

**New taxa and systematic evaluation of clausiliids
(Gastropoda, Pulmonata, Clausiliidae) from Iran and Turkey**

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Recently collected material provided valuable new information about Iranian and Turkish clausiliids. *Pravispira subserrulata* spec. nov. and *Euxina patrisnemethi* spec. nov. are described as new taxa from Turkey (Ordu prov.) and Iran (Mazandaran prov.), respectively. Systematic and zoogeographical relationships between the Iranian species of *Euxina* O. Boettger, 1877, are discussed on the basis of their shell and genital morphology, whereas the position of some endemic genera in the region is evaluated using newly obtained anatomical data.

Key words: Gastropoda, Pulmonata, Clausiliidae, taxonomy, new taxa, Iran, Turkey.

INTRODUCTION

Our knowledge of Turkish and Iranian clausiliids increased considerably since the early 1990s. Intense fieldwork and systematic studies resulted in the description of more than 70 new species from Turkey. A thorough work by Nordsieck (1995) summarised and evaluated all available information on the Hyrcanian clausiliids that encompass the vast majority of the Iranian Clausiliidae fauna. In contrast to Turkey, the data and material used in Nordsieck's publication originated from collections that were made more than a quarter of a century ago. Our present paper, which is based on the Iranian and Turkish material collected by the authors in 1999 and 2000, provides updates and new systematic evaluation based on chonchological and anatomical analyses of some little-known species and genera.

The collections where the type material of the newly described taxa has been deposited are abbreviated as follows: HNC: Haus der Natur, Cismar; HNHM: Hungarian Natural History Museum, Budapest; NHMW: Naturhistorisches Museum, Wien; RMNH: Nationaal Natuurhistorisch Museum, Leiden; SMF: Forschungsinstitut und Naturmuseum Senckenberg, Frankfurt am Main. MA, NE and SZ designate private collections of G. Majoros (Budapest), L. Németh (Budapest) and M. Szekeres (Szeged), respectively.

SYSTEMATICS

Phaedusinae, Serrulinini

The authors' classification of the Serrulinini within the Phaedusinae differs from



Fig. 1. *Pravispira subserrulata* spec. nov., holotype (HNHM 94010), Turkey, Harçbeli pass S of Ordu, L. Németh leg.; actual height 12.3 mm.

Nordsieck's view, according to which this taxon is regarded as a separate subfamily, most closely related to the Phaesusinae (Nordsieck, 1999; Szekeres, 1999; Nordsieck, 2002: 97).

Pravispira subserrulata spec. nov. (fig. 1)

Material. – Turkey, vilayet Ordu, Harçbeli pass S of Ordu, northern side, 1450 m; L. Németh and M. Szekeres leg., 13.vi.1999. Holotype: HNHM 94010. Paratypes: HNHM 94011; RMNH 98085/2; SMF 327435/2; NHMW 103193/2; HNC 61311/2; NE/43; SZ/16.

Diagnosis. – Differing from the other two *Pravispira* species that are known by the serrated parietal side of the peristome, and the stronger sculpture over the entire shell.

Description. – The light yellowish or corneous shell is fusiform, consisting of 9-10¹/₄ whorls. Except for the embryonic shell, the whorls are covered with regular, dense but conspicuous, ribs which, with a gradual transition, become strong, sharp and widely spaced towards the neck. The pear-shaped aperture protrudes, so that its columellar side is widely separated from the last whorl. The narrow rim of the peristome is curved backwards, and except for the sinulus, it is covered with plicae, resulting in a serrated margin. In front view, the lamella superior looks weak, not much more conspicuous than the larger interlamellar plicae that lie between the lamellae superior and inferior. The plica principalis starts somewhat behind the peristome and ends at the lateral side. Of the two short, dorsolateral palatal folds the lower one lying closer to the aperture is weak, often difficult to recognize. The basalis is well developed, but is usually shorter than one-third of the principalis.

Shell height 11.7-13.3 mm, shell width 2.6-3.2 mm.

Habitat. – This species was collected in moist beech forest with *Rhododendron* undergrowth, under and inside decaying tree stumps, together with the clausiliids *Serrulina serrulata* (L. Pfeiffer 1847), *Strigileuxina discedens* (Retowski, 1889), *Strigileuxina illustris* Neubert, 1993, and *Euxinastra (Odonteuxina) iberica* (Roth, 1838).

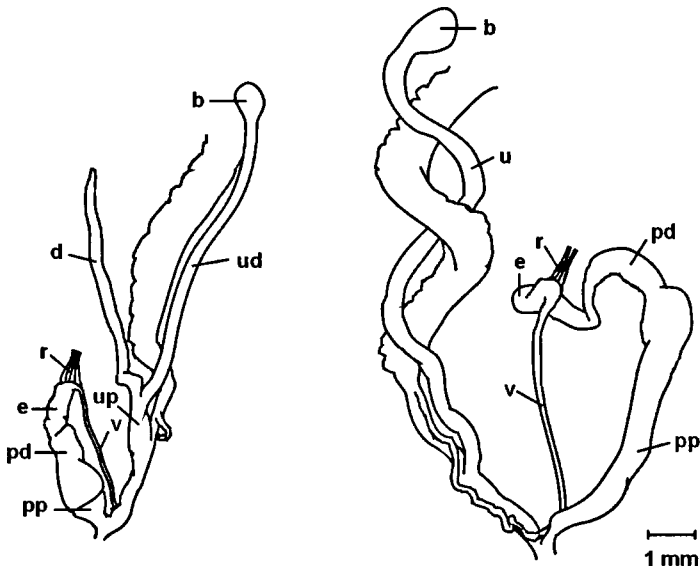
Etymology. – The name alludes to a superficial resemblance to *Serrulina serrulata*.

Systematic position. – The new species is closely related to *Pravispira serrulosa* (Retowski, 1889), but differs by its stronger sculpture, the serrated rim of both peristome sides, and the usually shorter palatal plicae and basal is.

This species is the westernmost representative of its genus, with its type locality about 150 km west of the range of *Pravispira serrulosa* [that lies, according to Nordsieck (1994), between the Zigana pass (SW of Trabzon) and the Ikizdere valley (S of Rize)]. From here starts the wide distribution area of *P. semilamellata* (Mousson, 1863), which extends along the Caucasus to the Hyrcanian deciduous forests along the Caspian coast of Iran (Likharev, 1962; Nordsieck, 1995). In the Hyrcanian region the authors found this species in the Talesh mountains, 22 km from Asalem toward Khalkhal, at 1200 m, a locality representing the southeastern limit of its known distribution.

Serrulinella senghanensis (Germain, 1933)

Material studied. – Iran, province of Gilan, stream bank 21 km from Astaneh along the road to Deylaman, 350 m. Live specimens were found at a depth of 20 to 40 cm in loose humus deposited among rocks near a stream, in mixed deciduous forest with *Quercus*, *Ostrya*, *Acer*, *Alnus*, *Pterocarya* and *Parrotia* species.



Figs 2, 3. Genital structures of *Laeviphaedusa hyrcanica* [2] and *Serrulinella senghanensis* [3]. Abbreviations: b, bursa of the bursa copulatrix; d, diverticulum of the bursa copulatrix; e, epiphallus; pd, distal part of the penis; pp, proximal part of the penis; r, retractor muscle; u, pedunculus; ud, distal part of the pedunculus; up, proximal part of the pedunculus; v, vas deferens.



Fig. 4. *Euxina patrisnemethi* spec. nov., holotype (HNHM 94008), Iran, 12 km from Abbasabad towards Hasankeif, L. Németh leg.; actual height 15.1 mm.

Serrulinella Nordsieck, 1984, was described as a monotypic subgenus of *Serrulina* Mousson, 1873. The genital structures of *Serrulinella senghanensis* (fig. 2) revealed that, compared to *Serrulina*, the distal part of the penis and the epiphallus are much shorter, the latter ending at the attachment of the retractor muscle. The distal part of the pedunculus with the bursa is longer than the diverticulum, and about four times longer than the proximal pedunculus. The shell characters outlined by Nordsieck (1984), together with the above-mentioned anatomical differences, seem to justify the classification of *Serrulinella* as an independent genus.

Laeviphaedusa hyrcanica (Germain, 1933)

Material studied. – Iran, province of Mazandaran, 12 km ENE of Alasht, 1400 m, and province of Gilan, 12 km from Deylaman towards Siyahkhal, 1220 m. At both localities live specimens were found in moist beech forests, under bark of decaying tree trunks.

Our findings regarding the genital structures of this species (fig. 3) generally agree with the brief description given by Nordsieck (2001: 15), but in the specimens that we studied from the two localities, the penial retractor was attached only at the epiphallus, without any additional minor muscle branch connected to the distal penis.

A fossil species of *Laeviphaedusa*, that has been described from the middle Miocene layers of the river Fars (about 150 km ESE of Krasnodar), represents one of the earliest reliable

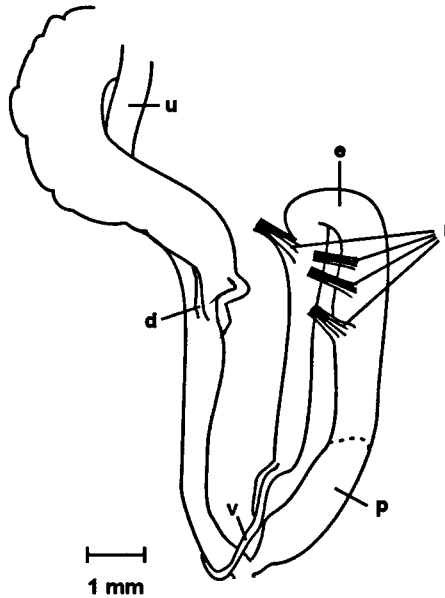


Fig. 5. Genital structures of *Euxina patrisnemethi* spec. nov. Abbreviations: d, diverticulum of the bursa copulatrix; e, epiphallus; p, penis; r, retractor muscles; u, pedunculus; v, vas deferens.

occurrences of the *Serrulina* group in the Caucasus region (Steklov, 1966). This indicates that *Laeviphaedusa*, which now inhabits the deciduous forests of eastern Gilan and Mazandaran, once lived much farther towards the northwest. This record brings the genus geographically closer to Of in northern Turkey, the type locality of *Pontophaedusella* Nordsieck, 1994. According to Nordsieck (1994), similar shell features of this genus (e.g. those of the aperture and the clausiliar apparatus, and the presence of a basal crest) may indicate a close relationship with *Laeviphaedusa*. The genital morphology of *Pontophaedusella* differs from that of *Laeviphaedusa* mainly by the shorter but wider epiphallus and the presence of a diverticulum (Szekeres, 1998). As in the case of Euxininae the loss of diverticulum has proven to be of limited taxonomic significance (Likharev, 1962; Nordsieck, 1994), the anatomical data seem to be compatible with the assumed relationship between these two genera.

Mentissoideinae, Mentissoideini

Euxina patrisnemethi spec. nov. (fig. 4)

Type material. – Iran, Mazandaran prov., 12 km from Abbasabad towards Hasankeif, 380–400 m. L. Németh & M. Szekeres leg., 2.vi.1999; holotype (HNHM 94008) and paratypes; paratypes also by G. Majoros and L. Németh leg., 8.vi. 2000 (HNHM 94009); RMNH 98086/2; SMF 327436/2; NHMW 103194/2; HNC 61312/2; MA/74; NE/188; SZ/17.

Diagnosis. – Differing from other *Euxina* species by the convex contour of its shell.

From other small-size Iranian species of the genus it differs by the neck sculpture that consists of prominent, widely spaced ribs, contrasting with the almost smooth remaining part of the last whorl.

Description. – The chestnut-coloured shell of 9 to 10½ whorls is strong, tumid, with a distinctly convex contour. The very blunt apex is costate, then the ribs become gradually weaker toward the almost smooth last whorl. The neck is strongly costate behind the peristome, and has a strong crest at its basis.

The aperture is wide, rimmed by a light-brown peristome. The lamella superior is strong, marginal, inward reaches beyond the outer end of the lamella spiralis. The spiralis ends on the lateral side, it becomes higher and slightly curved inwards over a short segment just opposite the weak, dorsolateral lamella inserta. Ending high in the aperture, the lamella inferior leans toward the superior, and in front view looks very close to it. The lamella subcolumellaris, that forms a wide curve at its lower part, is barely visible from the outside. The plica principalis starts behind the peristome and reaches to the lateral side. The short upper palatal fold is continuous with the lunella. This latter becomes wider towards its basis where it joins the well-developed subclaustralis. The clausilium has an angular end, without distinct lobes.

Shell height 14.4-16.3 mm, shell width 4.3-4.7 mm.

The genital apparatus of the new species is shown in fig. 5. Its characteristic features are the relatively long distal epiphallus and the bipartite attachment of the retractor muscle branches between which a relatively long segment of the epiphallus remains free.

Habitat. – *Euxina patrisnemethi* spec. nov. was collected in mixed deciduous forest (*Quercus castaneifolia*, *Ostrya*, *Alnus*, etc.), from among vegetation and litter of a scree, together with *E. lessonae* (Issel, 1865). At the same locality the clausiliids *Serrulina sieversi* (L. Pfeiffer, 1871), *Laeviphaedusa hyrcanica* and *Euxina mazanderanica* Nordsieck, 1994, were found.

Etymology. – The new species is dedicated to and named after the late László Németh senior, father of L. Németh.

Species	Overlapping lamellae	Laterally ending spiralis	Incised clausilium	Fused plica superior and lunella	Short distal epiphallus	Discontinuously attached retractor
<i>E. talyschana</i>	+	+	-	-	+	-
<i>E. gastron</i>	+	+	-	-	+	-
<i>E. lessonae</i>	-	+/-	+/-	-	+	-
<i>E. mazanderanica</i>	-	+	-	+	+	+
<i>E. patrisnemethi</i>	+	+	-	+	-	+
<i>E. achrafensis</i>	-	-	-	+	-	+
<i>E. forcarti</i>	+	-	+	-	+	-

Table 1. Morphological characteristics of the Iranian *Euxina* species

The Iranian species of *Euxina* O. Boettger, 1877

The Hyrcanian forest lands in the provinces of Gilan and Mazandaran are inhabited by several *Euxina* species. In an overview Nordsieck (1995) pointed out that these can be divided into so-called large-sized and small-sized species, and at most localities two *Euxina* species of the different size-groups occur sympatrically. This peculiar distribution pattern (fig. 6) is probably caused by different niche preferences of the large and small species, limiting their competition at the same locality. Intriguingly, *E. patrisnemethi* spec. nov. was found to be sympatric with another small species, *E. lessonae*, and also the large-sized *E. mazanderanica* (fig. 6). At this locality, however, only *E. patrisnemethi* spec. nov. and the much smaller *E. lessonae* were collected from the same habitat, while *E. mazanderanica* lived under the bark of fallen tree trunks. If competition indeed plays a role in limiting co-occurrence, this may explain the very limited distribution of *E. patrisnemethi* spec. nov., compared to the relatively widespread other Iranian *Euxina* species.

Nordsieck (1995) also presented a morphological comparison of the clausilium and the lunellar structures between the Iranian *Euxina* species. Taking advantage of the material we collected in 1999, we extended these analyses to the internal lamella structures and the features of genital morphology. The seven species studied had characteristic differences between the length, height and overlapping of the lamellae superior and spiralis, as well as the length and depth of the inserta (fig. 7). A comparison of the clausiliar structures between these species is given in table 1. Our studies of the genital structures revealed that some species had a short distal epiphallus and almost continuously attached (*E. talyschana* Likharev, 1962, *E. lessonae*, *E. gastron* Nordsieck, 1995, *E. forcarti* Nordsieck, 1995) or widely divided bipartite (*E. mazanderanica*) bundles of the retractor muscle, while

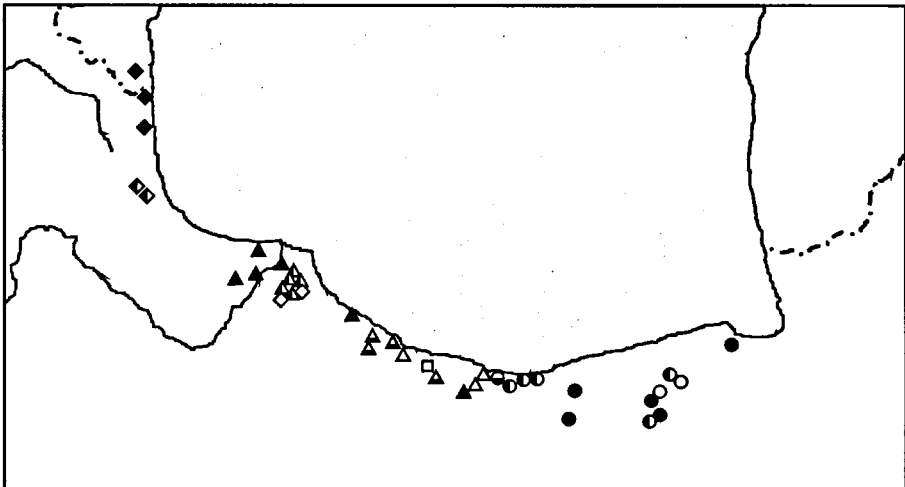


Fig. 6. Distribution of the Iranian *Euxina* species. The symbols indicate *talyschana* (diamond), *gastron* (open diamond), *talyschana* + *gastron* (divided diamond), *lessonae* (triangle), *mazanderanica* (open triangle), *lessonae* + *gastron* (vertically divided triangle), *lessonae* + *mazanderanica* (horizontally divided triangle), *lessonae* + *mazanderanica* + *patrisnemethi* spec. nov. (square), *achrafensis* (dot); *forcarti* (open circle), *achrafensis* + *forcarti* (vertically divided circle), *achrafensis* + *mazanderanica* (horizontally divided circle).

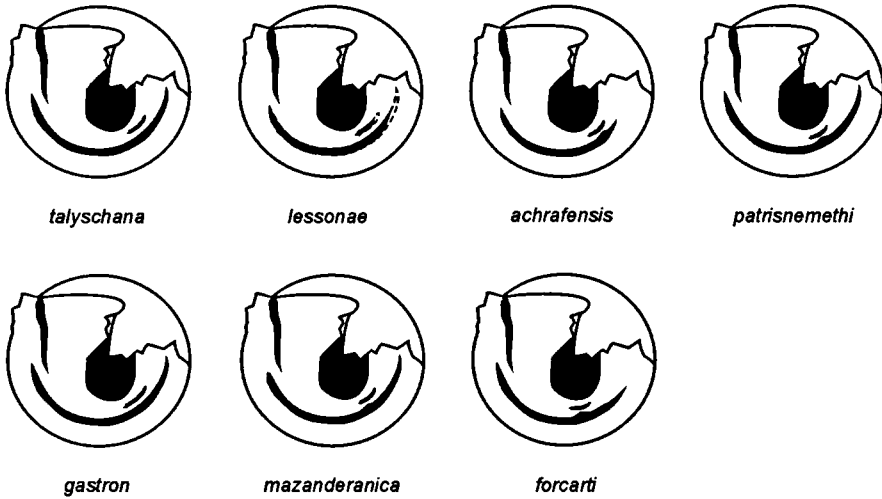


Fig. 7. Lamella structures of the Iranian *Euxina* species. The schematic drawings show the forms and relative positions of the lamellae superior, spiralis and inserta. Contours marked by broken line indicate variability in size or shape.

others (*E. achrafensis* Nordsieck, 1995, *E. patrisnemethi* spec. nov.) featured a well-developed distal epiphallus and divided retractor. These data are in agreement with Nordsieck's assessment (1995) suggesting that morphological similarities correlate better with the geographical distribution than differences in the shell size, therefore they do not seem to indicate monophyletic evolution, with lineages of large-sized and small-sized species.

Distribution data from Iran are relatively scarce and, due to changes of the geographical names, some old localities cannot be exactly identified. The available records, however, are sufficient for establishing the ranges of the *Euxina* species in the Hyrcanian region. Fig. 8 indicates some new *Euxina* localities from the authors' 1999 field trip, as well as the distribution boundaries of each species.

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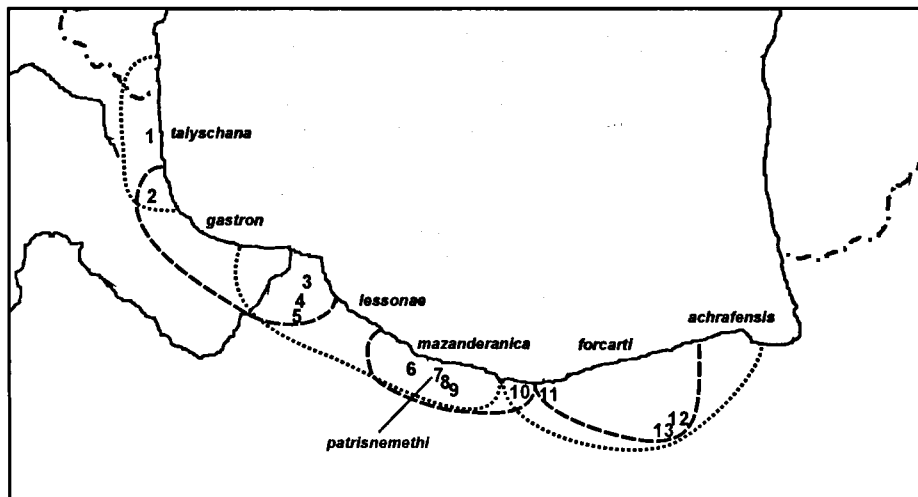


Fig. 8. Localities of the *Euxina* material collected by the authors, and the positions of these localities within the distribution of the species. The collection sites, indicated by numbers, and the species collected there are as follows: (1) valley above Lomir, 24 km S of Astara, 100-120 m (*talyschana*); (2) 22-24 km from Asalam, along the road to Khalkhal, 1200-1300 m (*talyschana* + *gastron*); (3) 7-15 km from Siyahkhal along the road to Deylaman, 300-650 m (*lessonae*); (4) 12-7.5 km from Deylaman along road to Siyahkhal, 1220-1520 m (*lessonae* + *gastron*); (5) mountain pass 3 km N of Deylaman, along the road to Siyahkhal, 1740 m (*lessonae* + *gastron*); (6) Katra 5 km S of Nashtarud, 120 m (*lessonae* + *mazanderanica*); (7) 12 km from Abbasabad, along the road to Hasankeif, 380-400 m (*lessonae* + *mazanderanica* + *patrisnemethi* spec. nov.); (8) 13 km NW from Hasankeif towards Abbasabad, 800 m (*lessonae*); (9) 9 km NW from Hasankeif towards Abbasabad, 1240 m (*lessonae* + *mazanderanica*); (10) 11 km E of Nowshahr, 500 m (*achrafensis* + *mazanderanica*); (11) 5 km from Nur towards Chomestan, 50 m (*achrafensis* + *forcarti*); (12) Alasht junction, along the Qaemshahr to Pol-e-Sefid road, 530 m (*achrafensis*); (13) 12 km ENE of Alasht, 1400 m (*achrafensis* + *forcarti*). The limits of distribution are marked with dotted (small species) or broken lines (large species).

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