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MONACHA CARTUSIANA (O. F. MÜLLER, 1774) (GASTROPODA: PULMONATA: HYGROMIIDAE) BECOMES MORE FREQUENT IN POLAND

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ABSTRACT: *Monacha cartusiana* (O. F. Müller, 1774) was found at new sites in Poland: in Janikowo near Inowrocław and in Poznań. At the site in Poznań, adult individuals were relatively large, as their shell width ranged from 14.5 to 19.7 mm. It must be emphasised that adult individuals of *M. cartusiana* with shell width of nearly 20 mm have not been reported so far. The new sites of this snail indicate that it has become a permanent component of the Polish fauna.

KEY WORDS: *Monacha cartusiana*, land snails, distribution, expansion, new locality, Poland

Monacha cartusiana (O. F. Müller, 1774) is a Sub-Mediterranean species with a wide geographical range: from Asia Minor to the Iberian Peninsula (KERNEY et al. 1983, PRIETO 1985, FECHTER & FALKNER 1990, COSSIGNANI & COSSIGNANI 1995, HAUSDORF 2000, WIKTOR 2004). The northern limit of its continuous distribution in Europe runs along the French and Belgian coasts of the English Channel (with some isolated localities at southeastern edges of the British Isles), through the south-western Netherlands and southern Germany, Hungary, southern Slovakia and Ukraine, to Crimea (SHILEYKO 1978, KERNEY et al. 1983, ČEJKA et al. 2007). Further north, isolated localities were found in Denmark, northern (Mecklenburg) and central (Saxony) Germany, Austria, the Czech Republic, Slovakia, and Poland (LOŽEK 1956, RIEDEL 1988, BECKMANN 2000, JUŘIČKOVA et al. 2001, WIKTOR 2004, BENKE & RENKER 2005).

In Poland the presence of *M. cartusiana* was first recorded in the 1970s in Wrocław, on a neglected dry meadow (KOSIŃSKA 1973, 1979), which is currently becoming a built-up area (WIKTOR 2004). In recent years, new localities of *M. cartusiana* were found in Poland: in the eastern part of Poznań city (CHOLEWA et al. 2003) and on the hill Wietrznia in Kielce city (GÓRKA 2005).

The newly recorded localities of *M. cartusiana* in Poland are: Janikowo near Inowrocław (UTM: CD50) – an anthropogenic site, subject to strong secondary salinization, with a high calcium carbonate content and a mosaic of patches of halophytes, such as: *Salicornia europea*, *Spergularia salina* Fr., *Puccinellia distans* L., and *Glaux maritima* L. (leg. Z. OLSZANOWSKI); and Poznań (XU 31) – a ruderal grassland in the northern part of the city.

In Janikowo only one empty shell of *M. cartusiana* was found. Its height and width were within the typical range of variation of the species (KERNEY et al. 1983, WIKTOR 2004).

At the new site in Poznań, the presence of *M. cartusiana* was first noticed on 10 September 2007. This locality is very distant from the one reported by CHOLEWA et al. in 2003. It is situated within the Adam Mickiewicz University campus in Morasko, on both sides of a newly built bicycle lane which links the campus with the tram terminus (Fig. 1). *M. cartusiana* has colonised there ca. 3,000 m^2 of wasteland which used to be an arable field, with two types of plant communities (Fig. 2). The bicycle lane is directly adjoined on each side by a relatively narrow (1.5 m) belt of grassland, composed of meadow species and ruderals, mainly *Trifolium pratense* L., *T. repens* L., *Holcus lanatus* L., *Achillea millefolium* L., *Lolium perenne* L., *Taraxacum*

Figs 1–8: 1. Locality of *Monacha cartusiana* at the university campus in Poznań (Morasko); 2. Fragment of ruderal grassland at this site of *M. cartusiana*; 3–4. Crawling individuals of *M. cartusiana*, whose shells have a brown (or rarely dark red) lip and a white-yellow (or rarely yellow-red) stripe above it; 5. *M. cartusiana* was frequently seen on vegetation (scale bar 20 mm); 6. Egg batch of *M. cartusiana* (scale bar 10 mm); 7. Hatching of young snails; 8. Snails on day 5 after hatching (photos J. MUSIAŁ)

officinale (Web.) and *Plantago maior* L., and single specimens of other ruderal species: *Artemisia vulgaris* L. and *Melilotus albus* Med. A much larger area, farther away from the bicycle lane, is covered by unstable, pioneering ruderal vegetation or field weeds in loose patches, dominated by *Echinochloa crus-galli* (L.), *Apera spica venti* (L.), *Conyza canadensis* (L.), *Artemisia vulgaris* L., and *Setaria glauca* (L.). Accompanying species include *Chenopodium album* L., *Daucus carota* L., *Atriplex nitens* Schkr., *Vicia villosa* Roth, *Trifolium arvense* L., and *Plantago lanceolata* L.

M. cartusiana is quite abundant at that site. We observed there more than 70 individuals of this species, but only three juveniles. Besides, nine empty shells were collected. The dominance of adults was probably due to the end of the growing season at that time. Active individuals were observed till 30 October 2007 (Figs 3–5). They were accompanied by numerous individuals of other snail species: *Cepaea nemoralis* (L.), *Helicella obvia* (Menke), *Deroceras reticulatum* (O. F. Müll.) and *Deroceras sturanyi* (Simroth), and single specimens of *Limax maximus* L. and *Helix pomatia* L.

For shell measurements, we caught 33 adult individuals of *M. cartusiana*, whose shells had a brown or rarely dark red lip and above it a white-yellow (Figs 4 and 5) or rarely yellow-red stripe (Fig. 3, right). Adult individuals of *M. cartusiana* were relatively large. Their shell height varied from 9.0 to 12.1 mm, mean 10.8 mm. The mean shell width was 17.4 mm, while its range was 14.5 to 19.7 mm. It must be emphasised that adults of *M. cartusiana* with shell width of nearly 20 mm have not been reported so far. Usually the diameter of *M. cartusiana* shell is reported as 9–17 mm (KERNEY et al. 1983, WIKTOR 2004).

Out of the group of measured snails, 16 individuals were placed in four containers, four snails per container. After two or three days, 17 egg batches were found in the containers. The eggs were spherical, with pearly lustre and 1.7–2.0 mm in diameter. *M. cartusiana* lays batches of 61 to 150 eggs each, on average 110 eggs per batch (Fig. 6). Young snails begin to hatch already two weeks after laying. The number of hatched snails per batch varied. In some batches, only a few snails hatched. However, juveniles frequently hatched from more than 50% of eggs in a batch. The hatchlings fed on remnants of eggshells. Earlier-hatched individuals were observed to feed on eggs and younger siblings (Figs 7 and 8).

M. cartusiana was probably accidentally introduced to synanthropic sites where it then formed new populations (KERNEY et al. 1983, WIKTOR 2004). A small horse stud is located near this new site in Poznań, and the bicycle lane to the university campus is a walking route for inhabitants of the large housing estates located nearby, at the northern limits of the city. The new localities of *M. cartusiana* confirm the suggestions (BECKMANN 2000, GÓRKA 2005, MIKOVCOVA et al. 2007) that this species is spreading northwards in Europe. The population found earlier in Poznań (CHOLEWA et al. 2003) still persists (KORALEWSKA-BATURA unpublished). The recent new records of *M. cartusiana* indicate that this species has become a permanent component of the Polish fauna.

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