New reports for *Oxychilus draparnaudi* (H. Beck, 1837) (Gastropoda: Oxychilidae) in the Province of Buenos Aires, Argentina

Oxychilus draparnaudi (H. Beck, 1837), a land snail commonly known as Draparnaud's Glass Snail, Darkbodied Glass Snail, or Blue Glass Snail, is a species with a wide distribution range. It is originally native to central, southern, and western Europe, British Islands, Iberian Peninsula, and Southwest Scandinavia (Neiber, 2017). Nevertheless, it has been introduced in anthropic ecosystems and its wide environmental tolerance has allowed this species to disperse to northern Europe (Alexandrowicz and Alexandrowicz, 2010) and finally to worldwide locations. Up to now, O. draparnaudi has been reported as introduced in United States (Frest and Rhodes, 1982), New Zealand (Barker, 1982), Tasmania (Kershaw, 1991), Canada (Forsyth, 1999), Bermuda islands (Bieler and Slapcinsky, 2000), some Macaronesian islands such as the Azores islands, Canary islands and Madeira (Cameron and Cook, 2001; Bank et al., 2002; Seddon, 2008), Réunion (Griffith and Florens, 2006), Australia (Shea, 2007), South Africa (Herbert, 2010), Argentina (Virgillito and Miquel, 2013) and Mexico (Naranjo-García and Castillo-Rodríguez, 2017). To compound the negative aspects of its widespread introductions, *Oxychilus draparnaudi* can be carnivorous despite a diet consisting also of a great variety of plants. This carnivory could negatively impact native faunas, due to the potential of *O. draparnaudi* to

predation (Frest and Rhodes, 1982; Forsyth, 1999). For this study, two living specimens of *Oxychilus draparnaudi* were collected at the Bioparque (formerly

reduce other terrestrial land snail populations through



Figure 1. Distribution of Oxychilus draparnaudi in the Province of Buenos Aires, Argentina.



Figures 2–7. Oxychilus draparnaudi (H. Beck, 1837). 2. Dorsal view of the shell. **3.** Umbilical view. **4.** Apertural view. **5.** Living animal of Oxychilus draparnaudi showing body coloration. **6–7**. Anatomy of the reproductive system. Abbreviations: ag: albumen gland; bc: bursa copulatrix; b-n: bottle-neck zone; dbc: duct of bursa copulatrix; dg: digestive gland; dp: distal portion of penis; e: epiphallus; f: flagellum; he: hermaphrodite duct; ov: ovotestis; p: prostate; pp: proximal portion of penis; pr: penial retractor muscle; ps: penis sheath; spo: spermioviduct; v: vagina; vd: vas deferens; vg: vaginal gland. Scale bars: 2–4, 6 = 2 mm; 5 = 5 mm; 7 = 1 mm.

Jardin Zoológico) in the city of La Plata on November 1, 2023. Subsequently, a new collection was made on November 27 of the same year, for a total of four specimens collected. The material was transported to the laboratory and

conditioned following Barrientos (2003). Then each specimen was examined, photographed, and dissected under a Leica S9i stereo microscope with digital camera. Identification relied on shell shape the distinctive body coloration of the species. This was then confirmed by studying the anatomy of the reproductive system. According to Barbato *et al.* (2021), a precise identification of specimens of *Oxy-chilus draparnaudi* can be only carried on through anatomical studies. The excellent conditions of the material collected for this study permitted detailed observations and documentation of the anatomical features, allowing for a reliable species identification.

The specimens were deposited in the Colección de Malacología at Museo de Ciencias Naturales de La Plata, catalogue numbers MLP-Ma 16136 and MLP-Ma 16137, for preservation and future reference.

Figure 1 indicates the new record obtained from this study, a previous one in Buenos Aires province for the Reserva Ecológica de Vicente López (Virgillito and Miquel, 2013) and 18 citizen scientist observations from 12 localities tagged as "Research Grade" from the iNaturalist platform (iNaturalist, 2024). All observations for O. draparnaudi were reviewed with the personal user profile (ana-c-diaz) to evaluate the accuracy of the identifications. The "Research Grade" tag indicates that these observations on iNaturalist have undergone a partial degree of confirmation, suggesting that they have been reviewed and deemed to meet certain quality criteria by the iNaturalist community. While these observations may not all have the same level of validation as scientifically collected specimens, they still provide valuable data for documenting the presence of this species.

Species in the genus Oxychilus Fitzinger, 1833 have discoidal shells with basically smooth whorls. Oxychilus draparnaudi differs from other related species by body color and major shell diameter. The body of Oxychilus alliarius (Miller, 1822) is described as dark gray or black, and its major shell diameter is generally short (6-7 mm). Oxychilus cellarius presents a light gray or brown cephalopedal mass, and its major shell diameter does not exceed 9 mm (Frest and Rhodes, 1982; Horáčková and Juřičková, 2009; Herbert, 2010). In contrast, the diameter of O. *draparnaudi* can reach 16 mm—with a mean of 11 ± 0.93 mm in the study material—and its body has a distinctive blue-gray coloration (Figures 2, 5). The head in this species also displays two dorsal lines that form a central groove, which coincides with the description of Garcia Meseguer et al. (2017). In relation to the number of shell whorls, O. alliarius presents 4-4.5 whorls, while O. draparnaudi exhibits 6–7 whorls (García-Meseguer et al., 2017). In the material observed in this study we counted 5^{1} 4–6 whorls. In contrast to the whorl-expansion rate observed in O. cellarius, the last whorl of O. draparnaudi widens rapidly to be notably wider than the previous one (Figure 2) (Kerney and Cameron, 1979; Giusti and Manganelli, 1997). In addition, *O. draparnaudi* shows diffuse growth lines from one suture of the shell to the next. In the specimens analyzed, the mean height was 5.6±0.94 mm; aperture was oblique, ovaltransverse, with a mean height of $4.22 \pm 0.61 \text{ mm}$ (Figure 4) and the umbilical diameter was 1.83±0.20 mm, being moderately large and not eccentric (Figure 3) (Germain, 1930; Giusti and Manganelli, 1997; Herbert, 2010).

With respect to the anatomy of the reproductive system (Figure 6), the material could be identified as *Oxychilus draparnaudi* due to a long and convoluted epiphallus that stretches from the penis sheath, a white penis sheath, a narrow proximal penis that meets with the distal penis in a bottleneck zone (Figure 7) (Giusti and Manganelli, 1997). Also, in *O. draparnaudi*, the penis and the epiphallus are proportionally longer compared to those of *O. cellarius* (Forcart, 1957).

The use of the free-access platform iNaturalist allowed for a community and collaborative survey of the presence of *Oxychilus draparnaudi* in Argentina, increasing its known distribution area in the Buenos Aires province beyond the localities of the Área Metropolitana de Buenos Aires (AMBA). Additionally, through that platform, the species was reported for localities of the coastal area of Buenos Aires such as Pinamar (Partido de Pinamar) and Mar del Plata (Partido de General Pueyrredon), showing the potential of iNaturalist to monitor the geographical distribution of introduced species such as *O. draparnaudi*. Accordingly, the platform can be a useful tool for detecting the range expansion of introduced species beyond their original areas of introduction, which allows for better tracking and management.

ACKNOWLEDGMENTS

Special thanks to Dra. Verónica Núñez and Dr. Álvaro Foieri who participated in collecting the first two specimens analyzed in this study. Many thanks to the authorities at the Bioparque (ex Jardin Zoológico) for allowing access for sampling.

LITERATURE CITED

- Alexandrowicz, W. P. and S. W. Alexandrowicz. 2010. Expansive migrations of molluscs during the historic period. Biological Invasions in Poland 1: 23–48.
- Bank, R. A., K. Groh and T. E. Ripken. 2002. Catalogue and Bibliography of the non-marine Mollusca of Macaronesia. In: Falkner M., K. Grah, and M. C. D. Speight (eds.) Collectanea Malacologica, pp. 89–235.
- Barbato, D., A. Benocci, M. Guasconi, and G. Manganelli. 2021. Light and shade of citizen science for less charismatic invertebrate groups: quality assessment of iNaturalist nonmarine mollusc observations in central Italy. Journal of Molluscan Studies 87: eyab033. https://doi.org/10.1093/mollus/ eyab033
- Barker, G. M. 1982. Notes on the introduced terrestrial Pulmonata (Gastropoda: Mollusca) of New Zealand. Journal of Molluscan Studies 48: 174–181.
- Barrientos, Z. 2003. Aspectos básicos sobre la clasificación, recolección, toma de datos y conservación de los moluscos. Revista de Biología Tropical 51 (3): 13–30.
- Bieler, R. and J. Slapcinsky. 2000. A case for the development of an island fauna: Recent terrestrial mollusks of Bermuda. Nemouria (Occasional Papers of the Delaware Museum of Natural History) 44: 1–99.

- Cameron, R. A. D. and L. M. Cook. 2001. Madeiran snails: faunal differentiation on a small island. Journal of Molluscan Studies 67: 257-267.
- Forcart, L. 1957. Taxionomische Revision palaarktischer Zonitinae, I. — Archiv für Molluskenkunde. 86: 101-136.
- Forsyth, R. G. 1999. Distributions of nine new or little-known exotic land snails in British Columbia. The Canadian Field-Naturalist 113 (4): 559-568.
- Frest, T. J. and R. S. Rhodes. 1982. Oxychilus draparnaldi (Beck, 1837) in Iowa. The Nautilus 96 (2): 36-39.
- García-Meseguer, A. J., M. A. Esteve, F. Robledano and J. Miñano. 2017. Atlas y Libro Rojo de los Moluscos Continentales de la Región de Murcia. Oficina de Impulso Socioeconómico del Medio Ambiente. Consejería de Agua, Agricultura y Medio Ambiente. Comunidad Autónoma de la Región de Murcia, 338 pp.
- Germain, L., 1930. Mollusques terrestres et fluviatiles. Première partie. Faune de France 21: 1-477 + iviii.
- Giusti, F. and G. Manganelli. 1997. How to distinguish Oxychilus cellarius (Müller, 1774) easily from Oxychilus draparnaudi (Beck, 1837) (Gastropoda, Stylommatophora, Zonitidae). Basteria 61 (1–3): 43–56.
- Griffiths, O. L. and F. B. V. Florens. 2006. A field guide to the non-marine molluscs of the Mascarene Islands (Mauritius, Rodrigues, Réunion) and the northern dependencies of Mauritius. Bioculture Press Mauritius.
- Herbert, D. G. 2010. The introduced terrestrial Mollusca of South Africa. SANBI Biodiversity Series. South African National Biodiversity Institute, Pretoria, 117 pp.
- Horáčková, J. and L. Juřičková. 2009. A new record of Oxychilus alliarius (Gastropoda: Zonitidae) with the species distribution in the Czech Republic. Malacologica Bohemoslovaca 8:63-65.
- iNaturalist. 2024. Observations of Oxychilus draparnaudi from Argentina. Observed on 10 May 2024. Exported from https:// www.inaturalist.org/places/argentina#q=oxychilus% 2Bdraparnaudi.
- Kerney, M. P. and R. A. D. Cameron. 1979. A field guide to the Land Snails of Britain and North-West Europe. London,
- Kershaw, R. C. 1991. Snail and slug pests of Tasmania. Queen Victoria Museum and Art Gallery, Launceston.

- Naranjo-García, E. and Z. G. Castillo-Rodríguez. 2017. First inventory of the introduced and invasive mollusks in Mexico. The Nautilus 131 (2): 107-126.
- Neiber, M. T. 2017. Oxychilus draparnaudi. The IUCN Red List of Threatened Species 2017:e.T171547A1327952. http://dx.doi.org/10.2305/IUCN.UK.2017-3.RLTS. T171547A1327952.en
- Seddon, M. B. 2008. An illustrated compendium of the land snails and slugs of the Madeiran archipelago. Studies in Biodiversity and Systematics of Terrestrial Organisms from the National Museum of Wales. BIOTIR Reports 2. National Museum of Wales, Cardif.
- Shea, M. 2007. Exotic snails and slugs found in Australia. Newsletter of the Malacological Society of Australasia 131: 3-11.
- Virgillito, M. and S. E. Miquel. 2013. New records of exotic land snails and slugs in Argentina. Revest del Museo Argentino de Ciencias Naturales, Nueva Serie 15 (2): 295–303.

Ana Carolina Díaz¹

División Zoología Invertebrados Facultad de Ciencias Naturales y Museo

Universidad Nacional de La Plata La Plata, Buenos Aires, ARGENTINA

and

- CONICET-Consejo Nacional de Investigaciones Científicas y Técnicas

La Plata, Buenos Aires, ARGENTINA anacdiaz@fcnym.unlp.edu.ar

Stella Maris Martin

División Zoología Invertebrados Facultad de Ciencias Naturales y Museo Universidad Nacional de La Plata La Plata, Buenos Aires, ARGENTINA

Luciana Marina Cao

Facultad de Ciencias Naturales y Museo Universidad Nacional de La Plata La Plata, Buenos Aires, ARGENTINA