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The stranger with no name: The non-indigenous murchisonellid from fresh and brackish water of northern Europe is a species new to science (Gastropoda: Murchisonellidae)

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In 2014 Warén & Könönen reported the presence of a dense population of an unnamed murchisonellid gastropod in brackish waters of the Baltic Sea of Finland. Already upon its initial record, it was considered a non-indigenous species, as (i) it had never been reported from European coasts despite good sampling coverage of its habitat, and (ii) due to the very high number of recorded individuals, which rendered it unlikely to represent an overlooked native species. Soon after its first finding, this gastropod was repeatedly found at several localities in the Netherlands and thus is now considered established. The identity of this species remained in a limbo since its discovery as its place of origin remained unknown and because there are still major gaps in our understanding of the taxonomy and ecology of Murchisonellidae.

We herein verified the systematic placement of this species within the family Murchisonellidae and compared it with accepted species to unravel its identity. The initially tentative familial placement was confirmed by the presence of a jaw apparatus, a synapomorphy shared by members of the Murchisonellidae as highlighted by Warén (1995). We included this species under the genus *Koloonella* Laseron, 1959 due to the presence of few claw-shaped radular teeth and the presence of an adapical sinus in the shell growth lines. As the species did not reasonably match any of the known murchisonellid species, we herein describe it as *Koloonella peregrina* spec. nov. Comparison with similar species allowed to clarify the status of a few taxa, among which *Murchisonella yuzan* Lin & Shao, 2024, here recognised as a junior synonym of *K. densistriata* (Nomura, 1936) syn. nov. et comb. nov., and *Eulimella folini* P. Fischer, 1869, which should be considered a taxon inquirendum. Although – due to its non-indigenous status within its currently known range that spans the Gulf of Finland and the Netherlands – the native species range remains enigmatic, we suggest that *Koloonella peregrina* spec. nov. most likely originates from fresh or brackish-water coastal habitats of cold-temperate regions.

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INTRODUCTION

Global mass transportation of people and goods, based on intense land, maritime and air traffic, is responsible for an increasing number of non-indigenous species (nis) introductions worldwide. Molluscs are no exception. While the introduction of land and freshwater molluscs can be problematic to human health, agriculture, farming and the environment (Carlsson, Brönmark & Hansson, 2004; Guiller et al., 2012; Ramos et al., 2021), including negative effects on the native biota eventually (co-)driving extinctions of endemic species (Gould, 1991; Gillis & Mackie, 1994; Zemanova, Knop & Heckel, 2017; Cowie, Bouchet & Fontaine, 2026), the impacts of most marine nis have remained less clear and often debated. Reports include examples of native species replacements and bathymetric shifts due to inferred competition, lack of significant impacts or, sometimes, even positive effects on local fisheries and ecosystem functioning (Boudouresque, 1999; Edelist et al., 2013; de Bruyne et al., 2013; Buba et al., 2017; Katsanevakis, Rilov & Edelist, 2018; Bonanno & Orlando-Bonaca, 2019; Steger et al., 2022; Diga et al., 2023; Katsanevakis et al., 2026).

Human-mediated introductions in marine environments may be intentional or unintentional. In fact, while species of commercial interest may be deliberately introduced for mariculture, most nis arrivals are accidental and represent indirect introductions in the wake of human activities. As an example, the opening of the Suez Canal in 1869 established a direct connection between the Mediterranean and the Red Sea, allowing numerous species to spread, and today nis represent about 10% of the Mediterranean marine mollusc fauna (Coll et al., 2010; Renda et al., 2025). Among the most frequent vectors for marine nis introduction, man-made waterways (shipping canals), ballast water and ship fouling can be mentioned. While ballast water is an important vector for the introduction of planktonic species and free-swimming larvae of benthonic species, ship hulls can transport adult individuals of benthonic species, which eventually may be able survive, reproduce and establish self-sustaining populations.

Murchisonellidae T. L. Casey, 1904 is a family of minute marine gastropods occurring in fully marine and brackish water, but also in hypersaline environments (Warén, 2013). Until the end of the 20th century, these snails were classified as Pyramidellidae J. E. Gray, 1840, a large family of ectoparasitic gastropods feeding on polychaetes and other molluscs, due to the similar high-spired shell with heterostrophic protoconch (Fretter, Graham & Andrews, 1986; Aartsen, 1995). However, Warén (1995) demonstrated that murchisonellids are distinct due to the presence of a jaw apparatus, unlike pyramidellids that have no radula, and placed them in the new family Ebalidae, later synonymised with Murchisonellidae. The genetic study of Dinapoli & Klussman-Kolb (2010) confirmed this picture and showed that Murchisonellidae and Pyramidellidae are well-separated and phylogenetically distant families within the Heterobranchia. Today, they are classified under different infraclasses Mesoneura and Euthyneura, respectively (Brenzinger, Schrödl & Kano, 2021).

According to Warén (2013), nothing is known about the diet of the Murchisonellidae, but they may feed on algae to which at least some species appear to be associated. *Ebala nitidissima* (Montagu, 1803) was found to occur in high densities on shallow bottoms with filamentous algae, also in brackish water (Anders Warén pers. obs.); Rasmussen (1973) stated that *E. nitidissima* lives on subtidal mud and muddy sand bottoms inhabited by the *Abra*-community; contrarily, Rolán & Peñas (2011) reported that *E. nitidissima* was observed parasitizing *Turritella communis* in an aquarium; Hedley & Musson (1892) reported *Koloonella moniliformis* to be abundant on the alga *Spirogyra*, while Brenzinger, Wilson & Schrödl (2014) sampled *K.* cf. *minutissima* in coarse sand covered with a fine algal or bacterial growth.

In 2014, Warén & Könönen reported the finding of a dense population of an unidentified, most likely non-indigenous, murchisonellid from brackish waters of the Baltic Sea, Finland (Warén & Könönen, 2014). Soon after, Warén appealed to the malacological community to engage in efforts to unravel the specific identity of this nis (Warén, 2015), but no further progress had been made since. At the same time, this species was collected in several canals in the Netherlands (Soes & Kruijt, 2017; Bakker & Kuijper, 2019; Berg, 2019) and thus can now confidently be considered established in the region. An electron-microscopic investigation of the radula conducted in the present study confirmed that this species belongs to Murchisonellidae due to the presence of a "jaw apparatus" (Warén, 1995). A literature survey highlighted that this species cannot be identified as any accepted species. Therefore, we herein describe it as new to science.

MATERIALS AND METHODS

All studied material originated from the Netherlands. Specimens in Hoogvliet were sampled by collecting a bucket of 1 l of mud from the middle of streams and sieving it to the finest fractions. Further material was either collected with a pondnet with mesh size of 0.5 mm on the banks, or with a box-corer in the deeper, soft-sedimented parts of water bodies. Despite extensive sampling on hard

substrates in rivers and lakes, it has never been found there.

Specimens were photographed using a motorized SMZ25 stereo microscope equipped with a Digital Sight 10 camera (Nikon) and operated through Nikon NIS Elements Basic Research software (version 5.42.04), which also served for image stacking. The specimen selected as holotype of the new species was cleaned and subsequently air dried, followed by examination with a Hitachi TM4000Plus Tabletop scanning electron microscope (SEM) in low vacuum mode without metal coating. Prior to drying, a tissue sample from the anterior body part of the holotype – extending beyond the apertural margin – was saved in 99.5% undenatured ethanol for potential future molecular analysis.

To study the radula and opercular morphology of the new species, specimens were decalcified by incubation in 0.5 M sodium ethylenediaminetetraacetate (EDTA) solution for several hours, the anterior body portion subsequently extracted using microscissors, transferred into distilled water, and finally digested in a thick microscopy glass depression slide by adding small quantities of commercial bleach (5% sodium hypochlorite solution) with a 1-10 µl laboratory pipette. The maceration process was monitored through a stereo microscope. After digestion, the clean radula and operculum were carefully rinsed multiple times with distilled water to remove any remaining bleach. The radula was pipetted onto a round glass cover slip and left to air-dry, and the entire glass slip then mounted onto an aluminium stub covered with a double-sided adhesive carbon tab, sputter-coated with gold-palladium, and SEM-imaged in high-vacuum mode. The operculum was dehydrated in absolute ethanol, transferred to hexamethyldisilazane (HMDS) through an ascending series of ethanol-HMDS mixtures, and left to air-dry at room temperature in a fume hood overnight. After mounting on an aluminium stub, it was SEM-imaged in low-vacuum mode without metal coating.

Terminology of shell features follows Cox (1960). Protoconch type classification follows van Aartsen (1987) and van der Linden & Eikenboom (1992). Specimen records are listed using the standardised format for citing sample data as described by Chester et al. (2019), with the following data fields: country or major geographic area • number of specimens; locality data (from largest to smallest geographic scale); geographic coordinates; date (format dd Mmm. Yyyy); other collecting data (e.g., habitat, method of collecting, etc.); collection and catalogue code.

Repositories abbreviations: AMS = Australian Museum Sydney, Australia; MNCN = Museo Nacional de Ciencias Naturales, Madrid, Spain; RMNH = Naturalis Biodiversity Center, Leiden, The Netherlands; SMF = Forschungsinstitut und Naturmuseum Senckenberg, Frankfurt am Main, Germany.

Other abbreviations: H = shell height; lv = living specimen(s); sh = empty shell(s); W = shell width; AV = Angelo Vannozzi collection, Rome, Italy; WR = Walter Renda collection, Amantea, Italy.

SYSTEMATIC PART

Class Gastropoda Cuvier, 1795
Subclass Heterobranchia Burmeister, 1837
Family Murchisonellidae T. L. Casey, 1904

Seven extant and fossil genera are currently accepted within Murchisonellidae, grouped into three subfamilies (MolluscaBase eds., 2026): Ebalinae Warén, 1995 (including *Ebala* J. E. Gray, 1847 and †*Pseudochileutomia* Friedberg, 1938); Murchisonellinae Casey, 1904 (including *Henrya* Bartsch, 1947, *Koloonella* Laseron, 1959, *Murchisonella* Mörch, 1875 and †*Pseudoaclisina* Yoo, 1994); and Solutaspirinae Raven, Kurtz & Moolenbeek, 2025 (including the only genus *Solutaspira* Raven, Kurtz & Moolenbeek, 2025). Apart from the latter, recently erected for a few elusive species with flat, openly-coiled shells (Raven, Kurtz & Moolenbeek, 2025), all genera show similar fragile, minute and high-spired shells with heterostrophic protoconchs.

The presence of the jaw apparatus, characterising the family Murchisonellidae, could hitherto be ascertained only in the genera *Ebala*, *Henrya*, *Koloonella* and *Murchisonella*, for which soft parts were available for examination. We agree with Brenzinger, Wilson & Schrödl (2014) who proposed to separate *Murchisonella* from the other genera (*Ebala*, *Henrya* and *Koloonella*) because *Murchisonella* shows a multi-teeth jaw apparatus, while the other three genera share a jaw apparatus consisting of few claw- or finger-like elements. *Henrya* and *Koloonella* should, together with *Ebala*, be grouped into the subfamily Ebalinae. Also, the aspect of the head-foot seems to support this arrangement (Warén, 2013; Brenzinger, Wilson & Schrödl, 2014; Miura, 2020; Fernández-Simón, Salvador & Moles, 2025). Therefore, we propose to rearrange genera, moving *Henrya* and *Koloonella* to Ebalinae and leaving *Murchisonella* and *Pseudaclisina* in Murchisonellinae. However, assignment to different genera within Ebalinae is subtle and relies on small differences in both shape of the claw-like teeth and conchological characters (Brenzinger, Wilson & Schrödl, 2014). Assignment to different genera is therefore difficult and somewhat subjective. The validity of individual genera needs to be tested genetically.

Subfamily Ebalinae Warén, 1995
Genus *Koloonella* Laseron, 1959

Type species (by original designation): *Eulimella moniliformis* Hedley & Musson, 1891 (monotypic).

Among the available genera, we placed the non-indigenous murchisonellid from northern Europe in the genus *Koloonella* due to the overall conchological similarity with its type species *K. moniliformis*, which is characterised by a tilted, detached protoconch of type B and very convex whorls with inverse-S-shaped growth lines showing a subsutural sinus (Figs 1, 2). *Koloonella moniliformis* was described from a coastal lagoon close to Sydney on the filamentous alga *Spirogyra* Link, 1820 (Hedley & Musson 1891). It is interesting to note that – despite the abundance of the original population mentioned in the text – this species was found no more just a few years later at the type locality, but was recorded from Victoria, southern Australia, in a similar environment (Hedley, 1895). Hence, we may speculate that the topotypical population might have been allochthonous and failed to establish, and that species of this genus, due to the possible association with algae, are prone to being passively transported by vectors such as ship fouling.

***Koloonella peregrina* spec. nov.**

Figs 5-9

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Unidentified — Warén & Könönen 2014: 40, unnumbered fig.

Unidentified — Warén 2015: 16, unnumbered fig.

Murchisonella sp. — Soes & Kruijt 2017: 31, figs 1-4.

Murchisonella sp. — Bakker & Kuijper 2019: 7, figs 2-3.

Murchisonella sp. — Berg 2019: 57, fig. 5.

Murchisonella sp. — Gmelig Meyling, Neckheim & de Bruyne, 2022: 32-33, unnumbered figs.

Type material. — Holotype (RMNH.MOL.653488; Fig. 8) and 32 paratypes listed below.

Holotype: Netherlands • 1 lv; South Steurgat, Brabantse Biesbosch; 51.76782° N, 4.86136° E (= type locality); 22 Apr. 2024; S. Honcoop & R. Vlierboom legit, (Fig. 8), H = 1.92 mm, W = 0.84 mm; RMNH.MOL.653488.

Paratypes: Netherlands • 1 sh; Spaarnwoude, west-oever, Zijkanaal C, Noordzeekanaal; 52.42727° N, 4.70722° E; 23 Apr. 2024; T. van Haaren & J. Knetsch legit, H = 1.55, W = 0.6 mm; paratype 1, RMNH.MOL.653483 • 8 lv; Hagestein, River Lek (Steenwaard); 51.97152° N, 5.16395° E; 11 Oct. 2017; A. Klink legit, H = 1.1-2.05 mm, W = 0.55-0.8 mm; paratypes 2-9, RMNH.MOL.653484 • 3 sh; Hellevoetsluis, Haringvliet west; 51.81546° N, 4.12485° E; 16 Aug. 2016; A. Storm legit, H = 1.3-2.85 mm, W = 0.55-1.05 mm; paratypes 10-12, RMNH.MOL.653485 • 8 lv; Veen, River Afgedamde Maas; 51.77715° N, 5.11775° E; 28 Apr. 2023; Waardenburg Ecology Staff legit, H = 1.3-2.4 mm; paratypes 13-20, RMNH.MOL.653486 • 6 lv; Veen, River Afgedamde Maas; 51.77715° N, 5.11775° E; 28 Apr. 2023; Waardenburg Ecology Staff legit, H = c. 2.3 mm; paratypes 21-26, SMF 384638 • 1 lv; Zeeburg, NVO-Hannesgat; 52.37898° N, 4.95657° E; 16 Nov. 2023; T. van Haaren legit, H = 1.1 mm; paratype 27, RMNH.MOL.653487 • 3 lv; Rotterdam, Haringvliet; 51.7687° N, 4.2325° E; 25 Sep. 2018; C. Morys legit, (ex M. Zettler collection), H = 1.9-2.2 mm; paratypes 28-30, WR • 2 lv; Hagestein, River Lek (Steenwaard); 51.97152° N, 5.16395° E; 11 Oct. 2017; A. Klink legit, H = 1.6-1.95 mm, W = 0.5-0.82 mm; paratypes 31-32, AV.

Other material examined: Netherlands • 1 lv; South Steurgat, Brabantse Biesbosch; 51.76782° N, 4.86136° E; 22 Apr. 2024; S. Honcoop & R. Vlierboom legerunt, H = 2.14 mm, W = 0.92 mm, used for radula preparation (unsuccessful), tissue sample preserved; SMF 384634 • 1 lv; Veen, River Afgedamde Maas; 51.76048° N, 5.17394° E; 28 Apr. 2023; Waardenburg Ecology Staff legit, H = 2.46 mm, W = 0.98 mm, used for radula preparation (unsuccessful); tissue sample and operculum preserved (Fig. 9); SMF 384635 • 1 lv; Veen, River Afgedamde Maas; 51.76048° N, 5.17394° E; 28 Apr. 2023; Waardenburg Ecology Staff legit, H = 2.53 mm, W = 0.96 mm, protoconch broken off, used for radula preparation (Fig. 7), radula on SEM stub, tissue sample and operculum preserved; SMF 384636 • 1 lv; Veen, River Afgedamde Maas; 51.76048° N, 5.17394° E; 28 Apr. 2023; Waardenburg Ecology Staff legit, H = 2.24 mm, W = 0.90 mm, used for radula preparation, damaged radula on SEM stub, tissue sample and operculum preserved; SMF 384637.

Diagnosis. — Shell of average size for the genus. Protoconch detached, inclined 45° relative to shell axis. Teleoconch conical, narrow, spirally striated, of c. 5 convex whorls.

Description of shell (data for holotype in parentheses). — Shell of average size for the genus, thin, colourless, transparent. Protoconch smooth, planispiral of type B, sinistral, of c. 1.5 whorls, inclined 45° relative to shell axis and detached from the teleoconch. Protoconch-to-teleoconch transition sharp, marked by a fine groove. Teleoconch conical, turriculated, evenly growing, with 4.5-5.5 (4.5) very convex whorls, shouldered adapically. Suture linear, impressed. Microsculpture of wavy spiral striae of uneven size separated by shallow, slightly narrower grooves (Fig. 8d). Striae 12-18 in the intersutural region, c. 25 on the last whorl, broader in the central part of the whorl, narrower abapically, suddenly becoming crowded and very fine in the subsutural region. New striae form by branching of wide striae. Microsculpture uniform in the early teleoconch, differentiating during the growth. Growth lines inverse-S-shaped, broadly prosocyrt in the median part of the whorl, opisthocyrt in the subsutural region, sometimes producing a crown-like costulation in the subsutural region, vanishing abapically and weakening in lower whorls. Umbilicus absent. Aperture oval, elongated, slightly pointed adapically and angled in the parieto-columellar side, everted

Figs 1-6. Shells of *Koloonella* spp. illustrated at the same magnification. **1, 2.** *Koloonella moniliformis*, **1.** syntype AMS C125, Manly Lagoon, Sydney, Australia, H = 3.4 mm. **2.** RMNH.MOL.AD.28072, Narrabeen, New South Wales, Australia, H = 2.75 mm. **3.** *Koloonella* cf. *moniliformis* ZMA.MOLL.366619, Victoria, Australia, H = 2.4 mm. **4.** *Koloonella* sp., Suttons beach, Redcliffe, Queensland, Australia, legit Roy Crookshanks H = 2.2 (WR). **5, 6.** *Koloonella peregrina* spec. nov. from Hoogvliet, Visserijgriend, Netherlands, reproduced after Bakker & Soes (2019); H = 2.56 mm (5), H = 2.22 mm (6). Photo: Alison Miller (AMS) (1); Arike Gill (RMNH) (2, 3); J. Goud (RMNH) (5, 6).

on the columellar side. Columella straight, inclined. Outer lip simple, fragile. Operculum thin, oligogyrous. Outer side with decentered, branched spiral groove separating a thicker inner region with sharp, even, prosocyrt, crowded and irregularly-set growth grooves and a thin membranaceous outer region with irregular spiral striae or even prosocyrt growth grooves visible abapically. Shell length 1.9-2.85 (1.92) mm, shell width 0.8-1.5 (0.84) mm, protoconch diameter 210-230 µm.

Description of soft parts (based on comparison with the anatomy published by Brenzinger, Wilson & Schrödl, 2014). — Visceral sac with adapical cream-yellowish ovarium and abapical greenish digestive gland running parallel through the spire. Kidney triangular yellow, mantle cavity dark. Head-foot whitish, with small and distant eyes. Snout bilobed, headshield-like. Cephalic tentacles subcylindrical with rounded ends, arched, directed posteriorly. Two narrow parallel or slightly convergent, sometimes merged dark stripes are visible on the head running in the median line from the position of the eyes to the mouth.

Description of radula (extracted and studied from two mature specimens) (Fig. 7). — Radula highly modified, forming the tip of a jaw apparatus (Warén, 1995) (Fig. 7a). Radula with two pairs of claw-like elements, and a lower median unpaired element, possibly a modified rachidian tooth (Fig. 7a). Paired elements, including their basal parts, are 15-20 µm long. Unpaired element c. 15 µm long featuring a well-developed, reinforced median axis extending into a pointed projection accompanied by c. 5 small, finger-like projections (possibly cusps) aligned on each side of it (Fig. 7b). The jaw apparatus is a pyramid-like structure composed of radular rods (Brenzinger, Wilson & Schrödl, 2014) that largely dissolved during maceration for radula extraction, leaving only faint traces in the dry SEM preparation (Fig. 7a).

Etymology. — From the Latin adjective *peregrinus* (foreign, but in the Middle Ages used also to indicate pilgrim) because it is allochthonous to northern Europe, and because this species presumably underwent a long journey to reach European shores.

Habitat. — All living specimens collected in the Netherlands occurred in shallow freshwater environments from the littoral zone down to 5.4 m depth, particularly in large water bodies such as rivers, freshwater tidal rivers and large lakes, and only occasionally in slightly brackish waters. The first record in the Netherlands originated from lake Krammer-Volkerak in 2014 (Kruijt et al., 2015, reported as an unknown Pyramidellidae), and later records were from Haringvliet (salinity 0.8). Lake Krammer-Volkerak can be considered an only slightly brackish environment. In fact, its invertebrate fauna includes mostly freshwater and some freshwater-tolerant brackish-water species. Other NIS found at this site were *Corbicula fluminea* (O. F. Müller,

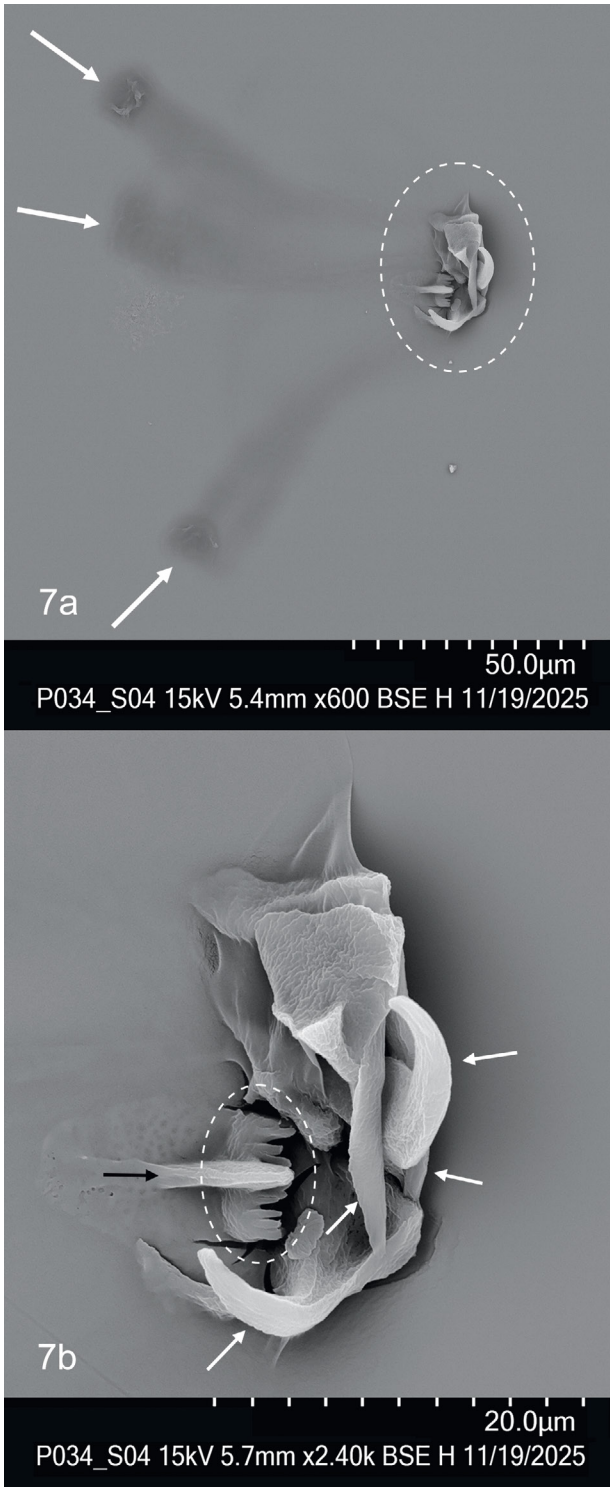
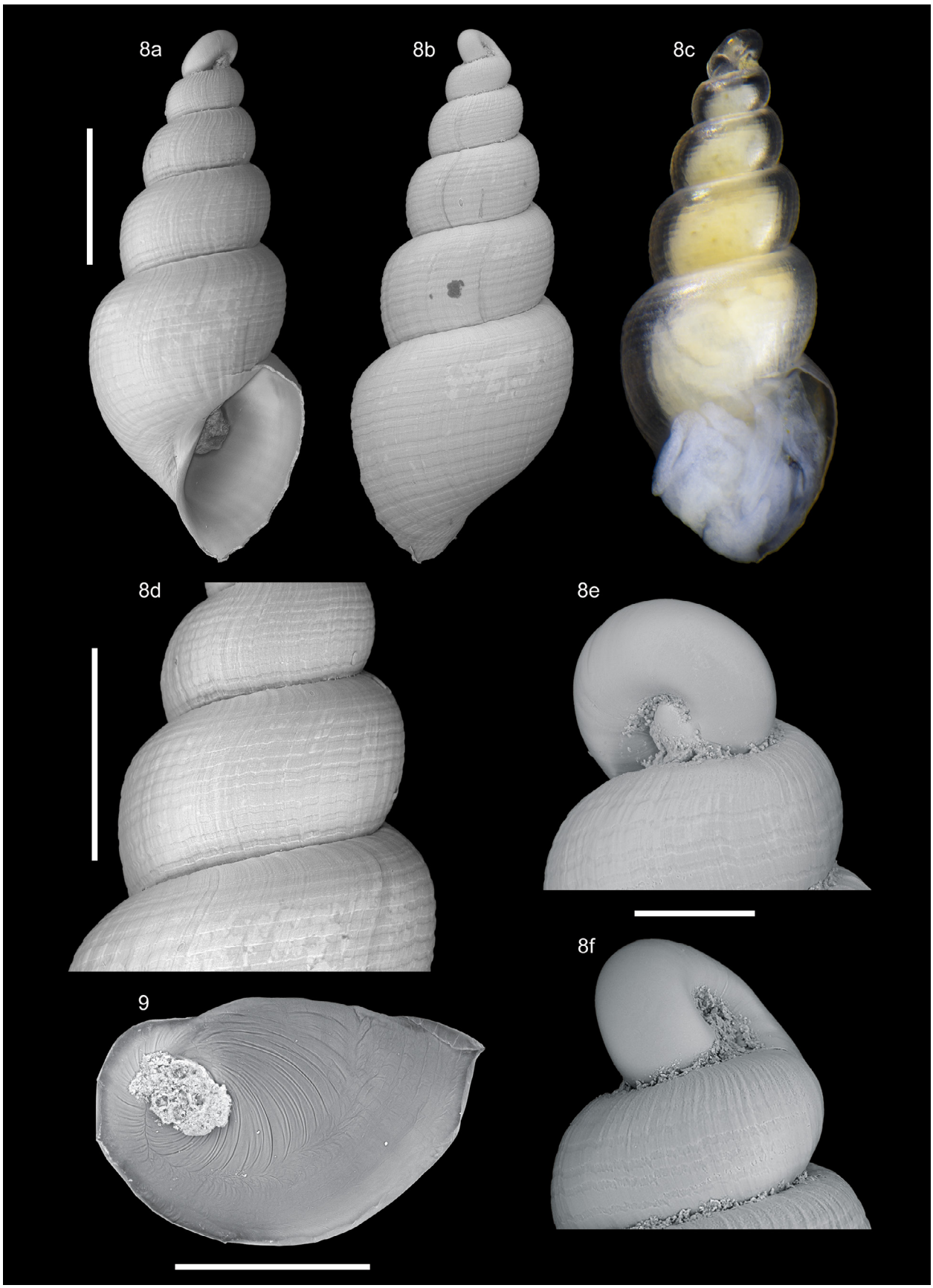


Fig. 7. SEM images of the jaw apparatus extracted from a mature specimen of *Koloonella peregrina* spec. nov. from the Netherlands (SMF 384636). **a.** Overview of the whole jaw apparatus including the radular rods (Brenzinger et al. 2014), now visible as faint dark traces (arrows) due to having been largely disintegrated by the maceration process, and the radula (dashed selection). **b.** Detail of the radula forming the tip of the jaw apparatus, showing 4 paired claw-like teeth (white arrows) and a lower multicuspid unpaired element (black arrow). Dashed selection highlights the finger-like projections visible in the unpaired element.



Figs 8, 9. *Koloonella peregrina* spec. nov. **8.** Holotype RMNH.MOL.653488, South Steurgat, Brabantse Biesbosch, Netherlands. **9.** Operculum (outer side), SMF 384635, Veen, River Afgedamde Maas, Netherlands. Scale bar 500 µm (8a-c); 400 µm (8d, 9); 100 µm (8e, f).

Fig. 10. Distribution map of *Koloonella peregrina* spec. nov. in the Netherlands based on examined material (red squares) and literature (yellow circles). The type locality is indicated by a red star.

1774), *Dreissena bugensis* Andrusov, 1897, *D. polymorpha* (Pallas, 1771), *Gammarus tigrinus* Sexton, 1939, *Hypania invalida* (Grube, 1860) and *Laonome xeprovala* Bick & Bastrop, 2018 (as *L. calida* Capa, 2007). Thus, *K. peregrina* spec. nov. in the Netherlands can be regarded as a freshwater species with a salinity tolerance limited to 0.8 (Soes & Kruijt, 2017). Findings in brackish or marine environments such as estuaries (including Bakker & Kuijper, 2019) seem to be due to empty shells or fresh-dead material carried downstream by the current during phases of high river discharges. In the Baltic Sea, where salinity is relatively stable, the new species occurs at a salinity of 5 (Warén, 2015).

Distribution. — Known from the Gulf of Finland (Baltic Sea) and the Netherlands (southern North Sea). The first report of this species from Finland dates to 2013 (Outinen et al., 2024) and it was later observed at several localities along southern and western Finnish coast (FinBIF, 2026), while the first record from the Netherlands occurred in 2014 (Soes & Kruijt, 2017). The known distribution of *K. peregrina* spec. nov. in the Netherlands is shown in Fig. 10. The introduction pathway to northern Europe is unknown, as is the relationship between the two currently known populations. Ships fouled by algae are a likely introduction vector, as the latter presumably represent the new species' habitat and/or trophic resource. The observed greenish digestive gland seen in living specimens may be due to algae ingestion. A video of a specimen *in vivo* from the Krammer-Volkerak is available on the web (Waardenburg Ecology, 2016).

Conchological comparison with other Murchiconellidae. — The morphologically closest species is *Koloonella moniliformis* (Figs 1 and 2), which shows a similar size and overall aspect with tilted and detached protoconch and convex whorls with inverse-S-shaped growth lines, thus justifying the generic placement of the new species. In the original description, the presence of spiral scratches was reported, although they are not visible from the pictures of the syntypes housed in the AMS. The new species can be distinguished mainly by its smaller size, the presence of a spiral microsculpture and the wider and more deeply notched growth lines in the subsutural region.

A similar, likely undescribed species occurs in Queensland, Australia (Fig. 4), showing a similar protoconch, spiral sculpture and growth lines. However, it differs from *K. peregrina* due to the smaller and narrower shell with flatter whorls and a wider, smooth subsutural region.

Koloonella peregrina is also somewhat similar to *Murchisonella modesta* Peñas & Rolán, 2013 from the Philippines due to the similar U-shaped growth lines in the subsutural region, which is not neatly separated from the rest of the whorl. However, the latter species has a protoconch of type C as in all representatives of the genus *Murchisonella*, whereas *K. peregrina* shows a detached planorbid protoconch of type B.

The new species further closely resembles *M. densistriata* (Nomura, 1936) from Japan, originally included in the genus *Careliopsis* Mörch, 1875, due to the convex whorls and the spiral microsculpture. However, *K. peregrina* is proportionally smaller and broader (the holotype of *M. densistriata* is 4.8 mm high (Hori, 2000), while the larger specimen of *K. peregrina* hardly reaches 2.9 mm), and shows more convex and shouldered whorls. Furthermore, growth lines are more deeply notched in the subsutural region in the new species. Besides, no comparison can be made as far as the protoconch is concerned: *M. densistriata* was described on a single specimen with immersed protoconch of type C and has never been collected since. Although the shape of the protoconch is not recognizable from the original pictures, a comparison of these (Nomura, 1936: pl. 6, figs 45a and b) with recent photographs of the holotype published by Hori (2000) and Lin & Shao (2024), shows that the protoconch is clearly broken, giving the idea of the presence of an immersed protoconch of type C (Lin & Shao, 2024: fig. 2C). Because *Murchisonella yuzan* Lin & Shao, 2024 was described only due to this basic difference, i.e., the detached protoconch of type A1 as compared to the immersed one of type C in *M. densistriata*, and given the occurrence in the same biogeographical province, we believe that they likely are the same species. Based on this proposed synonymisation, the new species is distinguished from *M. densistriata* = *M. yuzan* also by the different protoconch of type B (i.e., lying on a plane tilted by 45° with respect to shell axis),

whereas the latter shows a protoconch of type A1 (i.e., lying on a plane almost parallel to shell axis). Furthermore, on the basis of what has been said, in our opinion *Careliopsis densistriata* Nomura, 1936 should be transferred to the genus *Koloonella*.

DISCUSSION

While *Murchisonella* and the allied genus *Pseudoaclisina* were recently reviewed (Peñas & Rolán, 2013), taxonomy of the Ebalinae remains insufficiently known. In fact, there are several undescribed species as shown in Fig. 4 and in the literature (Hori, 2000; Hasegawa, 2006; Miura, 2020).

The presence of the jaw apparatus confirmed that the NIS from northern Europe belongs to the family Murchisonellidae. Its claw-like tooth morphology, together with conchological details, suggests the placement of the new species in the genus *Koloonella* (Warén, 2013; Brenzinger, Wilson & Schrödl, 2014). The radular morphology observed in *Koloonella peregrina* spec. nov. with four paired claw-like teeth seems to be consistent with that of *Ebala nitidissima* shown by Warén (1995: figs 2A-C). The presence of an unpaired median element was discussed by Brenzinger, Wilson & Schrödl (2014) and also reported by Warén (2013: caption of figs 1-5). The unpaired element likely originated from deep modification of the radula and might have derived either from a well-developed rachidian tooth fused with several lateral teeth, or from a single multicuspid rachidian tooth.

The extant murchisonellids from the European Atlantic coasts are represented only by *Ebala nitidissima* (Montagu, 1803) and *E. pointeli* (de Folin, 1868), of which only the former has been recorded in the Netherlands (Soes & Kruijt, 2017). Both are fully marine species. *Ebala nitidissima* shows a high-spired shell characterised by convex whorls and a fine spiral striation, while *E. pointeli* is shorter, with slightly cyrtoconoid spire and smooth shell (Fretter, Graham & Andrews, 1986; Peñas, Templado & Martínez, 1996). *Koloonella peregrina* differs mainly by the broader conical shell with shouldered whorls and coarser spiral microsculpture of different strength between the subsutural area and the rest of the whorl.

Yet another *Ebala* showing a similar microsculpture of spiral striae crossed by growth lines was described from European Atlantic coasts, namely *Eulimella folini* P. Fischer, 1869, now in the synonymy of *Ebala striatula* (Jeffreys, 1856) (Aartsen, 1995; Renda & Vannozzi, 2025). This species was described by Fischer (1869) in the chapter of "Les fonds de la Mer" by de Folin & Perrier dedicated to the Gulf of Biscay, based on material from de Folin's collection (Folin & Perrier, 1869: 149, pl. 22 fig. 9). However, this species has never again been found on the European Atlantic coasts since its description. Neither Dautzenberg (1927) recorded this species among the molluscs collected in the Gulf of Biscay, nor is it mentioned by Fretter, Graham & Andrews (1986) from the UK or Denmark. A few authors, among which Nordsieck (1972) and Gougerot & Feki (1981), considered *E. folini* a valid species, although they always reproduced the original drawing without providing new data (Nordsieck, 1972: 121, pl. P8, fig. 18; Gougerot & Feki, 1981: 42, pl. 2, fig. 25). The only record of *E. folini* (as *Eulimella striatula*) from the European Atlantic coasts is from Vigo, northern Spain (Hidalgo, 1917: 318), in turn cited by Rolán (1983: 307) as *Syrnola hyalina* (Jeffreys, 1870) (see Renda & Vannozzi, 2025 for the nomenclature of this species). However, no specimens labelled as such were found in the Hidalgo collection housed in the MNCN (Francisco Javier de Andrés Cobeta, pers. comm.). As the type material of *Eulimella folini* is lost (Gougerot & Feki, 1981), a comparison to our new species can be made only based on the original description. *E. folini* has different proportions with respect to *K. peregrina*, showing c. 5 (based on the original drawing) teleoconch whorls at a length of 1.5 mm reported in the original description, against 4.5 teleoconch whorls at a length of c. 1.9 mm for the holotype of the new species. Because of the loss of the type material and the uncertainties about this species, we think that *Eulimella folini* should be considered a taxon inquirendum.

CONCLUSION

The non-indigenous murchisonellid occurring in the Gulf of Finland and in several large fresh and brackish water bodies of the Netherlands was studied in detail, aiming at unravelling its taxonomic affinity and geographic origin. Anatomical investigation revealed the presence of a jaw apparatus, thus confirming the placement of this species within the family Murchisonellidae. The jaw apparatus' morphology was found to be characteristic of the subfamily Ebalinae, featuring a radula consisting of few, highly-modified claw-like teeth. We pointed out that generic classification within this subfamily requires a revision because the delimitation of genera seems somewhat arbitrary. We placed the new species in the genus *Koloonella* due to its resemblance to the type species *K. moniliformis*, but found it did not belong to any described species within that genus. As we formally described the species as new to science in the framework of this study, the geographic place of origin of *K. peregrina* spec. nov. remained unknown, however, the north-European localities where it successfully established suggest that its native distribution must be searched in fresh or slightly brackish waters of cold-temperate regions.

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