

Bhutanese snails, the smallest one: *Truncatellina bhutanensis* spec. nov. (Gastropoda, Pulmonata, Vertiginidae)

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Truncatellina bhutanensis spec. nov. is described from western Bhutan, where it was found to be common in calcareous areas at altitudes between 2100 and 2650 m.

Key words: Gastropoda, Pulmonata, Orthurethra, Vertiginidae, taxonomy, Bhutan.

INTRODUCTION

Hardly anything is known about the molluscan fauna of Bhutan. Nearly all allegedly Bhutanese records of molluscs that could be found turned out to be incorrect by modern standards. This is because the frontiers between Bhutan and neighbouring countries have not always been stable in the past. Several localities that are now situated in Sikkim, India, for example, are reported from western Bhutan, both in old collections and in the old literature. In fact, as far as known now, only a single molluscan species, viz. *Phaedusa* (*P.*) *bhutanensis* (Clausiliidae), was ever described from the

country (Nordsieck, 1974). Data on local molluscan faunas have never been published. With this article a series of papers is started, aiming at eventually a general overview of the Bhutanese molluscan fauna. The various taxa will be dealt with in a pragmatic, not a taxonomically determined sequence. Two recently published articles on *Truncatellina*, viz. Hausdorf & Wronski (2011) and Pokryszko et al. (2009), provided an easy base for the present paper.

MATERIAL AND METHODS

Since there is no collection anywhere with mollusks from Bhutan, all the study material should be collected first. Collecting was started in a modest way in 2012 and continued for ten days in 2013. In this initial phase priority was given to areas with calcareous soils or limestone rocks, since there the highest diversity was expected. In addition to collecting at sight, bottom samples were taken to be sorted out in the lab. We did not try to standardize our methods. A representative variety of habitats at different altitudes has not yet been investigated. As a consequence, conclusions about eco-

logical aspects cannot be based on our material. The following abbreviations are used: H = height; NBCS = National Biodiversity Centre, Serbithang; S = station; W = width. When there are over 25 specimens in a sample, these are referred to as 'many'.

SYSTEMATIC PART

Vertiginidae Fitzinger, 1833
Truncatellinae Steenberg, 1925

The classification of the conchologically homogeneous genus *Truncatellina* R.T. Lowe, 1852, next to *Vertigo* O.F. Müller, 1773, in the family Vertiginidae, albeit in a separate subfamily, was at least partly based on the fact that these are all minute snails. Long before the area of cladistics started, Steenberg (1925) published his admirably detailed anatomical descriptions and illustrations of these taxa, and introduced the subfamily Truncatellinae for the combined *Truncatellina* and *Columella* Westerlund, 1878. These genera are characterized by among others a genital tract without an externally visible prostate and a gut-furrow crossing the albumen gland instead of running parallel with it, a radula with a tricuspid central and bicuspid lateral teeth, and a mandible with many small plates that are separated by narrow ridges. These and other character states have not yet been valued in a cladistical analysis. In a preliminary, molecular phylogeny reconstruction, Armbruster et al. (2005) confirmed the close relationships between *Truncatellina* and *Columella*, but at the same time showed that *Vertigo* is much more distantly related. It is beyond the scope of this article to discuss this here in more detail.

Truncatellina R.T. Lowe, 1852.

Type species, by monotypy: *T. linearis* (R.T. Lowe, 1852).

Truncatellina bhutanensis spec. nov. (Figs 1, 2)

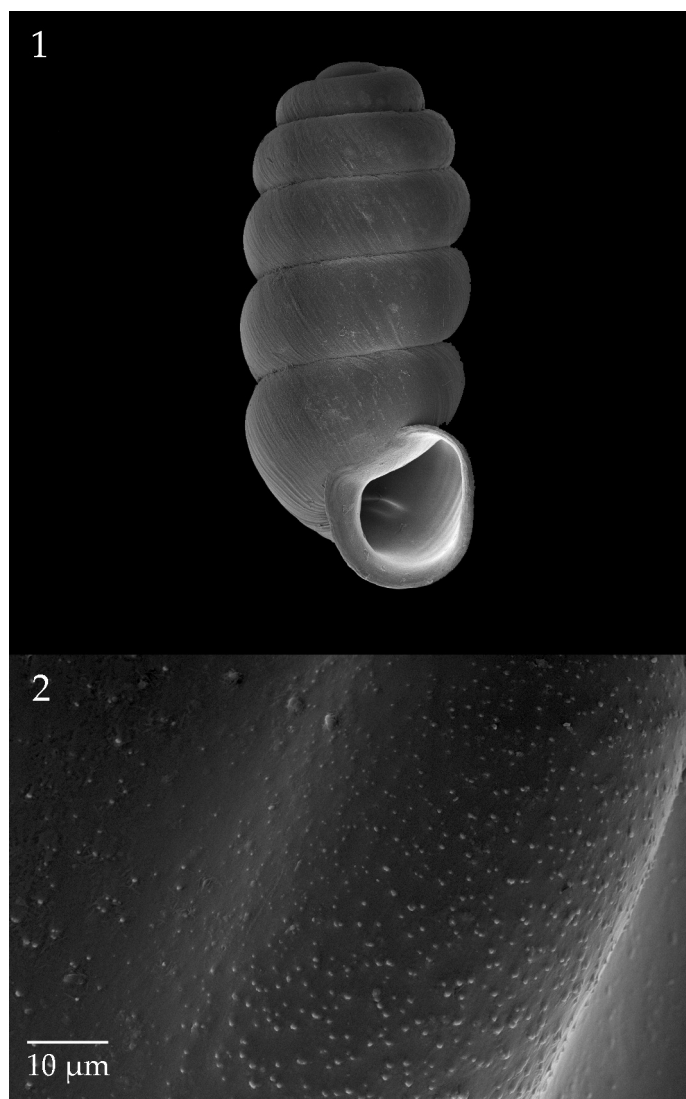
Material (paratypes, unless stated otherwise). – District Thimphu. – S 160: cross-road to quarry near Bjimina (13 km SW of Thimphu); 2300 m alt.; 27°24'N 89°34'E; E. Gittenberger et al. leg., 16.vi.2012 (NBCS1000/many). S 166: 16 km SSW of Thimphu, 3 km N of bridge;

2100 m alt.; 27°20'N 89°34'E; E. Gittenberger & Pema Leda leg., 6.iv.2013 (NBCS1001/3).

District Paro. – S 164: 14 km SE of Paro, N-side river, near monastery Tachugang Lhakhang; 2150 m alt., among rocks, near small rockface; 27°20'N 89°30'E; E. Gittenberger & Pema Leda leg., 6.iv.2013 (NBCS1002/many). S 167: S-slope E of limestone quarry NW of Dobji Dzong; 2300 m alt.; 27°17'N 89°31'E; E. Gittenberger & Pema Leda leg., 7.iv.2013 (NBCS1003/holotype, 1004/6). S 168: rocky S-slope 9 km SSW of Chuzom; 2450 m alt.; 27°14'N 89°30'E; E. Gittenberger & Pema Leda leg., 7.iv.2013 (NBCS1005/12). S 169: rocky S-slope 12 km SSW of Chuzom; 2650 m alt.; 27°13'N 89°29'E; E. Gittenberger & Pema Leda leg., 7.iv.2013 (NBCS1006/many). S 170: 10 km SW Chuzom; 2500 m alt.; 27°14'N 89°30'E; E. Gittenberger & Pema Leda leg., 7.iv.2013 (NBCS1007/20). S 171: small gully with high rockface at N-side; 2150 m alt.; 27°18'N 89°33'E; E. Gittenberger & Pema Leda leg., 7.iv.2013 (NBCS1008/15). S 178: S of Paro (= Rinpong) Dzong, E-side river; 2250 m alt.; 27°25'N 89°25'E; E. Gittenberger & Pema Leda leg., 11.iv.2013 (NBCS1009/20). S 177: 8 km SW Paro near Dzongdrakha; 2530 m alt.; 27°23'N 89°24'E; E. Gittenberger & Pema Leda leg., 11.iv.2013 (NBCS1010/36 [no paratypes; see below]).

Description. – Shell (Fig. 1) fragile, light brown, rather glossy, almost cylindrical with a domed apical part; teleoconch with relatively coarse growthlines, one or a few of which may be thickened as riblets near the aperture; with 5-5 3/4 convex whorls, which are separated by a deeply incised suture; umbilicus very narrow. Aperture squarish, somewhat higher than broad, with a narrowly reflected, slightly thickened apertural lip. Inside the aperture there is only a prominent to, rarely, obsolete, palatal denticle, which is visible in frontal view, and sometimes an inconspicuous columellar denticle, which is only discernible in very oblique view. The palatalis is thinly covered with more or less angular micro-protuberances (Fig. 2). Measurements, H 1.4-1.85 mm, W 0.75-0.85 mm.

Differentiation. – Hausdorf & Wronski (2011) listed all *Truncatellina* species with a palatalis that is visible in frontal view, as in *T. bhutanensis*. The latter species differs from all those species by a combination of character states, viz. its small size, the absence of riblets and the absence of a parietalis. *Truncatellina callicratis* (Scacchi, 1833) may recall *T. bhutanensis* to some extent, but not simultaneously in all



Figs 1, 2. *Truncatellina bhutanensis* spec. nov., holotype (NBCS1003); S-slope E of limestone quarry NW of Dobji Dzong; 2300 m alt.; 27°17'N 89°31'E; E. Gittenberger & Pema Leda leg. 7.iv.2013. **1**, shell, H = 1.8 mm; **2**, detail of palatal denticle with micro-protuberances.

character states; shells of the former species are usually larger, especially broader, less fragile, sculptured with riblets, and provided with three apertural denticles, includ-

ing a parietalis; *Truncatellina himalayana* (Benson, 1863), which comes geographically close, is toothless and provided with riblets. *Truncatellina asirensis* Hausdorf, 2011, from Saudi Arabia, looks somewhat similar by the lack of riblets, but is even smaller than *T. bhutanensis* and provided with a parietalis. The sample from S 177 is excluded from the type series because the shells are slightly different by the total lack of a palatalis and a shell height up to 1.95 mm.

Notes. –The *Truncatellina* species of the Himalayan area are poorly known. Only for the extremely southwestern part of the Himalaya, in Pakistan, exceptionally good data on no less than four species are available (Pokryszko et al., 2009). From Bhutan a single *Truncatellina* species is known now. At all localities, except for S 170, it was found together with *Gastrocopta huttoniana* (Benson, 1849), which has a slightly larger, more elongated, spindle-shaped shell with several apertural teeth. Taking into account that the Bhutan molluscan inventory has started just now, it would not be surprising if additional taxa were discovered.

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REFERENCES

- ARMBRUSTER, G.F.J., BÖHME, M., BERNHARD, D. & SCHLEGEL, M., 2005. The H3/H4 histone gene cluster of land snails (Gastropoda: Stylomatophora): TS/TV ratio, GC3 drive and signals in stylomatophoran phylogeny. – *Journal of Molluscan Studies* 71: 339-348.
- HAUSDORF, B. & WRONSKI, T., 2011. First records of *Truncatellina* species from Arabia (Gastropoda: Vertiginidae). – *Journal of Conchology* 40: 505-508.

NORDSIECK, H., 1974. Zur Anatomie und Systematik der Clausilien, XIV. Phaedusinae, II: *Phaedusa bhutanensis* n. sp. und ihre Beziehungen zu benachbarten Arten. – Archiv für Molluskenkunde 104: 41-49.

POKRYSZKO, B.M., AUFFENBERG, K., HLAVÁČ, J.Č. & NAGGS, F., 2009. Pupilloidea of Pakistan (Gastropoda: Pulmonata): Truncatellinae, Ver-

tigininae, Gastrocoptinae, Pupillinae (in part). – Annales Zoologici 59: 423-458.

STEENBERG, C.M., 1925. Études sur l'anatomie et la systématique des maillots (fam. Pupillidae s. lat.). – Videnskabelige Meddelelser fra Dansk naturhistorisk Forening 80: i-viii, 1-211, pls 1-34, 5 pp.