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HARPACTICOID COPEPODS FROM THE WEST INDIAN ISLANDS: DARCYTHOMPSONIIDAE (COPEPODA, HARPACTICOIDA)

by

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ABSTRACT

The present article in a series on the harpacticoid copepods gathered during the West Indian expeditions of the University of Amsterdam deals with three species of the family Darcythompsoniidae: *Darcythompsonia inopinata* Smirnov, *Leptocaris glaber* n. sp., and *Leptocaris echinatus* n. sp. Through comparison with other specimens from different localities, *Darcythompsonia radans* Por is considered here a synonym of *D. inopinata* Smirnov.

RÉSUMÉ

Cet article traite exclusivement des espèces de la famille Darcythompsoniidae, récoltées pendant les différentes expéditions de l'Université d'Amsterdam aux Indes Occidentales. Les prélèvements contiennent trois espèces: *Darcythompsonia inopinata* Smirnov, *Leptocaris glaber* n. sp. et *Leptocaris echinatus* n. sp. Une comparaison avec des spécimens provenant de plusieurs autres localités démontre que *Darcythompsonia radans* Por est un synonyme de *D. inopinata* Smirnov.

INTRODUCTION

The Darcythompsoniidae are a small worldwide distributed family containing 25 species, designated to 3 genera: *Darcythompsonia*, *Leptocaris* and *Kristensenia*. Although new species and new records of species of this family are frequently published, the systematics and ecology of this group of animals remain poorly understood. Por (1983: 141), referring to Fell et al. (1975), supports the idea that the species of the genus *Leptocaris* are distributed in "the peculiar niche formed by the bioderma of the decomposing mangrove-tree leaves". However, mangroves are roughly known only

between 30°N and 30°S, while the genera *Leptocaris* and *Darcythompsonia* have a worldwide distribution. Furthermore, the species here described and most other species of the genus *Leptocaris* are found in habitats completely different from mangrove ecosystems. It seems that these apparently highly specialized animals are adapted to live in particular "marginal" habitats (euryhaline, eurytherm, temporary, etc.) where colonization by most other harpacticoid groups is failing.

In the material gathered during several expeditions of the University of Amsterdam to the West Indies, and preserved in the Zoölogisch Museum Amsterdam (ZMA), this family is represented in the samples by three species: *Darcythompsonia inopinata* Smirnov, *Leptocaris glaber* n. sp., and *Leptocaris echinatus* n. sp.

SYSTEMATICS

Darcythompsonia inopinata Smirnov, 1934

D'Arcythompsonia inopinata Smirnov, 1934: 118-122, figs. 1-7; Lang, 1948: 274, fig. 139 (4); Kunz, 1961: 276-277.

Darcythompsonia inopinata; Yeatman, 1983: 74-77, figs. 12a-k.

Darcythompsonia radans Por, 1983: 141-143, figs. 1-25 & 63-66.

Material. — Amsterdam Expeditions to the West Indian Islands, sta. 79-160. BAHAMAS, Inagua: cave Salt Pond Hill no. 1 (20°57'00"N 73°34'50"W; semi-dark cave with several openings; in shallow pool (depth 0-30 cm), stagnant, strong smell of H₂S (bat manure), muddy bottom; plankton net; chlorinity 5096 mg/l; 18 Nov. 1979. Two adult females, one dissected (slide labelled WIAE 21a, b and c) and one preserved in alcohol (ZMA coll. no. Co. 102.766).

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Sta. 80-16. NETHERLANDS ANTILLES, Aruba: third well of plantation at Daimari, dug in dry gully (12°31'56"N 69°56'30"W); water table at 1.3 m, water depth 0.3 m; chlorinity 2804 mg/l; temp. 28.9°C; Cvetkov net; 23 May 1980. One juvenile specimen preserved in alcohol (ZMA coll. no. Co. 102.768).

Sta. 82-508A. VENEZUELA, Morocoy Peninsula: coenote no. 2 near Mayorquines (10°53'28"N 68°14'46"W); vertical coenote, depth to water table ca. 7 m, water depth ca. 5 m; Cvetkov net; chlorinity 1440 mg/l; temp. 27.0°C; strong smell of H₂S; 1 March 1982. Two female specimens preserved in alcohol (ZMA coll. no. Co. 102.766a).

Sta. 82-511. VENEZUELA, Morocoy Peninsula: Playa de Mayorquines (ca. 10°53'28"N ca. 68°14'46"W); Bour-Rouch biophreatical pump, in coarse sand and shell debris; depth of core 1.5 m; chlorinity 33632 mg/l; temp. 26.7°C; 1 March 1982. One female specimen preserved in alcohol (ZMA coll. no. Co. 102.767).

Other materials. — FIJI ISLANDS, Viti Levu: crabholes at Culanuku (see Yeatman, 1983). Three females and one male on one slide (coll. Yeatman).

WESTERN SAMOA: crabholes (see Yeatman, 1983). Two females and one male, mounted on slides (coll. Yeatman).

PAPUA NEW GUINEA, Laing Island: Hansa Bay (Madang Province). Two small brackish-water pools at the southern and northern end of the island (Fiers, in press). Eighteen females and eight males.

GRAND COMORES ARCHIPELAGO: Lac Salé, S. of Mitsamiouli; 28 July 1981. Three females and one male.

SOLOMON ISLANDS, Uipi Island, New Georgia: coralline sand with a thin layer of small detritus; shallow water; 30 October 1982. Three females and one male.

The material from Papua New Guinea, the Solomon Islands and the Grand Comores Archipelago is deposited in the collections of the Koninklijk Belgisch Instituut voor Natuurwetenschappen, Brussels.

Discussion. — When describing *Darcythompsonia radans* from some widespread localities (Sinai, Brazil and Curaçao), Por (1983) compared his species with *Darcythompsonia scotti* Gurney, 1920, only. In his discussion he even gives serious consideration to the possibility that *D. scotti* and *D. radans* are one and the same species. Both species, however, can easily be distinguished by the antennule (six-segmented in *D. scotti*, eight-segmented in *D. radans*) and by the cylindrical furcal rami of *D. scotti*. As a matter of fact, the cylindrical furcal ramus discriminates *D. scotti* from all other members of the genus.

Comparison of the figures and description of *D. radans* with the material from a wide variety

of localities, listed above, clearly reveals that *Darcythompsonia radans* is conspecific with *Darcythompsonia inopinata* Smirnov, 1934.

The only striking difference between the specimens examined and the description of *D. radans* is the shape of the rostrum. Por (1983: 143) states: "Rostrum a very small triangular process". However, the accompanying figures show only the most apical part of the rostrum. In all the specimens at hand, the apical part of the rostrum is strongly sclerified. The major part, however, about twice as long as the sclerified part, is a very thin integumental plate, fused with the anterior margin of the cephalothorax. This thin integument is often hardly visible in dissections, but it can easily be found in mounts of the whole animal.

Leptocaris glaber n. sp.

(Figs. 1-2)

Material. — Amsterdam Expeditions to the West Indian Islands, sta. 78-66. ST. MARTIN, French side: between Pointe Bluff and Trou David (18°04'35"N 63°07'12"W); marine interstitial in the lagoon, taken with a hand net; 17 April 1978. One female (holotype) dissected and labelled WIAE 22a and b (ZMA coll. no. Co. 102.769).

Etymology. — The specific name *glaber*, from the Latin (= smooth or glabrous) refers to the entirely smooth integument of this species.

Description. — Female (holotype): Habitus (figs. 1a and 1b) vermiform with parallel margins, only tapering in the anterior fourth of the cephalothorax and the posterior third of the anal segment; length, including rostrum and furcal rami, 500 µm; anal segment 2½ times as long as wide and about 4 times as long as the furcal rami; anal operculum slightly convex and furnished with minute hairs; furcal rami twice as long as broad; each ramus bearing two lateral setae, one dorsal seta and three apical ones; principal seta smooth.

Rostrum (fig. 2b) fused with cephalothorax; posterior half strongly tapering anteriorly; anterior half with parallel margins and a rounded apex.

Antennule (fig. 2a): five-segmented; first segment with two small rows of teeth; aesthetasc

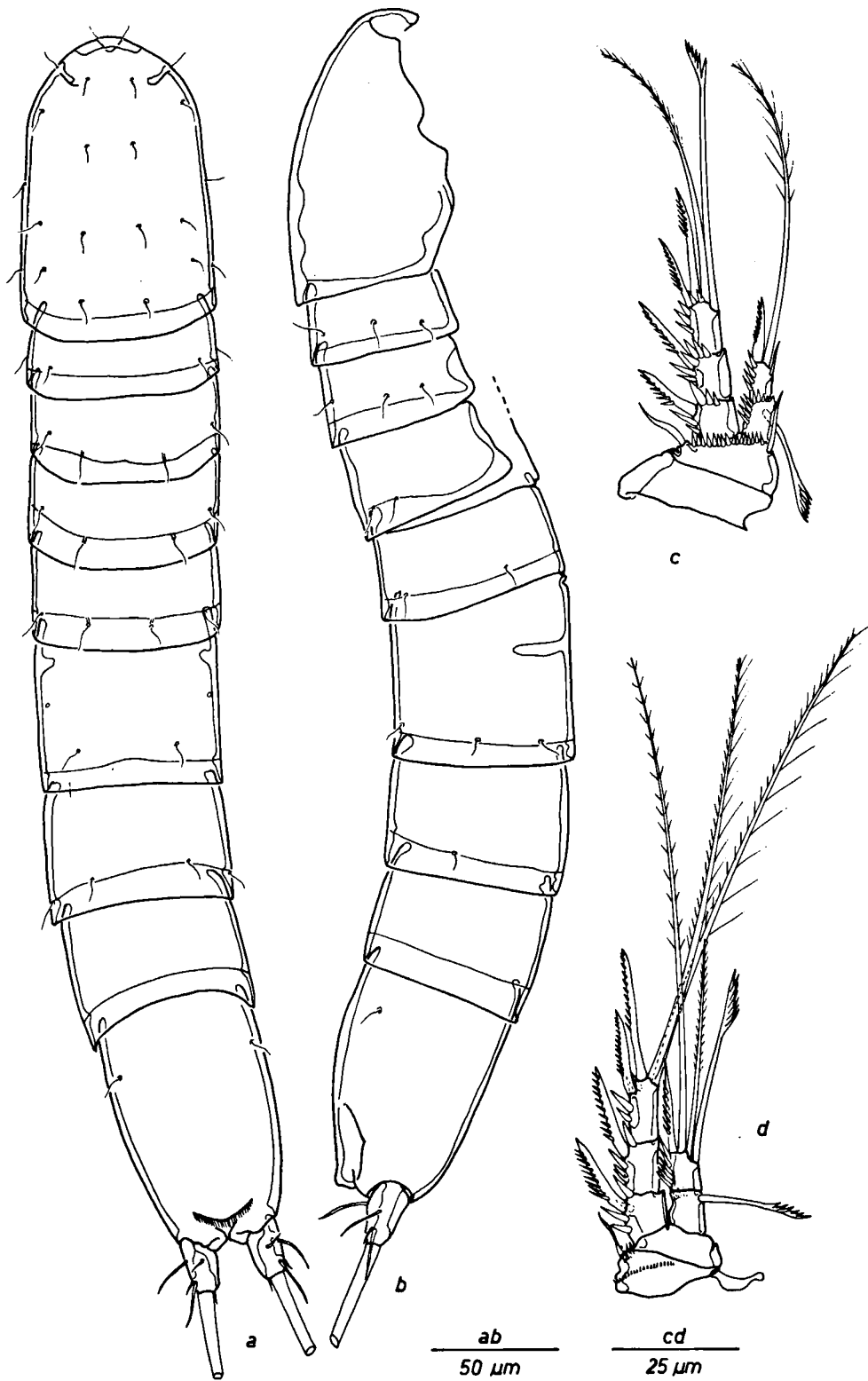


Fig. 1. *Leptocaris glaber* n. sp.: a, habitus, dorsal view; b, habitus, lateral view; c, P1; d, P2.

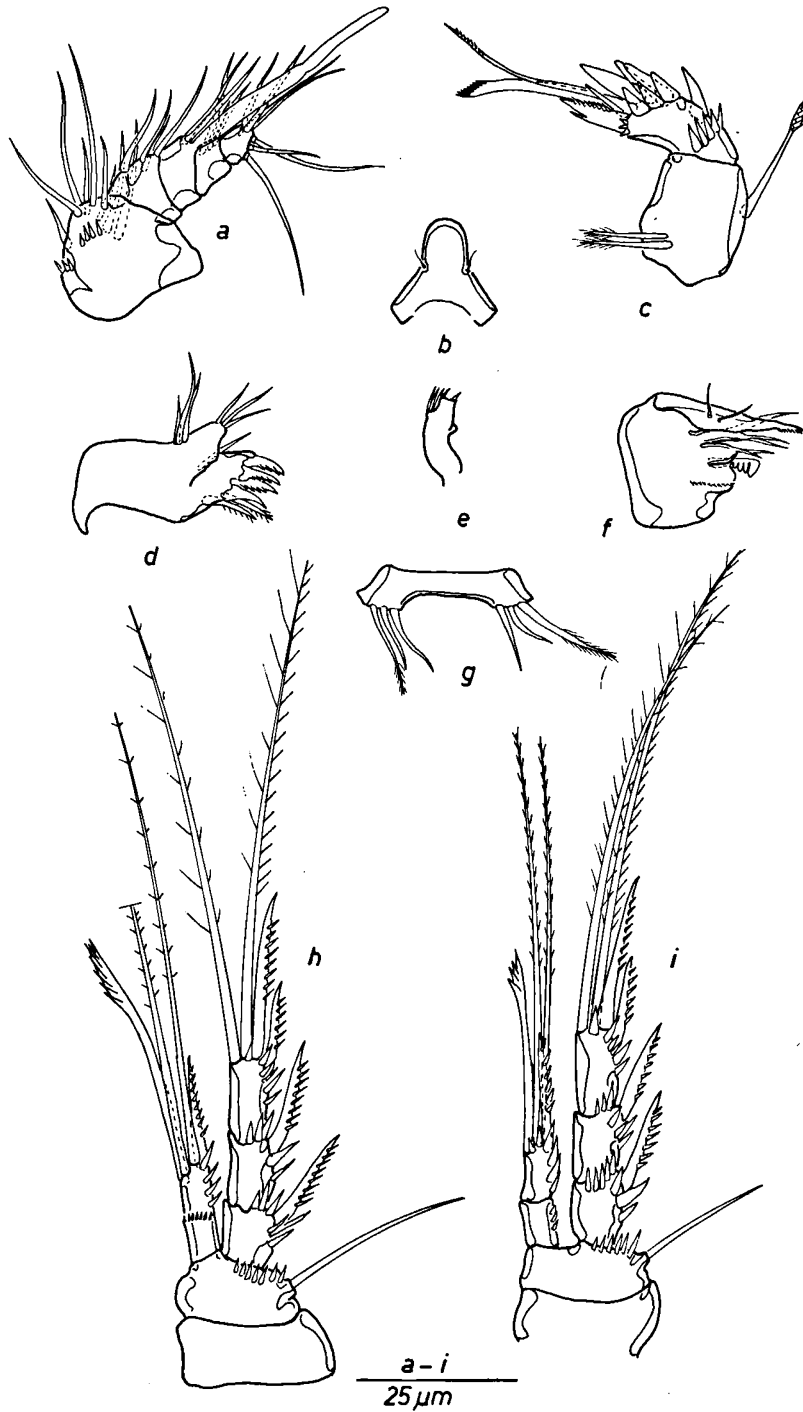


Fig. 2. *Leptocaris glaber* n. sp.: a, antennule; b, rostrum; c, antenna; d, maxillule; e, paragnath; f, maxilla, g, P5; h, P3; i, P4.

implanted on third segment and measuring 40 μm .

Antenna (fig. 2c): allobasis with a strong seta; exopodite represented as two setae; endopodite having two transverse rows of remarkably strong spinules, two subdistal spines and three distal ones, the most apical one strongly armed; two apical setae: one short and smooth, the other long and barbed apically.

Paragnath (fig. 2e): small with slightly curved margins; apical margin with a tuft of slender teeth.

Maxillule (fig. 2d): gnathobasis with four armed spines and two feathered setae; coxa and basis fused, with three groups of setae representing the vestigial rami: basis represented as one seta, exopodite and endopodite as three setae.

Maxilla (fig. 2f): syncoxa furnished with a row of very minute spinules and having three endites; proximal endite a strong comb-like spine; middle endite cylindrical, bearing two setae; distal endite cylindrical, bearing three setae; basis prolonged into an armed claw, bearing two setae on ventral margin.

Maxilliped absent.

P1 (fig. 1c): basis with an internal and an external strong seta; exopodite three-segmented, each segment with strong spinules; internal subapical spine of third exopodite segment with strong apical armature; endopodite two-segmented; inner spine of first segment armed distally; inner seta of second segment very small, apical one long and feathered and external spine with strong spinules. Setal formula of P1-P4 shown in table I.

P2 (fig. 1d): almost identical to P1 except for feathered inner seta of third exopodite segment and absence of inner seta on basis.

P3 (fig. 2h) and P4 (fig. 2i) both differing

from P2 in absence of inner seta on first endopodite segment; P3 slightly larger than P4.

P5 (fig. 2g): forming a common plate, each leg bearing three setae; external seta feathered, central and inner one smooth.

Male unknown.

Discussion. — *Leptocaris glaber* n. sp. clearly is closely related to *L. insularis* (Noodt, 1958). Both species share several characteristics but differ in the shape of the elements of the exopodite of P1 and in the relative length of the furcal rami. In *L. glaber* n. sp. the innermost spine of the distal exopodite segment of P1 is of a peculiar shape and is strongly toothed apically. In *L. insularis* this element is of a normal plumose type. The anal segment of *L. glaber* n. sp. is about five times as long as the furcal ramus, whereas in *L. insularis* this ratio is only 2.6 : 1.

Besides these obvious characteristics, other differences between both species are found in the antennule (five-segmented in *L. glaber* n. sp., six-segmented in *L. insularis*) and the setation of the maxillule and maxilla.

Leptocaris echinatus n. sp.

(Figs. 3-4)

Material. — Amsterdam Expeditions to the West Indian Islands, sta. 78-306. NETHERLANDS ANTILLES, CURAÇAO: Boca Tabla (12°22'19"N 69°06'49"W); dry gully below the entrance of a sea cave; coarse sand, near the waterline, frequently reached by the waves; interstitial sample taken with Bou-Rouch biophreatic pump; 19 May 1978. One female (holotype) dissected and labelled WIAE 18a, b and c (ZMA coll. no. Co. 102.770).

Etymology. — The specific name *echinatus*, from the Latin (= spinous), alludes to the remarkable ornamentation on the thoracic and abdominal segments.

Description. — Female (holotype): Habitus (figs. 3a and 3b) vermiform; length, rostrum and furcal rami included, 620 μm ; cephalothorax with curved lateral margins and tapering towards rostrum; thoracic segments with parallel margins; genital segments fused dorsally and laterally, fusion marked by same

TABLE I
Setal formula of *Leptocaris glaber* n. sp.

	P ₁	P ₂	P ₃	P ₄
exo	0-0-121	0-0-022	0-0-022	0-0-022
end	1-120	1-121	0-121	0-121

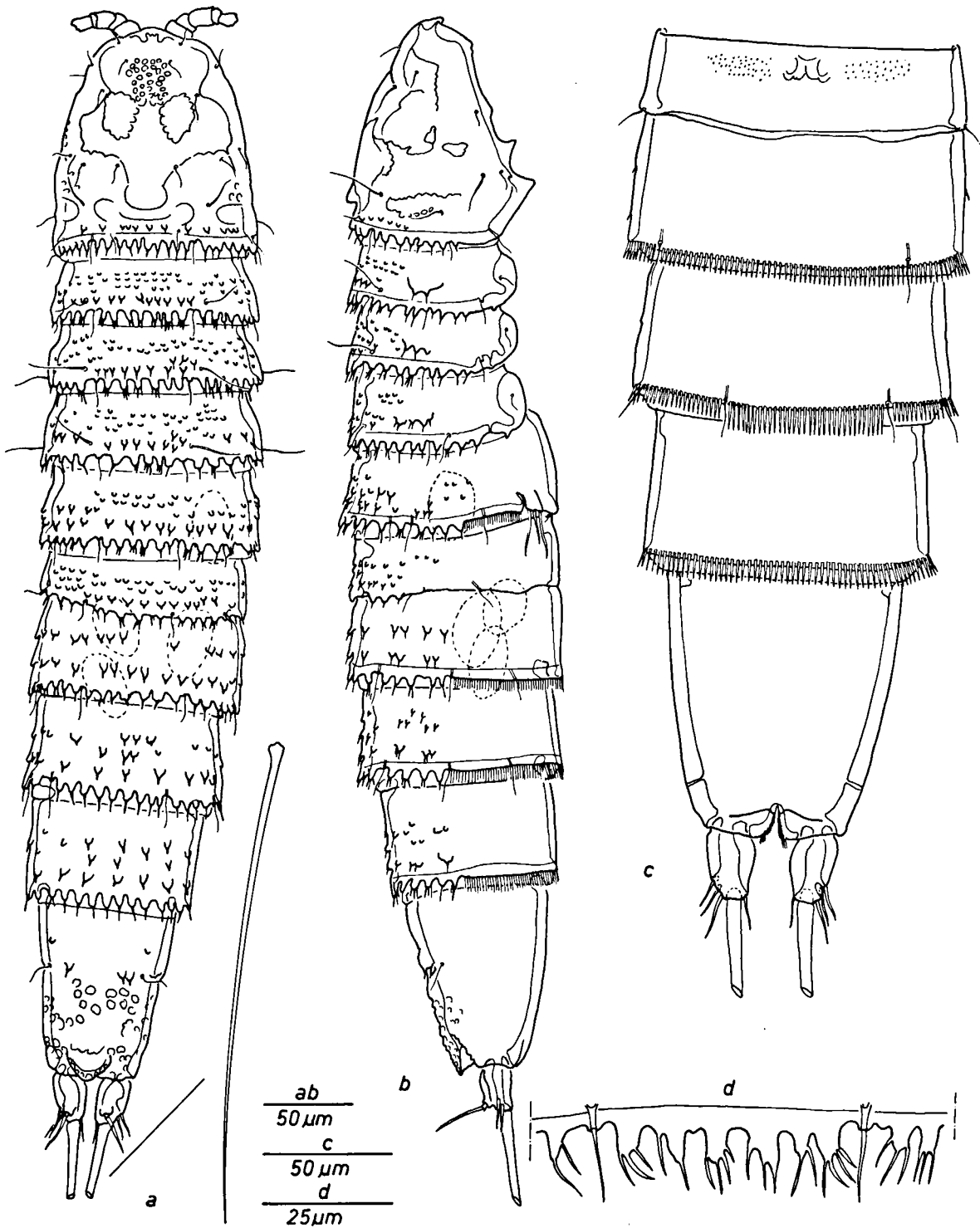


Fig. 3. *Leptocaris echinatus* n. sp.: a, habitus, dorsal view; b, habitus, lateral view; c, abdomen, ventral view; d, posterior margin of third pleurotergite.

structures as in thoracic segments; genital segments not fused along ventral side; abdominal segments tapering in posterior direction; anal segment twice as long as wide; anal operculum strongly convex; furcal rami $1\frac{1}{2}$ times as long as broad with curved margins, one dorsal and two lateral setae, articulating on a basal part; apical margin of rami with one inner and one outer short seta and a long smooth principal one.

Integumental structures (fig. 3d): cephalothorax furnished with several large and irregularly shaped impressions; posterior margin of cephalothorax, thoracic and abdominal segments provided with rounded cuticular processes, each furnished with variable number of sharp teeth; anterior half of pleurotergites of thoracic and first genital segment covered with blunt nodules; ventral surface of abdominal segments smooth; posterior margins of second genital segment and abdominal segments with sharp spinules; dorsal and lateral surface of anal segment pitted and ventral surface smooth; lateral margins of anal operculum indented.

Genital field (fig. 3c) consisting of a small pattern of sclerotizations on ventral body surface, and a field of irregularly implanted spinules on either side of it.

Rostrum (fig. 4h): triangular with a slightly projecting apex.

Antennule (fig. 4j): five-segmented; first segment with row of long and sharp spinules; aesthetasc on fourth segment, about 40 μ m long.

Antenna (fig. 4k) with allobasis, bearing a strong inner seta and a small proximal row of minute spinules; exopodite absent; endopodite with two transverse rows of spinules, two smooth lateral spines and three apical spines, two of which ornamented; furthermore, two short and one very long apical setae.

Mandible (fig. 4d): gnathobasis strongly developed; mandibular palp reduced to a smooth seta.

Maxillule (fig. 4f): arthrite with five ciliated spines, two setae and one setule; surface of arthrite with row of small spinules; basis of coxa

with three apical setae and two groups, both of two setae, along margin.

Paragnath (fig. 4e): strongly developed; external margin curved; inner margin and apex densely covered with sharp spinules and setules.

Maxilla (fig. 4i): surface of syncoxa with three rows of strong spinules; two endites; proximal endite with comb of teeth and small seta; distal endite small, bearing two setae, basis prolonged into a denticulated claw-like structure bearing two proximal setae.

Maxilliped: absent.

P1 (fig. 4a): surface of coxa covered with minute spinules; basis with one inner and one outer seta; exopodite three-segmented, endopodite two-segmented; first endopodite segment with peculiar, barbed seta; second segment with spine-like apical seta and two small subapical ones. Setal formula of P1-P4 shown in table II.

P2 (fig. 4b): protopodite and exopodite almost as in preceding leg, except for smooth coxal surface and absence of inner seta on basis; endopodite two-segmented; first endopodite segment without seta; second endopodite segment with a peculiar inner seta, a strong external spine and two feathered setae.

P3 and P4 (figs. 4c and 4g) resembling P2 closely, but differing in number of exopodal setae.

P5 (fig. 4-l): fused with ventral side of segment; each socle bearing three elements; central element of each group short, inner spine armed with small barbs.

TABLE II
Setal formula of *Leptocaris echinatus* n. sp.

	P ₁	P ₂	P ₃	P ₄
exo	0-0-022	0-0-022	0-0-122	0-0-122
end	1-210	0-121	0-121	0-121

Male unknown.

Discussion. — *Leptocaris echinatus* n. sp. can easily be distinguished from the other species of the genus by the presence of peculiar integumental structures on the thoracic and

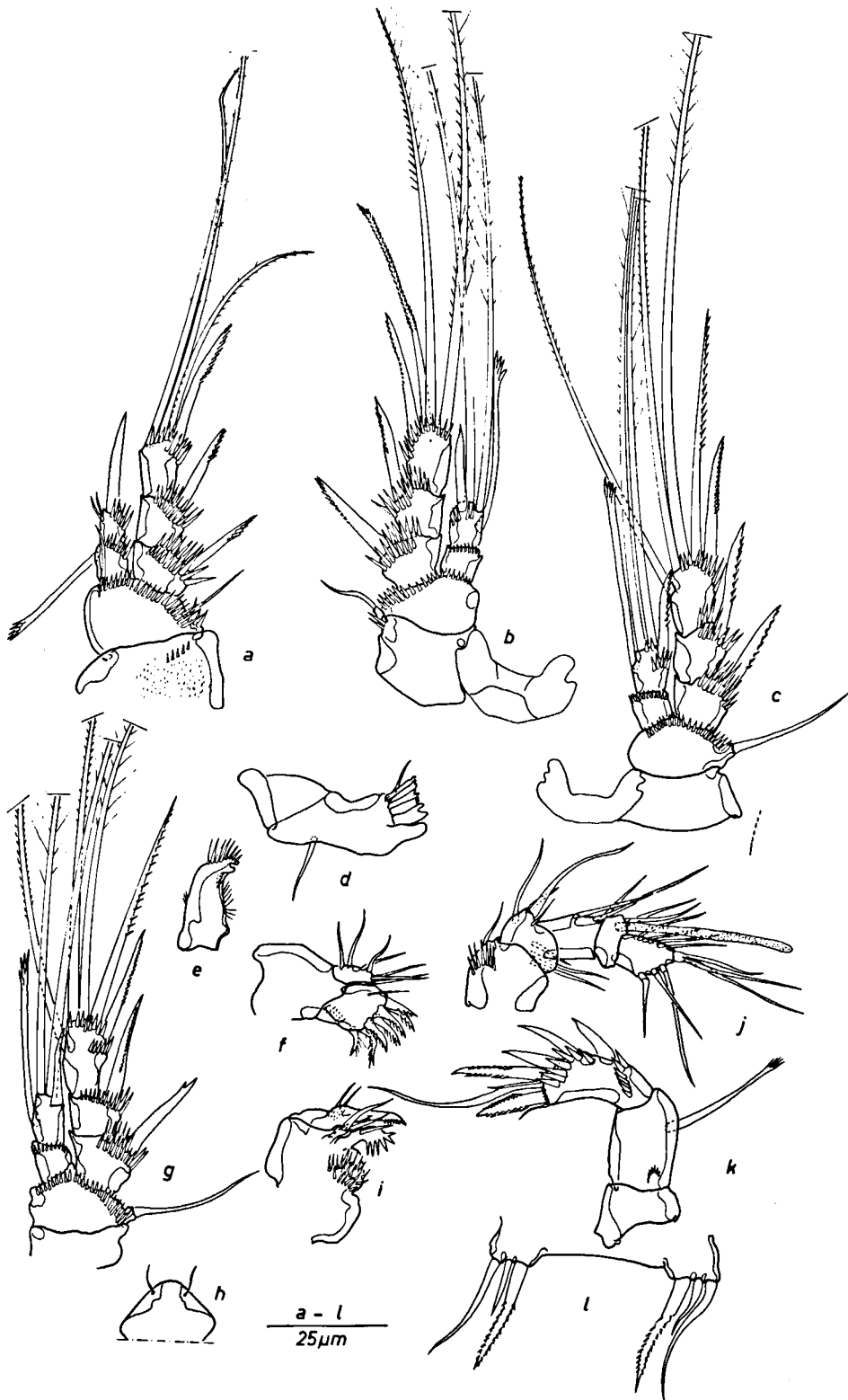


Fig. 4. *Leptocaris echinatus* n. sp.: a, P1; b, P2; c, P3; d, mandible; e, paragnath; f, maxillule; g, P4; h, rostrum; i, maxilla; j, antennule; k, antenna; l, P5.

abdominal segments. Furthermore, *L. echinatus* n. sp. has a characteristic endopodite of P1: the claw-like spine and the strongly reduced setae on the ultimate segment are only comparable with the P1 of *L. gurneyi* Nicholls, 1944 and *L. mangalis* Por, 1983. *L. echinatus* n. sp., however, is easily distinguishable from both species by the setal formula of the distal segment of the exopodite of P3 and P4: 222 in *L. gurneyi*, 121 in *L. mangalis*, and 122 in *L. echinatus* n. sp.

Leptocaris echinatus n. sp. in many respects is a remarkable species within the genus *Leptocaris*. This species unites characteristics until now only encountered in the most primitive species group (*brevicornis* group) and in the most advanced group (*minimus* group).

The chaetotaxis formula of the legs of this species, comprising five setae and spines on the distal exopodite segments and four setae on the endopodites of P3 and P4 is thought to be the most primitive arrangement (Kunz, 1983). Up to now, this setal arrangement was only known in the species of the *brevicornis* group.

On the other hand, *L. echinatus* n. sp. shares several characteristics with the most derived species group (*minimus* group): the sculptured dorsum, the conical operculum and the spinulation on the first antennular segment. However, the rather simple fifth leg, bearing three setae only, shows no clear resemblance to the more complex fifth leg of the species of the *minimus* group.

This remarkable combination of characteristics in *Leptocaris echinatus* n. sp. illustrates the rather inadequate subdivision of the genus. As pointed out by Fleeger & Clark (1980), more information on the systematics and the phylogenetic relationships in the genus will be obtained when the morphology of the fifth leg of males and females is carefully considered. Unfortunately, males of the present species, and of several other species, are still unknown. The discovery of males certainly will throw more light on the systematics of the genus *Leptocaris*.

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