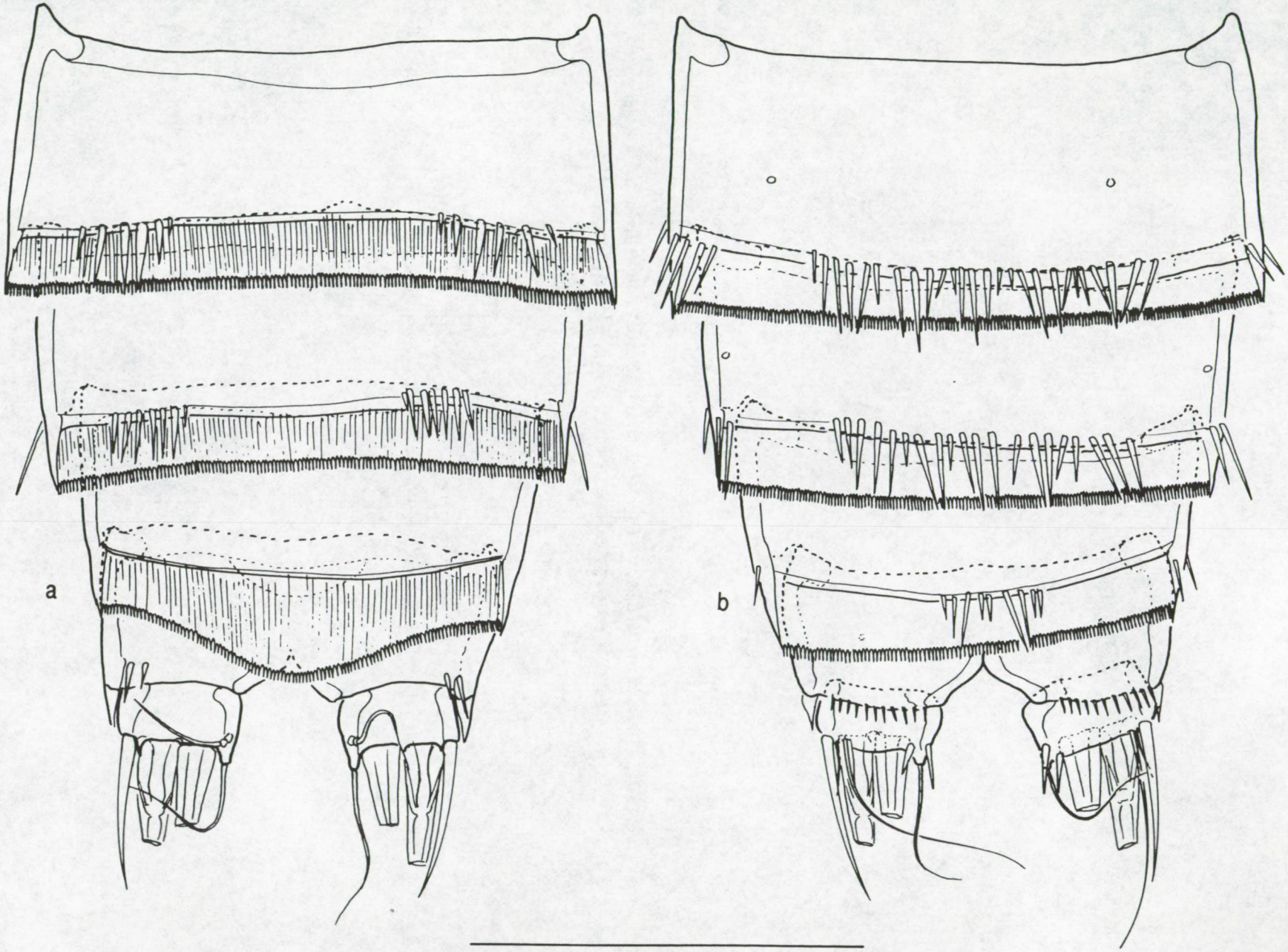

a
b
50 µm

Fig. 173. ***Amphiascoides subdebilis*** **Willey, male. a, antennule, armature omited; b, P1; c, P2 ENP; d, P5; e, P6.**

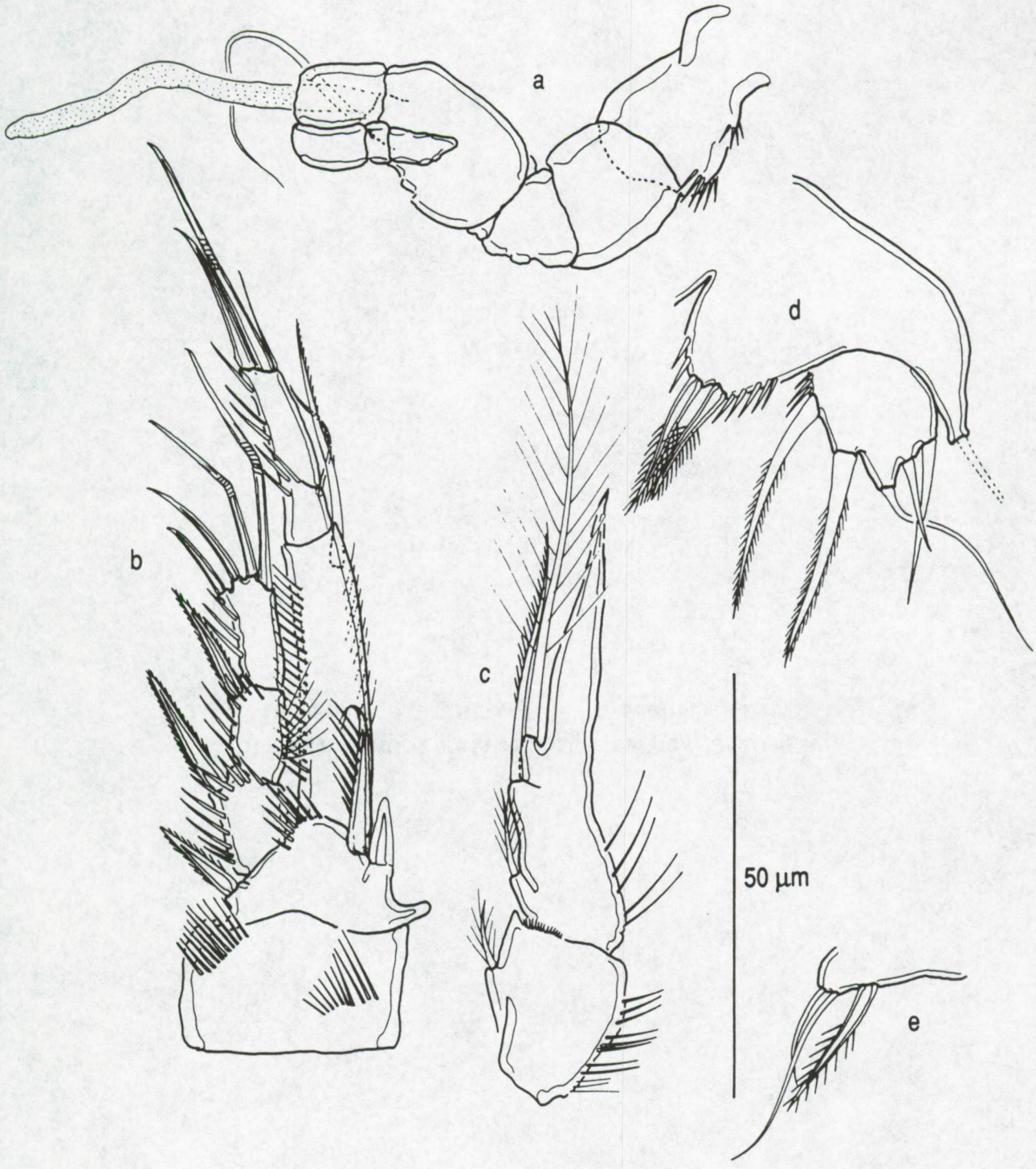

a
b
c
d
e
50 µm

Fig. 174. ***Haloschizopera n. sp. 1*****, female. a, urosome, dorsal; b, urosome, ventral (P5 bearing-somite omited).**

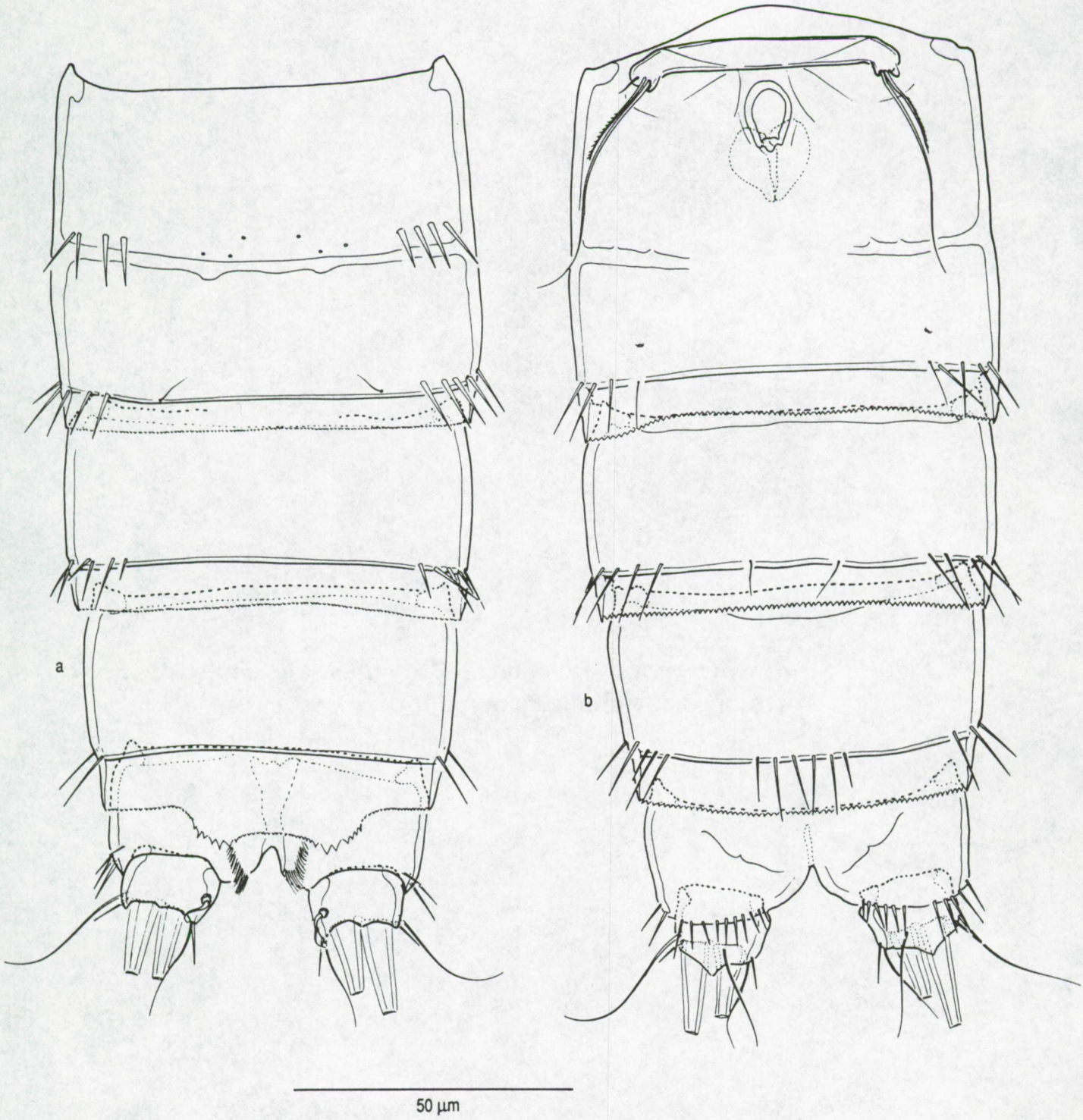

a
b
50 µm

Fig. 175. ***Haloschizopera n. sp. 1*****, female. a, antennule, exploded; b, antenna; c, mandible; d, maxilliped; e, rostrum.**

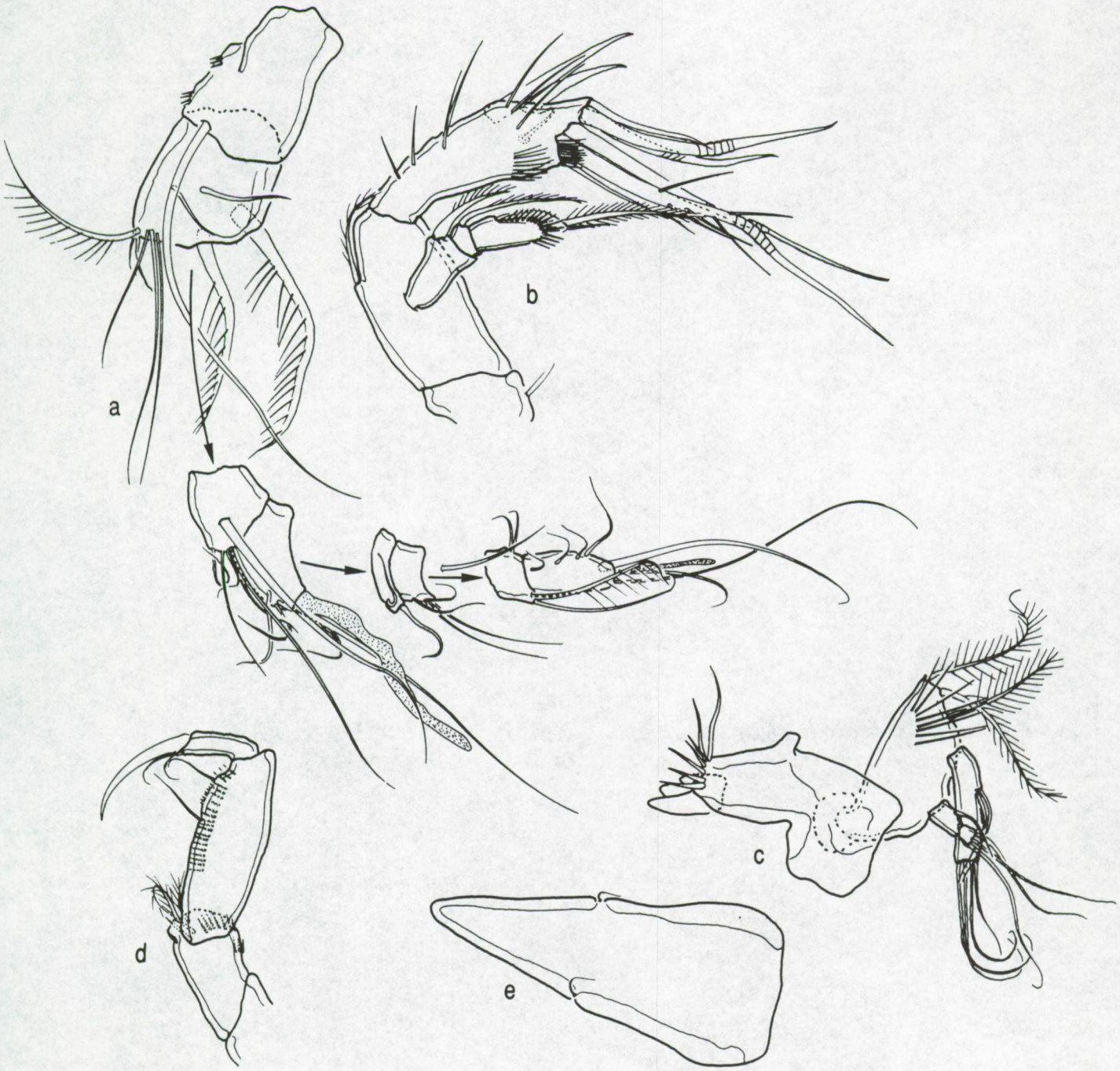
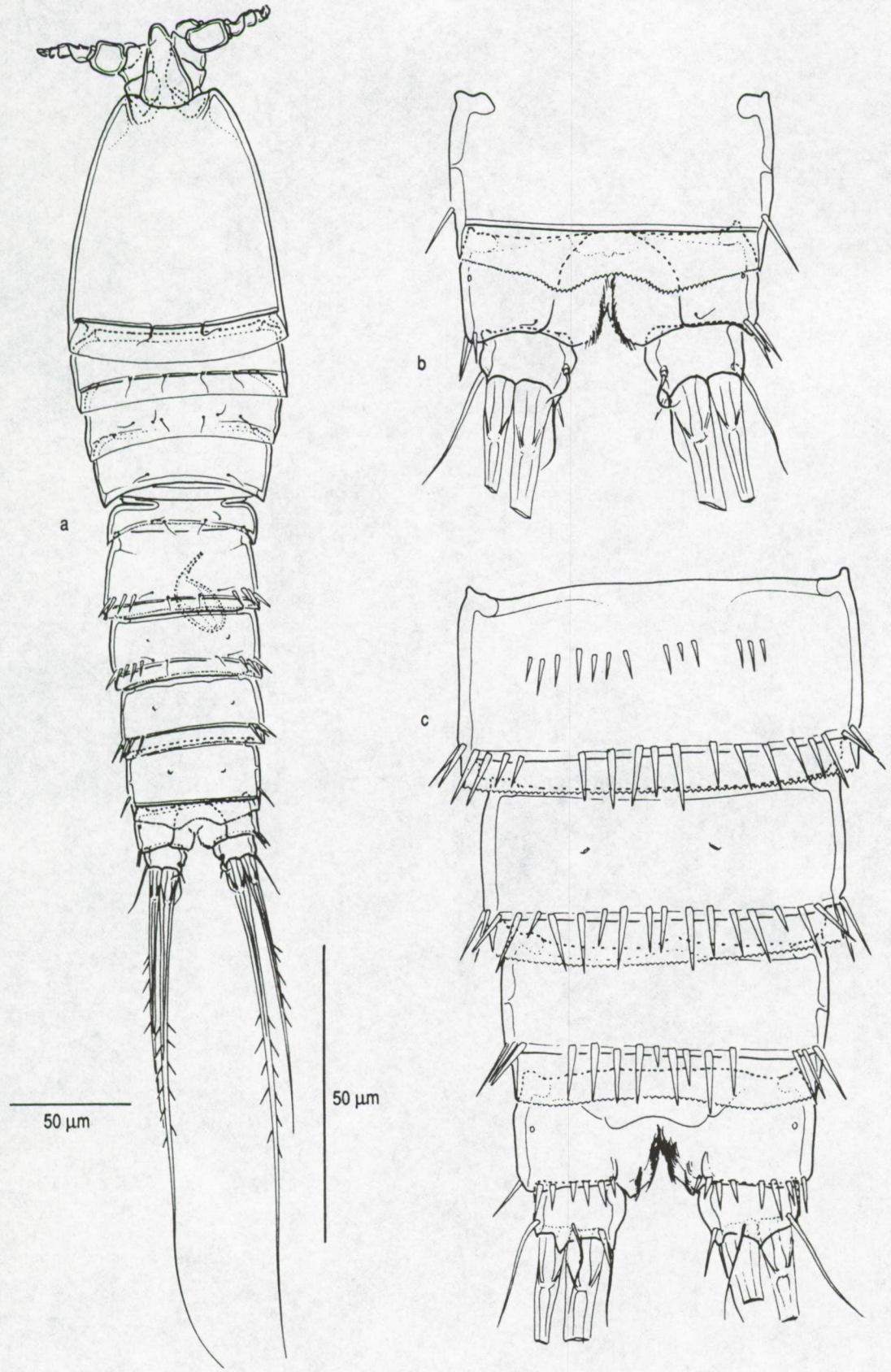

a
b
c
d
e
50 µm

Fig. 176. ***Haloschizopera n. sp. 1*****, female. a, P1; b, P2; c, P3; d, P4; e, P5.**

a
b
c
d
e
50 µm

Fig. 177. ***Haloschizopera n. sp. 1*****, male. a, habitus, dorsal; b, fifth urosomite, anal segment and caudal rami, dorsal; c, urosome, ventral (P5 and P6 bearing-somites omited).**


a
b
c
50 µm
50 µm

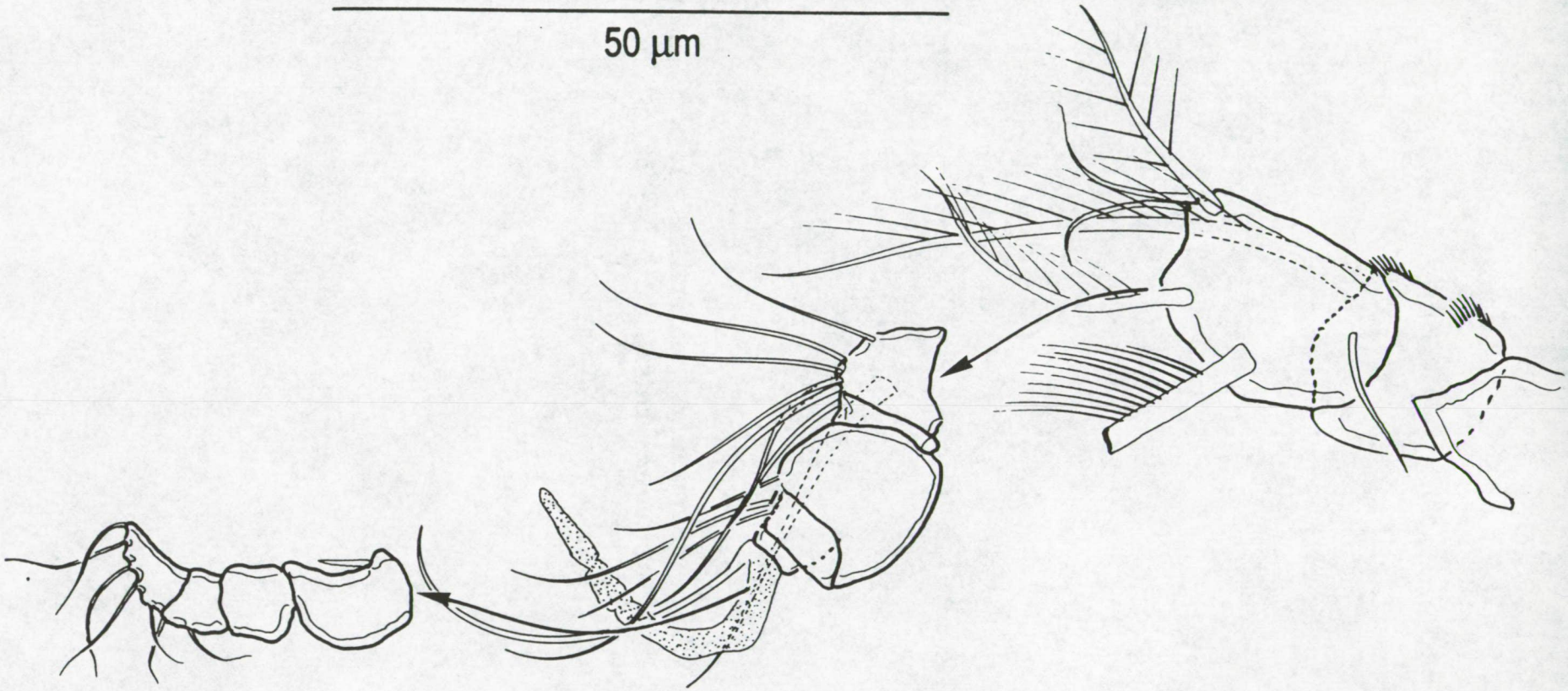

50 µm

Fig. 179. ***Haloschizopera n. sp. 1*****, male. a, P1; b, P2; c, P5; d, P6 and third urosomite, ventral; e, P3 EXP 3, posterior view.**

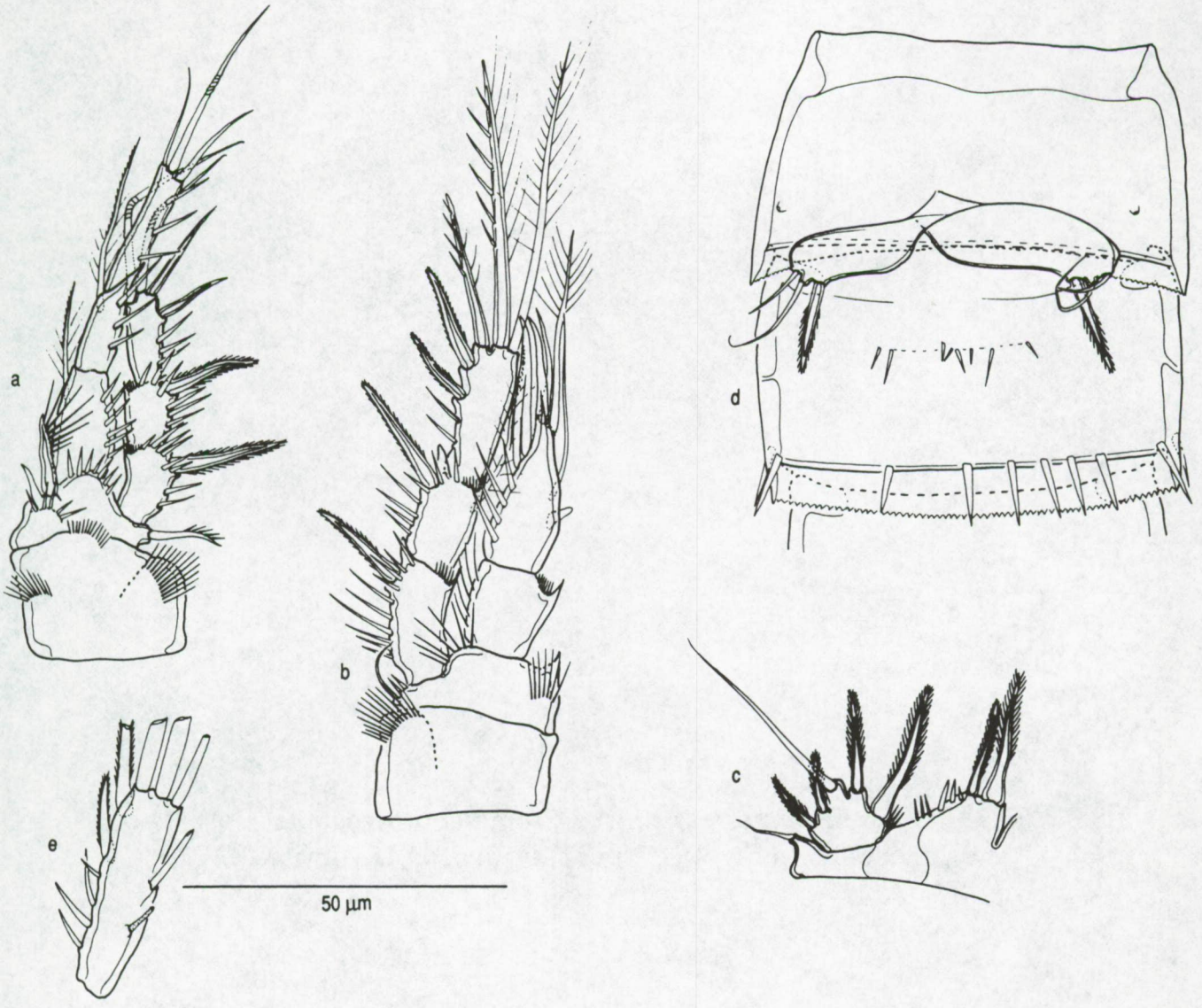

a
b
c
d
e
50 µm

Fig. 180. ***Eoschizopera (P.) n. sp. 1*****, female. a, urosome, dorsal; b, urosome, ventral (P5 bearing-urosomite omited).**

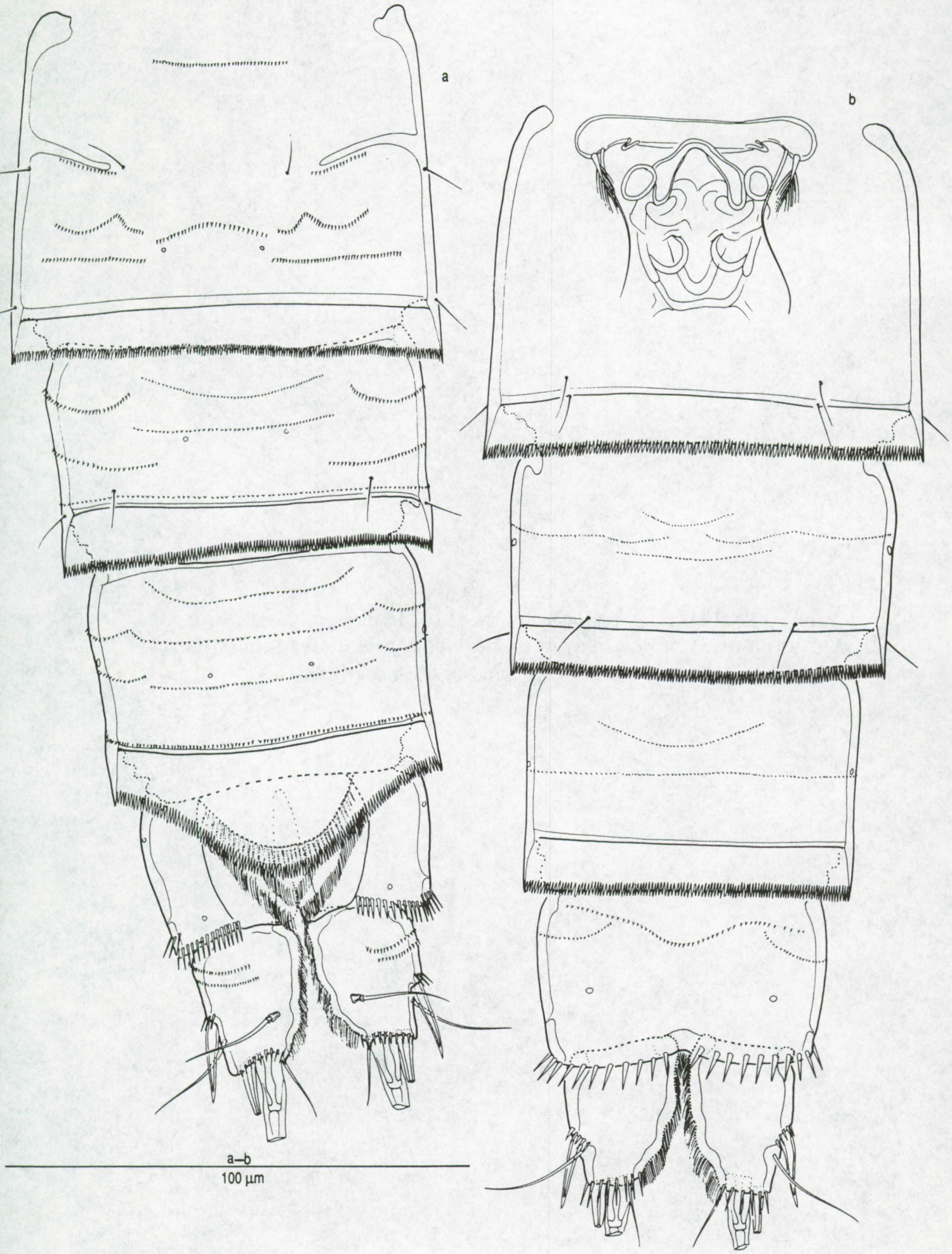

a
b
a–b
100 µm

Fig. 181. ***Eoschizopera (P.) n. sp. 1*****, female. a, rostrum; b, antennule; c, antenna; d, mandible; e, maxillule; f, maxilla; g, endopodal segments of maxilliped.**

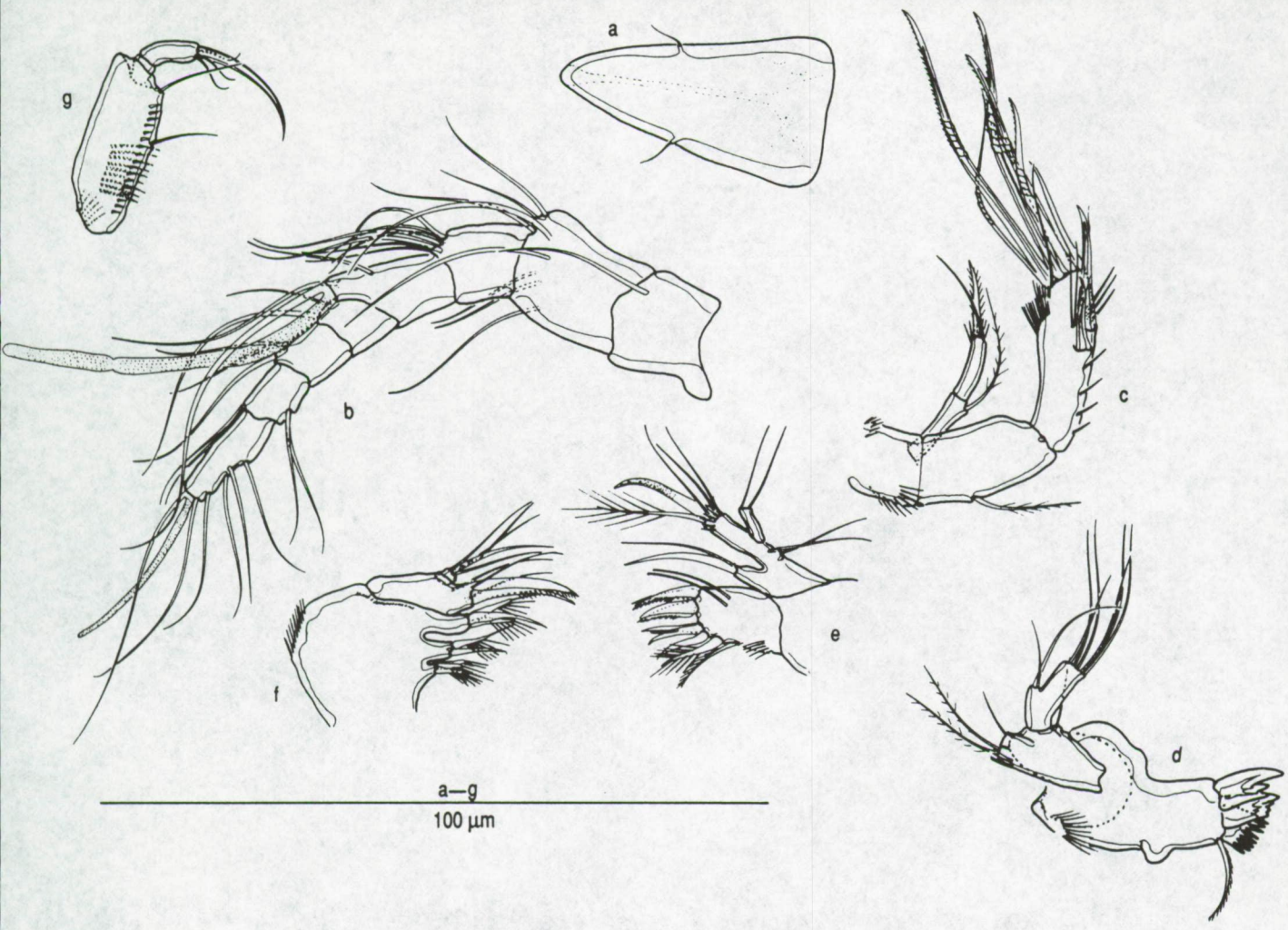

a
g
b
c
f
e
d
a—g
100 µm

Fig. 182. ***Eoschizopera (P.) n. sp. 1*****, female. a, P1; b, P2; c, P3; d, P4; e, P5.**

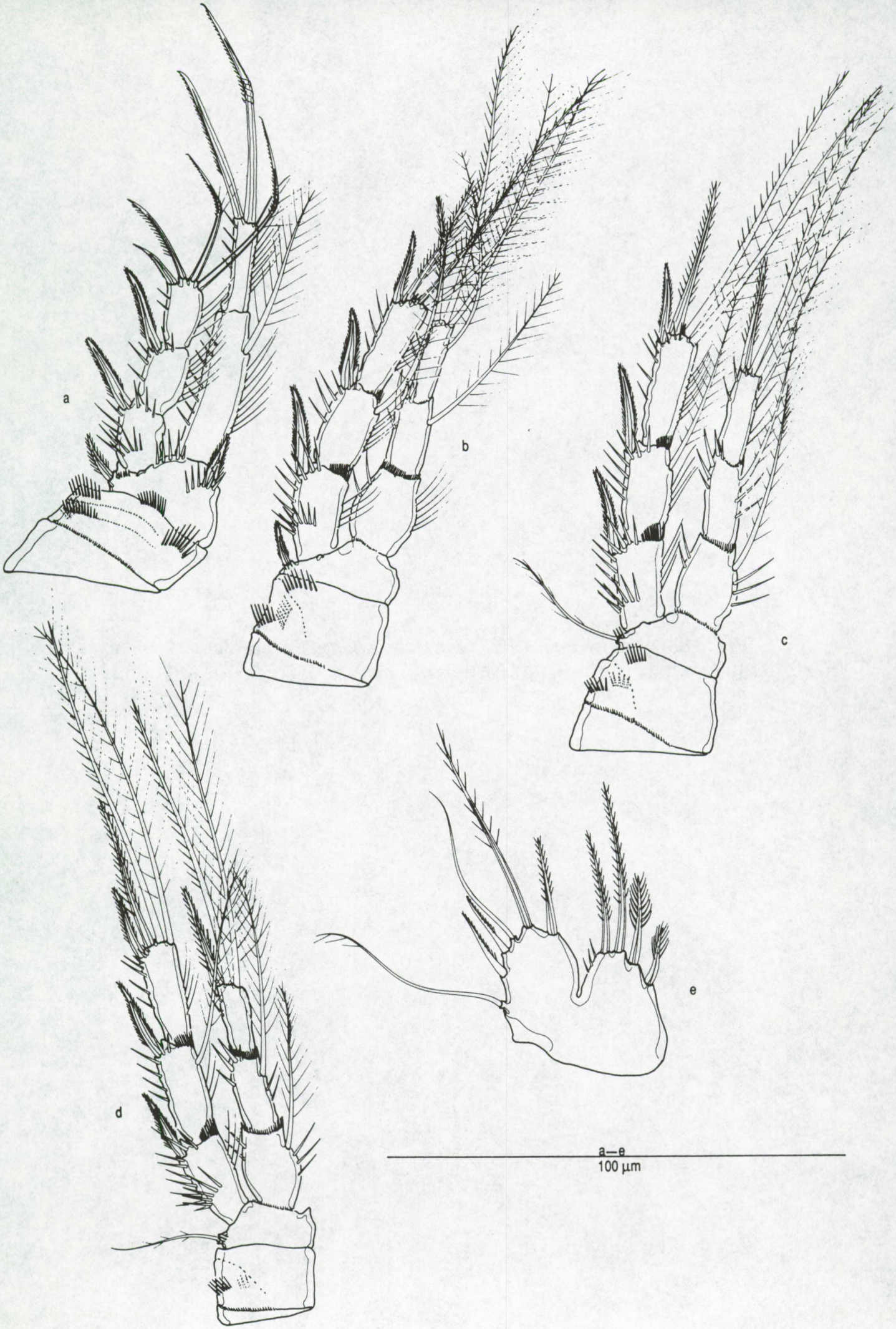

a
b
c
d
e
a—e
100 µm

Fig. 183. ***Eoschizopera (N. subgen.. 1) n. sp. 1*****, female. a, habitus, dorsal; b, distal part of fifth urosomite, anal segment and caudal rami, dorsal.**

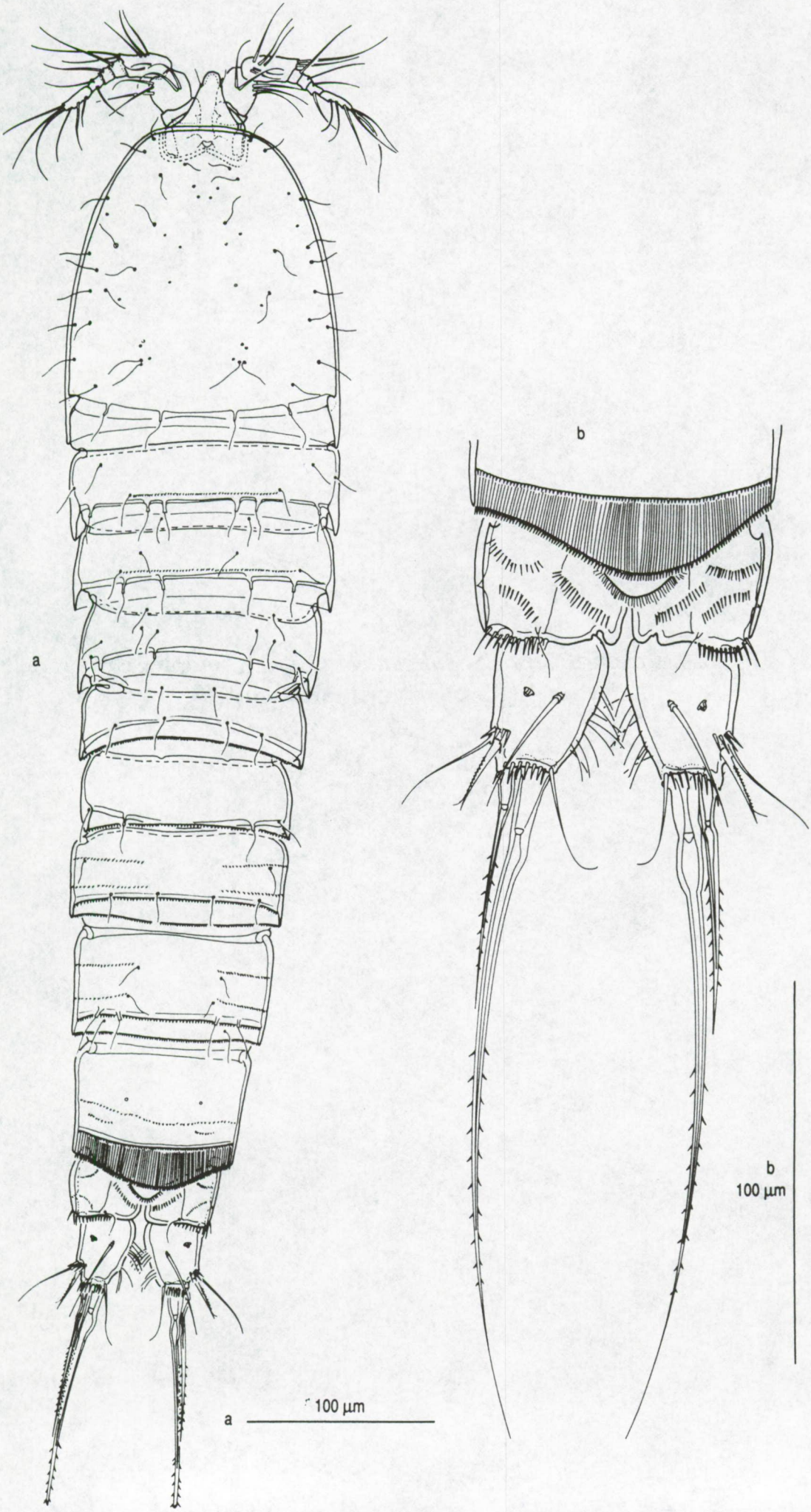

a
b
a
100 µm
b
100 µm

Fig. 184. ***Eoschizopera (N. subgen. 1) n. sp. 1*****, female. Urosome, ventral (P5 bearing-somite omited).**

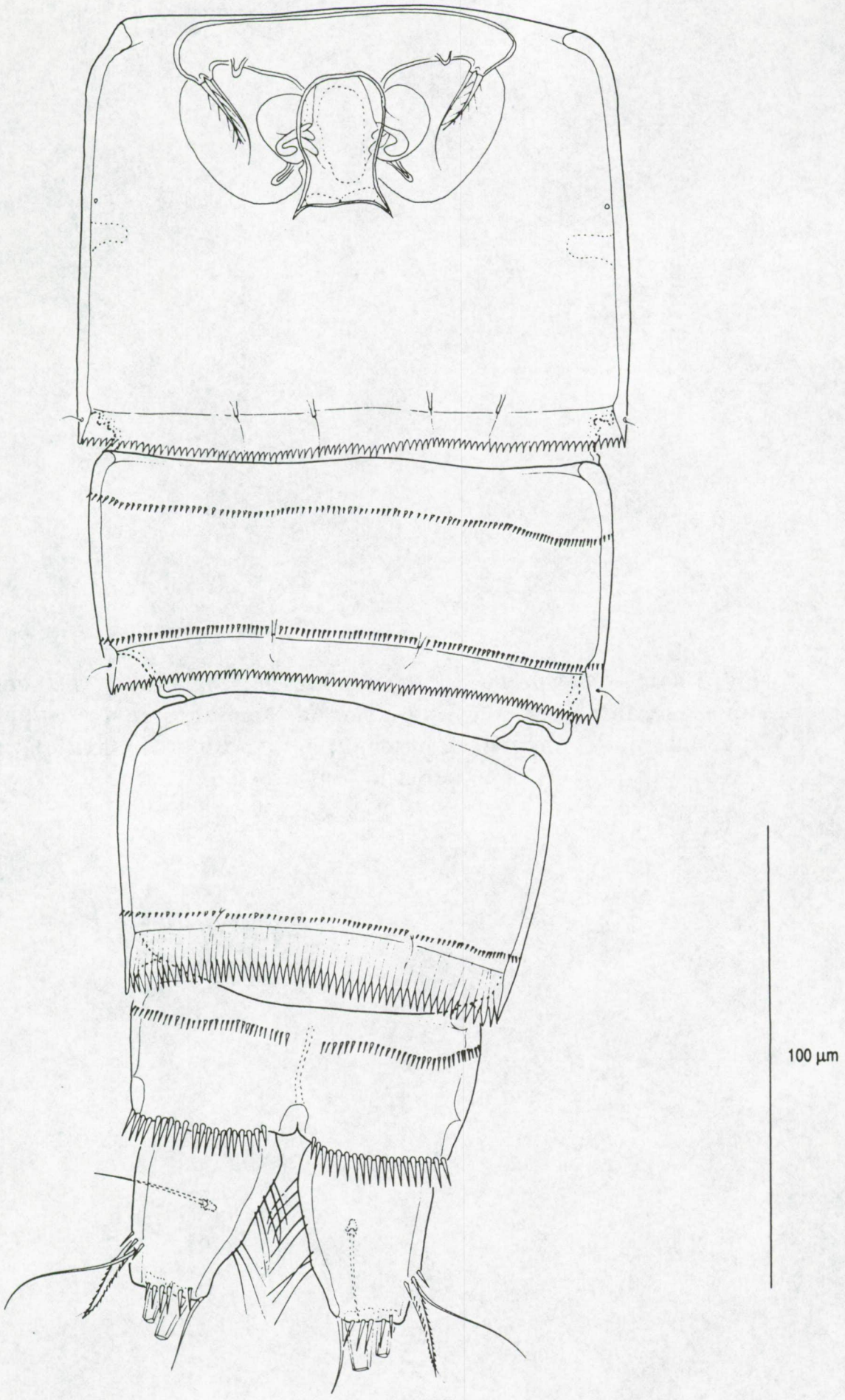

100 µm

Fig. 185. ***Eoschizopera (N. subgen. 1) n. sp. 1*****, female. a, rostrum; b, aberrant antennule, showing fusion of third and fourth segments; c, antennule, normal; d, antenna; e, mandible; f, maxillule; g, maxilla; h, maxilliped.**

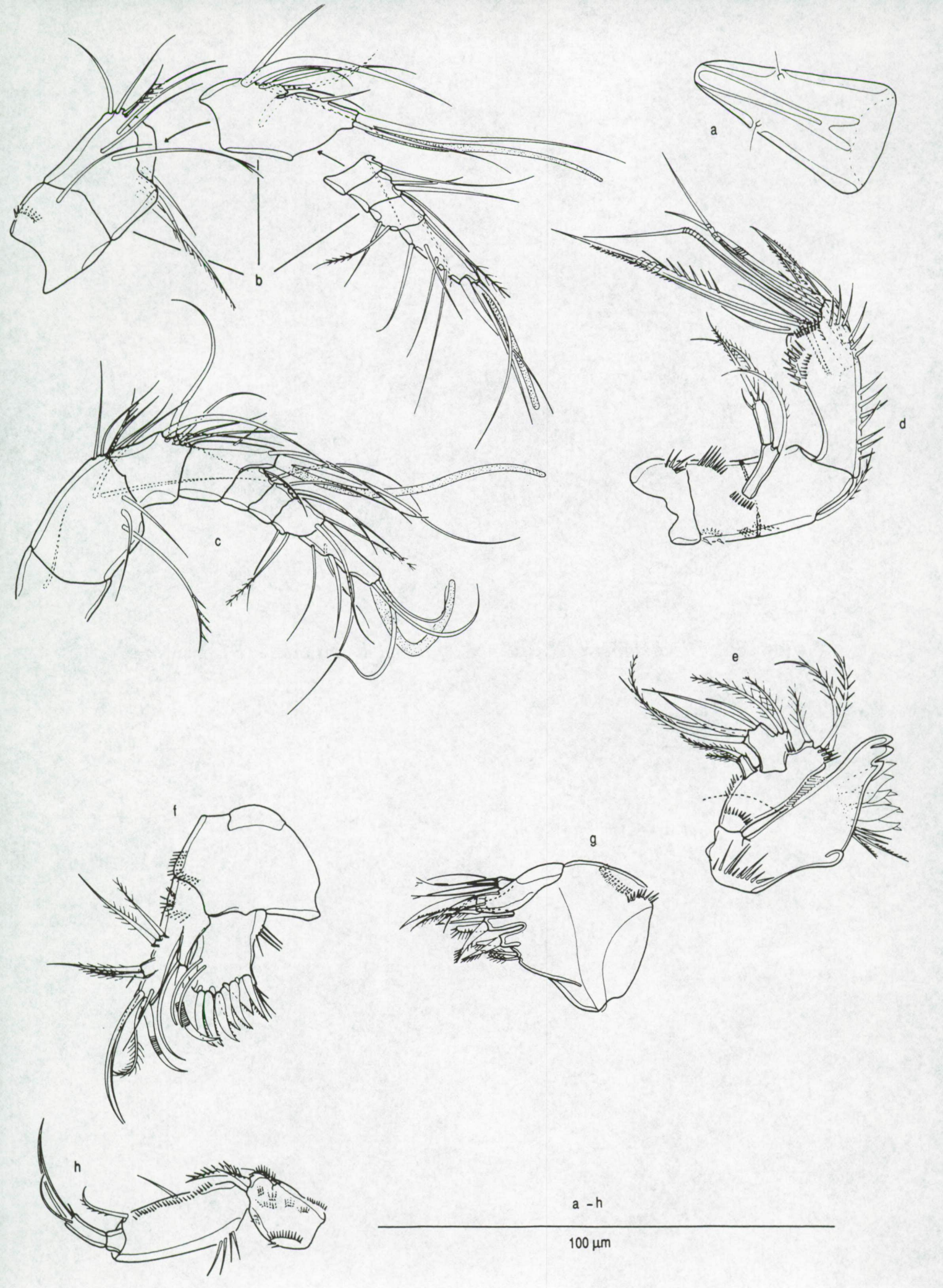
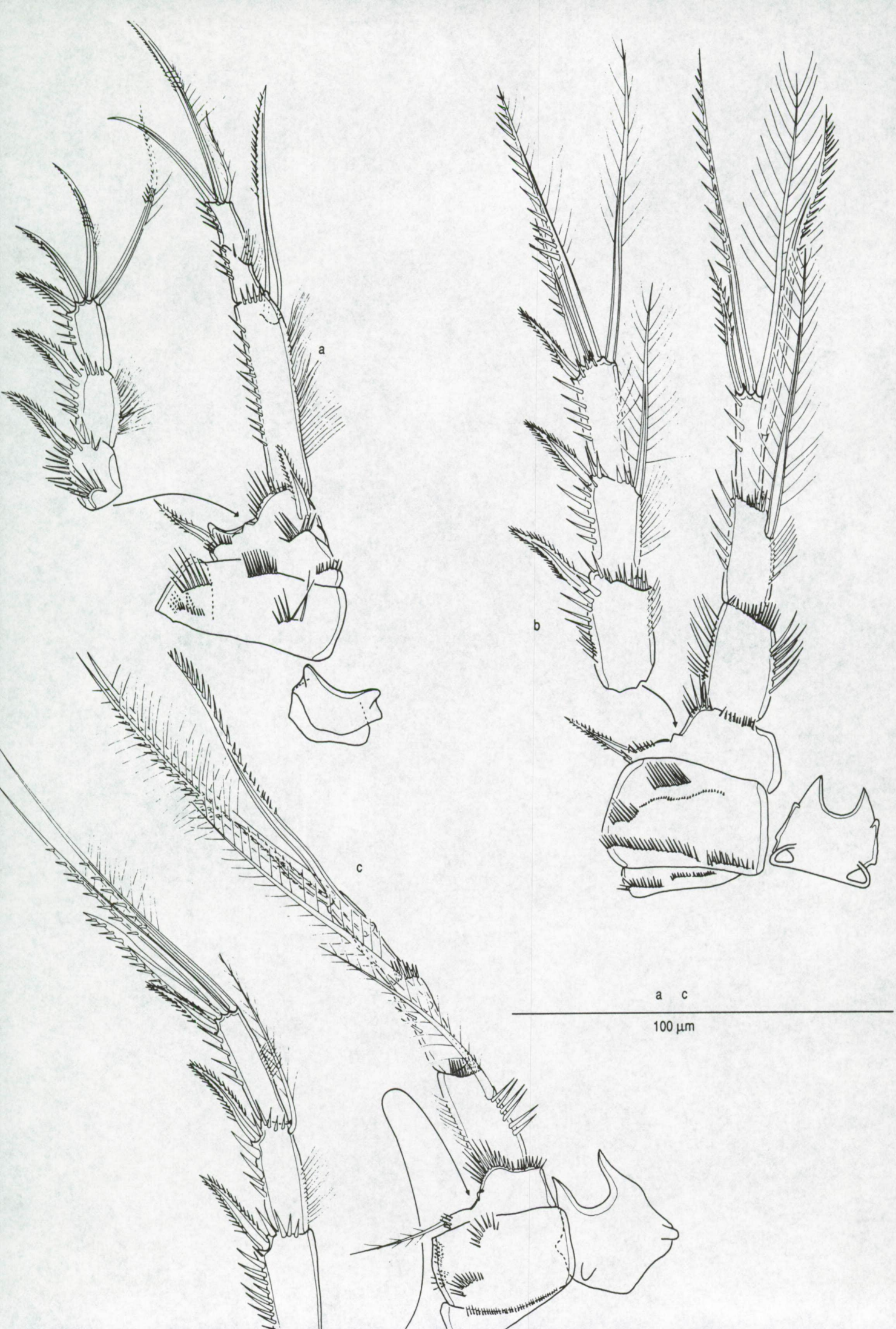

a
b
c
d
e
f
g
h
a - h
100 µm

Fig. 186. ***Eoschizopera (N. subgen. 1) n. sp. 1*****, female. a, P1; b, P2; c, P3.**


a
b
c
a c
100 µm

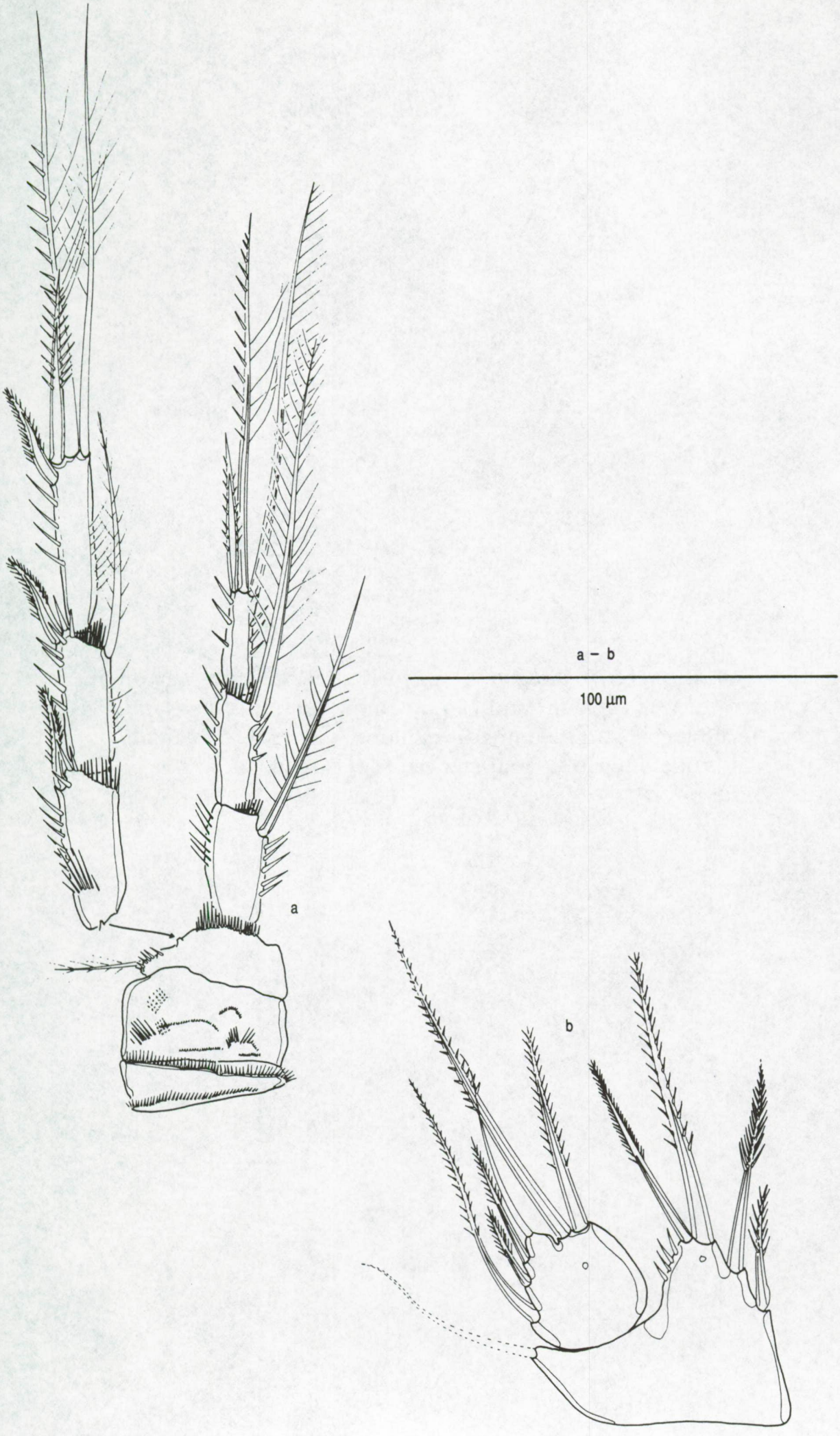

a
b
a – b
100 µm

Fig. 188. ***Eoschizopera (N. subgen. 1) n. sp. 1*****, male. a, distal part of fifth urosomite, anal segment and caudal rami, dorsal; b, urosome, ventral (P5 bearing-somite omited); c, habitus, dorsal (principal setae of caudal rami showed separately).**

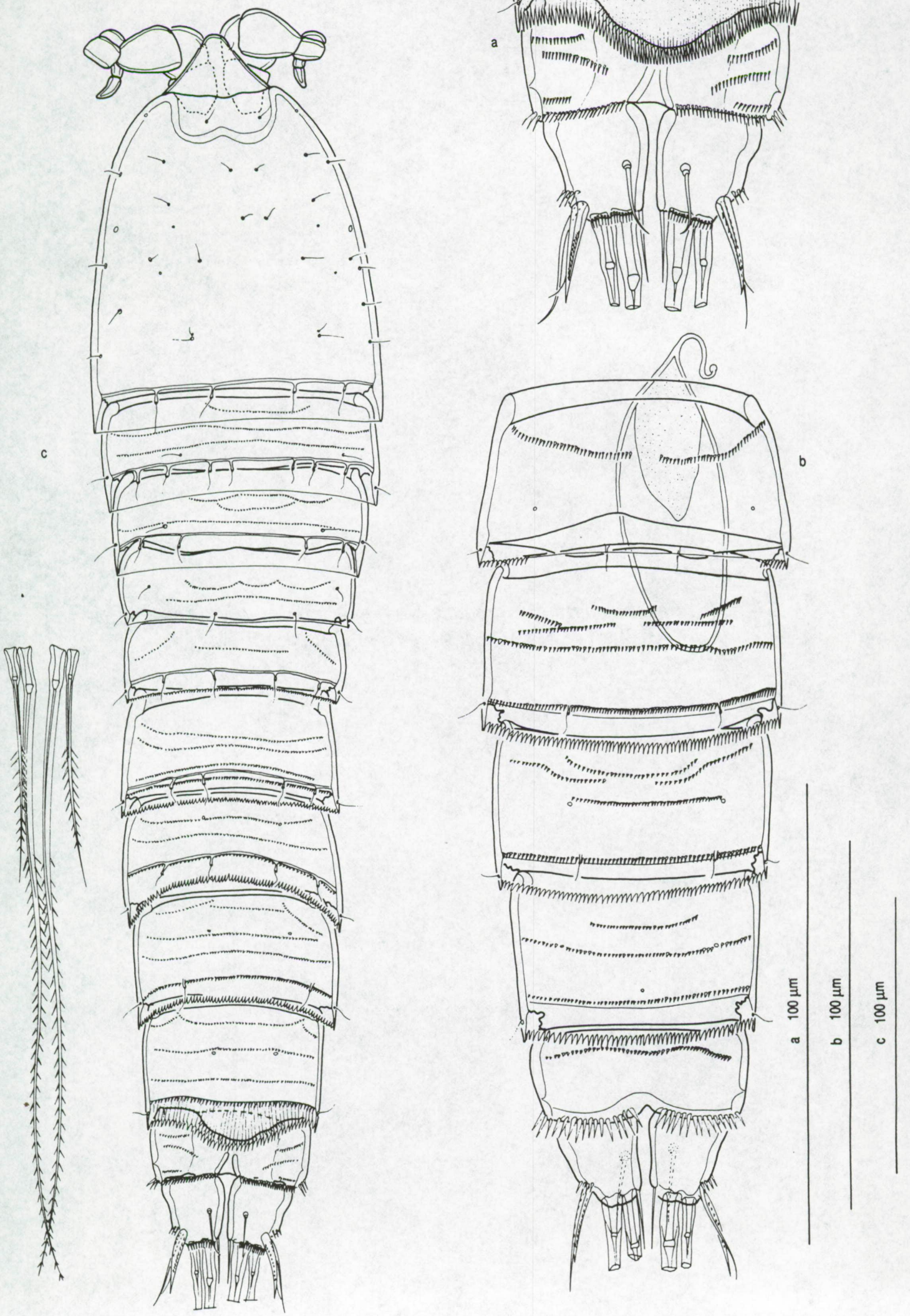

a
b
c
a 100 µm
b 100 µm
c 100 µm

Fig. 189. ***Eoschizopera (N. subgen. 1) n. sp. 1*****, male. a, antennule, exploded; b, P1; c, P2; d, P3 EXP 3; e, P5.**

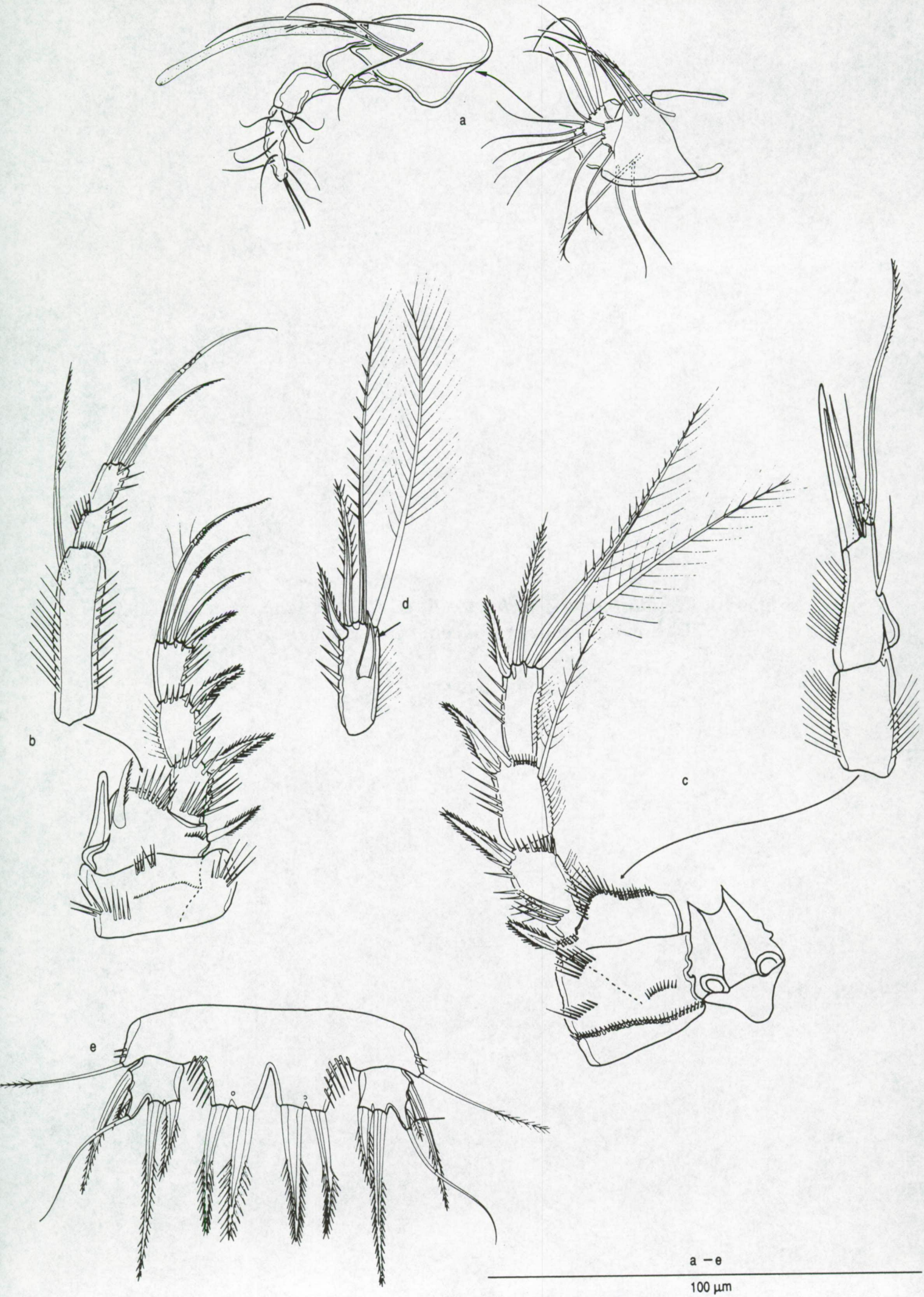

a
b
c
d
e
a – e
100 µm

Fig. 190. ***Pseudostenhelia wellsi*** **Coull & Fleeger, female. a, habitus, dorsal, showing caudal rami separately; b, habitus, lateral.**

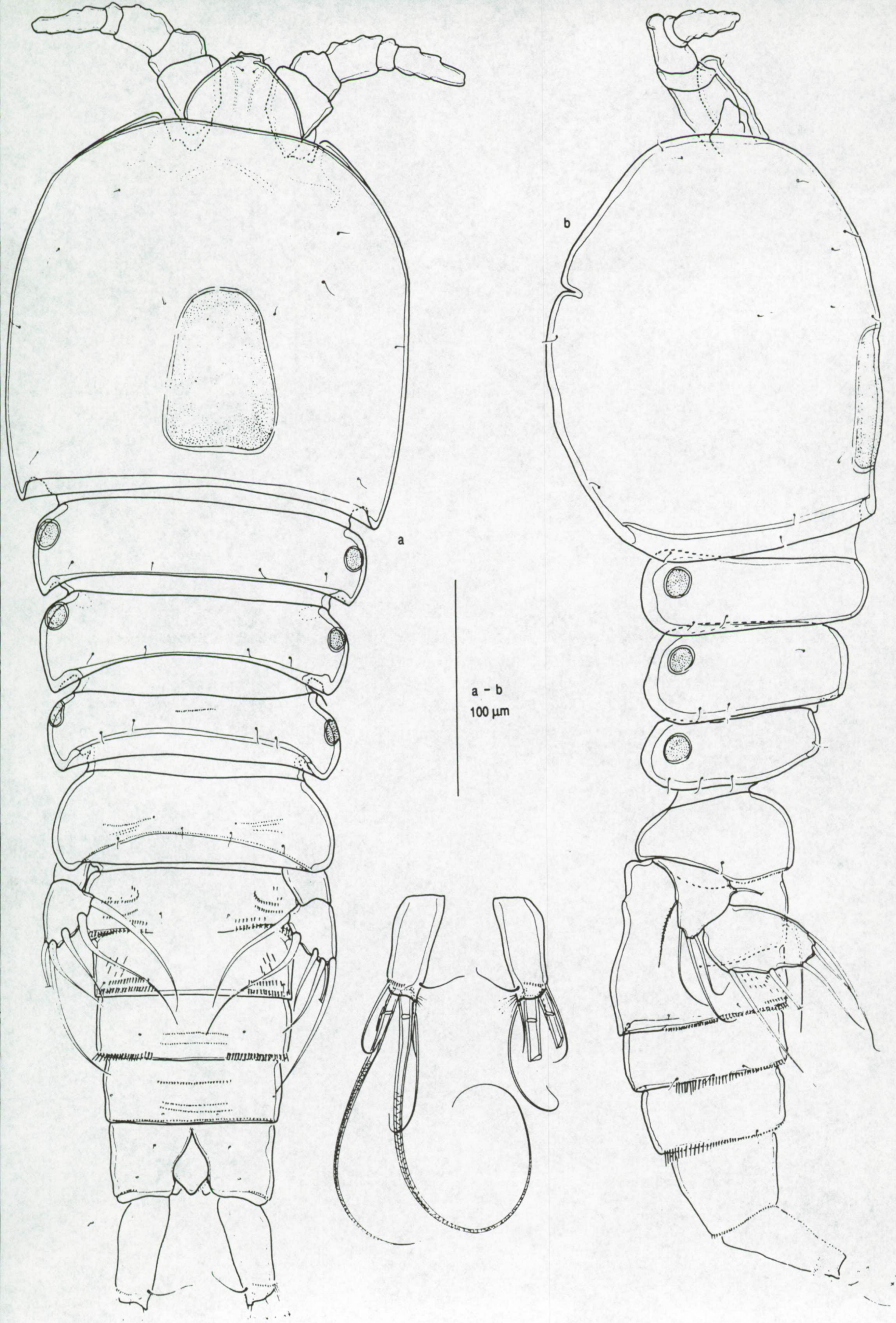

a
b
a - b
100 µm

Fig. 191. ***Pseudostenhelia wellsi*** **Coull & Fleeger, female. Urosome, ventral (P5 bearing-somite omited).**

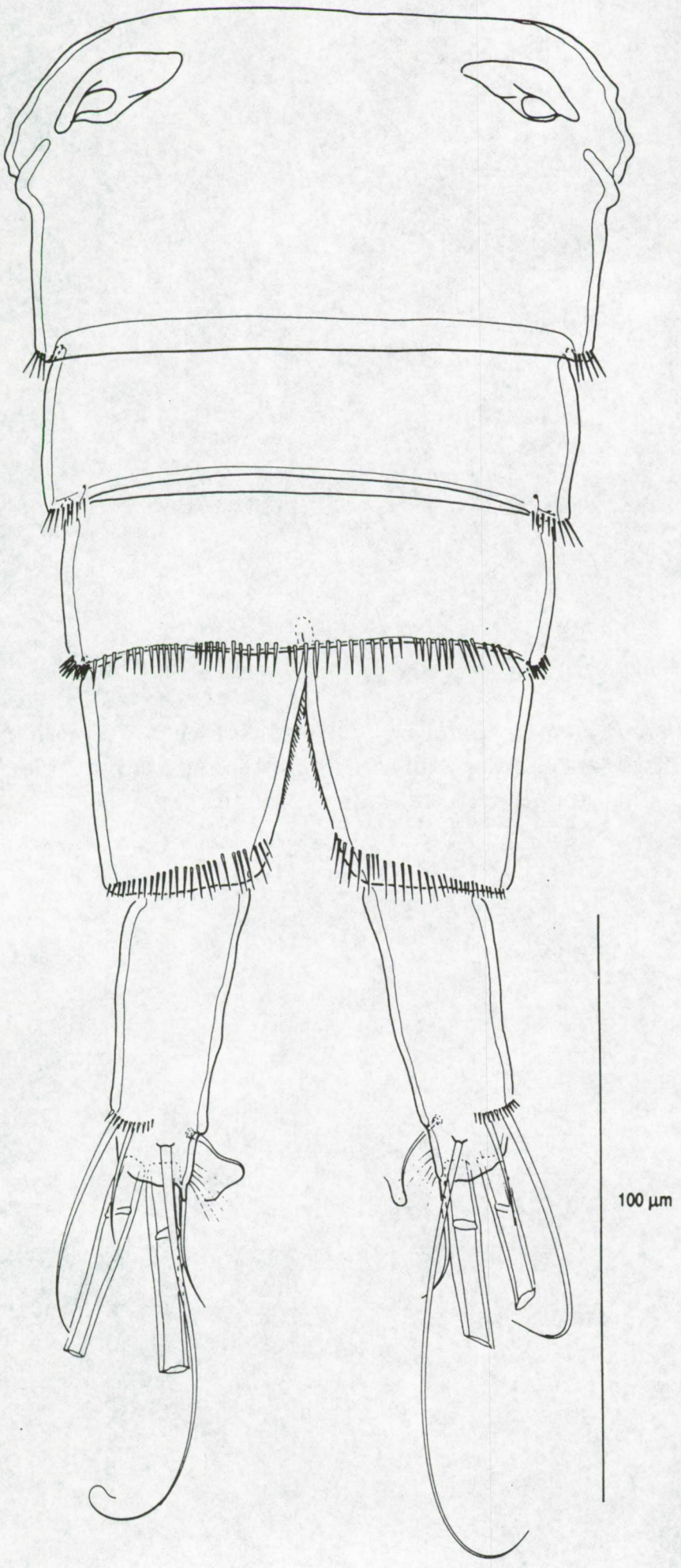
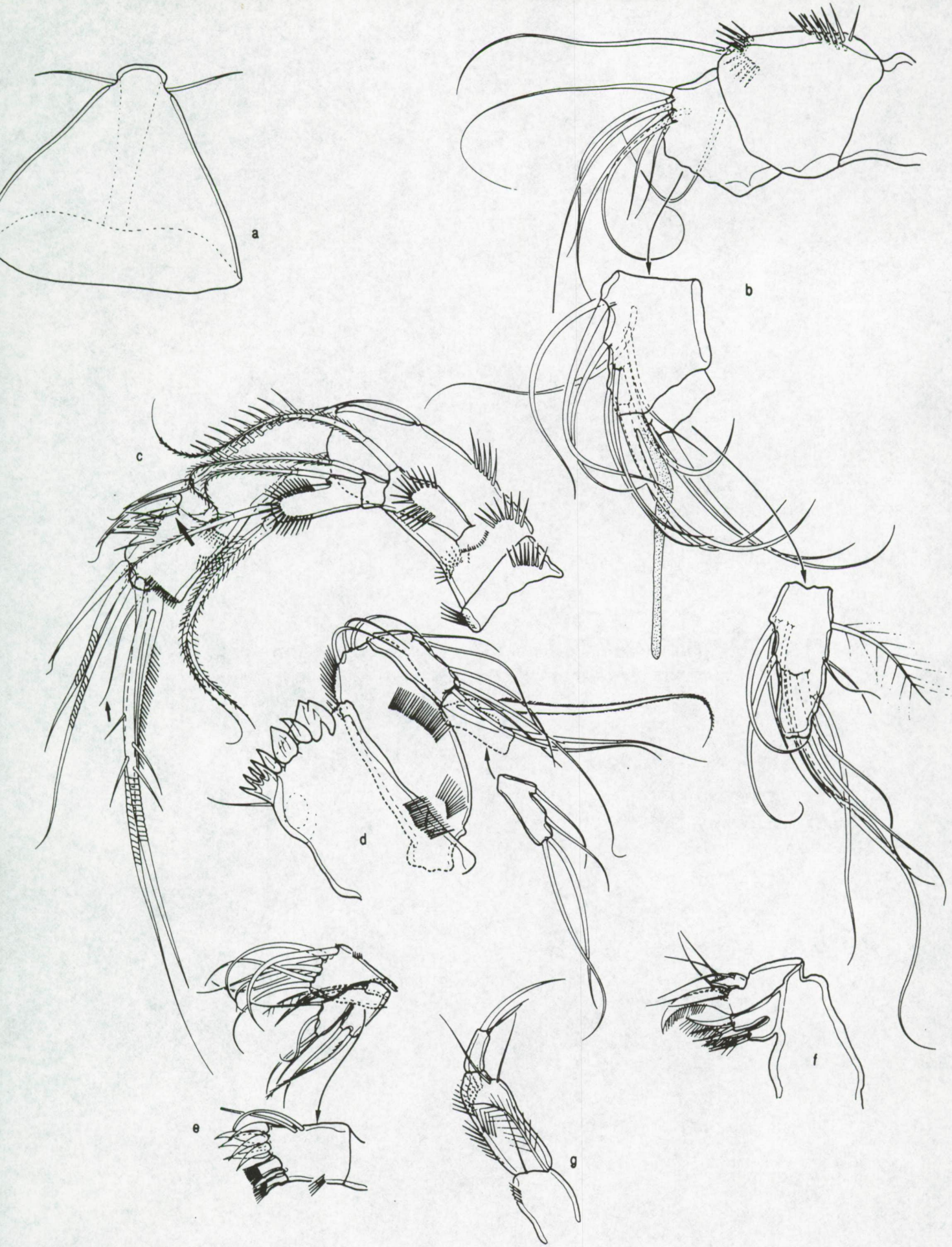

100 µm

Fig. 192. ***Pseudostenhelia wellsi*** **Coull & Fleeger, female. a, rostrum; b, antennule, exploded; c, antenna; d, mandible; e, maxillule; f, maxilla; g, maxilliped.**



a - g

100 µm

Fig. 193. *Pseudostenhelia wellsi* Coull & Fleeger, female. a, P1; b, P2; c, P3.

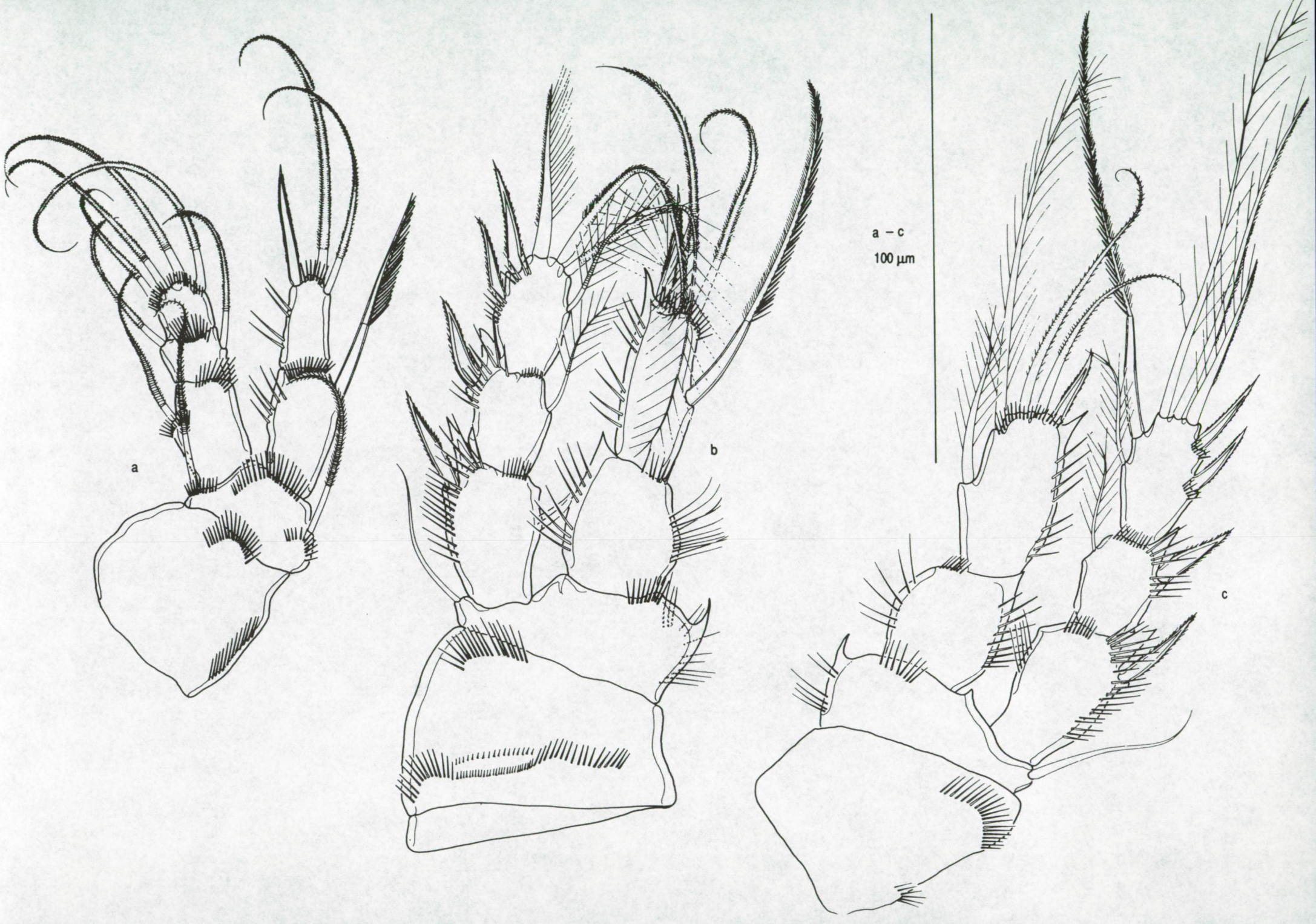

a
b
c
a – c
100 µm

Fig. 194. ***Pseudostenhelia wellsi*** **Coull & Fleeger, female. a, P4; b, P5.**

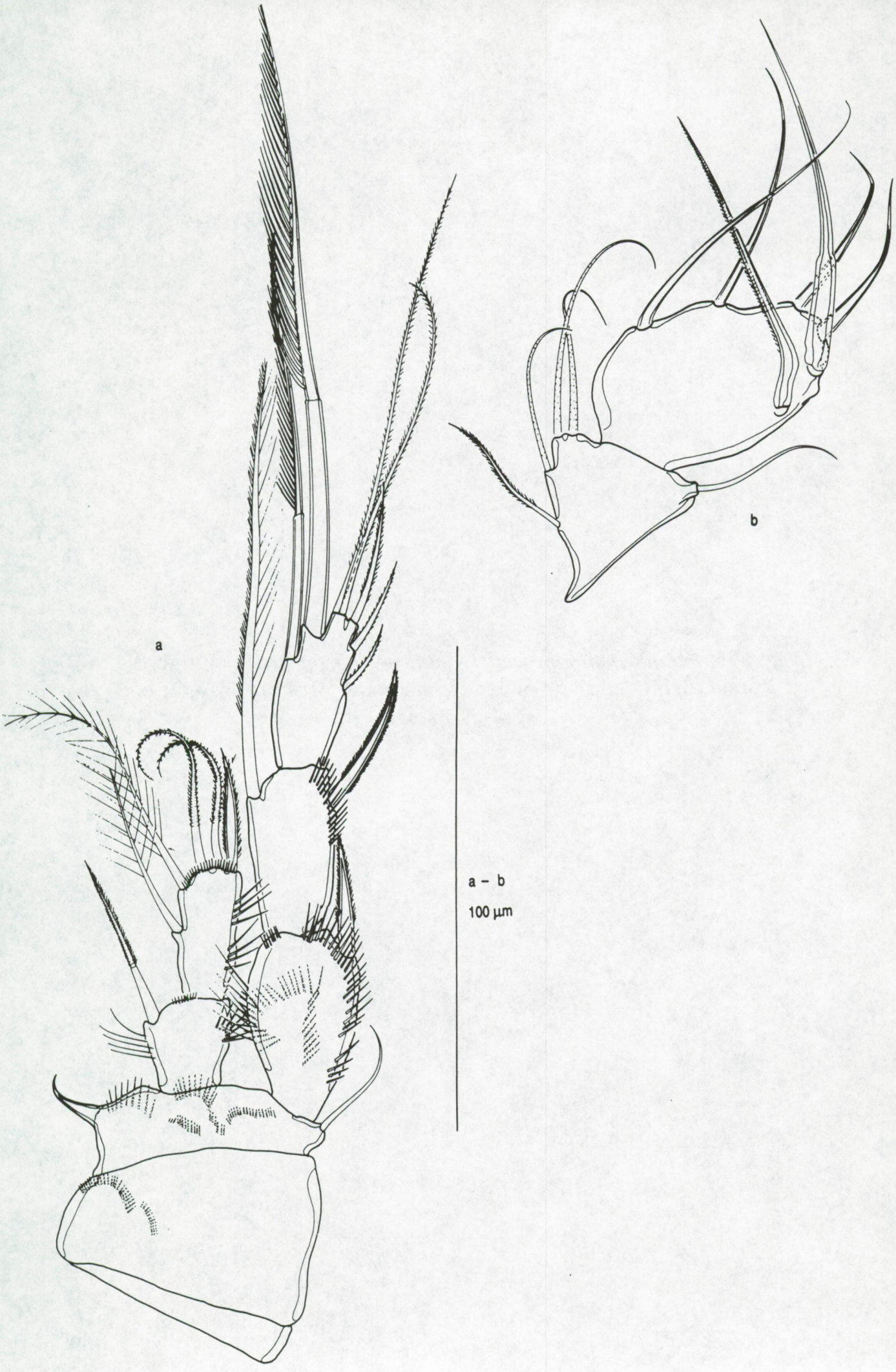

a
b
a – b
100 µm

Fig. 195. ***Pseudostenhelia wellsi*** **Coull & Fleeger, male. a, habitus, dorsal, principal setae of caudal ramus showed separately; b, habitus, lateral.**

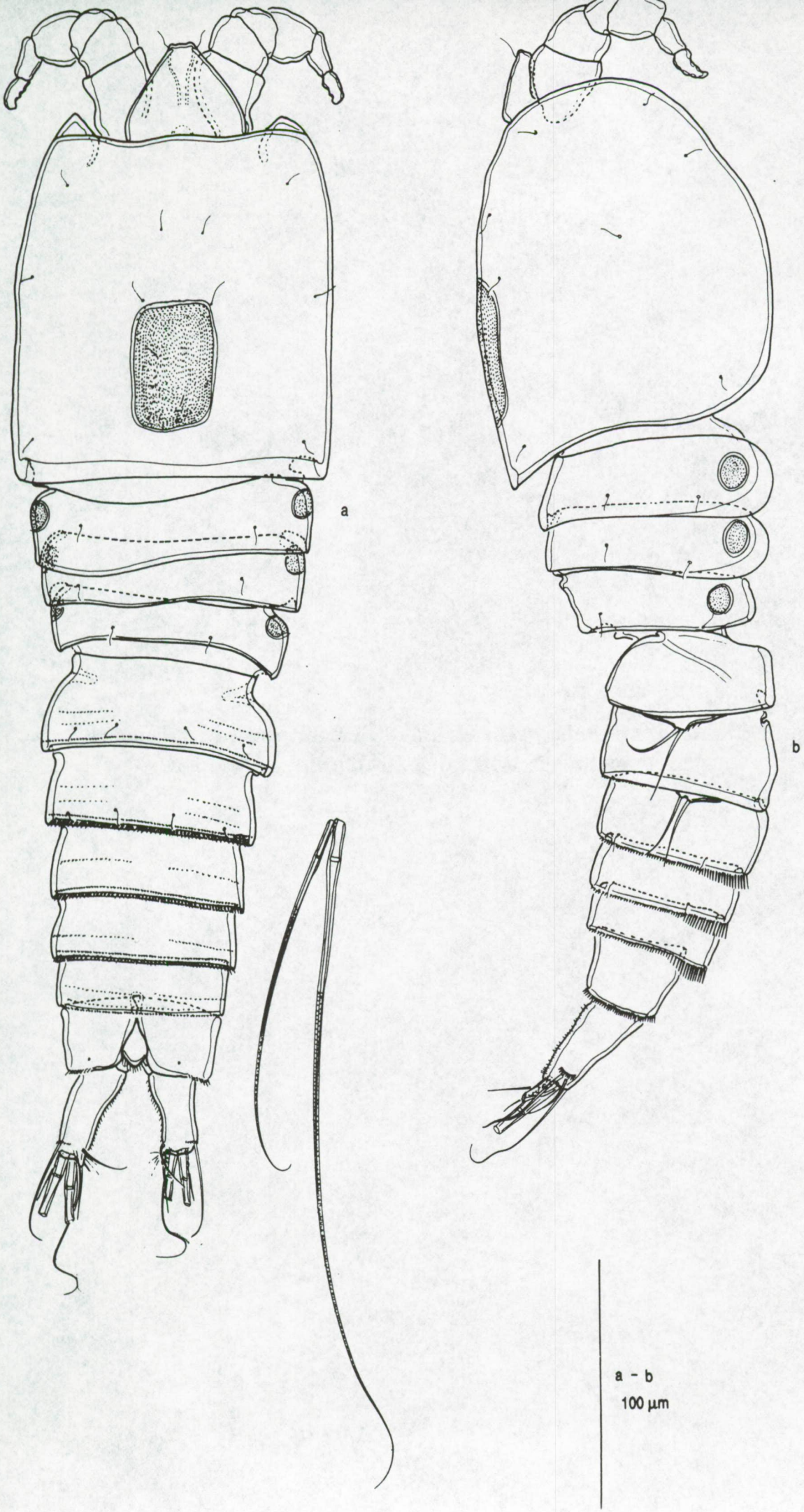

a
b
a - b
100 µm

Fig. 196. ***Pseudostenheia wellsi*** **Coull & Fleeger, male. a, urosome, ventral, showing P5 and P6; b, antennule, exploded.**

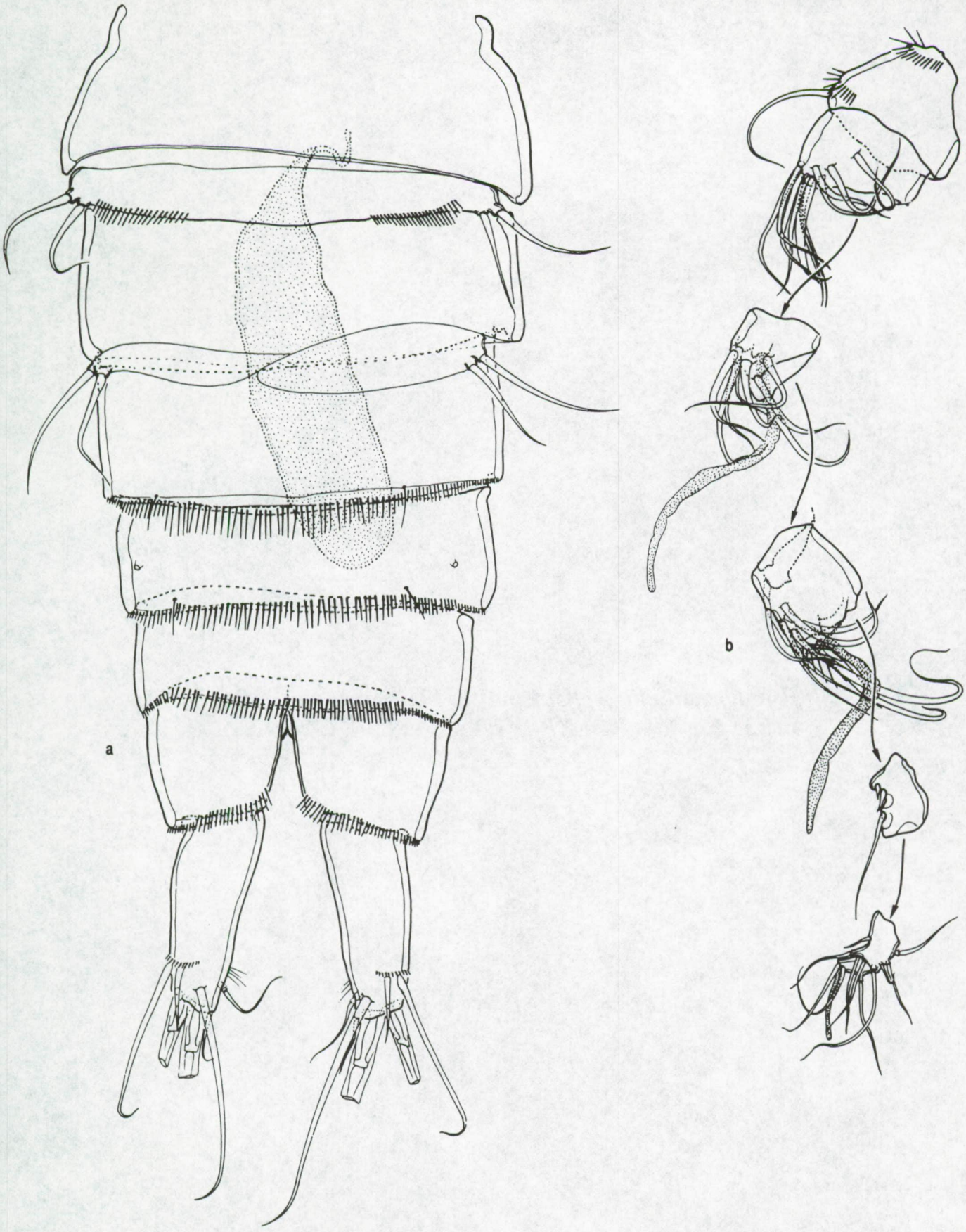

a
b
100 µm

Fig. 197. ***Pseudostenhelia wellsi*** **Coull & Fleeger, male. a, P1; b, P2; c, P3; d, P4; e, P4 EXP 2; f, P5; g, P6; h, P2 ENP.**

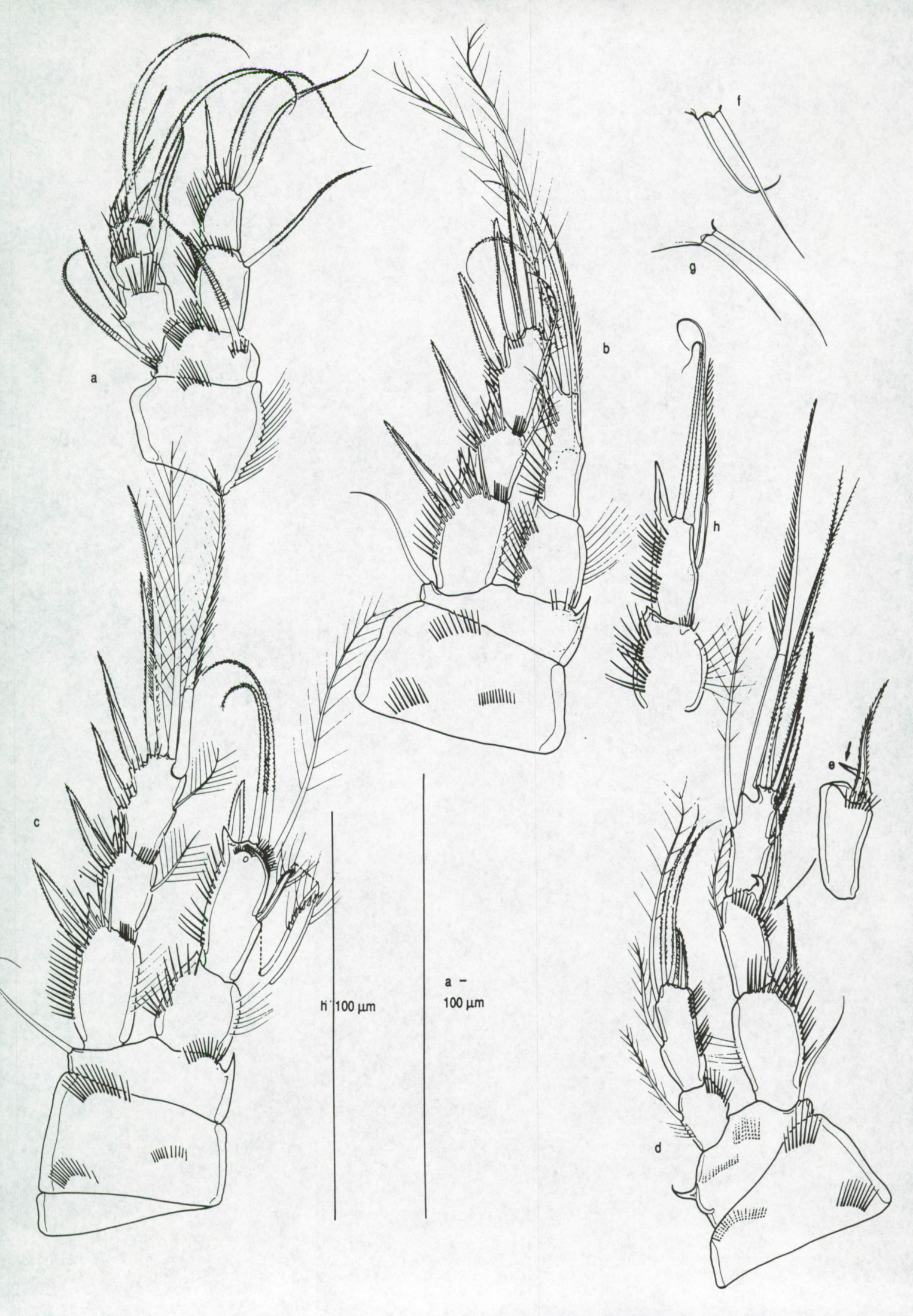

a
b
c
d
e
f
g
h
h 100 µm
a – 100 µm

Fig. 198. Diosaccidae *N. gen. 1 n. sp. 1*, female. Habitus, dorsal.

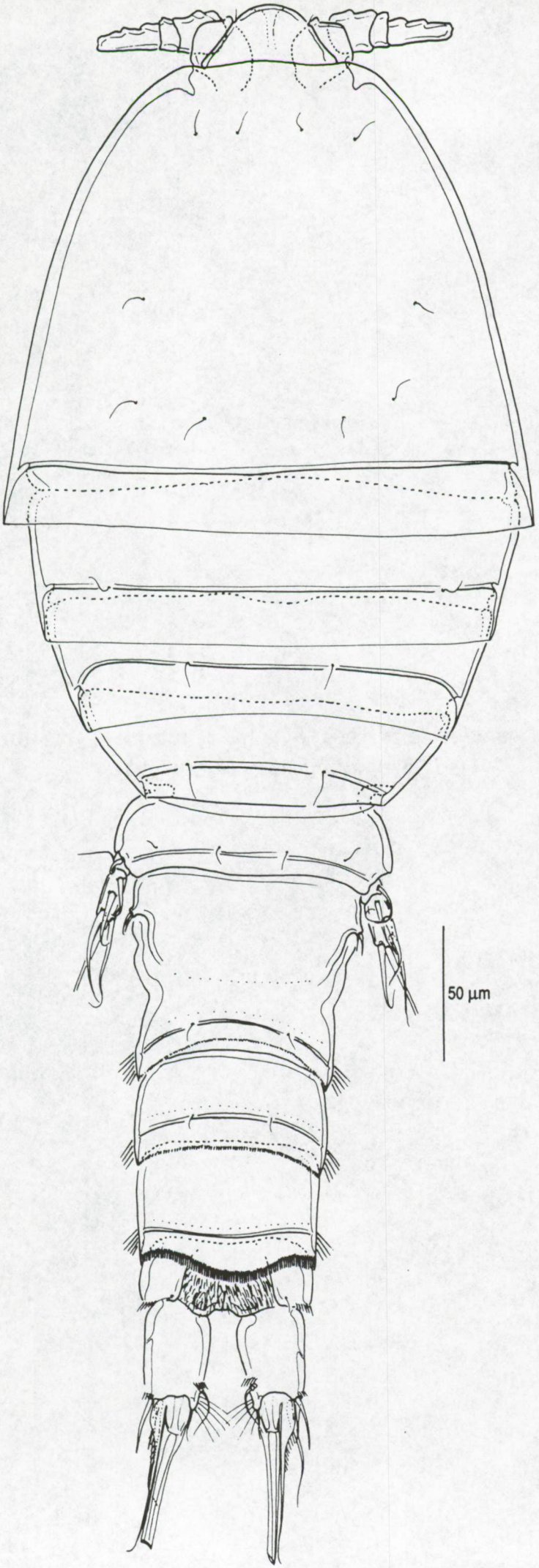

50 µm

Fig. 199. Diosaccidae *N. gen. 1 n. sp. 1*, female. Urosome, ventral (P5 bearing-somite omited).

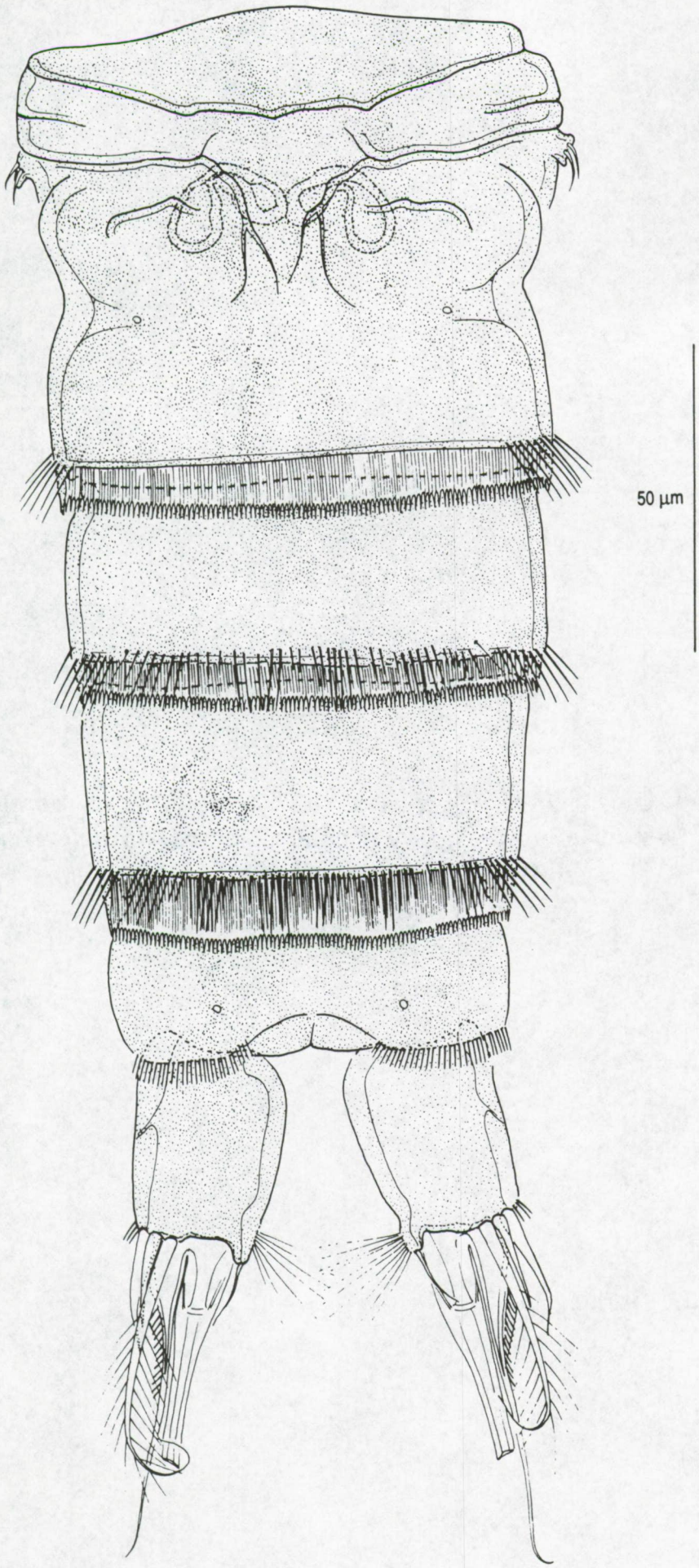

50 µm

Fig. 200. Diosaccidae *N. gen. 1 n. sp. 1*, female. Urosome, dorsal (P5 bearing-somite omited); b, left caudal ramus, dorsal; c; urosome, lateral (P5 bearing-somite omited).

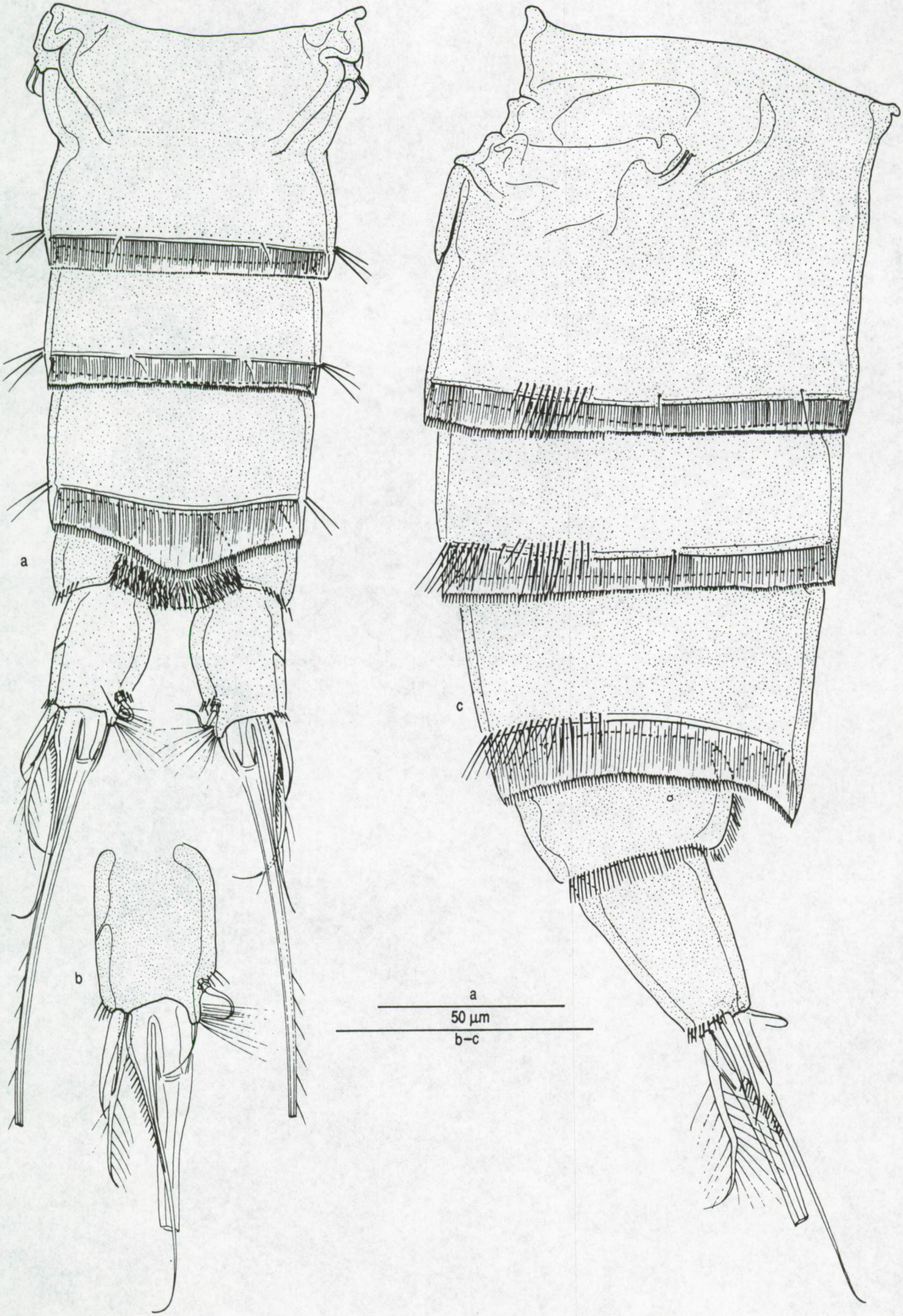

a
b
c
a
50 µm
b–c

Fig. 201. Diosaccidae *N. gen. 1 n. sp. 1*, female. a, rostrum; b, antennule, exploded; c, antenna; d, mandible, exploded; e, maxillule, exploded; f, maxilla; g, maxilliped.

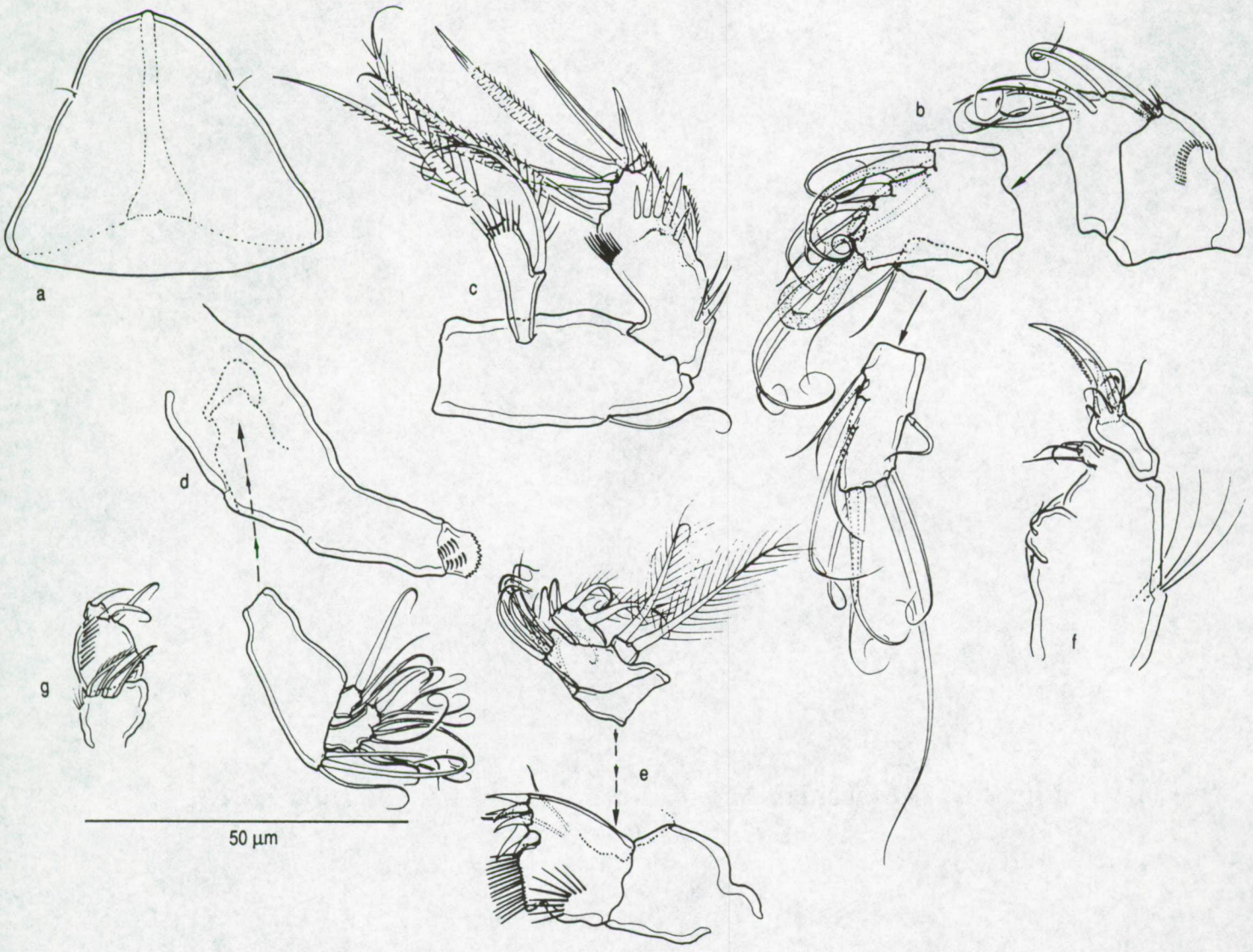

a
b
c
d
e
f
g
50 µm

Fig. 202. Diosaccidae *N, gen. 1 n. sp. 1*, female. a, P1; b, P2; c, P3; d, P4; e, P5.

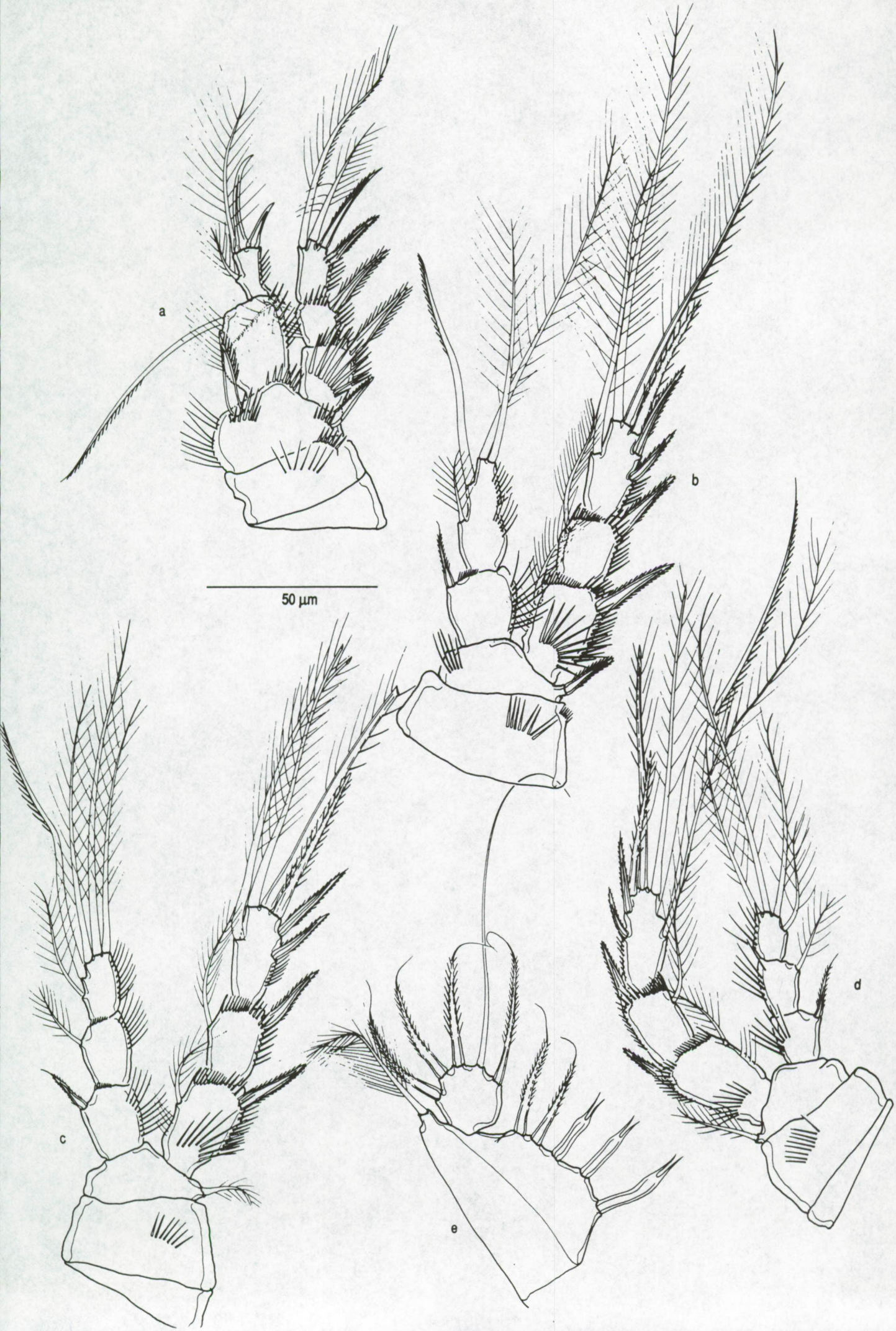

a
b
50 µm
c
d
e

Fig. 203. Diosaccidae *N. gen. 1 n. sp. 1*, male. Urosome, ventral (P5 and P6 urosomites omited).

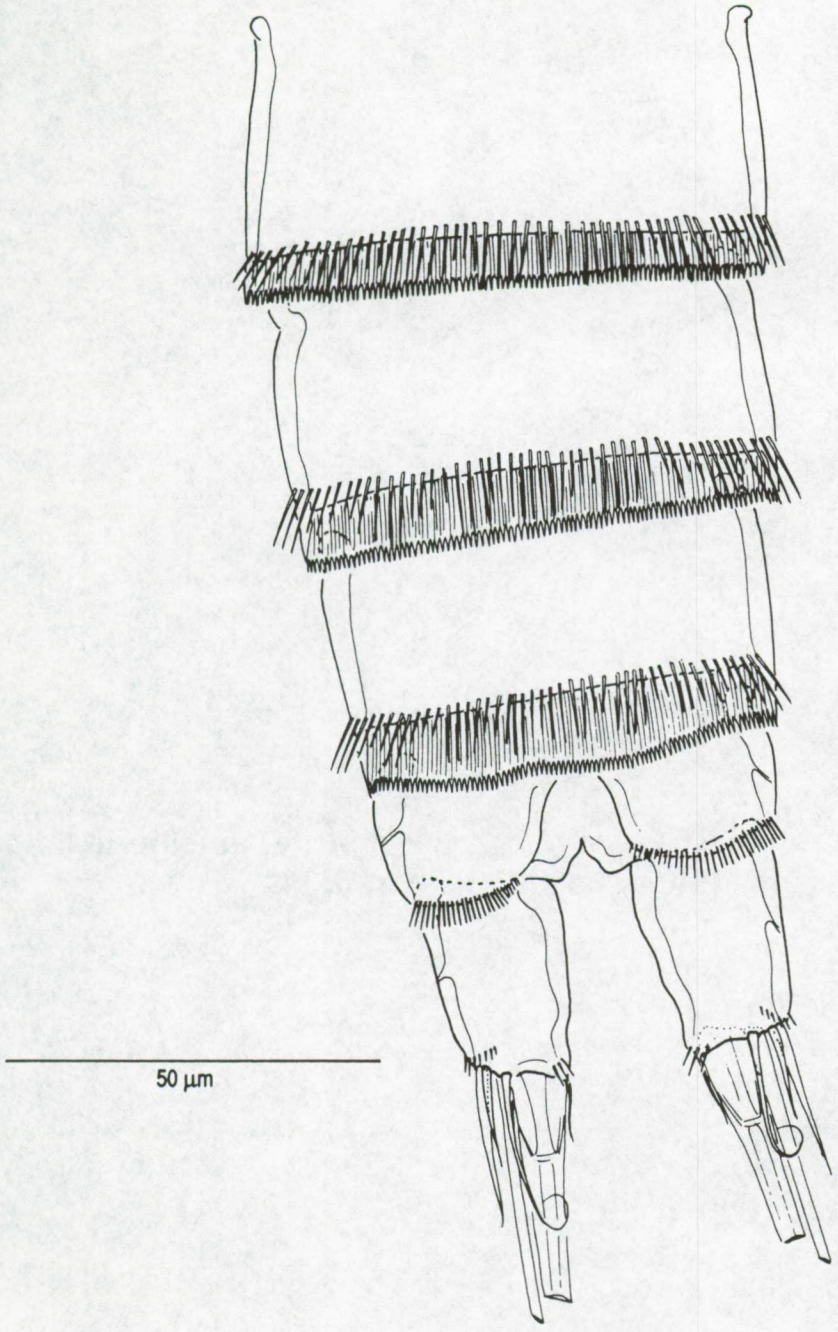

50 µm

Fig. 204. Diosaccidae *N. gen. 1 n. sp. 1*, male. a, antennule, exploded; b, basis of P1; c, P2; d, P5.

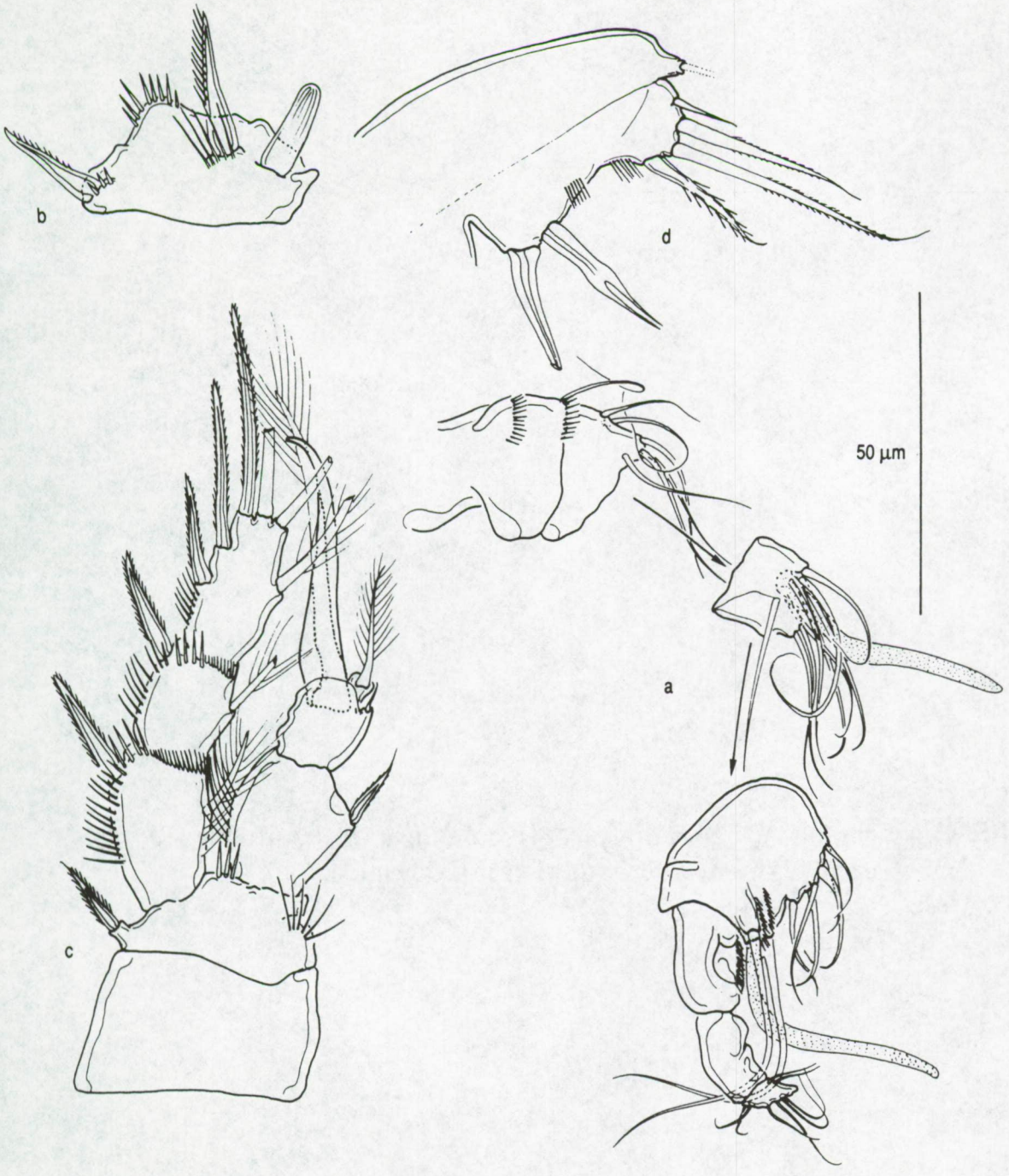
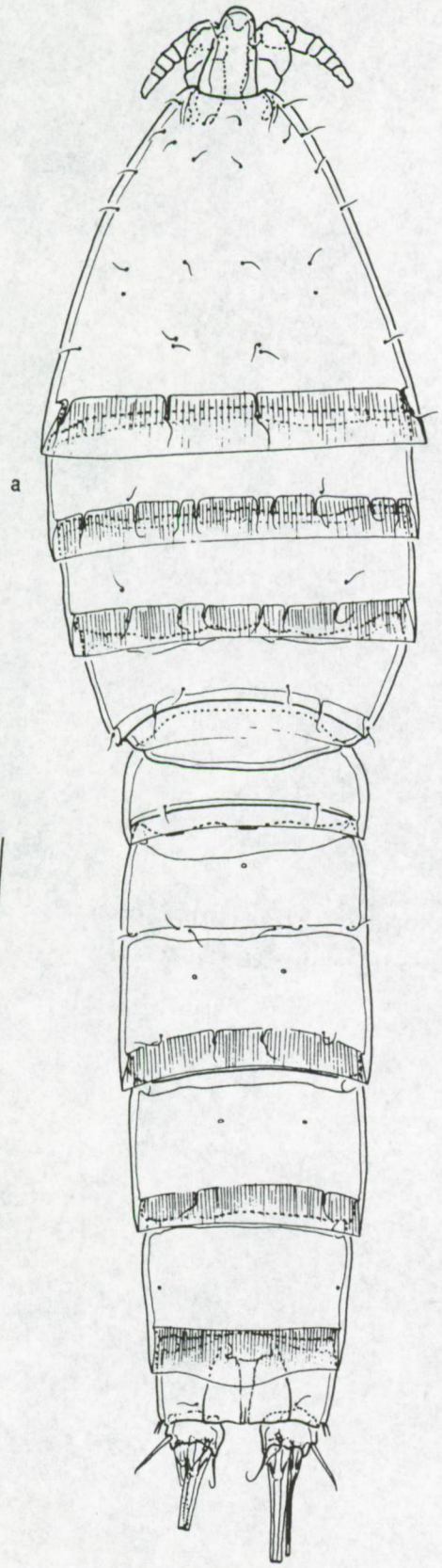
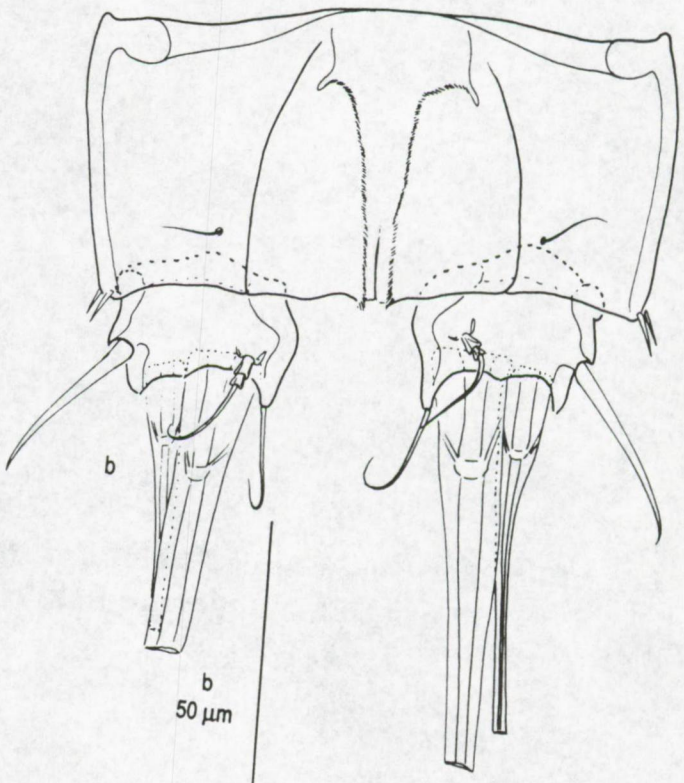

b
d
50 µm
c
a

Fig. 205. Diosaccidae *N. gen. 2 n. sp. 1*, female. a, habitus, dorsal; b, anal segment and caudal rami, dorsal.



a

a
100 µm



b

b
50 µm

Fig. 206. Diosaccidae *N. gen. 2 n. sp. 1*, female. Urosome, ventral, showing P6 and genital field (P5 bearing-somite omited).

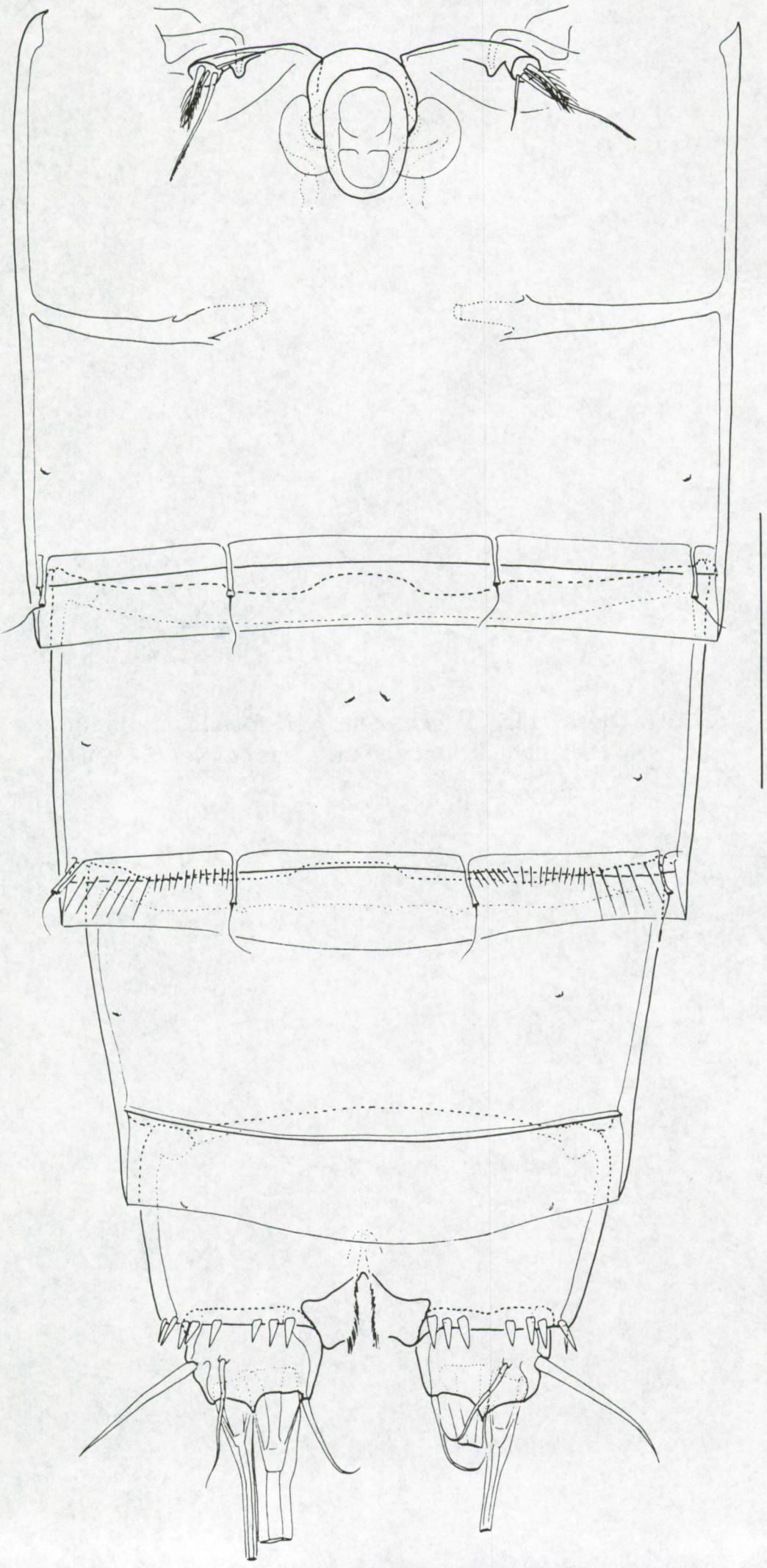


Fig. 207. Diosaccidae *N. gen. 2 n. sp. 1*, female. a, antennule, exploded; b, antenna; c, mandible.

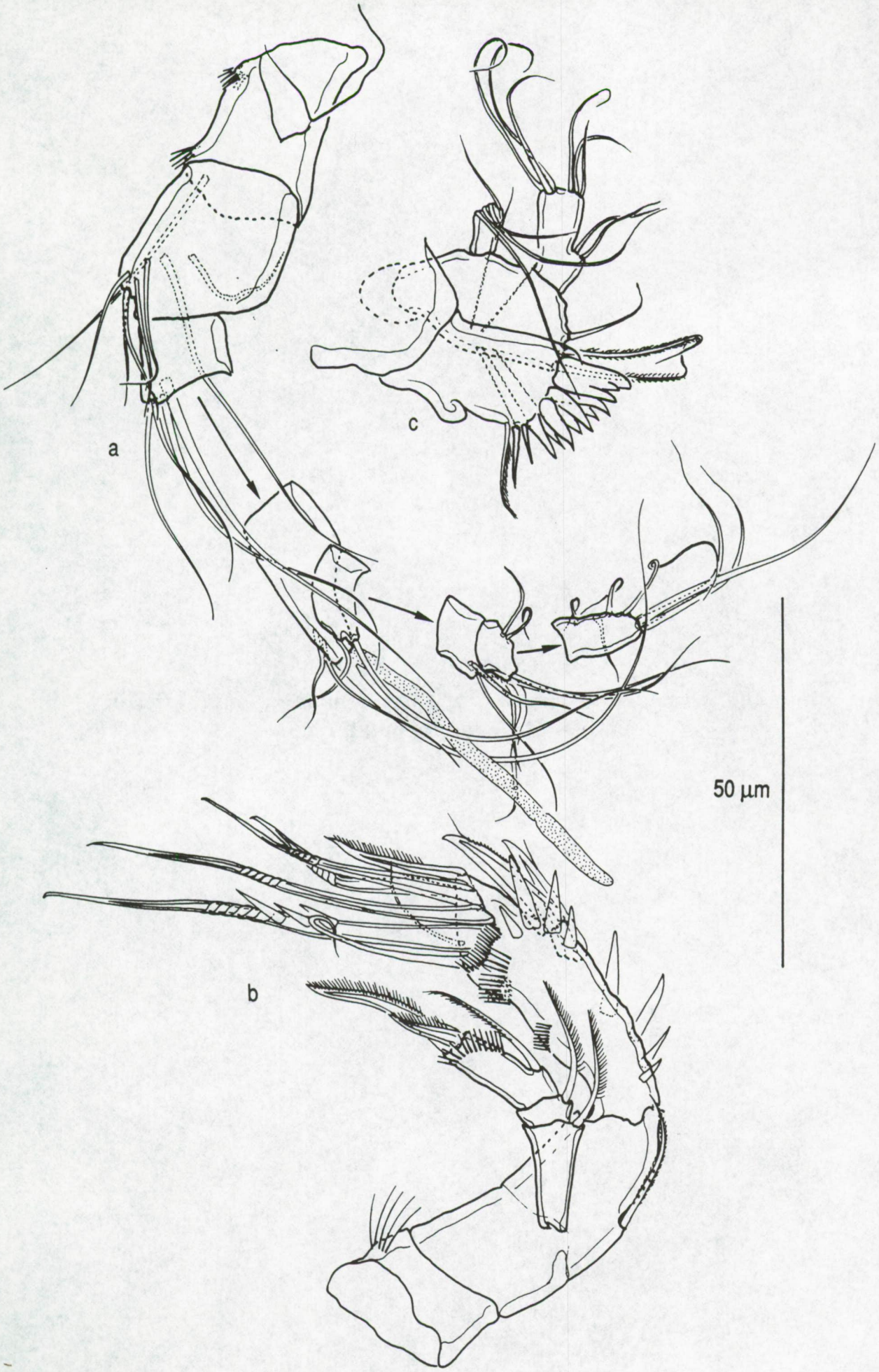

a
c
50 µm
b

Fig. 208. Diosaccidae *N. gen. 2 n .sp. 1*, female. a, maxillule; b, maxilla, exploded; c, maxilliped.

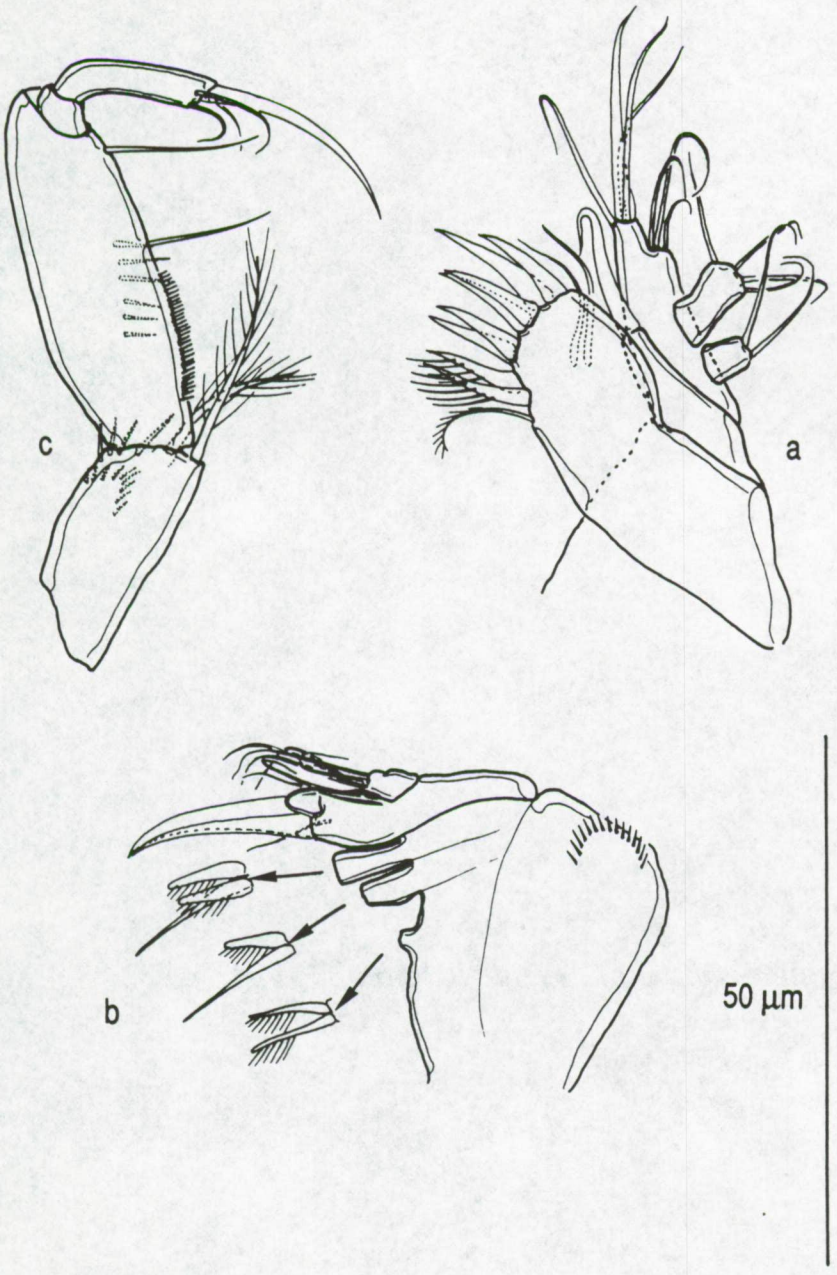

c
a
b
50 µm

Fig. 209. Diosaccidae *N. gen. 2 n. sp. 1*, female. a, P1; b, P2; c, P3.

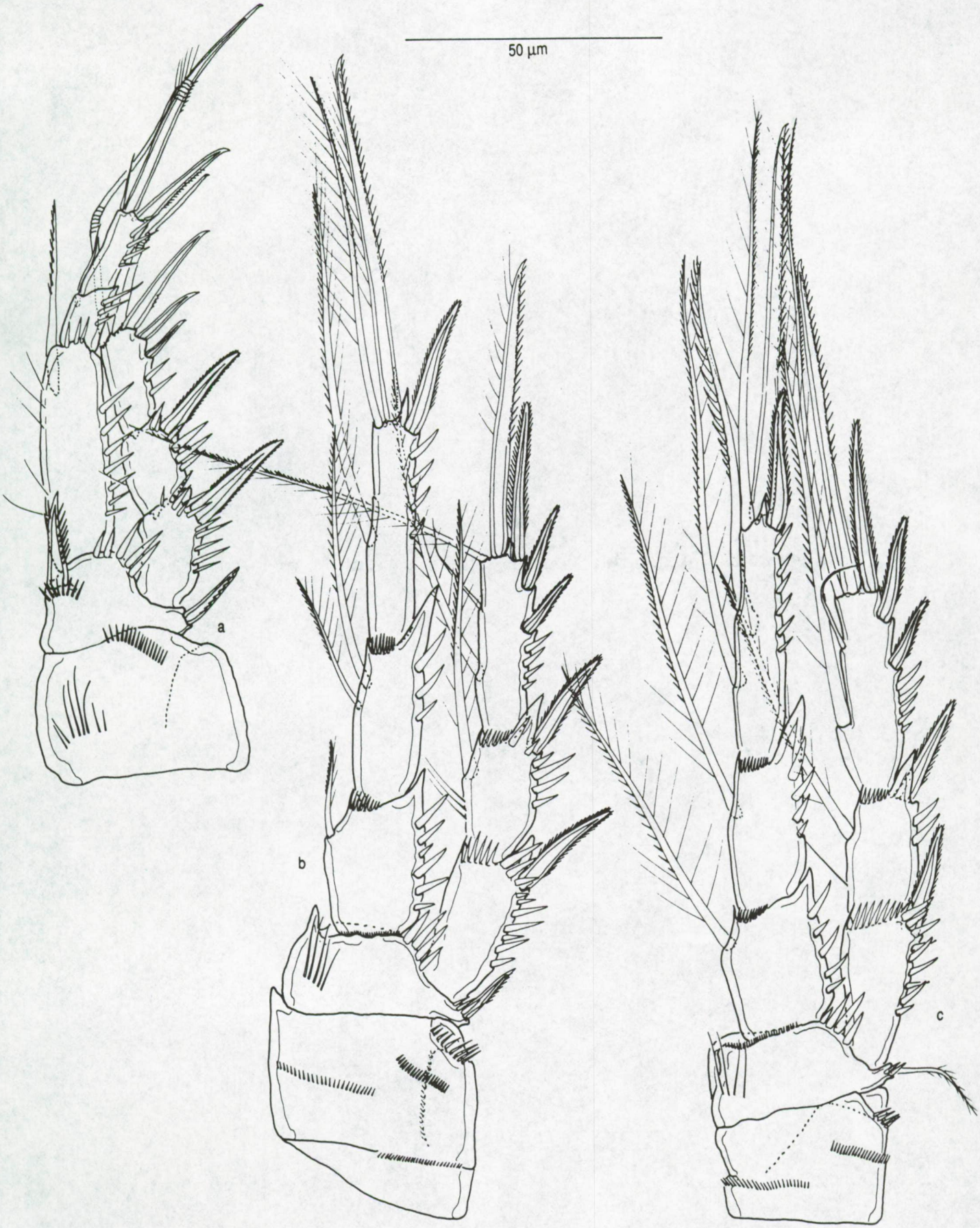

50 µm
a
b
c

Fig. 210. Diosaccidae *N. gen. 2 n. sp. 1*, female. a, P4; b, P5.

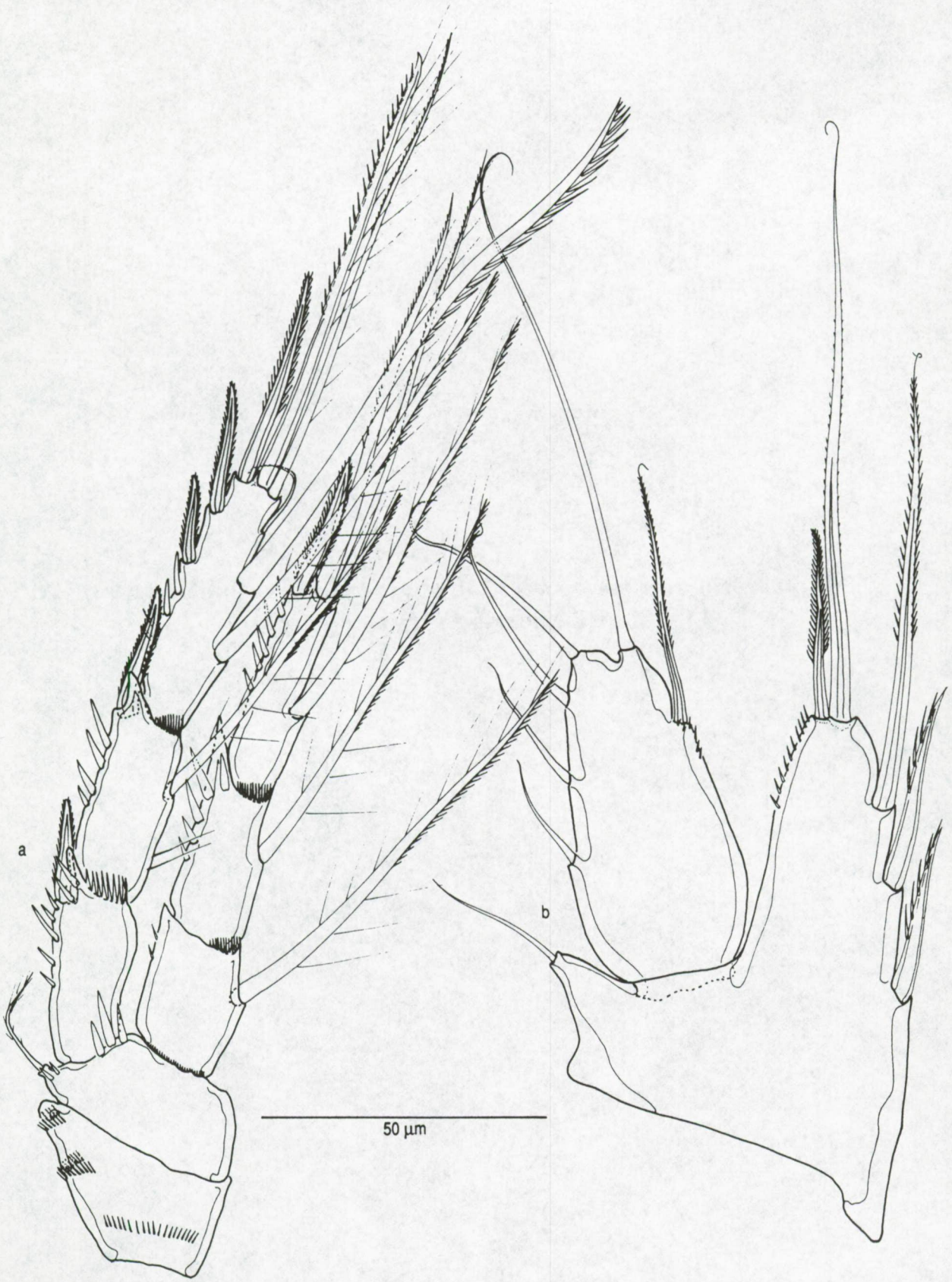

a
b
50 µm

Fig. 211. Diosaccidae *N. gen. 2 n. sp. 1*, male. Urosome, ventral (P5 and P6 bearing-somites omited).

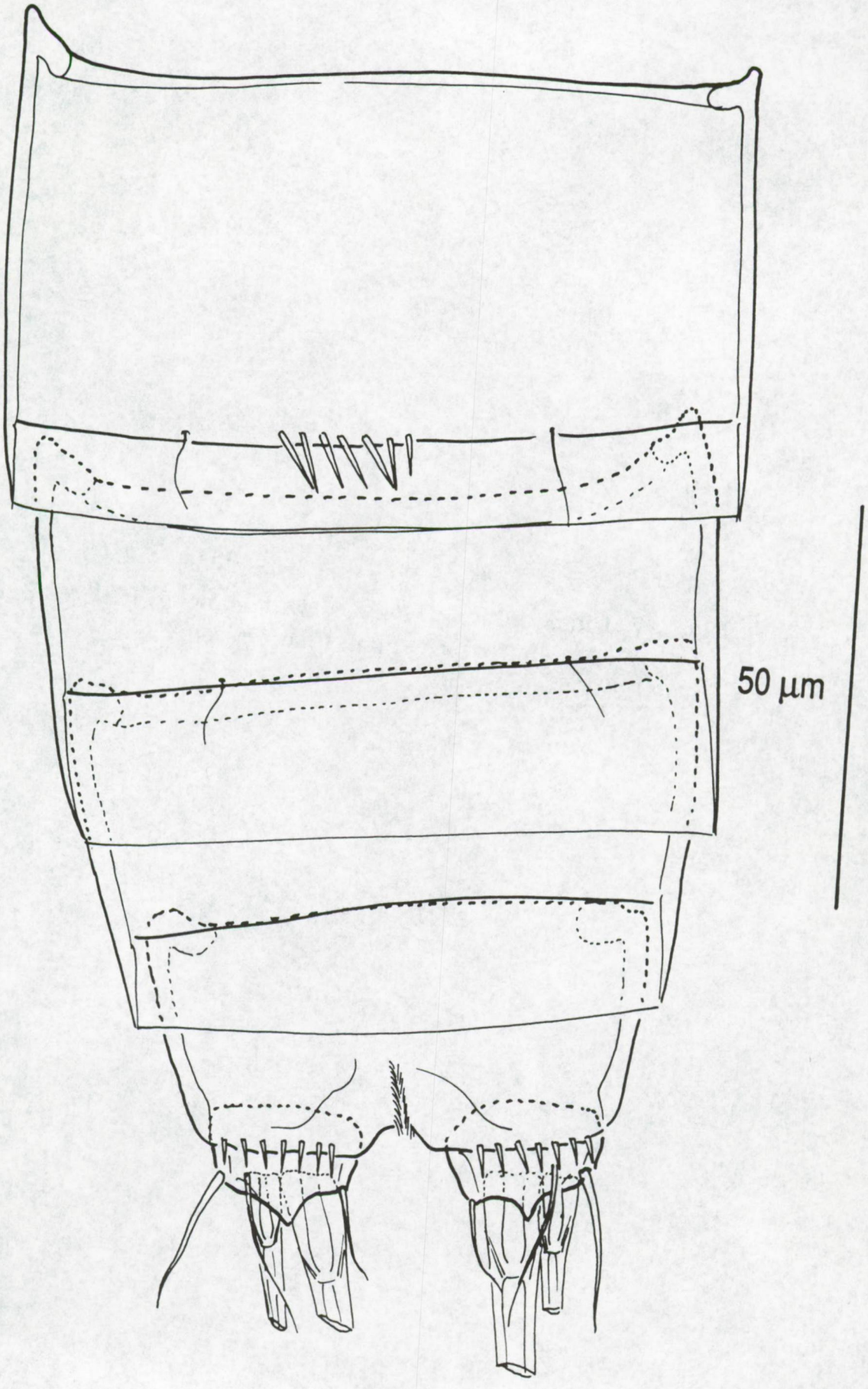

50 µm

Fig. 212. Diosaccidae *N. gen. 2 n. sp. 1*, male. a, P2 ENP 2; b, antennule, armature omited;.

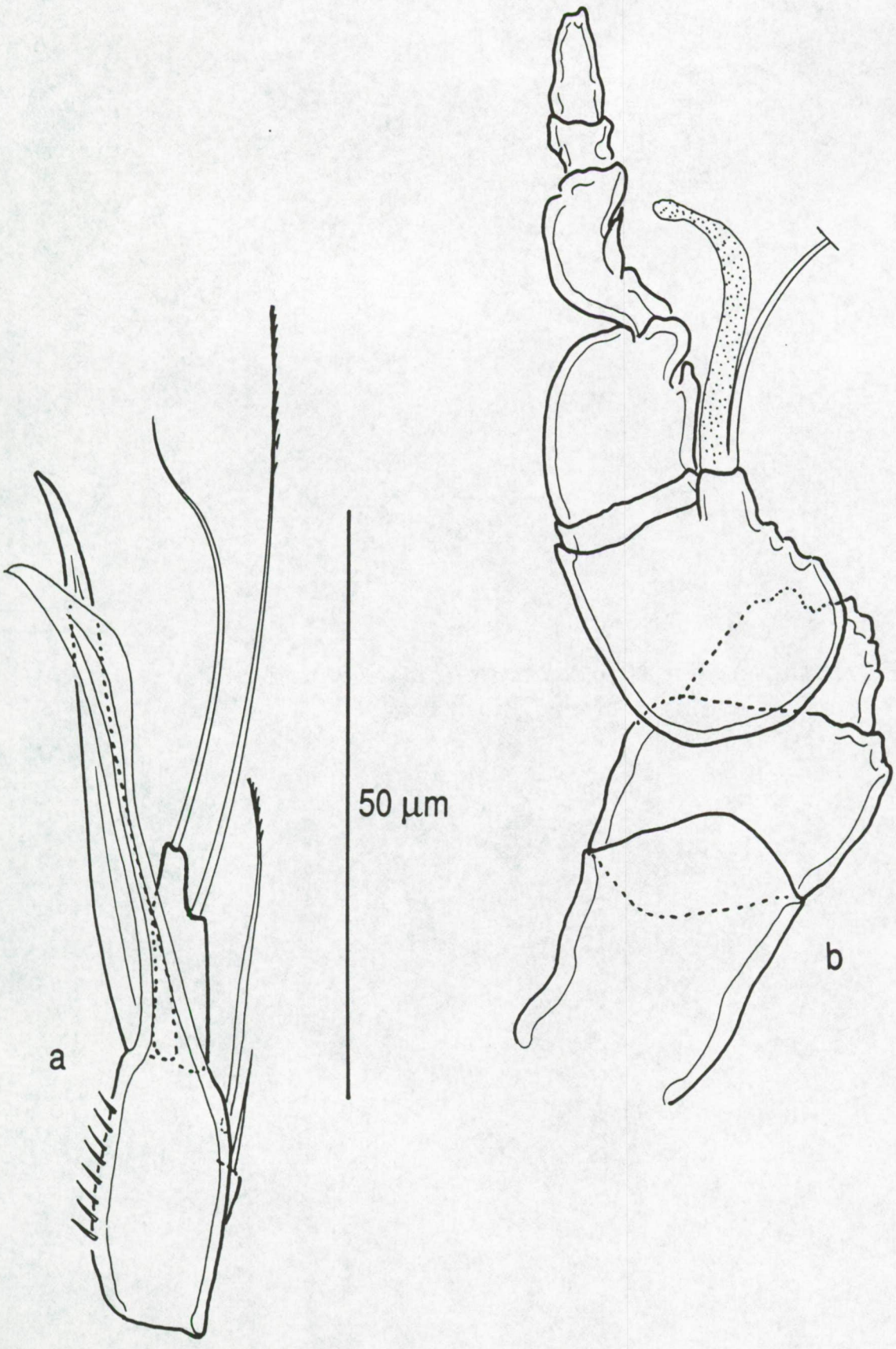
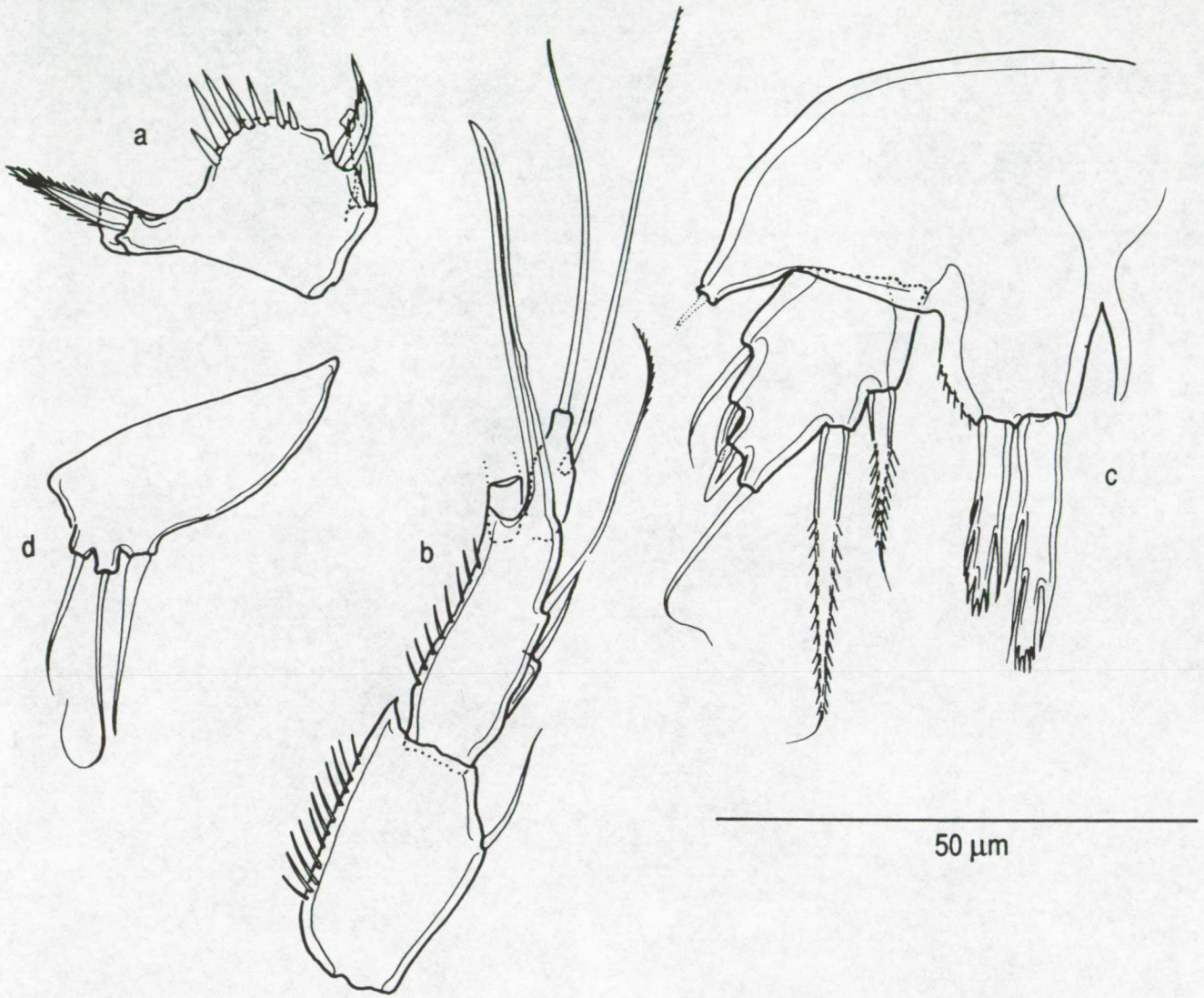

a
50 µm
b

Fig. 213. Diosaccidae *N. gen. 2 n. sp. 1*, male. a, basis of P1; b, P2 ENP; c, P5; d, P6.

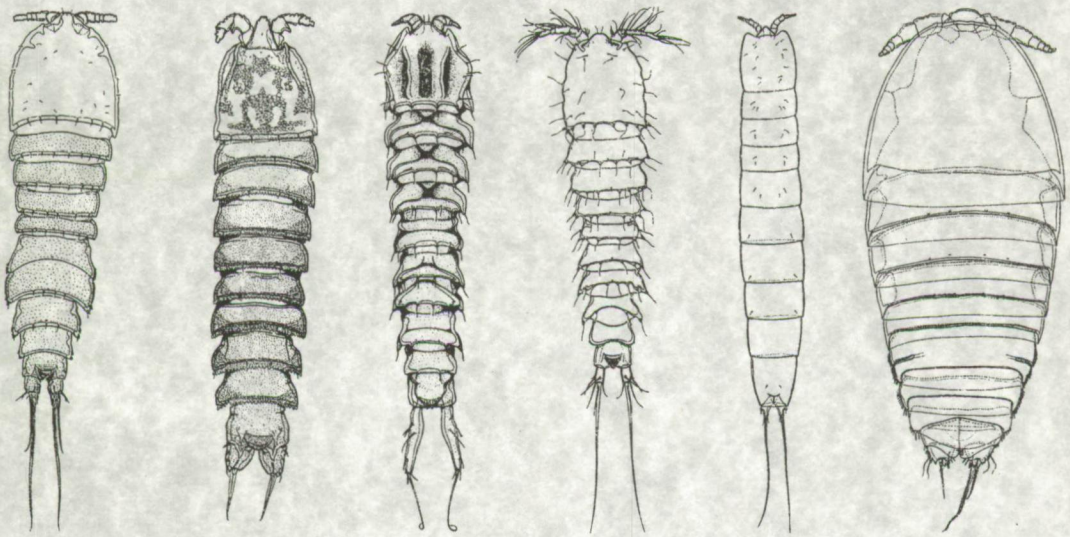

a
b
c
d
50 µm

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SYSTEMATICS AND SOME DATA ON THE ECOLOGY OF THE HARPACTICOID FAUNA (COPEPODA, HARPACTICOIDA) FROM A SUBTROPICAL COASTAL LAGOON IN THE SOUTH-EASTERN GULF OF CALIFORNIA (MEXICO) (FIGURES, PART II, FIGS. 214-378)

by

Samuel E. Gómez-Noguera



PROMOTOR

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Dr. F. Fiers
(KBIN)

Dr. M. Hendrickx
(UNAM)

Thesis presented for the degree of
Doctor in Sciences (Biology)
(Academic year 1998-1999)

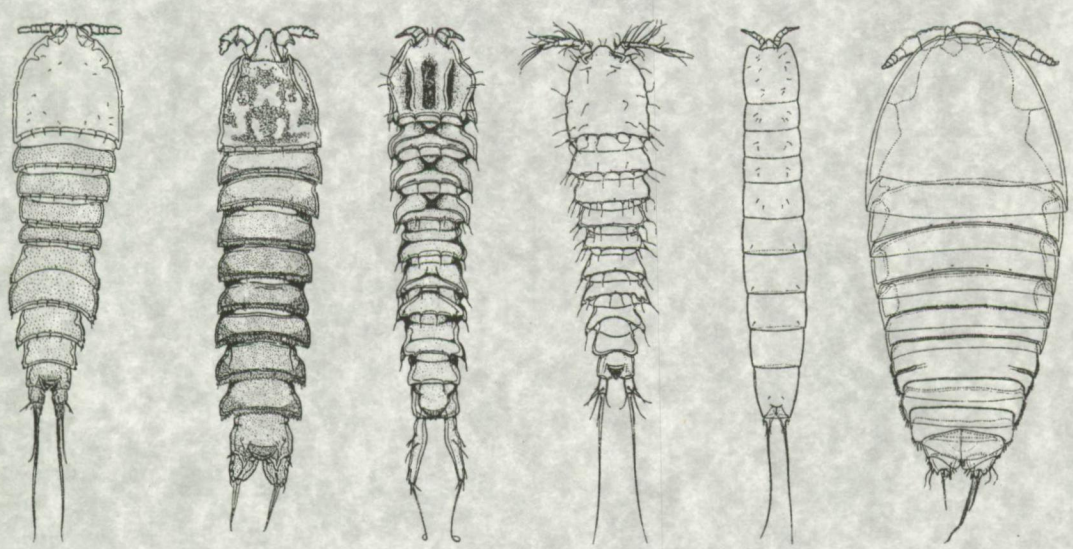
Fig. 215. ***Ameira parvula f. nana*** **Willey, female. a, antennule, armature omited; b, antenna; c, mandible; d, maxilla; e, maxilliped.**

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FLANDERS MARINE INSTITUTE
Oostende - Belgium

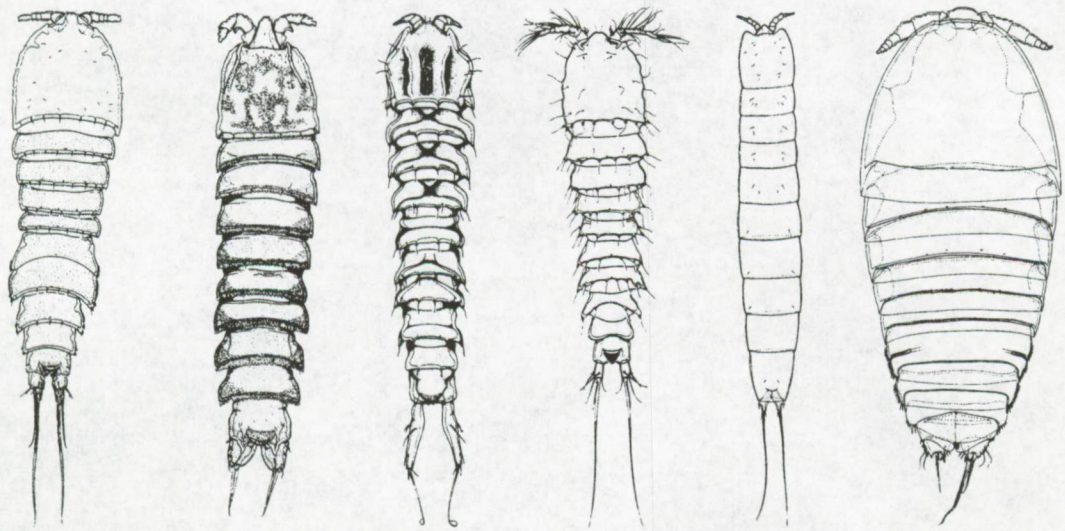
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CENTRUM

35334

SYSTEMATICS AND SOME DATA ON THE ECOLOGY OF THE HARPACTICOID FAUNA (COPEPODA, HARPACTICOIDA) FROM A SUBTROPICAL COASTAL LAGOON IN THE SOUTH-EASTERN GULF OF CALIFORNIA (MEXICO) (FIGURES, PART II, FIGS. 214-378)

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Fig. 214. ***Ameira parvula f. nana*** **Willey, female. a, urosome, dorsal; b, urosome, ventral (P5 bearing-somite omited in a and b).**

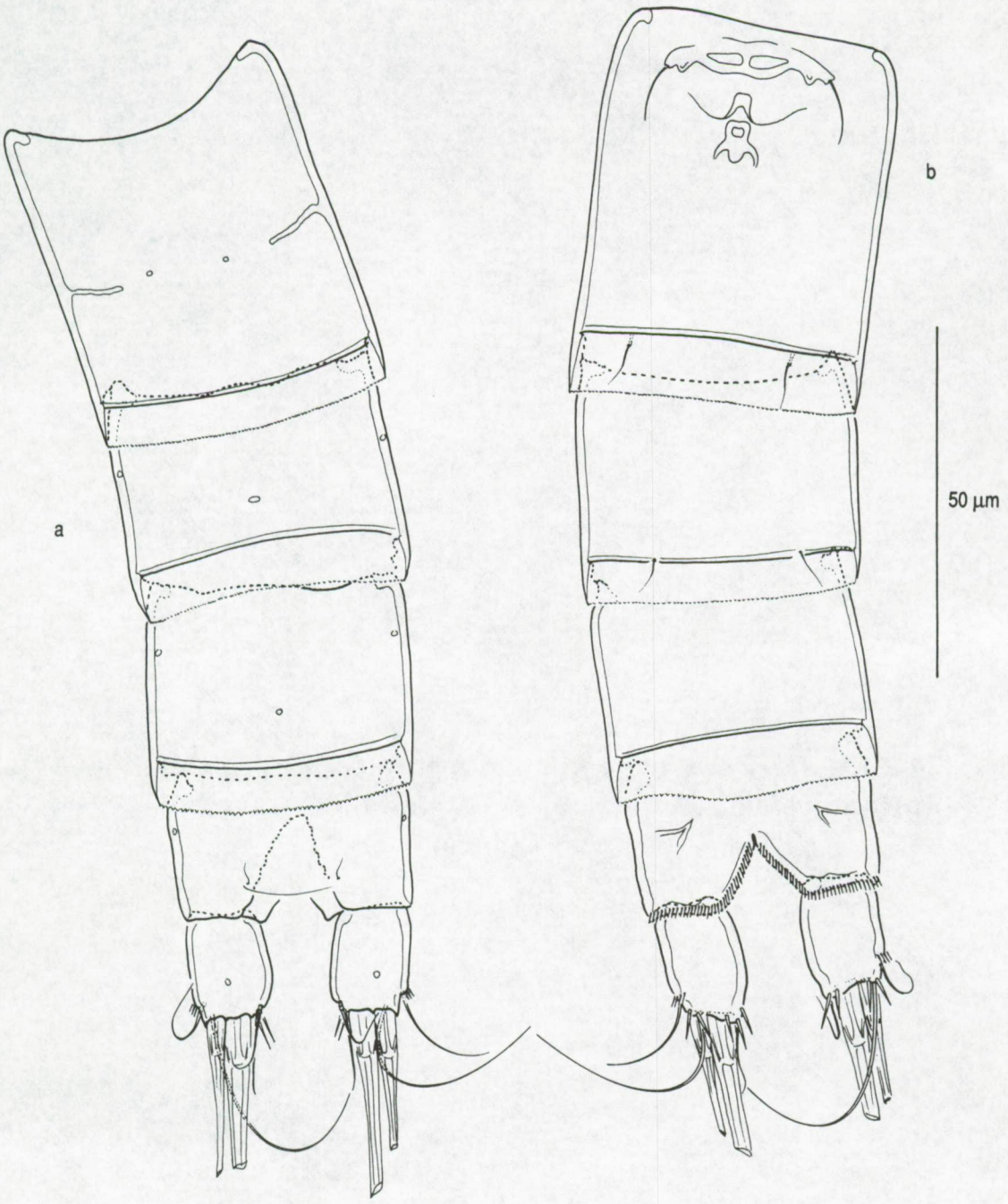

a
b
50 µm

Fig. 215. ***Ameira parvula f. nana*** **Willey, female. a, antennule, armature omited; b, antenna; c, mandible; d, maxilla; e, maxilliped.**

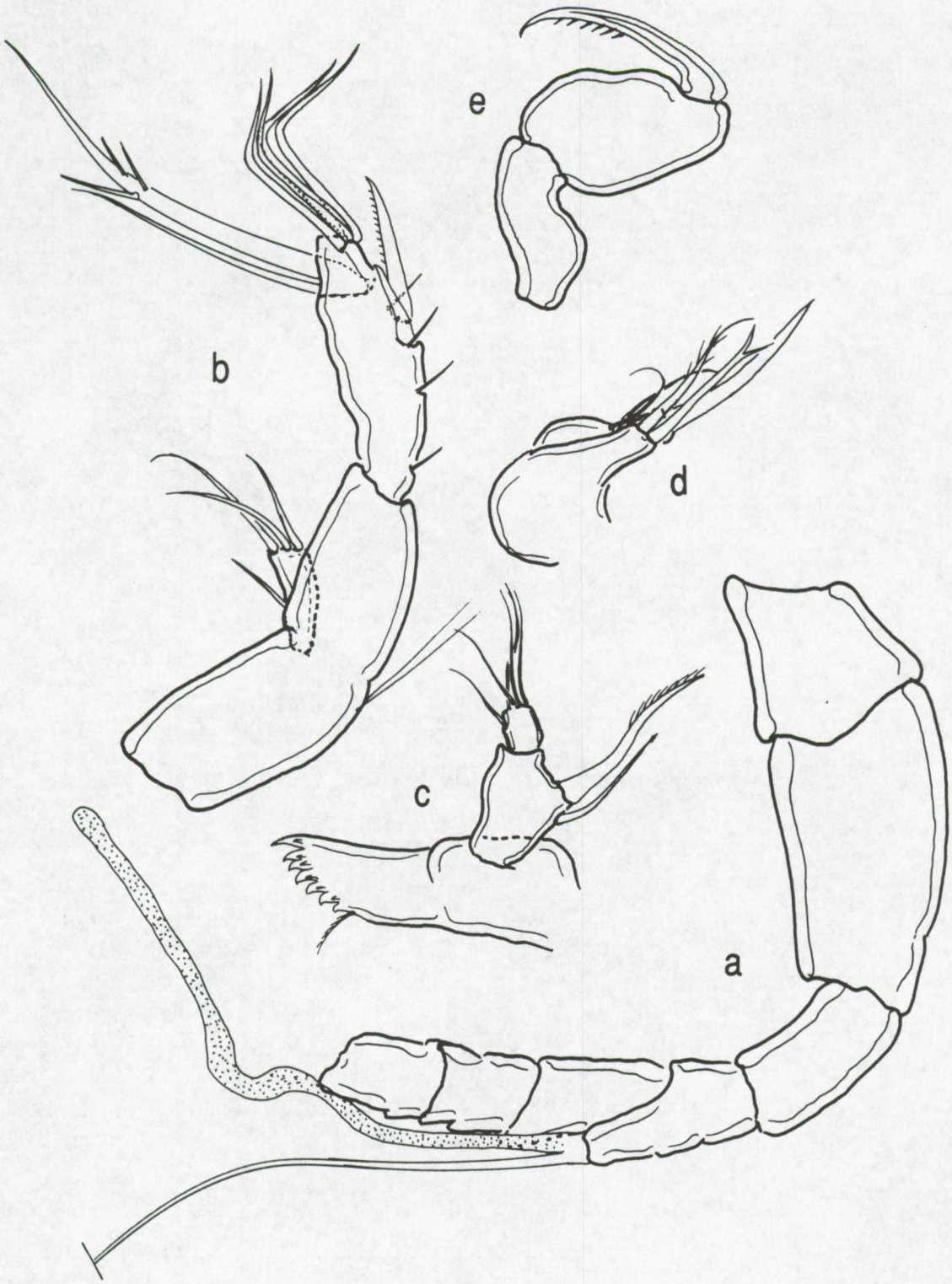

e
b
d
c
a
25 µm

Fig. 216. ***Ameira parvula f. nana*** **Willey, female. a, P1; b, P2.**

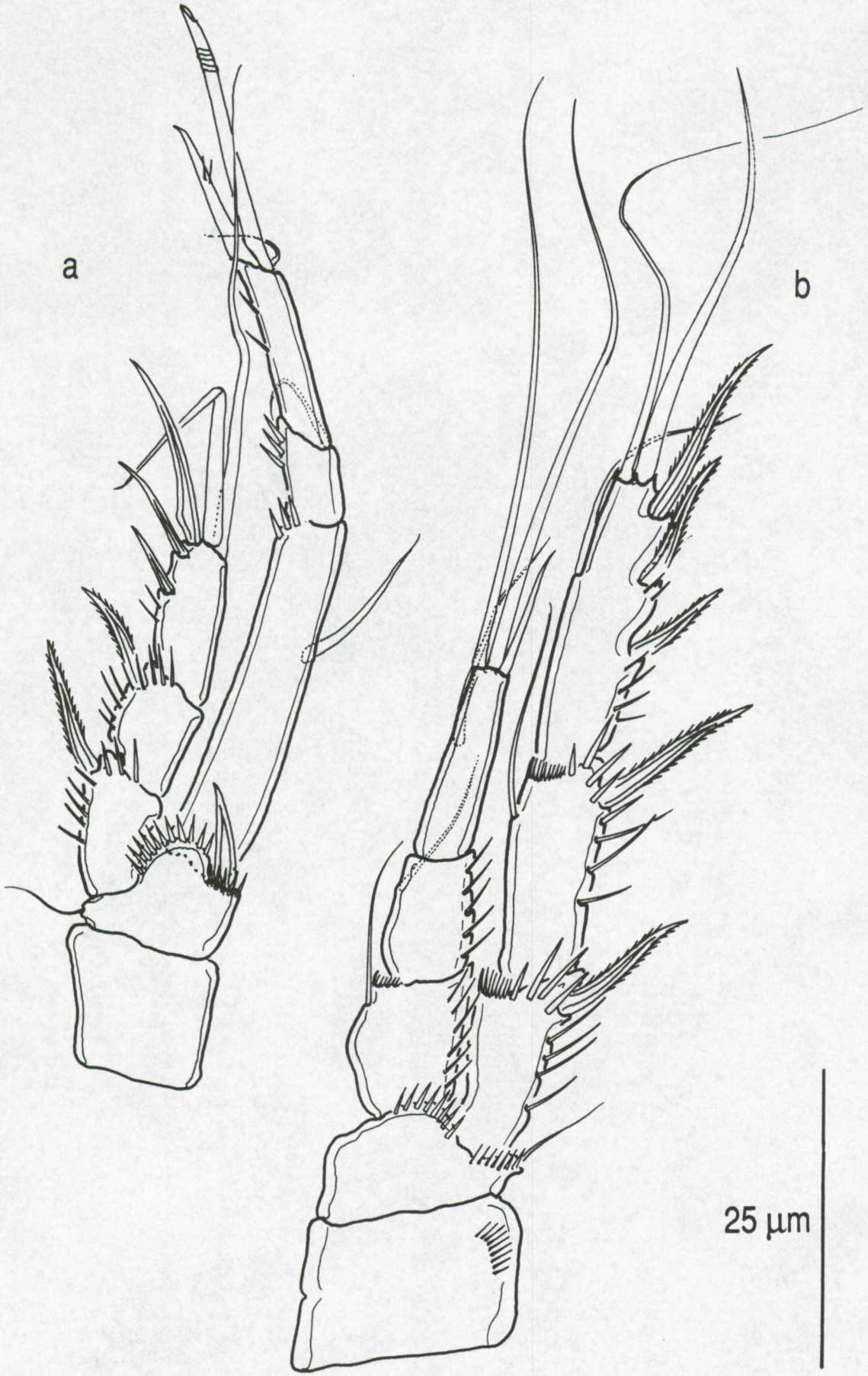
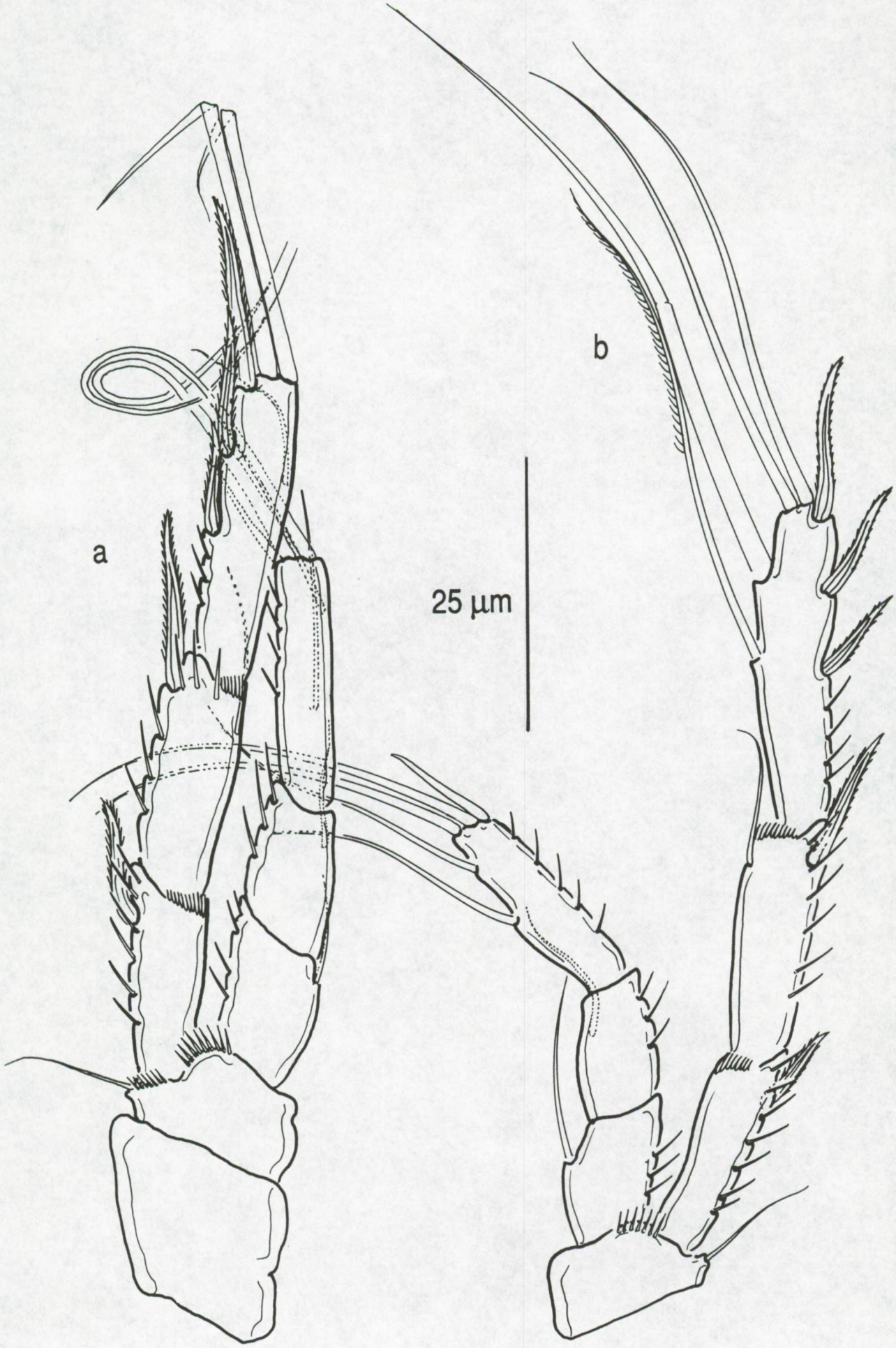

a
b
25 µm

Fig. 217. ***Ameira parvula f. nana*** **Willey, female. a, P3; b, P4.**


a
b
25 µm

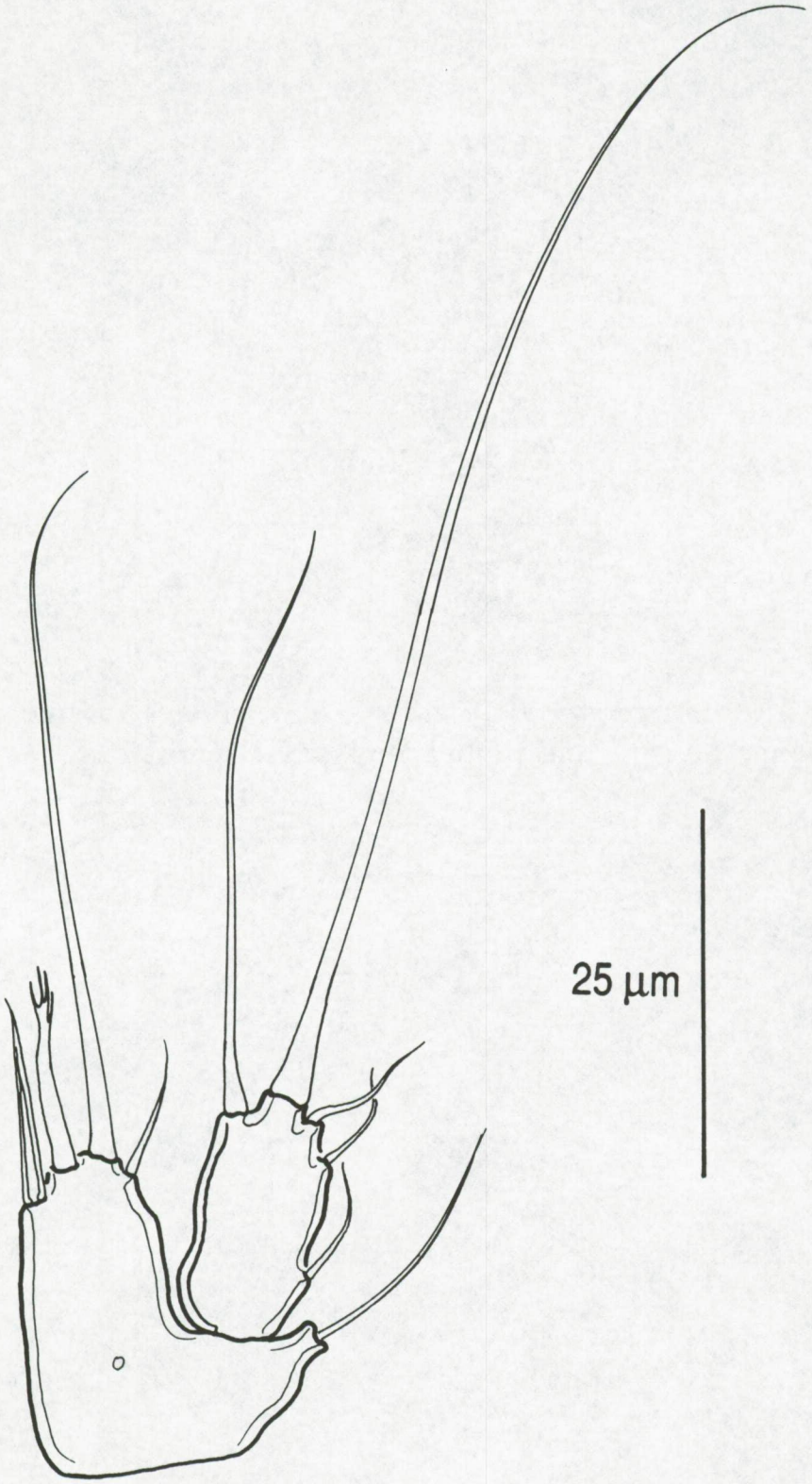

25 µm

Fig. 219. ***Ameira parvula f. nana*** **Willey, male. Urosome, ventral (P5 and P6 bearing-somites omited).**

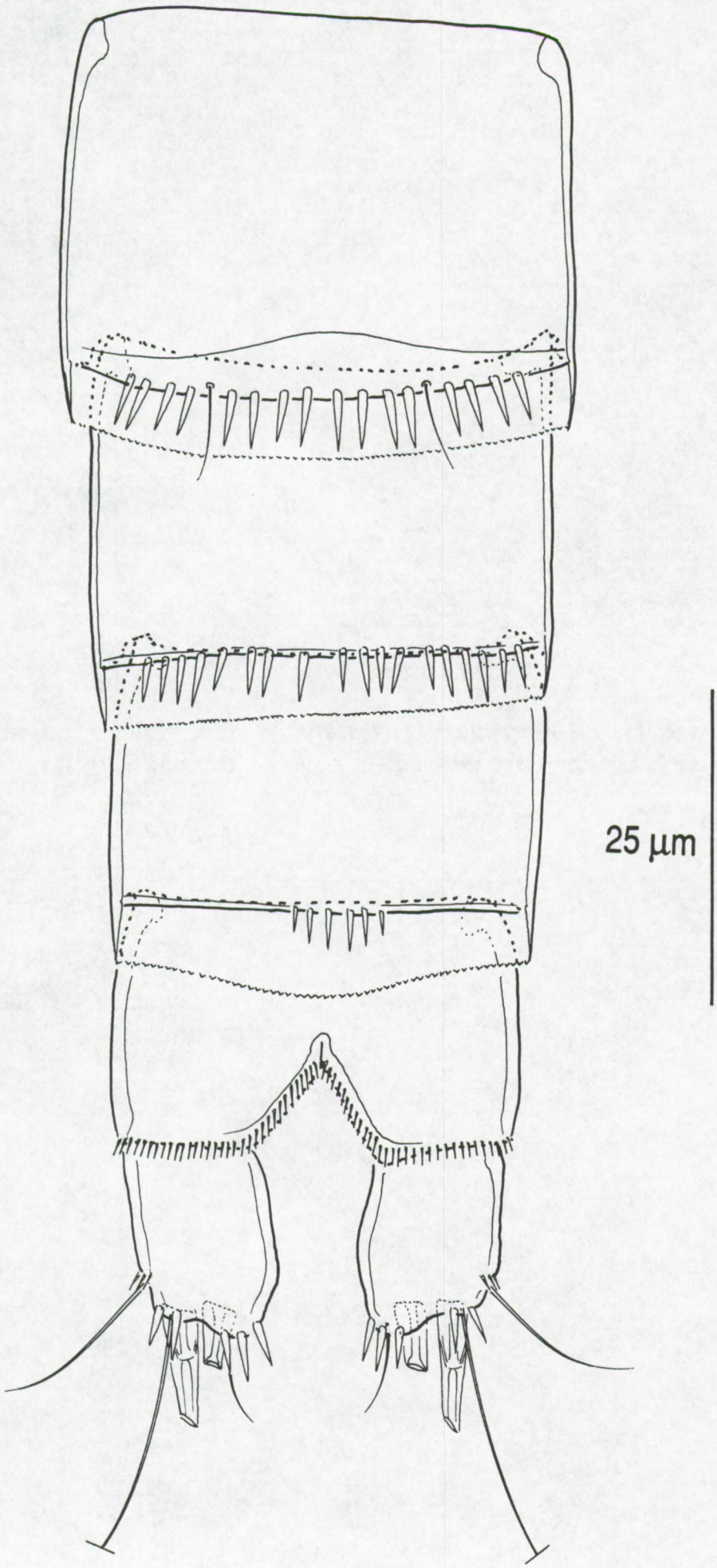

25 µm

Fig. 220. ***Ameira parvula f. nana*** **Willey, male. a, antennule, armature omited; b, basis of P1; c, P5; d, P6.**

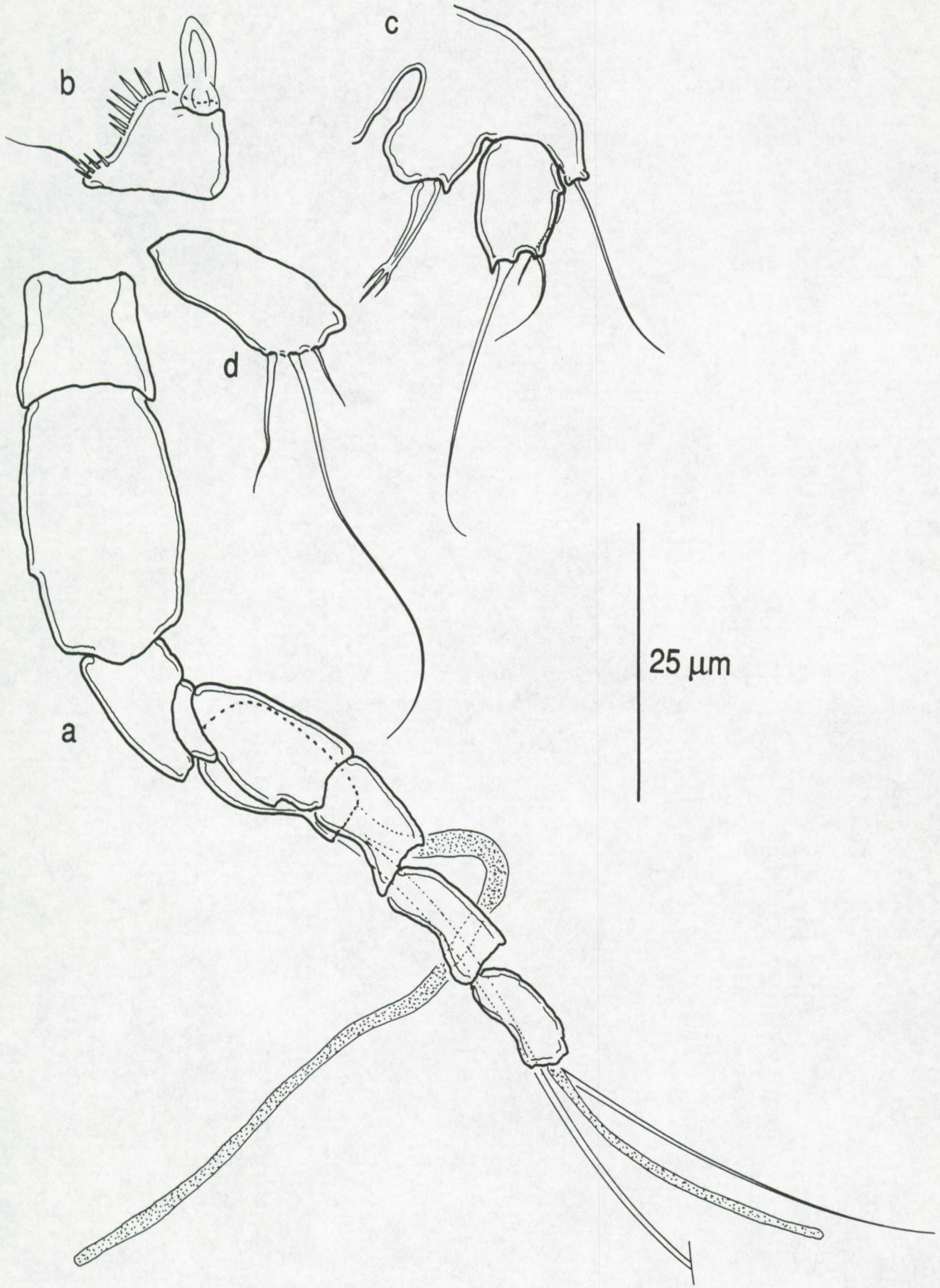

b
c
d
a
25 µm

Fig. 221. ***Ameira parvuloides*** **Lang, female. a, urosome, dorsal; b, urosome, ventral (P5 bearing somite omited).**

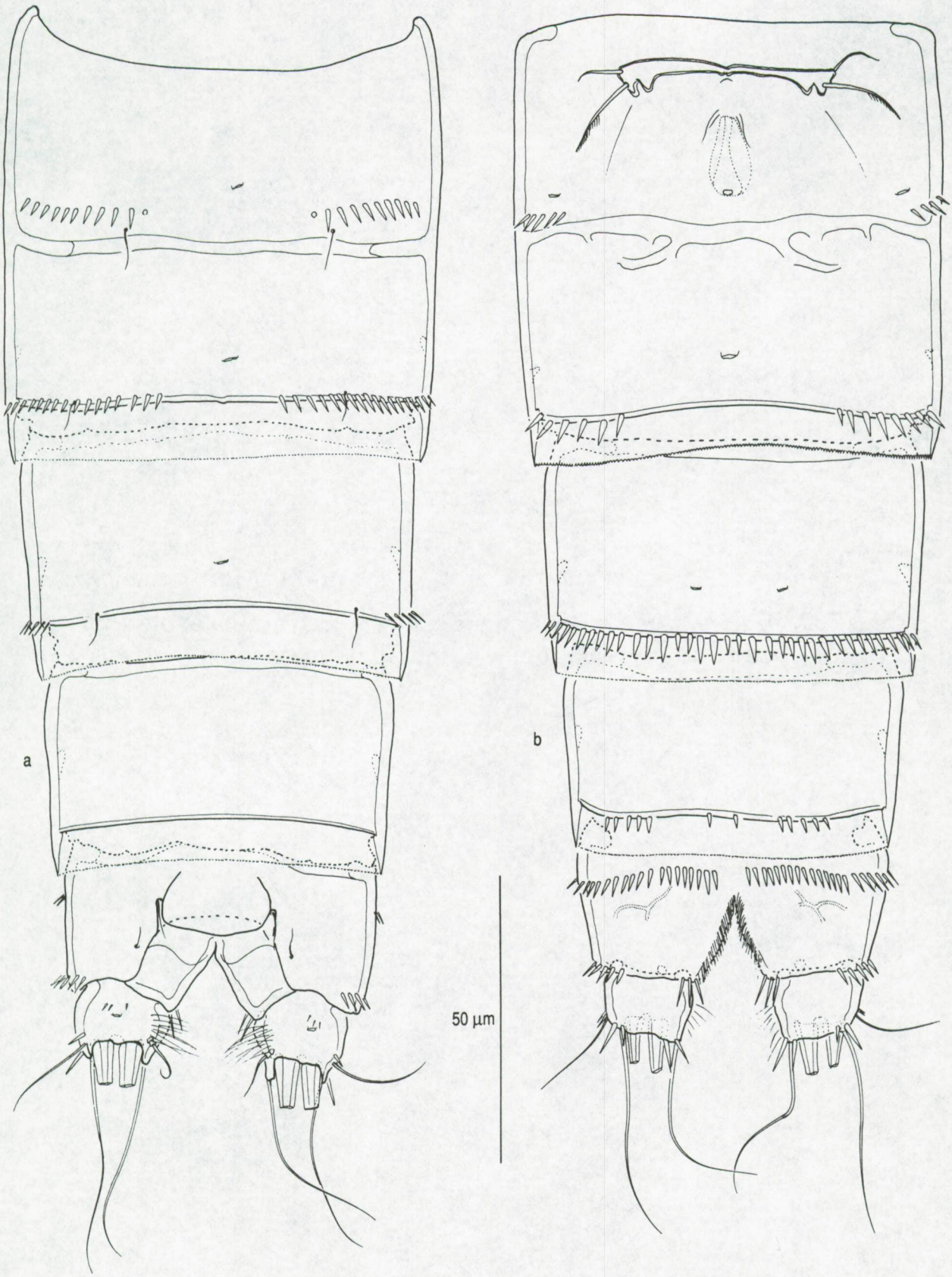

a
b
50 µm

Fig. 222. ***Ameira parvuloides*** **Lang, female. a, antennule, exploded; b, antenna; c, mandible; d, maxillule; e, maxilla.**

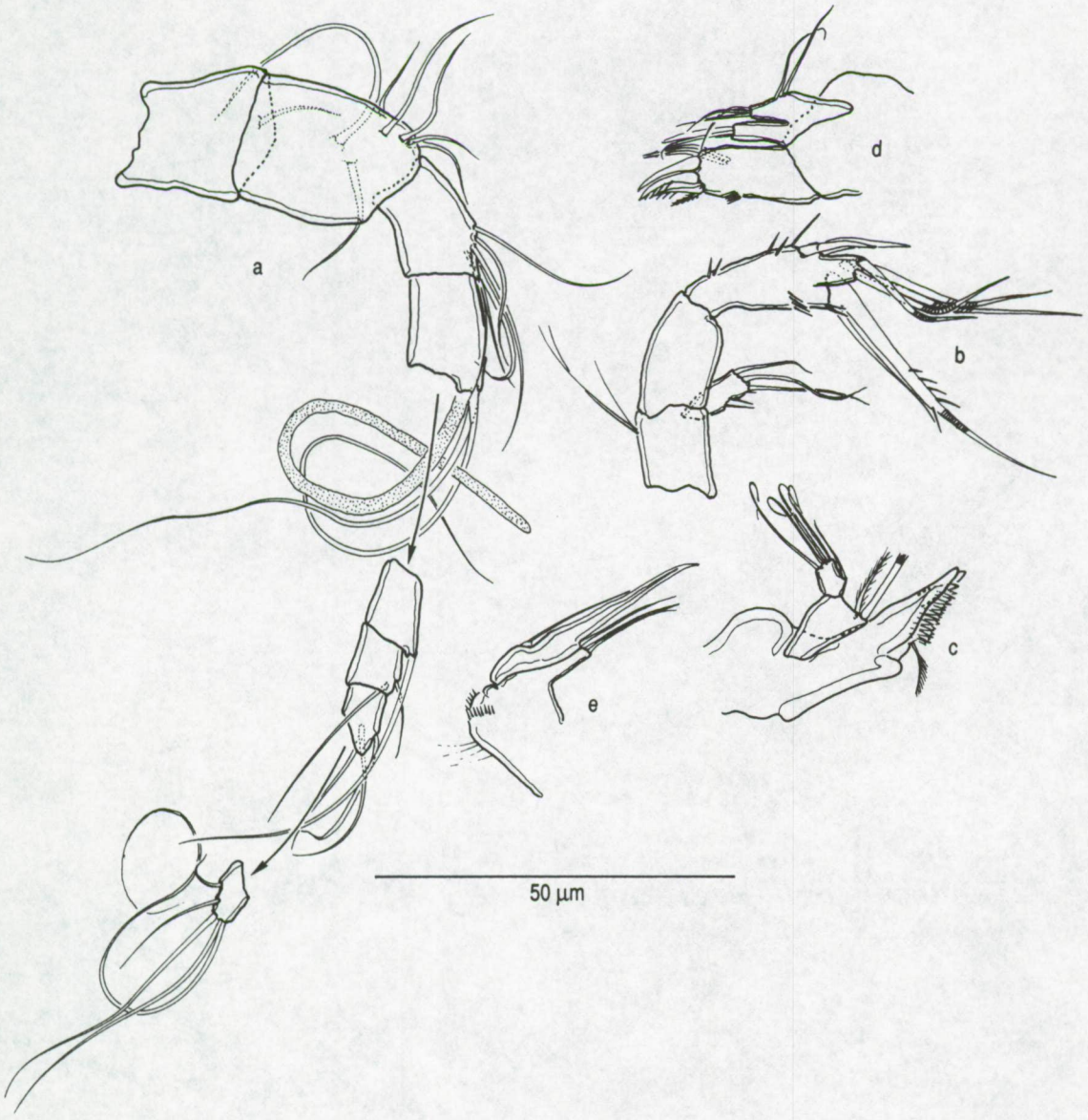
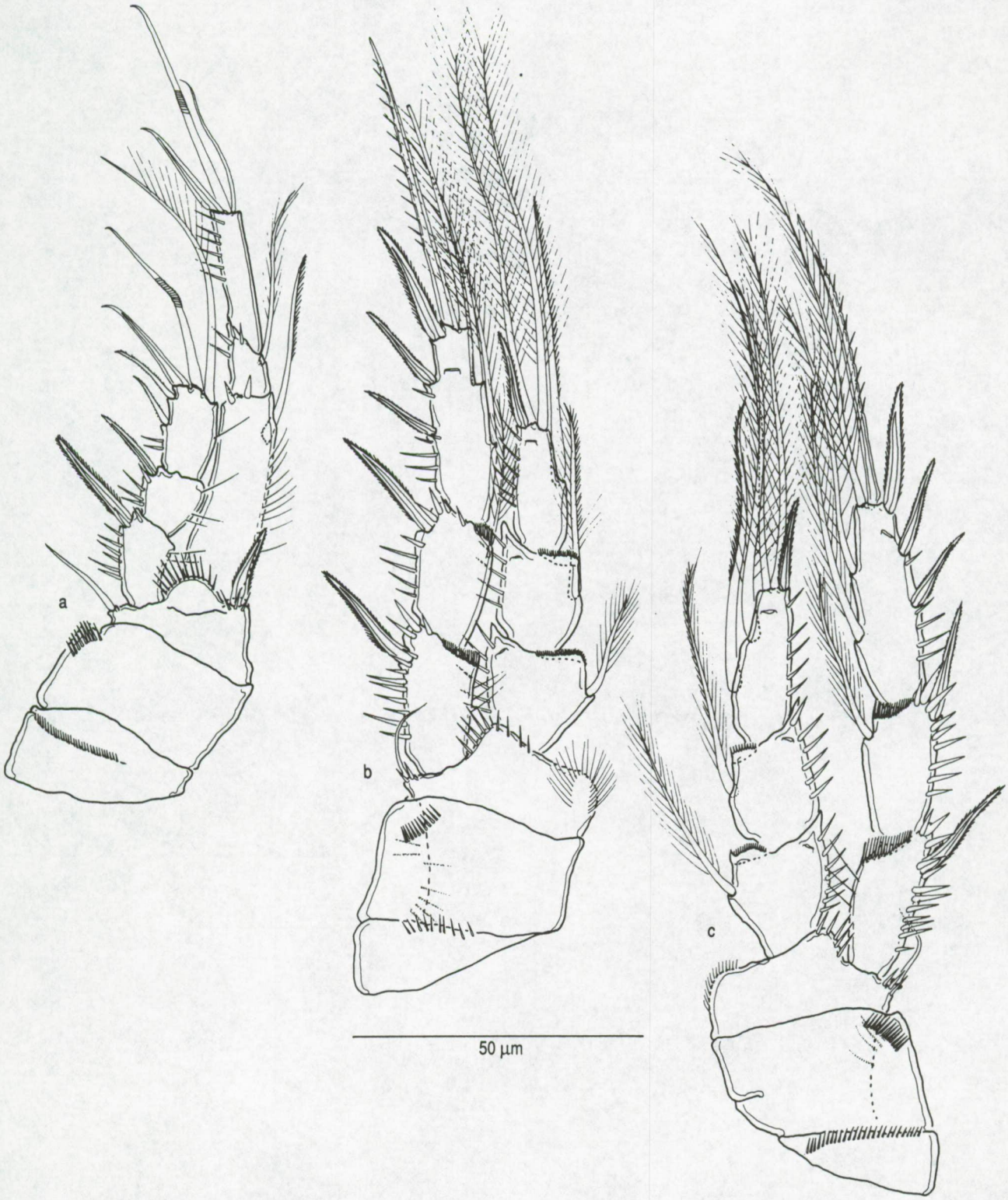

a
b
c
d
e
50 µm

Fig. 223. *Ameira parvuloides* Lang, female. a, P1; b, P2; c, P3.


a
b
c
50 µm

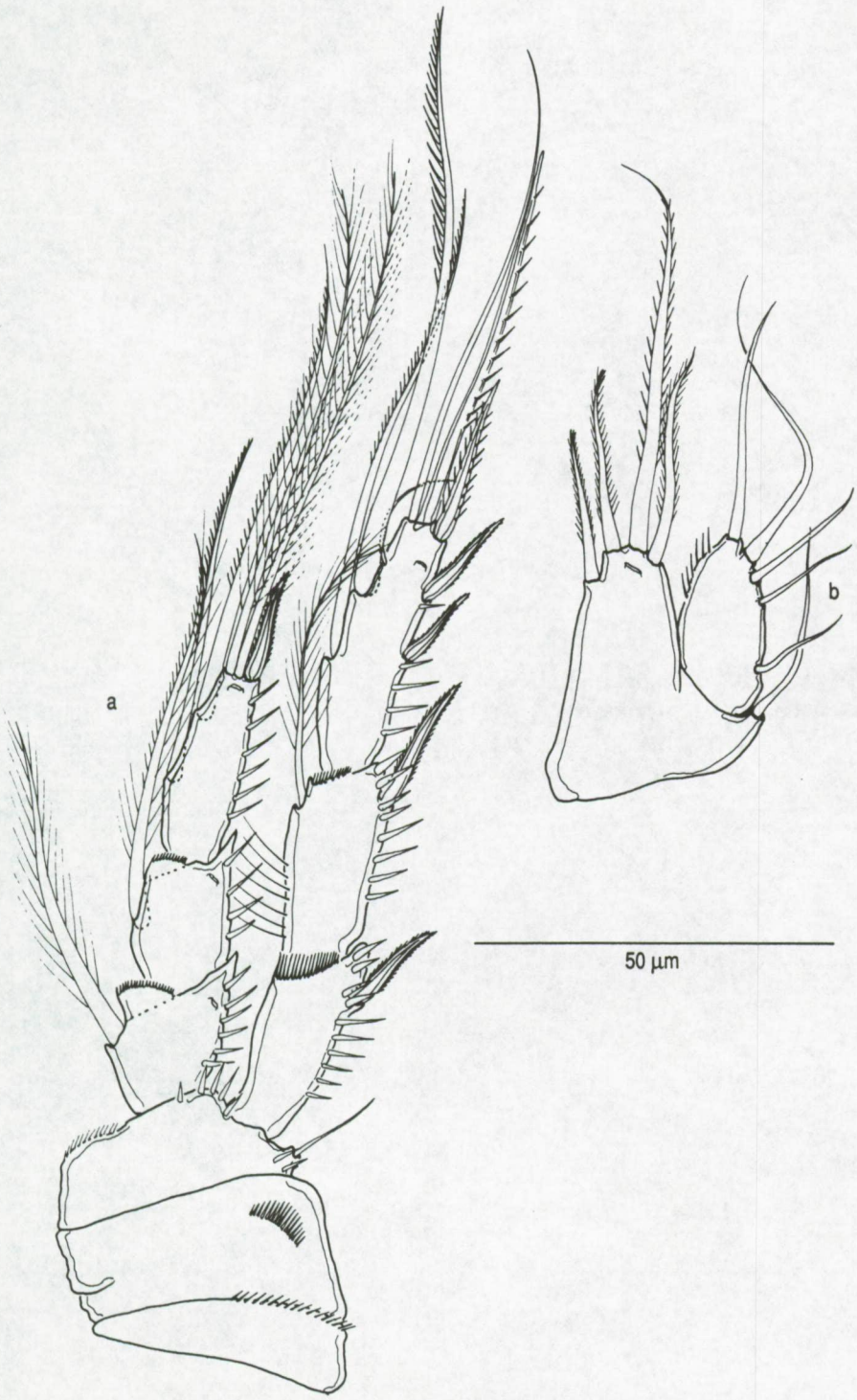
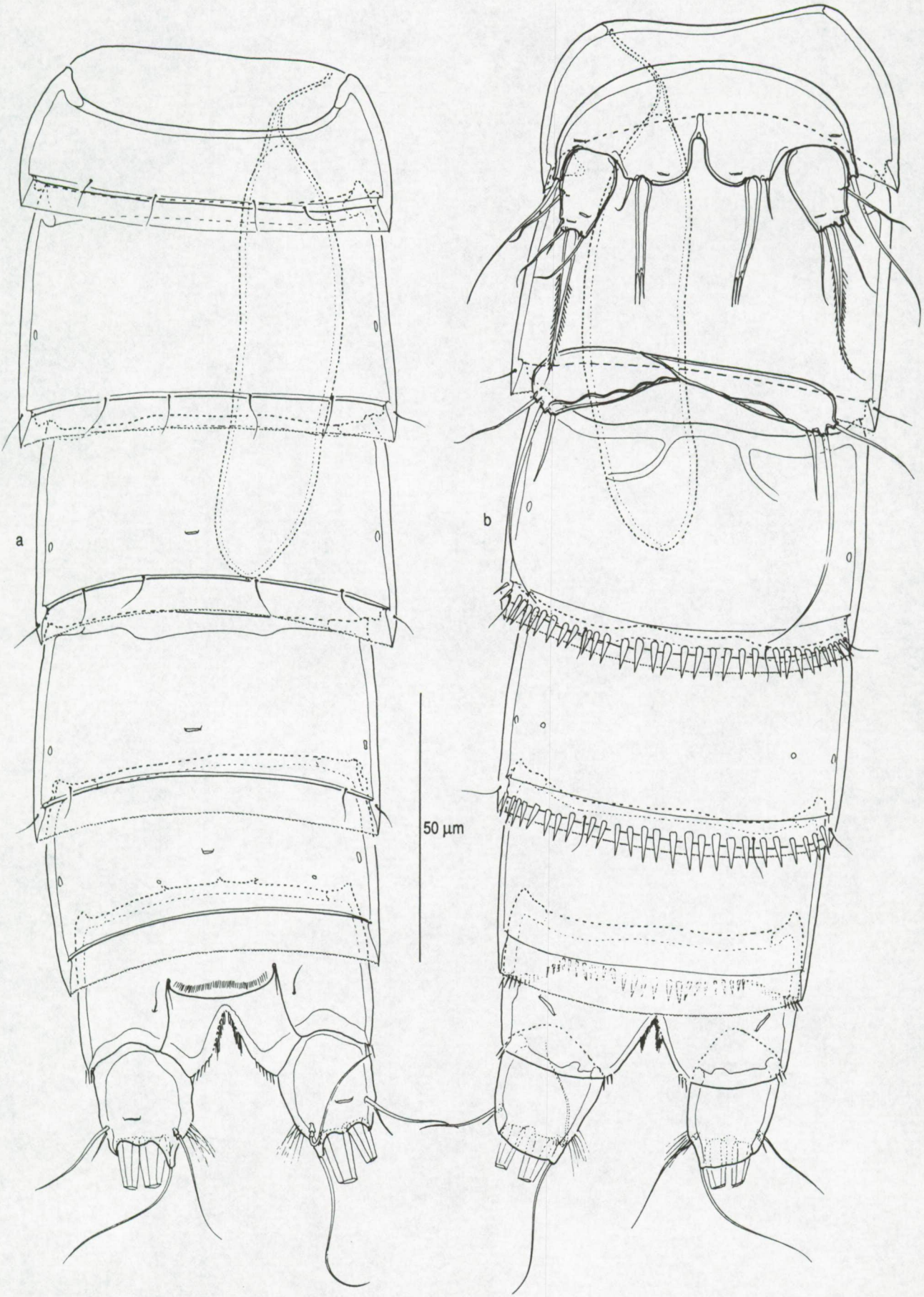

a
b
50 µm

Fig. 225. ***Ameira parvuloides*** **Lang, male. a, urosome, dorsal; b, urosome, ventral, showing P5 and P6.**


a
b
50 µm

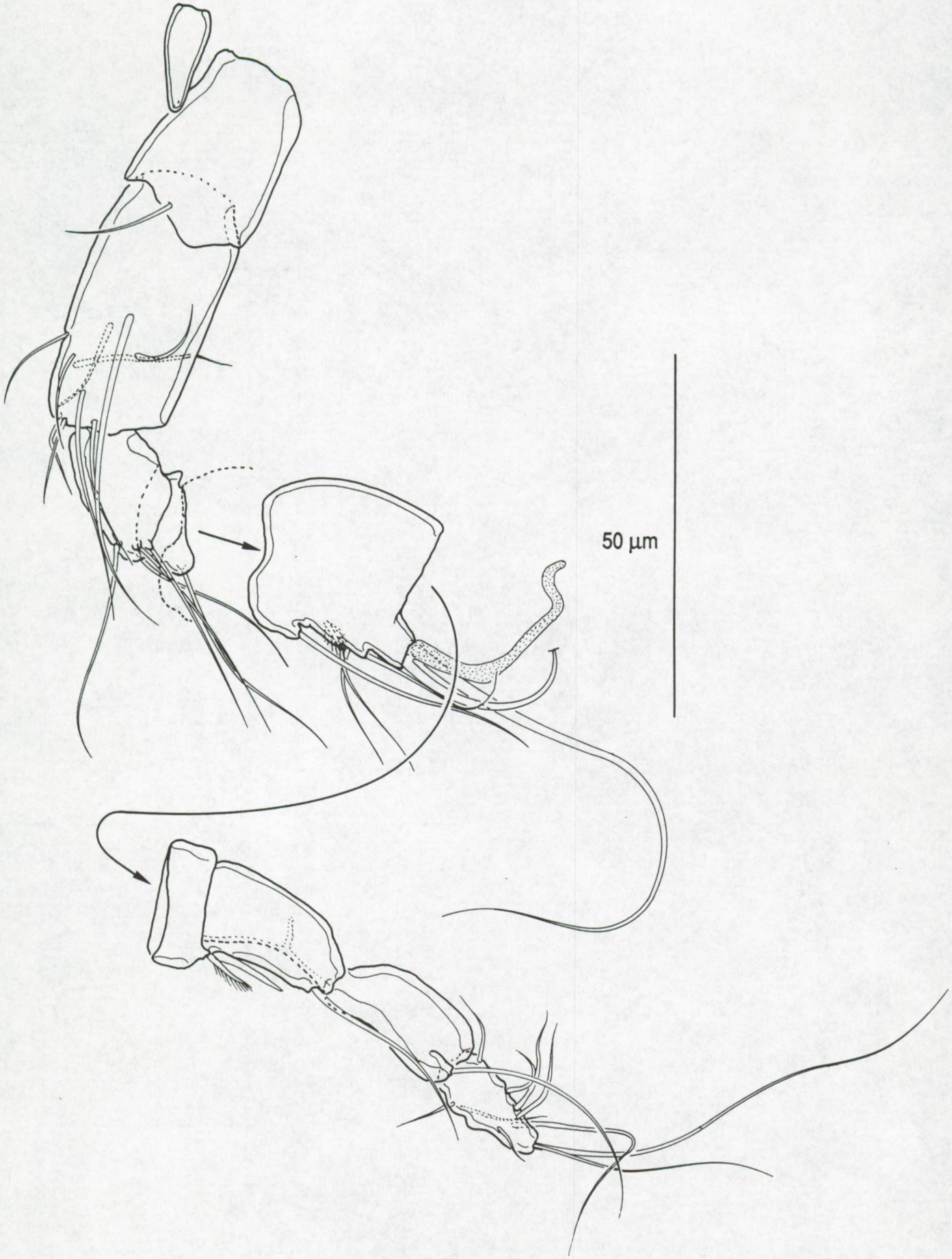

50 µm

Fig. 227. ***Ameira parvuloides*** **Lang, male. a, P5; b, P6; c, basis of P1.**

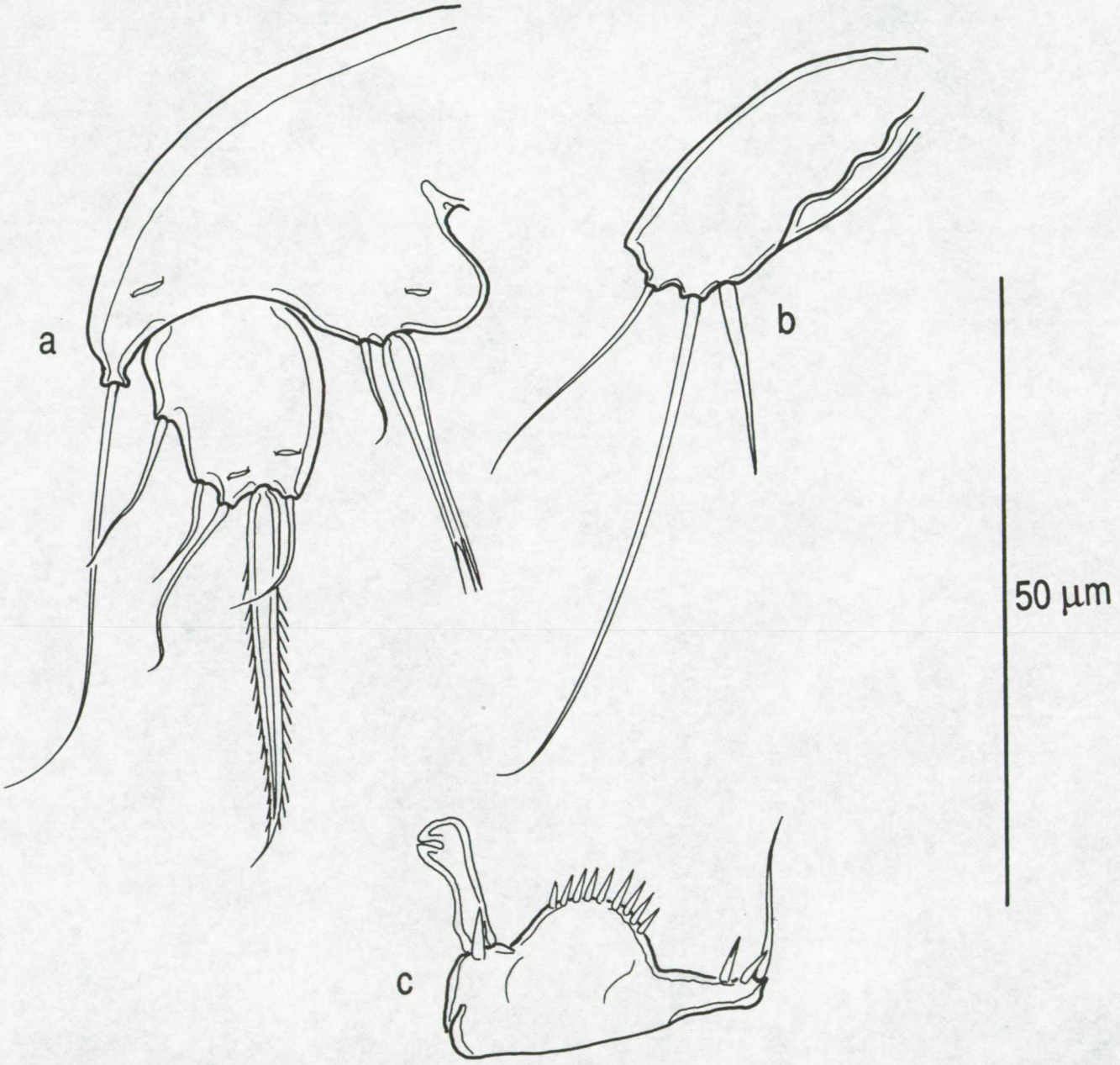

a
b
c
50 µm

Fig. 228. ***Psyllocamptus (P.) n. sp. 1*****, female. Habitus, dorsal.**

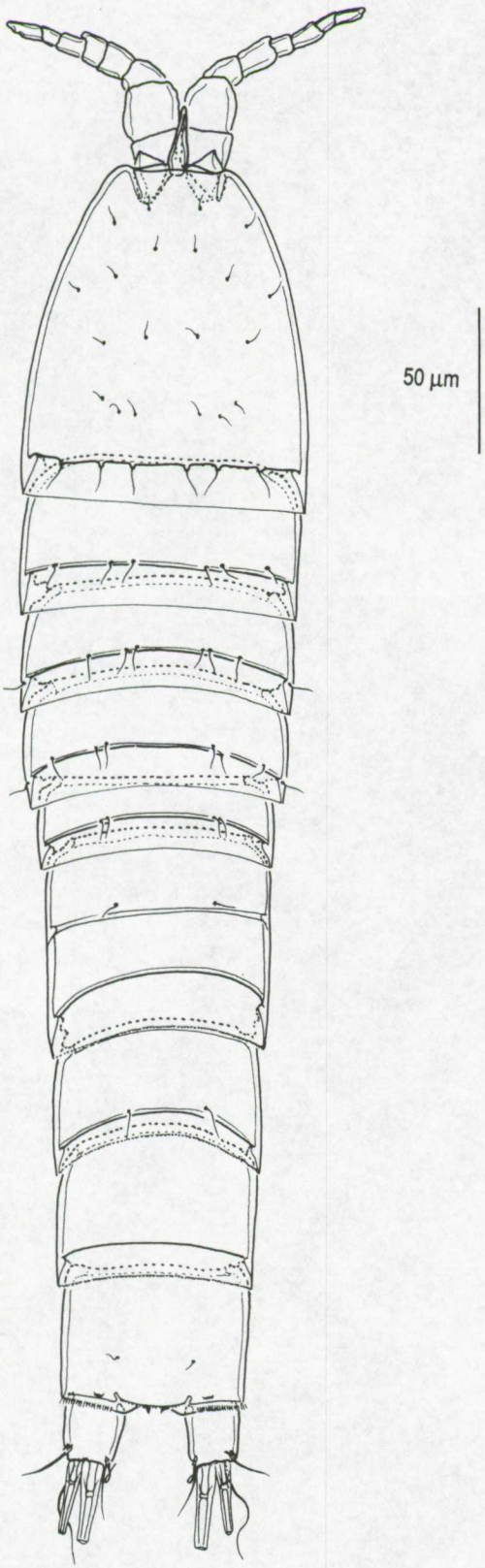

50 µm

Fig. 229. ***Psyllocamptus (P.) n. sp. 1*****, female. a, urosome, dorsal; b, urosome, ventral (P5 bearing-somite omited).**

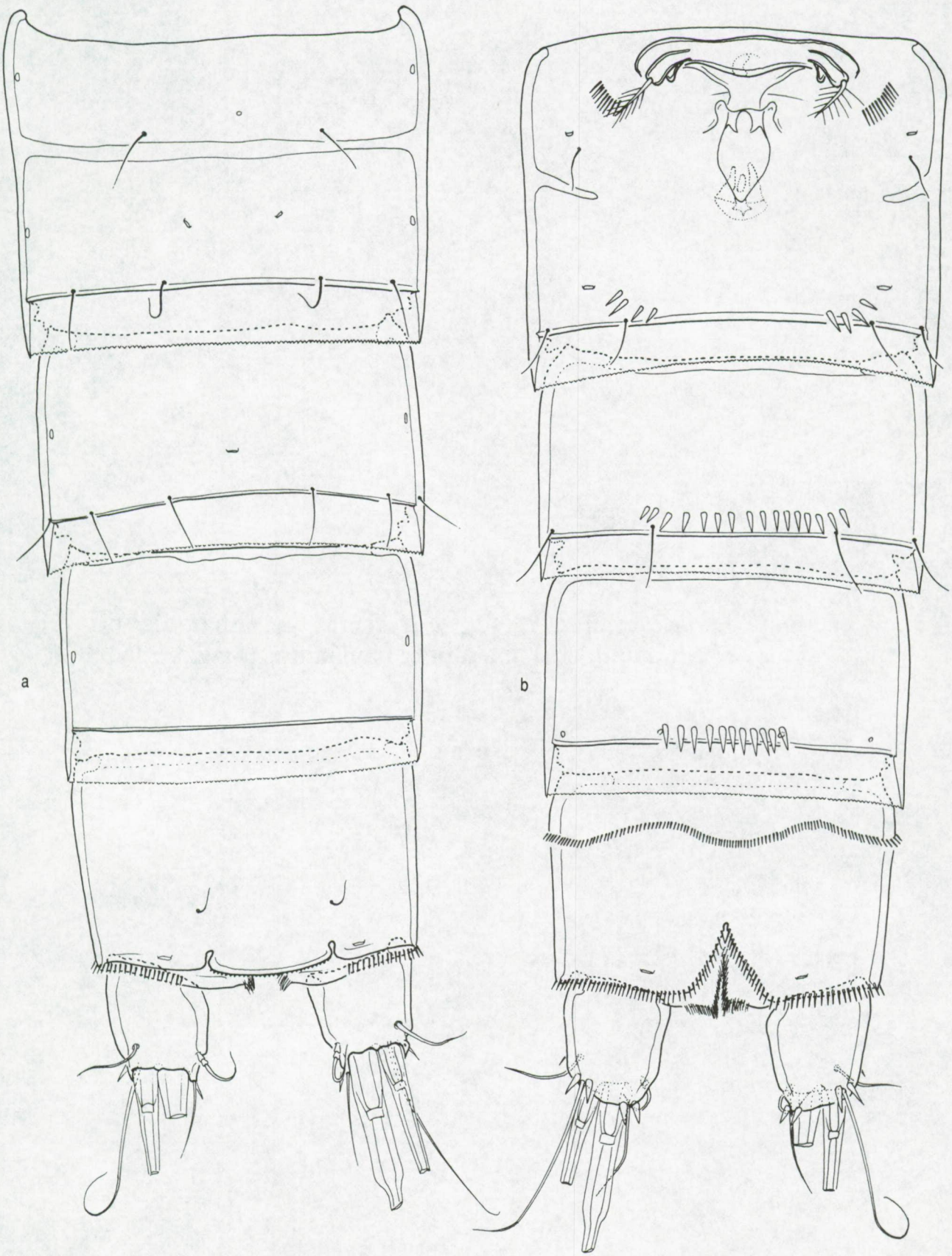

a
b
50 µm

Fig. 230. ***Psyllocamptus (P.) n. sp. 1*****, female. a, antennule; b, antenna; c, mandible; d, maxillule; e, maxilla; f, maxilliped.**

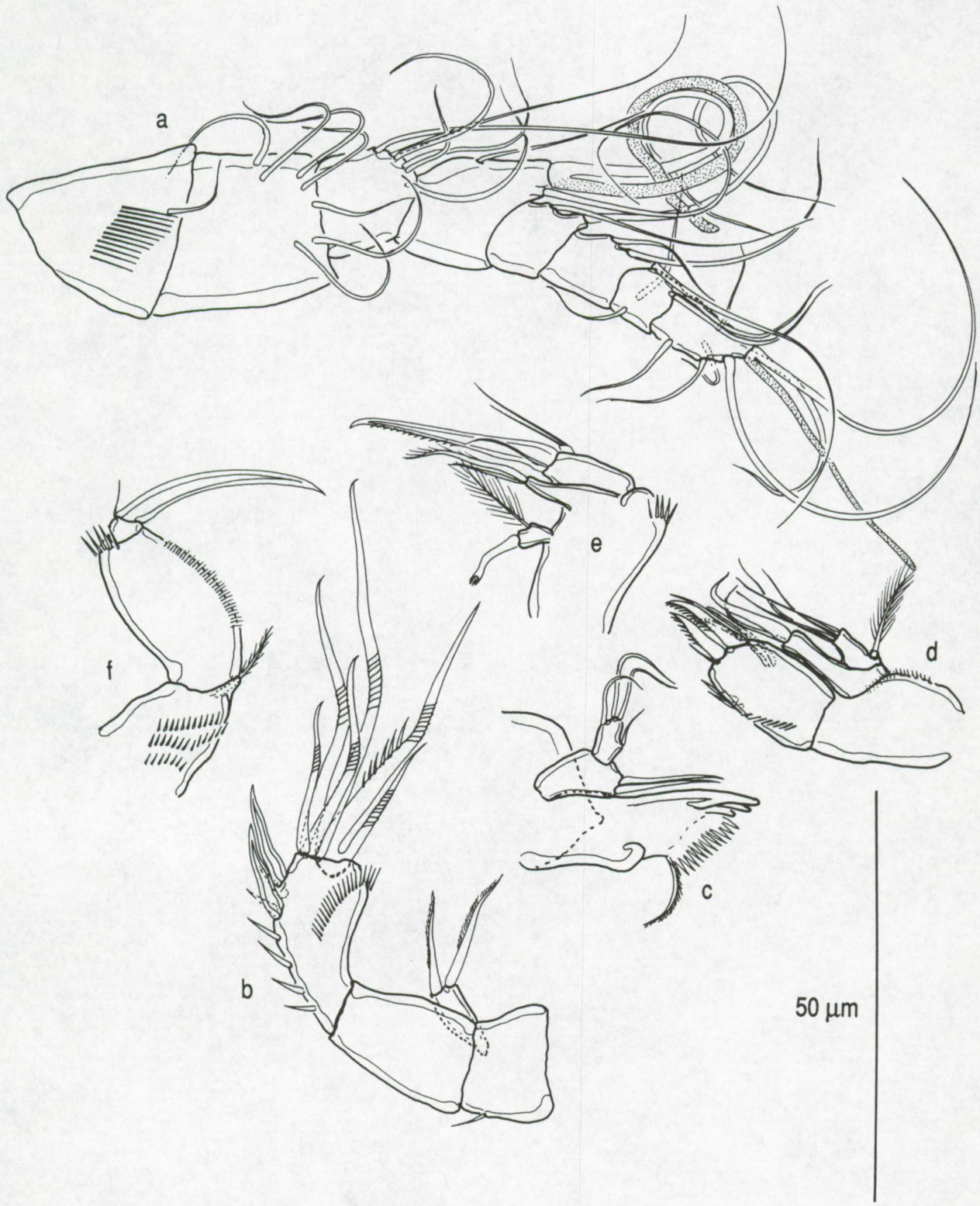

a
b
c
d
e
f
50 µm

Fig. 231. ***Psyllocamptus (P.) n. sp. 1*****, female. a, P1; b, P2; c, P3.**

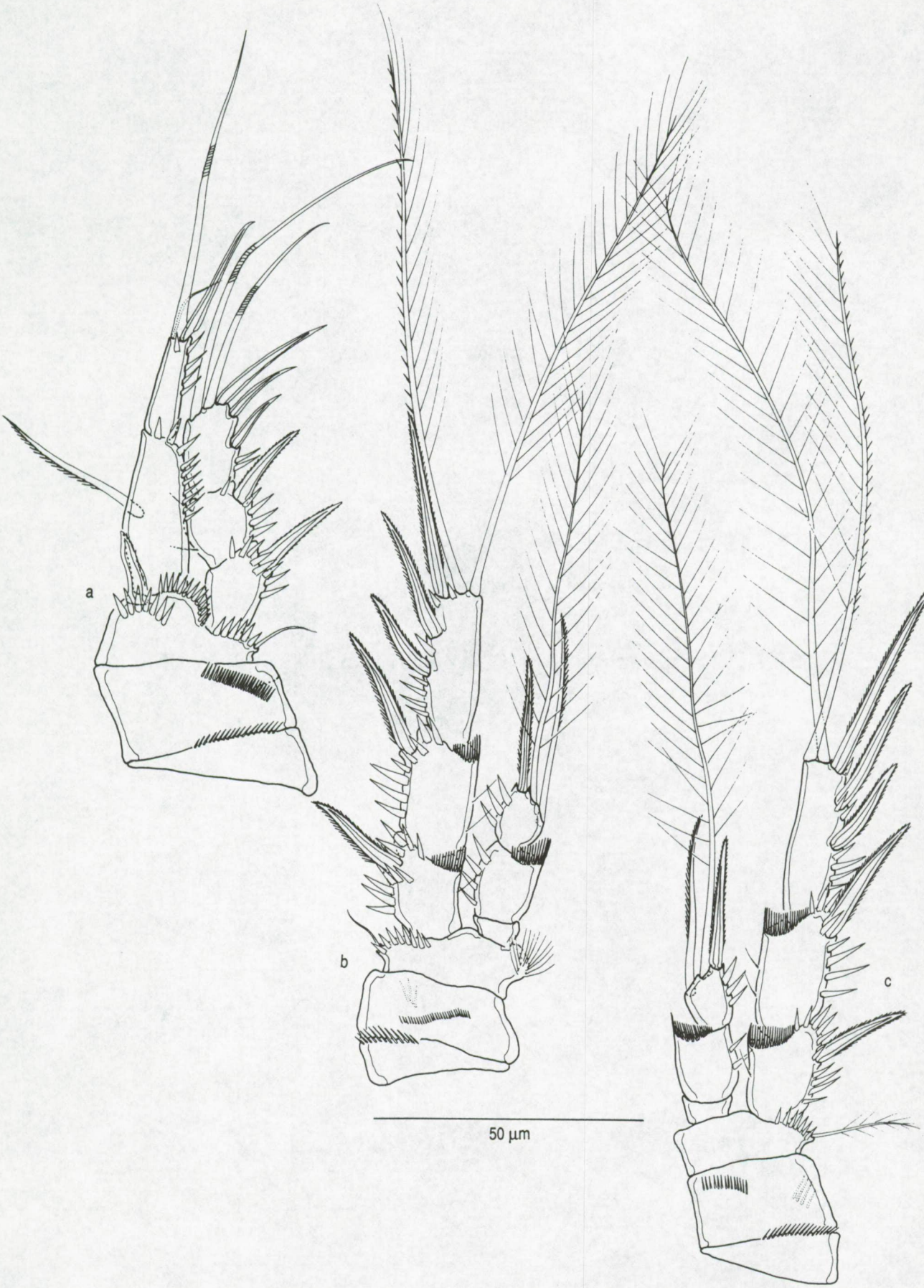

a
b
c
50 µm

Fig. 232. ***Psyllocamptus (P.) n. sp. 1*****, female. a, P4; b, P5.**

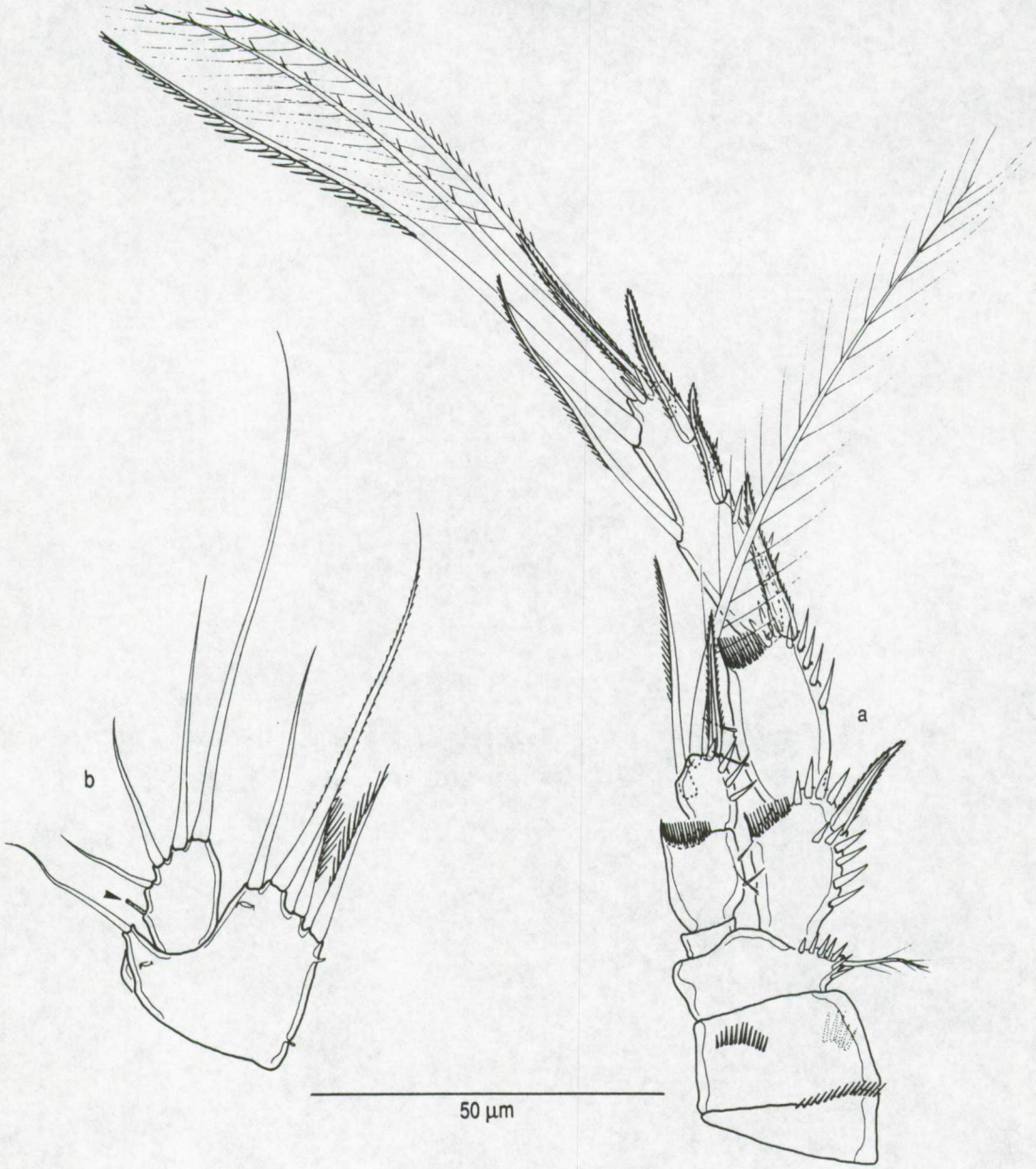
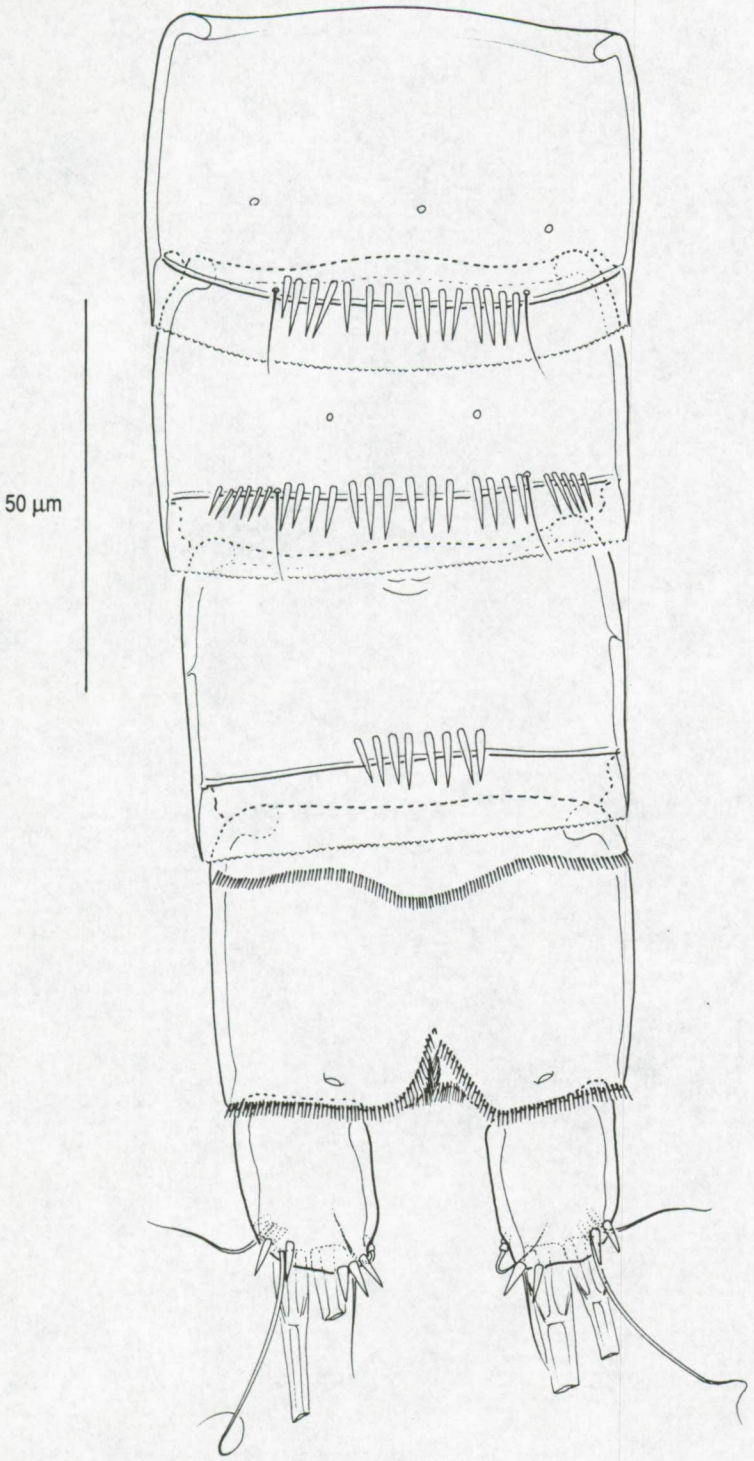

a
b
50 µm

Fig. 233. ***Psyllocamptus (P.) n. sp. 1*****, male. Urosome, ventral (P5 and P6 bearing-somites omited).**


50 µm

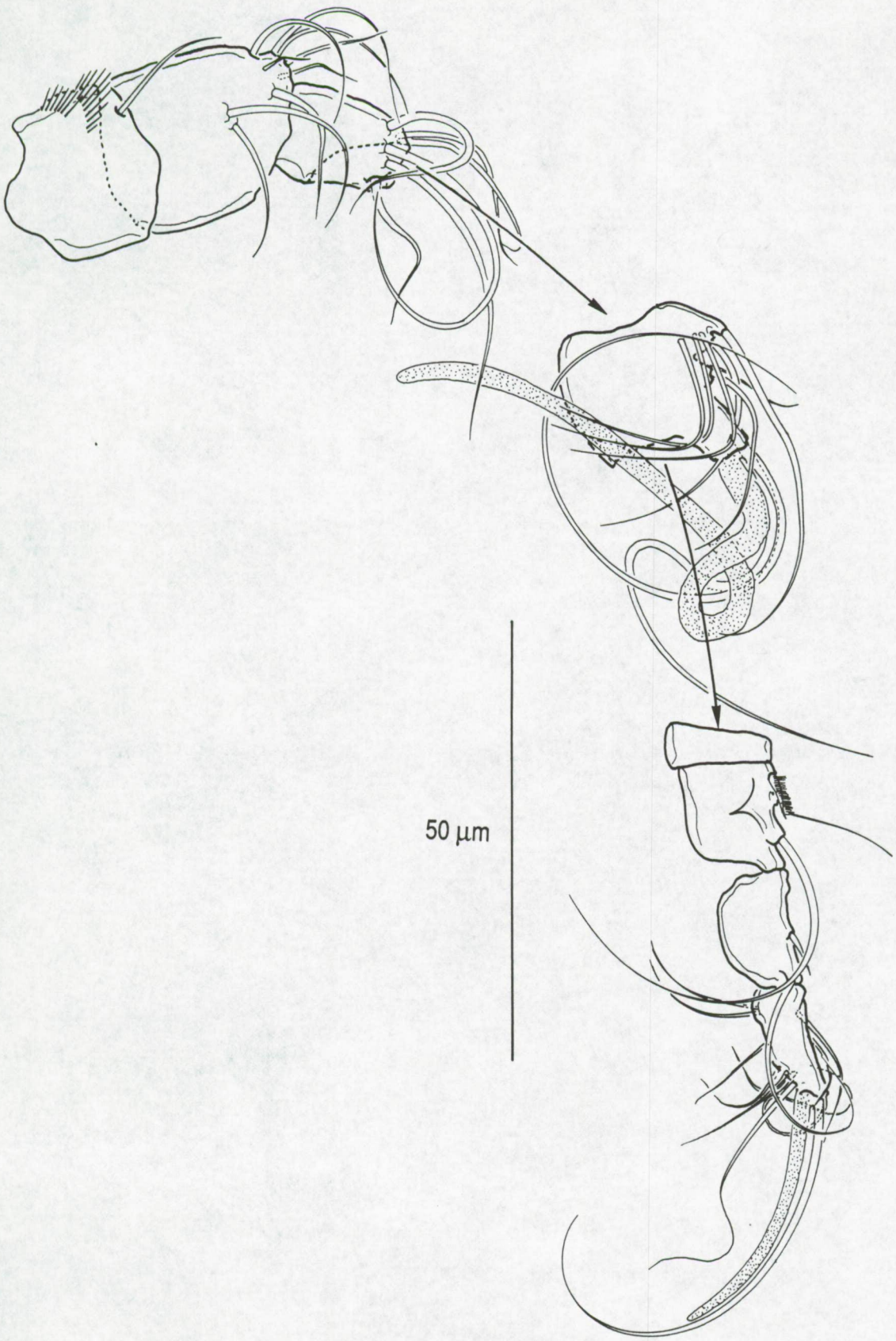

50 µm

Fig. 235. ***Psyllocamptus (P.) n. sp. 1*****, male. a, basis of P1; b, P3 ENP.**

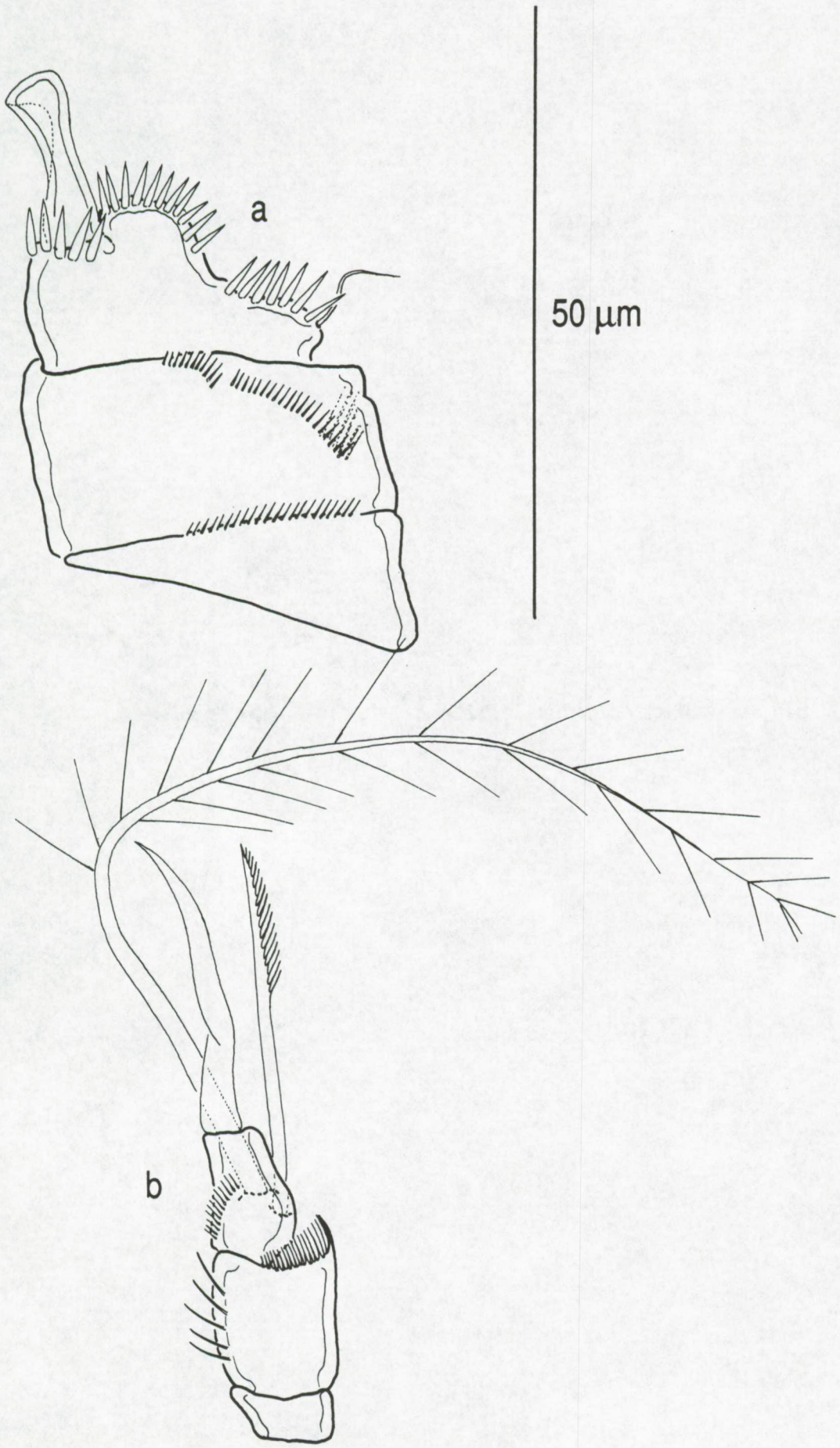

a
50 µm
b

Fig. 236. ***Psyllocamptus (P.) n. sp. 1*****, male. a, P5; b, P6.**

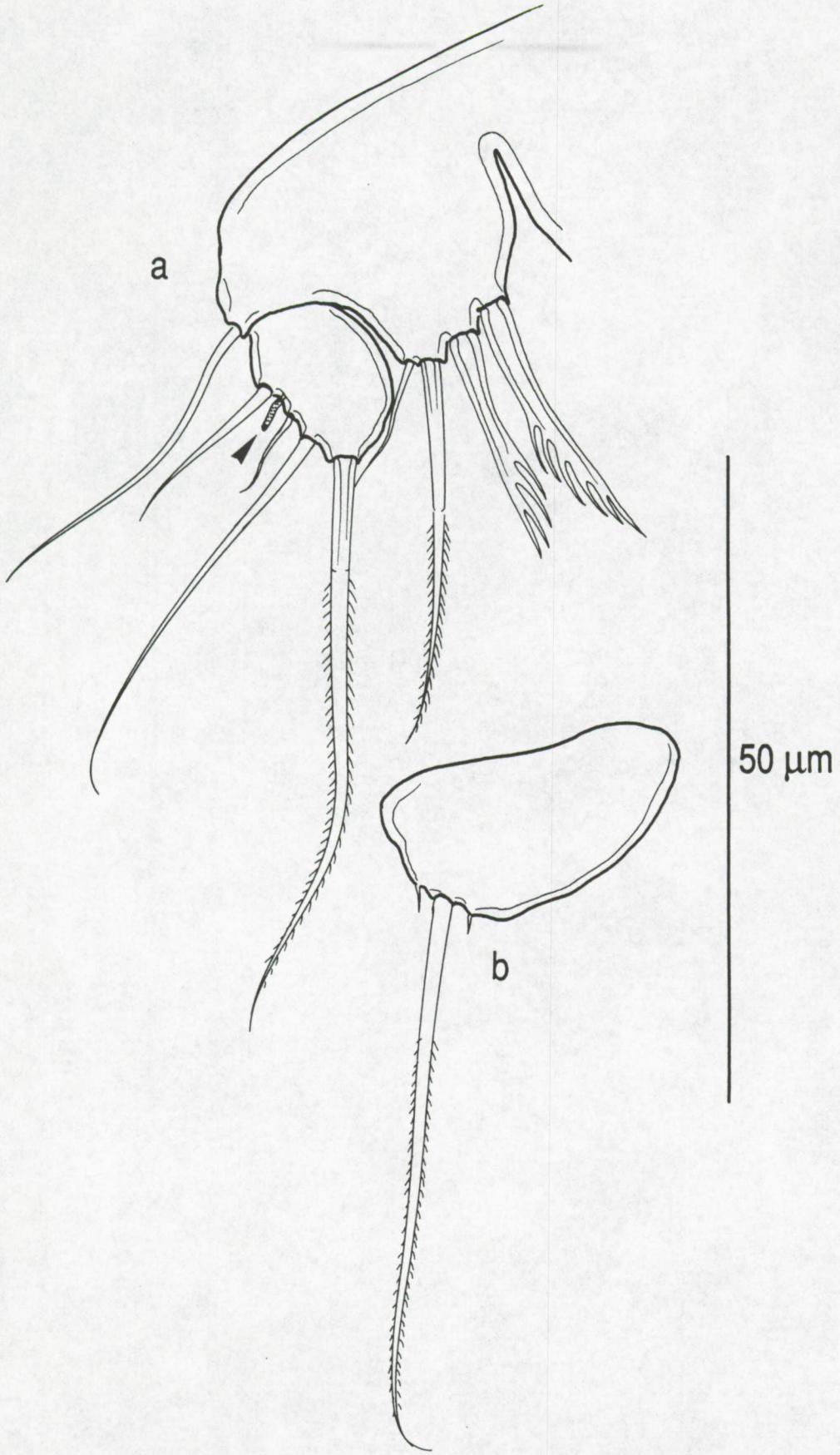

a
b
50 µm

Fig. 237. ***Apodopsyllus vermiculiformis*** **Lang. a, antenna; b, maxilliped; c, P1; d, P2; e, P3; f, P4; g, P5; h, P6 (a-f of female; g-h of male).**

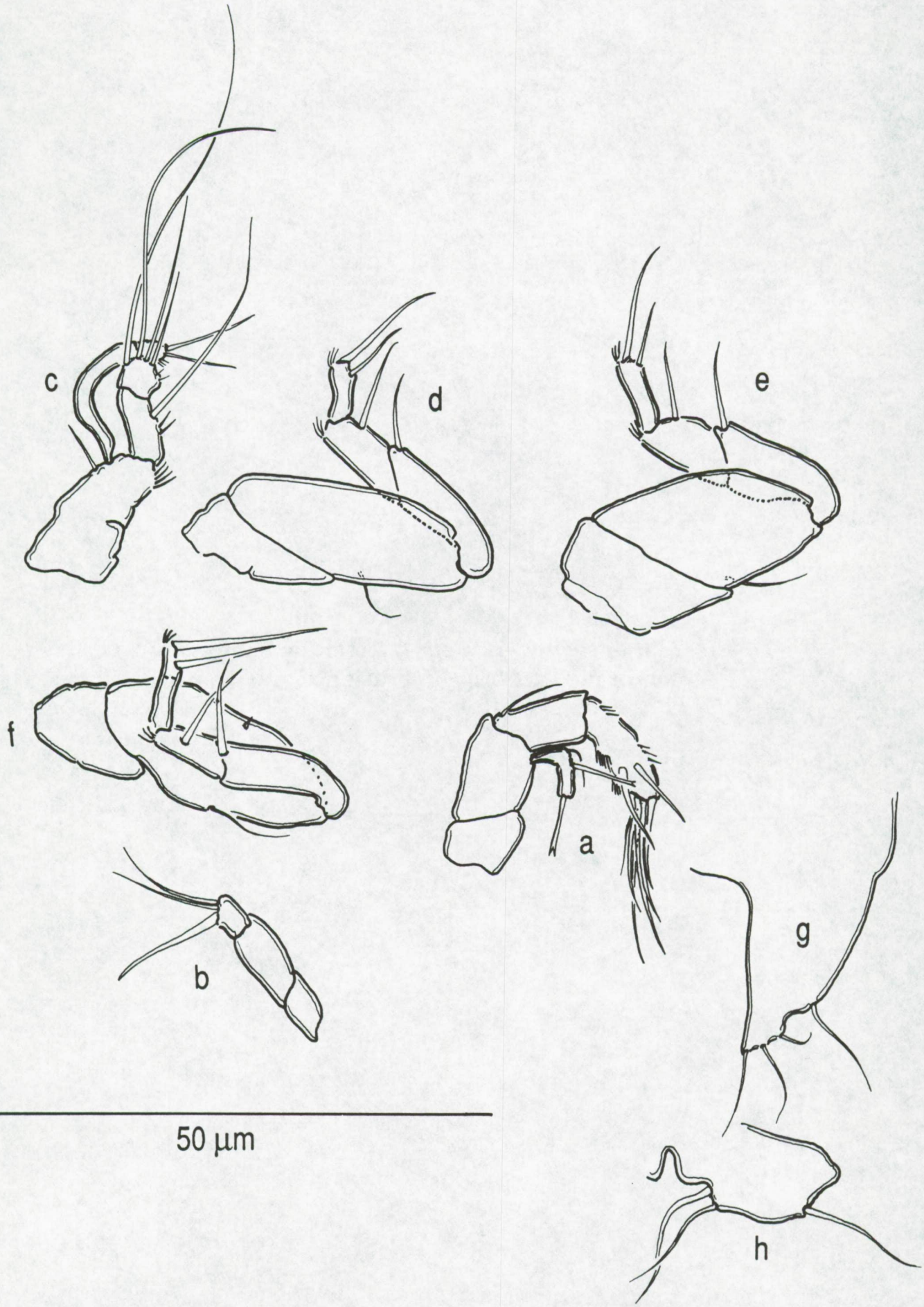

c
d
e
f
a
b
g
h
50 µm

Fig. 238. ***Apodopsyllus n. sp. 1*****, female. a, habitus, dorsal; b, urosome, ventral (P5 bearing-somite omited).**

a
50 mu
a
p
p

Fig. 239. ***Apodopsyllus n. sp. 1.*** **a, antennule; b, antenna; c, antennule, armature omited (a-b, of female; c, of male).**

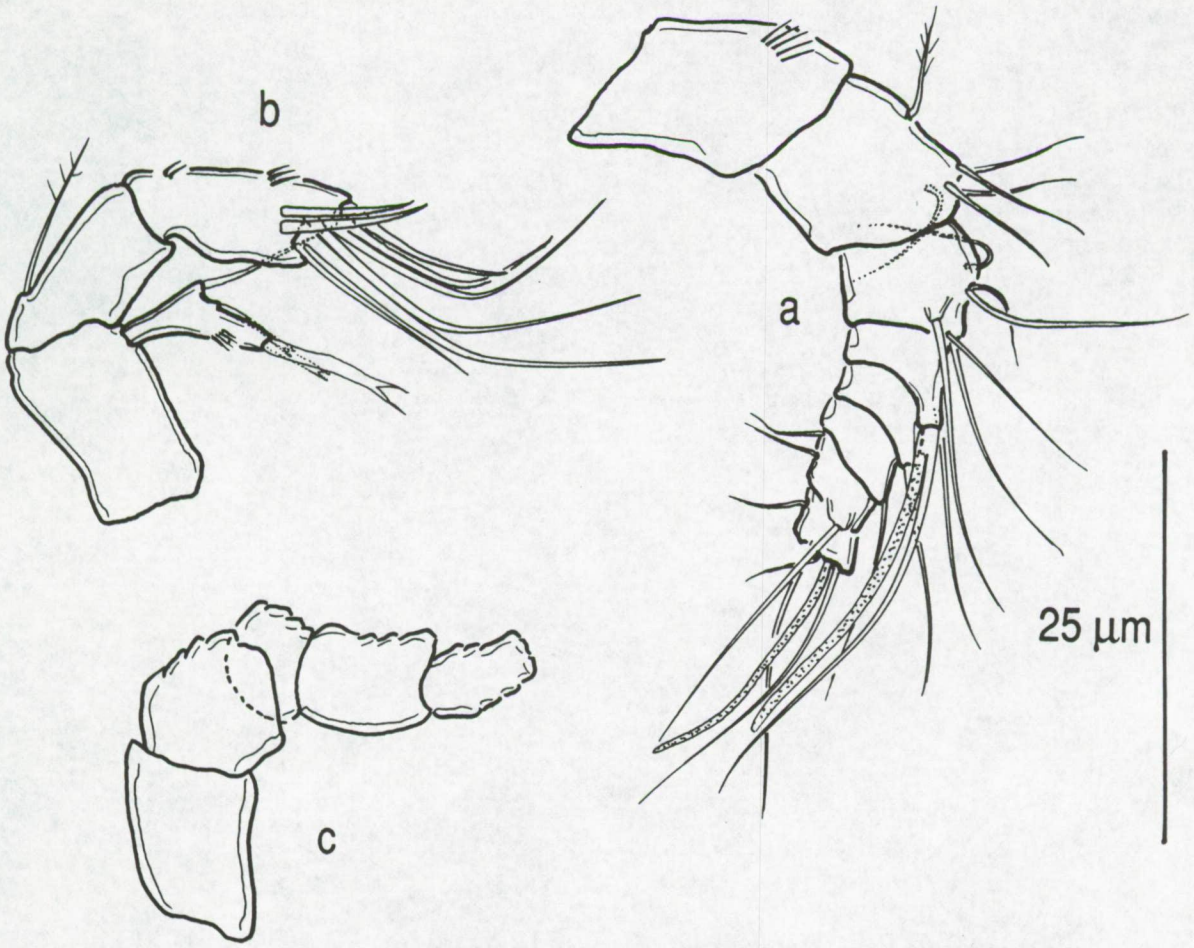

b
a
c
25 µm

Fig. 240. ***Apodopsyllus n. sp. 1.*** **a; P1; b, P2; c, P3; d, P4; e, P5, female; f, P5, male; g, P, male (a-d of female).**

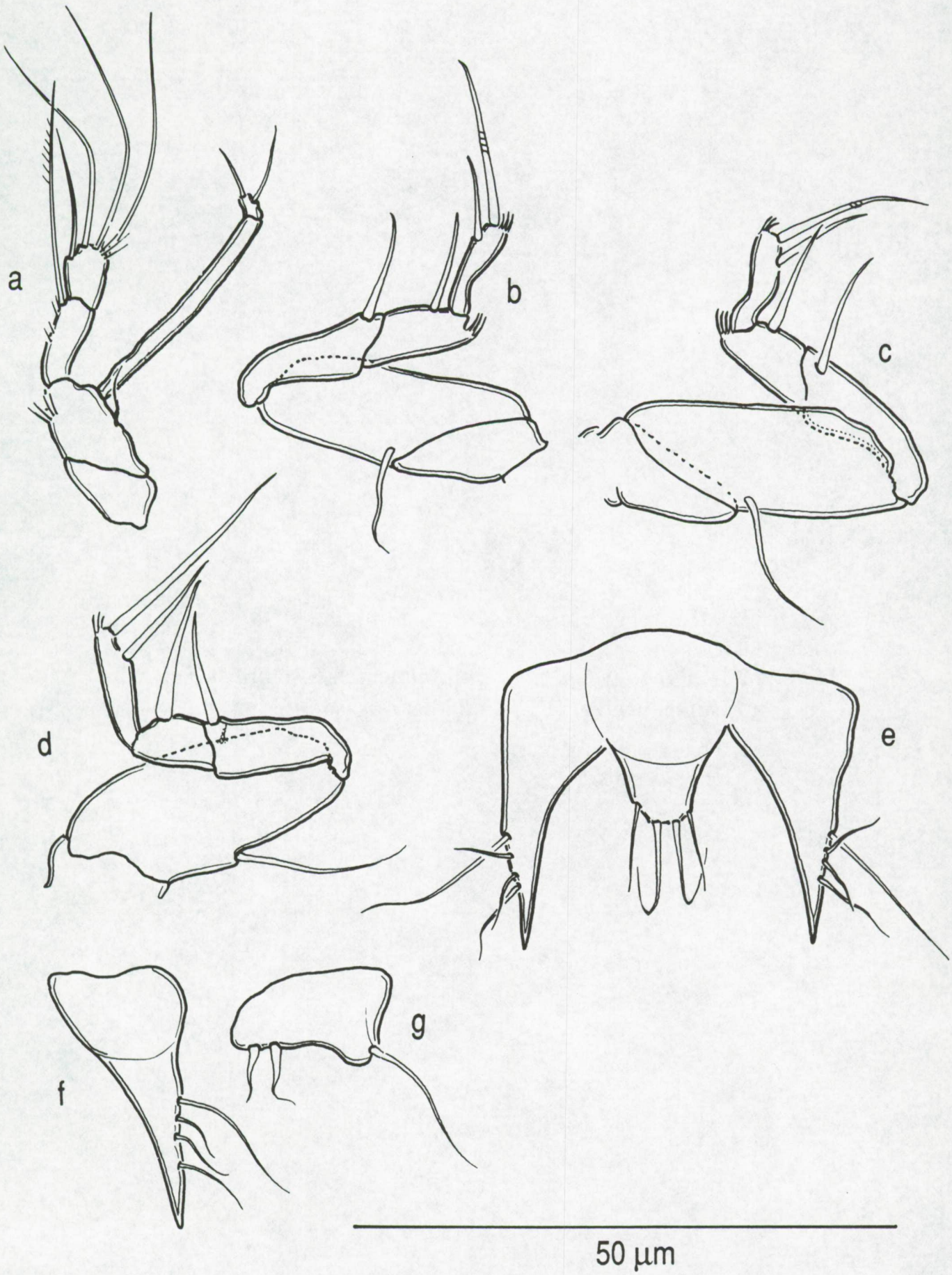

a
b
c
d
e
f
g
50 µm

Fig. 241. *Phyllopodopsyllus* sp. 1, male. a, urosome, dorsal; b, urosome, ventral (P5 and P6 bearing-somites omited).

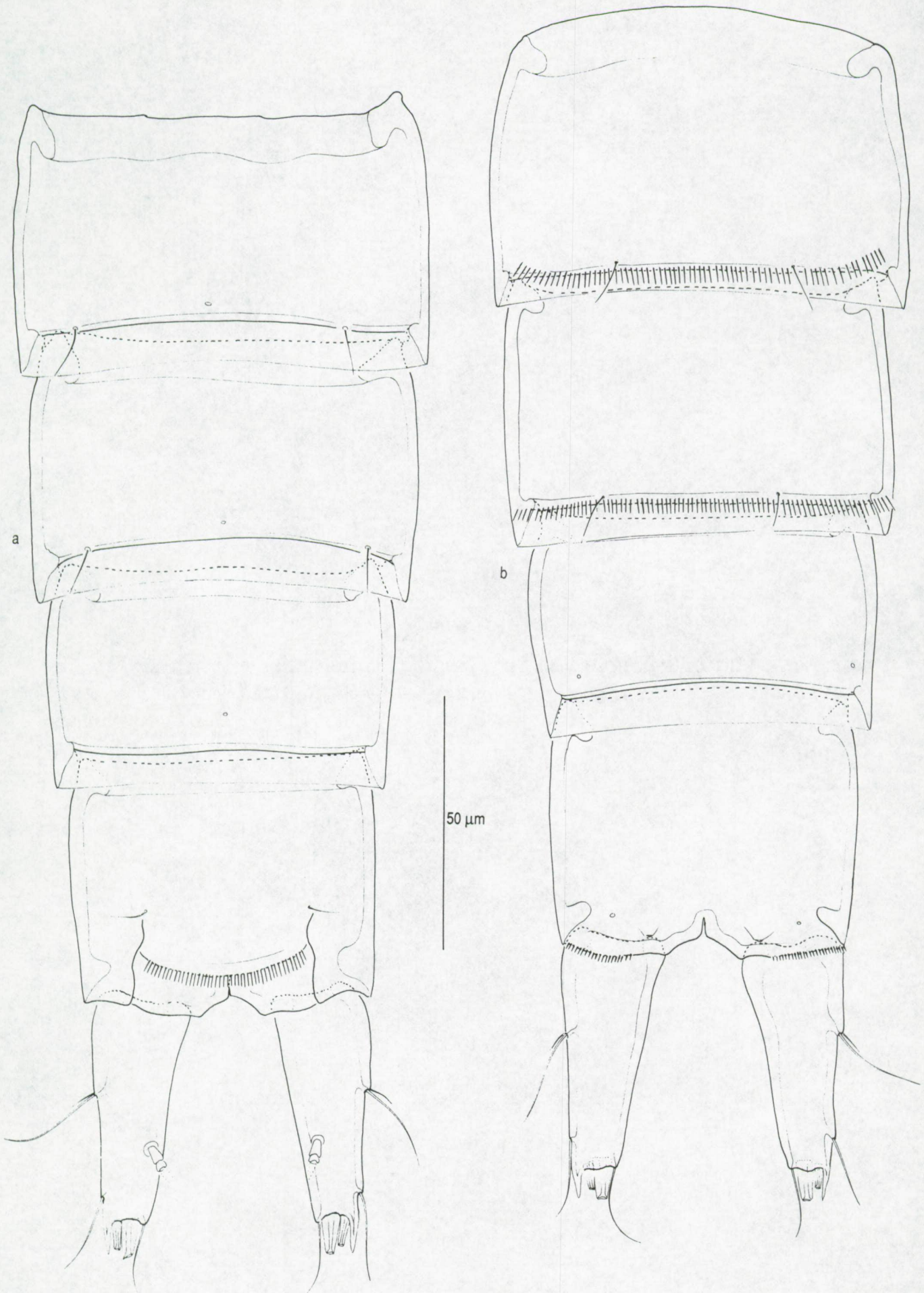
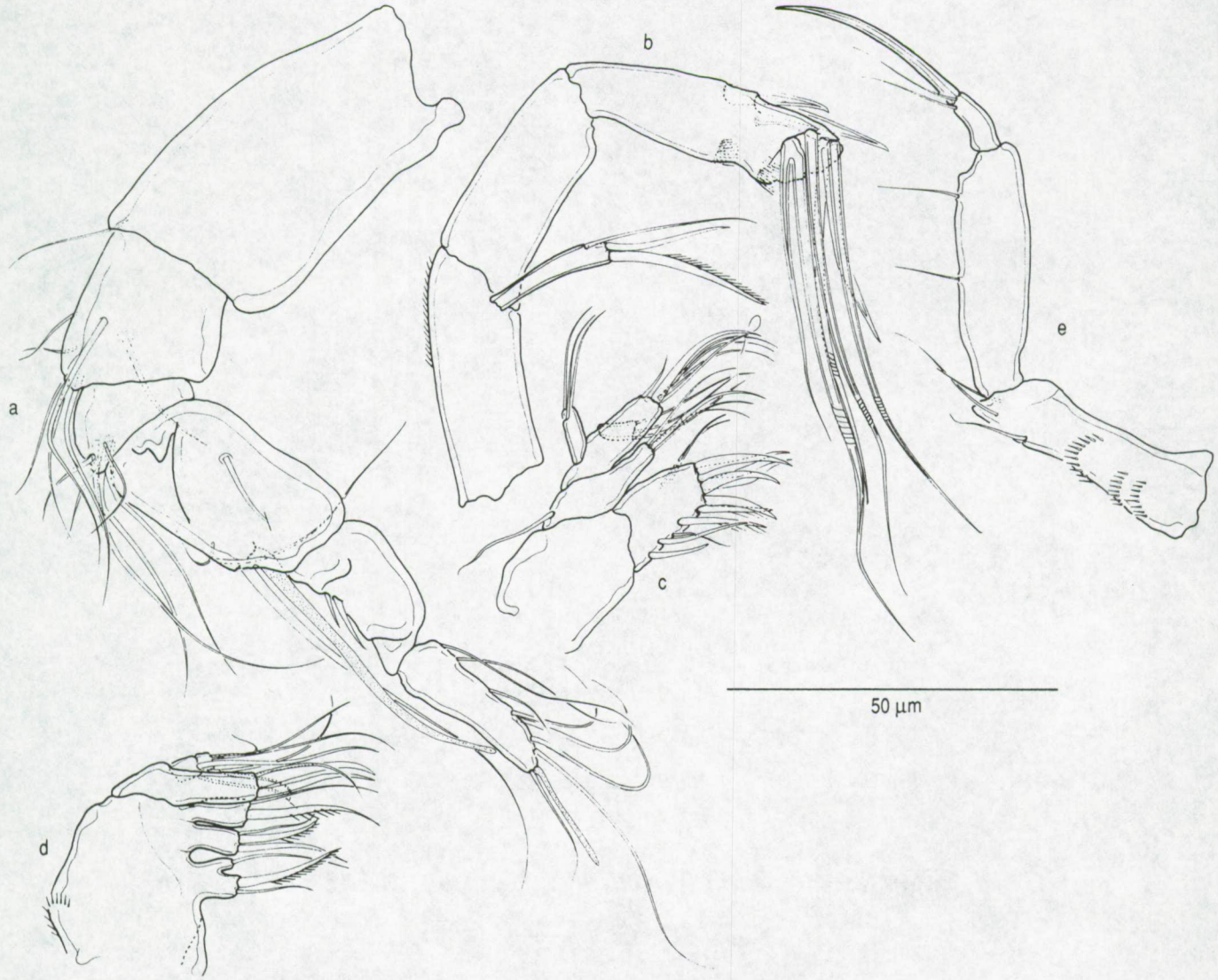
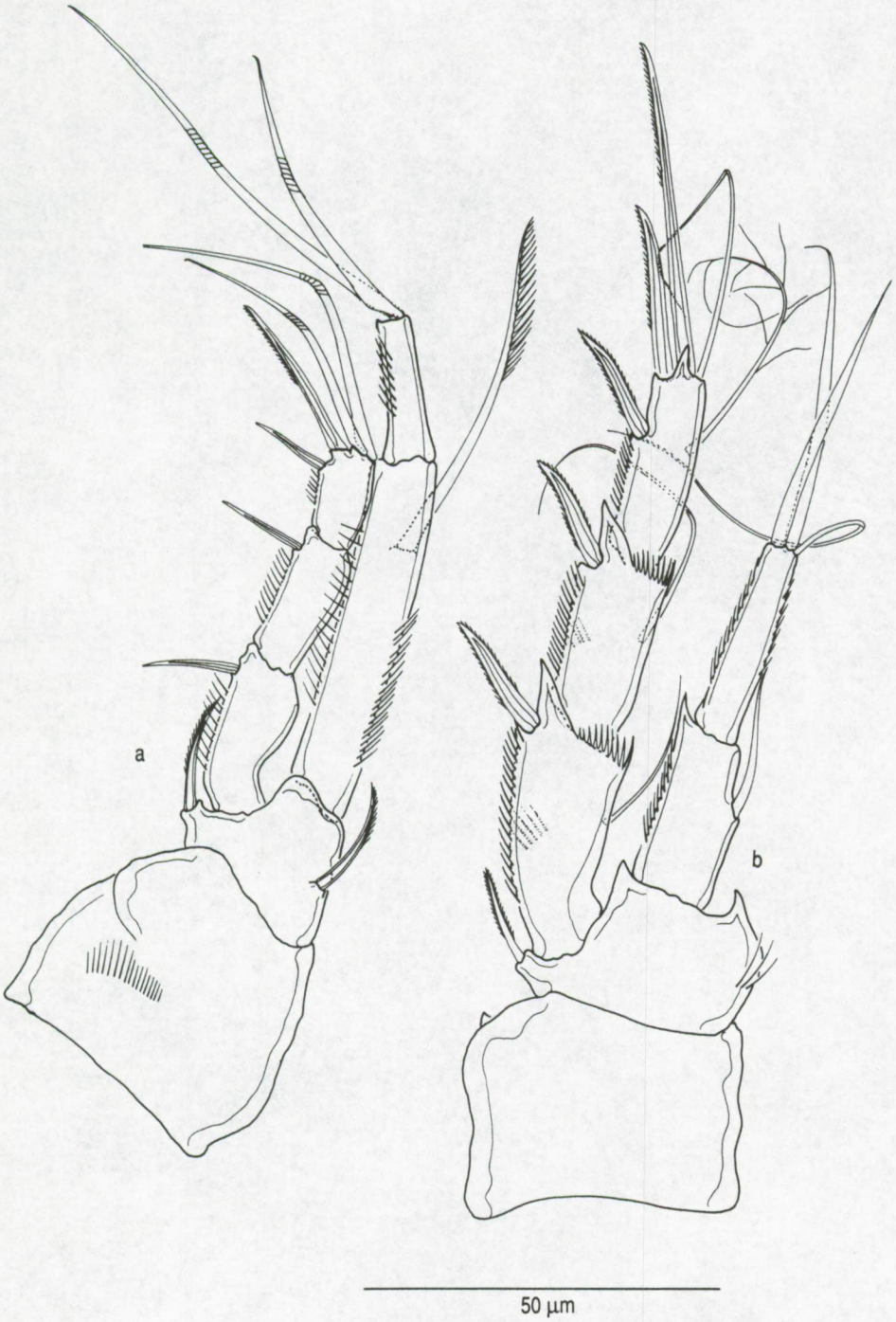

a
b
50 µm

Fig. 242. *Phyllopodopsyllus* sp. 1, male. a, antennule; b, antenna; c, maxillule; d, maxilla; e, maxilliped.


a
b
c
d
e
50 µm


a
b
50 µm

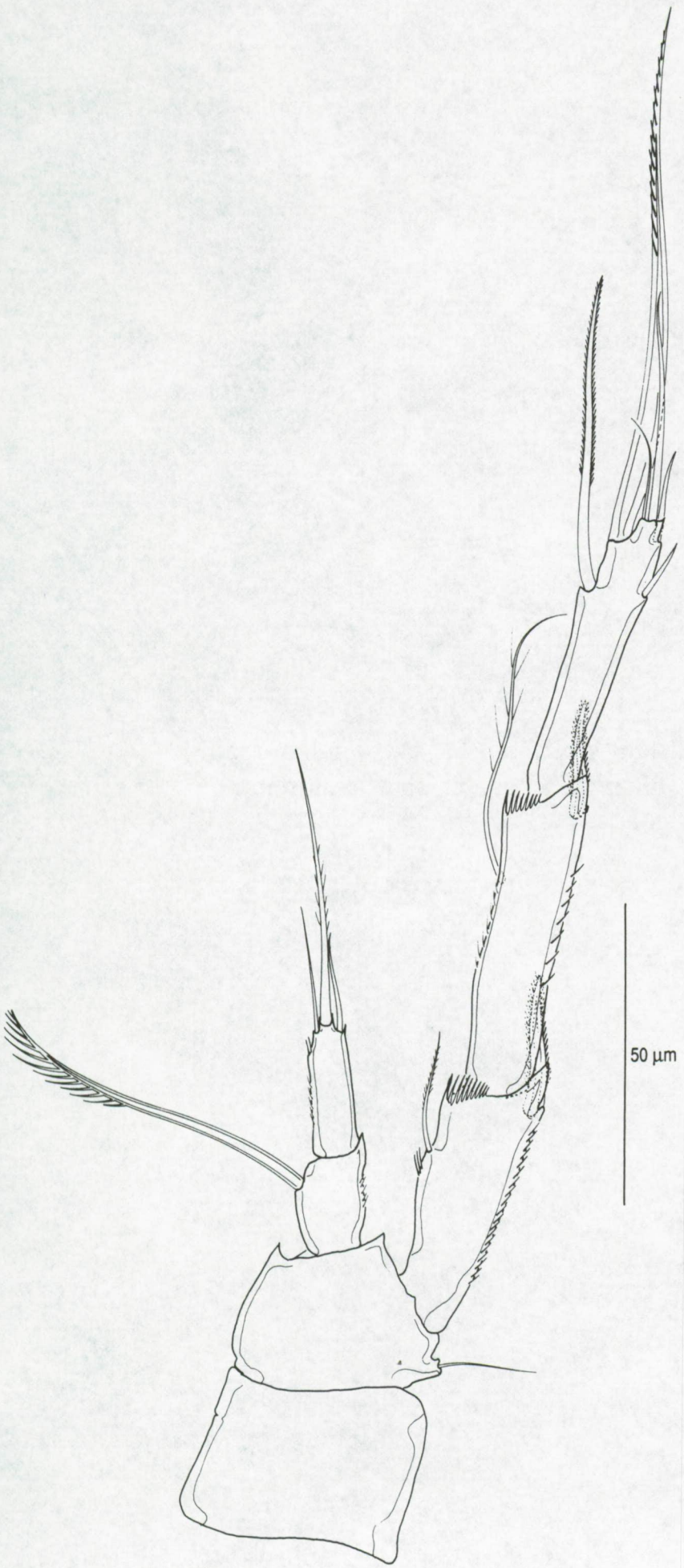

50 µm

Fig. 245. Tetragonicipitidae sp. 2, male. a, urosome, dorsal; b, urosome, ventral (P5 and P6 bearing somite omited).

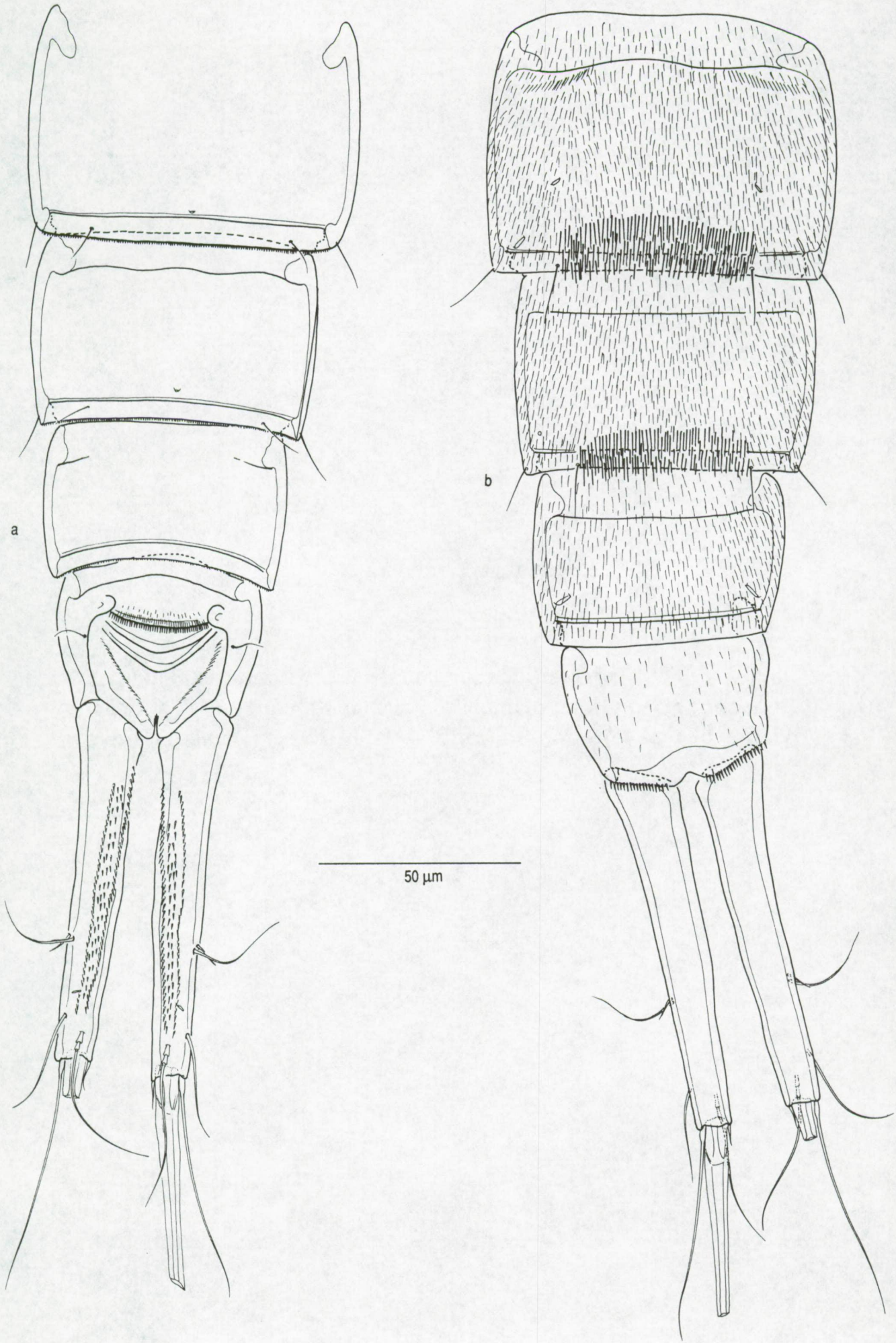
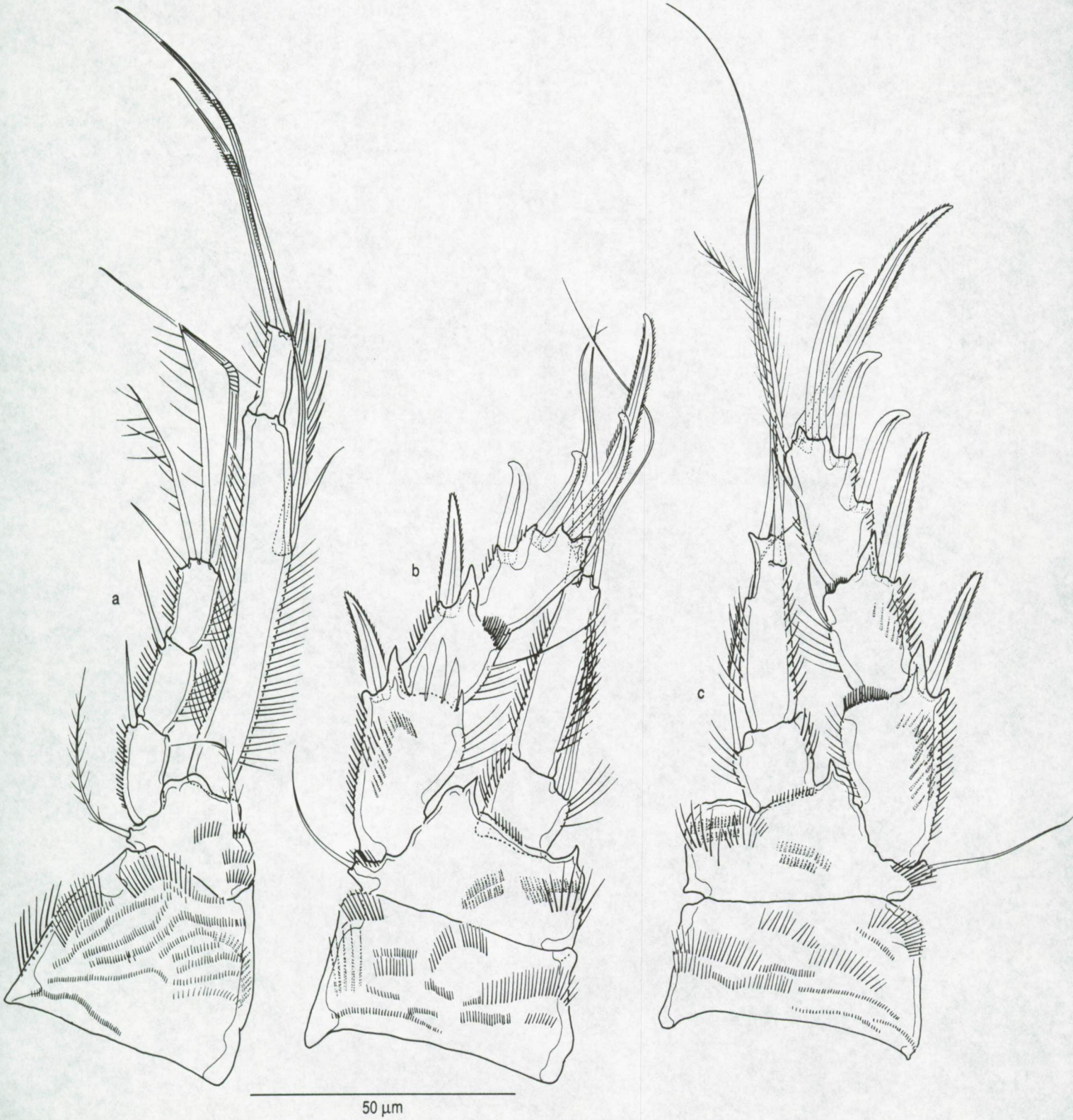

a
b
50 µm

Fig. 246. Tetragonicipitidae sp. 2, male. a, antennule, exploded; b, antenna; c, mandible; d, maxillule; e, maxilliped; f and g, anterior portion of cephalothorax showing rostrum, dorsal (f) and lateral (g).


a
b
c
d
e
f
g
a–e
50 µm
f–g


a
b
c
50 µm

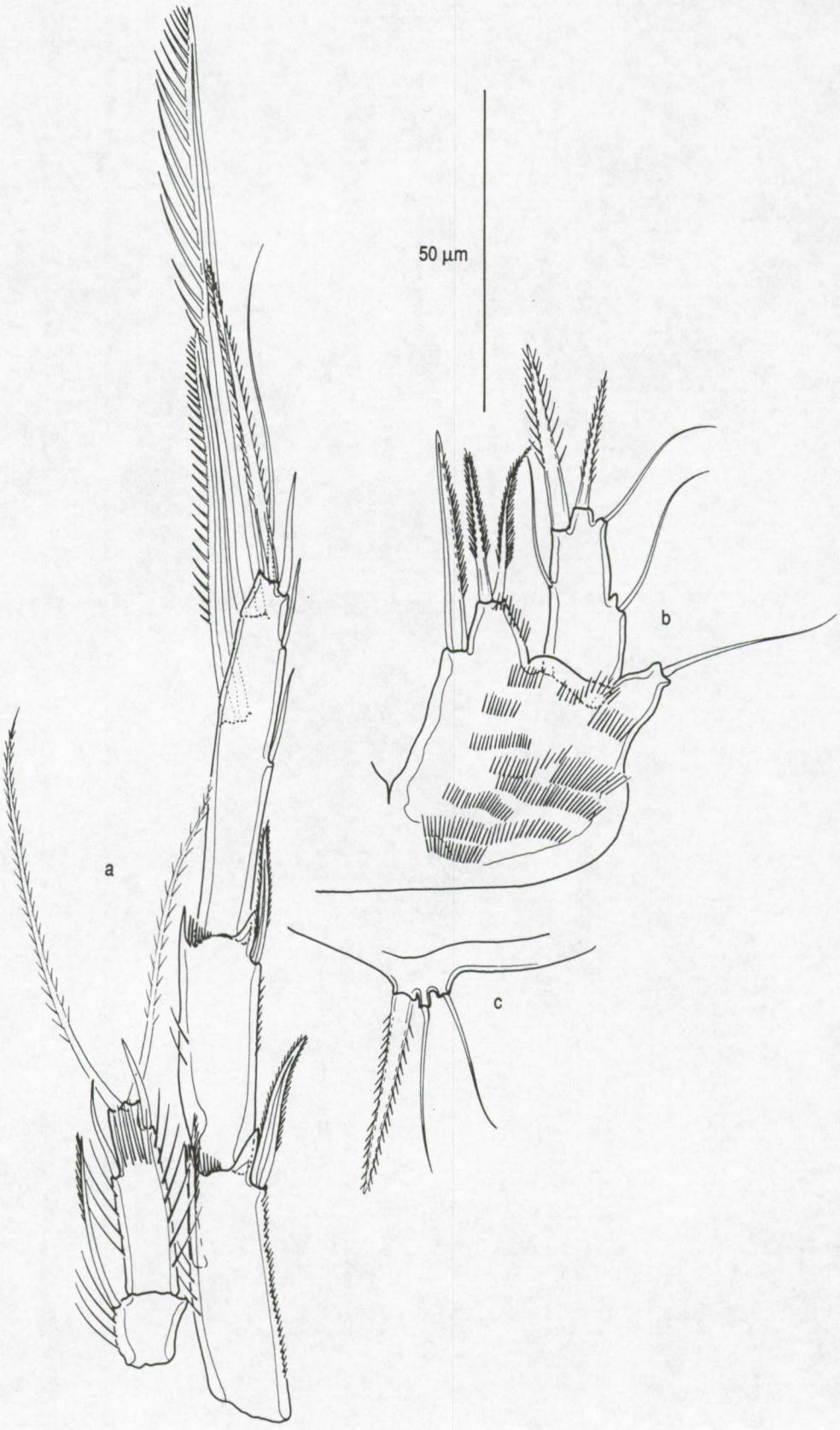

50 µm
a
b
c

Fig. 249. Tetragonicipitidae sp 3, male. Habitus, dorsal (specimen EMUCOP-477-G).

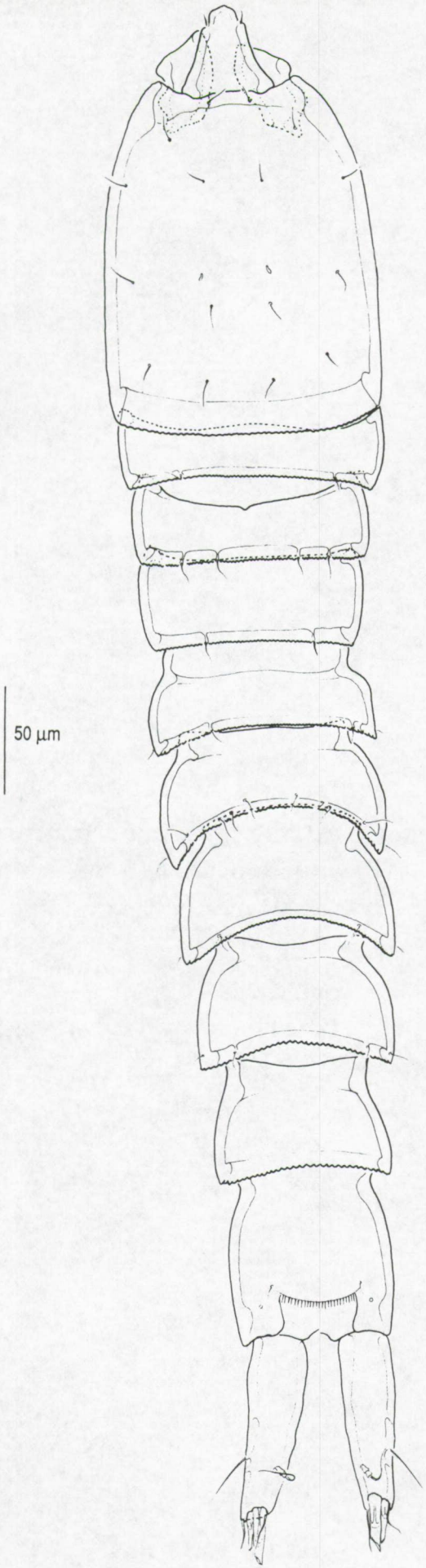

50 µm

Fig. 250. Tetragonicipitidae sp. 3, male. a, urosome, dorsal; b, urosome, ventral (P5 and P6 bearing somites omited) (specimen EMUCOP-476-G).

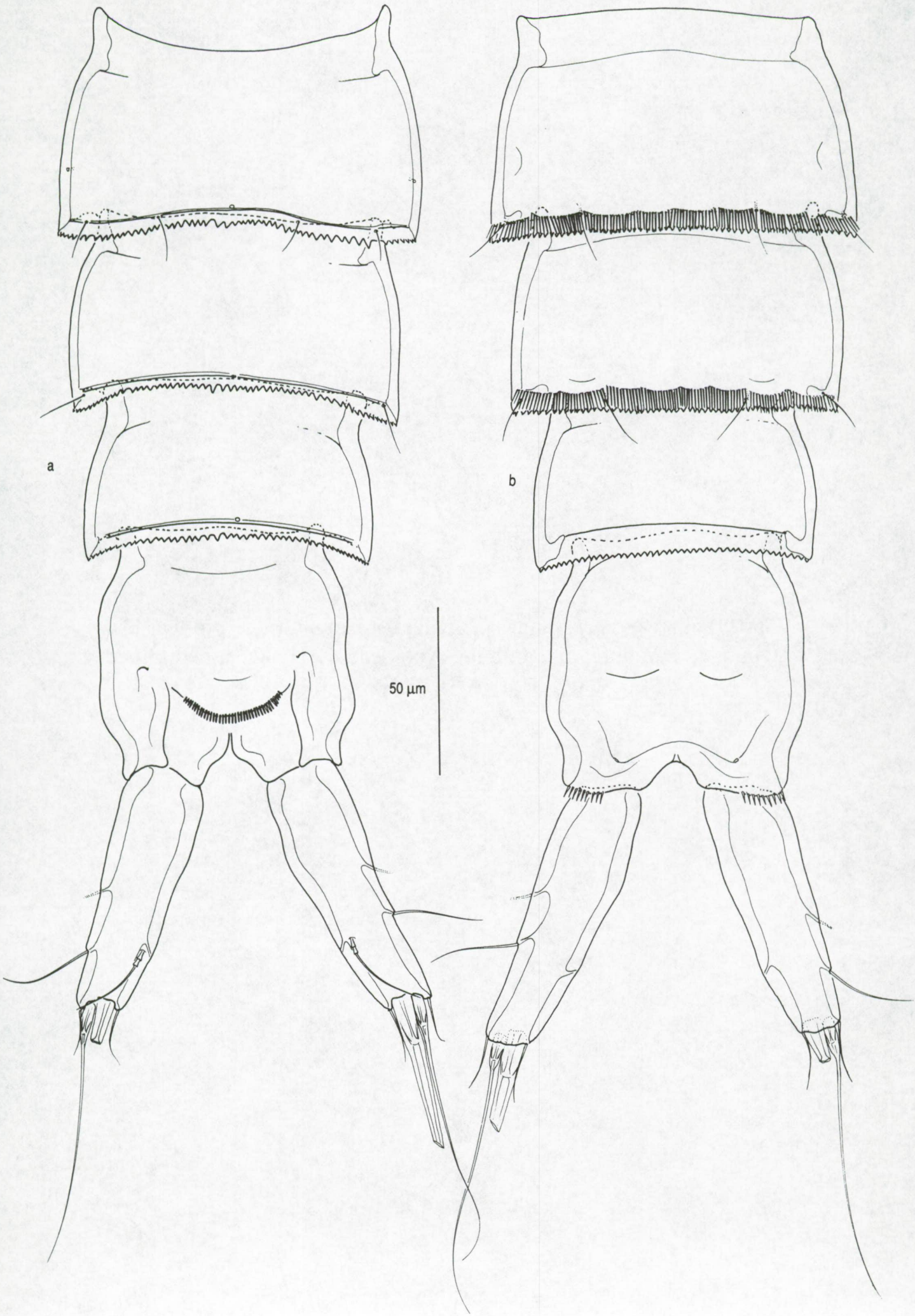

a
b
50 µm

Fig. 251. Tetragonicipitidae sp. 3, male. a, antennule, exploded; b, antenna; c, mandible; d, maxillule, exploded; e, maxilla; f, maxilliped (specimen EMUCOP-476-G).

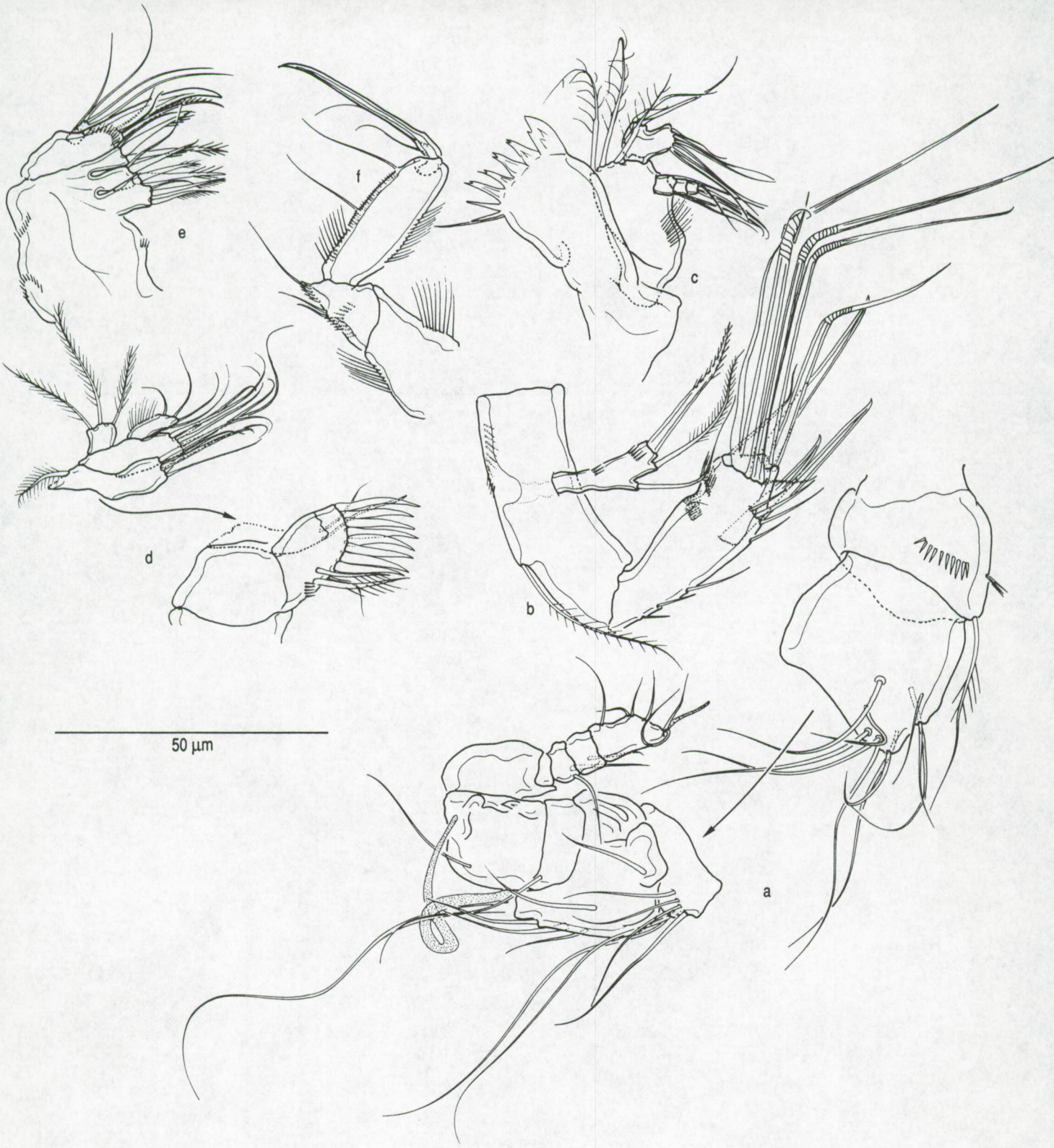

e
f
c
d
b
a
50 µm

Fig. 252. Tetragonicipitidae sp. 3, male. a, P1; b, P2; c, P3 (specimen EMUCOP-476-G).

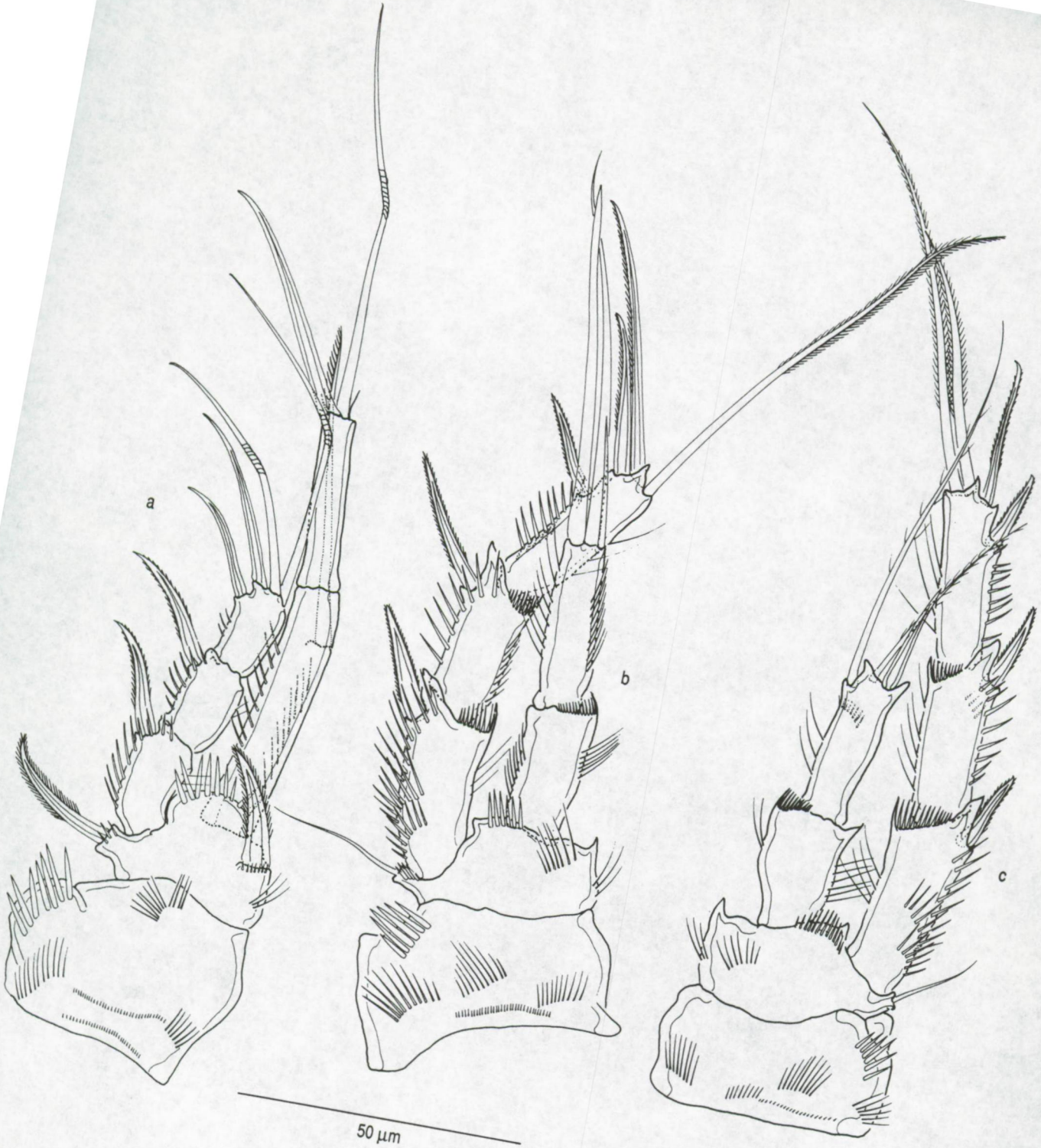

a
b
c
50 µm

Fig. 253. Tetragonicipitidae sp. 3, male. a, P4; b, P5; c, P6 (specimen EMUCOP-476-G).

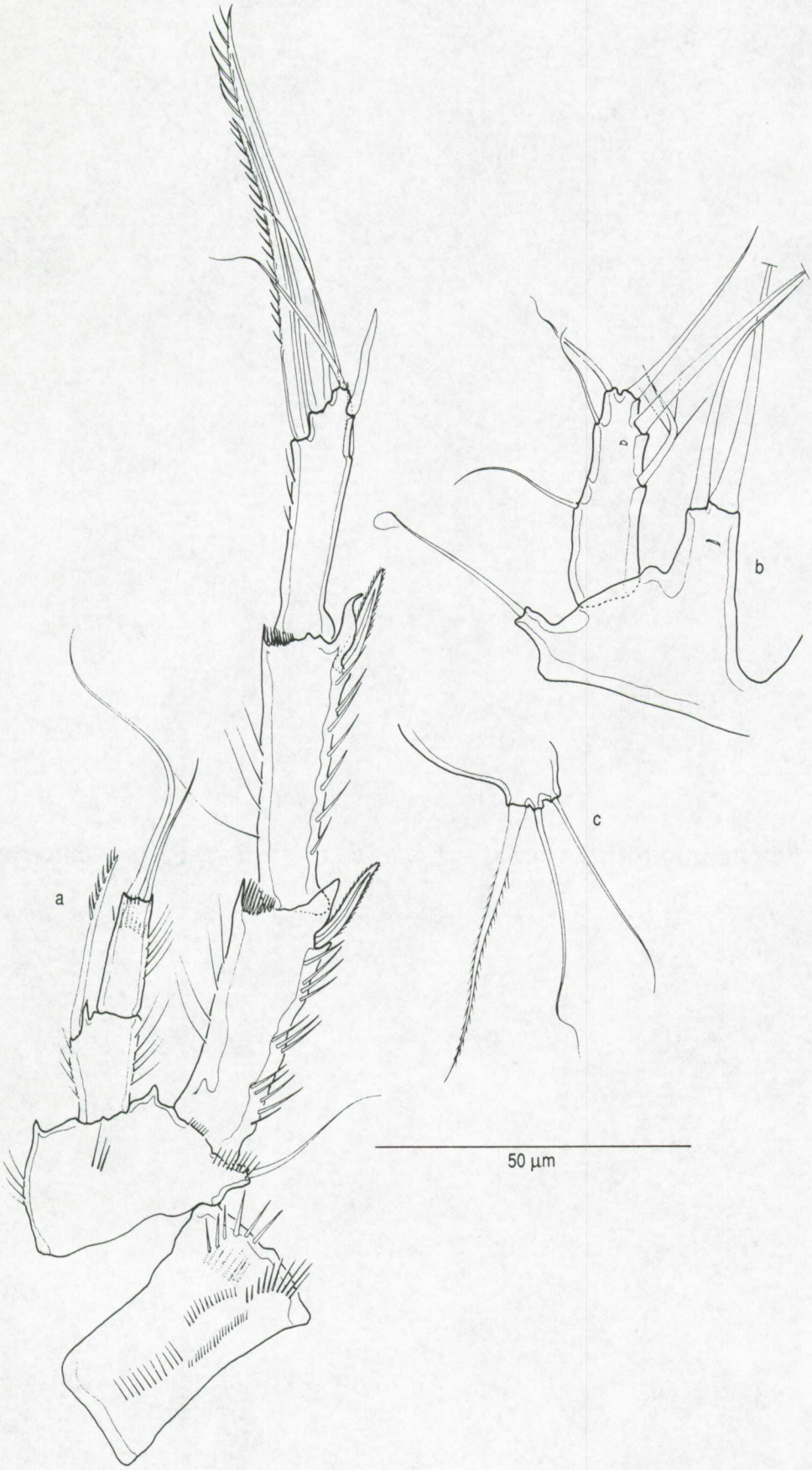

a
b
c
50 µm

Fig. 254. Tetragonicipitidae sp. 3, male. a, P1; b, P2;, c, P3 (specimen EMUCOP-477-G).


a
b
c
50 µm

Fig. 255. Tetragonicipitidae sp. 3, male. a, P4; b, P5; c, P6 (specimen EMUCOP-477-G).

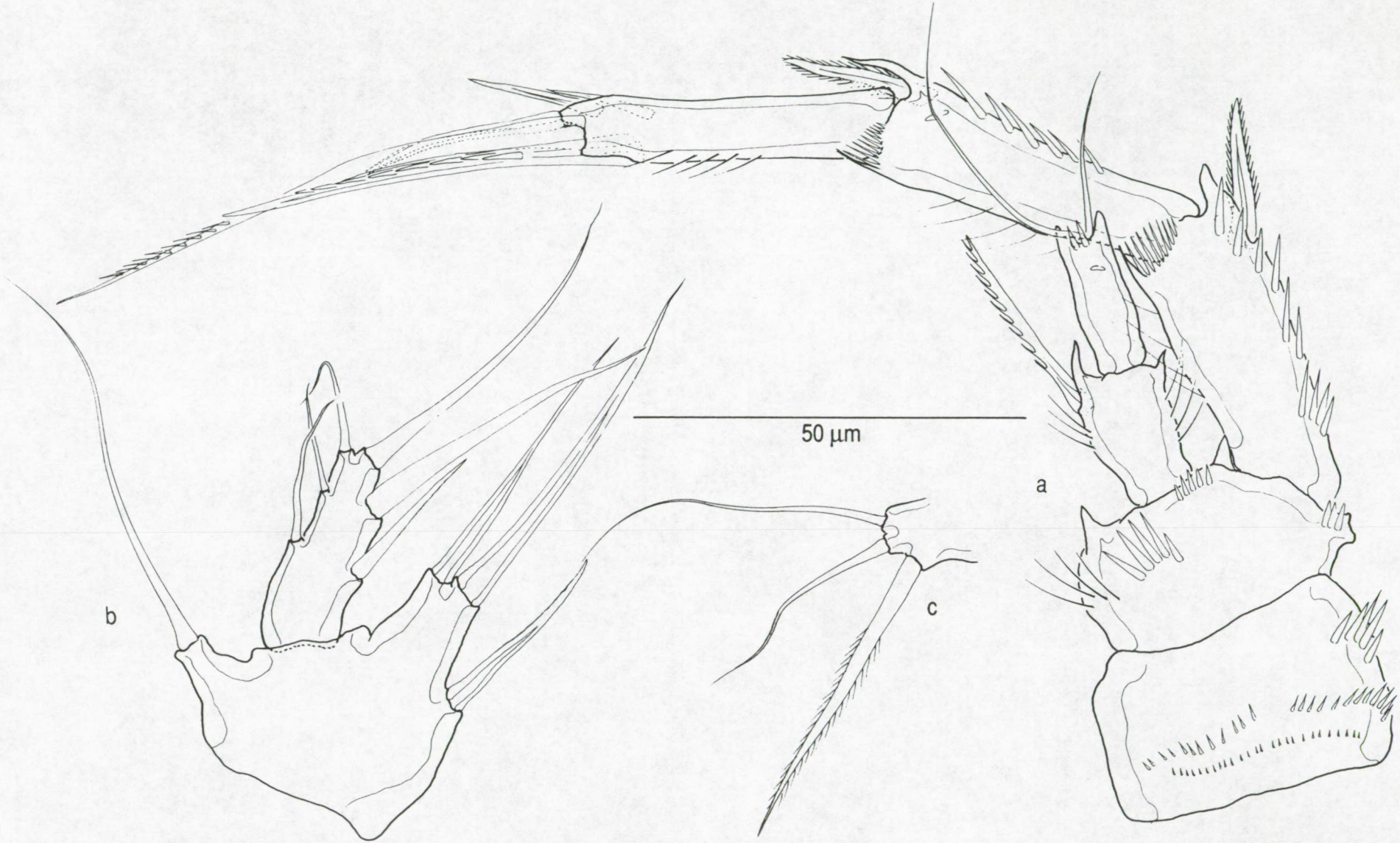

50 µm
a
b
c

Fig. 256. *Mesochra pacifica* n. sp., female. a, habitus, dorsal; b, habitus, lateral.

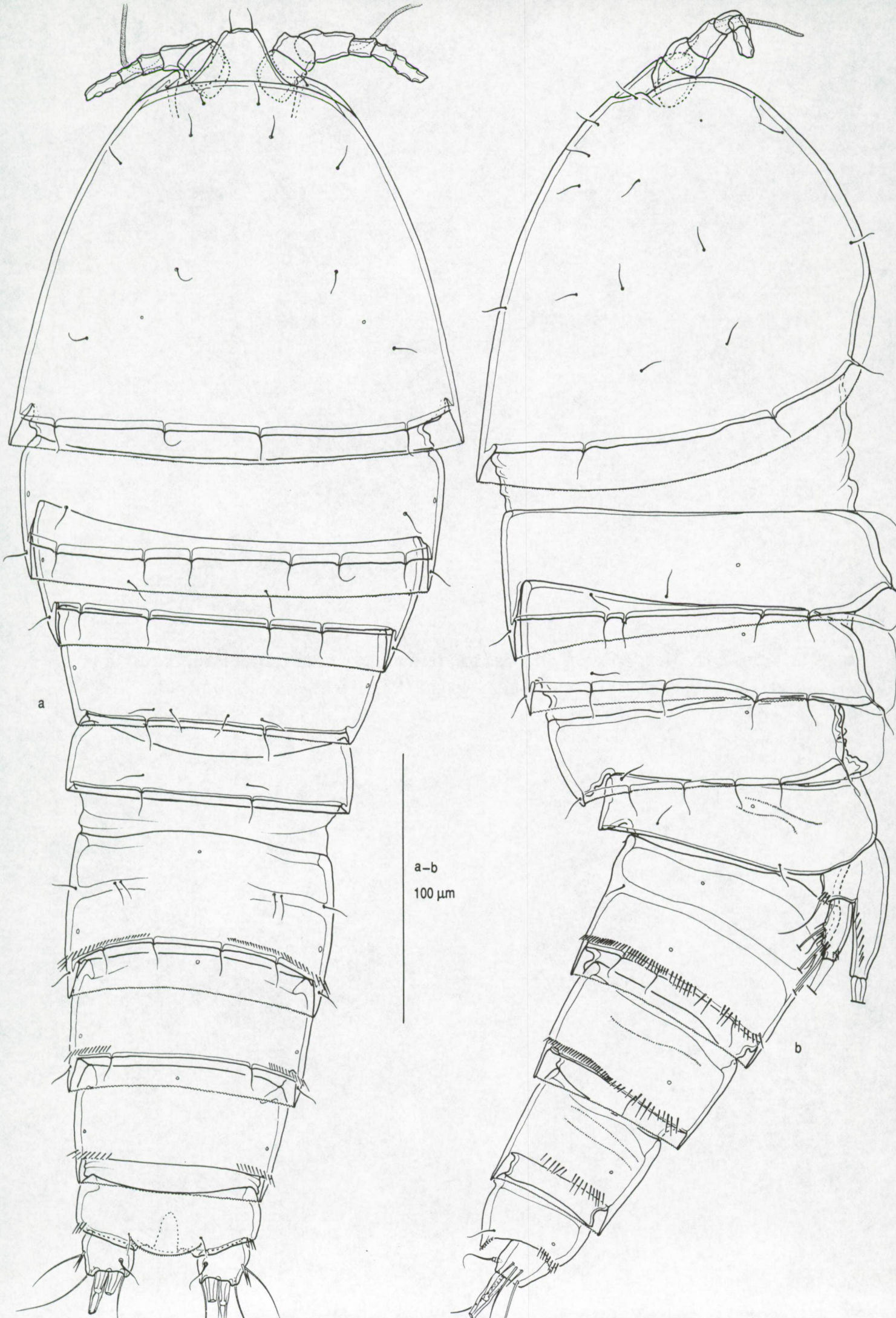

a
a–b
100 µm
b

Fig. 257. ***Mesochra pacifica*** **n. sp., female. a, anal segment and caudal rami, dorsal; b, urosome, ventral (P5 bearing-somite omited).**

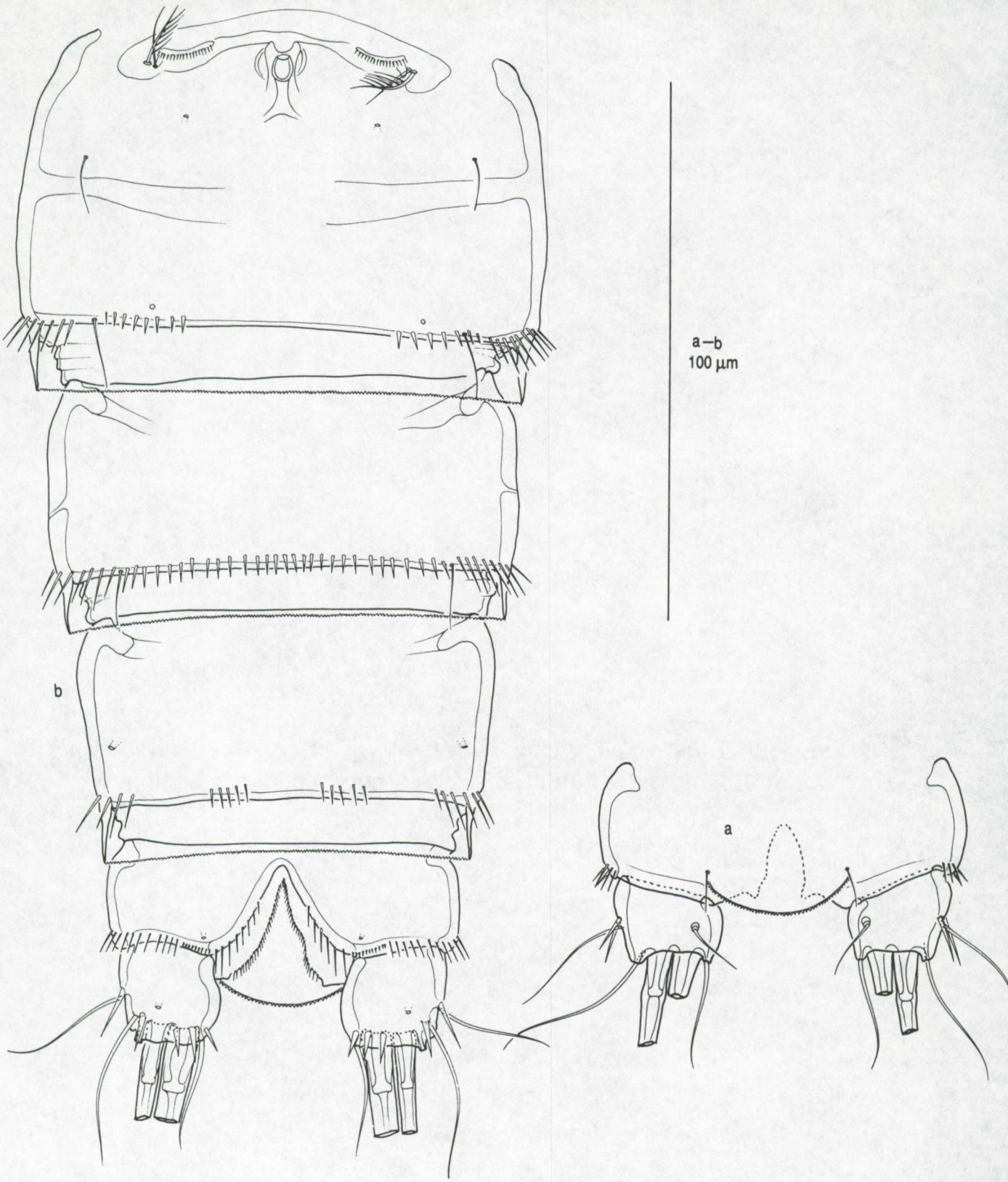
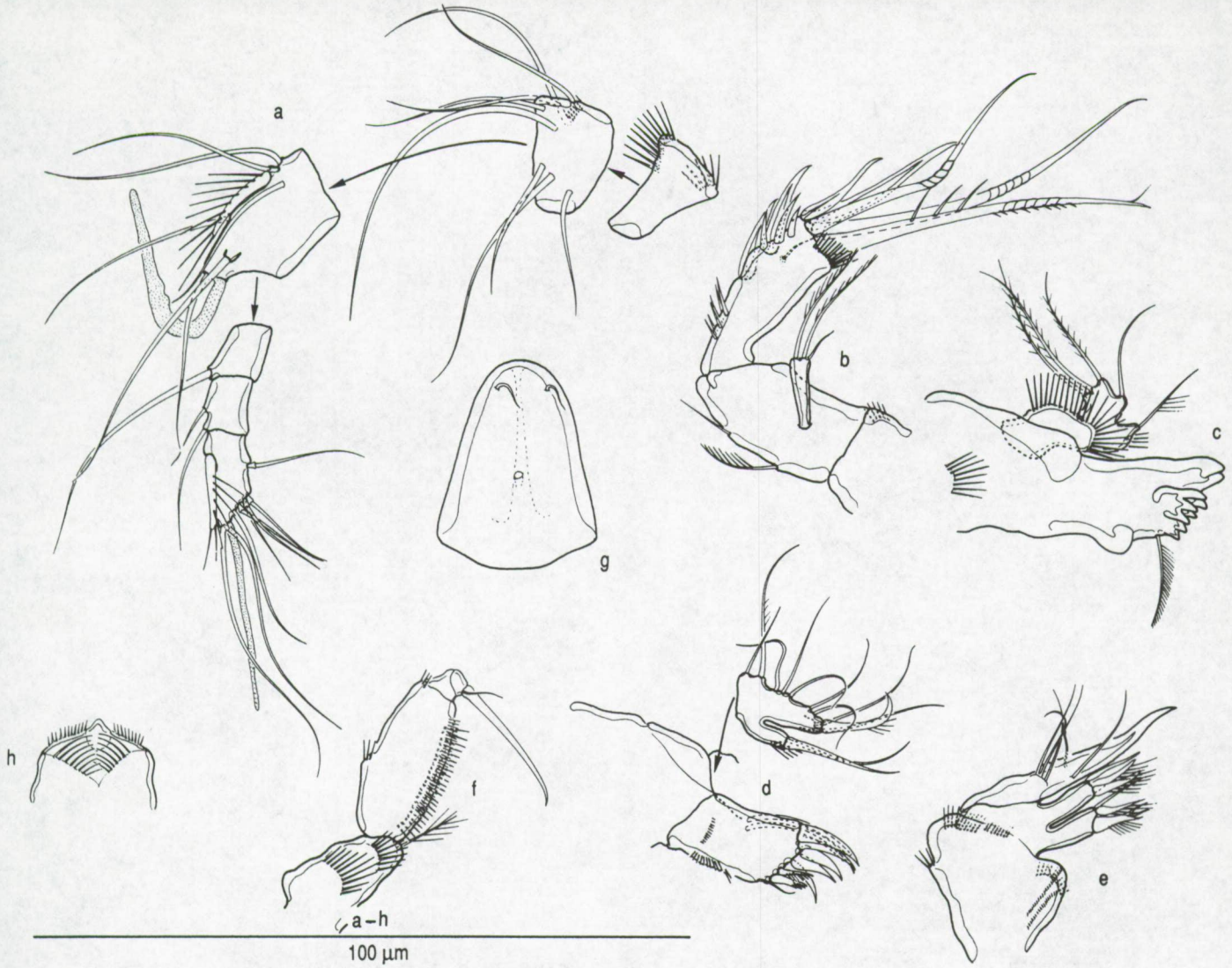
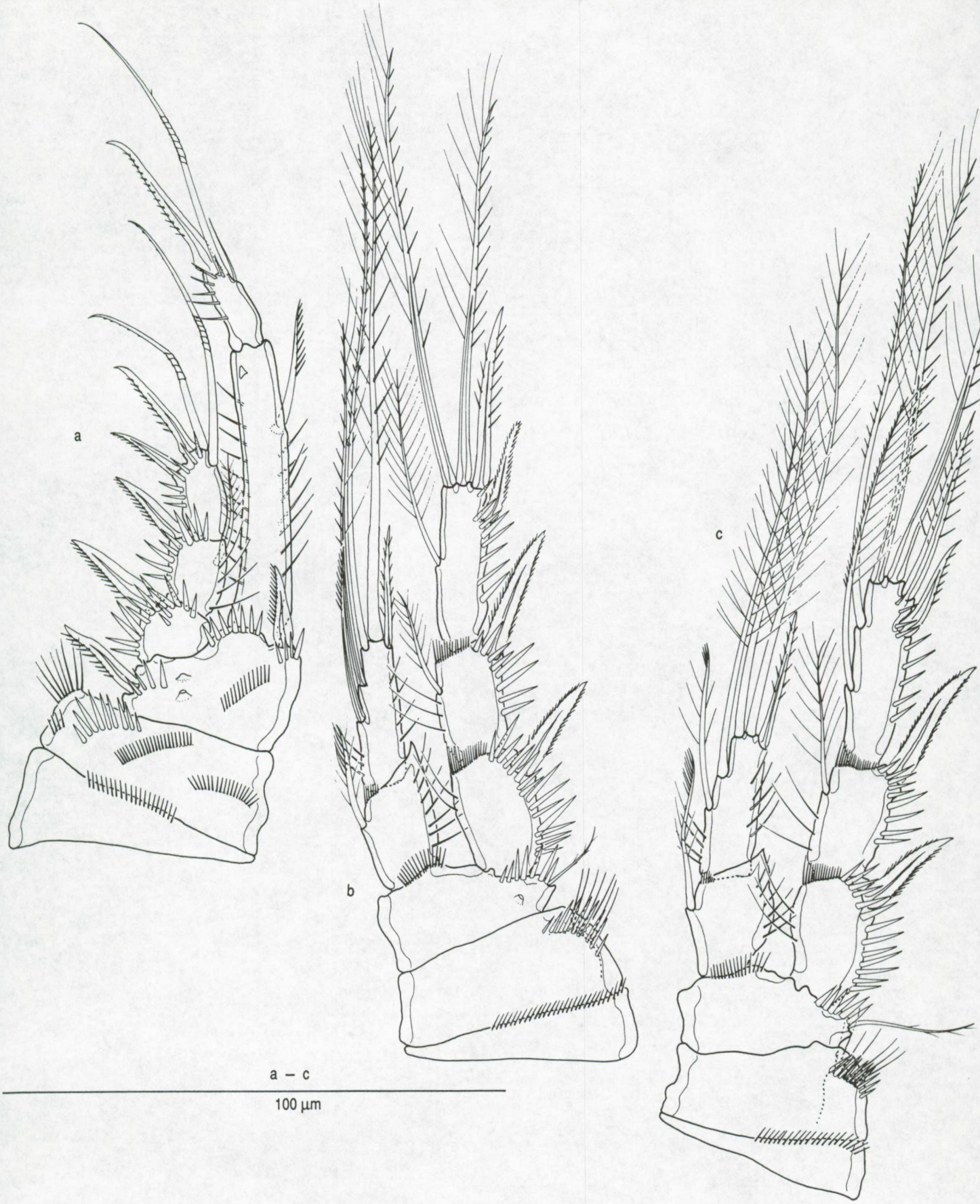

a–b
100 µm
b
a

Fig. 258. ***Mesochra pacifica*** **n. sp., female. a, antennule; b, antenna; c, mandible; d, maxillule; e, maxilla; f, maxilliped; g, rostrum; h, labrum.**


a
b
c
d
e
f
g
h
a–h
100 µm


a
b
c
a – c
100 µm


a – b
100 µm
a
b

Fig. 261. ***Mesochra pacifica*** **n. sp., male. a, habitus, dorsal; b, urosome, ventral.**

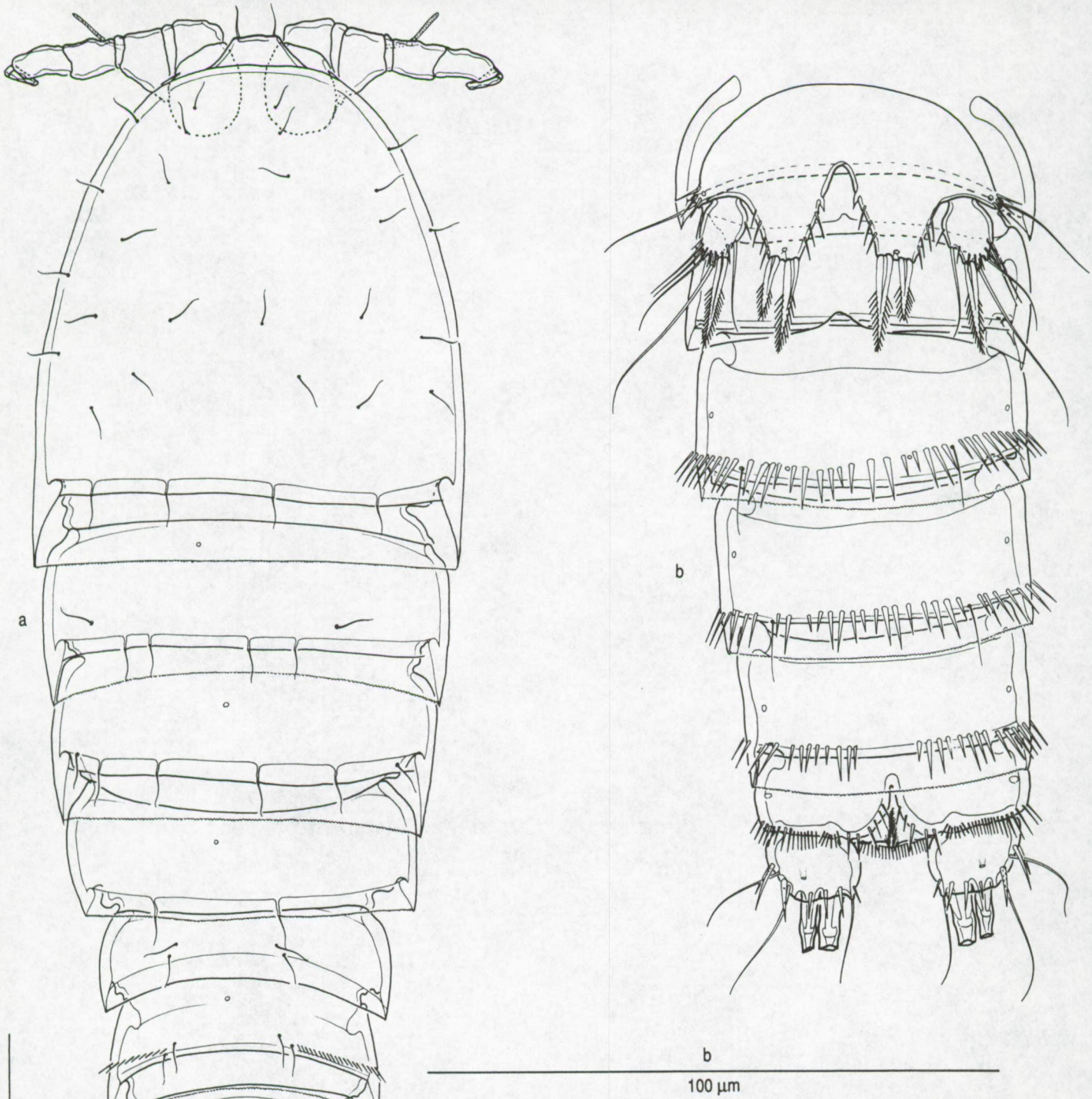
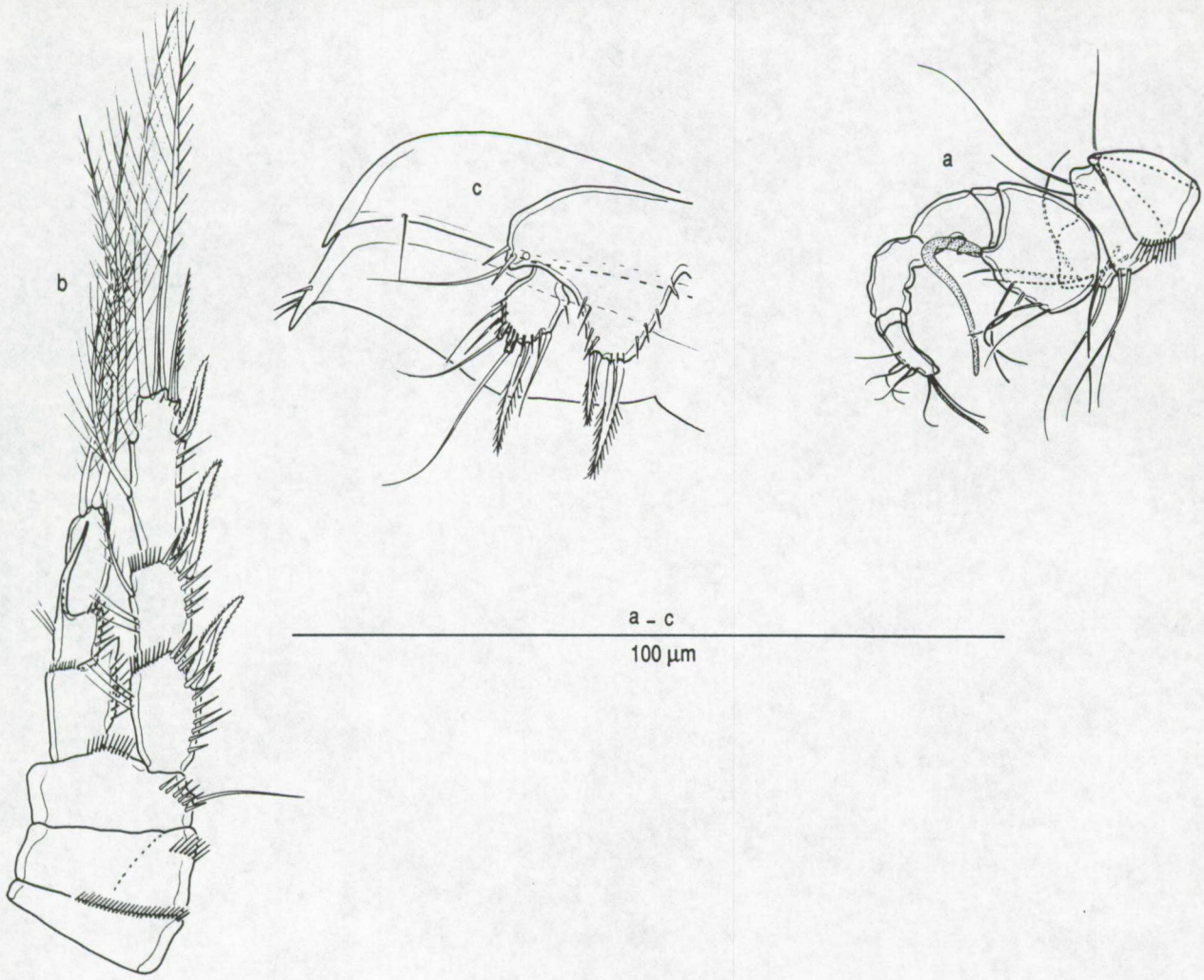

a
b
b
100 µm
a
100 µm

Fig. 262. *Mesochra pacifica* n. sp., male. a, antennule; b, P3; c, P5 and P6.



a – c

100 µm

Fig. 263. ***Mesochra pseudoparva*** **n. sp., female. a, habitus, dorsal; b, habitus lateral.**

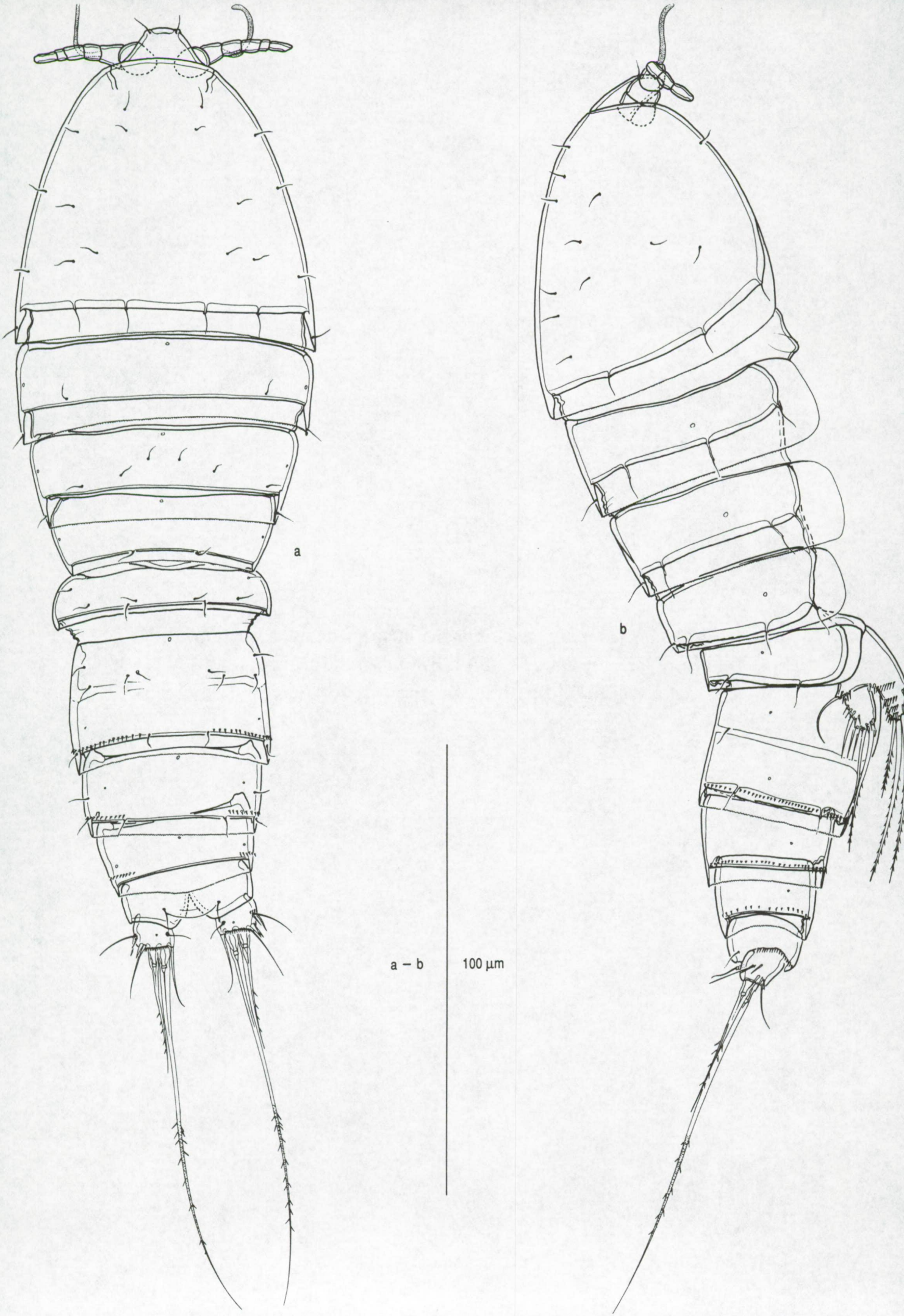

a
b
a – b
100 µm

Fig. 264. ***Mesochra pseudoparva*** **n. sp., female. a, antennule, exploded; b, antenna; c, mandible; d, maxillule; e, maxilla; f, maxilliped; g, rostrum; h, labrum.**

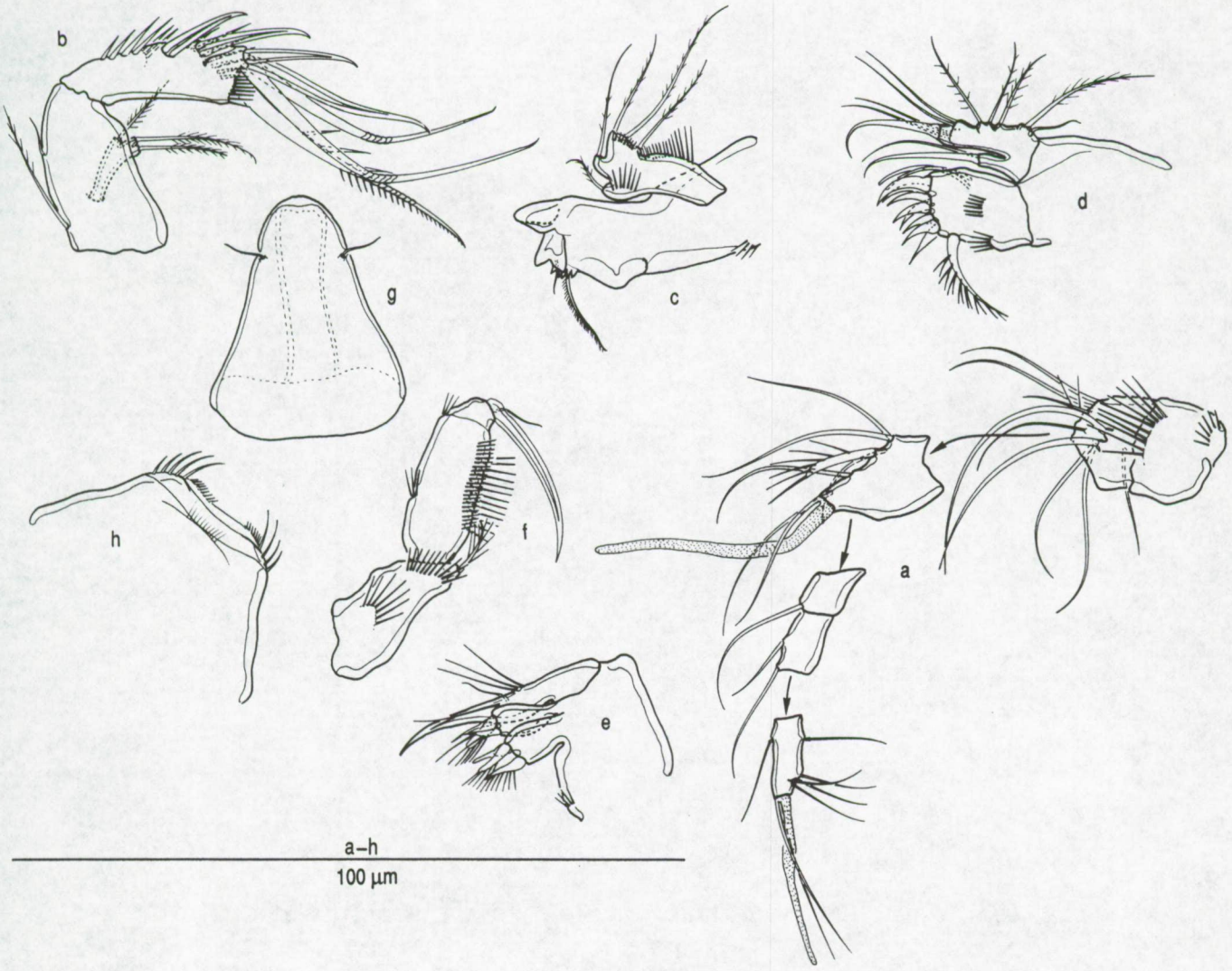

b
g
c
d
h
f
a
e
a–h
100 µm

Fig. 265. ***Mesochra pseudoparva n.*** **sp., female. a, P1; b, P2; c, abnormal P2 EXP; d, P3.**

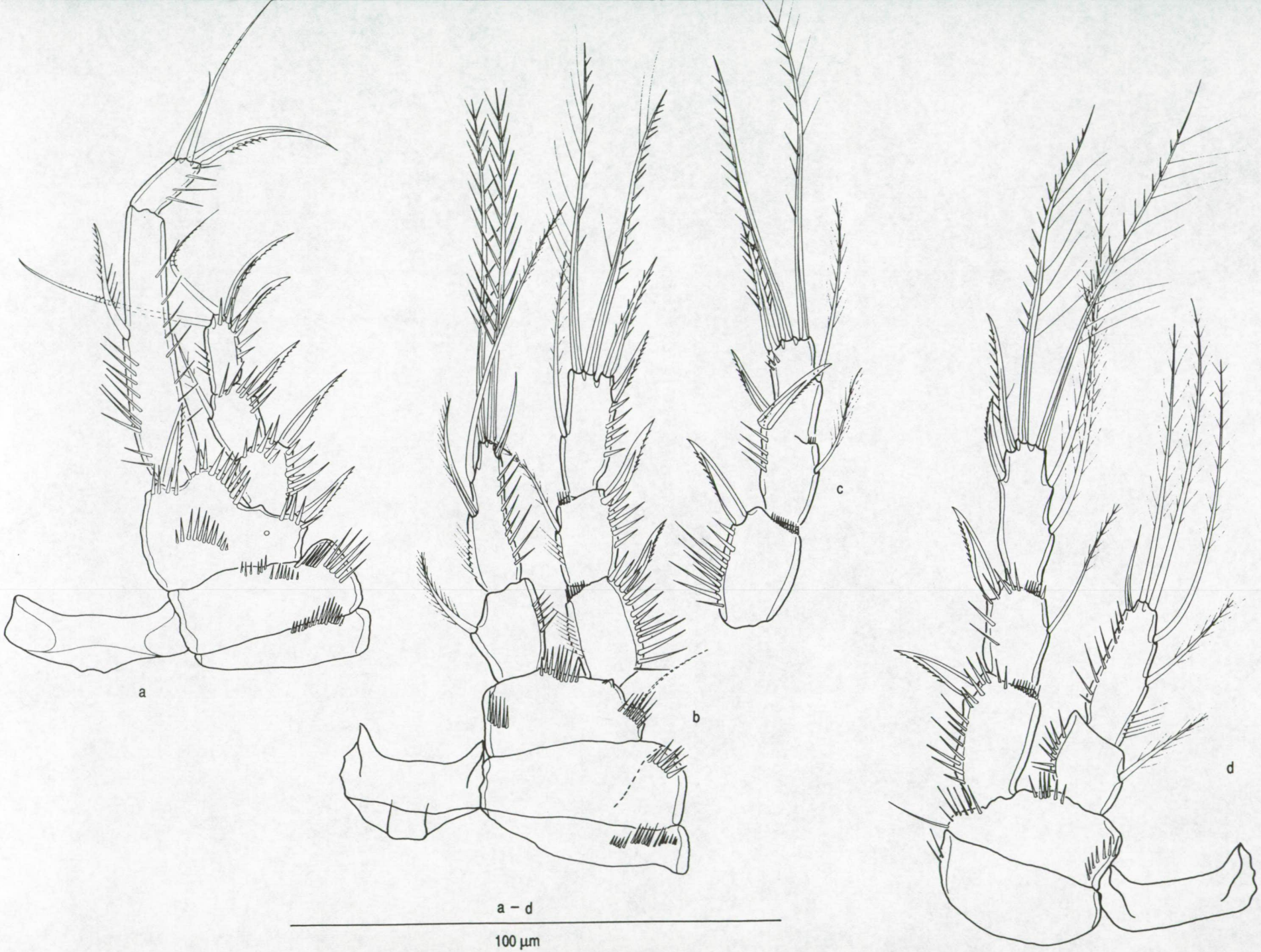
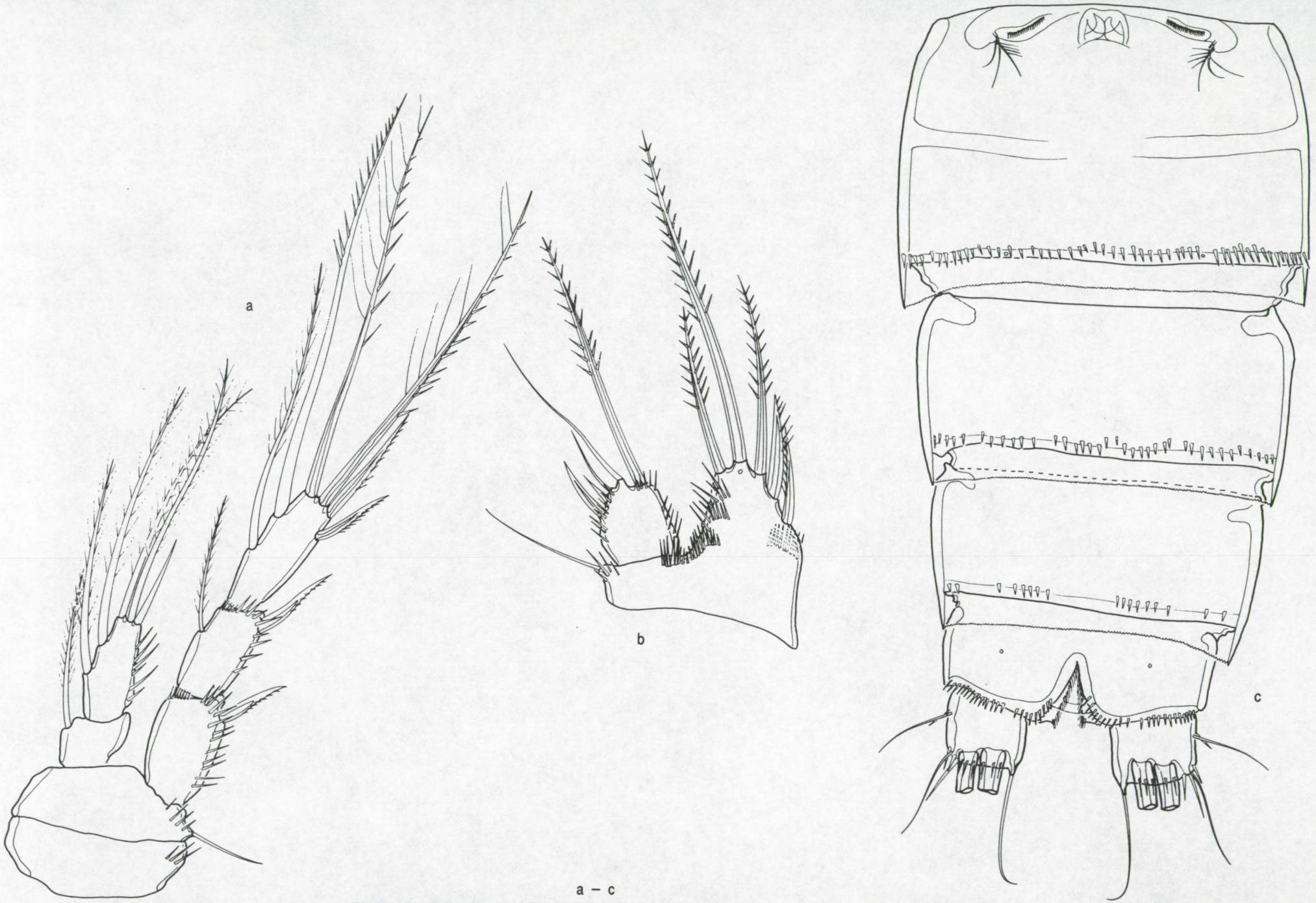

a
b
c
d
a – d
100 µm

Fig. 266. ***Mesochra pseudoparva*** **n. sp., female. a, P4; b, P5; c, urosome, ventral (P5 bearing-somite omited).**



a – c

100 µm

Fig. 267. ***Mesochra pseudoparva*** **n. sp., male. a, habitus, dorsal; b, urosome, ventral.**

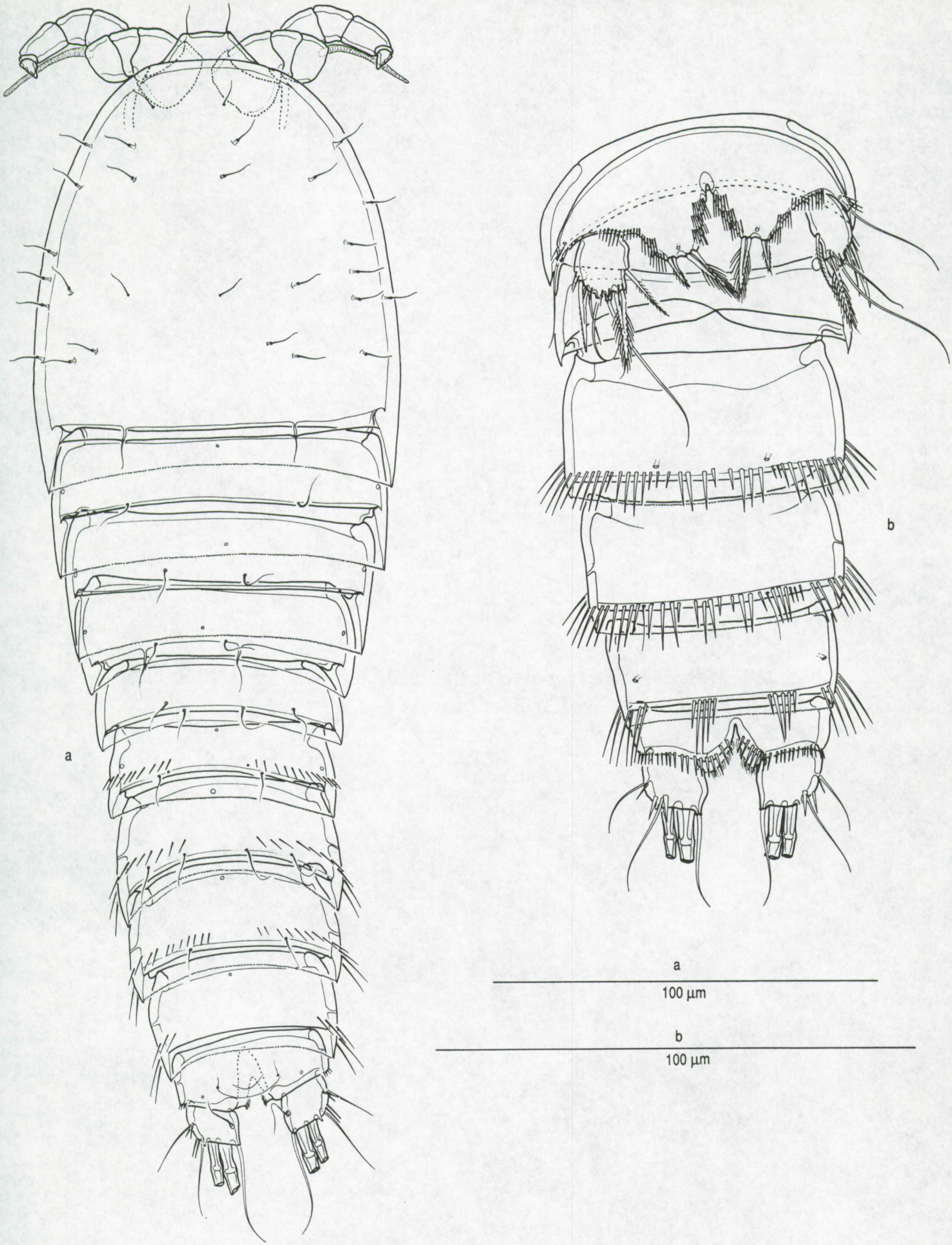

a
b
a
100 µm
b
100 µm

Fig. 268. ***Mesochra pseudoparva*** **n. sp., male. a, P3; b, P3 ENP 3; c, P5; d, P3 ENP of Mesochra wolski; e, antennule.**

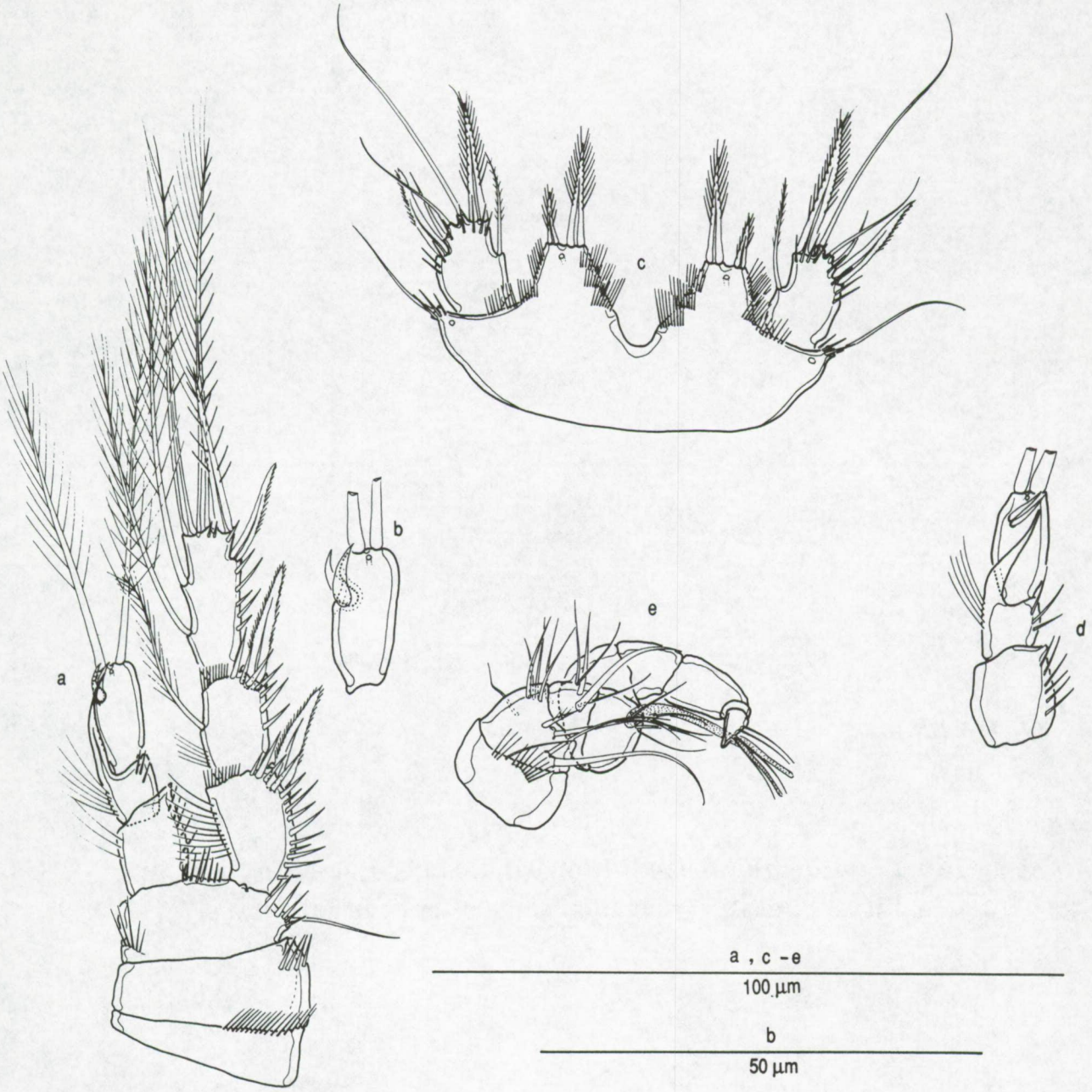

a
b
c
d
e
a , c – e
100 µm
b
50 µm

Fig. 269. ***Cletocamptus deitersi*** **Richard, female. a, habitus, dorsal; b, habitus, lateral; c, principal setae of left caudal ramus.**

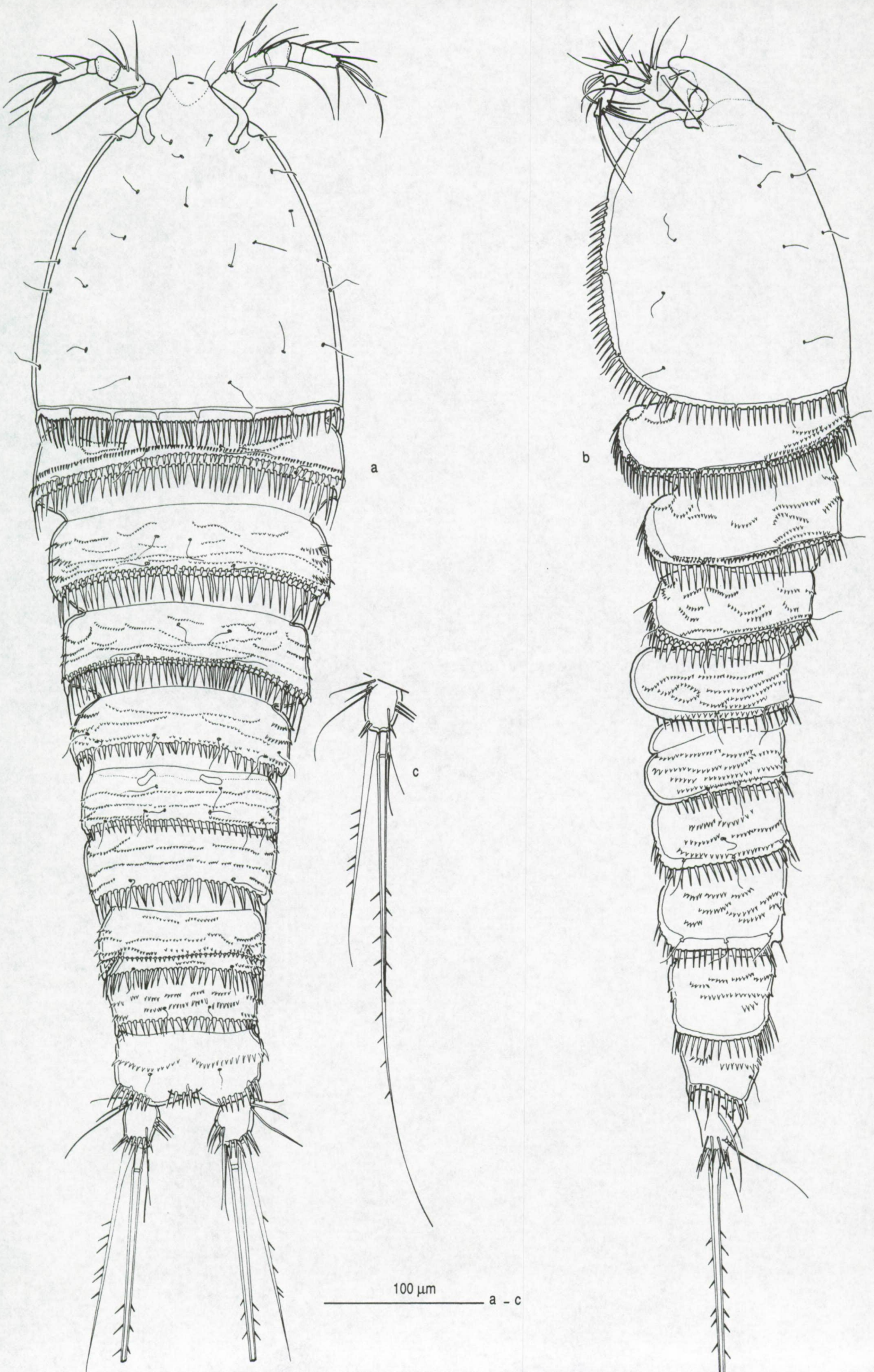

a
b
c
100 µm
a - c

Fig. 270. ***Cletocamptus deitersi*** **Richard, female. a, mandible; b, maxilliped; c, maxillule; d, rostrum; e, antenna; f, maxilla; g, antennule, exploded.**

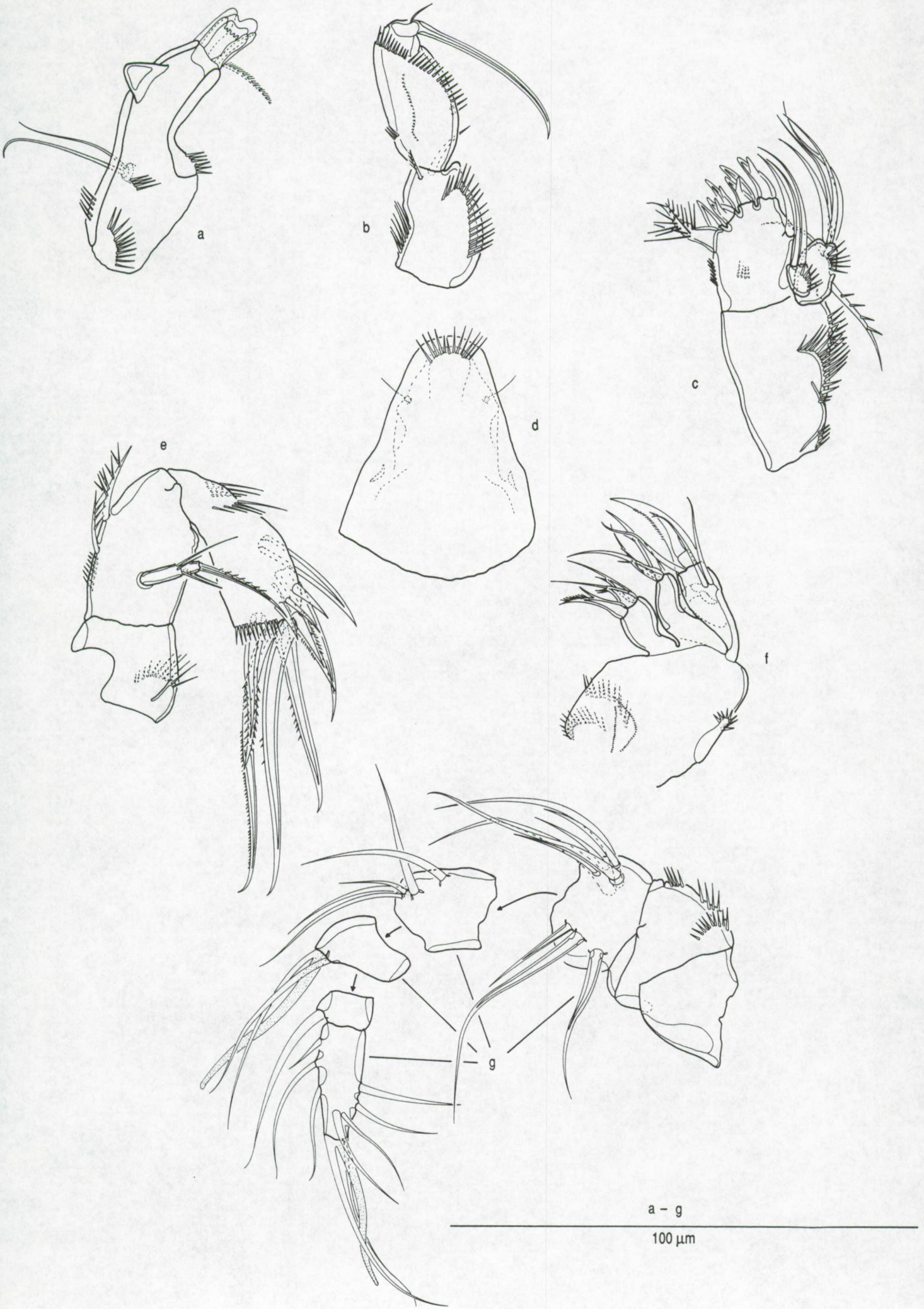

a
b
c
d
e
f
g
a – g
100 µm

Fig. 271. *Cletocamptus deitersi* Richard, female. a, P1; b, P2.


a
b
a b
100 µm


a
b
a – b
100 µm

Fig. 273. *Cletocamptus deitersi* Richard, female. a, urosome, ventral (P5 bearing-somite omited); b, P5.

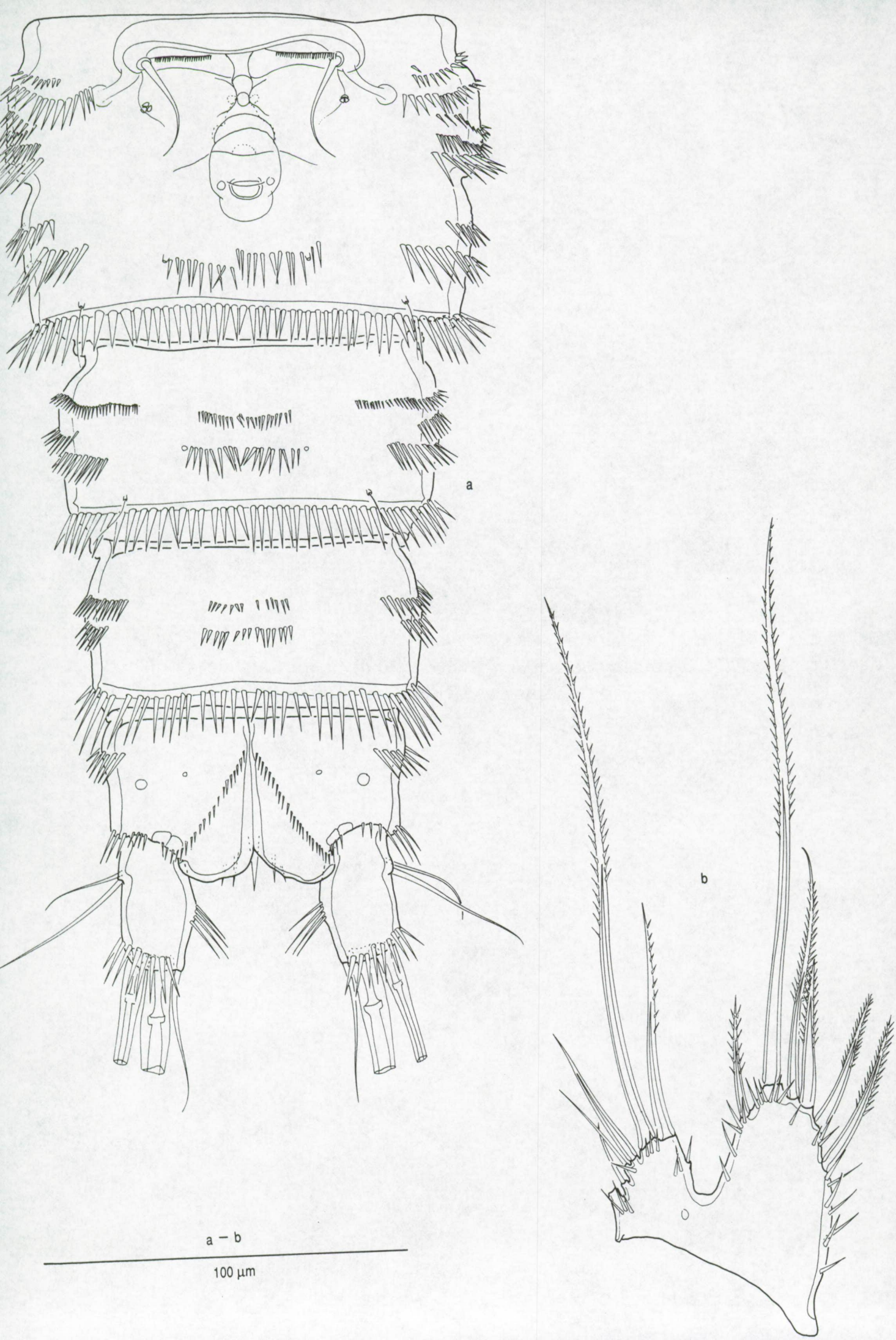

a
b
a – b
100 µm

Fig. 274. *Cletocamptus deitersi* Richard, male. a, habitus, dorsal; b, left caudal ramus.

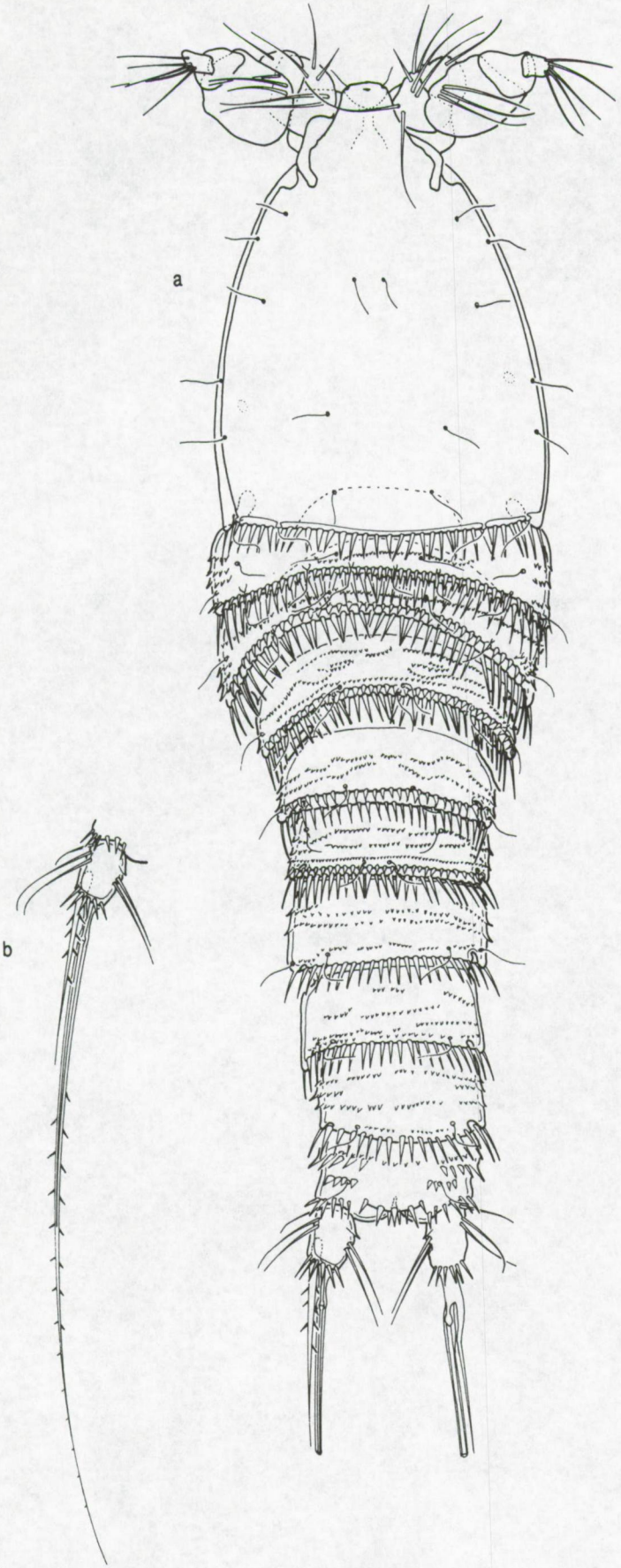
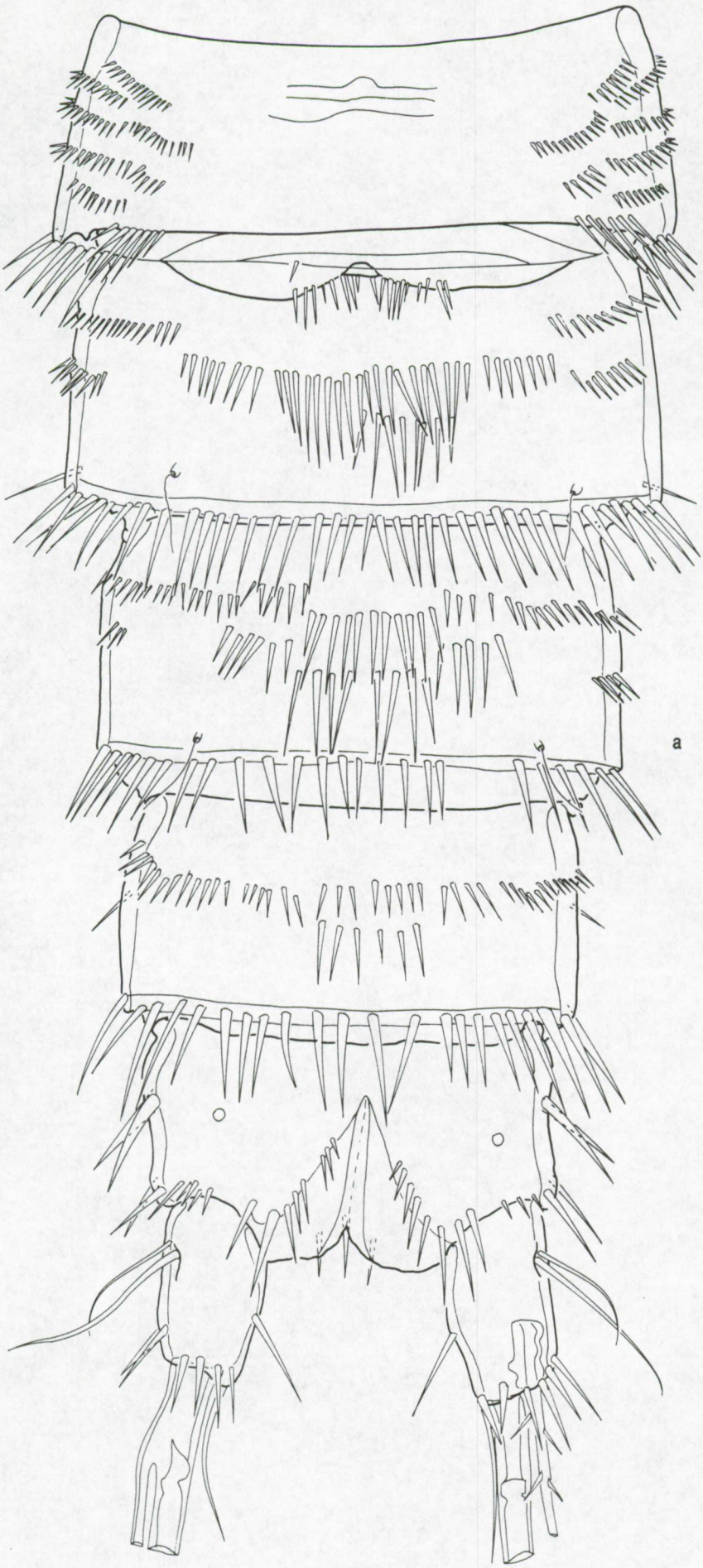
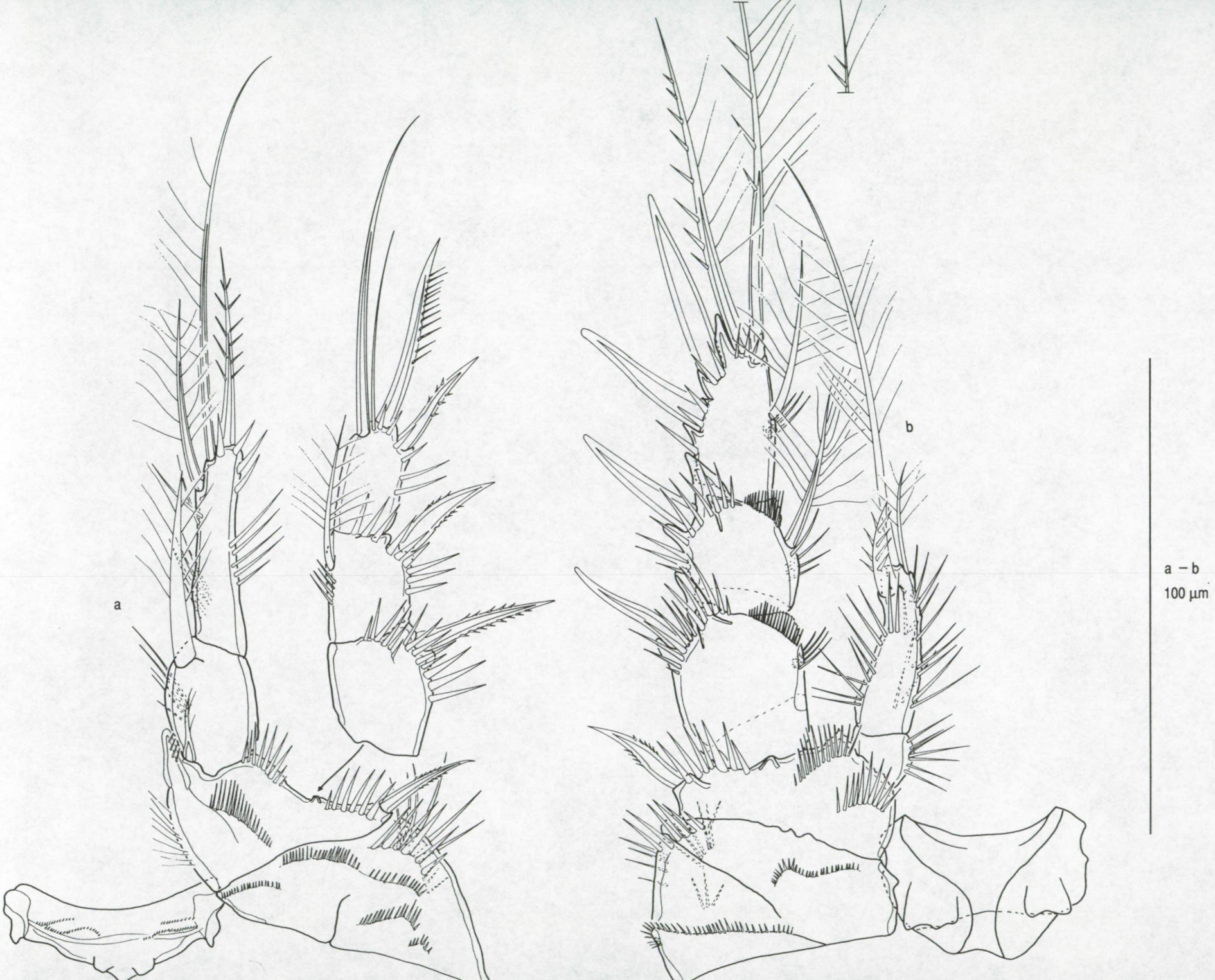

a
b
100 µm
a – b

Fig. 275. *Cletocamptus deitersi* Richard, male. Urosome, ventral (P5 bearing-somite omited).


a
a
100 µm


a
b
a – b
100 µm

a – c

100 µm

Fig. 278. *Orthopsyllus linearis* Claus n. spp., female. a, habitus, dorsal; b, anal segment and caudal rami, dorsal; c, urosome, ventral (P5 bearing-somite omited).

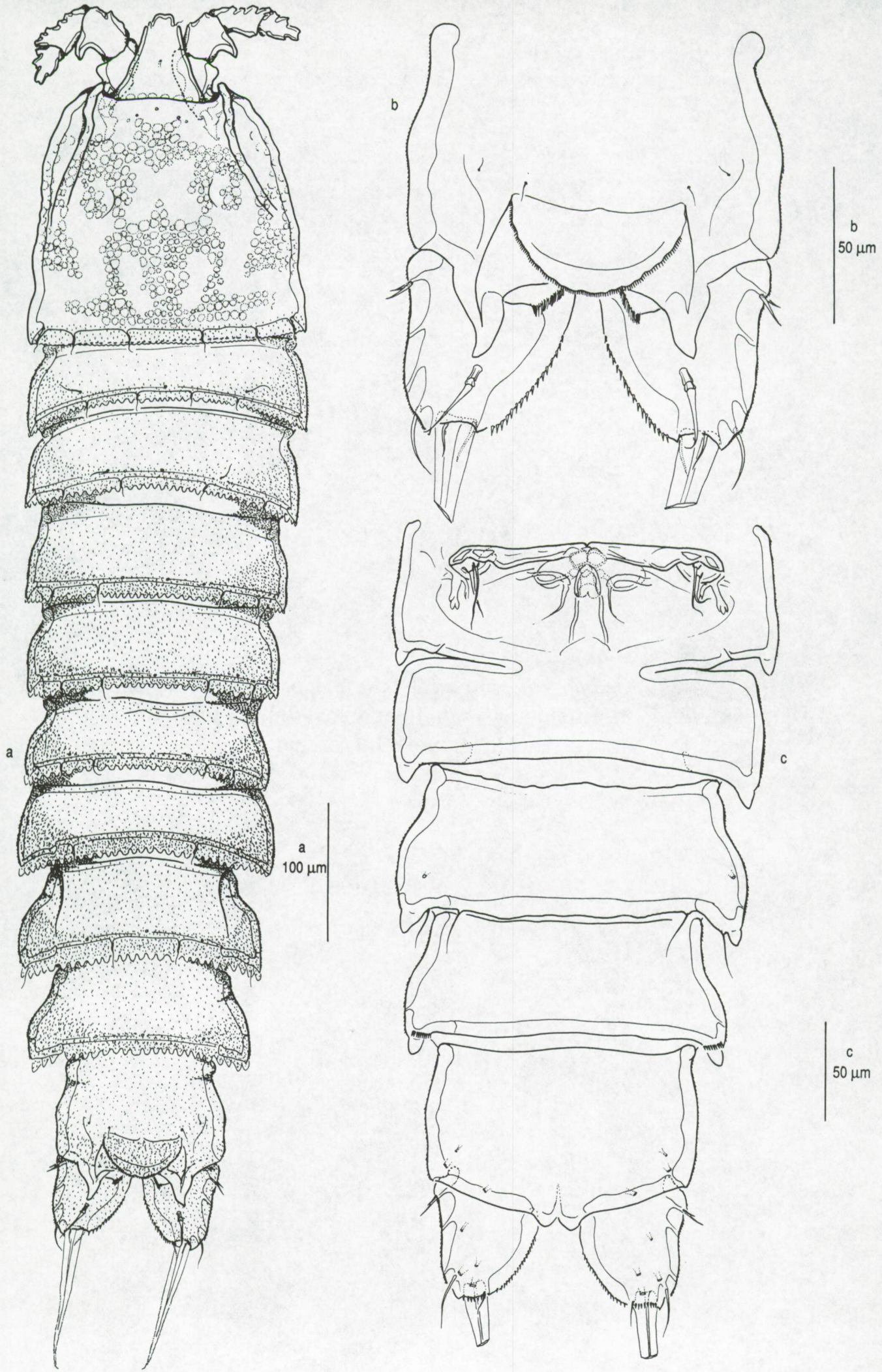

a
a
100 µm
b
b
50 µm
c
c
50 µm

Fig. 279. *Orthopsyllus linearis* Claus n. spp. a, rostrum and antennule; b, antenna; c, mandible; d, maxillule; e, maxilla; f, maxilliped (a, of male; b-f, of female).

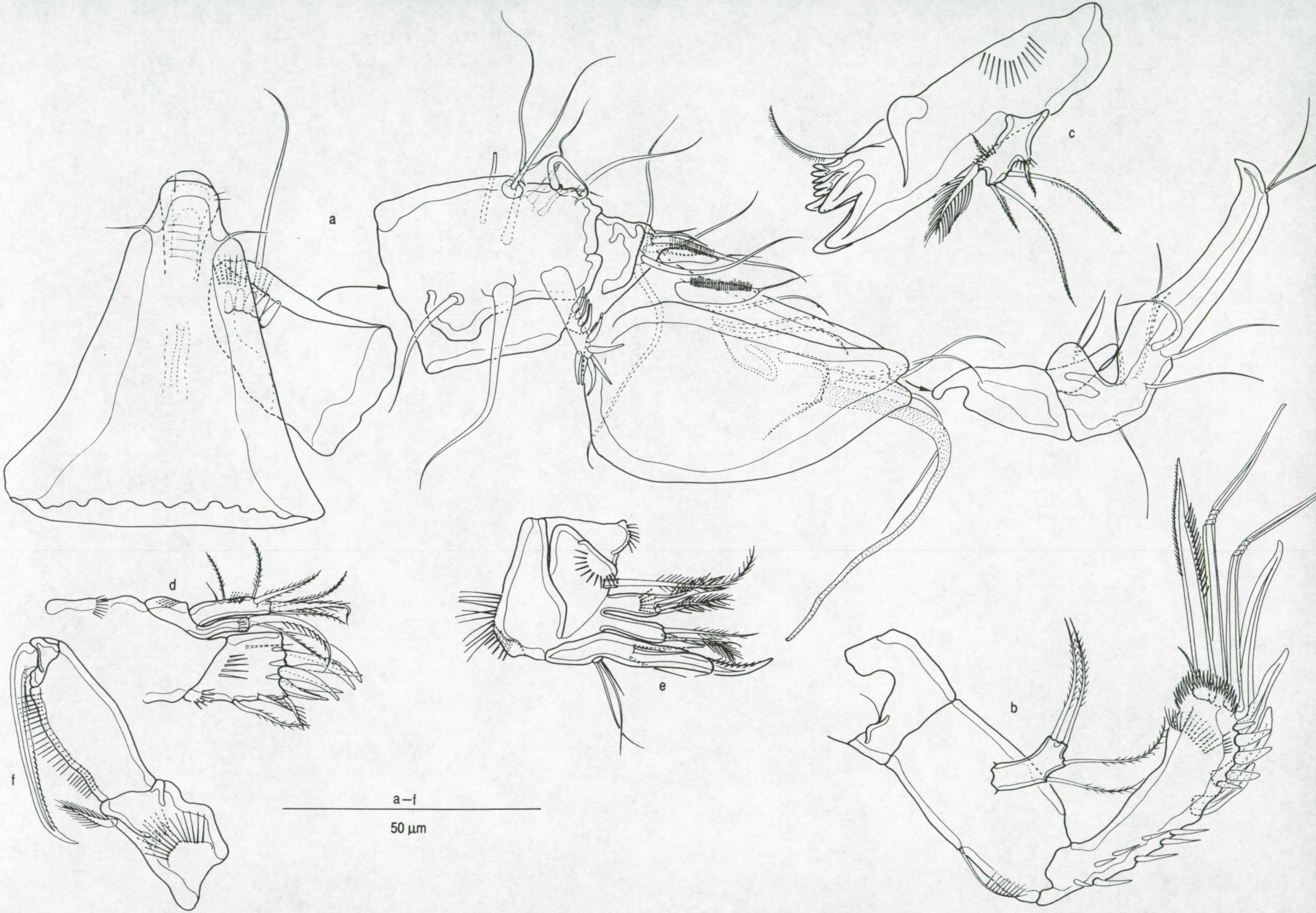

a
b
c
d
e
f
a–f
50 µm

Fig. 280. ***Orthopsyllus linearis*** **Claus n. spp., female. a, P2 ENP; b, P4 ENP (dashed line indicates position of EXP 1).**

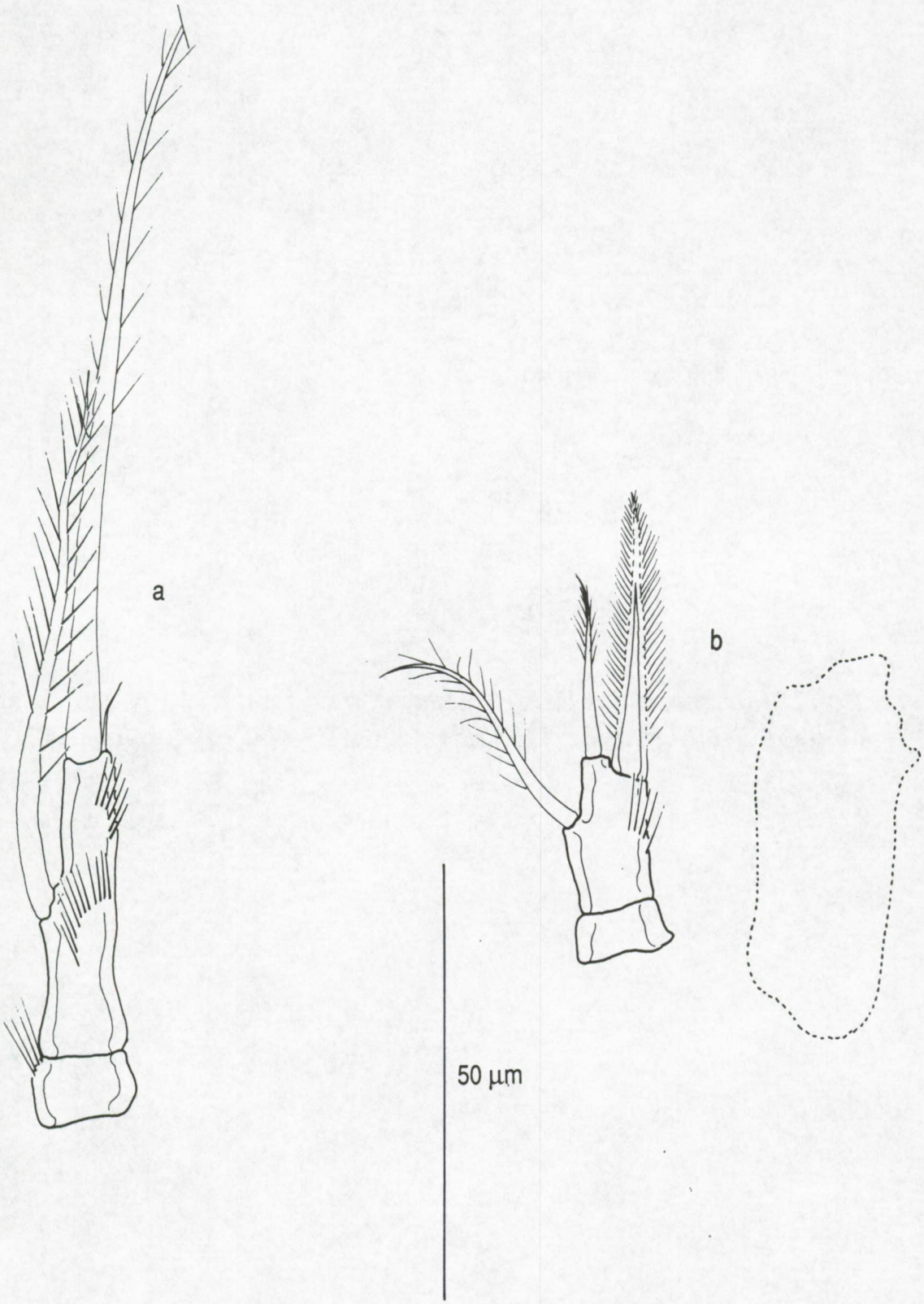

a
b
50 µm

Fig. 281. *Orthopsyllus linearis* Claus n. spp., female. a, rostrum and antennule, the latter exploded; b, P3; c, P3 ENP, aberrant; d, P5.

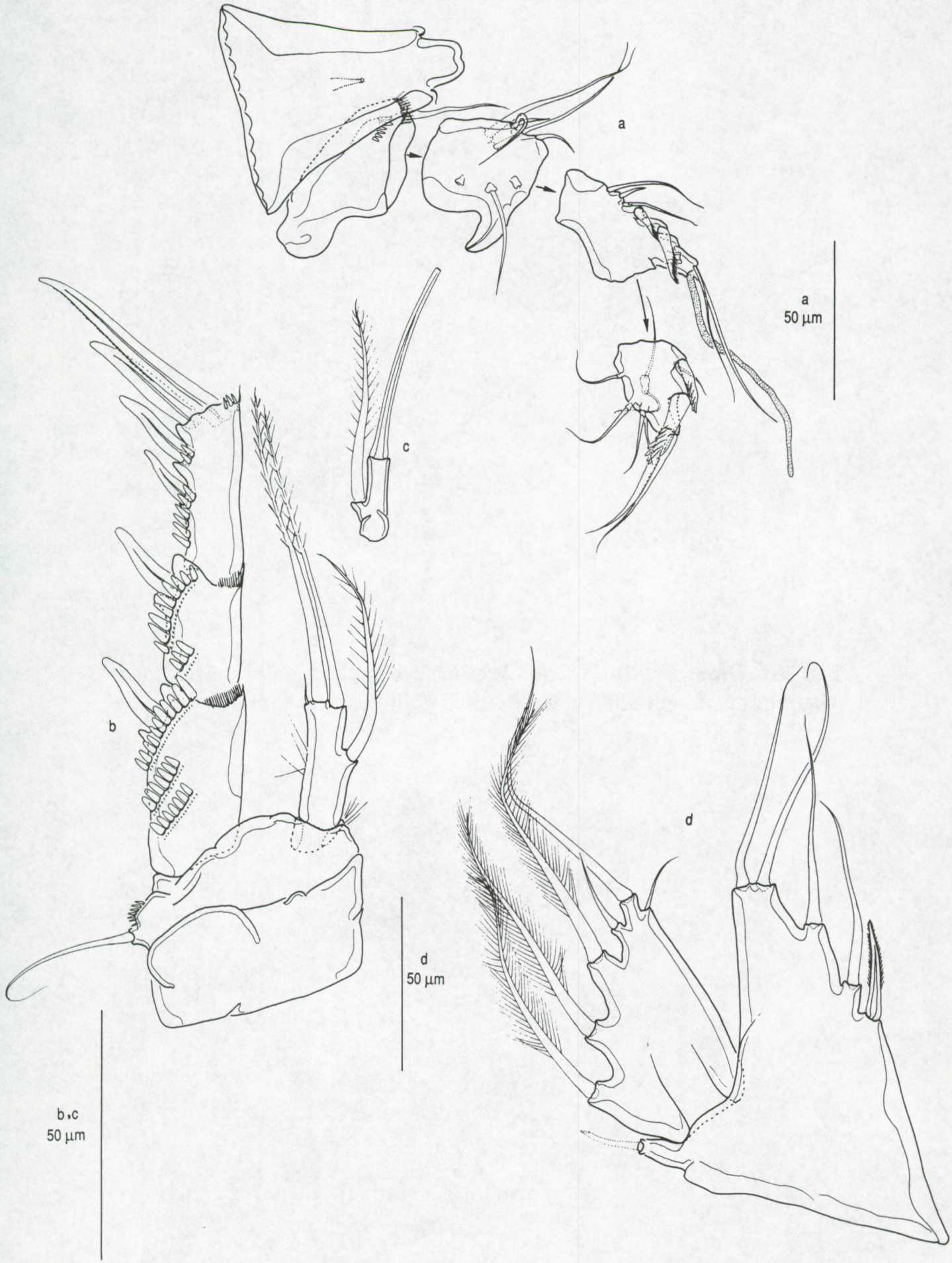

a
a
50 µm
c
b
d
50 µm
d
b,c
50 µm

Fig. 282. *Orthopsyllus linearis* Claus n. spp., male. a, habitus, drosal (caudal rami omited); b, anal segment and caudal rami, dorsal.

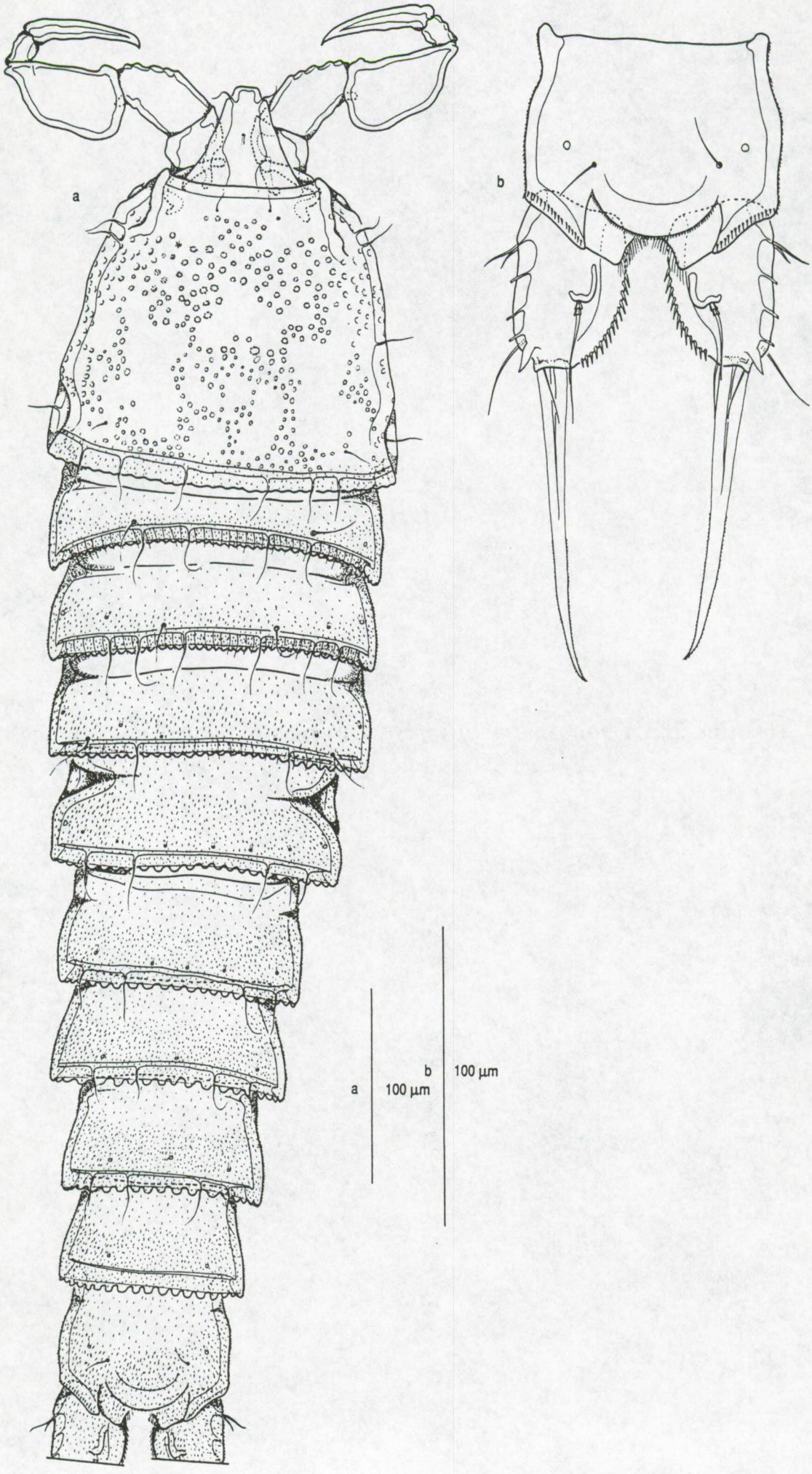
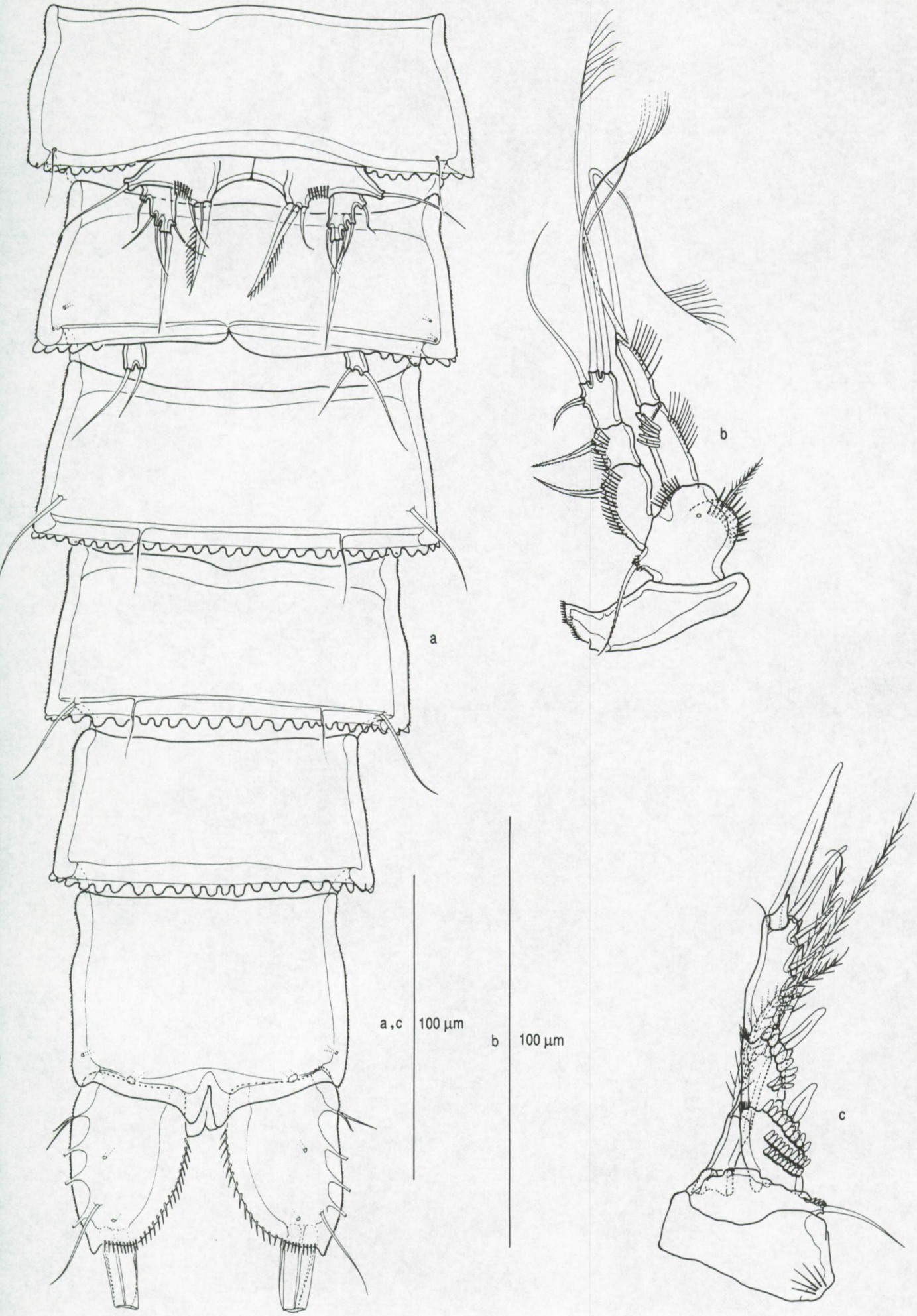
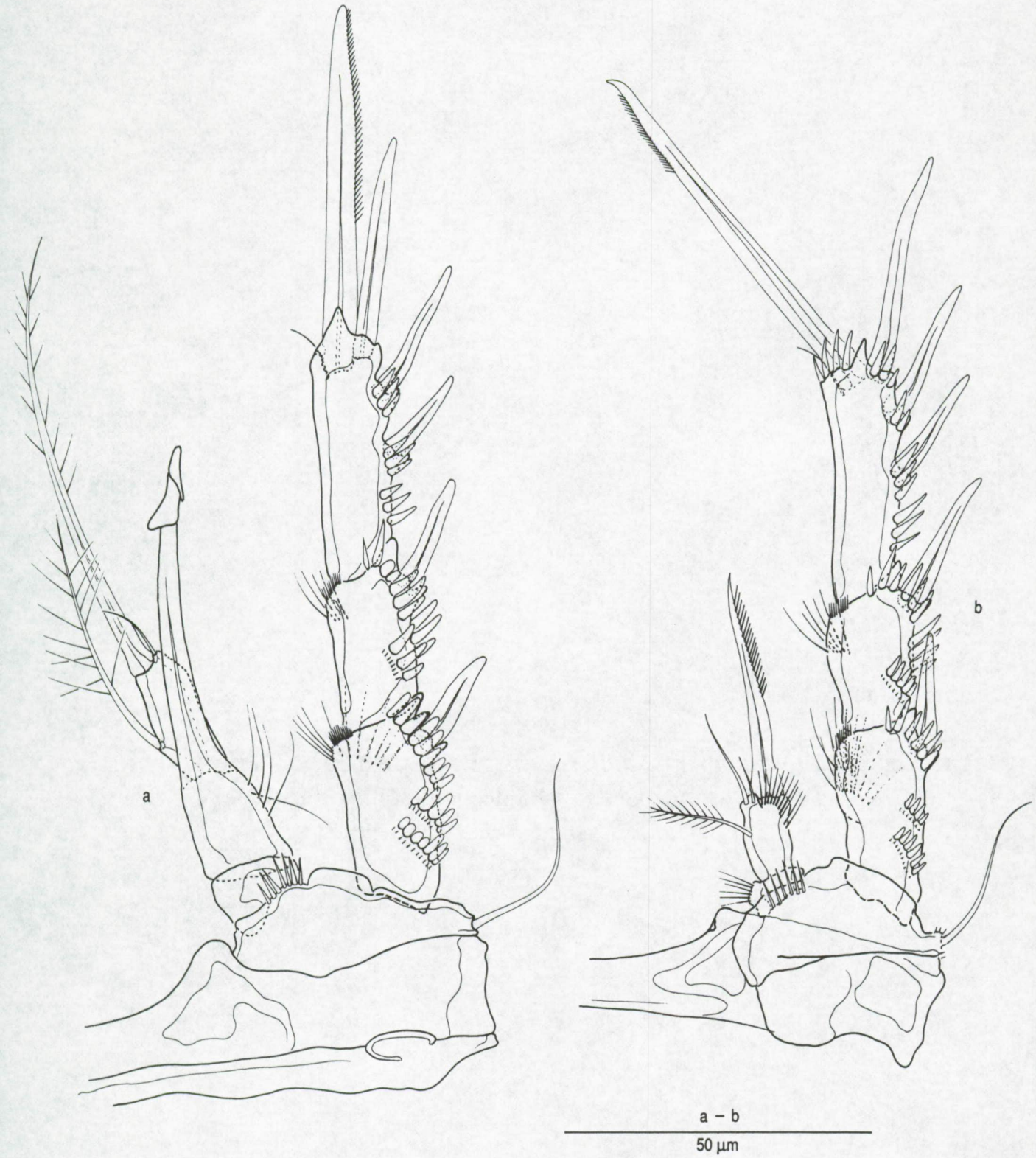

a
b
a
100 µm
b
100 µm

Fig. 283. *Orthopsyllus linearis* Claus n. spp. a, urosome, ventral; b, P1; c, P2 (a and c, of male; b, of female).


a
b
c
a, c 100 µm
b 100 µm



a – b

50 µm

Fig. 285. ***Belemnopontia panamensis*** **Mielke, female. a, habitus, dorsal; b, urosome, ventral (P5 bearing-somite omited).**

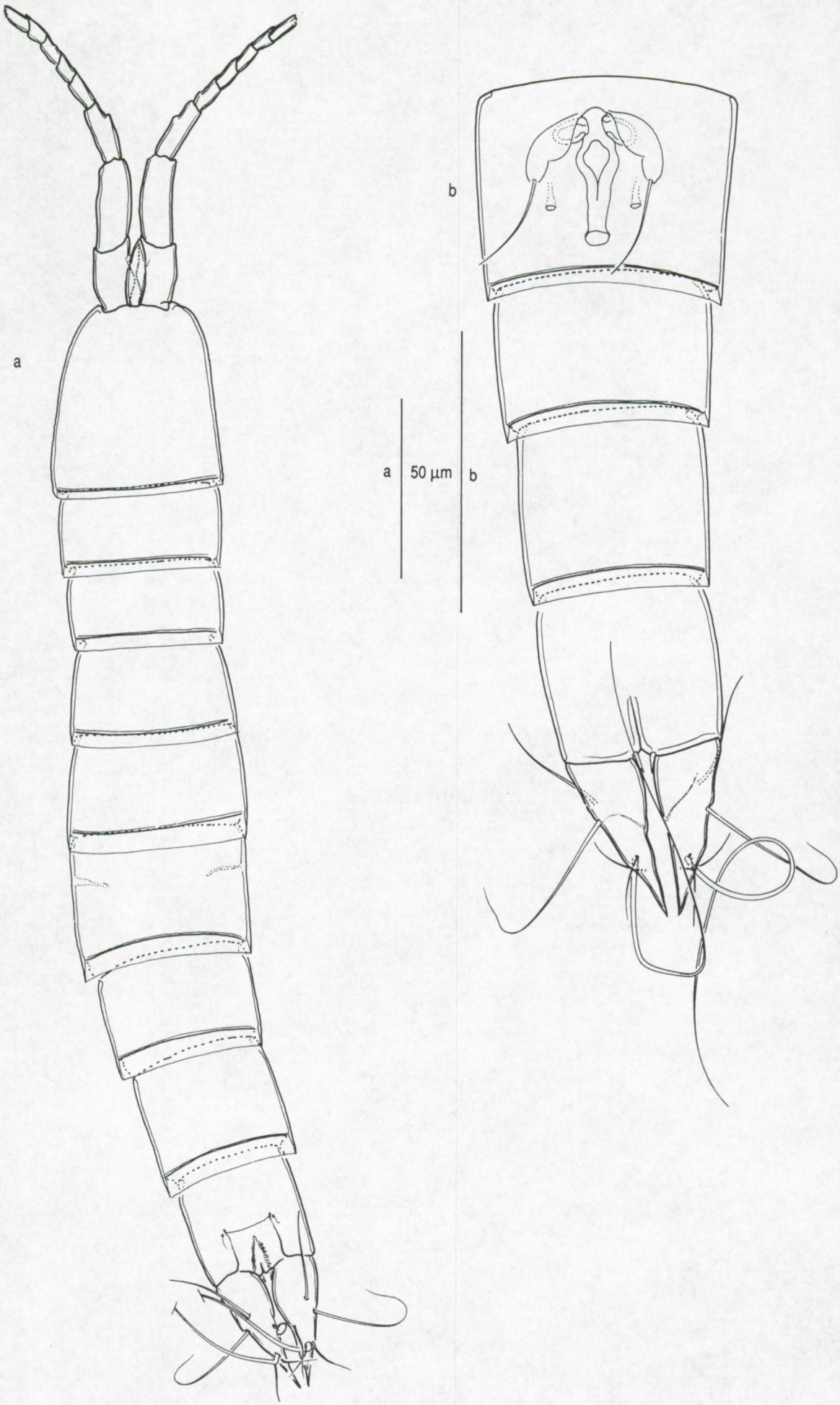

a
b
a
50 µm
b

Fig. 286. *Belemnopontia panamensis* Mielke. a, antennule; b, antenna; c, maxillule; d, maxilla; e, maxilliped; f, antennule (a-e of female; f, of male).

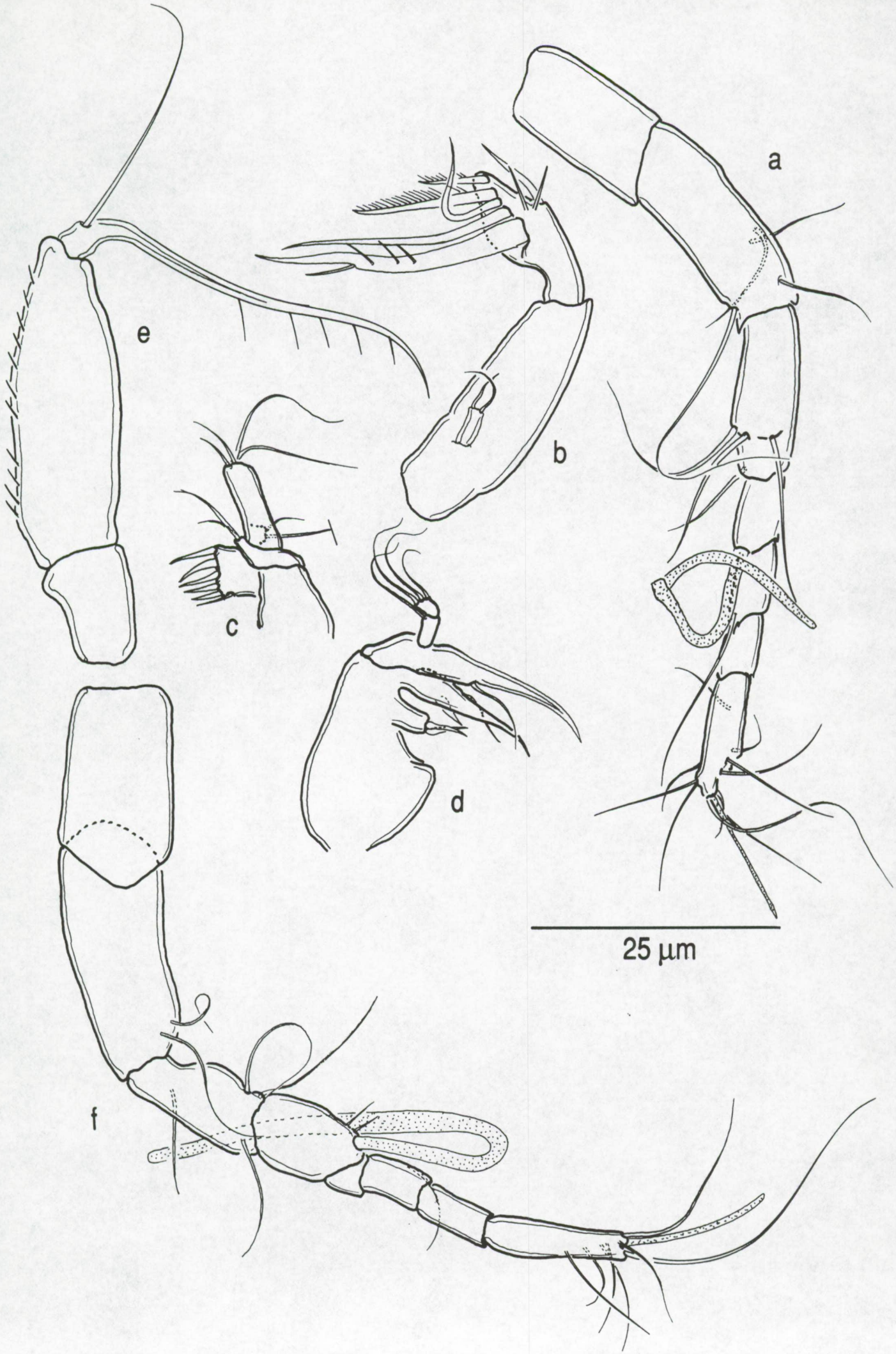

a
b
c
d
e
f
25 µm

Fig. 287. *Belemnopontia panamensis* Mielke, female. a, P1; b, P2; c, P3.

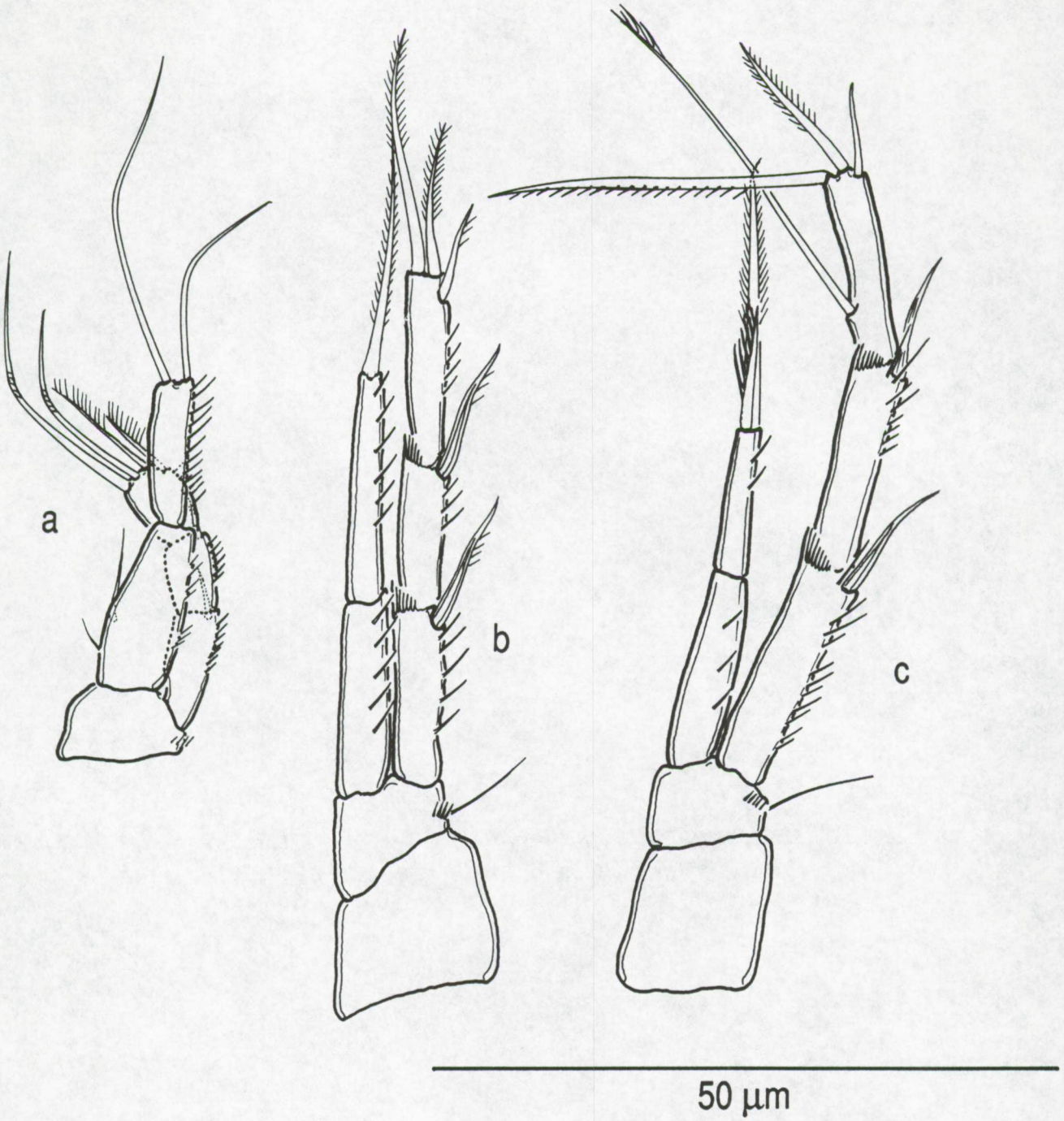

a
b
c
50 µm

Fig. 288. ***Belemnopontia panamensis*** **Mielke. a; P4; b, P5; c, P3 ENP; d, P5 and P6 (a-b, of female; c-d, of male).**

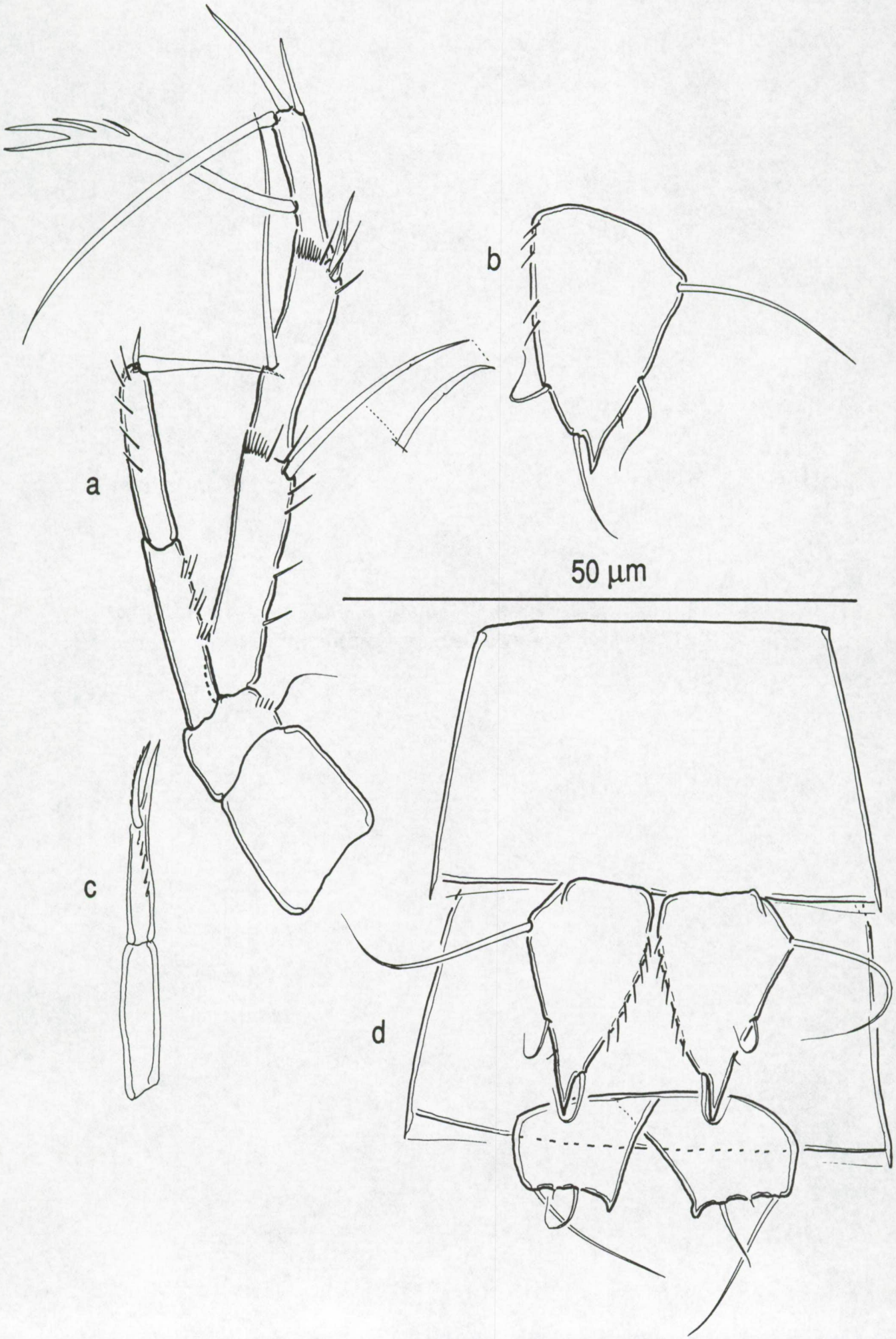

a
b
50 µm
c
d

Fig. 289. ***Cerconeotes n. sp. 1*****, female. a, habitus, dorsal; b, urosome, ventral (P5 bearing-somite omited).**

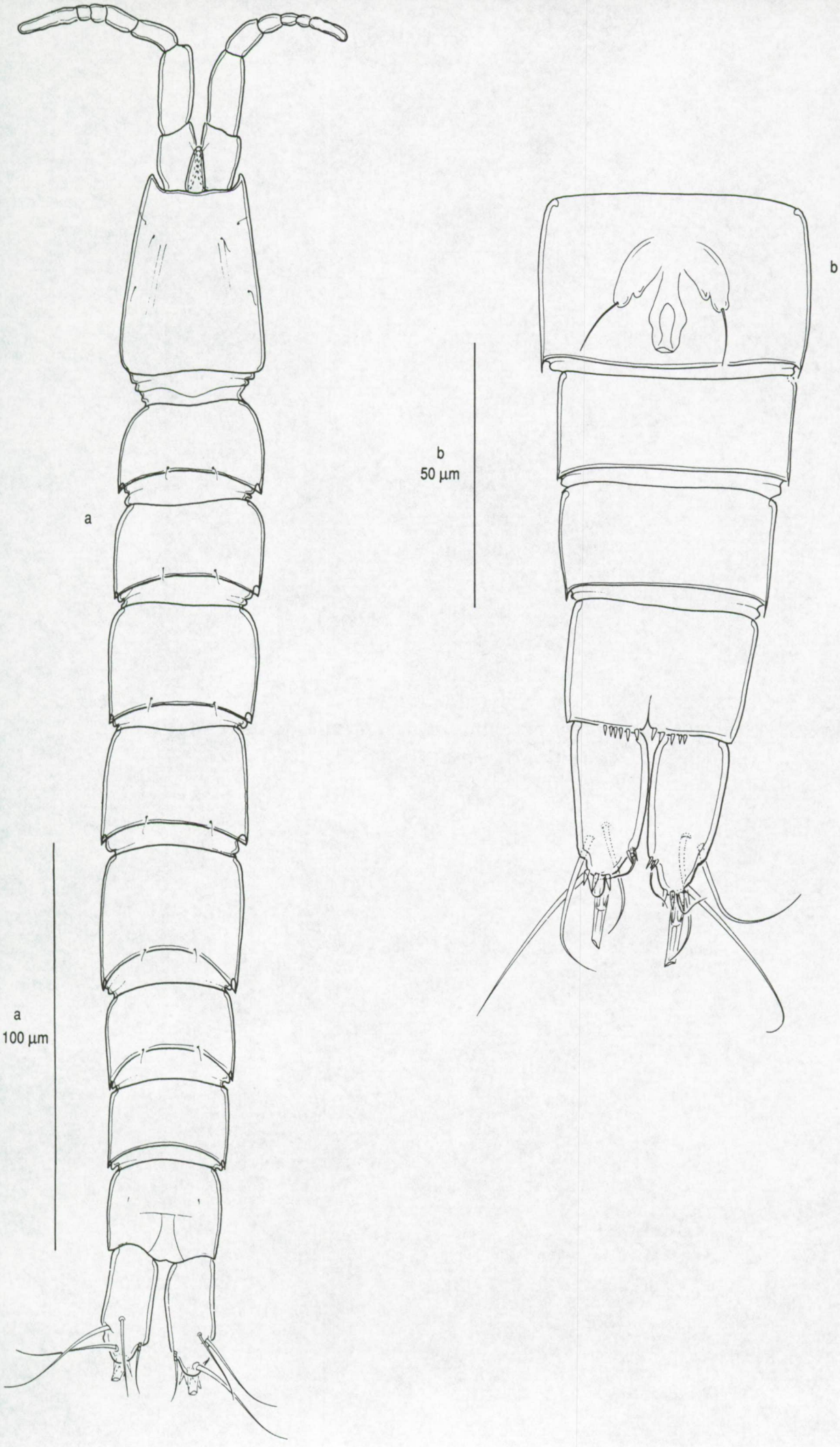
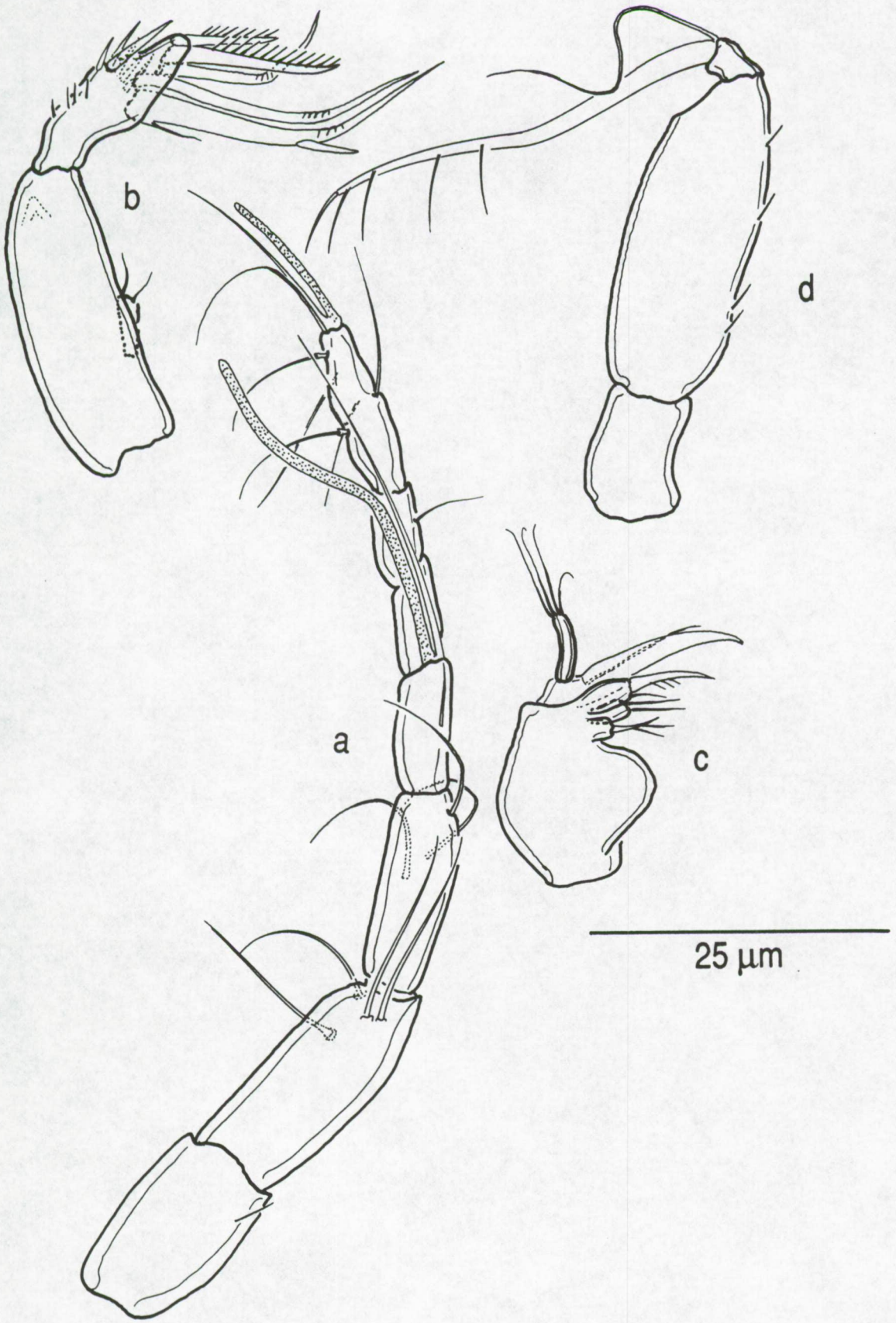

a
a
100 µm
b
b
50 µm

Fig. 290. ***Cerconeotes n. sp. 1*****, female. a, antennule; b, antenna; c, maxilla; d, maxilliped.**


b
d
a
c
25 µm

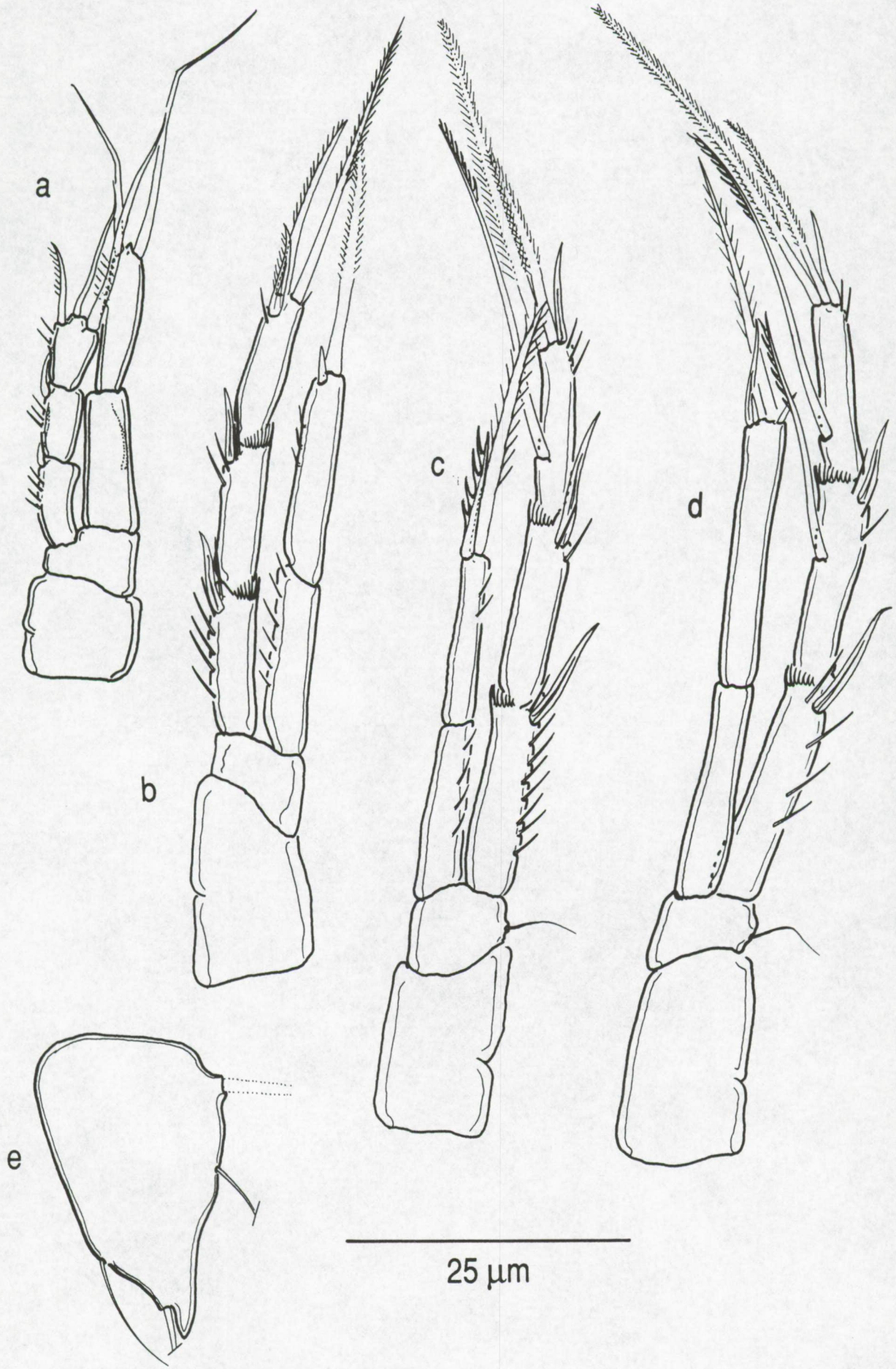
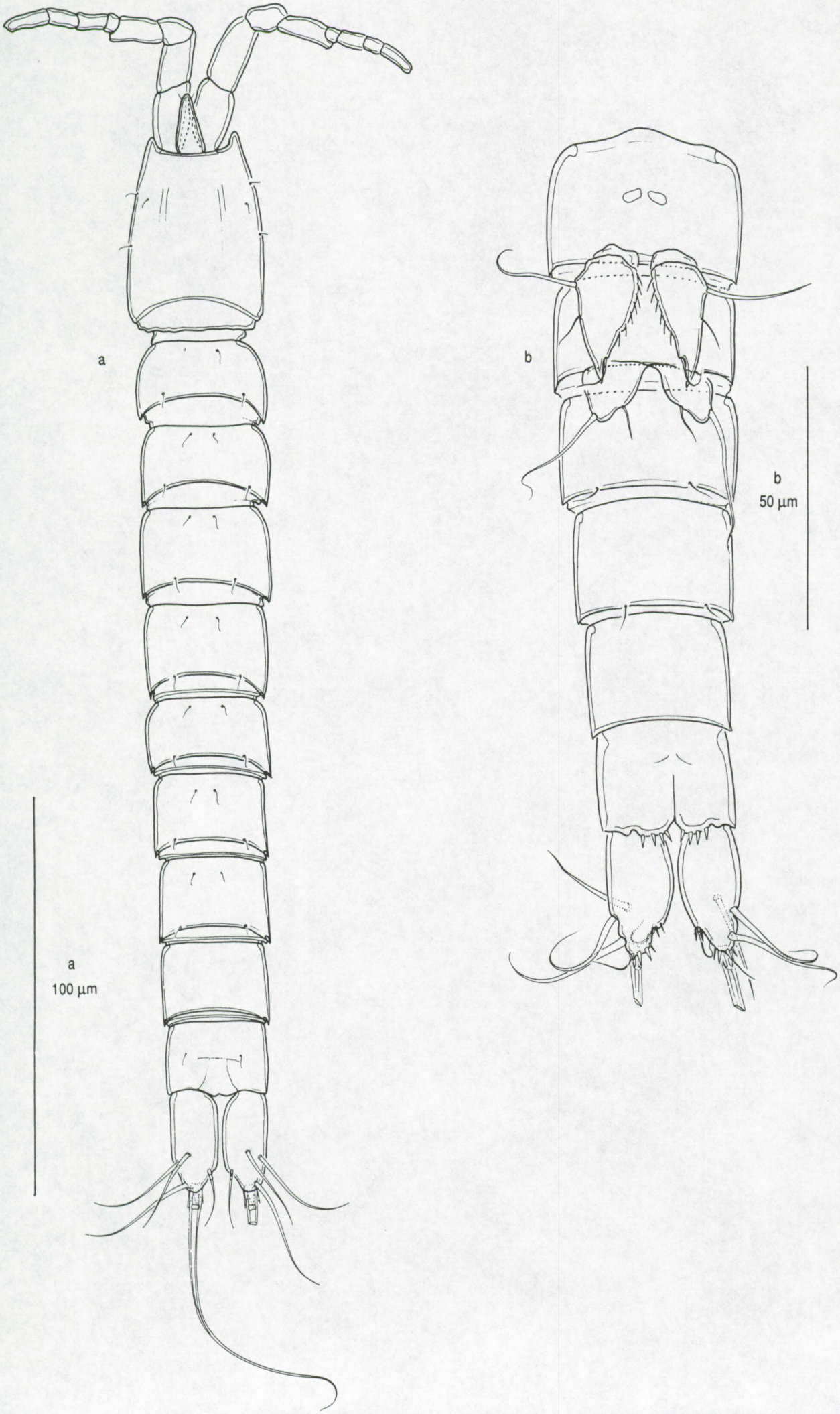

a
b
c
d
e
25 µm

Fig. 292. ***Cerconeotes n. sp. 1*****, male. a, habitus, dorsal; b, urosome, ventral, showing P5 and P6.**


a
a
100 µm
b
b
50 µm

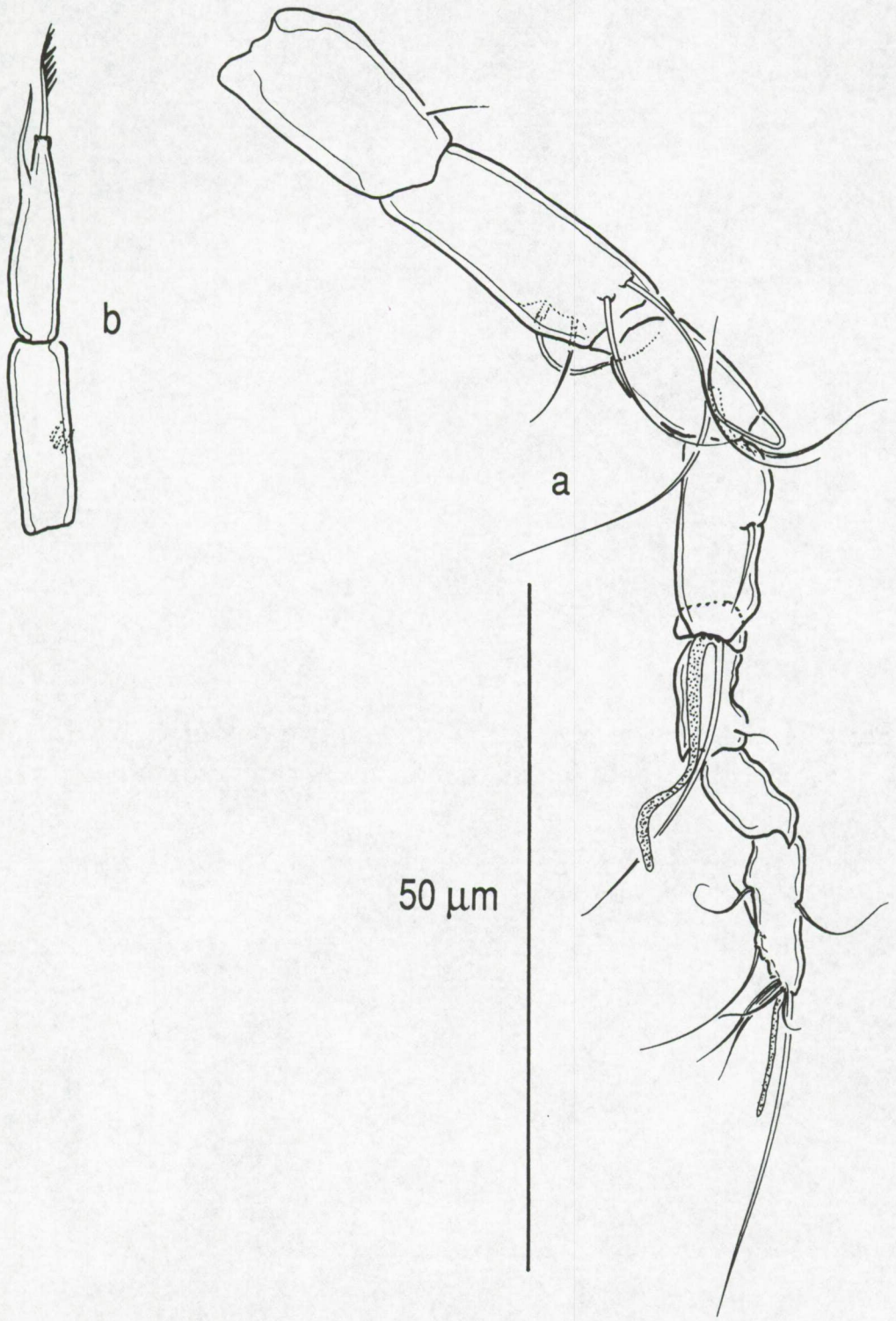

b
a
50 µm

Fig. 294. ***Cletodes n. sp. 1*****, female. a, habitus, dorsal; b, habitus, lateral; c, anal segment and caudal rami, dorsal.**

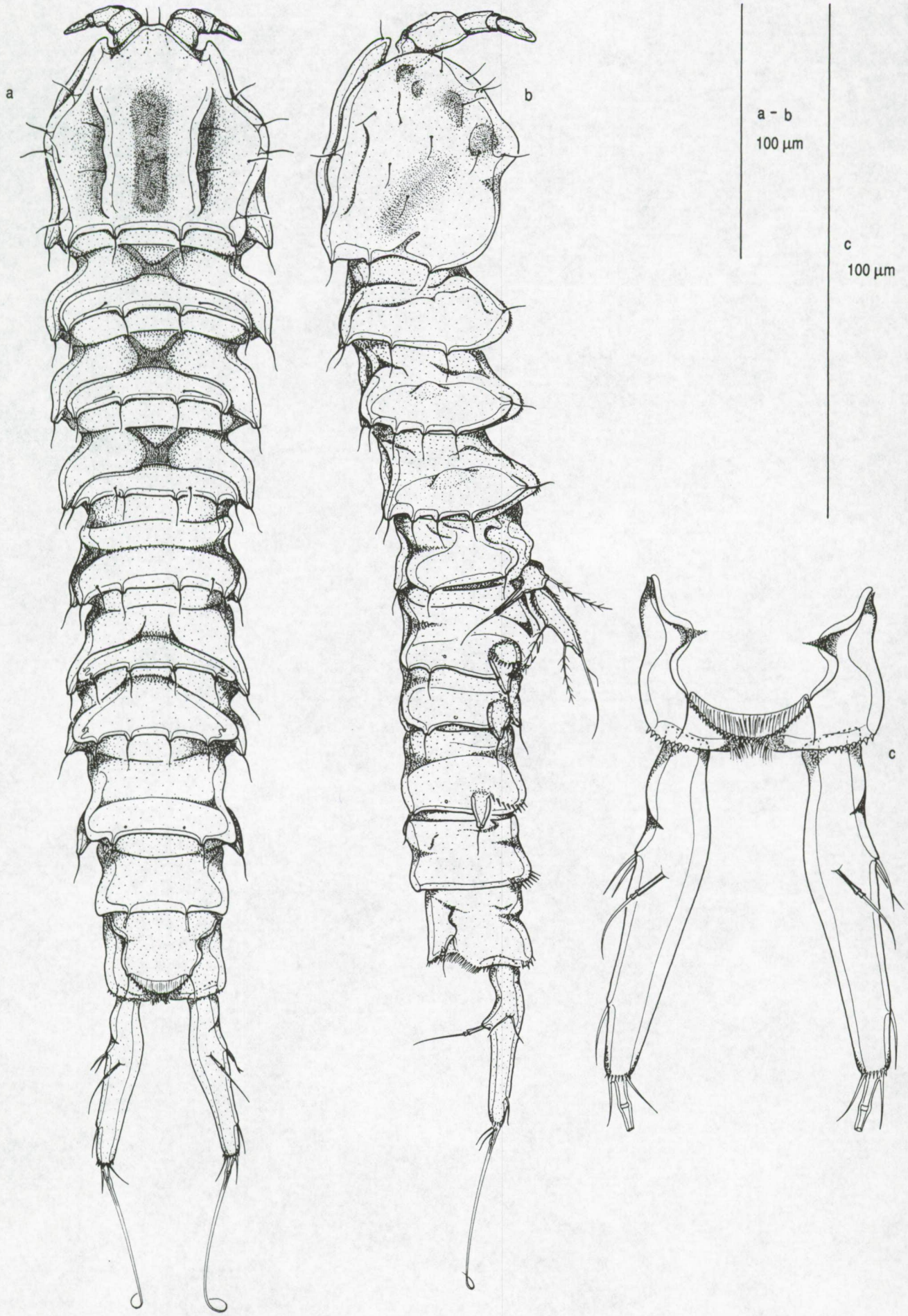
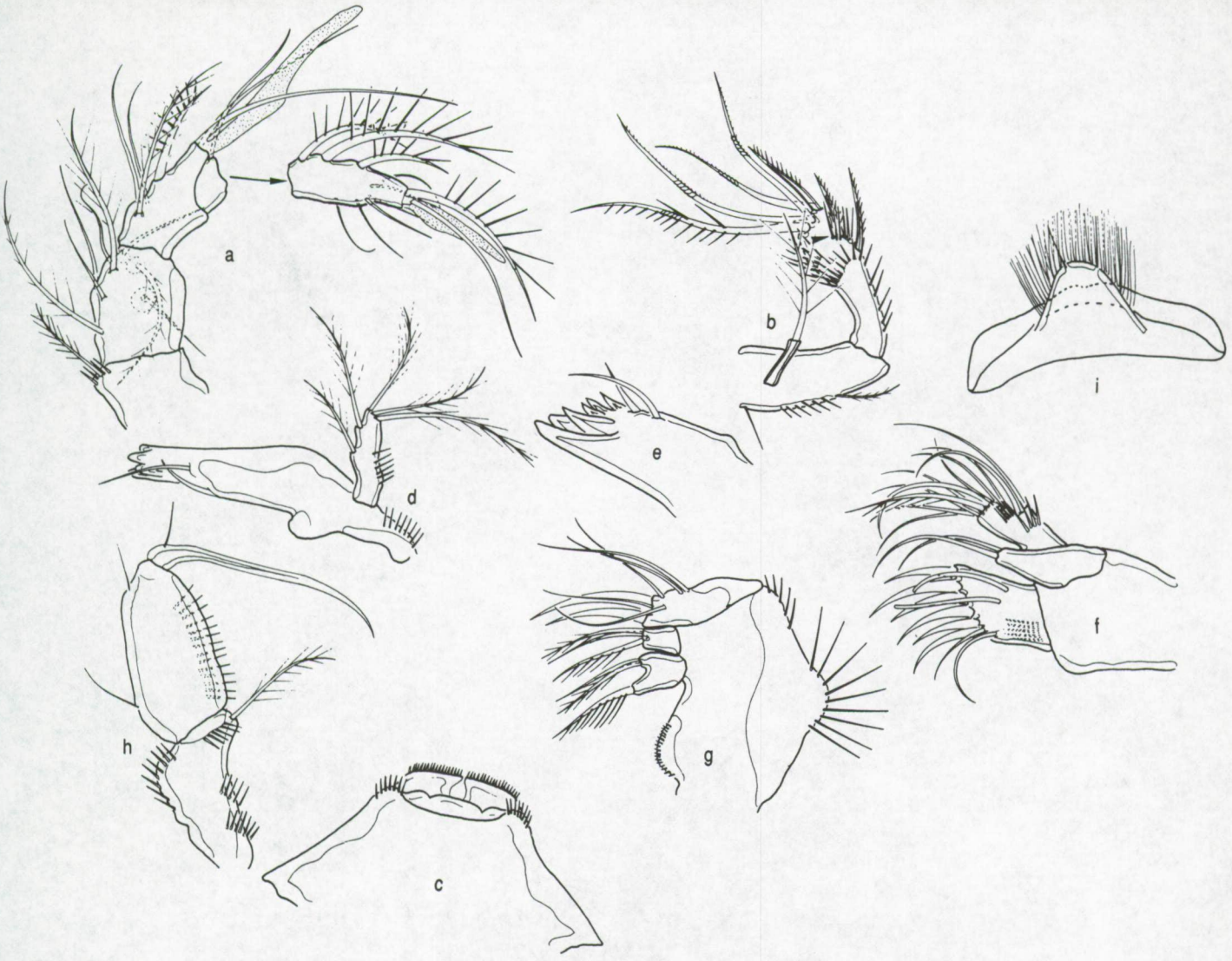

a
b
a - b
100 µm
c
100 µm
c

Fig. 295. ***Cletodes n. sp. 1*****, female. a, antennule, exploded; b, antenna; c, labrum; d, mandible; e, distal part of mandibular gnathobasis; f, maxillule; g, maxilla; h, maxilliped; i, rostrum.**



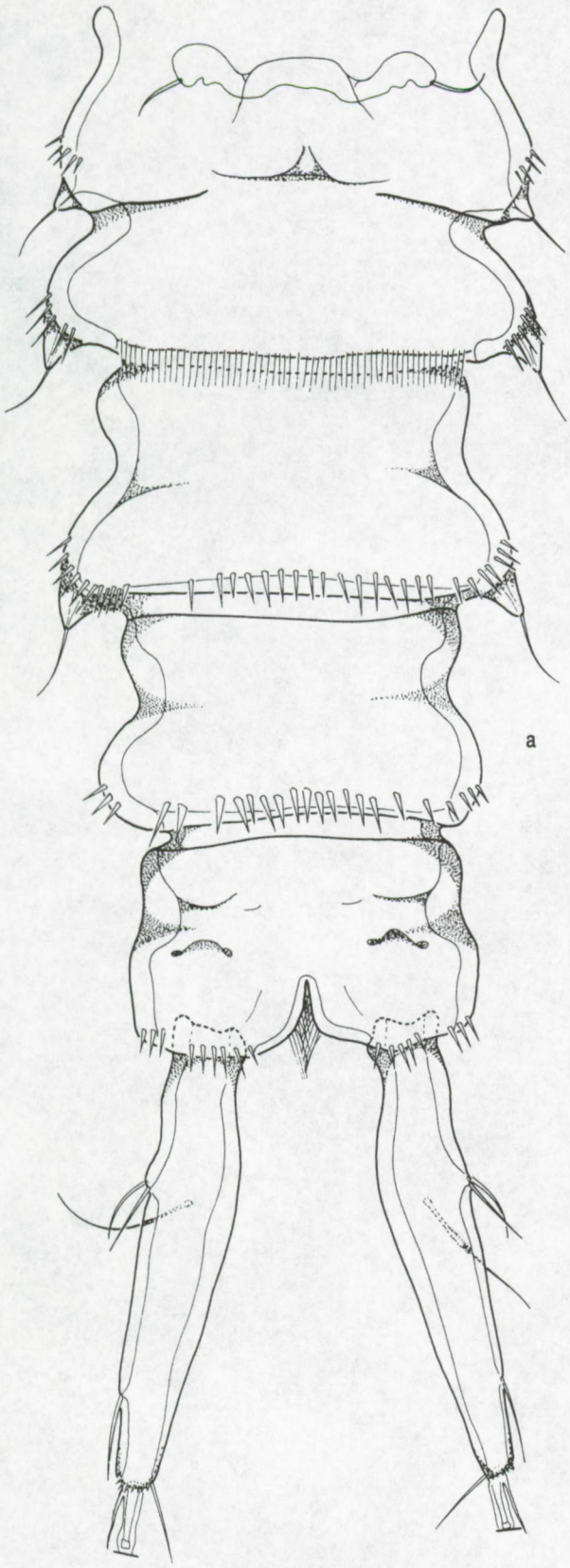
a – c

100 µm

d - i

50 µm

Fig. 296. ***Cletodes n. sp. 1*****, female. a, urosome (P5 bearing-somite omited); b, P1; c, P2.**



a



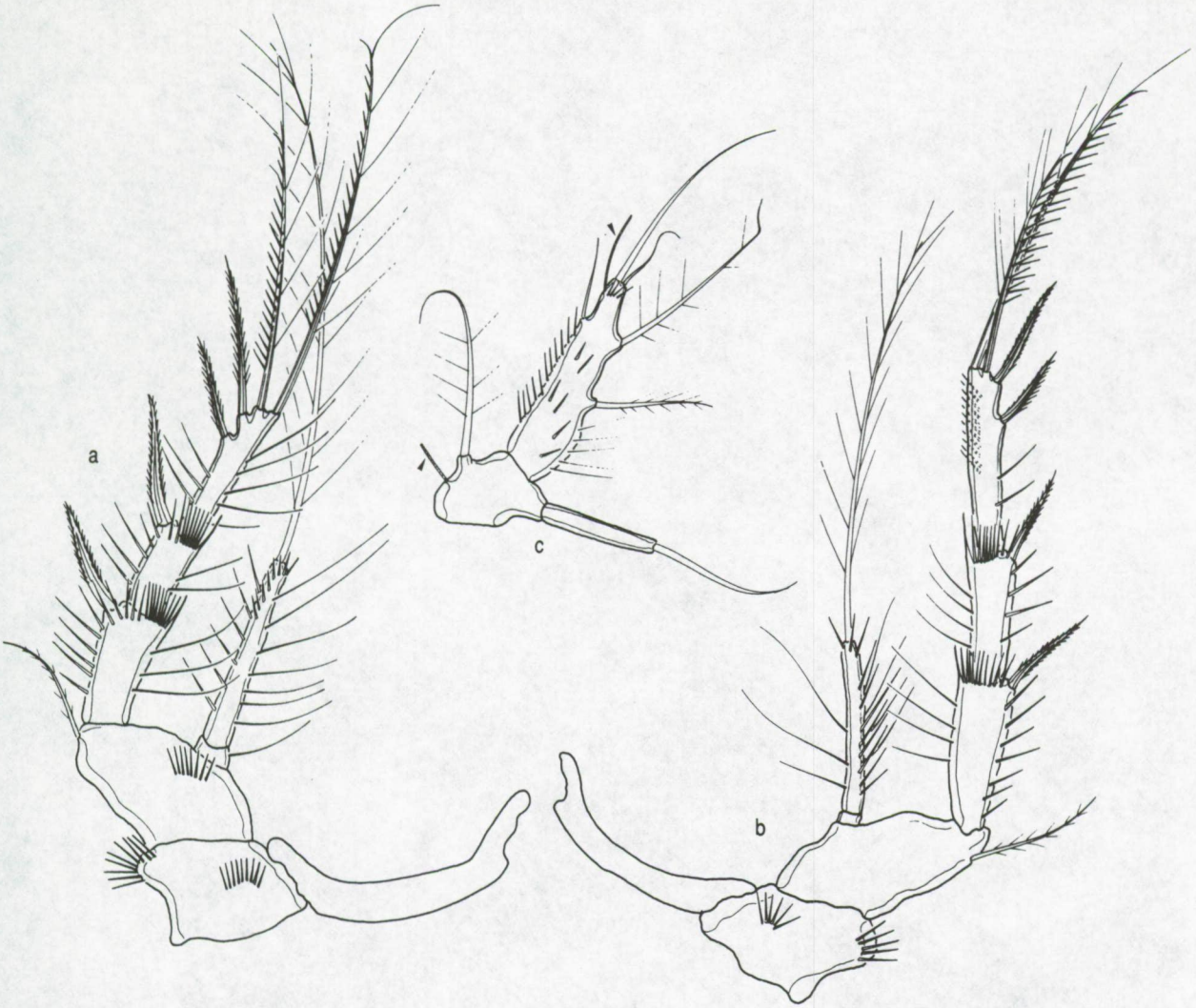
b



c

a – c

100 µm



a – c

100 µm

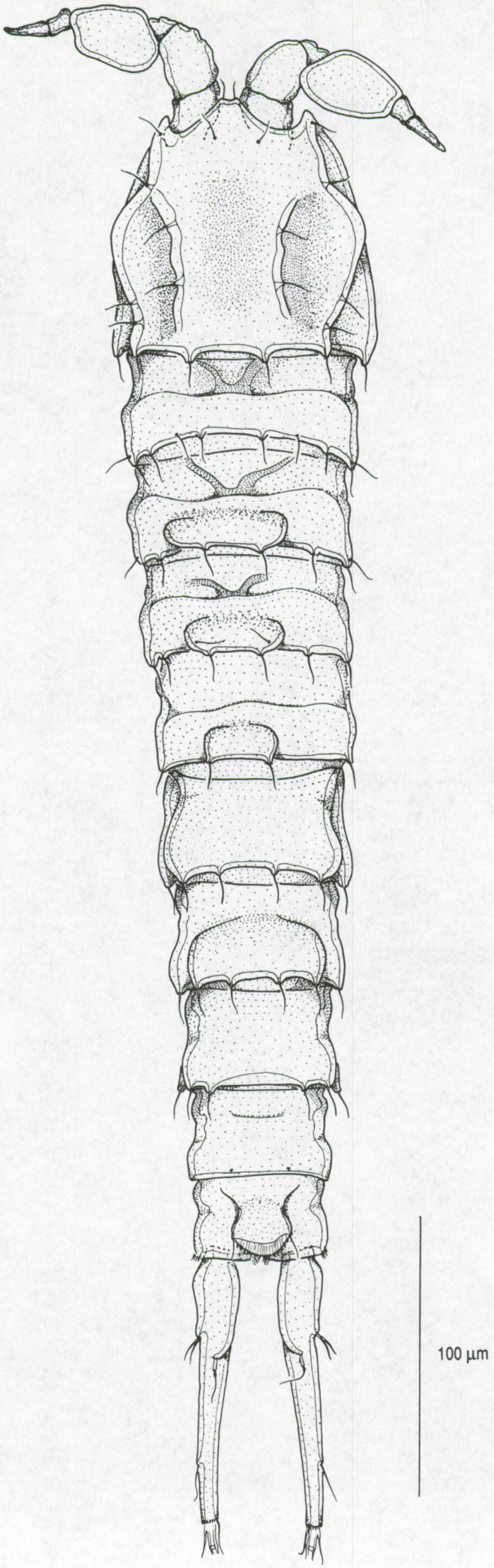
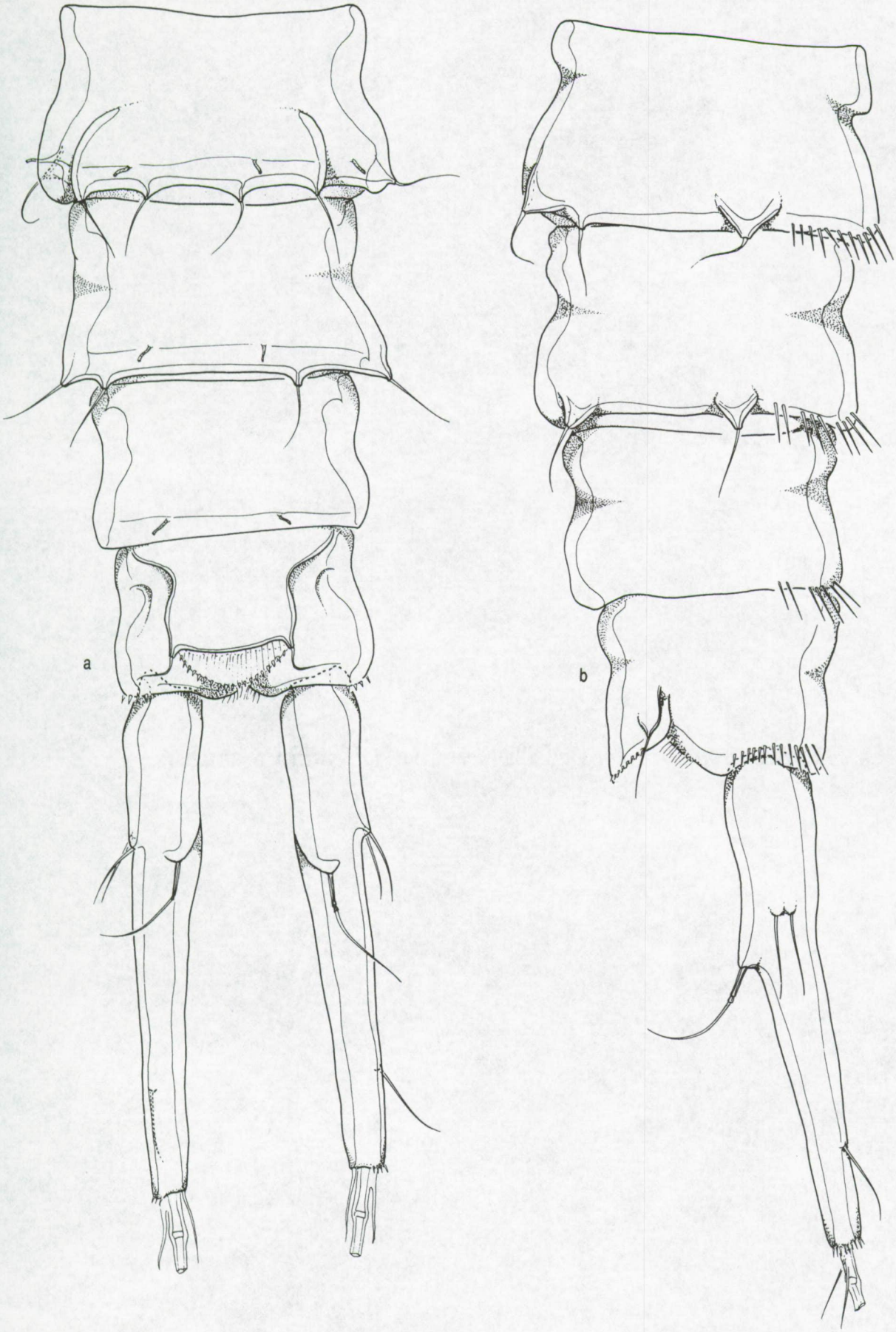

100 µm

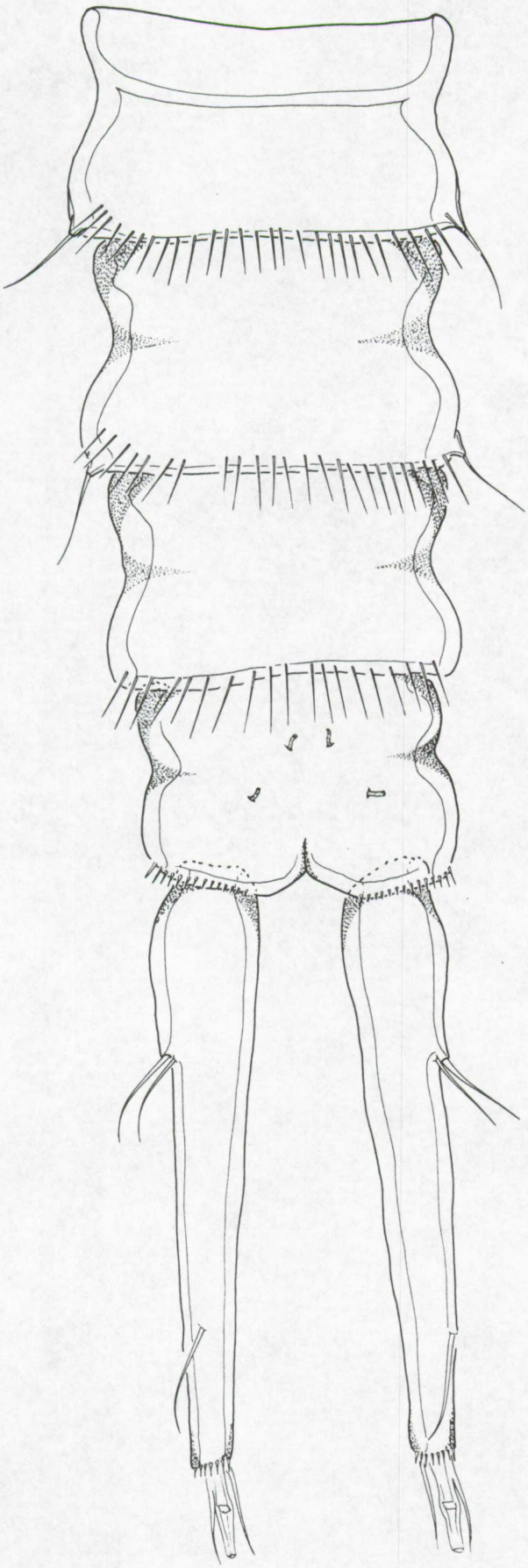
Fig. 299. ***Cletodes n. sp. 1*****, male. a, urosome, dorsal; b, urosome, lateral (P5 and P6 bearing-somites omited).**



a – b

100 µm

Fig. 300. ***Cletodes n. sp.1*****, male. Urosome, ventral (P5 and P6 bearing-somites omited).**



100 µm

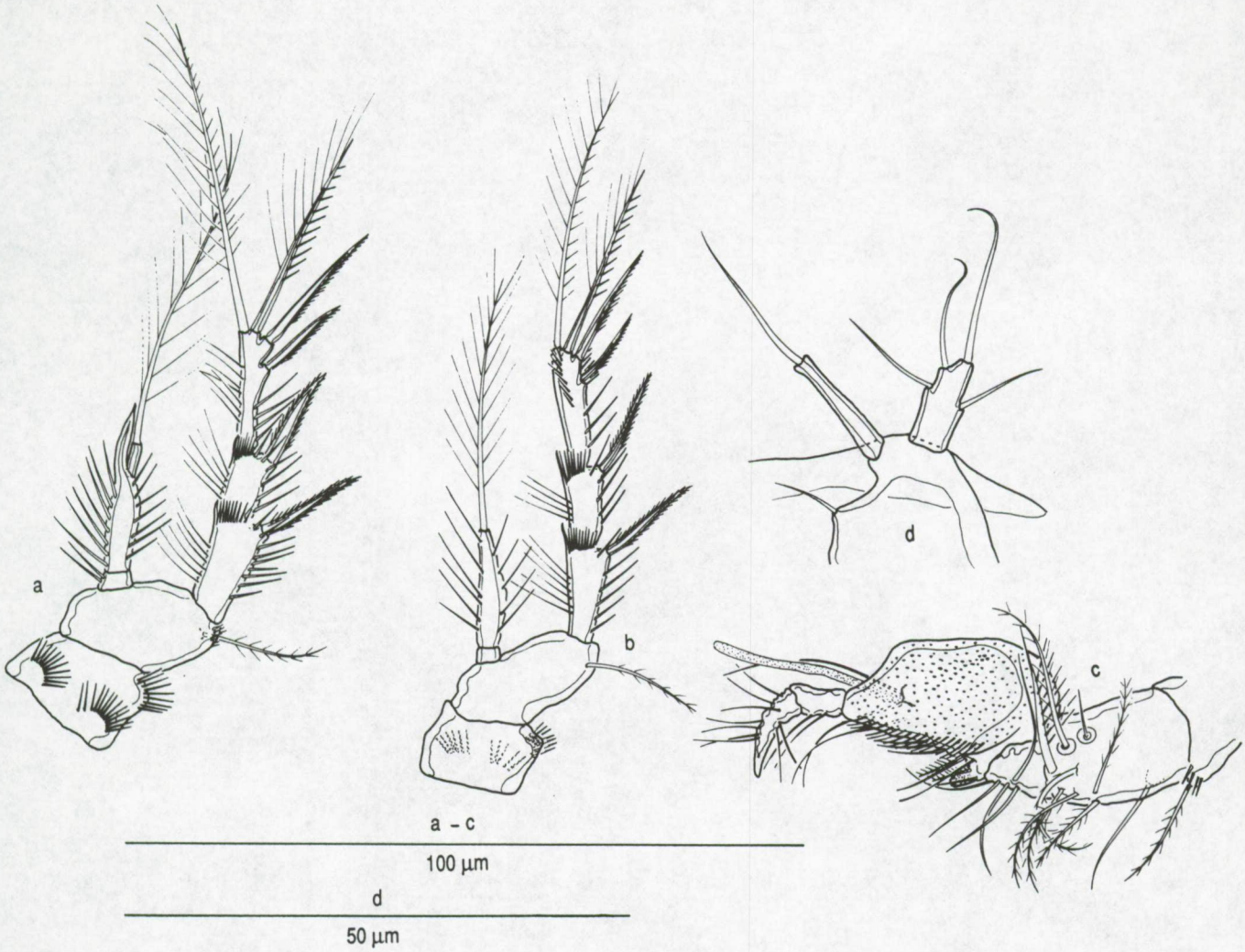

a
b
c
d
a – c
100 µm
d
50 µm

Fig. 302. ***Cletodes n. sp.2*****, female. a, habitus, dorsal; b, habitus lateral.**

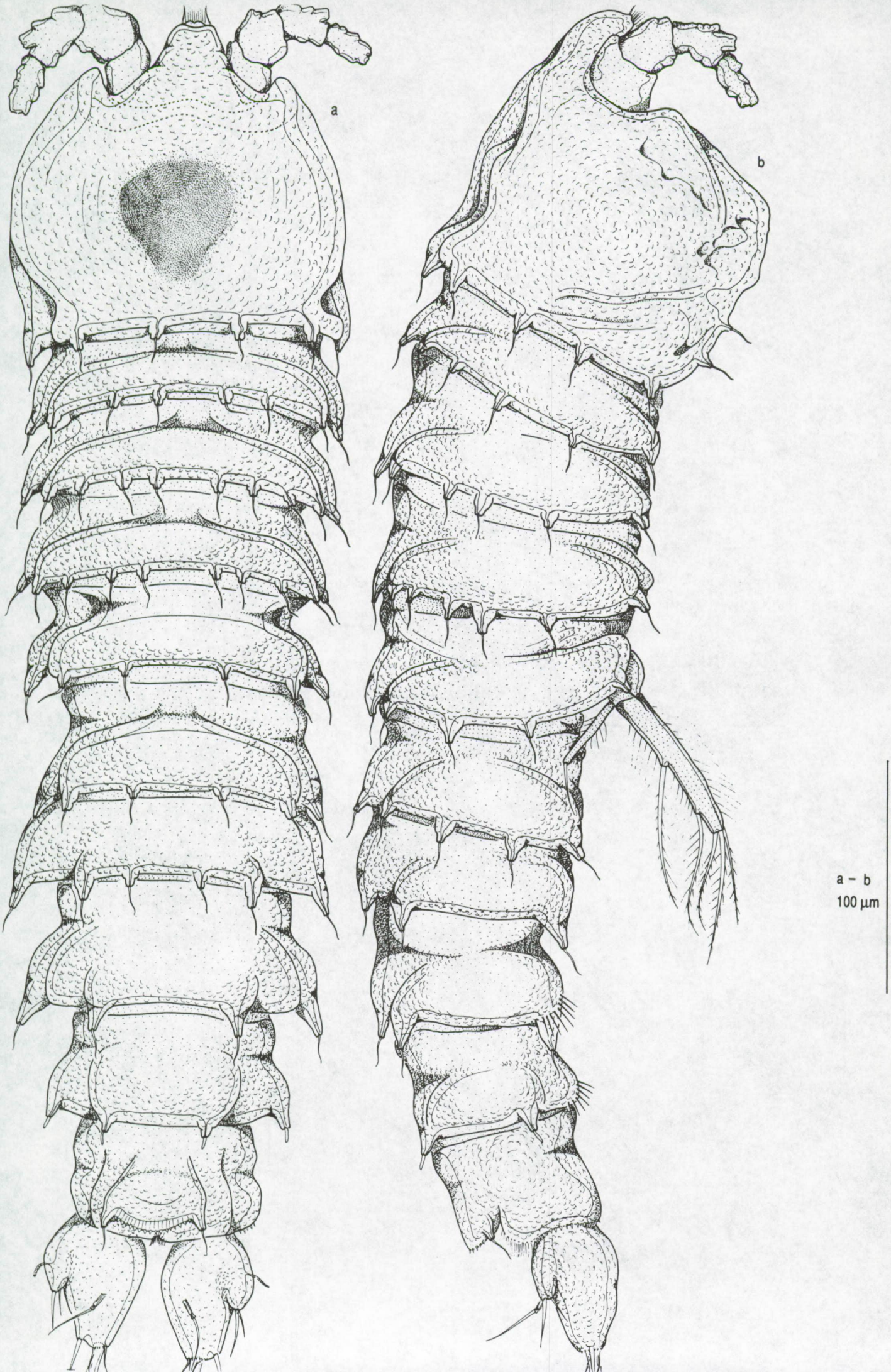
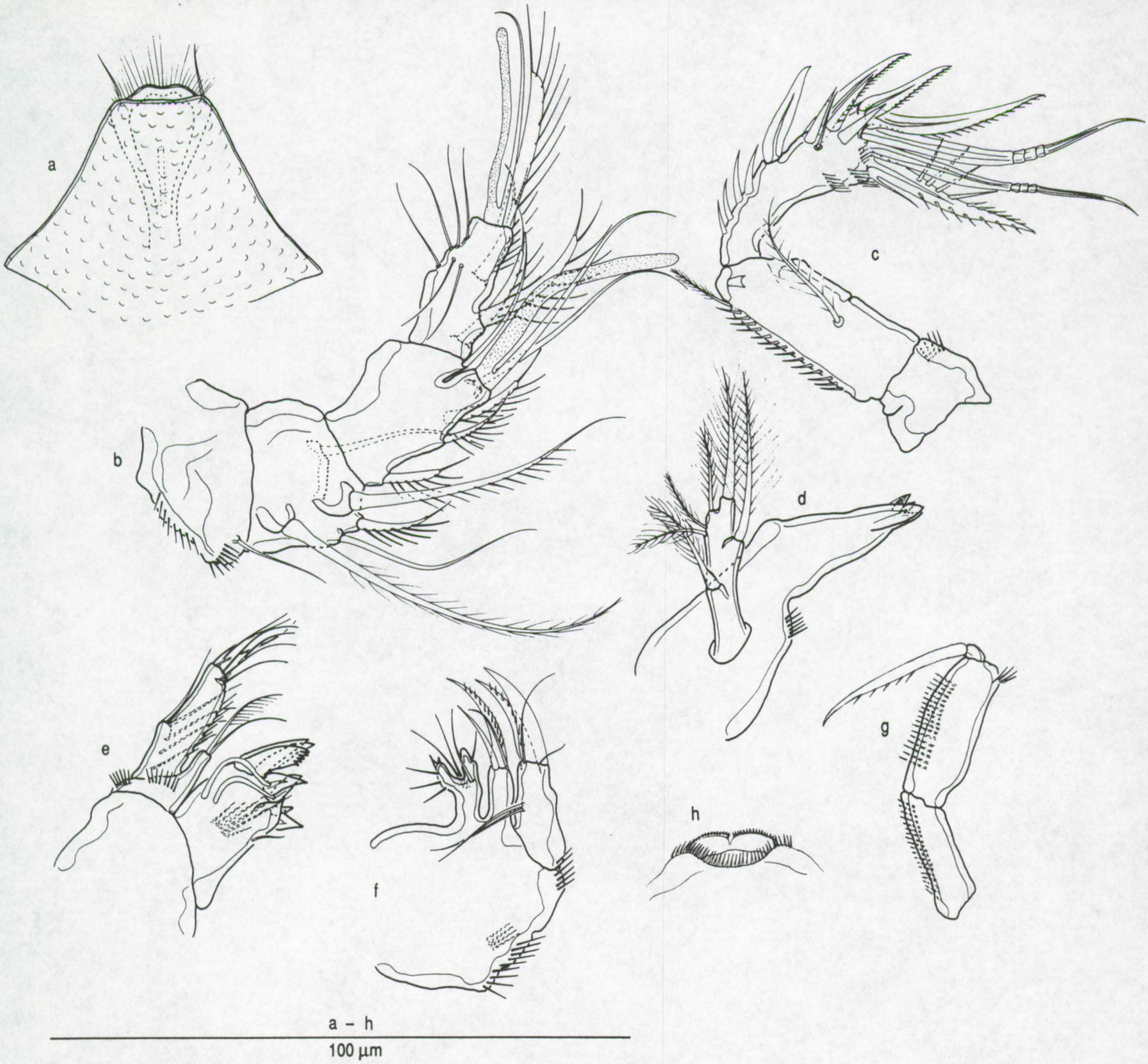

a
b
a – b
100 µm

Fig. 303. ***Cletodes n. sp.2*****, female.a, rostrum; b, antennule; c, mandible; d, mandible; e, maxillule; f, maxilla;, g, maxilliped; h, labrum.**


a
b
c
d
e
f
g
h
a – h
100 µm

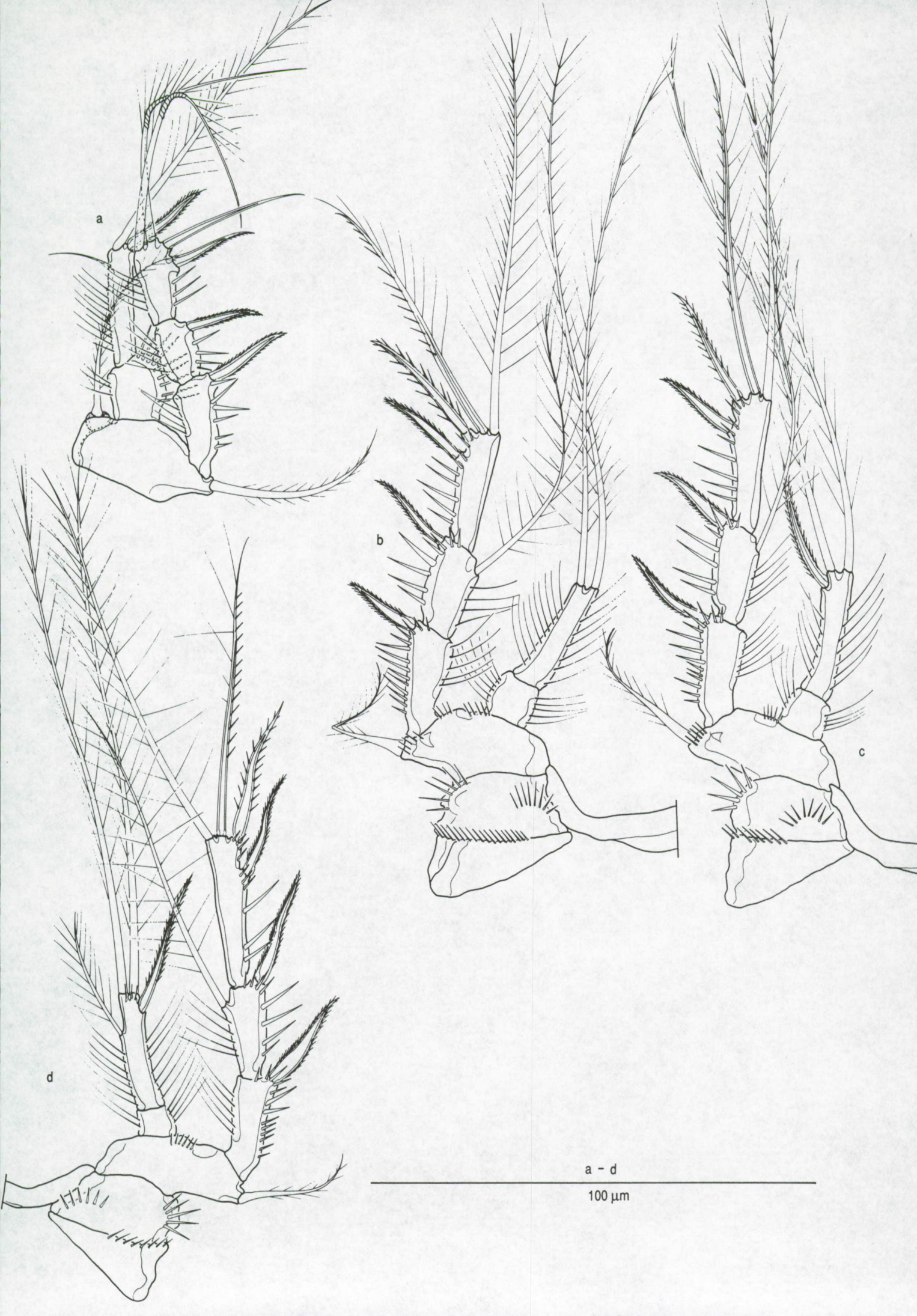

a
b
c
d
a – d
100 µm

Fig. 305. ***Cletodes n. sp.2*****, female. a, anal segment and caudal rami, dorsal; b, P5; c, urosome, ventral (P5 bearing-somite omited).**

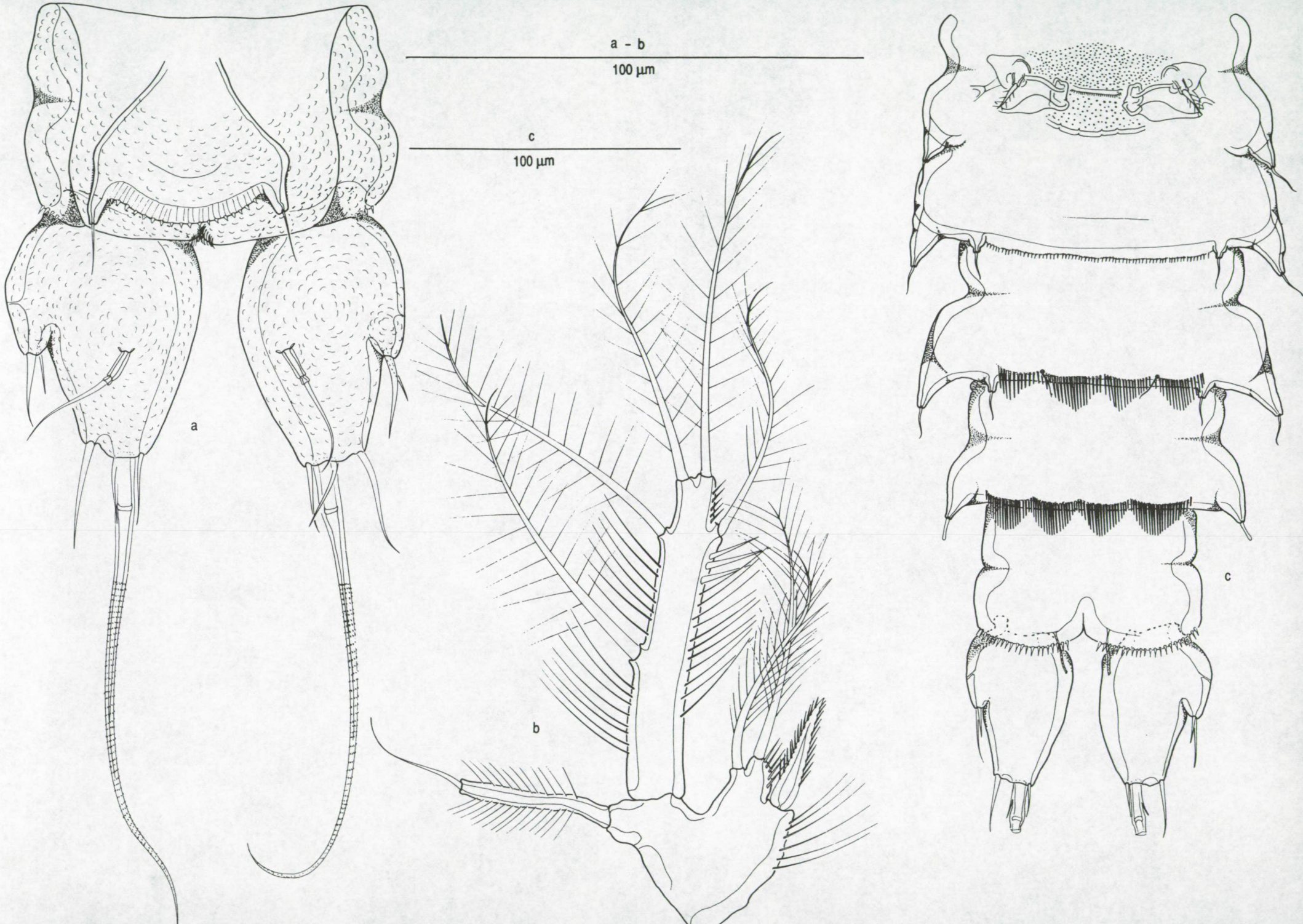
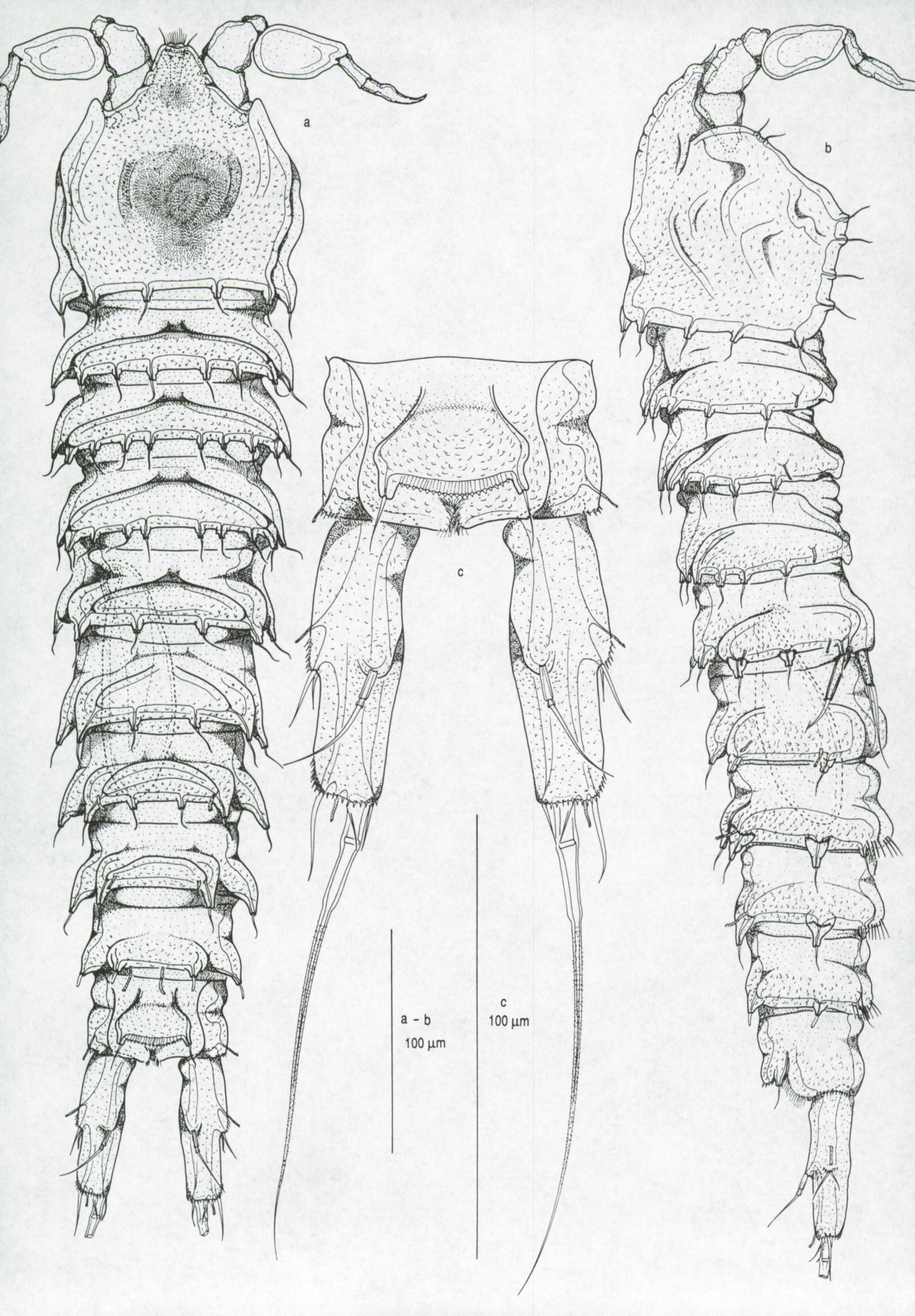

a - b
100 µm
c
100 µm
a
b
c

Fig. 306. ***Cletodes n. sp.2*****, male. a, habitus, dorsal; b, habitus, lateral; c, anal segment and caudal rami, dorsal.**


a
b
c
a – b
100 µm
c
100 µm

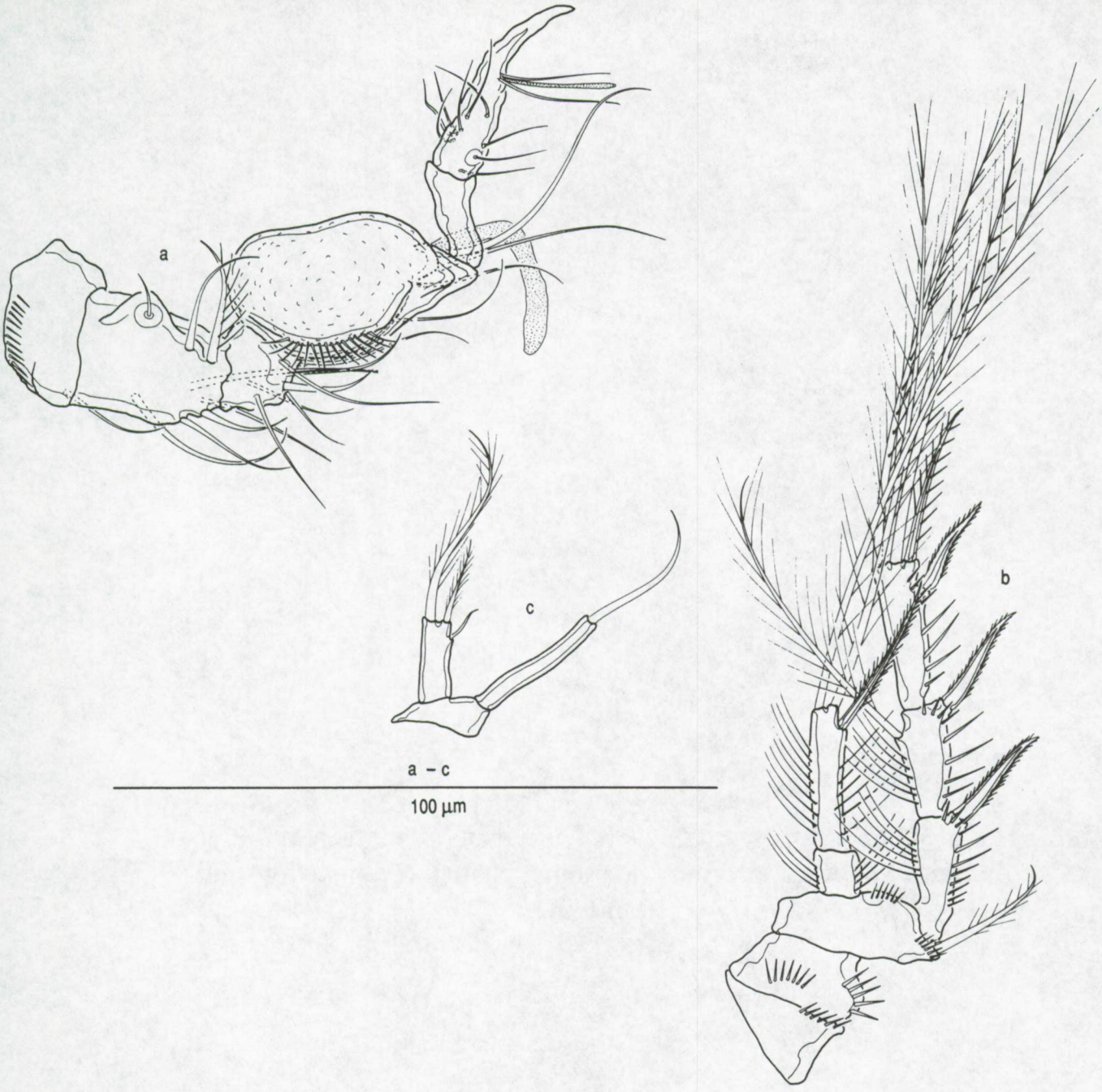

a
c
b
a – c
100 µm

Fig. 308. ***Enhydrosoma lacunae*** **Jakubisiak, female. a, habitus, dorsal; b, habitus, lateral; c, urosome, ventral (P5 bearing somite omited).**

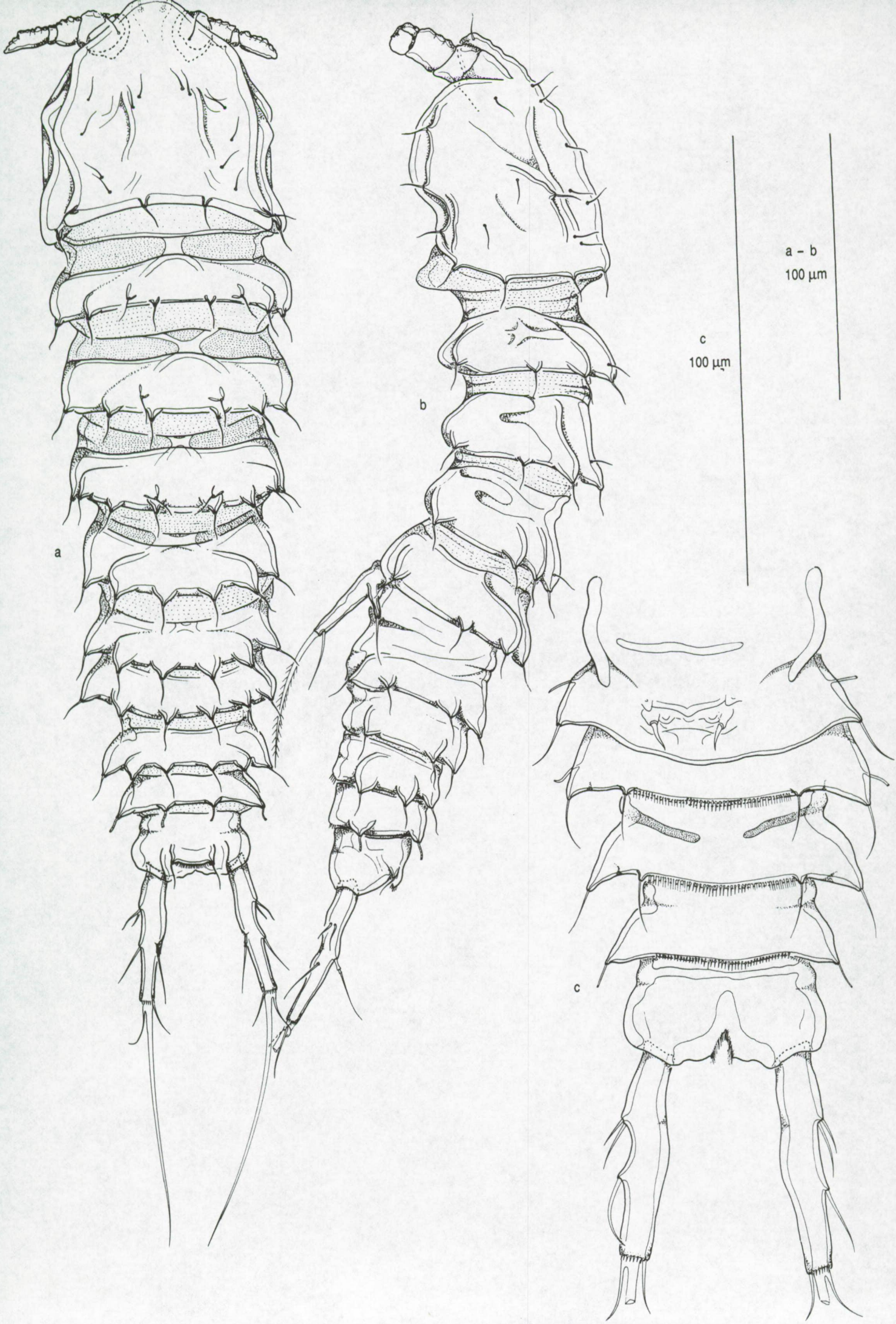
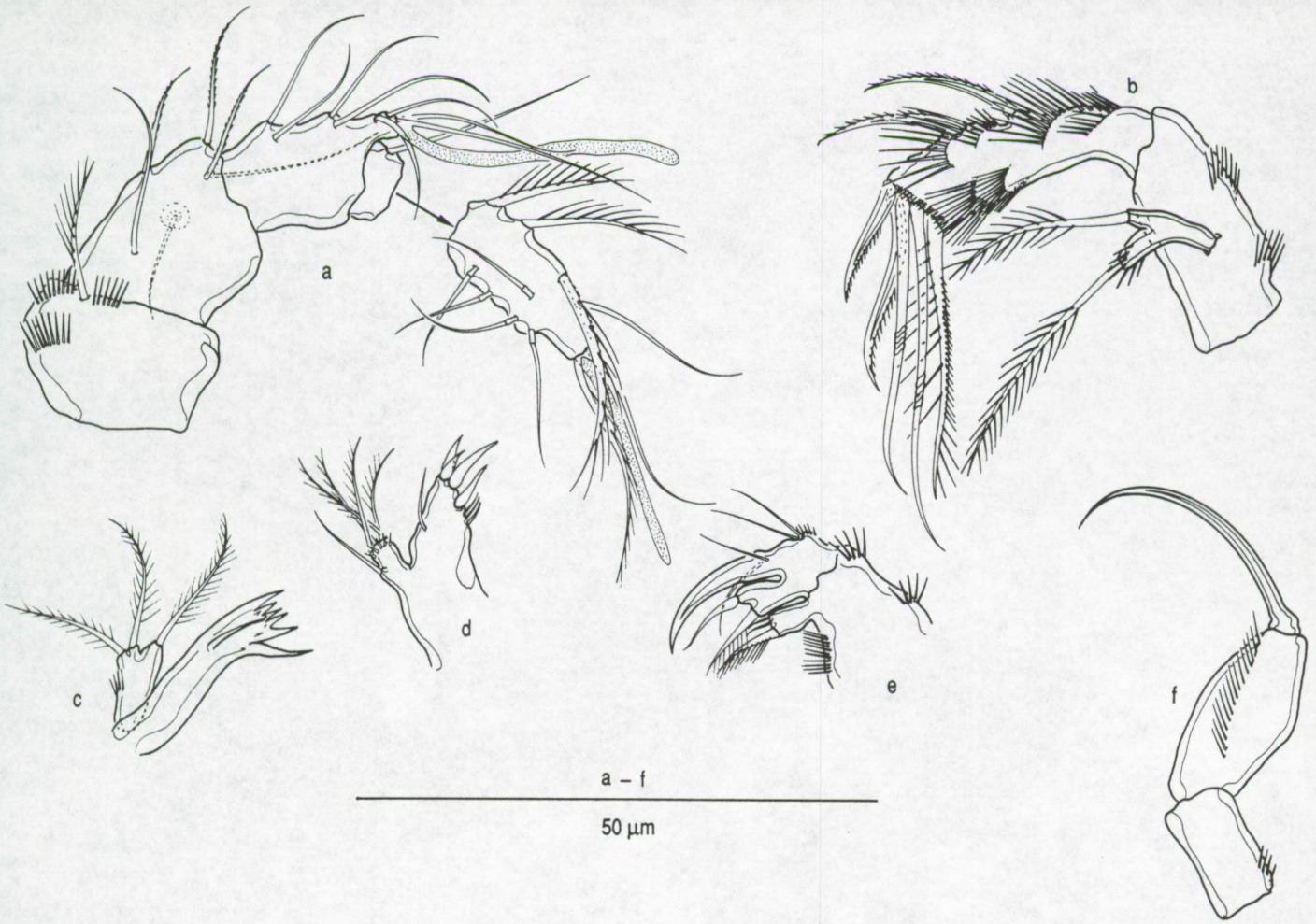

a
b
c
a – b
100 µm
c
100 µm

Fig. 309. ***Enhydrosoma lacunae*** **Jakubisiak, female. a, antennule, exploded; b, antenna; c, mandible; d, maxillule; e, maxilla; f, maxilliped.**



a – f

50 µm

Fig. 310. ***Enhydrosoma lacunae*** **Jakubisiak, female. a, P1; b, P2; c, P3; d, P4; e, P5.**

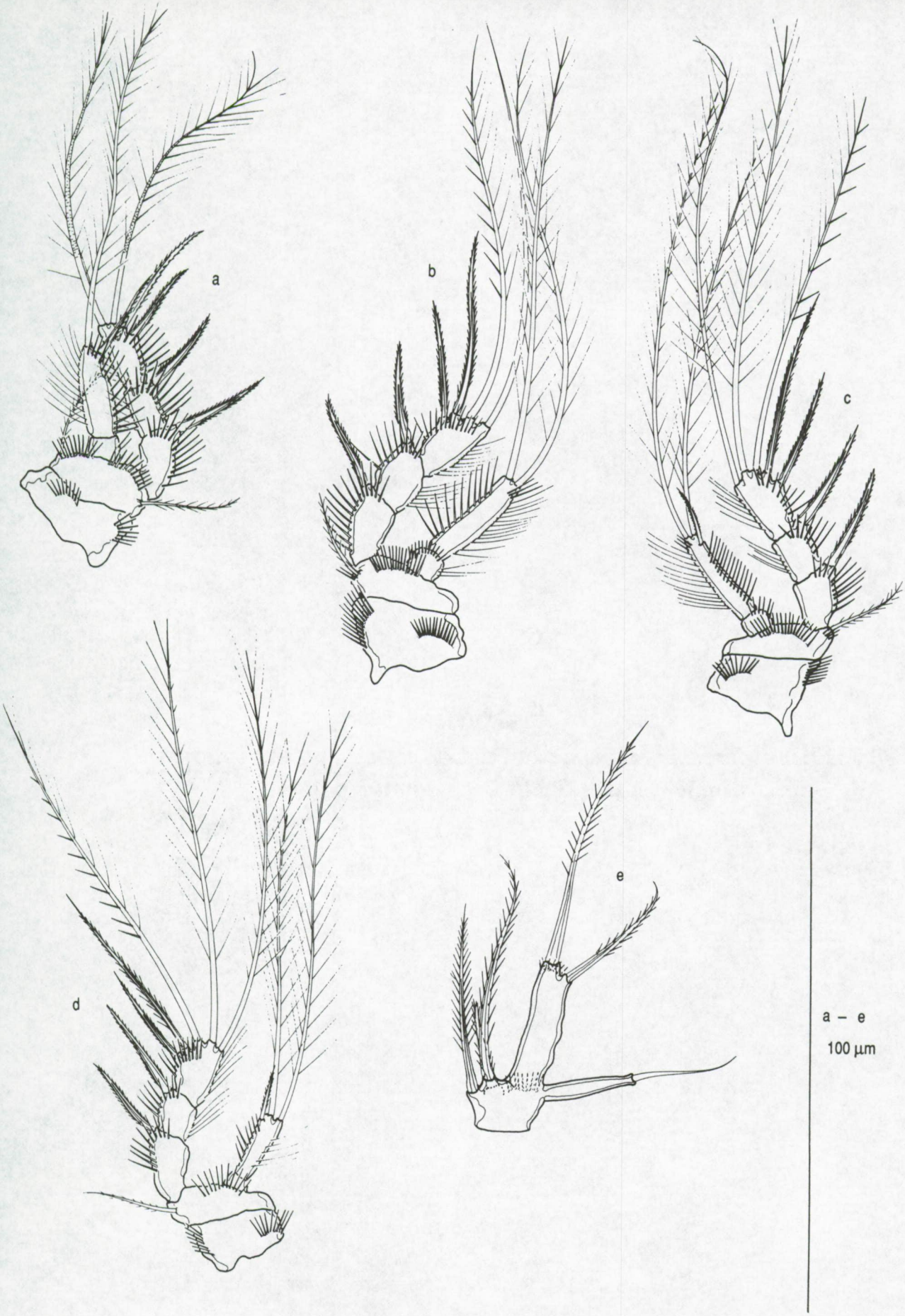

a
b
c
d
e
a – e
100 µm

Fig. 311. ***Enhydrosoma lacunae*** **Jakubisiak, male. a, habitus, dorsal; b, urosome, ventral (P5 bearing-somite omited).**

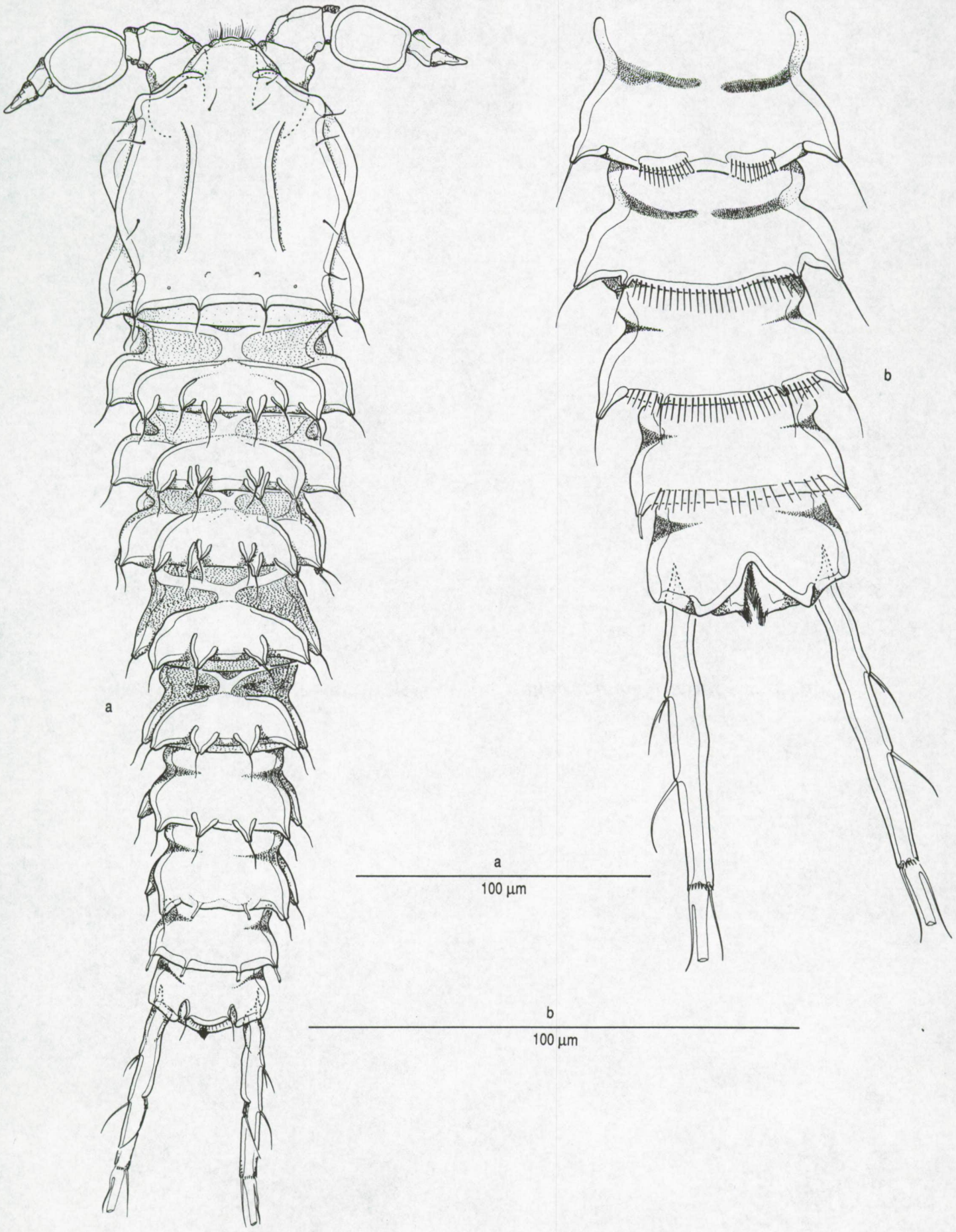

a
b
a
100 µm
b
100 µm

Fig. 312. ***Enhydrosoma lacunae*** **Jakubisiak, male. a, antennule; b, P3; c, P5.**

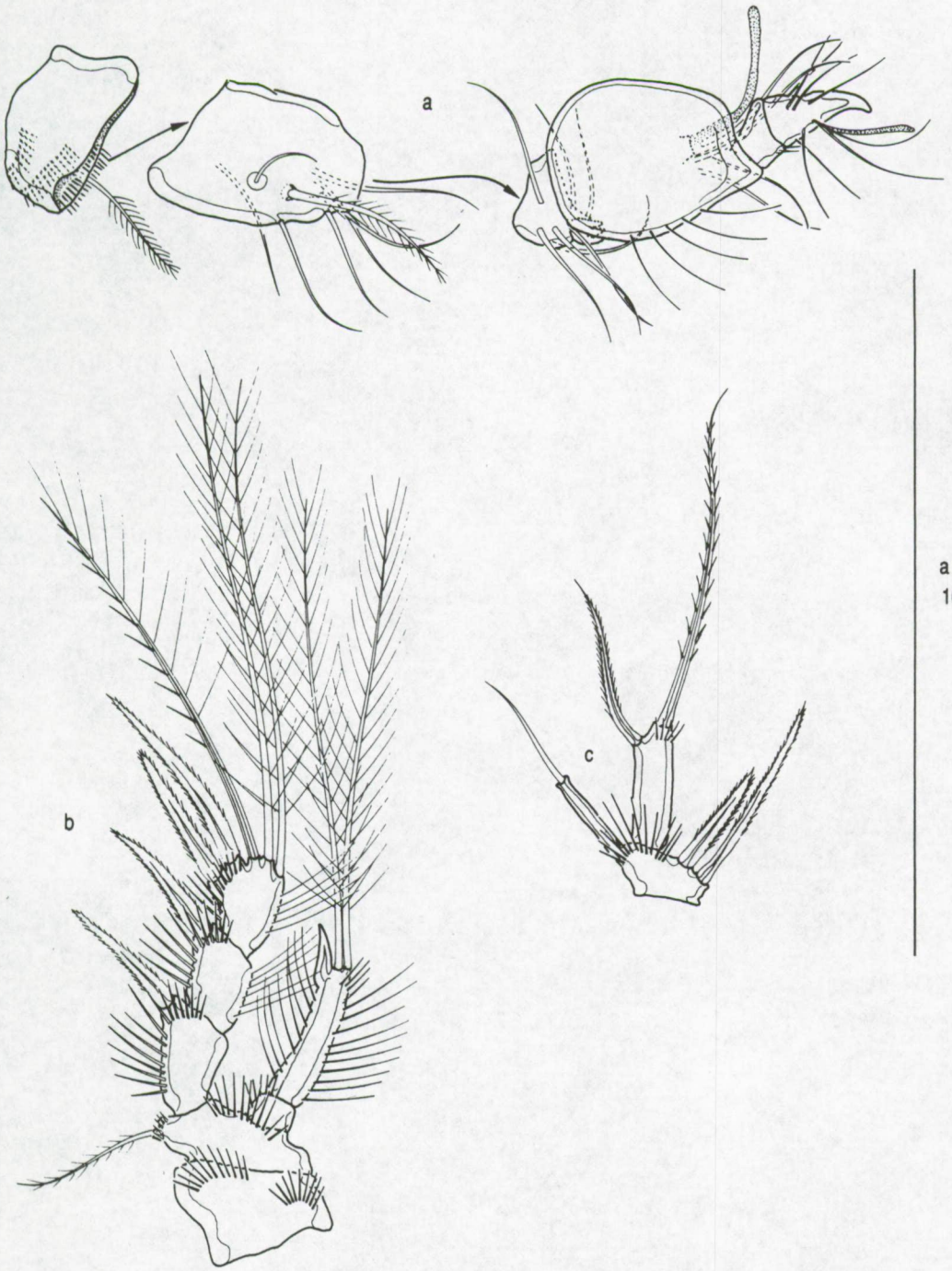

a
b
c
a – c
100 µm

Fig. 313. ***Enhydrosoma n. sp. 1*****, female. a, habitus, dorsal; b, habitus, lateral.**

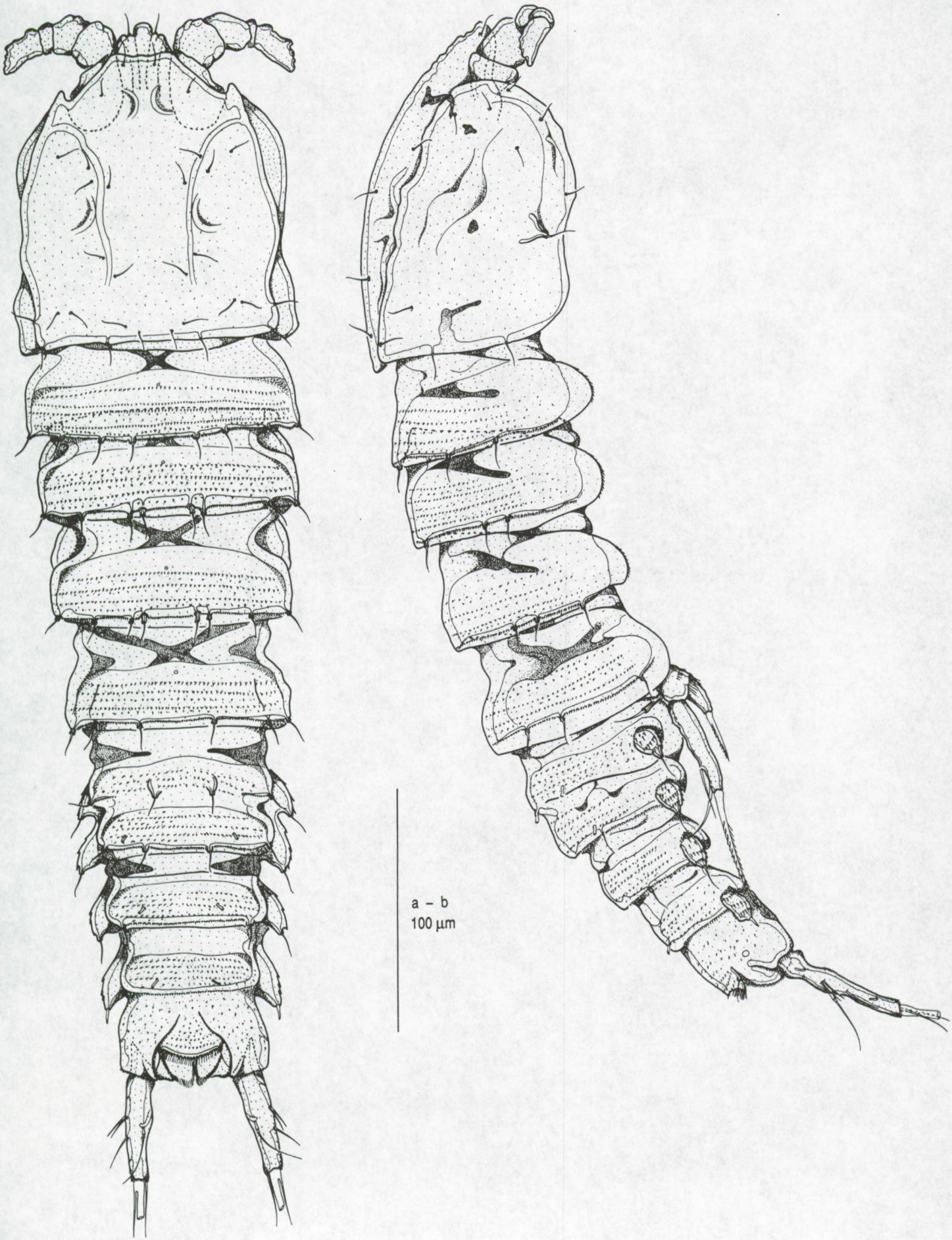
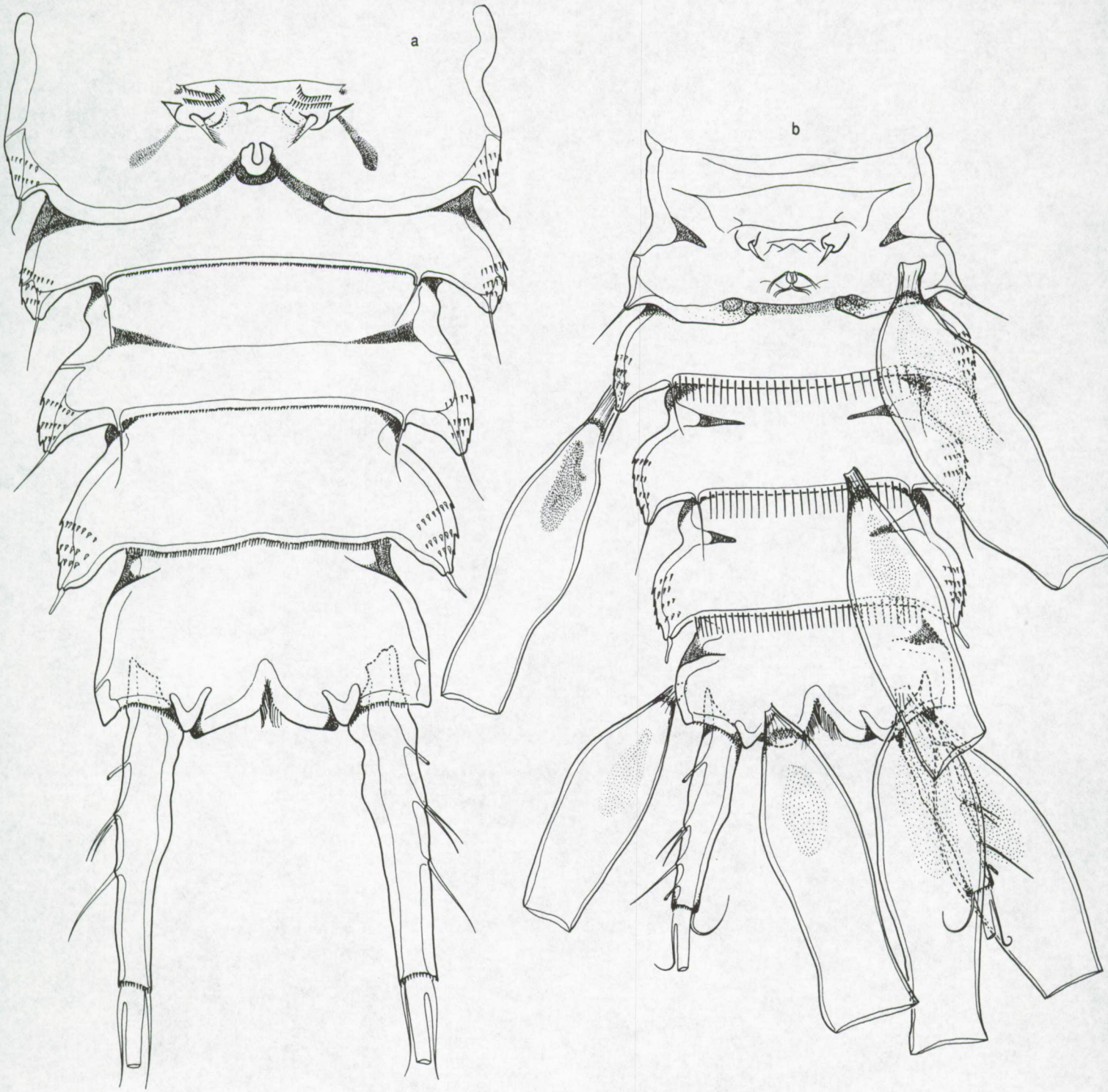

a – b
100 µm

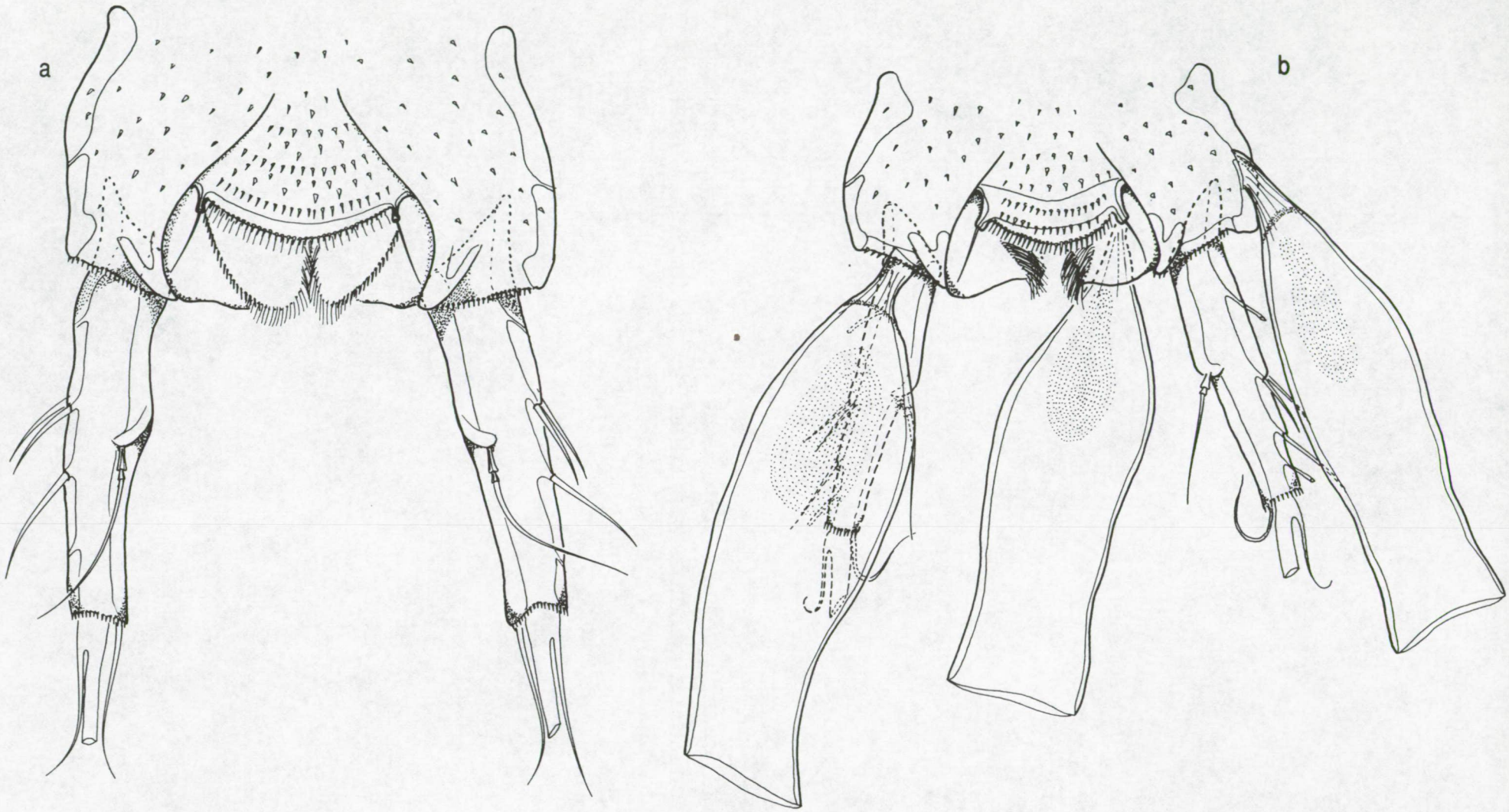
Fig. 314. Enhydrosoma n. sp 1, female. a, urosome, ventral (P5 bearing-somite omited); *Enhydrosoma n. sp. 2*, female. b, urosome, ventral (P5 bearing-somite omited).



a – b

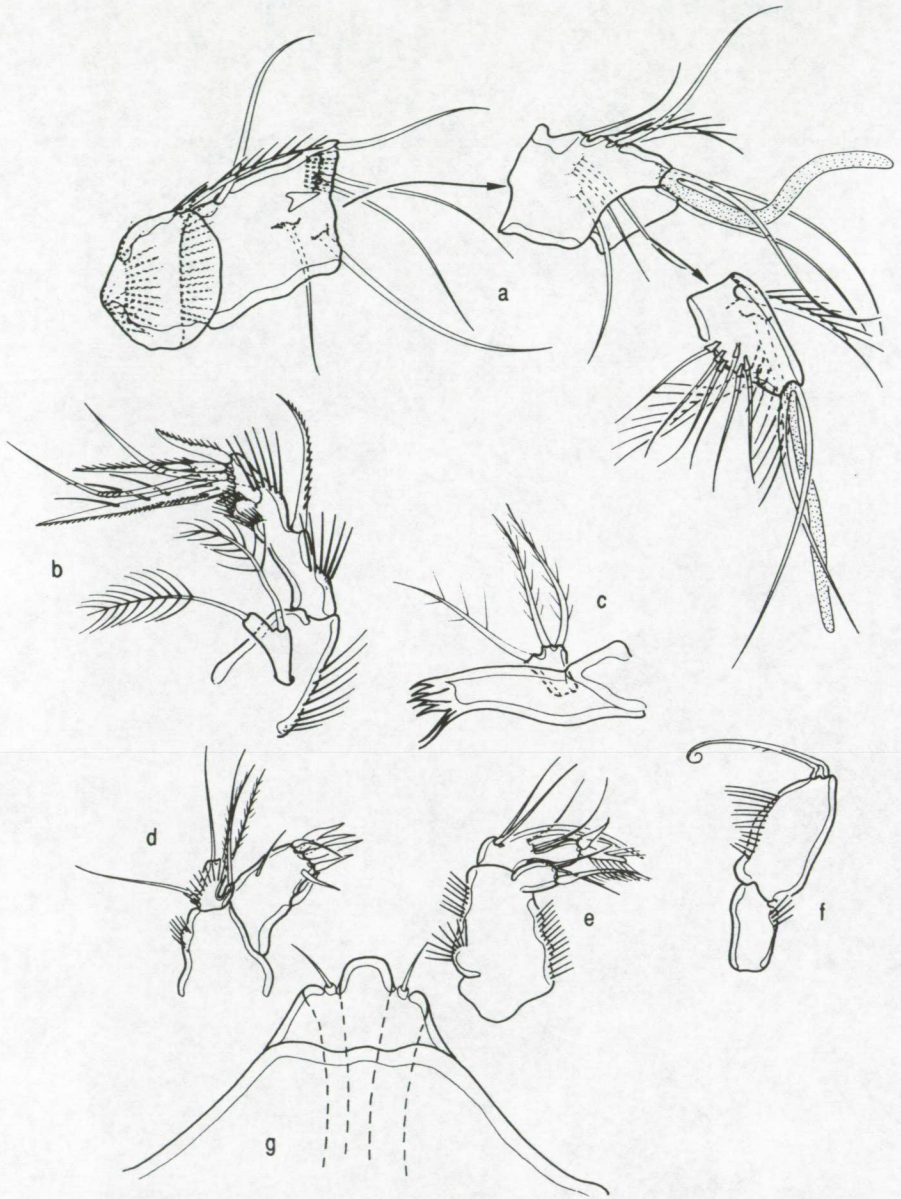
100 µm

Fig. 315. Enhydrosoma n. sp 1, female. a, anal segment and caudal rami, dorsal; *Enhydrosoma n. sp. 2*, female. b, anal segment and caudal rami, dorsal.



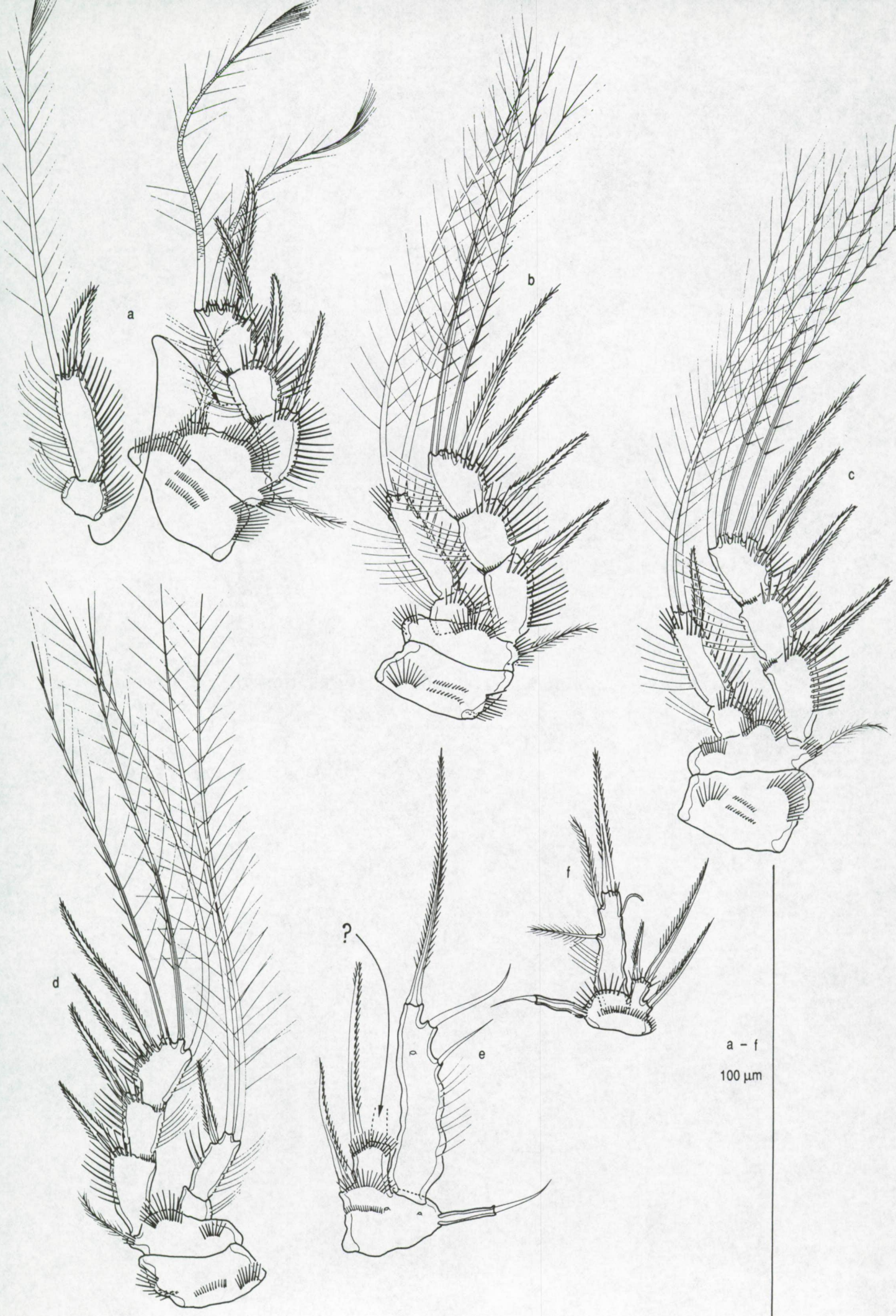
a – b 100 µm

Fig. 316. ***Enhydrosoma n. sp. 1*****, female. a, antennule, exploded; b, antenna; c, mandible; d, maxillule; e, maxilla; f, maxilliped; g, rostrum.**



a – g
100 µm

Fig. 317. ***Enhydrosoma n. sp. 1***, **female. a, P1; b, P2; c, P3; d, P4; e, P5;** ***Enhydrosoma n. sp. 2***, **female. f, P5.**


a
b
c
d
e
f
?
a – f
100 µm

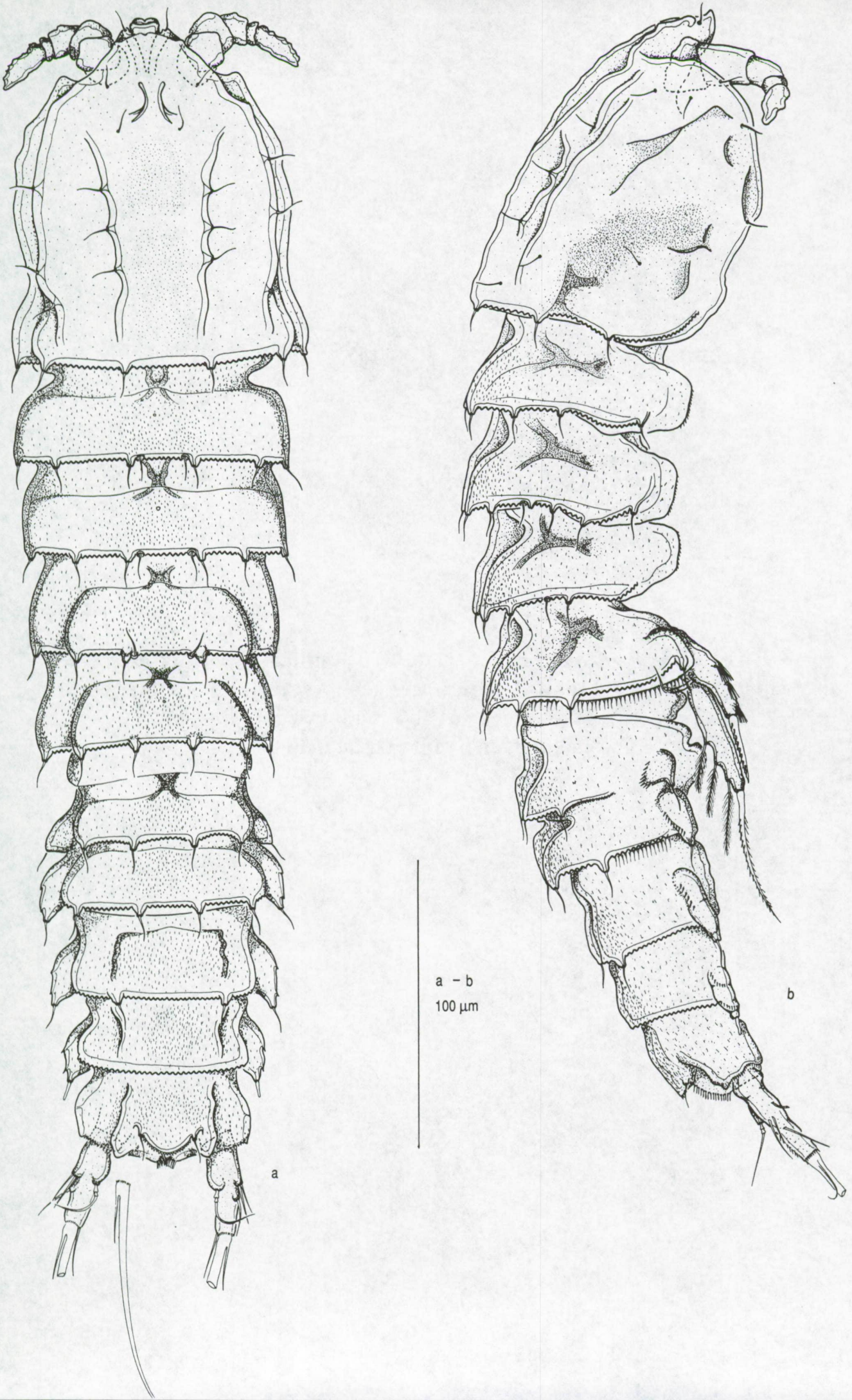

a
b
a – b
100 µm

Fig. 319. ***Enhydrosoma n. sp. 3*****, female. a, penultimate somite, anal segment and caudal rami, dorsal; b, urosome, ventral (P5 bearing-somite omited); c, anal segment and caudal rami of another specimen; d, aberrant genital field.**

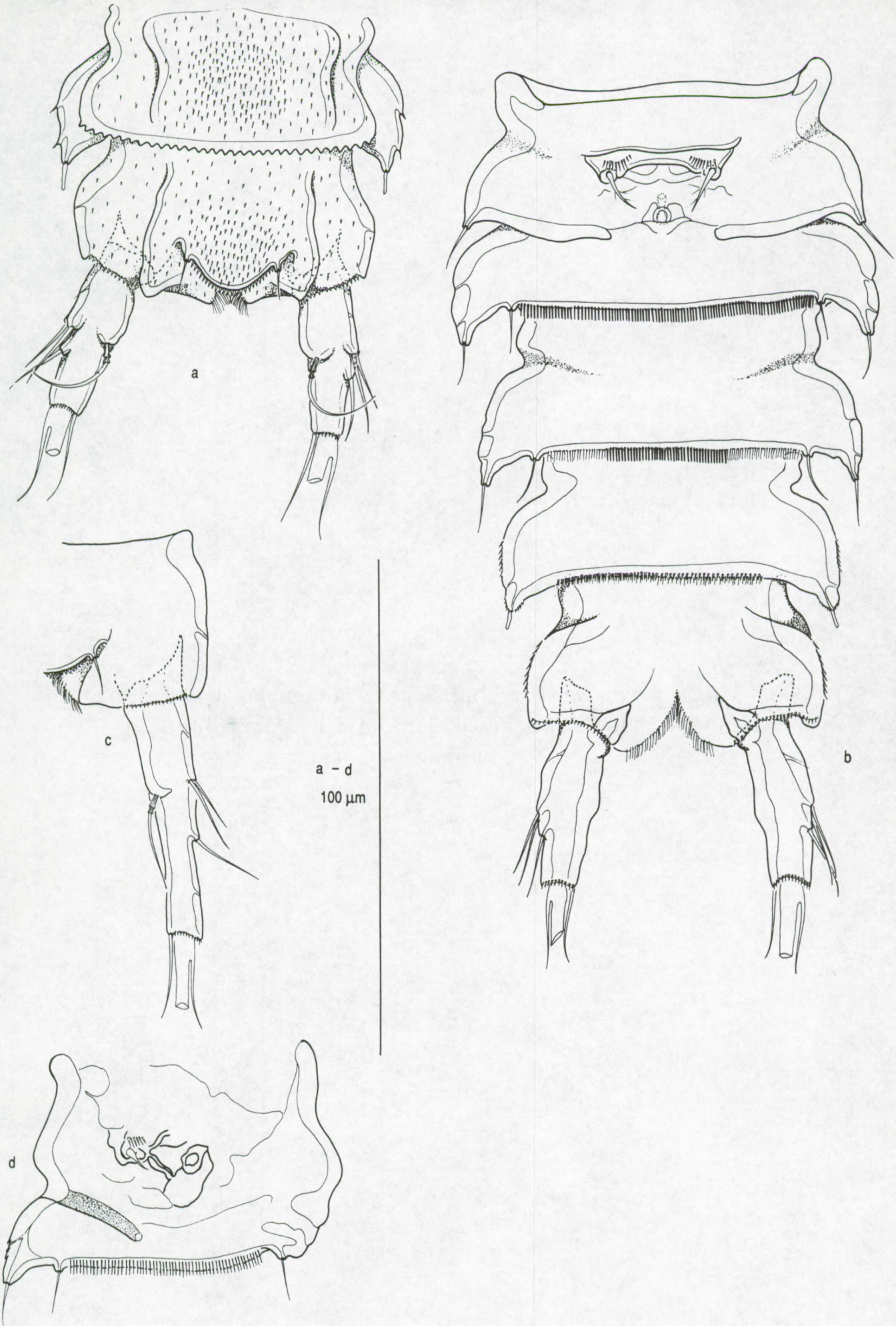

a
b
c
d
a – d
100 µm

Fig. 320. ***Enhydrosoma n. sp. 3*****, female. a, antennule, exploded; b, antenna; c, mandible; d, maxillule; e, maxilla; f, maxilliped; g, rostrum.**

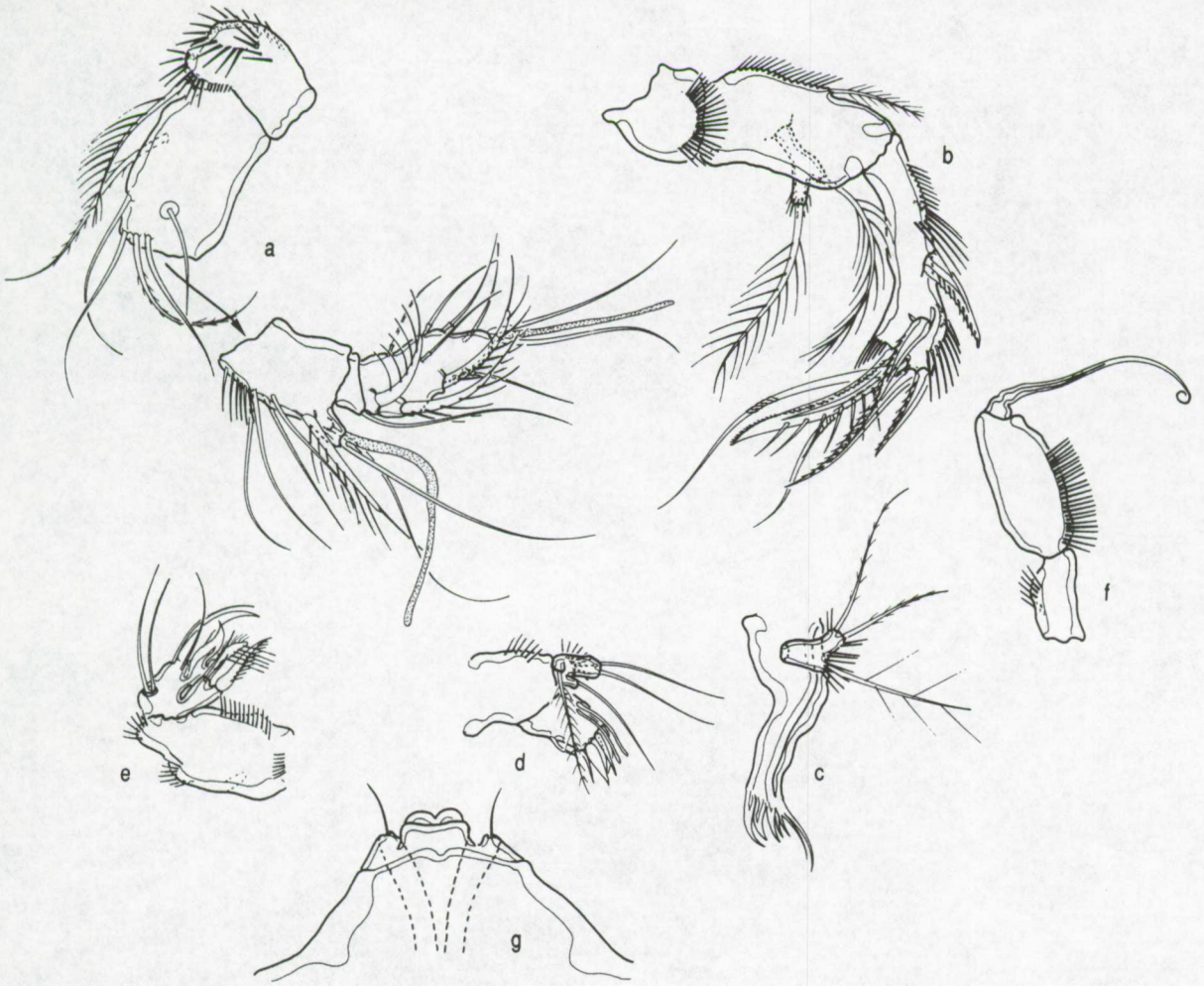

a
b
c
d
e
f
g
a - g
100 µm

Fig. 321. ***Enhydrosoma n. sp. 3*****, female. a, P1; b, P2; c, aberrant P2 EXP; d, P3; e, P4; f, P5; g, aberrant exopodite of P5; h, aberrant P5.**

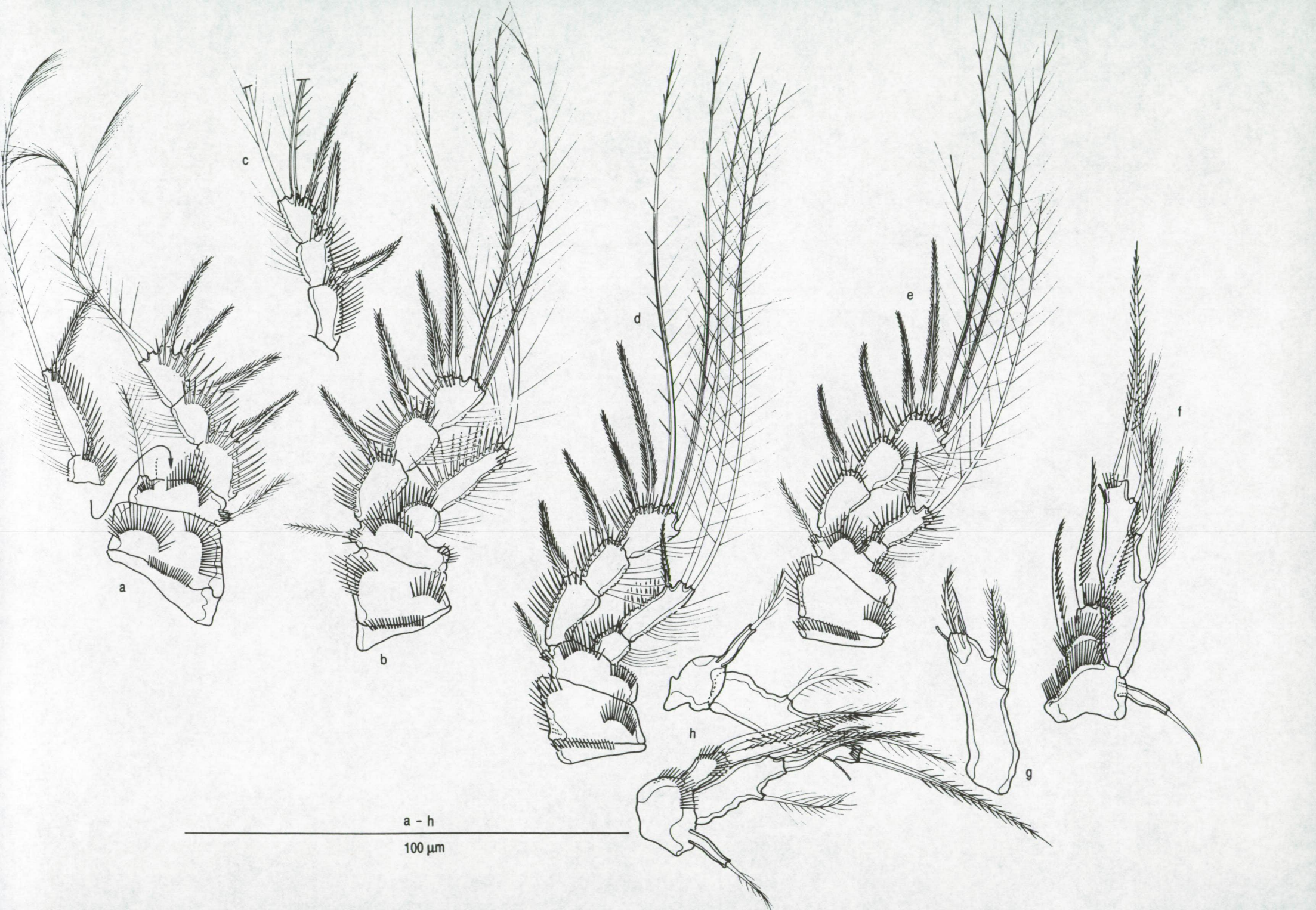

a
b
c
d
e
f
g
h
a - h
100 µm

Fig. 322. *Enhydrosoma n. sp. 3*, male. a, habitus dorsal; b, anal segment and caudal rami, dorsal; c, urosome, ventral (P5 bearing-somite omited).

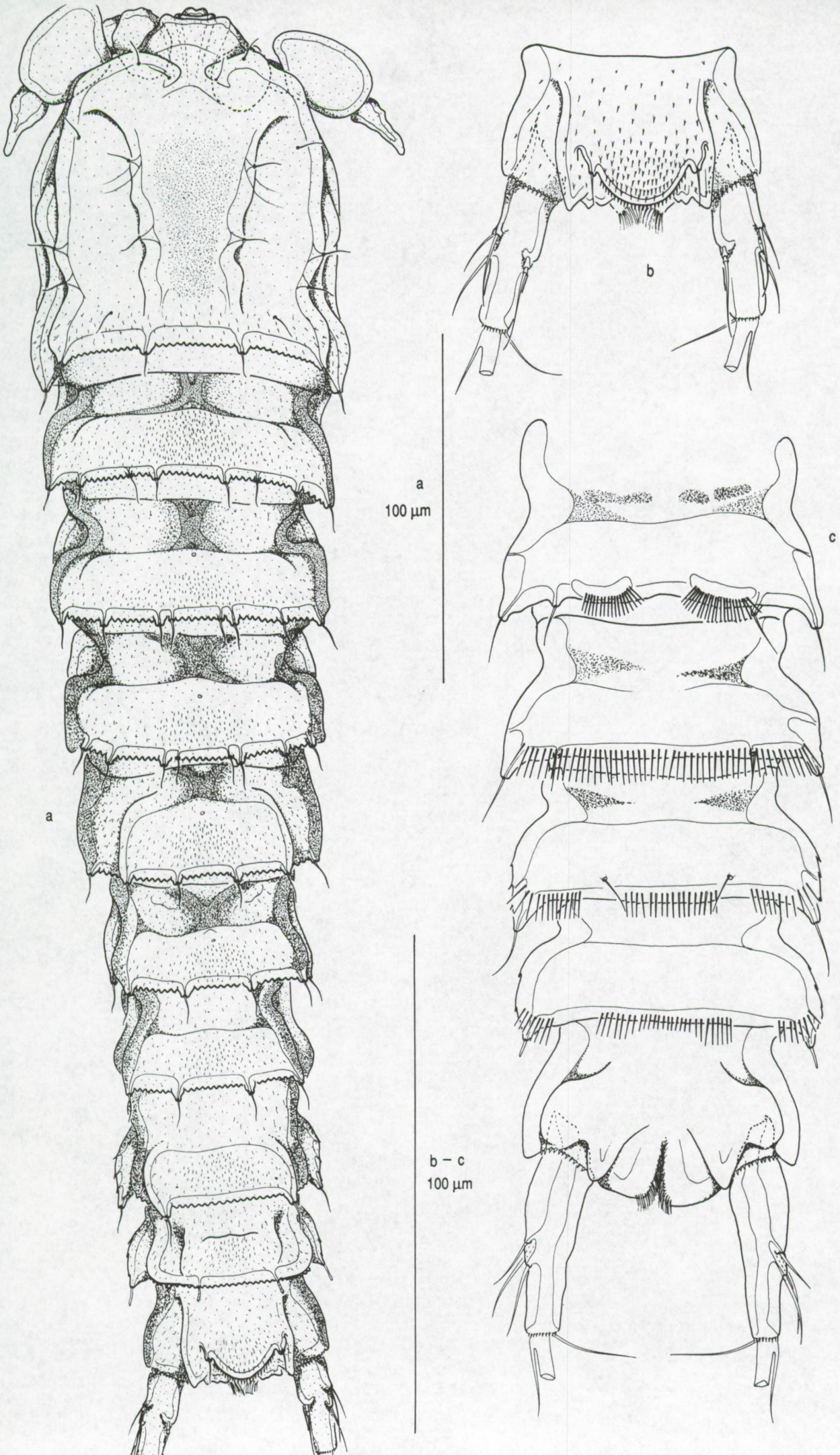
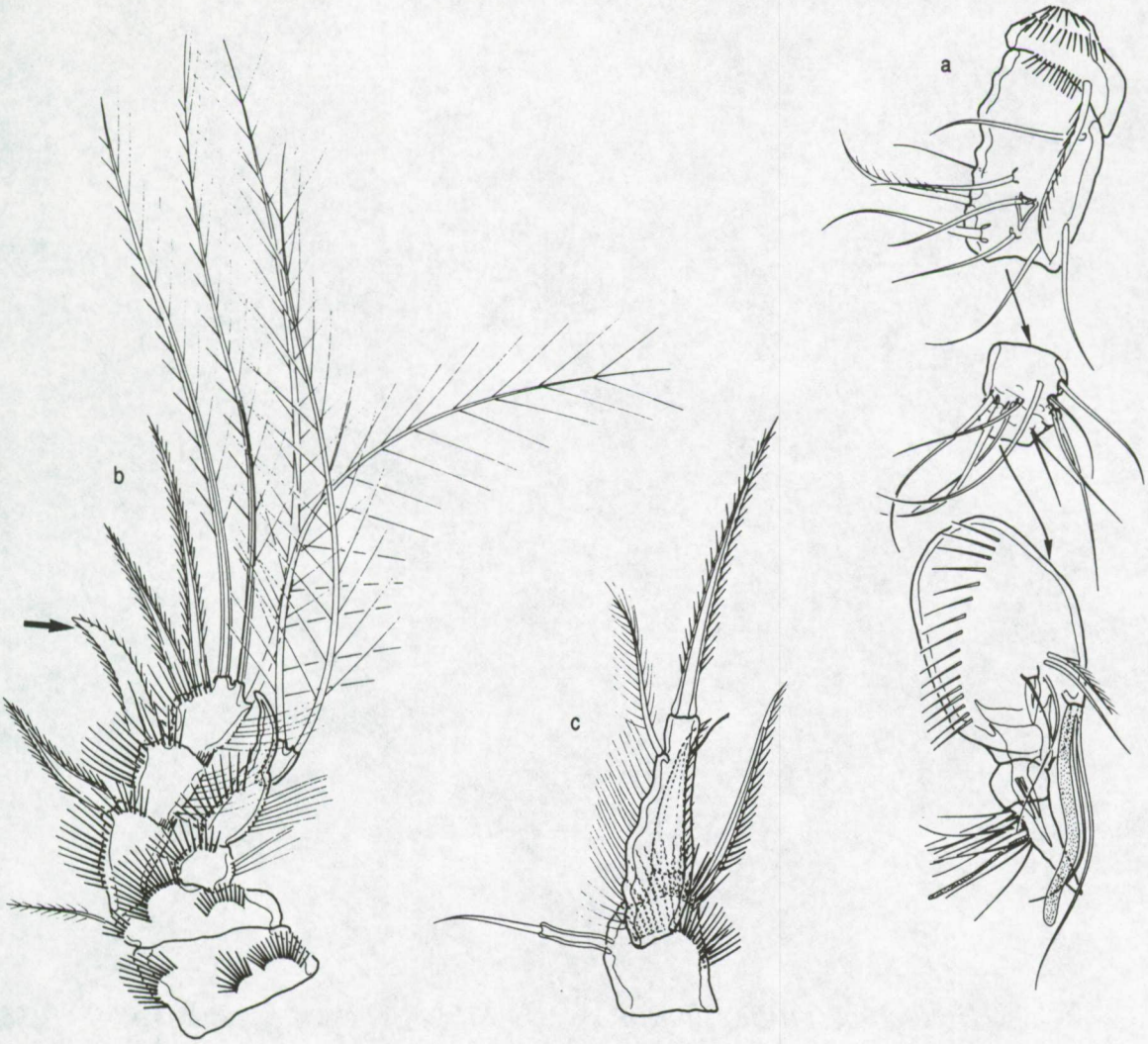

a
b
a
100 µm
c
b – c
100 µm

Fig. 323. ***Enhydrosoma n. sp. 3*****, male. a, antennule, exploded; b, P3; c, P5.**



a – c
100 µm

Fig. 324. ***Stylicletodes longicaudatus*** **Brady & Robertson, female. a, habitus, dorsal; b, urosome, lateral (P5 bearing-somite omited).**

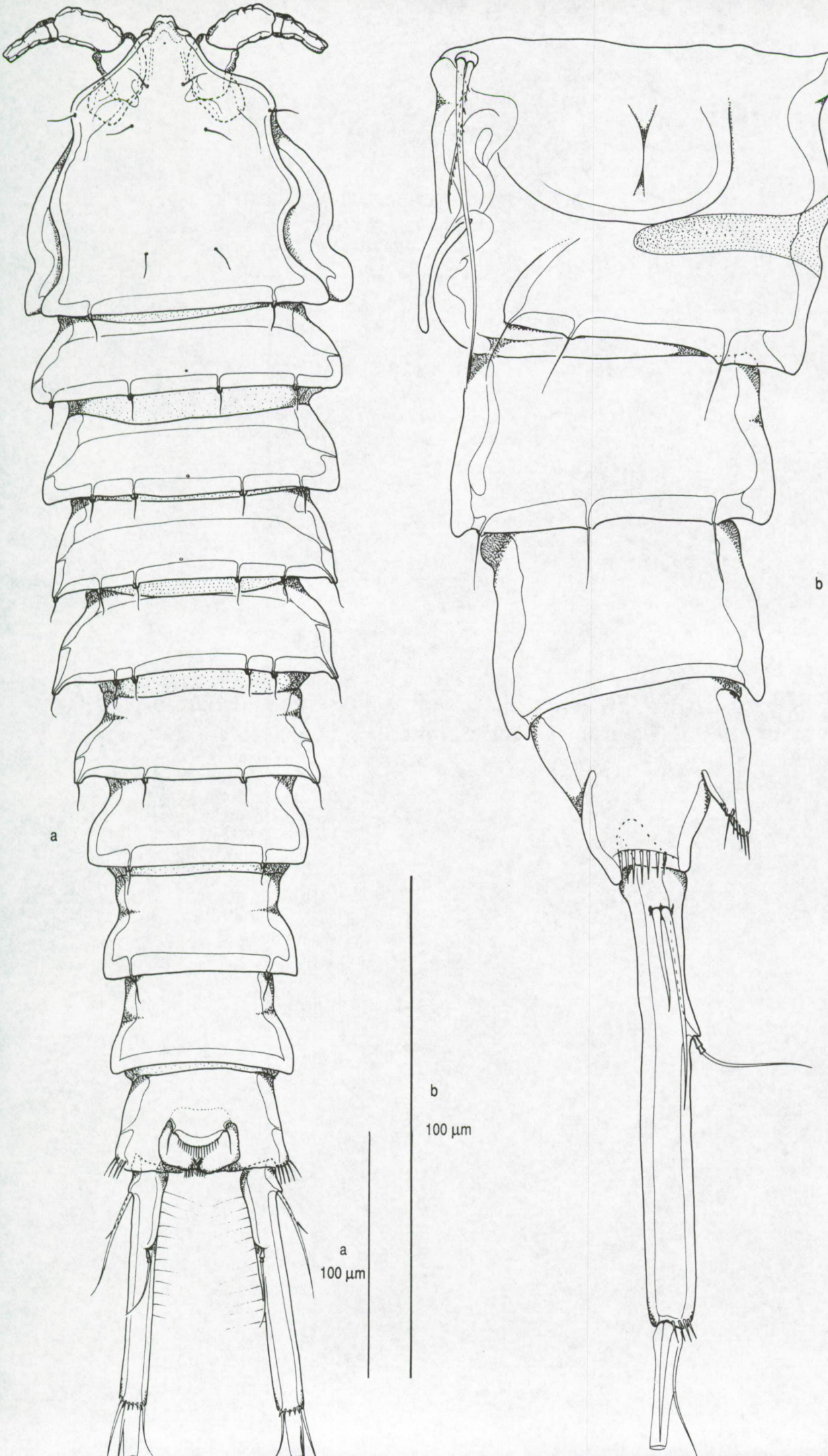
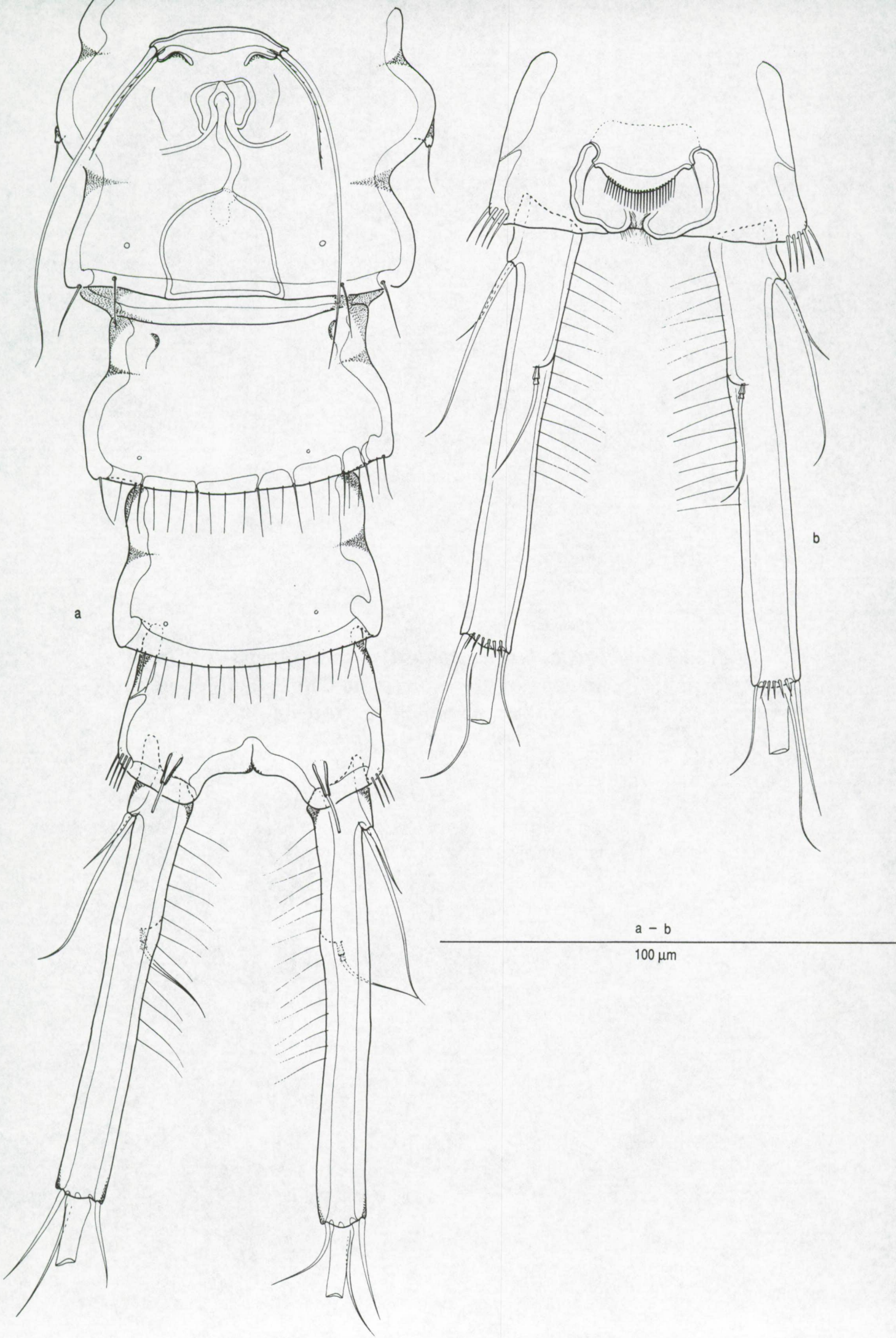

a
b
a
100 µm
b
100 µm

Fig. 325. ***Stylicletodes longicaudatus*** **Brady & Robertson, female. a, urosome, ventral (P5 bearing-somite omited); b, anal segment and caudal rami, dorsal.**



a – b

100 µm

Fig. 326. *Stylicletodes longicaudatus* Brady & Robertson, female. a, antennule; b, antenna; c, mandible; d, mandible, another view; e, maxillule; f, maxilla; g, rostrum.

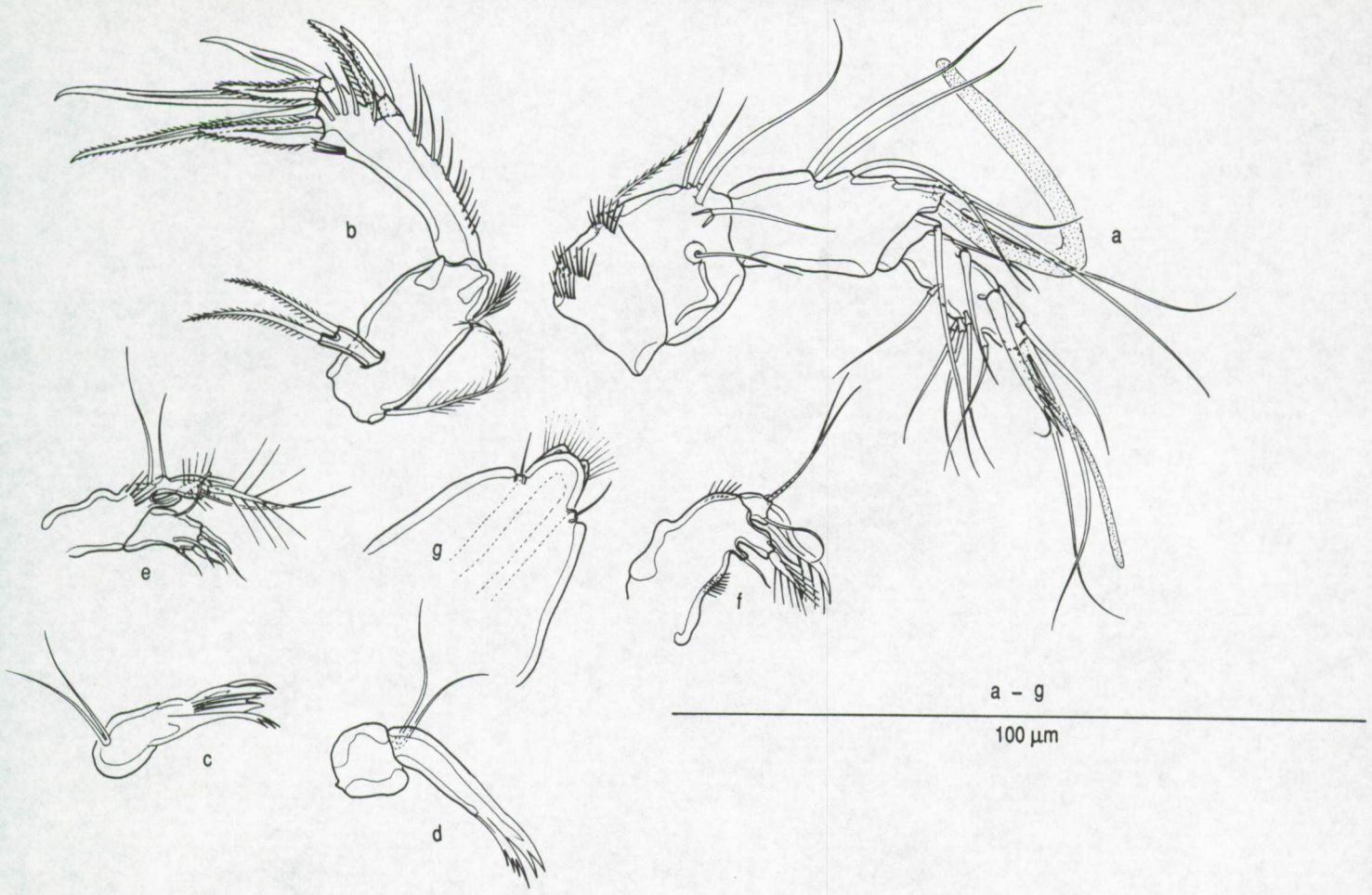

a
b
c
d
e
f
g
a – g
100 µm

Fig. 327. ***Stylicletodes longicaudatus*** **Brady & Robertson, female. a, P1; b, P2; c, P3.**



a - c

100 µm

Fig. 328. ***Stylicletodes longicaudatus*** **Brady & Robertson, female. a, P4; b, P5.**



a – b

100 µm

Fig. 329. ***Stylicletodes longicaudatus*** **Brady & Robertson, male. a, antennule, exploded; b, P3; c, P5.**


a
b
c
?
a – c
100 µm

Fig. 330. ***Nannopus palustris*** **Brady, female. a, habitus, dorsal; b, urosome, ventral (P5 bearing-somite omited).**

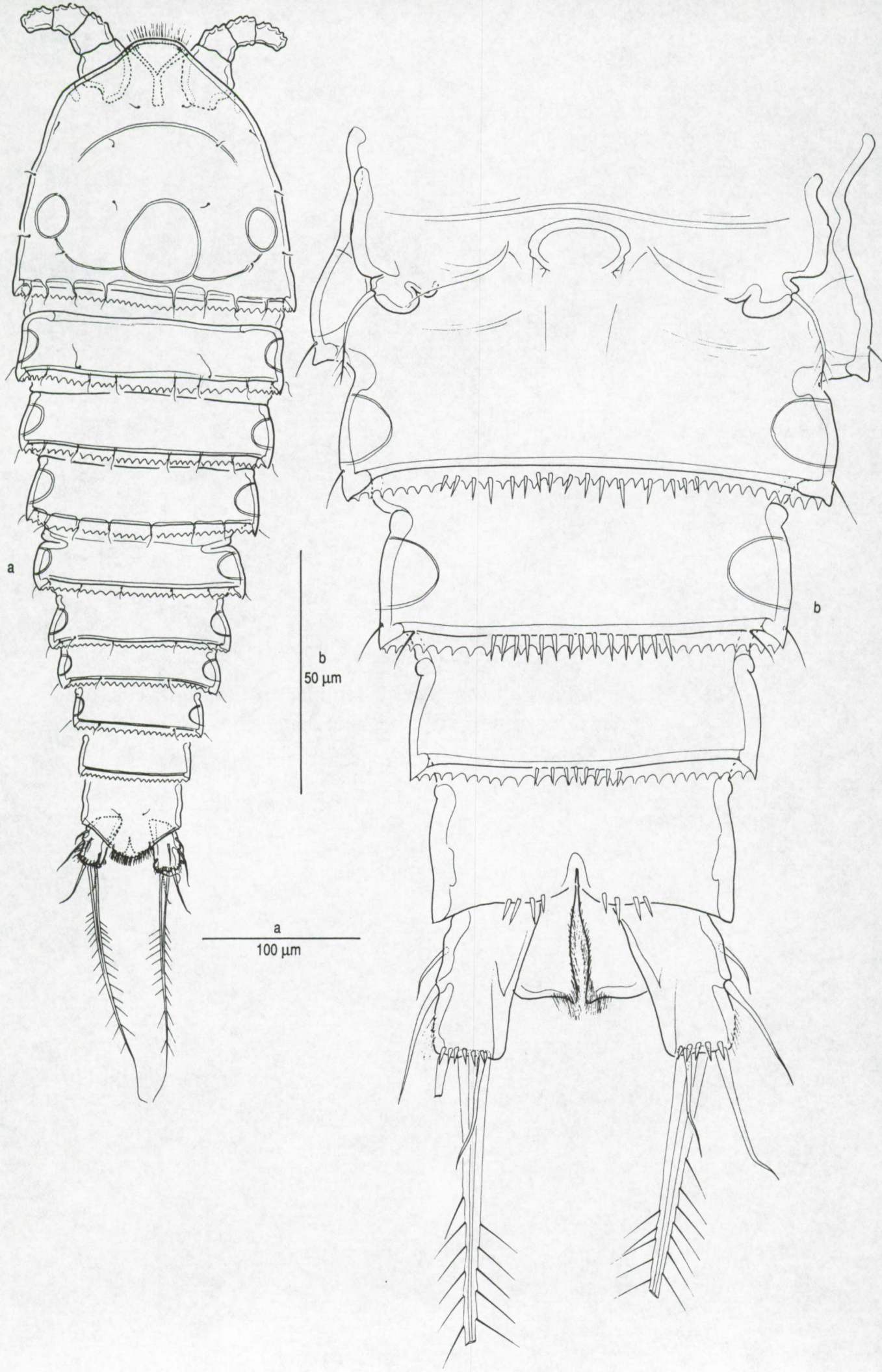
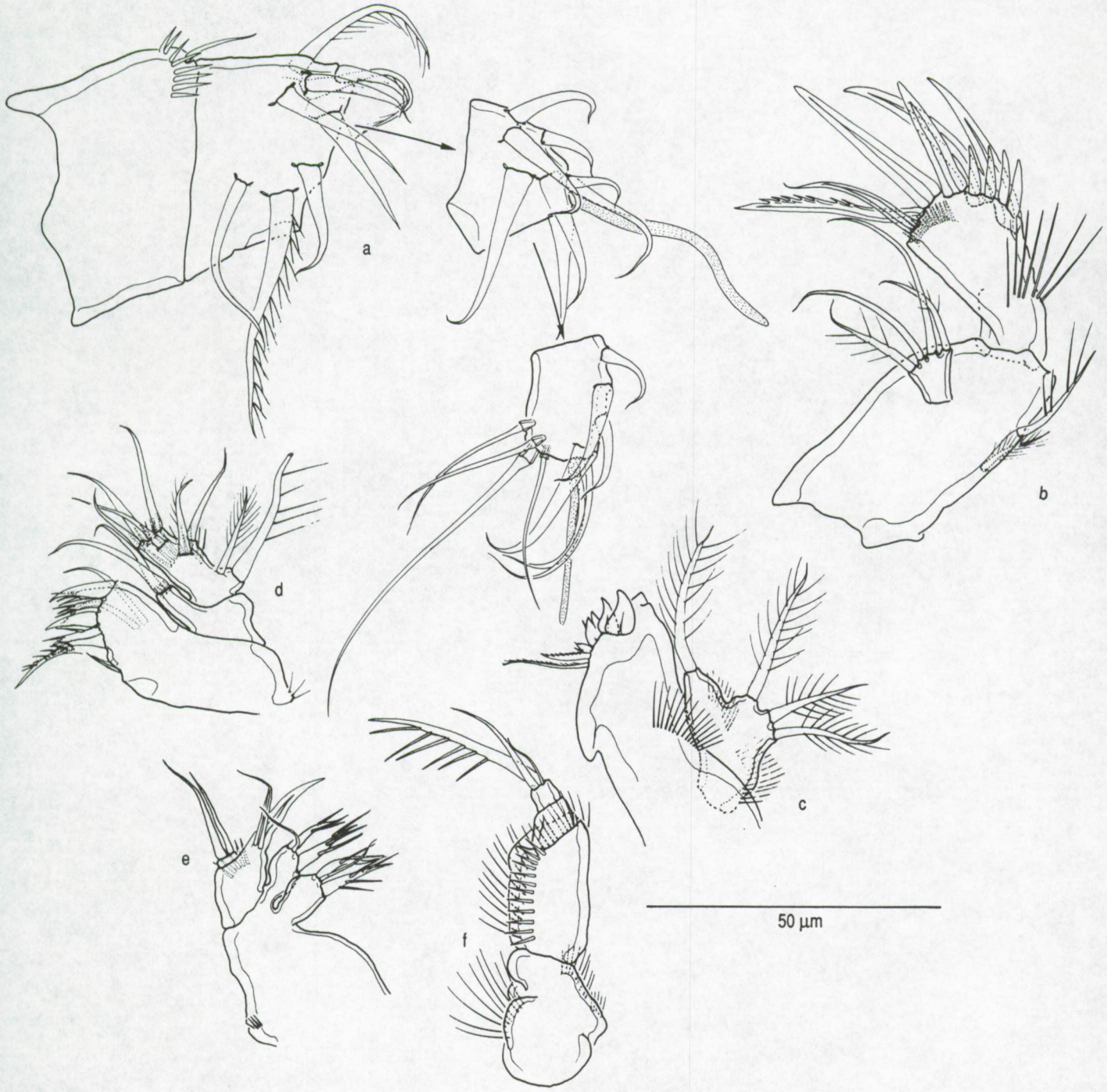

a
b
50 µm
a
100 µm
b

Fig. 331. ***Nannopus palustris*** **Brady, female. a, antennule, exploded; b, antenna; c, mandible; d, maxillule; e, maxilla; f, maxilliped.**


a
b
c
d
e
f
50 µm

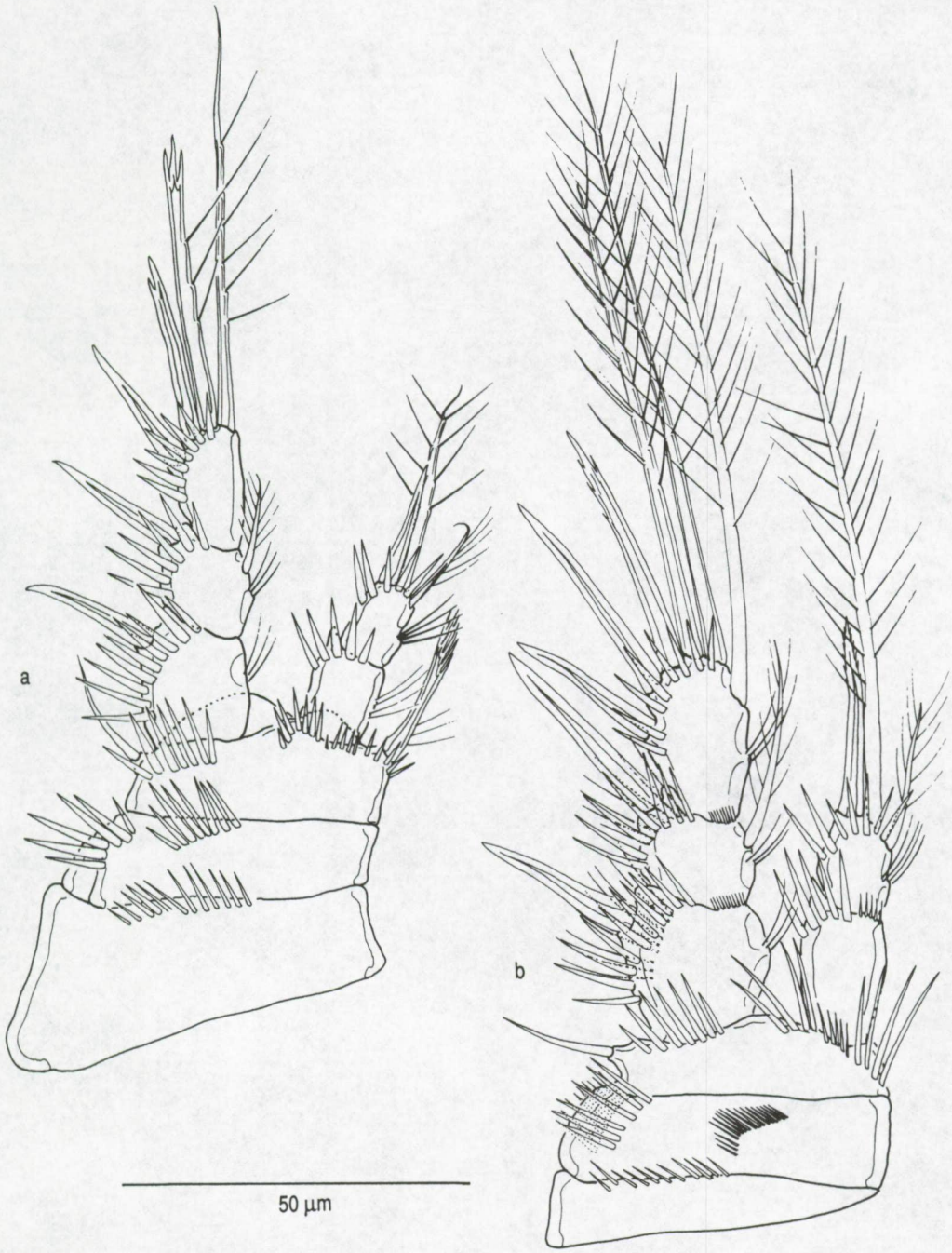

a
b
50 µm

Fig. 333. ***Nannopus palustris*** **Brady, female. a, P3; b, P4; c, P5.**

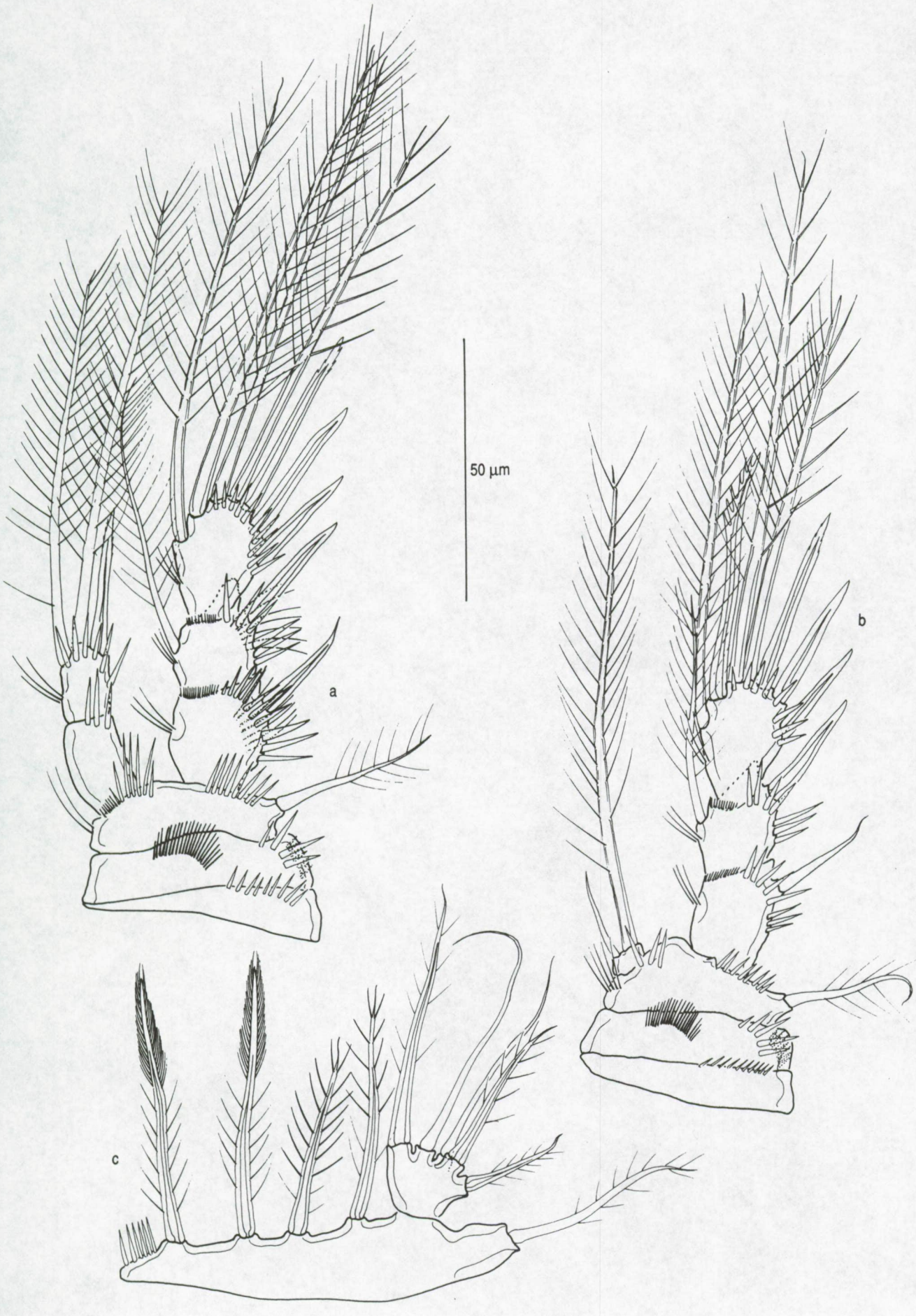
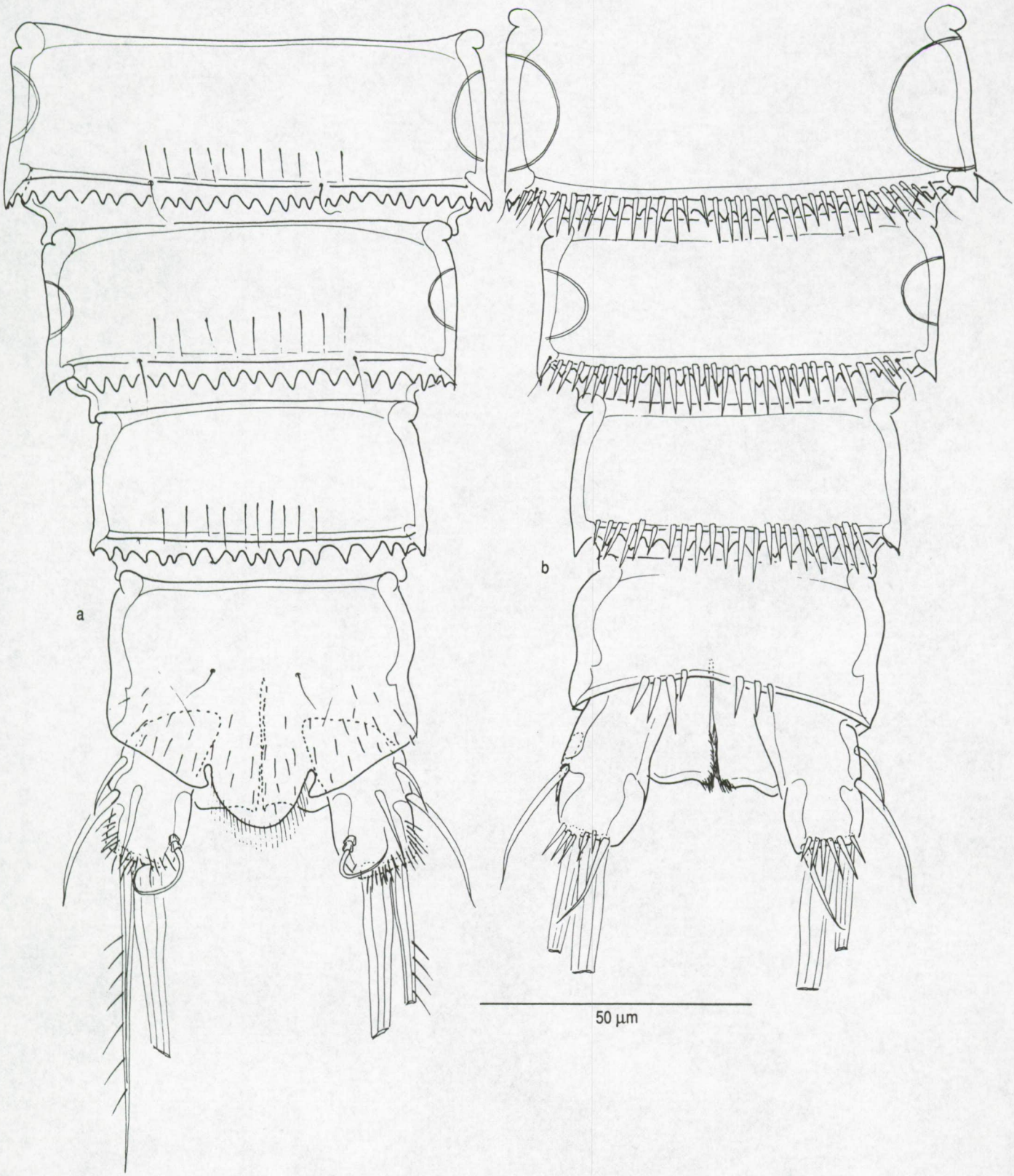

50 µm
a
b
c

Fig. 334. ***Nannopus palustris*** **Brady, male. a, urosome, dorsal; b, urosome, ventral (P5 and P6 bearing-somites omited in a and b).**


a
b
50 µm

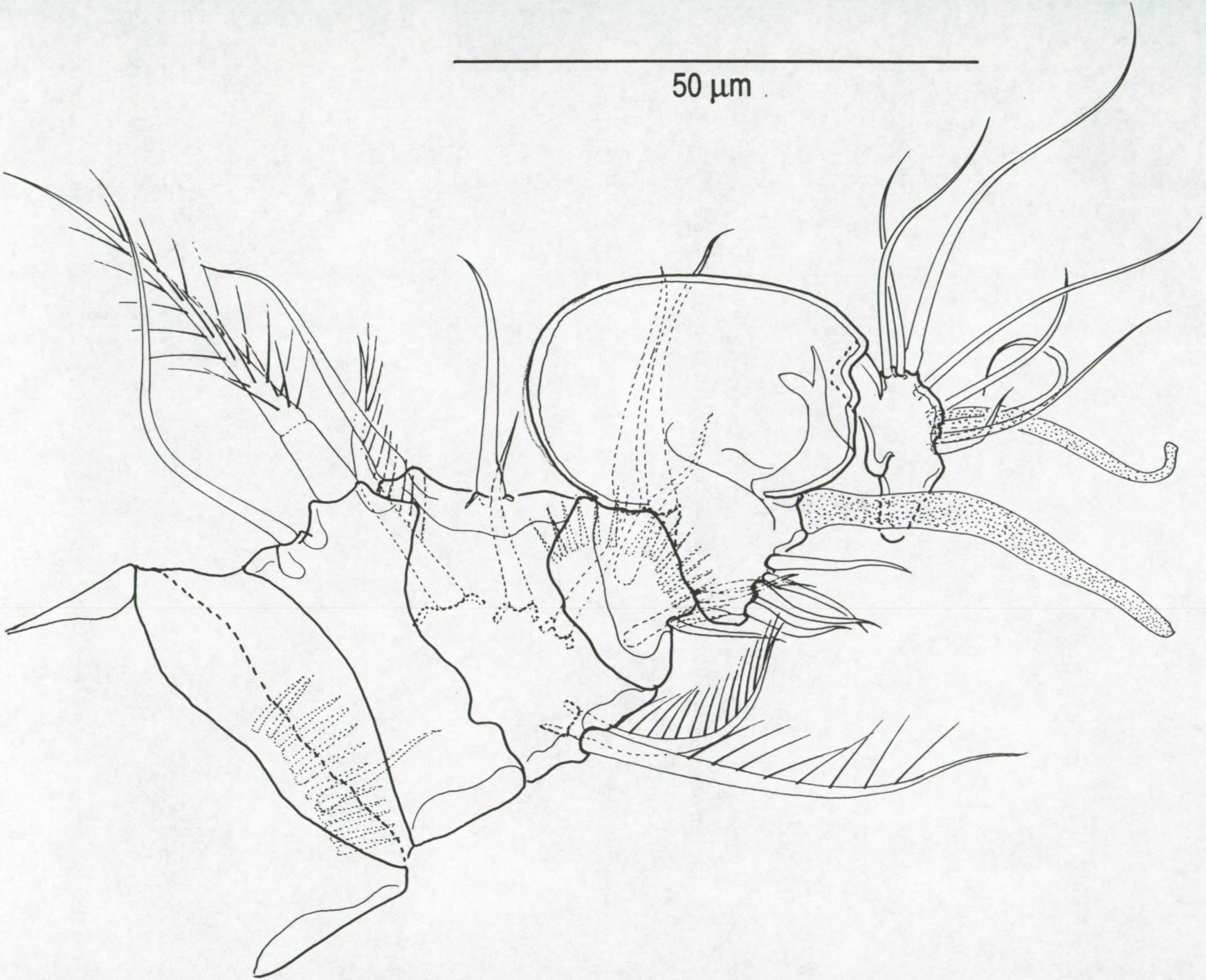

50 µm

Fig. 336. ***Nannopus palustris*** **Brady, male. a, P3; b, P5; c, P6.**


50 µm
a
b
c

Fig. 337. ***Laophonte n. sp. 1*****, female. a, urosome, dorsal; b, left caudal ramus, dorsal; c, urosome, ventral (P5 bearing-somite omited in a and c).**

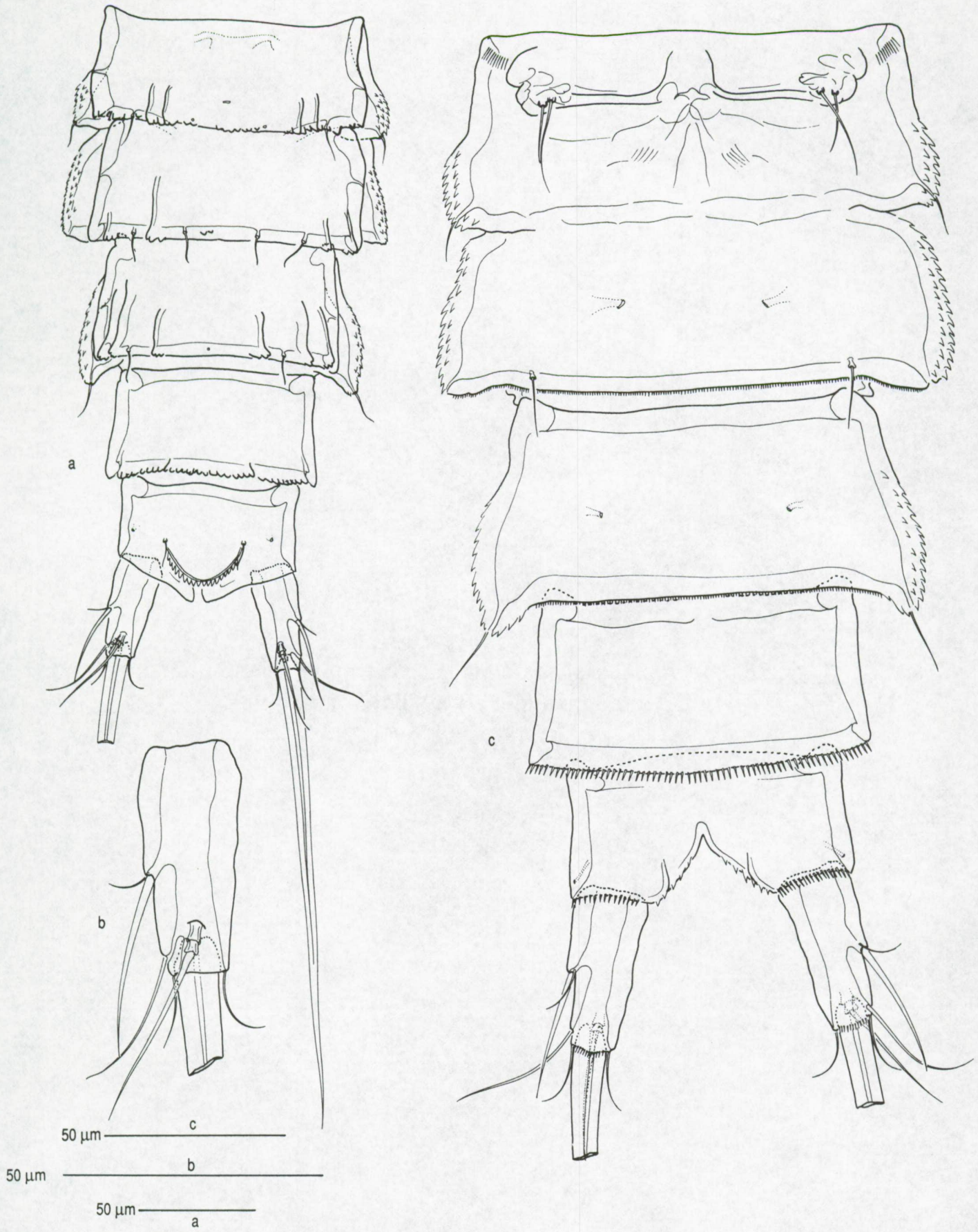

a
b
c
50 µm
c
50 µm
b
50 µm
a

Fig. 338. ***Laophonte n. sp. 1*****, female. a, antennule; b, antenna; c, mandible; d, maxillule; e, maxilla; f, maxilliped.**

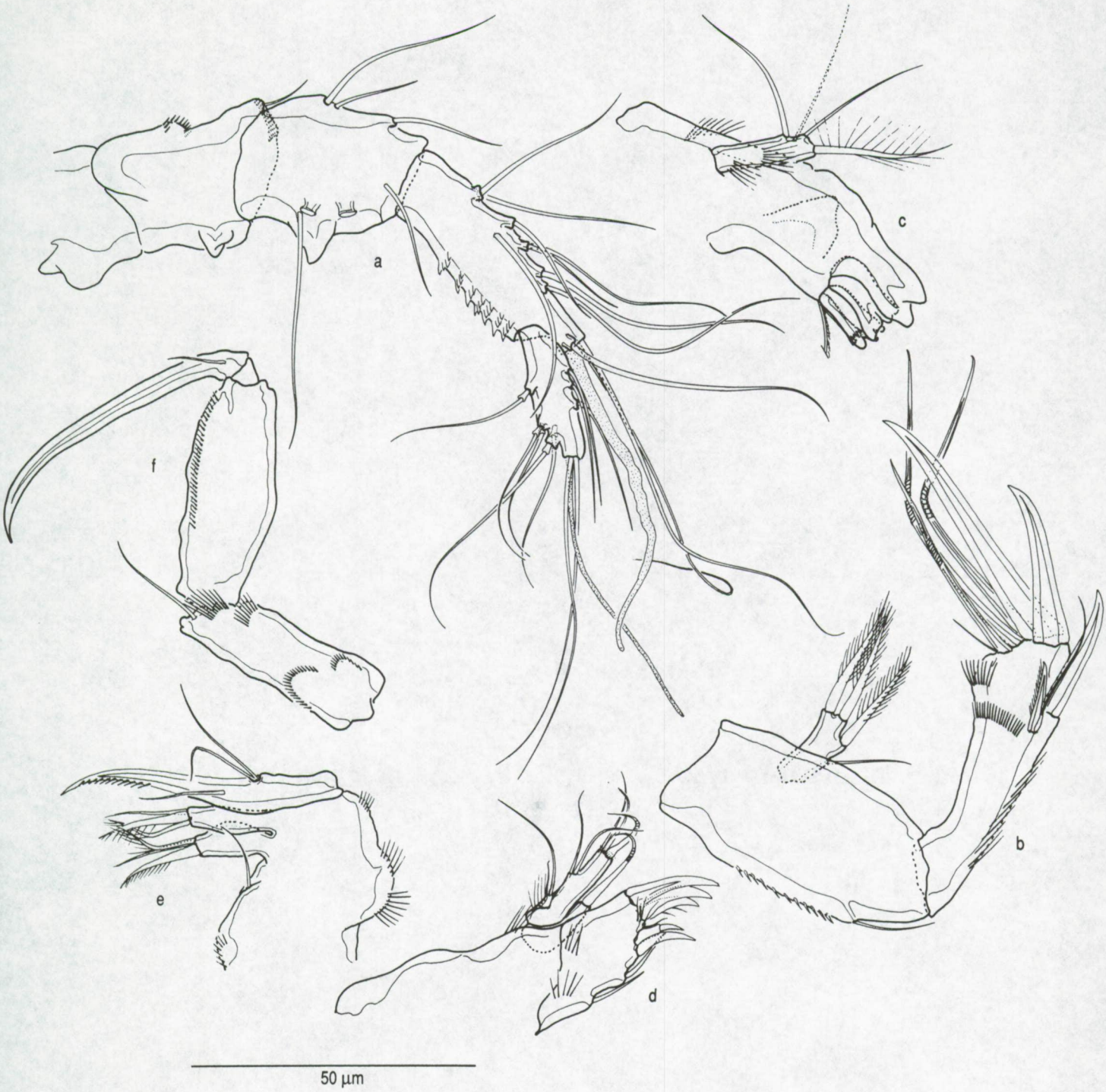
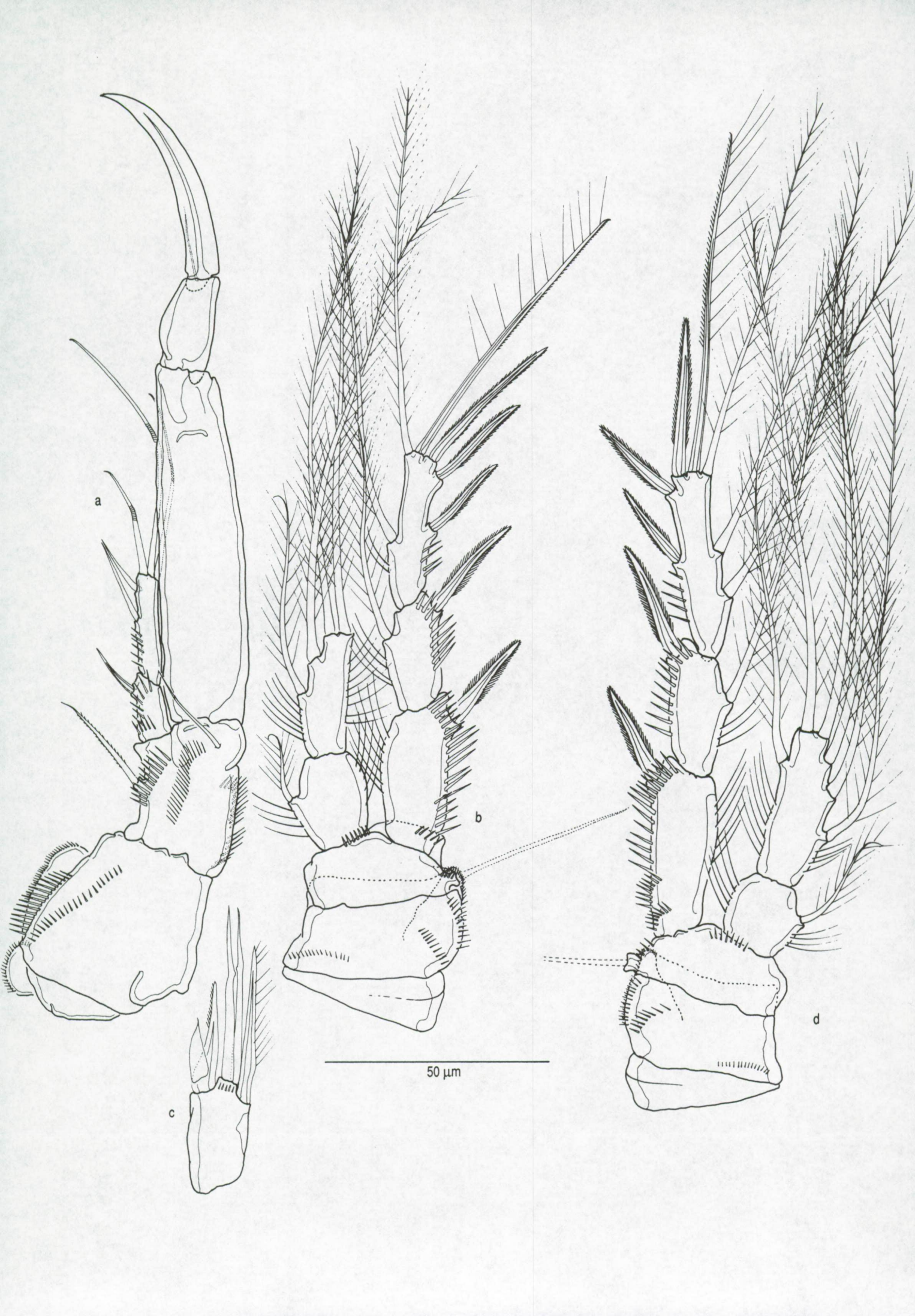
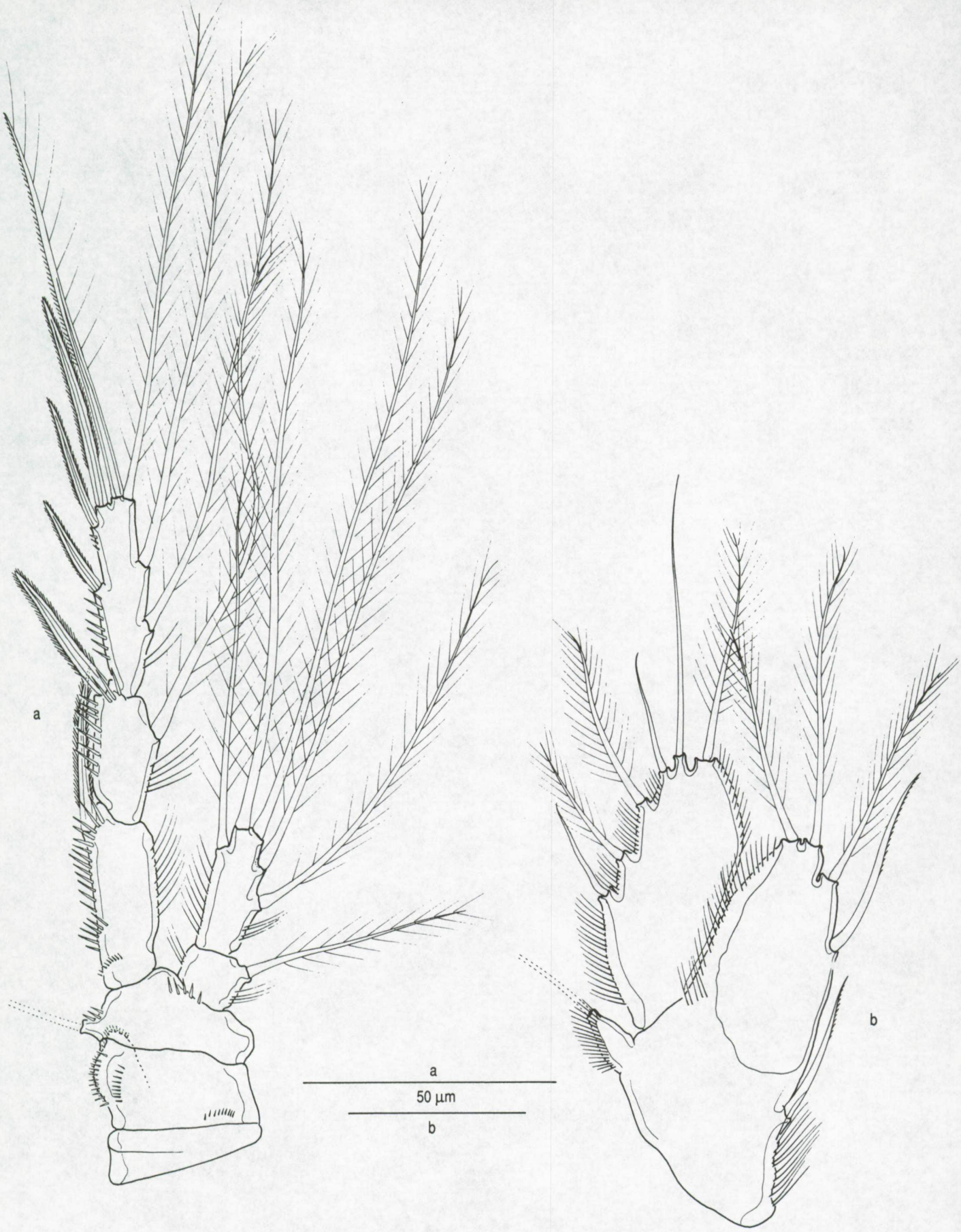

a
b
c
d
e
f
50 µm

Fig. 339. ***Laophonte n. sp. 1*****, female. a, P1; b, P2; c, aberrant P2 ENP 2; d, P3.**


a
b
c
d
50 µm


a
b
a
50 µm
b

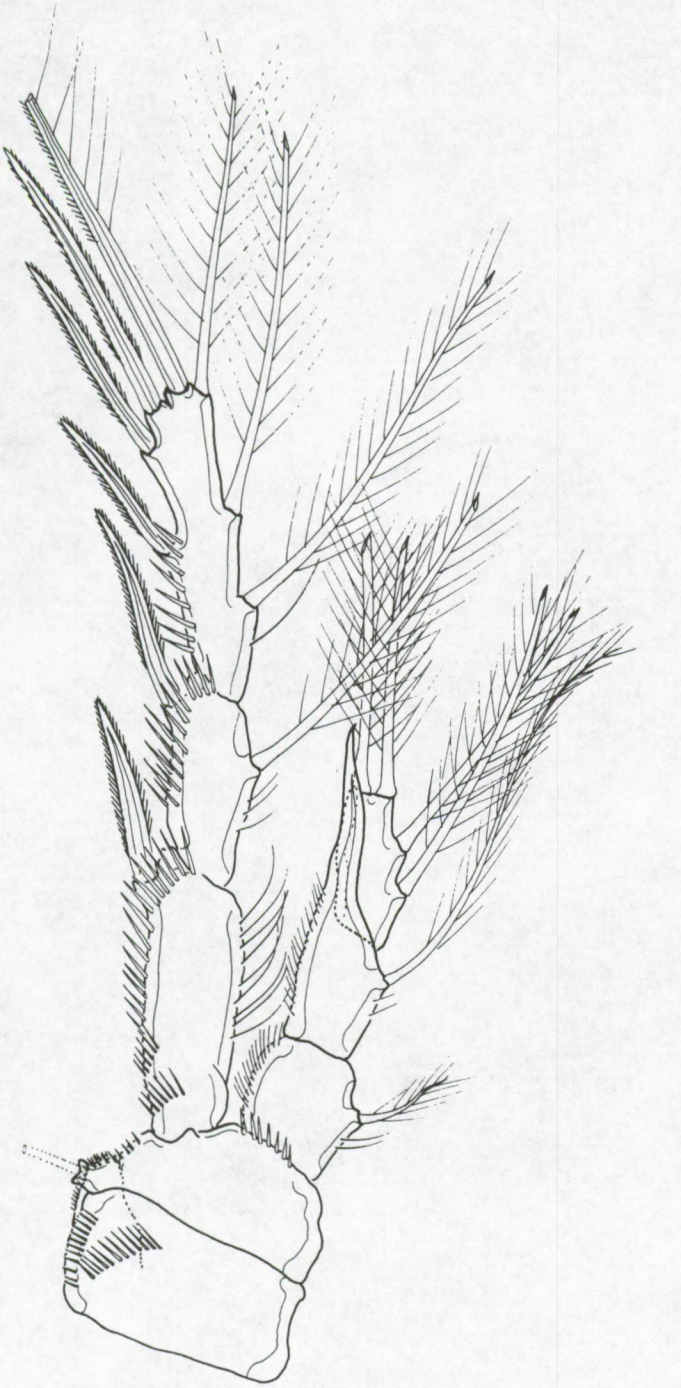

50 µm

Fig. 342. ***Laophonte n. sp. 2*****, female. a, urosome, dorsal; b, urosome, ventral (P5 bearing-somite omited).**

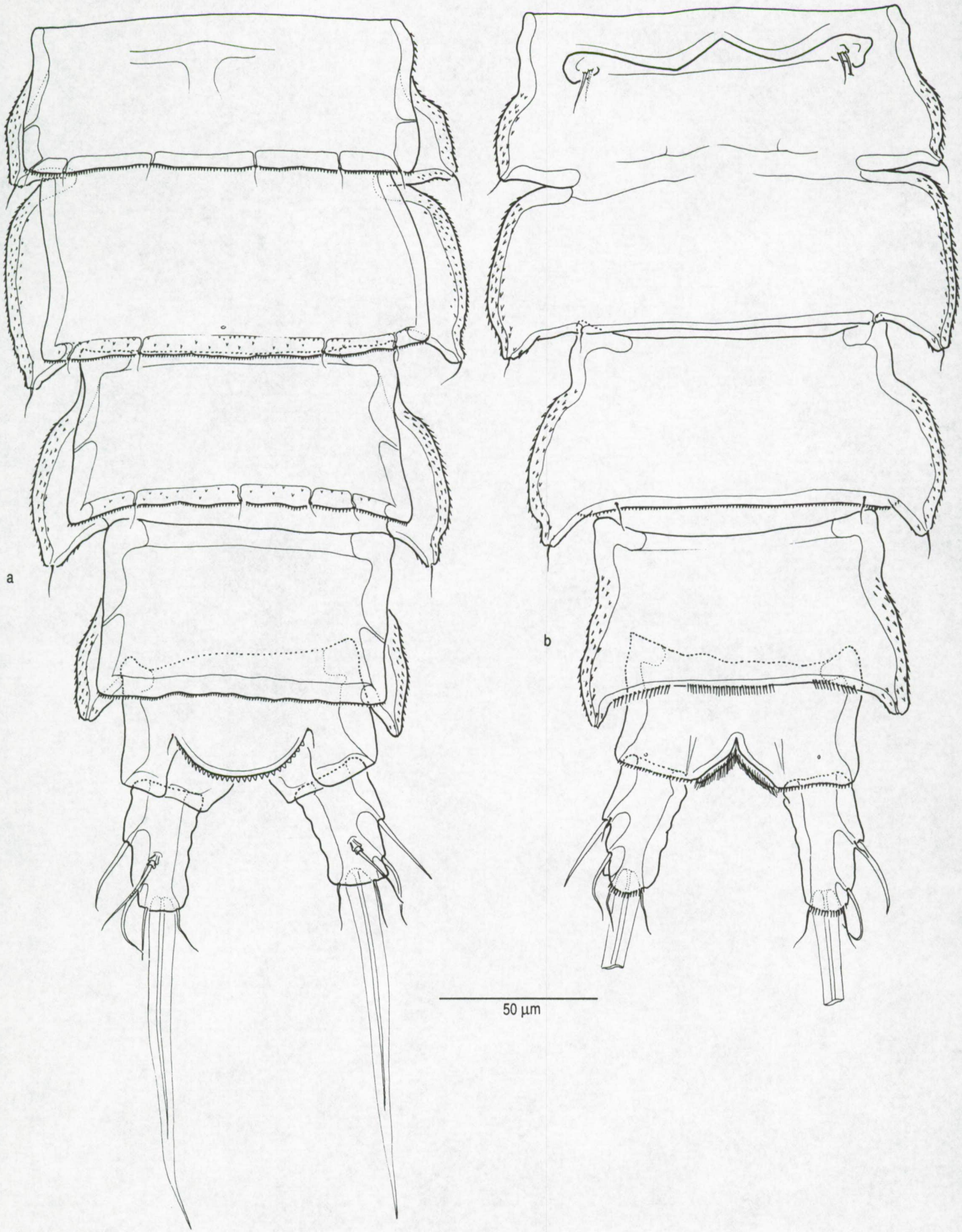
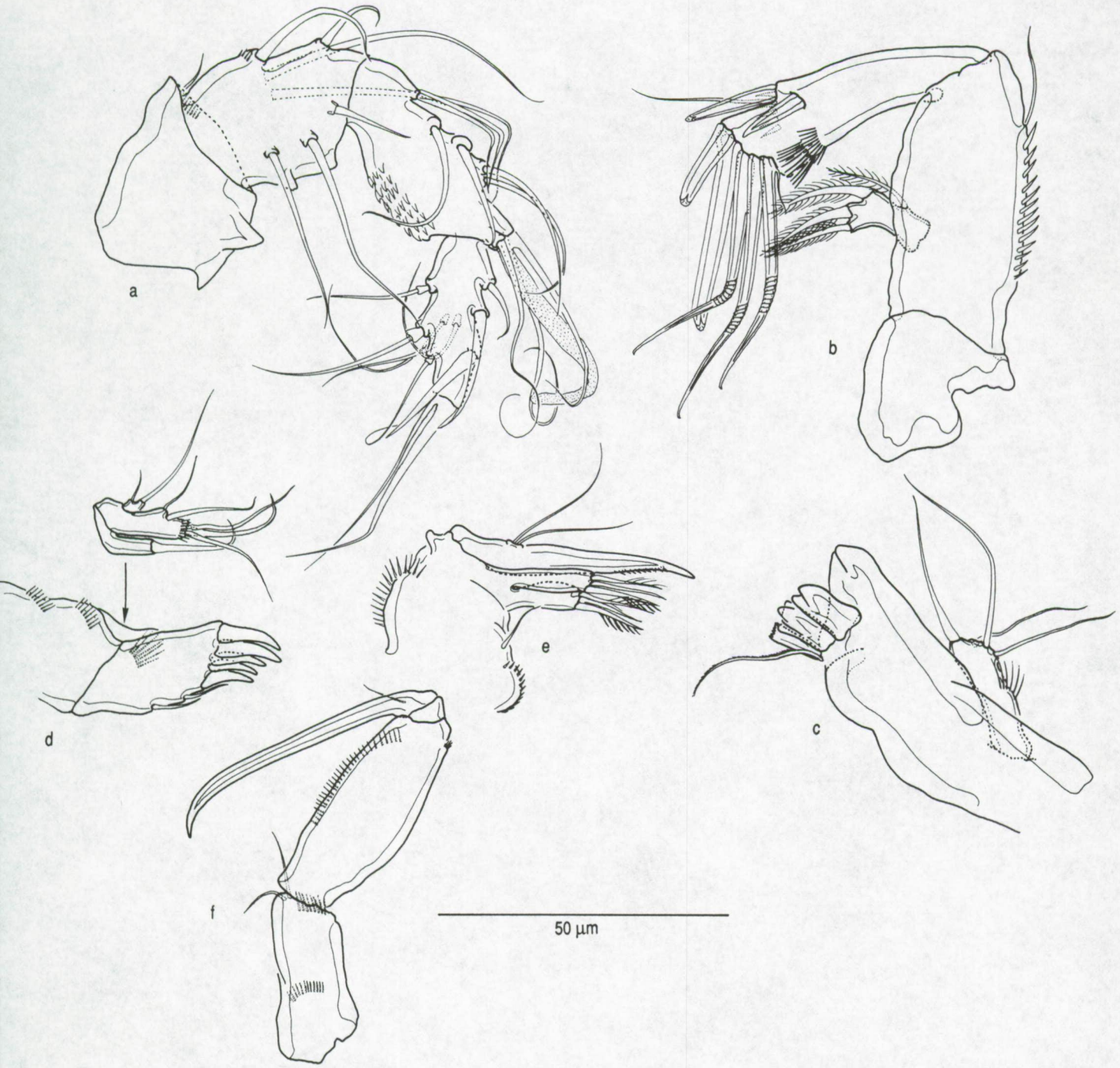
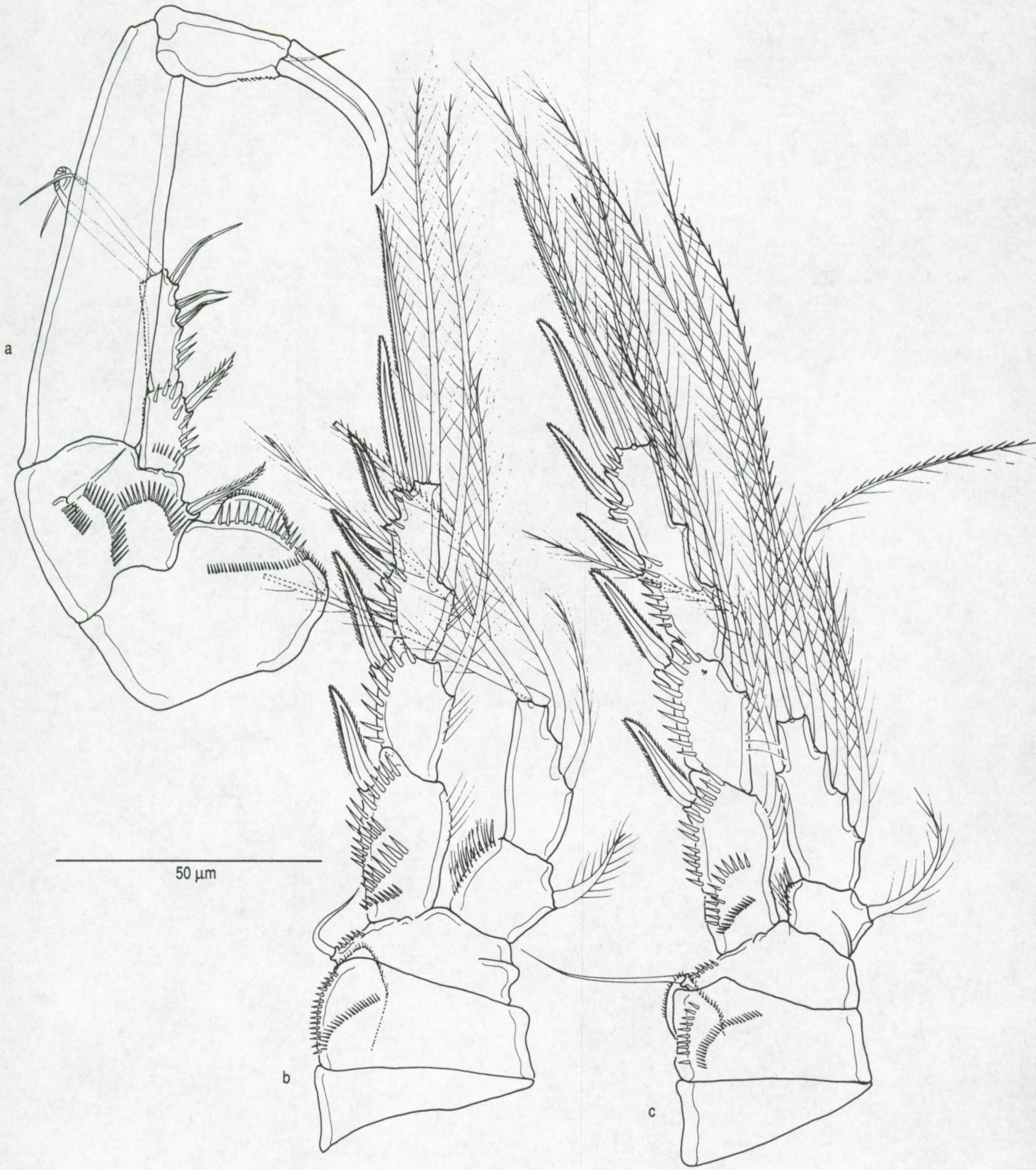

a
b
50 µm

Fig. 343. ***Laophonte n. sp. 2*****, female. a, antennule; b, antenna; c, mandible; d, maxillule; e, maxilla; f, maxilliped.**


a
b
c
d
e
f
50 µm


a
50 µm
b
c


a
b
50 µm

Fig. 346. ***Paralaophonte brevirostris*** **Claus, female. a, habitus, dorsal; b, habitus, lateral.**

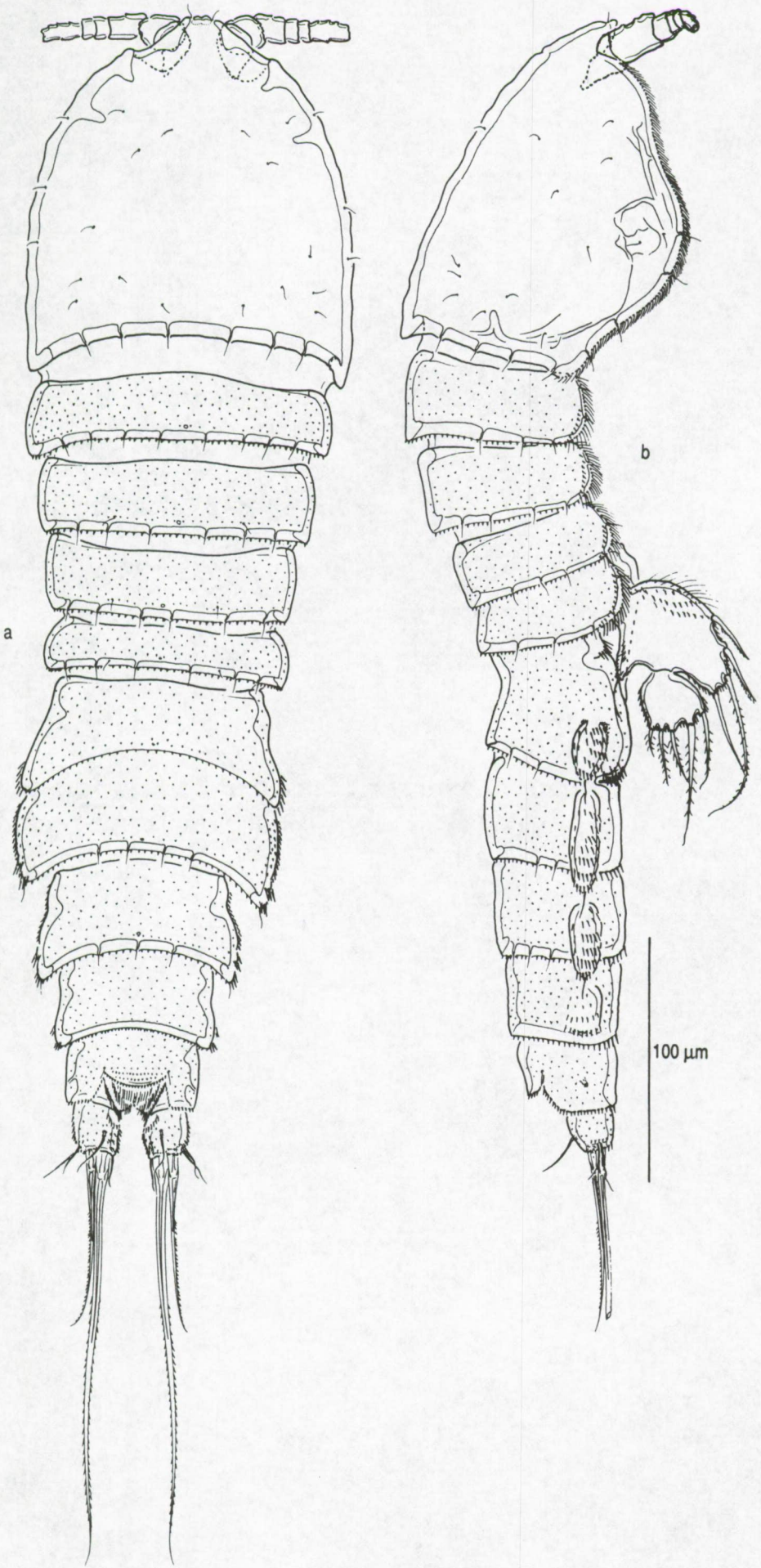

a
b
100 µm

Fig. 347. *Paralaophonte brevirostris* Claus, female. a, urosome, dorsal; b, urosome, ventral (P5 bearing-somite omited in borth figures).

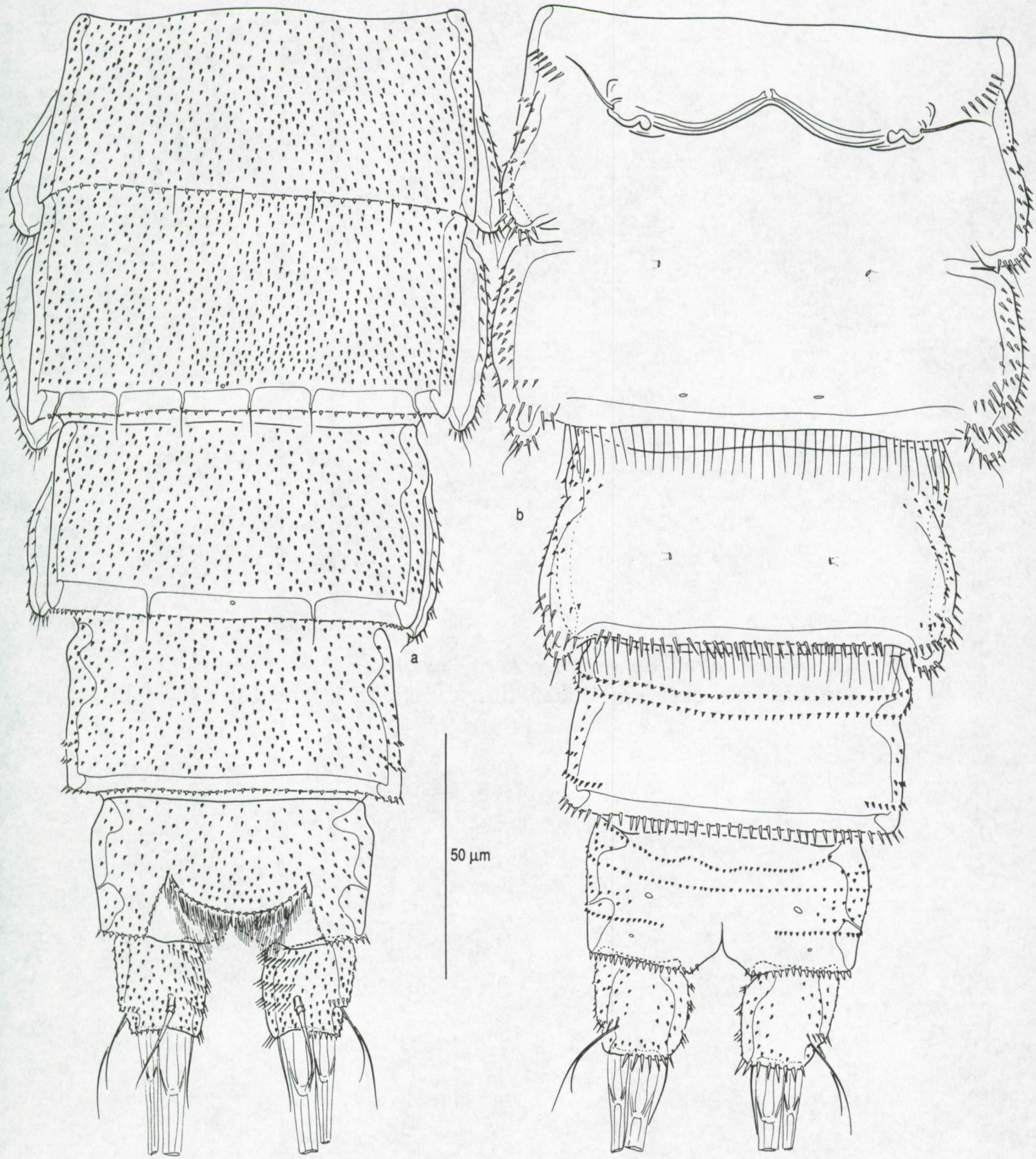
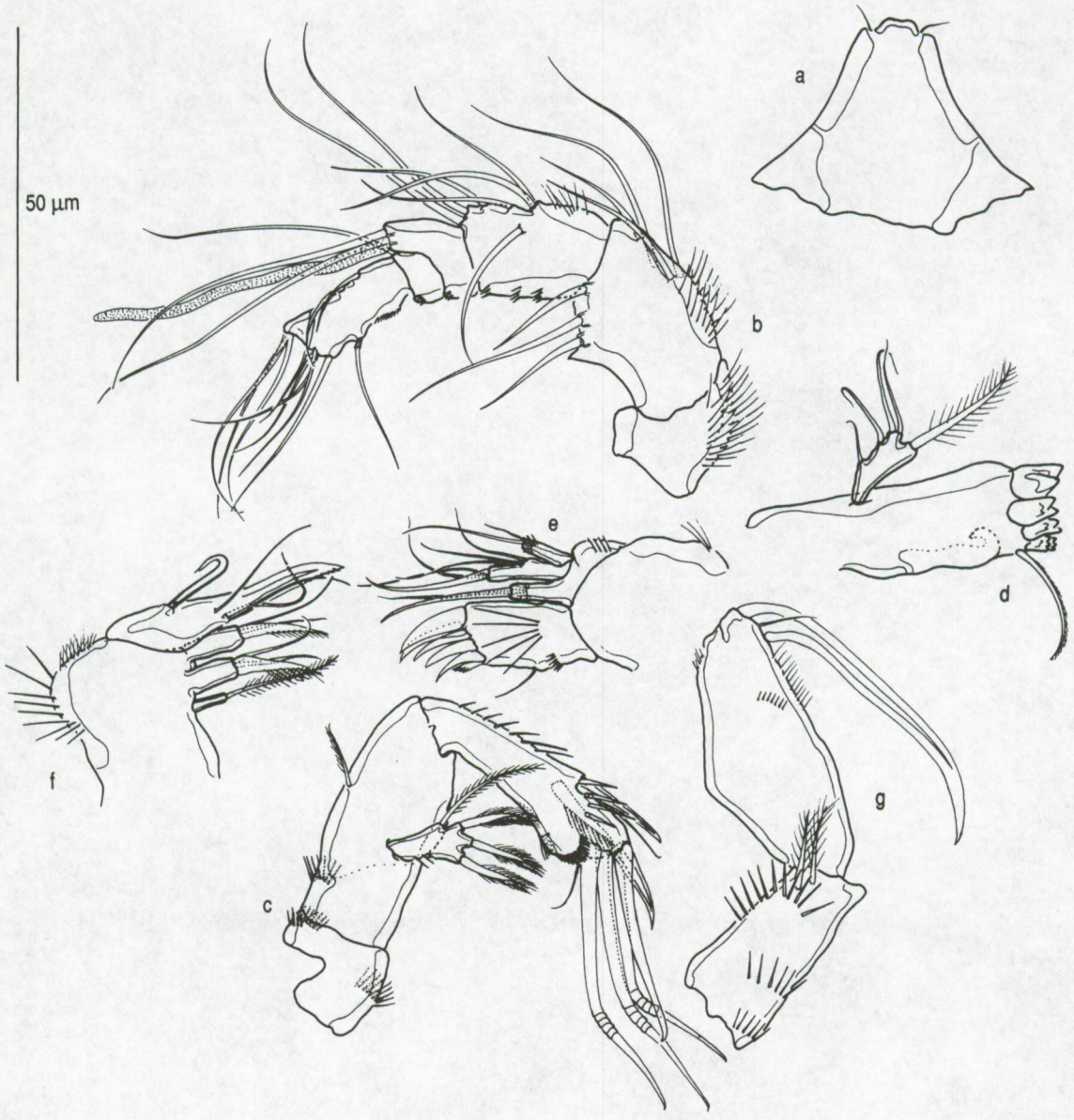
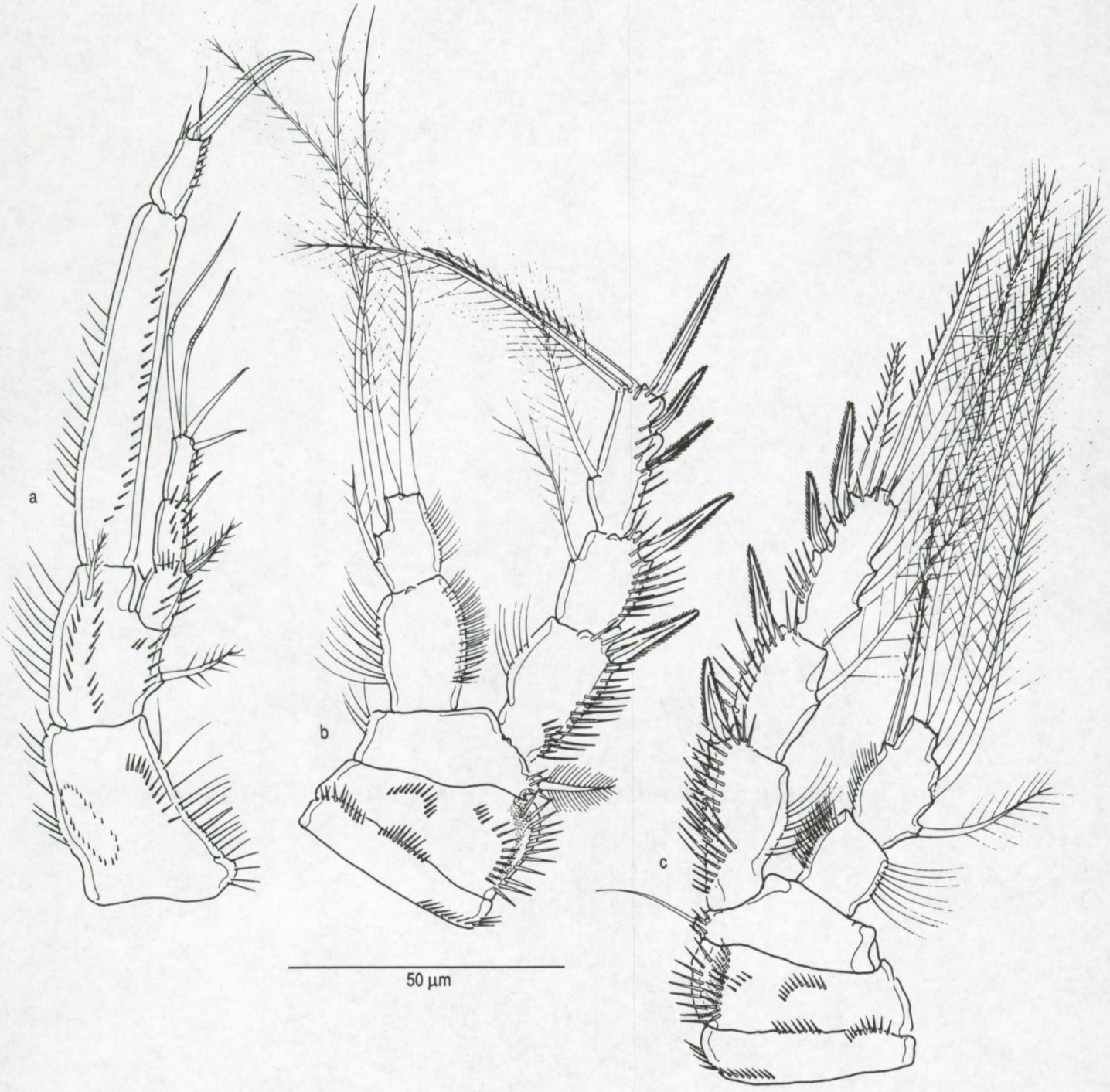

a
b
50 µm

Fig. 348. ***Paralaophonte brevirostris*** **Claus, female. a, rostrum; b, antennule; c, antenna; d, mandible; e, maxillule; f, maxilla; g, maxilliped.**


50 µm
a
b
c
d
e
f
g


a
b
c
50 µm

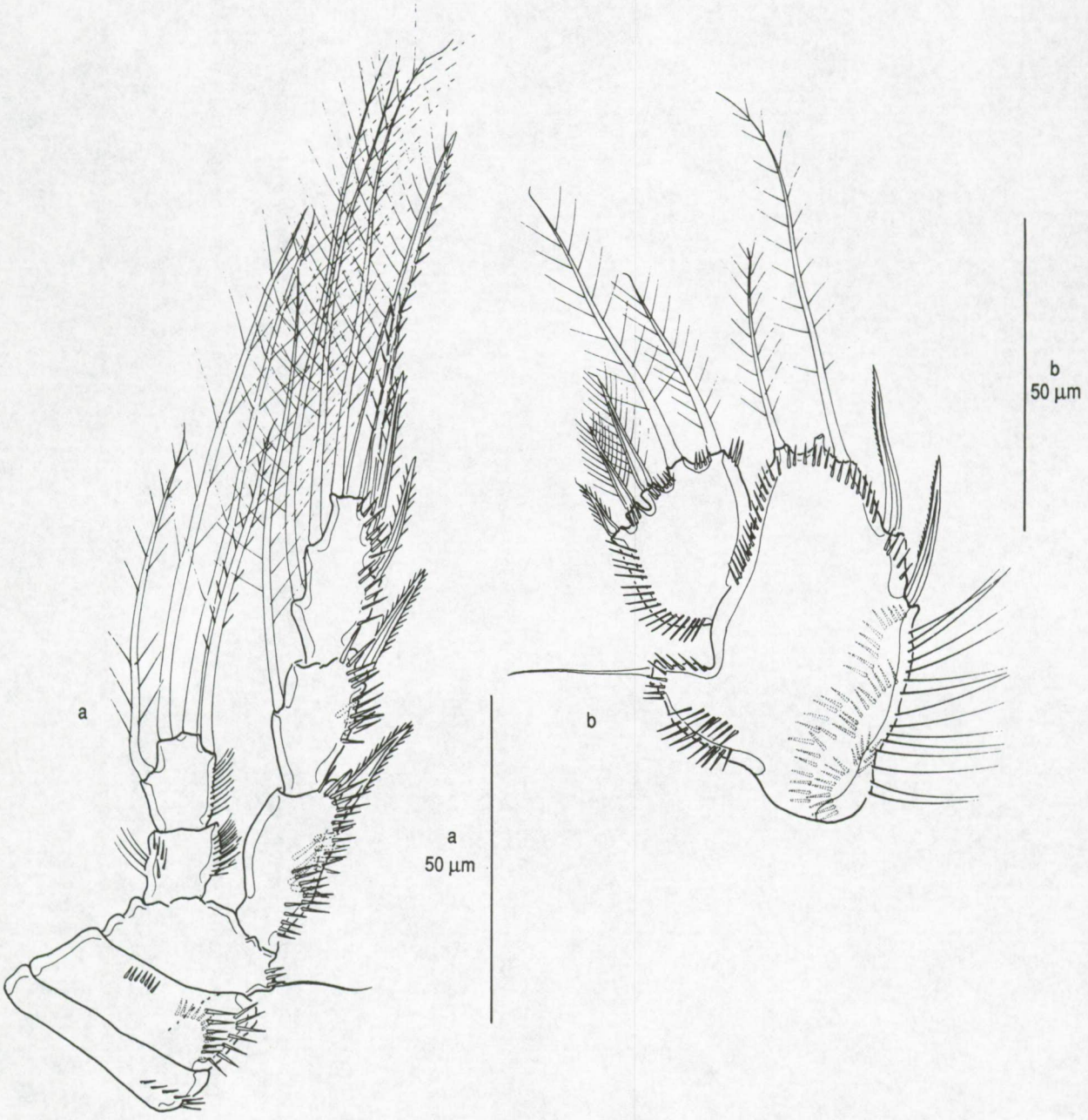

a
a
50 µm
b
b
50 µm

Fig. 351. ***Paralaophonte brevirostris*** **Claus, male. a, urosome, dorsal; b, urosome, lateral.**

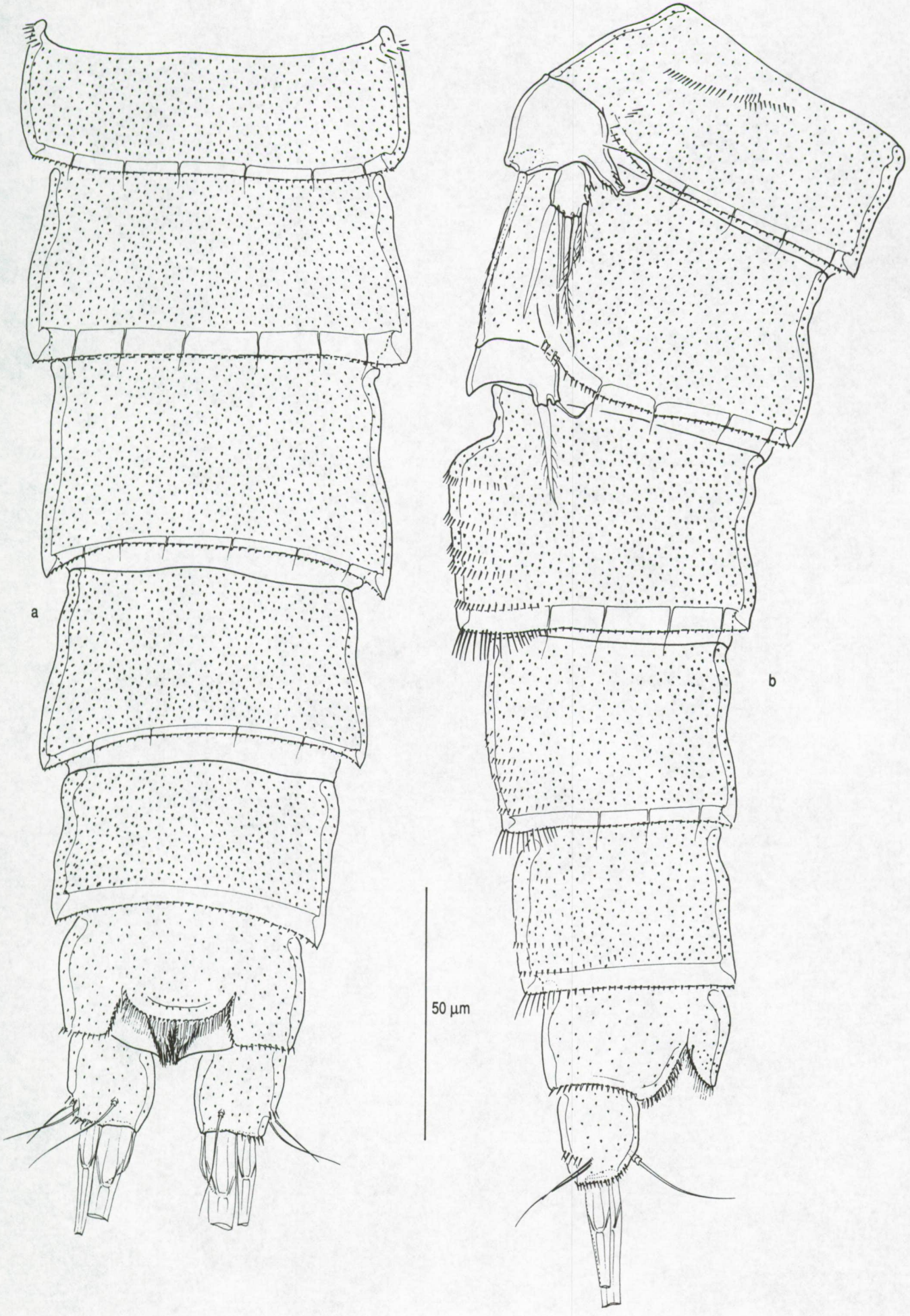

a
b
50 µm

Fig. 352. ***Paralaophonte brevirostris*** **Claus, male. a, urosome, ventral (P5 and P6 bearing-somites omited); b, antennule, exploded.**

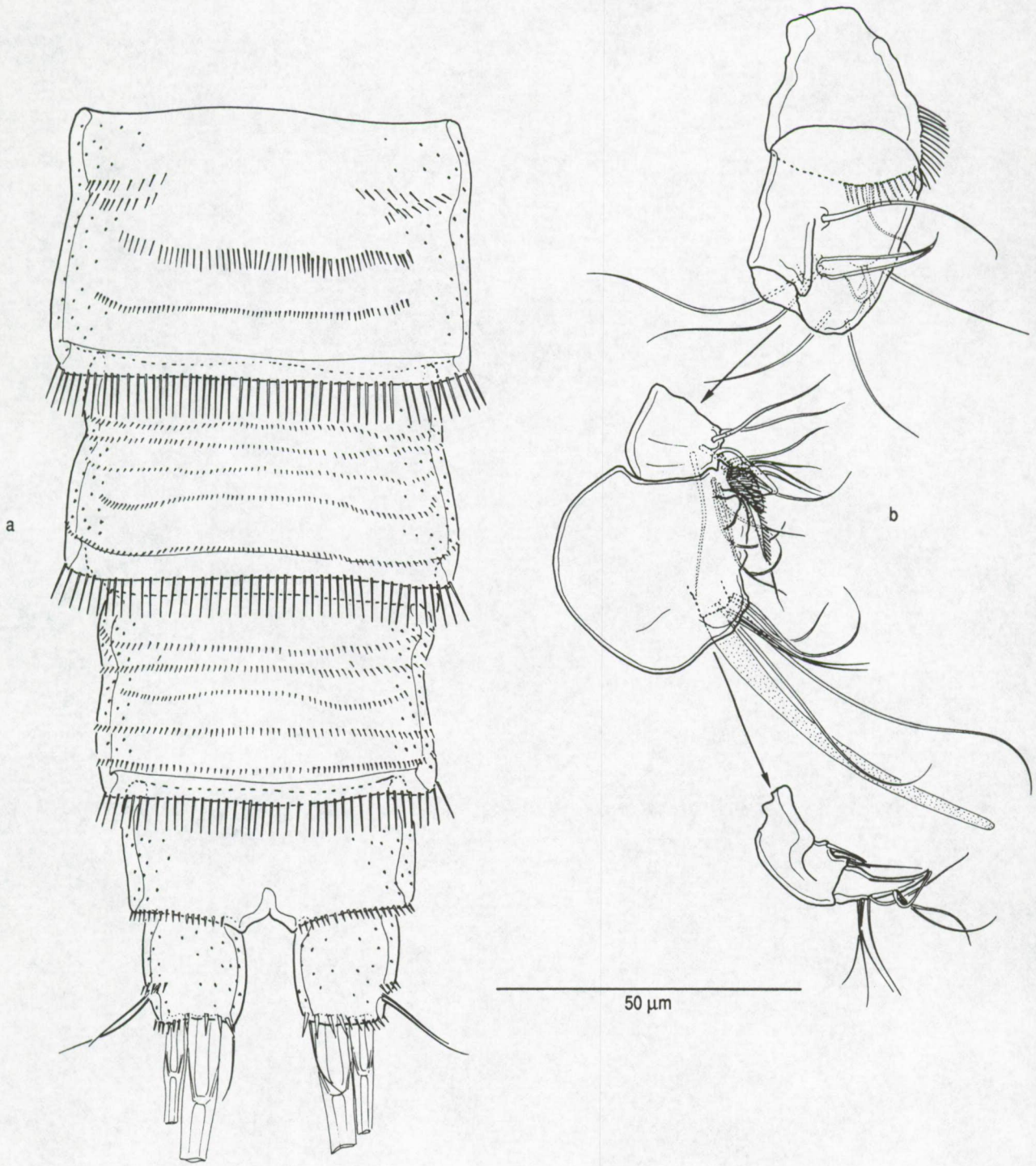

a
b
50 µm

Fig. 353. *Paralaophonte brevirostris* Claus, male. a, P2; b, P3; c, P4; d, P5.

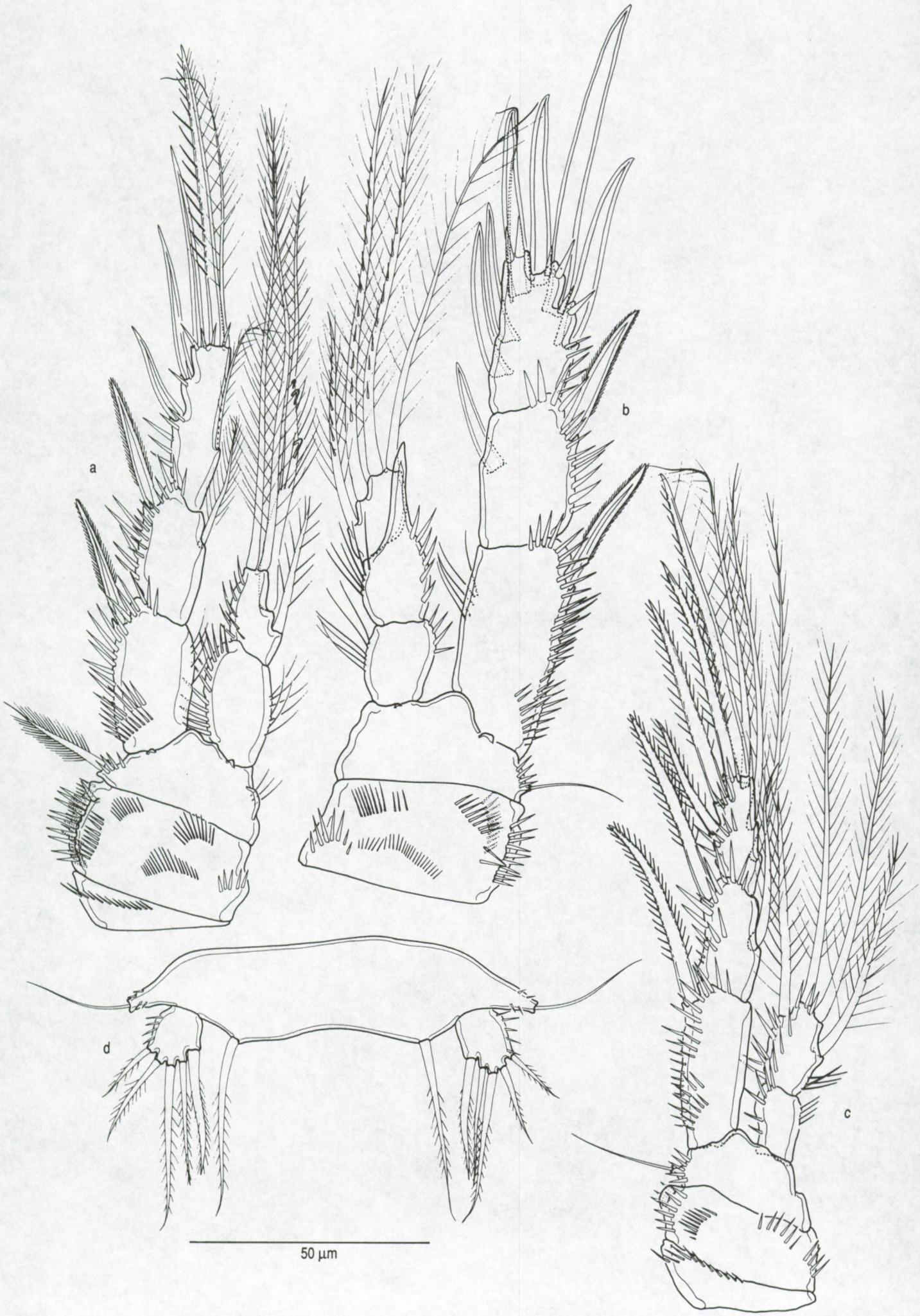

a
b
c
d
50 µm

Fig. 354. *Paralaophonte pacifica* Lang, female. a, habitus, dorsal; b, habitus, lateral.

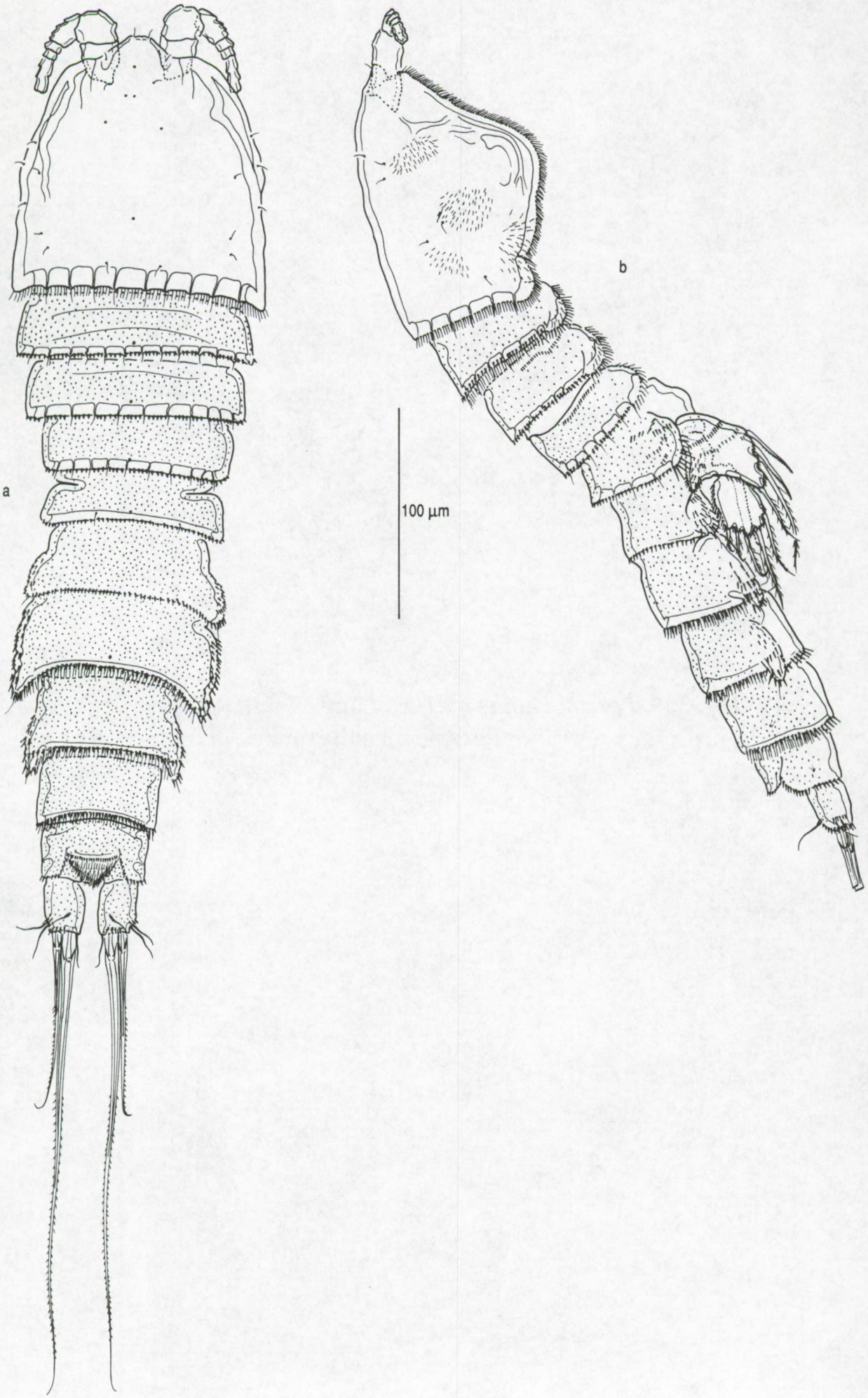

a
b
100 µm

Fig. 355. ***Paralaophonte pacifica*** **Lang, female. a, urosome, dorsal; b, urosome, ventral (P5 bearing-somite omited in both illustrations).**

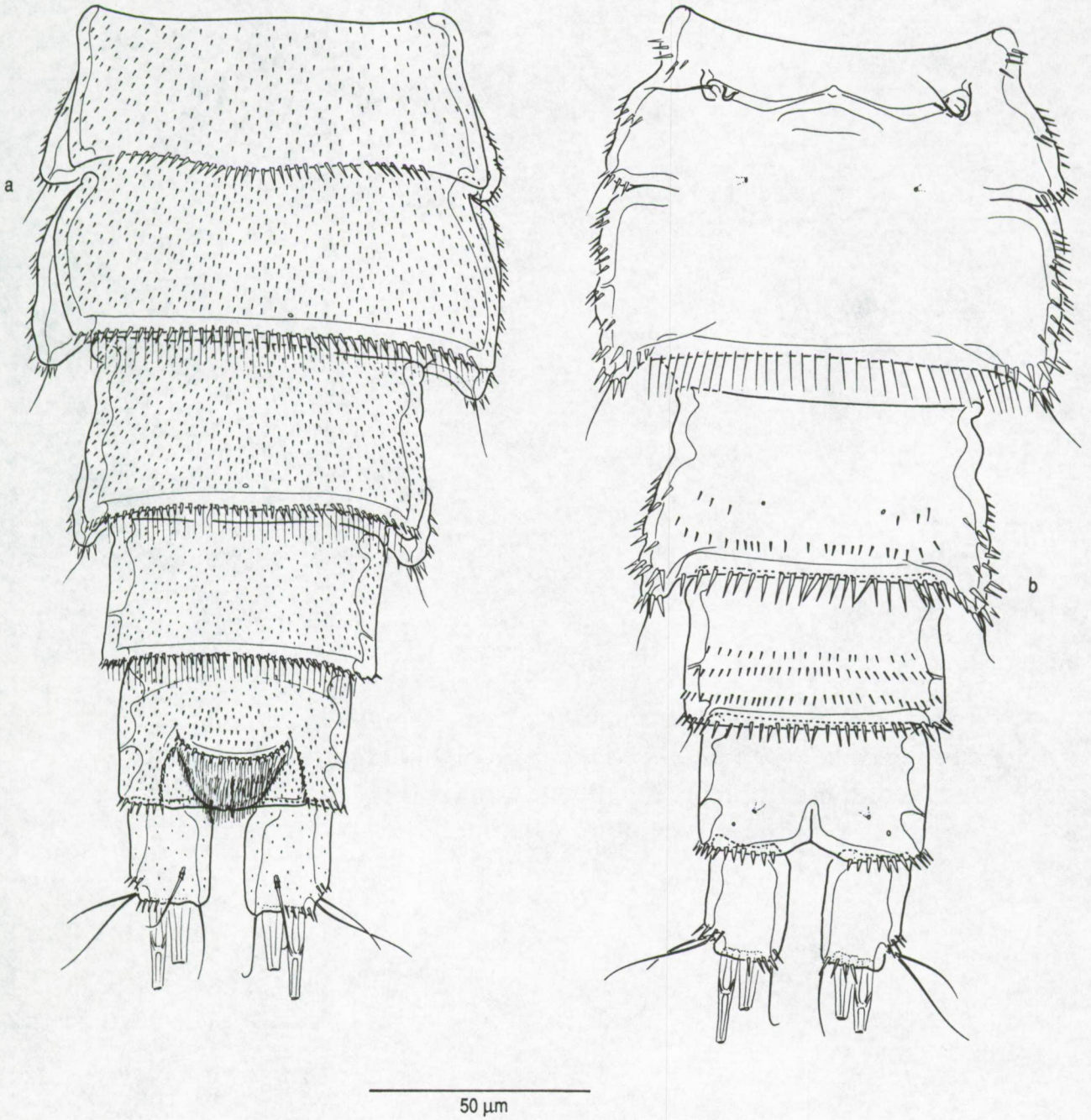

a
b
50 µm

Fig. 356. *Paralaophonte pacifica* Lang, female. a, antennule, exploded; b, antenna; c, endopodal segment of antenna, another view; d, mandible; e, maxillule; f, maxilla; g, maxilliped; h, antennule, male.

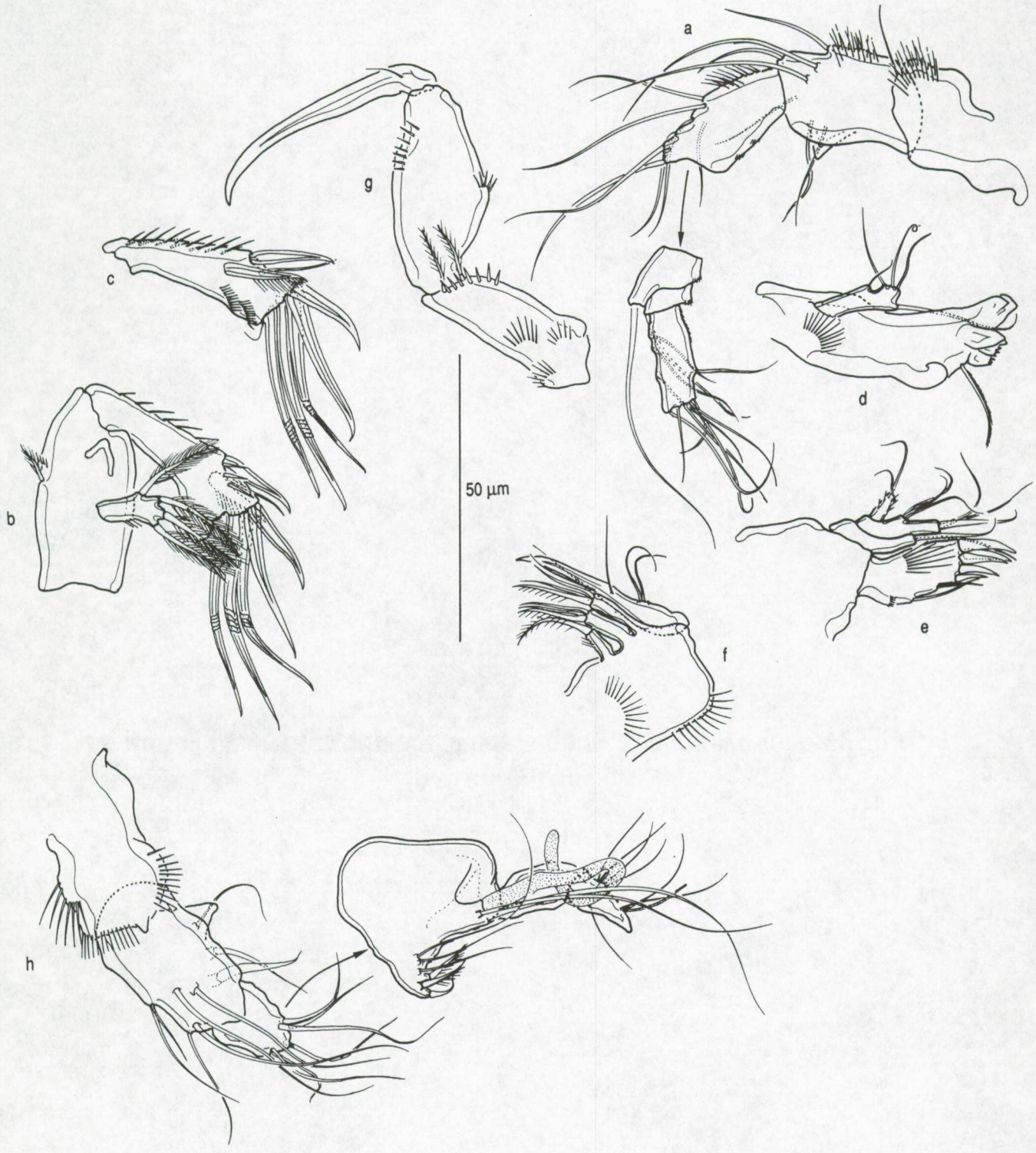
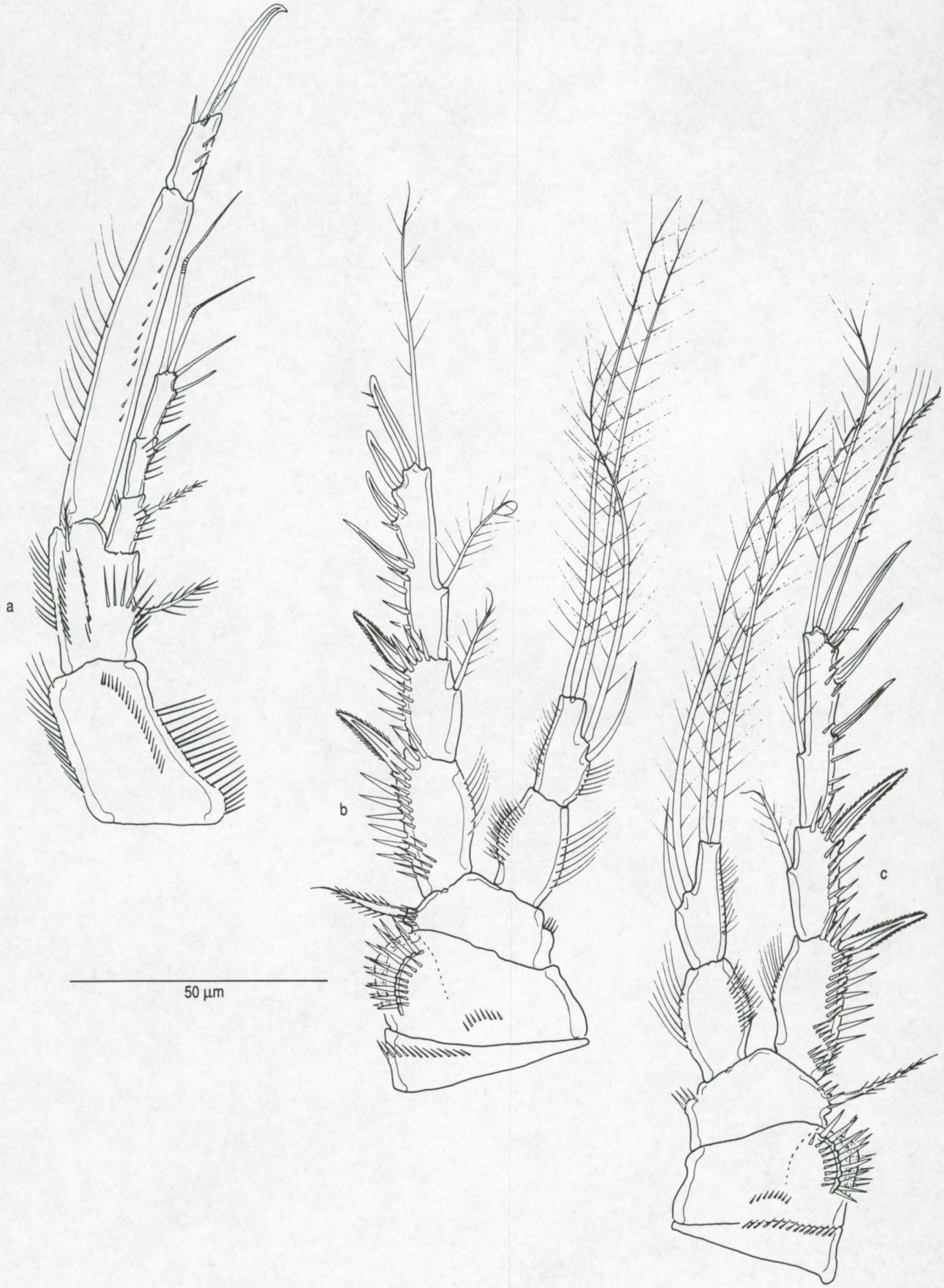

a
b
c
d
e
f
g
h
50 µm

Fig. 357. *Paralaophonte pacifica* Lang, female. a, P1; b, aberrant P2; c, P2, normal.


a
b
c
50 µm

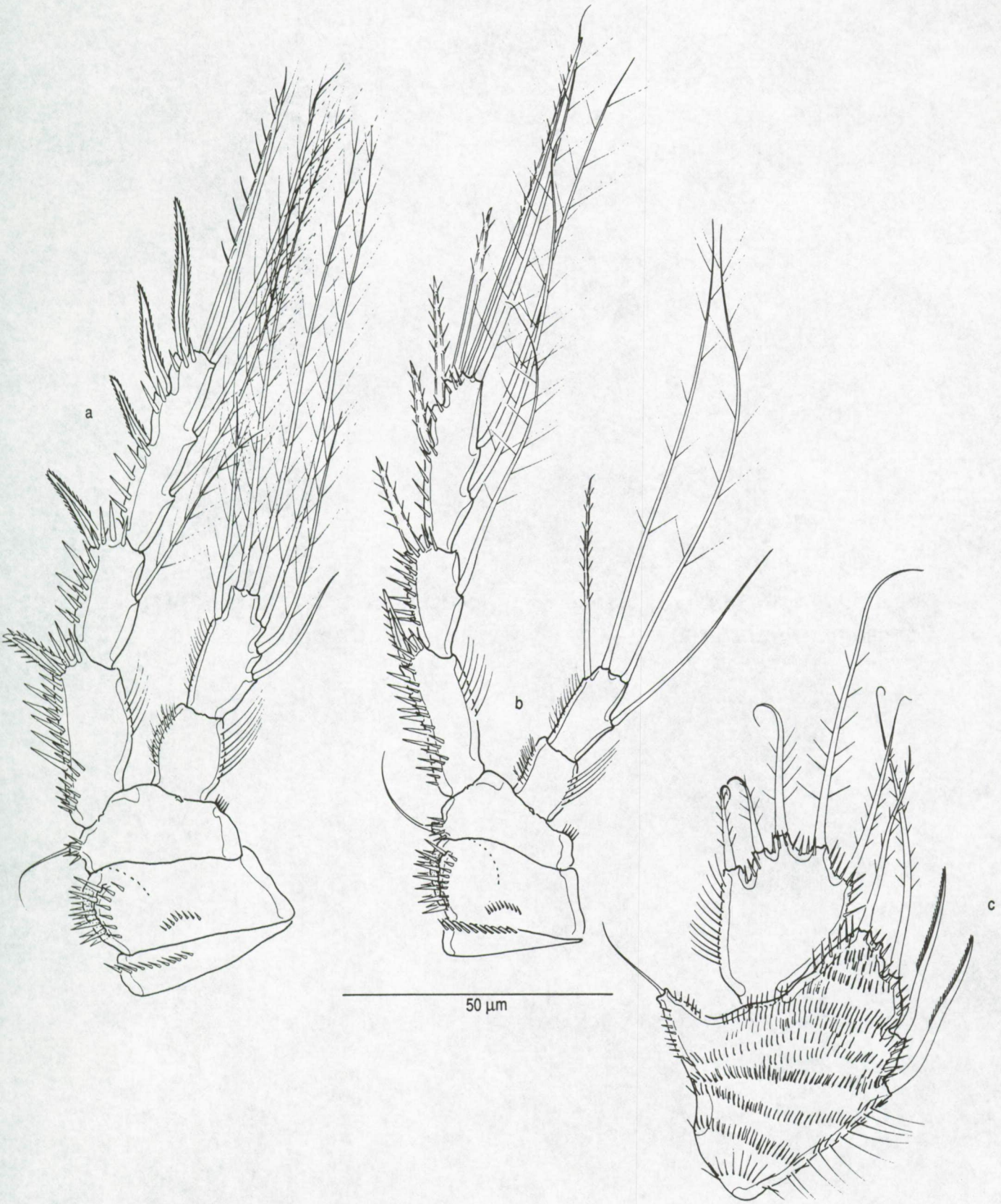

a
b
c
50 µm

Fig. 359. *Paralaophonte pacifica* Lang, male. a, urosome, dorsal; b, urosome, ventral, showing P6 (P5 bearing-somite omited in both figures).

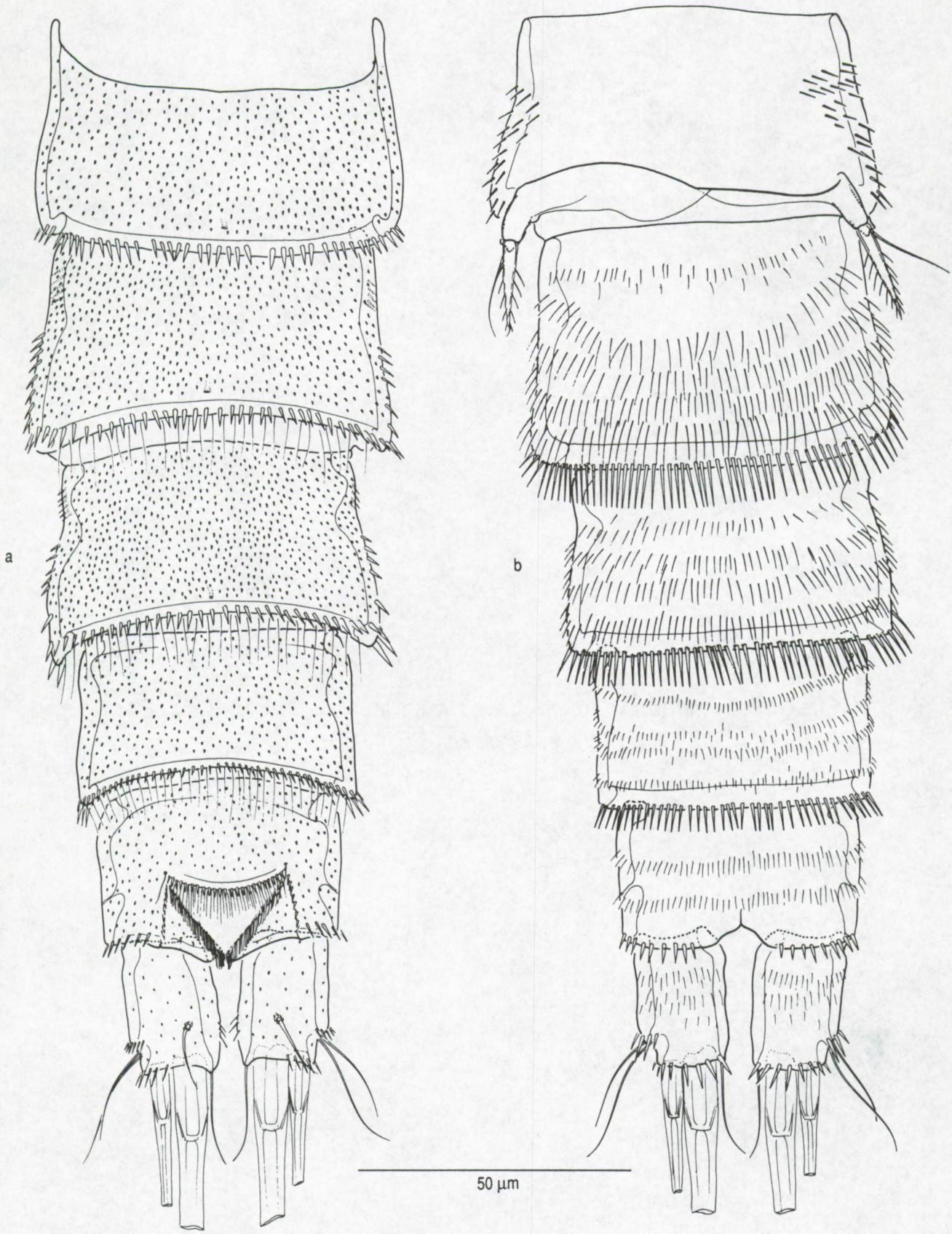

a
b
50 µm

Fig. 360. ***Paralaophonte pacifica*** **Lang, male. a, P2; b, P3, c, P4; d, P5; e, aberrant P5; f, P6.**

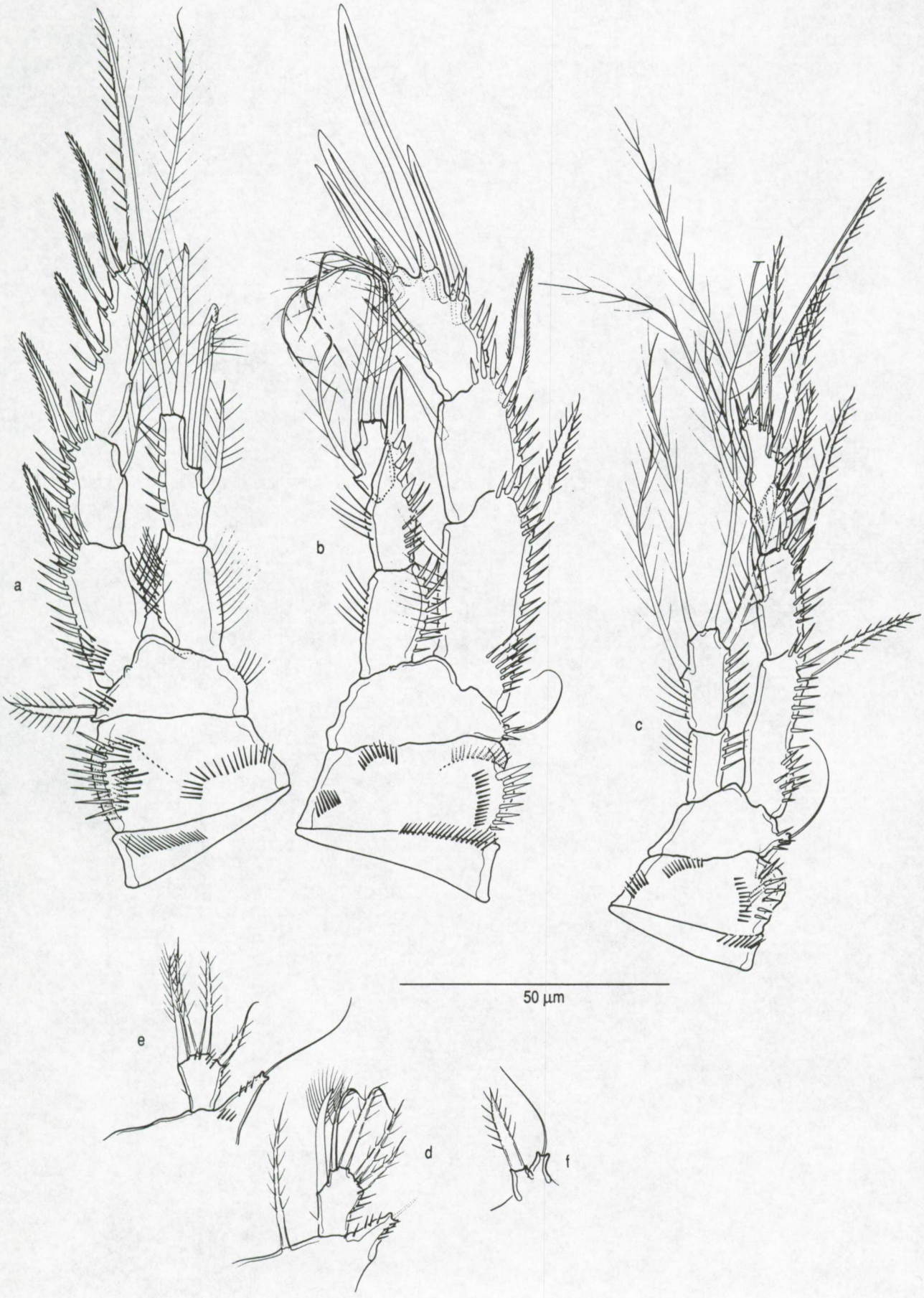

a
b
c
50 µm
e
d
f

Fig. 361. *Quinquelaophonte* n. sp. 1, female. a, urosome, dorsal; b, urosome, ventral (P5 bearing-somite omited).

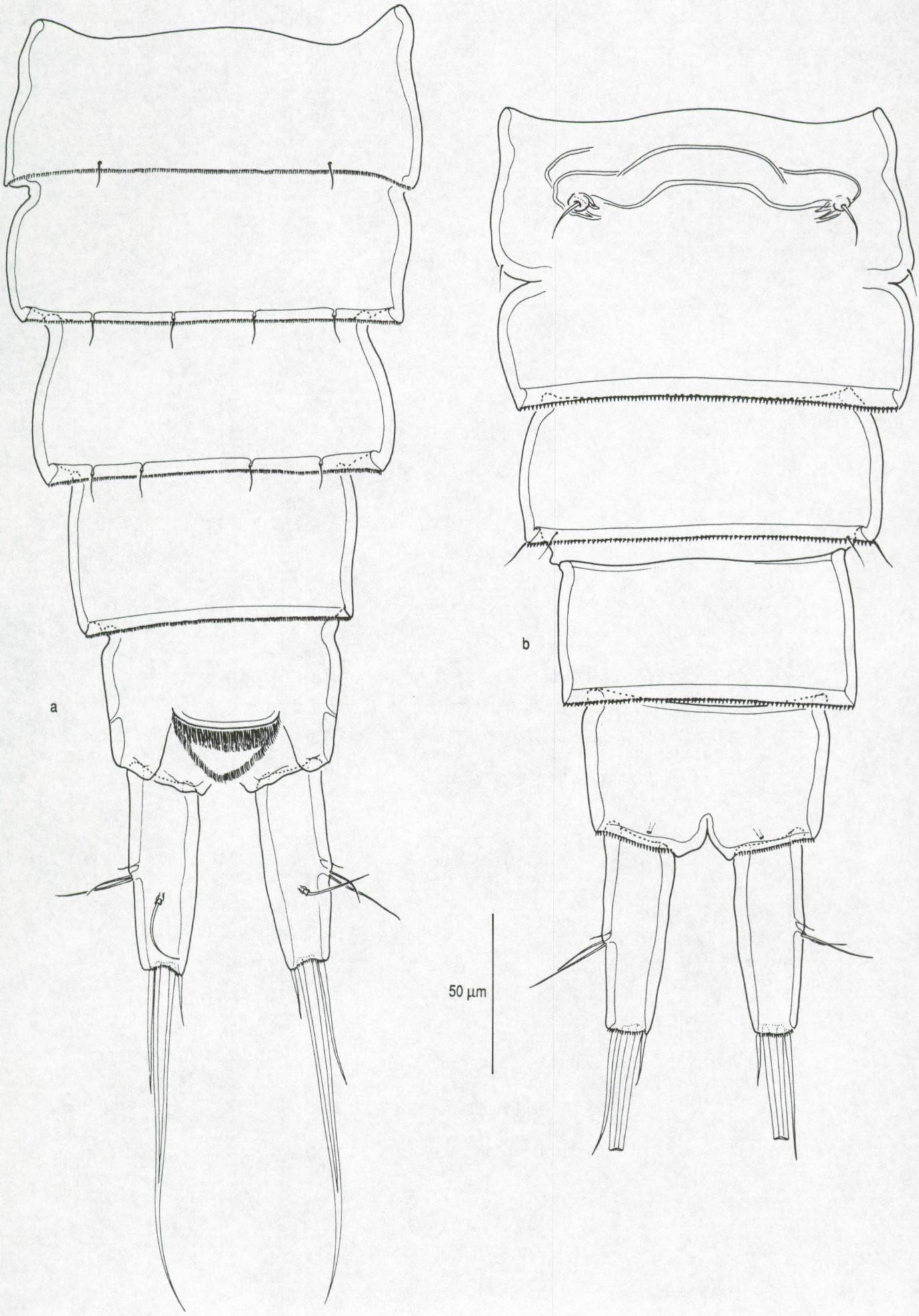

a
b
50 µm

Fig. 362. *Quinquelaophonte* n. sp.1. a, antennule; b, antenna; c, mandible; d, maxilliped; e, antennule (a-d, of female; e, of male).

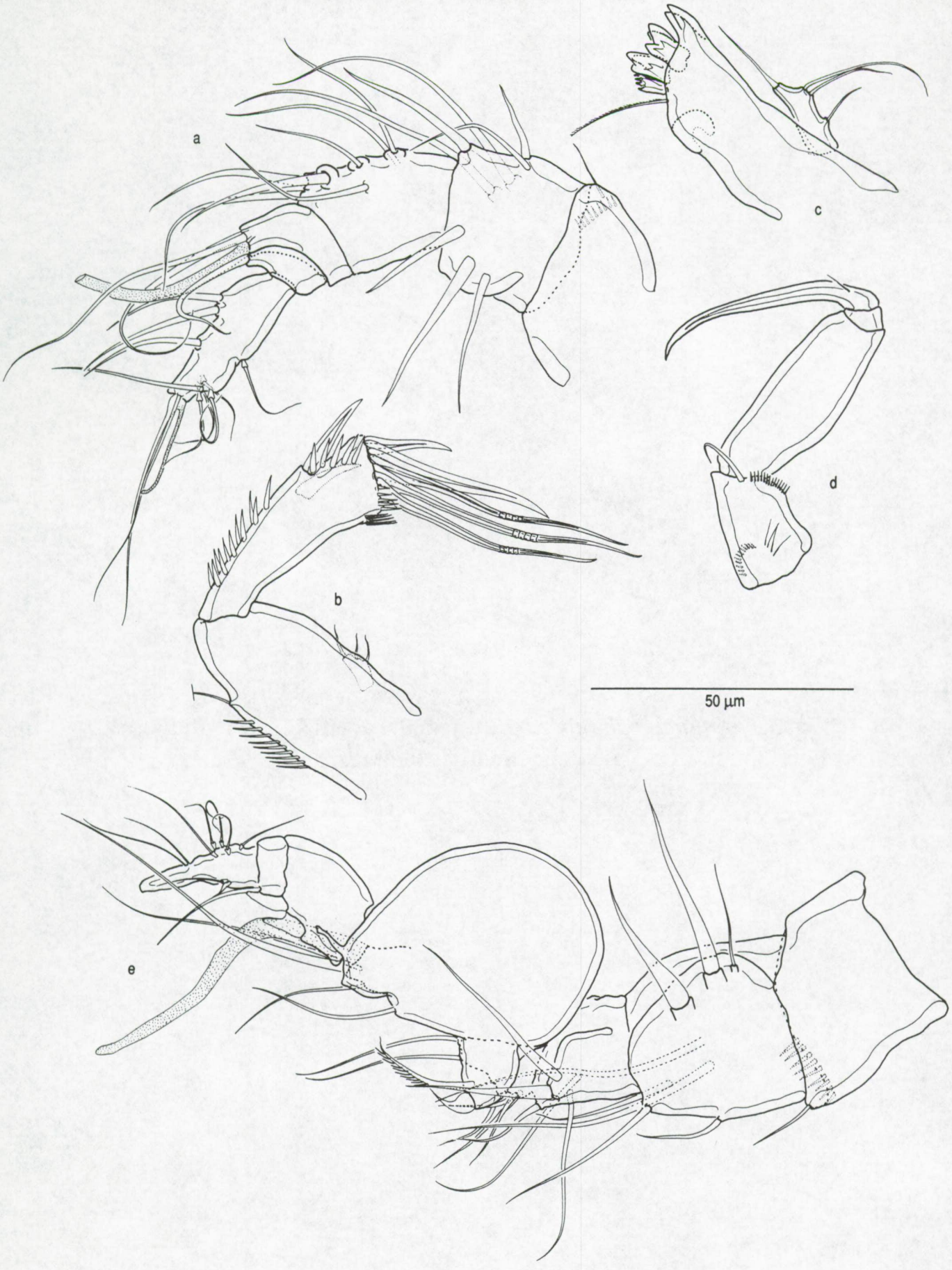
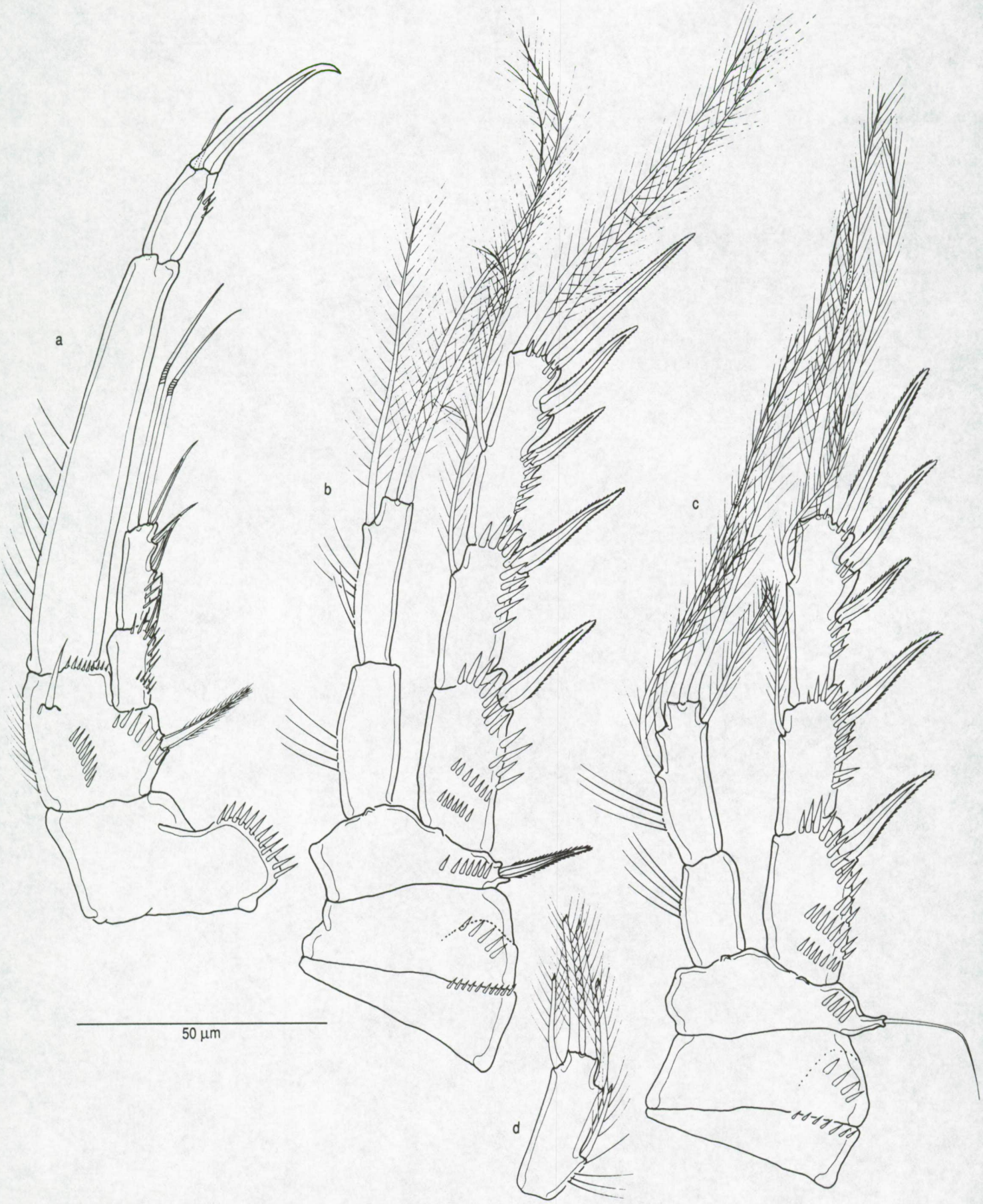

a
b
c
d
e
50 µm

Fig. 363. *Quinquelaophonte* n. sp. 1, female. a, P1; b, P2; c, P3; d, P3 ENP 2 of another female.


a
b
c
d
50 µm

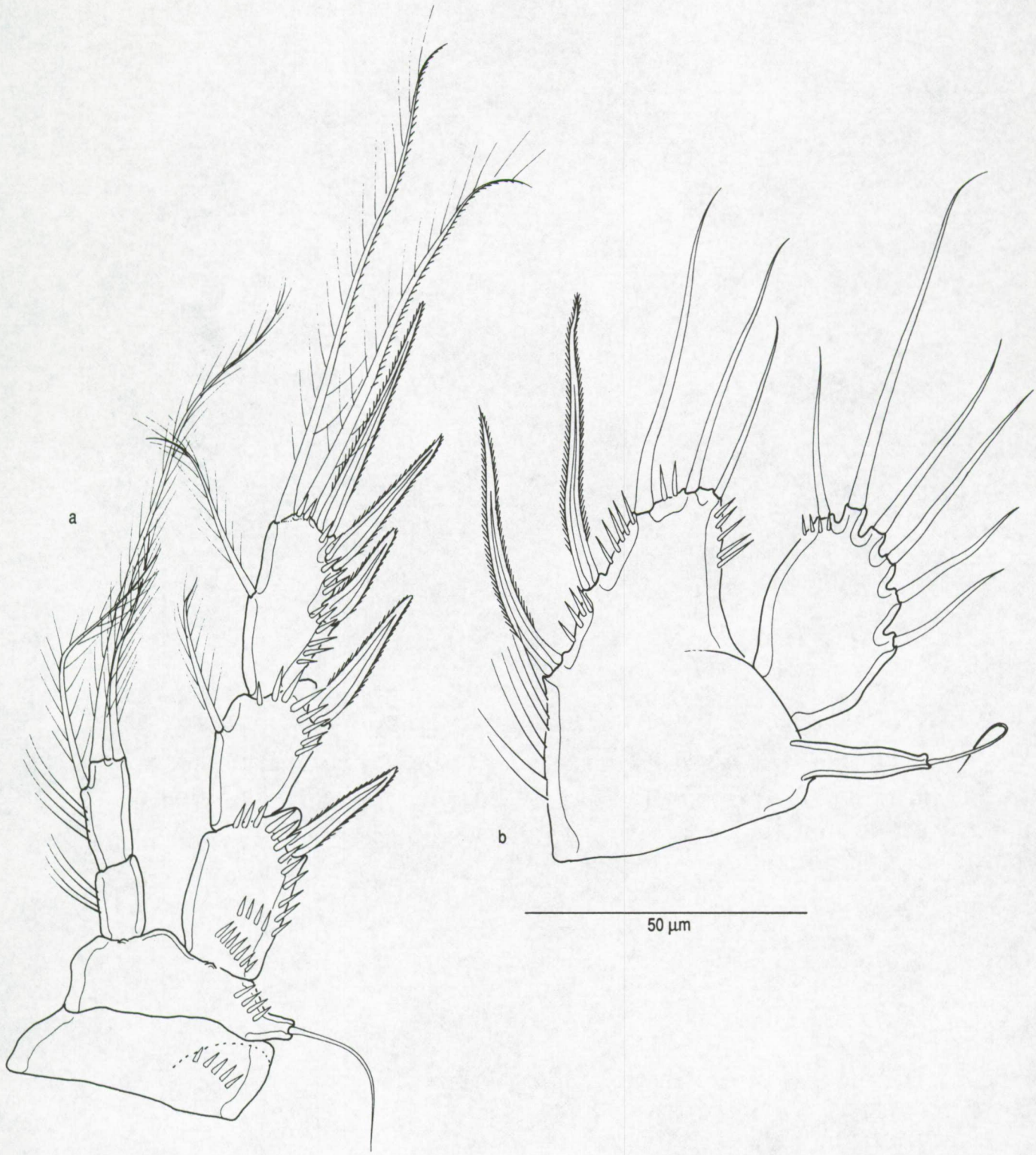

a
b
50 µm

Fig. 365. *Quinquelaophonte* n. sp. 1, male. a, urosome, dorsal; b, urosome, ventral (P5 and P6 bearing somites omited in both figures).

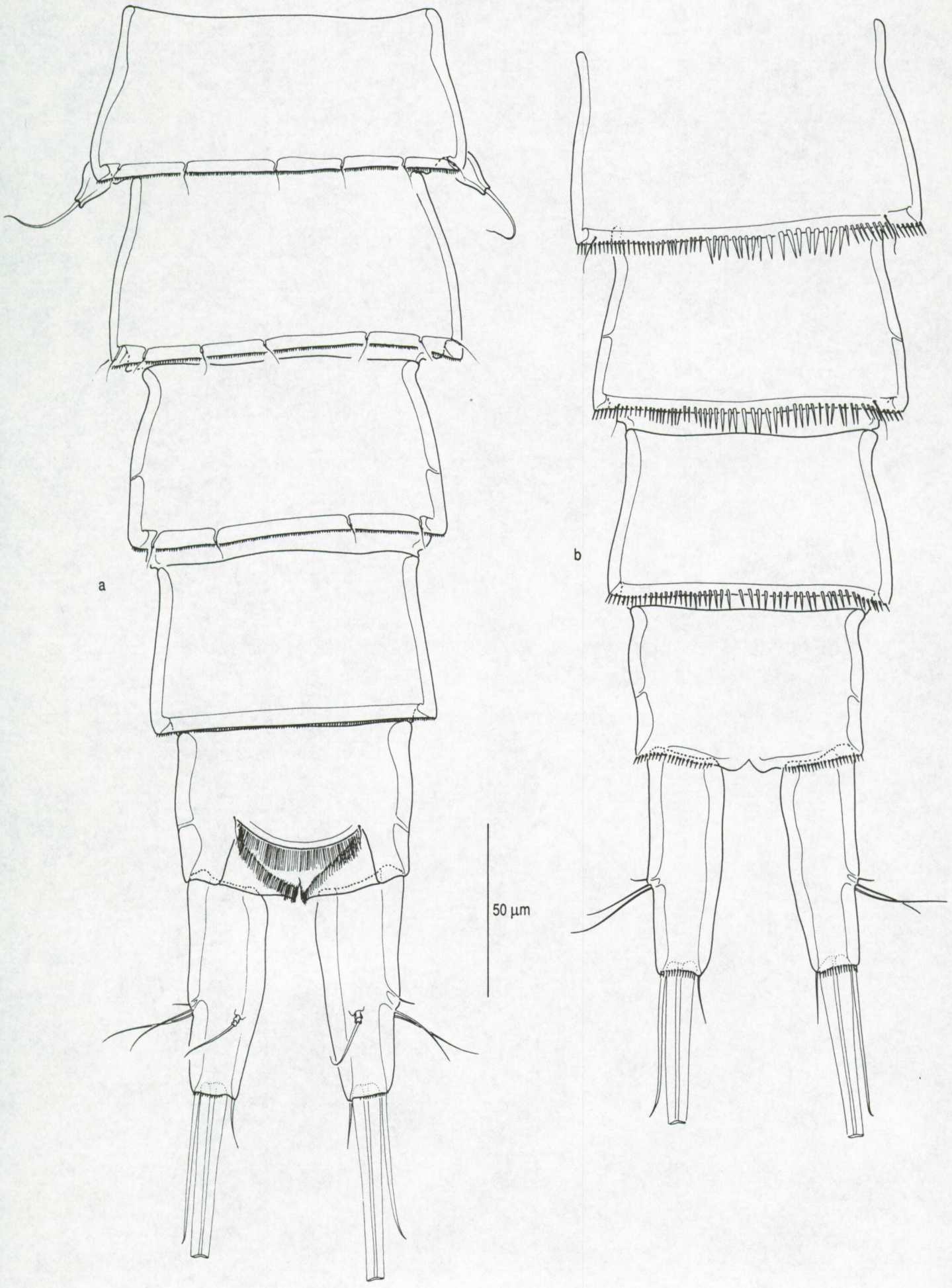

a
b
50 µm

Fig. 366. *Quinquelaophonte* n. sp. 1, male. a, P2; b, P3; c, P4; d, P5, e, P6.

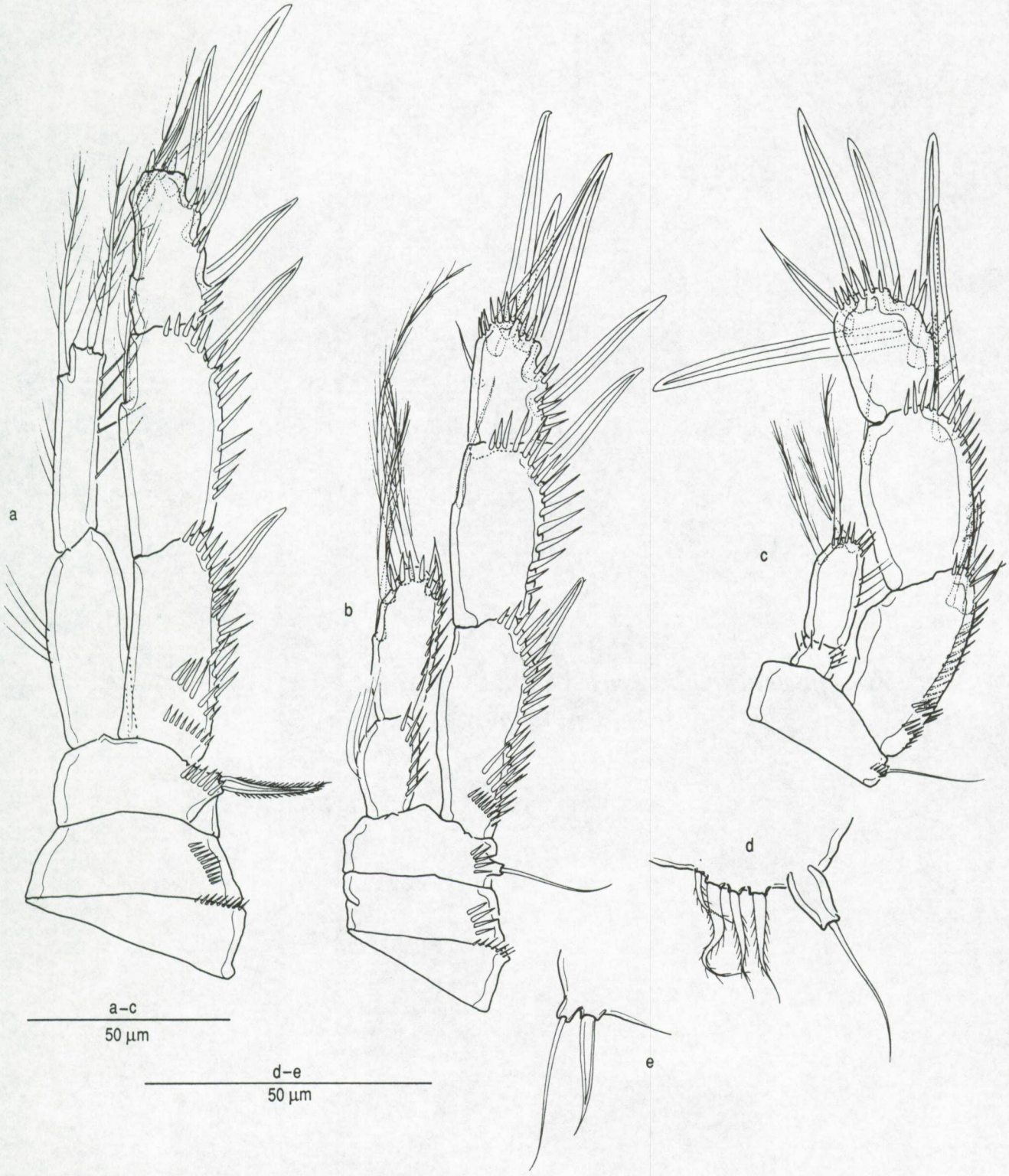
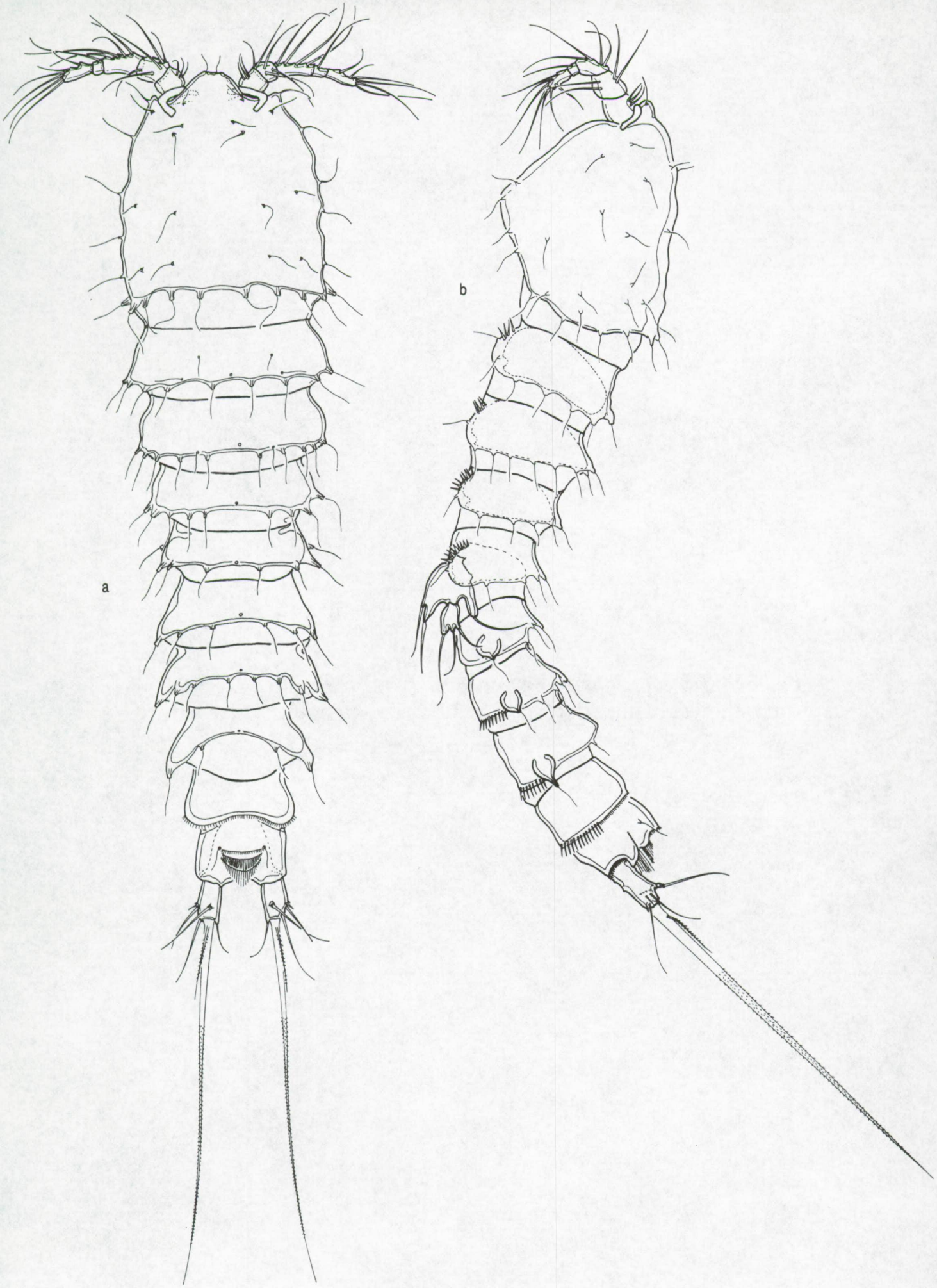

a
b
c
d
e
a–c
50 µm
d–e
50 µm

Fig. 367. *Onychocamptus krusensterni* Schizas & Shirley, female. a, habitus, dorsal; b, habitus, lateral.



a – b 100 µm

Fig. 368. *Onychocamptus krusensterni* Schizas & Shirley, female. a, maxilliped, b, maxillule; c, mandible; d, antennule, exploded; e, antenna; f, maxilla.

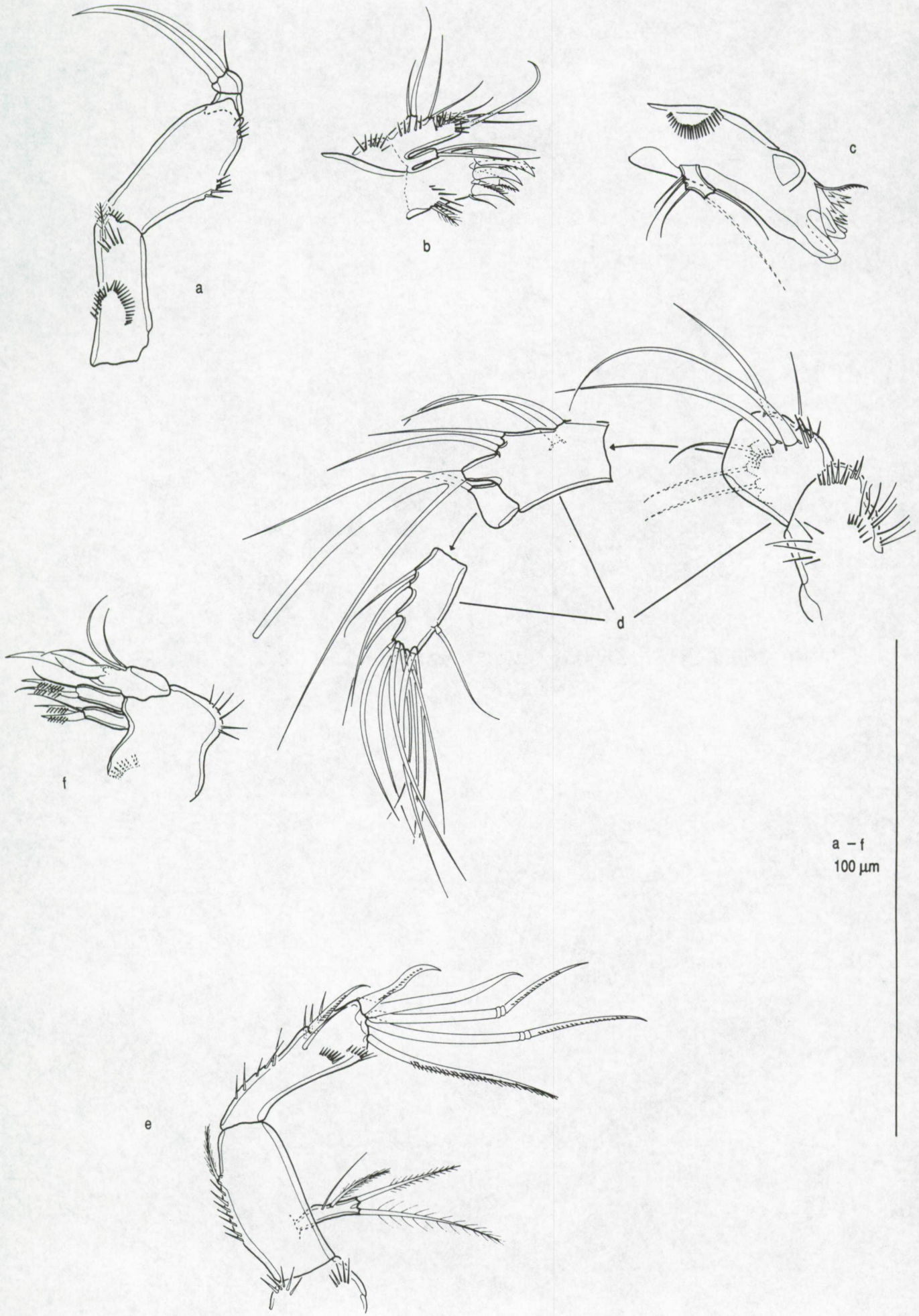

a
b
c
d
e
f
a – f
100 µm

Fig. 369. *Onychocamptus krusensterni* Schizas & Shirley, female. a, P1; b, P2; c, P3.

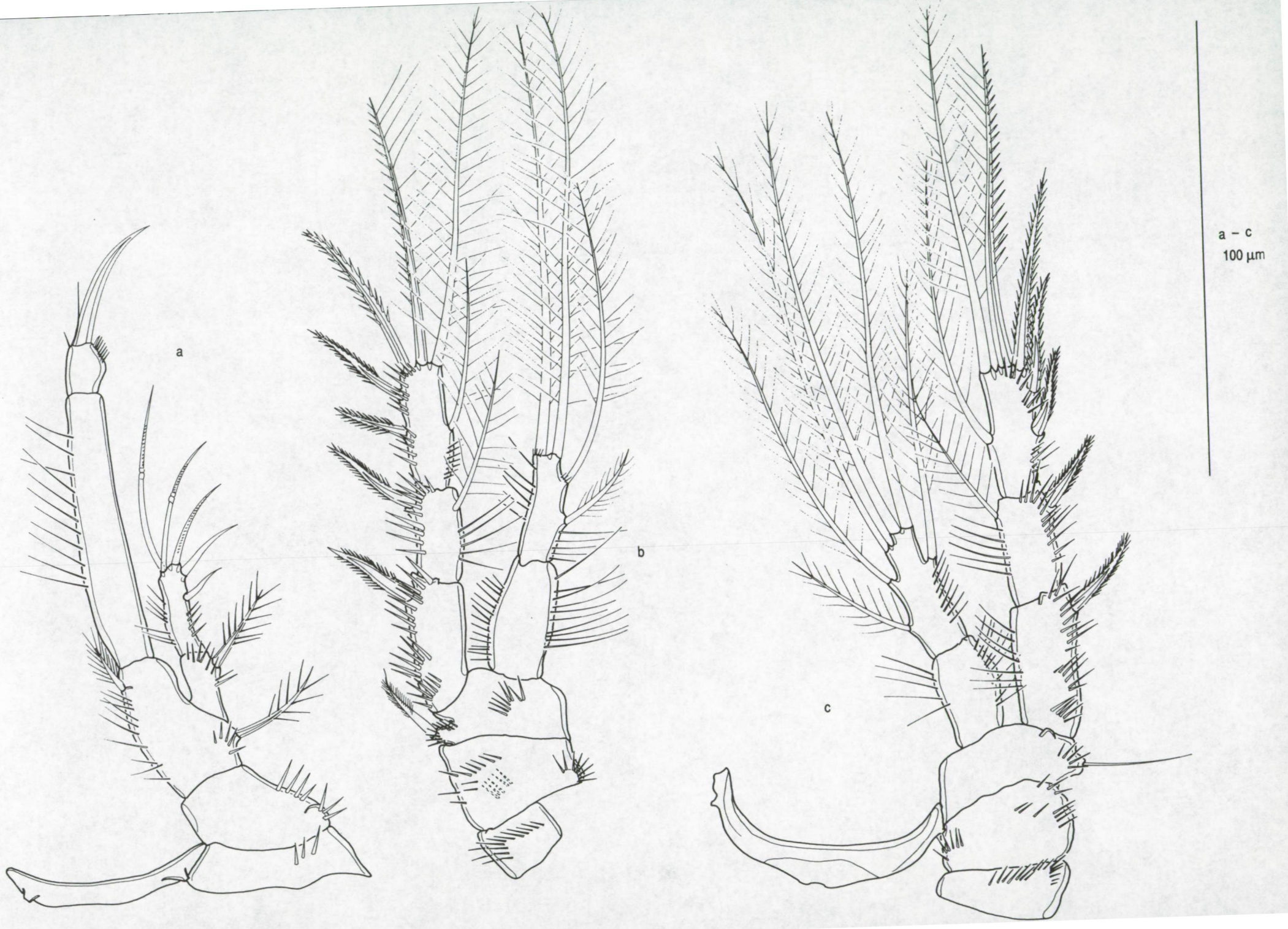

a
b
c
a – c
100 µm

Fig. 370. *Onychocamptus krusensterni* Schizas & Shirley, female. a, P4; b, P5; c, urosome, ventral (P5 bearing-somite omited).

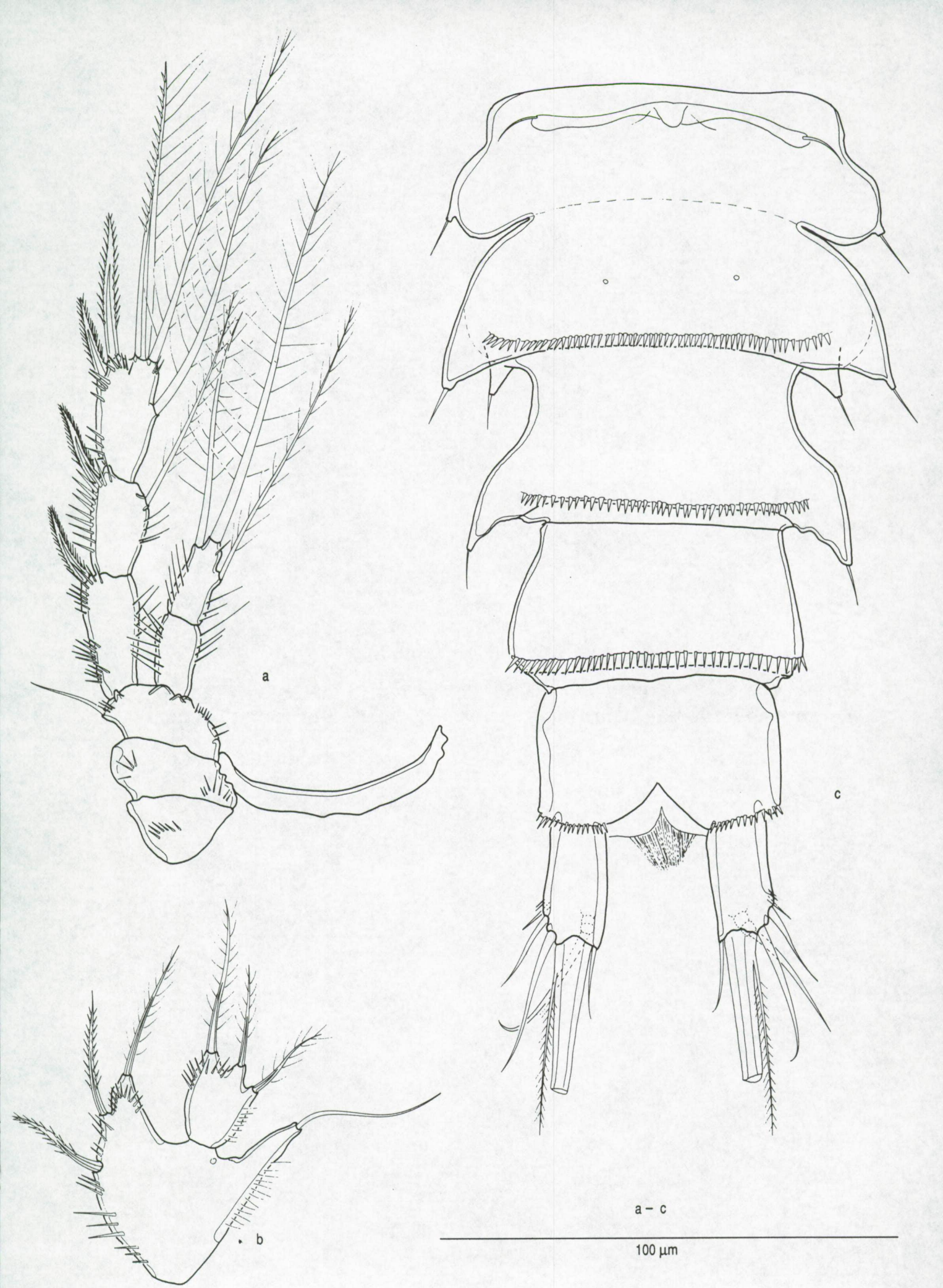

a
b
c
a – c
100 µm

Fig. 371. Normanellidae N. subfam. 1 *n. gen. 1 n. sp.1*, female. a, urosome, dorsal; b, urosome, ventral (P5 bearing-urosomite omited).

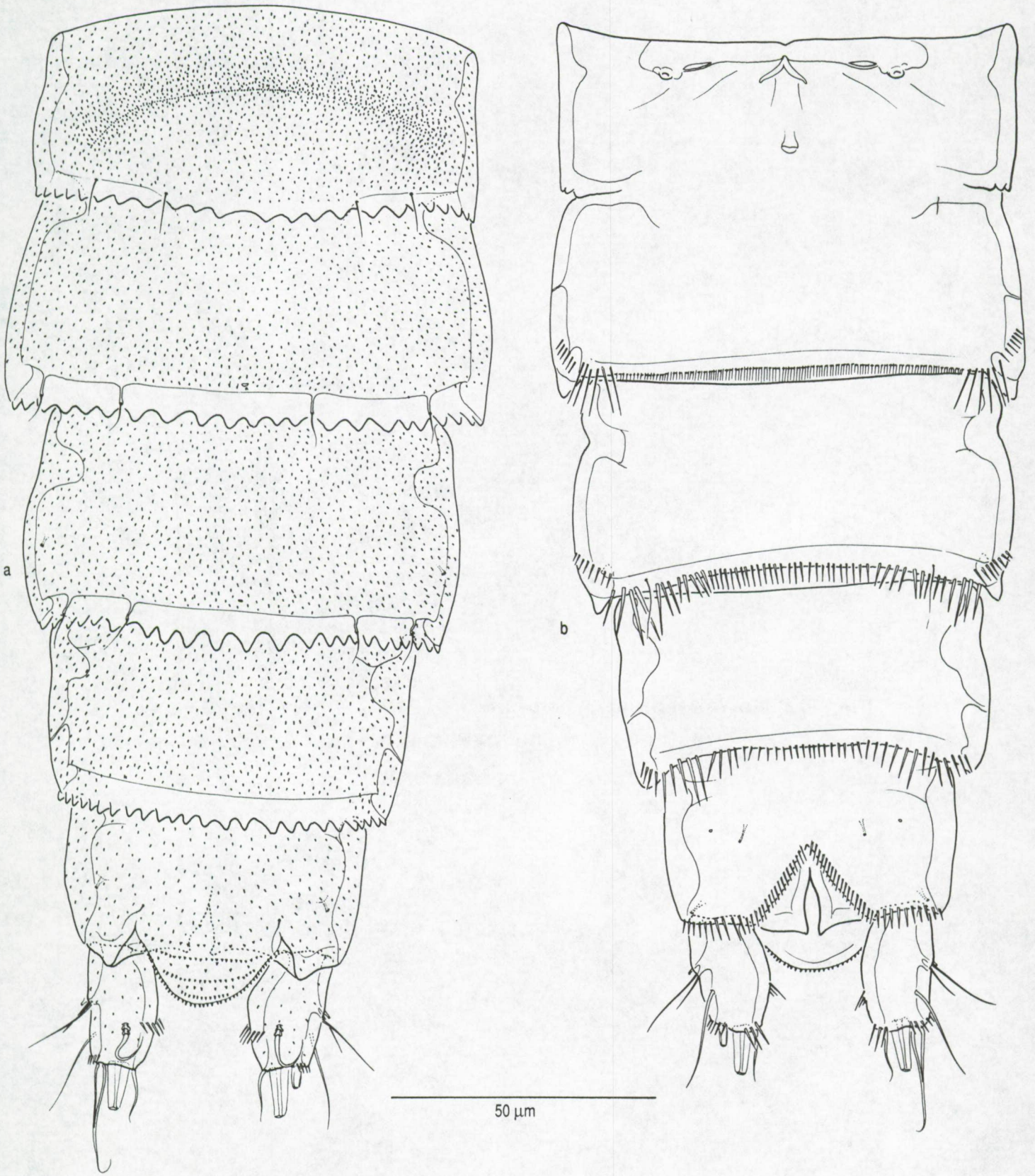

a
b
50 µm

Fig. 372. Normanellidae N. subfam. 1 *n. gen. 1 n. sp.1*, female. a, antennule; b, antenna; c, maxilla.

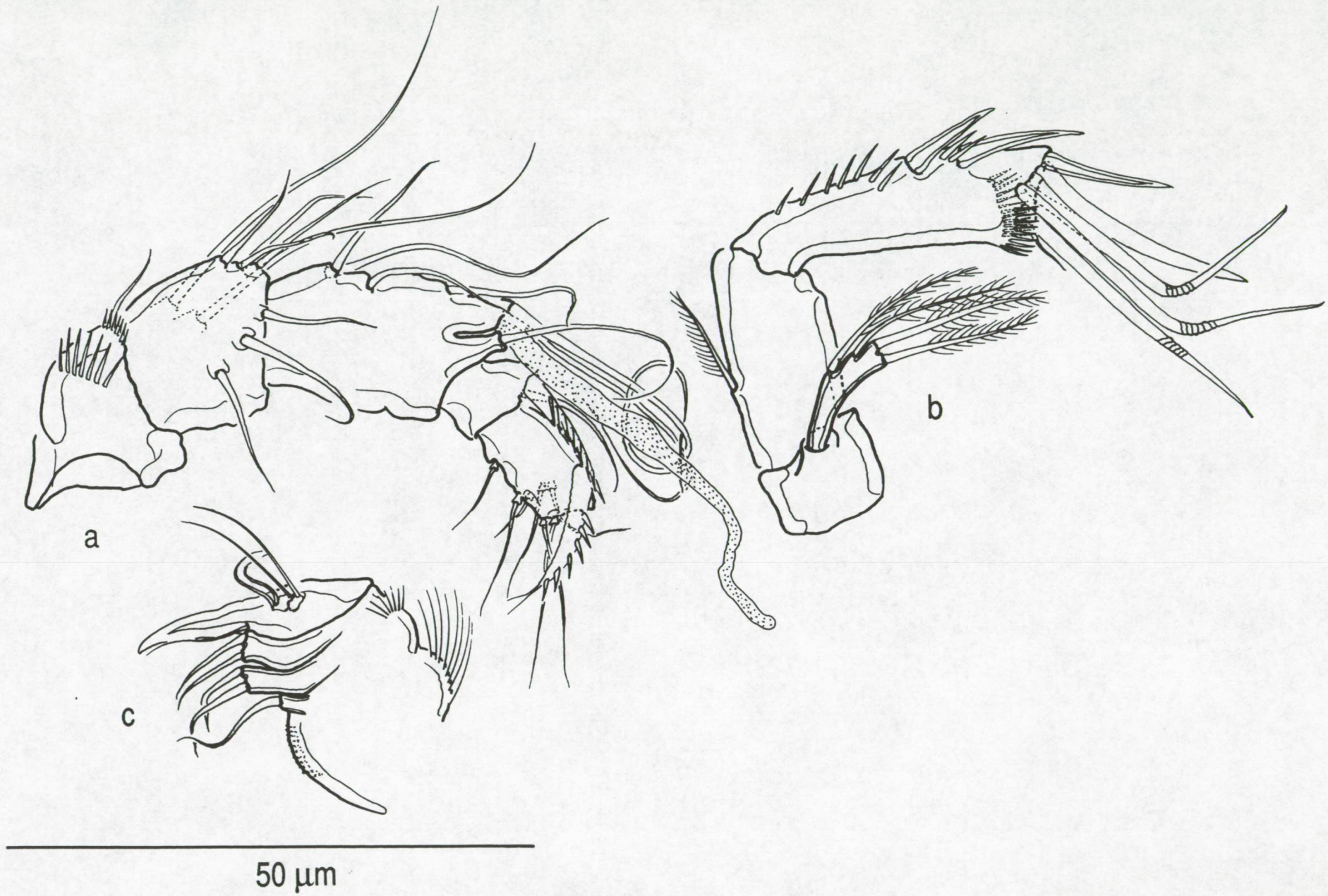

a
b
c
50 µm

Fig. 373. Normanellidae N. subfam. 1 *n. gen. 1 n. sp.1*, female. a, P1; b, P2; c, P3; d, P4; e, P5.


a
b
c
d
e
f
50 µm

Fig. 374. Normanellidae N. subfam. 1 *n. gen. 1 n. sp.1*, male. a, habitus, dorsal; b, urosome, ventral.

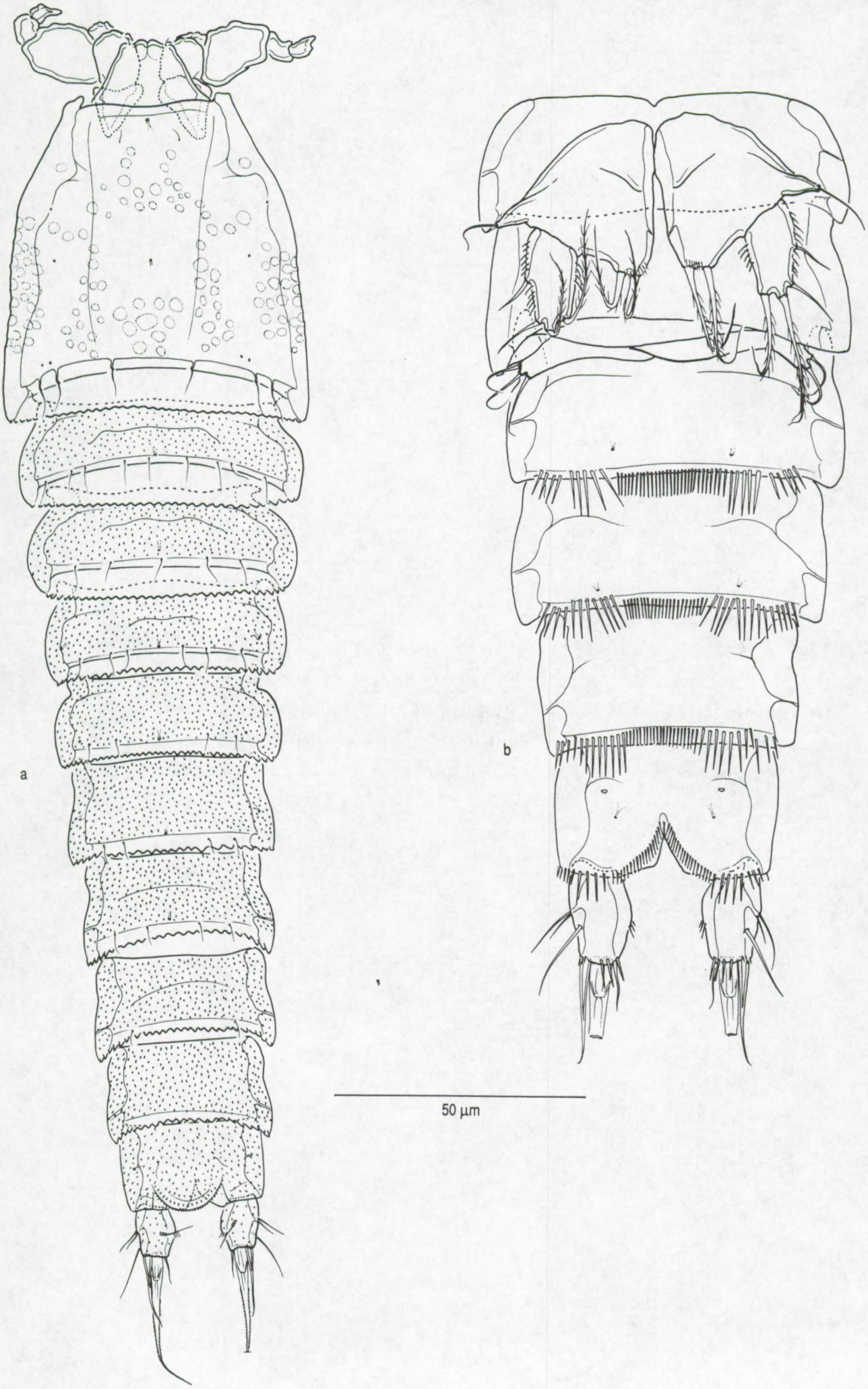

a
b
50 µm

Fig. 375. The *macronyx*-group of the genus *Leptastacus* T. Scott (Leptastacidae Lang *sensu* Huys). 1, track of the *macronyx*-group following Huys' (1992) phylogenetic vicariance model; 2, alternative track following a vicariance biogeographic approach; 3, area of overlap of Huys' (1992) phylogenetic vicariance track and the alternative vicariance biogeographic track.

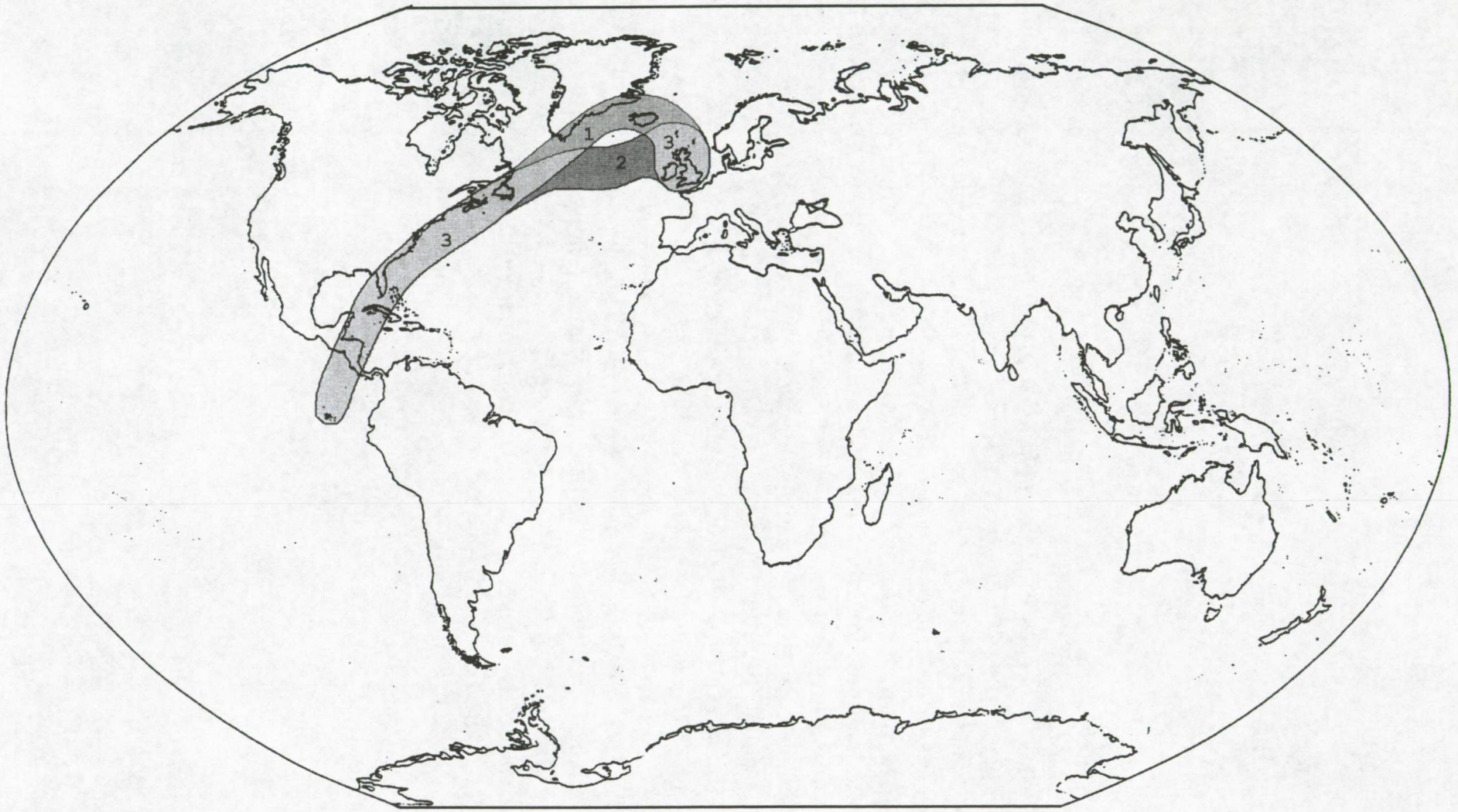

1
2
3
3'
3

Fig. 376. Track of the *helgolandica*-group of the genus *Longipedia* Claus (Longipediidae Sars *sensu* Lang). 1, track of *L. santacruzensis* Mielke; 2, track of *L. n. sp. 1*; 3, track of *L. americana* Wells; 4, generalized track of the *helgolandica*-group; 5, track of *L. minor* T. & A. Scott; 6, track of *L. helgolandica* Klie; a, *L. mourei* Jakobi was considered as *incertae sedis* and recently Wells (1986) considered the possibility that this species is not but a synonym of *L. americana* Wells; b, the discovery of *L. helgolandica* in South-west Africa raises the possibility that this species is distributed throughout the Eastern Atlantic, thus paralleling the possible Western-Atlantic distribution of *L. americana* Wells (Wells, 1986); c, T. Scott's (1894) possible record of *L. minor* from Angola introduces an element of discontinuity, but this may reflect only the lack of collecting in West Africa; d, Marques (1947, 1955) reported *L. longispina* from Guinea-Bissau, but since Marques' description lack the information necessary to determine the validity of the identification, Wells (1986) considers this as a probable record of *L. minor* T. & A. Scott;□*L. n. sp. 1*;☆*L. santacruzensis* Mielke;○*L. americana* Wells;▵*L. minor* T. & A. Scott;✱*L. helgolandica* Klie.

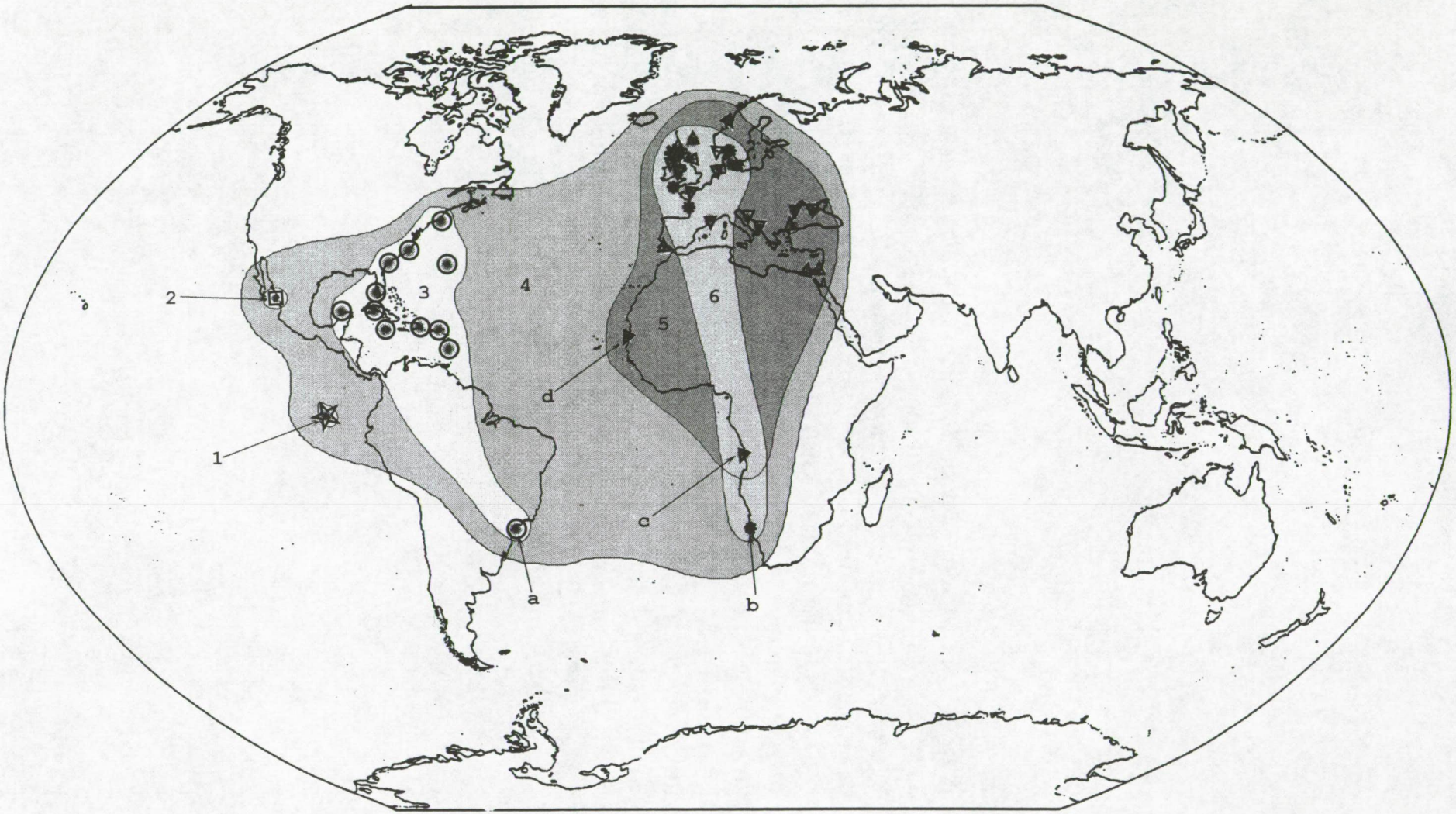
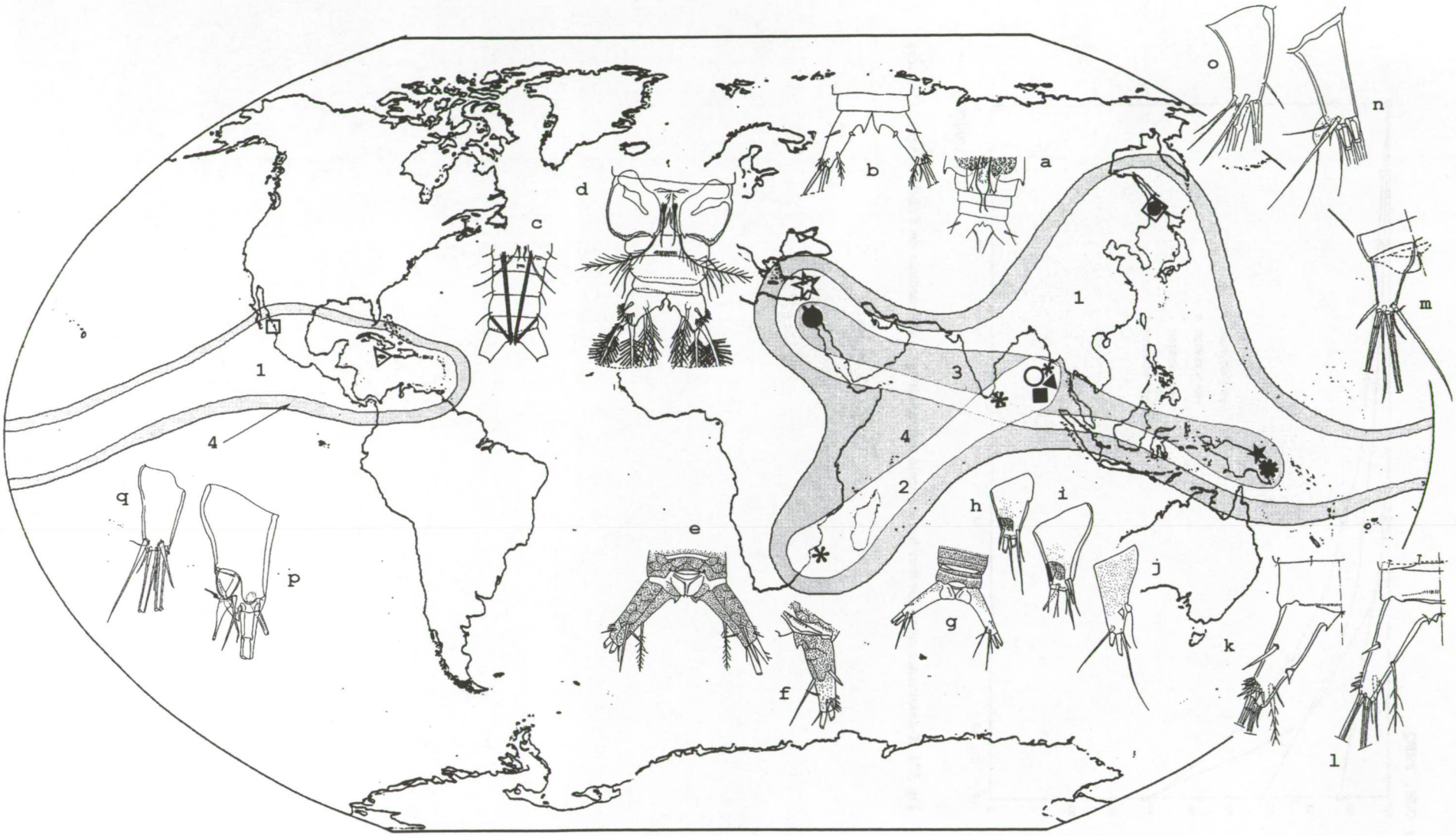

1
2
3
4
5
6
a
b
c
d

Fig. 377. Generalized track of the genus *Scottolana* Por and track of its species-groups. 1, track of the *dissimilis*-group; 2, track of the *longipes*-group; 3, track of the *uxoris*-group; since the *oleosa*-group in presently composed only of *L. oleosa*, the range of this species corresponds to the track of this species-group; a-b:☆Por's (1964b) *S. longipes* Thompson & A. Scott, a, male, b, female; c-d:●*S. uxoris* Por, c, male and female, ventral, d, male, ventral; e-f:✻*S. longipes* Thompson & A. Scott *sensu* Wells (1986), female, e, dorsal, f, ventral; g:▲*S. oleosa* Wells, female, dorsal; h-i:■*S. rostrata* Wells, h, male, ventral, i, female, ventral; j:○*S. tumidiseta* Wells, female, ventral; k-l:✸*S. dissimilis* Fiers, k, female, dorsal, l, male, dorsal; m: ★*S. glabra* Fiers, female; n-o:◙*S. bulbifera* Chislenko, n, female, o, male; p-q:△*S. antillensis* Fiers, p, female, ventral, q, male ventral; □S. sp. 1.


a
b
c
d
e
f
g
h
i
j
k
l
m
n
o
p
q
1
2
3
4