

# Notes on Hypselostomatidae (Gastropoda: Eupulmonata: Pupilloidea) from Myanmar

VUKAŠIN GOJŠINA<sup>1</sup>, ZHE-YU CHEN<sup>2,3</sup> & BARNA PÁLL-GERGELY<sup>4</sup>

**1** Department of Morphology, Systematics and Phylogeny of Animals, University of Belgrade, Faculty of Biology, Studentski Trg 16, 11000, Belgrade, Serbia (vukasin.gojsina@bio.bg.ac.rs; mr.gojsinavukasin@gmail.com). **2** Department of Life Sciences, Imperial College London, London SW7 2AZ, UK. **3** Department of Life Sciences, Natural History Museum, London SW7 5BD, UK. **4** Plant Protection Institute, Centre for Agricultural Research, ELKH, Herman Ottó út 15, 1022 Budapest, Hungary. • Corresponding author: V. Gojšina.

**Abstract.** In this paper we report specimens from Ava (Inn Wa), Myanmar, that are almost identical to the holotype of *Boysidia* (*Bensonella*) *tianxingqiaoensis* T.-C. Luo, D.-N. Chen & G.-Q. Zhang, 2000, a species originally described from Guizhou, China, c. 1020 km to the northeast. This species and *Hypselostoma bensonianum* W.T. Blanford, 1863 are moved to the genus *Gyliotrachela*. Additionally, *Gyliotrachela muangon* Panha & J.B. Burch in Panha et al., 2004 is reported for the first time from the territory of Myanmar. These 3 species are the only representatives of *Gyliotrachela* known from this country. We illustrate each of them as well as *Hypselostoma tubiferum* (Benson, 1856), the type species of that genus.

**Keywords.** New combination, new record, microsnails, Indochina, *Gyliotrachela bensonianum*, *Gyliotrachela muangon*, *Hypselostoma tubiferum*, *Boysidia tianxingqiaoensis*, *Bensonella*

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## Introduction

The family Hypselostomatidae is represented by minute pulmonate terrestrial gastropods widely distributed in Southeast Asia, Australia, and the Philippines, where they inhabit limestone-rich areas. It includes some of the world's smallest land snails (PÁLL-GERGELY et al. 2015, 2022). The family consists of 16 genera. Some of these genera contain only a single species while some others are species rich, including *Gyliotrachela* and *Hypselostoma*, each containing 35 species (MOLLUSCABASE 2022).

Several criteria are used to classify the representatives of this group (PILSBRY 1916–1918: 172 ff.), but these characters greatly overlap between the genera, thus sometimes making the genus-level identification challenging.

The genus *Gyliotrachela* is widely distributed in Southeast Asia and also has representatives living in Australia (ODHNER 1917, SOLEM 1981). It is most similar to *Hypselostoma* but can be clearly distinguished from it by the presence of separated parietal and angular lamellae (Fig. 1), which in *Hypselostoma* are fused (PILSBRY 1916–1918: 173, PÁLL-GERGELY et al. 2015). Until now, no representative of *Gyliotrachela* was recognised from Myanmar. However, 3 species hitherto considered to be in *Hypselostoma* are present in Myanmar: *H. bensonianum*

W.T. Blanford, 1863, *H. dayanum* Stoliczka, 1871, and *H. tubiferum* (Benson, 1856) (BENSON 1856a, BLANFORD 1863, STOLICZKA 1871). The lack of any records of *Gyliotrachela* from Myanmar was probably because this region is understudied. This is especially likely because this genus is one of the most speciose within the family.

Examination of the material stored in the Natural History Museum in London has now revealed a species from near Mandalay, Myanmar, that is almost identical to *Boysidia* (*Bensonella*) *tianxingqiaoensis* T.-C. Luo et al., 2000, a species originally described from Guizhou, China, c. 1020 km to the northeast. Based on the free last whorl and the separated angular and parietal teeth, *Boysidia tianxingqiaoensis* and *H. bensonianum* are transferred to *Gyliotrachela*. Another congener, *G. muangon* Panha & J.B. Burch in Panha et al., 2004, is also reported for the first time from the territory of Myanmar.

## Materials and Methods

Except for that in Figure 3, shells were photographed with a Nikon SMZ25 digital microscope using Nikon Nis-Elements software, and shells of *H. tubiferum* were observed without coating under a low-vacuum SEM (Miniscope TM-1000, Hitachi High-Technologies, Tokyo).

Abbreviations: **IZCAS** = National Zoological Museum of China, Institute of Zoology, Chinese Academy of Sciences (Beijing, China); **NHM & NHMUK** = Natural History Museum, London, UK; **AH** = aperture height; **AW** = aperture width; **SH** = shell height; **SW** = shell width.

## Results

### Superfamily Pupilloidea W. Turton, 1831

### Family Hypselostomatidae Zilch, 1959

### Genus *Gyliotrachela* Tomlin, 1930

*Gyliotrachela* TOMLIN 1930: 24 (replacement name for *Gyiliauchen* Pilsbry, 1917 in 1916–1918, non NICOLL 1915, Platyhelminthes, Trematodes).

**Type species.** *Hypselostoma hungerfordianum* Möllendorff, 1891, by typification of replaced name.

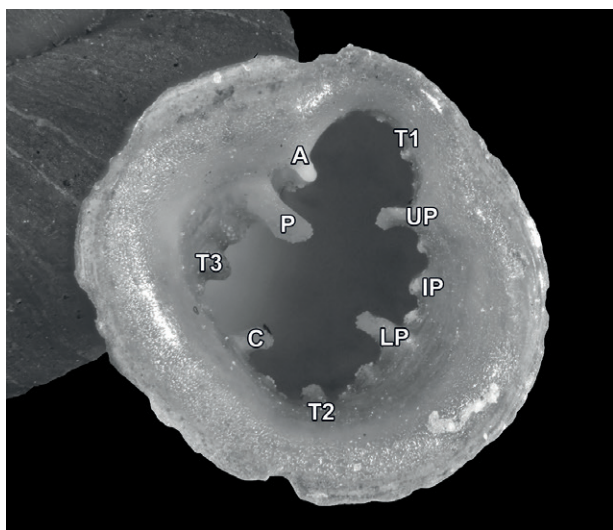
### *Gyliotrachela tianxingqiaoensis* (T.-C. Luo, D.-N. Chen & G.-Q. Zhang, 2000) comb. n.

Figures 1, 4B, 5C, D

*Boysidia* (*Bensonella*) *tianxingqiaoensis* T.-C. LUO et al. 2000: 147 (Chinese description), 150 (English description), figs 1–4.

**Type locality.** Tianxingqiao Town, Zhenning Bouyeizu Miaozu Zizhixian, Guizhou Province, China (26°N 105° 07' E; Fig. 2).

**Material examined.** Tianxingqiao, Guizhou Province, China, leg. D.-N. Chen 13.viii.1997 (holotype, IZCAS TM

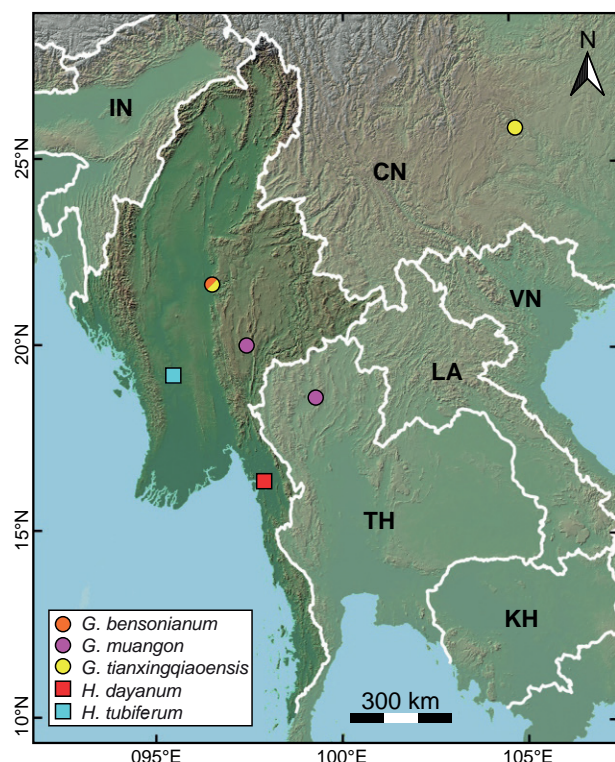


**Figure 1.** Apertural teeth in *Gyliotrachela tianxingqiaoensis* (T.-C. Luo et al., 2000) comb. n. (NHMUK 20191143/1). A = angular tooth; T1 = region of teeth between angular and upper palatal; UP = upper palatal tooth; IP = region of interpalatal teeth; LP = lower palatal tooth; T2 = region of teeth between lower palatal and columellar; C = columellar tooth; T3 = region of teeth between columellar and parietal; P = parietal tooth.

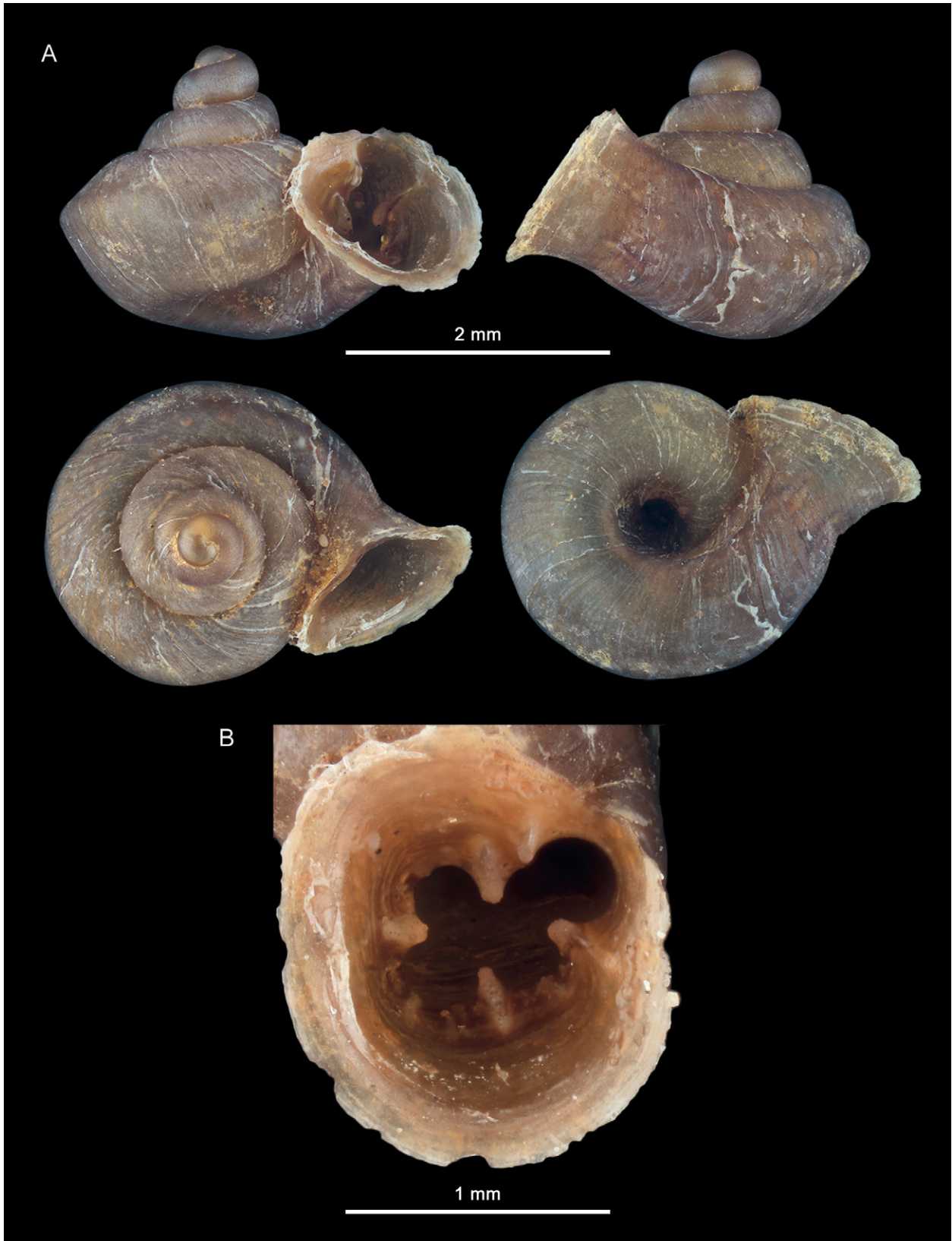
025075). Ava (nowadays Inn Wa), Myanmar, A.E. Salisbury collection, acc. no. 2172, NHMUK 20191143, 11 shells.

**Description of the shells from Myanmar.** The brown shell is small, consisting of  $4\frac{1}{4}$ – $4\frac{1}{2}$  whorls separated by a deep suture. The protoconch consists of  $1\frac{1}{4}$  whorls. On the granulated surface of the teleoconch, very fine radial growth lines can be observed, but spiral lines are missing. The last whorl is enlarged and with a blunt keel. A slight groove runs along the last whorl, just above the keel. The aperture is detached from the penultimate whorl and slightly bent upwards. The peristome is lighter than the shell, expanded but not reflected, and has sharp edges. The outer outline of the peristome is nearly rounded, and the aperture opening is pear-shaped due to the wide sinus. The umbilicus is relatively wide, approximately  $\frac{1}{4}$  of the shell width, and shows only the penultimate whorl. Inside the umbilicus, a deep groove can be observed. The aperture is armed with 5 strongly developed main teeth (parietal, angular, upper palatal, lower palatal, and columellar; Figs 1, 3B, 5C, D). The angular tooth is short and straight, and the parietal is longer and slightly bent towards the palatal ones. The parietal tooth is the largest, and the palatal teeth and the columellar tooth are slightly smaller than the parietal tooth, while the angular tooth is smaller than half the length of the parietal tooth.

Between these large teeth, several smaller ones can be observed, with some intraspecific variability. They are



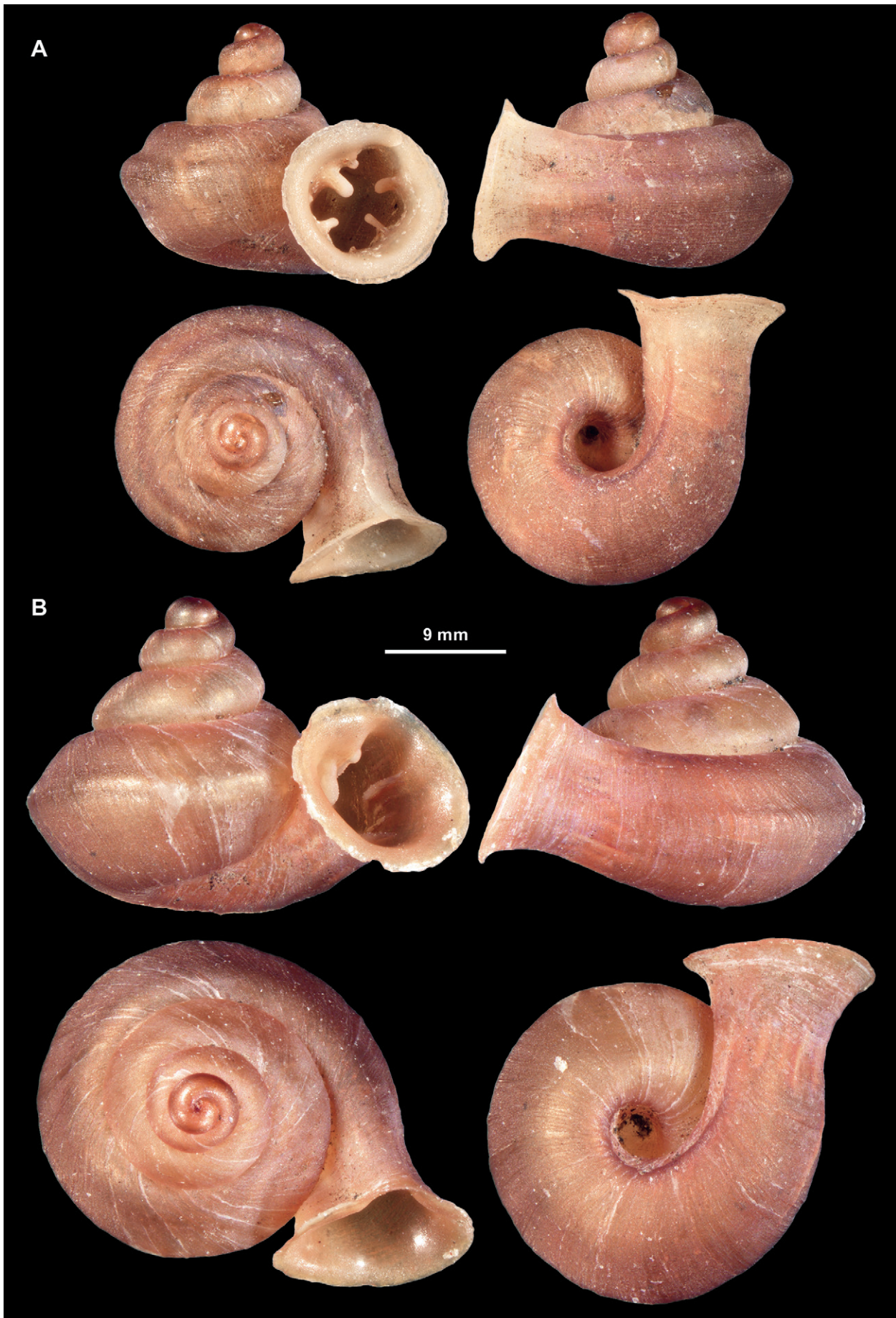
**Figure 2.** The distribution of species of *Gyliotrachela* and *Hypselostoma* known from Myanmar. Generated by QGIS v. 3.28 (QGIS.ORG 2022) using data on country boundaries from GADM and on elevation from US Geological Survey's EROS (CC BY-NC 3.0).



**Figure 3.** Holotype of *Gyliotrachela tianxingqiaoensis* (T.-C. Luo et al., 2000) comb. n. (IZCAS TM 025075). **A.** Shell. **B.** Aperture. Photograph: Meng Kaibaryer.

positioned deeper in the aperture and only sometimes reach the profiles of the main teeth. In 10 out of 11 specimens examined, there were 3 interpalatal teeth, whereas in 1 specimen a fourth one (also considerably smaller)

could be observed. The number of teeth between the lower palatal and columellar teeth varied from 3 to 5 (in most cases 4), but in 1 specimen it seemed that there were altogether 7 teeth, rather unevenly positioned. The



**Figure 4.** Species of *Gylotrachela* from Ava (Inn Wa), Myanmar. **A.** *G. bensonianum* (W.T. Blanford, 1963) comb. n. (syntype, NHMUK 20191141). **B.** *G. tianxingqiaoensis* (T.-C. Luo et al., 2000) comb. n. (NHMUK 20191143/1).



**Figure 5.** Aperture appearance of *Gyliotrachela* from Ava (Inn Wa), Myanmar. **A, B.** *G. bensonianum* (W.T. Blanford, 1963) comb. n. (syntypes, NHMUK 20191141). **C, D.** *G. tianxingqiaoensis* (T.-C. Luo et al., 2000) comb. n. (C: NHMUK 20191143/1; D: NHMUK 20191143/2).

number of teeth between the columellar and parietal teeth was mostly 4 (in 7 specimens) and sometimes 3 (in 4 specimens). Between the angular and upper palatal teeth, usually 4 more poorly developed teeth were present, but in some cases there were 5.

All the teeth (including the minor ones) are covered in minute, sharp spines.

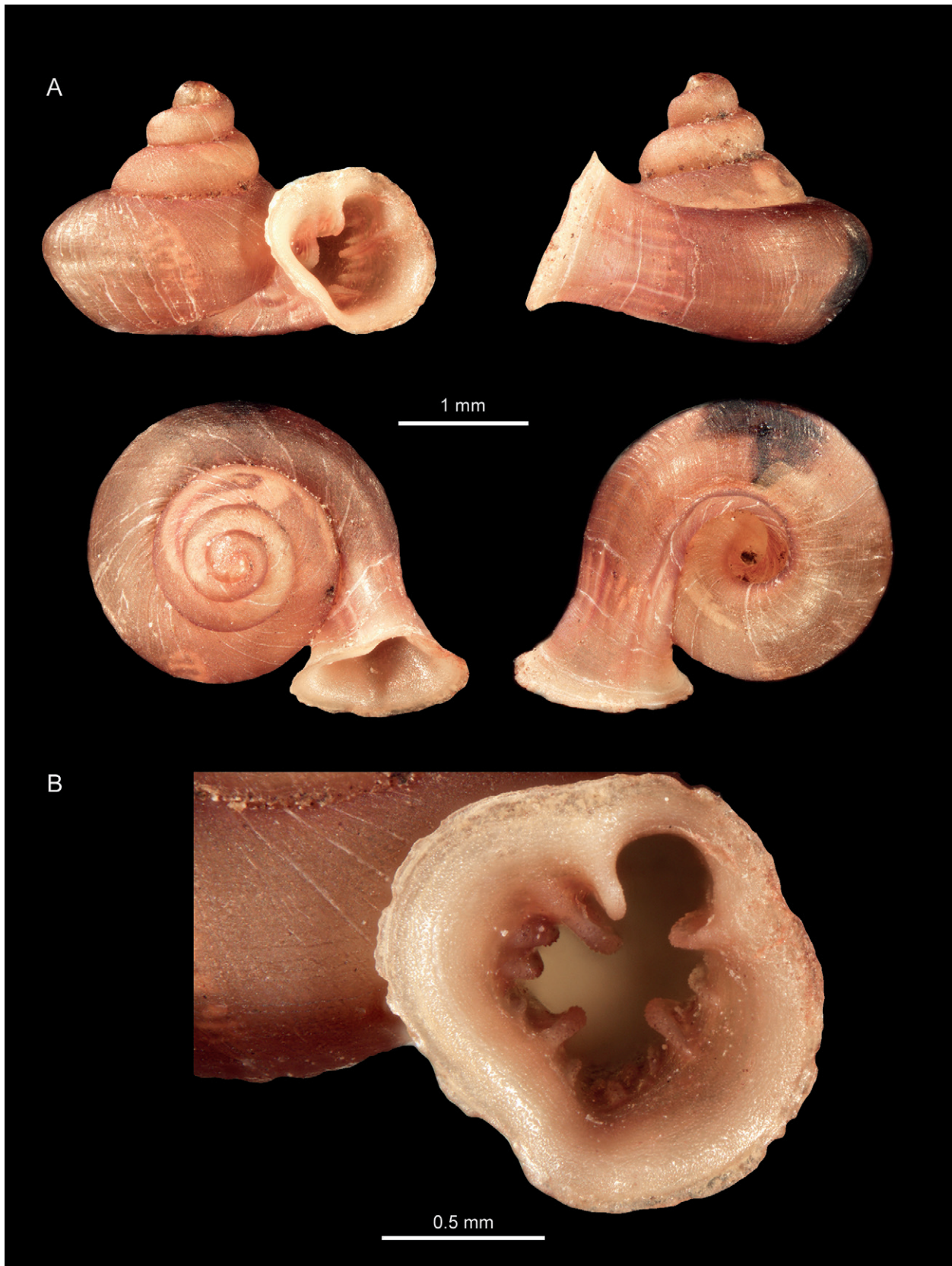
**Anatomy.** Unknown.

**Measurements.** AH = 1.5–1.63 mm; AW = 1.54–1.76 mm; SH = 2.52–2.8 mm, SW = 3.49–3.94 mm ( $n = 9$ ).

**Distribution.** This species is known from Guizhou, China, and Mandalay Region, Myanmar (Fig. 2).

**Remarks.** The *G. tianxingqiaoensis* shells from Myanmar (Fig. 4B) differ from the holotype from China (Fig. 3) only in having slightly more convex whorls and a slightly more protruding aperture. Otherwise, the shell, apertural shape, sculpture, and arrangement of apertural teeth are practically identical. The original description of *G. tianxingqiaoensis* (LUO et al. 2000) mentioned spiral striation on its teleoconch, but this was apparently a mistake as it could not be observed during the examination of the holotype.

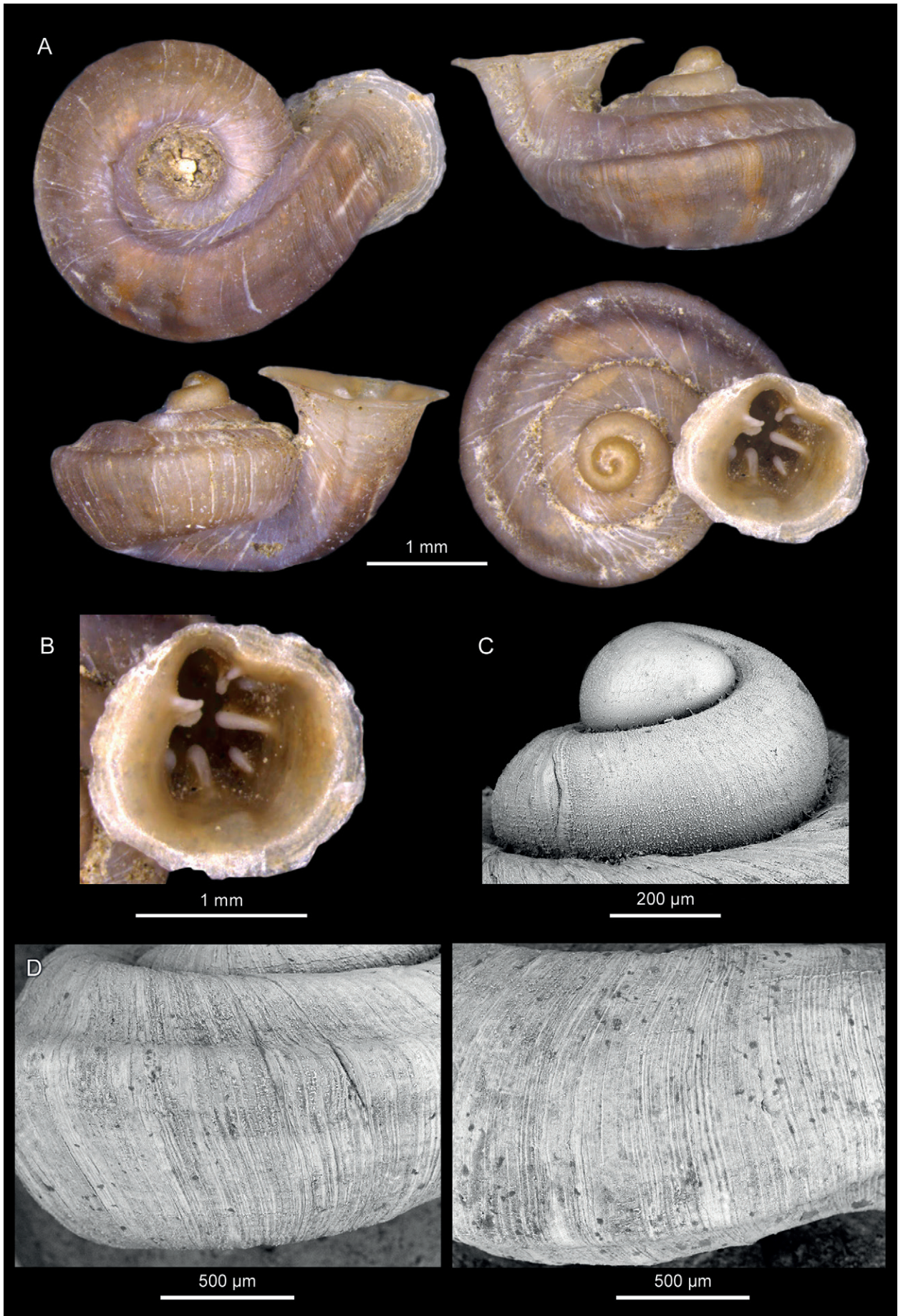
This species differs from *G. bensonianum*, which is also known from Myanmar, in having more numerous apertural barriers, a more elevated aperture, and slightly more whorls, and in lacking spiral striation, which is



**Figure 6.** *Gylotrachela muangon* Panha & J.B. Burch in Panha et al., 2004 from Shan, Myanmar. **A.** Shell. **B.** Aperture. Collection of András Hunyadi, Budapest.

present in *G. bensonianum* (Figs 4, 5). Also, the last whorl in *G. bensonianum* is more strongly carinated and with a deeper groove above the keel. *Gylotrachela*

*tianxingqiaoensis* differs from *G. muangon* (Fig. 6) in the lack of spiral striation and in the presence of a keel on the last whorl. It differs from both *Hypselostoma* in its



**Figure 7.** *Hypselostoma tubiferum* (Benson, 1856) (NHMUK 1888.12.4.17–22). **A.** Shell. **B.** Aperture. **C.** Protoconch sculpture. **D.** Teleoconch sculpture.

separated angular and parietal teeth. Additionally, its last whorl is more protruded and elevated than in *H. dayanum* but less so than in *H. tubiferum* (Fig. 7).

***Gyliotrachela bensonianum* (W.T. Blanford, 1863) comb. n.**

Figures 4A, 5A, B

*Hypselostoma bensonianum* W.T. BLANFORD 1863: 326–327.

*Hypselostoma bensonianum*—HANLEY & THEOBALD 1870 in 1870–1876: 4, pl. 8 fig. 2; PFEIFFER 1876 in 1875–1876: 488; GUDE 1914: 299.

*Gyliuchen bensonianus*—PILSBRY 1917 in 1916–1918: 211; pl. 37 figs 11, 12.

**Type locality.** “Mya Leit Doung, Ava” (nowadays Melai Taung, 21° 47' N 096° 15' E; Fig. 2).

**Material examined.** Ava (nowadays Inn Wa), Myanmar; NHMUK 20191141 (5 syntypes) (Fig. 4A).

**Measurements.** AH = 1.33–1.42 mm; AW = 1.38–1.52 mm; SH = 2.01–2.13 mm; SW = 2.92–3.18 mm ( $n = 3$ ).

**Remarks.** Examination of the type material showed that the parietal and angular lamellae are separated, which is the character for the genus *Gyliotrachela*, to which this species is therefore transferred.

***Gyliotrachela muangon* Panha & J.B. Burch in Panha et al., 2004**

Figure 6

*Gyliotrachela muangon* PANHA et al. 2004: 67–68, fig. 7.

**Type locality.** “Muangon Cave, San Kam Pang District, Chiangmai Province, 18° 47' 11" N 099° 14' 16" E, 280 meters elevation.” This is in Thailand.

**Material examined.** Myanmar, Shan, c. 3.6 km NNE of Hsihseng centre, limestone hill (1040 m); 20° 11' 15" N, 097° 16' 07" E (Fig. 2), leg. K. Okubo, J.U. Otani & A. Hunyadi 07.x.2018, 3 specimens (collection of András Hunyadi, Budapest).

**Remarks.** This species was, until now, known only from 260 km to the southeast in north-western Thailand (Fig. 2). Comparison with the original description has shown that the specimens collected from Myanmar belong to this species. This is the first record of *G. muangon* in Myanmar.

**Genus *Hypselostoma* Benson, 1856**

*Hypselostoma* BENSON 1856b: 342 (replacement name for *Tanystoma* Benson, 1856a, non MOTSCHULSKY 1845, Carabidae, Coleoptera).

**Type species.** *Tanystoma tubiferum* Benson, 1856a, by monotypy.

***Hypselostoma tubiferum* (Benson, 1856)**

Figure 7

*Tanystoma tubiferum* BENSON 1856a: 130.

*Hypselostoma tubiferum*—PFEIFFER 1859: 325; PFEIFFER 1860: 130, pl. 36 figs 1–4; W.T. BLANFORD 1863: 326; HANLEY & THEOBALD 1870: 4, pl. 8 fig. 3; STOLICZKA 1871: 173, pl. 7 fig. 1; PFEIFFER 1876 in 1875–1876: 488; GUDE 1914: 298; PILSBRY 1917 in 1916–1918: 178–179, pl. 31 figs 1–5.

**Type locality.** “Thyet-Mio” (nowadays Thayet), Myanmar (Fig. 2).

**Material examined.** 6 specimens (NHMUK 1888.12.4.17–22), collection of W. Theobald, “Tondung/Thyet Mio” (Fig. 7).

**Remarks.** *Hypselostoma tubiferum* is the type species of *Hypselostoma* and, since no good quality illustration has ever been provided in the literature, we publish photographs and SEM images of it (Fig. 7).

## Discussion

Not many species of *Hypselostoma* and *Gyliotrachela* occur in Myanmar, at least to our present knowledge. According to earlier literature, there are 3 species of *Hypselostoma*: *H. bensonianum*, *H. tubiferum*, and *H. dayanum* (BENSON 1856a; BLANFORD 1863; STOLICZKA 1871). In the present work, 2 new *Gyliotrachela* are reported from Myanmar (*G. tianxingqiaoensis* comb. n. and *G. muangon*), and *H. bensonianum* is moved from *Hypselostoma* to *Gyliotrachela*.

The apparently disjunct distribution of *G. tianxingqiaoensis* is, although surprising, not unique in this family. *Bensonella plicidens* (Benson, 1849) is known from the Himalaya as well as from eastern China and Japan (PILSBRY 1915, 1916–1918: 198 ff.). Such disjunct distributions can be explained by the lack of research in the area between the disjunct localities, or long-distance dispersal, or morphological convergence. At the moment, none of the 3 hypotheses can be excluded regarding *G. tianxingqiaoensis*. Although most *Gyliotrachela* and *Hypselostoma* species are narrow-range or single-site endemics, there are some examples, such as *Gyliotrachela hungerfordiana* (Möllendorff, 1891), which may have wider distributions because of their less strict association with limestone outcrops (SCHILTHUIZEN et al. 1999). The habitat preference of *G. tianxingqiaoensis* is unknown, but similar reasons can be part of the explanation. Further research is necessary to improve our knowledge of these minute terrestrial gastropods, not only in Myanmar, but in the whole of Southeast Asia.

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