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# A sinistral Pomacea canaliculata (Gastropoda: Ampullariidae).

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A SINISTRAL POMACEA CANALICULATA (GASTROPODA: AMPULLARIIDAE)<sup>1</sup>. - Néstor J. Cazzaniga and Alejandra L. Estebenet - The genera of the family Ampullariidae show three coiling types. *Lanistes* Montfort, from Africa, is a classical example of hyperstrophy (i.e., a sinistral coil of the shell with a dextral coil of the soft parts). *Marisa* Gray, from Central and South America, have dextral young (Pilsbry, 1933) but planispiral adults. The remaining genera (*Pila* Röding, *Pomacea* Perry, *Asolene* d'Orbigny, etc.) are normally dextral (Michelson, 1961).

There are few known exceptions to this scheme. No dextral *Lanistes* have been recorded, and Dartevelle (1953) cited only four cases of individual shell sinistrality restricted to three species of *Pila*: two shells of *Pila globosa* (Swainson) and one of *Pila carinata* (Swainson) from Asia (Nevill, 1877, 1886), and a single sinistral *Pila wernei dewulfi* Bequaert & Clench from Africa, all of which were found empty. Additional recorded cases of sinistrality in this genus are for *Pila conica* (Wood) (Letson, 1897), and *Pila ampullacea* (Linnaeus) (Walker, 1917). A live sinistral specimen of *Pila pesmei* (Morelet) was collected in Thailand in 1979 (R. Keawjam, pers. comm.). Emery (1943) reported a sinistral *Pomacea paludosa* (Say) from Florida, U.S.A., and, in an ecological study, Burky (1974) mentioned three sinistral spat and one sinistral juvenile *Pomacea urceus* (Müller) from Venezuela. These are the only cases of sinistrality in the genus *Pomacea* known to us.

A live sinistral female was found in a stock of ca. 350 dextral *Pomacea canaliculata* (Lamarck, 1822) in Paseo del Bosque (La Plata City, Argentina). It was maintained in a 10 liter aquarium with two dextral males of similar size. Matings were observed on January 8 (9:30 PM) and January 13 (9:00 AM) 1989, but no spawning occurred. On January 18 both of these dextral males were replaced by similar dextral ones, but the female still failed to spawn and eventually died on January 27. It was therefore not possible to trace the genetic origin of the sinistrality.

The behaviour of the sinistral snail was normal. It actively fed on lettuce. The protrusion of the aerial siphon on the right confirmed that it was a case of visceral inversion and not an individual hyperstrophy. This fact would explain the failure of oviposition, since the penis sheath was observed to enter the pallial chamber of the female via the usual right side or slightly more towards the center, whereas the vagina was on the left.

**Morphology.** The shell (Fig. 1) corresponds to the general features of the species, even in the shape of the last whorl, which is rather square. It shows a smooth "martelée" sculpture. The umbilicus is wide. The periostracum is thin, light brown, and bears 21 coloured spiral stripes, which are also evident on the inside. The spire is not eroded. The shell is 46.5 mm long and 41.0 mm wide. The last whorl is 41.9 mm long (90.1% of the total length). The specimen has 5 3/4 whorls. The aperture measures 33.3 x 24.5 mm. The operculum is a mirror-image but otherwise identical to the dextral one and measures 29.5 x 18.1 mm; the width/length ratio of the operculum (61.4%) lies within the normal range for female shells of this species (Cazzaniga, in press).

Fig. 2 shows the general anatomy of the cephalopodium and pallial chamber of the sinistral *Pomacea canaliculata*. In this specimen it is the right nuchal lobe which has transformed into a siphon. All the organs are well developed but inversely disposed. The rudimentary penial complex (Andrews, 1964) is represented here by a triangular fold of the left edge of the mantle, without the small penis drawn by Hylton Scott (1957). The specimen was fully mature, with a large albumen gland of normal shape and a rather inflated pallial oviduct.

**Location of the material.** The shell, operculum and dissected soft parts have been deposited in the Museo Argentino de Ciencias Naturales "Bernardino Rivadavia"

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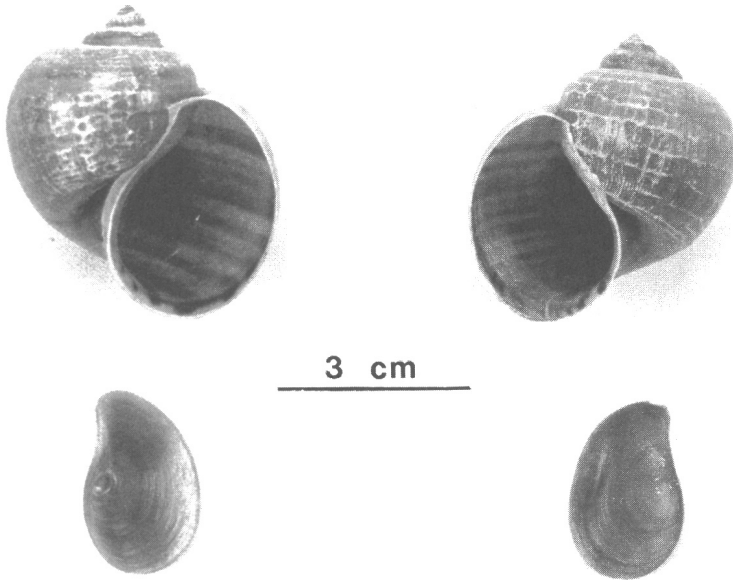


FIG. 1. *Pomacea canaliculata*. A dextral and the sinistral shell and operculum.

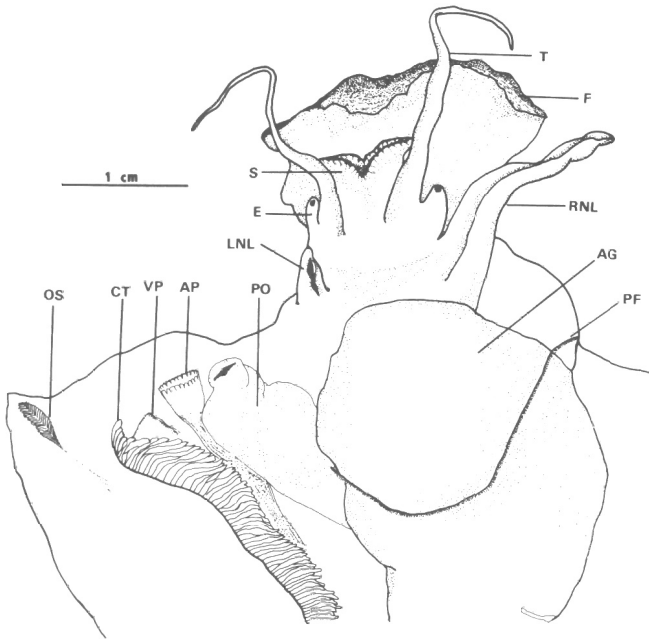


FIG. 2. General aspect of the anatomy of the cephalopodium and pallial chamber in the sinistral *Pomacea canaliculata*. AG: albumen gland; AP: anal papilla; CT: ctenidium; E: eye; F: foot; LNL: left nuchal lobe; OS: osphradium; PF: pallial fold; PO: pallial oviduct; RNL: right nuchal lobe; S: snout; T: tentacle; VP: vestigial penial complex.

(Buenos Aires), under the number 32,950 of the Mollusc Collection.

**Remarks.** Sinistrality in normally dextral Ampullariidae is an infrequent phenomenon. Paseo del Bosque pond is situated about 100 m from the Museo de La Plata, and has long been used as a source of material for malacological research and university courses on invertebrates. Hylton Scott (1934, 1957) collected *Pomacea canaliculata* there for her embryological and anatomical studies. The senior author has worked with this species since 1978, frequently obtaining specimens from the same site (Cazzaniga, 1981, 1983). Martín (1980) carried out a study on the penial complex of this species, including samples from Paseo del Bosque. However, in all previous collections of *Pomacea* from Paseo del Bosque pond, this is the first known sinistral specimen.

This accords with the fact that there are very few antecedents of sinistrality within the family as a whole. Milward de Andrade *et al.* (1978) and Guimaraes (1981) carried out extensive field observations on the closely related species *Pomacea haustum* (Reeve) from Brazil, but made no mention of sinistral specimens. Bourne (1983), Snyder & Kale (1983) and other authors have measured several thousand *Pomacea* shells from feeding deposits of the Snail Kite (*Rostrhamus sociabilis*, Aves, Accipitridae), and no sinistral shells were reported. Sinistral specimens of the Asian and African *Pila* have been reported rarely, with a total of only six shells reported in over a century.

Burky's (1974) sinistral specimens of *Pomacea urceus* were newly hatched snails and a juvenile. No adult sinistral shells were cited, though *P. urceus* is a well known species, repeatedly cited from northern South America (Baker, 1930; Pain, 1950, 1956, 1960).

Sinistrality in normally dextral species seems to be more frequent, however, in pulmonate shells. No mechanical barrier appears to exist for copulation between dextral and sinistral lymnaeas (Boycott *et al.*, 1930), and other gastropods. Nevertheless, Lipton & Murray (1979) stated that some degree of assortative mating appears in mating populations of *Partula* spp., which should enforce reproductive isolation of dextral and sinistral animals.

The left coiled shells of *Pila* and *Pomacea* must be considered developmental accidents or individual mutations. Should the sinistrality be due to the former reason, then the cause of the condition has no genetic basis. Should the sinistrality be due to the latter reason, then the mutated gene is destined to disappear when it occurs in single specimens, since normal copulation is impeded by mechanical incompatibility.

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