

A new *Tudora* (Gastropoda, Hypsogastropoda, Annulariidae) from Península de Paraguaná, Venezuela

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A new *Tudora* species (Gastropoda, Hypsogastropoda, Annulariidae) is described from the Península de Paraguaná, Estado de Falcón, Venezuela. In shell morphology the new species resembles *Tudora megacheilos* from Aruba and Curaçao. It can be separated by the considerably smaller apical angle and more turritiform shape of the shell. It is tentatively regarded as subfossil. This is the first record of *Tudora* from the mainland of South America.

Key words: Caenogastropoda, Annulariidae, *Tudora*, taxonomy, Paraguaná, Venezuela, Aruba, Caribbean.

INTRODUCTION

The Península de Paraguaná is the northernmost region of the Venezuelan mainland. During the Pliocene it was an island, and during the Holocene it became connected to the mainland by a long stretch of sand-dunes, the isthmus of Médanos. The peninsula has a surface area of about 3400 km². The highest point is the igneous-metamorphic complex of the Cerro Santa Ana at 830 metres, otherwise the topography is rather flat. Around the Cerro Ana four marine terraces exist (Audemard, 1996). The vegetation consists of xeric shrubland. The annual rainfall is less than 300 mm.

Aruba, an island belonging to the Kingdom of the Netherlands, is only 27 km away. It has been suggested that Aruba was connected to continental America, but this is uncertain. The maximum depth between Aruba and Venezuela is approximately 200 metres. Both fauna and flora of the Dutch Leeward Islands are largely of South American descent.

The available information on the malacofauna of the Península de Paraguaná is scant. During a visit to Paraguaná in 2006, a possibly subfossil *Tudora* was collected at two localities, which appears to be new to science.

SYSTEMATIC PART

Tudora Gray, 1850

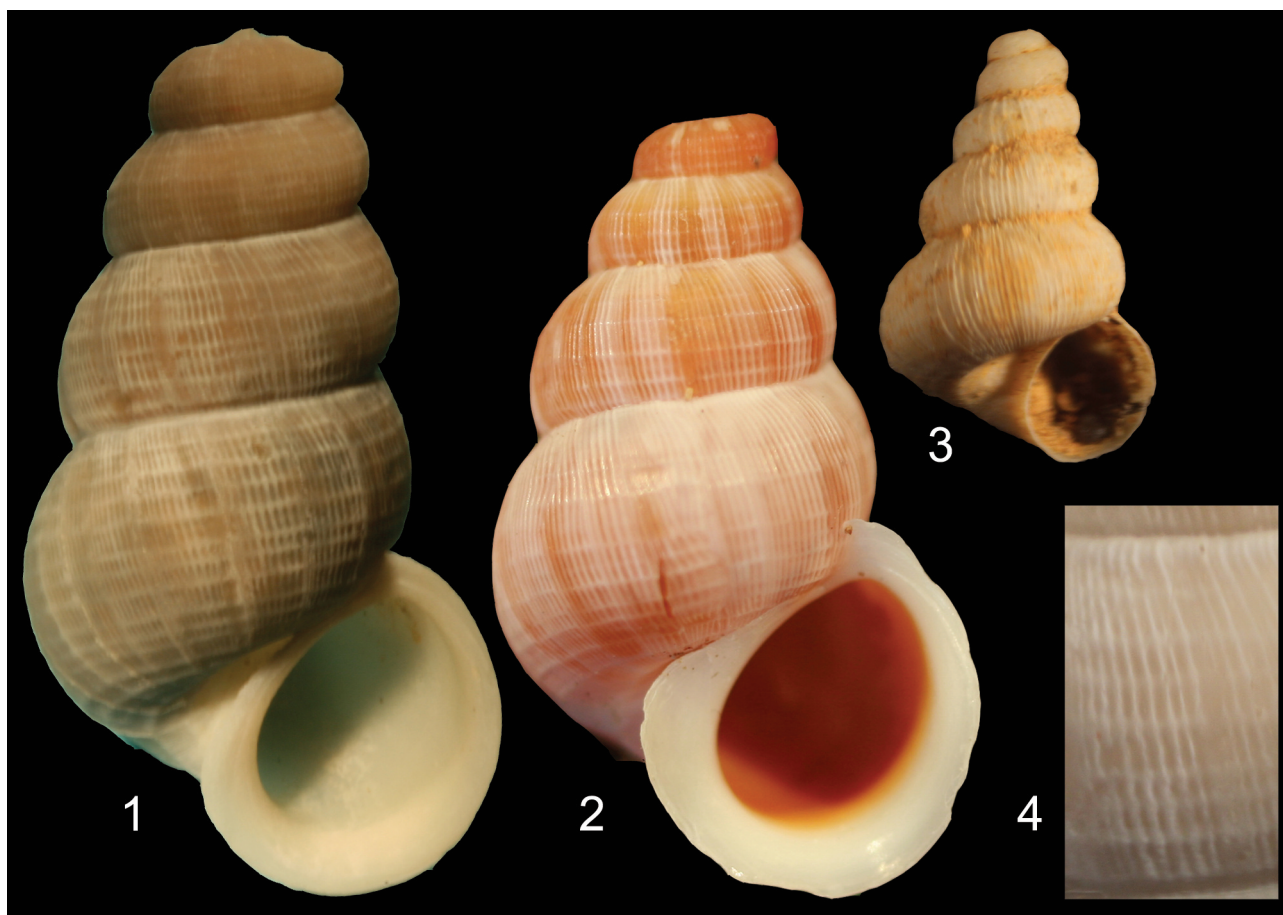
Tudora paraguanensis spec. nov. (Figs 1, 3, 4)

Material. – Venezuela, Estado Falcón, Península de Paraguaná, approximately 1 km south of El Pico, in the direction of Villa Marina, altitude 3 m, 11°51'06.4"N 70°16'22.6"W; A. Hovestadt leg. 25.xi.2006 [Naturalis Biodiversity Center RMNH.5004220 (holotype), dto.5004221 (10 paratypes); collection A. Hovestadt (65 specimens, paratypes)].

Other material. – Venezuela, Estado Falcón, Península de Paraguaná, about 50 meters southeast of Cabo San Roman, close to the lighthouse, altitude 7 m, 12°11'15.9"N 69°59'42.6"W [collection A. Hovestadt (14 specimens and fragments)].

Description of holotype. - Shell turritiform, height 18.3 mm, width 10.7mm. There are approximately 4.5 whorls, but the nuclear whorls are lost. Apical angle 31 degrees. This was measured by calculating the angle between two lines A and B, as in fig. 5. These lines do not touch the penultimate whorl, which is usually less protruding than the preceding whorl, or the aperture, so that the width of the apertural lip has no effect.

The sculpture consists of both axial and spiral ribs. The axial ribs appear as thin lamellae on the earlier whorls, but transform into more solid, rounded ribs



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Figs 1-4. *Tudora* species. 1, Holotype *Tudora paraguayensis* spec. nov., height 18.3 mm; 2, *Tudora megacheilos megacheilos* (Potiez & Michaud, 1838), collected at the type-locality of *Tudora fossor arubana*, Ceru Canashito, Aruba, height 16.8 mm; 3, juvenile paratype of *Tudora paraguayensis* spec. nov. height 7.3 mm collected at type-locality; 4, detail of abapertural side of body whorl of holotype of *Tudora paraguayensis* spec. nov. Photographs by A. Hovestadt.

on the final two whorls. On the body whorl there are 4 axial ribs per mm. On the last 3 whorls spiral ribs are present, 1-2/mm. Where these spiral ribs, generally somewhat more solid than the axial ribs, cross the axial ribs, small knobs are formed, creating a mal-leated aspect (Fig. 4).

The umbilicus is only partly covered. The aperture is suboval, with a maximal diameter of 5 mm. The simple lip is broadened, more on the lower palatal side than on the parietal side. No opercula were found.

The holotype is lustreless whitish with a brown-reddish hue, probably caused by the red sand where the specimens were found.

Description of additional material. - Paratypes: 76 fully grown paratypes, all decollated, and 1 fragile juvenile specimen still having the nuclear whorls (Fig. 3) were collected at the type locality. In the latter specimen the initial 2.5 whorls are without any surface sculpture, while the other whorls have axial lamellae, approximately 5-6 per mm. The 76 paratypes do not demonstrate any variation with regard to the surface

sculpture, but do so in size. The largest specimen measures 18.3 mm in height and 10.7 mm in width. The smallest one measures 9.3 mm x 6.0 mm. The material from the second locality, Cabo San Roman, is of poor quality, but does not differ from the shells found at the type-locality.

Etymology: this species is named after the area where it was found, i.e. Península de Paraguaná.

DISCUSSION

Several taxa belonging to the Annulariidae have been described from Venezuela. According to Watters (2006) all these taxa belong to either *Gouldipoma* Watters, 2006, or *Halotudora* Watters, 2006. *Gouldipoma* species have a simple peristome whereas *Halotudora* taxa have a double lip, with an evenly expanded peristome. The genus *Tudora* Gray, 1850, occurs only on Aruba, Curaçao and Bonaire. Baker (1923, 1924) recognized and described several taxa, but most of these were lumped together by Wagenaar Hummelinck (1940), who recognized only *Tudora megacheilos* (Potiez

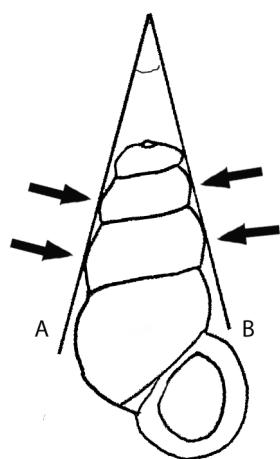


Fig. 5. Schematic drawing to demonstrate how the apical angle was measured. Arrows indicate the points where the lines touch the shell.

& Michaud, 1838), with two subspecies, and *Tudora rupis* Baker, 1924, with 4 subspecies. *Tudora maculata* (Baker, 1924) from Bonaire is now classified under *Bonairea* Baker, 1924, originally described as a subgenus of *Tudora*. *Tudora* is characterized by the simple peristome, expanded, with decollated nuclear whorls and a malleated shell sculpture, and pronounced sexual dimorphism.

Tudora paraguayensis resembles the *Tudora* taxa from Aruba, Curaçao and Bonaire. In spite of what Solem (1960:419) called "the bewildering shell variation shown by the Dutch West Indian *Tudora*" none of the taxa described by Baker (1923, 1924a, 1924b) from the Dutch Leeward Islands matches *Tudora paraguayensis*. Figure 2 for comparison shows *Tudora fossor arubana* Baker, 1924, from its type locality Ceru Canashito, Aruba. Wagenaar Hummelinck (1940b) regarded this as *Tudora megacheilos megacheilos* (Potiez & Michaud, 1828). *Tudora paraguayensis* differs in the more regular increase of the size of the whorls and the considerably smaller apical angle. None of the taxa mentioned by Baker (1923, 1924a, 1924b), have these features, which make this new taxon easily recognizable.

Tudora paraguayensis was found on two locations, both of which are in the presence of limestone belonging to the lowest marine terrace, as described by Audemard (1994). An effort was made to locate living specimens, but none were found. At the type locality, a subfossil *Bulimulus cacticolus* (Reeve, 1849) and a *Pupoides marginatus* (Say, 1821) were found.

On the second locality, besides fragments probably belonging to *Bulimulus cacticolus*, also a fragment

of a *Cerion* spec. was found. More were seen, but tools to collect these specimens, being cemented in the sand, were not available.

Tudora paraguayensis is regarded as subfossil, but the finding of living specimens seems possible, when one considers the lack of data with regard of the malacofauna of Paraguaná. Wagenaar Hummelinck (1940a) explored only a small part of the peninsula, and no *Tudora* taxa were found. Solem (1960) reported on the molluscs collected by Sanfilippo in Venezuela, including the Península de Paraguaná, and reviewed the pomatiasid snails of South America. None are reported from the peninsula.

Van Buurt (2005) mentions the occurrence of *Tudora* in Península de Paraguaná, but this seems to be based on misinformation (2016: personal communication; no material is available).

REFERENCES

- AUDEMARD, F.A., 1996. Late quaternary marine deposits of the Paraguana Peninsula, State of Falcón, Northwestern Venezuela: Preliminary geological observations and neotectonic implications. – *Quaternary International* 31: 5-11.
- BAKER, H.B., 1923. The Mollusca collected by the University of Michigan-Williamson expedition in Venezuela. Part I. Curaçao. – *Occasional Papers of the Museum of Zoology, University of Michigan* 137: 1-7.
- BAKER, H.B., 1924a. New land operculates from the Dutch Leeward Islands. – *Nautilus* 37: 89-94.
- BAKER, H.B., 1924b. Land and freshwater molluscs of the Dutch Leeward Islands. – *Occasional Papers of the Museum of Zoology, University of Michigan* 152: 1-158.
- BUURT, G. VAN, 2005. Field guide to the amphibians and reptiles of Aruba, Curaçao and Bonaire: 1-137. Edition Chimaira, Frankfurt am Main.
- SOLEM, A., 1960. Notes on south American non-marine Mollusca I-III. – *Annali del Museo Civico di Storia Naturale "Giacomo Doria"* 71: 416-432.
- WAGENAAR HUMMELINCK, P., 1940a. Studies on the fauna of Curaçao, Aruba, Bonaire and the Venezuelan Islands: 1-130. Utrecht University, dissertation.
- WAGENAAR HUMMELINCK, P., 1940b. Mollusks of the genera *Cerion* and *Tudora*. – *Studies on the fauna of Curaçao, Aruba, Bonaire and the Venezuelan Islands* 2: 43-82.
- WATTERS, G.T., 2006. The Caribbean land snail family Annulariidae: a revision of the higher taxa and a catalog of the species: 1-558. Backhuys Publishers, Leiden.