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Comunication

Record of *Achatina fulica* (Férussac, 1821) (Gastropoda, Achatinidae) sinistral in the MZUFRA Malacological Collection, Belém, Pará, Brazil

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Abstract

To report the occurrence of a specimen of *A. fulica* with a sinistral shell (rare case in the species). The specimen was found during the cataloging process of the collection of mollusks of the Zoology Museum of the Federal Rural University of Amazonia (MZUFRA). The *A. fulica* shell has 44.46 mm of total length, 26.06 mm of height, 29.08 mm of width, 26.26 mm of aperture length and 15.82 mm of aperture width. This work presents a record of *A. fulica* with sinistral shell, which is rare in the scientific literature.

Key words: Mollusca, Heterobranchia, Stylommatophora, gastropod invader, shell

Registro de *Achatina fulica* (Férussac, 1821) (Gastropoda, Achatinidae) sinistrógira na Coleção Malacológica do MZUFRA, Belém, Pará, Brasil. Objetivou-se relatar a ocorrência de um exemplar de *A. fulica* com concha sinistrógira (caso raro na espécie). O espécime foi encontrado durante o processo de catalogação da coleção de moluscos do Museu de Zoologia da Universidade Federal Rural da Amazônia (MZUFRA). A concha de *A. fulica* possui 44,46 mm de comprimento total, 26,06 mm de altura, 29,08 mm de largura, 26,26 mm de comprimento da abertura e 15,82 mm de largura da abertura. Este trabalho apresenta um registro de *A. fulica* com concha sinistrógira, o que é raro na literatura científica.

Palavras-chave: Mollusca, Heterobranchia, Stylommatophora, gastrópode invasor, concha.

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The gastropods of the family Achatinidae correspond to 13 genera and 200 species (RAUT; BARKER, 2002). According to the authors, according to fossil records, the Achantinids are believed to have originated from a monophyletic group on the African continent. However, they suggest that the evolutionary history of the family remains largely unknown.

Among the Achantinids, the species *Achatina fulica* (Férussac, 1821) – updated taxonomy according to Horton et al. (2019) –, popularly known as "African giant snail", is a gastropod that inhabits primary and secondary forest margins (FISCHER et al., 2010). Among its main characteristics, it is a protandric hermaphrodite species. It can perform simultaneous copulation, herbivorous feeding habits, nocturnal activities (intensified in the rainy season) and humidity dependence in the environment to remain active (RAUT; GHOSE, 1983; SIMONE, 1999; COLLEY; FISCHER, 2009).

A. fulica is a gastropod native to the east-northeast region of Africa. However, it is currently distributed on all continents (FISCHER et al., 2010; ZANOL et al., 2010). In Brazil, it was introduced illegally in the 1980s as an alternative to scargot (LEÃO et al., 2011). However, there was rejection by the consumer market, and the clandestine breeders deactivated the crops, releasing the gastropods in the natural environment. This fact led to its rapid proliferation throughout the Brazilian territory, mainly due to its easy adaptation to various adverse environmental conditions and high reproductive potential (CIVEYREL; SIMBERLOFF, 1996; SIMONE, 1999; MATTHEWS, 2005; LEÃO et al., 2011). The ecological/biological characteristics of *A. fulica* cause it to be classified as a pest, mainly because it causes diverse socioeconomic and environmental problems, such as destruction of plantations, alteration of habitats (e.g., high population density) and for serving as a vector of diseases (e.g., eosinophilic meningitis) (CIVEYREL; SIMBERLOFF, 1996; SIMONE, 1999; MATTHEWS, 2005; COLLEY; FISCHER, 2009; FISCHER et al., 2010; LEÃO et al., 2011).

The adult gastropods of the *A. fulica* species measure approximately 20 cm in length and present up to 200 g of body biomass (shell + soft body) (MATTHEWS, 2005). They have an oval-conical shell with a sharp apex, with a maroon color in yellowish-orange and white (CIVEYREL; SIMBERLOFF, 1996; LEÃO et al., 2011). However, it is noted that the size, weight, shape and color of *A. fulica* shells are directly related to the physical (e.g., pH and calcium) and biological (e.g., organic matter) properties of the environment (FISCHER et al., 2010).

The characteristics of shells of gastropods are primordial the correct taxonomy of the species (LEAL, 2002). It is estimated that more than 90% of gastropod molluscs have the shell opening facing right (dextral). However, in some species occur the presence of individuals with inverted shells, that is, facing the left side (sinistral) (SCHILTHUIZEN; DAVISON, 2005; CAMACHO; DEL RÍO, 2011), which help to identify some species (FERNANDEZ et al., 2012).

In addition to the mentioned morphological characteristics, *A. fulica* presents dextral shell, however, there are rare records of individuals with sinistral shells (ASAMI, COWIE; OHBAYASHI, 1998; SCHILTHUIZEN; DAVISON, 2005), there were no records in studies involving intensive field and laboratory work with hundreds of specimens of this species (JAYASHANKAR et al., 2014). The records of *A. fulica* sinistrógiras are generally found on personal online platforms or on websites whose purpose is the spreading/commercialization of shells (Table 1).

In the present work we report a specimen of the *A. fulica* species with an empty shell placed in the Museum of Zoology of the Federal Rural University of Amazon (MZUFRA) under the code

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MZUFRA Moll 212. Following the morphometric characteristics of gastropods cited by Chagas, Barros and Bezerra (2018), estimated that the morphology of *A. fulica* shell, which has total length of 44.46 mm, 26.06 mm in height, 29.08 mm wide, 26.26 mm long and the opening 15.82 mm width of the aperture (Figure 1).

According Gernet et al. (2018), the presence of sinistral shell gastropods is an enigmatic character and their explanations for this phenomenon are presented speculative forms. However, there are studies that seek a more in-depth analysis and that seek evolutionary explanations for the sinistral shells (SCHILTHUIZEN; DAVISON, 2005; KURODA et al., 2009), an example of this is the study proposed by Schilthuizen and Davison (2005), who reviewed scientific progress in understanding the chirality - twisting of the shell - of marine gastropods, freshwater and terrestrial, from genetic, developmental and ecological perspectives.

Table 1: Records of gastropods of the family Achatinidae with sinistrógira shell.

Specie	Site	Reference
Achatina fulica (Férussac, 1821)	Madagascar	H. G. Lee Collection
	Australia	Pest and Diseases Image Library (2013)
	Philippines	Poppe (2015c)
Lissachatina immaculata (Lamarck, 1822)	Curepipe, Mauritius Island	H. G. Lee Collection
Achatina zebra (Bruguière, 1792)	Jeffreys Bay, South Africa	H. G. Lee Collection
Archachatina ventricosa (Gould, 1850)	Grand Bassam, Ivory Coast	H. G. Lee Collection
Archachatina bicarinata (Bruguière, 1792)	Islands of São Tomé and Príncipe	Evanno e Evanno (2013)
		Poppe (2015a)
Columna columna (Müller, 1774)		Poppe (2017)
		Poppe (2015b)

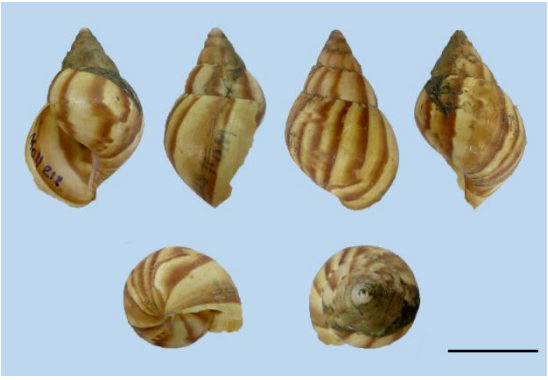

Figure 1: *Achatina fulica* sinistral shell (MZUFRA Moll 212). Scale: 30mm.

Divulgation

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