

## ***Chondrina tatrica* Ložek, 1948: new species for the Romanian fauna (Gastropoda: Chondrinidae)**

ROLAND FARKAS<sup>1</sup>, TAMÁS DELI<sup>2</sup> & BARNA PÁLL-GERGELY<sup>3</sup>

<sup>1</sup>Aggtelek National Park Directorate, Tengersizem oldal 1., H-3758 Jósvafő, Hungary, e-mail: farkasro@yahoo.com (corresponding author)

<sup>2</sup>Munkácsy Mihály Museum, Széchenyi u. 9., H-5600 Békéscsaba, Hungary, e-mail: deli@bmmi.hu

<sup>3</sup>Department of Biology, Shinshu University, Matsumoto 390-8621, Japan, e-mail: pallgergely2@gmail.com

FARKAS R., DELI T. & PÁLL-GERGELY B., 2015: *Chondrina tatrica* Ložek, 1948: new species for the Romanian fauna (Gastropoda: Chondrinidae). – Malacologica Bohemoslovaca, 14: 17–20. Online serial at <<http://mollusca.sav.sk>> 27-Apr-2015.

*Chondrina tatrica* Ložek, 1948 is reported for the first time for Romania. The species was thought to be endemic to the Western Carpathian Mountains. The Romanian locality (Boga valley, Bihor County) is situated approximately 260 km from the nearest known site of the species in a straight line. The zoogeographical significance of this finding and the possible route of the ancestors of *C. tatrica* to the Carpathians is discussed.

**Key words:** distribution, biogeography, endemism

### **Introduction**

The genus *Chondrina* Reichenbach, 1828 is widely distributed in Europe from the Iberian Peninsula and the neighbouring African coastline (Morocco) as far as the Caucasus Mountains and Iran, from North Africa to Middle Europe. Some isolated populations of *Chondrina arcadica clienta* (Westerlund, 1883) have been reported from several southern Swedish islands as well (GITTENBERGER 1973, KOKSHOORN & GITTENBERGER 2010, WELTER-SCHULTES 2012). However, the majority of the species inhabit Southern Europe. The genus is most diverse in terms of number of species in the Iberian Peninsula, where several endemic species are known (KOKSHOORN & GITTENBERGER 2010). The Carpathian Basin is inhabited by only two species, namely the widely distributed *Chondrina arcadica clienta*, and *Chondrina tatrica* Ložek, 1948 (LOŽEK 1948). The latter species has been reported from a relatively narrow area in the Western Carpathian Mountains only. Its area includes the Great Fatra Mts., the High and Low Tatra Mts., the Slovak Paradise, the Muráň Plateau, and the Slovak Karst area (LISICKÝ 1990). Most populations are known from Slovakia, but the species reaches Poland on the northern edge of the High Tatras and Hungary in the Aggtelek Karst (FARKAS 2008). Molecular data showed that *Chondrina tatrica* is not closely related to *C. avenacea* (Bruguière, 1792) and *C. arcadica* (Reinhardt, 1881), which are geographically the closest species (KOKSHOORN & GITTENBERGER 2010, KOKSHOORN et al. 2010). Instead, *C. tatrica* belongs to a clade together with *C. megacheilos* (De Cristofori & Jan, 1832) and *C. multidentata* (Strobel, 1851) which inhabit the Southern Alps, and *C. spelta* (Beck, 1837) which lives in the Western Balkans.

### **Abbreviations**

FR: Private collection of Roland Farkas, Szögliget, Hungary

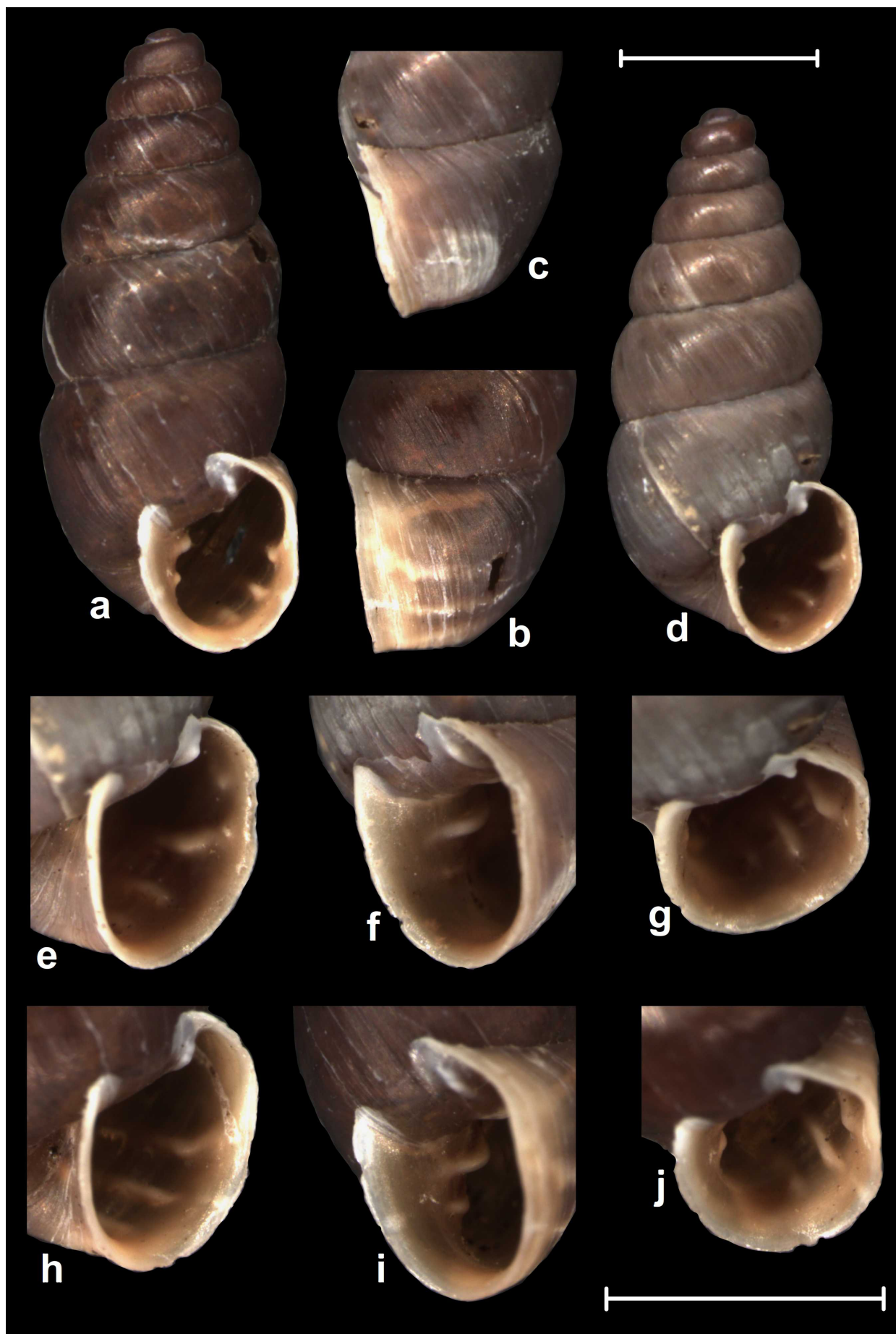
HNHM: Hungarian Natural History Museum, Budapest, Hungary

MMMB: Munkácsy Mihály Museum, Békéscsaba, Hungary

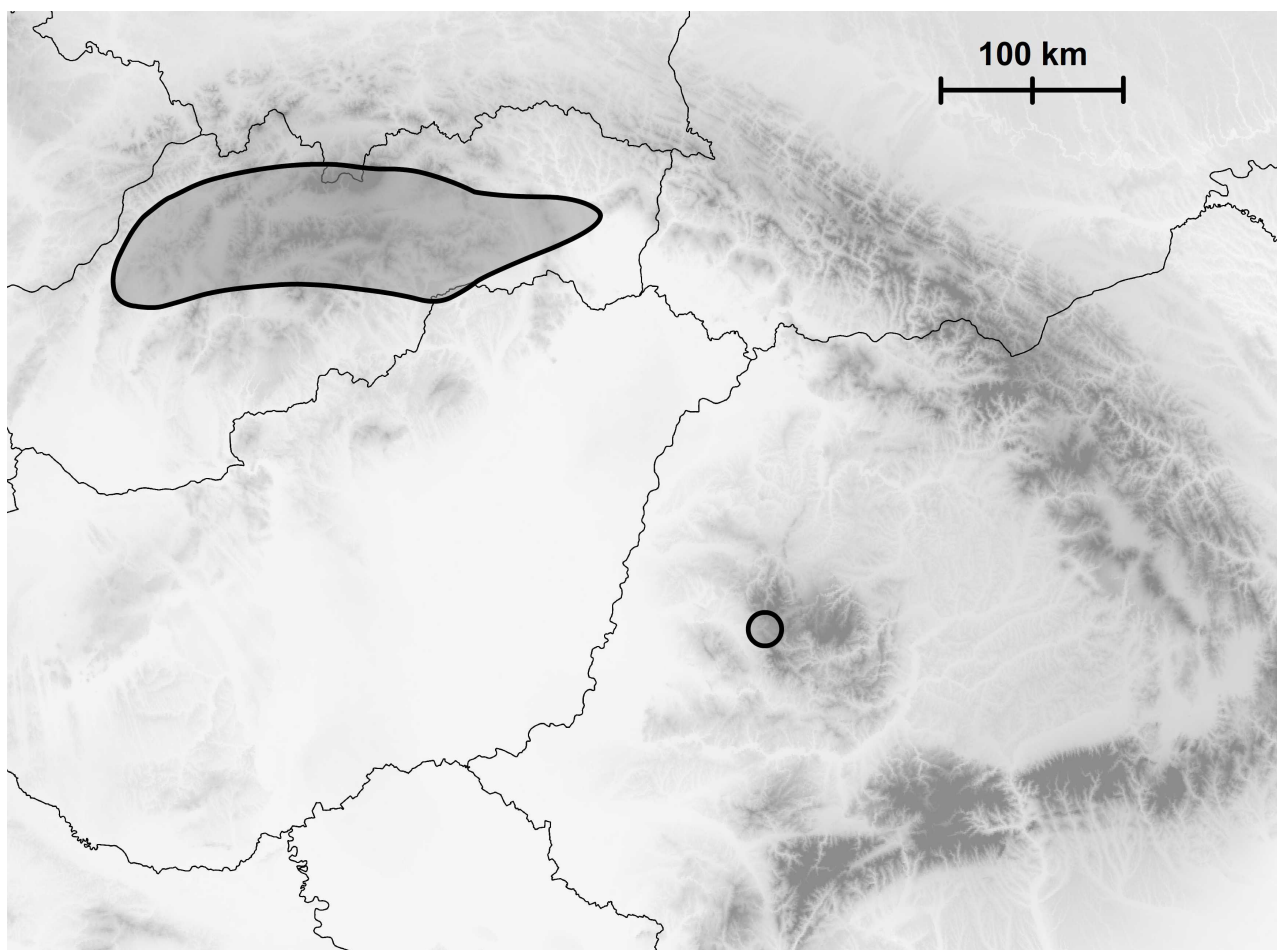
NMBE: Natural History Museum, Bern, Switzerland

### **Results**

During a faunistic survey in the Boga valley (=Valea Boghii, Bihor Mountains) in 2011, a soil sample was collected at the base of a huge limestone rock named Piatra Dracului. This rock is probably the highest in the Valea Boghii area, and has an enormous exposed surface facing to the south. The soil sample contained several empty *Chondrina* shells. Six of them were obviously different to the shells of *C. arcadica clienta* which were also present in the sample. The main differences were the following: the general shape of the shells were rather oval, the shell surface was smoother, with overall much weaker teeth in the aperture. Comparing the shells with Slovakian *C. tatrica* specimens we found no notable differences. Thus, these Romanian shells (Fig. 1) have been identified as *Chondrina tatrica*. The measurements of the Romanian shells are the following: height: 6.00–6.27 mm, width: 2.40–2.53 mm (n=4). As a comparison, KERNEY et al. (1983) reports 6.0–7.5 mm as shell height and 2.2–2.8 mm as shell width. During a second trip in 2012 we were aiming to find living individuals, but we were not successful. In 2012, Péter Subai also collected empty shells at the same site.



**Fig. 1.** Specimens of *Chondrina tatrica* Ložek, 1948 from the Valea Boghii, Romania (HNHM 99362/2). A–B and H–J: Specimen 1; C–D and E–G: Specimen 2. Scale represents 2 mm; upper scale refers to the whole shells, lower scale refers to the apertures. Photos: B. Páll-Gergely.



**Fig. 2.** Distribution of *Chondrina tatrica* Ložek, 1948. The distribution in Slovakia follows VAVROVÁ (2009), the Romanian locality is reported in this paper.

### Locations of collected shells

Romania, Jud. Bihor, Apuseni Mts., Boga valley: Piatra Dracului, leg. R. Farkas, July 4, 2011, HNHM 99362/2 (two specimens figured here), FR/4; Romania, Jud. Bihor, Apuseni Mts., Pietroasa, Boga valley, leg. P. Subai, July 19, 2012., NMBE 529954/7; Romania, Jud. Bihor, Apuseni Mts., Boga (E of Pietroasa), Valea Boghii, limestone cliffs, leg. Deli, Lennert & Subai, July 19, 2012, MMBB 1317/3.

### Discussion

#### Microhabitat of *Chondrina tatrica*

We have no direct observation regarding the microhabitat preference of the Romanian *Chondrina tatrica* populations, therefore we can rely on our experience in Hungarian and Slovakian sites. In those countries the species prefers huge, vertical limestone rocks, and living individuals can be found in rock surfaces directly exposed to sunlight. In the Romanian site we hypothesise that the species lives on high cliffs which are hardly accessible for collectors.

#### Biogeography of the Boga valley

The Boga valley is the most significant valley system of the western side of the Bihor Mountains. Because of the relatively low elevation and the vicinity of the Great Hun-

garian Plain, the climate of the Boga valley is drier than that of most of the Carpathian valleys. The Boga valley is inhabited by several typical Carpathian endemic species (Soós 1943), such as *Mastus bielzi* (M. von Kimakowicz, 1890), *Carpathica calophana* (Westerlund, 1881), *Petasina bielzi* (E. A. Bielz, 1860), *Monachoides vicinus* (Rossmässler, 1842), *Drobacia banatica* (Rossmässler, 1838), *Faustina faustina* (Rossmässler, 1835), *Cochlodina orthostoma* (Menke, 1828), *Pseudalinda stabilis* (L. Pfeiffer, 1847) and *Vestia elata* (Rossmässler, 1836). Probably because of the dry and warm climate, the Boga valley is also inhabited by typical species of the Banat region, such as *Orcula jetschini* (M. von Kimakowicz, 1883), *Platyla microspira* (Pini, 1885), *Platyla banatica* (Rossmässler, 1842), *Mediterranea montivaga* (M. von Kimakowicz, 1890), *Vitrea szekeresi* Deli & Subai, 2011, *Vitrea jetschini* (M. von Kimakowicz, 1890) (see DELI & SUBAI 2011) and *Kovacsia kovacsi* (Varga & Pintér, 1972) (FEHÉR et al. 2009).

The rock-dwelling *Alopi* genus is represented by *Alopi bielzii tenuis* (E. A. Bielz, 1861) in some parts of the Apuseni Mountains, and it has been reported from the Boga valley as well (DELI & DOMOKOS 2011). Interestingly, *Alopi bielzi clathrata* (E. A. Bielz, 1856), which is an isolated population of the same species, is known from the Slovak Karst. This is the northernmost representative of the genus *Alopi*. This *Alopi* species shows strikingly similar distribution pattern to that of *Chondrina*

*tatrica* (Fig. 2), because both species occur in the Apuseni Mountains and in the Western Carpathians without known populations in-between.

### Origin of *Chondrina tatrica*

In the molecular phylogeny of KOKSHOORN et al. (2010) *Chondrina tatrica* formed a clade ("Group A") together with *C. megacheilos* and *C. multidentata* (Southern Alps) and *C. spelta* (Western Balkans). The resolution of the phylogenetic tree was not sufficient to tell which of the two species is closer related to *C. tatrica*. Knowing the closest relatives of *C. tatrica*, we can assume that the ancestors of *C. tatrica* could have arrived to the Western Carpathians from two different directions. According to the first hypothesis, ancestors of *C. tatrica* are originated from the southern part of the Alps. Migration between the Alps and the Western Carpathians are known in some cases of land snails. For example, it probably happened several times in the case of also calciphilous *Orcula dolium* (Draparnaud, 1801) (HARL et al. 2014). The second hypothesis suggests that they have arrived from the Western Balkans. This route has been suggested in several genera, such as *Alopi*a and *Mastus* (FEHÉR et al. 2013). Without knowing the Romanian locality presented here, both hypotheses seemed to be possible because the current distribution of *C. tatrica* is in similar straight line distances from both areas. The presence of *Chondrina tatrica* in the Apuseni Mountains, however, suggests that the ancestors of the species could have followed the inner chains of the Carpathians to reach their present distributional area.

### Acknowledgements

We are very grateful to Péter Subai for his permission to publish his information, to Ľubomíra Vavrová for her maps of *Chondrina tatrica*, to Zoltán Fehér for his help in making the map, and to Simon Hursthouse for correcting the English.

### References

- DELI T. & DOMOKOS T., 2011: An isolated occurrence of *Alopi*a *bielzii tenuis* (E.A. BIELZ, 1861) (Mollusca, Gastropoda, Clausiliidae) in the Bihor-Vlădeasa Mountains (Romania). – *Nymphaea (Folia naturae Bihariae)*, 38: 129–136.
- DELI T. & SUBAI P., 2011: Revision der *Vitrea*-Arten der Südkar-

paten Rumäniens mit Beschreibung einer neuen Art (Gastropoda, Pulmonata, Pristilomatidae). – *Contributions to Natural History (Bern)*, 19: 1–53.

FARKAS R., 2008: A *Chondrina tatrica* Ložek, 1948 (Mollusca: Gastropoda) előfordulása az Aggteleki-karszton. [The presence of *Chondrina tatrica* Ložek 1948 (Mollusca: Gastropoda) in the Aggtelek karst]. – *A Békés Megyei Múzeumok Közleményei*, 32: 45–56.

FEHÉR Z., VARGA A., DELI T. & DOMOKOS T., 2009: Geographic distribution and genital morphology of the genera *Lozekia* Hudec, 1970 and *Kovacsia* Nordsieck, 1993 (Mollusca, Gastropoda, Hygromiidae). – *Zoosystematics and Evolution*, 85(1): 151–160.

FEHÉR Z., NÉMETH L., NICOARĂ A. & SZEKERES M., 2013: Molecular phylogeny of the land snail genus *Alopi*a (Gastropoda: Clausiliidae) reveals multiple inversions of chirality. – *Zoological Journal of the Linnean Society*, 167: 259–272.

GITTENBERGER E., 1973: Beiträge zur Kenntnis der Pupillacea III. Chondrinidae. – *Zoologische Verhandlungen, Rijksmuseum van Natuurlijke Historie te Leiden*, 127: 1–267.

HARL J., DUDA M., KRUCKENHAUSER L., SATTMANN H. & HARING E., 2014: In search of glacial refuges of the land snail *Orcula dolium* (Pulmonata, Orculidae) – An integrative approach using DNA sequence and fossil data. – *PLoS One* 2014, 9: e96012.

KERNEY M. P., CAMERON R.A.D. & JUNGBLUTH J. H., 1983: Die Landschnecken Nord- und Mitteleuropas. – Paul Parey, Hamburg-Berlin, 384 pp.

KOKSHOORN B. & GITTENBERGER E., 2010: Chondrinidae taxonomy revisited: New synonymies, new taxa, and a checklist of species and subspecies (Mollusca: Gastropoda: Pulmonata). – *Zootaxa*, 2539: 1–62.

KOKSHOORN B., VAN SCHOORA M., ERKELENSA I. & GITTENBERGER E., 2010: Waves of dispersal in island-hopping *Chondrina* species (Gastropoda, Pulmonata, Chondrinidae). – *Zoologischer Anzeiger*, 249: 71–79.

LISICKÝ M. J., 1990: Mollusca Slovenska. [Mollusca of Slovakia]. – Veda, Bratislava, 244 pp.

LOŽEK V., 1948: Nový plž z rodu *Chondrina* v ČSR. – *Chondrina tatrica* n. sp. en Tchécoslovaquie. – *Věstník Československé Zoologické Společnosti v Praze*, 12: 83–88.

SOÓS L., 1943: A Kárpát-medence Mollusca faunája. [Mollusc fauna of the Carpathian basin]. – Magyar Tudományos Akadémia, Budapest, 478 pp.

VAVROVÁ Ľ., 2009: Ecosozological evaluation of molluscs of Slovakia by using Geographical information system (GIS). – PhD. thesis, ÚEL SAV Zvolen.

WELTER-SCHULTES F. W., 2012: European non-marine molluscs, a guide for species identification. – Planet Poster Editions, Göttingen, 760 + 78 pp.