

A REVISION OF THE GENUS *SUMELIA* NEUBERT, 1995 (GASTROPODA: EUPULMONATA: CLAUSILIIDAE) WITH THE INTRODUCTION OF A NEW GENUS AND A SUBGENUS

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Abstract Reproductive anatomy, including morphology of the inner penial wall, and shell morphology of all five species hitherto classified in *Sumelia* Nordsieck, 1994 have been investigated. This resulted in the recognition of a new genus, *Blaeneuxina* n. gen. (type species: *Euxina recedens* Németh & Szekeres, 1995) and a new subgenus, *Sumelia* (*Neubertia*) (type species: *Strigileuxina carinata* Neubert, 1993).

Key words taxonomy, systematics, Turkey, anatomy, land snail

INTRODUCTION

So far four species have been classified in the genus *Sumelia* Nordsieck, 1994, namely *Sumelia rolli* (Nordsieck, 1975), *S. boniferae* (Neubert, 1993), *S. carinata* (Neubert, 1993) and *S. latecostata* Nordsieck, 1994. All of them inhabit the Maçka Valley, which is situated south of Trabzon in northern Turkey. Morphological similarities of a fifth species, originally described as *Euxina recedens* Németh & Szekeres, 1995, resulted in its tentative classification by Nordsieck (2005) also in *Sumelia*. Nevertheless, this species occurs approximately 500km west of the Maçka Valley (Fig. 1), and due to the lack of information on its anatomy and clausilial apparatus its taxonomic status remained uncertain.

We examined the shell morphology and genital anatomy, with special attention to the inner wall of the penis, of all five species. Our observations suggest that the rock-dwelling *S. boniferae*, *S. carinata* and *S. latecostata* should be separated from *Sumelia rolli*, the forest-dwelling type species of the genus, at subgeneric level. Furthermore, we establish a new genus for *Euxina recedens* because that species cannot be placed either in *Sumelia* or the most closely related *Strigileuxina* Nordsieck, 1975.

MATERIALS AND METHODS

Photographs were taken using a Keyence LHX5000 digital microscope. Focus-stacked

images of 15 to 30 exposures were generated by Photoshop. Ethanol-preserved specimens were dissected under a Leica stereomicroscope equipped with a digital camera.

ABBREVIATIONS

HNHM Hungarian Natural History Museum (Budapest, Hungary)
PGB Collection Barna Páll-Gergely (Mosonmagyaróvár, Hungary)

SYSTEMATICS

Clausiliidae Gray, 1855

Clausiliinae Gray, 1855

Remarks The genera *Strigileuxina* and *Sumelia* were classified in the subfamily *Mentissoideinae* Lindholm, 1924 (see Nordsieck 2007), until Uit de Weerd & Gittenberger (2013) proposed to unite *Baleinae*, *Clausiliinae* and *Mentissoideinae* under the subfamily *Clausiliinae*.

Tribe *Strigileuxinini* H. Nordsieck, 1994

Strigileuxinini H. Nordsieck, 1994: 6

Genus *Strigileuxina* H. Nordsieck, 1975

Type species: *Clausilia* (*Euxina*) *reuleauxi*
O. Boettger, 1887

Differential diagnosis See under *Blaeneuxina* n. gen., *Sumelia*, and in Table 1.

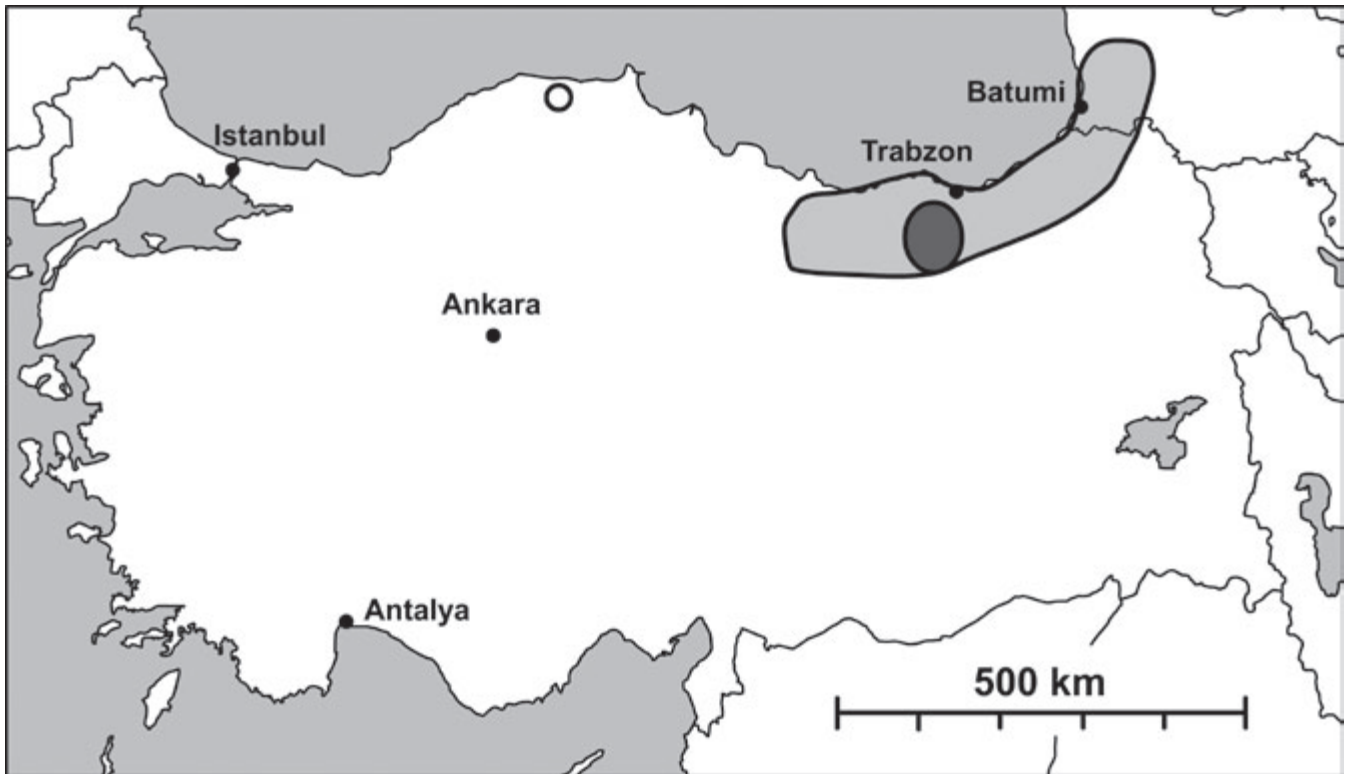


Figure 1 Map showing the distribution of *Strigileuxina* (light grey area), *Sumelia* (dark grey area) and *Blaeneuxina* n. gen. (empty circle).

Table 1 Key traits of *Strigileuxina* H. Nordsieck, 1975, *Sumelia* (*Sumelia*) Neubert, 1995, *Sumelia* (*Neubertia*) n. subgen. and *Blaeneuxina* n. gen.

	<i>Sumelia</i> (<i>Sumelia</i>)	<i>Sumelia</i> (<i>Neubertia</i>) n. subgen.	<i>Blaeneuxina</i> n. gen.	<i>Strigileuxina</i>
penis-epiphallus ratio	penis ca. as long as epiphallus	penis longer or as long as epiphallus	penis ca. as long as epiphallus	penis shorter or as long as epiphallus
penial wall	at least 3 longitudinal folds	single, knob-like thickening	single, large discoid thickening	unknown
insertion of retractor muscle	on penis-epiphallus transition	on penis-epiphallus transition	on penis-epiphallus transition	on epiphallus or on penis-epiphallus transition
basal and peripheral crests	relatively strong, situated basally	relatively strong, situated basally	relatively strong, shifted parietally	relatively weak, situated basally
clausilium plate	relatively wide, strongly curved	slender, strongly curved	slender, slightly curved	relatively wide, strongly curved
lamella inferior	without converging lamella	without or with weak converging lamella	with strong converging lamella	with strong converging lamella
lunella upper plica	absent very short or absent	present short, ending at the lunella	partially present strong, extends beyond the lunella	mostly present short, ending at the lunella

Distribution This genus is distributed along the southeastern coast of the Black Sea, roughly between Samsun in Turkey and Poti in Georgia (Fig. 1).

Remarks No taxonomic changes are proposed in *Strigileuxina*. *Strigileuxina reuleauxi* is included only for comparison with species of the discussed genera.

Strigileuxina reuleauxi (O. Boettger, 1887)
Figs 2i–p

Strigileuxina reuleauxi, — Neubert, 1995: 101, fig. 1a.

Strigileuxina reuleauxi, — H. Nordsieck, 2005: 56.

Strigileuxina reuleauxi, — H. Nordsieck, 2007: 56.

Material examined Turkey, Dikkaya, 4km from Çamlıhemşin toward Pazar, 41°05.05'N 41°02.22'E, 270m, leg. Eröss, Hunyadi, Páll-Gergely 16.07.2005, coll. PGB; Turkey, northern end of Çamlıhemşin toward Zilkale, leg. Páll-Gergely 08.07.2010, coll. PGB; Turkey, Çamlıhemşin to Çat road at Zilkale 40°57.60'N 40°57.74'E, 750m, leg. Németh, Páll-Gergely 23.05.2006, coll. PGB.; Turkey, near Zilkale, between Çamlıhemşin and Çat, 40°57.522'N, 40°58.000'E, 750m, leg. Páll-Gergely 08.07.2010, HNHM 104432 (1 shell, clausilium figured: Figs 2o–p), coll. PGB; Turkey, Çifteköprü, 10th bridge of the Çuhala Stream, 41°22.89'N 41°34.77'E, 330m, leg. Eröss, Hunyadi, Páll-Gergely 17.07.2005, coll. BPG; Turkey, stone wall 3km from Hopa toward Borçka 41°23.34'N 41°29.05'E, 80m, leg. Eröss, Hunyadi, Páll-Gergely 17.05.2005, coll. PGB; Turkey, Borçka to Muratlı road, old road beyond the junction to Camili, 41°24.436'N, 41°41.693'E, 150m, leg. Páll-Gergely 08.07.2010, coll. BPG; Turkey, Borçka to Muratlı road 700m beyond the junction to Camili, 41°24.10'N 41°42.23'E, 150m, leg. Eröss, Hunyadi, Páll-Gergely 24.05.2005, HNHM 104409 (2 figured shells: Figs 2i–n); Georgia, Adjara Region, small gorge along the Black Sea coast between Batumi and the Turkish border, 41°32.792'N 41°33.867'E, 40m, leg. Ohara, Otani, Páll-Gergely 17.07.2012, coll. PGB; Georgia, Adjara Region, Batumi, Botanical Garden, 41°41.749'N 41°42.696'E, 100m, leg. Ohara, Otani, Páll-Gergely 17.07.2012, coll. PGB; Georgia, Adjara Region, 4km from the Khulo to Batumi road toward Kirnati, bank of the Tchorokhi River, 50m (rocky forest), 41°30.990'N 41°43.019'E, leg.

Fehér, Ishibe, Ohara, Okubo, Otani, Páll-Gergely 16.07.2012, coll. PGB; Georgia, Guria Region, Chkonagora, 2km along the road to Sameba, Jikheti Monastery, 42°04.230'N 42°09.214'E, 200m, leg. Fehér, Ishibe, Ohara, Okubo, Otani, Páll-Gergely 13.07.2012, coll. PGB.

Genus *Sumelia* Neubert, 1995

Sumelia, — Nordsieck, 1994: 17. (not available).

Sumelia Neubert, 1995: 102.

Sumelia “H. Nordsieck, 1994”, — H. Nordsieck, 2005: 56.

Type species: Euxina rolli Nordsieck, 1975 by original designation

Differential diagnosis Compared to *Strigileuxina*, the basal and peripheral crests are stronger, with a deeper fissure between them (Figs 2t, 3d, 3l, 3t). A lamella-like structure converges to the descending lamella inferior at an acute angle in *Strigileuxina* and *Blaeneuxina* n. gen., which is not discernible in *Sumelia* (Figs 2v, 3f, 3n, 3v). The retractor muscle of the male organs inserts at the penis-epiphallus transition (Figs 4b–e), whereas in *Strigileuxina* it inserts on the epiphallus (Neubert, 1995).

Distribution All known species of this genus occur in the Maçka Valley, south of Trabzon (Fig. 1).

Remarks The name *Sumelia* first appeared in the doctoral thesis of Neubert (1993a), which was not published. Therefore, it became available only when the description was officially published by Neubert in 1995. Nordsieck (1994) used the generic name *Sumelia* without fixing a type species, therefore this did not make the name available. Later he used the name as *Sumelia* Nordsieck, 1994 (Nordsieck, 2005), explaining that he had thought Neubert’s description of *Sumelia* had already been published before his 1994 paper.

Subgenus *Sumelia* (*Sumelia*) Neubert, 1995

Differential diagnosis See under *Sumelia* (*Neubertia*) n. subgen. and Table 1.

Included taxa *Sumelia rolli* (Nordsieck, 1975).

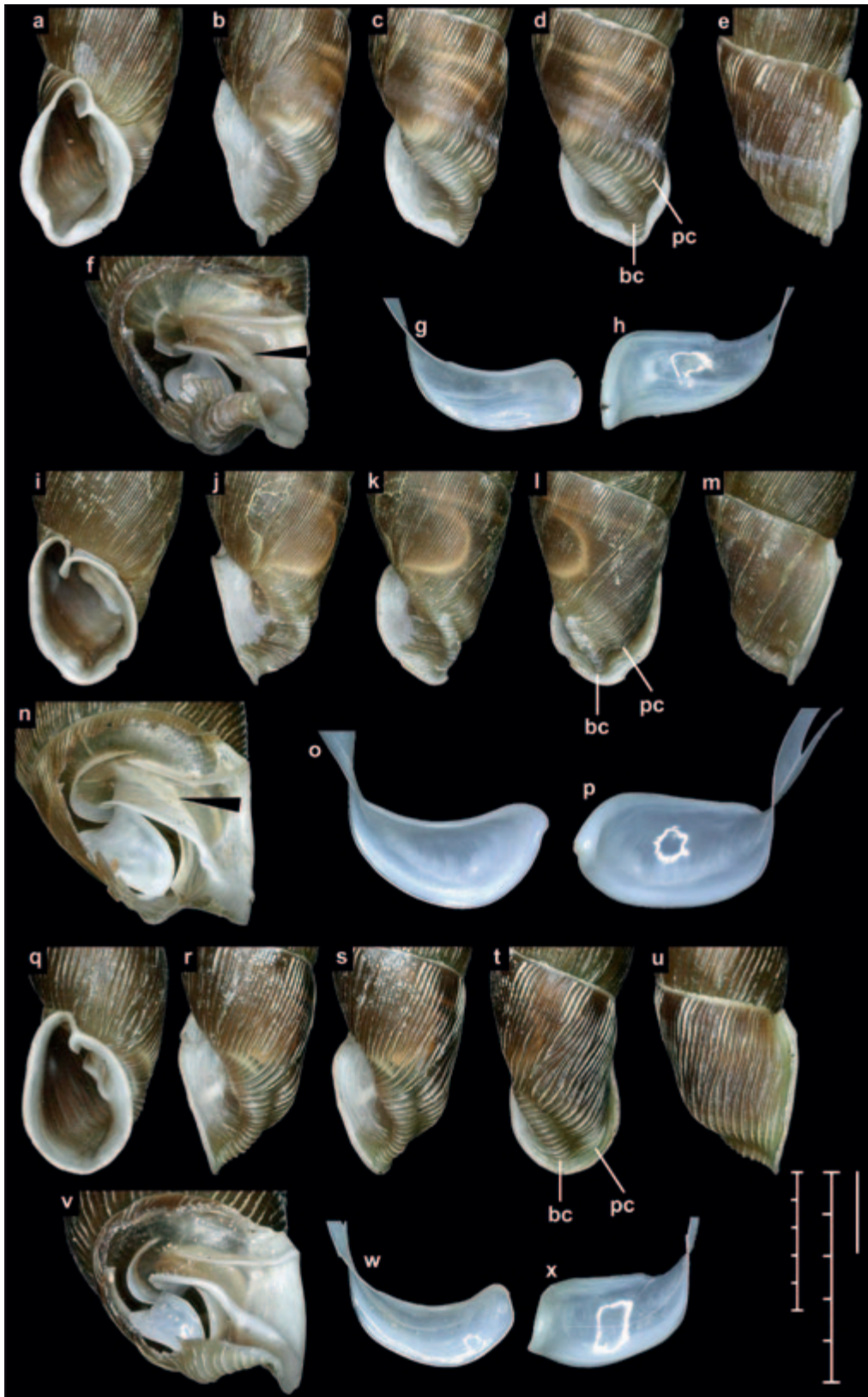


Figure 2 Last whorl (a–e, i–m, q–u), lamellae (f, n, v) and clausilia (g–h, o–p, w–x) of *Blaeneuxina* n. gen., *Strigileuxina* and *Sumelia* species. a–h: *Blaeneuxina recedens*; i–p: *Strigileuxina reuleauxi*; q–x: *Sumelia (Sumelia) rolli*. Left scale represents 5mm and refers to figs of the last whorl, middle scale represents 5mm and refers to figs showing the lamellae, and right scale represents 1mm and refers to the clausilia. Black arrows show the lamella-like structure converging to the descending lamella inferior. Abbreviations: bc: basal crest; pc: peripheral crest.

Habitat The only species classified in this subgenus inhabits old-growth forests, where it can be found on trees and decaying logs.

Sumelia (Sumelia) rolli (Nordsieck, 1975)
Figs 2q–x, 4b, 5b

Euxina rolli H. Nordsieck, 1975: 101, plate 8, fig. 12.

Strigileuxina rolli, — Neubert, 1993b: 31, textfig. 3.

Sumelia rolli, — H. Nordsieck, 2005: 57.

Sumelia rolli, — H. Nordsieck, 2007: 56.

Material examined Turkey, forest below the Sümela/Meryemana Monastery, 40°41.41'N 39°39.55'E, leg. Páll-Gergely 03.07.2010, coll. HNHM 104410a (2 figured shells), HNHM 104410b (anatomically examined specimen in ethanol), coll. PGB.

Remarks on the anatomy Internally the distal (main) part of the penis has at least three longitudinal folds, one of which is dichotomously divided (Fig. 5b).

Subgenus *Sumelia (Neubertia)* n. subgen.

Type species: *Strigileuxina carinata carinata*
Neubert, 1993

Differential diagnosis All three *Sumelia (Neubertia)* species possess a strongly developed lunella (Figs 3b–d, 3j–l, 3r–t), which is residual or absent in *Sumelia (Sumelia) rolli* (Figs 2r–t). The inner wall of the penis bears a single thickened, knob-like structure (Figs 5c–e), whereas in *Sumelia (Sumelia) rolli* it has longitudinal folds (Fig. 5b). The thickened knob on the penial wall of *Sumelia (Neubertia)* is probably homologous with one of the longitudinal folds of *Sumelia (Sumelia) rolli*. See also Table 1.

Derivation of name This new subgenus is dedicated to our valued colleague, Eike Neubert, who considerably contributed to the knowledge of Turkish terrestrial molluscs.

Included taxa *Sumelia boniferae* (Neubert, 1993), *S. carinata* (Neubert, 1993), *S. latecostata* Nordsieck, 1994.

Habitat The three species classified in the new subgenus are exclusively rock-dwelling (Fig. 6).

Sumelia (Neubertia) boniferae (Neubert, 1993)
Figs 3a–h, 4c, 5c

Strigileuxina carinata boniferae Neubert, 1993b: 30, plate 1, figs 3a–b.

Sumelia boniferae, — Nordsieck, 1994: 17.

Sumelia boniferae, — Neubert, 1995: 103, fig. 1e.

Sumelia boniferae, — H. Nordsieck, 2005: 57.

Sumelia boniferae boniferae, — H. Nordsieck, 2007: 56.

Sumelia boniferae, — Páll-Gergely, 2010: 266, fig. 22.

Material examined Turkey, Hamsiköy SW of Trabzon, 40°41.225'N 39°29.210'E, leg. Németh, Páll-Gergely 07.06.2011, HNHM 104411 (anatomically examined specimen); Turkey, 1km N of Hamsiköy 40°41.30'N 39°29.20'E, 1120m, leg. Németh, Páll-Gergely 22.05.2006, coll. HNHM 104412 (2 figured shells), PGB.

Remarks on the anatomy Distal (main) part of penis internally with a thickened, knob-like structure, which is probably homologous with a longitudinal fold in *Sumelia (Neubertia)*. This knob-like structure is situated under the cup-shaped proximal penial part (Fig. 5c).

Sumelia (Neubertia) carinata (Neubert, 1993)
Figs 3i–p, 4d, 5d

Strigileuxina carinata Neubert, 1993b: 28, textfig. 2, plate 1, figs 2a–b.

Sumelia carinata, — Neubert, 1995: 103, fig. 1d.

Sumelia carinata, — H. Nordsieck, 2005: 57.

Sumelia carinata, — H. Nordsieck, 2007: 56.

Material examined Turkey, immediately underneath the Sümela/Meryemana Monastery, 40°41.41'N 39°39.55'E, leg. Páll-Gergely 03.07.2010, coll. HNHM 104413a (anatomically examined specimen), PGB; same locality, leg. Fehér, Ishibe, Ohara, Okubo, Otani, Páll-Gergely 06.07.2012, HNHM 104413b (2 figured shells).

Remarks on the anatomy Same as that of *S. boniferae*.

Sumelia (Neubertia) latecostata Nordsieck, 1994
Figs 3q–x, 4e, 5e, 6

Sumelia boniferae latecostata Nordsieck, 1994: 17, plate 2, fig. 4.

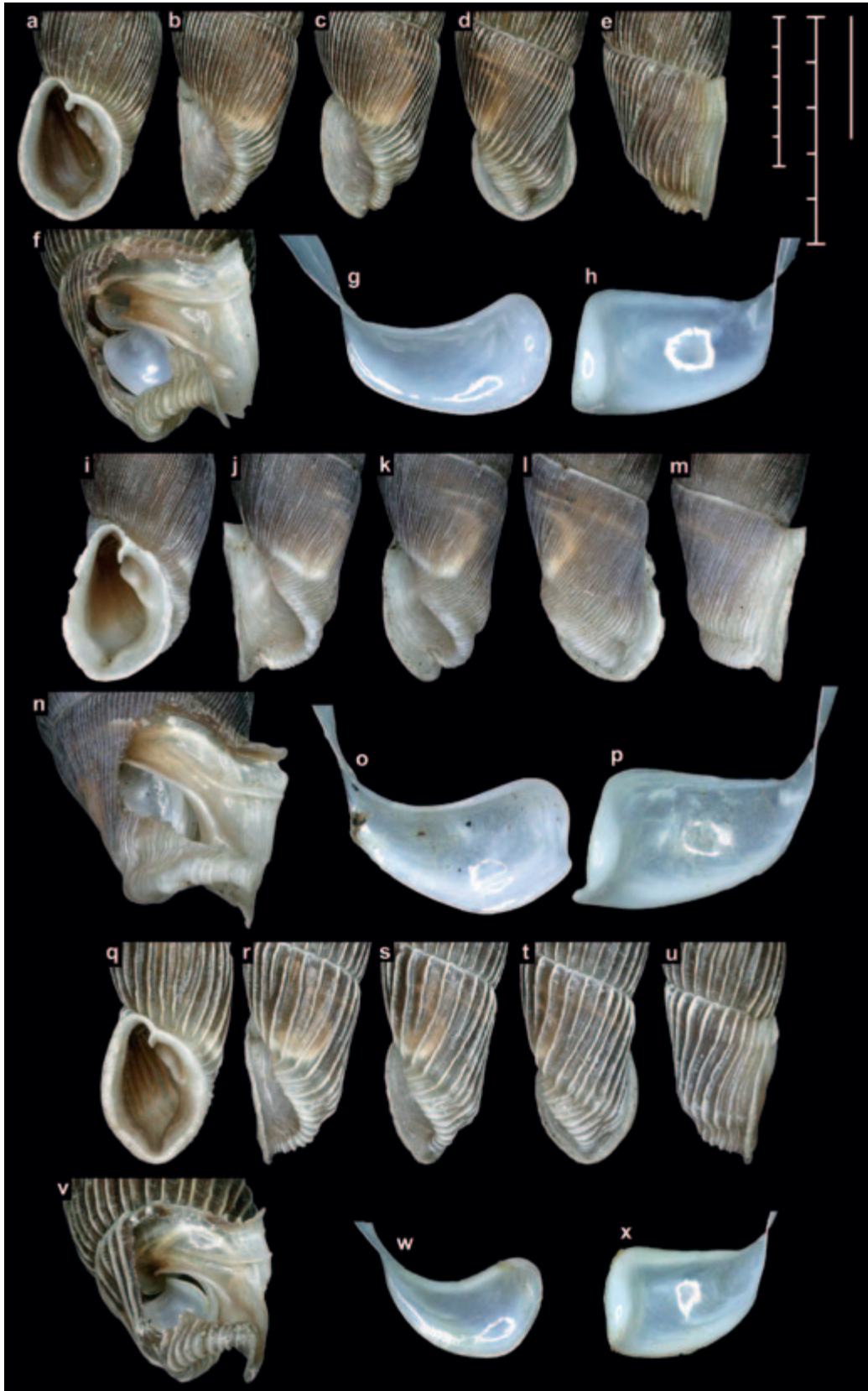


Figure 3 Last whorl (a–e, i–m, q–u), lamellae (f, n, v) and clausilia (g–h, o–p, w–x) of *Sumelia* (*Neubertia*) species. a–h: *Sumelia* (*Neubertia*) *boniferae*; i–p: *Sumelia* (*Neubertia*) *carinata*; q–x: *Sumelia* (*Neubertia*) *latecostata*. Left scale represents 5mm and refers to figs of the last whorl, middle scale represents 5mm and refers to figs showing the lamellae, and right scale represents 1mm and refers to the clausilia.

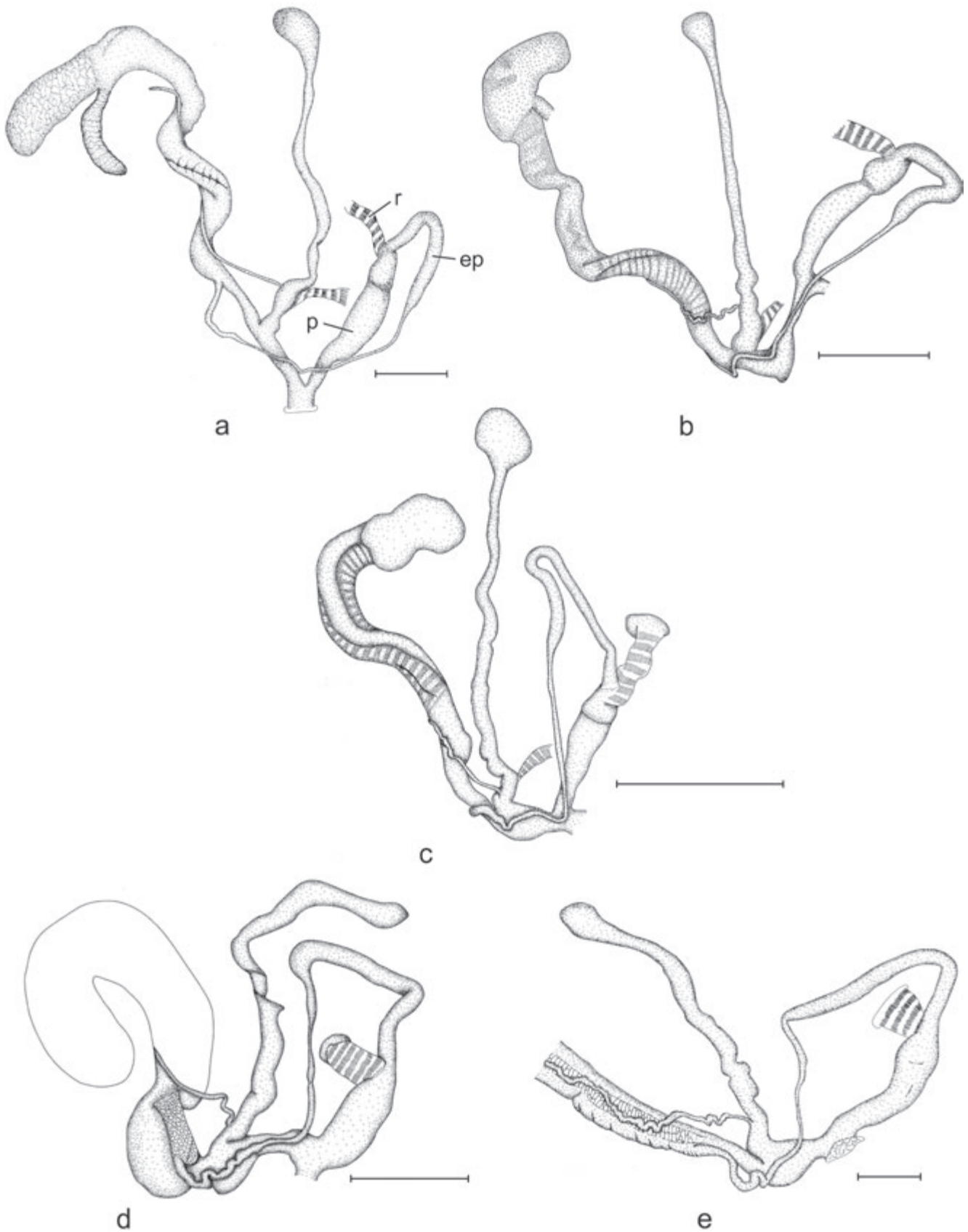


Figure 4 Reproductive organs of *Blaeneuxina* n. gen. and *Sumelia* species. a: *Blaeneuxina recedens*; b: *Sumelia* (*Sumelia*) *rolli*; c: *Sumelia* (*Neubertia*) *boniferae*; d: *Sumelia* (*Neubertia*) *carinata*; e: *Sumelia* (*Neubertia*) *latecostata*. Abbreviations for Fig. a: ep: epiphallus; p: penis; r: retractor muscle. Scale bars represent 2mm.

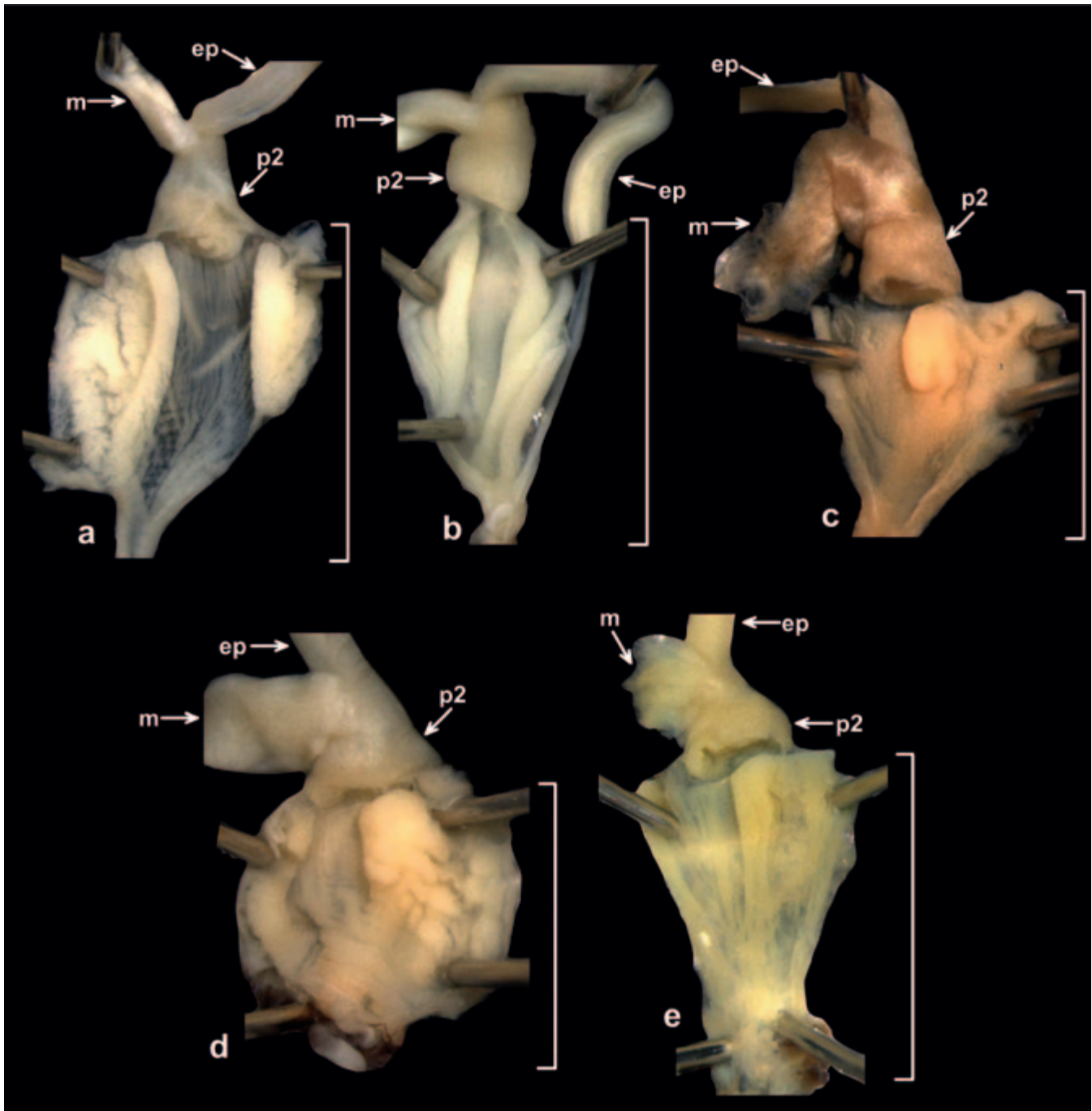


Figure 5 Inner surface of the proximal part of the penis of *Sumelia* species. a: *Blaeneuxina recedens*; b: *Sumelia* (*Sumelia*) *rolli*, c: *Sumelia* (*Neubertia*) *boniferae*, d: *Sumelia* (*Neubertia*) *carinata*, e: *Sumelia* (*Neubertia*) *latecostata*. Abbreviations: ep: epiphallus, m: retractor muscle of the penis; p2: proximal part of the penis. The white frames next to each figure indicate the extent of the distal part of the penis. Not to scale.

Sumelia boniferae latecostata, — H. Nordsieck, 2007: 56.

Sumelia latecostata, — Páll-Gergely, 2010: 266, figs 21, 26.

Material examined Turkey, Çatak SW of Trabzon, 2nd bridge of the Maçka Stream, 40°48.040'N,

39°35.093'E, 390m, leg. Németh, Páll-Gergely 21.05.2006, HNHM 104414 (2 figured shells), PGB; Turkey, Çatak, cliffs at 2nd bridge of the Maçka Stream, 40°48.030'N 39°35.013'E, 400m, leg. Fehér, Ishibe, Ohara, Okubo, Otani, Páll-Gergely 06.07.2012, HNHM 104415 (anatomically examined specimen) (Fig. 6).



Figure 6 *Sumelia (Neubertia) latecostata* (indicated with white asterisk) found living in rock crevices together with the generally more numerous *Armenica euprepes* (Biggs, 1936) (indicated with black circle) near Çatak, Turkey. (Photo: J.U. Otani).

Remarks on the anatomy Similar to those of *S. boniferae* and *S. carinata*, although the penial knob is more weakly developed.

Genus *Blaeneuxina* n. gen.

Type species *Euxina recedens* Németh & Szekeres, 1995.

Diagnosis The only species of this genus is characterized by the combination of a large, densely and finely ribbed shell (Figs 2a–e), an aperture oblique to the shell axis (Fig. 2a), the strong basal and peripheral crests (Fig. 2d) that are shifted from the basal toward the parietal side of the last whorl, a lamella-like structure that converges to the descending lamella inferior at an acute angle (Fig. 2f), long plica principalis, strongly developed upper plica, and a basal remnant of a lunella (Figs 2b–d).

Differential diagnosis The most similar genus is *Strigileuxina*, which also possesses a lamella converging to the descending lamella inferior (Fig. 2n). However, *Strigileuxina* has weaker basal and peripheral crests, and they are not shifted parietally (Fig. 2l), the lunella and the outer end of the lamella inferior are more strongly developed (Figs 2j–l). In *Sumelia* the basal and peripheral crests are also not shifted parietally (Fig. 2t), and the lamella inferior is simple (without the auxiliary lamella, or only with a very weak form of it; Fig. 2v). *Sumelia* species have longitudinal folds on the inner wall of the penis (Figs 5b–e), whereas there is a flattened, plate-like structure in *Blaeneuxina* n. gen. (Fig. 5a). See also Table 1.

Derivation of name The name of the new genus is coined from *Blaene*, the historic name of the region of its locality, and *Euxina*, referring to several related genera of northern Turkey.

Distribution The only known species of this genus is known from the Çuhadaroğlu Pass near the Black Sea coast between İnebolu and Küre (Fig. 1).

Blaeneuxina recedens (Németh & Szekeres, 1995)
new combination
Figs 2a–h, 4a, 5a

Euxina recedens Németh & Szekeres, 1995: 98, Fig. 2.

Sumelia ? recedens, — H. Nordsieck, 2005: 57.

Sumelia ? recedens, — H. Nordsieck, 2007: 56.

Material examined Turkey, Çuhadaroğlu Pass between İnebolu and Küre, 41°52.535'N 33°42.773'E, 1000m, leg. Németh, Páll-Gergely 09.06.2011, HNHM 104422 (anatomically examined specimen), HNHM 104423 (2 figured shells).

Description of the genitalia (Figs 4a, 5a) Penis spindle-shaped, relatively long, consisting of a longer distal and a short, rounded proximal (terminal) part. Internally the distal part has a large, discoid, fleshy structure attached to the penial wall (Fig. 5a). The cylindrical epiphallus is thinner than the penis and is approximately of the same length. The retractor muscle inserts at the penis-epiphallus transition. The vas deferens is long, slender, somewhat thickened near its joint with spermoviduct. The length of the more slender vagina is approximately half of that of the penis. The bursa copulatrix is long, with a retractor muscle inserted near the origin of its stalk. The bursa is club-shaped. The very slender diverticulum initiates near the base of the bursa stalk. The pedunculus is shorter than vagina.

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