Notes on some land snails from the Pantepui Region in Venezuela

Notas sobre algunos caracoles terrestres de la Región de Pantepui en Venezuela

Abraham S.H. BREURE[1,2,3,*] & Marijn T. ROOSEN[1,4]

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ABSTRACT

Critical remarks are being made on *Plekocheilus* species from the Pantepui area, reported in a study on the collection of a local museum. Several of these species appear to be misidentified, which may lead to incorrect classifications in the future, and to incorrect biogeographical interpretations. Correct identifications are given for all the disputed *Plekocheilus* species.

RESUMEN

Se hacen observaciones críticas sobre las especies de *Plekocheilus* de la zona de Pantepui, citadas en un estudio sobre la colección de un museo local. Varias de estas especies parecen estar mal identificadas, lo que puede dar lugar a clasificaciones incorrectas en el futuro y a interpretaciones biogeográficas erróneas. Se dan identificaciones correctas para todas las especies de *Plekocheilus* en disputa.

KEY WORDS: biodiversity hotspot, Orthalicoidea, Trochomorphoidea, Venezuelan Guayana.
PALABRAS CLAVE: punto caliente de biodiversidad, Orthalicoidea, Trochomorphoidea, Guayana venezolana.

INTRODUCTION

The malacofauna of the Pantepui region in southern Venezuela, also known as "the Lost World" (Breure, 2009), was hitherto known by a few dispersed papers during the last two centuries (Sowerby III, 1890; Oberwimmer, 1931; Haas, 1955; Breure and Eskens, 1981). During the course of this century, however, substantial attention has been given to this malacofauna with the description of several, additional endemics (Thompson, 2008; Breure, 2009, 2012a, b, 2019, 2020; Breure and Schlögl, 2010; Simone, 2006). The most recent overview (Breure, 2019: 248–249) lists 23 species, of which one tentatively identified and two only identified at the generic level. An expedition from the Comenius University (Bratislava) in

[1] Naturalis Biodiversity `Center, P.O.Box 9517, NL-2300RA Leiden, the Netherlands.
[2] Royal Belgian Institute of Natural Sciences, Vautierstraat 29, B-1000 Brussels, Belgium.
[3] Natural History Museum, London SW7 5BD, U.K.
[4] Natural History Museum Rotterdam, Westzeedijk 345, NL-3015AA Rotterdam, the Netherlands.
* Corresponding author: A.S.H. Breure, E-mail: ashbreure@pm.me

2015 resulted in some interesting material and images that we here present.

This area (Fig. 1) is a geologically ancient part of northern South America, dominated by massive table mountains (tepuis), composed of quartzites and sandstones from the Guayana Shield. The tepuis, of which more than 100 can be found in the area encompassing parts of Venezuela, Brazil and Guyana, tower over surrounding rain forests and savannahs. These massifs provide a wealth of habitats both for plants and animals, thus forming a biodiversity hotspot of endemic species (Aubrecht *et al.*, 2012; Rull *et al.*, 2019; Steyermark *et al.*, 1995–2005).

Based on data from literature (mostly Agudo-Padrón & Vera-Caripe, 2023) and some newly available material, new records of snails from the Pantepui area are provided. Some identifications in Agudo-Padrón & Vera-Caripe (2023) proved to be incorrect, so that corrected identifications are supplied herein to avoid erroneous conclusions in future papers.

METHODS AND MATERIAL

The expedition in 2015 by Jan Schlögl (Comenius University, Bratislava) revealed some interesting material, that was recently donated to Naturalis Biodiversity Center, Leiden. The current status of all taxa has been checked in MolluscaBase (2025).

Abbreviations used:
D, diameter of the shell;
H, shell height (both in mm);
UW, width of the umbilicus (in percentage of the diameter).

Depositories of the material:
AMNH, American Museum of Natural History, New York, U.S.A.;
FMNH, Field Museum of Natural History, Chicago, U.S.A.;
MBUCV, Museo de Biología de la Universidad Central de Venezuela, Caracas, Venezuela;
RMNH, Naturalis Biodiversity Center, Leiden, the Netherlands;
UF, Florida Museum of Natural History, Gainesville, U.S.A.

SYSTEMATICS

Superfamily Trochomorphoidea Möllendorff, 1890
Family Euconulidae H.B. Baker, 1928
Genus *Guppya* Mörch, 1867

Guppya sp. (Fig. 2)

Remarks: Two photos, albeit not of high quality (focus improved via software in Fig. 2), give an impression of a species that is likely to be new to science. The specimen was not collected, but occurs on Kukenán-tepui in the Roraima-massif. This may prove to be the same species as mentioned as *Euconulus* (?) species in Breure (2019) from Akopán-tepui.

Superfamily Orthalicoidea E. von Martens, 1860
Family Amphibulimidae P. Fischer, 1873
Genus *Plekocheilus* Guilding, 1827

Plekocheilus (*Plekocheilus*) *alticola* (F. Haas, 1955) (Fig. 3)

Plecocheilus (*Plecochileus*) *fulminans alticola* Haas 1955: 381, fig. 81. Type locality: "Torono-tepui, Chimantá-massif, on the slopes bordering Cáno Mojado, Bolivar, Venezuela". Holotype FMNH 52442.

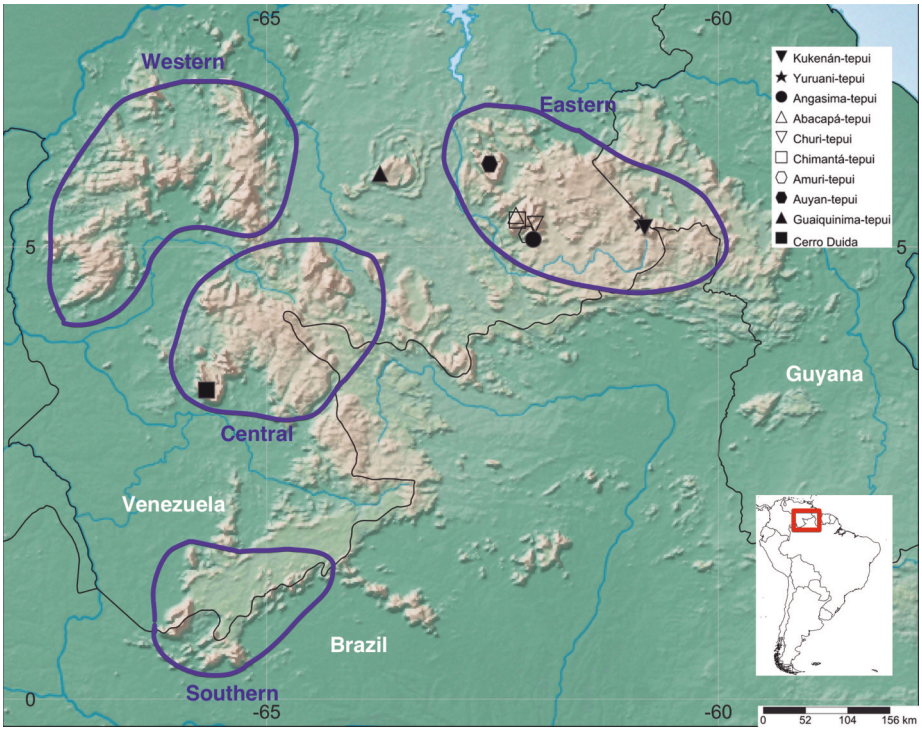

Figure 1. Study area with the main localities mentioned in the text. Insert shows location of Pantepui in South America.

Figura 1. Área de estudio con las principales localidades mencionadas en el texto. El recuadro muestra la ubicación de Pantepui en América del Sur

Remarks: AGUDO-PADRÓN & VERA-CARIPE (2023: 2242, fig. 6) mentioned two lots of this species, one from Auyán-tepui in Bolivar state (MBUCV 1035) and one from Duida-tepui (MBUCV 6022). The latter is part of the Duida-Marahuaka massif, a large mountain complex in the centre of Amazonas State, circa 430 km SW of Auyán-tepui. This last mentioned tepui lies circa 80 km NNW of Toronó-tepui, the type locality of this species. However, both specimens illustrated in AGUDO-PADRÓN & VERA-CARIPE (2023) are misidentifications.

The specimen MBUCV 1035 (their fig. 6A) lacks the characteristic malleation of *Plekocheilus* s.str., and therefore cannot be the species described by Haas. As their text and figure lacks information about the shell size, we tentatively consider it a subadult specimen of *Plekocheilus* (*Eurytus*) *juliani* (F. Haas, 1955); see below.

Figure 6B in AGUDO-PADRÓN & VERA-CARIPE (2023) illustrated a subadult shell of *Plekocheilus* (*Eurytus*) *fusitortus* (Oberwimmer, 1931); see below.

Plekocheilus (Plekocheilus) philippei Breure, 2012 (Fig. 4)

Plekocheilus (*Plekocheilus*) *philippei* Breure, 2012a: 102, figs 2–4. Type locality: Venezuela, Edo. Bolivar, Angasima-tepui, 2121 m. Holotype RBINS/MT 2576.

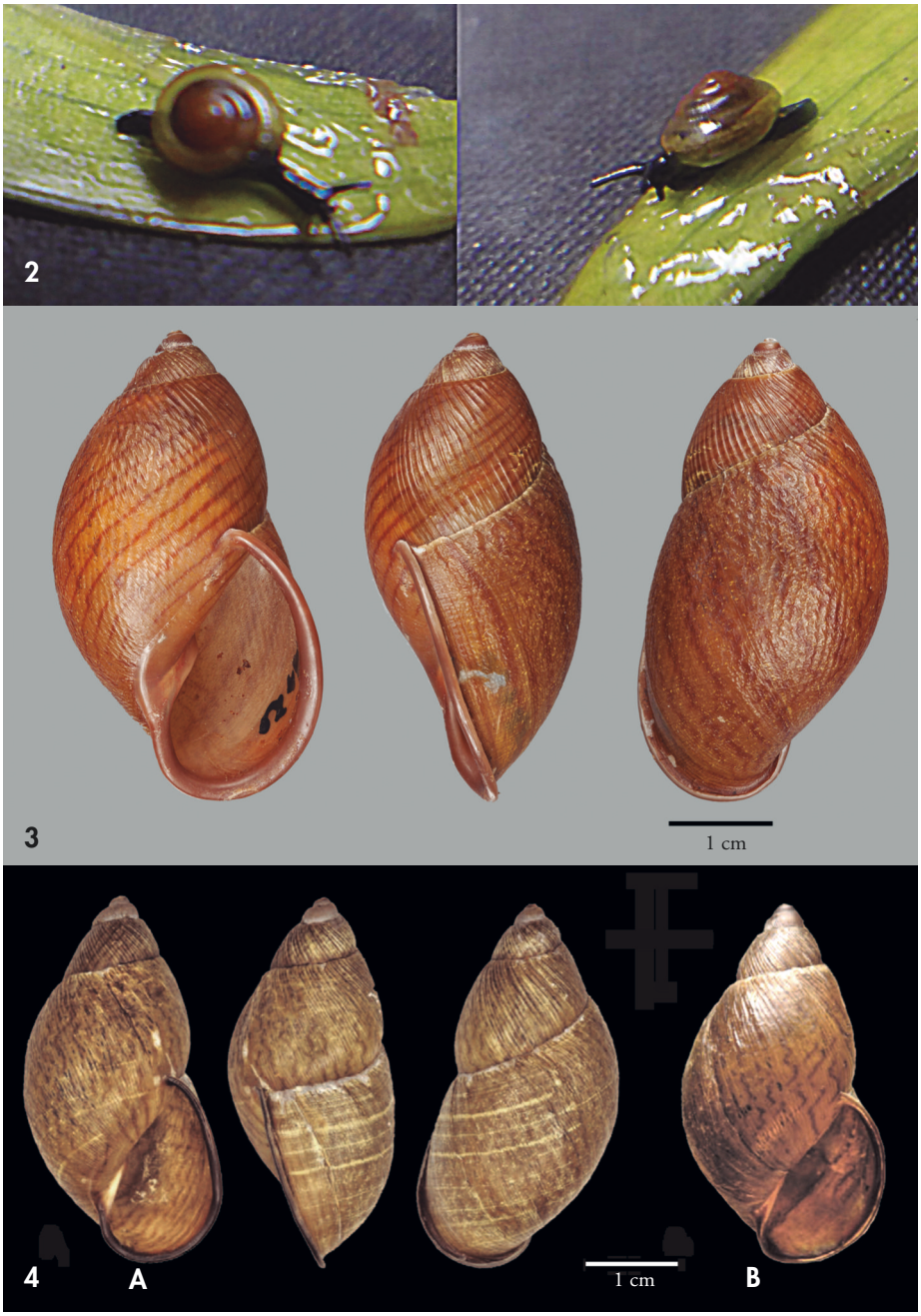

Figure 2. *Guppya* sp. from Kukemán-tepui, no scale. Figure 3. *Plekocheilus* (*P.*) *alticola* (F. Haas, 1955), holotype FMNH 52442. Figure 4. *Plekocheilus* (*P.*) *philippei* Breure, 2012. A: holotype RBINS/MT2576; B: paratype RMNH 172353.

Figura 2. Guppya *sp. de Kukemán-tepui, sin escala. Figura 3.* Plekocheilus (P.) alticola *(F. Haas, 1955), holotipo FMNH 52442. Figura 4.* Plekocheilus (P.) philippei *Breure, 2012. A: holotipo RBINS/MT2576; B: paratipo RMNH 172353.*

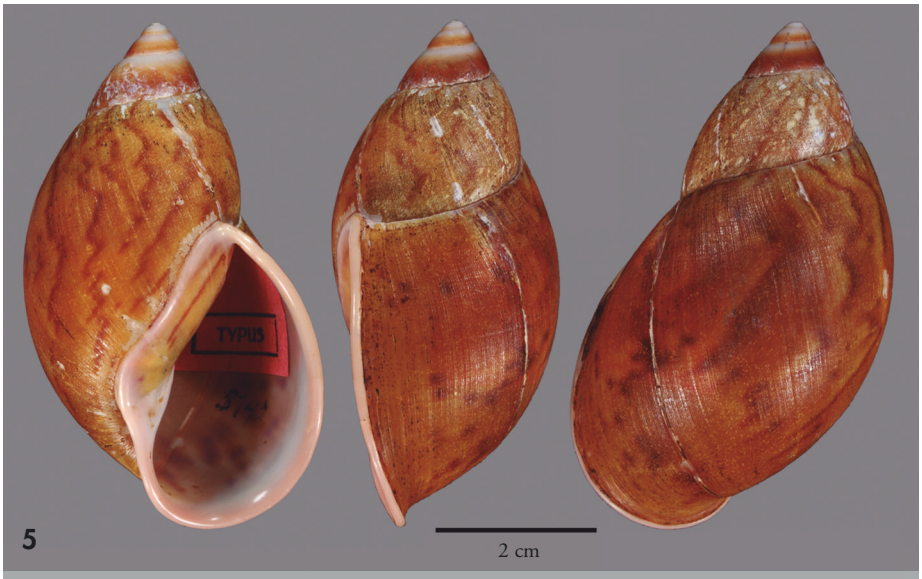

Figure 5. *Plekocheilus* (*Eurytus*) *fusitorsus* (Oberwimmer, 1931), holotype SMF 5142. Figure 6. *Plekocheilus* (*Eurytus*) *juliani* (F. Haas, 1955), holotype FMNH 49737.
Figura 5. Plekocheilus (Eurytus) fusitorsus *(Oberwimmer, 1931), holotipo SMF 5142. Figura 6.* Plekocheilus (Eurytus) juliani *(F. Haas, 1955), holotipo FMNH 49737.*

Remarks: AGUDO-PADRÓN & VERA-CARIPE (2023: 2246, fig. 15) mentioned this species from Bolivar, Auyán-tepui. However, their figure clearly shows a shell different from this species; the shell—for which no scale or further data are given—

might be wrongly labelled as coming from this tepui or might have been found in lowlands. It is characterised by the very thick shell (hence it cannot come from a tepui, which all have calcium-poor soils), and might be new to science.

Subgenus *Eurytus* Albers, 1850

Plekocheilus (*Eurytus*) *fusitortus* (Oberwimmer, 1931) (Fig. 5)

Eurytus fusitortus Oberwimmer 1931: 190, figs 1, 4. Type locality: "Rio Padamo". Holotype SMF 5142.
Plekocheilus alticolus (Haas, 1955) [sic]; Agudo-Padrón & Vera-Caripe, 2023: 2242, fig. 6B.

Remarks: The type locality lies in lowland near Duida-tepui; however, the data of the holotype do not reveal at which altitude the single shell was found. In literature there is one additional locality known: Bolivar, Guaiquinima-tepui, along Rio Paragua, 1500 m, J.A. Steyermark leg. 1978 (FMNH 198500) (Breure, 2012b: 120). The altitude given indicates it was found at the west side of this tepui, near the highest point (1650 m; Huber, 1995). This locality lies circa 350 km northeast of the type locality.

A second additional locality is Amazonas, Duida-tepui (Agudo-Padrón & Vera-Caripe, 2023: 2242, fig. 6B). The specimen (MBUCV 6022) is subadult and no additional data are given by the authors.

The shells from Bolivar, Auyán-tepui (MBUCV 1036) (Agudo-Padrón & Vera-Caripe, 2023: 2245, fig. 12) are misidentified and belong to *Plekocheilus (Eurytus) juliani* (F. Haas, 1955); see below.

Plekocheilus (*Eurytus*) *juliani* (F. Haas, 1955) (Fig. 6)

Plecocheilus (*Eurytus*) *juliani* Haas 1955: 375, fig. 78. Type locality: "Summit of Apacará-tepui, NW part of Chimantá-massif, Bolivar, Venezuela". Holotype FMNH 49737.
Plekocheilus alticolus (Haas, 1955) [sic]; Agudo-Padrón & Vera-Caripe, 2023: 2242, fig. 6A.
Plekocheilus fusitorsus (Oberwimmer, 1931) [sic]; Agudo-Padrón & Vera-Caripe, 2023: 2245, fig. 12.
Plekocheilus juliani Haas, 1955; Agudo-Padrón & Vera-Caripe, 2023: 2245, fig. 14 [partim].

Remarks: This species, which is widespread on the Chimantá-massif, is mentioned in error twice in Agudo-Padrón & Vera-Caripe (2023). First as *Plekocheilus alticolus* [sic] (MBUCV 1035), and secondly as *Plekocheilus fusitorsus* (MBUCV 1036).

Agudo-Padrón & Vera-Caripe (2023: 2245–2246, fig. 14) mentioned this species from Auyán-tepui in the Chimantá-massif (MBUCV 6930). In their figure 14, at least the juvenile specimens are tentatively referred to this species. However, the adult specimen gives the impression of being malleated, in which case it would belong to *Plekocheilus* (*P.*) *alticola* (F. Haas, 1955). No scale or additional data are given.

Plekocheilus (*Eurytus*) *sophiae* Breure, 2009 (Fig. 7)

Plekocheilus (*Eurytus*) *sophiae* Breure 2009: 29, figs 5A–C, 9C. Type locality: "Venezuela, Estado Bolivar, Yuruani-tepui, 2300 m, R.W. Diamid leg., 11.i.1977". Holotype UF 24413.

Remarks: This characteristic species has until now only been found at Yuruani-tepui in the Eastern Pantepui District. Agudo-Padrón & Vera-Caripe (2023: 2246, fig. 16) erroneously mentioned this species from "Amazonas State (Tepui)". See below.

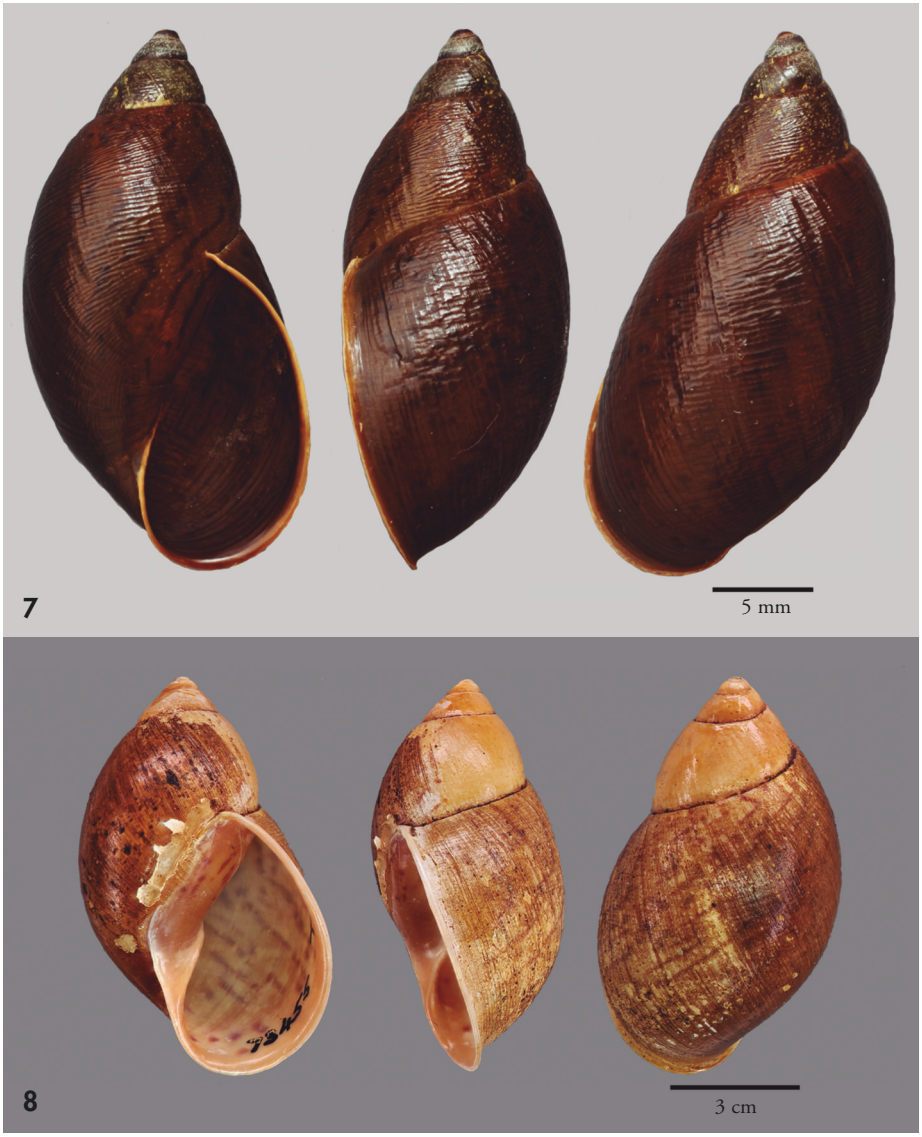

Figure 7. *Plekocheilus* (*Eurytus*) *sophiae* Breure, 2009, RBINS INV.135001. Figure 8. *Plekocheilus* (*Eurytus*) *tatei* (F. Haas, 1955), holotype AMNH 73455.
Figura 7. Plekocheilus (Eurytus) sophiae *Breure, 2009, RBINS INV.135001. Figura 8.* Plekocheilus (Eurytus) tatei *(F. Haas, 1955), holotipo AMNH 73455.*

Plekocheilus (*Eurytus*) *tatei* (F. Haas, 1955) (Fig. 8)

Plecocheilus (*Eurytus*) *tatei* Haas 1955: 385, fig. 84. Type locality: " 'Ledge 23B', Mount Duida, Territory of the Amazon, Venezuela". Holotype AMNH 73455.
Plekocheilus sophiae Breure, 2009 [sic]; AGUDO-PADRÓN & VERA-CARIPE, 2023: 2246, fig. 16.

Table I. Identifications and data in AGUDO-PADRÓN & VERA-CARIPE (2023) and their re-identification in this paper.
Tabla I. Identificaciones y datos en AGUDO-PADRÓN Y VERA-CARIPE (2023) y su reidentificación en este trabajo.

AGUDO-PADRÓN & VERA-CARIPE (2023)				This paper
Figure	Identification	Repository	Locality	Re-identification
6A	*Plekocheilus alticolus*	MBUCV 1035	Auyantepui	*Plekocheilus juliani*
6B	*Plekocheilus alticolus*	MBUCV 6022	Tepuy Duida	*Plekocheilus fusitorsus*
12	*Plekocheilus fusitorsus*	MBUCV 1036	Auyantepui	*Plekocheilus juliani*
14	*Plekocheilus juliani*	MBUCV 6930	Auyantepui	*Plekocheilus juliani*
15	*Plekocheilus philippei*	MBUCV 1038	Auyantepui	*Plekocheilus* sp.
16	*Plekocheilus sophiae*	MBUCV 6026	Tepui	*Plekocheilus tatei*

Remarks: This species is hitherto only known from Duida-tepui in the Western Pantepui District. The specimen figured by AGUDO-PADRÓN & VERA-CARIPE (2023: 2246, fig. 16; MBUCV 6926) is likely this species, although the name of the tepui was not mentioned by these authors. This species is similar to *Plekocheilus* (*Eurytus*) *fusitortus* (Oberwimmer, 1931), and future research may show that these taxa are synonyms.

Family BULIMULIDAE Tryon, 1867

Genus *Mesembrinus* Albers, 1850

Remarks: SALVADOR *ET AL.* (2023) have shown that *Drymaeus* and *Mesembrinus*, the latter hitherto considered as subgenus of *Drymaeus*, are both monophyletic. They raised *Mesembrinus* to generic rank.

Mesembrinus extraneus (F. Haas, 1955) (Figs. 9–11)

Bulimulus (*Lissoacme*) *extraneus* Haas 1955: 382, fig. 82. "Summit of Apacará-tepui, NW part of Chimantá-massif, State of Bolívar, Venezuela". Holotype FMNH 49736.

Remarks: This species is hitherto known from the Chimantá-massif and Roraima-tepui (BREURE, 2020). A new locality is Kukenán-tepui in the Roraima-massif (Fig. 15). Two subadult shells were imaged but not collected. They may constitute a different colour morph of this species. Another colour morph (Fig. 16) was found on Akopán-tepui, part of the Chimantá-massif. These shells are also subadult and are tentatively considered to be this species. The different colour morphs are comparable to those seen in other species with different morphs in the same area, viz. *Mesembrinus rex* (Breure, 2009) and *Mesembrinus yapacanensis* (Breure & Eskens, 1981); see BREURE, 2009: fig. 8.

DISCUSSION

Accurate identification is key to biodiversity research. And although to err is human, misidentifications can hinder the research of biodiversity,

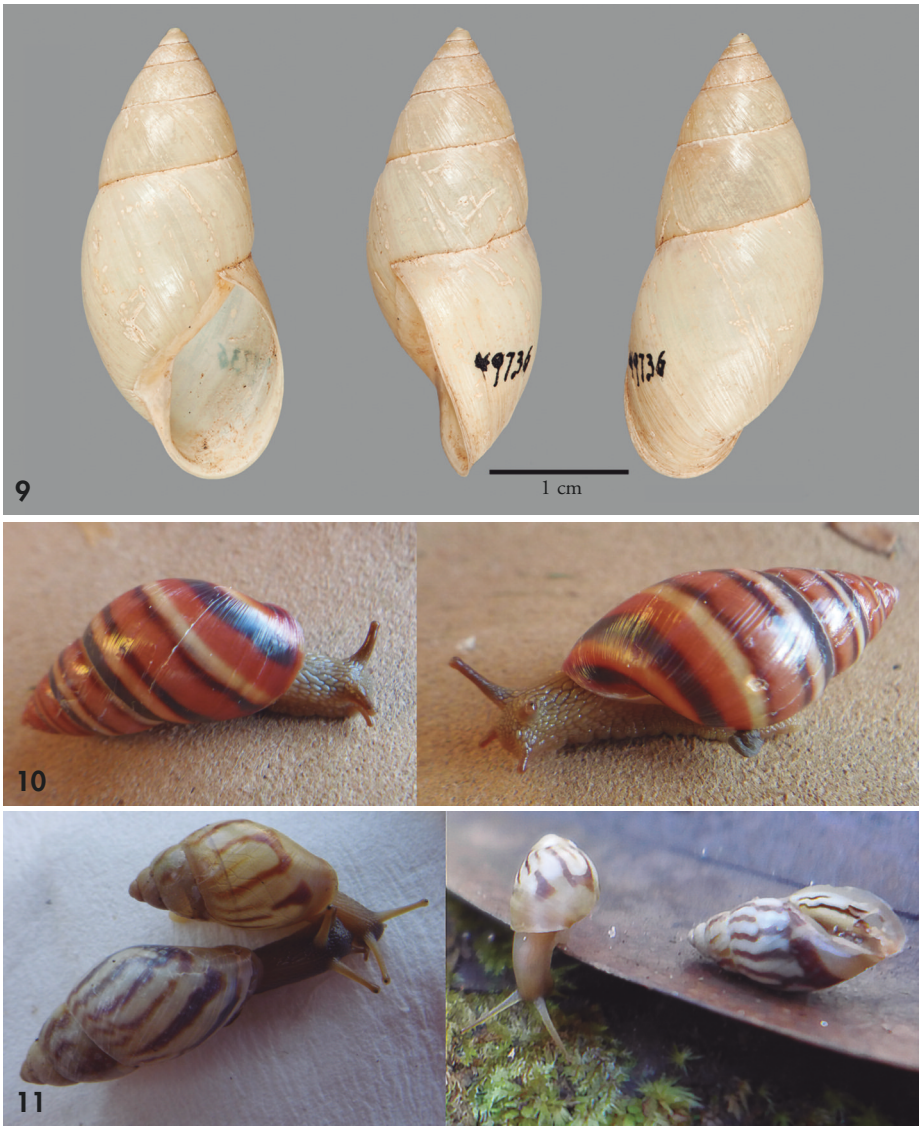

Figure 9. *Mesembrinus extraneus* (F. Haas, 1955), holotype FMNH 49736. Figure 10. *Mesembrinus extraneus* (F. Haas, 1955), Kukenán-tepui, no scale. Figure 11. *Mesembrinus extraneus* (F. Haas, 1955), Akopán-tepui, no scale.
Figura 9. Mesembrinus extraneus *(F. Haas, 1955), holotipo FMNH 49736. Figura 10.* Mesembrinus extraneus *(F. Haas, 1955), Kukenán-tepui, sin escala. Figura 11.* Mesembrinus extraneus *(F. Haas, 1955), Akopán-tepui, sin escala.*

especially in hotspots like the Venezuelan Guayana. Moreover, incorrect identifications may turn up in online databases and can lead to meta-studies based on these, where not always the sources may be re-studied, resulting in misleading conclusions. Table I summarises the misidentifications we found in

Table II. Distribution of snail species among Pantepui phytogeographical districts and altitudinal strata. Districts and altitudinal ranges taken from HUBER (1995). Abbreviations: (*P.*), *Plekocheilus*; (*E.*) *Eurytus.* Abbreviations localities: CH, Chimantá-massif; DU, Duida-Marahuaka-massif; GU, Cerro Guaiquinima; MA, Sierra de Maigualida; NE, Sierra de Neblina; RO, Roraima-massif; YA, Cerro Yapacaná. Modified after BREURE (2019).

Tabla II. Distribución de las especies de caracoles entre los distritos fitogeográficos y estratos altitudinales de Pantepui. Distritos y rangos altitudinales tomados de Huber (1995). Abreviaturas: (P.), Plekocheilus; (E.) Eurytus. Abreviaturas localidades: CH, macizo de Chimantá; DU, macizo de Duida-Marahuaka; GU, cerro Guaiquinima; MA, sierra de Maigualida; NE, sierra de Neblina; RO, macizo de Roraima; YA, cerro Yapacaná. Modificado según BREURE (2019).

	Eastern District		Central District		Western District		Southern District	
Highlands (1500–3000 m)	*Plekocheilus (P.) linterae*	RO	*Plekocheilus (E.) gibber*	DU	*Plekocheilus* cf. *plectostylus*	MA	*Plekocheilus (E.) huberi*	NE
	Plekocheilus (P.) alticola	CH	*Plekocheilus (E.) fusitorsus*	DU, GU			*Plekocheilus (E.) nebulosus*	NE
	Plekocheilus (P.) vlecki	CH	*Plekocheilus (E.) tatei*	DU			*Mesembrinus rex*	NE
	Plekocheilus (P.) philippei	CH						
	Plekocheilus (E.) sophiae	RO						
	Plekocheilus (E.) juliani	CH						
	Plekocheilus (E.) mundiperditi	CH						
	Plekocheilus (E.) breweri	CH						
	Mesembrinus steyermarki	CH						
	Mesembrinus extraneus	RO, CH						
	Systrophidae sp.1	CH						
	Systrophidae sp.2	CH						
	Guppya sp.	CH						
Uplands (500–1500 m)	*Mesembrinus extraneus*	RO, CH	*Plekocheilus (E.) tepuiensis*	YA			*Mesembrinus rex*	NE
			Mesembrinus yapacanensis	YA			*Columbinia exul*	NE
Lowlands (0–500 m)			*Eudolichotis sinuatus*				*Mesembrinus rex*	NE
							Olympus nimbus	NE

Pantepui *Plekocheilus* species in a recent paper.

The political and economic situation in Venezuela during recent years, has made the ongoing scientific research in the Pantepui Region so far impossible. Therefore, we were keen to present an update based on photos and material that became recently available, collected during an expedition in

2015. The distribution of the malacofauna is given in Table II. Especially the Central and Western Districts in the Pantepui Region need more research as their tepuis have not been well researched so far. Also, additional research in the Brazilian and Guyanan parts of the Pantepui region may yield additional data or species new to science.

Whenever a new expedition to the Pantepui region can be organised, researchers should also pay special attention to small gastropod species. Right now, only 24 species are known, of which 19 are Orthalicoids and all but one are above 10 mm in size. Given the diversity of small taxa in other, better studied Neotropical areas (e.g. WENDEBOURG AND HAUSDORF 2019), it is unlikely that no small species have adapted to the Pantepui habitat.

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