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A new species of the genus *Moraria* T. Scott et A. Scott, 1893 (Copepoda: Harpacticoida) from Russian Arctic

Новый вид рода *Moraria* T. Scott et A. Scott, 1893 (Copepoda: Harpacticoida) из российской Арктики

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KEY WORDS: freshwater fauna, DNA barcoding, Bolshezemelskaya tundra, Komi Republic, Siberia, Copepoda, Harpacticoida, Canthocamptidae, *Moraria*.

КЛЮЧЕВЫЕ СЛОВА: пресноводная фауна, ДНК баркодинг, Россия, Большеземельская тундра, Республика Коми, Сибирь, Copepoda, Harpacticoida, Canthocamptidae, *Moraria*.

ABSTRACT. *Moraria harbei* sp.n. described from a temporary pool in the south-east part of the Bolshezemelskaya tundra, the Komi Republic, north-east of the European part of Russia. During study of harpacticoid fauna composition of some northern Siberian regions (the Lena River delta, Putorana and Anabar Plateaus) a wide distribution of the species eastern of the Urals was revealed. The new species differs from its congeners in presence of cross row spinules in the medial part of inner sides of caudal rami (in female and male), smooth urosomal hyaline membranes without spinules on the back side, thoracic legs structure. We provide barcodes (nucleotide sequences of the COI mtDNA gene) of two specimens of the new species from the Lena River Delta.

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РЕЗЮМЕ. Описан новый вид *Moraria harbei* sp.n., впервые найденный во временной луже в юго-восточной части Большеземельской тундры, в Республике Коми (северо-восток европейской части России). В результате исследований состава фауны гарпактикоид северных регионов Сибири (дельта реки Лены, плато Путорана, Анабарское плато) выявлено широкое распространение *M. harbei* sp.n. к востоку от Урала. Новый вид отличается от других близких ему представителей рода присутствием ряда мелких шипиков на середине внутреннего края каудальных ветвей у самок и самцов, гладкими задними краями сегментов тела, без шипиков на спинной стороне, строением торакальных конечностей. Получены баркоды (нуклеотидные последовательности первой субъединицы митохондриальной ДНК — COI) двух особей нового вида из дельты реки Лена.

Introduction

The harpacticoid genus *Moraria* T. Scott et A. Scott, 1893 includes more than 60 named species and subspecies: approximately 62 according [Reid, Lesko, 2003] or 69 by [Gaviria, Defaye, 2017]. Of these, 23 species are members of the subgenus *Baikalomoraria* Borutsky 1931, spread in the Lake Baikal [Okuneva, Evstigneeva, 2001] and the Lake Khubsugul [Borutzky, 1972] only. Oher species are wider spread in Holarctic. The majority of *Moraria* species were noted from the Central and Southern Europe, surface and ground waters [Stoch, 1996; Gaviria, Defaye, 2017]. Four species of *Moraria*: *M. brevipes* (Sars), *M. duthiei* (Scott), *M. insularis* Fefilova, and *M. mrazeki* Scott, were recognized in the Russian Arctic [Borutzky, 1952; Fefilova, 2008, 2015; Novikov *et al*., 2021; Chertoptud *et al*., 2022].

During study of the Bolshesemelskaya tundra wetlands in 2009–2010 [Fefilova *et al*., 2013], four species

Table 1. Description of the material.
Таблица 1. Описание материала.

No. in the Fig. 1A	Region	Date	Sampling methods	Occurrence
1	Bolshezemelskaya tundra	29 July 2010	Collected by handle net	The species was found in one (from 41 studied) small pond and pools; rare species
2	Lena River Delta	June–August 2019, 2021, 2022	Collected by meiobenthic tubular sampler and by handle net	Common species in shallow waterbodies overgrown with macrophytes
3	Putorana Plateau	August 2021	Collected by meiobenthic tubular sampler	The species was recorded in four lakes of the central and western parts of the plateau
4	North-West of Komi Republic	June 2023	Collected by a hand net	The species has been noted once
5	Anabar Plateau	July 2023	Collected using the Karaman-Chappuis method	The species has been noted once in the upper reaches of the Kotuykan River

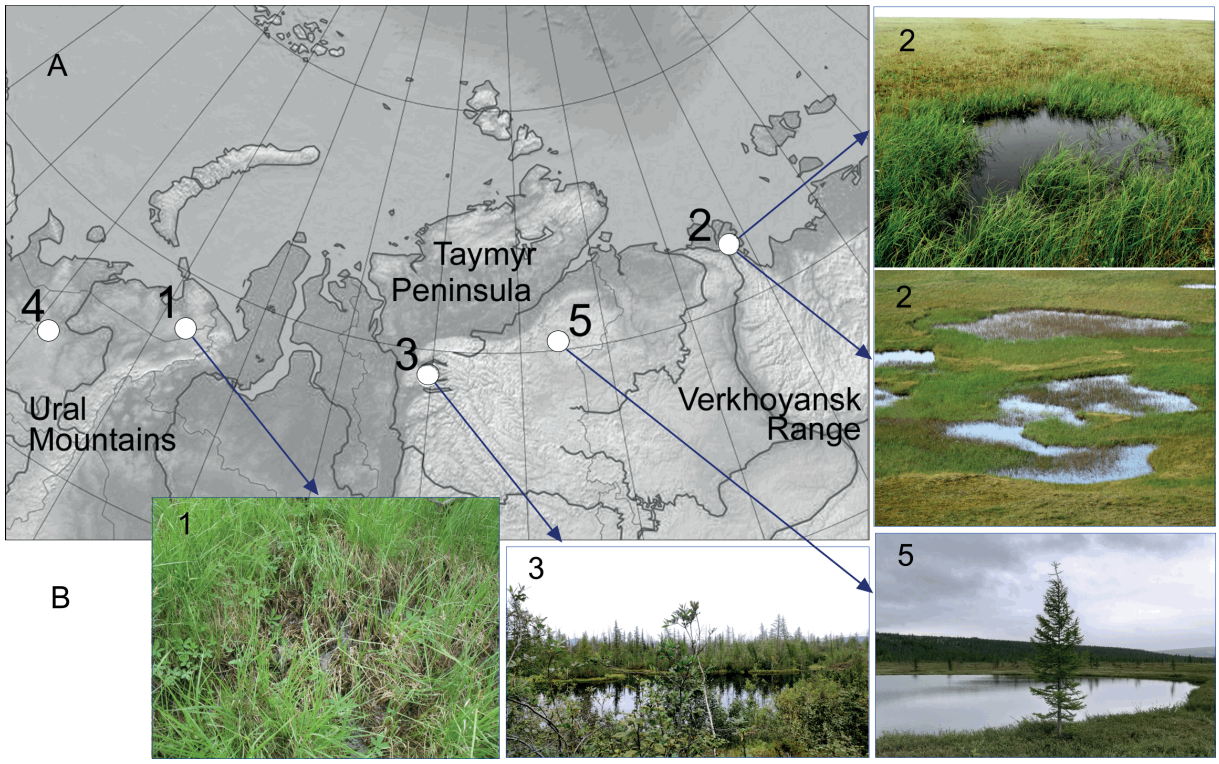

Fig. 1. Distribution and habitats of *Moraria harbei* sp.n.: A — distribution map (according to Russian physical location map, 2023); B — waterbodies, habitats. 1 — pool in Bolshezemelskaya tundra; 2 — ponds in the Lena River Delta; 3 — lake in Putorana Plateau; 4 — Lake Yamozero; 5 — lake in Anabar Plateau (Kotuykan River basin).

Рис. 1. Распространение и местообитания *Moraria harbei* sp.n.: A — карта распространения, согласно [Russian physical location map, 2023]; B — водоемы-местообитания. 1 — лужа в Большеземельской тундре, 2 — мелкие водоемы в дельте реки Лена; 3 — озеро на плато Путорана; 4 — озеро Ямозеро; 5 — озеро на Анабарском плато (бассейн реки Котуйкан).

of *Moraria* including a new one were collected. The new species was found in one temporary waterbody near the Lake Bolshoy Kharbey (Vorkuta area). Later this species was discovered in the north-western part of the Komi Republic (Lake Yamozero), and also in Siberian regions: small fresh waterbodies of the Lena River Delta [Novikov et al., 2021], Putorana [Chertoptud *et al*., 2022] and Anabar Plateaus.

In the present article we describe and illustrate both sexes of the new species, discuss its differences with congener species of the genus, and provide barcodes (nucleotide sequences of the COI mtDNA gene) of the new species.

Material and methods

Harpacticoid specimens were obtained from meiobenthos samples collected in summer of 2010, 2019, 2021–2023 in the northern regions (65–72.8° N) of Russia (Table 1, Fig. 1).

Harpacticoids from the Bolshesemelskaya tundra were fixed and preserved in 4% formalin. Living organisms from the Lena River Delta, the Lake Yamozero (Komi Republic), the Putorana and Anabar Plateaus were sorted from bottom sediment at the laboratory, fixed in 96% ethanol and stored at –20 °C. For taxonomic description, individual specimens were transferred to glycerin. Drawings were made from either whole specimens or from dissected specimens mounted on slides. Specimens were drawn using a Leica DM 4000B microscope compound microscope equipped at magnifications of 2000x. The photomicrographs were taken with a digital camera ASUS ZE520KL Phone. The final versions of drawings were made using Adobe Photoshop CS3 Extended and Xara Photo & Graphic Designer 6 software packages.

The type specimens have been deposited in the collections of the Institute of Biology of Komi Scientific Centre of the Ural Branch of the Russian Academy of Sciences (ZMIB catalog numbers). Specimens from the Lena River Delta, the Putorana and the Anabar Plateaus are stored in the Copepoda collection of the Laboratory of synecology of the A.N. Severtsov Institute of Ecology and Evolution of the Russian Academy of Sciences.

For molecular genetic analysis, we used two specimens of *Moraria harbei* sp.n. from the ethanol sample taken in the Lena River Delta. A gene fragment of the first subunit of mitochondrial DNA cytochrome oxidase (COI mtDNA or COI) was analysed. The DNA extraction and sequencing were performed at the CCU Molecular Biology of the Institute of Biology of Komi Scientific Centre of the Ural Branch of the Russian Academy of Sciences using protocol described in Kochanova *et al*. [2018]. In order to amplify the COI mtDNA gene, we used COIH 2198 (5' TAAACTTCAGGGTGACCAAAAAATCA 3') and COIL 1490 (5' GGTCAACAAATCATAAAGATATTGG 3') primers [Folmer *et al*., 1994]. Sequencing was carried out in both directions, using the BigDye Terminator v3.1 (Life Technology) reagent kit in an ABI PRISM 310 Genetic Analyzer (Applied Biosystems, Waltham, Massachusetts, USA) in the "Genome" Centre for Collective Use (Engelhardt Institute of Molecular Biology, Russian Academy of Sciences, Moscow). The molecular-genetic distances were computed using the Tamura-Nei method [Tamura, Nei, 1993]. Original nucleotide sequences were deposited at the NCBI GenBank database (https://www.ncbi.nlm.nih.gov/genbank/).

Nomenclature and descriptive terminology follow Huys & Boxshall [1991], terminology and homology of maxillary structures follow Ferrari & Ivanenko [2008].

We used some abbreviations in the text: A1 — antennules, Ae — asthetasc, modif — modified, P1–P6 — swimming legs 1–6.

Results

Subclass Copepoda Milne Edwards, 1840
Superorder Podoplea Giesbrecht, 1882
Order Harpacticoida Sars, 1903
Family Canthocamptidae Brady, 1880
Genus *Moraria* T. Scott et A. Scott, 1893
Subgenus *Moraria* T. Scott et A. Scott, 1893

Moraria harbei **sp.n.**
Figs 2–7.

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Moraria sp. 1 – Novikov *et al*., 2021: 268
Moraria sp. nov. – Chertoprud *et al*., 2022: Appendix A
Moraria sp. – Novikov *et al*., 2023: Table 1

ETYMOLOGY. The specific name is given by the name of the Lake Bolshoy Kharbey (Bolschezemelskaya tundra, Komi Republic), where this species was first found. Name "harbei" is a latinized word from the Russian toponym "Харбей", it is noun in the nominative singular standing in apposition.

MATERIAL. **Holotype** ♀ dissected on one slide, RUSSIA, Komi Republic, Bolshezemelskaya tundra, small pool; approx. 67.6° N 62.93° E; water temperature: 9.9 °C, pH: 5.6, dissolved oxygen concentration: 3.7 mg L^{-1}, water conductivity: 45 µS cm^{-1}; 29 July 2010; E.B. Fefilova leg; ZMIB: HRP-50. **Allotype** ♂ dissected on one slide; collection data as for holotype; ZMIB: no. HRP-51. **Paratypes** 7 ♀♀ and 1 ♂ dissected on seven slides; collection data as for holotype; ZMIB: HRP-52 – HRP-58.

Other material. RUSSIA; Krasnoyarsk Territory, Putorana Plateau, Burgul Lake; 68.685278° N 93.742778° E; 9 Aug 2021; Kutaramakan Lake basin; 68.76071° N 91.901395° E; 14 Aug 2021; lakes of Keta Lake basin (Hogoldymakit Cape); 68.970278° N 89.773333° E and 68.807646° N 89.65611319° E; 19 Aug 2021; E. Chertoprud leg; Anabar Plateau, Kotuykan River basin, 70.470110° N 108.199459° E, 17 Jul 2023, E.S. Chertoptud. & A.A. Novikov leg; Yakutia, Lena River delta, 1 ♀ and 1 ♂ on slides (exoskeletons after DNA analisys); ZMIB: HRP-59, HRP-60, moss, 72.371548° N 126. 480726° E, 16 Jul 2021; moss, 72.479338° N 126.268277° E, 20 July 2019; Tit-Ary Creek, 71.968008° N 127.093484° E, 9 Aug 2018; Tigie River, 71.395639° N 127.246639° E, 29 Jun 2019; pools, 71.385645° N 127.230135° E, 29 Jun 2019; moss, 72.845° N 123.301833° E, 5 Jul 2019; pool, 71.965437° N 127.089156° E, 14 Aug 2019; moss, 72.469611° N 126.268016° E, 21 Aug 2019; Lake Krugloe, 72.468859° N 126.265658° E, 21 Aug 2019; Lake Ryba, 72.373323° N 126.491284° E, 23 Aug 2019; moss, 72.374986° N 126.507926° E, 12 Jul 2021; moss, 72.355219° N 126.317774° E, 26 Jul 2021; moss, 72.365697° N 126.443334° E, 29 Jul 2021; near Lake Kobchik, 71.53506° N 128.79431° E and 71.536544° N 128.775408° E, 2 Aug 2021; close to Sevastyan-Kyuele River, 71.546744° N 128.801305° E, 2 Aug 2021; streams with moss, 71.629875° N 128.911029° E and 71.631783° N 128.896022° E, 11 Aug 2022; Snezhinka River, 71.707598° N 128.864305° E and 71.70848° N 128.869874° E, 12 Aug 2022; small lagoon, 71.73761°2 N 128.923002° E, 12 Aug 2022; pools, 71.610816° N 128.767922° E, 14 Aug 2022; close to Sevastyan-Kyuele River, 71.549906° N 128.782949° E, 16 Aug 2022; stream, 71.529281° N 128.770956° E, 16 Aug 2022; Sogo River, 71.555625° N 128.986785° E, 19 Aug 2022; moss, 71,631423° N 128,89452° E, 22 Aug 2022, A.A. Novikov leg; Komi Republic, Lake Yamozero, 1 ♀ dissected on slide; 65.020833° N 50.239722° E, 3 Jun 2023, N.P. Selivanova leg, ZMIB: HRP-61.

DESCRIPTION. **Female.** Body (Fig. 2A) length from tip of rostrum to tips of caudal rami, 441 µm. Body compact, slightly tapering antero-posteriorly. Rostrum distinct from cephalothorax, trapezoidal with subapical sensillae. Dorsal side of body somites with smooth free margins.

Urosomite 3 and 4 ventrally each with rows of spinules with gaps in the middle of somites (Fig. 3A). Genital doublesomite without armament, smooth and free. Genital field (Fig. 2E) small, copulatory duct short (0.13 genital somite length), chitinised. P6 fused with somite with one seta. Anal operculum round and smooth (Fig. 2A, B).

Caudal rami (Fig. 2B–D) about 2 times longer than wide, tapering posteriorly and with prominent longitudinal dorsal crest extending to 4/5 length of ramus and ending in acute point. Inner medial margin of rami with row of eight thin spinules (Fig. 2D). Ramus with two lateral (outer) setae (I–III); three terminal setae (IV–VI) of which the medial (inner) terminal seta (VI) is short and slender, and dorsal seta (VII). Outer

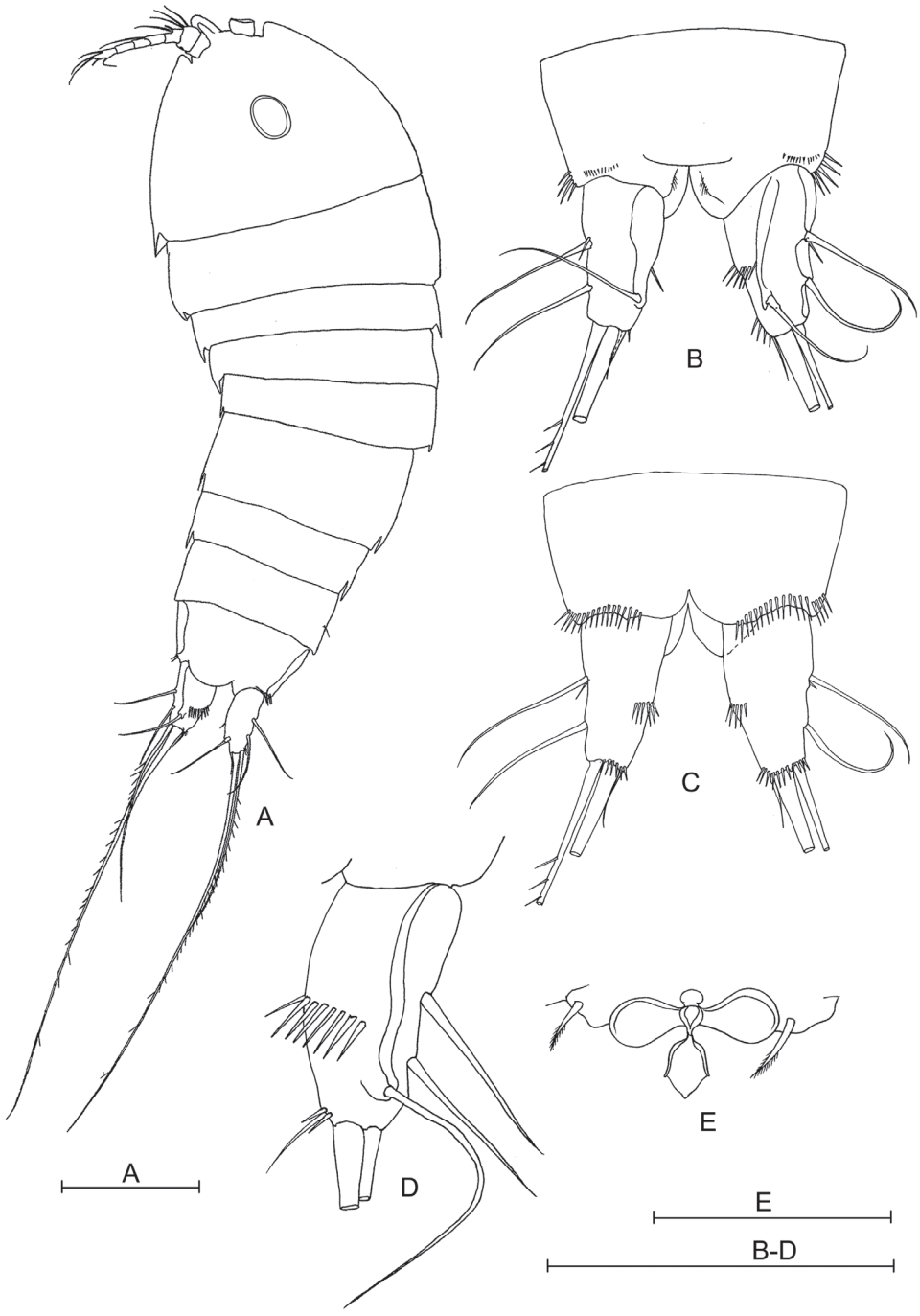

Fig. 2. *Moraria harbei* sp.n., holotype ♀: A — habitus, dorsal view; B — anal somite and caudal rami, dorsal view; C — anal somite and caudal rami, ventral view; D — caudal ramus; E — genital field. Scale bars: A–C – 100 μm, D, E – 50 μm.

Рис. 2. *Moraria harbei* sp.n., голотип ♀: A — габитус, дорсально; B — анальный сегмент и каудальные ветви, дорсально; C — анальный сегмент и каудальные ветви, вентрально; D — каудальная ветвь; E — генитальное поле. Масштаб: A–C — 100 μm, D, E — 50 μm.

terminal seta, curved inward, longer than seta V in 2.2 times (Fig. 2A). Terminal setae without fracture planes. Setae I small attaching near setae II.

Antennule (Figs 2A, 3B) relatively short, 7-segmented (unclear 8-segmented: last segment is not fully divided into two segments). Aesthetasc of fourth segment cylindrical with rounded tip, reaching apex of antennule. Setal formula: 1, 9, 6, 1+Ae, 1, 3, 7+Ae.

Antenna (Fig. 3C) allobasis with two setae on inner margin, exopod (Fig. 3D) 1-segmented, bearing one spinulose seta on margin and three smooth setae terminally. Free endopodal segment with two subdistal spines and subdistal thin seta; apically with two strong, three geniculate setae and one small seta.

Mandible (Fig. 3E) with 2-segmented palp. Basis with two setae, one of this represented by exopod. Endopodal segment with three apical setae.

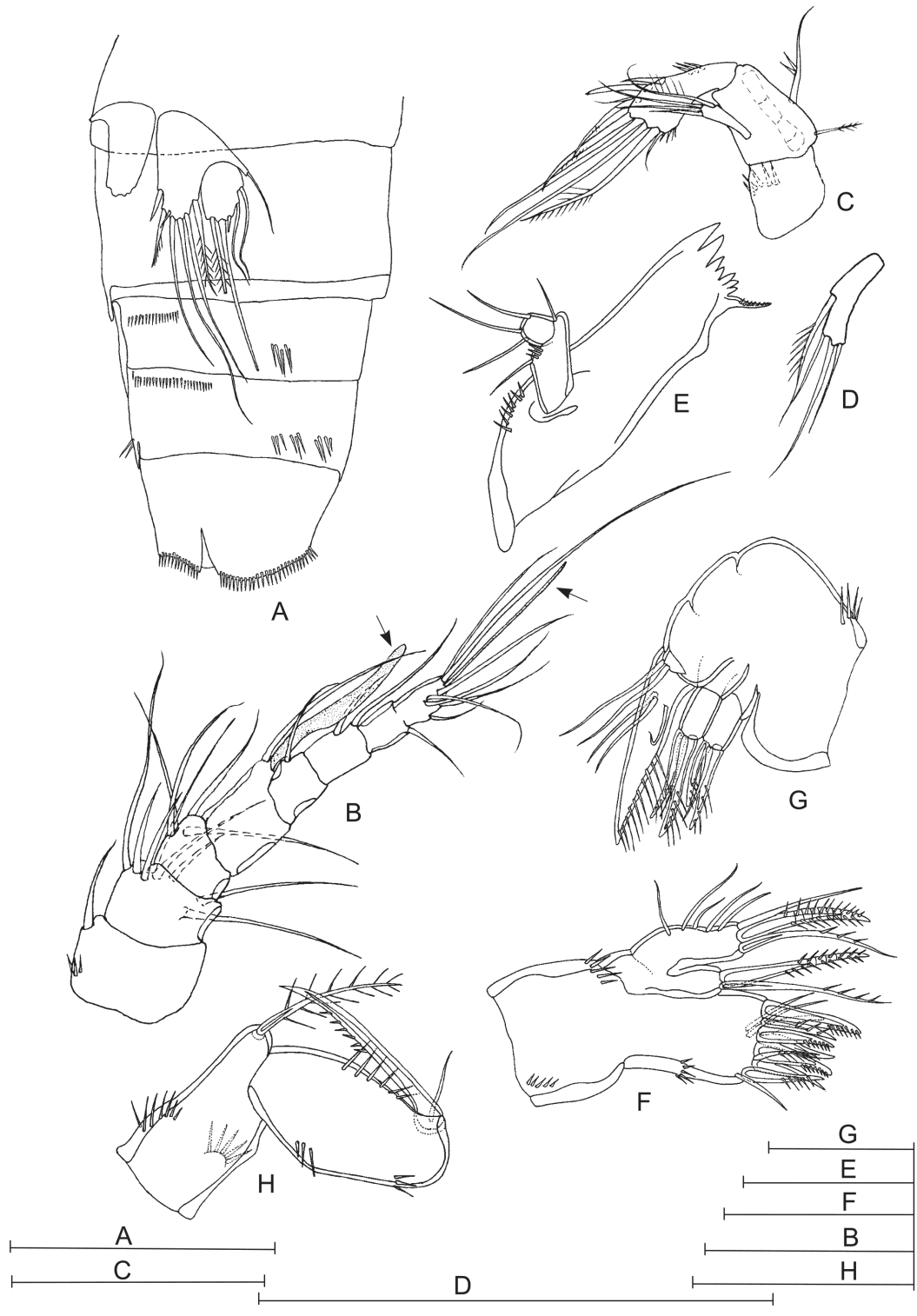

Fig. 3. *Moraria harbei* sp.n., ♀, A–D — holotype, E–H — paratype: A — abdomen, ventral view; B — antennules (aesthetascs shown by arrows); C — antenna; D — antennal exopodite, enlarged; E — mandible; F — maxillule; G — maxilla; H — maxilliped. Scale bars: A — 100 μm, C, D — 50 μm, B, E–H — 20 μm.

Рис. 3. *Moraria harbei* sp.n., ♀, A–D — голотип, E–H — паратип: A — абдомен, вентрально; B — антеннула (стрелками показаны астетаски); C — антенна; D — экзоподит антенны, увеличено; E — мандибула; F — максиллула; G — максилла; H — максиллярная ножка. Масштаб: A — 100 μm, C, D — 50 μm, B, E–H — 20 μm.

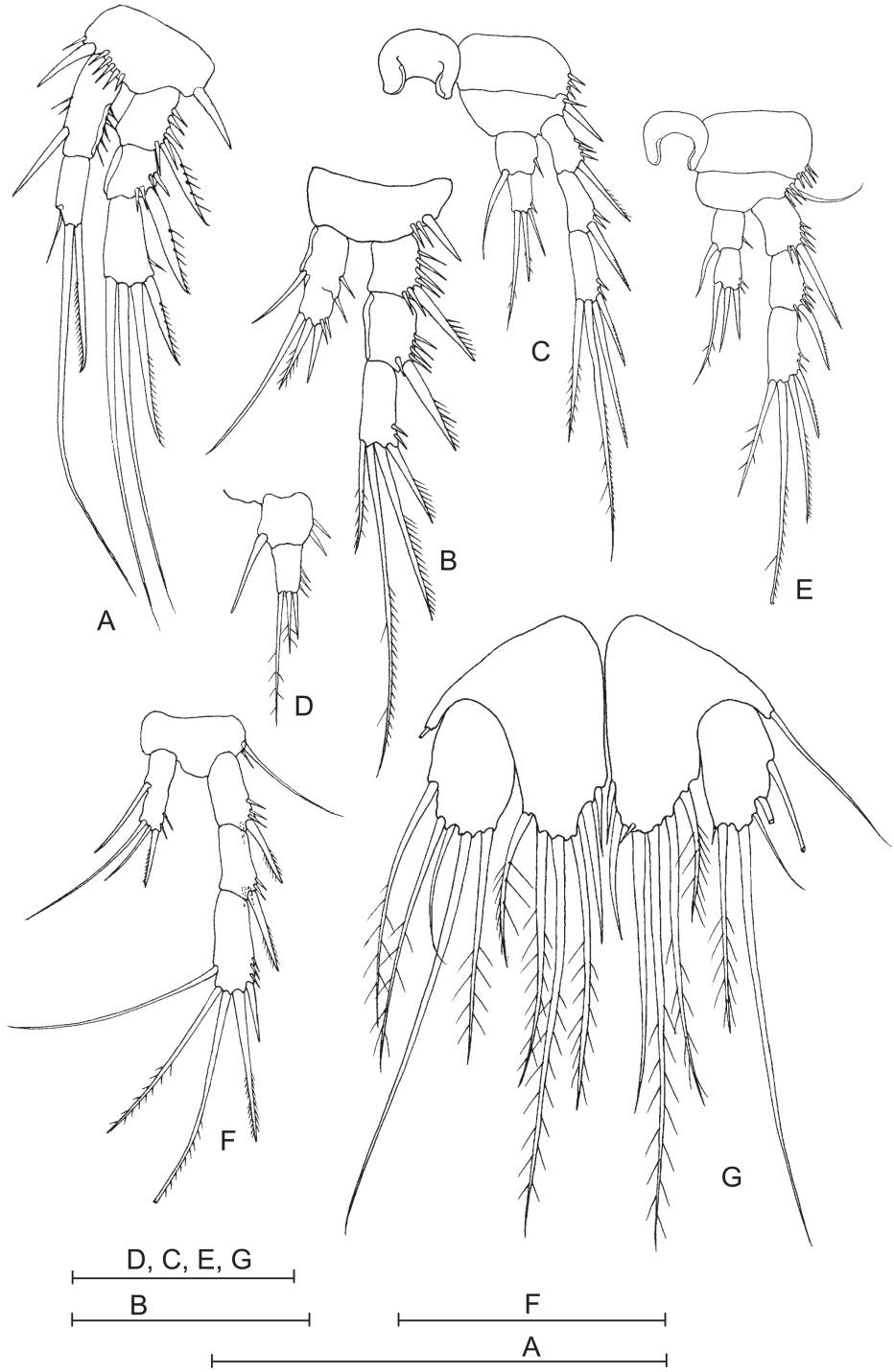

Fig. 4. *Moraria harbei* sp.n., ♀, A, C, E, G — holotype, B, D, F — paratypes: A — P1; B, C — P2; D — P2 endopodite; E — P3; F — P4; G — P5. Scale bar: 50 μm.

Рис. 4. *Moraria harbei* sp.n., ♀, A, C, E, G — голотип, B, D, F — паратипы: A — P1; B, C — P2; D — эндоподит P2; E — P3; F — P4; G — P5. Масштаб: 50 μm.

Maxillule (Fig. 3F) praecoxal arthrite with six apical spines, one apical seta and two subapical setae; coxal endite with one strong geniculate and one thin setae; basis apically with spiniform seta and two accessory setae; subapically with two setae. Exopod and endopod incorporated into basis, represented by one and two setae respectively.

Maxilla (Fig. 3G) with two endites, each with three plumose terminal setae; basis with spine and pair of setae. Endopod small with two setae. First endopodal segment with three setae and distal massive claw; second segment with two setae.

Maxilliped (Fig. 3H) coxa with large plumose distal seta and rows of spinules basally. Basis with three rows of spinules. Endopod with large claw accompanying minute seta.

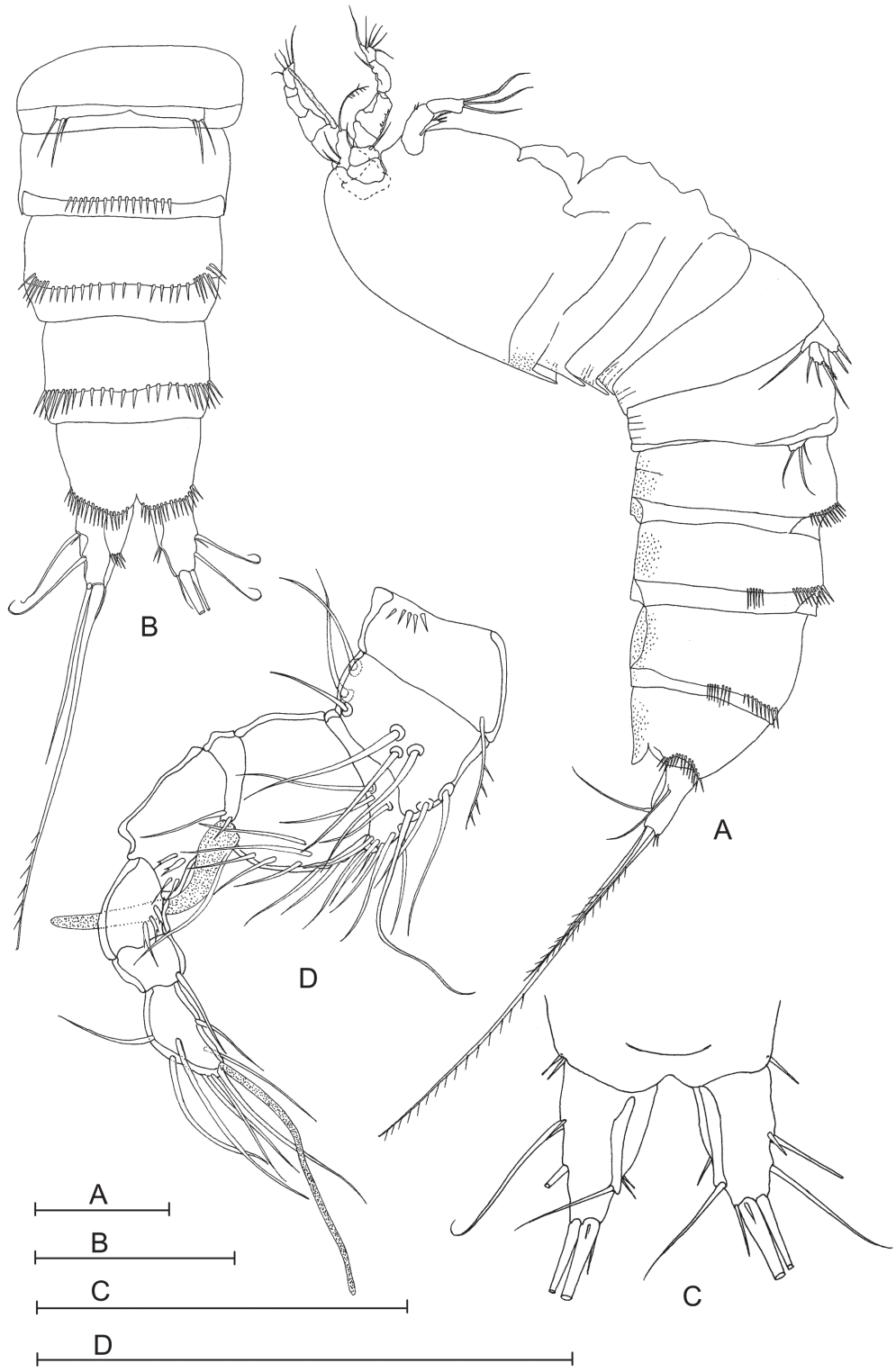

Fig. 5. *Moraria harbei* sp.n., ♂, allotype: A — habitus, lateral view; B — abdomen, ventral view; C — caudal rami, dorsal view; D — antennule. Scale bar: 50 μm.

Рис. 5. *Moraria harbei* sp.n., ♂, аллотип: A — габитус, дорсо-вентрально; B — абдомен, вентрально; C — каудальные ветви, дорсально; D — антеннула. Масштаб: 50 μm.

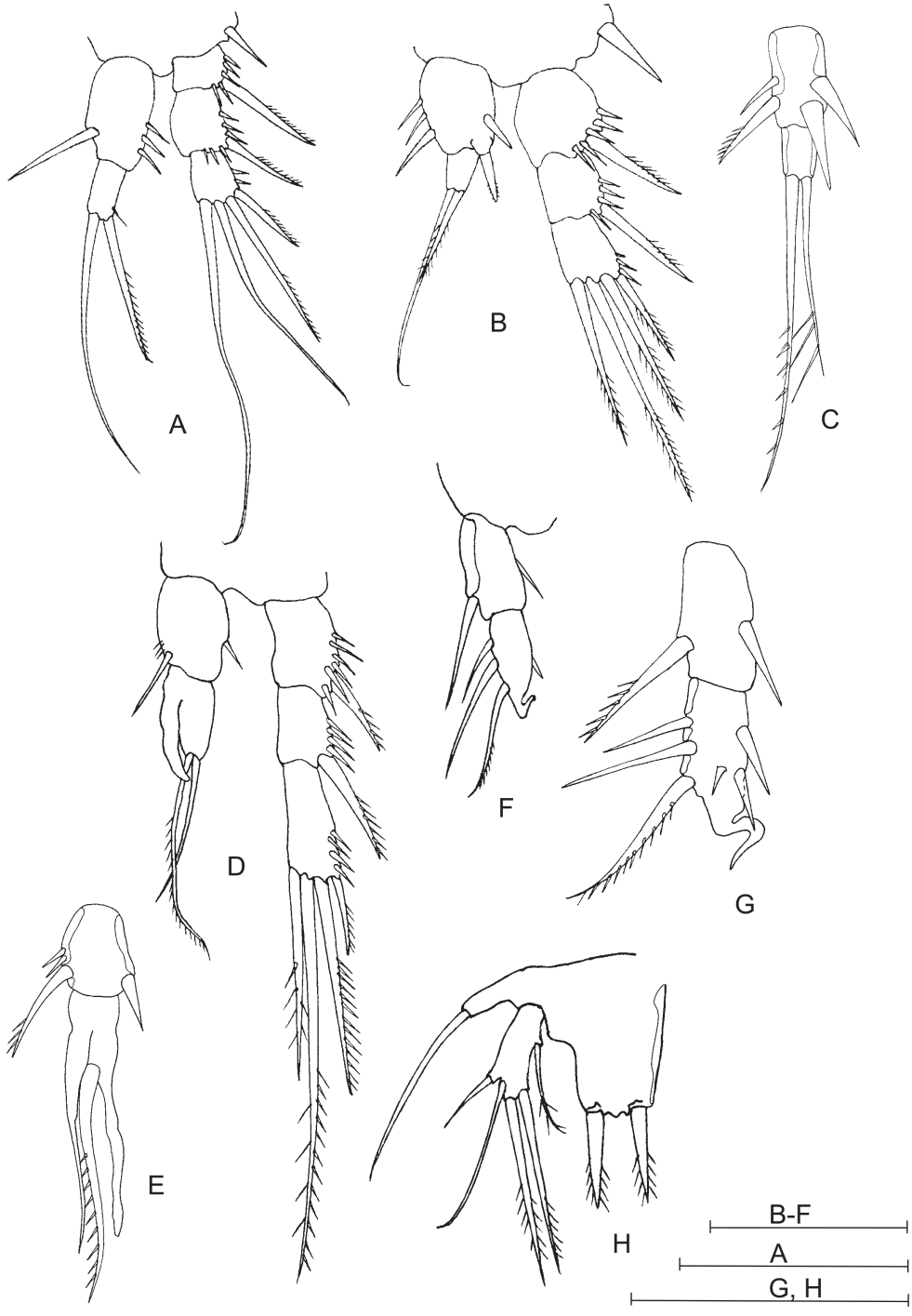

Fig. 6. *Moraria harbei* sp.n., ♂: A — allotype, P1; B — allotype, P2; C — individual from Lena River Delta, P2 endopod; D — allotype, P3; E — individual from Lena River Delta, P3 endopod; F — allotype, P4 endopod; G — individual from Lena River Delta, P4 endopod; H —allotype, P5. Scale bar: 20 μm.

Рис. 6. *Moraria harbei* sp.n., ♂: A — аллотип, P1; B — аллотип, P2; C — особь из дельты реки Лена, эндоподит P2; D — аллотип, P3; E — особь из дельты реки Лена, эндоподит P3; F — аллотип, эндоподит P4; G — особь из дельты реки Лена, эндоподит P4; H —аллотип, P5. Масштаб: 20 μm.

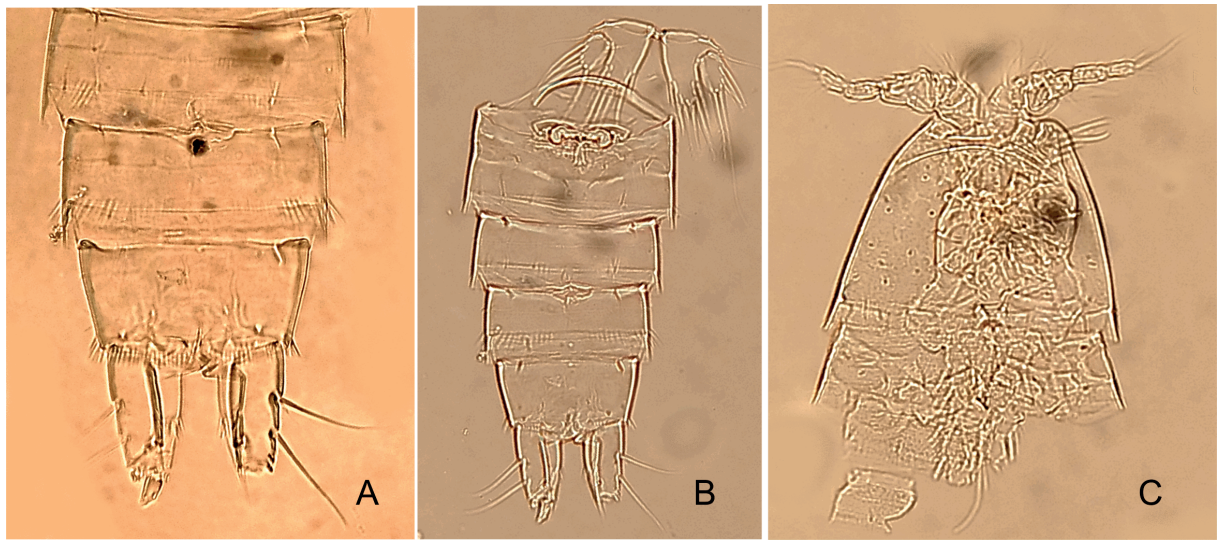

Fig. 7. Photo of exosceleton of *Moraria harbei* sp.n. specimens used for molecular-genetic analysis (associated GenBank numbers): A, B — abdomen of female (OR528780); C — cephalothorax and first thoracic somite of male (OR528781).

Рис. 7. Фото экзоскелета особей *Moraria harbei* sp.n., использованных для молекулярно-генетического анализа (номера в GenBank): A, B — абдомен самки (OR528780); C — цефалоторакс и первый торакальный сегмент самца (OR528781).

P 1–3 (Fig. 4A–F) with 3-segmented exopods and 2-segmented endopods (holotype female has unclear border between first and second segments of P2 endopod, Fig. 4B). Intercoxal sclerites without ornament.

P1 (Fig. 4A) endopod shorter than exopod, segment 1 with seta on mediodistal corner on inner margin; segment 2 with outer spiniform, medial long geniculate and inner small setae; middle seta about 2.5 times longer than endopod.

P2–P3 (Fig. 4B, C, E) exopods 3-segmented with one pinnate spinule on outer margin of segments one-three and three terminal pinnate setae on segment 3 (middle seta longest).

P2–P3 endopods (Fig. 4B–E) with unipinnate inner setae on basal segment and 3 setae on distal segment, from which inner seta about 2 times as long as segment bearing it. P2 endopod segments with 1-3 small spinules on inner side.

P4 (Fig. 4F) exopod with 5 setae on segment 3: 1 pinnate spinule subterminally on outer margin, 3 terminal pinnate setae and 1 long unipinnate seta on inner margin. Endopod 2-segmented (but two paratype have 1-segmented endopod, Fig. 4F); both segments ornamented as in P2–P3.

P5 (Fig. 4G) with separated baseoendopods. Endopodal lobe of baseoendopods with six setae. Exopods distinct from baseoendopod, ovoid, reaching about to end of baseoendopod, bearing five setae.

Male. Body (Fig. 5A) length from tip of rostrum to tips of caudal rami, 395 µm. The description deals with morphological differences with respect to the female. Anal operculum, and caudal rami as in female.

Spinules rows on urosomites 3, 4 (Fig. 5B) without gaps in the middle of somites. Urosomite 2 with row of small spinules in middle on ventral side.

Antennule (Fig. 5D) 10-segmented, segments 5 and 10 each with aesthetacs. Setal formula: 1, 9, 8, 2, 7+Ae, 2, 2+2 modif, 3 modif, 1, 7+Ae.

Antenna and mouthparts as in female.

P1–P4 exopods, P1 endopod (Fig. 6A-C) as in female. P2-P4 endopods 2-segmented, all sexually dimorphic.

P2 endopod (Fig. 6B, C) with two stout lateral spinules on outer margin of segment 1 and one setae and two-tree small spinules on inner margin; segment 2 with two setae, from which inner seta about 2 times longer than outer seta. Segment 1 lager than segment 2.

P3 endopod (Fig. 6C, D) segment 1 with one seta on laterodistal corner of inner side and small spinule in the middle of outer margin; segment 2 with stout apophysis having simple acute tip and reaching distal point of segment which it bearing, and 2 terminal setae of which the inner seta is longer and spinulose.

P4 endopod (Fig. 6E) segment 1 with one seta on laterodistal corner of inner side and small spinule in the middle of outer margin; segment 2 with five elements: hook-shaped apex on the tip, and three setae on inner margin, two of which twice as long as third (upper).

P5 (Fig. 6F) 2-segmented, baseoendopods partly fused; endopodal lobe rectangular, bearing two equal by length spinulose setae. Exopod small and slender, with 5 setae of which three inner pinnate and two outer naked.

P6 (Fig. 5B) in the form of a single plate fused to somite bearing at its outer corner three unipinnate setae.

VARIABILITY. Morphological variability of *M. harbei* sp.n. was detected in the structure of female A1 and P2-P4 endopods of females and males. So, A1 of the holotype female was 7-segmented, whereas in the type population, and among the individuals from the Lena River Delta, females with 8-segmented A1 were presented. The P2, P4 endopods of female and the P3 endopod of male can be 2-segmented or 1-segmented. Arming of endopods was relatively stable, but one female from the type locality has abnormal P2 endopod, 1-segmented with only one terminal seta on the tip. Margins of the P5 endopodal lobe and exopod of female and male can be smoth and free or with a few of small setules like in some specimens from the Lake Yamozero and the Lena River Delta.

ECOLOGY. *M. harbei* sp.n. was observed in the fresh and mostly small waterbodies: pools, ponds and in mosses of wetland areas from tundra and forest zones. The new species is psychrophilic organism, because it lives in the high-latitude area, on Putorana Plateau it has been found at altitude about 84 and 347 m. In Bolshezemelskaya tundra *M. harbei* sp.n. was

Table 2. Comparison of morphological characters distinguishing the *Moraria* species recoded from Russian Arctic.
Таблица 2. Сравнение различительных морфологических признаков видов *Moraria*, указанных для российской Арктики.

Species	Female A1	Urosomal membrane	Caudal ramus spinules	Anal operculum	Female P5
M. harbei sp.n.	7- or 8-segmented	smooth	female and male have	round	baseoendopodal lobe and exopod without spinules on the inner margins or with 1-4 spinules, exopod ovoid
M. brevipes[1]	7-segmented	smooth	female and male have not	triangular	setae on baseoendopodal lobe and exopod rather short, naked; both segments without spinules on the inner margins
M. duthiei[1]	8-segmented	smooth	female and male have not	triangular (sometimes round)	exopod with a lot of spinules on the inner margins
M. insularis[2]	7-segmented	serrate	female and male have	round	baseoendopodal lobe and exopod slender and long (about 2 times longer than wide)
M. mrazeki[1]	7-segmented	smooth	female has, male has not	round	baseoendopodal lobe and exopod about 1.7 times longer than wide

[1] – by Fefilova, [2015], [2] – by Fefilova, [2008].

rare, it preferred acid condition and low water mineralization. The Lena River delta was one from the regions under study where the new species was common in shallow waterbodies and terrestrial moss.

DNA SEQUENCES. Nucleotide sequences of the 613 bp COI mtDNA gene region were obtained from two specimens of *M. harbei* sp.n. from the Lena River Delta. They were deposited in the GenBank database under the numbers: OR528780 and OR528781. Photo of specimens used for obtaining of the nucleotide sequences are presented in the Fig. 7. The genetic distance between the specimens of *M. harbei* sp.n. was 3.2%, counted genetic distance of 21.2–29.6% were between new species and other *Moraria* species: *M. brevipes* (Sars, 1862) (GenBank accession numbers: MW266957.1, MW266958.1), *M. cristata* Chappuis, 1929 (BOLD systems accession numbers: ZOOPS313-19, ZOOPS316-19, ZOOPS317-19), *M. duthiei* (Scott, 1896) (GenBank accession numbers: MZ169069.1–MZ169071.1), and *M. mrazeki* Scott, 1903 (GenBank accession numbers: OP093566–OP093566).

Discussion

Comparative analysis of the type material and other material from the north-eastern Europe and Siberia give the following results. Except the new described species in the Russian Arctic occur five species of the subgenus *Moraria* (*Moraria*) [Fefilova, 2015; Novikov *et al*., 2021; Chertoptud et al., 2022]: *M. duthiei*, *M. brevipes*, *M. insularis* (Fefilova, 2008), *M. mrazeki* Scott, 1903. From these species *M. harbei* sp.n. differs in structure of female A1, urosomal hyaline membranes, form of anal operculum, arming of caudal rami, and the female P5 structure (Table 2). Besides that, *M. harbei* sp.n. differs from *M. duthiei* and *M. mrazeki* in arming of P1 endopod (it has three setae on the distal segment instead of four). Also the new species good differs from the species recoded from the Russian Arctic by the key published [Fefilova, 2015]. Another questionable Arctic species — *M. similis* (Lilljeborg 1902), was described from the Novaya Zemlya Archipelago. Borutzky [1952] synonymized this species with *M. schmeili* Douwe, 1903 (junior synonym of *M. mrazeki*, see Gurney [1932]). *Moraria similis* is similar to the new species in the structure of P5 and caudal rami. However, this species appears to have an inner seta (four with distal setae) on the P1 endopod, as in *M. mrazeki* [Lilljeborg, 1902].

In the North America ten *Moraria* species are currently recognized: *M. laurentica* Willey, 1927, *M. affinis* Chappuis, 1927, *M. cristata* Chappuis, 1929, and *M. virginiana* Carter, 1944, *M. arctica* Flössner, 1988, *M. hudsoni* Reid et Lesko, 2003, *M. catracha* Fiers et Jocque, 2013, *M. cusuca* Fiers et Jocque, 2013 and abovementioned *M. duthiei* and *M. mrazeki* [Reid, Lesko, 2003; Fiers, Moldovan, 2012; Fiers, Jocque, 2013]. Morphologically close to *M. harbei* sp.n. species are living also in surface waterbodies of mountain regions of the Central and Southern Europe: *M. alpina* Stoch, 1998, *M. radovnae* Brancelj, 1988 [Stoch, 1998], *M. poppei* (Mrazek, 1894), *M. monticola* (Menzel, 1912), *M. pectinata* Thiébaud et Pelosse, 1928 [Borutsky, 1952; Gaviria, Defaye, 2017]. According the first paragraphs of the identification key of the *Moraria* genus members [Gaviria, Defaye, 2017] these species can be divided into several groups differed in the arming of the female P2–P4 exopods. Female (and male) of *M. harbei* sp.n. with its four setae on distal segments of the P2, P3 exopods and five setae on distal segment of the P4 exopod belongs to common group with the majority of the North-American species except *M. duthiei*, and two European species: *M. poppei*, *M. monticola*. But, members of this group are distinguished mainly on combinations of characters: ornamentation of

the caudal rami, anal operculum form, and structure of urosomal hyaline membranes. So, *M. laurentica*, *M. affinis*, *M. poppei* differ from *M. harbei* sp.n. in the absence of spinules row on the inner sides of caudal rami in male (*M. laurentica*) or in both sexes (*M. affinis*, *M. poppei*) [Borutsky, 1952; Reid, Lesko, 2003; Fier, Moldovan, 2012]. Females of *M. monticola*, M. *catracha*, and *M. cusuca* have other form and/or other arming of caudal rami [Borutsky, 1952]. *M. arctica* has spinules row on the inner sides of female caudal rami, but male of this species has not been described [Reid, Lesko, 2003]. The last species has round, denticulate operculum, whereas the anal operculum of *M. harbei* sp.n. is round and smooth. In form of the anal operculum the new species differs from *M. virginiana* and *M. cusuca* which have it triangular [Reid, Lesko, 2003] or round-triangular [Fiers, Moldovan, 2012]. Urosomal hyaline membranes of *M. cristata* and *M. hudsoni*, which close to the new species in the structure of caudal rami and anal operculum, are serrate on dorsal side [Reid, Lesko, 2003; Fiers, Moldovan, 2012], whereas back margins of abdominal somites of *M. harbei* sp.n. are smooth. Additional character distinguishing *M. harbei* sp.n. from *M. hudsoni* is presence of three (but not two) setae on the distal segment of the P2 endopod. While the endopods armament of some *Moraria* species (including *M. harbei* sp.n.) can vary [Reid, Lesko, 2003].

As a result, we offer "field marks" for distinguishing *M. harbei* sp.n. from other congeneric species which are present in the Russian Arctic, North-American and mountain European regions: P1 endopod with three setae, conic caudal rami with cross row spinules in the medial part of inner sides (in female and male); rounded and smooth anal operculum; smooth urosomal hyaline membranes.

A comparison of the COI nucleotide sequences of *M. harbei* sp.n. specimens from the Lena River Delta with barcodes of *M. brevipes*, *M. duthiei* from the North Europe (NCBI GenBank database), *M. cristata* from the North America (BOLD system), and *M. mrazeki* from Siberia [Fefilova *et al*., 2023] showed genetic differentiation of the new species from this species group.

Habitats of the new species is common for the members of Holarctic-Boreal *Moraria*-group, which live mostly in wet soil and mosses, springs and seeps, bogs, decaying leaf litter [Borutsky, 1952; Reid, Lesko, 2003]. Few *Moraria* species prefer large waterbodies, such as lakes and the rivers, but subgenus *Baikalomoraria* members inhabit only the deepest ancient lakes [Borutzky, 1972; Okuneva, Evstigneeva, 2001; Fefilova *et al*., 2023]. Areal of *M. harbei* sp.n. is associated with the area of distribution of wet semi-terristial cold-water habitats (wetlands) in Russia.

Compliance with ethical standards

CONFLICT OF INTEREST: The authors declare that they have no conflict of interest.

Ethical approval: No ethical issues were raised during our research.

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