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Arianta arbustorum (Linnaeus, 1758) (Mollusca: Gastropoda, Helicidae), a new snail for the fauna of the Republic of Macedonia

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Abstract

The Copse Snail - *Arianta arbustorum* (Gastropoda: Helicidae) was for the first time recorded on the territory of Republic of Macedonia, in the region of city Skopje. The genus *Arianta* is newly recorded for Macedonian gastropod fauna, also.

Key words: Copse Snail, "Gastropoda terrestria", first record, museum collection

Introduction

The Copse Snail *Arianta arbustorum* has the largest distribution of all snail species within the subfamily Ariantinae: it is found in most of North and Central Europe, but it has not been confirmed in Belorussia and the southernmost parts of the continent: Portugal, Spain, Greece and Macedonia, as well as the Mediterranean Islands (Stanković et al. 2006, Groenenberg et al. 2012, Falkner et al. 2013). According to Haase et al. (2003), the current distribution of the Copse Snail largely coincides with the parts of Europe that were repeatedly covered with ice or subjected to permafrost during the Pleistocene ice ages.

It has been introduced to Russia (Moscow region) (Schileyko, 2013), North America (only known from Canada, McAlpine et al. 2009, McAlpine and Forsyth, 2014). It is not yet established in the USA, but it is considered as a pest with low pest potential, and an invasive species that can represent a potentially serious threat which could negatively affect agriculture, natural ecosystems, human health or commerce (Cowie et al. 2009, McAlpine and Forsyth 2014).

The Copse Snail shows a high degree of adaptation to different living conditions such as the type of habitat and altitude. It inhabits deciduous forests, humid meadows, rocky places, gardens, pastures along ditches and streams and marshes (Baur 1993, Lelo et al. 2002). It is also found in disturbed habitats, but always requires humidity, and locally can tolerate non-calcareous substrate. In the Alps it has been found up to 2,700 m asl, in Britain up to 1,200 m, in Bulgaria up to 1,500 m, and in Bosnia and Herzegovina up to 600 m (Lelo *et al*. 2002, Welter-Schultes 2012).

The shell of *Arianta arbustorum* is brown with numerous pale yellowish rows of spots and usually with a brown band above the periphery, occasionally yellowish, reddish or with greenish hue, weakly striated. The animal is usually dark (Welther-Schultes 2012). Shell is depressed to globose, moderately thin, with 5-6 not very convex whorls. Body whorl markedly descending in front, evenly rounded. Aperture ovate to rounded, oblique; margins reflexed, sharp, with a strong inner lip. Umbilicus narrow to almost closed. Height is 10-24 mm, diameter 15-24 mm (Schileyko, 2013).

It has been classified in the category Least Concern on the IUCN Red List of Threatened Species (Falkner et al. 2013).

Material and methods

The specimens of *Arianta arbustorum* which are deposited in the museum collection of land snails were hand collected during 2008, 2009, 2013, 2014, 2015 and 2017 on five various localities (Fig. 1) along the right bank of the river Vardar in the Skopje city region. The data for the collected and analyzed samples are

Table 1. Inventory of the specimens of *A. arbustorum* in the Macedonian Museum of Natural History

Inventory number	Locality	Date	Collector	Number of samples
ПММ-3-П-6165	Aerodrom, Skopje region	06.03.2008	E. Stojkoska	15
ПММ-3-П-6166	Aerodrom, Skopje region	07.02.2009	E. Stojkoska	2
ПММ-3-П-6057	Vill. Orešani, Skopje region	07.11.2013	E. Stojkoska	1
ПММ-3-П-6056	Vill. Orešani, Skopje region	24.07.2014	E. Stojkoska; N. Stefanovska	21
ПММ-3-П-6167	Vill. Pakoševo, Skopje region	04.12.2015	E. Stojkoska; N. Stefanovska	3
ПММ-3-П-6168	Vill. Pakoševo, Skopje region	04.12.2015	E. Stojkoska; N. Stefanovska	6
ПММ-3-П-6370	Vill. Orešani, Skopje region	04.12.2015	E. Stojkoska; N. Stefanovska	52
ПММ-3-П-6371	Vill. Orešani, Skopje region	04.12.2015	E. Stojkoska; N. Stefanovska	28
ПММ-3-П-6372	Vill. Dolno Lisiče, Skopje region	04.12.2015	E. Stojkoska; N. Stefanovska	9
ПММ-3-П-6373	Vill. Dolno Lisiče, Skopje region	04.12.2015	E. Stojkoska; N. Stefanovska	1
ПММ-3-П-11315	Vill. Zelenikovo, Skopje region	28.08.2017	E. Stojkoska	11

given in Tab. 1. A total of 149 samples (dry shells and live specimens preserved in 75% and 96% alcohol) of *Arianta arbustorum* were analyzed.

For the need od determination, the morphological analysis of dry shells was made and dissection of numb live specimens for the isolation of the sex system was also done.

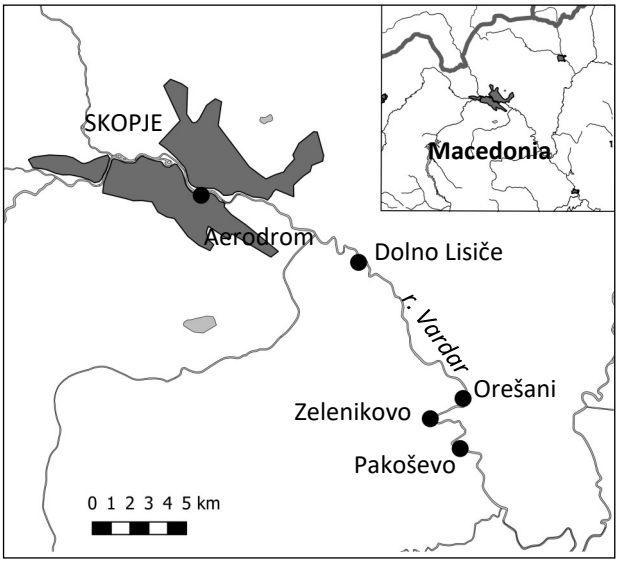


Figure 1. A map of localities from which the samples were collected

Results and discussion

Morphology

The shells of the samples of *Arianta arbustorum* which are found along the bank of the Vardar River have typical characteristics for the species (Fig. 2). They have a globular form with usually 5-6 whorls and narrow to almost closed umbilicus. The color of the shell at the base is brown with yellow streaks and spots. The animal is dark. The dimensions of the largest shell are: width – 21 mm and height – 11 mm. The size of the fully-grown specimens corresponds to the typical size for the species (Groenenberg et al. 2012, Welther-Schultes 2012, Schileyko 2013).

Anatomy

The dissection of fresh animals for isolation of the sex system showed that the construction of the sex system corresponds to that given by Beese et al. (2005) and Schileyko (2013). Flagellum is long, vermiform, epiphallus is about two times shorter. Penis is swollen, bulky. Penial retractor is attaching to the epiphallus below its middle. The dart sac is relatively small, elongated to subglobose. There are two very long mucus glands, always undivided. Spermathecal stalk is with long neck and the reservoir is attending the albumen gland.

Habitats

The Macedonian population of the species was found very close to the river Vardar, in the riparian vegetation, on wet substrates under trees (*Populus, Alnus, Salix, Betula*), in the undergrowth, grass or leaf litter.



Figure 2. External view of adult Macedonian specimens

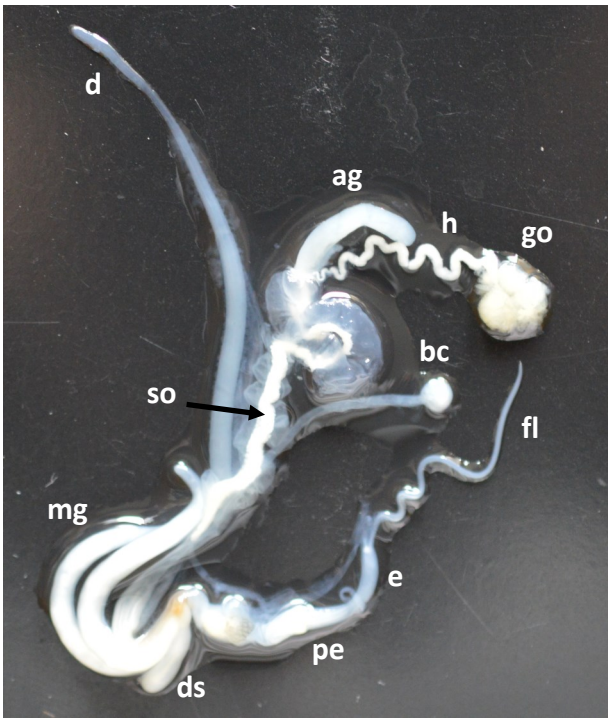


Figure 3. Sexual system of *Arianta arbustorum* from a specimen from Macedonia. Compare the anatomy with the figure 1b in Beese et al. (2005) . Abbreviations: ag - albumen gland; bc - bursa copulatrix, d - diverticulum, ds - dart sac, e - epiphallus, fl - flagellum, go - gonad, h - hermaphroditic duct, mg - mucus glands, pe - penis, so - spermoviduct, vd - vas deferens;

(Fig. 4). These habitats are known to be suitable for the species (Lelo et al. 2002, Welther-Schultes 2012).

Origin

The localities in Macedonia from which the samples of the Copse Snail were collected are not much further south than the southernmost localities of the species on the Balkan Peninsula (Stara Planina in Bulgaria, Groenenberg et al. 2012). Therefore, we can not be conclusive if the species has been native for the country, or it is an introduced species. If the later is a case, its introduction probably happened with the importation of garden plants, as the region where the samples were collected is very rich of gardens.

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References

Baur, B., 1993. Population structure, density, dispersal and neighbourhood size in *Arianta arbustorum* (LINNAEUS, 1758) (Pulmonata: Helicidae). – Ann. Naturhist. Wien., 1993, 94/95, 307-321.

Beese, K., Beier, K., Baur, B., 2006. Coevolution of male and female reproductive traits in a simultaneously hermaphroditic land snail. Journal of Evolutionary Biology, 19: 410-418.

Cowie, R.H., Dillon, R.T., Robinson, D.G., Smith, J.W., 2009. Alien non-marine snails and slugs of priority quarantine importance in the United States: A preliminary risk assessment. American Malacological Bulletin 27: 113-132.

Falkenr, G., Falkner, M., von Proschwitz, T., Neubert, E., 2013. *Arianta arbustorum*. The IUCN Red List of Threatened Species 2013: e.T156468A4949797.

Groenenberg D.J.S, Subai, P., Gittenberger, E., 2012. Molecular phylogeny of the Ariantinae (Gastropoda:



Figure 4. Habitats of *Arianta arbustorum* along river Vardar, Skopje city area, Macedonia

Pulmonata: Helicidae), a new approach to an old problem. - Molecular taxonomy and natural history collections. Chapter 6. PhD thesis, Pp. 117-169.

Hasse, M., Misof, B., Wirt, T., Baminger, H., Baur, B., 2003. Mitochondrial differentiation within a polymorphic land snail: evidence for Pleistocene survival within the boundaries of permafrost. Journal of Evolutionary Biology, 16: 415– 428.

Hewitt, G., 1999. Post-glacial re-colonization of European biota. Biological Journal of the Linnaean Society, 68: 87–112.

McAlpine, D.F., Schueler, F.W., Maunder, J.E., Noseworthy, R.G., Sollows, M.C., 2009. Establishment and persistence of the copse snail, *Arianta arbustorum* (Linnaeus, 1758) (Gastropoda: Helicidae) in Canada. The Nautilus 123 (1): 14-18.

McAlpine, D.F., Forsyth, G.R., 2014. Occurrence of the Copse Snail, *Arianta arbustorum* (Helicidae) on Prince Edward Island: an addition to the North American range of a purported potential pest. Northeastern Naturalist 21 (1): 5–7

Lelo, S., Krunić, A., Kotrošan, D., 2002. The variation of some qualitative and quantitative characteristics of shells of *Arianta arbustorum* (LINNAEUS 1758) (Stylommatophora: Helicidae, Ariantinae) from Bosnia and Herzegovina. Nachrichtenblatt der Ersten Vorarlberser Malakolosischen Gesellschaft, 10, 15-22, Rankweil, 20. Dez. 2002.

Schileyko, S.S., 2013. Family Helicidae exluding Helicinae (Gastropoda Pulmonata): morphology, taxonomy and a catalogue of taxa. - *Ruthenica*, 2013, vol. 23, No. 2: 127-162. Published online October 15, 2013.

Stankovic, S.V., Stojkoska, E., Norris, A., 2006. Annotated Checklist of the Terrestrial Gastropods (Gastropoda) of the Republic of Macedonia. Anniversary Proceedings (1926-2006). Mac. Mus. Sci. Nat.: 43-55. Skopje

Welter-Schultes, F.W., 2012. European non-marine molluscs, a guide for species identification. Planet Poster Editions, Göttingen. 674 + Q1-78 pp.

Arianta arbustorum (Linnaeus, 1758) (Mollusca: Gastropoda, Helicidae), нов полжав за фауната на Република Македонија

Емилија Стојкоска и Наташа Стефановска

Дамкавиот полжав *Arianta arbustorum* (Gastropoda: Helicidae) е за прв пат најден на територијата на Република Македонија, во околината на Скопје. Овој наод исто така претставува и прво наоѓање на родот *Arianta* во Македонската фауна.

Клучни зборови: дамкав полжав, музејска колекција, прв наод, “Gastropoda terrestria”