

NEW SPECIES OF *MIRADISCOPS* (GASTROPODA: SCOLODONTIDAE) FROM MARTINIQUE

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ABSTRACT: Only 17 endemic land snail species are known so far on the Lesser Antillean island of Martinique, most of which are macrogastropods that are easily visible, and thus, easily collectable. On the other hand, species of microgastropods remain undersampled and overlooked. Based on recently collected shells from Mount Vauclin, we describe a new species of Scolodontidae, *Miradiscops madinina* sp. nov. from Martinique. This is the first recorded incidence of *Miradiscops* stricto sensu from the volcanic arc of the Lesser Antilles, as well as the second species of Scolodontidae recorded from Martinique. This emphasises the importance of Mount Vauclin as a home to endemic invertebrates on the island and the need for collection efforts that includes soil and leaf litter sampling.

KEY WORDS: endemic species; insular species; Lesser Antilles; *Miradiscops madinina* sp. nov.; Scolodontoidea; Stylommatophora

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INTRODUCTION

Terrestrial molluscan island diversity is often characterised by high levels of endemism (COOK 2008, CHIBA & COWIE 2016, YEUNG & HAYES 2018, PROIOS et al. 2021). This pattern is particularly interesting in the Antilles, with high levels of diversification in the Greater Antilles but an apparently reduced richness in the Lesser Antilles (e.g., ROBINSON et al. 2009, VAN LEEUWEN et al. 2015, HOVESTADT & VAN LEEUWEN 2017, HOVESTADT & NECKHEIM 2020).

Only 17 endemic land snail species are so far known on the Lesser Antillean island of Martinique (DELANNOYE et al. 2015, GARGOMINY et al. 2022),

which is about 40% of the number known on its similar-sized island neighbour Dominica (ROBINSON et al. 2009). Most of the species recorded from Martinique are macrogastropods, which are easily visible and thus, easier to find; while species of microgastropods (e.g., Punctoidea, Scolodontidae) often remain undersampled and overlooked (SALVADOR 2019).

Herein, we describe a new species of scolodontid snail from Martinique collected by the second author based on material obtained from sifted soil and leaf litter. This is the second species of Scolodontidae recorded from the island.



MATERIAL AND METHODS

The specimens analysed in the present study are deposited in the malacological collection of the Muséum national d'Histoire naturelle (MNHN; Paris,

France) and consist of dry empty shells collected from ground sieving by the second author during a one-day trip to Mount Vauclin.



Figs 1–3. Collection site: 1 – overview of the top of Mount Vauclin (photo by E. POIRIER); 2 – the mesophyllous forest of top Mount Vauclin (photo by T. RAMAGE); 3 – place where the specimens were collected (photo by T. RAMAGE)



The specimens were collected on the southwestern slope just below the top of Mount Vauclin (Montagne du Vauclin, Figs 1–3), the highest point on the southern portion of the island (c. 500 m a.s.l.). Mount Vauclin is an eroded remnant of a volcano, part of the Vauclin-Pitault Chain; its latest eruption has been dated to the Late Miocene (GERMA *et al.* 2011). Martinique has a wet tropical climate and the province of Le Vauclin specifically has a mean annual temperature of 27.3 °C and average annual precipitation of 1,229.7 mm (MÉTÉO-FRANCE 2022). The rainfall gradient is the main factor defining the vegetation types and assemblages in Martinique, though present-day vegetation is mostly secondary, resulting from agricultural practices and exploitation (BAILLARD & JOSEPH 2015). A survey of Martinique's flora has found the greatest species diversity in Le Vauclin, which contains mesophilic and xerophilic assemblages (BAILLARD & JOSEPH 2015). The flora in Le Vauclin is characterised by an *Odontonema nitidum* (Jacq.) Kuntze grass carpet and the dominant tree species are *Guapira fragrans* (Dum. Cours.) Little, *Lonchocarpus punctatus* Kunth, and *Citharexylum flexuosum* (Ruiz & Pav.) D. Don (BAILLARD & JOSEPH 2015).

SYSTEMATICS

Stylommatophora

Superfamily Scolodontoidea

Family Scolodontidae

Genus *Miradiscops* H. B. Baker, 1925

Type species: *Miradiscops variolata* H. B. Baker, 1925, by monotypy

Miradiscops madinina sp. nov.

(Figs 4–10)

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Type material. Holotype MNHN-IM-2000-38056 (coated for SEM), paratypes MNHN-IM-2012-21275 (30 shells, 5 of which coated for SEM); col. O. GARGOMINY, 18/Feb/2011.

Type locality. Martinique, Le Vauclin, Montagne du Vauclin [Mount Vauclin], 14°33'28.0"N, 60°53'07.6"W, alt. 510 m.

Distribution. Known only from the type locality.

Etymology. The specific epithet refers to the first known name of the island of Martinique, Madinina. It is treated as a noun in apposition.

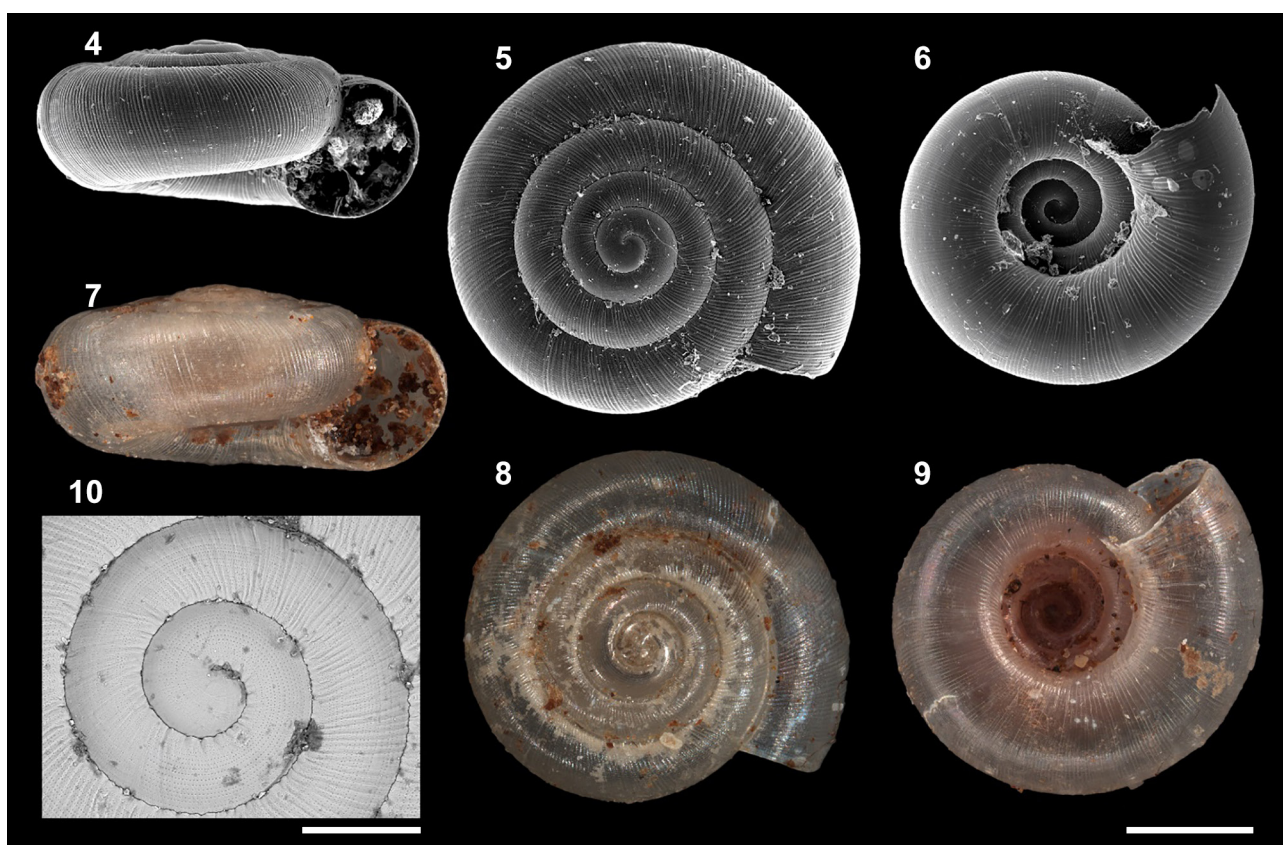
Scanning electron microscopy (SEM) was conducted at the Victoria University of Wellington School of Chemical and Physical Sciences (Wellington, New Zealand). All images were captured on a JEOL 6500F Scanning Electron Microscope (JEOL Ltd., Japan) (55–170× magnification). Selected shells were mounted in the desired orientation on aluminium stubs using carbon tape and placed in the vacuum desiccator overnight to facilitate carbon coating and remove volatile substances that can result in artifacts during the process. All samples were collectively coated with 3 rods of graphite-carbon at approximately 24 nm of thickness per rod.

The following abbreviations are used throughout: H – shell height (parallel to the columellar axis); D – greatest shell width (perpendicular to H); h – aperture height (parallel to H, from the apical insertion of the lip to the basal region of the lip). All measurements were conducted on the free public domain image processing software ImageJ v.1.53q (National Institutes of Health, Bethesda, USA; SCHNEIDER *et al.* 2012).

Diagnosis. Teleoconch sculpture (rib-like axial striae) significantly more pronounced and stronger than that of its Central American congeners. Spire generally more flattened than in congeners. Aperture D-shaped, generally narrower.

Description. Shell minute (D ~1.67 mm), discoid, of c. 4 to 4½ whorls, with flattened spire; translucent, of whitish/ light ochre colour (Figs 4–9). Protoconch (Fig. 10) with c. 1¼ whorls, sculptured with closely-spaced spiral rows of microscopic pits (c. 10 rows apically visible at the beginning of protoconch, up to 16 at the end). Transition to teleoconch marked by a gradual appearance of axial sculpture. Teleoconch sculptured with 20–30 spiral rows of microscopic pits (that continue from protoconch) and well-marked axial rib-like striae (numbering 4–5 per 50 µm). Spire stepped; whorl profile markedly convex; suture well marked, but not deep. Umbilicus deep and wide; c. 1/3 width of shell diameter. Aperture D-shaped; peristome simple.

Measurements. c. 4 whorls; H – 0.64 to 0.65 mm (n=2); D – 1.66 to 1.68 mm (n=6; holotype = 1.66 mm); h – 0.54 to 0.57 mm (n=2).



Figs 4–10. *Miradiscops madinina* sp. nov.: 4 – paratype MNHN-IM-2012-2127; 5 – holotype, MNHN-IM-2000-38056; 6–9 – paratypes MNHN-IM-2012-21275; 10 – detail of the holotype's protoconch. 4–6, 10 – SEM images of type specimens; 7–9 – stereomicroscope images of paratypes. Scale bars equal to 0.5 mm (4–9) or 200 μ m (10)

DISCUSSION

Miradiscops madinina sp. nov. exhibits a minute discoid and sculptured shell characteristic of some Scolodontidae and also of Punctoidea snails in the Neotropics. It can be placed in the genus *Miradiscops* due to its unique proto- and teleoconch sculpture consisting of spiral rows of microscopic pits (THIELE 1931, ZILCH 1960, SCHILEYKO 2000). Importantly, the protoconch sculpture is not easily visible under a stereomicroscope (Fig. 8), but SEM enables a clear perspective (Figs 5, 10). Under the stereomicroscope, the protoconch can appear smooth or sculptured by spiral cordlets, depending on magnification.

The shell of *Miradiscops madinina* sp. nov. is characterised by a profile of rounded whorls, a lightly flattened spire, a D-shaped aperture, and a marked teleoconch sculpture, all of which contribute to an easy diagnosis when compared to most of its congeners. All species of *Miradiscops* share the characteristic rows of microscopic pits including the type species *M. variolata*, as well as *M. brasiliensis* (Thiele, 1927), *M. lunti* (E. A. Smith, 1898), *M. panamensis* Pilsbry, 1930, *M. punctata* (H. B. Baker, 1925), *M. puncticipitis* (Pilsbry, 1926), and *M. youngii* Dourson, Caldwell et Dourson, 2018.

Miradiscops madinina sp. nov. has a slightly more flattened spire than its congeners, which gives the shell a more discoid aspect; the exception is *M. puncticipitis*, which has an even flatter spire compared to the new species. Likewise, *M. madinina* sp. nov. has a D-shaped aperture, narrower than most congeners, which have wider and more circular apertures; the exceptions are *M. puncticipitis* and *M. brasiliensis*, whose apertures have a similar shape to that of the new species. *Miradiscops puncticipitis* and *M. brasiliensis* are conchologically the most reminiscent of *M. madinina* sp. nov. The most obvious diagnostic feature for identifying *M. madinina* sp. nov. from those species and its other congeners, however, is its marked teleoconch sculpture: the axial striae are stronger and more regularly spaced, being rib-like in their appearance (in other *Miradiscops* spp., the striae are fainter and more irregular).

The genus *Miradiscops* stricto sensu is distributed from southern Mexico, along continental Central America (Belize, Nicaragua, Guatemala, Panama), to Venezuela and Trinidad (SMITH 1898, BAKER 1925, PILSBRY 1926, PILSBRY 1930b, PÉREZ & LÓPEZ 2002, ROBINSON et al. 2004, NARANJO-GARCÍA &



FAHY 2010, THOMPSON 2011, DOURSON et al. 2018). Venezuela is the type locality of type species *M. variolata* (BAKER 1925). After a gap in the genus' geographic distribution, a single species can be found in southeast Peru, southern Brazil, and northeast Argentina (THIELE 1927, WEYRAUCH 1967a, SIMONE 2006). *Miradiscops* had two additional subgenera that were synonymised between themselves and with nominate *Miradiscops* (THIELE 1931, ZILCH 1960, WEYRAUCH 1967a, SIMONE 2006): *Punctodiscops* H. B. Baker, 1925 (type species *M. punctata*); *Microhappia* Thiele, 1927 (type species *M. brasiliensis*). Notably, the diagnosis of *Punctodiscops* was based on more numerous pits on the protoconch, but the pits are difficult to see under the stereomicroscope, so that definition could have been biased by earlier descriptions of *Miradiscops* spp. (BAKER 1925, ZILCH 1960).

Further species presently classified in the genus present shells lacking the characteristic rows of microscopic pits seen in the type species and the other species mentioned so far. Such species stem from Central and South America, as follows: *M. andivaga* (Pilsbry, 1932) and *M. florezi* (Weyrauch, 1967) from Peru (PILSBRY 1932, WEYRAUCH 1967b); *M. balboa* Pilsbry, 1930 from Panama (PILSBRY 1930b); *M. bladenensis* Dourson, Caldwell et Dourson, 2018 and *M. striatae* Dourson, Caldwell et Dourson, 2018 from Belize (DOURSON et al. 2018); *M. fruhstorferi* (O. Boettger, 1889) and *M. sublenticularis* (O. Boettger, 1889) from southeast Brazil (ZILCH 1983, SIMONE 2006); *M. implicans* (Guppy, 1868) from Trinidad (GUPPY 1868; reports from Barbados are likely mistaken, see CHASE & ROBINSON 2001); *M. maya* (Pilsbry, 1920) from Belize, Guatemala and Venezuela (PILSBRY 1920, BAKER 1925, THOMPSON 2011, DOURSON et al. 2018); *M. opal* (Pilsbry, 1920) from Mexico, Nicaragua, and Venezuela (PILSBRY 1920, BAKER 1925, 1929, PÉREZ & LÓPEZ 2002, THOMPSON 2011); *M. ridicula* Pilsbry, 1930 from Providencia Island, Colombia (PILSBRY 1930a); and a putative *Miradiscops* sp. from Puerto Rico (VAN DER SCHALIE 1948). Besides lacking the diagnostic sculpture, these species also typically have more rounded whorls and shell profile, with more raised apices and a more abapically positioned aperture. In all likelihood, they do not belong to *Miradiscops* and might belong instead to other scolodontid genera; further molecular phylogenetic work on these species is needed to clarify this issue.

The specimens of *Miradiscops madinina* sp. nov. studied here were collected in leaf litter on top of Mount Vauclin. The area is within protected secondary forest and a biodiversity hotspot in Martinique (BAILLARD & JOSEPH 2015), which suggests that this new species is native to the island. The present report represents the first record of *Miradiscops* stricto sensu from the whole volcanic arc of Lesser Antilles;

the only other record is from Trinidad (SMITH 1898, ROBINSON et al. 2004), an island that is part of continental America and thus, not part of the volcanic arc. It is also the second species of Scolodontidae recorded from Martinique – the other being *Tamayoa decolorata* (Drouët, 1859) (DELANNOYE et al. 2015). Scolodontids are generally carnivorous and feed on snails and earthworms (HAUSDORF 2006, MIQUEL & BUNGARTZ 2017, MIQUEL 2020).

Mount Vauclin is recognised as a natural zone of ecological, faunistic or floristic value extending to 56 ha only (LEPAREUR et al. 2022); it represents one of the major sites for entomological conservation in Martinique (TOUROULT et al. 2021). Notably, it is the home of strictly endemic species such as the Myrtaceae *Eugenia gryposperma* Krug et Urb. ex Urb. and the beetle *Madiana brigitteae* Ratcliffe et Romé, 2019, the latter representing a monotypic genus endemic to Mount Vauclin and surroundings (RATCLIFFE 2019). *Madiana brigitteae* has already been classified as Vulnerable in the Red list of the fauna of Martinique (UICN COMITÉ FRANÇAIS et al. 2020) due to its very restricted range in areas subject to clearing and urbanisation. The presence of *Miradiscops madinina* sp. nov. in the same region emphasises the importance of this isolated mount in the southern part of Martinique; this new endemic snail species thus might also receive the conservation status of Vulnerable.

Further collection efforts should concentrate on observing and obtaining live specimens, which would allow us to understand its natural history as well as enable the description of internal anatomy and acquiring DNA sequence data for barcoding and phylogenetic work. A focus on collecting microgastropods by sieving soil and leaf litter is a key path to the discovery of other undetected species. Land snail biodiversity is much less understood in the Lesser Antilles compared to their marine counterparts. It is highly probable that undersampled microgastropods are more prevalent on these islands than initially thought and could thus, provide interesting cases for biogeographical and evolutionary studies.

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