


# *Anauchen* (?) *kozari* n. sp., a new Hypselostomatid species from Laos (Gastropoda: Stylommatophora: Pupilloidea)

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## RESEARCH ARTICLE

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## ABSTRACT

*Anauchen* (?) *kozari* n. sp. is described from Luang Prabang province, central Laos. This new species is temporarily placed in the genus *Anauchen* due to the similarity of its apertural barriers to those of *A. messengeri* (Bavay & Dautzenberg, 1904). *Boysidia gereti* Bavay & Dautzenberg, 1904 is a junior synonym of *Anauchen rochebruni* (Mabille, 1887) (originally described as *Hypselostoma*).

## KEYWORDS

taxonomy, systematics, apertural barriers, endemic species

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## INTRODUCTION

Our knowledge on the land snail fauna of Laos was summarised in a recent checklist (Inkhavilay et al., 2019), which reported 231 species from that country. Most species from Laos were described at the end of the 19th and beginning of the 20th century. Nearly a century has passed

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with only one paper about Lao land snails (Saurin, 1953). Fortunately, increasing interest in Southeast Asian land snail taxonomy in the last ca. 2 decades resulted in numerous publications (Maassen, 2008; Inkhavilay et al., 2016a, 2016b; Páll-Gergely et al., 2015, 2016, 2017, 2019, 2020a, 2020b; 2022, in press), suggesting that this country is inhabited by a much higher number of endemic species than previously thought. Many species described in the last years belong to the family Hypselostomatidae, which are tiny (0.6–5 mm) snails, typically inhabiting limestone areas. With very few exceptions (Tongkerd et al., 2004), the systematics of Hypselostomatidae is based on conchological characters, typically on the arrangement of apertural barriers.

In the following, a new hypselostomatid species is described from Luang Prabang province, Central Laos. This species is provisionally placed in the genus *Anauchen*, although it may require a genus of its own.

## MATERIAL AND METHODS

Shells were manually brushed clean of mud using wet, finely tapered brushes. Shells of the new species were viewed without coating under a low vacuum SEM (Hitachi TM-4000 Plus SEM at the Research and Instrument Core Facility of the Faculty of Science, Eötvös Loránd University, Budapest, Hungary). Shell whorl number was counted to the nearest quarter whorl according to Kerney and Cameron (1979). All shells were measured using a Keyence Digital microscope.

Nomenclature of apertural barriers mostly follows Páll-Gergely and White (2023), which is based on Pilsbry (1918 and 1948). Names or authors closely follow MolluscaBase (MolluscaBase eds, 2022).

## TAXONOMIC DESCRIPTION

### Family Hypselostomatidae Zilch, 1959

**Remarks:** The generic placement of *Anauchen kozari* n. sp. was problematic, because it is not similar to any other hypselostomatid species. The following genera were evaluated as possible hosts for *A. kozari* n. sp.: *Acinolaemus* F. G. Thompson & Upatham (1997) (type species: *Acinolaemus ptychochilus* F. G. Thompson & Upatham, 1997), *Anauchen* Pilsbry, 1917 (type species: *Boysidia gereti* Bavay & Dautzenberg, 1904), *Bensonella* Pilsbry & Vanatta, 1900 (type species: *Pupa plicidens* Benson, 1849) (*Paraboysidia* Pilsbry, 1917 is a junior synonym, see Gittenberger et al., 2021 and Páll-Gergely and White, 2023), *Boysidia* Ancey, 1881 (type species: *Pupa dorsata* Ancey, 1881), *Clostophis* Benson, 1860 (type species: *Clostophis sankeyi* Benson, 1860), *Gyliotrachela* Tomlin, 1930 (type species *Hypselostoma hungerfordianum* Möllendorff, 1891), and *Hypselostoma* Benson, 1856 (type species: *Tanystoma tubiferum* Benson, 1856).

Among them, *Acinolaemus*, *Bensonella* and *Gyliotrachela* possess two apertural barriers on the parietal wall (Pilsbry, 1916–1918; Thomson and Upatham, 1997; Panha and Burch, 2005), whereas it is a single, long, wavy lamella in the new species. In many cases it is not clear whether the long lamella on the parietal wall represents the parietal lamella or the concrescent angular and parietal lamella. *Hypselostoma*, although it has a single parietal lamella resulted in the fusion of the parietal and angular lamellae, has a free last whorl. Moreover, most *Hypselostoma* species (including the type species, see Gojšina et al., 2022) are brown in colour and are much larger



than the new species. *Boysidia* species (at least the ones being similar to the type species) are also brown, have weaker sculpture, and larger than the new species. *Clostophis* species are also small and colourless, but the typical ones have much weaker apertural dentition than the new species. Some species classified in *Clostophis* show some similarity with the new species (see below), but those are only temporarily placed in *Clostophis* (Páll-Gergely et al., 2020b).

The apertural dentition of the new species is very similar to that of *Anauchen messengeri* (Bavay & Dautzenberg, 1904) (Fig. 1C, E), especially the formation of the parietal lamella, and the relative positions of all other barriers. The type species of *Anauchen*, *A. gereti* (Fig. 1A, B) is nearly identical in shape and sculpture to *A. messengeri*, and can be interpreted as its relative with less numerous apertural barriers. Due to this similarity, the new species is temporarily placed in

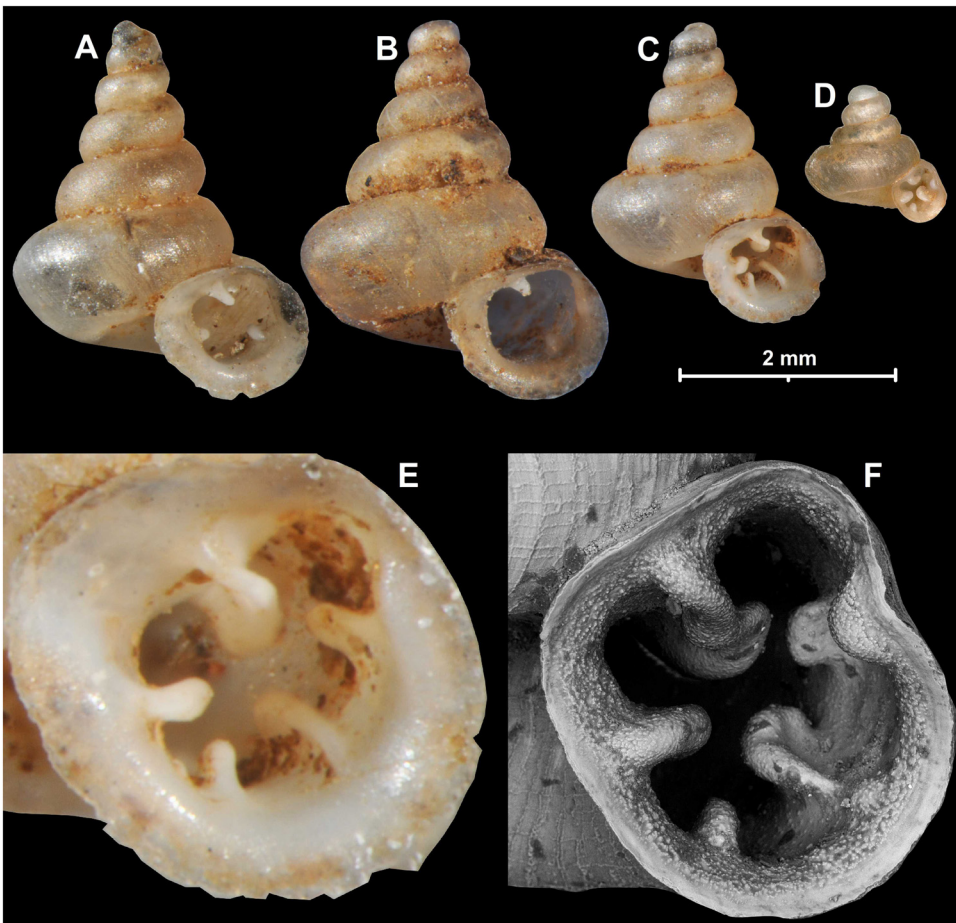


Fig. 1. *Anauchen* species. A–B: *Anauchen rochebruni* (Mabille, 1887). A: syntype of *B. gereti* (MNHN-IM-2000-35161); B: syntype of *H. rochebruni* (MNHN-IM-2000-35156); C & E: syntype of *Anauchen messengeri* (Bavay & Dautzenberg, 1904) (MNHN-IM-2000-35159); D & F: Holotype of *Anauchen* (?) *kozari* n. sp. (MNHN-IM-2012-27269). Figs E and F are not to scale. All images: B. Páll-Gergely



the genus *Anauchen*. Since *Anauchen* is defined on the basis of the absence of the angular tooth, the long lamella of this new species is named parietal lamella herein.

Another option would be to erect a new genus for this species. However, in the current hectic systematics of the Hypselostomatidae this decision would be immature.

## Genus *Anauchen* Pilsbry, 1917

**Type species:** *Boysidia gereti* Bavay & Dautzenberg (1904) (synonym of *Hypselostoma rochebruni* Mabilbe, 1887), see Fig. 1A, B.

*Anauchen* (?) *kozari* n. sp.

Figures 1D, F, 2, 3.

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**Type material:**

**Holotype:** (1 adult shell, SH: 1.25 mm, SW: 1.3 mm, AH: 0.53 mm, AW: 0.51 mm), Central Laos, Luang Prabang province, Phou Xuang mountain, ca. 1.5 km NE of Ban Lak Sip, ca. 5 km SE of Luang Prabang, under rocks and logs in old secondary forest under cliff, 19°51.605'N, 102°11.081'E, alt. 640 m (locality code: 39L06), leg. A. Abdou & I.V. Muratov, 24.11.2006, MNHN-IM-2012-27269 (Fig. 1D, F, 2, 3B–D).

**Paratype:** 1 adult shell, same data as for holotype, MNHN-IM-2012-27225 (Fig. 3A).

**Diagnosis:** A hypselostomatid species with triangular shell, wide umbilicus (ca. third of shell width), strong radial ribs and dense spiral striation; aperture with a long, sinuous parietal lamella, an upper and lower palatal plicae, a basal plica, a columellar lamella and a strong palatal tubercle, and a scaly surface on all apertural barriers.

**Description:** Shell triangular, approximately as high as wide, whorls 4, concave, rapidly increasing; protoconch consisting of 1.25 whorls, finely pitted, and spirally striated with ca. 10 equidistantly running low, inconspicuous striae; teleoconch with strong, irregular radial ribs and denser spiral striae of comparable strength; spiral striae “beaded” (consisting of elevated tubercles) in higher magnification, largest tubercles occur on and near radial ribs; ventral side of the terminal part of body whorl (ca. less than quarter whorl) is with extremely dense, fine radial ribs (visible only using SEM); umbilicus wide, shows all whorls, covers one third of shell width from umbilical view; aperture rhomboid, sinulus wide, separated from the rest of the aperture by the parietal lamella and the upper palatal tooth; parietal wall straight, parietal callus only slightly diverged from penultimate whorl, rather sharp; peristome thickened, slightly expanded, not reflected; parietal lamella long, sinuous, inner part more elevated, bent towards upper palatal plica, outer part lower, sinuous, perpendicular to parietal wall; palatal tubercle strong, corresponding with a slight depression of the palatal wall; lower palatal plica high, elevated, situated in some distance from peristome; basal plica elevated but lower than other plicae; columellar lamella strong, elevated, straight, inner surface of aperture and apertural barriers finely scaly, probably homologous with scales of *Gyliotrachela* species. Among the apertural barriers, the parietal lamella is the most dominant (highest and longest), followed by the lower palatal plica and the columellar lamella.

**Measurements:** SH = 1.26–1.3 mm, SW = 1.26–1.3 mm, AH = 0.51–0.53 mm, AW = 0.5–0.51 mm ( $n = 2$ ).

**Differential diagnosis:** There are no very similar hypselostomatid species to this new species. *Anauchen kozari* n. sp. can be distinguished from other hypselostomatids in the region based on the strongly, upwards curved parietal lamella and the unique sculpture. This new



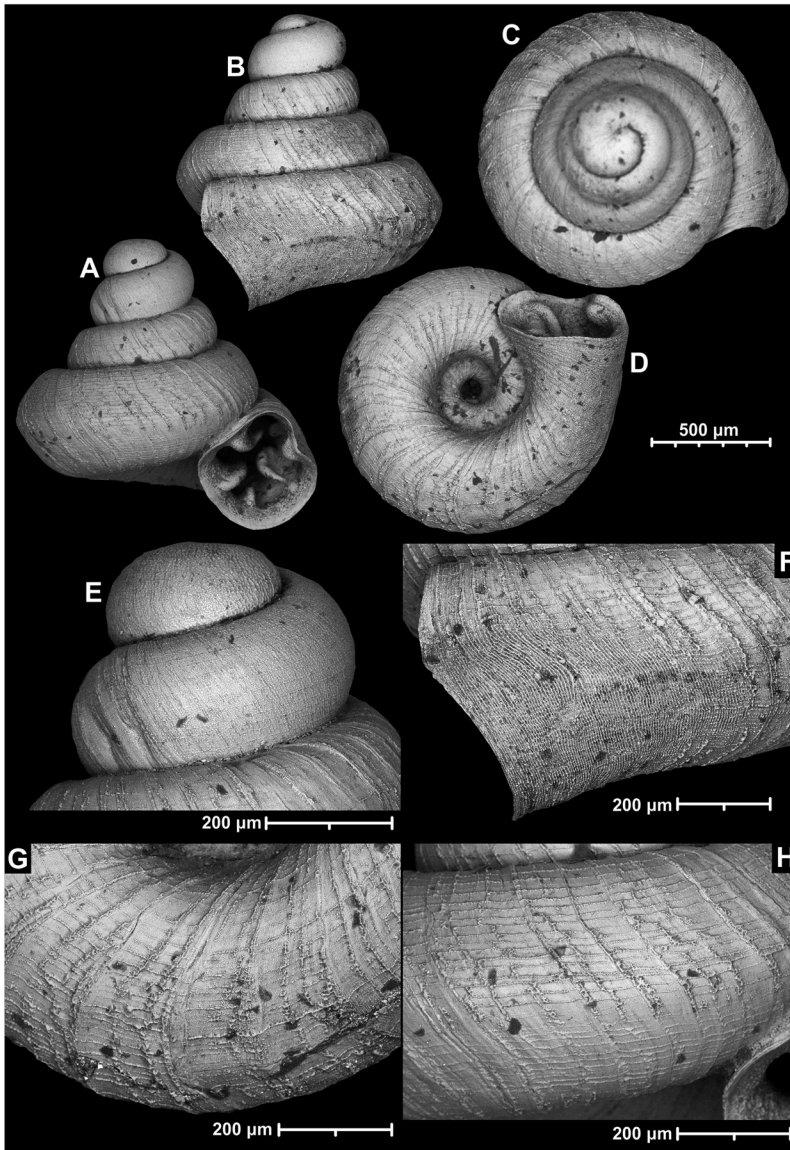


Fig. 2. *Anauchen* (?) *kozari* n. sp., holotype (MNHN-IM-2012-27269). All images: B. Páll-Gergely

species differs from the sympatric *Bensonella paviei* (Bavay & Dautzenberg, 1912) by the larger shell, finer sculpture with denser spiral striation, and the presence of two teeth on the parietal wall.

*Anauchen messageri* is somewhat similar in the arrangement of the apertural barriers, but it is much larger than the new species, has a higher spire, narrower umbilicus, and has no scales on its apertural barriers.



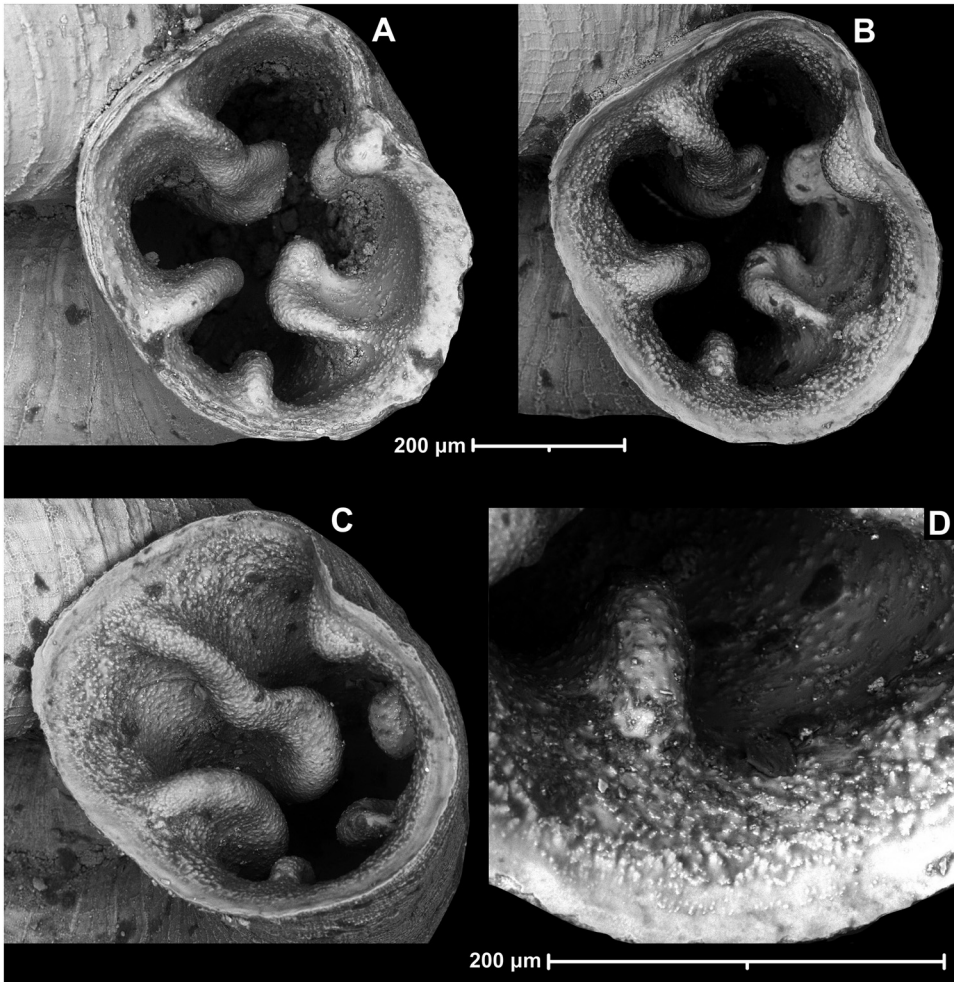


Fig. 3. *Anauchen (?) kozari* n. sp. A: paratype (MNHN-IM-2012-27225); B–D: holotype (MNHN-IM-2012-27269). All images: B. Páll-Gergely

*Clostophis* species are similar to the new species in shell size and white shell, but usually have much weaker apertural dentition than the new species. However, there are three species classified temporarily in that genus with more numerous and long apertural barriers (*C. lacrima* (Páll-Gergely & Hunyadi, 2015), *Clostophis obliquus* Páll-Gergely & Hunyadi, 2022 and *C. socialis* (Páll-Gergely & Hunyadi, 2015)). Among other traits, *Anauchen kozari* n. sp. differs from all three *Clostophis* species by the presence of a strong palatal tubercle, stronger sculpture and scaly surface of apertural barriers.

**Etymology:** This species is dedicated to Ferenc Kozár (1943–2013), Hungarian entomologist, to commemorate the 10th anniversary of his death.



**Anauchen rochebruni** (Mabille, 1887).

Figure 1A, B.

*Hypselostoma rochebruni* Mabille (1887): 8.*Boysidia gereti* Bavay & Dautzenberg (1904): 212, pl. 9, figs 5–8. **new synonym.***Anauchen gereti* – Pilsbry (1917) (1916–1918): 189, pl. 33, figs 1–3.*Anauchen rochebruni* – Pilsbry (1917) (1916–1918): 190.*Anauchen gereti* – Schileyko (2011): 4.*Hypselostoma rochebruni* – Schileyko (2011): 3.**Material examined:** Haut-Tonkin, MNHN-IM-2000-35161, 1 syntype of *B. gereti*; Tonkin, MNHN-IM-2000-35156, 1 syntype of *H. rochebruni*.**Remarks:** *Boysidia gereti* Bavay & Dautzenberg (1904) is a junior synonym of *Hypselostoma rochebruni* Mabille (1887). They agree in general shell shape, sculpture and dentition. The columellar tooth is absent in the syntype of *B. gereti*, but this can well be due to immature state of the shell, since the other two teeth are also weaker of that specimen than those of *H. rochebruni*. Even if the columellar tooth is absent in some specimens or populations and present in others, it should not be used as a distinguishing mark on species level.**Anauchen messageri** (Bavay & Dautzenberg, 1904).

Figure 1C, E.

*Boysidia messageri* Bavay and Dautzenberg (1904): 211, plate 9, figs 1–4.**Material examined:** Haut-Tonkin, MNHN-IM-2000-35159, 1 syntype.**ACKNOWLEDGEMENTS**

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**ABBREVIATIONS**

AH	aperture height
AW	aperture width (diameter)
MNHN	Muséum National d'Histoire Naturelle (Paris, France)
SH	shell height
SW	shell width (diameter)

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