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A new species of Ancorabolidae (Copepoda, Harpacticoida) from the Beagle channel (Chile)

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Abstract

A new species of the family Ancorabolidae Sars, 1909 (Copepoda, Harpacticoida), *Arthropsyllus australis* sp. n. was collected 1994 during 'Magellan Campaign' of RV 'Victor Hensen' and is described in the present paper. Its inclusion in the genus *Arthropsyllus* Sars, 1909 is justified by the diagnostic characters of the genus: lack of any dorsal or dorsolateral well-developed processes, body slightly depressed dorsoventrally, body somites with lateral epimeres except cephalothorax and last two abdominal somites. *A. australis* sp. n. differs from *Arthropsyllus serratus Sars*, 1909 in the shape of the rostrum, in having moderately-sized sensilla-bearing dorsal and dorsolateral projections on cephalothorax and body somites, and in several differences on mandible, maxillule, maxilla and swimming legs.

Zusammenfassung

Arthropsyllus australis sp.n. wird aus Probenmaterial, das 1994 während der 'Magellan Campaign' von FS 'Victor Hensen' im Beagle-Kanal (Chile) gesammelt wurde, als neue Art der Familie Ancorabolidae Sars, 1909 (Copepoda, Harpacticoida) beschrieben. Die Zugehörigkeit dieser Art zu der bisher ausschließlich in nördlichen Breiten vertretenen Gattung *Arthropsyllus* Sars, 1909 wird durch die diagnostischen Gattungsmerkmale belegt: Keinerlei wohlentwickelte dorsale oder dorsolaterale Fortsätze, Körper dorsoventral leicht abgeflacht, Körpersegmente außer Cephalothorax und letzten beiden Abdominalsegmenten lateral ausgezogen. Andererseits unterscheidet sich die neue Art von der nördlichen *A. serratus* Sars, 1909 in folgenden Merkmalen: Unterschiedlicher Bau des Rostrums, Cephalothorax und Körpersegmente dorsal und dorsolateral mit mäßig großen, sensillenbewehrten Vorsprüngen, Bau von Mandibel, Maxillula, Maxilla sowie der Schwimmbeine.

Introduction

During 'Magellan Campaign' of RV 'Victor Hensen' in 1994, meiofauna samples could be taken for the first time in coastal waters of the southern tip of South America. This was done with a small Multicorer (MUC) in the northern Magellan Straits and the southeastern Beagle Channel (Chile). In several of these samples harpacticoid copepods belonging to the family Ancorabolidae Sars, 1909 were found. This is a small family containing 2 subfamilies, Laophontodinae Lang, 1944 and Ancorabolinae Sars, 1909. Ancorabolinae include 6 genera, *Ancorabolus* Norman, 1903, *Arthropsyllus* Sars, 1909, *Ceratonotus* Sars, 1909, *Dorsiceratus* Drzycimski, 1967, *Echinocletodes* Lang, 1936 and *Echinopsyllus* Sars, 1909, with altogether 12 species so far. Ancorabolinae are only rarely found, and their distribution seems to be restricted primarily to the northern hemisphere, with exception of *Echinocletodes*, 2 species of which have been reported by Dinet (1974) from deep-sea waters off southwestern Africa. The material collected dur-

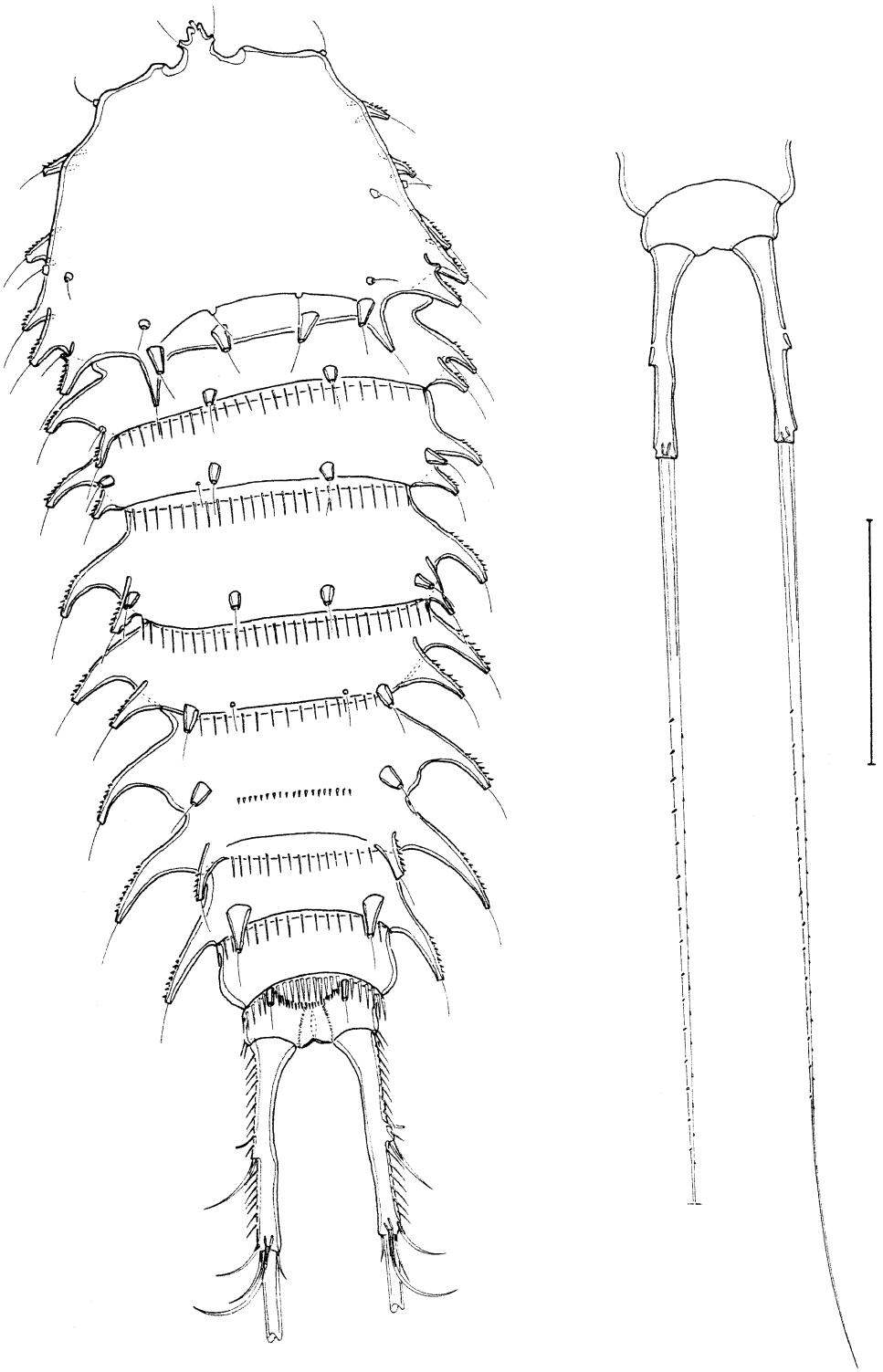

Figure 1. *Arthropsyllus australis* sp. n., female. Habitus, dorsal view, and telson with CR and terminal setae . Scale bar: 100 μm.

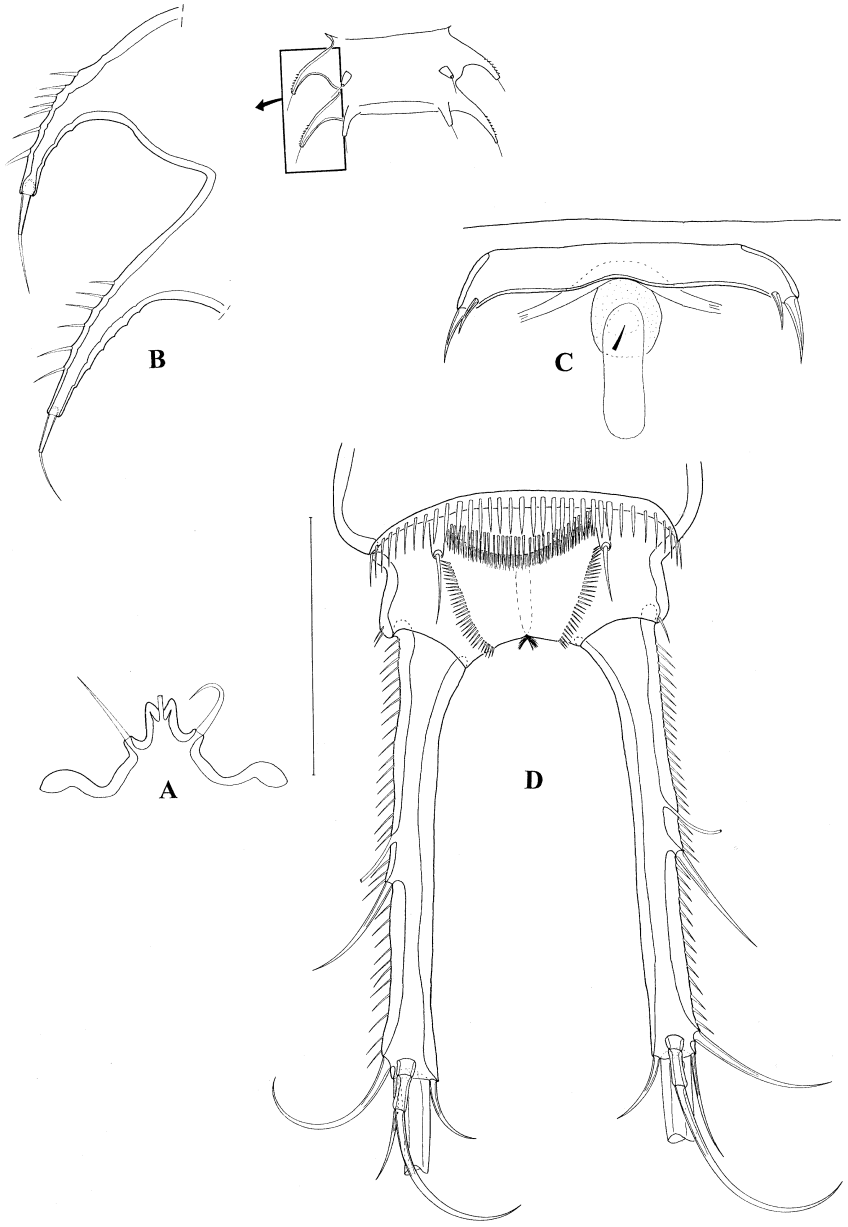

Figure 2. Arthropsyllus australis sp. n., female. A. rostrum, B. lateral epimeres of GDS, dorsal view, C. genital field, triangular arrow indicates position of gonoporus, which is covered by part of stalk of egg-sac, D. telson and CR, dorsal view. Scale bar: 50 μm.

ing 'Magellan Campaign' indicates that some of these genera are also present at least in the Patagonian region. *Arthropsyllus*, so far known from the coasts of Norway (Sars, 1909) and Scotland (Norman, 1911), the Baltic (Germany) (Kunz, 1935; Becker, 1970; Arlt, 1983) and the White Sea (Russia) (Chislenko, 1967), was collected in the southeastern Beagle Channel. This is the first record of this genus in the Southern Hemisphere.

Material and methods

One ovigerous female has been obtained from material of station 1234/I at Gardiner Island, eastern Beagle Channel (Chile), collected during 'Magellan Campaign' of RV 'Victor Hensen' on 18.11.1994, location 55° 00,4′ S/66°53,6′ W, at a depth of 100 m. The specimen was fixed in 5% buffered formalin, dissected and mounted on 7 slides and labeled UNIOL 1997.27/1

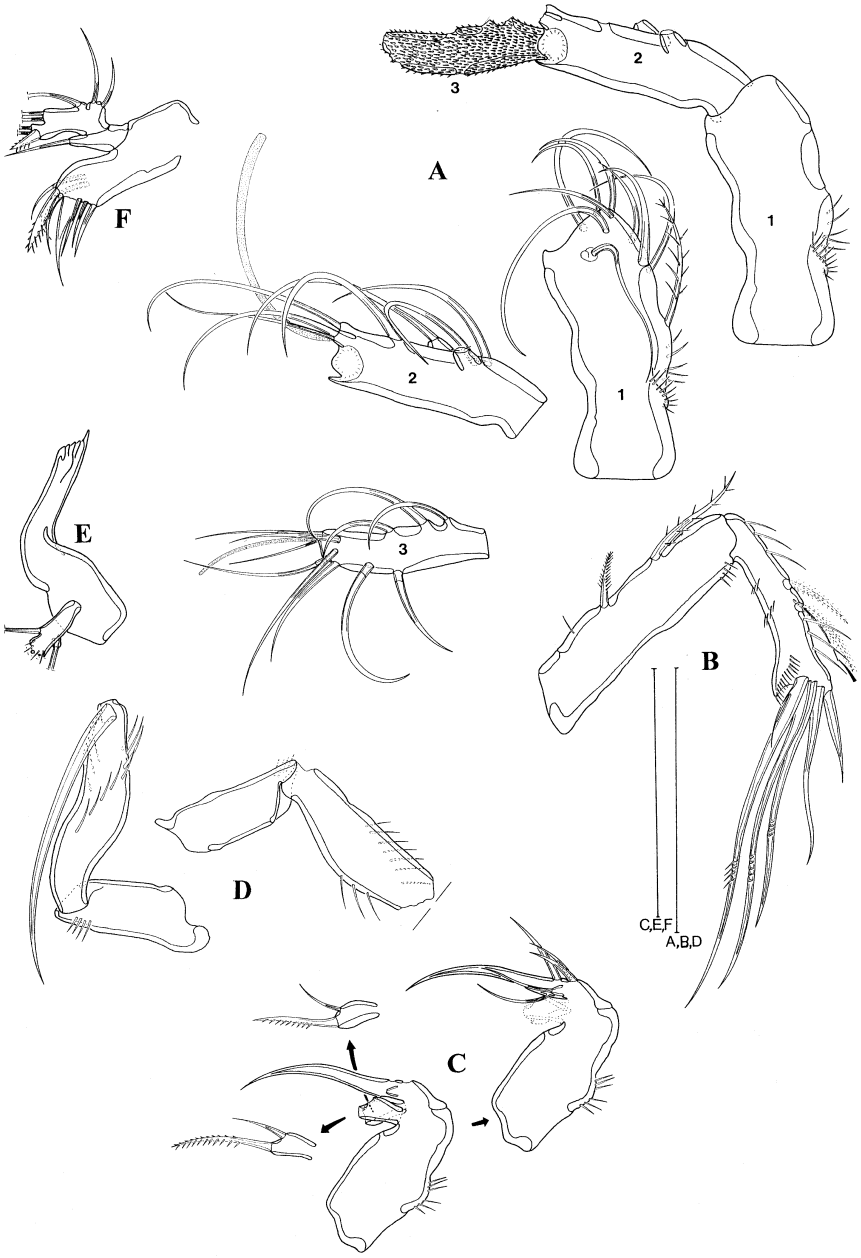

Figure 3. Arthropsyllus australis sp. n., female. A. A1, complete but without setae and splitted into single segments 1, 2, and 3. All segments are covered with small spinules, as demonstrated in third segment, B. A2, triangular arrow indicating small third inner seta, C. mx, D. mxp and its counterpart, showing better the geniculation between the segments, E. md, F. mxl,. Scale bars: 50 μm.

– UNIOL 1997.27/7, using glycerol as embedding medium. The type material is stored in the Copepod Collection of the Arbeitsgruppe Zoomorphologie, Carl von Ossietzky Universität, D-26111 Oldenburg, Germany.

Drawings were made with the aid of a camera lucida on a Leitz Dialux 20 EB microscope equipped with a phase contrast 100 times objective and could later be checked with a Leica DMLB interference contrast microscope.

The terminology is adopted from Huys & Boxshall (1991). The terminology related to phylogenetic systematics is used according to Ax (1984). Abbreviations used in the text: cphth cephalothorax, A1: an-

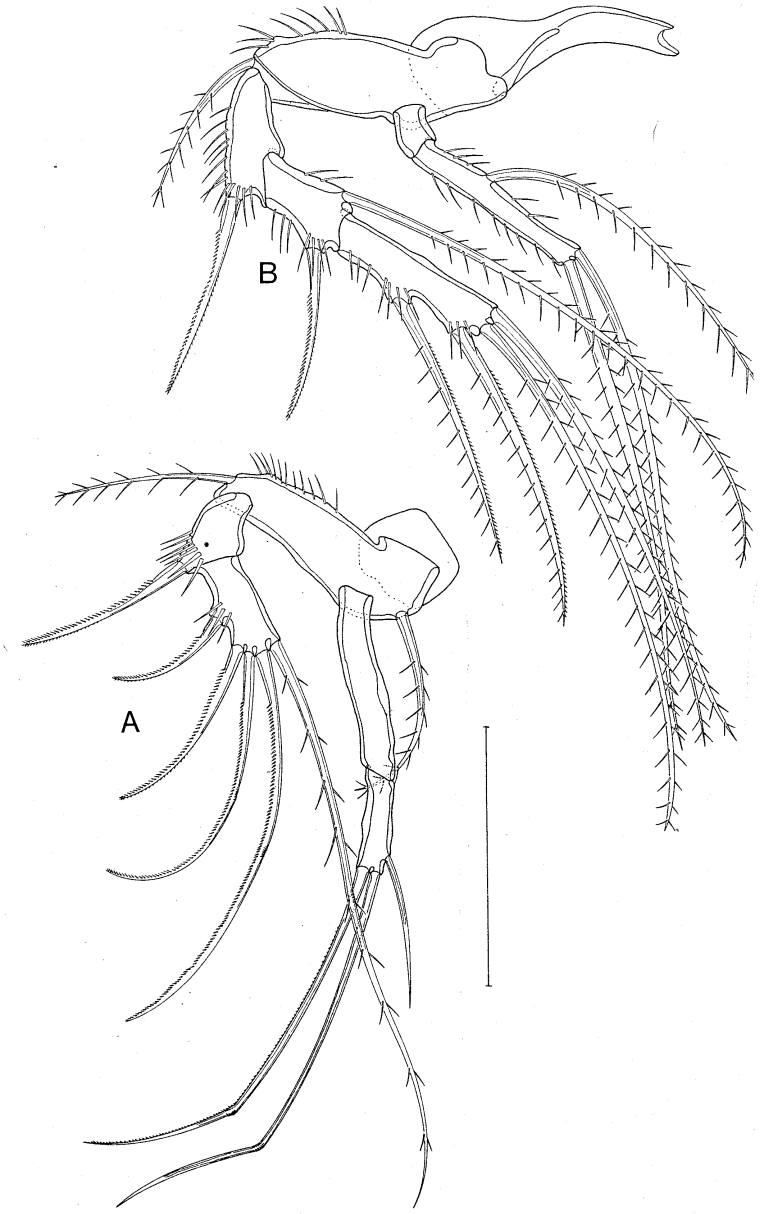

Figure 4. Arthropsyllus australis sp. n., female. A. P1, B. P2. Scale bar: 50 μm.

tennule, A2: antenna, md: mandible, mxl: maxillule, mx: maxilla, mxp: maxilliped, enp: endopodite, exp: exopodite, exp1: first segment of exp, GDS: genital double somite, CR: caudal ramus, P1–P6: swimming legs 1–6, benp: basendopodite.

Description

Arthropsyllus australis sp.n., *female*

Body (Figure 1) slightly dorsoventrally depressed, length (including CR) 529 μm. Rostrum (Figure 2A) small but prominent, anteriorly bifurcated and having a tube pore, laterally with 2 sensilla, inserting from cuticular projections. Cphth wider than long, laterally with 4 pairs of moderate cuticular processes, bear-

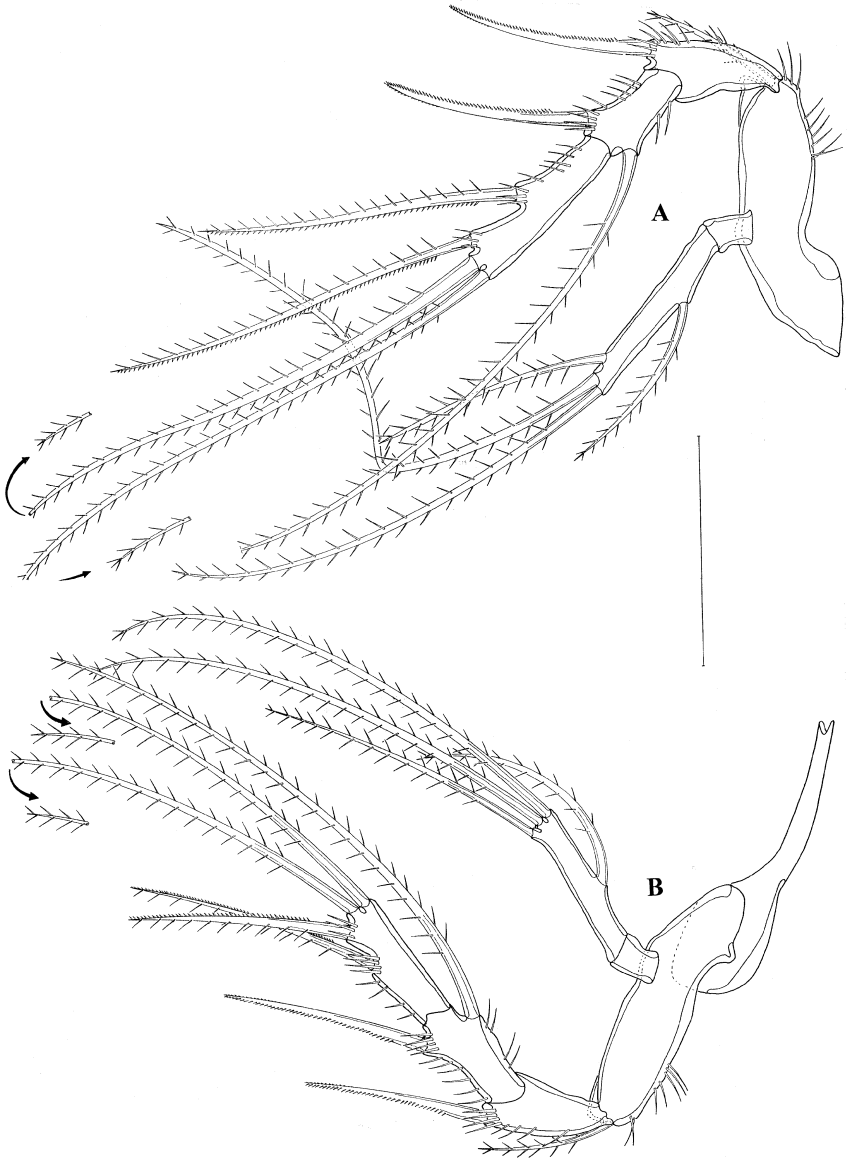

Figure 5. Arthropsyllus australis sp. n., female. A. P3, B. P4. Scale bar: 50 μm.

ing each a sensillum terminally. Posterior margin also with 4 moderate cuticular processes, subterminally additionally with 4 smaller knob-like, sensilla-bearing cuticular processes. Cphth dorsally and dorsolaterally with totally 6 pairs of sensilla. Body somites except telson and penultimate somite laterally with backwardly directed epimeres (Figure 1, 2B), each of which bearing a row of small spinules anteriorly and a sensillum terminally. Each body somite except last 3 ones dorsolaterally with moderate sensilla-bearing cuticular processes, which nevertheless are only indicated in original last thoracic somite. First to fifth body somite additionally with 2 smaller-sized sensilla-bearing knob-like cuticular processes dorsolaterally. First 3 thoracic somites as well as second abdominal somite dorsally also with knob-like processes, fourth somite with a pair of simple sensilla. Each body somite at posterior dorsal border with a row of long spinules, except last thoracic somite, which possesses a row of small spinules. Anal operculum (Figure 2D) dorsally with long spinules, laterally flanked by a pair of sensilla, arising from long knob-like bases.

CR (Figures 1, 2D) about 7 times longer than broad, each ramus laterally with 1 tube pore and with the following setae: I laterally midlength of ramus, II subterminally, longer than I. III, V and VI terminally, III and VI being very small. IV absent. V being longest (approx. 380 μm), as long as body and half of cphth. VII arising dorsally from 2 basal knobs.

GDS (Figure 2C). Last thoracic and first abdominal somite completely fused to form genital double somite, the original separation still indicated by a row of small spinules and cuticular processes dorsally, and by lateral epimeres. Gonopore located ventrally in middle of somite. P6 small, forming genital operculum, with 2 setae.

A1 (Figure 3A) 3-segmented, all segments covered with small spinules. First segment proximally on outer side with 2 rows of spinules and 1 bipinnate seta, inserting midlength on outer margin, additionally with 9 bare setae, all inserting on outer distal half. Second segment not as long as of first one, bearing 7 bare setae and 1 aesthetasc, which is fused with 1 additional seta basically. Third segment shortest, with 8 bare setae and a trithec compound by a small aesthetasc and 3 additional setae.

Setal formula: I/10; II/8 + aes.; III/11 + aes.

A2 (Figure 3B) with allobasis, exp absent. Allobasis longer than enp, on its outer margin with 1 short and 1 longer bipinnate seta. Subterminally on outer side with 4 spinules. Enp along inner side with row of long spinules and 2 bipinnate setae, the second accompanied by a third smaller bare one. Terminally with 1 short seta, 1 longer seta and 3 long geniculate setae, the longest of which is fused basically with an additional very small bare seta.

Md (Figure 3E). Coxa without any setation, cutting edge prolonged and curved by nearly 90°, consisting of 5 teeth. Basis, enp and exp fused to 1-segmented mandibular palp, which seems to carry 5 setae and 4 spinules apically.

Mxl (Figure 3F). Arthrite of praecoxa terminally with 5 bare setae, one of which very strong, and 1 bipinnate seta. Subapically on surface with 2 bare setae. Coxal endite with 1 bare seta. Proximal basal endite with 3 setae, one of which short, but very strong and bipinnate. Distal basal endite with 2 bare setae. Enp with 1, exp with 2 bare setae.

Mx (Figure 3C). Syncoxa with a row of spinules and 2 endites, the first carrying 1 bipinnate and 1 smaller bare seta, and the second 1 unipinnate and 1 smaller bare seta. Basis fused with syncoxa, bearing 3 setae, one of which fused to basis and transformed into long claw-like process. To this claw is fused a fourth seta. Enp fused to basis, with 2 bare setae.

Mxp (Figure 3D) prehensile, syncoxa distally with 4 spinules, without seta. Basis with 1 row of long spinules and a few single ones. Enp reduced and represented by a big claw, which is longer than basis. A small accessory seta, if present, could not be distinguished.

P1 (Figure 4A) with transversely prolonged basis bearing 1 inner and 1 outer pinnate seta. Exp 2-segmented, exp1 with 1 outer seta accompanied by a row of long spinules. Exp2 longer than first segment, with 2 outer bipinnate setae, the first of which with 4 spinules at its base; terminally with 2 long bipinnate and slightly geniculate setae and 1 very long plumose slightly geniculate seta. Enp 2-segmented, first segment without setae. Enp2 half as long as enp1, terminally with 2 long geniculate setae, one of which unipinnate, and with 1 short bare seta subterminally on the inner side.

P2–P4 (Figures 4B, 5) with transversely prolonged bases, 3-segmented exps and 2-segmented enps. Exp2 P2–P4 with inner seta, exp3 P2–P4 without inner seta, longest exopodial segment, with 2 outer and 2 terminal setae. Enp1 P2–P4 very small, without setae. Enp2 of P2 reaching end of exp, bearing 1 inner seta on proximal half, and 2 terminal setae. Enp2 of P3 with 4 setae, 1 inner seta on proximal half, subterminally 1 outer seta and terminally 2 setae. Enp2 of P4 also with 4 setae, but the outer seta shifted terminally, so that there are 1 inner seta on proximal half of segment and 3 terminal setae.

Setal formula:

	Exp1	Exp2	Exp3	Enp1	Enp2
P2	0	1	0;2;2;	0	1;2;0
P3	0	1	0;2;2	0	1;2;1
P4	0	1	0;2;2	0	1;2;1

P5. (Figure 6). Benp elongate, bearing 2 inner and 2 terminal setae. Outer basal seta arising from an extreme elongated knob. Exp long, with 2 outer, 2 terminal setae and 1 very strong inner seta.

Discussion

Ancorabolidae Sars, 1909 are harpacticoids which have been reported only rarely in ecological and systematic studies (review in George, 1993). In an on-

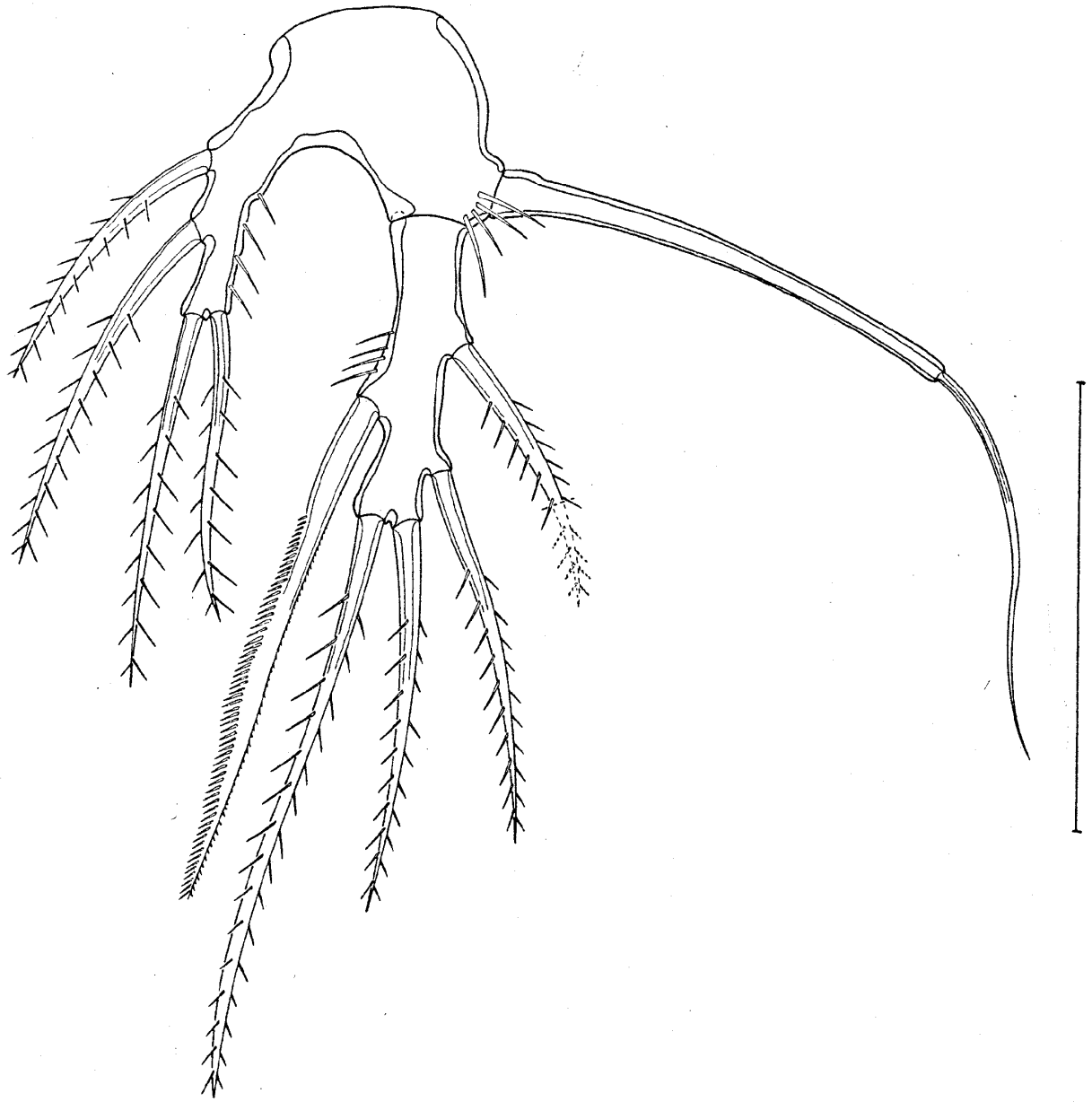

Figure 6. P5. Scale bar: 50 μm

going investigation of harpacticoid assemblages of Patagonian waters, Ancorabolidae show less than 1% of total abundance, but are represented by 4 genera. The presence of *Arthropsyllus* Sars, 1909 is remarkable, because this genus has up to now been reported from boreal and subpolar sites of the Northern Hemisphere only. *Arthropsyllus serratus* was described by Sars (1909) from Trondhjem Fjord, Norway. Subsequently, Kunz (1935), Chislenko (1967) and Arlt (1983) reported it from the Bight of Kiel (Germany), Kandalaksski Bight (White Sea) and eastern of Darss Sill (Germany), respectively. In addition, Norman (1911) described the variation *A. serratus* var. *spinifera* from Little Cumbrae, Scotland, and Becker (1970) reported it from the Bight of Kiel (Germany).

Whereas there is no question that the genus *Arthropsyllus* belongs to Ancorabolinae Sars, 1909 because of autapomorphic characters like the lack of

exp A2[1], transversely prolonged basis of P1 and loss of 1 outer seta in exp3 of P2–P4, it is difficult to name autapomorphic characters for the genus. As such the slight dorsoventral depression of the body and the presence of lateral epimeres on the body somites, excluding the cphth and last 2 abdominal somites, may be cited. *Arthropsyllus* also differs from most Ancorabolinae in the absence of any strongly developed dorsal or dorsolateral chitinous processes, but this character cannot be used as long as it is unknown wether it belongs to groundpattern of Ancorabolinae or not. It has also be verified wether the chitinous processes of *Ancorabolus* Norman, 1903, *Ceratonotus* Sars, 1909, *Dorsiceratus* Drzycimski, 1967 and *Echinopsyllus* Sars, 1909 are homologuos, or wether they have developed independently within these genera.

The species from Patagonia agrees with *Arthropsyllus serratus* in many diagnostic details like lack of any strong dorsal and dorsolateral processes, general body shape and number of setae on enps P1–P5, but it differs in the following characters:

1. Rostrum: triangular in *A. serratus*, but rather similar to that of *Ancorabolus mirabilis* Norman, 1903 in *A. australis* sp. n.
2. Cphth and body somites of *A. australis* sp.n. with 2 to 6 sensilla-bearing projections, which are absent in *A. serratus. A. serratus* var. *spinifera* Norman, 1911 has 2 to 4 very small sensilla-bearing knobs on each body somite ('spines' sensu Norman (1911), 'geknöpfte, kurze Borsten' sensu Lang (1948)), but they differ in shape and size from the projections of *A. australis* sp.n. and lack on the cphth of *A. serratus* var. *spinifera.*
3. Cutting edge of md of *A. australis* sp.n. prolonged, curved by nearly 90°, whereas in *A. serratus* it is shorter, and not strongly curved.
4. P1: a) Exp in *A. serratus* at least as long as enp, exp of *A. australis* sp.n. not reaching the end of enp1,
   b) inner basal seta in *A. serratus* at most as long as enp1 but longer than enp1 in *A. australis* sp.n.,
   c) terminal setae of exp2 in *A. serratus* without geniculation but geniculate in *A. australis* sp.n.
5. P2–P4 enps: a) In *A. serratus* inner seta of enp2 P2–P4 inserting at distal half, in *A. australis* sp.n. at proximal half,
   b) in *A. serratus* outer seta enp2 P4 inserting subterminally, in *A. australis* sp.n. terminally.
6. P5: a) In *A. serratus* exp nearly twice as long as benp, in *A. australis* sp.n. only slightly longer than benp,
   b) in *A. serratus* inner seta inserting terminally, in *A. australis* sp.n. inserting laterally in the distal part of exp,
   c) in *A. serratus* all setae of exp sparsely bipinnate, in *A. australis* sp.n. inner seta different, stronger than the others and densely bipinnate.

[1] In opinion of the author, the assumption of the loss of the exp A2 being an autapomorphy of Ancorabolidae is erroneous, because in addition to *Paralaophontodes exopoditus* Mielke, 1981, at least two more laophontodin species, *Laophontodes psammophilus* Soyer, 1974 (see Soyer, 1974) and *L. whitsoni* T. Scott, 1912 (see Pallares, 1975; George, 1993) present an antennary exp. Therefore, this character is considered as an autapomorphy of Ancorabolinae only.

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