



***Chilostoma (Cingulifera) cingulatum* (S. Studer, 1820) (Gastropoda: Pulmonata: Helicidae) new to the fauna of Hungary**

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Abstract

Chilostoma cingulatum (S. Studer, 1820) is reported for the first time in Hungary. A seemingly viable population, consisting of several living adult and juvenile specimens has been discovered in Budapest, on the ruins of the Church of Mary Magdalene of the Castle of Buda. The collected specimens could be identified only to the species level. However, they are most similar to *Chilostoma cingulatum baldense* (Rossmässler, 1839). It is unlikely that this introduced population will become an invasive pest due to its narrow ecological niche, limestone-rich rocks and walls.

Key words: introduced species, viable population, rock-dwelling snail

Kivonat

A *Chilostoma cingulatum* (S. Studer, 1820) (alpesi sávocsiga) első adatát közöljük Magyarországról. Egy életképesnek látszó populációt fedeztünk fel a Mária Magdolna-templom (Budai Vár egyik temploma) romjain, melyet több kifejlett és fiatal példány alkotott. A példányokat csak fajsztinten azonosítottuk, azonban megjegyezzük, hogy a *Chilostoma cingulatum baldense* (Rossmässler, 1839) alfajhoz hasonlítanak leginkább. A faj szűk ökológiai tűrőképessége miatt (csak mészbzen gazdag rakott és sziklafalakon képes életben maradni) valószínűtlen, hogy ez a faj kártékony invazív vá váljon.

Kulcsszavak: behurcolt faj, életképes populáció, sziklalakó csiga

Introduction

The second author collected some snails on the ruins of the Church of Mary Magdalene of the Castle of Buda, Budapest, District I, Hungary. Through a review of the literature and comparisons of the shells with the specimens deposited in the Hungarian Natural History Museum (HNHM) the snails were identified as *Chilostoma cingulatum* (S. Studer, 1820), a species normally inhabiting the Northern Alps (Liechtenstein to Salzburg), the Southern Alps (Ticino,

Switzerland), and the Apennines Monte del Matese, Italy) (Pfeiffer 1951, Welter-Schultes 2012). This species has been introduced to a number of German urban areas (Schlesch 1962, Fauer 1998, Kobiálka 2000, Schmid 2000, Rosenbauer 2011, Hirschfelder 2017, Kittel 2017, Eta & Hausdorf 2019) and Austria near Vienna (Fischer et al. 2010). This is its first record from Hungary, extending its area considerably eastwards.

Results

Collection site

Budapest, Várnegyed, ruins of Church of Mary Magdalene, southern side, ca. 47°30.222'N, 19°1.734'E (Fig. 1). Specimens were found at two sites where grass was not cut after rain on 26 August 2019. At one site 26 adult and 6 juvenile specimens were collected, and 15 adults and 6 juveniles were found at the other. Living specimens of *Oxychilus draparnaudi*

(H. Beck, 1837) (anatomically verified) were also collected at the site.

Three specimens (shells and ethanol-preserved bodies) are deposited in the HNHM (HNHM 104406: figured specimen; HNHM 104407: two additional specimens).

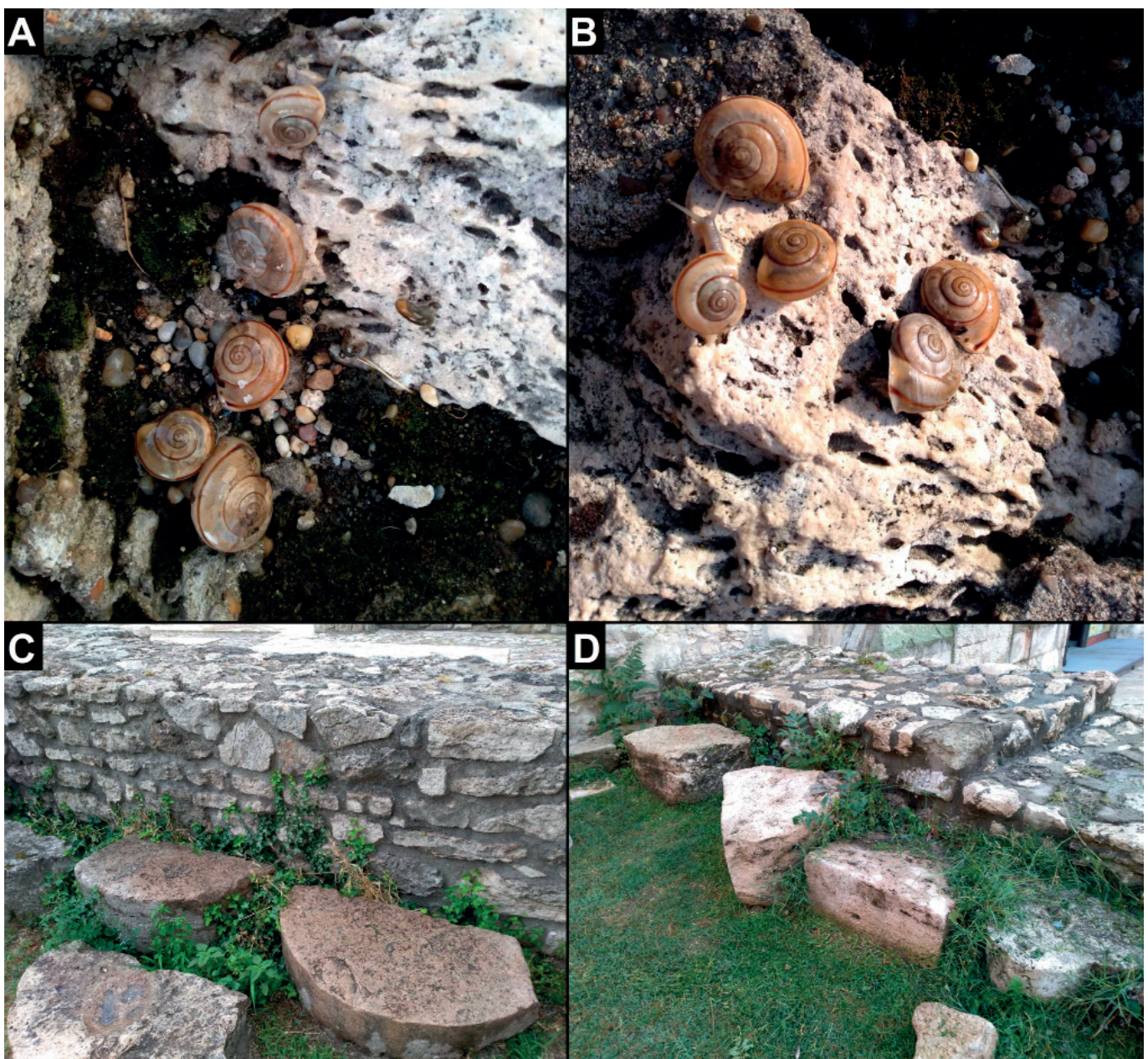


Figure 1. A–B: Living *Chilostoma cingulatum* (S. Studer, 1820); C–D: habitat of *Chilostoma cingulatum* at the Church of Mary Magdalene, Várnegyed, Budapest. Photos: Natália Tőkési.

Systematics

Chilostoma cingulatum (S. Studer, 1820) belongs to the monotypic subgenus *Cingulifera* Held, 1838 (Groenenberg et al. 2016). This species had the highest number of described subspecies among European land snails (Bank 2007) with 29 accepted subspecies. Two of them were elevated to species level (Groenenberg et al. 2016), thus, 27 subspecies remained (Molluscabase 2019). This extreme splitting is probably due to the large, fragmented distribution (one of the largest in this genus), and that taxonomists tend to describe more subspecies for taxa having larger and more character-rich shells (Páll-Gergely et al. 2019).

The populations found in Budapest is most similar to *Chilostoma cingulatum baldense* (Rossmässler, 1839) (B. Hausdorf, pers. comm., 2019 December). However, since intraspecific systematics of this species is not resolved yet, we identify the newly discovered population to species level only. Future research, especially molecular phylogeny, could shed light on the origin of the Hungarian population.

Family Helicidae Rafinesque, 1815

Subfamily Ariantinae Mörch, 1864

Genus *Chilostoma* Fitzinger, 1833

Chilostoma (Cingulifera) cingulatum (S. Studer, 1820)

Description of the shell (Fig. 2): Depressed, with only slightly elevated spire, dorsal side domed, body whorl rounded, consisting of 4.25–4.75 whorls; base colour light brown to whitish with a slender, reddish brown peripheral band; shell surface glossy, almost smooth, with fine, inconspicuous, irregular growth lines; aperture semilunar, strongly oblique to shell axis; peristome strongly expanded, not reflected, except in direction of the umbilicus; umbilicus open, narrow, its edge is covered by reflected peristome.



Figure 2. *Chilostoma cingulatum* (S. Studer, 1820) found on the ruins of the Church of Mary Magdalene, Várnegyed, Budapest (HNHM 104406). Scale bar represents 20 mm. Photos: B. Páll-Gergely.

Description of the genitalia (Fig. 3): Atrium short, internally with an atrial stimulator; penis short, penial verge conical with an elongated tip, opening laterally at the base of tip; epiphallus cylindrical, relatively slender, approximately twice as long as penis; retractor muscle inserts near middle of epiphallus, slightly in distal direction; flagellum slender, extremely long (at least twice as long as penis and epiphallus combined), vermiform; vas deferens as thick as flagellum, moderately long; vagina slightly thicker and longer than penis; dart sac short, oval; dart with a slender stalk and a wider blade; glandulae mucosae two, simple, relatively thick, at least 5 times longer than dart sac; pedunculus branches to bursa copulatrix and diverticulum; stalk of bursa copulatrix at least twice as long as pedunculus; bursa small, rounded;

diverticulum approximately 3.5 times as long as pedunculus; end of diverticulum not tapering; diverticulum attached to spermoviduct with numerous fibres; albumen gland long (slightly longer than spermoviduct), thick, C-shaped; talon clearly visible, relatively weakly developed.

Differential diagnosis: *Chilostoma cingulatum* is not similar to any other land snail species reported from Budapest. The most similar species from Hungary is *Faustina faustina* (Rossmässler, 1835), which is known from the North Hungarian Mountains (Subai & Neubert 2016). That species has a more elevated spire, a wider umbilicus, and its yellow colour morph has a darker colouration. Moreover, the spiral band, which is not present in all *F. faustina* specimens, is thicker than that of *C. cingulatum*.

Discussion

The presence of living adult and juvenile specimens indicates that a viable population of *Chilostoma cingulatum* is established at the ruins of the Church of Mary Magdalene, Várnegyed, Budapest. Since this species is an obligate limestone-dweller in its native range (Welter-Schultes 2012), and wherever it has been

introduced (Eta & Hausdorf 2019), we speculate that the species will not disperse beyond man-made limestone walls. Consequently, it seems unlikely that this introduced species will become a highly invasive pest.

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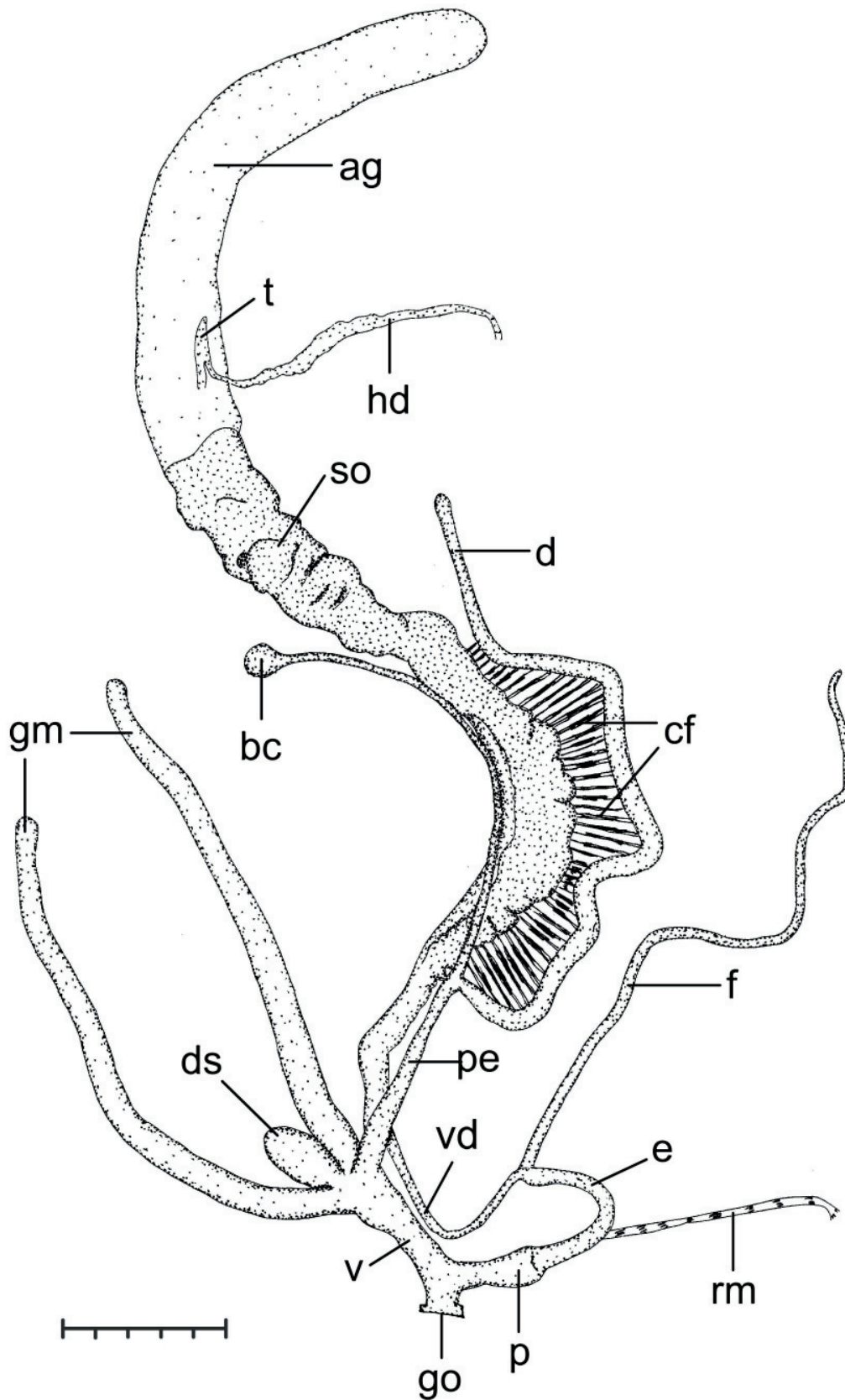


Figure 3. Reproductive anatomy of *Chilostoma cingulatum* (S. Studer, 1820) (HNHM 104406). Abbreviations: ag: albumen gland; bc: bursa of the bursa copulatrix; cf: connecting filaments; d: diverticulum; ds: dart sac; e: epiphallus; f: flagellum; gm: glandulae mucosae; go: genital opening; hd: hermaphroditic duct; p: penis; pe: pedunculus; rm: retractor muscle; so: spermooviduct, t: talon; v: vagina; vd: vas deferens. Scale bar represents 5 mm.

References

- BANK, R.A. (2007). Mollusca: Gastropoda. Fauna Europaea version 2.4. 2013 September 27. Retrieved from <https://www.faunaeur.org>
- ETA, K. & HAUSDORF, B. (2019): *Chilostoma cingulatum* (Studer 1820) und *Cornuaspersum* (O.F. Müller 1774) in Hamburg (Gastropoda: Helicidae). – Mitteilungen der Deutschen Malakozologischen Gesellschaft, 100: 13–16.
- FAUER, W. (1998): Zum Vorkommen der Großen Felsenschnecke *Chilostoma cingulatum* (S. Studer 1820) im mittleren und nördlichen Bayern (Gastropoda: Helicidae). – *Heldia*, 2(5/6): 137–140.
- FISCHER, W., REISCHÜTZ, A. & REISCHÜTZ, P.L. (2010): Beiträge zur Kenntnis der österreichischen Molluskenfauna XIX. Es kam nicht nur der Marmor nach Wien – Biodiversität auf dem Gelände eines ehemaligen Steinmetzbetriebes. – *Nachrichtenblatt der Ersten Vorarlberger Malakologischen Gesellschaft*, 17: 9–12.
- GROENENBERG, D.S.J., SUBAI, P. & GITTENBERGER, E. (2016): Systematics of Ariantinae (Gastropoda, Pulmonata, Helicidae), a new approach to an old problem. – *Contributions to Zoology*, 85 (1): 37–65.
- HIRSCHFELDER, H.-J. (2017): Zwei weitere außeralpine Vorkommen der Großen Felsenschnecke (*Chilostoma cingulatum*) in Bayern. – Mitteilungen der Deutschen Malakozologischen Gesellschaft, 97: 79–81.
- KITTEL, K. (2017): Die Weichtierfauna mittelalterlicher und frühneuzeitlicher Ruinen Unterfrankens. – Mitteilungen des Naturwissenschaftlichen Museums der Stadt Aschaffenburg, 28: 1–360.
- KOBIALKA, H. (2000): Zum Vorkommen der Großen Felsenschnecke *Chilostoma cingulatum* (S. Studer 1820) in Baden-Württemberg (Gastropoda: Helicidae). – Mitteilungen der Deutschen Malakozologischen Gesellschaft, 65: 45–49.
- MOLLUSCABASE (2019). MolluscaBase. *Chilostoma cingulatum* (Studer, 1820). Accessed at: <http://www.molluscabase.org/aphia.php?p=taxdetails&id=871135> on 2019-12-23
- PÁLL-GERGELY, B., ASAMI, T. & SÓLYMOS, P. (2019): Subspecies description rates are higher in morphologically complex land snails. – *Zoologica Scripta*, 48: 185–193.
- PFEIFFER, K.L. (1951): *Chilostoma (Cingulifera) cingulata* (Studer). Versuch einer monographischen Darstellung des Rassenkreises. – *Archiv für Molluskenkunde*, 80(4/6): 89–214, Tafel 5–10.
- ROSENBAUER, A. (2011): Vorkommen südeuropäischer Schneckenarten in Steinmetzbetrieben. – Mitteilungen der Deutschen Malakozologischen Gesellschaft, 85: 27–34.
- SCHMID, G. (2000): Die Große Felsenschnecke *Chilostoma cingulatum* (Studer) an Buntsandsteinmauern im Nordschwarzwald. – *Carolina*, 58: 149–154, Taf. 1.
- SCHLESCH, H. (1962): Bemerkungen und Berichtigungen zum neuerschienenen Ergänzungsband Mollusken in die Tierwelt Mitteleuropas, Band 2, Lfg. 1 (1962). – Mitteilungen der Deutschen Malakozologischen Gesellschaft, 1(2): 24–26.
- SUBAI, P. & NEUBERT, E. (2016): Revision of the Ariantinae. 4. The genus *Faustina* Kobelt 1904 (Gastropoda: Pulmonata: Helicidae). – *Archiv für Molluskenkunde*, 145(1): 85–110.
- WELTER-SCHULTES, F.W. (2012): European non-marine molluscs, a guide for species identification. – pp. A1–A3, 1–679, Q1–Q78, Göttingen. (Planet Poster Editions).