

SHORT COMMUNICATION

FIRST RECORD OF A RARE SINISTRAL SPECIMEN
OF *PYRAMIDULA JAENENSIS* (CLESSIN, 1882)
(GASTROPODA: PYRAMIDULIDAE) IN SPAIN

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ABSTRACT: Enantiomorphism in gastropods is related to the shell shape: high-spired snails present a higher proportion of enantiomorphs, in the low-spired snails it is less frequent. This could be a consequence of the way the snails mate; shell mounting mating occurs in the high-spired species and is independent of the chirality while the low-spired snails mate face-to-face which implies a certain degree of genitalia adjustment for successful copulation. Cases of sinistral *Pyramidula* have been reported in Eurasia, however, it is the first time it has been observed in *P. jaenensis* and Spain.

KEY WORDS: reverse chirality; gastropods; Spain; malacology

The cases of reverse chirality (i.e., reverse-coiled specimens in relation to the normal coiling for a given species) are always of interest for malacology in general, not only for being rare but also because they help to understand the evolution of shell chirality (PÁLL-GERGELY 2009). The direction of coiling in heterobranch snails is determined by a single Mendelian locus with either the ‘dextral’ allele or the ‘sinistral’ allele being dominant (ASAMI et al. 2008, SCHILTHUIZEN & HAASE 2010, RICHARDS et al. 2017, DAVISON 2020).

Another factor to consider is the shell shape: it can be low-spire (i.e., shells broader than high) and high-spire (i.e., shells higher than broad). Several authors have suggested that the vast majority of reverse chiral gastropods are among the high-spired species (GITTEBERGER et al. 2012, FEHÉR et al. 2013, HARL et al. 2020) as a probable consequence of the mating mode. As enantiomorphism is a whole-body phenomenon, the position of the genital orifice on the body side affects reproduction depending on how the snails mate. While mating between low-spired spe-

cies is not usually possible due to the engagement of the genitalia as they mate face-to-face exchanging sperm (ASAMI et al. 1998), the high-spired species are more able to copulate as the mating mode implies shell mounting where the chirality might not interfere and the mating could be non-reciprocal (PÁLL-GERGELY et al. 2020).

An additional feature of the chirality polymorphism seems to be the stability of its occurrence within the species. The occurrence of dextral and sinistral specimens living sympatrically has been widely recorded in gastropods (e.g., *Amphidromus* Albers, 1850, *Partula* A. Férussac, 1821, *Achatinella* Swainson, 1828, *Jaminia* Risso, 1826, *Lymnaea* Lamarck, 1799, *Vertigo* O. F. Müller, 1774) being the basis of evolutionary studies which conclude that chirality could also promote sympatric speciation (FEHÉR et al. 2013) although RICHARDS et al. (2017) claim that more than one locus is necessary to support speciation. Chirality has been also considered as the result of the predator-prey interaction where the reverse phenotype confers some degree of anti-predation



Figs 1–4. Reverse-coiled specimen of *Pyramidula jaenensis* from Pontón de la Oliva, Madrid, Spain: 1 – frontal view; 2 – lateral view; 3 – apical view; 4 – umbilical view. Scale bar 1 mm

protection in contrast to normal-coiled individuals (HOSO 2012, DEGAGNE & STONE 2019).

According to GITTENBERGER et al. (2012) 16% of the species in Europe are sinistral, although this number could fall to 1.1% if the species of the family Clausiliidae Gray, 1855 (high-spire) were excluded, confirming what has been said before about the less frequent cases of reverse coiling in low-spired snails.

Although this phenomenon is infrequent, it has been reported in low-spired snails such as *Vallonia pulchella* (O. F. Müller, 1774) in a quaternary deposit in Hungary (PÁLL-GERGELY & SZAPPANOS 2019), *Pseudalinda fallax* (Rossmässler, 1836) and *Helicopsis* cf. *istabilis* (Rossmässler, 1838), also in Romania (PÁLL-GERGELY et al. 2020).

The genus *Pyramidula* Fitzinger, 1833, has as its main morphological character a trochoid shell, with four or five whorls and a wide umbilicus showing

the preceding whorls (MARTÍNEZ-ORTÍ et al. 2007). Most of the species are low-spired snails which could suggest a face-to-face mating agreeing with the low proportion of the observed reversed enantiomorphs. Some cases of reverse chirality have been documented within this genus: *P. pusilla* (Vallot, 1801) (PÁLL-GERGELY 2009), or *P. humilis* (Benson, 1838) (HUTTON & BENSON 1838) but no similar cases were known in Spain to date.

Recently MILLER et al. (2021) carried out studies in the Community of Madrid, Spain, reporting for the first time the occurrence of *P. jaenensis*. In the material from this study we found a single sinistral animal within this population (Figs 1–4). This find constitutes the first documented case of reverse chirality for *P. jaenensis*, and the first case of enantiomorphism for the genus *Pyramidula* in Spain.



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