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Research Article

Maraenobiotus skombrosus sp. n. (Copepoda: Harpacticoida: Canthocamptidae) from Groundwaters in Vitosha Mountain, Bulgaria

***Apostol Apostolov*[1] *& Ivan Pandourski*[2]**

[1]1 Knyaz Alexander Batenberg Street, Bx. A, 8000 Burgas, Bulgaria; E-mail: apostolov2003@abv.bg; https://orcid.org/0000-0001-8712-9066
[2]Institute of Biodiversity and Ecosystem Research, Bulgarian Academy of Sciences, 1 Tsar Osvoboditel Blvd, 1000 Sofia, Bulgaria; E-mail: pandourski12@gmail.com

Abstract: A new harpacticoid species, *Maraenobiotus skombrosus* sp. n., is described based on specimens collected from groundwaters in the area of Dragalevtsi District, Vitosha Mountain, Bulgaria. According to the morphological characteristics, the specimens belong to the *vejdovskyi*-species group: mandibular palp one-segmented; distal segments of exopod P_2 and P_3 with five and six setae; distal segment of endopod P_4 with four setae; baseoendopod P_5 with four setae. Following these morphological characteristics, the specimens from Vitosha Mountain have been misidentified as the Palaearctic polymorphic and widely distributed *M. vejdovskyi* Mrázek, 1893 (s. l.). In this study, we describe the specimens from Vitosha Mountain as *M. skombrosus* sp. n. based on several features, among which are the morphology and size of the caudal rami, the presence of three lateral setae, the ornamentation of the anal operculum with six spinules as well as the ornamentation of the prosome and urosome.

Key words: Harpacticoida, groundwater, taxonomy, new species, Bulgaria.

Introduction

The genus *Maraenobiotus* Mrázek, 1893 includes 43 accepted species and subspecies, which are distributed in the Northern and Southern Hemispheres (Apostolov 2001, Gurney 1932, Borutzky 1964, Flössner 1988, 1992, Fefilova 2010, Novikov & Sharafutdinova 2020). Members of this genus are cosmopolitan; they occur in various habitats in low-temperature waters such as tundra water bodies (Borutzky 1952), moist mosses and hypogean environments throughout different zoogeographic regions. As noted by Löffler (1968), representatives of the genus are absent from habitats in tropical areas with high temperatures but there they occur in flowing water bodies up to 2000 m a. s. l. and up to 3000 m a. s. l. in lentic water bodies.

Seven harpacticoid copepods of the genus *Maraenobiotus* are reported from Bulgaria. These are *M. brucei caucasicus* Borutzky, 1934 (Western Rhodope Mountains), *M. insignipes insignipes* (Lilljeborg, 1902) (Pirin Mountains), *M. aischghoi* (Schiklejev, 1931) (Pirin and Rila Mountains), *M. bulbiseta* Bassamakov & Apostolov, 1989 (Yagodinska Peshtera Cave in the Western Rhodopes and in Stara Planina Mountains), *M. parainsignipes* Apostolov, 1991 (Ponor Mountains), *M. rhodopensis* Apostolov, 2020 (Western Rhodope Mountains) and *M. rilaensis* Apostolov, 2020 (Rila Mountains).

Based on the tabular key by Lang (1948), the species from Vitosha Mountain is to be designated as *M. vejdovskyi* Mrázek, 1893. However, according to the tabular key by Novikov & Sharafutdinova (2020), it belongs to *M. zschokkei* Kreis, 1920. From

a taxonomic point of view, the identification of many species of the genus *Maraenobiotus* is problematic due to the short and incomplete descriptions, the absence of details of taxonomic significance as well as the presence of intrapopulation variability, which has been insufficiently studied and, thus, posing serious obstacles to modern taxonomy. Brancelj & Karanovic (2015), when describing a new troglobiont from Slovenia (*Maraenobiotus slovenicus*), found a low level of intraspecific variability, which gives reason to conclude that the interpopulation variants described so far are rather associated with several large polymorphic species that are likely to turn out to be differing closely related species.

Considering the shortcomings in the morphological examination of the specimens identified as *M. vejdovskyi* from Vitosha Mountains, it was necessary to revise the initial data with the aim of more precise identification. To distinguish between these two species, it was essential that all morphological details were taken into consideration when describing new taxa. As the morphological characters of the specimens identified as *M. vejdovskyi* from Vitosha Mountain (Apostolov 2010) differed from the descriptions of the type specimens of *M. vejdovskyi*, the aim of this paper was to revise its taxonomic status by comparison with its closest congeners from the *vejdovskyi*-complex.

Materials and Methods

The specimens examined (two ♀♀) of *Maraenobiotus skombrosus* sp. n. were collected from saturated proluvium in Ilina Tsarkva (Church) locality (N 42^0 37' and E 23^0 19', 23.04.1989) at the foot of northern slope of Vitosha Mountain, Sofia, Dragalevtsi District. The material was collected after filtering of 10 litres of groundwater through a hand-held net with a mesh size of 0.110 mm. The groundwater was extracted from a depth of 0.5 m from sediments using the Bou-Rouch pump (Bou 1974).

In the collected sample, the presence of associated fauna was recorded: Nematoda, Oligochaeta, Halacaridae: *Soldanellonyx visurgis* Viets, 1959, Cladoceara: *Bosmina coregoni* gr., Cyclopoida: *Paracyclops fimbriatus* (Fischer, 1853)*, Eucyclops serrulatus* (Fischer, 1851), *Megacyclops viridis* (Jurine, 1820)*, Diacyclops bisetosus* (Rehberg, 1880)*, Diacyclops languidoides* (Lilljeborg, 1901) (s. lat.) – juveniles, *Graeteriella unisetigera* (Graeter, 1908)*,* Harpacticoida: *Canthocamptus staphylinus staphylinus* (Jurine, 1820)*, Epactophanes richardi richardi* Mrázek, 1893*, Elaphoidella elaphoides elaphoides* (Chappuis, 1924) and *Bryocamptus* (*Br.*) *minutus minutus* (Claus, 1863). The samples were sorted in the laboratory and specimens were preserved in 70% alcohol.

An ocular micrometre was used to take measurements. Body length was measured before dissection from the anterior tip of the rostrum to the posterior margin of the caudal rami (without the apical setae). The dissection of the body was performed in glycerol at a magnification of 100× and examination of all parts of the body and their ornamentation at a magnification of 1000×. Permanent preparations contain all dissected body parts in a drop of glycerol on a microscope slide, covered by a cover glass coverslip and sealed with nail polish. Detailed drawings were made for all parts of the body using a drawing apparatus at a magnification of 1000×. Before dissection, the holotype of *M. skombrosus* sp. n. was drawn from the dorsal side and detailed dorsal and ventral drawings of the abdomen were made. The materials used in the description of the new species are stored in the scientific collection of the first author.

The descriptive terminology follows Huys & Boxshall (1991). The terminology of Karanovic (2019, 2020) has been adopted for the abbreviated names of some appendages: A1 – antennula, A2 – antenna, Md – mandibula, Mxl – maxillula, Mx – maxilla. Abbreviations used in the text and figure legends follow the conventional ones frequently used in the taxonomy of copepods: ac – acrothek (composed of one aesthetasc and two setae fused basally); ae – aesthetasc, apo – apophysis; mxp – maxilliped; benp – baseoendopod; enp –endopod; exp – exopod; exp (enp) 1, 2, 3 – first, second, third exopodal (endopodal) segment; P_1–P_6 first to sixth legs.

Results

Order Harpacticoida Sars G. O., 1903
Family Canthocamptidae Brady, 1880
Genus *Maraenobiotus* Mrázek, 1893

***Maraenobiotus skombrosus* sp. n.** (Figs. 1–6)

Syn. *Maraenobiotus vejdovskyi vejdovskyi* Mrázek, 1893 sensu Apostolov (2010): 180, figs. 58-59.

Type locality: Groundwater in the proluvium cone of the Vitosha Mountain, Ilina Church area, borehole depth 0.50 m; 23.04.1989 (leg. I. Pandourski).

Material examined: Holotype: one ♀ (dissected). Paratype: one ♀.

Etymology. The specific name derives from the ancient Greek name "σκόμπρος", which means "sharpness" and refers to the steepness of Vitosha Mountain.

Description

Female. Habitus: Total body length, measured from anterior tip of rostrum to posterior margin of caudal rami (excluding caudal setae), 0.70 mm.

Body (Fig. 1A): colourless, cylindrical, without clear demarcation between prosome and urosome. Cuticle thin. Integument of all somites generally smooth, without cuticular formations. Nauplius eye absent. Body length/width ratio about 4.6; prosome/urosome ratio 1.1. Body composed of prosome and urosome.

Prosome (Fig. 1A) four-segmented, comprising cephalothorax (cephalosome completely fused with first pedigerous somite) and three free pedigerous somites, bearing P_2–P_4. Cephalothorax (Fig. 1A, B): dorsally and laterally with sensilla; 21% of total body length, about 1.25 times as long as wide, widest at posterior end in dorsal view, tapering towards anterior end in dorsal and lateral views. Rostrum small, fused to cephalothorax, does not reach the middle of the first member of the antennula.

Second pedigerous somite (first free prosomite) (Fig. 1A) slightly narrower than posterior half of cephalothorax in dorsal view; with only six sensilla dorsally and one pore. Third pedigerous somite (second free prosomite) (Fig. 1A) has the same dimensions and number of sensilla as the preceding somite. Fourth pedigerous somite (third free prosomite) (Fig. 1A) with only five sensilla, and one pore. Posterior margins of all pedigerous somites dorsally smooth.

Urosome (Figs. 1A, 2A-B) five-segmented, comprising five pedigerous somites: first urosomite, Genital double-somite, two free urosomites and one anal somite bearing furcal branches. First urosomite (fifth pedigerous somite) slightly narrower than preceding prosomite and bearing P_5; dorsal and lateral surface seemingly smooth, with four sensilla dorsally. Genital double-somite, formed by the complete fusion of the genital and the third urosomite dorsally and ventrally. Proximal part (genital somite) with dorsal and lateral surface without ornamentation, dorsal with two sensilla and one pore. P_6 represented by a small plate located in proximal half of genital somite (second urosomite) ventrally; each rudimentary leg armed with one long seta. Distal part (third urosomite) as wide as proximal part without ornamentation dorsally and ventrally, with four sensilla dorsally in distal part, with row of spinules at distal corners. Fourth urosomite (Fig. 2A, B) largely as distal half of double genital somite dorsally; laterally with several spinules and four sensilla dorsally, as well as more spinules laterally on ventral side. Fifth (preanal) urosomite (Figs. 1A, 2A, B) slightly narrower than fourth urosomite, without sensilla, with spines in the lateral part dorsally and ventrally. Sixth urosomite (anal somite; Fig. 2A, B) with spinular rows laterally and ventrally close to joint with caudal rami, with pair of sensilla dorsally. Anal operculum short, narrow and convex, about 22% of

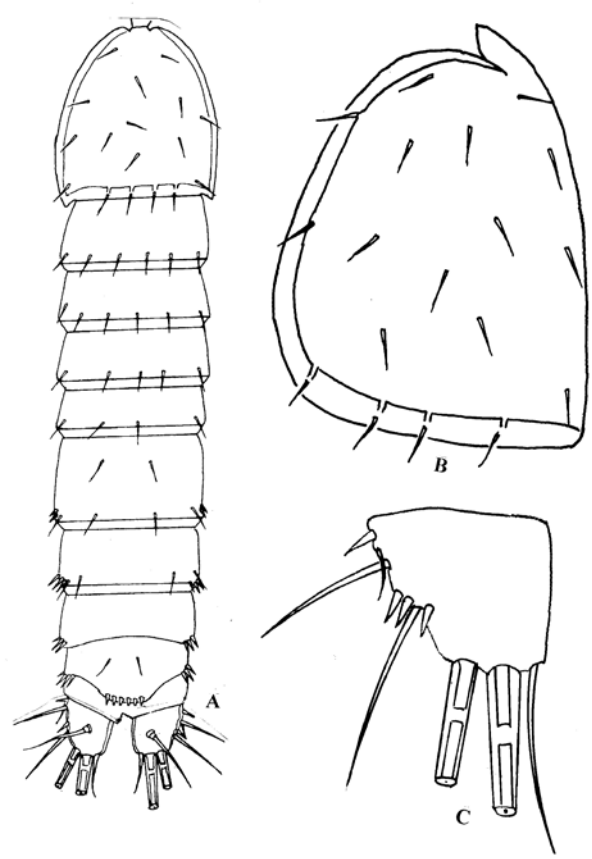

Fig. 1. *Maraenobiotus skombrosus* sp. n. ♀. A, Habitus; B, Cephalothorax, C, Caudal rami, ventral view.

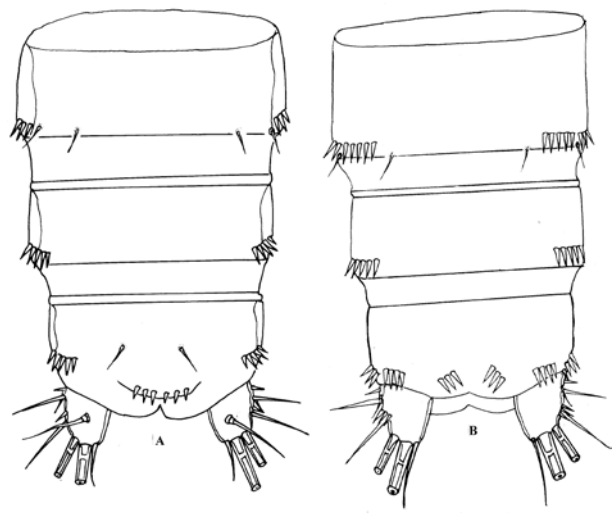

Fig. 2. *Maraenobiotus skombrosus* sp. n. ♀. A, Urosome, dorsal view; B, Urosome, ventral view.

somite's width, not reaching posterior end of anal somite, with six spinules along distal margin.

Caudal rami (Figs. 1C, 2A, B) almost square, shorter than anal somite with space between rami, about twice the ramus width; dorsal and ventral surface smooth, armed with seven elements (three lateral, three terminal, one dorsal), of which lateral proximal setae inserted very close to each other in first third; anterolateral accessory seta I small, short and smooth, (hardly visible) located below anterolateral seta II and with one spinule at base of setae I and III; anterolateral seta II well developed, long, smooth, inserted at proximal part of caudal ramus length; posterolateral seta III below midway of outer margin of ramus, about 1.2 times as long as seta II; apical setae IV and V well developed, not inflated proximally to breaking plane; outer apical seta IV much shorter than median apical seta V, strong, without breaking plane, about three times as long as caudal ramus, not inflated proximal to breaking plane; inner apical seta V strongest, without breaking plane, longest; inner accessory seta VI thin, smooth, about as long as caudal ramus; dorsal seta VII thin, smooth, articulated, situated dorsally midway length of ramus nearer to inner edge, longer than caudal ramus.

Antennula (Fig. 3A) eight-segmented, not reaching posterior extremity of cephalothorax, surface of segments smooth, segments 1-4 stout, segment 8 elongated. Segment 1 unornamented, with one seta at distal corner. Segment 4 bears one seta, aesthetasc fused basally to a seta, reaching end of segment 8; aesthetasc of segment 8 shorter than first, with acrothek consisting of slender aesthetasc and one seta, fused basally. Armature of antennulary segments: 1. 5. 4. 2 + aesthetasc. 1. 2. 2. 3 + 2 and acrothek; all setae naked. Length ratio of antennular segments from proximal to distal end: 1. 1.3. 2. 2. 2. 2. 2.5. 1.3.

Antenna (Fig. 3B) with small coxa unarmed and unornamented. Allobasis about three times as long as coxa; two times as long as wide and with one abexopodal seta; with a row of spinules near coxa and at base of abexopodal seta on abexopodal margin. Free endopodal segment almost equal to allobasis; one-segmented, 2.4 times as long as wide, proximal part narrower than distal part, inner margin with two rows spinules followed by two spines unipinnate, with six distal elements (two strong and unipinnate distal spines, two geniculate setae, one thin and short smooth seta at base of inner apical seta), with few spines in middle of outer edge and subdistally. Exopod two-segmented, with base narrower than distal part, 3.3 times as long as wide: first segment with unipinnate seta, second segment with three naked setae.

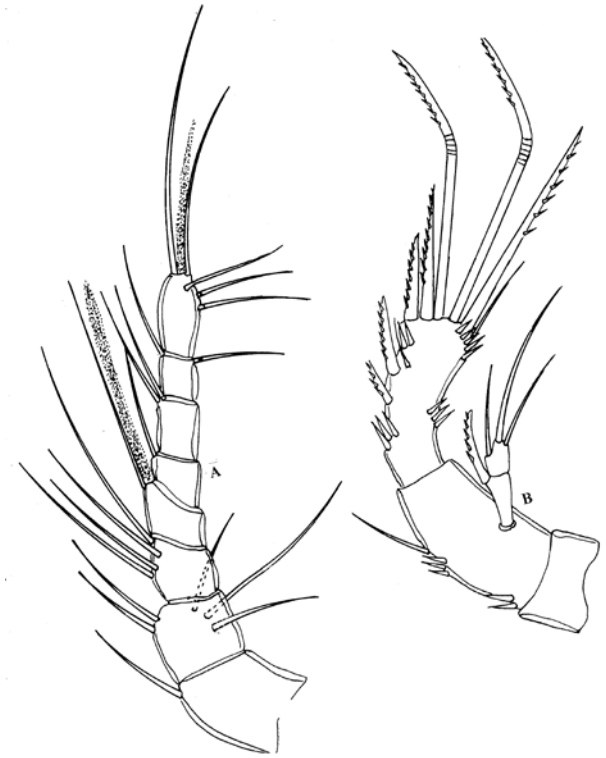

Fig. 3. *Maraenobiotus skombrosus* sp. n. ♀. A, Antennula; B, Antenna.

Mandibula (Fig. 4A) coxa elongated, robust, with well-developed coxal gnathobase bearing two bicuspidate teeth, several smaller multicuspidate teeth and one pinnate dorsal seta. Mandibular palp one-segmented, short, fused with coxa, with three setae, of different length.

Maxillula (Fig. 4B) three-segmented, composed of praecoxa, coxa and basal complex with endopod and exopod completely fused to basis. Praecoxal arthrite with six apical spines and one unipinnate seta. Coxa with single short cylindrical endite three times as long as wide and reaching the middle of the praecoxal arthrite, armed with one thin and bare seta, and one strong unipinnate seta. Basis longer than coxal endite and twice as long as wide; wider at base and tapering towards distal end; armed with one strong beak-like outgrowth with one row of small spinules, two thin and bare apical setae and two lateral elements. Exopod and endopod completely fused to basis, each bearing one setal elements.

Maxilla (Fig.4C) two-segmented; composed of syncoxa, allobasis and one-segmented endopod. Syncoxa large, with two rows of large spinules along inner margin and some spinules along outer margin, with two elongated endites, outer endite with two and inner endite with three setae. Basis drawn out into strong unipinnate claw, flanked by

Fig. 4. *Maraenobiotus skombrosus* sp. n. ♀. A, Mandibula; B, Maxillula; C, Maxilla; D, Maxilliped.

one anterior and one posterior setae. Endopod small, one-segmented, with one setae.

Maxilliped (Fig. 4D) subchelate, comprising syncoxa, basis and one-segmented endopod. Syncoxa ornamented with one unipinnate seta on distal inner corner and a few spines on outer margin. Basis elongated, 1.8 times as long as wide, slightly swollen in central part, with longitudinal row of spinules along inner margin and three rows of spinules on outer margin. Endopod short, fused completely with apical claw-like spine, armed with one short, slender and naked anterior seta at base of apical spine; apical claw-like spine slightly curved and does not reach end of base, armed with several spinules in distal half.

First swimming leg (Fig. 5A) with two-segmented exopod and endopod of equal length. Intercoxal plate unarmed. Coxa 2.16 times as wide as long, with anterior surface with row of five spinules near outer margin and one row of spinules in the middle of border with basis. Basis armed with one outer and one inner spine, furnished with spi-

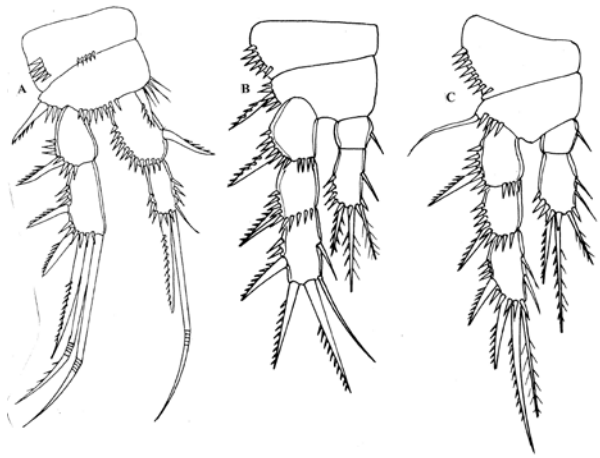

Fig. 5. *Maraenobiotus skombrosus* sp. n. ♀. A, First swimming leg; B, Second swimming leg; C, Third swimming leg.

nules on inner and outer margins, as well as one row of spinules between exopod and endopod. Exopod two-segmented; exp-1 1.75 times as long as wide, with outer strong and unipinnate spine and with one row of large spinules along outer margin; exp-2 elongated, twice as long as wide, with three outers strong unipinnate spines of different lengths and two long geniculate apical setae. Endopod two-segmented, enp-1 elongate, 1.6 times as longer as wide, not reaching middle of exp-2, with one row of spinules on outer margin and at base of enp-2, with one inner seta; enp-2 shorter than first article, twice as long as wide with one strong unipinnate outer spine, one long geniculate seta and one small, naked inner seta, inner and outer margin with a row of spinules.

Second swimming leg (Fig. 5B) with coxa about twice as broad as length with one row of spinules to outer distal corner anteriorly. Basis ornamented with row spinules at base of outer margin. Coxa and basis together forming 25% length of P_2. Exopod three-segmented; first and second segments with one outer unipennate spine, without inner armature and row of spinules as figured; third segment slightly elongated with two outer unipennate spines, two apical elements and one inner short and smooth seta. Endopod two-segmented; first endopodal segment 1.5 times as wider as long, not reaching the end of exp-1, with one short, thin, bare seta on inner margin; second segment elongate, 2.5 times as long as wide, with one row of spinules on outer margin and at base of apical setae with one inner, two apical and one outer spine. Exopod 68% of entire length of swimming leg; endopod 53% exopod's length.

Third swimming leg (Fig. 5C) with coxa and basis ornamented as in P_2. Basis with straight inner

margin, with slender, long and bare outer seta, no inner spine on basis. Coxa and basis together forming 41% of length of this swimming leg. Exopod three-segmented, outer margin of first and second segments with spinules and one unipinnate spine; inner margin without seta; exp-3 elongated, twice as long as wide, with several spinules on outer margin and at the base of apical setae, with two outer spines, two apical elements and two thin, short and naked inner setae. Exopod 62% of the entire length of swimming leg. Endopod two-segmented, shorter than exopod, not reaching end of exp-2; enp-1 as in P_2; enp-2 elongated, 1.6 times as long as wide, with one row of spinules on outer margin, with two inner, two apical and one outer spine. Length of shorter two-segmented endopod 46% the length of exopod.

Fourth swimming leg (Fig. 6A) with coxa and basis as in P_3. Coxa and basis together are 37% the length of this swimming leg. Exopod three-segmented, exp-1 elongated, 1.5 times as long as wide, with one outer unipinnate spine, three spinules on outer margin and four spinules at base, without inner armature; exp-2 shorter than exp-1, with one outer unipinnate spine, four basal spinules and one inner seta; exp-3 twice as long as wide, with two spinules on outer margin, four spines at base of apical setae, two apical elements and one inner seta. Two-segmented endopod not reaching the middle of exp-3; first segment unornamented, with one inner seta; enp-2 elongated, 1.6 times as long as wide, unornamented, with one inner, two apical and one outer spine. Exopod 66% of entire length of swimming leg; length of endopod 37% the length of exopod.

For armature of female P_1–P_5, see Table 1.

Fifth leg (Fig. 6B): exopod and baseoendopod distinctly separated. Baseoendopodal lobe well developed, does not reach middle of exopod, with four strong pinnate spines of unequal length; third seta (from the inner to the outer side) is the longest. Exopodal lobe as long as wide, outer margin with one naked seta, apical margin with one long naked seta, innermost seta shortest, with spinules.

Variability. No variability was observed.

Male: Unknown.

Distribution. At present, *Maraenobiotus skombrosus* sp. n. is known only from the type locality from the ground waters of Vitosha Mountain, Bulgaria.

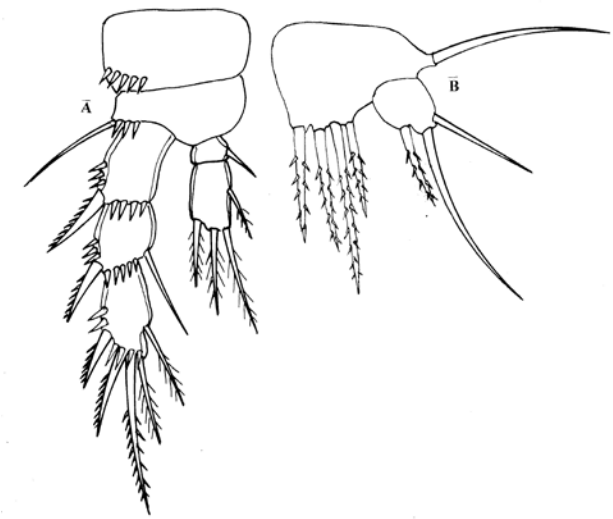

Fig. 6. *Maraenobiotus skombrosus* sp. n. ♀. A, Fourth swimming leg; B, Fifth leg.

Discussion

Maraenobiotus skombrosus sp. n. belongs to the *Maraenobiotus vejdovskyi*-complex according to the distinctive characters for the group given by Novikov & Sharafutdinova (2020). The new species shares the main characters of *vejdovskyi*-complex, such as the armature formula of the swimming leg, mandibular palp 1-segmented, distal exopodal segments of P_2 and P_3 with five and six setae, respectively, distal endopodal segment endopod of P_4 with four setae, P_5 baseoendopod with four setae. This group includes 16 species: *M. anglicus* Gurney, 1932, *M. arcticus* Keilhack, 1909, *M. canadensis* Flössner, 1992, *M. galassiae* Brancelj & Karanovic, 2015, *M. ishidai* Brancelj & Karanovic, 2015, *M. parainsignipes*, *M. pescei* Brancelj & Karanovic, 2015, *M. slovenicus* Brancelj & Karanovic, 2015, *M. tenuispina* Roy, 1924, *M. truncates* Gurney, 1932, *M. vejdovskyi*, *M. veris* Ishida, 1995, *M. zschokkei* and *M. supermario* Novikov & Sharafutdinova, 2020 (Novikov & Sharafutdinova 2020),

Table 1. Armature formula of female P_1–P_5 as follows. Arabic numerals represent setae, Roman numerals represent spines.

Leg	P_1	P_2	P_3	P_4	P_5
Basis	**I**-**I**	**I**-0	1-0	1-0	1
Exopod	**I**-0; **III**, 2, 0	**I**-0; **I**-0; **II, I**+1,1	**I**-0; **I**-0; **II**, **I**+1,2	**I**-0; **I**-1;**II**, **I**+1,1	3
Endopod	0-1; **I**, 1, 1	0-1; **I** ,2, 1	0-1; **I**, 2, 2	0-1; **I,** 2, 1	4

M. *rhodopensis* Apostolov, 2020 and *M. rilaensis* Apostolov, 2020 (Apostolov 2020). A characteristic feature of the species of this group is the presence of interpopulation variability but without available examples of significant morphological variations occurring within one and the same population (Brancelj & Karanovic 2015).

Maraenobiotus skombrosus sp. n. is similar to *Maraenobiotus vejdovskyi* Mrázek, 1893 discovered in moist moss in a forest area in the Thiergarten between Picin and Hlubos as well as in forests between the Vojna and Trojak Mountains (630 m a.s.l.), south of Pfibram, Czechia. Despite the similarity between the two species, the new species has characteristics that distinguish it from the original description of *M. vejdovskyi*. The differences concern: the armature formula of the first antennular segment (illustration in Taf. 4, fig. 1 9 of Mrázek 1893)

– without an inner seta in *M. vejdovskyi* vs. with an inner seta on the distal corner in the new species);

– morphology and the ornamentation of A_2 – allobasis smooth without small spinules in *M. veydovskyi* vs. two rows of spines in *M. skombrosus* sp. n.);

– free endopodal segment with two lateral spines – smooth in *M. veydovskyi* vs. unipinnate in the new species); the ornamentation of syncoxa on the maxilla – smooth in *M. vejdovskyi*, with inner and outer spinules in the new species.

It is possible that these taxonomic characters were not observed by Mrázek (1893) due to the technical means used at the time. We trust the precision of the presented drawings in the description of *M. vejdovskyi*.

The species of the *M. vejdovskyi*-complex exhibit differences in the shape and size of the caudal rami and the shape of IV and V apical setae, which can be filiform, proximally swollen or reduced to a small knob, as in *M. rhodopensis* and *M. rilaensis* from Bulgaria as well as in *M. slovenicus* (Slovenia), *M. ishidae* (Japan) and *M. pescei* (Italy) (Apostolov 2020, Ishida 1987, Pesce et al. 1994).

Maraenobiotus skombrosus sp. n., differs from *M. vejdovskyi* in caudal rami shape and size (1.25 times longer than wide in *M. vejdovskyi* vs. square in *M. skombrosus* sp. n.). The number of lateral setae is also different (two in *M. vejdovskyi* vs. three in *M. skombrosus* sp. n.). The shape of apical seta V has differentiation value: with bulbous proximal part in *M. vejdovskyi* vs. normal, without bulbous proximal part in *Maraenobiotus skombrosus* sp. n. Relative length of P_4enp, is reaching the end of P_4exp-1 in *M. vejdovskyi* vs. reaching the middle of P_4exp-2 in *M. skombrosus* sp. n. The new species also differs from most of the other species of the *vejdovskyi* complex in the reduced number of spinules on the anal operculum – 16 small spinules in *M. vejdovskyi* vs. six spinules in *M. skombrosus* sp. n.). The new species shows differences in ornamentation of the urosome dorsally and ventrally compared to *M. vejdovskyi*.

Maraenobiotus skombrosus sp. n. shares setal formula with *M. tenuispina, M. veris*, *M. zschokkei, M. slovenicus* and *M. supermario* and shape of caudal setae. The new species differs from the female of *M. zschokkei* in the following combination of characters: 1. Ornamentation of the urosomites (the two penultimate urosomites dorsally with a continuous row of spines in *M. zschokkei* vs. absence in the new species). 2. Ornamentation of the anal somite – with two groups of spinules above the base, with the caudal rami in *M. skombrosus* sp. n. vs. absence in *M. zschokkei*. 3. Number and size of spinules on the anal operculum – from 17 to 21 fine spinules on the free margin in *M. zschokkei* vs. six small spinules in the new species. 4. Length of caudal rami (twice as long as wide in *M. zschokkei* vs. square in the new species). 5. Number of lateral setae on the caudal rami – two in *M. zschokkei* vs. three in *M. skombrosus* sp. n. (see Kreis 1920).

Maraenobiotus skombrosus sp. n. can be distinguished from *M. tenuispina* by the size of the caudal rami – only 1/3 times as long as wide in *M. tenuispina* vs. as long as wide in the new species. The armament of the anal operculum also differs: two transverse rows of fine hairs in *M. tenuispina* vs. six short spines in *M. skombrosus* sp. n. In addition, the length of the P_5 baseoendopod in females (reaching the end of the exopod in *M. tenuispina* vs. shorter in *M. skombrosus* sp. n.). The two species differ from one another by the ornamentation of prosome and urosome (Roy 1924).

Maraenobiotus skombrosus sp. n. shares the setal formula of swimming legs with *M. slovenicus* (Brancelj & Karanovic 2015). However, the two species can be distinguished by the ornamentation of the urosoma (dorsally and ventrally) and the ornamentation of the anal somite (laterally with short row of strong spinules; ventrally four groups of long and slightly curved spinules in *M. slovenicus* vs. two groups of spines ventrally in *Maraenobiotus skombrosus* sp. n.). The armament of the anal operculum also differs: ten spines in *M. slovenicus* vs. six small spines in *M. skombrosus* sp. n.). The shape, size and ornamentation of the caudal rami differs: it is conical, with inner and outer margins slightly convex, inner distal corner dorsally with 6–10 strong spines, ventrally inner corner with row of long spinules and smaller spinules towards outer corner in *M. sloveni-*

cus compared to almost square, dorsal and ventral surface smooth in *M. skombrosus* sp. n. The shape of four and five apical setae (outer terminal seta IV and inner terminal seta) are reduced to minute knob in *M. slovenicus* and well-developed and filiform, without changes, in *M. skombrosus* sp. n.

Maraenobiotus skombrosus sp. n. can be distinguished from *M. supermario* Novikov & Harafutdinova, 2020 by the ornamentation of the urosome dorsally and ventrally. The ornamentation of the anal somite ventrally (with spinular rows laterally and ventrally close to joint with caudal rami in *M. supermario* vs. with four spinular rows at the base of the caudal rami and three spines in the middle of the somite ventrally in *M. skombrosus* sp. n.). The armature of P_3enp-2 also differs: four setae in *M. supermario* vs. five setae in *M. skombrosus* sp. n.). The ornamentation of the anal operculum is rounded at the end of the anal somite, with nine strong posterior spinules in *M. supermario*; in contrast, it is short, narrow and convex, not reaching posterior end of anal somite, with six spinules along distal margin in the new species. The morphology of the caudal rami is also different: length/width ratio is 1.5 in *M. supermario* vs. about as long as wide, shorter than anal somite in the new species. The ornamentation of the caudal rami is also differentiating between the two species – with posterior spinules dorsally and ventrally in *M. supermario* vs. smooth in *M. skombrosus* sp. n.

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