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Elena L. Markhaseva^a & Knud Schulz^b

^a Russian Academy of Sciences, Zoological Institute, St Petersburg, Russia

^b DZMB-Senckenberg, Biozentrum Grindel & Zoologisches Museum, Hamburg, Germany

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New species of *Brodskius*, *Rythabis*, and *Omorius* (Crustacea: Calanoida) from deep Antarctic waters

ELENA L. MARKHASEVA¹ & KNUD SCHULZ²

¹Russian Academy of Sciences, Zoological Institute, St Petersburg, Russia, and ²DZMB-Senckenberg, Biozentrum Grindel & Zoologisches Museum, Hamburg, Germany

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Abstract

Three new species of rare benthopelagic clausocalanoidean genera with sensory setae on the maxilla are described from female specimens collected during the German Antarctic expeditions ANDEEP I–III in 2002 and 2005, mainly from abyssal depths close to the sea bed. *Brodskius abyssalis* sp. nov. differs from congeners by the lack of rostral filaments, two setae on the second segment of antenna exopod, thread-like tips of maxillary worm-like sensory setae, and the length of spines of P5 exopod. *Rythabis assymetrica* sp. nov. is distinguished from other species in the genus by asymmetrical posterior corners of the prosome, the shape of spermathecae, and setal numbers on the maxillulary distal basal endite plus endopod. *Omorius curvispinus* sp. nov. is characterized by strongly curved setae of the maxillipedal syncoxa, a comparatively long seta on the basis of antenna, a slightly swollen genital double-somite, and the shape of spermathecae. The genera *Brodskius*, *Omorius*, and *Rythabis* are recorded for the first time from the southern hemisphere.

Keywords: *Benthopelagic*, *Brodskius*, *Calanoida*, *Copepoda*, *Omorius*, *Rythabis*, *Southern Ocean*

Introduction

The benthopelagic fauna encompasses species usually found exclusively in the vicinity of the sea bed. Up to now near-bottom calanoid copepods have been poorly known. However, recent studies show that benthopelagic copepods of the Southern Ocean are highly diverse and include a great number of species that proved of outstanding interest both in taxonomic and ecological view (Bradford & Wells 1983; Schulz 1996, 1998, 2002, 2005, 2006; Ohtsuka et al. 1998; Schulz & Markhaseva 2000; Markhaseva & Dahms, 2004; Markhaseva & Schulz 2006).

Three new species of three rare benthopelagic genera were found in the samples collected during the German expeditions ANDEEP I–III in 2002 and 2005 in the Scotia and Weddell Seas of the Southern Ocean which incorporated a deep benthopelagic sampling programme using an epibenthic sledge (Brandt et al. 2004).

Correspondence: Elena L. Markhaseva, Russian Academy of Sciences, Zoological Institute, Universitetskaya nab. 1, 199034, St Petersburg, Russia. Email: copepoda@zin.ru

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In this paper three new species of the rare benthopelagic genera *Brodskius* Markhaseva and Ferrari, 2005, *Omorius* Markhaseva and Ferrari, 2005, and *Rythabis* Schulz and Beckmann, 1995 are described from deep waters of the Southern Ocean.

Methods and terminology

Copepod specimens were collected during R/V *Polarstern* expeditions ANDEEP I–II in 2002 and ANDEEP III in 2005. Sampling was done close to the sea bed at bathyal and abyssal depths between 2258 and 4655 m in the Scotia Sea and the Weddell Sea of the Southern Ocean by a closing epibenthic sledge (Brandt & Barthel 1995), with both supranet (sampling layer ca 1.00–1.30 m above the bottom; mesh size 0.3 mm) and epinet subsamples (0.27–0.60 m above the bottom; mesh size 0.5 mm). Specimens were fixed in 96% ethanol and later stained by adding a solution of chlorazol black E dissolved in 70% ethanol/30% water. Oral parts and swimming legs were dissected in glycerin and figures were drawn using a camera lucida.

The following abbreviations are used in the descriptions: P1–P5, swimming legs 1–5. Free segments of the antennule are designated by arabic numerals, ancestral segments are designated by roman numerals. One seta and one aesthetasc on a segment of the antennule are designated: 1s+1ae; “1?” indicates that a setal element was broken so that its identity on the antennule could not be determined and only the scar at the location of its attachment was counted. Segmentation of the antenna is assumed as having an 11-segmented exopod (Schulz 2005). The maxilliped syncoxa is considered to consist of three praecoxal endites and one coxal endite (Ferrari & Markhaseva 2000a, 2000b; Ferrari & Ivanenko 2001). Type specimens are deposited at the Zoological Museum Hamburg (ZMH).

Taxonomy

Family THARYBIDAE Sars, 1902
Genus *Brodskius* Markhaseva and Ferrari, 2005
Brodskius abyssalis sp. nov.
 (Figures 1–3)

Material examined

Holotype: adult female, dissected, body length 1.28 mm (ZMH K-41170). Weddell Sea, 67°31'S, 00°01'E, station 59-5, epinet, 14 February 2005, above the sea bed at depths of 4651–4655 m.

Description

Adult female. Total length 1.28 mm; prosome 4.1 times longer than urosome. Rostrum without filaments (Figure 1C, D). Cephalosome and pediger 1 incompletely separate, pedigers 4 and 5 separate (Figure 1A, B); posterior corners significantly indented in lateral view (Figure 1B, E, G). Spermathecae oblong-round (Figure 1E, G, H). Caudal rami with four terminal, one small dorsal and a small ventral setae (Figure 1E, F, J).

Antennule slightly longer than prosome. Antennule (Figure 1K) of 24 free segments, armature as follows: I—3s, II–IV—6s+1ae, V—2s+1 ae, VI—2s, VII—2s+1 ae, VIII—2s,

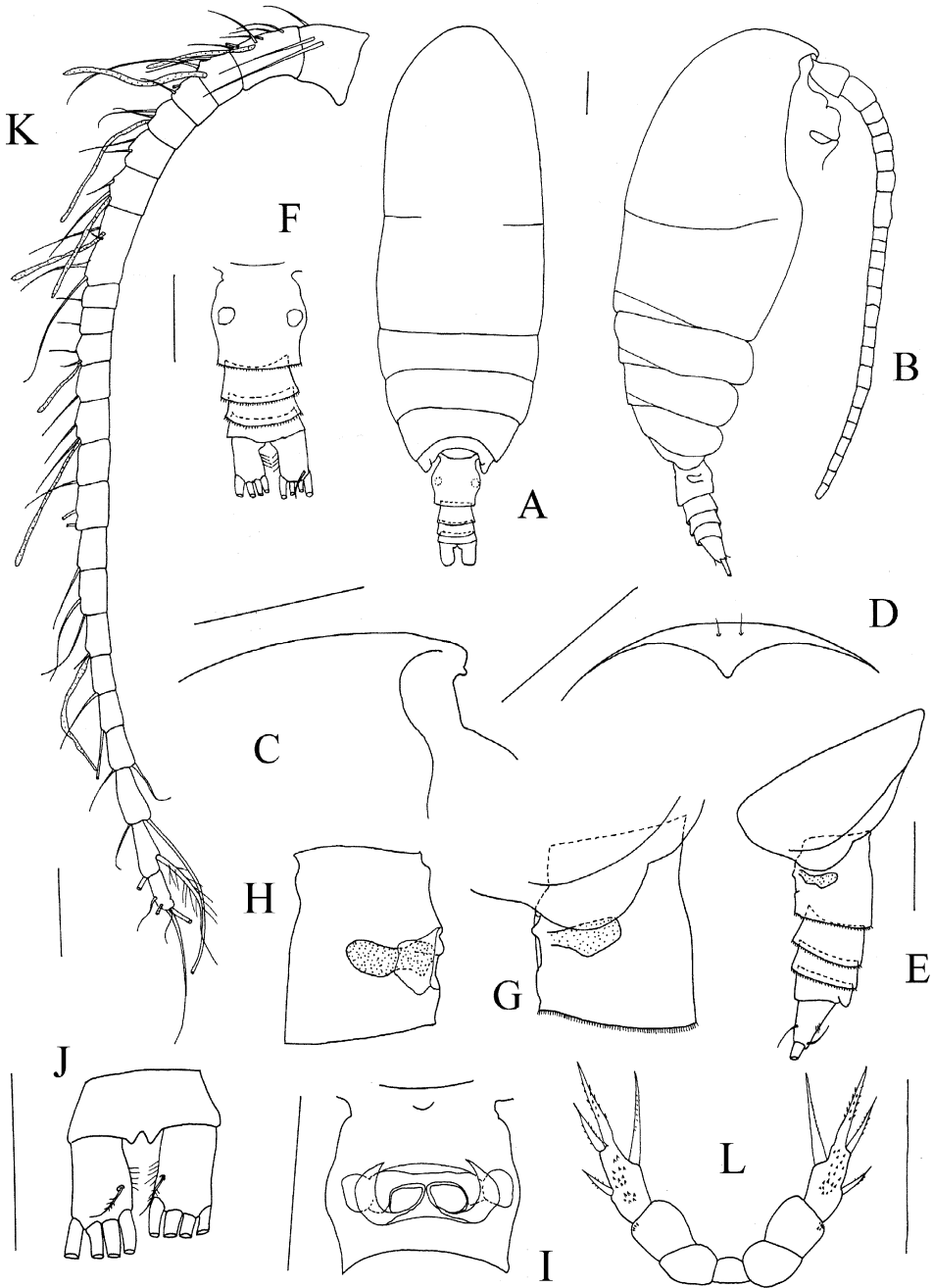


Figure 1. *Brodskius abyssalis* sp. nov., female, holotype. (A) Habitus, dorsal; (B) habitus, lateral; (C) rostrum, lateral; (D) rostrum, ventral; (E) posterior prosome and urosome, left lateral; (F) urosome, dorsal, left dorsal seta detached; (G) genital double-somite, lateral; (H) genital double-somite, lateral; (I) genital double-somite, ventral; (J) anal somite and caudal rami, ventral; (K) antennule; (L) P5, posterior. Scale bars: 0.1 mm.

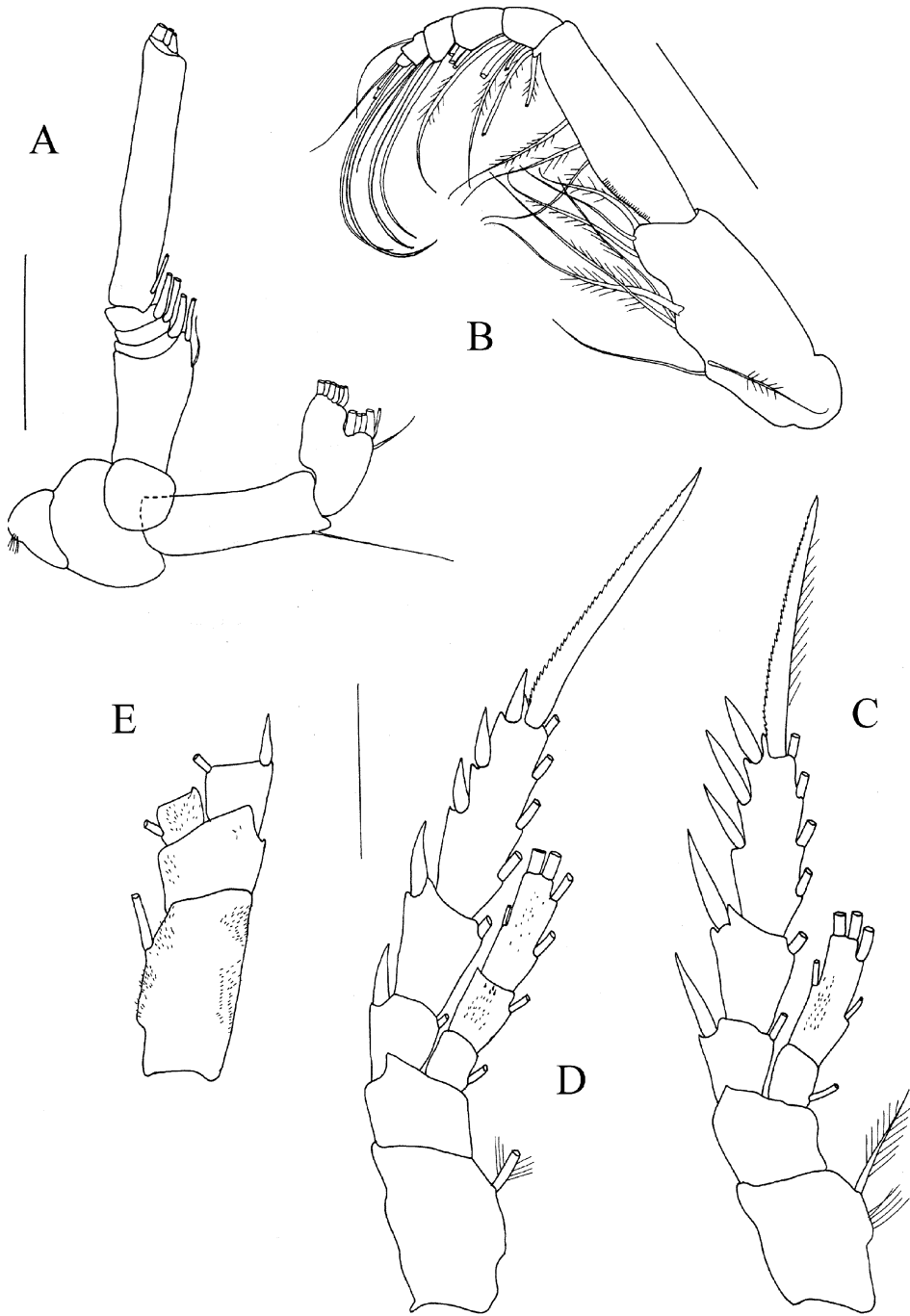


Figure 2. *Brodskius abyssalis* sp. nov., female, holotype. (A) Antenna; (B) maxilliped; (C) P2, posterior; (D) P3, posterior; (E) P4, posterior. Scale bars: 0.1 mm.

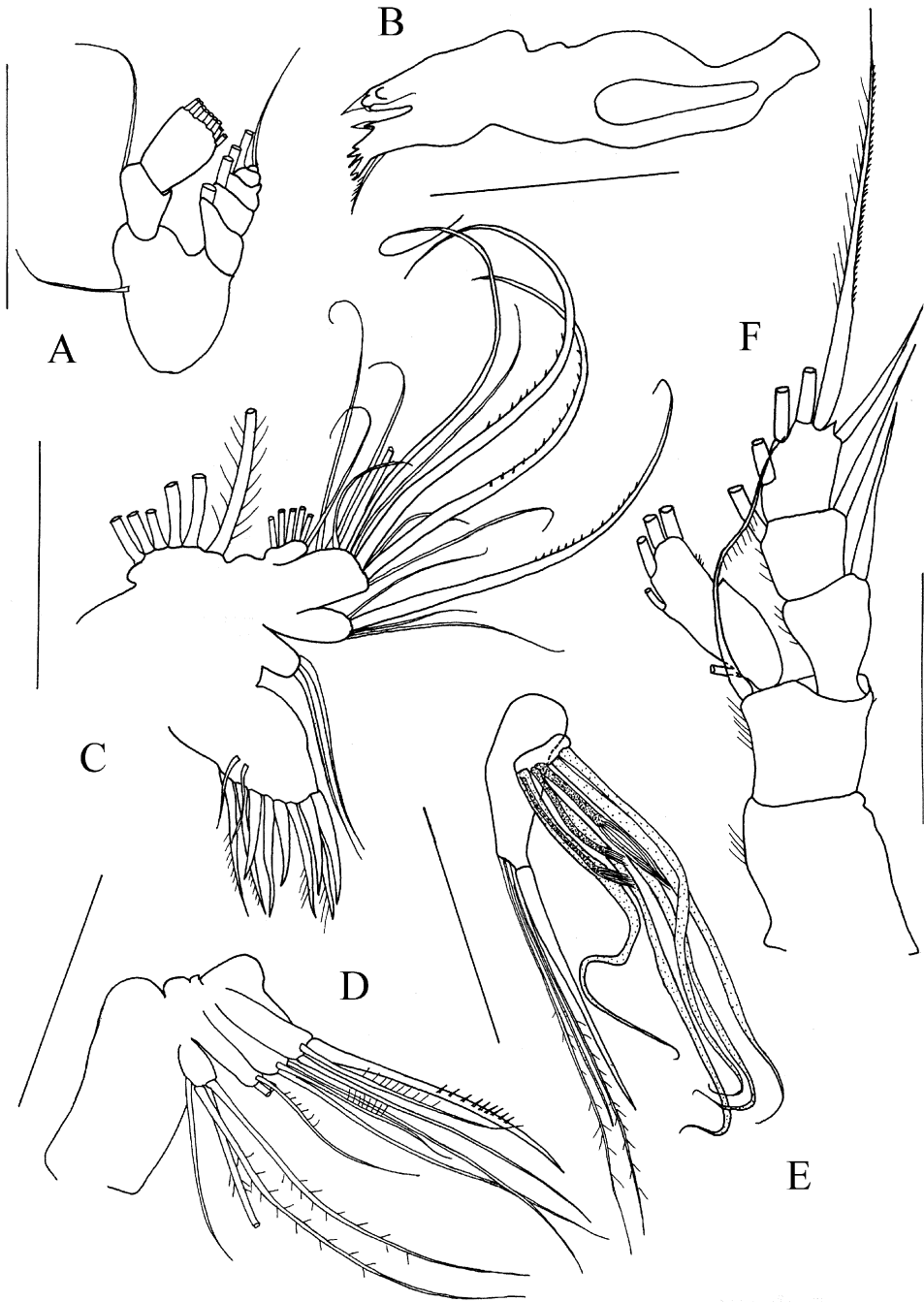


Figure 3. *Brodskius abyssalis* sp. nov., female, holotype. (A) Mandible palp; (B) mandible gnathobase; (C) maxillule; (D) maxilla, praecoxal and coxal endites; (E) maxilla, proximal basal endite and distal basal endite fused to endopod; (F) P1, anterior. Scale bars: 0.1 mm.

IX—2s+1ae; X—XI—4s+1ae, XII to XIII—1s each; XIV—2s+1ae, XV—1s, XVI—2s+1ae, XVII—1s, XVIII—2s, XIX—1s, XX—2s, XXI—1s+1ae, XXII to XXIII—1s each, XXIV to XXVI—2s each, XXVII—XXVIII—4s+1 ae.

Antenna (Figure 2A): coxa and basis without setae; endopodal segment 1 with one seta, endopodal segment 2 with 12 setae; exopod seven-segmented with 0, 2, 1, 1, 1, 1, and 3 setae.

Mandible (Figure 3A, B): gnathobase elongate, narrow; cutting edge narrow with deep incision; exopod of five segments with 1, 1, 1, 1, and 1 seta; endopod segment 1 with one seta, endopod segment 2 with nine setae; basis with one seta.

Maxillule (Figure 3C): praecoxal endite with nine terminal and two posterior setae; coxal endite with two setae, coxal epipodite with six setae; proximal basal endite with four setae, one of them longer and thicker than others and heavily setulated; distal basal endite fused to endopod with 10 setae in total, two of them longer and thicker than others and heavily setulated; exopod with six setae.

Maxilla (Figure 3D, E): proximal praecoxal endite with four setae, distal with three setae; proximal and distal coxal endites with three setae each; proximal basal endite with four setae, one of them thicker than others, one poorly sclerotized; distal basal endite plus endopod with eight sensory setae: five worm-like and three brush-like. Tips of worm-like sensory setae thread-like, one of brush-like setae thicker than others (Figure 3E).

Maxilliped (Figure 2B): syncoxa without seta on proximal praecoxal endite, two setae on middle endite, and three setae on distal praecoxal endite; coxal endite with three setae. Basis with three medial, two distal setae and row of denticles proximally. Endopod of five segments with 4, 3, 2, 2+1 and 4 setae.

P1 (Figure 3F): basis with tiny distolateral seta and medial distal seta moderately curved; endopod one-segmented with three medial and two terminal setae and small denticles along lateral edge distally; lateral lobe poorly developed, triangular. Exopod three-segmented, segment 1 with lateral spine, segment 2 with lateral spine and medial seta, segment 3 with lateral spine, terminal spine and three medial setae. All lateral spines of comparatively great lengths, distal one slightly shorter.

P2 (Figure 2C): coxa with medial seta; endopod two-segmented, segment 1 with one medial seta, segment 2 with two medial, two terminal and one lateral setae and spinules on posterior surface. Exopod three-segmented, segments 1 and 2 with lateral spine and medial seta each, segment 3 with three lateral spines, terminal spine and four medial setae.

P3 (Figure 2D): coxa with medial seta; endopod three-segmented, segments 1 and 2 with one medial seta each, segment 3 with two medial, two terminal and one lateral setae; segments 2 and 3 with scattered spinules on posterior surface. Exopod three-segmented, segments 1 and 2 with lateral spine and medial seta each, segment 3 with three lateral spines, terminal spine as long as combined lengths of segments 2 and 3 and very finely serrate.

P4 (Figure 2E): coxa with medial seta, basis without seta; only proximal exo- and endopod segments intact: endopod segment 1 with one medial seta; exopod segment 1 with one lateral and one medial seta. Posterior surface of coxa, basis, and endopod segment 1 with spinules.

P5 (Figure 1L): uniramous, three-segmented; coxae naked and fused by intercoxal sclerite; basis with small patch of denticles distolaterally; exopod with denticles on posterior surface, one short lateral, a moderately long subterminal spine, a long terminal unarticulated extension, and one long medial spine, all toothed; short lateral spine hardly

reaching base of subterminal spine; subterminal spine exceeding mid-length of terminal unarticulated extension; medial spine extending nearly to tip of terminal extension.

Male. Unknown.

Etymology

The specific name is derived from the Greek *abyssos* meaning bottomless, abyss, and refers to the type locality of the species.

Remarks

Markhaseva and Ferrari (2005) attributed four species to the genus *Brodskius*: *B. benthopelagicus* Markhaseva and Ferrari, 2005, *B. confusus* Markhaseva and Ferrari, 2005, *B. paululus* (Park, 1970), and *B. robustipes* (Grice and Hulsemann, 1965). The new species fits well the generic definition, but is distinguished from the above species by: (1) the lack of rostral filaments (present in other species); (2) presence of two setae on the second exopodal segment of the antenna (one seta in other species); (3) thread-like tips of maxillary worm-like sensory setae (not thread-like); and (4) the subterminal spine of P5 having moderate length surpassing mid-length of terminal unarticulated extension. The new species shares a long subterminal spine of P5 with *B. confusus*, however, it differs by a shorter lateral spine not reaching the base of the subterminal spine (exceeding the base in *B. confusus*); in other congeners the subterminal spine not reaching or hardly reaching mid-length of terminal extension.

An additional single female of an undescribed species of *Brodskius* was found in sample 042-2 at depths of 3680–3683 m (59°40'S, 57°35'W), collected on 27 January 2002, which could not be described due to poor condition. This specimen differs from congeners particularly by larger size (1.48 mm) and the presence of a well-developed rostrum furnished with two thick filaments.

Genus *Rythabis* Schulz, 1995
***Rythabis asymmetrica* sp. nov.**
 (Figures 4–7)

Material examined

Holotype: adult female, dissected, body length 1.35 mm (ZMH K-41168). Scotia Sea, 58°24'S, 25°01'W, station 141-10, supranet, 23 February 2002, above the sea bed at depths of 2258–2281 m. Paratype: dissected, body length 1.28 mm (ZMH K-41169), locality data as for holotype.

Description

Adult female. Total length 1.28, 1.35 mm; prosome 3.0–3.4 times longer than urosome. Cephalosome and pediger 1, and pedigers 4 and 5, incompletely separate (Figure 4A, B, D–G); posterior corners of prosome rounded, asymmetrical, right one shorter (Figure 4B, D, F). Genital double-somite nearly symmetrical (Figure 4D). Spermathecae elongate, in distal half frontally directed (Figure 4E–H). Caudal rami with four terminal setae, one small dorsal seta; ventral seta apparently missing (Figure 4D, E).

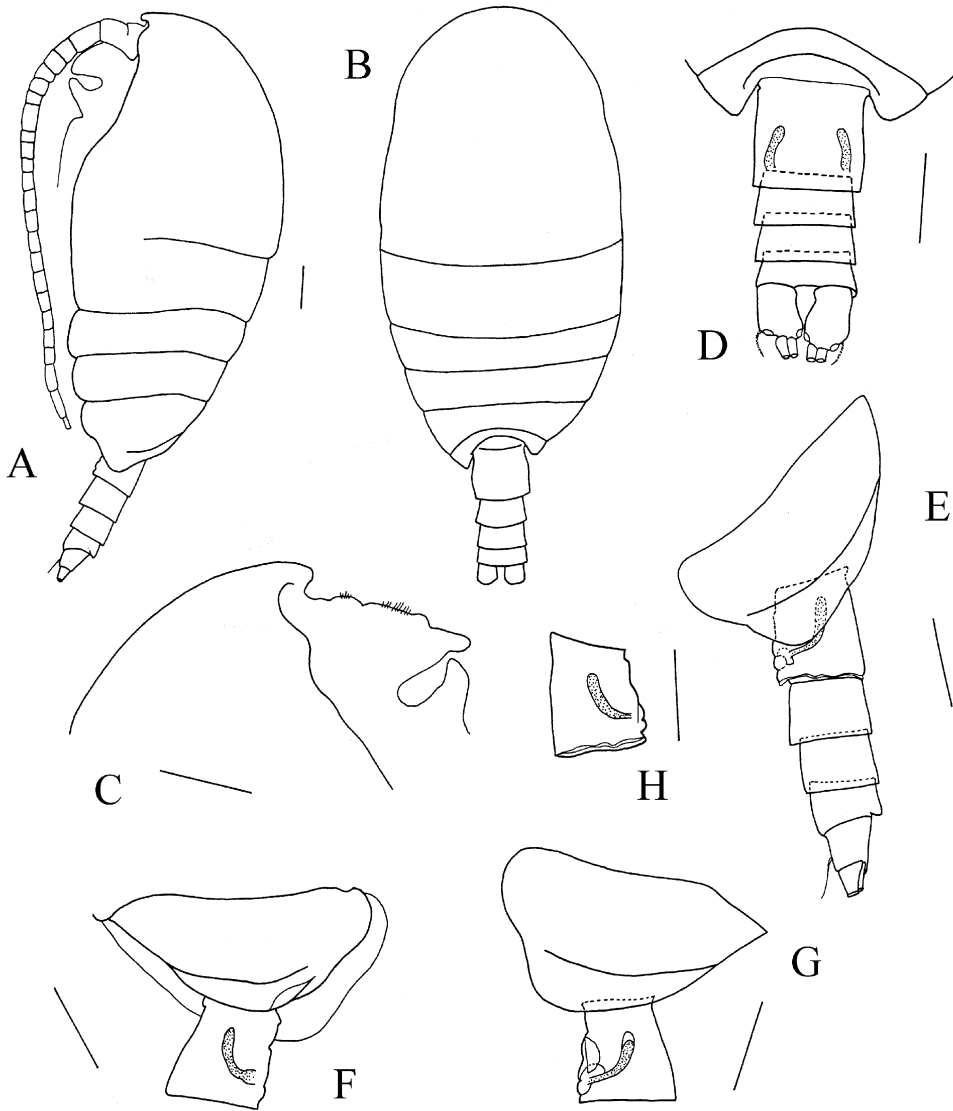


Figure 4. *Rythabis asymmetrica* sp. nov., female. (A) Habitus, lateral; (B) habitus, dorsal; (C) cephalosome anterior, lateral; (D) posterior prosome and urosome, dorsal; (E) posterior prosome and urosome, lateral; (F) posterior prosome and genital double-somite, lateral; (G) posterior prosome and genital double-somite, lateral; (H) genital double somite, right lateral. (A, B, E, H) Paratype; (C, D, F, G) holotype. Scale bars: 0.1 mm.

Antennule (Figures 4A, 5A) exceeding anterior margin of pedigerous somite 4; of 24 free segments, armature as follows: I—3s, II—IV—6s+1ae, V—2s+1 ae, VI—2s, VII—2s+1 ae, VIII—2s, IX—2s+1ae; X—XI—4s+1ae, XII—XIII—1s; XIV—2s+1ae, XV—1s, XVI—2s+1ae, XVII—XIX—1s each, XX—2s, XXI—1s+1ae, XXII—XXIII—1s each, XXIV—XXVI—2s each, XXVII—XXVIII—4s+1 ae.

Antenna (Figure 5B, C): coxa with one seta, basis with two setae, exopod seven-segmented, ca 2.5 times as long as endopod, with 0, 1, 1, 1, 1, 1, 3 setae; endopod segment 1 with two setae, segment 2 with seven and six setae.

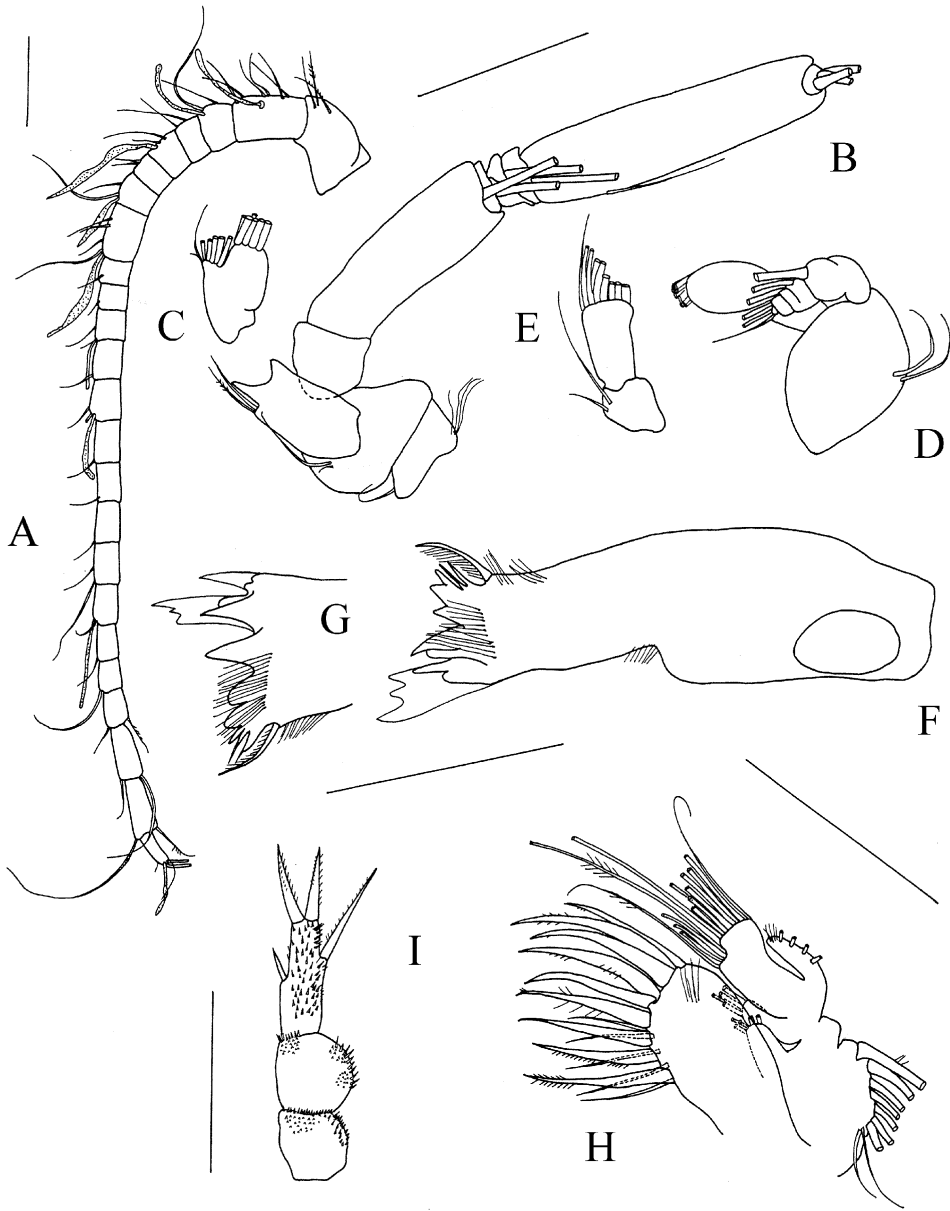


Figure 5. *Rythabis asymmetrica* sp. nov., female, paratype. (A) Antennule; (B) antenna, endopod segment 2 omitted; (C) antenna, endopod segment 2; (D) mandible, palp; (E) mandible, endopod; (F, G) mandible, gnathobase; (H) maxillule; (I) P5, posterior. Scale bars: 0.1 mm.

Mandible (Figure 5D–G): gnathobase with five large and three small teeth, one seta and a row of spinules along cutting edge; basis with two setae; exopod of five segments with 1, 1, 1, 1 and 2 setae; endopod segment 1 with two setae, endopod segment 2 with nine setae.

Maxillule (Figure 5H): praecoxal endite with nine thick and one thin small terminal and four posterior setae; coxal endite with five setae; coxal epipodite with nine setae; proximal

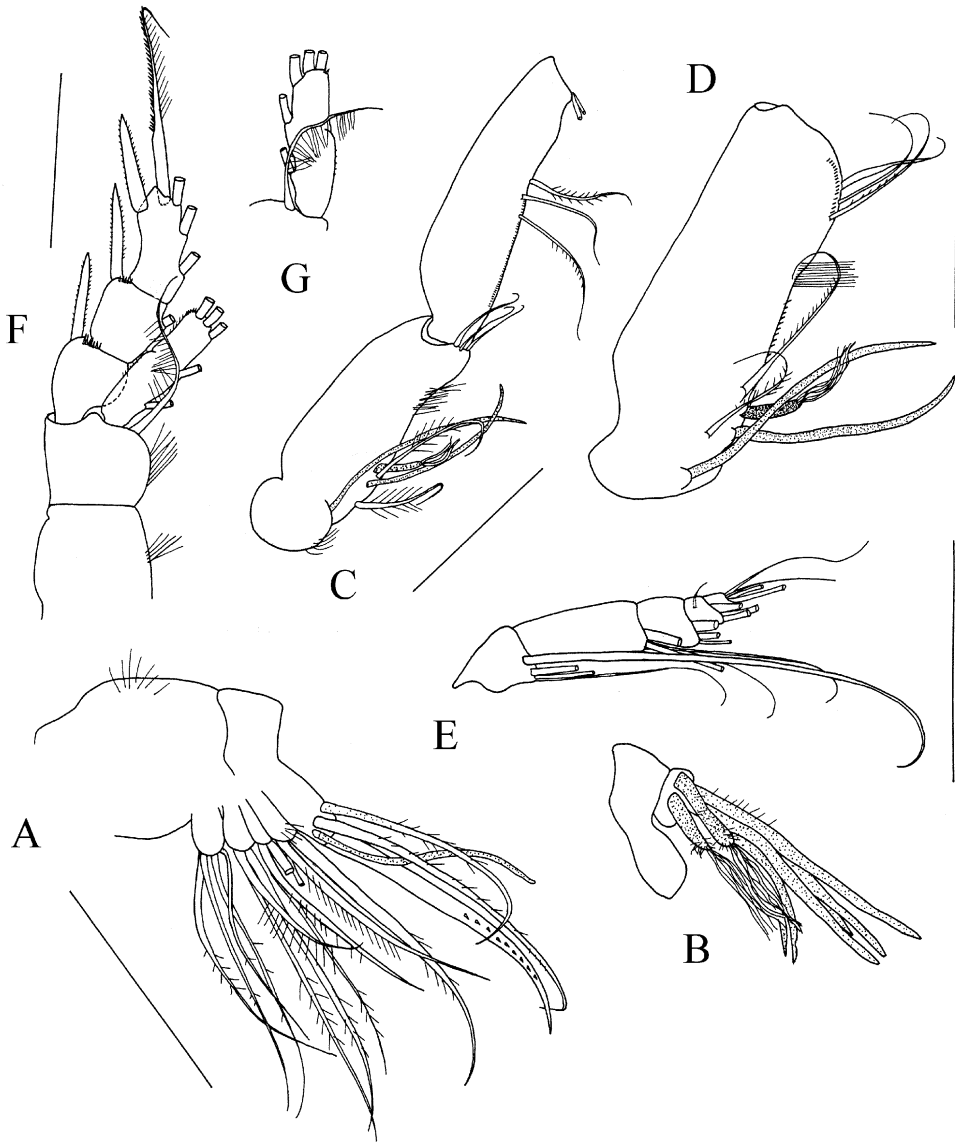


Figure 6. *Rythabis asymmetrica* sp. nov., female, paratype. (A) Maxilla, praecoxal, coxal and proximal basal endites, posterior; (B) maxilla, proximal basal endite and distal basal endite plus endopod, setae of proximal basal endite not figured; (C) maxilliped, syncoxa and basis; (D) maxilliped, syncoxa; (E) maxilliped, endopod; (F) P1, anterior; (G) P1, right endopod, anterior. Scale bars: 0.1 mm.

basal endite with four setae, distal basal endite with five setae fused to endopod, endopod with nine setae; exopod with four setae.

Maxilla (Figure 6A, B): proximal praecoxal endite with four setae, distal with three setae; proximal and distal coxal endites with three setae each; proximal basal endite with four setae: one thick, one sensory and one poorly sclerotized; distal basal endite plus endopod with six worm-like (three longer than others) and two brush-like sensory setae with distal filaments longer than setae itself (Figure 6B).

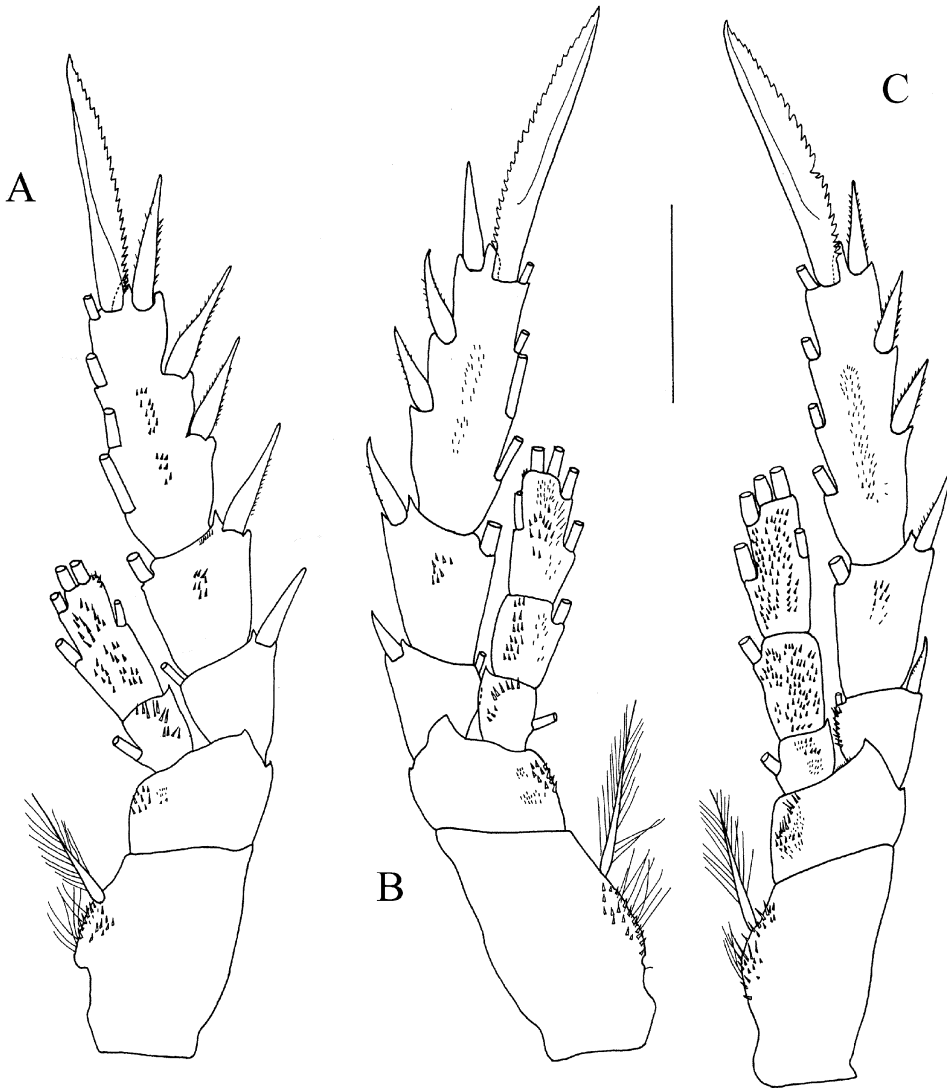


Figure 7. *Rythabis asymmetrica* sp. nov., female, paratype. (A) P2, posterior; (B) P3, posterior; (C) P4, posterior. Scale bars: 0.1 mm.

Maxilliped (Figure 6C–E): syncoxa with groups of setae on praecoxal endites not well separated, one sensory worm-like on proximal praecoxal endite, two setae (one sclerotized and one sensory worm-like) on middle, and two setae (one sclerotized and one sensory brush-like with long filaments) on distal praecoxal endite. Syncoxa with four rows of denticles: first row on proximal praecoxal endite (Figure 6C), second and third rows (of short and long denticles) between distal group of setae on praecoxal endite and coxal endite (Figure 6D) and fourth row on coxal endite along distolateral edge. Basis with three medial setae, two distal setae and row of small denticles proximally; endopod five-segmented with 4, 4, 3, 3+1, and 4 setae.

P1 (Figure 6F, G): basis with curved mediiodistal seta; endopod one-segmented with poorly developed lateral lobe; three medial and two terminal setae present; endopod with denticles along proximal lateral edge and lateral corner distally. Exopod segment 1 with lateral spine and a row of small denticles along distal edge, segment 2 with lateral spine, one medial seta and row of small denticles along distal edge; segment 3 with lateral spine, one terminal and three medial setae. Lateral spines subequal in length, that of segment 1 extending well beyond base of lateral spine of segment 2, that of segment 2 well beyond base of lateral spine of segment 3.

P2 (Figure 7A): coxa with medial seta; denticles on inner posterior surface of coxa and basis; endopod two-segmented, segment 1 with one medial seta, segment 2 with two medial, two terminal and one lateral setae; both segments with denticles on posterior surface. Exopod segments 1 and 2 with one medial seta and one lateral spine each, segment 3 with four medial setae, one terminal and three lateral spines; terminal spine slightly shorter than segment 3; segments 2 and 3 with posterior denticles.

P3–P4 (Figure 7B, C): coxa with medial seta; coxa and basis with denticles on inner posterior surface; rami three-segmented; endopod segments 1 and 2 with one medial seta each, segment 3 with one lateral, two terminal and two medial setae; all segments with denticles on posterior surface. Exopod segments 1 and 2 with one medial seta and one lateral spine each, segment 3 with four medial setae, one terminal and three lateral spines, length of terminal spine subequal to that of segment 3; segments 2 and 3 of P3 and all segments of P4 ornamented with posterior denticles.

P5 (Figure 5I) uniramous, three-segmented, coxa slightly smaller than basis, both with denticles on posterior surface medially and distally; exopod armed with four spines, one toothed medial, of greater length than others, one short lateral and two strong toothed spines distally; subterminal lateral spine slightly longer than terminal.

Etymology

The specific name *asymmetrica* refers to the asymmetrical shape of the prosomal posterior corners.

Remarks

Schulz and Beckmann (1995) placed the genus *Rythabis* in the family Tharybidae. This affiliation was supported by Bradford-Grieve (2001) and Vyshkvartzeva (2005) but was not accepted by Ohtsuka et al. (2003) and Boxshall and Halsey (2004), who included the genus in the Scolecitrichidae. Markhaseva and Ferrari (2005) considered the family placement as incompletely resolved. *Rythabis* accommodates *R. atlantica* Schulz, 1995, *R. schulzi* Markhaseva and Ferrari, 2005, and *R. heptneri* Markhaseva and Ferrari, 2005. *Rythabis asymmetrica* differs from congeners by: (1) posterior corners of prosome asymmetrical (symmetrical in other species of *Rythabis*); (2) elongate spermathecae, which are frontally directed in distal half (not directed frontally, or moderately frontally directed); (3) presence of 14 setae on the distal basal endite plus endopod of maxillule (17 setae in *R. atlantica*, 11 in *R. heptneri*, 13 in *R. schulzi*). The new species shares with *R. atlantica* an articulated terminal spine on P5 exopod (unarticulated in other species of *Rythabis*) and two setae on the antenna endopod segment 1 (one seta) and thus appears more closely related to this species than to any other.

Family **SCOLECITRICHIDAE**Genus *Omorius* Markhaseva and Ferrari, 2005*Omorius curvispinus* sp. nov.

(Figures 8–11)

Material examined

Holotype: adult female, poor condition, dissected, body length 1.86 mm (ZMH K-41171). Scotia Sea, 60°38'S, 53°57'W, station 46-7, supranet, 30 January 2002, above the sea bed at depths of 2889–2893 m.

Description

Adult female. Total length 1.86 mm; prosome about 4.6 times longer than urosome. Rostrum without filaments (Figure 8B, C). Cephalosome and pediger 1 and pedigers 4 and 5 separate (Figure 8A, D, E). Right posterior corner of prosome rounded with small knob ventrally (Figure 8E), left posterior corner probably folded back (Figure 8D). In dorsal view, genital double-somite slightly swollen at mid-length; lateral surfaces of genital double-somite with denticles; spermathecae small, oblong (Figure 8D, E, G). Caudal rami with four terminal setae, one small dorsal and one small ventral seta (Figure 8D, F, H).

Antennules broken (Figure 9A), eight proximal free segments intact, armature as follows: I—3s, II–IV—6s+2ae, V—1s+1ae+?, VI—2s, VII—1s+1ae+?, VIII—2s+1ae, IX—1s+?, X–XI—2s+?.

Antenna (Figure 9B–D): coxa with one seta; basis with two setae, one very long extending to bases of subdistal setae of endopodal segment 1; endopodal segment 1 with two setae, endopodal segment 2 with seven and eight setae. Exopod eight-segmented, with 1, 2, 2, 1, 1, 1, 1, and 3 setae; third proximal segment small, incompletely separate from second segment.

Mandible (Figure 9E–G): gnathobase with tooth-like knob on posterior face and wide cutting edge, with eight blunt teeth and one seta; basis with three setae; exopod of five segments with 1, 1, 1, 1 and terminal setae broken; endopod segment 1 with two setae, endopod segment 2 with nine setae.

Maxillule (Figure 9H, J): praecoxal endite with nine terminal and four posterior setae; terminal setae 1–2 and 5–9 large (from proximal to distal), setae 3–4 small and slightly curved. (Figure 9J); coxal endite with two setae; coxal epipodite with nine setae; proximal basal endite with two setae; distal basal endite with three setae; endopod with seven setae; exopod with four setae and small spinules distally.

Maxilla (Figure 10A, B): proximal praecoxal endite with four setae and short triangular attenuation; distal endite with three setae; proximal coxal endite with three setae, distal coxal endite with three setae, one long, thick and spine-like; proximal basal endite with four setae, one thick, spine-like and one worm-like sensory seta; all endites with small spinules distally; distal basal endite plus endopod with eight sensory setae, of these five worm-like and three brush-like.

Maxilliped (Figure 10C, D): syncoxa with one seta on praecoxal endite, two setae on middle endite (one heavily sclerotized, spine-like and strongly curved), and one seta slightly curved in proximal third on distal praecoxal endite; coxal endite with three setae; four rows of spinules present: proximally; between medial and distal praecoxal endites; adjacent to coxal endite proximally; along distal edge of coxal endite. Basis with row of spinules

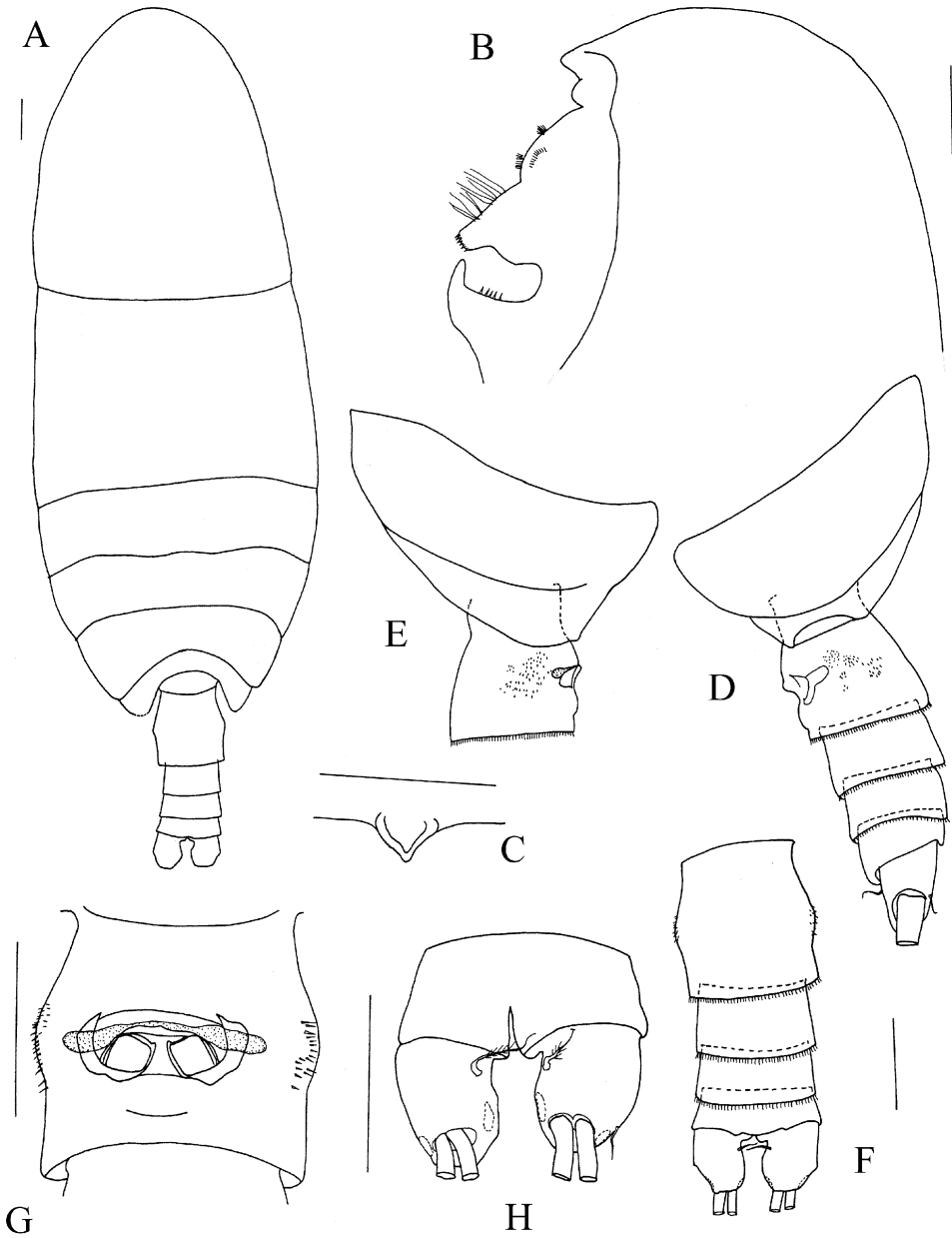


Figure 8. *Omorius curvispinus* sp. nov., female, holotype. (A) Habitus, dorsal; (B) cephalosome, anterior part, lateral; (C) rostrum, ventral; (D) posterior prosome and urosome, lateral; (E) posterior prosome and genital double-somite, lateral; (F) urosome, dorsal; (G) genital-double somite, ventral; (H) anal somite and caudal rami, ventral, setae partly detached. Scale bars: 0.1 mm.

proximally and three medial and two distal setae. Endopod five-segmented with 4, 4, 3, 3+1 and 4 setae.

P1 (Figure 10E): coxa with row of small denticles along distal outer edge; basis with tiny distolateral seta and mediolateral seta on anterior face; endopod one-segmented,

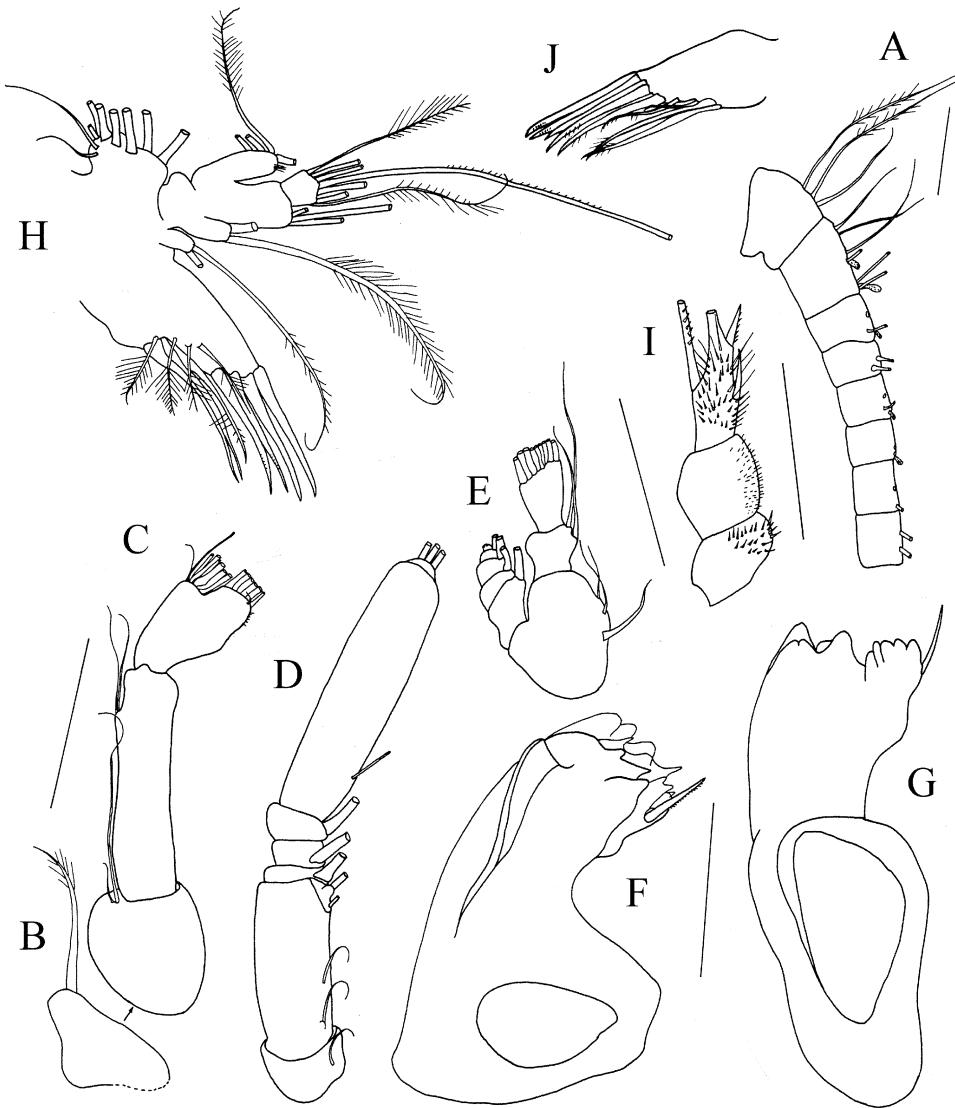


Figure 9. *Omorius curvispinus* sp. nov., female, holotype. (A) Antennule, segments I (first) to X–XI (eighth); (B) antenna, coxa; (C) antenna, basis and endopod; (D) antenna, exopod; (E) mandible, palp; (F, G), mandible, gnathobase, different positions; (H) maxillule, posterior; (I) P5, posterior; (J) maxillule, praecoxal endite, anterior. Scale bars: 0.1 mm.

comparatively long and extending to anterior margin of exopod segment 2, with three medial and two terminal setae; lateral lobe small and triangular lacking denticles, spinules present along distolateral edge of endopod. Exopod three-segmented, segment 1 with lateral spine, segment 2 with lateral spine and medial seta, segment 3 with lateral spine, terminal spine and three medial setae; lateral spines of exopod segments 1 and 2 covered with denticles, spine of segment 3 longest.

P2 (Figure 11A): coxa with medial seta; basis with group of small denticles on posterior surface near base of endopod; endopod two-segmented, segment 1 with one medial seta, segment 2 with two medial, two terminal and one lateral setae and ornamented with

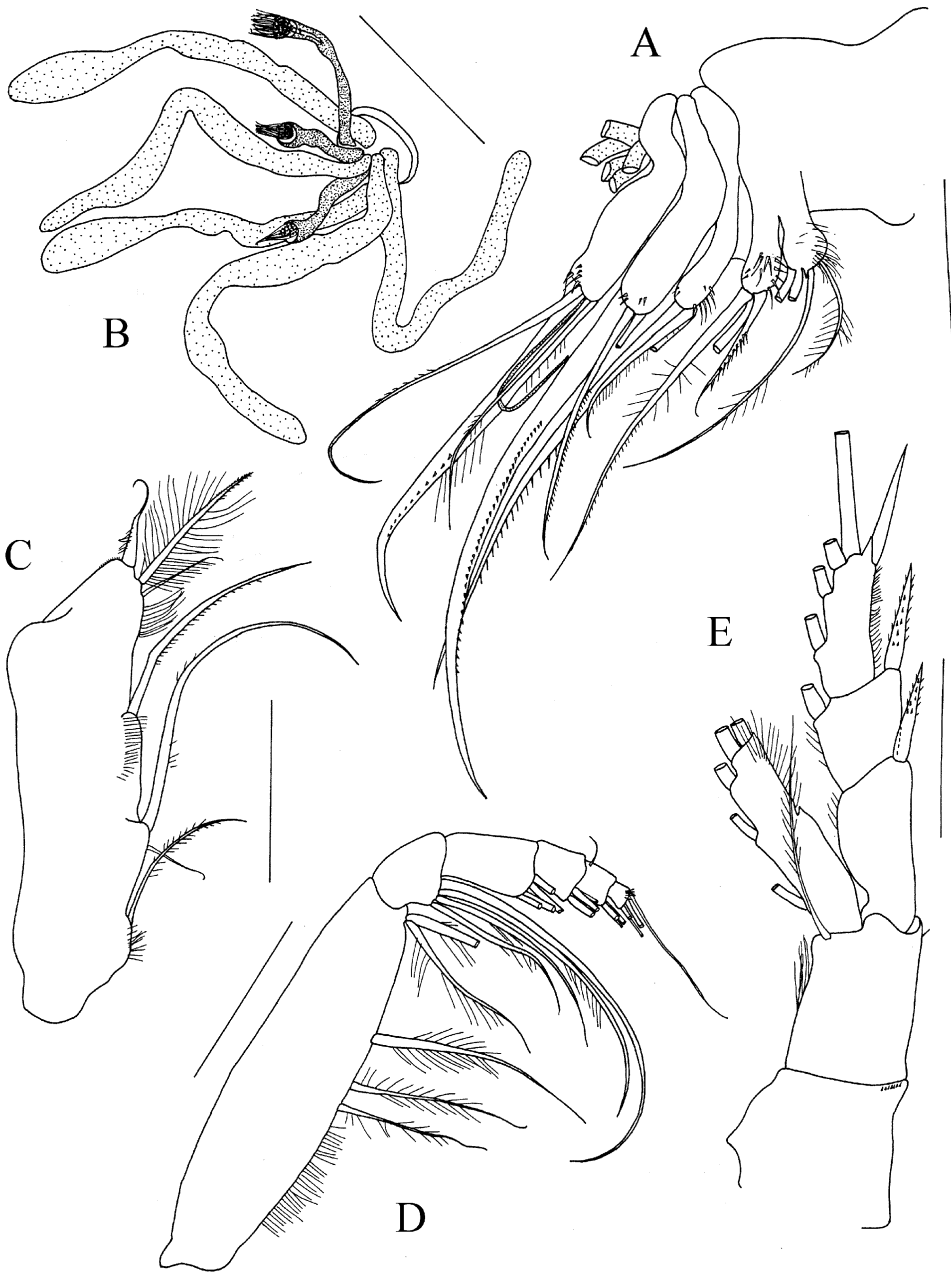


Figure 10. *Omorius curvispinus* sp. nov., female, holotype. (A) Maxilla, posterior; (B) maxilla, sensory setae of distal basal endite plus endopod, anterior; (C) maxilliped, syncoxa; (D) maxilliped, basis and endopod; (E) P1, anterior. Scale bars: 0.1 mm.

denticles on posterior surface; exopod segments 2 and 3 detached, segment 1 with one medial and one lateral seta.

P3 (Figure 11B): coxa with medial seta; basis with row of denticles distally; endopod segment 1 with one medial seta; exopod segment 1 with one medial and one lateral seta; exopod and endopod segments 2 and 3 detached.

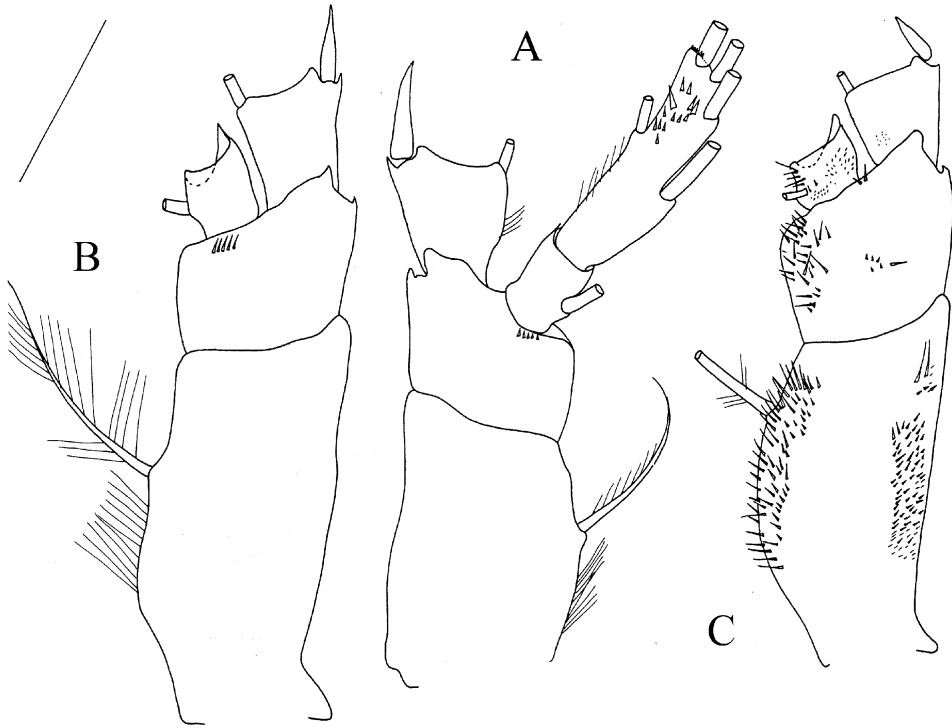


Figure 11. *Omorius curvispinus* sp. nov., female, holotype. (A) P2, posterior; (B) P3, posterior; (C) P4, posterior. Scale bars: 0.1 mm.

P4 (Figure 11C): coxa with medial seta; coxa and basis with large patches of denticles on posterior surface; endopod segment 1 with one medial seta and with posterior denticles; exopod segment 1 with one medial, one lateral seta and sparse posterior denticles, exopod and endopod segments 2 and 3 broken.

P5 (Figure 9I): three-segmented, all segments with denticles on posterior surface; exopod (distal segment) with one medial spine (broken), one lateral, one short subterminal and one terminal attenuation (broken).

Male. Unknown.

Etymology

The specific name is derived from the Latin *curvus* meaning curved and *spinus* meaning spine and relates to the strongly sclerotized, spine-like curved setae of the maxillipedal syncoxa.

Remarks

Omorius curvispinus is the second species attributed to the genus. It differs from *O. atypicus* Markhaseva and Ferrari, 2005 (1) in a slightly greater size (1.85 versus 1.56 mm in *O. atypicus*); (2) by a strongly curved seta on the medial praecoxal endite of the maxilliped (slightly curved in *O. atypicus*); (3) presence of an exceptional long seta on antenna basis

Table I. Collection data for *Brodskius*, *Rythabis*, and *Omorius* species.

Species name	Station	Vessel	Date	Locality	Depth layer (m)	Source of data
<i>Brodskius abyssalis</i> sp. nov.	59-5	<i>Polarstern</i>	14 February 2005	67°31'S, 00°01'E	4651–4655	This paper
<i>B. benthopelagicus</i>	2146	<i>Alvin</i>	November 1988	13°23'N, 102°27'W	3022–3100	Markhaseva and Ferrari (2005)
<i>B. confusus</i>	3668	<i>Discovery II</i>	19 March 1958	32°29'N, 20°09'W	1900–3000	Grice and Hulsemann (1965);
	4748		24 September 1961	29°57'N, 22°58'W	3000–4000	Markhaseva and Ferrari (2005)
	4768		12 October 1961	40°03'N, 19°57'W	4000–4750	
<i>B. paululus</i>	4	<i>Chain</i>	18 June 1966	21°55'N, 95°25'W	509–1000	Park (1970); Markhaseva and
	–	–	12–18 November 1969	18°N, 25°W	1003–1900	Ferrari (2005)
<i>B. robustipes</i>	–	–	12–18 November 1969	18°N, 25°W	800–1250	Roe (1975)
	4712	<i>Discovery II</i>	4 September 1961	30°01'N, 23°00'W	3000–4000	Grice and Hulsemann (1965);
	4748		24 September 1961	29°57'N, 22°58'W	4000–5000	Markhaseva and Ferrari (2005)
<i>Brodskius</i> sp.	2147	<i>Alvin</i>	November 1988	13°23'N, 102°27'W	2973–2992	Markhaseva and Ferrari (2005)
<i>Brodskius</i> sp.	042-2	<i>Polarstern</i>	27 January 2002	59°40'S, 57°35'W	3680–3683	This paper
<i>Rythabis asymmetrica</i> sp. nov.	141-10	<i>Polarstern</i>	23 February 2002	58°24'S, 25°01'W	2258–2281	This paper
<i>R. atlantica</i>	745	<i>Meteor</i>	28 July 1989	59°13'N, 20°50'W	2860	Schulz and Beckmann (1995)
<i>R. heptneri</i>	–	–	6 July 1997	19°43'N, 156°04'W	600	Markhaseva and Ferrari (2005)
<i>R. schulzi</i>	2146	<i>Alvin</i>	November 1988	13°23'N, 102°27'W	3022–3100	Markhaseva and Ferrari (2005)
<i>Omorius atypicus</i>	2146	<i>Alvin</i>	November 1988	13°23'N, 102°27'W	3022–3100	Markhaseva and Ferrari (2005)
<i>O. curvispinus</i> sp. nov.	46-7	<i>Polarstern</i>	30 January 2002	60°38'S, 53°57'W	2889–2893	This paper

extending to bases of endopod segment 1 setae (much shorter in *O. atypicus*); (4) oblong spermathecae (rounded); (5) genital double-somite slightly swollen at mid-length (not swollen); (6) P1 endopod with lateral lobe lacking denticles (with small denticles); (7) antenna exopod segment 3 small, partly fused to segment 2 (separate).

Geographical distribution and bathymetry

Each of the genera *Brodskius*, *Rythabis*, and *Omorius* is recorded here for the first time in the southern hemisphere (Table I). Other congeners of *Brodskius* have been reported from the North Atlantic, namely *B. paululus*, *B. robustipes*, and *B. confusus*. *Brodskius benthopelagicus* was described from the tropical Pacific Ocean. The genus *Rythabis* was established for *R. atlantica* Schulz, 1995 from the North Atlantic but *R. heptneri* and *R. schulzi* were collected in the Pacific Ocean. The type species of *Omorius*, *O. atypicus*, has been recorded from the tropical Pacific Ocean (Grice & Hulsemann 1965; Park 1970; Schulz & Beckmann 1995; Markhaseva & Ferrari 2005).

All three genera, *Brodskius*, *Rythabis*, and *Omorius*, are deep-water genera collected mostly at abyssal depths immediately above the sea bed. There are several records of *Brodskius paululus* between depths of 1900 and 509 m (Park 1970) and from the 800–1250 m layer (Roe 1975, as '*Xanthocalanus paululus*'), all other records of this genus originate from depths below 1900 m (Table I). Up to now, species of *Rythabis* have been collected at depths between 2258 and 3100 m, except for *R. heptneri* recorded at mesopelagic depth (600 m) ca 30 m from the bottom. Both known species of *Omorius* were captured between 2889 and 3100 m.

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