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RESULTS OF THE DIVA-1 EXPEDITION OF RV "METEOR" (CRUISE M48/1)

A new taxon of Idyanthidae (Copepoda, Harpacticoida) from the deep sea of the Angola Basin

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Abstract

Multicorer samples from the deep sea of the Angola Basin yielded 19 species of Idyanthidae Lang, 1994 belonging to five genera. The taxon membership of the species was determined following (Phylogeny of Harpacticoida (Copepoda): Revision of "Maxilliped-asphalea" and Exanechentera. Cuvillier Verlag, Göttingen, 259pp.). Except for one species, *Styracothorax gladiator* Huys, 1993, all species are new to science. One of them is described here on the basis of females and males. It represents a new genus, *Nematovorax* gen. nov. One female of the new species *N. gebkelinae*, was found to hold a nematode between its mouthparts.

Keywords: Copepoda; Harpacticoida; Angola Basin; Deep sea; Idyanthidae; *Nematovorax gebkelinae*

Introduction

The DIVA 1 (Latitudinal gradients of Deep Sea BioDIVersity in the Atlantic ocean) expedition in the year 2000 with RV "Meteor" was undertaken to study the benthic species diversity in the deep sea of the Angola Basin. Along a transect of over 600 nautical miles samples were taken at depths of more than 5000 m. Four stations of this transect were sampled with a multicorer (MUC) and yielded more than 16,500 harpacticoid copepods. From them representatives of Idyanthidae Lang, 1944 sensu Seifried (2003) were selected for study. It was found that there are 18 new and one known species belonging to three known and two new genera. One of the new species of one of the new genera will be described here because it shows an interesting biological detail. Its phylogenetic position will be discussed.

Abbreviations: A1, antennula; aes, aesthetasc; acr, acrothek; A2, antenna; enp, endopod; exp, exopod; P1–P6, swimming-legs 1–6.

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Material and methods

All specimens were preserved in 4% buffered formalin and subsequently transferred into glycerol. The dissected specimens are mounted on several slides in glycerol. Preparations were sealed with transparent nail varnish. All drawings have been made using a Leica interference microscope DMLB with a drawing tube.

The type material of *Nematovorax gebkelinae* gen. et sp. nov. is kept in the collection of the AG Zoosystematik und Morphologie, Universität Oldenburg, Germany.

The laserscan photo was taken with a laserscan microscope Leica TCS NT with 488 nm and a scale bar of 20 μm.

The morphological terminology has been adopted from Huys and Boxshall (1991). For setal homology and setae numbers Seifried (2003) is followed here.

Results

The material studied yielded 19 species of Idyanthidae in 5 genera (Table 1). Only one of these species,

Table 1. Abundances of Idyanthidae at four stations in the deep sea of the Angola Basin (+ = 1–5 individuals; + + = 6–15 individuals; + + + = 16–35 individuals)

Species	Station 325	Station 331	Station 342	Station 346
Nematovorax gebkelinae	+ +	+ +	+ +	+ + +
Nematovorax sp. 1	+	–	+	+
Nematovorax sp. 2	+ +	+	+	+ + +
Idyanthe sp. 1	+	–	–	–
Idyanthe sp. 2	–	+	–	–
Idyanthidae sp. 1	+	–	+	+ +
Idyanthidae sp. 2	–	–	–	+
Idyanthidae sp. 3	+	–	–	–
Idyanthidae sp. 4	–	+	–	–
Idyanthidae sp. 5	–	–	+	–
Idyella sp. 1	–	–	–	+
Idyella sp. 2	–	–	–	+
Idyella sp. 3	–	–	–	+
Idyella sp. 4	–	+	–	–
Idyella sp. 5	–	–	+	–
Idyella sp. 6	–	–	–	+
Idyella sp. 7	–	–	–	+
Idyella sp. 8	–	–	–	+
Styracothorax gladiator	–	–	–	+

Position of station 325: 19°58.1′S 02°59.8′E, 5450 m; position of station 331: 19°07.0′S 03°52.0′E, 5427 m; position of station 342: 17°08.0′S 04°42.0′E, 5415 m; position of station 346: 16°17.0′S 05°27.0′E, 5389 m.

Styracothorax gladiator Huys, 1993, is known, the remaining 18 species are new to science. As shown in Table 1, two species are abundant at all stations: *N. gebkelinae* gen. et sp. nov. and *Nematovorax* gen. nov. sp. 2. Only four species are present at more than one station: *N. gebkelinae* gen. et sp. nov., *Nematovorax* gen. nov. sp. 1, *Nematovorax* gen. nov. sp. 2 and *Idyanthidae* gen. sp. 1. The other species are represented by only one or two individuals at one single station. Most species were found at station 346. One of the most abundant species is described here: *N. gebkelinae* gen. et sp. nov. One individual was found with a nematode between its mouthparts (Fig. 1).

Description

Idyanthidae Lang, 1944

Diagnosis of Idyanthidae (autapomorphies italics) (Seifried, 2003):

Female. Exopod of **mandible** 2-segmented *with long proximal segment with 4 lateral setae and short distal segment with 2 distal setae*. Exopod of **maxillule** *elongated*. P1 of *characteristic shape: enp-1 elongated and broadened at the level of the inner seta, enp-2 and enp-3 short*. The 2 outer spines of exopod **P5** *inserting near the basis* and near the distal outer edge, respectively.

Male. **P2** enp-3 *without inner setae, inner setae present in female lacking*; terminally with big modified bare spine (I) fused at base with segment (derived from displaced outer spine), 1 middle hyaline seta (2) and 1 inner terminal seta (3) (Fig. 9A and B).

	coxa	basis	exopod	endopod
P2	0-0	1-0	I-1; I-1; III–I + 1-2	0-1; 0-2; I-2-0

Nematovorax gen. nov.

Diagnosis (autapomorphies italics):

Female. **Anal somite** covered by *pseudoperculum with serrated margin*. **Caudal rami** *with 6 setae*. Exopod of **maxillule** 1- segmented and *not elongated*. **P5** baseoendopod with 1 outer basal seta, endopodal lobe with 3 setae (3–5), exopod with 4 setae (7, 10–12): 1 inner seta, 2 terminal setae, *1 outer seta*; the outer seta of exopod inserting near the basis (7) (Fig. 6B).

Male. Sexual dimorphism in body size, genital segmentation, antennule, P2, P5 and P6. **P5** fused medially; basis not separated from coxa and endopod, *exopod 1-segmented*.

Type and only species: *N. gebkelinae* sp. nov.

Etymology: The generic name *Nematovorax* (nêma gr. = thread; vorax lat. = voracious) refers to an individual fixed while feeding on a nematode.

Nematovorax gebkelinae sp. nov.

Diagnosis (autapomorphies italics):

Mandibular palp comprising basis, endopod and exopod; basis with *3 setae*; endopod 1-segmented, with *1 lateral* seta and *2+2 apical* setae; exopod 1-segmented with *3 lateral* setae and 2 distal setae. Endopod of **maxillule** 1-segmented with *4 setae*. **Maxilla** 5-segmented consisting of syncoxa, allobasis, and 3-segmented endopod; syncoxa with (*3* + 3), 3, 3 setae, the two proximal endites fused basally; endopod with armature formula: 2, 1, 3.

Type material

Holotype female, dissected and mounted on 12 slides, deposited in the Copepod Collection of the AG Zoosystematik und Morphologie, University of

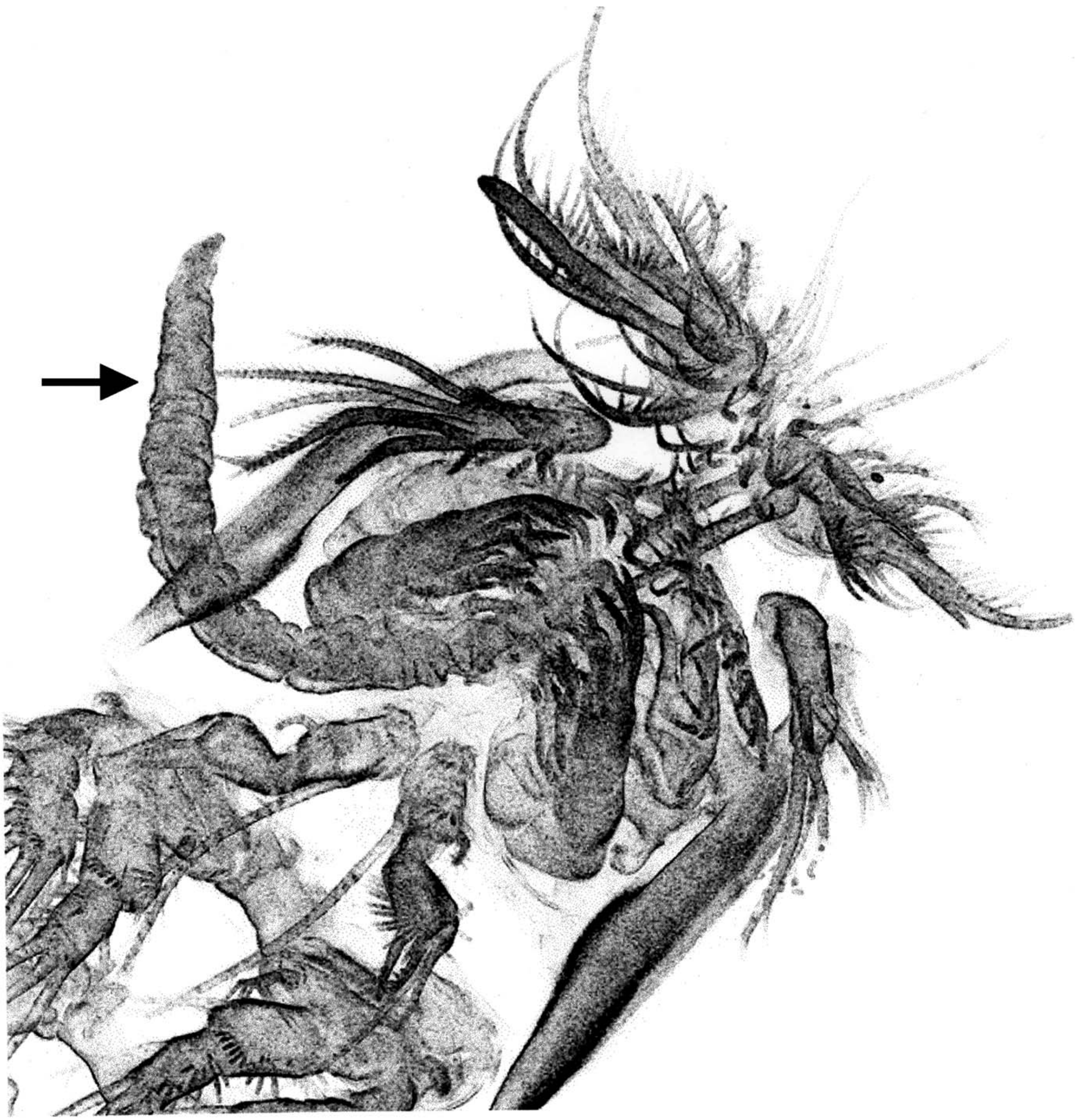

Fig. 1. Laserscan photo of ventral side of cephalothorax of *Nematovorax gebkelinae* gen. et sp. nov. with a nematode (arrow) between the mouthparts.

Oldenburg, Germany (UNIOL Coll. No. 2003.001/1-12); Atlantic Ocean, Angola Basin, 16°17.0′S 05°27.0′E, 5389 m. Allotype male, dissected and mounted on 10 slides (UNIOL Coll. No. 2003.005/1-10); Atlantic Ocean, Angola Basin, 16°17.0′S 05°27.0′E, 5389 m. Paratype: one female, dissected and mounted on 11 slides (UNIOL Coll. No. 2003.002/1-11); Atlantic Ocean, Angola Basin, 19°07.0′S 03°52.0′E, 5427 m; two females not dissected (UNIOL Coll. No. 2003.003/1 and 2003.004/1) Atlantic Ocean, Angola Basin, 16°17.0′S 05°27.0′E, 5389 m and 17°08.0′S 04°42.0′E, 5415 m and one male with fused P2 enp-2 and enp-3, not dissected (UNIOL Coll. No. 2003.006/1); Atlantic Ocean, Angola Basin, 16°17.0′S 05°27.0′E, 5389 m.

Description of female holotype

Apart from exopod P5 the drawings are made from the holotype. Exopod P5 is from the paratype (Coll. No. 2003.002/1-13). Body length 330 μm, measured from anterior margin of cephalic shield to distal rim of anal operculum; largest width of cephalic shield 106 μm; length of cephalic shield 110 μm; length of caudal rami 15 μm; length of caudal ramus seta IV 115 μm, length of caudal ramus seta V 238 μm (Fig. 2C).

Body (Fig. 2 A and B) with different widths of prosome and urosome. Prosome consisting of cephalothorax and 3 free pedigerous somites; first pedigerous somite completely fused to dorsal cephalic shield. Urosome 5-segmented, consisting of somites bearing P5 and P6, and 3 free abdominal somites; copulatory pore large. Cephalothorax and body somites with sensillae and pores; third free segment of prosome with dorsal and lateral sickle-shaped rows of spinules. All prosomites and urosomites with smooth hyaline frills; hyaline frills of urosome with rows of small spinules, dorsally and laterally.

Nauplius eye not visible.

Pseudoperculum with serrate margin (Fig. 2A).

Caudal rami (Fig. 2D and E) slightly longer than wide, terminally with row of spinules. Each ramus with six setae; seta I missing; seta II and seta III bare; seta VI bipinnate and close to terminal seta V; seta IV bare; seta V longer than seta IV and unipinnate. Seta VII bare, tri-articulate at base, located dorsally in distal half of caudal ramus; seta VII flanked by short spinules.

Antennule (Fig. 3A) short, 9-segmented; segment 1 longest, with sickle-shaped rows of spinules medially and on outer margin; fourth segment with aesthetasc, ninth with acrothek; setae partially pinnate; armature formula: 1, 11, 8, 5 + aes, 2, 2, 2, 2, 6 + acr.

Antenna (Fig. 3B) with coxa, basis, 2-segmented endopod and 3-segmented exopod; basis with two rows of spinules and one seta; endopod-1 without seta, endopod-2 with two setules on outer margin, one unipinnate spine I, one bare seta 2, one bipinnate spine III and subterminally with geniculated seta 4; terminally with seven setae; exopod with 2, 1, 4 setae.

Mandible (Fig. 3D) with well developed gnathobase bearing eight teeth in two rows along distal margin and one pinnate seta at dorsal corner; mandibular palp biramous, basis with three setae, subterminal one bare, the other two bipinnate; endopod 1-segmented; laterally with one seta, apically with four setae, all setae bipinnate; exopod 1-segmented, laterally with three setae, terminally with two setae, all setae bipinnate.

Maxillule (Fig. 4A) composed of praecoxa, coxa, exopod and endopod; praecoxal arthrite with two rows of setules at proximal and distal border; anterior surface in outer half with two juxtaposed, bare setae (1 + 2), apically two rows of spines, three anterior and four posterior ones (III–IX), anterior ones with spinules, additionally one smaller flexible seta (10) inserting on anterior surface; subapical inner margin with two strong, plumose setae (11 + 12); armature formula: 2, VII, 1, 2, 0; coxal endite with four strong, bare setae; epipodite represented by one strong, bipinnate seta; basis with four and four setae; endopod 1-segmented, elongate, with four setae; exopod 1-segmented with three plumose setae.

Maxilla (Fig. 4B) composed of syncoxa, allobasis and 3-segmented endopod; syncoxa with four endites, the two praecoxal endites fused basally, outer margin with row of setules; all coxal and praecoxal endites with three strong setae; allobasis with strong claw (I) at end of endite, one curved spine (II), one seta (3) on anterior surface and one seta (4) on posterior surface from basis and one seta on anterior surface (9) and one seta on posterior surface (11) from fused endopodal segment; endopod 3-segmented with two geniculate setae on proximal segment, one geniculate seta on middle segment and one geniculate and two bare setae on last segment.

Maxilliped (Fig. 4C) with syncoxa, basis and 1-segmented endopod; syncoxa with one short pinnate spine on outer margin (10) and one very long bipinnate spine on inner margin (11); with several rows of short and long setules on anterior surface; basis with one pinnate spine on distal margin (8); with row of setules along inner edge; endopod 1-segmented, with one spine (V), two bare outer setae (1 + 2) and two pinnate distal setae (3 + 4).

P1-P4 (Figs. 4D–6A) biramous; with broad intercoxal sclerites; coxae and bases with rows of surface spinules;

P1 (Fig. 4D) basis with one strong, unipinnate spine and long setules along inner margin and one stout bipinnate spine at outer margin; exopod 3-segmented with spinules on outer margin; exp-1 with one stout bipinnate outer spine; exp-2 with one bipinnate outer spine and one small plumose inner seta; exp-3 with four bipinnate spines and two plumose setae; endopod 2-segmented with spinules on outer margin; enp-1 elongated and broadened at level of plumose inner seta; enp-2 with one unipinnate spine and three plumose setae.

P2–P4 (Figs. 5A–6A) with 3-segmented rami; P2–P3 (Fig. 5A and B) bases with bare outer seta, P4 (Fig. 6A) basis with plumose outer seta; exopodal and endopodal segments with setules along outer margin; endopods slightly shorter than exopods; exopodal spines typically

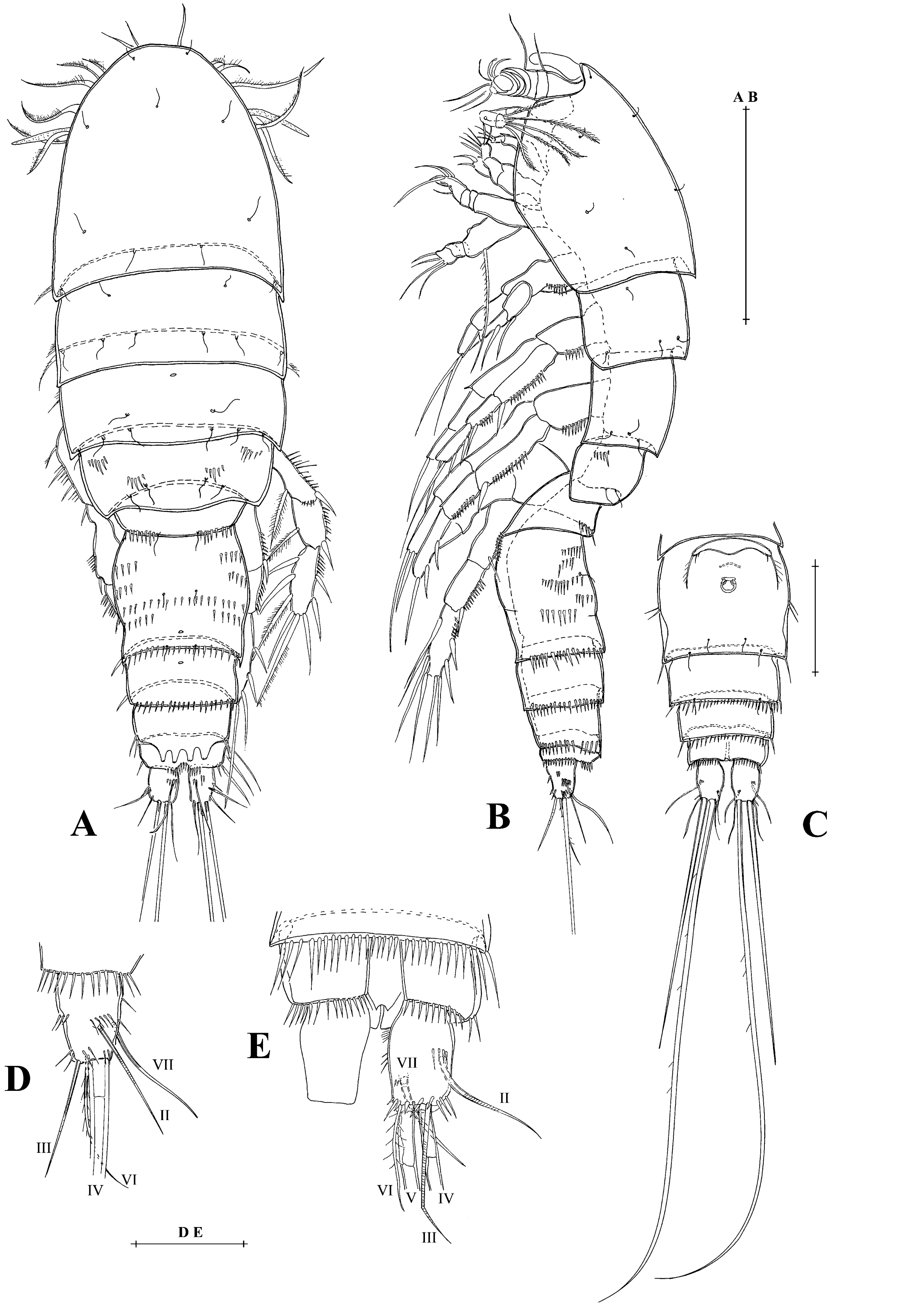

Fig. 2. *N. gebkelinae* gen. et sp. nov., holotype female: (A) habitus, dorsal, (B) habitus, lateral, (C) urosome, ventral, (D) caudal ramus, lateral, (E) caudal ramus, ventral. Scale bars: (A,B) 100 µm; (C) 50 µm; (D,E) 20 µm.

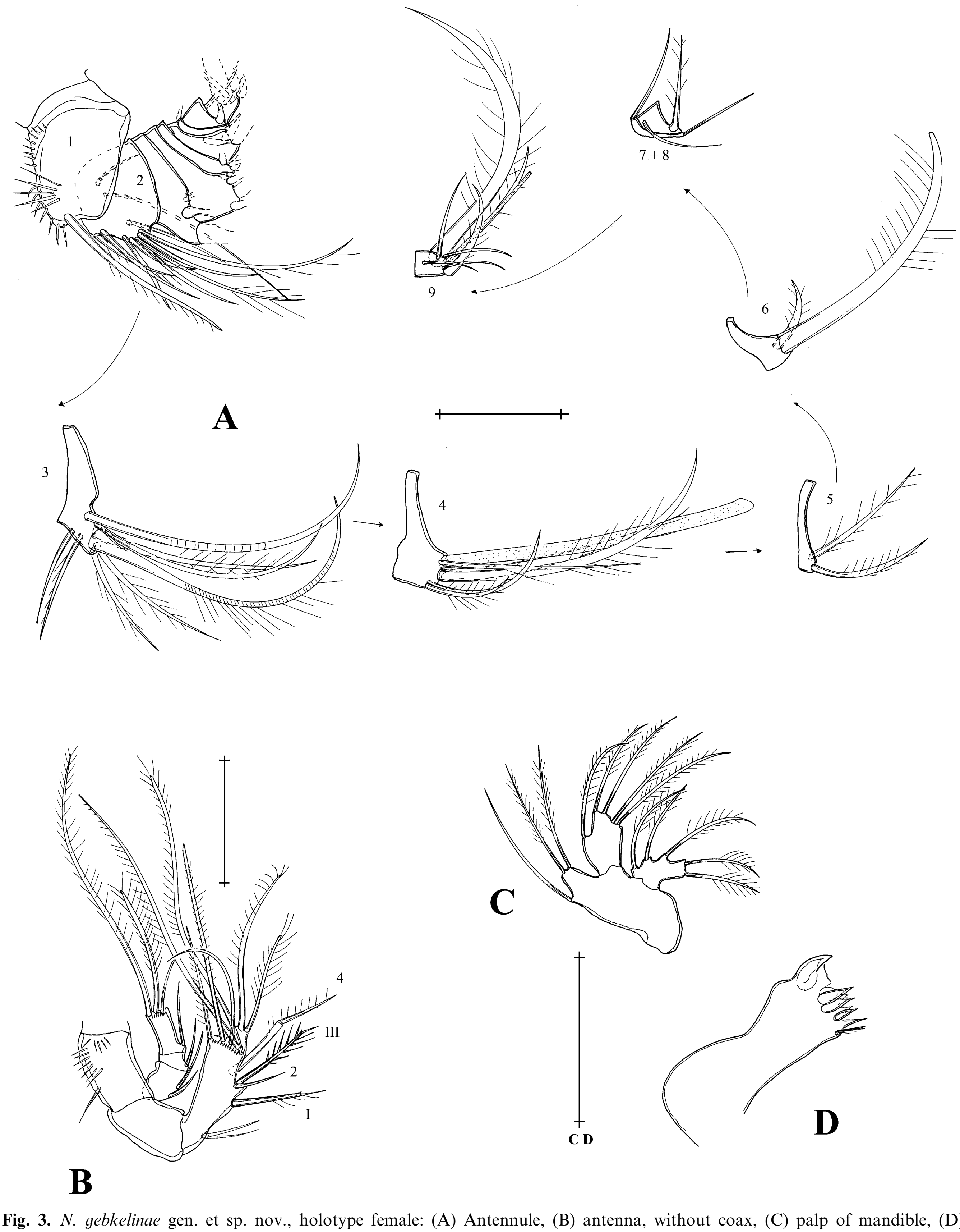

Fig. 3. *N. gebkelinae* gen. et sp. nov., holotype female: (A) Antennule, (B) antenna, without coax, (C) palp of mandible, (D) gnathobase of mandible. Scale bars: 20 μm.

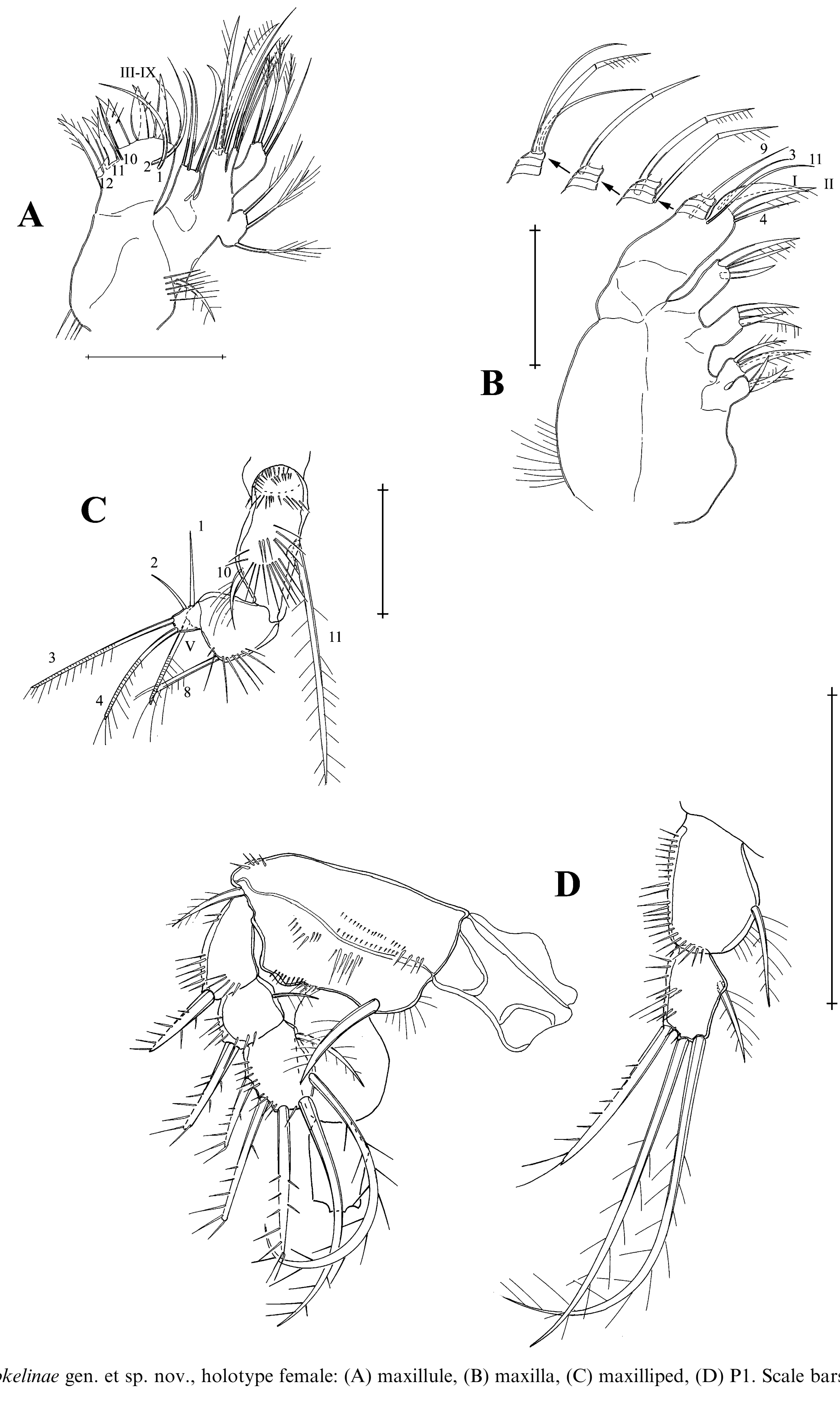

Fig. 4. *N. gebkelinae* gen. et sp. nov., holotype female: (A) maxillule, (B) maxilla, (C) maxilliped, (D) P1. Scale bars: (A–C) 20 μm; (D) 50 μm.

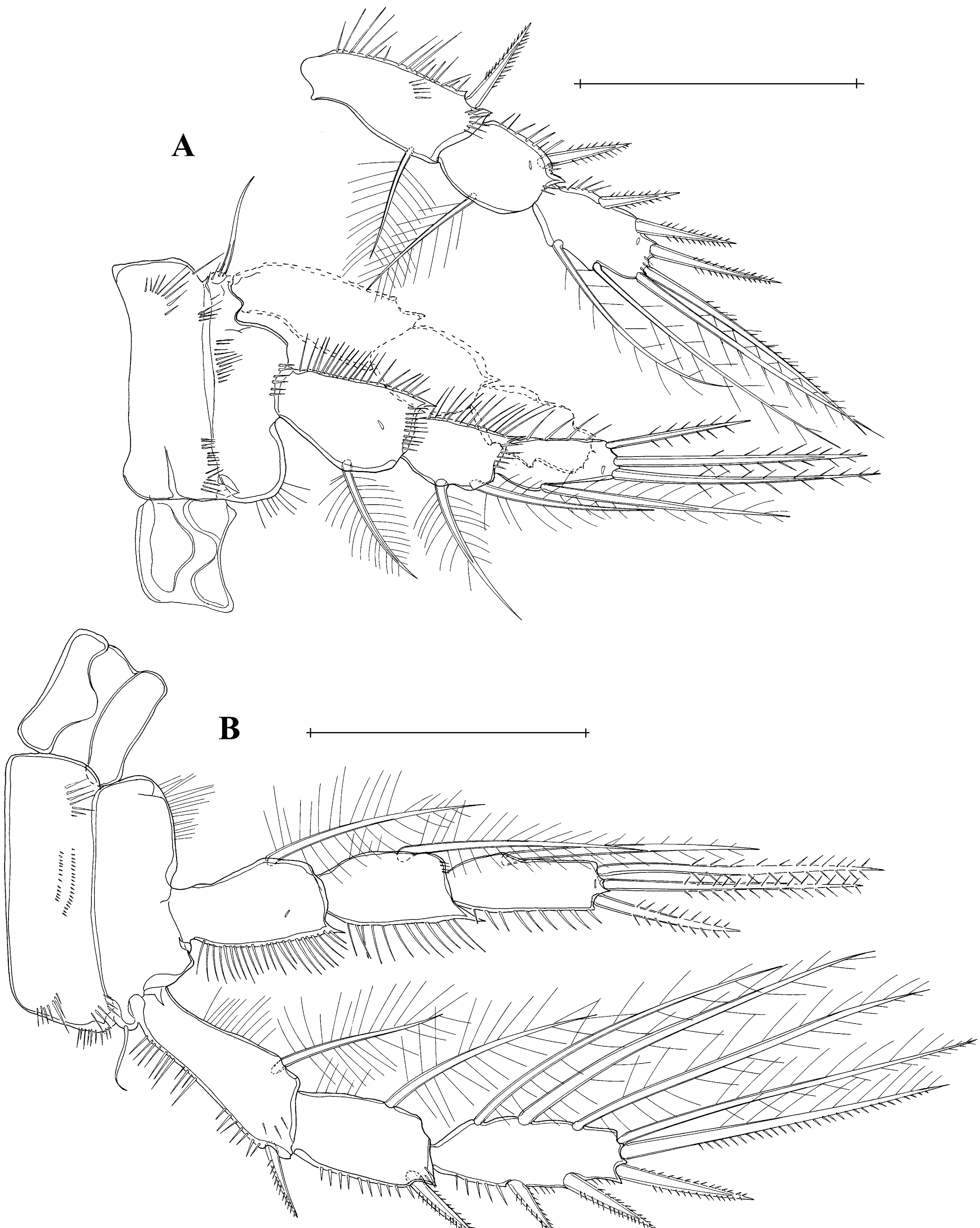

Fig. 5. *N. gebkelinae* gen. et sp. nov., holotype female: (A) P2, (B) P3. Scale bars: 50 μm.

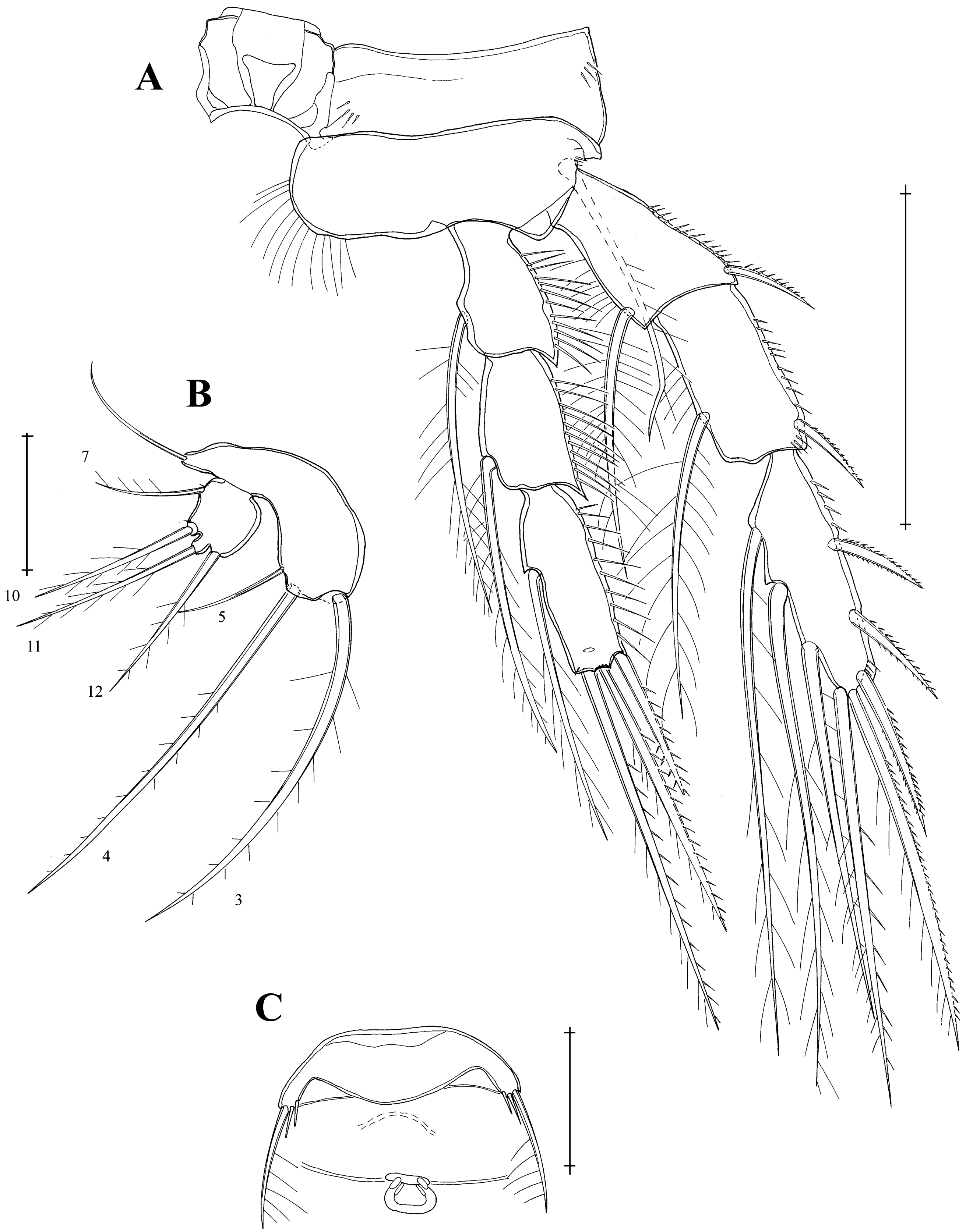

Fig. 6. *N. gebkelinae* gen. et sp. nov., holotype female: (A) P4, (B) P5, exopod from paratype, (C) P6 and copulatory pore. Scale bars: (A) 50 μm; (B,C) 20 μm.

serrate, endopodal spines bipinnate, setae plumose. P1-P4 armature formula as follows:

	Coxa	Basis	Exopod	Endopod
P1	0-0	1-I	I-0; I-1; III−I+1-1	0-1; I-2-1
P2	0-0	1-0	I-1; I-1; III−I+-2	0-1; 0-2; I-2-1
P3	0-0	1-0	I-1; I-1; III−I+1-3	0-1; 0-1; I-2-1
P4	0-0	1-0	I-1; I-1; III−I+1-3	0-1; 0-1; I-2-1

P5 (Fig. 6B) consisting of baseoendopod and 1-segmented exopod; baseoendopod with one bare outer seta; endopodal lobe with two long bipinnate setae and one bare seta (3–5); exopod with three bipinnate setae (10–12) and one unipinnate outer seta (7).

P6 (Fig. 6C) bearing one large, unipinnate outer seta and two short, bare inner setae.

Description of male allotype

Body (Fig. 7A and B) more slender than that of female. Body length 293 µm, measured from anterior margin of rostrum to distal rim of anal operculum. Largest width of cephalic shield 84 µm, length of cephalic shield 105 µm; length of caudal rami 15 µm; length of caudal ramus seta IV 101 µm, length of caudal ramus seta V 187 µm. Urosome narrower than prosome. All prosomites and urosomites with smooth hyaline frills; hyaline frills of urosome with rows of small spinules, dorsally and laterally. Pseudoperculum with serrate margin. Nauplius eye not visible. Male with sexual dimorphism in genital segmentation, antennule, P2, P5, and P6.

Rostrum (Fig. 7C) large, as long as basal width, tapering anteriorly; anterior margin rounded; with two pairs of lateral sensillae and two dorsolateral pores in the middle.

Antennule (Fig. 8A) 7-segmented; subchirocer with geniculation between segments 5 and 6; segment 1 with several spinules along posterior margin; segment 5 largest, with large aesthetasc, fused basally with one bipinnate seta; segment 7 with acrothek; armature formula: 1, 1, 9, 9, 9 + aes/ 1, 8 + acr.

P2 (Fig. 9A) enp-3 with no inner seta, terminally with modified bare spine (I) fused at base with segment, one middle hyaline seta (2) and one inner terminal seta (3), armature formula:

	Coxa	Basis	Exopod	Endopod
P2	0-0	1-I	I-1; I-1; III−I+1-2	0-1; 0-2; I-2-0

P5 (Fig. 8B) baseoendopod with one outer basal seta; endopodal lobe rudimentary, represented by two bare setae; exopod ovoid, with three bipinnate setae and one bare outer seta.

P6 (Fig. 8C,D) asymmetrical, represented on both sides by well-developed plate. Outer distal corner bearing one strong bipinnate seta flanked by bare inner and bipinnate outer setae; small spinules at bases of elements.

Variability

Variability in male (Fig. 9B): enp-2 and enp-3 of P2 sometimes fused; armature formula:

	Coxa	Basis	Exopod	Endopod
P2 fused	0-0	1-I	I-1; I-1; III−I+1-2	0-1; I-2-2

Etymology: The species name is dedicated to my mother Gebkeline Bröhldick-Ley.

Discussion

Lang (1944) established Idyanthinae Lang, 1944 which was raised to family rank by Seifried (2003). Together with Zosimidae Seifried (2003) Idyanthidae belongs to Idyanthidimorpha Seifried (2003). *N. gebkelinae* belongs to Idyanthidimorpha as it shares all its autapomorphies: coxal setae of maxilliped inserting subapically at inner and outer border (Fig. 4C), outer spine of P1 enp-3 (fused with enp-2 in *N. gebkelinae*) displaced terminally, all exopodal spines of P1 elongated with very long spinules on one side (Fig. 4D), male enp-3 of P2 terminally with modified bare spine (I) fused at base (derived from displaced outer spine), one middle hyaline seta (2) and one inner terminal seta (Fig. 9A).

The groundpattern of Idyanthidae was reconstructed by Seifried (2003), who regards the following genera as constituting the taxon Idyanthidae: *Dactylopia* Becker, 1974 together with *Idyanthe* Sars, 1909, *Idyella* Sars, 1906, *Idyellopsis* Lang, 1944, *Styracothorax* Huys, 1993 and *Tachidiella* Sars, 1909.

The new species belongs to Idyanthidae because of the following apomorphies:

Characteristic shape of P1: enp-1 elongated and broadened at the level of inner seta.
P2 enp-3 of male without inner setae, inner setae present in female lacking.
Outer seta of exopod P5 inserting near the basis.

N. gebkelinae gen. et sp. nov. does not fit into any of the known taxa of Idyanthidae. The body shape of *Styracothorax* Huys, 1993 is so specific, that there is no

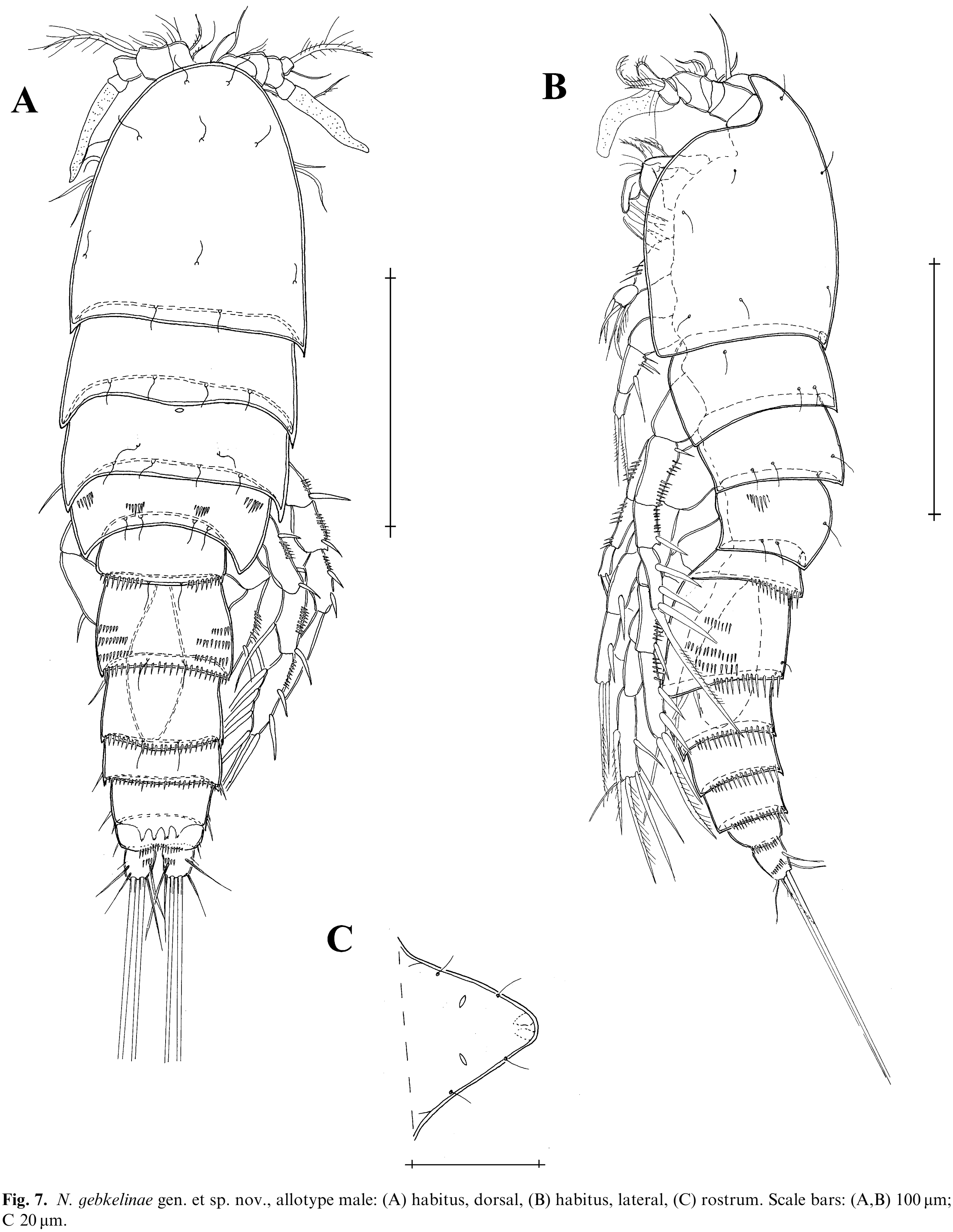

Fig. 7. *N. gebkelinae* gen. et sp. nov., allotype male: (A) habitus, dorsal, (B) habitus, lateral, (C) rostrum. Scale bars: (A,B) 100 μm; C 20 μm.

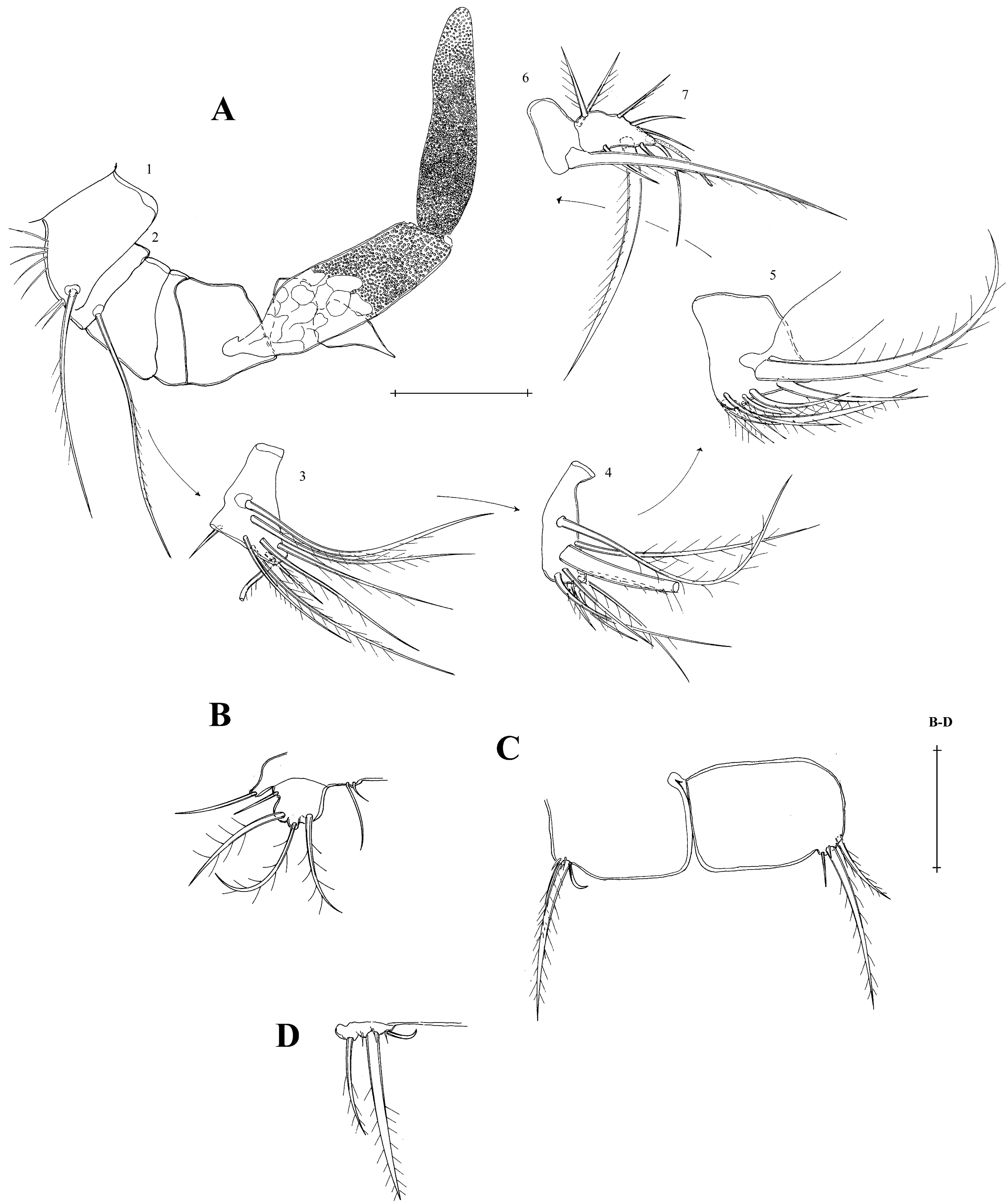

Fig. 8. *N. gebkelinae* gen. et sp. nov., allotype male: (A) A1, (B) P5, (C) P6, (D) P6, detail. Scale bars: 20 μm.

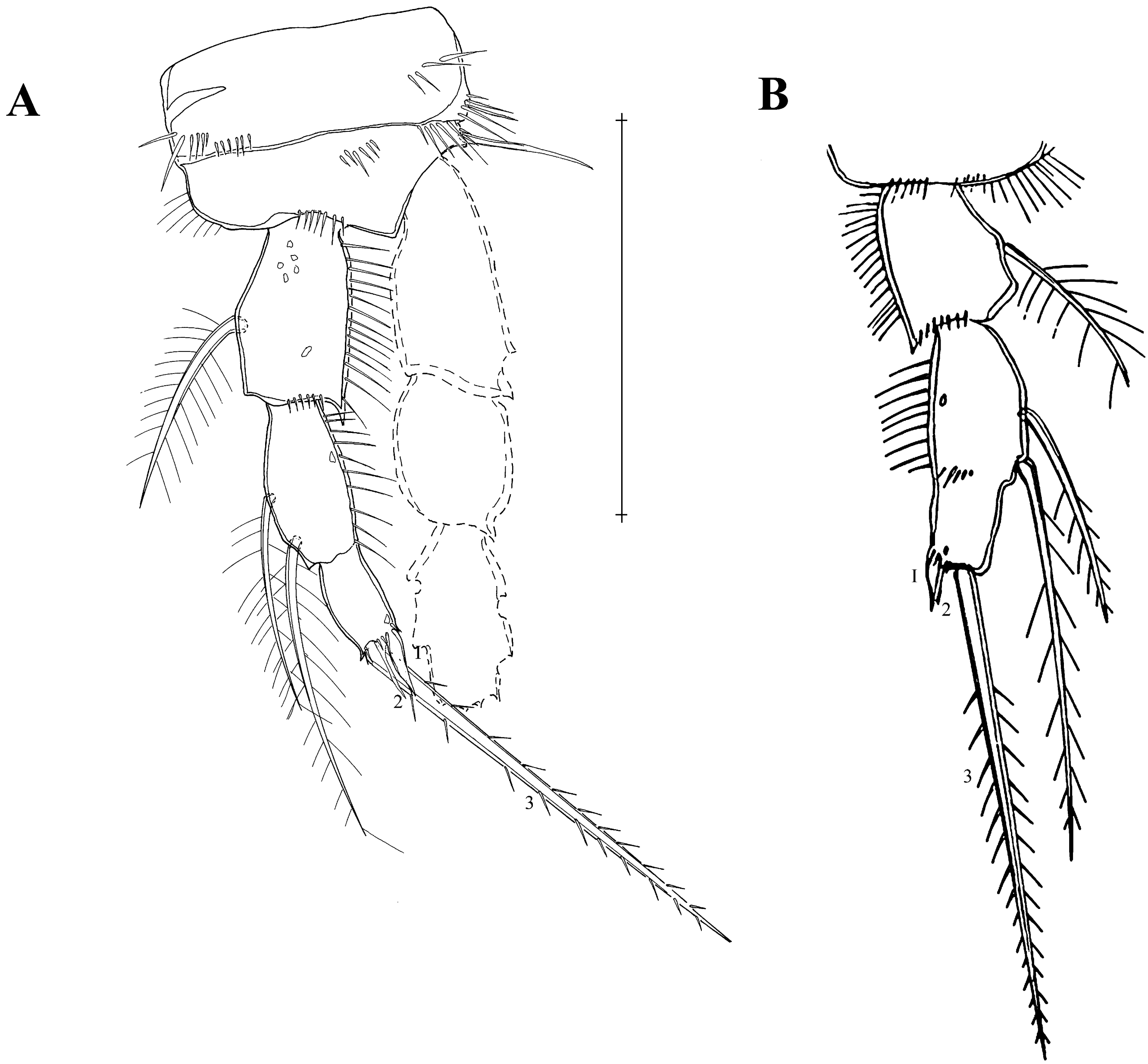

Fig. 9. *N. gebkelinae* gen. et sp. nov., male: (A) P2 from allotype, exopod as in female (Fig. 5A). (B) P2 from male with fused enp-2 and enp-3. Scale bar: 50 μm.

doubt that the new species is not a member of this taxon. Allocation of *Styracothorax* Huys, 1993 to Idyanthidae was confirmed by Moura and Martínez Arbizu (2003) because of the characteristic sexual dimorphism on endopod of the second leg of male. A conspicuous character of *Dactylopia* Becker, 1974 is the shield-like cephalothorax which is not shared by *N. gebkelinae* gen. et sp. nov. The wing-shaped epimeral plates of the genital double somites of *Idyanthe* Sars, 1909 and *Idyella* Sars, 1906 are not shared by the new species, either. *Idyellopsis* Lang, 1944 also has a broad genital double somite like that of *Idyanthe* and *Idyella*. In body shape the new species resembles *Tachidiella* Sars, 1909, but the endopod of P1 in *N. gebkelinae* gen. et sp. nov. is not 3-segmented. Apart from these differences there are others in mouthpart structure and in sexual dimorphism of P2 male which distinguish the new species from all known taxa.

The autapomorphies of *Nematovorax* gen. nov. are shared by *N. gebkelinae* gen. et sp. nov. and *Nematovorax* gen. nov. sp. 1 and 2.

The sexual dimorphism of males P2 enp-3 varies among genera. The plesiomorphic condition within Idyanthidae is as follows: no inner setae present, the transformed and fused outer spine (I) is displaced to outer terminal edge, and the middle seta (2) is hyaline

(Seifried 2003). As exactly these plesiomorphic conditions are shared by *N. gebkelinae* (Fig. 9A and B), it is clear that it occupies a very basal phylogenetic position within Idyanthidae. In fact, there are many other characters in which the new species corresponds with the groundpattern of Idyanthidae and what is more, there are even a few which require the groundpattern as reconstructed by Seifried (2003) to be corrected.

The fourth Oligoarthra segment of the female antennule has 5 setae and one aesthetasc instead of 4 setae and one aesthetasc.
Basis of maxillule bearing 4 +4 setae, not 3+4 setae.

Nematovorax species show many plesiomorphic character states within Idyanthidimorpha. This means that *N. gebkelinae* shares many characters with the hypothetical ancestor of all Idyanthidimorpha which makes it difficult to attribute it neither to Idyanthidae sensu Seifried (2003) or to Zosimidae.

Three phylogenetic interpretations are possible. First, *Nematovorax* is a member of Idyanthidae sensu Seifried (2003). This hypothesis is followed here. The autapomorphies shared by *Dactylopia* Becker, 1974, *Idyanthe* Sars, 1909, *Idyella* Sars, 1906, *Idyellopsis* Lang, 1944, *Styracothorax* Huys, 1993, *Tachidiella* Sars, 1909 and *Nematovorax* and the characters speaking against a membership of *Nematovorax* to Zosimidae are listed below. As a consequence, the diagnosis of Idyanthidae has to be slightly amplified, as is done here. This hypothesis includes the sister group relationship between Idyanthidae and Zosimidae. The second possible hypothesis maintains this sister group relationship but since *Nematovorax* species have many plesiomorphic characters they are regarded as the sister group of Idyanthidae–Zosimidae. In the DIVA 1 samples there are many undescribed species which show affinities either with Zosimidae or with Idyanthidae species but like *N. gebkelinae* lack certain autapomorphies of these taxa. Until these species are described and a phylogenetic analysis on species level is performed, it would be premature to erect a new family only for *N. gebkelinae*. The third possibility is to include *N. gebkelinae* into Zosimidae. This hypothesis seems less probable because *Nematovorax* does not share more apomorphies with Zosimidae than with Idyanthidae (see below). Compared with the species of Zosimidae sensu Seifried (2003), it also has many more plesiomorphic character states, so that the diagnosis of Zosimidae would have to be extremely extended should it also encompass *Nematovorax*.

Characters supporting the membership of *N. gebkelinae* to Zosimidae:

Two of three setae of the mandibular basis insert on a bulge. Yet, in Zosimidae all three setae are involved.
Endopod of mandible with one lateral seta like in many species of Exanechentera Lang, 1944.
Endopod of P1 2-segmented like in many species of Harpacticoida. However, the details differ between *N. gebkelinae* and species of Zosimidae (see below). In the DIVA 1 samples there also is an undescribed species related to *Nematovorax*, which has a 3-segmented endopod of P1. It can therefore not be ruled out that the fusion of enp-1 and enp-2 in *Nematovorax* and Zosimidae is a convergence.

Characters speaking against a membership of *N. gebkelinae* to Zosimidae (apomorphic character states of Zosimidae in brackets):

N. gebkelinae with a 9-segmented female antennule and the setal formula: 1, 11, 8, 5 + aes, 2, 2, 2, 6 + acr. (Zosimidae: 8-segmented with at most 1, 7, 9, 3 + aes, 1, 4, 4, 6 + acr.).
Antennal exopod with 2,1,4 setae (with 1,1,4 setae).
Antennal endopod with 7 terminal and 4 lateral setae and spines (with 6 terminal and 3 lateral setae and spines).
Endopodal seta 4 of antenna fully developed as geniculated seta (endopodal seta 4 of antenna developed as tiny not geniculated seta).
Antennal exopod with 2,1,4 setae (1,1,4 setae).
Distal border of endopod slightly bevelled (not bevelled).
Mandibular endopod with 4 apical setae (with 3 apical setae).
Mandibular exopod with 2 distal setae (with 1 distal seta).
Spines VII and VIII present on praecoxal arthrite; formula of armature: 2, VII, 1, 2, 0 (spines VII and VIII absent from praecoxal arthrite; formula of armature: 2, V, 1, 2, 0)
Maxillular exopod short (very short).
Praecoxal endite inserting in the middle of the syncoxa (inserting on the distal half of the syncoxa).
Maxilla with basal endite reaching beyond the end of the distal coxal endite (endite weakly developed and not reaching to the end of the distal coxal endite).
Maxillar endopod 3-segmented with 6 setae (maxillar endopod 1-segmented with 5 setae).
Syncoxa of maxilliped more than twice as long as wide (at most 1.5 times longer than wide).
Joint present between syncoxa and basis of maxilliped (without joint between syncoxa and basis).
Maxillipedal endopod not directed outwardly (directed outwardly).
Claw V of maxillipedal endopod transformed into spine V (without setal element V, therefore no claw present).

Fused enp-2 and enp-3 of P1 not much longer than wide (fused enp-2 and enp-3 of P1 forming a long and slender segment).
Endopod P1 with 2 distal setae, with armature formula: 0–1; I–2–1 (with 1 distal spine, with armature formula: 0-1; I–I-2).
Female P2 with endopodal armature formula: 0-1; 0-2; I-2-1 (with armature formula: 0-1; 0-1; I-2-1).
Outer basal extension of male and female P5 not long and cylindrical (long and cylindrical).
P6 of female with 3 setae (with 2 setae).
Male antennule with setal formula: 1, 1, 9, 9, 9 +aes/ 1, 8+acr. (1, 1, 9, 7, 2, 4 +aes/ 2, 4+acr.).
Male P2 with endopodal armature formula 0-1; 0-2; I-2-0 (with armature formula 0-1; 0-1; I-2-1).

Including *Nematovorax* into Zosimidae would require a profound change of its diagnosis and a recognition of the autapomorphies of the expanded Zosimidae in respect to all these characters. Considering all described species of Idyanthidimorpha the most parsimonious hypothesis is: *Nematovorax* is a member of Idyanthidae.

As shown in Table 1 two species are abundant at all stations sampled: *N. gebkelinae* gen. et sp. nov. and *Nematovorax* gen. nov. sp. 2. The other species are represented by only one or two individuals, a situation encountered in the deep sea also by Hessler and Jumars (1974), Coull et al. (1977) and Grassle and Maciolek (1992).

Most species and individuals were found at station 346, as is also the case for the mega- and macrofauna (Kröncke and Türkay, 2003). This may be explained by the higher content of organic carbon and chlorophyll *a* in the sediments at station 346 as measured by Kröncke and Türkay (2003), which could mean enhanced food availability at station 346. As also sediment heterogeneity is higher at station 346, this is favourable for the occurrence of nematodes (Tietjen 1989). As shown above, the new species *N. gebkelinae* gen. et sp. nov. is a predator of nematodes and its great abundance at station 346 is therefore no surprise. This kind of feeding behaviour is not new, it is known that *Phyllognathopus viguieri* (Maupas, 1892) is able to ingest nematodes (Lehman and Reid 1992) and carnivorous behaviour is also observed in species of Ectinosomatidae Sars, 1903 (Seifried and Dürbaum 2000).

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