

Pseudocyclopina livingstoni sp. n. (Copepoda, Cyclopinidae) from the Livingston Island (Antarctica)

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A new species of the genus *Pseudocyclopina* Lang, 1946, viz. *Pseudocyclopina livingstoni* sp. n., is described from the littoral interstitial (South bay) and from littoral plankton (Bulgarian Base “St. Kliment Ohridsky”) of the Livingston Island (Antarctica). The discovery of this new species brings the total number of the species in the genus, all from the Antarctic waters, to six.

Key words: *Pseudocyclopina*, Cyclopinidae, Copepoda, interstitial, plankton, Antarctica.

Introduction

GIESBRECHT (1902), in his report on the Antarctic copepods, described *Pseudocyclopina belgicae* (as *Cyclopina belgicae*) to accommodate material from the under ice plankton community, southwest of the Pierre I Island. Recently ELWERS et al. (2001) described the following four new species, all from the Antarctic waters: *Pseudocyclopina edatreyae* Elwers, Martinez Arbizu et Fiers, 2001, *Pseudocyclopina berndtreyi* Elwers, Martinez Arbizu et Fiers, 2001, *Pseudocyclopina veitkoehlerae* Elwers, Martinez Arbizu et Fiers, 2001, from the King George Island and *Pseudocyclopina guentheri* Elwers, Martinez Arbizu et Fiers, 2001, from the Weddell Sea; in the same occasion the authors redescribed in details the type-species *Pseudocyclopina belgicae* (GIESBRECHT, 1902) giving a revised diagnosis of the genus.

The present discovery of *Pseudocyclopina livingstoni* sp. n. from the Livingston Island

(Antarctica) brings the total number of the species of *Pseudocyclopina* Lang, 1946 to six, also confirming, as ELWERS et al. (2001) suggested, the genus can be considered endemic to Antarctic waters. The presence of *P. livingstoni* sp. n. in planktonic community could be the result of active migration or drift caused by near bottom currents.

Material and methods

The material for this study was collected by one of the authors (I. Pandourski) during the 6th and 7th Bulgarian Antarctic Expeditions (1997/98 and 1998/99). The fieldwork was carried out in the free of ice and snow littoral zone of the South Bay near the Bulgarian Base “St. Kliment Ohridsky” (62°38' S, 60°^{cir}c22' W, Livingston Island, South Shetland Island Group).

The interstitial material was sampled from the littoral interstitial waters of the tidal zone with the Karaman-Chappuis method; the material from the marine zooplankton was collected with a plankton net with mesh of 0.125 mm.

Pseudocyclopina livingstoni sp. n. (Figs 1–14)

Description. Body length, including furcal rami, 770–990 μm (Fig. 2). First pedigerous somite not incorporated in head. Posterior margin of head and pedigerous somites smooth. Urosomal somites without visible hyaline fringes. Anal somite with spinules along posterior-ventral margin, anal operculum smooth. Genital double somite about 1.5 times longer than wide; genital area as in Fig. 2.

Furcal rami cylindrical, about 4 times longer than wide, bearing 7 setae, proximal setae (setae I) resembling sensilla; lateral setae (setae II) arising in distal third of furcal ramus; inner distal setae (VI) about as long as dorsal setae (VII), both about as long as ramus; outer and inner principal setae without particular characteristics. Rostrum large, with rounded apex.

Antennule 15-segmented, not reaching the maxilliped region, segments 3 and 4 with remnant of further articulation on ventral surface (Fig. 9). Setal formula as follows (Roman numerals = segments; Arabic numerals = number of setae, A = aesthetasc, sp = spine): I (3), II (5), III (8), IV (4), V (4+2 sp), VI (2+A), VII (2), VIII (1), IX (1), X (1+A), XI (1), XII (1), XIII (2), XIV (2+A), XV (7+A); most setae and aesthetascs partially broken in all specimens.

Antenna (Fig. 1) without exopodal setae on coxo-basis, and a single distal abexopodal seta; endopodite 3-segmented, with 1, 5 and 7 lanceolate setae, respectively.

Mandible (Fig. 3) with large gnathobasis, biting edge with widely separated teeth, and serrate elements, basis with one outer seta. Endopodite 2-segmented, with 3 and 6 elements on proximal and distal segment, respectively. Exopodite 4-segmented, with setal arrangement: 1, 1, 1, 2, all pinnate.

Maxillule (Fig. 7) with short precoxal arthrite, bearing 9 spines and 2 setae; armature of coxa and basal endites as in Fig. 7; exopodite and endopodite 1-segmented, with 4 and 7 setae, respectively.

Maxilla (Fig. 5) 6-segmented; praecoxa not well visible, apparently armed with 1 seta and 1 spinule; coxa with 2 endites, the proximal one bearing 2 setae, the distal one 3 setae, one short; basis produced in a stout serrate claw, accompanied by 2 setae; first and second exopodal segment with 3 and 2 serrate setae, respectively, third segment armed with one apical serrate element and 3 slender setae.

Maxilliped (Fig. 8) 8-segmented; pre-coxa and coxa not fused, bearing 1, 3 and 2 setae, respectively; basis semiovalate, 1 endite bearing 2 setae; endopod 5-segmented, bearing 1, 2, 2, 1, 4 setae, respectively; all setae normally lanceolate.

Legs 1 to 4 (Figs 10–14) with well developed coxa, basis and 3-segmented rami; intercoxal sclerite without ornamentation; terminal exopodal segment of legs 1–4 with 3, 4, 4, 3 spines and 5, 5, 5, 5 setae; first exopodal segment in legs 1 to 4 with inner seta; terminal endopodal segment of legs 1–4 with 6, 6, 6, 5 setae; ornamentation of coxa and basis in all legs hardly visible. Leg 1, medial spine on the basis overreaching the distal margin of second endopodal segment, ornamentation as in Fig. 11.

Leg 5 (Fig. 6) with fused coxa and basis. Coxobasis with 1 outer and 1 inner setae, exopodite 1-segmented armed with four elements (3 spines and 1 plumose seta); medial and outer margin of exopodal segment without spinules.

Leg 6 (Fig. 4) consisting in a plate bearing two long, slender setae.

Male unknown.

Material examined. **Holotype:** 1 female, dissected on 1 slide (coll. Department of Environmental Sciences, University of L'Aquila, Italy no. 2001/Cy.021); **paratypes:** 2 females, dissected on 4 slides (coll. G. L. Pesce no. 2001/Cy.022-025), Livingston Island (Antarctica), interstitial, "Lyon marine" bay; No 136: 21.12.98, coll. I. Pandourski.

Two females, undissected, Livingston Island (Antarctica), littoral marine plankton near the Bulgarian Base "Ste Kliment Ohridsky". No 160: 27.12.97, coll. I. Pandourski.

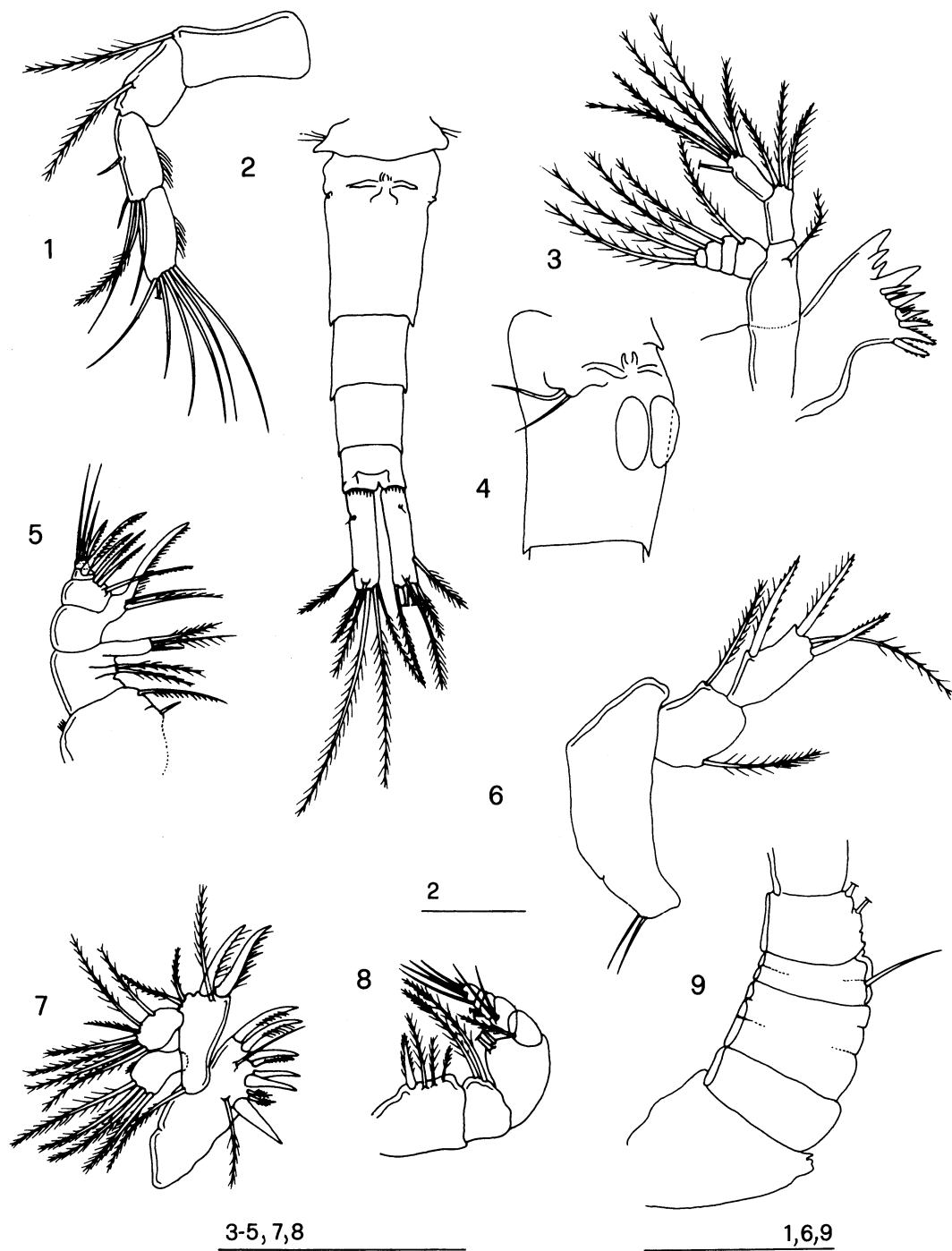
Associated fauna (APOSTOLOV & PANDOURSKI, 1999): Nematoda, Ostracoda, Harpacticoida [*Scutellidium longicauda* (Philippi, 1840), *Parasthenelia hornelli* Thompson et A. Scott, 1903, *Ameira parvula* (Claus, 1866)]; Amphipoda.

Etymology. Specific epithet from the Livingston Island.

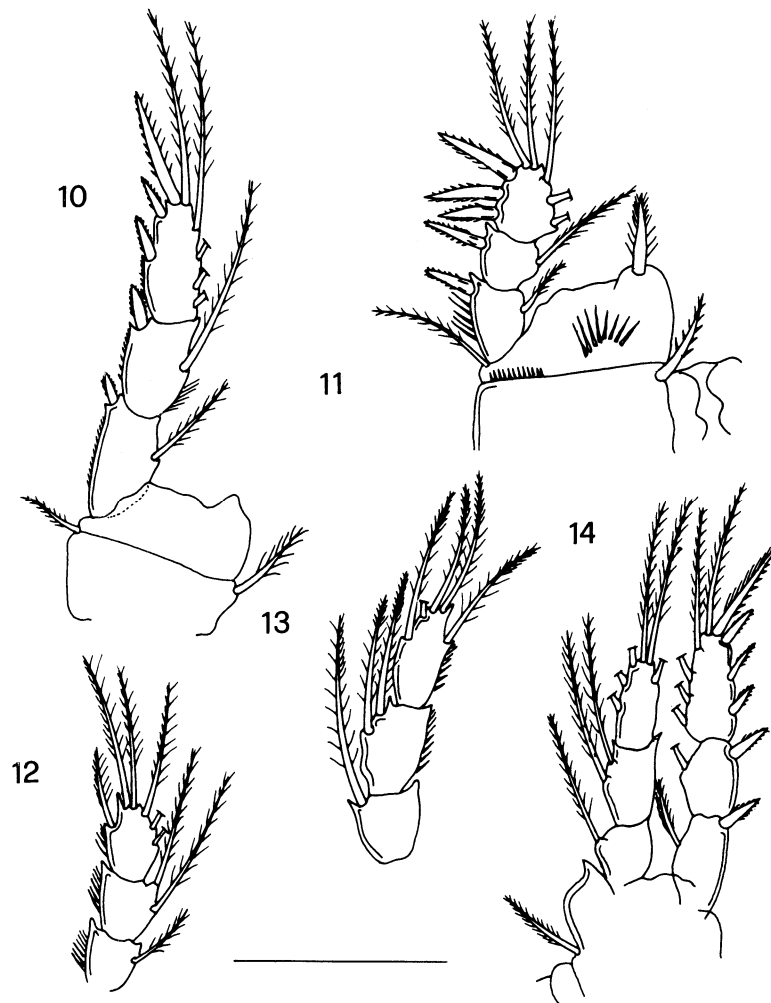
Differential diagnosis. *Pseudocyclopina livingstoni* sp. n., on account of the absence of antennary exopodite is closely related to *P. belgicae* and *P. guentheri*.

According to ELWERS et al. (2001) *P. belgicae* and *P. guentheri* differ from the group formed by the other three species of the genus by the following features: "absence of ornamentation on the tergite of the fifth pediger, antenna without exopodal setae; maxilliped with a long endopodite, and the modified setae on antenna and maxilliped".

From the above species *Pseudocyclopina livingstoni* sp. n. differs as follows: from *P. belgicae* by the 15-segmented antennule (vs. 16-



Figs 1-9. *Pseudocyclopina livingstoni* sp. n. (holotype): 1 - antenna; 2 - abdomen and furcal rami; 3 - mandible; 4 - genital double-somite and leg 6; 5 - maxilliped; 6 - leg 5; 7 - maxillula; 8 - maxilliped; 9 - antennula. Scale 0.1 mm.



Figs 10–14. *Pseudocyclopina livingstoni* sp. n. (holotype): 10 – leg 4 (exopodite) (caudal view); 11 – leg 1 (exopodite and basis) (frontal view); 12 – leg 1 (endopodite) (caudal view); 13 – leg 4 (endopodite) (caudal view); 14 – leg 2 (caudal view). Scale 0.1 mm.

segmented), the length/width ratio of the furcal rami (1 : 4, vs. 1 : 7), the unornamented coxo-basis of leg 5 (vs. medial and outer margins and surface near proximal corner ornamented with rows of spinules), the exopodite of leg 5 about 2 times longer than wide (vs. about 3 times longer than wide) and without transversal remnant of articulation on anterior surface (vs. remnant of articulation present on anterior surface), lateral margins of the fifth legs tergite with 2–3 slender spinules (vs. spinules absent); from *P. guentheri* as well by the length/width ratio of furcal rami (1 : 4, vs. 1 : 9), the unornamented coxo-basis of leg 5 and

lateral margins of the fifth legs tergite with 2–3 slender spinules (vs. spinules absent). A striking feature of the new species is the setae I of furcal rami modified in setule.

Acknowledgements

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FAUNISTICAL NOTES

First record of *Daphnia hyalina* (Crustacea: Branchiopoda, Anomopoda, Daphniidae) in Slovakia

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Daphnia hyalina Leydig, 1860

Material examined. Zooplankton of two Slovakian reservoirs:

Ružín (48°52' N, 21°04' E) peak-load power station on the Hornád river (Margecany village), 11.X.2000, leg. Žufová, identified morphologically (females and males) and by the RAPD method with 1400 bp primer for identification (SCHWENK et al., 1998), where the species was identified in 9.5% out of 95 randomly taken *Daphnia* individuals. Other morphological identifications of *D. hyalina* were recorded on 21.IX.2000 and 30.X.2000. In the reservoir *D. hyalina* was found with *Bosmina* (*B.*) *longirostris* O. F. Müller, 1785, *B. (E.) coregoni* Baird, 1857, *B. (E.) longicornis kessleri* Uljanin, 1874, *Ceriodaphnia pulchella* Sars, 1862, *Daphnia cucullata* Sars, 1862, *D. galeata* Sars, 1864, *D. longispina* O. F. Müller, 1785, *Diaphanosoma brachyurum* Liévin, 1848, *D. mongolianum* Ueno, 1938 and *Leptodora kindti* Focke, 1844.

Bukovec I (48°42' N, 21°10' E) drinking water supply reservoir on the Idanský potok brook over Bukovec village, 28.IX.1999, identified only by RAPD method – 8.2% of *D. hyalina* like species were identified from 95 accidentally separated specimens; the species was not morphologically confirmed in 2000–2001. It is possible to predict that *D. hyalina* was introduced into Bukovec reservoir in the past, but recently it is absent.

Distribution in Europe: *D. hyalina* is continually known from England throughout N Germany and Poland lowlands, Scandinavia up to C Russia. It also occurs in mountain lakes in the Alps (HRBÁČEK et al., 1978; FLÖSSNER, 2000). It lives only in formerly glaciated area (HRBÁČEK, 1987). We accept Hrbáček's idea and I presume that *D. hyalina* was introduced to Slovakia from N Europe. This idea is supported by the accompanied species *Bosmina longicornis kessleri*, which was recorded in Slovakia for the first time in 1987 (HUDEC, 1989) and has a similar distribution in Europe, along with *D. hyalina*. *D. hyalina* was most probably introduced by cranes (*Grus grus* L., 1758) because both reservoirs are on their regular annual migratory route. This is a possible mechanism for the introduction of both *B. longirostris kessleri* (HUDEC, 1995, 1998) and the recently found *D. hyalina*.

Notes. There are problems with the morphological identification of *D. hyalina* because of common cyclomorphoses of *D. galeata* and interspecific hybrids between *D. hyalina* × *D. galeata* = *Daphnia* × *obscura* (FLÖSSNER & KRAUS, 1986; FLÖSSNER, 2000). The most typical characteristic of *D. hyalina* is the relatively small head resembling the equilateral triangle where the longest arm (the head width) is the line from the tip of rostrum throughout ventral to the posterior margin of the head. The maximal height of the crest is opposite to the middle part of the head width. For com-