

The first record of the Turkish snail *Helix lucorum* Linnaeus, 1758 (Stylommatophora: Helicidae) in Denmark: accidental introduction without confirmed establishment

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Helix lucorum Linnaeus, 1758, a large land snail native to Turkey and the southeastern Balkans, has expanded across Europe and the rest of the world in recent decades due to trade and climate warming. We report the first documented record of *H. lucorum* in Denmark, based on an empty weathered shell found in Aarhus in September 2025. We reviewed the currently available Danish records, including observations from citizen-science databases. A targeted survey of approximately 15 ha in the Aarhus conducted after the discovery failed to detect any further specimens, although nine other terrestrial gastropod species were recorded. The results suggests an accidental introduction without confirmed establishment. This highlights the importance of citizen-science observations and targeted surveys for the early detection of newly introduced terrestrial gastropods.

Key words: terrestrial gastropods, Aarhus, citizen science, Jutland

Helix lucorum Linnaeus, 1758 is a large land-snail species in the family Helicidae; its distinctive shell, featuring broad brown bands, can reach up to 60 mm in diameter (HORSÁK et al. 2013). Currently, no subspecies have been identified, and its natural range includes Turkey and the southeastern Balkans. Since the beginning of the 21st century, as a result of climate change, human pressure, and anthropochory, this species has been gradually expanding its range and is now found in countries such as Russia (STOYKO & BULAVKINA 2010, EGOROV 2017), Ukraine (GURAL-SVERLOVA & LYZHECHKA 2024), Austria (FISCHER et al. 2008, FISCHER 2025), Czechia (PELTANOVÁ et al. 2012, DOLEŽAL 2021), Slovakia (ČEJKA & ČAČANÝ 2014), Hungary (PÁLL-GERGELY et al. 2019), Poland (SZPALEK et al. 2023), France (MIENIS & RITTNER 2010, BERTRAND & SANÈGRE 2015, LÉONARD & LATRECHE 2015), Spain (SALGADO et al. 2010), Germany (HENKEL 2013), and the United Kingdom (PALMER 2010, WHITEHEAD 2014). There are no scientific publications reporting the presence of *H. lucorum* in Scandinavian countries, including Denmark. The only snail of the genus *Helix* recorded in that country is *H. pomatia* Linnaeus, 1758, which is widespread there, although its occurrence in Denmark is also likely of anthropogenic origin (SCHLESCH 1938, KORÁBEK et al. 2018).

A *H. lucorum* weathered and empty shell measuring 35 mm in length and 28 mm in height, with the characteristic coloration of this species (Fig. 1), was found on September 11, 2025, in the city of Aarhus, Denmark. The discovery site was a narrow, shaded grove (56°09'18"N 10°11'32"E) in the very center of the city, in a residential and commercial area near Ceres Allé, close to the Aarhus River (Fig. 2). From the moment the single shell was found until September 18, 2025, an intensive search was conducted for living or dead specimens across a range of urbanization levels (refugia were checked systematically). Two people (authors FM & PEB) surveyed an area of approximately 15 hectares (the shaded area in Fig. 2). The search began in the morning and continued into the afternoon. Despite optimal weather conditions conducive to snail activity, the target species was not found: each day featured intermittent rain, cloudy skies, and temperatures ranging from 10 to 20 °C. During the search for the target species (detection probability for *H. lucorum* was not formally estimated, but the species is large, conspicuous, and readily detectable in urban habitats), all land snails were observed and collected. Large and medium-sized land snails were identified in the field, while small species were placed in 96% ethanol and subsequently identified under a PZO Warszawa MSt 130 stereoscopic



Fig. 1. Empty shell of *Helix lucorum* Linnaeus, 1758 found in Aarhus, Denmark on 11 September 2025, shown in multiple views. Photo by Franciszek Mika. Scale bar = 10 mm (generated with ImageJ).

microscope. Two identification keys were used for morphological identification (WIKTOR 2004, HORSÁK et al. 2013). The presence of 9 other species of land snails was confirmed: *Cepaea nemoralis* (Linnaeus, 1758) (Fig. 3), *Hygromia cinctella* (Draparnaud, 1801), *Fruticicola fruticum* (O. F. Müller, 1774), *Limax maximus* Linnaeus, 1758 (Fig. 4), *Ambigolimax* cf. *valentianus* (A. Férussac, 1821) (Fig. 5), *Gonyodiscus rotundatus* (O. F. Müller, 1774) (Fig. 5), *Oxychilus draparnaudi* (Beck, 1837) (Fig. 6), *Trochulus hispidus* (Linnaeus, 1758), and *Arion* cf. *vul-*

garis Moquin-Tandon, 1855. Most of these are eurytopic species that can be found in parks, gardens, and all kinds of shaded anthropogenic environments (ALEXANDROWICZ & ALEXANDROWICZ 2011). The iNaturalist website, a nature database and citizen-science platform, contains two records of a live *H. lucorum*. First older record submitted by a user named “emma_292289” on June 27, 2022, also from the vicinity of Ceres Allé (GBIF 2026). The presence of this earlier record indicates that the species was introduced, but the lack of subsequent observations on this site

and in the field suggests that the introduction was unsuccessful. The second record from city Hedensted submitted by Marcus Stenskjær on 13. 08. 2023 (STENSKJÆR 2023) (the status of this population is unknown, but there are no further records in the following years). Table 1 summarises the currently known locations of *Helix lucorum* in Denmark.

The detailed origin of the individual of *H. lucorum* whose shell was found is unknown. The introduction was likely accidental and anthropogenic, e.g., via the transport of ornamental plants, vegetables, or gardening supplies, which is the most common method for the introduction of *H. lucorum* in Europe. No consistent source of new individuals has been identified, and the only two known individuals indicate low propagule pressure, which significantly reduces the chances of successful colonization (HUFBAUER et al. 2013). Interspecific interactions, including predation pressure, may influence the success of an introduction. *O. draparnaudi* and *L. maximus* found in this area, could potentially prey on the eggs and newly hatched *H. lucorum* (ROLLO & WELLINGTON 1979, HORSÁK et al. 2013). In addition, snails may be subject to intense predation by vertebrates. In the study area, the authors repeatedly observed dozens of birds of the family Turdidae. These birds are effective hunters of land snails and prefer larger ones (ROSIN et al. 2011). Large terrestrial snails, including *Helix lucorum*, are able to tolerate partial freezing and may

survive subzero temperatures for limited periods. Although low winter temperatures may reduce survival and population growth, their role in preventing the establishment of *H. lucorum* in Denmark remains unclear. Moreover, climatic conditions alone do not necessarily prevent the establishment of alien land snails originating from warmer regions. For example, *Hygromia cinctella* a species native to the Mediterranean region, has expanded across large parts of Central and Eastern Europe during recent decades (ŘÍHOVÁ & JUŘÍČKOVÁ 2011, ČEJKA et al. 2020, GURAL-SVERLOVA & ANDRIK 2023) and was found to be common at the study site, occurring on benches, walls, stairways and other urban structures.

In summary, the available evidence indicates that *Helix lucorum* was introduced into Aarhus but provides no evidence of the existence of an established population. Despite observations made in 2022 and 2023 and the discovery of an empty shell in 2025, no additional individuals were detected during targeted surveys and no further records were found in available databases. Although climatic conditions, biotic interactions, and low propagule pressure may have contributed to the apparent lack of establishment, the available data do not allow the causes to be determined. This record represents the first documented occurrence of *H. lucorum* in Denmark and highlights the value of citizen-science observations for the early detection and monitoring of alien terrestrial gastropods.

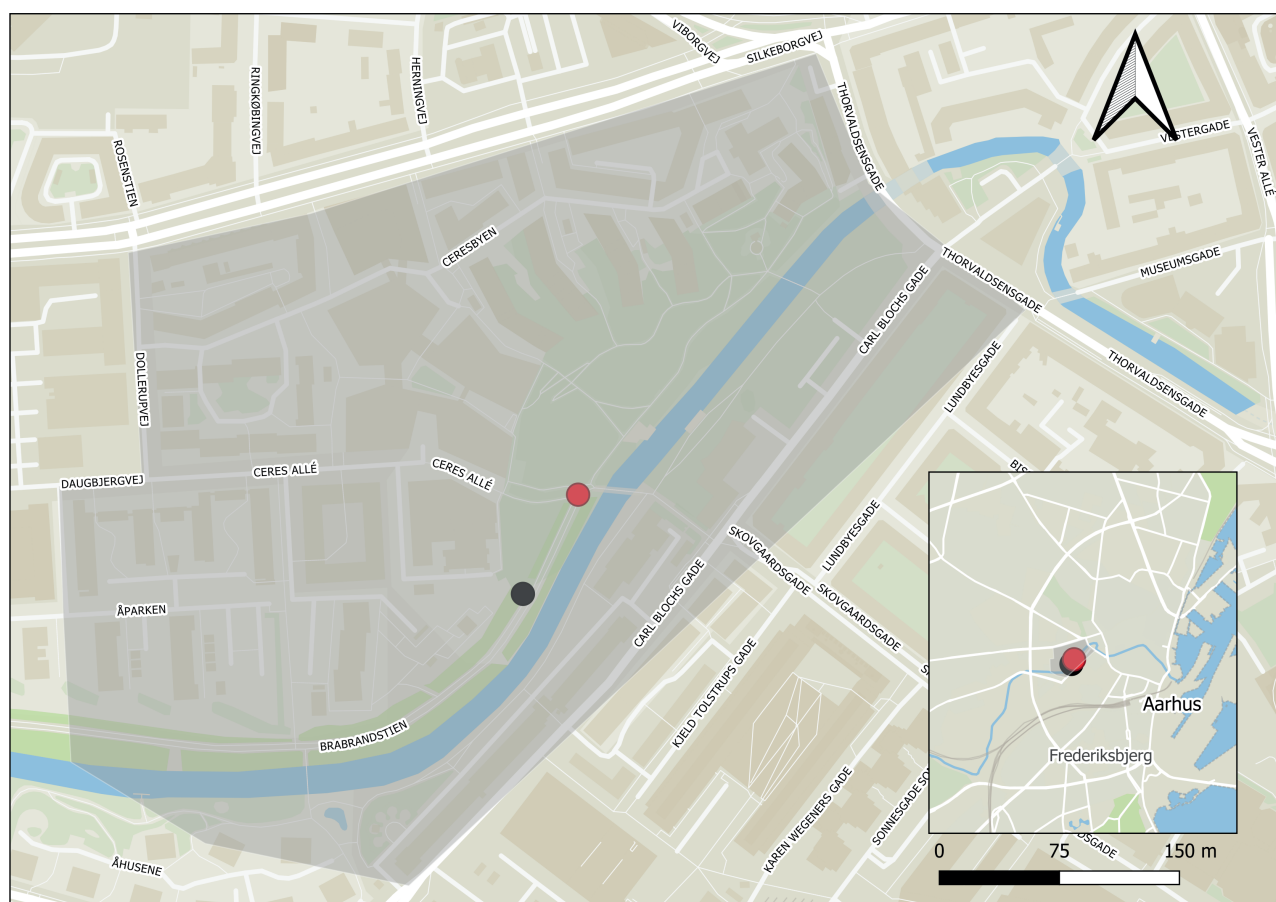


Fig. 2. Map of the study area in Aarhus, Denmark, prepared in QGIS. Red dot – location of the empty shell found in 2025; black dot – location of the living individual recorded on iNaturalist in 2022 (GBIF 2026); grey area – the search area (~15 ha).

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Fig. 3. *Cepaea nemoralis* (Linnaeus, 1758) from the study area, Aarhus, Denmark. Photo by Franciszek Mika.



Fig. 4. *Limax maximus* Linnaeus, 1758 from the study area, Aarhus, Denmark. Photo by Franciszek Mika.

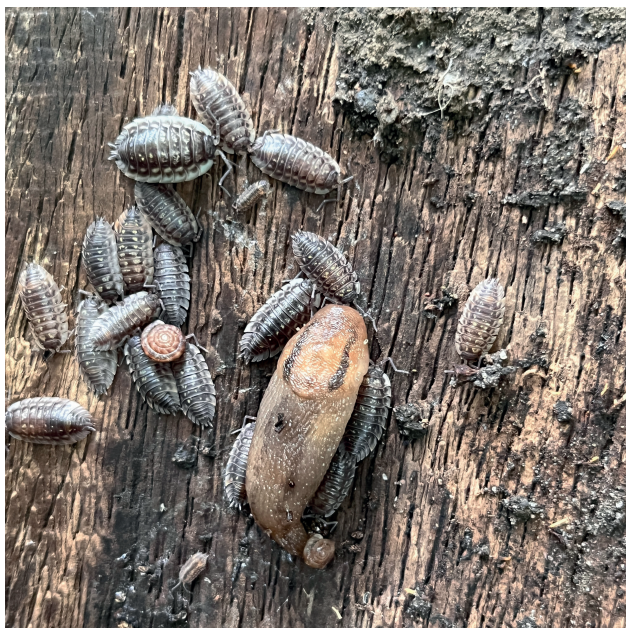


Fig. 5. *Ambigolimax* cf. *valentianus* (A. Férussac, 1821) and *Gonyodiscus rotundatus* (O. F. Müller, 1774) from the study area, Aarhus, Denmark. Photo by Franciszek Mika.



Fig. 6. *Oxychilus draparnaudi* (Beck, 1837) from the study area, Aarhus, Denmark. Photo by Franciszek Mika.

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Table 1. List of all Denmark localities with occurrences of *Helix lucorum* known at first half of 2026. Abbreviations: FM – Franciszek Mika, PEB – Pola Emma Brettschneider, AS – Artur Szpalek, NGS – Nina Gural-Sverlova, OK – Ondřej Korábek, MTN – Marco T. Neiber, MS – Marcus Stenskjær, JM – Jarosław Maćkiewicz, APF – Alejandro Pérez Ferrer.

	Date of obs./coll.	Nearest municipality	GPS coordinates	Altitude (m a.s.l.)	Location and habitat	No. of specimens	Status	Leg./obs.	Det.	Reference
1.	11. 9. 2025	Aarhus	56.155000 (N) 10.192222 (E)	1.9 m	Shaded grove in litter under, the trunk	1	Dead	FM & PEB	FM, AS	This study
2.	27. 6. 2022	Aarhus	56.154695 (N) 10.191674 (E)	2.5 m	Paved, wet path nearby shaded grove	1	Alive	emma_292289	NGS, OK, MTN, FM	GBIF 2026
3.	12. 5. 2023	Hedensted	55.777061 (N) 9.687579 (E)	64.2 m	Between the paved road and the lawn in a residential neighborhood	1	Alive	Marcus Stenskjær	MS, NGS, JM, APF, MTN, FM	STENSKJÆR 2023