About the finding of the invasive geomitrid *Xerolenta obvia* (Menke, 1828) (Mollusca, Stylommatophora) in Andorra

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Abstract

About the finding of the invasive geomitrid Xerolenta obvia *(Menke, 1828) (Mollusca, Stylommatophora) in Andorra*. An invasive snail population of *Xerolenta obvia* was discovered at the end of 2021 in Sant Julià de Lòria (Principat d'Andorra). This location, the first occurrence of this species for this country, is intermediate between the few locations in the south of France and the only known location in Spain. For its taxonomical determination, morpho-anatomical studies of the shell and the reproductive system have been carried out, and it has been compared with other species of geomitrids that are more similar based on the shell, such as *Cernuella neglecta* or *Helicella itala* and even, for less expert people, with *Xerosecta cespitum arigonis*, also present in Andorra. *X. obvia* is an invasive species, considered as a pest, which can produce serious impacts on agriculture. From a parasitological-veterinary point of view, it acts as an intermediate host for helminths (nematodes, trematodes, cestodes) and various pathogenic fungi, and can affect animals and humans. Regarding its eradication and control, *X. obvia* has been an objective in several countries and a project is currently underway to eradicate it in the municipality of Linares de Mora by the Government of Aragon (Spain).

Key words: *Xerolenta obvia*, geomitrid, pest snail, invasive snail, Andorra, Iberian Peninsula.

Resumen

Sobre el hallazgo del geomítrido invasor Xerolenta obvia *(Menke, 1828) (Mollusca, Stylommatophora) en Andorra.* A finales del 2021 los autores descubrieron una población del caracol invasor *Xerolenta obvia* en Sant Julià de Lòria (Principat d'Andorra). Esta población, primera cita de la especie para este país, es intermedia entre las escasas localidades del sur de Francia y la única población conocida en España. Para su determinación taxonómica se han realizado estudios morfo-anatómicos de la concha y del aparato reproductor y se ha comparado con otras especies de geomítridos conquiológicamente más similares como *Cernuella neglecta* o *Helicella itala* e incluso, para los menos expertos, con *Xerosecta cespitum arigonis*, también presentes en Andorra. *X. obvia* es una especie invasora, considerada plaga, que puede producir graves impactos sobre la agricultura. A nivel parasitológico-veterinario actúa como hospedador intermediario de helmintos (nematodos, trematodos, cestodos) y de diversos hongos patógenos, pudiendo afectar a animales y personas. En cuanto a su erradicación y control, *X. obvia* ha sido objetivo en varios países, y actualmente está en marcha un proyecto para erradicarla en Linares de Mora (Teruel) por el Gobierno de Aragón.

Palabras clave: *Xerolenta obvia*, geomítrido, caracol plaga, especie invasora, Andorra, península ibérica.

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Introduction

Recently, Martínez–Ortí (2020) shows for the first time the presence of a population of the geomitrid *Xerolenta obvia* (Menke, 1828) (Heath snail) in Spain, and studies a snail sample from Linares de Mora (Teruel, Aragón, Spain). The taxon identification was carried out by studies of the shell and reproductive system. Never before no species of this genus has been recorded on the Iberian Peninsula, and the population was considered as a case of accidental introduction. *Xerolenta obvia* is an invasive species, considered as a pest, which can produce serious impacts on agriculture (Cowie, 2005; Cowie *et al.*, 2009; Grimm *et al*., 2009; Martínez–Ortí, 2020).

We now report the finding of this species in the Principat d'Andorra for the first time. Keep in mind that Borredà *et al.* (2010) did not collect this species during the samplings carried out in 2008–2009, to publish the Andorran land mollusc field guide. The morpho-anatomical characters are compared with the very similar geomitrids, *Cernuella neglecta* (Draparnaud, 1805), *Helicella itala* (Linnaeus, 1758) and even with *Xerosecta cespitum arigonis* (A. Schmidt, 1853), all them cited in Andorra (Borredà *et al.*, 2010). This finding allows us to better understand the invasive geographical distribution of the species in south-western Europe and notes on its ecology and potential impact as an intermediate host of vertebrate-infecting parasites are given.

Material and methods

Three adult specimens of *X. obvia* were found by one of the authors, in the Fontaneda road in a path close to the Valira river in Sant Julià de Lòria (Andorra) (UTM 31TCH7502; 900 m altitude) (Fig. 1). The sample collected on October 25, 2020 was collected in a highly entropized grassland near the right bank of the river, on soil and among the ruderal vegetation. The specimens were preserved in 70% ethanol, and deposited in the MVHN of Alginet (Spain) with the code MVHN–141021TE01. The images of its dart and one of the specimens of *X. obvia*, have been taken using a Leica M80 stereomicroscope with an attached IC90E camera.

Results and discussion

Studies of the shell and reproductive system confirm that the species found in Sant Julià de Loira corresponds to *Xerolenta obvia*, so it is the first record of both, genus and species, in Andorra, and the second one in the Iberian Peninsula. The obtained morpho-anatomical data (Figs 2–5) are the shell with medium size, more or less depressed above, with 5 to 6 whorls, slightly convex, opaque unbanded white or cream in colour, often with 1 to 5 dark bands of varying intensity, mainly on the periphery and below. Moderate open umbilicus, about ¼ the diameter of the shell. External surface of the protoconch smooth and the teleoconch with ornamentation formed by very fine and irregular radial microsculpture. Subcircular aperture, somewhat oblique, without well-marked internal thickening, which when presented is slightly white (Martínez–Ortí, 2020). The dimensions of the shells of the three studied Andorran specimens vary between 15.1 and 16.3 mm in width and between 9.0 and 10 mm in height. Martínez–Ortí (2020) points between 13.5 mm and 18.2 mm in width and between 8.2 and 11.4 mm in height for Spanish specimens from Linares de Mora (Teruel), while other authors give ranges in width between 14 and 20 mm and height between 7 and 10 mm.

This taxon can be confused conchologically with other species of geomitrids mainly such as *C. neglecta* or *H. itala* and even, for less expert people, with *X. c. arigonis*, all present in the area.

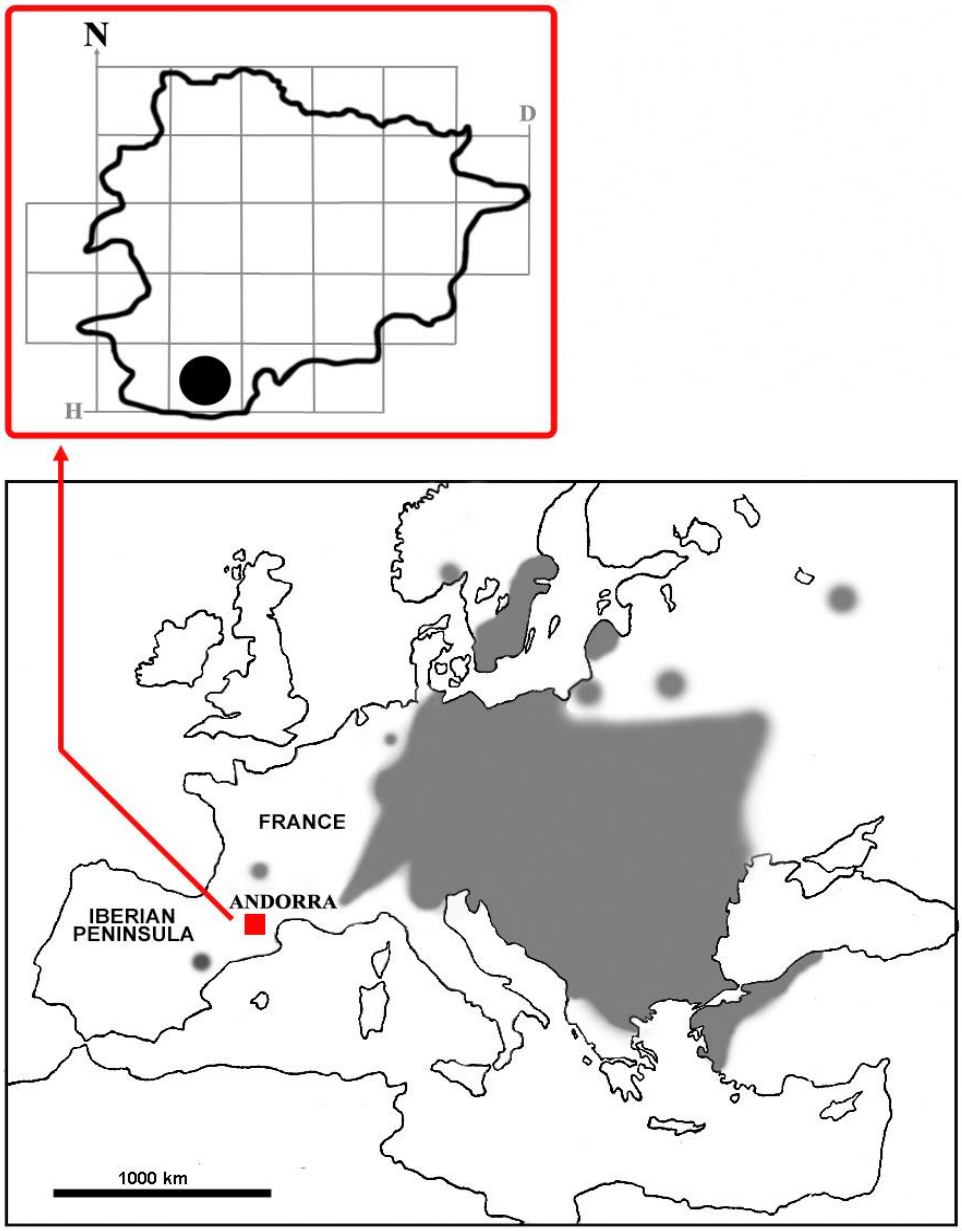
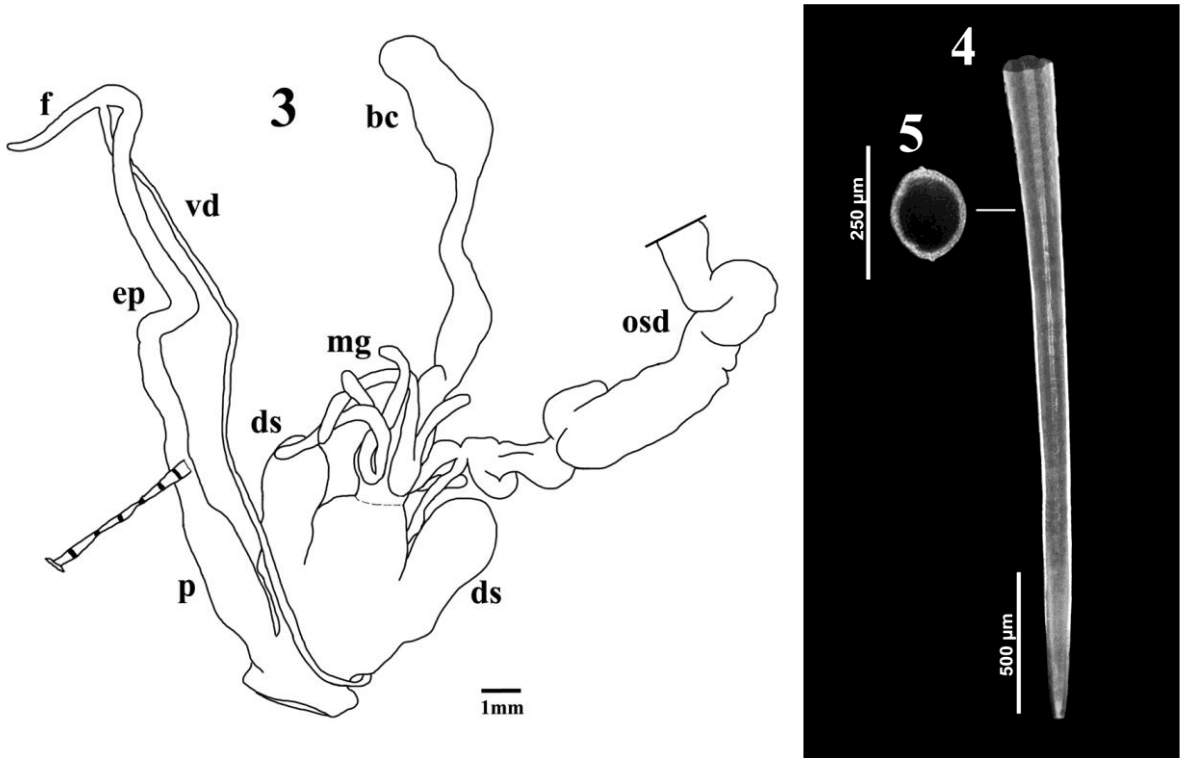


Figure 1. Map of the geographical distribution of *Xerolenta obvia* in Europe and detail of its location in Andorra.
Figura 1. Mapa de distribución geográfica de Xerolenta obvia *en Europa y detalle de su localización en Andorra.*

Figure 2. Specimen of *Xerolenta obvia* from Sant Julià de Lòria (Andorra).
Figura 2. Ejemplar de Xerolenta obvia *de Sant Julià de Lòria (Andorra).*



Figures 3–5. 3. Reproductive system of *Xerolenta obvia* from Sant Julià de Lòria (Andorra); 4–5. Dart. 5. Cross-section. (abbreviations: bc=bursa copulatrix; ds=dart sac; ep=epiphallus; f=flagellum; mg=mucous glands; osd=ovispermiduct; p=penis; vd=vas deferens).
Figuras 3–5. 3. Aparato reproductor de Xerolenta obvia *de Sant Julià de Lòria (Andorra); 4–5. Dardo; 5. Corte transversal. (abreviaturas: bc=bursa copulatrix; ds=saco del dardo; ep=epifalo; f=flagelo; mg=glándulas mucosas; osd=ovispermiducto; p=pene; vd=vaso deferente).*

The conchological differences between the two first mentioned species are shown by Martínez–Ortí (2020). About *X. c. arigonis*, its shell is bigger and more globose, which can reach 26 mm in width and 17.02 mm in height, and with a narrower umbilicus (on ⅙ of the shell) than in *X. obvia*. The shell is brownish-yellow or whitish in colour, with variable pattern, very banded or dark brown flammulated (Fechter & Falkner, 2002; Martínez–Ortí, 1999; Kerney & Cameron, 1999). All these similar taxa are also clearly distinguishable from *X. obvia* by the reproductive system, mainly by the dart apparatus. *Xerolenta obvia* is provided with two symmetrical dart-sacs on opposite sides of the vagina and the lower portion of them contains a wide cavity, more or less angular in the upper portion, without accessory sacs. Besides, it presents a short flagellum in relation to the epiphallus (Martínez–Ortí, 2020) (Fig. 3). The dart is long, slightly curved, narrow, with a wingless tip, in transverse section some oval and with two small lateral traces of wings in opposites sides, more patent towards the end of the dart (Figs 4–5).

At the parasitological-veterinary level, it acts as an intermediate host for helminths (cestodes nematodes and trematodes) and various pathogenic fungi (*Alternaria* spp., *Fusarium* spp., *Phytophthora* spp., etc.), that can affect animals and people. The known parasitic nematodes are *Cystocaulus ocreatus* (Railliet et Henry, 1907), *Muellerius capillaris* (Mueller, 1899), *Neostrongylus linearis* (Marotel, 1913) and *Protostrongylus rufescens* (Leuckart, 1865), that cause broncho-pulmonary strongylosis in small ruminants and leporidae and as parasitic cestodes *Davainea proglottina* (Davaine, 1860), which causes avian cestodiosis and the fluke digenea *Dicrocoelium dendriticum* (Rudolphi, 1819) that can cause dicrocoeliasis in humans as well as *Brachylaema* spp. (Kalkan, 1971; Cordero & Manga, 1976; Edwards *et al*., 1980; Ismail & Gürelli, 2018; Yildirum *et al*., 2018; Martínez–Ortí, 2020).

The new population of *X. obvia* in Andorra was also probably introduced accidentally, with ornamental plants, as occurred in Spain (Martínez–Ortí, 2020). This Andorran location is intermediate between the localities in southern France and the only population in Spain known until now, and allows us to better understand the expansion of this species native from eastern Europe to western Europe (Welter–Schultes, 2012; Martínez–Ortí, 2020) which probably will colonize completely the Iberian Peninsula. It is of interest to know the degree of expansion of this invasive snail throughout the country and to be able to carry out some action for its control and eradication, as has already happened in several countries (Robinson & Slapcinsky, 2005; Robinson, 2018; Martínez–Ortí, 2020). Currently the Government of Aragon is carrying out actions for its eradication in Linares de Mora.

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