

FIRST RECORDS OF AN INVASIVE CAUCASIAN LAND SNAIL *HARMOZICA RAVERGIENSIS* (FÉRUSSAC, 1835) (GASTROPODA: STYLOMMATOPHORA: HYGROMIIDAE) IN BELARUS

ARTSIOM M. OSTROVSKY

Department of Public Health and Health, Faculty of Professional Development and Retraining, Gomel State Medical University, Lange 5, 246000, Gomel, Belarus (e-mail: Arti301989@mail.ru);
 <https://orcid.org/0000-0003-1729-9750>

ABSTRACT: A large population of the Caucasian land snail *Harmozica ravergiensis* was found in Gomel city (South-Eastern Belarus). There were no reports of this species from Belarus before and this find documents its further spreading outside natural range. The material was collected in 2022. Shell and reproductive anatomy of *H. ravergiensis* from Gomel are described and illustrated. The presence of the species in the area is discussed.

KEY WORDS: Gastropoda; alien species; malacofauna

INTRODUCTION

Biological invasions are one of the most significant environmental issues of the 21st century and are known to have major negative consequences for both human enterprise and ecological systems (PIMENTEL et al. 2000). Many species of terrestrial molluscs are spread far from their natural ranges, often damaging agriculture as pests and sometimes also causing a decline in local faunas (CAMERON 2016).

Within Belarus, 12 species of alien terrestrial molluscs are known, several of which have (*Deroceras*

causicum (Simroth, 1902), *Krynickillus melanocephalus* Kaleniczenko, 1851)) or may have (*Oxychilus translucidus* (Mortillet, 1853)) a Caucasian origin, spreading in a northerly direction (OSTROVSKY 2017, 2018, 2022a, b, RABCHUK & ZEMOGLYADCHUK 2011, ZEMOGLYADCHUK 2020). We here add to these with the discovery of *Harmozica ravergiensis* (Férussac, 1835) in Belarus.

MATERIAL AND METHODS

Most of our material was collected near the micro-district “Sputnik Mira” in Gomel city (around 52°26'10"N, 30°56'34"E). *H. ravergiensis* was seen here for the first time on 15.05.2022. Our last collection here was made on 12.10.2022 (Fig. 1). A total of 107 specimens were collected here. Snails were found on plant stems, reinforced concrete fences and sidewalks along the railway tracks (Fig. 2). Another 44 living specimens of *H. ravergiensis* was collected near

the stadium “Gomselmash” (52°27'06"N, 30°57'53"E) and one living specimen was also collected near the plant “Gomselmash” (52°26'43"N, 30°58'26"E) on 25.09.2022 and 12.10.2022. The last time living specimens were found here was on 20.10.2022. A map with all these localities is shown in Figure 3. The specimens are preserved in 70%-ethanol and kept at the author’s collection.



Fig. 1. Caucasian land snail *Harmozica ravergiensis* from Gomel city: living snails collected 25.09.2022



Fig. 2. The habitat of the local population of *Harmozica ravergiensis* from Gomel city

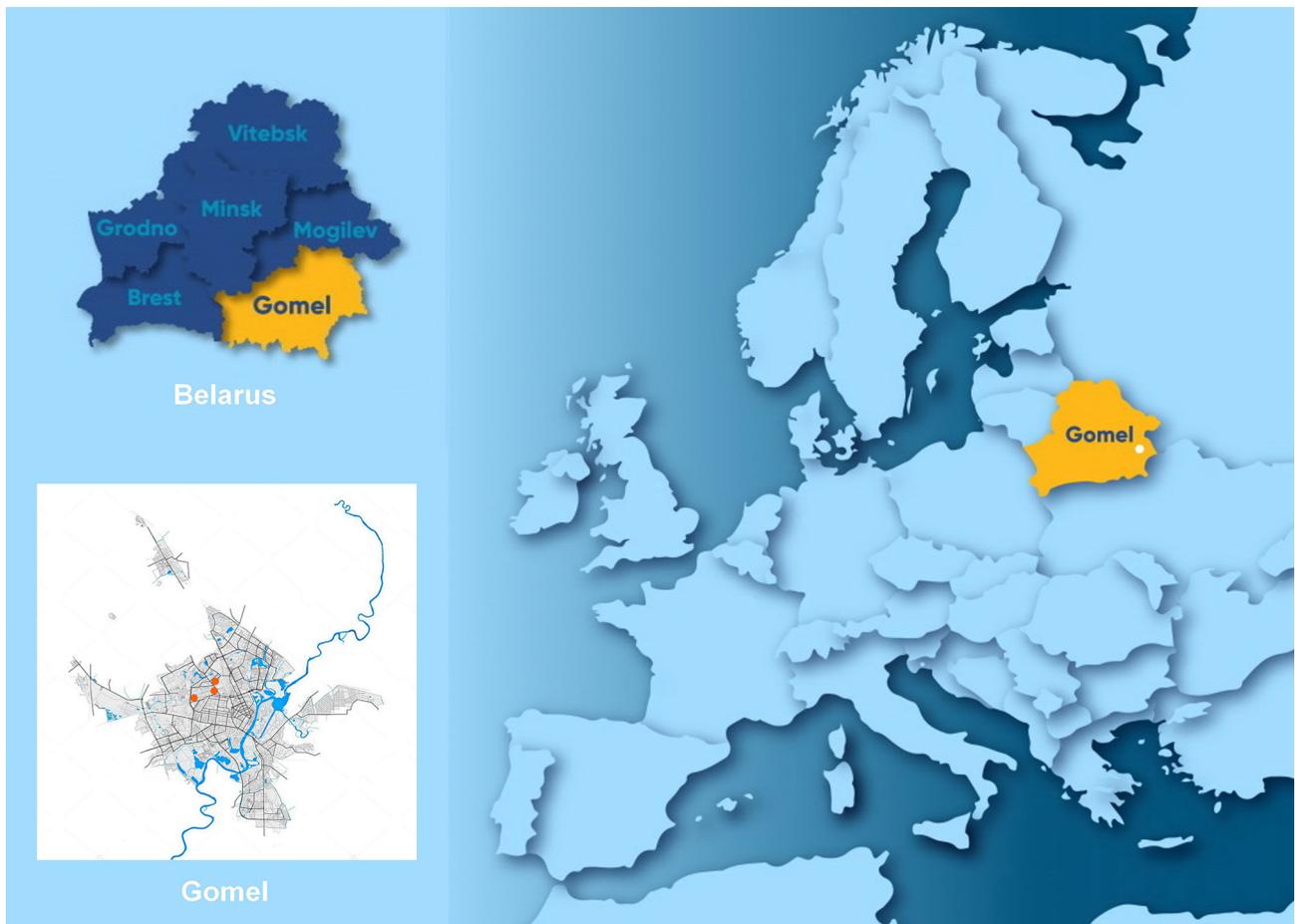


Fig. 3. A map showing localities of *Harmozica ravergiensis* in Gomel city

RESULTS AND DISCUSSION

One hundred and fifty-two specimens of *H. ravergiensis* were collected in Gomel city, including 5 empty shells. Width of shell of adult specimens ranges between 11–16 mm, and height between 9–12 mm at 6–7 whorls. The umbilicus is around 1/10 of shell width. Nearly all shells have a white band on the periphery above the aperture, which is better visible in partly depigmented empty shells of the specimens that died naturally (Fig. 4). The shells have a granulated surface (Fig. 5).

Reproductive anatomy clearly corresponds to existing descriptions of *H. ravergiensis* (SCHILEYKO 1978, 2006, BALASHOV 2016): vagina with two vaginal appendages and 4 mucus glands; the basal sections of the vaginal appendages are not swollen; long epiphallus, almost the same length as the flagellum; muscular bands connecting the penis with the epiphallus are well developed (Fig. 6).

The land snail *H. ravergiensis* is naturally distributed in the North Caucasus, Daghestan and Transcaucasia (SYSOEV & SCHILEYKO 2009). Since 1998 numerous populations of *H. ravergiensis* were found in territory of the Donetsk Upland and adjacent areas (GURAL-SVERLOVA & TIMOSHENKO 2012, GURAL-SVERLOVA et al. 2012, BALASHOV et al. 2013) and in Belgorod region of Russia (SNEGIN & ADAMOVA 2016). One population was found near a quarry on Podolian Upland in Ternopil region of Ukraine in 2006 (BALASHOV & GURAL-SVERLOVA 2012). Since 2015 large population *H. ravergiensis* was reported in Gvozdiv village



Fig. 5. *Harmozica ravergiensis* from Gomel city: sculpture of the shell surface. Scale bar 0.2 mm



Fig. 4. Shells of *Harmozica ravergiensis* from Gomel city: front, top and bottom views. Scale bars 2 mm

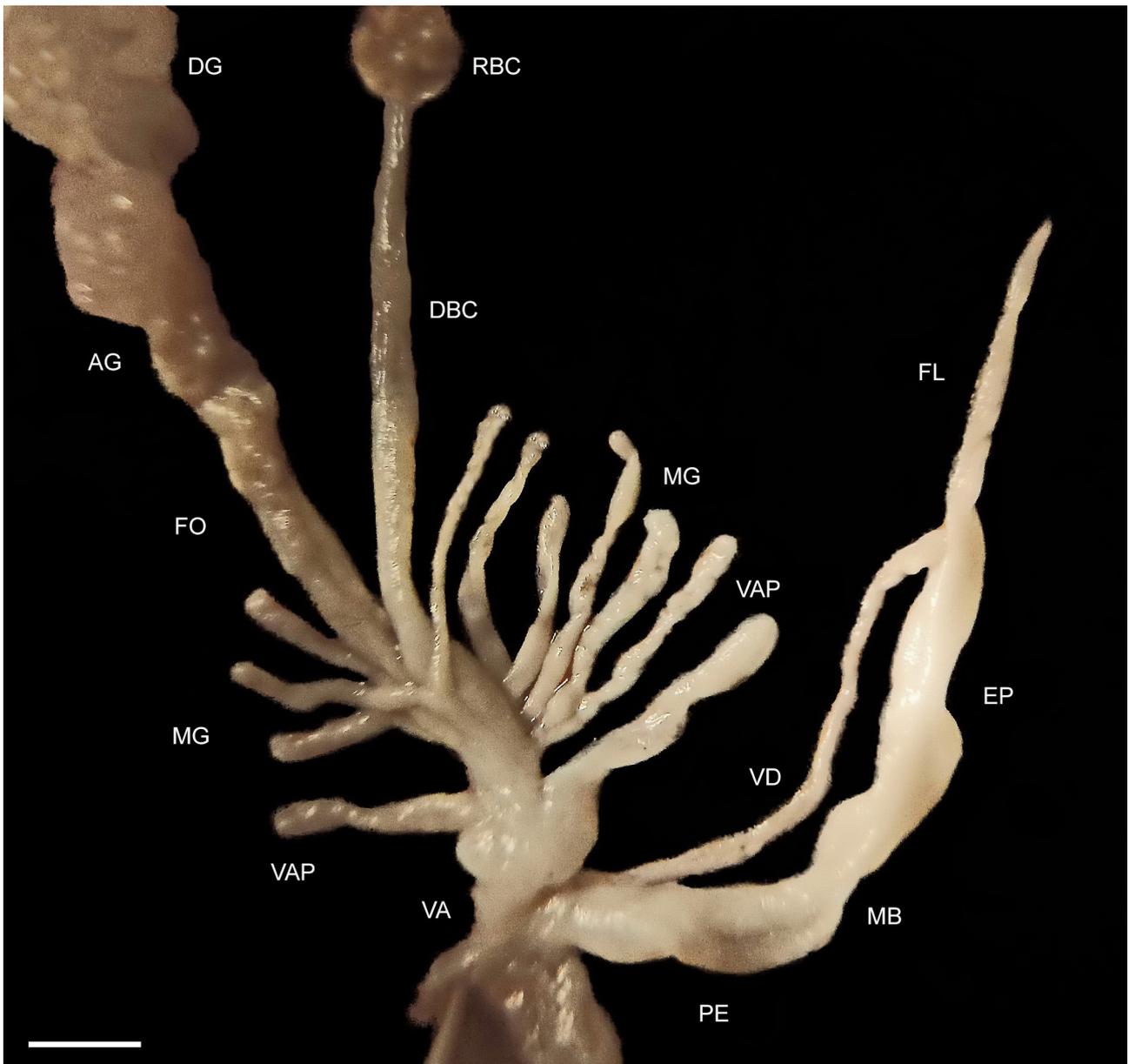


Fig. 6. *Harmozica ravergensis* from Gomel city, reproductive system: AG – albumen gland; DBC – duct of bursa copulatrix; DG – duct of gonad; EP – epiphallus; FL – flagellum; FO – free oviduct; MB – muscular bands of penis; MG – mucus glands; PE – penis; RBC – bursa copulatrix; VA – vagina; VAP – vaginal appendix; VD – vas deferens. Scale bar 2 mm

in the Kyiv region (BALASHOV et al. 2018). Another find is known in Petrykivka village (Dnipropetrovsk region, Southern Ukraine) in 2016 (BALASHOV et al. 2018). SCHIKOV (2013, 2016) also mentions findings of *H. ravergensis* in the centre of the Russian Plain, in anthropogenic habitats of the Moscow, Novgorod and Tver regions of Russia.

New findings of *H. ravergensis*, especially the large populations that have evidently lived in Gomel city for several years, testify that this species should be

expected to invade most parts of Belarus in the future.

Probably *H. ravergensis* will become a common component of anthropogenic environments in Belarus, as has already happened in the last decades with other species of molluscs of Caucasian origin. This tendency might relate to the moving of southern faunas to the north in the regions that becoming warmer due to global climate change.



REFERENCES

- BALASHOV I. A. 2016. Fauna Ukrainy. Vol. 29. Molluski. Stebelchatoglaznye. Naukova Dumka, Kiyev.
- BALASHOV I., GURAL-SVERLOVA N. 2012. An annotated checklist of the terrestrial molluscs of Ukraine. *Journal of Conchology* 41: 91–109.
- BALASHOV I. A., KRAMARENKO S. S., ZHUKOV A. V., SHKLYARUK A. N., BAIDASHNIKOV A. A., VASYLIUK A. V. 2013. Contribution to the knowledge of terrestrial molluscs in southeastern Ukraine. *Malacologica Bohemoslovaca* 12: 62–69.
- BALASHOV I., SHVYDKA Z., VASYLIUK O., MARUSHCHAK O., SHYRIAIEVA D., OSKYRKO O. 2018. The first record of an invasive Caucasian land snail *Harmozica ravergiensis* in Central Ukraine (Stylommatophora, Hygromiidae). *Ruthenica, Russian Malacological Journal* 28: 43–45.
- CAMERON R. A. D. 2016. Slugs and snails. William Collins, London.
- GURAL-SVERLOVA N. V., MARTYNOV V. V., MARTYNOV A. V. 2012. Nazemnye mollyuski (Gastropoda, Pulmonata) Doneckoy vozvysheynosti i prilegayushchikh territoriy. *Vestnik Zoologii* 46: 319–326.
- GURAL-SVERLOVA N. V., TIMOSHENKO E. G. 2012. *Oxychilus koutaisanus mingrelicus* (Zonitidae) i *Stenomphalia ravergiensis* (Hygromiidae) – kavkazskye vidy nazemnykh mollyuskov na yugo-vostoke Ukrainy. *Ruthenica, Russian Malacological Journal* 22: 159–170.
- OSTROVSKY A. 2017. Novye nakhodki sinantropochnykh vidov slizey *Limacus flavus* (Linnaeus 1758) i *Krynichillus melanocephalus* Kaleniczenko, 1851 (Mollusca, Gastropoda, Stylommatophora) v Belarusi. *Ruthenica, Russian Malacological Journal* 27: 155–158.
- OSTROVSKY A. 2018. History of invasion and first findings of Caucasian garden slug *Deroceras caucasicum* (Simroth, 1901) (Mollusca, Gastropoda, Stylommatophora) in Belarus. *Russian Journal of Biological Invasions* 9: 241–244.
- OSTROVSKY A. 2022a. *Oxychilus translucidus* (Mortillet, 1854) – novy invazyiny vid nazemnykh slimakoy (Mollusca: Gastropoda: Stylommatophora: Zonitidae) v faunie Belarusi. *Natural Resources* 1: 110–111.
- OSTROVSKY A. 2022b. Novye nakhodki sinantropnykh slizey *Limacus maculatus* i *Arion vulgaris* (Mollusca, Gastropoda, Stylommatophora) v Belarusi. *Ruthenica, Russian Malacological Journal* 32: 93–98. [https://doi.org/10.35885/ruthenica.2022.32\(2\).6](https://doi.org/10.35885/ruthenica.2022.32(2).6)
- PIMENTEL D., LACH L., ZUNIGA R., MORRISON D. 2000. Environmental and economic costs of nonindigenous species in the United States. *BioScience* 50: 53–65. [https://doi.org/10.1641/0006-3568\(2000\)050\[0053:EAECON\]2.3.CO;2](https://doi.org/10.1641/0006-3568(2000)050[0053:EAECON]2.3.CO;2)
- RABCHUK V. P., ZEMOGLYADCHUK K. V. 2011. Pervaya nakhodka nazemnoy ulitki *Brephulopsis cylindrica* (Gastropoda, Pulmonata, Enidae) na territoriyi Belarusi. *Ruthenica, Russian Malacological Journal* 21: 95–96.
- SCHILEYKO A. A. 1978. Nazemnye mollyuski nadsemeystva Helicoidea. *Fauna SSSR, Molluski*. Vol. 3, 6. Nayka, Leningrad.
- SCHILEYKO A. A. 2006. Treatise on recent terrestrial pulmonate molluscs. Part 14. Helicodontidae, Ciliellidae, Hygromiidae. *Ruthenica, supplement 2*: 1907–2047.
- SCHIKOV E. V. 2013. Adventivnyye vidy nazemnoy malakofauny gorodov Moskovskoy, Novgorodskoy i Tverskoy oblastey. In: SKLYARENKO S. L., OGAR N. P., DUISEBAYEVA T. N. (eds). Sokhraneniye stepnykh i polupustynnykh ekosistem Yevrazii, 13–14.03.2013, Almaty, Book of Abstracts: 143.
- SCHIKOV E. V. 2016. Adventivnyye vidy nazemnoy malakofauny tsentral'noy chasti Russkoy ravniny. *Ruthenica, Russian Malacological Journal* 26: 153–164.
- SNEGIN E. A., ADAMOVA V. V. 2016. Analiz demograficheskikh i morfologicheskikh pokazateley adventivnykh populyatsiy *Stenomphalia ravergiensis* (Mollusca, Gastropoda, Pulmonata) na yuge Srednerusskoy vozvysheynosti. *Vestnik Tomskogo Gosudarstvennogo Universiteta, Biologiya* 3: 149–160.
- SYSOEV A. V., SCHILEYKO A. A. 2009. Land snails and slugs of Russia and adjacent countries. *Pensoft Series Faunistica* 87. Pensoft Publishers, Sofia and Moscow.
- ZEMOGLYADCHUK K. V. 2020. Chuzherodnyye vidy nazemnykh mollyuskov (Mollusca: Gastropoda: Stylommatophora) v faune Belarusi. *BarSU Herald* 8: 34–45.

Received: October 10th, 2022

Revised: October 20th, 2022

Accepted: October 25th, 2022

Published on-line: December 5th, 2022

