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BOXSHALLIA BULBANTENNULATA GEN. ET SPEC. NOV. (COPEPODA: MISOPHRIOIDA) FROM AN ANCHIHALINE LAVA POOL ON LANZAROTE, CANARY ISLANDS

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SUMMARY

A new genus and species of misophrioid copepod is described from an anchihaline lava pool on Lanzarote, Canary Islands. *Boxshallia bulbantennulata* gen. et spec. nov. lacks any trace of a carapace, possesses a genital double somite, and can be distinguished from other misophrioids by the presence of a bulb-shaped process on the first antennular segment, the loss of the inner coxal spine in leg 1 and the presence of 3 setae on the mandibular basis. The new genus also exhibits many plesiomorphic features such as the 27-segmented antennula and the biramous leg 5 with a 2-segmented protopod and a well developed intercoxal sclerite in the female. On the basis of urosome segmentation and gonopore location, the holotype of *Dimisophria cavernicola* Boxshall & Iliffe, 1987 is recognised as being a (female) copepodid V stage. The discovery of a close deep-sea relative of the cavernicolous *Expansophria* species confirms Boxshall & Iliffe's (1987) idea that its puzzling distribution on Indo-West Pacific and North Atlantic islands can be explained by assuming that the genus must be widespread in the deep-sea.

RÉSUMÉ

On décrit un genre et une espèce nouveaux de Copépodes Misophrioides d'une pièce d'eau anchihaline sur substrat de lave, de Lanzarote, Canaries. *Boxshallia bulbantennulata* gen. et sp. nov. est dépourvu de toute trace de carapace, possède un somite génital double, et peut être distingué d'autres Misophrioides par la présence d'un processus en forme de bulbe sur le 1er segment antennulaire, par la perte de l'épine coxale interne des pattes 1, et par la présence de 3 setae sur la base de la mandibule. Le genre nouveau présente de nombreux caractères plésiomorphes, comme l'antennule à 27 segments et la patte 5 birame, avec un protopodite bisegmenté et un sclérite intercoxal bien développé chez la femelle. L'holotype de *Dimisophria cavernicola* Boxshall & Iliffe, 1987, est reconnu comme étant un copépodite (femelle), Ve stade, cette conclusion étant basée sur la segmentation de l'urosome et sur l'emplacement du gonopore. La découverte d'une forme abyssale étroitement apparentée aux espèces stygobies d'*Expansophria*, étaie l'hypothèse de Boxshall & Iliffe (1987) conformément à laquelle le genre doit être largement répandu dans l'abyssal, ce qui pourrait expliquer sa distribution curieuse dans des îles des océans Indo-Ouest Pacifique et Nord Atlantique.

INTRODUCTION

Misophrioid copepods are widely accepted as representing the earliest offshoot during podoplean evolution because of the possession of a vast array of plesio-

morphic characters retained from the common ancestral copepod stock (Boxshall et al., 1984). They also exhibit many unique features, such as the presence of a carapace-like extension of the cephalosome enclosing the first pedigerous somite, the neotenic retention of the antennary gland and the absence of the nauplius eye throughout the life cycle. However, most of these characters were viewed collectively as an adaptation to the bathypelagic feeding strategy of opportunistic macrophagy (Boxshall, 1982, 1984, 1986), because at that time the Misophrioida were considered to be essentially a deep-sea taxon living in the near-bottom community (Hülsemann & Grice, 1964; Boxshall, 1983; Alvarez, 1985).

Since the discovery in Roadside Cave, Bermuda, of the first cavernicolous misophrioid *Speleophria bivexilla* (cf. Boxshall & Iliffe, 1986) three new genera and five new species of the order have been discovered in anchihaline caves on Indo-West Pacific and North Atlantic islands (Boxshall & Iliffe, 1987). Subsequent exploration of other caves in the West Indies revealed several other new species to be described soon (Boxshall, pers. comm.) and the puzzling and often inexplicable distribution patterns let suggest that the group is more widespread (littoral, bathypelagic, cave-dwelling) than previously expected.

Anchihaline caves on the Canary Islands are known to harbour many interesting copepods, including three new families of harpacticoids (Huys, 1988; in prep.). Four new genera of misophrioids were found to co-occur in the submerged lava tube of Jameos del Agua on Lanzarote (Boxshall & Iliffe, 1987). This paper describes another new genus of misophrioid collected by Prof. Dr. J. H. Stock from Playa de Montaña, Bermeja, Lanzarote, and raises the number of stygobiont misophrioids to nine.

MATERIAL AND METHODS

Before dissection, the habitus was drawn in lactophenol and body length measurements were made. Specimens were dissected in lactic acid and the dissected parts were placed in lactophenol mounting medium. Preparations were sealed with glyceel.

All figures have been prepared using a camera lucida on a Leitz Dialux 20 interference microscope. Abbreviations used in the text and figures are: P1-P6, first to sixth legs. Type-specimens are deposited in the collections of the Zoölogisch Museum, Amsterdam (ZMA).

SYSTEMATICS

The genus is not assigned to a particular family as the familial rearrangement will be the subject of a forthcoming paper (Boxshall, in prep.).

Boxshallia gen. nov.

Diagnosis. — Misophrioida. Prosome 5-segmented with posterior margin of maxilliped-bearing somite not produced into carapace-like expansion; first pedigerous somite exposed. Urosome 5-segmented in female; genital double

somite without any trace of subdivision. Antennula with conspicuous swelling at the outer side of segment I; 27-segmented in female with aesthetascs on segments XI, XVI and XXVII; 23-segmented in male, unigeniculate between segments XIX and XX, with aesthetascs on segments XI, XVI and XXIII. Exopod of antenna 7-segmented; endopod indistinctly 3-segmented. Mandibular palp biramous; basis with 3 setae; endopod 2-segmented; exopod 3-segmented. Maxillula with 1-segmented rami; epipodite with 7 setae. Praecoxa and coxa of maxilla with 2 endites each; endopod 3-segmented. Maxilliped with 4 endites on syncoxa and with 6-segmented endopod. Coxa of leg 1 without inner spine; endopod 3-segmented. Distal exopod segment P1-P4 with 3 outer spines. Distolateral angle of 2nd endopod segment bifid in P2-P4. Leg 5 biramous, endopod represented as a bipinnate spine, exopod 2-segmented; with distinct intercoxal sclerite and coxa in female; positioned midventrally in male. Caudal ramus with 6 setae. Testes paired.

Etymology. — The genus is named in honour of my friend and colleague Dr. Geoffrey Boxshall, British Museum (Natural History), London, in recognition of his major contribution to the anatomy and systematics of misophrioid copepods.

Type and sole species. — *Boxshallia bulbantennulata* gen. et spec. nov.

Boxshallia bulbantennulata spec. nov.

Type locality. — Amsterdam Expedition to the Canary Islands, sta. 85-53. Lanzarote, Playa de Montaña Bermeja; anchihaline lava pool, situated at about 50-100 m from the sea (UTM coordinates FM 61415 x 320395); separated from the sea by a ridge of lava and pumice; tidal activity perceptible in the pool via subterranean connections with the sea; the sample was taken with the Karaman-Chappuis method; conductivity 39.2 mS/cm (= ca. 27.9 ppt salinity): 14 May 1987; coll. J. H. Stock.

Accompanying fauna: Harpacticoida (Ameiridae, Canuellidae, Tisbidae) and an undescribed genus of Tantulocarida (Boxshall & Huys, in press.).

Material. — One female (holotype, ZMA Co. 102.811 a) and one male (allotypic paratype, ZMA Co. 102.811 b) dissected and mounted on 7 slides each; other paratypes are one copepodid I and one copepodid III stage (preserved in alcohol, ZMA Co. 102.811 c).

Etymology. — The specific name is derived from the Latin *bulbus*, meaning bulb, and *antennula*, and refers to the conspicuous swelling of the proximal antennular segment.

Description. — Female (figs. 1A-B). Body length 683 μm rostrum and caudal rami included. Prosome large, 5-segmented with first pedigerous somite free and not concealed beneath a carapace-like extension from the posterior margin of the maxilliped-bearing somite. Cephalosome bell-shaped in dorsal view. Nauplius eye not observed. Rostrum well developed, anteroventrally deflexed but still visible in dorsal aspect, not defined at base, not fused to labrum. Ventrolateral margins of dorsal cephalic shield not indented, cone organs absent. First pedigerous somite without areas of folded, flexible integument. Dorsal and dorsolateral surfaces of prosomal somites (except cephalosome)

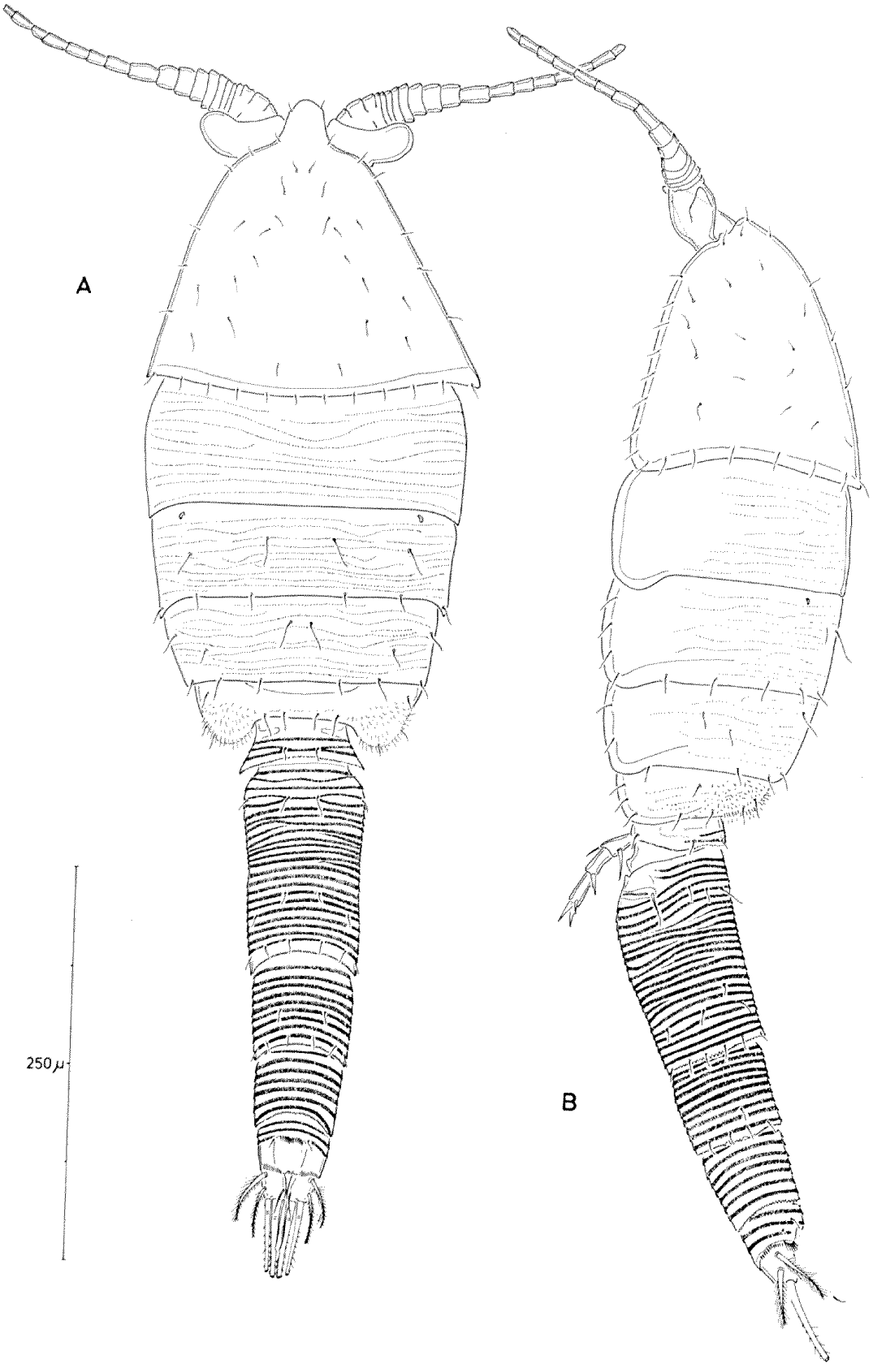

Fig. 1. *Boxshallia bulbantennulata* gen. et spec. nov.: A, habitus of female, dorsal view; B, habitus of female, lateral view.

ornamented with pattern of minute denticles. Posterolateral areas of last prosome somite furnished also with hair-like pinnules. Urosome 5-segmented, with genital and first abdominal somites fused to form genital double somite; all urosomites with squamose ornamentation. Caudal rami (figs. 7F, G) slightly longer than wide; armed with 6 setae: anterolateral seta dorsally displaced and plumose, posterolateral seta tripinnate, outer and inner terminal setae strongly developed, terminal accessory seta well developed and tripinnate, dorsal seta smooth and located near the midposterior margin, anterolateral accessory seta missing; inner and posterior margins furnished with fine spinules.

Antennula (figs. 2B-C) 27-segmented and borne on an expanded basal pedestal; outer margin of proximal antennular segment produced into a conspicuous anteriorly directed bulb-shaped process bearing a ventral spinular row. Segments II to XI fused along the outer margin and the angle of fusion directs the distal segments more laterally. Armament elements as follows: I-3, II-1, III-2, IV-1, V-2, VI-2, VII-2, VIII-2, IX-2, X-2, XI-1 + 1 aesthetasc, XII-2, XIII-2, XIV-2, XV-2, XVI-2 + 1 aesthetasc, XVII-2, XVIII-2, XIX-2, XX-2, XXI-2, XXII-1, XXIII-1, XXIV-2, XXV-2, XXVI-2, XXVII-5 + 1 aesthetasc. The aesthetascs on the anteroventral surfaces of segments XI and XVI are large, that on segment XXVII very short. The seta on segment XI looks aethetasc-like and the inner one on segment XXVI is swollen.

Antenna (fig. 3A) biramous; protopod comprising separate coxa and basis. Coxa with inner spinular row near anterior margin. Basis with 1 inner seta. Endopod indistinctly 3-segmented, segments 2 and 3 fused anteriorly; segment 1 longest, with 2 setae midway along inner margin; segment 2 with 5 unequal medial margin setae located distally; distal margin of segment 3 with 6 basally fused, long, pinnate seta and 1 short smooth seta, outer margin furnished with fine spinules. Exopod 7-segmented; segments 1-6 wider than long, each with 1 long plumose seta on inner margin, segments 2-6 also with fine spinules distally; segment 7 squarish, with 2 patches of spinules, 2 inner setae and a terminal cluster of 3 plumose setae.

Labrum small, not fused with rostrum, bilobed.

Mandible (figs. 3B-C) with well developed gnathobase bearing several teeth along the distal margin. Palp biramous, comprising basis, 2-segmented endopod and indistinctly 3-segmented exopod. Basis with cluster of 3 unequal setae along the inner margin. First endopod segment largest, with 4 setae midway along inner margin; segment 2 with 7 distal margin setae. Exopod segments fused along the inner margin; segments 1 and 2 each with 1 inner margin plumose seta; segment 3 with 5 plumose setae distally.

Maxillula (fig. 3D) with praecoxa and coxa separated by well developed articulation. Praecoxal arthrite bearing 15 setae or spines around the distal margin. Coxal exite (epipodite) represented by 7 unequal plumose setae located on the outer margin, the 2 proximal-most setae being spatulate at tip;

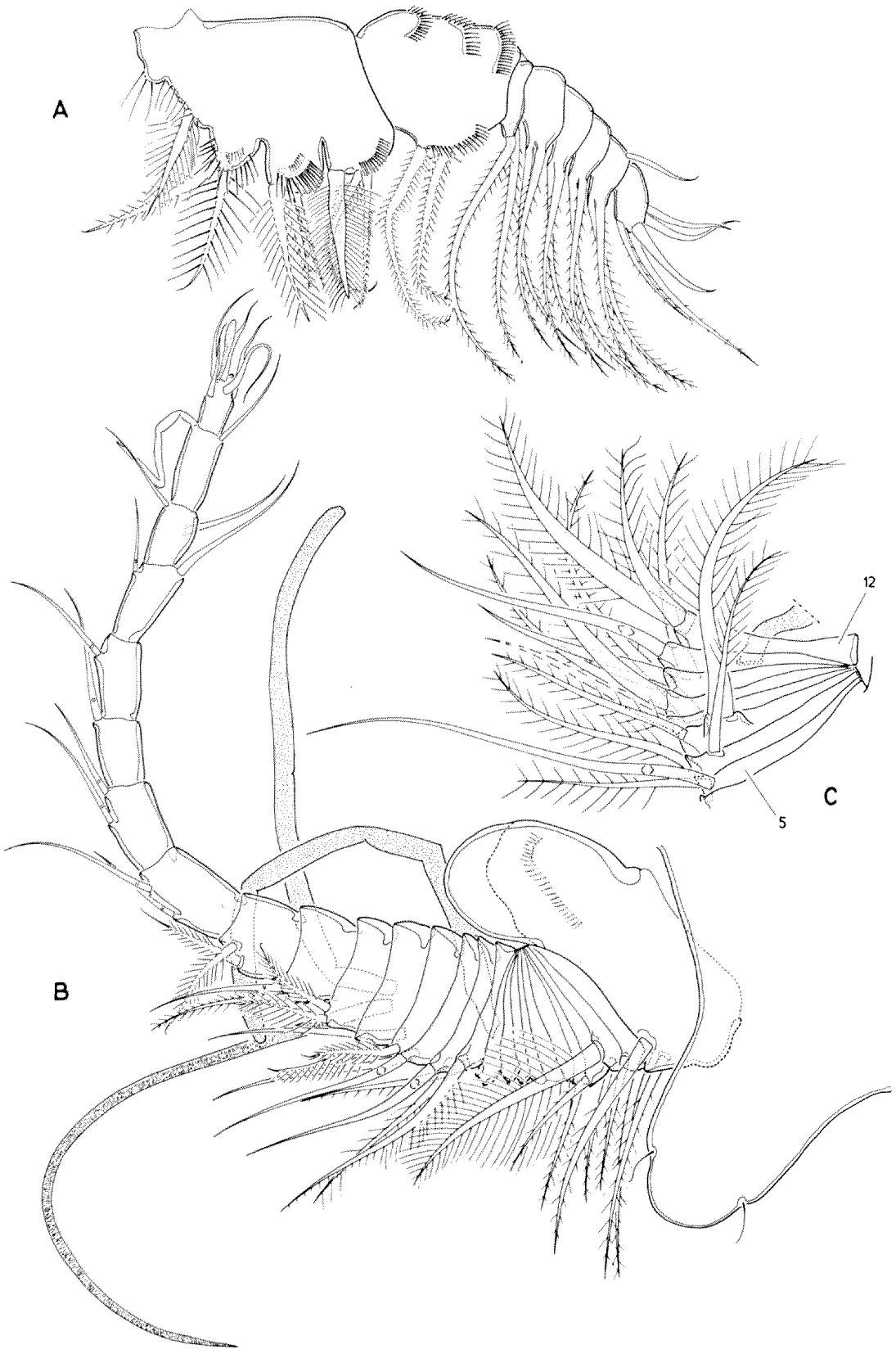

Fig. 2. *Boxshallia bulbantennulata* gen. et spec. nov.: A, maxilliped; B, antennula of female, setation of segments 5 to 11 omitted; C, antennula of female, segments 5 to 12.

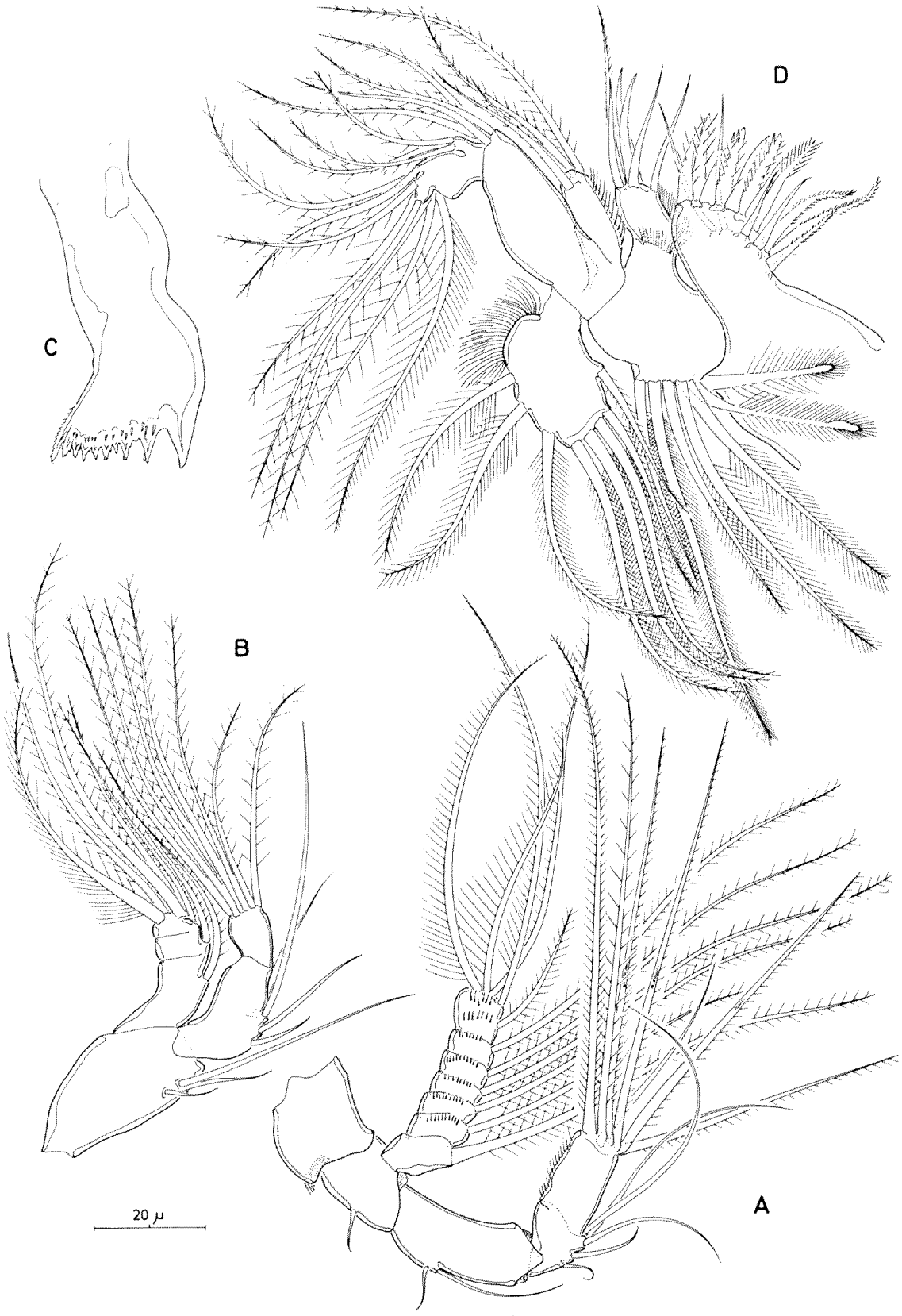

Fig. 3. *Boxshallia bulbantennulata* gen. et spec. nov.: A, antenna; B, mandibular palp; C, mandibular gnathobase; D, maxillula.

coxal endite well developed, with 1 patch of spinules on the anterior surface, setules along inner margin and 4 setae and 2 curved spines distally. Basis elongated, with 2 endites; proximal endite produced medially, bearing 4 plumose setae distally and being spinulose along inner margin; distal endite vestigial, represented by 4 plumose setae. Endopod 1-segmented, bilobed; proximal inner lobe (equivalent of 1st endopod segment) with 3 apical plumose setae; distal lobe forming apical process bearing 8 plumose setae. Exopod forming a flattened, 1-segmented plate, narrowing proximally and armed with 8 plumose setae around distal margin and with proximal fringe of long setules on inner margin.

Maxilla (fig. 7A) with praecoxa and coxa separated. Praecoxa bearing 2 short distal endites, closely set to each other, the first bearing 5 plumose setae, the second 3 setae; outer margin with several spinular rows. Coxa with 2 long cylindrical endites, not closely set to each other and furnished each with 3 plumose setae. Basis with single endite with fringe of long spinules along inner margin and produced into strong claw, being spinulose along inner distal half; bearing 2 setae on both anterior and posterior surface and 1 seta at basis of the claw near joint with endopod. Endopod 3-segmented; segments 1 and 2 each with 2 inner margin setae; segment 3 elongated and bearing 5 setae.

Maxilliped (fig. 2A) 8-segmented, praecoxa and coxa forming syncoxa, endopod 6-segmented. Syncoxa bearing 4 less defined endites, each armed with spinular rows distally; bearing 1, 2, 3 and 3 setae, respectively. Basis with 2 inner margin setae and 3 fringes of fine spinules along outer margin. First endopod segment fused with basis at posterior surface. Endopod segments 1-5 with 2 plumose inner margin setae; segment 5 also with 1 short, smooth outer seta; segment 6 longest, bearing 2 plumose and 3 bare setae.

Legs 1 to 4 (figs. 4, 5) biramous with 3-segmented exopods and endopods. Leg 1 without inner seta on coxa; inner spine of basis bearing flagellum subapically; endopod segments 1 and 2 drawn out into short spiniform process at distolateral angle; outer and apical spines of 3rd endopod segment and lateral spines of exopod segments with strips of serrated membrane; apical seta of 3rd exopod segment bifid at tip; lateral spinose processes of exopod segments also with strips of serrated membrane. Legs 2-4 with distolateral angle of 2nd endopod segment bifid; lateral exopodal spines armed with pinnules, except for distal spine of 3rd exopod segment which has strips of serrated membrane; coxa with inner seta; basis with bipinnate spine (P2) or plumose seta (P3-P4).

Spine and seta formula as follows:

	coxa	basis	endopod	exopod
leg 1	0-0	I-I	0-1; 0-1; I, II, 3	I-1; I-1; III, 1, 3
leg 2	0-1	I-0	0-1; 0-2; I, II, 3	I-1; I-1; III, I, 4
leg 3	0-1	1-0	0-1; 0-2; I, II, 3	I-1; I-1; III, I, 4
leg 4	0-1	1-0	0-1; 0-2; I, II, 2	I-1; I-1; III, I, 3

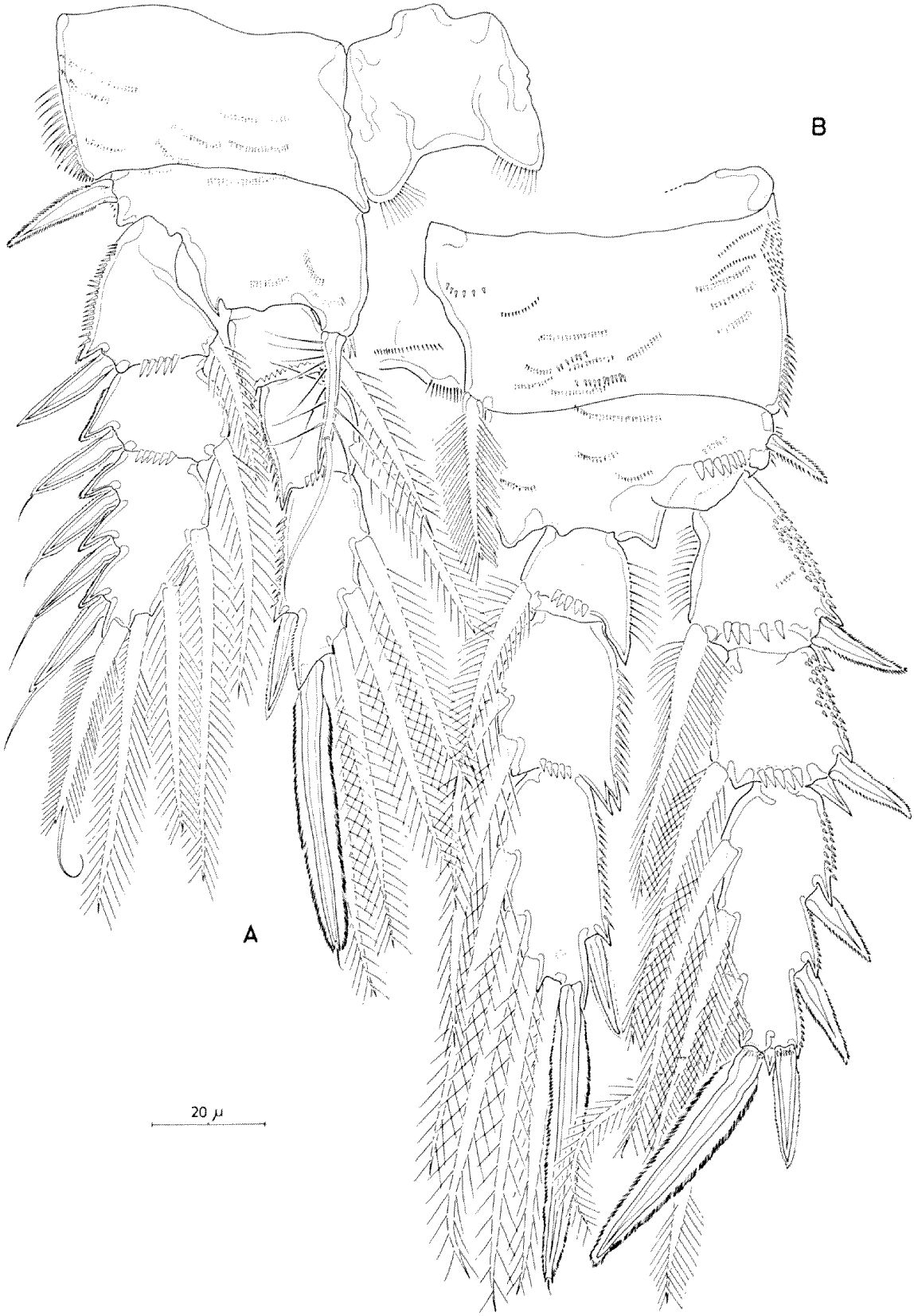

Fig. 4. *Boxshallia bulbantennulata* gen. et spec. nov.: A, P1, B, P2.

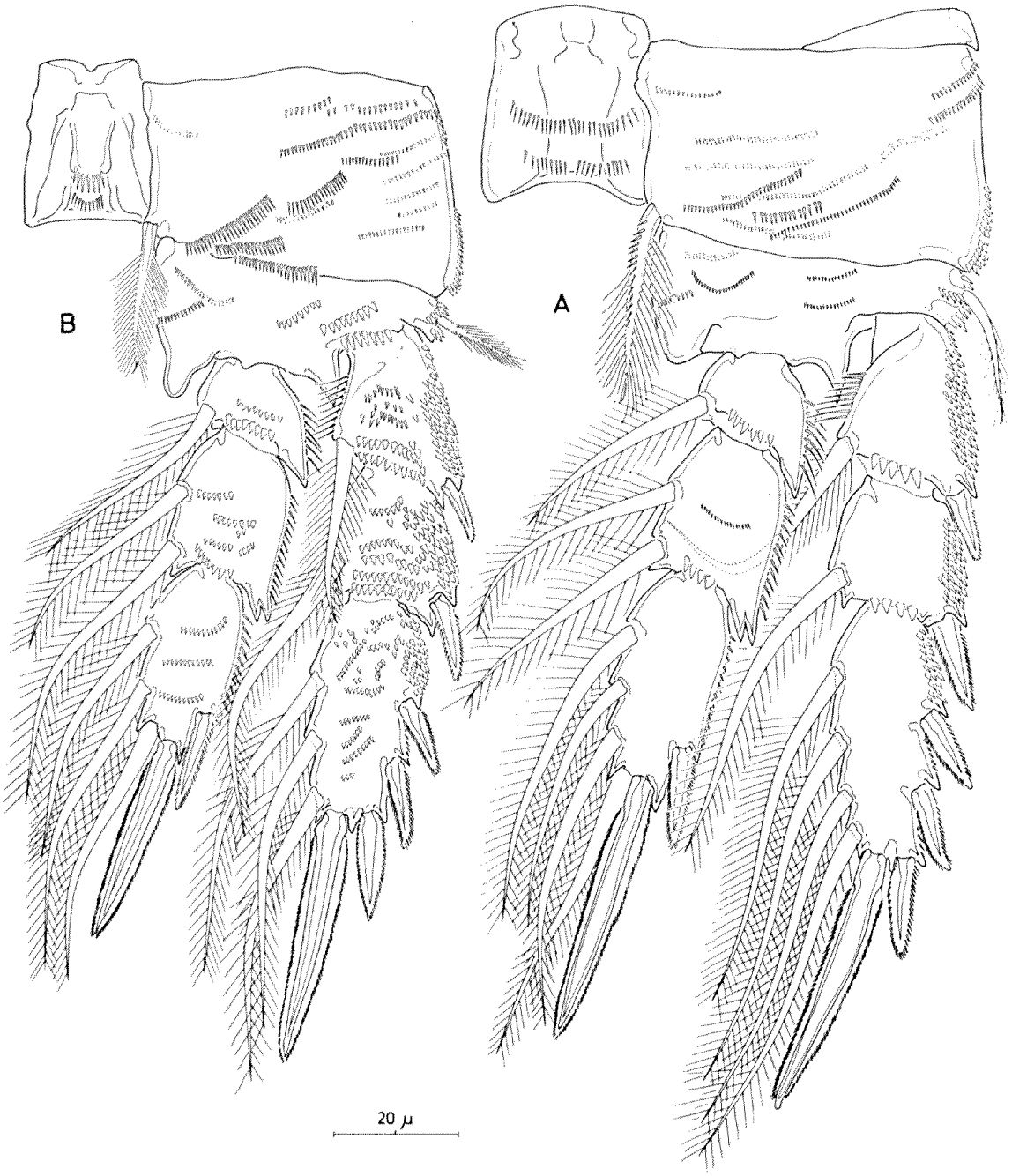

Fig. 5. *Boxshallia bulbantennulata* gen. et spec. nov.: A, P3; B, P4.

Leg 5 (fig. 6C) biramous, comprising 2-segmented protopod, 2-segmented exopod and vestigial endopod represented by a bipinnate spine. Coxa unarmed; basis spinulose along outer and distal margins, bearing plumose outer seta and some patches of spinules on surface. Exopod segment 1 with unipinnate spine at outer distal corner; segment 2 with 4 distal margin elements, 2 short pinnate spines, 1 median longer spine and 1 inner minute seta. Members of fifth leg pair joined by well developed intercoxal sclerite as in legs 1 to 4.

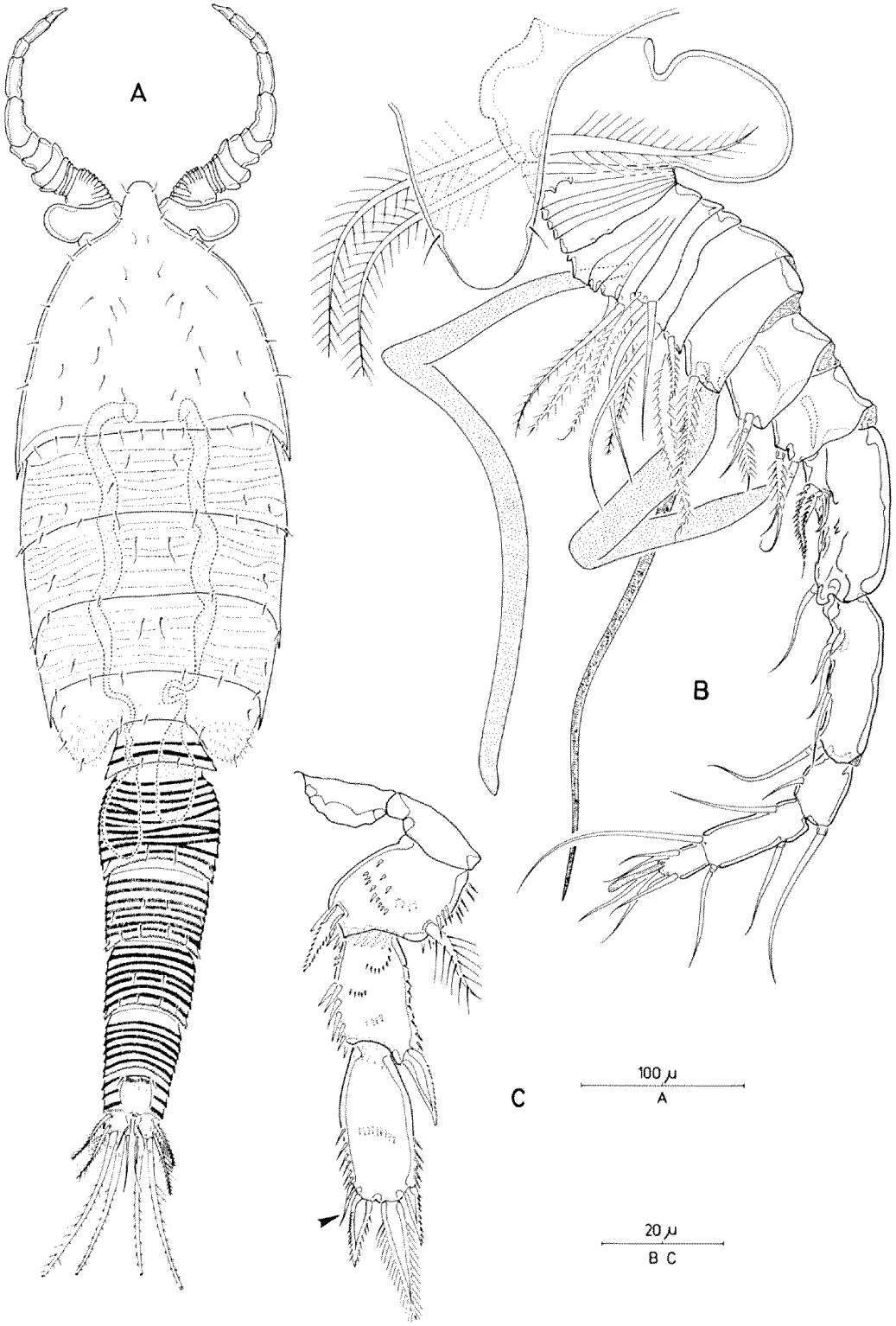

Fig. 6. *Boxshallia bulbantennulata* gen. et spec. nov.: A, habitus of male, dorsal view; B, antennula of male, setation of segments 2 to 10 omitted; C, leg 5 and intercoxal sclerite of female, arrow indicating minute seta.

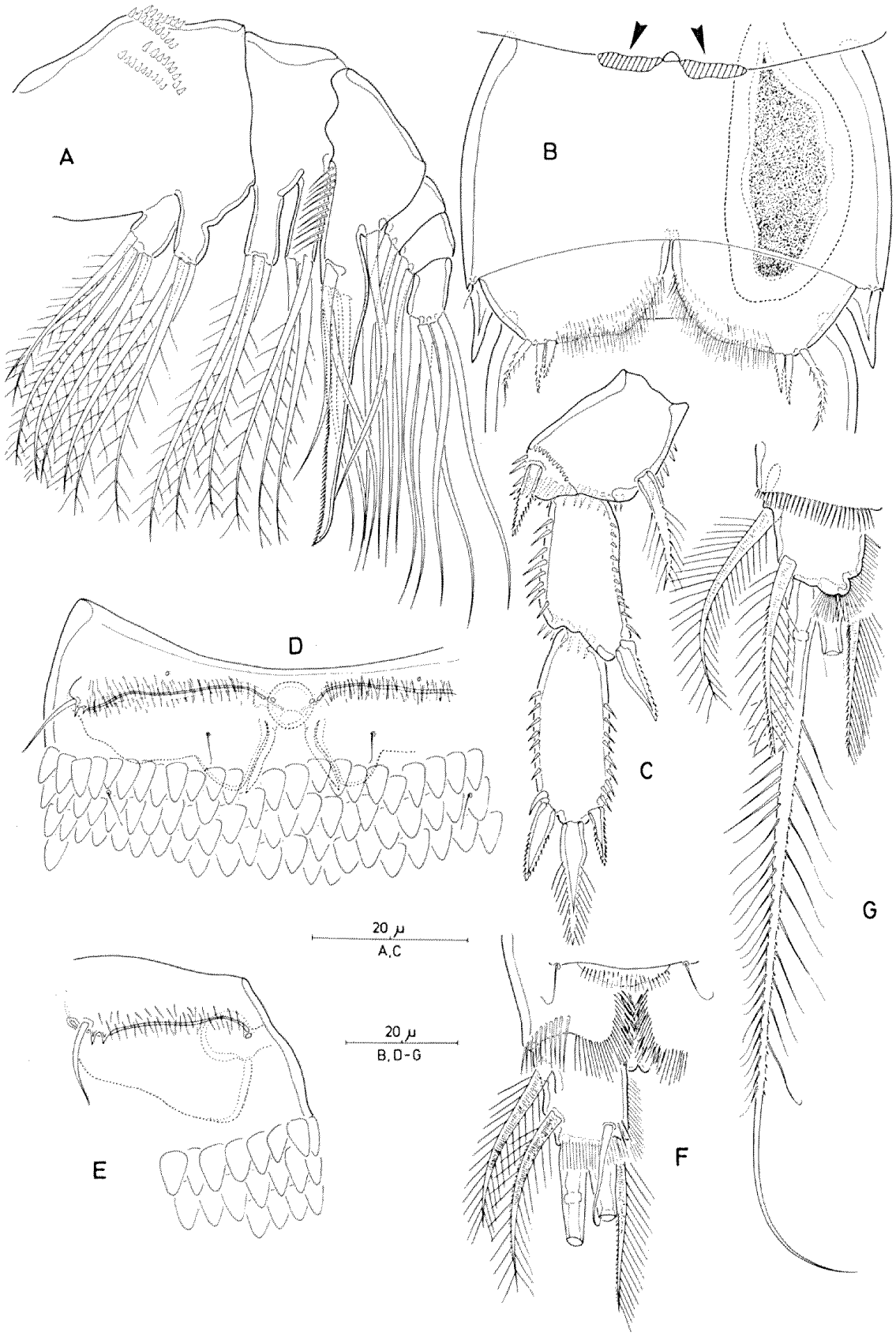

Fig. 7. *Boxshallia bulbantennulata* gen. et spec. nov.: A, maxilla; B, genital somite and leg 6 of male, arrows indicating location of leg 5; C, leg 5 of male; D, gonopores and leg 6 of female, ventral view; E, gonopores and leg 6 of female, lateral view; F, caudal ramus, dorsal view; G, caudal ramus, ventral view;

Leg 6 (figs. 7D-E) acting as an operculum closing off genital antrum on each side of ventral midline; located near anterior margin of genital double somite and fused medially at level of median seminal receptacle; covered with hair-like pinnules and bearing at outer corner 1 plumose seta in addition to 2 spinose processes.

Male (fig. 6A). Body form as in female; length 577 μm, rostrum and caudal rami included. Genital somite as long as wide, containing two oval spermatophores visible through integument on either side of midline. On either side a testis extends through most of the prosome; apical part recurved dorsally and posteriorly at level of maxillipedal somite. Sexual dimorphism occurring in antennula, fifth and sixth legs and genital segmentation.

Antennula (fig. 6B) 23-segmented, unigeniculate on both sides with geniculation located between segments XIX and XX and distal part medially directed. Outer margin of segment I produced into conspicuous anteriorly directed bulb-shaped process. Segments IX to XI fused along outer margin. Segment XV fused ventrally with segment XVI; producing anteriorly a sheath overlapping lateral part of segment XVI; both segments free and fully exposed dorsally. Segments XIX and XXII each represent two (XIX-XX and XXV-XXVI, respectively) fused segments; segment XX represents three (XXI-XXIII) segments of the female. Armature elements as follows: I-3, II-1, III-2, IV-1, V-2, VI-2, VII-2, VIII-2, IX-2, X-2, XI-1 + 1 aesthetasc, XII-2, XIII-2, XIV-2, XV-2, XVI-2 + 1 aesthetasc, XVII-2, XVIII-2, XIX-4, XX-4, XXI-2, XXII-4, XXIII-5 + 1 aesthetasc. The aesthetascs on the anteroventral surfaces of segments XI and XVI are large, that on segment XXIII very short. The seta on segment XI looks aesthetasc-like.

Leg 5 (figs. 7B-C) biramous, comprising unisegmented protopod, 2-segmented exopod and vestigial endopod represented by 1 bipinnate spine. Bases of legs almost touching at ventral midline; with minute sclerite (intercoxal sclerite ?) in between. Armament of exopod basically as in female.

Leg 6 (fig. 7B) represented by flattened plate bearing 3 unequal armature elements on lateral portion of posterior margin; inner and distal part covered with numerous hair-like pinnules. Members of sixth pair of legs meeting in ventral midline but not fused; articulation with somitic wall not well developed.

DISCUSSION

The new genus can be easily distinguished from all other misophrioids by the presence of the bulb-shaped process on the first antennular segment of both sexes. This structure is already discernible in the copepodid I stage. In spite of the profound condensation of the proximal segments, the primitive 27-segmented condition is still recognisable. At first, this condition was con-

sidered as being highly exceptional within the Copepoda (Boxshall, 1983, 1984) but continuing discovery of new misophrioid taxa (*Archimisophria*, *Dimisophria*, undescribed ?*Expansophria* species, present account) revealed that this might be more common than previously expected; moreover, since then it has been found to occur in primitive calanoids (*Erebonectes*; Fosshagen & Iliffe, 1985) as well.

The presence of a genital complex representing fused genital and first abdominal somites is shared only by a few misophrioid genera (Boxshall & Iliffe, 1986, 1987), all inhabiting anchihaline cave habitats. *Boxshallia* most closely resembles *Speleophria* in that the respective somites are completely fused, with the genital apertures located in the anterior quarter of the genital double somite. In female *Palpophria aestheta* the urosome is also 5-segmented, but a partial suture is still present ventrally between the genital and first abdominal somites. The location of the sixth pair of legs and the associated gonopores at the posterior margin of the genital somite (i.e. near the middle of the genital double somite) indicates that the condition in *Palpophria* represents an intermediary step in the process of fusion and anterior gonopore displacement, starting from a definite 6-segmented urosome (as in e.g. *Archimisophria*) and leading to the *Speleophria-Boxshallia* condition.

Boxshall & Iliffe (1987) admitted some difficulties in determining the precise sexual status of *Dimisophria carvernicola* because of the position of the genital openings at the posterior margin of the second urosomite. This configuration excludes the possibility that the somite in question represents a genital double somite (see above). Moreover, the third urosomite, although a complete suture is present, is in a position ready to fuse with the genital somite at the final moult, thus leaving two free abdominal somites. In those species exhibiting a genital double somite in the adult female, the number of urosomites alone is not a good criterion to decide on the sexual state as both the copepodid V stage and the adult female possess a 5-segmented urosome. Indeed, at the final moult one further somite is added by subdivision of the last abdominal somite (= telson), but simultaneously the genital double somite is formed by fusion of urosomites 2 and 3. This developmental process has often led to misidentifications, particularly in copepod groups where a genital double somite is commonplace, such as the harpacticoids. For example, *Tachidiopsis parasimilis* Dinet was found to diverge from *T. similis* Drzycimski only in the segmentation of leg 5 (Dinet, 1974); re-examination revealed that the female paratype of *T. parasimilis* is nothing more than a copepodid V because the urosome is 5-segmented *and* leg 6 is located at the posterior margin of the second urosomite. For analogous reasons it is my opinion that the holotype of *Dimisophria cavernicola* should be regarded as a copepodid V despite the well developed state of the reproductive system. The apparently immature nature of the fifth leg and of the outer exopodal spines of P3-P4 probably gives also indication of the juvenile status, but as Boxshall & Iliffe (1987) rightly concluded, this does not affect the validity of the genus.

Apart from the antennular segmentation, the new genus exhibits also some other unusual plesiomorphic characters. Boxshall (1983) stressed the great phylogenetic significance of the biramous fifth leg in *Misophriopsis* in assessing homologies between Podoplea and Gymnoplea. Particularly a free endopod in leg 5 is an unusual character amongst podopleans and is further only found in a few primitive harpacticoids. In other misophrioids this ramus has undergone considerable reduction or, more often, has disappeared entirely. *Boxshallia* clearly exhibits the first condition; here, the endopod is represented by a single spine and resembles the condition found in *Benthomisophria palliata* and in both species of the genus *Misophria*. The 2-segmented protopod, comprising coxa and basis, is shared with the females of *Misophriella tetraspina*, *Speleophria bivexilla* and *Misophria kororiensis* and with both sexes of *Expansophria dimorpha*. However, only *B. bulbantennulata* and *S. bivexilla* have a well defined intercoxal sclerite joining the members of the fifth pair of legs. In *M. kororiensis* the coxae are connected by a non-articulating rod-like sclerite, a structure found also in *Palpophria aestheta*.

The new genus is unique in the presence of 3 setae on the basis of the mandible. In all other genera the basis bears a single seta. Another unusual feature is the presence of 4 setae midway along the inner margin of the proximal endopod segment. In many misophrioids this segment is armed with 1 seta at the inner distal angle and 2 setae were found only in the unnamed copepodid III stage from Bermuda (Boxshall & Iliffe, 1986) and in *B. cornuta* (Boxshall & Roe, 1980); some species (*Expansophria dimorpha*, *Dimisophria cavernicola*) have no setae at all. A high number of armature elements occurs also on different parts of the maxillula. The gnathobase bears 15 spines and setae; this maximum number is shared only with the two *Benthomisophria* species. The outer coxal lobe represented by 7 setae is only found in *B. palliata*; *Misophriopsis* is the sole known misophrioid with 8 seta on the epipodite.

A 7-segmented antennal exopod is shared with the two *Expansophria* species and with *Archimisophria squamata* (8-segmented in *A. discoveryi*) but *Boxshallia* is differing from the latter genus and from other deep-sea genera in the complete absence of a full carapace enclosing the first pedigerous somite. This is a situation analogous to that reported from the cave-dwelling genera *Palpophria* and *Dimisophria* (Boxshall & Iliffe, 1987) and this character serves also to distinguish the new genus from *Speleophria* and *Expansophria* where the carapace is greatly reduced yet still allows distension of the midgut.

The new genus is unique amongst misophrioids in lacking an inner spine on the coxa of leg 1 in both sexes. The evolutionary loss of protopodal armature elements in swimming legs apparently has taken place on several occasions within the misophrioids but these reductions were thus far found to be confined to the bases. Both *Expansophria* and *Dimisophria* have lost the outer seta or spine on the basis of legs 1-4 whilst both species of *Benthomisophria* lack the inner spine on the bases of the first leg pair.

Boxshallia belongs to the group of genera in which the outer seta on the basis of leg 2 is modified into a spine. This character is shared with the species belonging to the genera *Misophria* and *Archimisophria*. The new genus shows a bifid process on the distolateral angle of the second endopod segment of legs 2-4. This detailed structure is also present in most deep-sea genera, however, not always on the same legs. In *Misophriella*, *Misophriopsis*, *Benthomisophria*, and in *Misophria* a bifid endopodal process is discernible on legs 1-4. In the fourth deep-sea genus *Archimisophria* this structure is restricted to leg 4 (Boxshall, 1983; Alvarez, 1985). The cave-dwelling genera *Expansophria*, *Palpophria* and *Dimisophria* are missing the bifid process altogether. In addition to *Boxshallia*, *Speleophria* represents the second stygobiont genus displaying this character, however, only on legs 3-4. These morphological minutiae might provide clues as to the phylogenetic interrelationships of the genera when more material becomes available.

The discovery of *Boxshallia* raises the number of stygobiont genera to six, excluding the unnamed copepodid III from Bermuda and the copepodid IV from Lanzarote which apparently represent separate genera. At least two of these genera also have representatives living in non-cavernicolous habitats. *Misophria pallida*, inhabiting the shallow neritic waters of Europe from Norway (Sars, 1903), through to the Mediterranean and the Red Sea (Gurney, 1927), and a new species *M. sinensis* (Boxshall, in press) from a similar habitat, are very closely related to *M. kororiensis*, described from an anchihaline cave on Palau in the Indo-West Pacific (Boxshall & Iliffe, 1987). According to Boxshall & Iliffe (1987), the puzzling distribution pattern of the genus *Expansophria* with representatives in North Atlantic and Indo-West Pacific caves is best explained if the genus is also widespread in the deep-sea. A survey of the copepod fauna from the deep-sea off La Réunion, Indian Ocean revealed a new misophrioid with a 27-segmented antennula (Huys, unpubl.). The precise generic status of this species has yet to be ascertained; however, the unusual modification of the prosome indicates a very close relationship with *Expansophria*.

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