

## A new genus and a new species of freshwater Canthocamptidae (Copepoda: Harpacticoida) from wet mosses of Canada

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### Abstract

A new genus and a new species of Canthocamptidae: *Maraenobiotus canadensis* and *Neomaraenobiotus laurentiacus* (Copepoda: Harpacticoida) are described and their taxonomic relationships are discussed. They have been collected from wet mosses in Northern Canada.

Wet mosses in both temperate and tropical regions are a special semiterrestrial habitat populated by numerous species of freshwater harpacticoids (Reid, 1986). Only few records about harpacticoids in this particular habitat are known in North America. Willey (1927) described *Moraria laurentiaca* as new species from wet mosses in Quebec and Chappuis (1927) found *Attheyella illinoisensis*, *Moraria laurentiaca*, *Moraria affinis* and *Bryocamptus newyorkensis* in wet mosses in New Jersey. Recently Reid (1988 a and b, 1990) recorded *Attheyella americana* from a seasonally flooded marsh in Maryland, *Attheyella spinipes* and *Attheyella illinoisensis* from a spring seepage in Fort Mahan Park, Washington, D.C. and *Canthocamptus illinoisensis* and *Bryocamptus zschokkei* from wetlands in parks in Columbia.

In 1974 Dr. Siegfried Husmann of the Limnologische Flußstation des Max-Planck-Institutes für Limnologie, Schlitz (F.R.G.) sampled wet mosses in Northern Canada in order to study the microfauna of this special freshwater habitat. The Copepoda Harpacticoida were sent to me for identification. The material includes five samples, containing the species *Attheyella illinoisensis* (For-

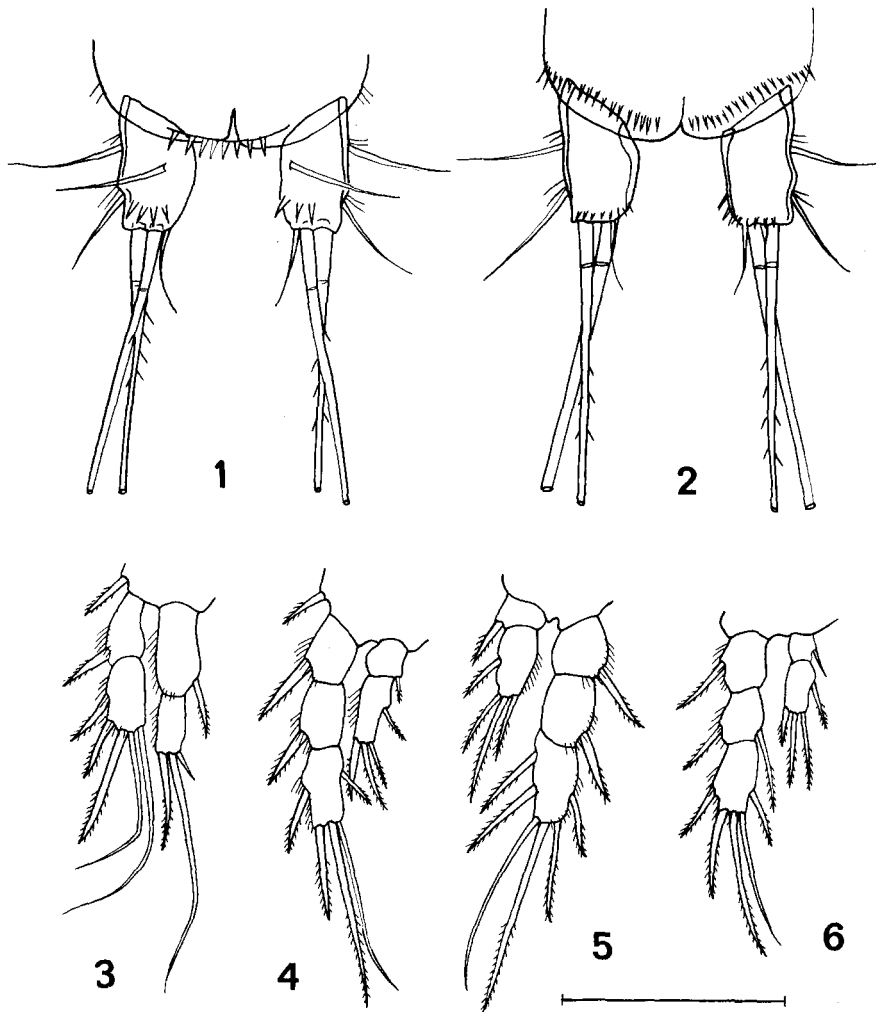
bes, 1876), *Moraria duthiei* (T. A. Scott, 1896), *Moraria laurentiaca* Willey, 1927 and additionally two species, which are new to science and will be described in this paper. The new species belong to the genus *Maraenobiotus* and to a genus here described as new – *Neomaraenobiotus* n. gen. The fact, that nearly half the taxa found are new to science confirm the assumption of Wilson (1956) that some species groups of harpacticoids have had a much greater surge of speciation on the North American continent than in Eurasia.

For microscopical examination, specimens were slowly evaporated to glycerine and examined in this medium. Drawings were made at 640× with the aid of a camera lucida; details were confirmed under oil immersion at 1440×.

*Maraenobiotus canadensis* n. sp.

### Material examined

1. Approximately 90 specimens from wet mosses, Shingle Point, Mackenzie Bay at western boundary of the Mackenzie delta, Yukon Territory, Canada, 68° 56' N, 137° 15' W; 1 Sep-



Figs 1–6. *Maraenobiotus canadensis* n. sp., female. 1. caudal rami, dorsal view. 2. caudal rami, ventral view. 3. Leg 1. 4. Leg 2. 5. Leg 3. 6. Leg 4. Scale = 50  $\mu$ m.

tember 1974; samples M/Ca/8 and M/Ca/10 (type series).

2. 16 specimens from wet mosses (*Sphagnum* sp.) near Campbell river, Inuvik, Northwest Territories, Canada; 1 September 1974; sample M/Ca/4. All samples were collected by S. Husmann.

**Holotype and allotype.** – A mature female and a mature male in alcohol, deposited in the Zoological Museum of Humboldt-University Berlin, F.R.G. (registration number 26 783a–b).

**Paratypes.** – Approximately 80 specimens in alcohol in the D. Flößner collection in Jena.

**Diagnosis**

**Female.** Caudal ramus rectangular, about 1.5 times longer than wide; dorsally with a subapical row of stout spines, ventrally with slender spinules; outer and middle caudal setae placed side by side; middle caudal seta 6–7 times longer than caudal ramus; inner caudal seta very slender. Legs 2–4 exp-3 with 5-6-5 spines and setae; exp-2 of legs 2–3 without inner seta. Leg 4, enp-

2 with 4 setae. Leg 5, baseoendopod with 4, exopod with 3 setae.

*Male.* Caudal ramus somewhat shorter than that of female; without spinules on dorsal and ventral sides. Leg 2, enp-2 with 3 setae. Leg 3, exp-2 without inner seta; inner setae of enp-3 slightly thickened and slightly curved.

*Etymology.* Named for the type locality in the Yukon Territory, Canada.

#### *Description*

*Female.* Length 0.35–0.40 mm. Body slender, vermiform. Urosomites unarmed dorsally; ventrally surface of third somite with discontinuous, of fourth somite with continuous row of spinules (median ones shorter). Anal operculum (Fig. 1) with 6–10 fine spinules.

Caudal ramus rectangular (Figs. 1–2), 1.5–1.7 times longer than wide; dorsally with a subapical row of 3–4 stout spines, ventrally with a row of slender spinules at the end of the ramus; middle caudal seta 6–7 times longer than caudal ramus, basally not enlarged, both placed side by side; inner caudal seta very slender, pilose, placed beside the middle seta.

Antennule 8-segmented, aesthetasc of segment 4 reaching to middle of apical segment. Exopod of antenna 1-segmented, with 4 setae. Mandibular palp 1-segmented, with 3 setae.

*Leg 1* (Fig. 3). Endopod somewhat longer than exopod; segment 1 a little stouter and about 1.5 times longer than segment 2; segment 2 of exopod with 3 spines.

*Legs 2 and 3* (Figs. 4–5). Exp-3 slightly longer than exp-2; outer spines equal to or somewhat longer than exp-3; inner margin with 1 seta in leg 2 and 2 setae in leg 3; endopod 2-segmented, reaching to end (leg 2) or to middle (leg 3) of exp-2; enp-1 with inner seta; enp-2 with 4 setae (one inner, 2 apical and one subapical, spinelike seta); outer margin with row of slender spinules.

*Leg 4* (Fig. 6). Segment 2 and 3 of exopod with inner seta; endopod 2-segmented, reaching to middle of exopod 2; basal segment with inner seta; apical segment with 4 setae (one inner, 2 apical and one subapical, spine-like seta).

*Leg 5* (Fig. 7). Exopod nearly circular, with 3 setae, the middle twice as long as the inner; baseoendopod short, not reaching middle of exopod, with 4 setae, the two median setae somewhat longer than the outermost and innermost.

*Male.* Length 0.31–0.39 mm. Urosomites unarmed dorsally, ventrally somites 2–4 with continuous row of spinules. Anal operculum with 6 spinules.

Caudal ramus (Figs. 8–9) somewhat shorter than that of female, about 1.4 times longer than wide; dorsally and ventrally without row of spinules, apical setae as in female.

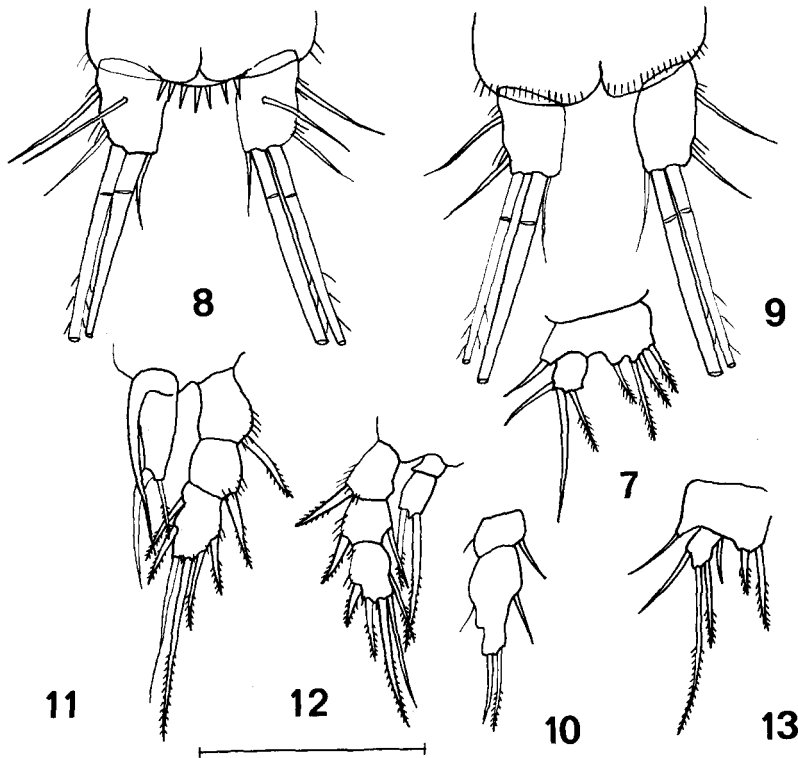
*Leg 1* as in female.

*Legs 2–3* (Figs. 10–11). Exopods as in female. Endopod of leg 2 2-segmented; basal segment with an inner seta; apical segment with 3 setae (one inner and 2 apical of equal length). Endopod of leg 3 reaching to end of segment 2 of exopod; 2-segmented, apophysis of basal segment stout basally, reaching to end of exopod; apical segment with short, unthickened outer seta and larger, spine-like, sharply pointed inner seta, slightly curved at base.

*Leg 4* (Fig. 12). Segments 2 and 3 of exopod with inner seta; endopod reaching nearly to middle of exp-2; exp-1 small, without seta; enp-2 with

Setation formula of legs 1–5.

	Exopod			Endopod	
	1	2	3	1	2
<i>Female</i>					
Leg 1	–	01	122	10	111
Leg 2	01	01	122	10	121
Leg 3	01	01	222	10	121
Leg 4	01	11	122	10	121
Leg 5		3			4
<i>Male</i>					
Leg 1	–	01	122	10	111
Leg 2	01	01	122	10	120
Leg 3	01	01	222	10	020
Leg 4	01	11	122	00	020
Leg 5		4			2



Figs 7-13. *Maraenobiotus canadensis* n. sp. 7. Leg 5 ♀. 8. caudal rami ♂, dorsal view. 9. caudal rami ♂, ventral view. 10. Leg 2 ♂, endopod. 11. Leg 3 ♂. 12. Leg 4 ♂. 13. Leg 5 ♂. Scale = 50 μm.

2 apical seta, the inner about twice as long as the outer.

*Leg 5* (Fig. 13). Exopod oblong, twice as long as wide, with 4 setae, the apical one the longest; baseoendopod reaching to middle of exopod, with 2 setae of unequal length.

#### *Species relationships*

The new species is closely related to *Maraenobiotus vej dovskiyi* Mrazek (Lang, 1948). It differs from this species in (1) the presence of only 4 setae on segment 2 of endopod of leg 3 of the female, (2) the 1-segmented exopod of the antenna, (3) the longer caudal ramus of the female whose middle apical seta is not swollen basally, (4) the inner seta of the apical segment of the endopod of leg 3 of male, which is only slightly thickened, and (5) the outer seta of the apical segment of the endopod of leg 4 of the male, which is not piliform.

#### *Neomaraenobiotus* n. gen.

##### *Diagnosis*

*Canthocamptidae*. Body small and slender. Caudal margin of somites smooth. Anal operculum rounded, with stout spinules. Caudal ramus rectangular, without sexual dimorphism. Antennule 8-segmented. Exopod of antenna 1-segmented, with 4 setae. Mandibular palp reduced, 1-segmented. Exopod of legs 1-4 3-segmented, segments 1 and 2 with outer spine, but without inner seta; apical segment with 2 outer spines, two apical setae on legs 2 and 4 and two inner setae on leg 3. Endopod of legs 1-4 2-segmented, with reduced setation. Endopod of male legs 2 and 3 with sexual dimorphism; endopod of leg 3 2-segmented, segment 2 with apophysis. Both segments of leg 5 separated; baseoendopod little projected, in female with 3, in male with 2 setae; exopod less than twice as long as wide, in female with 3, in male with 2 setae.

*Type species*

*Neomaraenobiotus laurentiacus* sp. nov., as described in the present paper.

*Type locality*

Shingle Point, Mackenzie Bay at western boundary of the Mackenzie delta, Yukon Territory, Canada at approximately 68° 56' N, 137° 15' W.

*Relationships*

This genus resemble *Maraenobiotus* Mrazek, 1893 in the structure of the anal operculum and caudal ramus and in the segmentation of legs 2–4, especially in the male endopod of leg 3. It differs from this genus in the 3-segmented exopod of leg 1, the presence of only 2 spines on the distal segment of the exopod of leg 1 and in the reduced number of setae of the endopod of legs 2–4 in the female.

*Neomaraenobiotus laurentiacus* n. gen. n. sp.

*Material examined*

- 17 specimens from wet mosses, Shingle Point, Mackenzie Bay, Yukon Territory, Canada. 1 September 1974, sample M/Ca/8 (type series).
- 25 specimens from wet mosses of the Campbell River near Inuvik, Northwest Territories, Canada; 1 September 1974, sample M/Ca/4. All samples were collected by S. Husmann.

*Holotype and allotype.* – A mature female and a mature male in alcohol, deposited in the Zoological Museum of Humboldt-University Berlin, F.R.G. (registration number 26 786a–b).

*Paratypes.* – One female and three males mounted on slides in glycerin jelly, 10 specimens in alcohol in the D. Flößner collection in Jena.

*Diagnosis*

*Female.* Anal operculum with few stout spinules. Caudal ramus elongated, about 1.5 times longer than wide, all apical setae lying side by side. Leg 1, exopod 3-segmented, exp-3 with 2 spines only. Legs 2–4, exp-3 with 5-6-5 spines and setae. Leg 4, exp-2 without seta. Legs 2–4, enp-1 without seta. Enp-2 of leg 2 with 2 setae, of leg 4 with

3 setae. Leg 5 with 3 setae on exopod and baseoendopod.

*Male.* Anal operculum as in female. Caudal ramus somewhat shorter than in female. Leg 2, enp-1 without setae, enp-2 with 3 setae. Leg 3, of enp-2 inner seta spiniform, very stout.

*Etymology.* From *Laurentia*, the Proterozoic Canadian Shield, referring to the type locality.

*Description*

*Female.* Length 0.32–0.38 mm. Urosomites unarmed dorsally, third and fourth somites with a continuous row of spinules ventrally. Anal operculum (Fig. 14) with 3–6 short, thick spinules.

Caudal ramus (Figs. 14–15) oblong, about 1.5 times longer than wide, shorter than last urosomal somite; with a weak continuous thickening on proximal part of the dorsal side; ventrally 2–4 slender spines near the end of the ramus; all apical setae placed terminally side by side; outer apical seta nearly 5 times as long as caudal ramus, inner seta distinct, not enlarges basally.

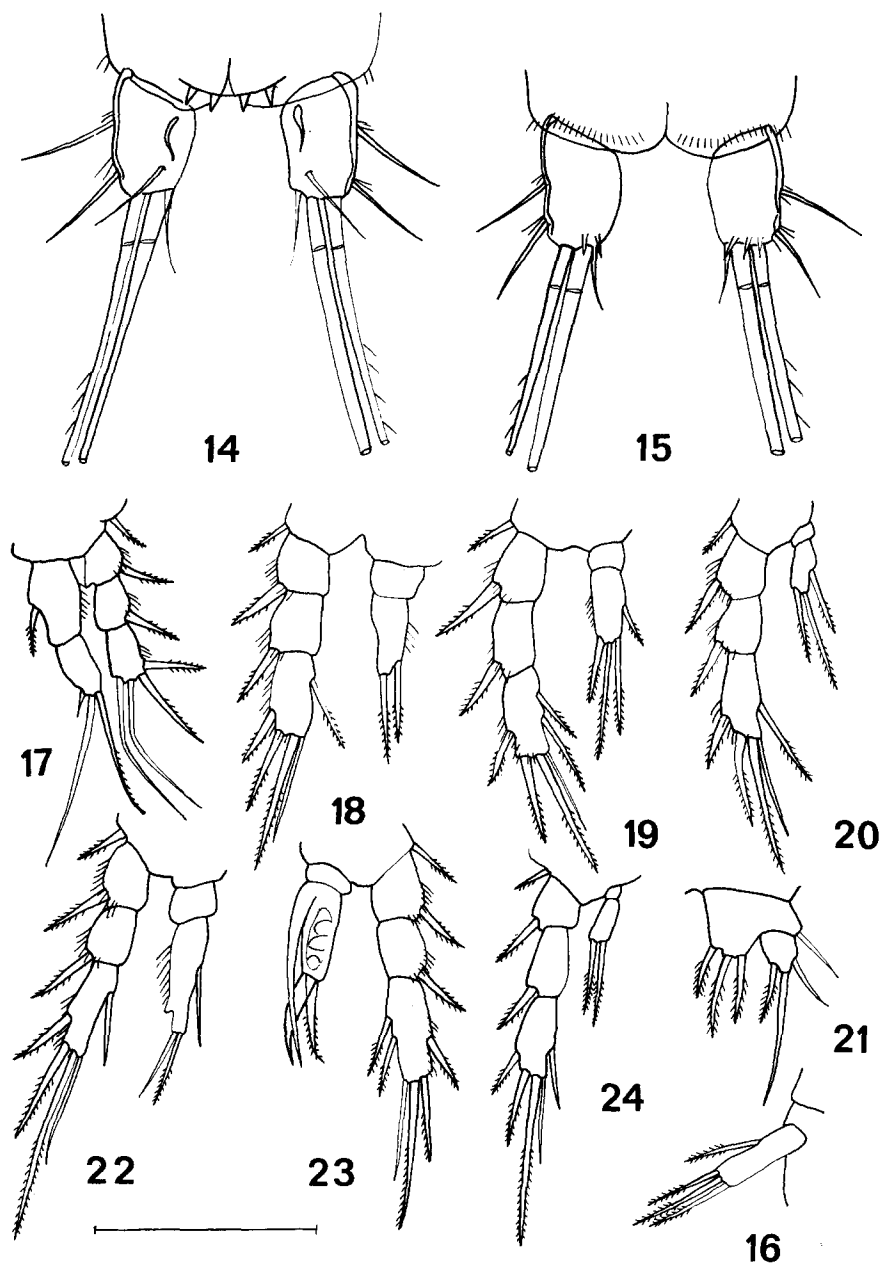
Antennule 8-segmented, aesthetasc of segment 4 reaching to the end of apical segment. Exopod of antenna (Fig. 16) 1-segmented, with 1 lateral and 3 apical setae.

*Leg 1* (Fig. 17). Exopod 3-segmented; exp-3 with 2 spines and 2 setae; endopod of same length as exopod; outer apical seta spine-like, middle seta slender and longer than endopod, inner seta very short and slender.

*Leg 2 and 3* (Figs. 18–19). Exp-3 somewhat longer than segment 2; outer spines a little shorter or equal to segment 3; inner margin with 1 spine in leg 2, with 2 spines in leg 3; endopod 2-segmented, reaching to end of segment 2 of exopod; basal segment without inner seta; apical segment with 2 apical setae in leg 2, with 4 setae (one inner, 2 apical, one subapical spiniform setae) in leg 3.

*Leg 4* (Fig. 20). Inner margin of exp-2 without, that of exp-3 with seta; endopod 2-segmented, short, reaching to the end of exopod 1; basal segment without inner seta; apical segment with 3 setae.

*Leg 5* (Fig. 21). Exopod ovate, about 1.3 times



Figs 14–24. *Neomaraenobiotus laurentiacus* n. gen. n. sp. 14. caudal rami ♀, dorsal view. 15. caudal rami, ♀, ventral view. 16. Exopodite of antenna, ♀. 17. Leg 1 ♀. 18. Leg 2 ♀. 19. Leg 3 ♀. 20. Leg 4 ♀. 21. Leg 5 ♀. 22. Leg 2 ♂. 23. Leg 3 ♂. 24. Leg 4 ♂. Scale = 50  $\mu$ m.

longer than wide, with 3 setae, the middle seta twice as long as the inner one; baseoendopod rather large, reaching to middle of exopod, with 3 setae of which the middle seta is the longest.

*Male.* – Length 0.31–0.37 mm. Urosomal spinulation as in female, but second somite also with a continuous row of spinules ventrally. Anal operculum with 3–5 denticles (Fig. 25). Caudal ramus (Figs. 25–26) 1.3 times longer than wide, slightly narrower distally, otherwise as in female.

Setation formula of legs 1–5.

	Exopod			Endopod	
	1	2	3	1	2
Female					
Leg 1	01	01	121	10	111
Leg 2	01	01	122	00	011
Leg 3	01	01	222	00	121
Leg 4	01	01	122	00	120
Leg 5		3			3
Male					
Leg 1	01	01	121	10	111
Leg 2	01	01	122	00	120
Leg 3	01	01	222	10	020
Leg 4	01	01	122	00	020
Leg 5		4			2

Antennule (Fig. 27), fifth segment with aesthetasc, reaching to middle of apical segment.

*Leg 1* as in female.

*Legs 2–3* (Figs. 22–23). Exopods as in female. Endopod of leg 2 reaching to middle of exp-3; enp-1 without seta; enp-2 with 3 setae (one inner, 2 apical setae of equal length). Endopod of leg 3 reaching to end of exp-2, 2-segmented; basal segment without inner seta; apophysis of segment 2 very stout, with blunt tip, reaching to middle of exp-3; setae stout, of equal length, the inner one very thick, spiniform.

*Leg 4* (Fig. 24). Exp-2 without inner seta, endopod projecting somewhat beyond exp-1; basal segment very small, without seta; apical segment with 2 setae of equal length.

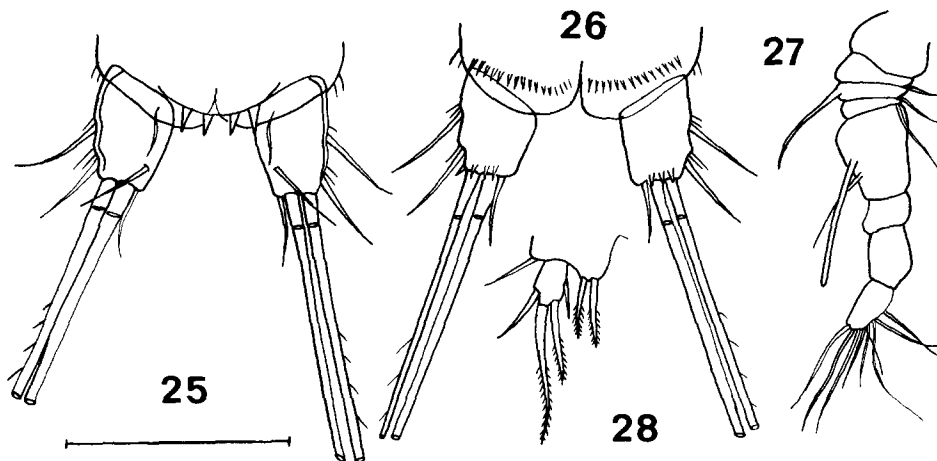
*Leg 5* (Fig. 28). Exopod oblong, nearly twice as long as wide; with 4 setae, the apical one stout at its base; baseoendopod reaching to middle of exopod, with 2 setae of equal length.

#### Species relationships

*Neomaraenobiotus laurentiacus* is the only known species of the genus, and nothing can be said about its taxonomic relationships to other species within the family Canthocamptidae beyond what was said about the genus. Noteworthy, however, is the great similarity to *Maraenobiotus vej dovskyi* Mrazek, 1893 (Lang, 1948) in the structure of the endopod of leg 3 of the male.

#### Acknowledgements

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Figs 25–28. *Neomaraenobiotus laurentiacus* n. gen. n. sp., male. 25. caudal rami, dorsal view. 26. caudal rami, ventral view. 27. Antennula. 28. Leg 5. Scale = 50  $\mu$ m.

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