

SPECIES OF *MACROCHIRIDOTHEA* OHLIN, 1901 (ISOPODA, VALVIFERA) FROM
SOUTHERN BRAZIL, WITH NOTES ON REMAINING SPECIES OF THE GENUS*

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SYNOPSIS

This paper reports the species of *Macrochiridothea* occurring up to now on the continental shelf of southern Brazil. Two species are new to science: *M. marcusii* sp. n. and *M. lilianae* sp. n.. *M. stebbingi* Ohlin, 1901, is the third species reported for the area. The genus now comprises 8 species. A diagnosis for the genus, as well as for all the species is given, together with comprehensive illustrations to permit prompt recognition of the species. Secondary sexual dimorphism is reported for the first time in the genus. A classification key based on adults is furnished, and remarks or comments for each species are made. The geographic range for the genus has been considerably extended to the north, to about Lat. 23°07'S. General ecological and zoogeographical remarks are made.

INTRODUCTION

The present paper deals with species of *Macrochiridothea* (Isopoda, Valvifera) occurring along the continental shelf of southern Brazil (Moreira, 1970). The genus seems to be well represented within the area, and it is quite certain that more species will be found in this region when it is more thoroughly investigated.

The soft bottom marine Isopoda fauna from southern Brazil bears close relationship with those of Antarctic and chiefly with those of Sub-Antarctic areas (Moreira, 1966). As more findings of *Macrochiridothea* species from these areas can be expected along the southern Brazilian shelf, all actually known species of the genus are briefly discussed and comprehensively illustrated.

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Family IDOTEIDAE
Subfamily CHAETILINAE Dana, 1852
Genus *MACROCHIRIDOTHEA* Ohlin, 1901

Macrochiridothea Ohlin, 1901, p. 286; Nordenstam, 1933, p. 105; Menzies, 1962, p. 98; Hurley & Murray, 1968, p. 244.

DIAGNOSIS - Cephalon laterally expanded, with a deep incision on either side, posterior part immersed in pereonite I. Eyes, when present, dorsal. Maxilliped, palp 4-articulated. Maxilla 1, inner lobe with 2 apical setae. Mandible with lacinia mobilis and setal row, no molar process. Coxal plates marked off dorsally only on pereonites V-VII. Pereopods I-III sub-chelate, the first with propodus strongly developed. Pereopod IV with a minute dactylus, those of pereopods V-VII small, ending in a long seta. Pereopod VII elongate, but not as long as body. Pleon with 4 pleonites, last one free, indistinct or well marked but without free lateral margins. Uropod biramous.

- modified after Menzies, 1962.

GENEROTYPE - *Macrochiridothea michaelseni* Ohlin, 1901, p. 287-289, pls XXI-XXII, fig. 8.

NUMBER OF SPECIES - Eight, of which two are here described as new.

RANGE - New Zealand shores, and East and West coast of southern part of South America.

REMARKS - In the subfamily Chaetilinae the antenna 1 is composed of a 3-articulated peduncle, and a flagellum "appearing as a single clavate article" (Menzies 1962, p. 96). Actually, in all described species of *Macrochiridothea* the flagellum is composed of 2 or 3 articles, the 1st article being always elongate and the largest, and the penultimate and/or ultimate articles being very small.

One of the most variable characters within the species of the genus is related to the number of segments composing the pleon. The first 3 pleonites are always free and distinct. The pleonite 4, however, sometimes is coalesced medially to the pleotelson and has free lateral margins, sometimes it is clearly marked but has no free lateral margins, and sometimes it is hardly discernible.

Six species of this genus have previously been reported:

- 1 - *M. michaelseni* Ohlin, 1901
- 2 - *M. stebbingi* Ohlin, 1901
- 3 - *M. kruimeli* Nierstrasz, 1918
- 4 - *M. setifer* Menzies, 1962
- 5 - *M. uncinata* Hurley & Murray, 1968
- 6 - *M. robusta* Bastida & Torti, 1969

To this list two new species are added, increasing to 8 the actual number of known species in the genus:

- 7 - *M. marcusii* sp. n.
- 8 - *M. liliana*e sp. n.

The following species are here recorded from southern Brazil: *M. stebbingi*, *M. marcusii* sp. n. and *M. liliana*e sp. n.

KEY TO SPECIES OF *MACROCHIRIDOTHEA*

- 1 - Body tuberculated 2
 - Body smooth 4
- 2 - Pleotelson with 2 longitudinal carinae situated very laterally, one on each side; apex acutely pointed or with a medial spine; pleonite 4 well marked but without free lateral margins *M. stebbingi*
 - Pleotelson devoid of lateral carinae 3
- 3 - Pleotelson with 3 longitudinal carinae placed medially close together, the mid one stronger; apex acutely pointed; pleonite 4 indistinct *M. marcusii* sp. n.
 - Pleotelson anteriorly devoid of tubercles; 1 longitudinal carina medially; all 4 pleonites with free lateral margins *M. kruimeli*
- 4 - Ischium of pereopod V with 1 prominent uncinata hook *M. uncinata*
 - Ischium of pereopod V without uncinata hook 5
- 5 - Eyes present 6
 - Eyes lacking 7
- 6 - Cephalon with a pair of flattened posterolateral elevations *M. setifer*
 - Cephalon without flattened posterolateral elevations .. *M. liliana*e sp. n.
- 7 - Antenna 1 with peduncular article 2 strongly projected at the outer angle; apex of pleotelson produced in a distinct point *M. michaelsoni*
 - Dorsolateral sides of pereonite I prolonging backwards into a prominent spine; pereonite VI the largest of pereon, and with a short, rounded middistal point; apex of pleotelson acutely pointed *M. robusta*

Macrochiridothea stebbingi Ohlin, 1901

(Figs 1-3)

Macrochiridothea stebbingi Ohlin, 1901, p. 289-291, pl. XXII (fig.9); *Stebbingi*, 1914, p. 353-354; Sheppard, 1957, p. 170-172, fig. 12; Menzies, 1962, p. 98-101, fig. 33.

Macrochiridothea stebbingi var. *multituberculata* Nordenstam, 1933, p. 110-112, fig. 26, pl. I (fig. 7).

DIAGNOSIS - Body tuberculated. Eyes present or absent. Cephalon with frontal row of 2 and posterior row of 4 tubercles along distal margin. Pereonite VI with 3 tubercles, VII with 1 or 3 tubercles on midposterior margin. Pleonite 4 well marked but devoid of free lateral margins. Pleotelson with 1 anterior median tubercle, anterolateral sides with or without tubercles; midlongitudinal carina indistinct or lightly marked; 2 longitudinal carinae situated very laterally, one on each side; apex acutely pointed or with a medial spine surrounded by long, plumose setae.

- modified after Menzies, 1962.

HOLOTYPE - Female, 7.0 mm long.

TYPE LOCALITY - Tierra del Fuego, South America, between Isla Nueva and Navarino, 55 m depth.

SIZE RANGE - Adult females, 7.0-15.0 mm long; adult male, 6.0 mm in length.

MATERIAL EXAMINED - See Benthic Station List, for details on station. Rio Grande do Sul. GEDIP Sta. 410: 4 males (4.2, 4.5, 5.0 and 10.0 mm).

BATHYMETRICAL DISTRIBUTION - The species depth ranges from intertidal to 309 m.

GEOGRAPHICAL DISTRIBUTION - Tierra del Fuego (Ohlin, 1901). Port Harriet and Port Williams, Falkland Islands (Stebbingi, 1914; Nordenstam, 1933). N of Le Maire Strait and N of the Falkland Islands, Lat. 54°00'S, Long. 64°57'30"W, and from Lat. 45°13'S, Long. 60°00'W to Lat. 45°13.8'S, Long. 60°00.5'W (Sheppard, 1957). Seno Reloncavi, Chile, S of Punta San Pedro at Isla Maillén, Lat. 41°35'S, Long. 72°58'20"W (Menzies, 1962). Rio Grande do Sul, off Arroio Chuí, Brazil, Lat. 34°03'S, Long. 52°07'W (present recording).

REMARKS - This species may be readily distinguished from all other in the genus by the sharp tubercles on the dorsum of the body, and by the 2 longitudinal carinae placed very laterally one on each side, on the dorsum of the pleotelson.

Nordenstam described in 1933 a variety of *M. stebbingi* which she named var. *multituberculata*. Sheppard (1957), however, considered it as a true *stebbingi*, as for this author the characteristics of the variety are within the normal variation of *stebbingi*. Menzies (1962) suggests that it is probably a distinct species. I examined specimens of *stebbingi* and agree with Sheppard's observations.

The following remarks can be made on the collected specimens:

Cephalon with tubercles as described by Menzies (1962), but in larger specimens additional tubercles may be present; lateral margins crenulated and bordered by long setae; lateral incisions short, widening outwardly; both lobes at each side of incisions distinctly upturned; eyes absent.

Pereonite VI, coxal plates elongate, acutely pointed and strongly upturned. Pleonite 4 sometimes bearing 1 small tubercle posteriorly. Pleonite 3 with pleural plates distal angles slightly but distinctly pointed posteriorly; sometimes pleonite 3 with 1 single median tubercle or with 3 tubercles posteriorly.

In larger specimens the pleotelson shows 2 well-marked longitudinal carinae placed very laterally, one on each side, but in smaller specimens these carinae are indistinct or only slightly marked. Also, the anterolateral tubercles on the pleotelson may or may not be present. In smaller specimens they are usually indistinct, but in larger specimens the tubercles are usually well developed.

ECOLOGICAL AND DISTRIBUTIONAL NOTES - *M. stebbingi* is the species within the genus with the broadest bathymetrical range, as well as the species recorded from greatest depth (309 m). It was also collected in the Falkland Islands at low water mark spring tide in the intertidal region (Stebbingi, 1914).

The species is found in both the Pacific and the Atlantic Oceans, at both sides of South America. Its occurrence off Rio Grande do Sul, at Lat. 34°03'S, is its northernmost record.

It seems that the species prefers coarse rather than clay bottoms. It was found on the following substrata; dead shells (Ohlin, 1901); sand, shell and stones, and grey sand (Sheppard, 1957), coarse sand (Menzies, 1962, and present datum).

Macrochiridothea michaelsoni Ohlin, 1901

(Figs 4-6)

Macrochiridothea michaelsoni Ohlin, 1901, p. 287-289, pls XXI-XXII (fig. 8); Nordenstam, 1933, p. 106-108, fig. 25; Menzies, 1962, p. 98, fig. 32.

DIAGNOSIS - Body smooth, lacking tubercles. Eyes present. Antennal, peduncular article 2 with a strongly projecting outer angle. Pleotelson with a distinct, narrow apical point on either side of which are 3-4 pairs of plumose setae. Pleonite 4 distinctly marked but without free lateral margins.

- modified after Menzies, 1962.

HOLOTYPE - Adult male, 11.5 mm long. Deposited in the Naturhistoriska Riksmuseet, Stockholm, Sweden, type No. 7409.

TYPE LOCALITY - Magellan Strait, Punta Arenas, Chile, in brackish pools, lagoon-like rests of a branch in the delta of Rio de las Minas.

SIZE RANGE - Adult male, 11.5 mm long; females smaller (Ohlin, 1901).

BATHYMETRICAL DISTRIBUTION - From intertidal to 22 m depth.

GEOGRAPHICAL DISTRIBUTION - Magellan Strait, Punta Arenas, Chile (Ohlin, 1901). N of the town Punta Arenas, Lat. 53°08'S, Long. 70°51'W (Menzies, 1962).

REMARKS - This species may be easily recognized by the smooth body, absence of eyes and peduncular article 2 of antenna 1 strongly projected at outer angle.

ECOLOGICAL AND DISTRIBUTIONAL NOTES - *M. michaelseni* occurs intertidally in exposed sandy beaches (Menzies, 1962), as well as in brackish pools (Ohlin, 1901). Only 1 single specimen was collected at 22 m depth, off Punta Arenas, Magellan Strait (Ohlin, *op. cit.*).

Macrochiridothea kruimeli Nierstrasz, 1918

(Figs 7-8)

Macrochiridothea kruimeli Nierstrasz, 1918, p. 130-132, pl. IX (fig. 13), pl. X (figs 54-64); Nordenstam, 1933, p. 112; Sheppard, 1957, p. 172-173, fig. 13; Menzies, 1962, p. 101, fig. 51.

DIAGNOSIS - Body tuberculated. Eyes present. Antenna 2 considerably longer than antenna 1. Pleon with all 4 pleonites distinct and with free lateral margins. Pleotelson apex narrow, acutely pointed, and devoid of apical spine.

HOLOTYPE - Adult female, 15.0 mm long. Deposited in the Zoological Museum of Amsterdam, Netherlands.

TYPE LOCALITY - Punta Arenas, Chile.

SIZE RANGE - Adult female, 15.0 mm long; adult male, 8.0 mm in length.

BATHYMETRICAL DISTRIBUTION - From shallow bottom, probably intertidally, to 107-104 m depth.

GEOGRAPHICAL DISTRIBUTION - Magellan region, Punta Arenas, Chile (Nierstrasz, 1918). Between Falkland Islands and the mainland of South America, considerably nearer to the latter, from Lat. 49°29'S, Long. 66°27'W to Lat. 49°27.5'S, Long. 66°31'W (Sheppard, 1957).

REMARKS - Very little can be added at present for a better knowledge of the species. One of the most striking features of this species is that all pleonites, including the 4th one, have free lateral margins. Such a feature was reported originally by Nierstrasz (1918), and confirmed later by Sheppard (1957, p. 173, fig. 13 a).

ECOLOGICAL AND DISTRIBUTIONAL NOTES - The shallowest depth range of this species is unknown. Nierstrasz (1918, p. 130), refers only that the species was collected by Dr. J.H. Kruiemel from Punta Arenas, without mentioning the collecting depth and the collecting gear used. So, it seems fair to suppose that Dr. Kruiemel's specimens were collected from very shallow bottom or most probably intertidally.

The only notice available on the nature of the bottom where the species occurs is given by Sheppard (1957), who studied material collected by the Discovery Expedition from brown speckled sand.

Macrochiridothea setifer Menzies, 1962

(Figs 9-10)

Macrochiridothea setifer Menzies, 1962, p. 101, fig. 34.

DIAGNOSIS - Body flattened, lacking tubercles or swellings, except for a pair of flattened elevations posterolaterally on cephalon. Eyes present. Lateral margins of cephalon and pereon with stout setae. Pleonite 4 weakly marked, without free lateral margins. Pleotelson with a midlongitudinal carina, apex tipped with a large terminal spine lateral to which are numerous plumose setae.

- modified after Menzies, 1962.

HOLOTYPE - Adult female, 4.0 mm long. Deposited in the Swedish State Museum, Stockholm, Sweden.

TYPE LOCALITY - Southern Chile, Isla Guafo, the anchorage E of Punta Weather, 25 m depth.

SIZE RANGE - See Holotype, the only specimen so far collected.

BATHYMETRICAL DISTRIBUTION - 25 m depth (only recording available).

GEOGRAPHICAL DISTRIBUTION - Known only from the type locality.

REMARKS - This species is close to *M. michaelsoni*. However, the presence of a pair of flattened elevations posteriorly on the cephalon, distinguished it readily from *michaelsoni*.

ECOLOGICAL AND DISTRIBUTIONAL NOTES - The species is reported by Menzies (1962) as occurring on a rather coarse sand bottom with stones.

Macrochiridothea uncinata Hurley & Murray, 1968
(Figs 11-15)

Macrochiridothea uncinata Hurley & Murray, 1968, p. 244-248, figs 2-4.

DIAGNOSIS - Body flattened, without tubercles. Eyes absent. Carpus of pereopod I with ventral margin devoid of setae. Posterior margin of ischium in pereopod V developed into prominent hook, more distinct in female than in male. Apex of pleotelson a median spine-like tooth with setae on either side.

- modified after Hurley & Murray, 1968.

HOLOTYPE - Adult male, 4.0 mm long. Deposited in the N.Z.O.I., No. 43.

TYPE LOCALITY - Muriwai Beach, New Zealand, just above extreme low water, neap, fully exposed beach, 3-4 cm depth.

SIZE RANGE - Adult female, 5.5 mm long; adult male, 4.0 mm long (type).

BATHYMETRICAL DISTRIBUTION - Intertidal, so far gathered few cm (3-4) below the surface on exposed sand beaches.

GEOGRAPHICAL DISTRIBUTION - New Zealand: Muriwai Beach, Whangamata Beach, and Ahipara and Bayly's Beach in Northland (Hurley & Murray, 1968).

REMARKS - A small species, very close to *M. michaelsoni*. The prominent hook in the ischium of pereopod V promptly distinguished this species from all the others of the genus.

ECOLOGICAL AND DISTRIBUTIONAL NOTES - Restricted up to date to New Zealand shores. It is found on exposed sand beaches, between mid-tide level and extreme low water, neap tide level, in predominantly fine sand grade (Hurley & Murray, *op. cit.*).

Macrochiridothea robusta Bastida & Torti, 1969
(Fig. 16)

Macrochiridothea robusta Bastida & Torti, 1969, p. 65-72, lams 1-2.

DIAGNOSIS - Body without tubercles. Eyes absent in adults, in juveniles inconspicuous. Frontal margin with a broad, rounded rostrum. Pereonite I bearing on each dorsolateral sides a prominent, acutely pointed spine.

Pereonite VI the largest of pereon, prolonging backwards slightly in a broadly rounded middistal point. Pleonites 1-3 distinct, pleonite 4 absent. Pleotelson with a mid-anterior tubercle and a longitudinal carina, apex narrow, acutely pointed, devoid of apical spine.

- modified after Bastida & Torti, 1969.

HOLOTYPE - Ovigerous female, 8.9 mm long. Deposited in the Museo Argentino de Ciencias Naturales "Bernardino Rivadavia", Argentina, No. 27.327.

TYPE LOCALITY - Off Argentina, Lat. 37°57'S, Long. 57°28'W, 16 m depth.

SIZE RANGE - Adult female, 8.9 mm (holotype), only measurement available.

BATHYMETRICAL DISTRIBUTION - The species depth ranges from 16 to 22 m.

GEOGRAPHICAL DISTRIBUTION - Argentina: at the type locality and from Lat. 38°01'S, Long. 57°26'W (Bastida & Torti, 1969).

REMARKS - This species may be easily distinguished by the dorsolateral spines on pereonite I, and by the development of pereonite VI.

ECOLOGICAL AND DISTRIBUTIONAL NOTES - *M. robusta* is a shallow-water species collected on both fine and median-fine quartzitic sand. Up to date known only from Argentina.

Macrochiridothea marcusii sp. n.

(Figs 17-47)

DIAGNOSIS - Body tuberculated. Eyes present. Pereopod I (male), carpus with 2 distinct tufts of long fine setae at ventral margin, 1 stout spine distally, lower margin of propodus with composite setae of 2 shapes, the fine and elongate kind being the most abundant. Pereopod I (female), lower margin of carpus with few short setae, distal margin as in male, ventral margin of propodus bordered by setae shaped as in male, but with the shortest setae being the commonest kind. Pereopods II-III, carpus with 1 seta at ventral margin, lower margin of propodus devoid of setae. Posterior margin of pereonites I-VI bearing many small, sharp tubercles; pereonite VII with 3 tubercles. Pleonite 4 indistinct. Pleotelson with 3 anterior tubercles, the mid one larger and extending backward; 3 narrow longitudinal carina tapering distally placed close one to another, median carina the most pronounced; apex acutely pointed surrounded by long, plumose setae; dorsolateral surface smooth, slightly flattened, and devoid of any carina.

HOLOTYPE - Adult male, 5.0 mm long. Deposited in the Museu de Zoologia, University of São Paulo.

TYPE LOCALITY - São Paulo, Brazil, off Ilha Anchieta to SE, 12-21 m depth.

NAME - The specific name is given in honor of the late Emeritus Prof. Dr. Ernst Marcus, from the Department of Zoology, University of São Paulo, my professor in zoology.

SIZE RANGE - Adult female, 7.0 mm long; adult male, 4.0-6.6 mm in length.

MATERIAL EXAMINED - For details on stations, see Benthic Station List. Rio de Janeiro. Sta. 12: 2 juveniles, Sta. 311: 1 juvenile. São Paulo. Ilha Anchieta to SE: 3 ovigerous females (5.5, 5.8 and 6.6 mm), 2 adult males (4.0 and 5.0 mm, holotype), 1 juvenile. MBT Sta. 37: 2 adult females, the largest one ovigerous (5.2 and 7.2 mm), 1 adult male (4.9 mm), 23 juveniles. Rio Grande do Sul: 1 adult female without marsupium (7.0 mm).

SUPPLEMENTARY DESCRIPTIVE NOTES -

Body (Fig. 17) - Lateral margins of pereon and pleon smooth and devoid of setae, those of cephalon minutely crenulated and bordered by elongate setae. Dorsal surface of cephalon irregular, tuberculated, tubercles small and not too prominent; usually with 1 or 2 small tubercles on each side in front of more than 4 tubercles posteriorly; lateral incisions narrow and elongate, reaching almost to the eyes, not widening outwardly. Eyes small, not vaulted, weakly pigmented.

Pereon - Pereonite I abruptly raised dorsolaterally into tubercles placed close together. Posterior margin of pereonite VII usually with 3 tubercles, not infrequently, however, with another 2 minute tubercles placed one at each side of the median one. As it is normal and expected, a slight variation in body tuberculation (number and size of tubercles on pereonites I-VI) occurs, making it difficult to report a fixed pattern of tuberculation.

Pleon - Pleonites 1-3 free. Pleonite 1 with minute pleural plates, those of pleonites 2-3 flattened and only slightly expanded. Pleonite 3 with 1 small median tubercle. Pleotelson with 3 anterior tubercles, anterolateral ones never too pronounced; 1 minute tubercle may be present at each side on the base of the median tubercle; sometimes also, the anterolateral tubercles may be double.

Antenna 1 (Fig. 18) - Flagellum 3-articulated; flagellar article 1 about as long as article 3 of peduncle, and about 1.6 times as long as article 2 of peduncle. *Female antenna 1*: Fig. 19.

Antenna 2 (Fig. 20) - Peduncular article 4 about 2 times as long as 5; flagellum 11-articulated.

Right and left mandibles (Figs 21-22) - Incisor process with 4-5 strongly chitinized teeth. Lacinia mobilis rectangular, in the right mandible minutely denticulated distally, in the left mandible with strong distal teeth. Setal row with 8 stout, serrated setae. A bifid seta below lacinia mobilis and setal row. *Female left mandible*: Fig. 23.

Maxilla 1 (Fig. 24) - Outer lobe with 11-13 unequal, apical spines; inner lobe with 2 apical spines, and 2 short, stout, slightly subapical spines at the outer distal margin.

Maxilla 2 (Fig. 25) - Two outer lobes each with 3 and 2 apical spines; inner lobe with 5 spines; inner margin of innermost lobe bordered by a row of setae.

Maxilliped (Fig. 26) - Endite with 1 coupling hook. Palp 4-articulated. Epipod narrow, lamellar, bordered by fine setae distally.

Pereopod I (Fig. 27) - See accompanying figure for details. *Female pereopod I*: Figs 28-30.

Pereopods II-III (Figs 31-34) - Dactylus minute, stout, strongly recurved inwards.

Pereopods IV-VII (Figs 35-40) - Pereopod IV with a minute dactylus bearing a small seta apically; dactylus of pereopods V-VII somewhat longer, ending in a long simple seta reaching far beyond setae bordering distal margin of propodus.

Pleopods 1-3 (Figs 41-42) - Natatory, very alike. Appendix masculinum on inner margin of endopod of pleopod 2 elongate, almost straight, about 1.5 times as long as maximum length of endopod. *Female pleopod 2*: Fig. 43.

Pleopods 4-5 (Figs 44, 46) - Branchial, similar one to the other. Exopod biarticulated, with the transverse suture on pleopod 4 complete, on pleopod 5 incomplete; exopod of pleopod 4 with a long, simple seta, lacking on pleopod 5. Endopod of both pleopods entire, devoid of transverse suture. Exopod of *female pleopod 4*: Fig. 45.

Uropod (Fig. 47) - See accompanying figure.

REMARKS ON FEMALE - The adult female differs from the male in the following chief features: it is larger (see Size range), stouter, the body is more vaulted and the tubercles on the body more sharp. As the adult male and female appendages share the same characteristics, the female appendages have not been figured, except the principal ones of interest.

A striking secondary sexual dimorphism is found in the relative number of longer and shorter composite setae on ventral margin of propodus pereopod I (see Diagnosis). The longest shaped setae are almost lacking in the females

(cp. Figs 27-28). This shape of setae on the lower margin of the male propodus extend noticeable forward on the outer margin of dactylus when it is closed. Thanks to this feature males and females can be distinguished at once from the other.

DISCUSSION - The tuberculated body approaches this new species to *M. stebbing* and *M. kruimeli*.

M. marcusii sp. n. differs from all the above named species by the number and arrangement of the longitudinal carina on the dorsal surface of pleotelson, by the setal pattern of carpus and propodus of pereopods I-III, and by the relative length of the peduncular articles of antenna 1.

BATHYMETRICAL DISTRIBUTION - The depth range recorded for the species varies from 12 to 13 m.

GEOGRAPHICAL DISTRIBUTION - Known from off Rio de Janeiro, São Paulo and Rio Grande do Sul (present recording).

ECOLOGICAL AND DISTRIBUTIONAL NOTES - This new species, like most of the remaining species of the genus, seems to be also a shallow sand bottom form. *M. marcusii* sp. n. appears to be a cryophyle eurythermic species, has been collected in temperatures ranging from 14.6 to 23.9°C. It seems to occur in all shallow bottoms of southern Brazil, judging from the present known sites of collection.

Macrochiridothea liliana sp. n.

(Figs 48-76)

DIAGNOSIS - Body flattened, smooth, without tubercles. Eyes present. Pereopod I, carpus with ventral margin devoid of setae. Pereopods II-III (male), carpus and propodus with ventral margin bordered by a thick coverage of long, fine setae, propodus with 1 long seta at ventrodiscal angle. Pereopods II-III (female), carpus with 2-3 minute, simple setae at lower margin, propodus with ventral margin devoid of setae, distal angle with 6 setae. Pereonites I-III abruptly raised on each dorsolateral side into a well marked longitudinal carina; pereonites IV-VII smoothly vaulted laterodorsally. Pleonite 4 weakly marked or indistinct. Pleotelson with a slight midlongitudinal carina; lateral surface smooth, without any carina; apex narrow, acutely pointed, devoid of apical spine, and bordered by long plumose setae.

HOLOTYPE - Adult male, 5.0 mm long. Deposited in the Museu de Zoologia, University of São Paulo.

TYPE LOCALITY - São Paulo, Brazil, Ilha Anchieta, Ponta do Catimbau to W, 21 m depth.

NAME - The species is named after Dr. Liliana Forneris of the Department of Zoology, University of São Paulo, who has been outstanding in the Brazilian benthic studies.

SIZE RANGE - Adult females, 4.5-6.0 mm long; adult male, 5.0 mm long.

MATERIAL EXAMINED - For details on stations, see Benthic Station List. Rio de Janeiro. Sta. 12: 1 juvenile, with an epicaridian attached to the ventral side of body. São Paulo. Ilha Anchieta, off Saco Grande to W: 2 males (3.7 and 5.0 mm), 3 ovigerous females (5.0, 5.5 and 5.6 mm), 3 juveniles. Ilha Anchieta, off Ponta do Catimbau to W: 1 female (6.0 mm), 1 male (5.0 mm, holotype), 4 juveniles. Rio Grande do Sul. MBT Sta. 129: adult females (1 ovigerous, 6.0 mm long, and 6 devoid of marsupium, from 4.5 to 5.3 mm).

SUPPLEMENTARY DESCRIPTIVE NOTES -

Body (Fig. 48) - Lateral margins of pereon and pleon smooth and devoid of setae. Cephalon without tubercles, dorsal surface slightly convex, lateral incisions narrow and deep, almost reaching to the eyes, lateral margins minutely crenulated. Eyes not vaulted, appearing as a small pigmented spot.

Pereon - Coxal plates of pereonites II-VII acutely pointed, getting gradually longer posteriorly; coxal plates of pereonites IV-VI expanded, those of pereonite VII small, narrow and elongate.

Pleon - Pleonites 1-3 free, all with free lateral margins; pleonite 1 narrow, smaller than pereonite VII and pleonite 2, strongly vaulted, hardly visible from above because usually covered by pereonite VII; pleonites 2-3 with small, flattened, slightly expanded pleural plates. Pleonite 4 indistinct in most specimens examined; in few specimens, however, slightly marked by a minute lateral suture line.

Antenna 1 (Fig. 49) - Flagellum 3-articulated; flagellar article 1 about 1.7 times as long as peduncular article 3, and about 2.7 times as long as peduncular article 2.

Antenna 2 (Fig. 50) - Peduncular article 4 about 1.5 times as long as 5; flagellum composed of 11-12 articles.

Right and left mandibles (Figs 51-52) - Incisor made up of 4-5 large, strong chitinized teeth. Lacinia mobilis roughly rectangular, in the right mandible minutely toothed distally, in the left mandible with 4 large, strong teeth. Setal row with 8-9 stout, serrated, incurved setae.

Maxilla 1 (Fig. 53) - Outer lobe bearing 10-11 unequal, apical spines; spines of different shapes, the number of each type slightly different in the right and left mandibles, as well as, in the males and females; inner lobe

with 2 apical spines, and 2 short, stout, subapical spines at the outer distal margin.

Maxilla 2 (Fig. 54) - Two outer lobes each with 2 apical spines; inner lobe with 5 spines; inner margin of innermost outer lobe bordered by setae.

Maxilliped (Fig. 55) - Endite with 1 single coupling hook. Palp 4-articulated, article 1 small, covered partially by the endite. Epipod expanded, lamellar.

Pereopod I (Figs 56-60) - Ventral margin of propodus, and rear margin of carpus, with 2 different shapes of composite setae.

Pereopods II-III (Figs 61-63) - Propodus elongate and slightly incurved downward. Dactylus stout, minute, strongly recurved downward. Details of female pereopod III: Figs 64-65.

Pereopods IV-VII (Figs 66-68) - Pereopod IV with a very reduced dactylus bearing a small seta apically; dactylus of pereopods V-VII slightly larger, ending in a long, simple seta reaching far beyond the setae bordering the distal margin of propodus.

Pleopods 1-3 (Figs 69-70) - Natatory, very alike. Appendix masculinum on inner margin of endopod of pleopod 2 elongate, straight, incurved inwards distally, about 1.5 times as long as endopod maximum length. Female pleopod 2: Fig. 71.

Pleopods 4-5 (Figs 72-75) - Branchial, similar one to the other. Exopod biarticulated, with the suture line transverse and complete; exopod of pleopod 4 ending in a long, simple, apical seta, missing in pleopod 5. Endopod of both pleopods entire, devoid of transverse suture.

Uropod (Fig. 76) - See accompanying figure.

REMARKS ON FEMALE - The adult female differs from the male in the following chief features: it is larger, stouter and has the body more vaulted. The incisor process of both right and left mandibles bears larger and more prominent teeth. The setae bordering all pereopods are longer and more numerous.

The most striking secondary sexual dimorphism is found in the setal pattern of the carpus and propodus of pereopods II-III (*cp.* Figs 63 and 64-65). As in the male, the female dactylus of pereopods II-III is of extremely reduced size.

DISCUSSION - By the smooth body the present new species resembles *M. michaelsoni*, *M. setifer* and *M. uncinata*.

It differs from *M. michaelsoni* by the outline of the pleotelson distal portion, presence of eyes, number of flagellar articles of antenna 2, dorso-lateral carina on each side of pereonites I-III, and prominence on antenna 1 peduncular article 2 missing.

From *M. setifer* it differs by the absence of a pair of flattened elevations posterolaterally on cephalon, lack of a stout apical spine on the pleotelson apex, by the body devoid of stiff marginal setae, and by the presence of a carina on each dorsolateral side of pereonites I-III.

It differs from *M. uncinata* by the missing of an uncinata hook on the dorsal margin of ischium of pereopod V, the presence of eyes and the outline of the pleotelson's apex.

REMARKS - The biarticulated characteristic of the exopod of pleopods 4-5 may become of generic value. It is found in both new species here described, as well as in *M. uncinata* (Hurley & Murray, 1968, fig. 4). Regarding the remaining species of the genus no illustrations of this feature were found, nor additional informations were available.

It is worth to stress the secondary sexual dimorphism shown by *M. lilianae* sp. n., as well as by *M. marcusii* sp. n.. It can be that the detailed study of the genus will lead to the discovery of similar features in the other species also.

BATHYMETRICAL DISTRIBUTION - The depth recorded for the species ranges from 12 to 33 m (present data).

GEOGRAPHICAL DISTRIBUTION - Known from Rio de Janeiro (Ilha Grande), São Paulo (off Ilha Anchieta), and off Rio Grande do Sul.

ECOLOGICAL AND DISTRIBUTIONAL NOTES - The available data indicate *M. lilianae* sp. n. as a shallow sandy bottom form. This species seems to be also a cryophyle eurythermic species.

GENERAL ECOLOGICAL AND ZOOGEOGRAPHICAL NOTES

Macrochiridothea is essentially a Southern Hemisphere genus. All species but one occur in the Atlantic and Pacific Oceans, at both the East and the West coast of the southern part of South America. *M. uncinata* is up to date restricted to several New Zealand shores.

So far, all species were collected outside the Antarctic Convergence. The genus distribution is essentially temperate. The finding in southern Brazil of species common to the South America subantarctic region points out the relationship between these two geographic areas regarding the Isopoda fauna (Moreira, 1966). Unpublished data on species from different Isopoda genera seem to stress this relationship.

The southernmost recording of the genus is about Lat. 54°00'S, while the new northernmost record is about Lat. 23°07'S, off Rio de Janeiro (present datum).

A relationship seems to exist between the distribution of species of *Macrochiridothea* and colder waters, as can be inferred by the recorded temperature in the sites of collection. Previous available data show that all species occur below the maximum temperature limit of 16°C. No published temperature data are available for *M. uncinata*.

Along the southern Brazilian shelf the scanty data do not permit yet a reasonable appreciation of a possible similar relationship. The single occurrence of *M. stebbingi* off Rio Grande do Sul was at 11.7°C. *M. marcusii* sp. n. and *M. lilianae* sp. n. were collected at some stations in colder waters (between 14.6-17.2°C), but also from stations with higher temperatures (22.3-23.9°C). Both new species seem to be cryophyle eurythermic species.

At least one species, *M. michaelsoni*, collected in sand beaches as well as in brackish pools (Ohlin, 1901), seems to be tolerant to lower salinities.

The genus seems to be restricted to relatively shallow bottoms. Most of the species occur in very shallow areas, and some intertidally, on exposed sand beaches. In general, the species occur in depths shallower than 50 m. The known bathymetrical limits for the genus ranges from intertidal to 309 m depth. Along southern Brazil it ranges from 12 to 65 m depth. Except for *M. stebbingi* (intertidal to 309 m depth) and *M. kruimeli* (shallow bottom to 107 m depth), all species seem to have very narrow bathymetrical limits.

Judging from the limited information available both in the literature and from data associated with the specimens reported here, the species of *Macrochiridothea* seem to prefer various types of sand grade. They do not appear to be associated with clay, or silt-clay bottoms.

Nothing is known about the biology of all the known species of the genus.

RESUMO

Três espécies do gênero *Macrochiridothea* (Crustacea, Isopoda, Valvifera), são registradas na plataforma continental centro-sul do Brasil. Duas espécies são novas para a ciência: *M. marcusii* sp. n. e *M. lilianae* sp. n.; *M. stebbingi* Ohlin, 1901, é ocorrência nova para o Brasil. O limite N de distribuição do gênero é consideravelmente ampliado. São fornecidas diagnoses para o gênero e para todas as espécies que atualmente o compõem, juntamente com ilustrações que possibilitam seu pronto reconhecimento. Dimorfismo sexual secundário é relatado pela primeira vez no gênero. É dada uma chave de identificação para todas as espécies do gênero. Considerações ecológicas e zoogeográficas gerais completam o trabalho.

ACKNOWLEDGEMENTS

I would like to acknowledge Drs. L. Forneris and L.R. Tommasi by providing specimens and information, and Dr. T.S. Björnberg for the correction of the English manuscript. Thanks are also due to Miss L. Kanno, who inked the drawings, and to Messrs. C. de Jesús, A. Tararan and J. Lupi for their valuable help during my cruises aboard the R/V "Prof. W. Besnard".

LIST OF BENTHIC STATIONS AND SPECIES PRESENT*

RIO DE JANEIRO

1. Sta. 12; Ilha Grande, off Ponta do Drago to NNW; December, 1965; 33 m; fine sand; 23.9°C, 34.88‰; "Emília"; rectangular dredge.
M. marcusii sp. n.
M. lilianae sp. n.
2. Sta. 311; Ilha Grande Bay, off Mambucaba; 23°07'S, 44°29.5'W; February, 1968; 25 m; fine sand; R/V "Prof. W. Besnard"; photograph.
M. marcusii sp. n.

SÃO PAULO

3. Ilha Anchieta, off Saco Grande to W; February, 1964; 12 m; shelly sand; 16.0°C, 35.12‰, 3.9 ml/l; "Emília"; anchor dredge.
M. lilianae sp. n.
4. Ilha Anchieta, off Ponta do Catimbau to W; February, 1964; 12 m; shelly sand; 14.6°C, 35.12‰, 3.8 ml/l; "Veliger"; anchor dredge.
M. lilianae sp. n.
5. Ilha Anchieta to SE; March, 1963; January-February, 1964; 12-21 m; shelly sand; 14.6°C, 35.12‰; "Veliger"; anchor dredge, Van Veen 1/10.
M. marcusii sp. n.
6. MBT Sta. 37, off Ponta Grossa; 23°51'S, 45°40'W; May, 1970; 22 m; fine sand; 22.30°C, 34.40‰; R/V "Prof. W. Besnard"; MBT dredge.
M. marcusii sp. n.

RIO GRANDE DO SUL

7. MBT Sta. 129, off Tôrres to NW; 29°13'S, 49°25'W; June, 1970; 27 m; fine sand; 17.2°C, 33.02‰; R/V "Prof. W. Besnard"; MBT dredge.
M. marcusii sp. n.
M. lilianae sp. n.
8. GEDIP Sta. 410, off Arroio Chuí; 34°03'S, 52°07'W; October, 1968; 65 m; coarse sand; 11.7°C, 33.46‰, 5.15 ml/l; R/V "Prof. W. Besnard"; triangular dredge.
M. stebbingi Ohlin

* - Station data listed as follows: Station number; locality and/or latitude-longitude; date; depth; substrata; temperature, salinity and oxygen content of bottom water; vessel; collecting gear, and species present.

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Macrochiridothea stebbingi Ohlin, 1901

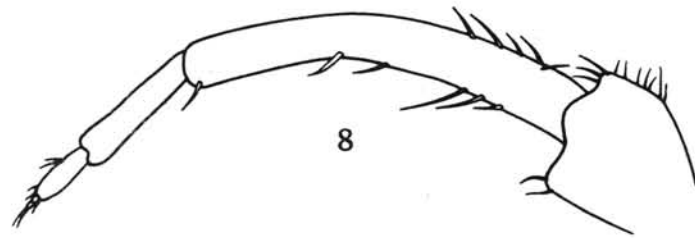
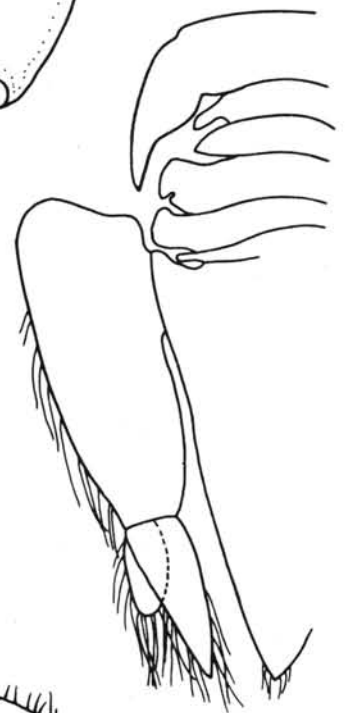
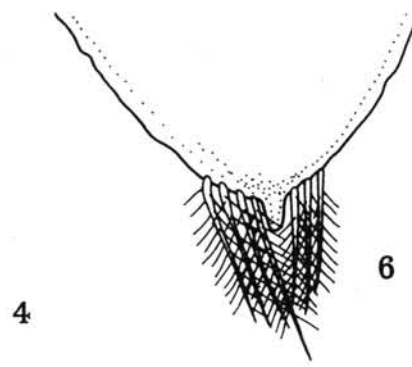
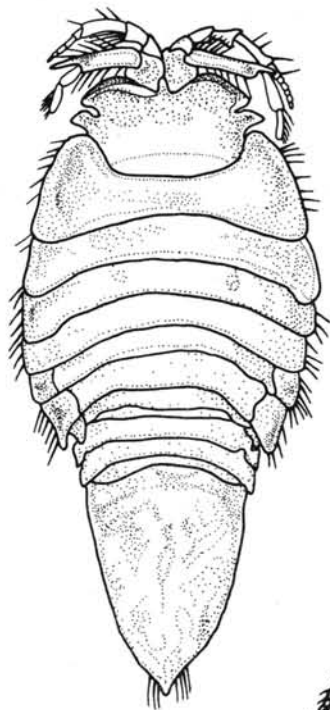
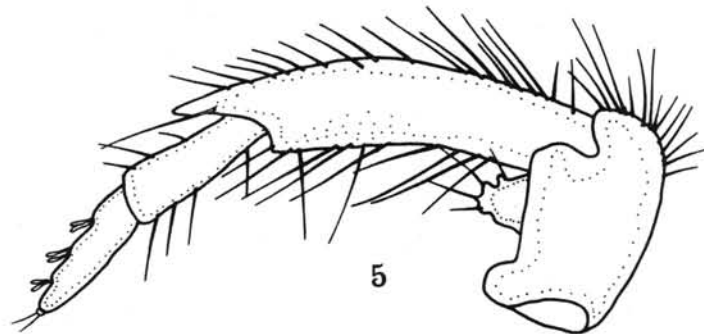
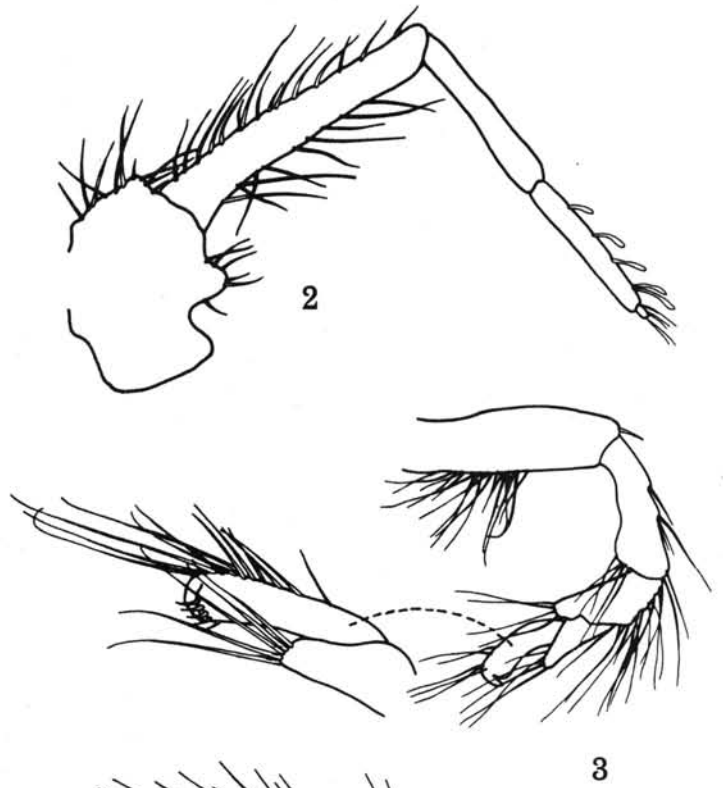
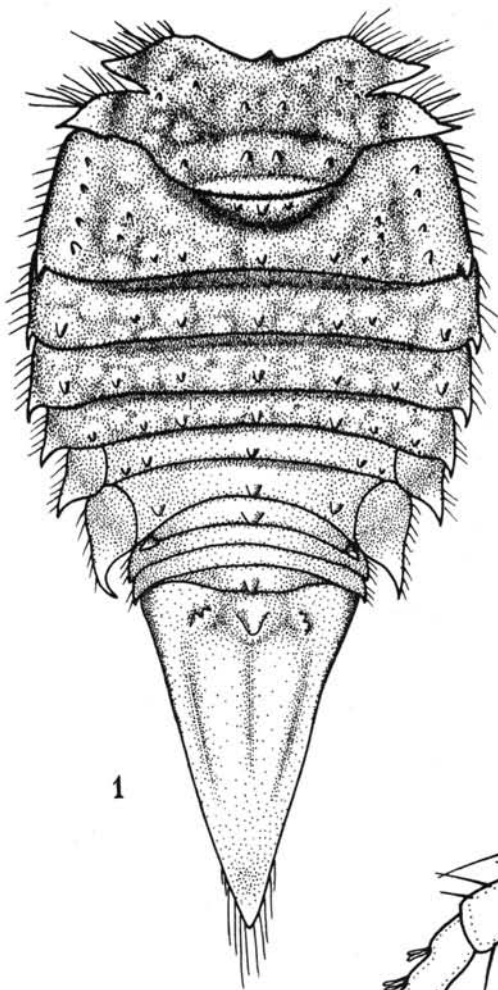
- Fig. 1* - Whole animal, adult male 10,0 mm long (original).
Fig. 2 - Antenna 1 (redrawn from Sheppard, 1957).
Fig. 3 - Pereopod II (redrawn from Sheppard, 1957).

Macrochiridothea michaelseni Ohlin, 1901
Figs 4-6 (redrawn from Menzies, 1962)

- Fig. 4* - Whole animal.
Fig. 5 - Antenna 1.
Fig. 6 - Apex of pleotelson.

Macrochiridothea kruimeli Nierstrasz, 1918
Figs 7-8 (redrawn from Sheppard, 1957)

- Fig. 7* - Left half of pleon.
Fig. 8 - Antenna 1.



Macrochiridothea setifer Menzies, 1962
Figs 9-10 (redrawn from Menzies, 1962)

Fig. 9 - Whole animal.

Fig. 10 - Apex of pleotelson.

Macrochiridothea uncinata Hurley & Murray, 1968
Figs 11-15 (redrawn from Hurley & Murray, 1968)

Fig. 11 - Whole animal.

Fig. 12 - Apex of pleotelson.

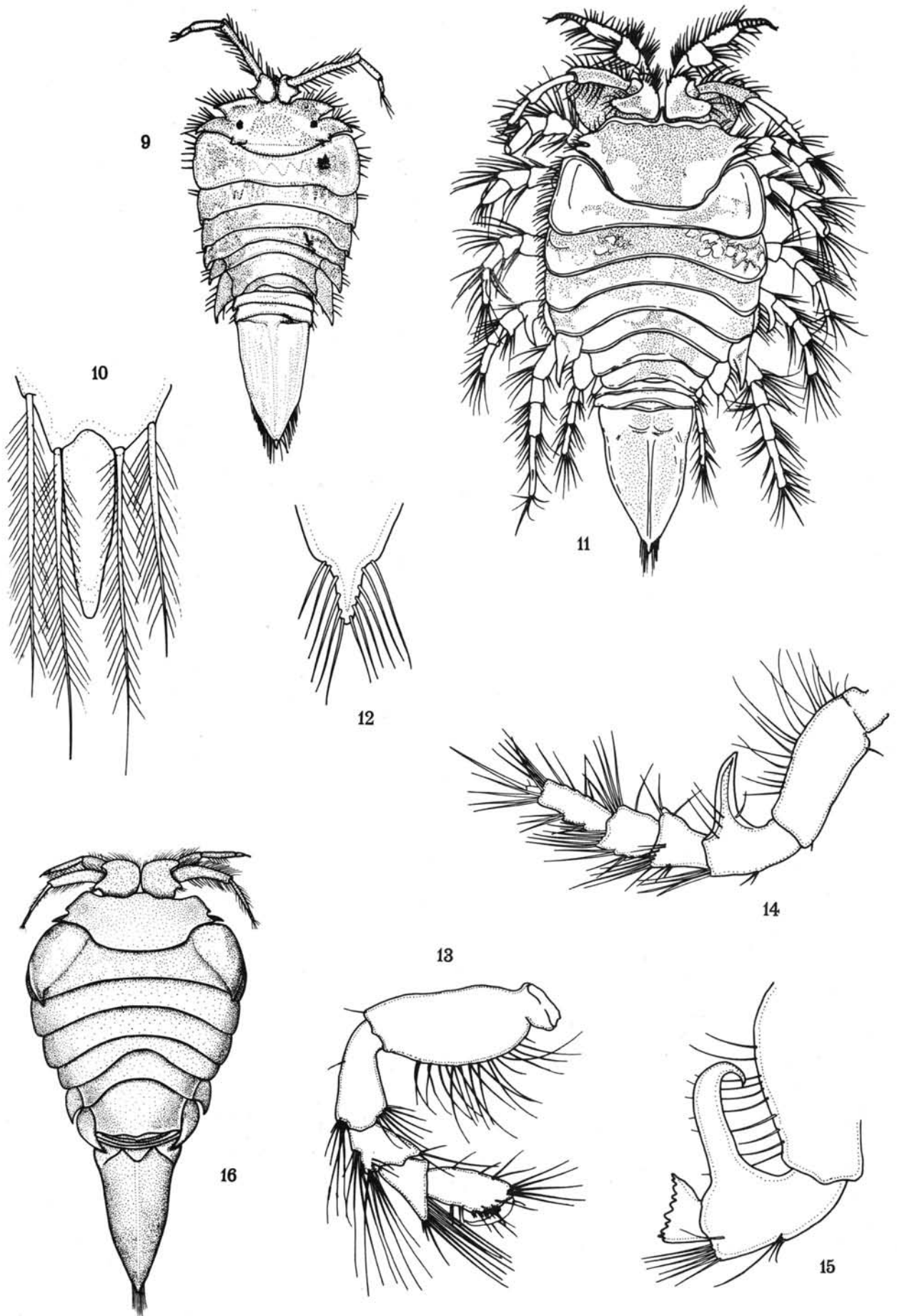
Fig. 13 - Pereopod III.

Fig. 14 - Pereopod V of male.

Fig. 15 - Ischium of female pereopod V.

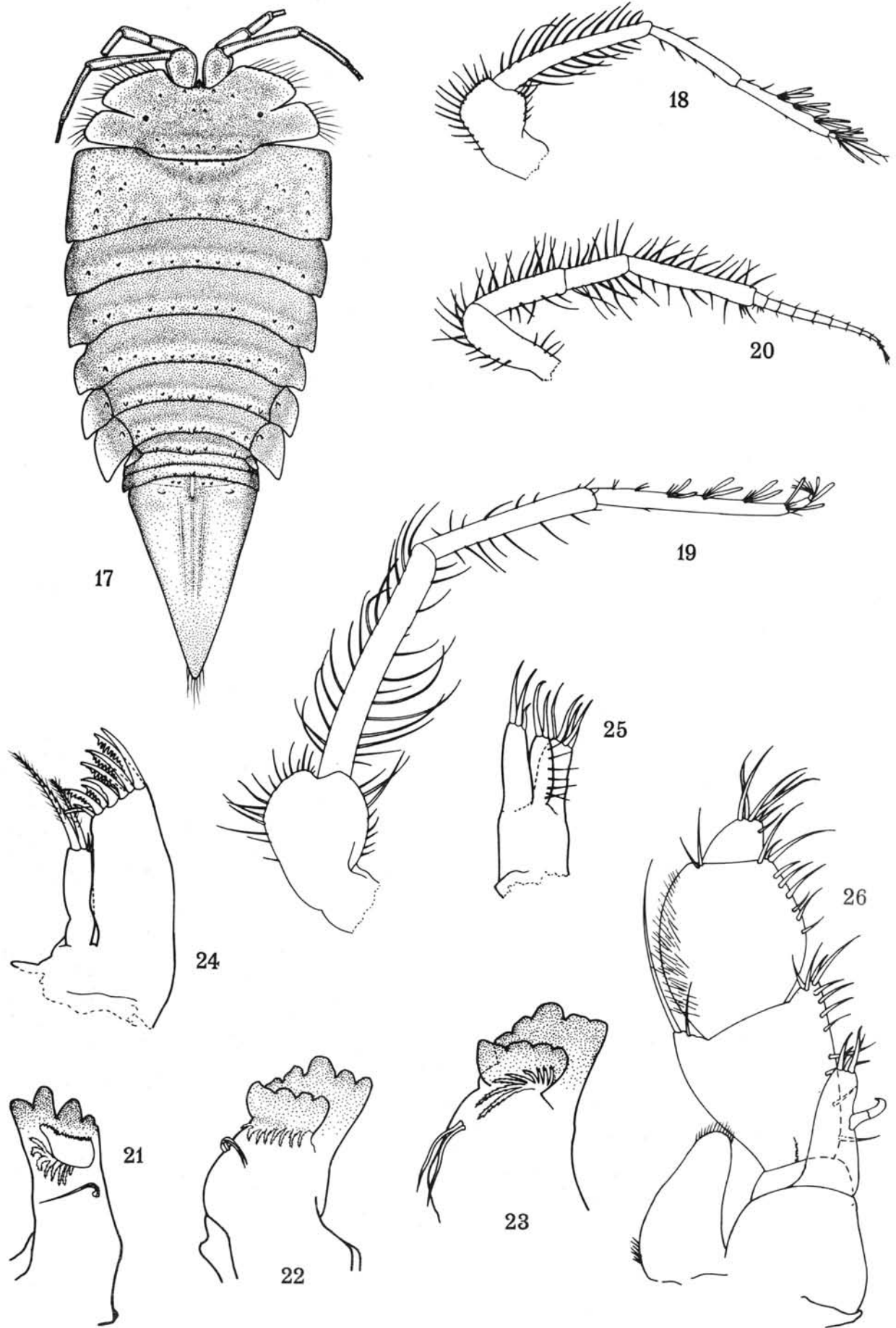
Macrochiridothea robusta Bastida & Torti, 1969

Fig. 16 - Whole animal (redrawn from Bastida & Torti, 1969).



Macrochiridothea marcusii sp. n.,
adult male, 5.0 mm long, adult female, 5.5 mm long.

- Fig. 17* - Whole animal.
Fig. 18 - Antenna 1.
Fig. 19 - Antenna 1 of female.
Fig. 20 - Antenna 2.
Fig. 21 - Right mandible.
Fig. 22 - Left mandible.
Fig. 23 - Left mandible of female.
Fig. 24 - Maxilla 1.
Fig. 25 - Maxilla 2.
Fig. 26 - Maxilliped.



Macrochiridothea marcusii sp. n.,
adult male, 5.0 mm long, adult female, 5.5 mm long.

Fig. 27 - Pereopod I.

Fig. 28 - Pereopod I of female.

Fig. 29 - Distal portion of carpus of female pereopod I.

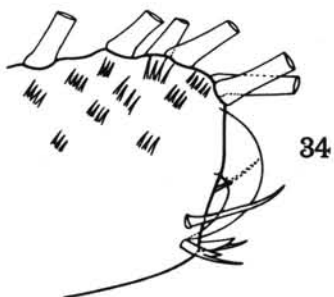
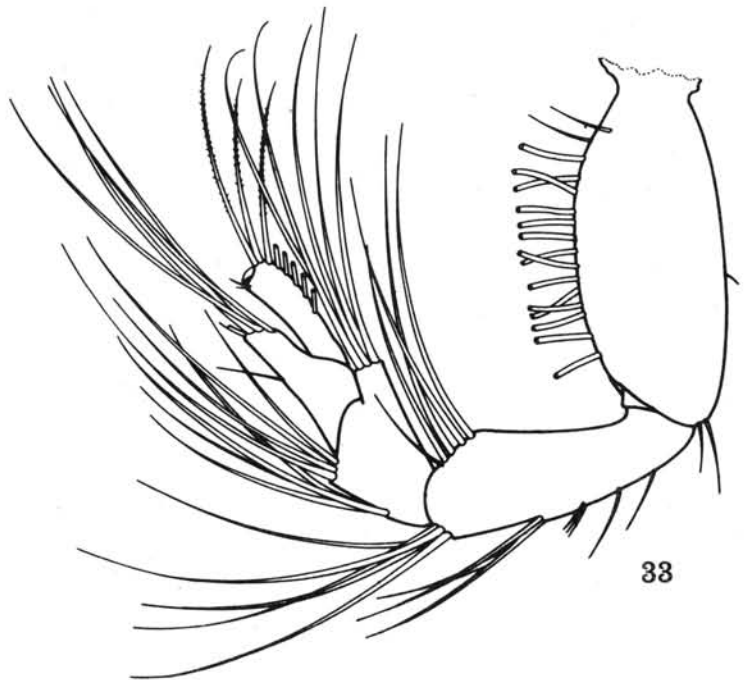
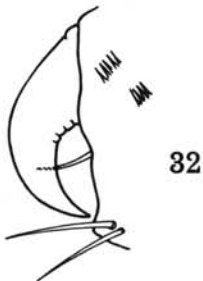
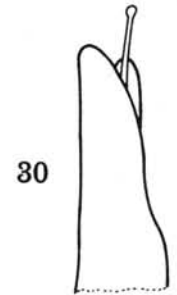
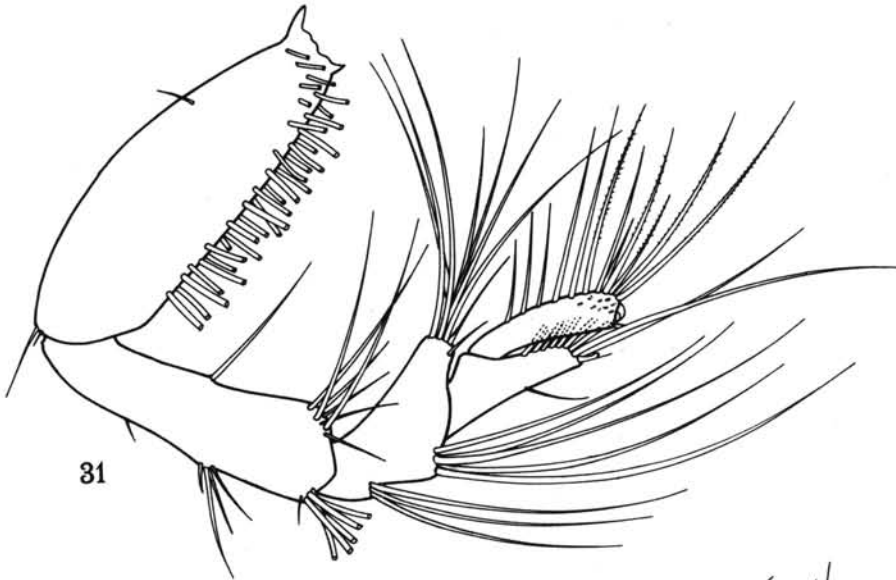
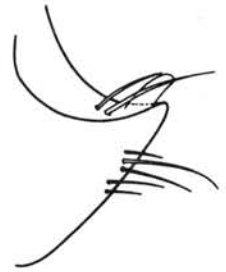
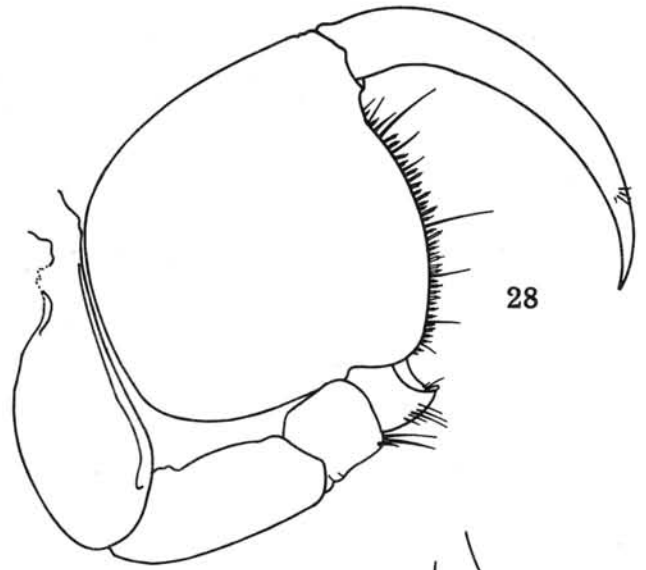
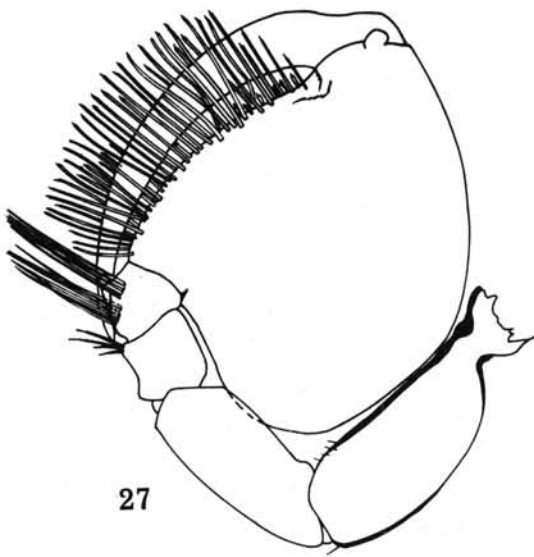
Fig. 30 - Short composite seta on ventral margin of propodus of both male and female pereopod I.

Fig. 31 - Pereopod II.

Fig. 32 - Tip of propodus pereopod II.

Fig. 33 - Pereopod III.

Fig. 34 - Distal portion of propodus pereopod III.



Macrochiridothea marcusi sp. n.,
adult male, 5.0 mm long.

Fig. 35 - Pereopod IV.

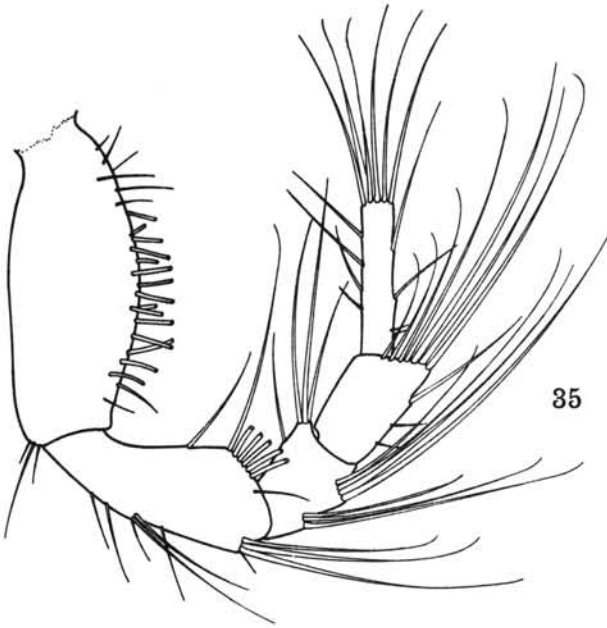
Fig. 36 - Distal portion of propodus pereopod IV.

Fig. 37 - Pereopod V.

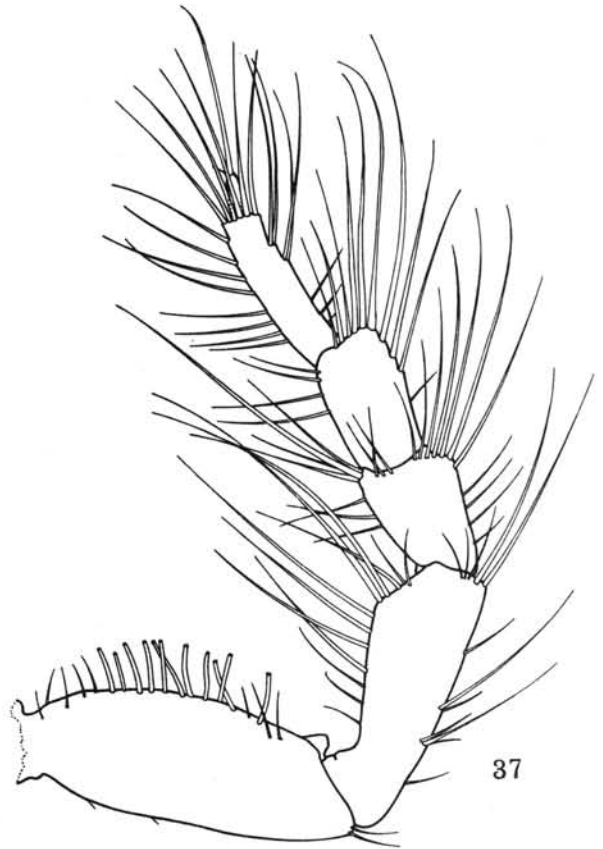
Fig. 38 - Pereopod VI.

Fig. 39 - Pereopod VII.

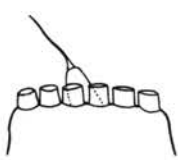
Fig. 40 - Distal portion of propodus pereopod VII.



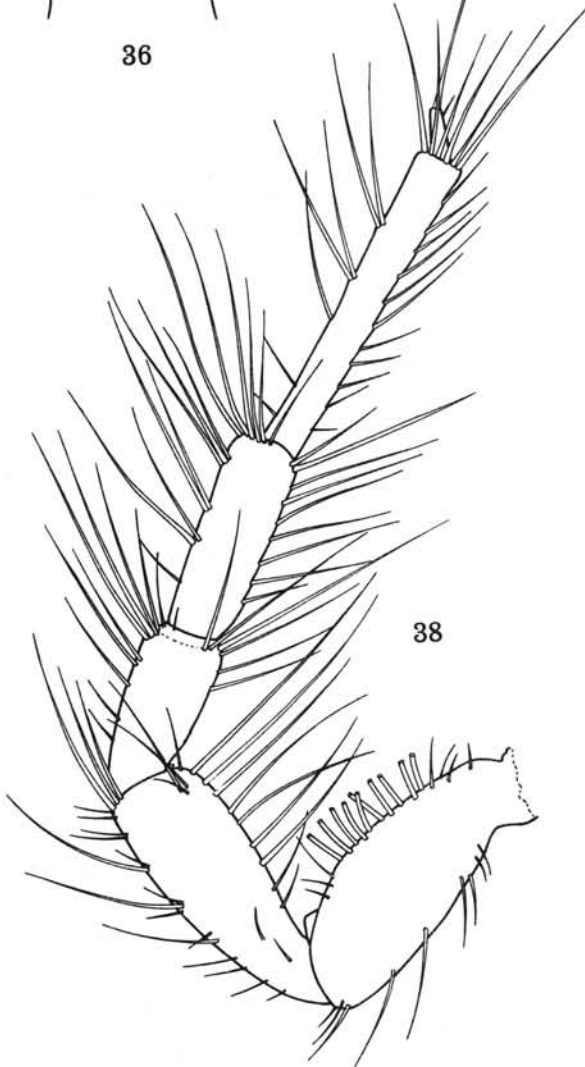
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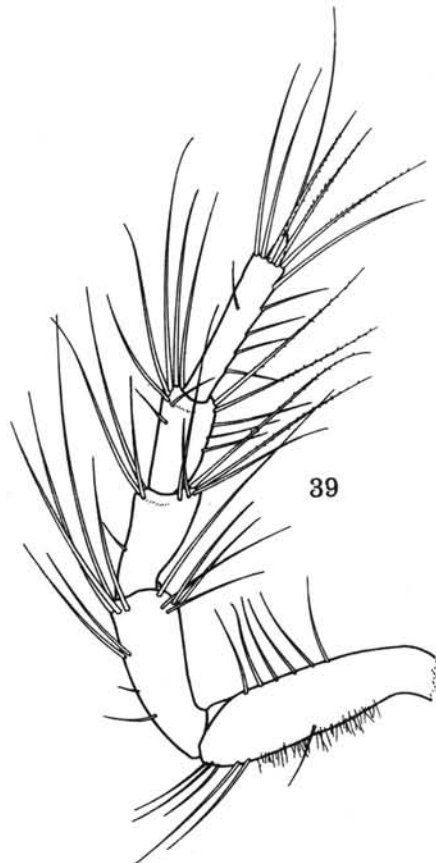
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Macrochiridothea marcusii sp. n.,
adult male, 5.0 mm long, adult female, 5.5 mm long.

Fig. 41 - Pleopod 1.

Fig. 42 - Pleopod 2.

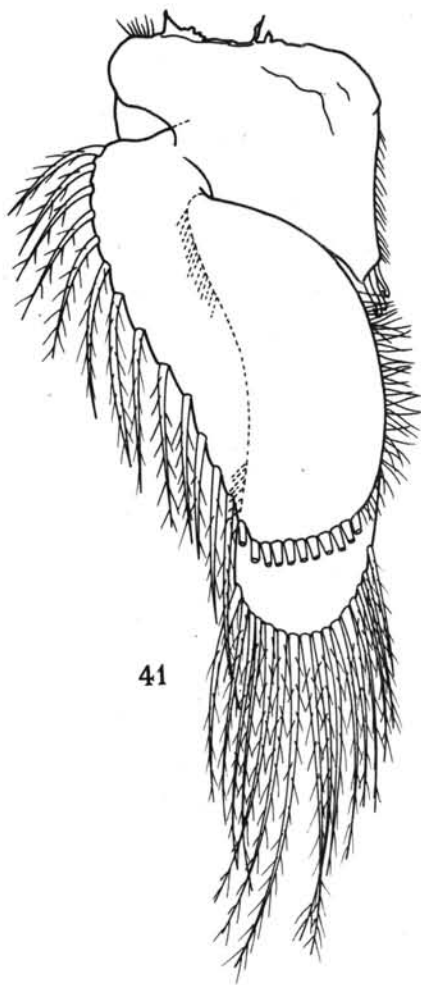
Fig. 43 - Pleopod 2 of female.

Fig. 44 - Pleopod 4.

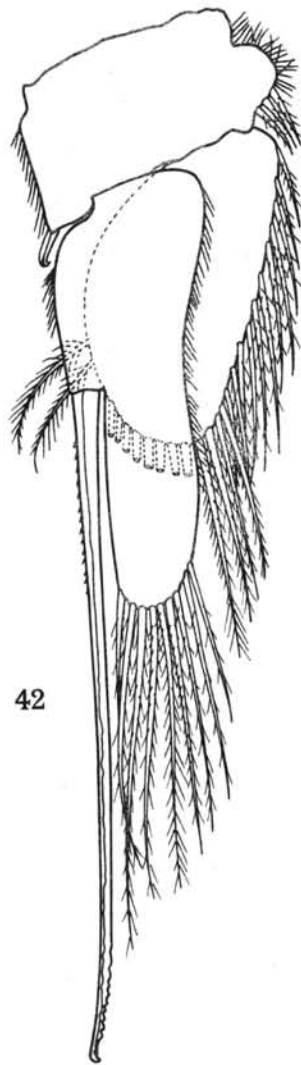
Fig. 45 - Distal portion of exopod of female pleopod 4.

Fig. 46 - Pleopod 5.

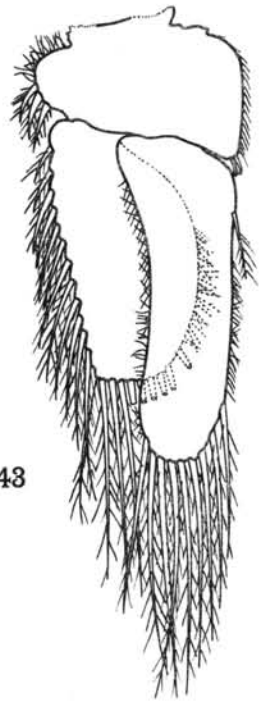
Fig. 47 - Uropod.



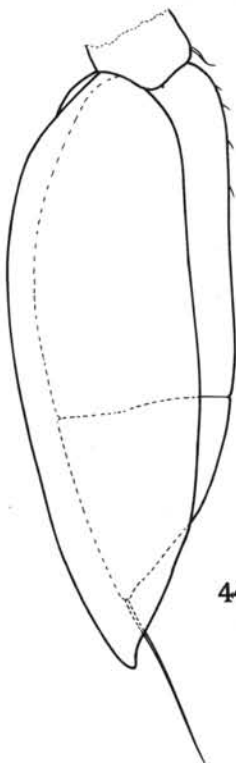
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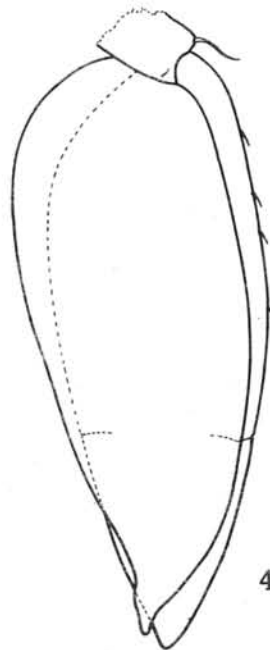
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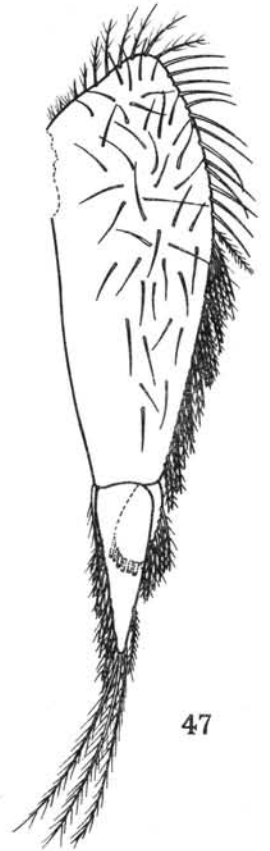
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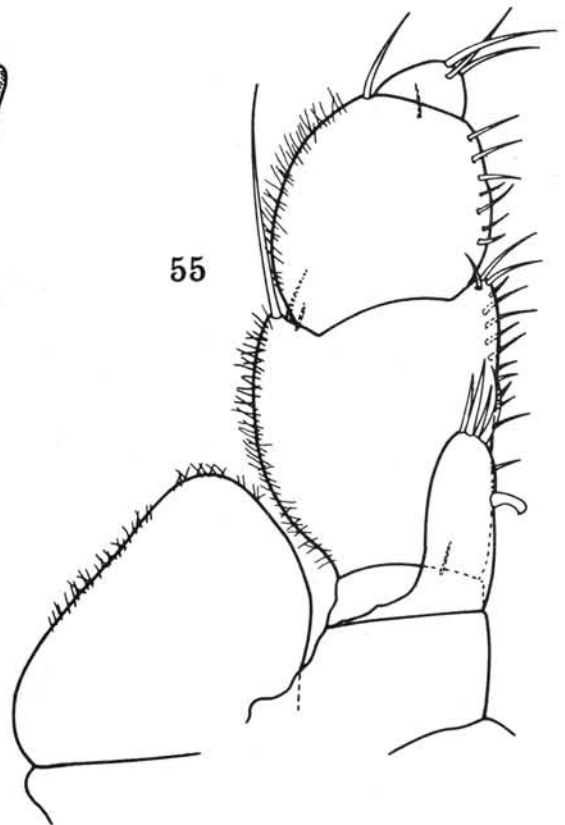
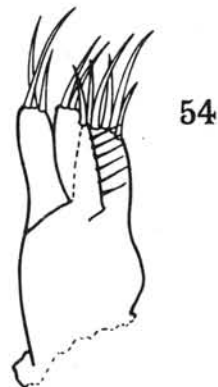
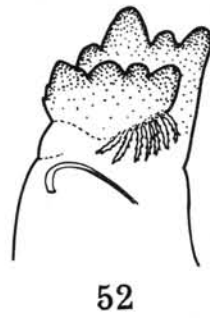
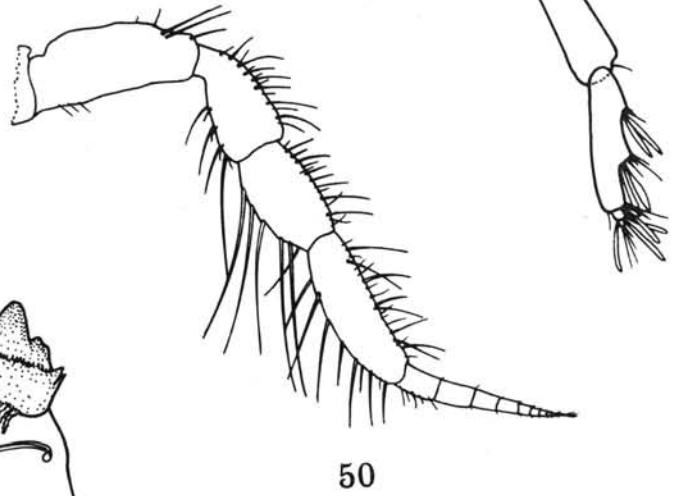
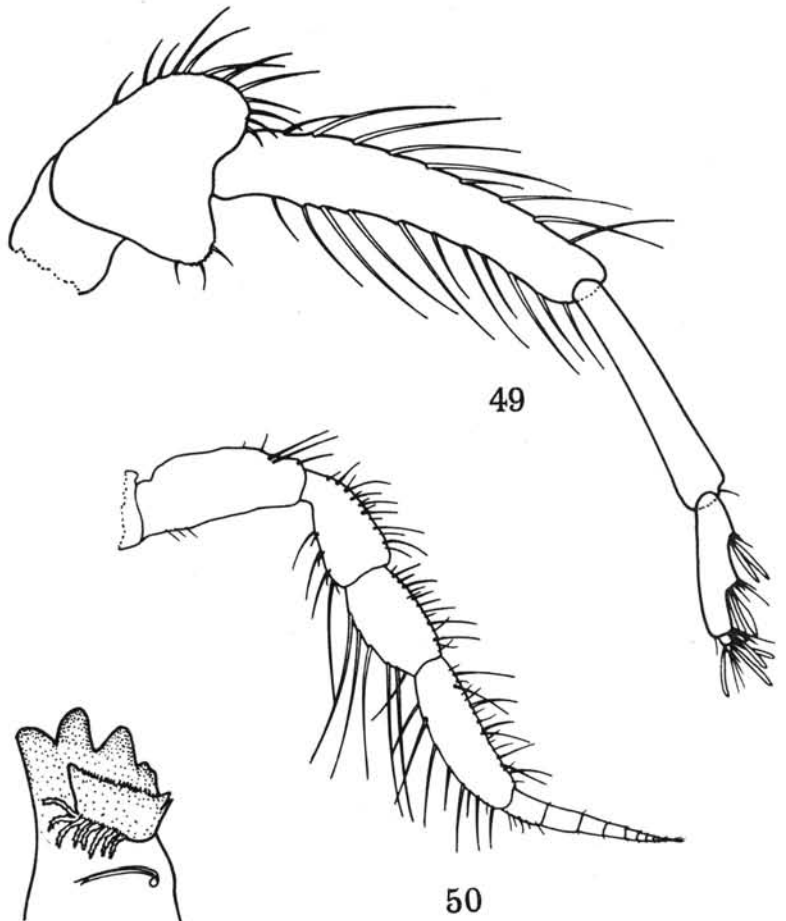
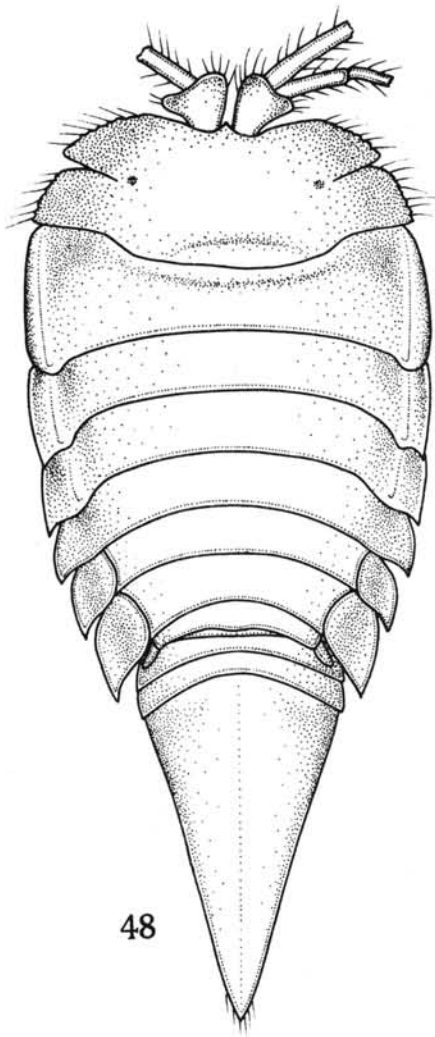
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Macrochiridothea lilianae sp. n.,
adult male, 5.0 mm long.

- Fig. 48* - Whole animal.
Fig. 49 - Antenna 1.
Fig. 50 - Antenna 2.
Fig. 51 - Distal portion of right mandible.
Fig. 52 - Distal portion of left mandible.
Fig. 53 - Maxilla 1.
Fig. 54 - Maxilla 2.
Fig. 55 - Maxilliped.



Macrochiridothea lilianae sp. n.,
adult male, 5.0 mm long.

Fig. 56 - Pereopod I.

Fig. 57 - Distal portion of carpus pereopod I.

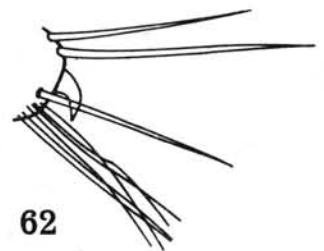
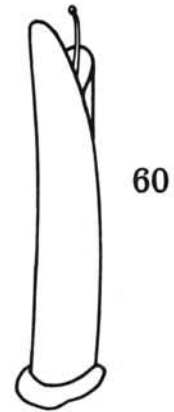
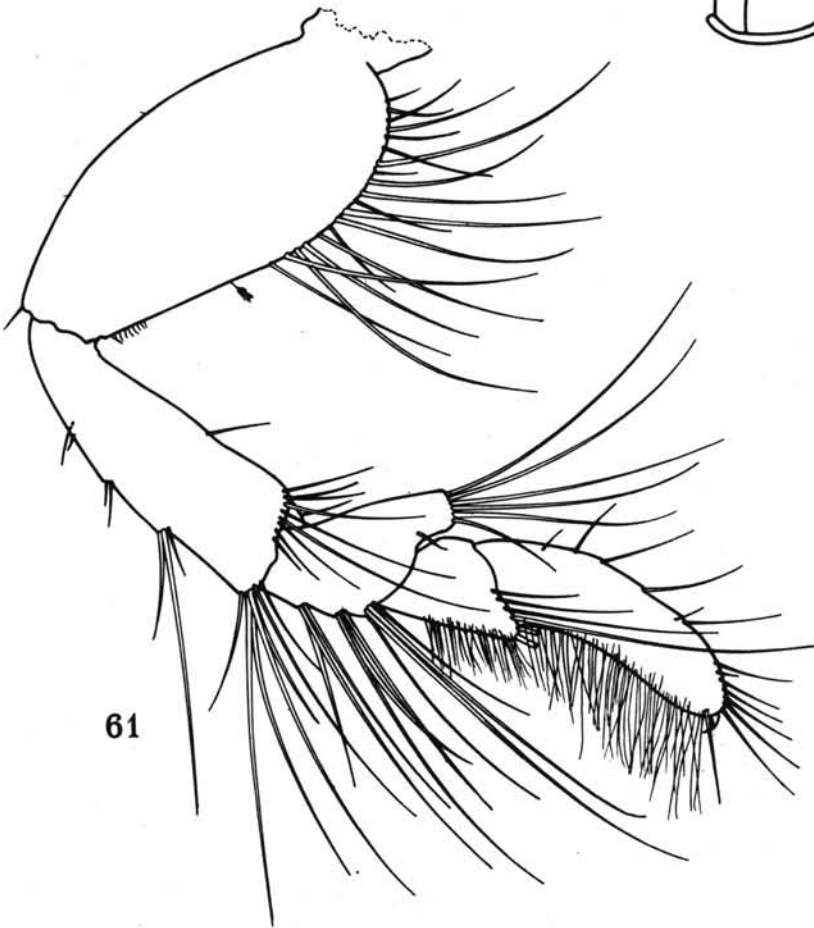
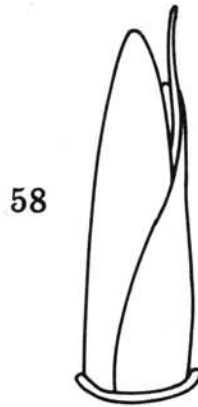
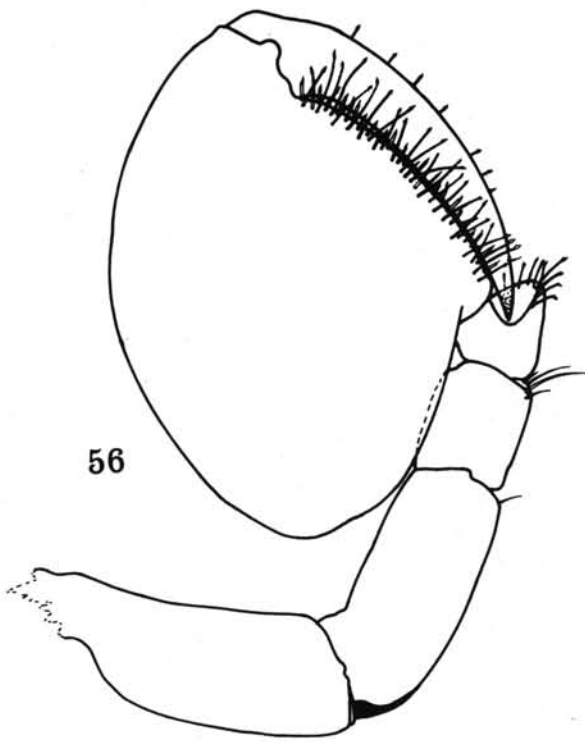
Fig. 58 - Composite seta from carpus pereopod I.

Fig. 59 - Long composite seta from ventral margin of propodus pereopod I.

Fig. 60 - Short composite seta on ventral margin of propodus pereopod I.

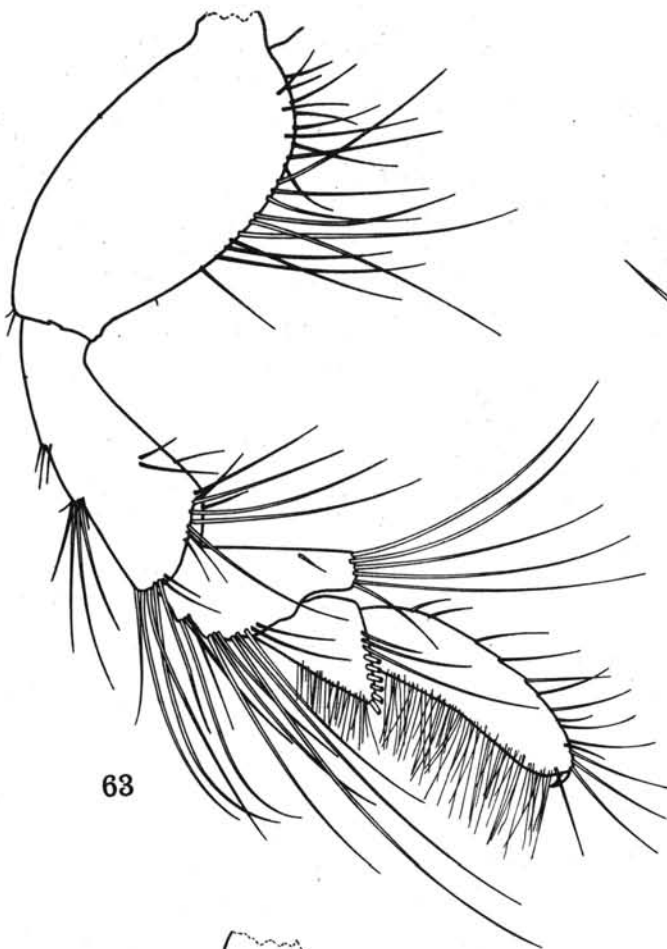
Fig. 61 - Pereopod II.

Fig. 62 - Distal portion of propodus pereopod II.

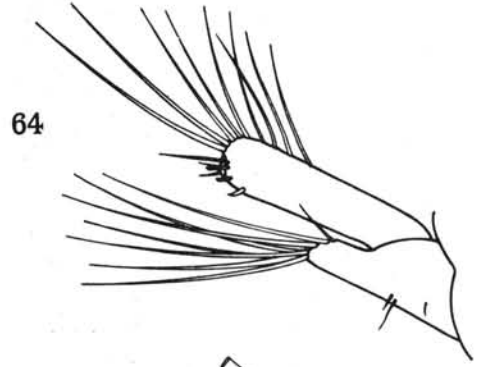


Macrochiridothea liliana sp. n.,
adult male and female, 5.0 mm long.

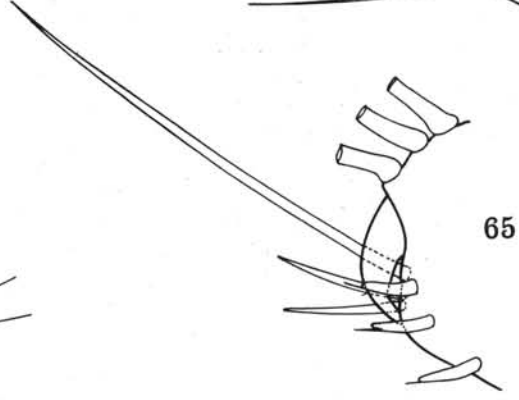
- Fig. 63* - Pereopod III.
Fig. 64 - Carpus and propodus of female pereopod III.
Fig. 65 - Distal portion of propodus female pereopod III.
Fig. 66 - Pereopod IV.
Fig. 67 - Distal portion of propodus pereopod IV.
Fig. 68 - Pereopod VIII.



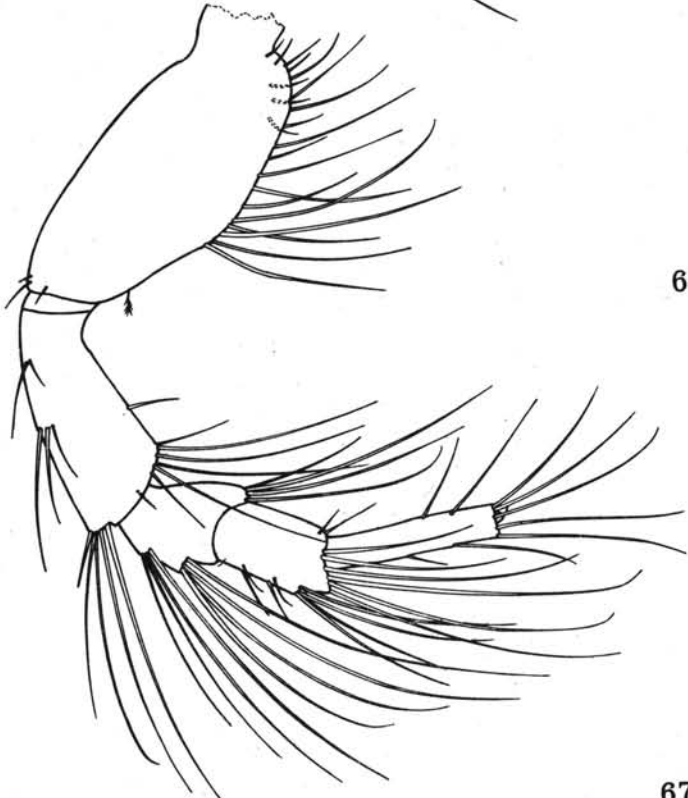
63



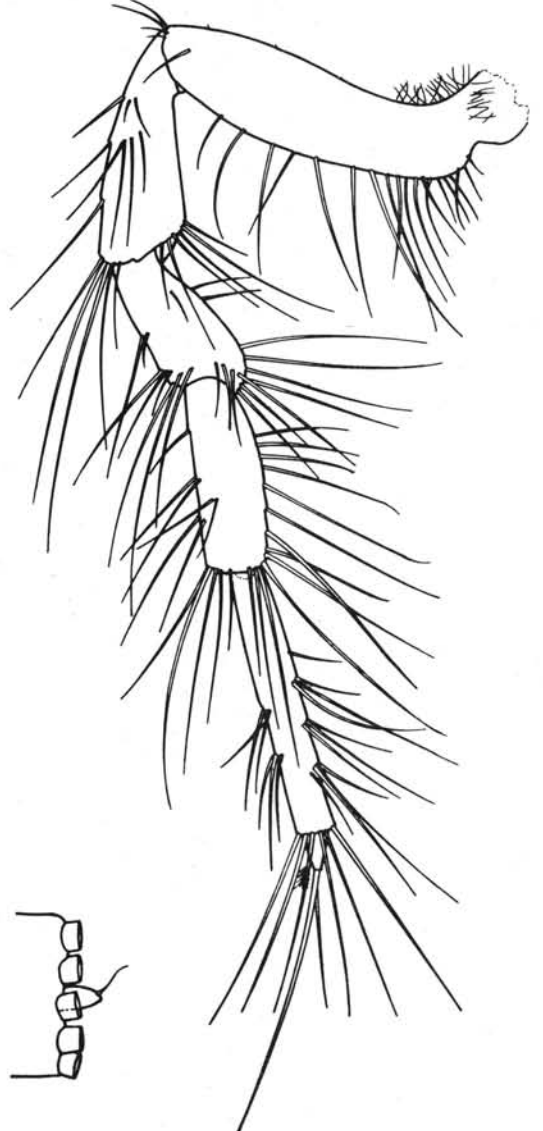
64



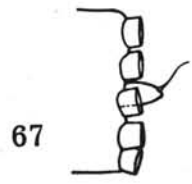
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67

Macrochiridothea liliana sp. n.,
adult male and female, 5.0 mm long.

Fig. 69 - Pleopod 1.

Fig. 70 - Pleopod 2.

Fig. 71 - Pleopod 2 of female.

Fig. 72 - Pleopod 4.

Fig. 73 - Distal portion of exopod of pleopod 4.

Fig. 74 - Pleopod 5.

Fig. 75 - Distal portion of exopod and endopod of pleopod 5.

Fig. 76 - Uropod.

