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CONFIRMATION OF *POLYGYRA CEREOLUS*  
(GASTROPODA: POLYGYRIDAE) IN PUERTO RICO, GREATER ANTILLES

Confirmación de *Polygyra cereolus* (Gastropoda: Polygyridae)  
en Puerto Rico, Antillas Mayores

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ABSTRACT

*Polygyra cereolus* (Megerle von Mühlfeld, 1816) is a small air-breathing snail originating in Florida, which is considered as an invasive species and is reported from a wide area in the south of the United States to Mexico and in some in some Caribbean Islands, Hawaii, Spain and the Arabian peninsula. Here we report the observation of this species in Puerto Rico.

*Keywords:* land snail, new record, alien species, Greater Antilles.

RESUMEN

*Polygyra cereolus* (Megerle von Mühlfeld, 1816) es un pequeño caracol pulmonado originario de Florida, considerado una especie invasora, ahora ampliamente distribuido en el sur de los Estados Unidos a México y más localmente en el área del Caribe, Hawai, España y la Península Arábiga. Aquí presentamos la observación de esta especie en la isla de Puerto Rico.

*Palabras clave:* caracol, nuevo registro, especies foráneas, Antillas Mayores.

*Polygyra cereolus* (Megerle von Mühlfeld, 1816), commonly called the Southern Flatcoil, is a small pulmonate landsnail native to Florida (Pilsbry, 1940), in the family Polygyridae. This family originate from North America (Pilsbry, 1939). With 24 genera and about 294 species (Perez *et al.*, 2014), it is a significant proportion of the North America land snail fauna. The genus *Polygyra* Say, 1818 comprises actually 5 (Perez *et al.*, 2014) to 9 (MolluscaBase, 2019) valid species. It displays a depressed to planorboid shell, with striated whorls, a wide umbilicus and one parietal tooth. Maximum shell diameter is generally around 8 mm, but can reach up to 18 mm, while shell elevation is around 4 mm.

*Polygyra cereolus* is the only species in the genus to have been reported as an invasive species, following accidental introductions in many countries. Its current distribution includes the southern United States (Perez, 2008) and Mexico (Thompson, 2008), as well as St Martin (Bertrand, 2002 as *P. cf. plana*; Neckheim & Hovestadt, 2016) and Guadeloupe (Charles, 2014) in the Caribbean, Hawaii (Cowie, 1996), Spain (Navarro-Barrachina *et al.*, 2012; Quiñonero-Salgado & Soriano, 2015), Saudi Arabia (Neubert, 1995), the United Arab Emirates (Feulner *et al.*, 2005), and Qatar (Al-Khayat, 2010).

In July 2013 one of us (AL) has been able to do some naturalistic observations, including a small land snail shell collection in the gardens of the University of Puerto Rico campus at Utuado (18°15'25" N; 66°43'15" W), in the centre of the island. Land snails have been

looked for on the ground, among leaf litter resulting in the finding of fresh but empty shells. The specimens were sent to the Natural History Museum of Bordeaux where the shells were cleaned and observed with a binocular magnifying glass and then compared with West Indian material from the Museum's collection. The usual shell length and diameter measurements were made using a digital calliper. Photos of the specimen presented in this note have been made with a Pentax K5 digital camera and 90 mm macro lens. The shell is preserved as voucher at the Bordeaux Natural History Museum (catalog number: MHNbx 2018.19.1).

The status of new occurrence was established by consulting the lists of the island's terrestrial snail inventories (Van der Schalie, 1948; Aguayo, 1961, 1966; Grana Raffucci, 2007) as well as the naturalist databases documenting terrestrial molluscs in North America and the Caribbean (iNaturalist) or compiling the catalogues of natural history collections, including that of the University of Puerto Rico (iDigBio, GBIF).

The examination of the seven shells collected makes it possible to recognize two species. Six shells are identified as *Bulimulus guadalupensis* (Bruguière, 1789), a widespread species in the Caribbean region (e.g. Breure, 1974) and in Puerto Rico (Van der Schalie, 1948; Grana Raffucci, 2007) where it is reported since 19th century. The last specimen, the subject of this note, corresponds to a shell of *Polygyra cereolus* (Fig. 1).

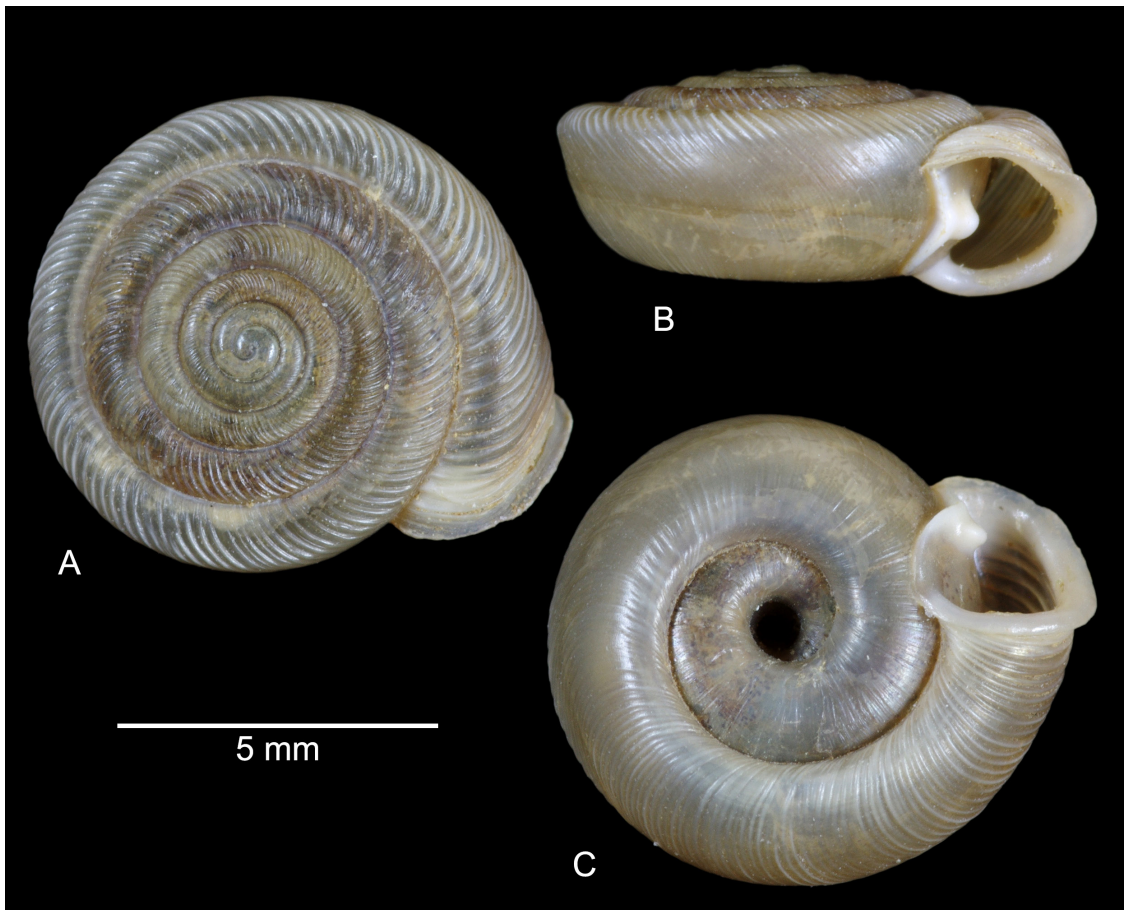


Figure 1. Specimen of *Polygyra cereolus* collected at the Utuado Campus, Puerto Rico. Apical view (A), apertural view (B), umbilical view (C).

*Polygyra cereolus* is difficult to distinguish from *P. septemvolva* Say, 1818, and misidentification are probably frequent, as suggested by Perez *et al.* (2014). According to Pilsbry (1940), a well-developed parietal lamellae deep within the first half of the last whorl wall characterises *P. cereolus*. Our specimen fits well with the shell size, morphology and spire height variability from samples from Guadeloupe displaying the parietal lamellae (Charles, 2014).

From literature and natural history collections, *Polygyra cereolus* is not known in Puerto Rico. However, the species is listed and illustrated in a conference paper by Robinson and Fields (2014), but with no locality or habitat information. The occurrence that we report here thus confirms the presence of this species on the island while providing the first information on the context in which this snail can be observed in Puerto Rico.

With a land area of approximately 9,000 km<sup>2</sup>, Puerto Rico is a large island that harbours a rich and diverse terrestrial molluscan fauna with more than 180 species and subspecies (Grana Raffucci, 2007). This fauna was mainly inventoried and described during the 19th century (Shuttleworth, 1854; Crosse, 1892) and the first part of the 20th century (Dall & Simpson, 1902; Van der Schalie, 1948). Knowledge have been enhanced by the contributions of Aguayo (1961, 1966) and more recently by the works of Grana Raffucci (2007). None of these publications lists *Polygyra cereolus* and the first report of this species in Puerto Rico appears to be the Robinson and Fields (2014) conference.

Our mention appears thus to be the second report of *Polygyra cereolus* on the island of Puerto Rico. It confirms the introduction of the species, around 2013 or a little earlier and provides a localized record that can help to trace the spread of this taxon on the island.

In its natural range, and in most localities where the species was introduced, *P. cereolus* lives in coastal environments, seemingly tolerating a certain salinity (Capinera & White, 2011; Neckheim & Hovestadt, 2016). It is also well acclimatised to gardens where irrigation provides favourable moisture conditions (Al-Khayat, 2010).

One of the main vectors for the spread and introduction of *P. cereolus* appears to be the trade and transport of living plants. In the Antilles, specimens were found in a shipment of potted plants (Miller, 1994), while its introduction on the Arabian Peninsula is assumed to have occurred along with turfgrass sod (Capinera & White, 2011).

The Utuado campus is located in a rural environment in the centre of Puerto Rico. The snail was therefore not found in the coastal environment where it is frequently encountered when introduced. However, the introduction of this non-native snail may have accompanied the transport of plants to the university, the Utuado campus being specialized in agricultural technology studies.

This new record of *Polygyra cereolus* in Puerto Rico confirms its introduction into the island and shows that the dispersion of this species in the Caribbean is probably more important than the few known reports indicate. In addition, the taxon has been observed in a garden context which may be conducive to the establishment of a population, especially if new individuals are likely to be introduced through the importation of new plants.

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