Ecologica Montenegrina
ISSN 2336-9744 (online) | ISSN 2337-0173 (print)

Ecologica Montenegrina 103: 53-73 (2026)
This journal is available online at: www.biotaxa.org/em
https://dx.doi.org/10.37828/em.2026.103.4

Correspondence

https://www.zoobank.org/urn:lsid:zoobank.org:pub:377D1EF3-3073-4D1B-8CAB-51EF09F2E013

Hemiclepsis bivalvicola sp. nov. and *H. koreaensis* sp. nov., two Northeast Asian mainland relatives of the Japanese endemic mussel-associated leech *H. kasmiana* (Hirudinida: Glossiphoniidae)

TATYANA A. ELISEEVA[1], ALEXANDER V. KONDAKOV[1]*, ALEXANDER V. KROPOTIN[1], MIKHAIL Y. GOFAROV[1], YULIA V. BESPALAYA[1], ILYA V. VIKHREV[1], SANG KI KIM[2], JIN HEE LEE[3], LARISA A. PROZOROVA[4], ELENA M. SAYENKO[4], VIKTOR V. BOGATOV[4] & IVAN N. BOLOTOV[1]

[1] *N. Laverov Federal Center for Integrated Arctic Research of the Ural Branch of the Russian Academy of Sciences, Nikolsky Ave. 20, Arkhangelsk, 163020, Russia;*
https://orcid.org/0000-0001-7214-9822; https://orcid.org/0000-0002-9830-5472;
https://orcid.org/0000-0002-8532-0307; https://orcid.org/0000-0002-9066-4833;
https://orcid.org/0000-0002-8612-7736; https://orcid.org/0000-0002-3878-4192
[2] *Nakdonggang National Institute of Biological Resources, Gyeongsangbuk-do, 37242 Sangju, Republic of Korea; https://orcid.org/0000-0003-2387-4264*
[3] *Institute of Freshwater Ecology, 41518 Daegu, Republic of Korea; https://orcid.org/0000-0003-0893-0272*
[4] *Federal Scientific Center of the East Asia Terrestrial Biodiversity of the Far Eastern Branch of the Russian Academy of Sciences, Pr. 100-letia Vladivostoka 159, Vladivostok, 690022, Russia;*
https://orcid.org/0000-0003-2174-815X; https://orcid.org/0000-0002-5459-2692;
https://orcid.org/0000-0002-0525-6983
**Corresponding author. E-mail: akondakv@yandex.ru; https://orcid.org/0000-0002-6305-6496*

Received 3 October 2026 | Accepted by *V. Pešić*: 29 October 2026 | Published online 13 November 2026.

The mussel-associated leech *Hemiclepsis kasmiana* Oka, 1910 was thought to be a widespread species, the range of which covers Japan, mainland China, Taiwan, and Korea (Oka 1928; Yang 1996; Lai and Chen 2010). Later on, it was discovered in Far Eastern Russia (Bolotov *et al.* 2017, 2019). Recently, topotypes of *H. kasmiana* from Japan were collected and carefully examined by Kambayashi and Nakano (2026). Their research revealed that the Japanese *H. kasmiana* represents a divergent lineage, which is more closely related to *Hemiclepsis khankiana* Bolotov, Klass, Bespalaya, Konopleva, Kondakov & Vikhrev, 2019 than to the mainland *H. kasmiana* sensu Bolotov *et al.* (2017, 2019) from Russia and Korea (Kambayashi and Nakano 2026).

This study describes the mainland '*Hemiclepsis kasmiana*' as two species new to science (as *Hemiclepsis bivalvicola* **sp. nov.** from the Russian Far East and *Hemiclepsis koreaensis* **sp. nov.** from South Korea) and illustrates their diagnostic morphological features in detail. The morphological, anatomical, and *COI* sequencing approaches used in this study followed those described by Bolotov *et al.* (2019, 2022). The sequence set was aligned using the MUSCLE algorithm of MEGA11 (Tamura *et al*. 2021). The maximum likelihood phylogeny was reconstructed using IQ-TREE v.3.1.2 (Nguyen *et*

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al. 2015; Wong *et al*. 2026). Node support values were estimated with an ultrafast bootstrap algorithm (Hoang *et al*. 2017). The best evolutionary models were automatically detected using ModelFinder (Kalyaanamoorthy *et al*. 2017). Species delimitation procedures included three methods: the multi-rate Poisson tree processes (mPTP) species delimitation model (https://mptp.h-its.org/#/tree; Kapli *et al.* 2017); the Automatic Barcode Gap Discovery (ABGD) and the Assemble Species by Automatic Partitioning (ASAP) (https://spartexplorer.mnhn.fr/delimitation; Puillandre *et al.* 2012; Puillandre *et al.* 2021; Miralles *et al.* 2022). The latter two approaches are distance-based, and the JC69 model was used as a measure of genetic distance. The uncorrected *COI* p-distances between and within species were calculated using MEGA11 (Tamura *et al.* 2021). The complete list of *COI* sequences of mussel-associated *Hemiclepsis* species examined in this study is presented in Appendix A.

Our *COI* phylogeny and median-joining network indicate that the *Hemiclepsis kasmiana* species complex comprises four well-supported clades: *H. kasmiana* s. str. from Japan, *H. khankiana* from the Russian Far East and China, and two unnamed clades – one from the Russian Far East and one from South Korea (Figures 1-2). The species-level status of these clades was supported by three different species-delimitation approaches (see Figure 1). Diagnostic features for these four species are presented in Table 1. In all cases, the mean intraspecific *COI* p-distance is at least two times lower than the mean interspecific p-distance (Table 2). The mean *COI* p-distance between species within the *Hemiclepsis kasmiana* complex varies from 3.5 to 4.6 % (see Table 2).

Table 1. Diagnostic features of species within the *Hemiclepsis kasmiana* complex (Bolotov *et al*. 2019; Kambayashi and Nakano 2026; this study).

Features	***H. kasmiana***	***H. khankiana***	***H. bivalvicola*** sp. nov.	***H. koreaensis*** sp. nov.
Size	Medium-sized (BL up to 13.6 mm)	Medium-sized (BL up to 11.8 mm)	Medium-sized (BL up to 10.0 mm)	Small (BL up to 6.1 mm)
Eyes	Two pairs	Two pairs	Two pairs	Two pairs
Dorsal ground color	Brown	Brown	Brown	Brown to dark brown
Dorsal markings pattern	Five longitudinal whitish stripes, each of which is broadened at a3 of each mid-body somite, sometimes forming continuous whitish transverse bands	Five longitudinal light stripes (median, outer paramedian, and outer paramarginal positions) with sharp edges	Five longitudinal light stripes (median, outer paramedian, and outer paramarginal positions) with strongly blurred edges	Five longitudinal rows of yellow or whitish oval spots at median, inner paramarginal, and marginal position
Posterior sucker	Brown with light radial stripes	Light-colored, with dense, diffuse brown dots	Brown with light radial stripes or ovate spots	Brown with light radial stripes or ovate spots
Papillae	Absent	Absent	Absent	Absent
Salivary glands	Diffuse	Diffuse	Diffuse	Diffuse
Number of the crop caeca pairs	11	11	11	11
Gonopores	XI/XII (male) and in XII a1/a2 (female); separated by 2 annuli	XI/XII (male) and in XII a1/a2 (female); separated by 2 annuli	XI/XII (male) and in XII a1/a2 (female); separated by 2 annuli	XI/XII (male) and in XII a1/a2 (female); separated by 2 annuli
Pairs of testisacs	6	6	6	6

..continued on the next page

Features	***H. kasmiana***	***H. khankiana***	***H. bivalvicola*** sp. nov.	***H. koreaensis*** sp. nov.
Bivalve hosts	One family, eight species: *Cristaria plicata*; *Lanceolaria oxyrhyncha*; *Nodularia douglasiae*; *N. nipponensis*; *Obovalis omiensis*; *Pronodularia japanensis*; *Sinanodonta calipygos*; *S. lauta* (Unionidae)	One family, three species: *Middendorffinaia mongolica*; *Nodularia douglasiae*; *Sinanodonta shrenkii* (Unionidae)	Two families, nine species: *Margaritifera dahurica* (Margaritiferidae); *Amuranodonta kijaensis*; *Buldowskia shadini*; *B. suifunica*; *Cristaria plicata*; *Middendorffinaia mongolica*; *Nodularia douglasiae*; *Sinanodonta lauta*; *S. schrenkii* (Unionidae)	One family, five species: *Lamprotula leaii*; *Nodularia breviconcha*; *N. douglasiae*; *Scriptolamprotula coreana*; *Sinanodonta lauta* (Unionidae)
Fish hosts	*Carassius* sp. (Cypriniformes: Cyprinidae) [GenBank acc. no. LC928810, LC928811, LC928812]	*Rhodeus uyekii* (Mori, 1935) (Cypriniformes: Acheilognathidae) [GenBank acc. no. MN605514]	*Silurus asotus* Linnaeus, 1758 (Siluriformes: Siluridae) [GenBank acc. no. MN605513]	*Perccottus glenii* Dybowski, 1877 (Perciformes: Odontobutidae) [GenBank acc. no. MN605512]
Range	Japan	China and the southern part of the Russian Far East (Ussuri River basin)	The Russian Far East and, most likely, adjacent areas of Northern China (at least within the Amur River basin)	South Korea

Table 2. Mean uncorrected *COI* p-distance (± S.E., %) within and between species belonging to the *Hemiclepsis kasmiana* complex

Species	Number of *COI* sequences (*n*)	Intraspecific mean p-distance	*H. kasmiana*	*H. khankiana*	*H. koreaensis*
H. kasmiana	18	0.77 ± 0.13			
H. khankiana	12	0.65 ± 0.18	4.0 ± 0.7		
H. koreaensis	14	1.46 ± 0.27	4.1 ± 0.7	3.9 ± 0.7	
H. bivalvicola	30	0.40 ± 0.12	4.4 ± 0.8	4.6 ± 0.8	3.5 ± 0.6

Taxonomy

Class Clitellata Michaelsen, 1919
Subclass Hirudinea Lamarck, 1818
Order Hirudinida Siddall, Apakupakul, Burreson, Coates, Erséus, Gelder, Källersjö & Trapido-Rosenthal, 2001
Suborder Glossiphoniiformes Tessler & de Carle, 2018

Family Glossiphoniidae Vaillant, 1890
Subfamily Glossiphoniinae Vaillant, 1890

Genus *Hemiclepsis* Vejdovsky, 1884
Type species: *Hirudo marginata* O. F. Müller, 1774 (by subsequent designation)

Hemiclepsis bivalvicola **Eliseeva, Kondakov, Bespalaya & Bolotov sp. nov.**
= *Hemiclepsis kasmiana* Bolotov *et al.* (2017): 389, figs 1-6; Bolotov *et al.* (2019): 4, table 1, figs 3G, 4G, 5G, 6A. [partim = Russian lineage; misidentification; non Oka 1910].
Figures 3A-D, 4A-B, 5A-B, 6; see also Appendix A for information on reference DNA sequences.
https://zoobank.org/urn:lsid:zoobank.org:act:8C317D07-C300-4CAE-AD73-2C83CFFF19DF

Holotype RMBH Hir_0540_1-H (ethanol-preserved specimen); RUSSIA: Far East, Primorsky Krai, Gladkaya River, 42.7063°N, 130.9080°E, from the mantle cavity of *Buldowskia suifunica* (Lindholm, 1925) (Bivalvia: Unionidae), 10 August 2021, I.N. Bolotov, I.V. Vikhrev, E.S. Konopleva & Y.E. Chapurina leg. Measurements (mm): body length (BL) 8.9; body width (BW) 4.3; width of anterior sucker (AW) 1.0; width of posterior sucker (PW) 1.8.

Paratypes RMBH Hir_0540 (nine ethanol-preserved specimens): the type locality, the same host, collecting date, and collectors. Range of measurements (n = 9; min-max, mm): BL 6.1–9.9; body width (BW) 2.3–4.3; width of anterior sucker (AW) 0.6–1.0; width of posterior sucker (PW) 1.2–2.4. Additional sequenced paratypes (n = 30; unmeasured) are listed in Appendix A with information on *COI* GenBank accession numbers and collection labels.

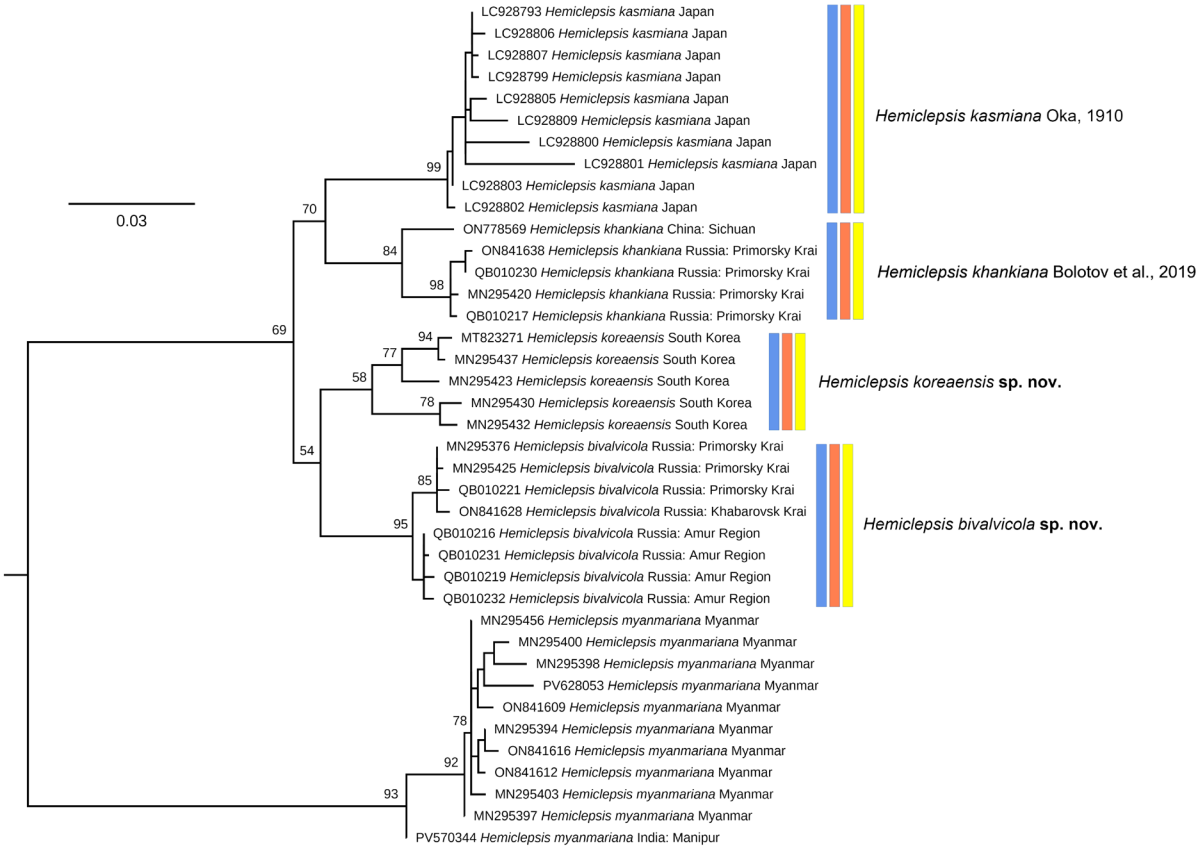


Figure 1. Results of species delimitation analysis of the *Hemiclepsis kasmiana* species complex based on the *COI* haplotype phylogeny. Vertical bars indicate Molecular Operational Taxonomic Units (MOTUs) generated by various species delimitation models: ABGD (blue), ASAP (orange), and mPTP (yellow). Information on *COI* sequences is given in Appendix A. The scale bar indicates the branch lengths (substitutions per site). Outgroup taxon is not shown (*Hemiclepsis yangtzenensis* C. Yang & Bolotov, 2021 from Yangtze Basin, China; GenBank acc. no. MW699107).

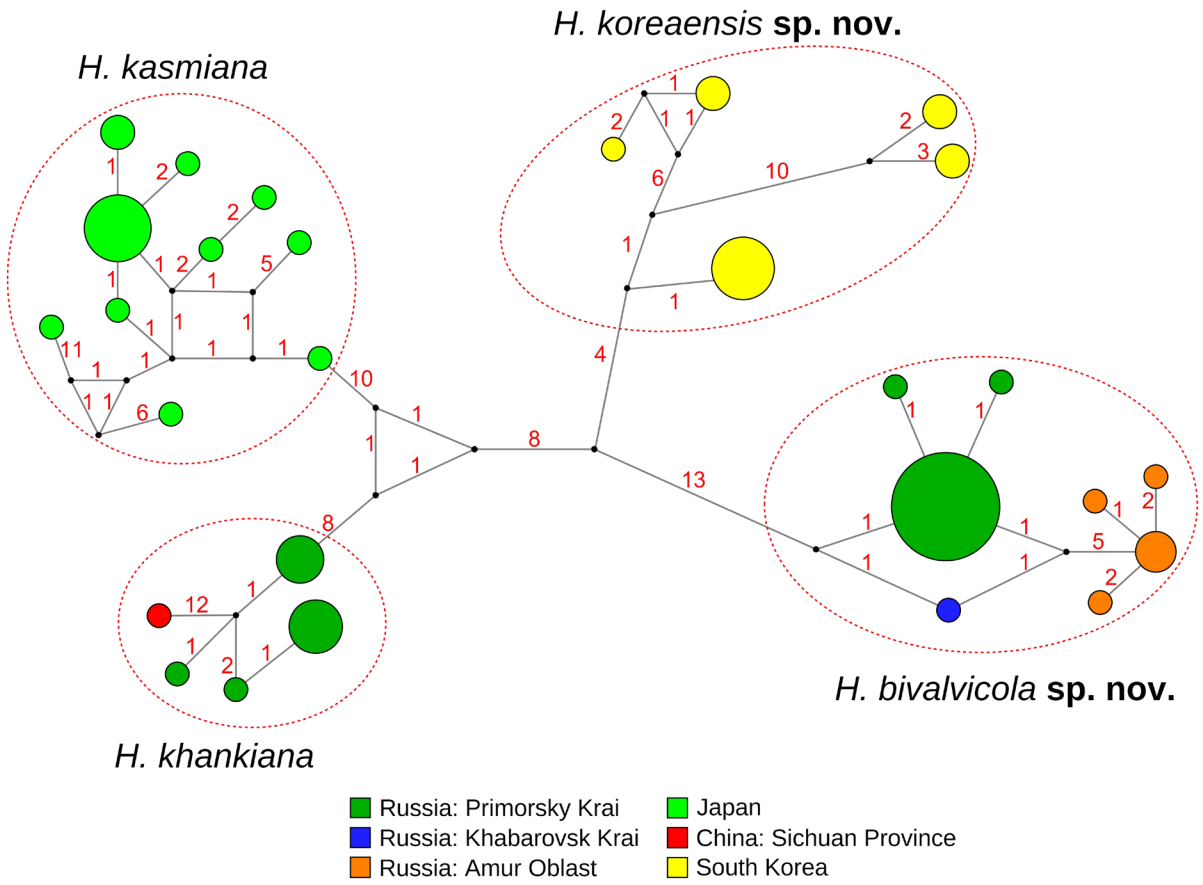


Figure 2. Median-joining haplotype network of the mussel-associated *Hemiclepsis kasmiana* species complex from East Asia based on *COI* gene sequences ($n = 74$, length = 649 bp; see Appendix A for detail). The red numbers near branches are number of nucleotide substitutions between haplotypes. The size of circles corresponds to the number of *COI* sequences that were used in the analysis (the smallest circle = one sequence).

Etymology: The name of the new species refers to its bivalve-dwelling life style.

Differential diagnosis: Medium-sized leech that can be distinguished from its congeners by the following combination of characters: a brown dorsal surface with five longitudinal light stripes extending along the entire body length (median, outer paramedian, and outer paramarginal positions); a posterior sucker with a brown ground color and radial light stripes or spots; papillae absent; two pairs of eyes on annuli II and III; and 11 pairs of crop caeca. The new species is morphologically similar to *H. koreaensis* **sp. nov.**, *H. kasmiana* and *H. khankiana*. *H. koreaensis* **sp. nov.** differs from the new species by having a brown to dark brown dorsal surface with five longitudinal rows of yellow or whitish oval spots at the median, inner paramarginal, and marginal positions. *H. kasmiana* could be distinguished from the new species by having five longitudinal whitish stripes, each broadened at a3 of each mid-body somite, sometimes forming continuous whitish transverse bands (vs. continuous stripes lacking explicit expansion at a3). *H. khankiana* differs from the new species by having a more distinct light and brown longitudinal striped pattern on the dorsum with sharp stripe edges (vs. a striped pattern with strongly blurred edges).

Description: Medium-sized leech (body length up to 10 mm). The body is elongated-oval, dorsoventrally flattened, and widest in the middle region. The anterior end is narrowed, and the posterior end is broadly rounded. The dorsal surface is smooth, without evident papillae. Two pairs of eyes: the 1st pair on II, and the 2nd pair on III. Coloration of living animals: the dorsum is brown with five longitudinal yellow or whitish stripes with unclear, diffuse edges; the coloration of the ventral side varies from yellow with diffuse brown pattern to light brown with an unclear median light stripe. Coloration of ethanol-preserved animals: the dorsum is brown to gray, with five distinct longitudinal light stripes extending along the entire body length (median, outer paramedian, and outer paramarginal positions);

the posterior sucker has a brown ground color with radial light stripes. The ventral surface varies from weakly pigmented, almost uniformly pale with scattered brown pigment cells to brown with a light median stripe. The anterior sucker is small (maximum diameter of 1.0 mm) and weakly differentiated from the body. The proboscis pore is located in the anterior part of the anterior sucker. The posterior sucker is rounded and relatively small (maximum diameter of 2.4 mm). The total number of annuli: 70. Somites I–III are uniannulate, IV–XXIV triannulate, XXV biannulate, and XXVI–XXVII uniannulate. The anus is located on somite XXVII. Reproductive system: six pairs of medium-sized, spherical testisacs are located intersomitally from XIV to XIX; the atrium is spherical, and the atrial cornua are ovate, elongated, and anterolaterally directed. The paired sperm ducts are thick, coiled. One pair of ovisacs, tubular and folded. The gonopores are separated by two annuli: the male gonopore at XI|XII, and the female gonopore at XII a2 | a3. Digestive system: the esophagus is broad; the salivary glands are diffuse; the crop has 11 pairs of crop caeca: the 1st-3th pairs are simple, the 4th-10th are diverticulated into two to three lobes, and the 11th pair (posterior caeca) has four to five blind processes; the intestine is enlarged, with four pairs of bag-like processes, each bearing several short lobes.

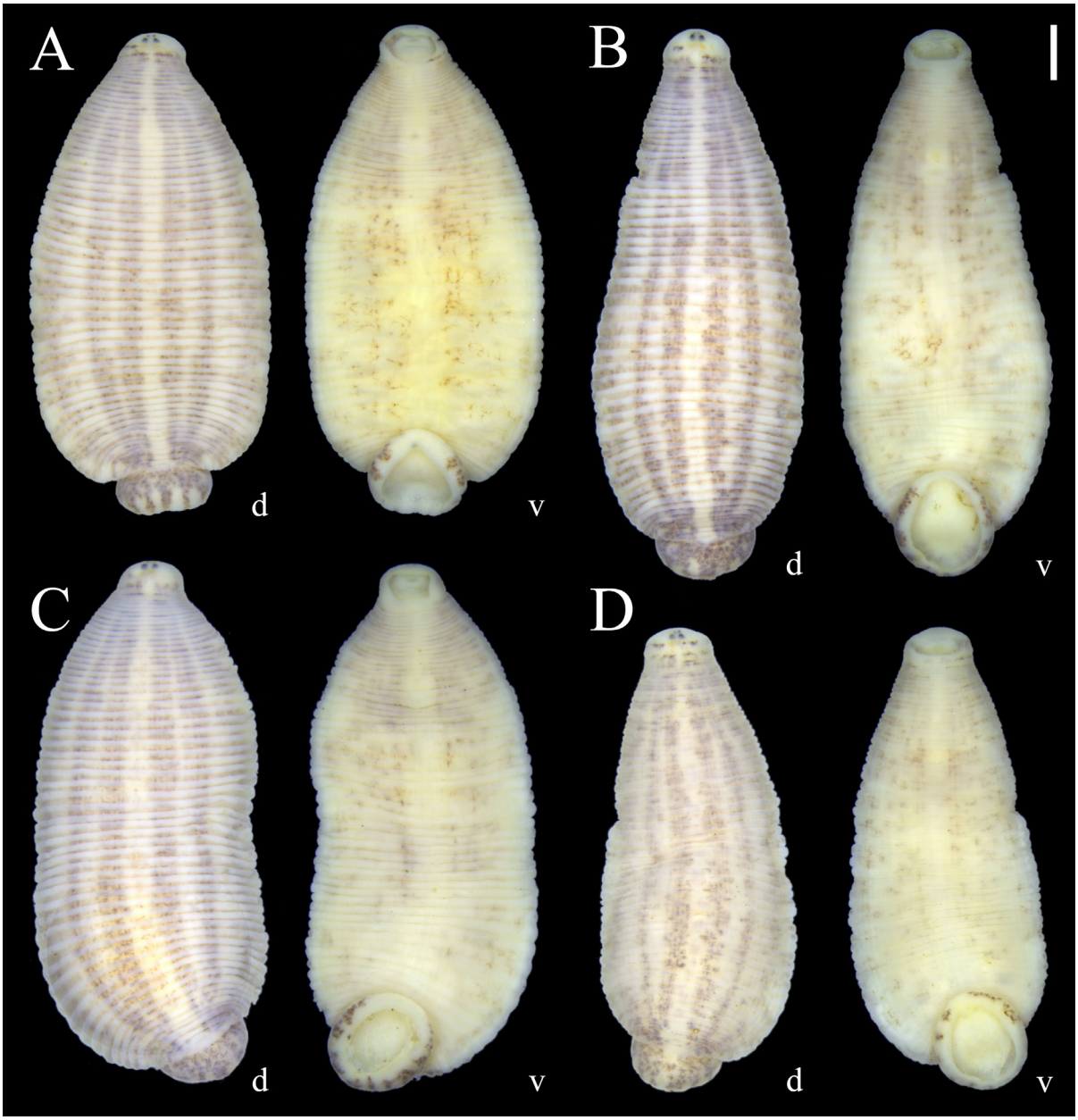


Figure 3. Dorsal (d) and ventral (v) view of the holotype and selected paratypes of *Hemiclepsis bivalvicola* **sp. nov.** from Gladkaya River, Primorsky Krai, Russia: (**A**) holotype RMBH Hir_0540_1-H; (**B**) paratype RMBH Hir_0540_2; (**C**) paratype RMBH Hir_0540_4; and (**D**) paratype RMBH Hir_0540_5. Scale bar = 1.0 mm. Photos: Tatyana A. Eliseeva.

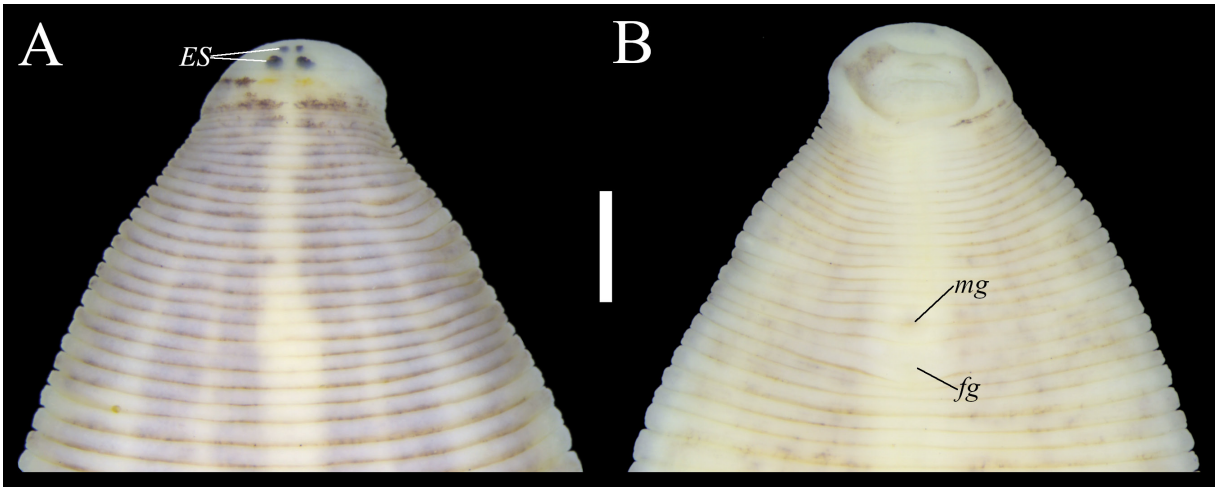


Figure 4. Anterior region with eyes in dorsal view (**A**) and gonopores in ventral view (**B**) of the holotype of *Hemiclepsis bivalvicola* **sp. nov.** (RMBH Hir_0540_1-H, Gladkaya River, Primorsky Krai, Russia). Abbreviations: *ES*, eyes; *mg*, male gonopore; *fg*, female gonopore. Scale bar = 0.75 mm. Photos: Tatyana A. Eliseeva.

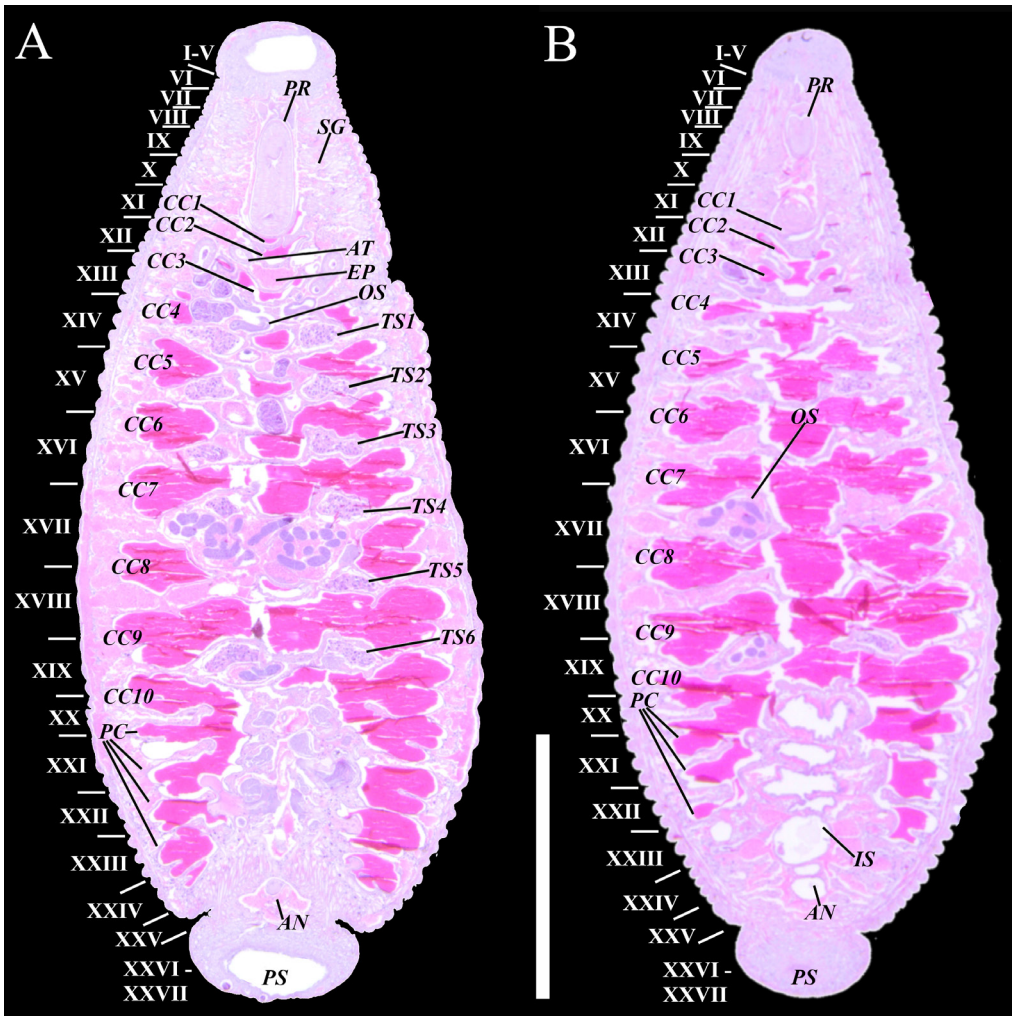


Figure 5. H&E-stained longitudinal slices showing the digestive and generative systems of *Hemiclepsis bivalvicola* **sp. nov.** (paratype Hir_0540_2, Gladkaya River, Primorsky Krai, Russia): (**A**) closer to the ventral side (slide No. 03); (**B**) closer to the dorsal side (slide No. 7). Abbreviations: *PR*, proboscis sheath; *EP*, esophagus; *SG*, salivary glands; *CC*, pairs of crop caeca with their numbers; *PC*, the last pair of crop caeca (posterior caeca); *TS*, testisacs with their numbers; *OS*, ovisacs; *PS*, posterior sucker; *IS*, intestine; *AN*, anus. Body somites are indicated by Roman numerals. Scale bar = 2.5 mm. Photos: Alexander V. Kropotin; graphics: Tatyana A. Eliseeva.

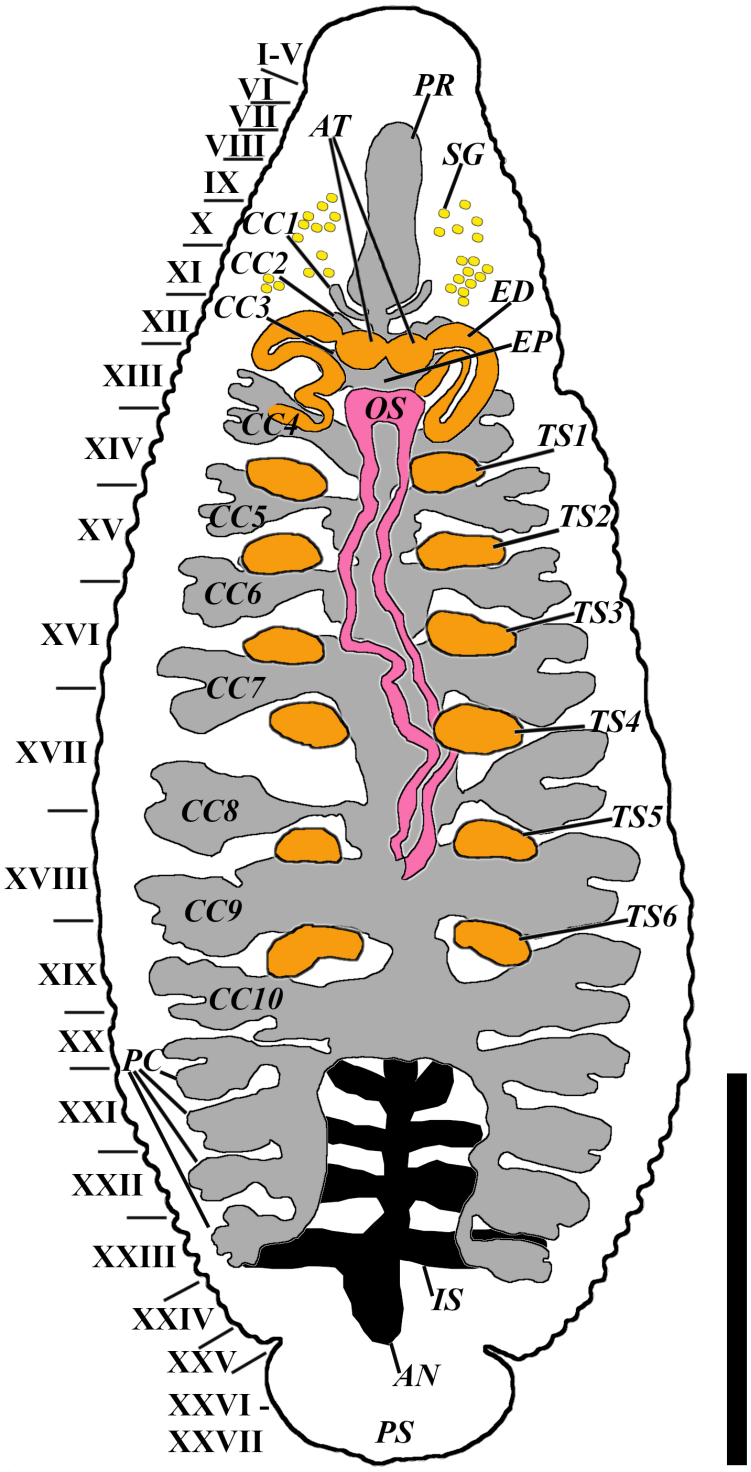


Figure 6. General scheme of the digestive and generative systems of *Hemiclepsis bivalvicola* **sp. nov.** Abbreviations: *PR*, proboscis sheath; *EP*, esophagus; *SG*, salivary glands; *CC*, pairs of crop caeca with their numbers; *PC*, the last pair of crop caeca (posterior caeca); *IS*, intestine; *AN*, anus; *AT*, atrium; *ED*, ejaculatory ducts; *TS*, testisacs with their numbers; *OS*, ovisacs; and *PS*, posterior sucker. Body somites are indicated by Roman numerals. Scale bar = 2.5 mm. Graphics: Tatyana A. Eliseeva.

Molecular diagnosis: The new species is genetically closest to *H. koreaensis* **sp. nov.** (mean *COI* p-distance = 3.5 ± 0.6 %), while its divergence from *H. kasmiana* and *H. khankiana* is higher (mean *COI* p-distance of 4.4 ± 0.8 % and 4.6 ± 0.8 %, respectively). The latter two species are more closely related to each other, with a mean *COI* p-distance of 4.0 ± 0.7 % (Table 2).

Life style and hosts: The new species is a mussel-associated leech, whose life history aligns with that of other bivalve-associated *Hemiclepsis* species. These species use bivalves as secondary hosts and shelters, while freshwater fishes serve as primary hosts (see Bolotov *et al.* 2019 for detail). The confirmed bivalve hosts are nine freshwater mussel species belonging to two families: *Margaritifera dahurica* (Middendorff, 1850) (Margaritiferidae: Margaritiferinae), *Amuranodonta kijaensis* Moskvicheva, 1973, *Buldowskia shadini* (Moskvicheva, 1973), *B. suifunica* (Lindholm, 1925), *Cristaria plicata* (Leach, 1814), *Sinanodonta lauta* (Martens, 1877), *S. schrenkii* (Lea, 1870) (Unionidae: Unioninae: Anodontini), *Middendorffinaia mongolica* (Middendorff, 1851), *Nodularia douglasiae* (Griffith & Pidgeon, 1833) (Unionidae: Unioninae: Unionini) (Bolotov *et al.* 2019). One primary fish host, *Silurus asotus* Linnaeus, 1758 (Siluriformes: Siluridae), was identified based on the DNA sequence of the crop content of an adult leech (Bolotov *et al.* 2019).

Distribution: The new species is known to occur in the Russian Far East, including the Amur and Razdolnaya River basins and smaller drainages of the southern part of Primorsky Krai (Bolotov *et al.* 2019). It is also expected to be widespread in the surrounding areas of China (Yang 1996; Bolotov *et al.* 2017) and North Korea, but DNA sequence data from these regions are still lacking.

Comments: The species-level differences between the Japanese and mainland populations of *H. kasmiana* sensu lato were expected based on morphological features, as they clearly differ from each other in their general markings pattern (see Bolotov *et al.* 2017, 2019; Kambayashi and Nakano 2026). Bolotov *et al.* (2019) proposed that several *Hemiclepsis* species possess seven pairs of crop caeca, including their '*H. kasmiana*' [= *H. bivalvicola* **sp. nov.** + *H. koreaensis* **sp. nov.**], *H. khankiana*, *H. myanmariana* Bolotov, Klass, Bespalaya, Konopleva, Kondakov & Vikhrev, 2019, *H. schrencki* Bolotov, Klass, Bespalaya, Konopleva, Kondakov & Vikhrev, 2019, and *H. tumniniana* Bolotov, Klass, Bespalaya, Konopleva, Kondakov & Vikhrev, 2019. However, this proposal was based on incomplete specimen dissections, where the first four pairs of crop caeca were hidden within the anterior part of the animal. Subsequently, it was shown that *H. schrencki* and *H. kasmiana* from Japan possess 11 pairs of crop caeca (Kambayashi and Nakano 2025, 2026). Here, we show that *H. bivalvicola* from the Russian Far East and *H. koreaensis* from South Korea also possess 11 pairs of crop caeca.

A number of recent studies have revealed that many freshwater animal species, previously thought to have a broad range covering mainland East Asia and Japan, actually represent cryptic species complexes (Watanabe *et al.* 2016; Lopes-Lima *et al.* 2020; Aksenova *et al.* 2024). These complexes typically contain several narrow-range Japanese endemics and a few more widespread species, including the freshwater mussel genera *Beringiana* Starobogatov, 1983 and *Buldowskia* Moskvicheva, 1973 (Unionidae), the freshwater snail genera *Orientogalba* Kruglov & Starobogatov, 1985, *Galba* Schrank, 1803, and *Kamtschaticana* Kruglov & Starobogatov, 1984 (Lopes-Lima *et al.* 2020; Aksenova *et al.* 2024), as well as the freshwater leech genus *Hemiclepsis* Vejdovský, 1884 (Kambayashi and Nakano 2026). These biogeographic patterns reflect the complex geological history of the Japanese Archipelago (Watanabe *et al.* 2016).

***Hemiclepsis koreaensis* Eliseeva, Kondakov, Bespalaya, Kim, Lee & Bolotov sp. nov.**

= *Hemiclepsis kasmiana* Bolotov *et al.* (2019): 4, table 1, figs 3H, 4H, 5H, 6A. [partim = Korean lineage; misidentification; non Oka 1910].

Figures 7A-D, 8A-B; see also Appendix A for information on reference DNA sequences.

https://zoobank.org/urn:lsid:zoobank.org:act:AF1AD2E2-4428-49F7-A4BA-56D234F2F963

Holotype RMBH Hir_118_1-H (ethanol-preserved specimen); SOUTH KOREA: Seomjin River, 35.7010°N, 127.2845°E, from the mantle cavity of *Sinanodonta lauta* (Martens, 1877) (Bivalvia: Unionidae), 10 July 2018, Bogan, Bolotov, Kim, Kondakov, Lee, Lopes-Lima & Vikhrev leg. Measurements (mm): body length (BL) 5.8; body width (BW) 2.0; width of anterior sucker (AW) 0.5; width of posterior sucker (PW) 1.2.

Paratypes: SOUTH KOREA: the type locality, the same host, collecting date, and collectors (six ethanol-preserved specimens; voucher no. RMBH Hir_0118_2 - RMBH Hir_0118_7); Geum River, 35.9891°N, 127.5836°E, from the mantle cavity of *Scriptolamprotula coreana* (Martens, 1886) (Bivalvia: Unionidae), 08 July 2018, Bogan, Bolotov, Kim, Kondakov, Lee, Lopes-Lima & Vikhrev leg. (two ethanol-preserved specimens; voucher no. RMBH Hir_0106_1 and RMBH Hir_0106_2); Geum

River, 35.9891°N, 127.5836°E, from the mantle cavity of *Lamprotula leaii* (Gray, 1833), 08 July 2018, Bogan, Bolotov, Kim, Kondakov, Lee, Lopes-Lima & Vikhrev leg. (one ethanol-preserved specimen; voucher no. RMBH Hir_0107_2). Range of measurements (n = 10; min-max, mm): BL 3.2–6.1; body width (BW) 2.0–3.3; width of anterior sucker (AW) 0.5–0.8; width of posterior sucker (PW) 1.0–1.7. Additional sequenced paratypes (n = 14; unmeasured) are listed in Appendix A with information on *COI* GenBank accession numbers and collection labels.

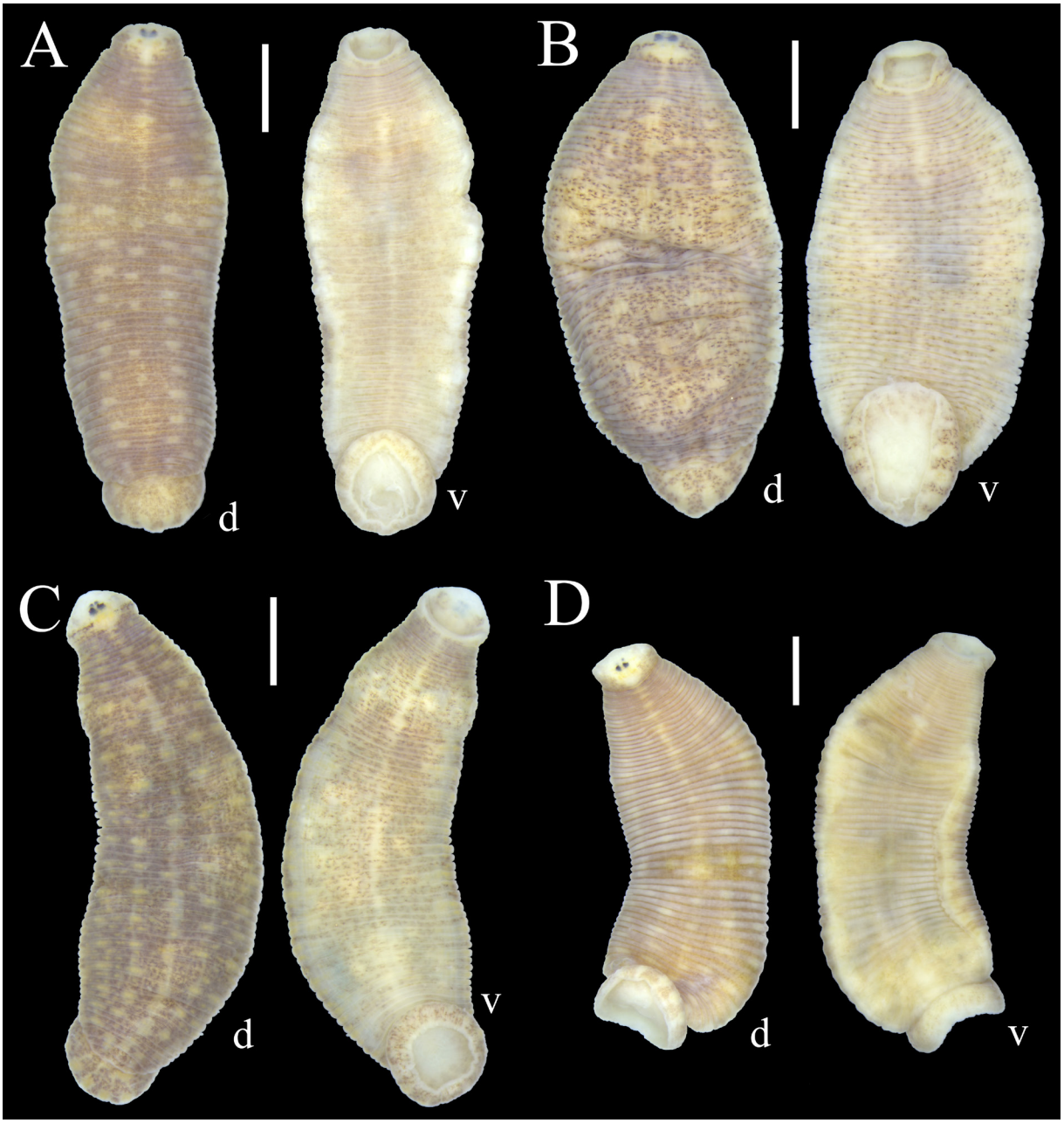


Figure 7. Dorsal (d) and ventral (v) view of the holotype and selected paratypes of *Hemiclepsis koreaensis* **sp. nov.** from Seomjin River, South Korea: (**A**) holotype RMBH Hir_0118_1-H; (**B**) paratype RMBH Hir_0118_2; (**C**) paratype RMBH Hir_0118_3; and (**D**) paratype RMBH Hir_0118_4. Scale bars = 1.0 mm. Photos: Tatyana A. Eliseeva.

Etymology: The name of the new species refers to its distribution range on the Korean Peninsula.

Differential diagnosis: Small leech, which could be distinguished from other congeners by the following combination of characters: a dorsal surface ranging from brown to dark brown with five longitudinal rows of yellow or whitish oval spots at the median, inner paramarginal, and marginal

positions; a brown posterior sucker with radial light stripes or oval spots; papillae absent; two pairs of eyes on annuli II and III; and 11 pairs of crop caeca. The new species is morphologically similar to *H. bivalvicola* **sp. nov.**, *H. kasmiana* and *H. khankiana*. *H. bivalvicola* **sp. nov.** differs from the new species by having a brown dorsal surface with five longitudinal light stripes extending along the entire body length (median, outer paramedian, and outer paramarginal positions). *H. kasmiana* could be distinguished from the new species by having five longitudinal whitish stripes, each broadened at a3 of each mid-body somite, sometimes forming continuous whitish transverse bands (vs. continuous stripes lacking explicit expansion at a3). *H. khankiana* differs from the new species by having a more distinct light and brown longitudinal striped pattern on the dorsum, with sharp edges to the stripes (vs. a striped pattern with strongly blurred edges); a posterior sucker with brown spots (vs. radial light stripes).

Description: Small leech (body length up to 6.1 mm). The body is elongated-oval, dorsoventrally flattened, and widest in the middle region. The anterior end is narrowed, and the posterior end is broadly rounded. The dorsal surface is smooth, without evident papillae. Two pairs of eyes: the 1st pair on II, and the 2nd pair on III. Coloration of living animals: unknown. Coloration of ethanol-preserved animals: the dorsum is brown to dark brown with five longitudinal rows of yellow or whitish oval spots at the median, inner paramarginal, and marginal positions; the posterior sucker is brown with radial light stripes or oval spots; the coloration of the ventral side varies from whitish yellow with a diffuse brown pattern to light brown with an unclear median light stripe. The anterior sucker is small (maximum diameter of 0.8 mm) and weakly differentiated from the body. The proboscis pore is located in the anterior part of the anterior sucker. The posterior sucker is rounded and relatively small (maximum diameter of 1.7 mm). The total number of annuli: 70. Somites I–III are uniannulate, IV–XXIV triannulate, XXV biannulate, and XXVI–XXVII uniannulate. The anus is located on somite XXVII. The reproductive and digestive systems are identical to those of *H. bivalvicola* **sp. nov.** and *H. kasmiana*.

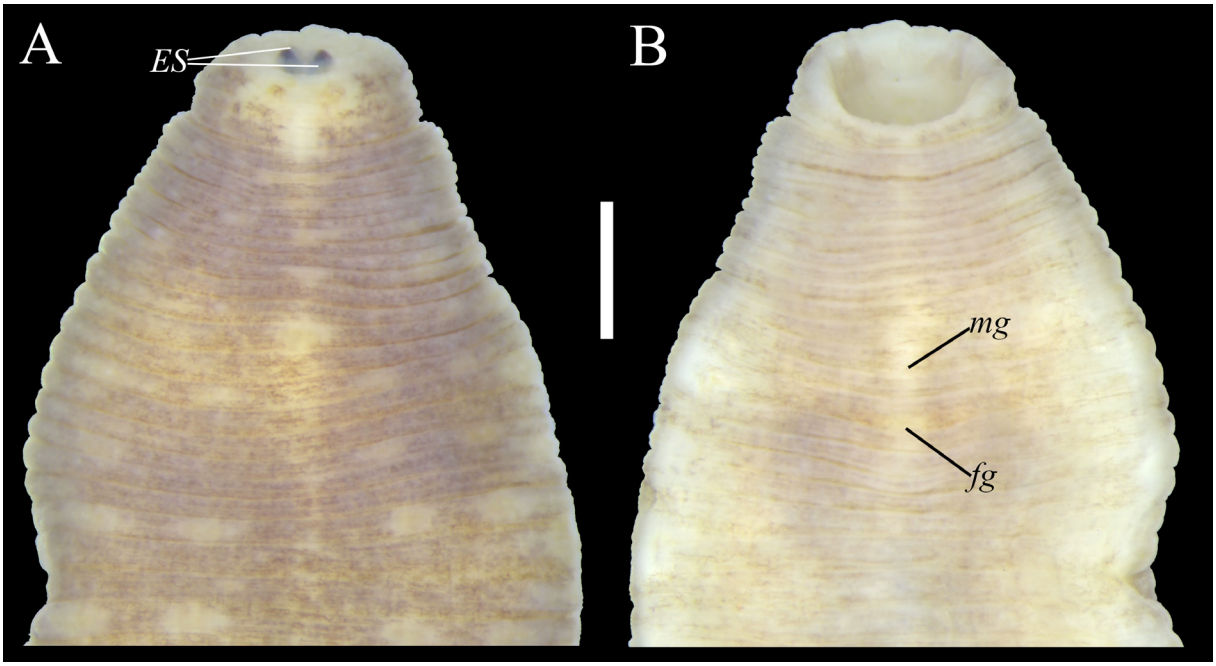


Figure 8. Anterior region with eyes in dorsal view (**A**) and gonopores in ventral view (**B**) of the holotype of *Hemiclepsis koreaensis* **sp. nov.** (holotype RMBH Hir_0118_1-H, Seomjin River, South Korea). Abbreviations: *ES*, eyes; *mg*, male gonopore; *fg*, female gonopore. Scale bar = 0.5 mm. Photos: Tatyana A. Eliseeva.

Molecular diagnosis: The new species is most closely related to *H. bivalvicola* **sp. nov.** (mean *COI* p-distance = 3.5 ± 0.6 %), whereas its divergence from *H. kasmiana* and *H. khankiana* is higher (mean *COI* p-distance of 4.1 ± 0.7 % and 3.9 ± 0.7 %, respectively) (Table 2).

Life style and hosts: The new species is a mussel-associated leech, the life history of which aligns with that of other bivalve-associated *Hemiclepsis* species. These species use bivalves as secondary hosts and shelters, while freshwater fishes serve as primary hosts (see Bolotov *et al.* 2019 for detail). The confirmed bivalve hosts are five freshwater mussel species belonging to the family Unionidae:

Sinanodonta lauta (Martens, 1877) (Unioninae: Anodontini), *Scriptolamprotula coreana* (Martens, 1886), *Nodularia douglasiae* (Griffith & Pidgeon, 1833), *Nodularia breviconcha* Lee, Kim, Bogan & Kondo, 2020 (Unioninae: Unionini), *Lamprotula leaii* (Gray in Griffith & Pidgeon, 1833) (Gonideinae: Lamprotulini) (Bolotov *et al.* 2019). One primary fish host, *Perccottus glenii* Dybowski, 1877 (Perciformes: Odontobutidae), was identified based on the DNA sequence of the crop content of an adult leech (Bolotov *et al.* 2019).

Distribution: The new species is known to occur in South Korea (Bolotov *et al.* 2019).

Comments: Populations of *H. koreaensis* belong to two relatively divergent phylogenetic lineages (Figures 1-2; also see Bolotov *et al.* 2019). The taxonomic status of these lineages requires further in-depth research.

Acknowledgements

We are grateful to Clemens Grosser and an anonymous reviewer for valuable comments on earlier versions of this paper. The Russian Science Foundation (project no. 26-14-00267) supported the molecular-genetic and morphological analyses of specimens, as well as manuscript writing contributions of I.N.B., T.A.E., A.V.K., A.V. Kr., M.Y.G., and Y.V.B. Field sampling of leeches by L.A.P., E.M.S., and V.V.B. was funded by the Ministry of Science and Higher Education of Russia (state assignment theme no. 124012400285-7).

References

Aksenova, O. V., Vinarski, M. V., Itagaki, T., Ohari, Y., Oshida, T., Kim, S. K., Lee, J. H., Kondakov, A. V., Khrebtova, I. S., Soboleva, A. A., Travina, O. V., Sokolova, S. E., Palatov, D. M., Bespalaya, Y. V., Vikhrev, I. V., Gofarov, M. Y. & Bolotov, I. N. (2024) Taxonomy and trans-Beringian biogeography of the pond snails (Gastropoda: Lymnaeidae) of East Asia: an integrative view. *Zoological Journal of the Linnean Society*, 201(4), zlae083. https://doi.org/10.1093/zoolinnean/zlae083

Bolotov, I. N., Klass, A. L., Kondakov, A. V., Vikhrev, I. V., Bespalaya, Y. V., Gofarov, M. Y., Filippov, B. Y., Bogan, A. E., Lopes-Lima, M., Zau Lunn, Nyein Chan, Aksenova, O. V., Dvoryankin, G. A., Chapurina, Y. E., Kim, S. K., Kolosova, Y. S., Konopleva, E. S., Lee, J. H., Makhrov, A. A., Palatov, D. M., Sayenko, E. M., Spitsyn, V. M., Sokolova, S. E., Tomilova, A. A., Than Win, Zubrii, N. A. & Vinarski, M. V. (2019) Freshwater mussels house a diverse mussel-associated leech assemblage. *Scientific Reports*, 9, 16449. https://doi.org/10.1038/s41598-019-52688-3

Bolotov, I. N., Kondakov, A. V., Eliseeva, T. A., Aksenova, O. V., Babushkin, E. S., Bespalaya, Y. V., Chertoprud, E. S., Dvoryankin, G. A., Gofarov, M. Y., Klass, A. L., Konopleva, E. S., Kropotin, A. V., Lyubas, A. A., Makhrov, A. A., Palatov, D. M., Shevchenko, A. R., Sokolova, S. E., Spitsyn, V. M., Tomilova, A. A., Vikhrev, I. V., Zubrii, N. A. & Vinarski, M. V. (2022) Cryptic taxonomic diversity and high-latitude melanism in the glossiphoniid leech assemblage from the Eurasian Arctic. *Scientific Reports*, 12, 20630. https://doi.org/10.1038/s41598-022-24989-7

Bolotov, I. N., Sorokhaibam, S. D., Naorem, M. M., Yambem, T. S., Loukrakpam, B. C., Dvoryankin, G. A., Gofarov, M. Y., Kondakov, A. V. & Eliseeva, T. A. (2025) Mollusc-associated leeches from Manipur with the first records of two invasive *Helobdella* species from India (Hirudinida: Glossiphoniidae). Ecologica Montenegrina, 87, 192–211.

Bolotov, I.N., Vikhrev, I.V., Aksenova, O.V., Bespalaya, Y.V., Gofarov, M.Y., Kondakov, A.V. & Sokolova, S.E. (2017) Discovery and natural history of the mussel leech *Batracobdella kasmiana* (Oka, 1910) (Hirudinida: Glossiphoniidae) in Russia. *Zootaxa*, 4319(2), 386–390. https://doi.org/10.11646/Zootaxa.4319.2.11

He, Y., Li, Z., Jin, W., Li, C., Wang, G., Wang, Z., Kang, M., Li, J., Wang, J., Hu, X., Jiang, S., Chen, Q., Li, H., Gao, D., Liu, P. & Li, Y. (2023) First description study on molecular characterization

of *Hemiclepsis khankiana* (Hirudinea: Glossiphoniidae) in China. *BMC Veterinary Research*, 19(1), 240. https://doi.org/10.1186/s12917-023-03796-w

Hoang, D. T., Chernomor, O., Von Haeseler, A., Minh, B. Q. & Vinh, L. S. (2018) UFBoot2: improving the ultrafast bootstrap approximation. *Molecular Biology and Evolution*, 35(2), 518–522. https://doi.org/10.1093/molbev/msx281

Kalyaanamoorthy, S., Minh, B. Q., Wong, T. K., Von Haeseler, A. & Jermiin, L. S. (2017) ModelFinder: fast model selection for accurate phylogenetic estimates. *Nature Methods*, 14(6), 587–589. https://doi.org/10.1038/nmeth.4285

Kambayashi, C. & Nakano, T. (2025) First record of the freshwater leech *Hemiclepsis schrencki* Bolotov, Klass, Bespalaya, Konopleva, Kondakov & Vikhrev, 2019 (Hirudinea, Glossiphoniidae) in Hokkaido, Japan. *Check List*, 21(4), 744–749. https://doi.org/10.15560/21.4.744

Kambayashi, C. & Nakano, T. (2026) Redescription and molecular characterization of freshwater mussel-associated leech *Hemiclepsis kasmiana* (Hirudinea: Glossiphoniiformes: Glossiphoniidae). *Species Diversity*, 31(2), 229–238. https://doi.org/10.12782/specdiv.31.229

Kapli, P., Lutteropp, S., Zhang, J., Kobert, K., Pavlidis, P., Stamatakis, A. & Flouri, T. (2017) Multi-rate Poisson tree processes for single-locus species delimitation under maximum likelihood and Markov chain Monte Carlo. *Bioinformatics*, 33(11), 1630–1638. https://doi.org/10.1093/bioinformatics/btx025

Kwak, H. J., Kim, J. H., Kim, J. Y., Jeon, D., Lee, D. H., Yoo, S., Kim, J., Eyun, S., Park, S. C. & Cho, S. J. (2021) Behavioral variation according to feeding organ diversification in glossiphoniid leeches (Phylum: Annelida). *Scientific Reports*, 11, 10940. https://doi.org/10.1038/s41598-021-90421-1

Lai, Y. T. & Chen J. H. (2010) *Leech fauna of Taiwan*. National Taiwan University Press, Taipei, 108 pp.

Lopes-Lima, M., Hattori, A., Kondo, T., Lee, J. H., Kim, S. K., Shirai, A., Hayashi, H., Usui, T., Sakuma, K., Toriya, T., Sunamura, Y., Ishikawa, H., Hoshino, N., Kusano, Y., Kumaki, H., Utsugi, Y., Yabe, S., Yoshinari, Y., Hiruma, H., Tanaka, A., Sao, K., Ueda, T., Sano, I., Miyazaki, J.-I., Gonçalves, D. V., Klishko, O. K., Konopleva, E. S., Vikhrev, I. V., Kondakov, A. V., Gofarov, M. Y., Bolotov, I. N., Sayenko, E. M., Soroka, M., Zieritz, A., Bogan, A. E. & Froufe, E. (2020) Freshwater mussels (Bivalvia: Unionidae) from the rising sun (Far East Asia): phylogeny, systematics, and distribution. *Molecular Phylogenetics and Evolution*, 146, 106755. https://doi.org/10.1016/j.ympev.2020.106755

Miralles, A., Ducasse, J., Brouillet, S., Flouri, T., Fujisawa, T., Kapli, P., Knowles, L. L., Kumari, S., Stamatakis, A., Sukumaran, J., Lutteropp, S., Vences, M. & Puillandre, N. (2022) SPART: A versatile and standardized data exchange format for species partition information. *Molecular Ecology Resources*, 22(1), 430–438. https://doi.org/10.1111/1755-0998.13470

Nguyen, L. T., Schmidt, H. A., von Haeseler, A. & Minh, B. Q. (2015) IQ-TREE: A fast and effective stochastic algorithm for estimating maximum-likelihood phylogenies. *Molecular Biology and Evolution*, 32, 268–274. https://doi.org/10.1093/molbev/msu300

Oka, A. (1928) Description de l'*Hemiclepsis kasmiana*. *Ibid*, 4, 64–66. [in French]

Puillandre, N., Brouillet, S. & Achaz, G. (2021) ASAP: assemble species by automatic partitioning. *Molecular Ecology Resources*, 21(2), 609–620. https://doi.org/10.1111/1755-0998.13281

Puillandre, N., Lambert, A., Brouillet, S. & Achaz, G. J. M. E. (2012) ABGD, Automatic Barcode Gap Discovery for primary species delimitation. *Molecular Ecology*, 21(8), 1864–1877. https://doi.org/10.1111/j.1365-294X.2011.05239.x

Tamura, K., Stecher, G. & Kumar, S. (2021) MEGA11: Molecular Evolutionary Genetics Analysis version 11. *Molecular Biology and Evolution*, 38, 3022–3027. https://doi.org/10.1093/molbev/msab120

Watanabe, K., Tominaga, K., Nakajima, J., Kakioka, R. & Tabata, R. (2016). Japanese freshwater fishes: biogeography and cryptic diversity. In: Motokawa, M., Kajihara, H. (eds) *Species Diversity of Animals in Japan. Diversity and Commonality in Animals*. Springer Japan, Tokyo, pp. 183–227. https://doi.org/10.1007/978-4-431-56432-4_7

Wong, T. K., Ly-Trong, N., Ren, H., Demotte, P., Baños, H., Roger, A. J., Susko, E., Bielow, C., De Maio, N., Goldman, N., Hahn, M. W., dos Reis, M., Vinh, L. S., Huttley, G., Lanfear, R. &

Minh, B. Q. (2026) IQ-TREE 3: phylogenomic inference software using complex evolutionary models. *Molecular Biology and Evolution*, 43(5), msag117. https://doi.org/10.1093/molbev/msag117

Yang, T. (1996) *Annelida Hirudinea* (*Fauna Sinica*). Science Press, Beijing, 259 pp. [in Chinese]

Appendix A

Information on *COI* sequences of mussel-associated *Hemiclepsis* species used in this study.

Species	*COI* sequence acc. No	Specimen voucher	Locality	Reference
H. bivalvicola **sp. nov.**	MN295376	RMBH Hir_0015/1/1	Russia: Primorsky Krai, Gladkaya River, 42.7065°N, 130.9084°E, from the mantle cavity of *Sinanodonta lauta* and *Buldowskia suifunica*, 25.x.2016, Bolotov & Vikhrev leg.	Bolotov *et al.* (2019)
H. bivalvicola **sp. nov.**	MN295377	RMBH Hir_0015/1/2	Ditto	Bolotov *et al.* (2019)
H. bivalvicola **sp. nov.**	MN295378	RMBH Hir_0015/2	Ditto	Bolotov *et al.* (2019)
H. bivalvicola **sp. nov.**	MN295379	RMBH Hir_0015/3/1	Russia: Primorsky Krai, Razdolnaya River basin, Soldatskoye Lake, 3.7747°N, 131.9406°E, from the mantle cavity of *Buldowskia suifunica*, 24.x.2016, Bolotov & Vikhrev leg.	Bolotov *et al.* (2019)
H. bivalvicola **sp. nov.**	MN295380	RMBH Hir_0015/3/2	Ditto	Bolotov *et al.* (2019)
H. bivalvicola **sp. nov.**	MN295381	RMBH Hir_0015/3/3	Ditto	Bolotov *et al.* (2019)
H. bivalvicola **sp. nov.**	MN295382	RMBH Hir_0015/4/1	Russia: Primorsky Krai, Gladkaya River, 42.7065°N, 130.9084°E, from the mantle cavity of *Middendorffinaia mongolica*, 25.x.2016, Bolotov & Vikhrev leg.	Bolotov *et al.* (2019)
H. bivalvicola **sp. nov.**	MN295383	RMBH Hir_0015/4/2	Ditto	Bolotov *et al.* (2019)
H. bivalvicola **sp. nov.**	MN295384	RMBH Hir_0015/5	Russia: Primorsky Krai, Razdolnaya River basin, Komarovka River, 43.6392°N, 132.1614°E, from the mantle cavity of *Margaritifera dahurica*, 23.vi.2012, Bespalaya leg.	Bolotov *et al.* (2019)
H. bivalvicola **sp. nov.**	MN295422	RMBH Hir_0102	Russia: Primorsky Krai, Khanka Lake basin, Melgunovka River, 44.5939°N, 132.1818°E, from the mantle cavity of *Buldowskia shadini*, 01.vii.2018, Bogan, Bolotov, Kim, Kondakov, Lee, Lopes-Lima & Vikhrev leg.	Bolotov *et al.* (2019)
H. bivalvicola **sp. nov.**	MN295425	RMBH Hir_0105	Russia: Primorsky Krai, Khanka Lake Basin, Komissarovka River, 44.8254°N, 132.0456°E, 02.vii.2018, Lopes-Lima, Bogan & Vikhrev leg.	Bolotov *et al.* (2019)
H. bivalvicola **sp. nov.**	MN295439	RMBH Hir_0122	Russia: Primorsky Krai, Khanka Lake basin, Melgunovka River, 44.5939°N, 132.1818°E, from the mantle cavity of *Buldowskia shadini* and *Sinanodonta schrenckii*, 01.vii.2018, Bogan, Bolotov, Kim, Kondakov, Lee, Lopes-Lima & Vikhrev leg.	Bolotov *et al.* (2019)
H. bivalvicola **sp. nov.**	MN295440	RMBH Hir_0123/1	Russia: Primorsky Krai, Khanka Lake basin, Melgunovka River, 44.5939°N, 132.1818°E, from the mantle cavity of *Nodularia douglasiae*, 01.vii.2018, Bogan, Bolotov, Kim, Kondakov, Lee, Lopes-Lima & Vikhrev leg.	Bolotov *et al.* (2019)

Species	*COI* sequence acc. No	Specimen voucher	Locality	Reference
H. bivalvicola **sp. nov.**	MN295443	RMBH Hir_0129/2	Russia: Primorsky Krai, Khanka Lake basin, Komissarovka River mouth, 44.8255°N, 132.0456°E, from the mantle cavity of *Cristaria plicata*, 02.vii.2018, Bogan, Bolotov, Lopes-Lima, Vikhrev & Kondakov leg.	Bolotov *et al.* (2019)
H. bivalvicola **sp. nov.**	ON841628	RMBH Hir_0426/3	Russia: Khabarovsk Krai, Nizhnyaya Manoma village, Manoma River, 49.1929°N, 136.3758°E, 14.ix.2020, Aksenova, Vinarsky, Travina & Kropotin leg.	Bolotov *et al.* (2022)
H. bivalvicola **sp. nov.**	ON841641	RMBH Hir_0497	Russia: Primorsky Krai, Beltsovo village, Arsenyevka River, 44.8388°N, 133.5742°E, from the mantle cavity of *Nodularia douglasiae*, 04.viii.2021, Sayenko & Rodionov leg.	Bolotov *et al.* (2022)
H. bivalvicola **sp. nov.**	QB010216	RMBH Hir_0516/2	Russia: Amur Oblast, the oxbow lake of the Arkhara River, 49.4045°N, 130.1565°E, 04. vii.2021, Aksenova, Vinarsky, Travina & Kropotin leg.	This study
H. bivalvicola **sp. nov.**	QB010218	RMBH Hir_0527	Russia: Amur Oblast, Alim River, 50.3371°N, 127.7573°E, from the mantle cavity of *Sinanodonta shrenkii*, 27. vii.2021, Bolotov, Vikhrev, Konopleva & Chapurina leg.	This study
H. bivalvicola **sp. nov.**	QB010219	RMBH Hir_0528	Russia: Amur Oblast, Ust-Ivanovskaya village, Ivanovka River, 50.3369°N, 127.4757°E, from the mantle cavity of *Nodularia duglasiae*, 27.vii.2021, Bolotov, Vikhrev, Konopleva & Chapurina leg.	This study
H. bivalvicola **sp. nov.**	QB010220	RMBH Hir_0529	Russia: Primorsky Krai, Solenoe Lake, 42.7038°N, 130.7209°E, from the mantle cavity of *Buldowskia suifunica*, 09.viii.2021, Bolotov, Vikhrev, Konopleva & Chapurina leg.	This study
H. bivalvicola **sp. nov.**	QB010221	RMBH Hir_0530	Russia: Primorsky Krai, Soldatskoe Lake, 43.7753°N, 131.9364°E, from the mantle cavity of *Nodularia douglasiae*, 07.viii.2021, Bolotov, Vikhrev, Konopleva & Chapurina leg.	This study
H. bivalvicola **sp. nov.**	QB010222	RMBH Hir_0531	Russia: Primorsky Krai, Blagodatnoe Lake, 44.326°N, 132.0717°E, from the mantle cavity of *Cristaria plicata*, 06.viii.2021, Bolotov, Vikhrev, Konopleva & Chapurina leg.	This study
H. bivalvicola **sp. nov.**	QB010224	RMBH Hir_0533	Russia: Primorsky Krai, Solenoe Lake, 42.7038°N, 130.7209°E, from the mantle cavity of *Middendorffinaia mongolica*, 09.viii.2021, Bolotov, Vikhrev, Konopleva & Chapurina leg.	This study
H. bivalvicola **sp. nov.**	QB010225	RMBH Hir_0535	Russia: Primorsky Krai, Blagodatnoe Lake, 44.3261°N, 132.0717°E, from the mantle cavity of *Buldowskia shadini*, 06.viii.2021, Bolotov, Vikhrev, Konopleva & Chapurina leg.	This study

Species	*COI* sequence acc. No	Specimen voucher	Locality	Reference
H. bivalvicola **sp. nov.**	QB010226	RMBH Hir_0537	Russia: Primorsky Krai, Gladkaya River, 42.70634°N, 130.9079°E, from the mantle cavity of *Middendorffinaia mongolica*, 10.viii.2021, Bolotov, Vikhrev, Konopleva & Chapurina leg.	This study
H. bivalvicola **sp. nov.**	QB010227	RMBH Hir_0538	Russia: Amur Oblast, Alim River, 50.2141°N, 127.7566°E, from the mantle cavity of *Sinanodonta shrenkii*, 27.vii.2021, Bolotov, Vikhrev, Konopleva & Chapurina leg.	This study
H. bivalvicola **sp. nov.**	QB010228	RMBH Hir_0540	Russia: Primorsky Krai, Gladkaya River, 42.7063°N, 130.9079°E, from the mantle cavity of *Buldowskia suifunica*, 10.viii.2021, Bolotov, Vikhrev, Konopleva & Chapurina leg.	This study
H. bivalvicola **sp. nov.**	QB010229	RMBH Hir_0750	Russia: Primorsky Krai, Beltsovo village, Arsenyevka River, 44.8388°N, 133.5742°E, from the mantle cavity of *Nodularia douglasiae*, 10.ix.2022, Sayenko leg.	This study
H. bivalvicola **sp. nov.**	QB010231	RMBH Hir_0753	Russia: Russia: Amur Oblast, Dolgoye Lake, 49.3815°N, 129.7398°E, from the mantle cavity of *Amuranodonta kijaensis*, 24.viii.2022, Balan leg.	This study
H. bivalvicola **sp. nov.**	QB010232	RMBH Hir_0754	Russia: Amur Oblast, Khingan Nature Reserve, Lake Kleshchenskoe, 49.4006°N, 129.7247°E, from the mantle cavity of *Amuranodonta kijaensis*, 21.viii.2022, Balan leg.	This study
H. koreaensis **sp. nov.**	MN295442	RMBH Hir_0124	South Korea: Geum River, 35.9891°N, 127.5836°E, from the mantle cavity of *Nodularia* sp., 08.vii.2018, Bogan, Bolotov, Kim, Kondakov, Lee, Lopes-Lima & Vikhrev leg.	Bolotov *et al.* (2019)
H. koreaensis **sp. nov.**	MT823271	HJK-2020	South Korea: Chungcheongbuk-do, Cheongju, Bangjook Reservoir	Kwak *et al.* (2021)
H. koreaensis **sp. nov.**	MN295423	RMBH Hir_0103/4	South Korea: Geum River, 35.9891°N, 127.5836°E, beneath stone, 08.vii.2018, Bogan, Bolotov, Kim, Kondakov, Lee, Lopes-Lima & Vikhrev leg.	Bolotov *et al.* (2019)
H. koreaensis **sp. nov.**	MN295426	RMBH Hir_0106	South Korea: Geum River, 35.9891°N, 127.5836°E, from the mantle cavity of *Scriptolamprotula coreana*, 08.vii.2018, Bogan, Bolotov, Kim, Kondakov, Lee, Lopes-Lima & Vikhrev leg.	Bolotov *et al.* (2019)
H. koreaensis **sp. nov.**	MN295427	RMBH Hir_0107	South Korea: Geum River, 35.9891°N, 127.5836°E, from the mantle cavity of *Lamprotula leaii*, 08.vii.2018, Bogan, Bolotov, Kim, Kondakov, Lee, Lopes-Lima & Vikhrev leg.	Bolotov *et al.* (2019)
H. koreaensis **sp. nov.**	MN295430	RMBH Hir_0110/6	South Korea: Geum River, 36.0708°N, 127.5891°E, beneath stones, 08.vii.2018, Bolotov & Kondakov leg.	Bolotov *et al.* (2019)
H. koreaensis **sp. nov.**	MN295431	RMBH Hir_0110/6/2	Ditto	Bolotov *et al.* (2019)
H. koreaensis **sp. nov.**	MN295432	RMBH Hir_0113/2	South Korea: Seomjin River, 35.4217°N, 127.2228°E, beneath stones, 10.vii.2018,	Bolotov *et al.* (2019)

Species	*COI* sequence acc. No	Specimen voucher	Locality	Reference
			Bogan, Bolotov, Kim, Kondakov, Lee, Lopes-Lima & Vikhrev leg.	
H. koreaensis **sp. nov.**	MN295433	RMBH Hir_0113/2/2	Ditto	Bolotov *et al.* (2019)
H. koreaensis **sp. nov.**	MN295434	RMBH Hir_0116	South Korea: Seomjin River, 35.7010°N, 127.2845°E, from the mantle cavity of *Nodularia breviconcha*, 10.vii.2018, Bogan, Bolotov, Kim, Kondakov, Lee, Lopes-Lima & Vikhrev leg.	Bolotov *et al.* (2019)
H. koreaensis **sp. nov.**	MN295435	RMBH Hir_0118	South Korea: Seomjin River, 35.7010°N, 127.2845°E, from the mantle cavity of *Sinanodonta lauta*, 10.vii.2018, Bogan, Bolotov, Kim, Kondakov, Lee, Lopes-Lima & Vikhrev leg.	Bolotov *et al.* (2019)
H. koreaensis **sp. nov.**	MN295436	RMBH Hir_0119	South Korea: Seomjin River, 35.4217°N, 127.2228°E, from the mantle cavity of *Nodularia douglasiae*, 10.vii.2018, Bogan, Bolotov, Kim, Kondakov, Lee, Lopes-Lima & Vikhrev leg.	Bolotov *et al.* (2019)
H. koreaensis **sp. nov.**	MN295437	RMBH Hir_0120	South Korea: Mangyeong River, irrigation channel, 35.9165°N, 127.7135°E, from the mantle cavity of *Sinanodonta lauta*, 11.vii.2018, Bogan, Bolotov, Kim, Kondakov, Lee, Lopes-Lima & Vikhrev leg.	Bolotov *et al.* (2019)
H. koreaensis **sp. nov.**	MN295438	RMBH Hir_0121	South Korea: South Korea: Mangyeong River, irrigation channel, 35.9165°N, 127.7135°E, from the mantle cavity of *Nodularia breviconcha*, 11.vii.2018, Bogan, Bolotov, Kim, Kondakov, Lee, Lopes-Lima & Vikhrev leg.	Bolotov *et al.* (2019)
H. kasmiana	LC928793	KUZ Z6530	Japan: Ibaraki Prefecture, Inashiki City	Kambayashi and Nakano (2026)
H. kasmiana	LC928794	KUZ Z6531	Japan: Ibaraki Prefecture, Inashiki City	Kambayashi and Nakano (2026)
H. kasmiana	LC928795	KUZ Z6532	Japan: Ibaraki Prefecture, Inashiki City	Kambayashi and Nakano (2026)
H. kasmiana	LC928796	KUZ Z6533	Japan: Ibaraki Prefecture, Inashiki City	Kambayashi and Nakano (2026)
H. kasmiana	LC928797	KUZ Z6534	Japan: Ibaraki Prefecture, Inashiki City	Kambayashi and Nakano (2026)
H. kasmiana	LC928798	KUZ Z6535	Japan: Ibaraki Prefecture, Inashiki City	Kambayashi and Nakano (2026)
H. kasmiana	LC928799	KUZ Z6536	Japan: Saitama Prefecture, Hiki-gun	Kambayashi and Nakano (2026)
H. kasmiana	LC928800	KUZ Z6537	Japan: Tochigi Prefecture, Oyama City	Kambayashi and Nakano (2026)

Species	*COI* sequence acc. No	Specimen voucher	Locality	Reference
H. kasmiana	LC928801	KUZ Z6538	Japan: Niigata Prefecture, Joetsu City	Kambayashi and Nakano (2026)
H. kasmiana	LC928802	KUZ Z6539	Japan: Gifu Prefecture, Gifu City	Kambayashi and Nakano (2026)
H. kasmiana	LC928803	KUZ Z6540	Japan: Gifu Prefecture, Mizuho City	Kambayashi and Nakano (2026)
H. kasmiana	LC928804	KUZ Z6541	Japan: Shiga Prefecture, Nagahama City	Kambayashi and Nakano (2026)
H. kasmiana	LC928805	KUZ Z6542	Japan: Hyogo Prefecture, Toyooka City	Kambayashi and Nakano (2026)
H. kasmiana	LC928806	KUZ Z6543	Japan: Hyogo Prefecture, Tatsuno City	Kambayashi and Nakano (2026)
H. kasmiana	LC928807	KUZ Z6544	Japan: Okayama Prefecture, Okayama City	Kambayashi and Nakano (2026)
H. kasmiana	LC928808	KUZ Z6545	Japan: Okayama Prefecture, Okayama City	Kambayashi and Nakano (2026)
H. kasmiana	LC928809	KUZ Z6546	Japan: Hiroshima Prefecture, Fukuyama City	Kambayashi and Nakano (2026)
H. kasmiana	QB010233	RMBH Hir_1279	Japan: Shiga Prefecture, Lake Biwa, 29.iv.2014, Prozorova leg.	This study
H. khankiana	ON778569	COX1-Un	China: Sichuan Province, Zigong, Daan, 29.3637°N, 104.7739°E	He *et al.* (2023)
H. khankiana	ON841637	RMBH Hir_0494	Russia: Primorsky Krai, Beltsovo village, Arsenyevka River, 44.8388°N, 133.5742°E, from the mantle cavity of *Sinanodonta shrenkii*, 04.viii.2021, Sayenko & Rodionov leg.	Bolotov *et al.* (2022)
H. khankiana	ON841638	RMBH Hir_0493	Russia: Primorsky Krai, Beltsovo village, Arsenyevka River, 44.8388°N, 133.5742°E, from the mantle cavity of *Sinanodonta shrenkii*, 04.viii.2021, Sayenko & Rodionov leg.	Bolotov *et al.* (2022)
H. khankiana	ON841639	RMBH Hir_0495	Russia: Primorsky Krai, Beltsovo village, Arsenyevka River, 44.8388°N, 133.5742°E, from the mantle cavity of *Sinanodonta shrenkii*, 04.viii.2021, Sayenko & Rodionov leg.	Bolotov *et al.* (2022)
H. khankiana	ON841640	RMBH Hir_0496	Russia: Primorsky Krai, Beltsovo village, Arsenyevka River, 44.8388°N, 133.5742°E, from the mantle cavity of *Sinanodonta shrenkii*, 04.viii.2021, Sayenko & Rodionov leg.	Bolotov *et al.* (2022)
H. khankiana	ON841642	RMBH Hir_0498	Russia: Primorsky Krai, Beltsovo village, Arsenyevka River, 44.8388°N, 133.5742°E, from the mantle cavity of *Middendorffinaia mongolica*, 04.viii.2021, Sayenko & Rodionov leg.	Bolotov *et al.* (2022)

Species	*COI* sequence acc. No	Specimen voucher	Locality	Reference
H. khankiana	MN295420	RMBH Hir_0101	Russia: Primorsky Krai, Khanka Lake Basin, Melgunovka River, 44.5804°N, 132.0803°E, from the mantle cavity of *Nodularia douglasiae*, 01.vii.2018, Bolotov, Vikhrev & Kondakov leg.	Bolotov *et al.* (2019)
H. khankiana	MN295421	RMBH Hir_0101/2	Ditto	Bolotov *et al.* (2019)
H. khankiana	MN295441	RMBH Hir_0123/2	Russia: Primorsky Krai, Melgunovka River, 44.5939°N, 132.1818°E, from the mantle cavity of *Nodularia douglasiae*, 01.vii.2018, Bolotov, Vikhrev & Kondakov leg.	Bolotov *et al.* (2019)
H. khankiana	QB010217	RMBH Hir_0526/1	Russia: Primorsky Krai, Zavitaya River, 45.8451°N, 134.4622°E, from the mantle cavity of *Middendorffinaia mongolica*, 03.viii.2021, Bolotov, Vikhrev, Konopleva & Chapurina leg.	This study
H. khankiana	QB010223	RMBH Hir_0532	Russia: Primorsky Krai, Abramovka River, 44.1013°N, 132.0204°E, from the mantle cavity of *Nodularia douglasiae*, 06.viii.2021, Bolotov, Vikhrev, Konopleva & Chapurina leg.	This study
H. khankiana	QB010230	RMBH Hir_0751	Russia: Primorsky Krai, Beltsovo village, Arsenyevka River, 44.8388°N, 133.5742°E, from the mantle cavity of *Sinanodonta shrenkii*, 10.ix.2022, Sayenko leg.	This study
H. myanmariana	PV570344	RMBH Hir_1259	India: Kangla Siphai, 24.8426°N, 93.9950°E, Iril River, Chindwin/Irrawaddy River basin, Imphal East District, Manipur, from the mantle cavity of *Lamellidens generosus* (Gould, 1847) (Bivalvia: Unionidae)	Bolotov *et al.* (2025)
H. myanmariana	MN295397	RMBH Hir_0051	Myanmar: ox-bow lake near Ta Naung Taig village, 21.4064°N, 95.3399°E, Chindwin/Irrawaddy River basin, from the mantle cavity of *Lamellidens savadiensis* (Nevill, 1877) (Bivalvia: Unionidae)	Bolotov et al. (2019)
H. myanmariana	MN295403	RMBH Hir_0056-2	Myanmar: Mone Ding Dam outlet, 20.8099°N, 95.7242°E, Middle Sittaung River basin, from the mantle cavity of *Lamellidens savadiensis* (Nevill, 1877) and *Indonaia andersoniana* (Nevill, 1877) (Bivalvia: Unionidae)	Bolotov et al. (2019)
H. myanmariana	MN295456	RMBH Hir_0211	Myanmar: Nga Wun River near Pyay town, 18.8624°N, 95.2822°E, Chindwin/Irrawaddy River basin, from the mantle cavity of *Lamellidens savadiensis* (Nevill, 1877) (Bivalvia: Unionidae)	Bolotov et al. (2019)
H. myanmariana	ON841618	RMBH Hir_0358-1	Myanmar: Nantyin Stream, 25.0271°N, 96.6183°E, Irrawaddy River basin, from the mantle cavity of *Leoparreysia canefrii* Vikhrev, Bolotov & Kondakov, 2017 (Bivalvia: Unionidae)	Bolotov *et al.* (2025)
H. myanmariana	MN295394	RMBH Hir_0048-1	Myanmar: Nadi Lake, 20.6858°N, 96.9316°E, Salween River basin, from the	Bolotov et al. (2019)

Species	*COI* sequence acc. No	Specimen voucher	Locality	Reference
			mantle cavity of *Lamellidens savadiensis* (Nevill, 1877) (Bivalvia: Unionidae)	
H. myanmariana	ON841613	RMBH Hir_0349	Myanmar: Bonelee Stream, 25.5000°N, 97.5941°E, Irrawaddy River basin, from the mantle cavity of *Radiatula* cf. *chaudhurii* (Preston, 1912) (Bivalvia: Unionidae)	Bolotov *et al.* (2025)
H. myanmariana	ON841612	RMBH Hir_0348	Myanmar: Nantyin Stream, 25.0271°N, 96.6183°E, Irrawaddy River basin, from the mantle cavity of *Radiatula* cf. *myitkyinae* (Prashad, 1930) (Bivalvia: Unionidae)	Bolotov *et al.* (2025)
H. myanmariana	ON841615	RMBH Hir_0353-1	Myanmar: Nantyin Stream, 25.0271°N, 96.6183°E, Irrawaddy River basin, from the mantle cavity of *Yaukthwa* sp. (Bivalvia: Unionidae)	Bolotov *et al.* (2025)
H. myanmariana	MN295400	RMBH Hir_0054	Myanmar: Pangaing Stream, 17.7080°N, 96.7155°E, Lower Sittaung River basin, from the mantle cavity of *Lamellidens generosus* (Gould, 1847) (Bivalvia: Unionidae)	Bolotov et al. (2019)
H. myanmariana	ON841609	RMBH Hir_0343	Myanmar: Mhong Shik Stream, 25.4423°N, 97.3439°E, Irrawaddy River basin, from the mantle cavity of *Yaukthwa* sp. (Bivalvia: Unionidae)	Bolotov *et al.* (2025)
H. myanmariana	ON841617	RMBH Hir_0357	Myanmar: section of the Lashio River near Lashio Hot Springs, 22.9933°N, 97.7752°E, Irrawaddy River basin, from the mantle cavity of *Sinanodonta pacifica* (Heude, 1878) (Bivalvia: Unionidae)	Bolotov *et al.* (2025)
H. myanmariana	ON841616	RMBH Hir_0355	Myanmar: section of the Lashio River near Lashio Hot Springs, 22.9933°N, 97.7752°E, Irrawaddy River basin, from the mantle cavity of *Lamellidens savadiensis* (Nevill, 1877) (Bivalvia: Unionidae)	Bolotov *et al.* (2025)
H. myanmariana	MN295398	RMBH Hir_0052	Myanmar: Shwe Laung Lake near Pyintha village, 17.4395°N, 97.2457°E, Bilin River basin, from the mantle cavity of *Lamellidens generosus* (Gould, 1847) (Bivalvia: Unionidae)	Bolotov et al. (2019)
H. myanmariana	PV628053	RMBH Hir_1100-1	Myanmar: irrigation canal near the Yelegale Police Station, 16.7317°N, 95.5284°E, Irrawaddy Delta Region, from the mantle cavity of *Lamellidens generosus* (Gould, 1847) (Bivalvia: Unionidae)	Bolotov *et al.* (2025)