



Basteria

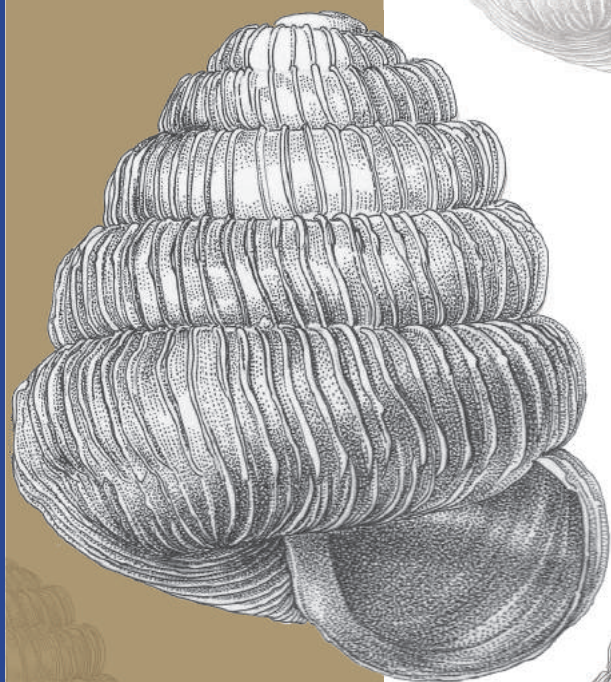
TIJDSCHRIFT VAN DE NEDERLANDSE MALACOLOGISCHE VERENIGING

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Holotype of *Rahula kleini*

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First record of *Carychium* in Bhutan (Gastropoda, Ellobioidea)

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Carychium indicum Benson, 1849, hitherto known from only two localities in the Western Himalaya, is reported from Pemagatshel District in the Eastern Himalaya of Bhutan.

Key words: Gastropoda, Pulmonata, Basommatophora, Carychiidae, distribution, Bhutan.

Abbreviations for collections: NBCB = National Biodiversity Centre, Serbithang, Thimphu, Bhutan; RMNH = Naturalis Biodiversity Centre, Leiden, Netherlands; SMF = Senckenberg Museum Frankfurt, Germany.

SYSTEMATIC PART

Superfamily Ellobioidea L. Pfeiffer, 1854
Family Carychiidae Jeffreys, 1830

INTRODUCTION

The genus *Carychium* O.F. Müller, 1773, is widespread in the Northern Hemisphere, with the oldest first unambiguous record dating from the Early Palaeocene of Belgium and France (Briart & Cornet, 1889; Villatte, 1979). Although Carychiidae shells can easily be recognized, identifying the species is often difficult without manipulating (breaking) the shells (Bank & Gittenberger, 1985; Bulman, 1990) or using SEM or CT scanning techniques (Jochum et al., 2013, 2015). There is only a limited number of useful, though variable, characters, viz. general shape, sculpture, microsculpture, and configuration of the internal columellar lamellae. Here we report the first occurrence of a *Carychium* species in Bhutan from Pemagatshel District in the Eastern Himalaya of eastern Bhutan.

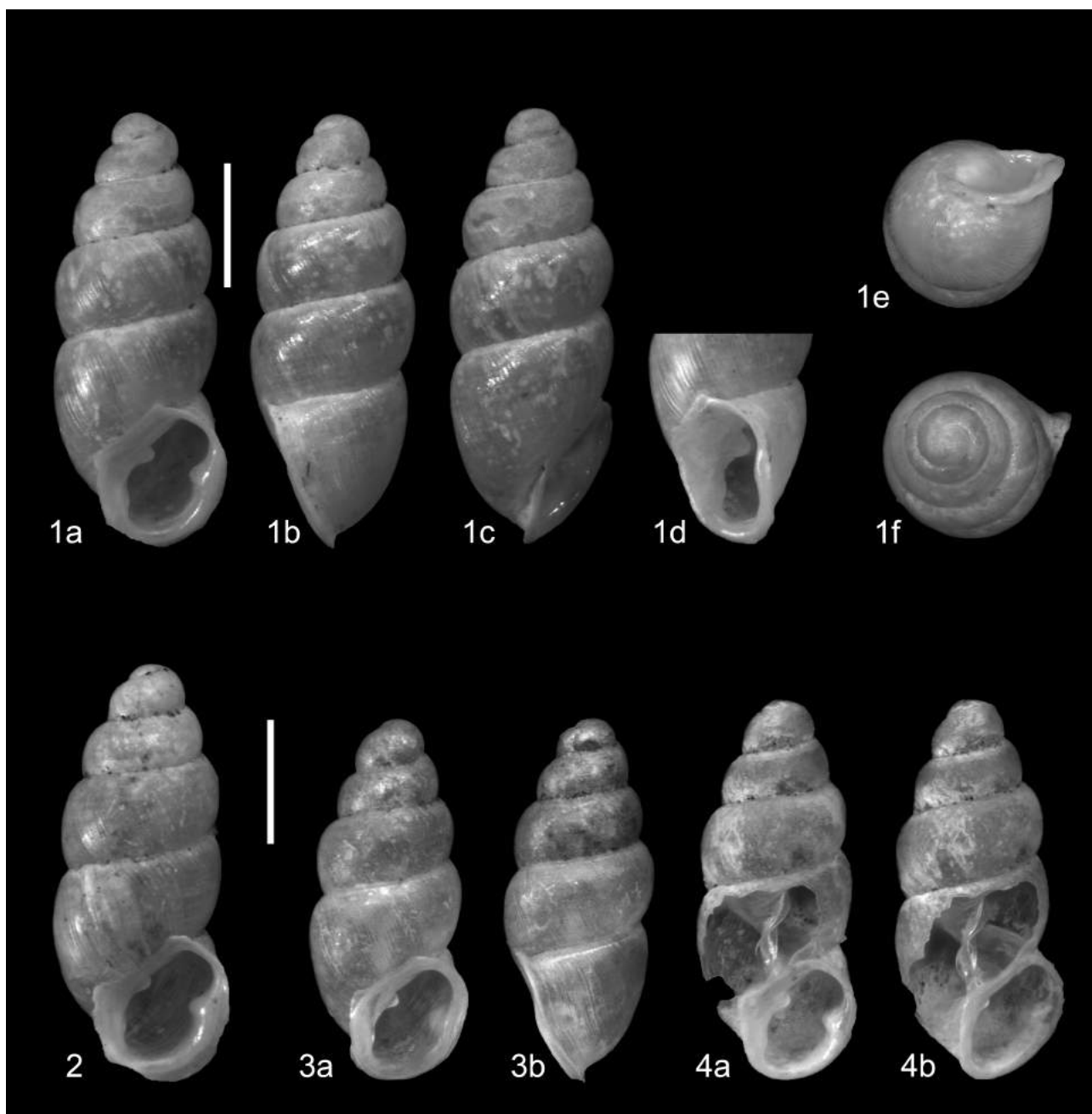
Carychium O.F. Müller, 1773

Carychium indicum Benson, 1849 (Figs)

Carychium indicum Benson, 1849: 194 ("Simla" [= Shimla, 31°4'N 77°8'E, 2276 m alt.] et Landour [30°28'N 78°6'E, 2134 m alt.]".

Records. – Pemagatshel District. NBCB193: W-side of Pemagatshel, Nangkhon; 27°02'24.4"N 91°23'52.2"E, 1200 m alt.; E. Gittenberger & Pema Leda leg. 15.iv.2015 [5 shells & 1 juvenile shell]. NBCB194: N-side of Pemagatshel, 27°02'29.0"N 91°25'43.3"E, 1750 m alt.; E. Gittenberger & Pema Leda leg. 15.iv.2015 [2 shells].

Shell (Figs 1-6). – Small, spindle-shaped, with $4\frac{1}{8}$ - $4\frac{3}{4}$ moderately convex whorls and a deeply incised suture; with more or less prominent, dense growth lines and vague spiral lines. At a high magnification



Figs 1-4. *Carychium indicum* Benson, 1849; Bhutan, Pemagatshel District. **1, 2**, N-side of Pemagatshel, 27°02'29.0"N 91°25'43.3"E, 1750 m alt. [NBCB194]; **3, 4**, W-side of Pemagatshel, Nangkhor, 27°02'24.4"N 91°23'52.2"E, 1200 m alt. [NBCB193]. Measurements: **1**, 1.74×0.7 mm; **2**, 1.69×0.71 mm; **3**, 1.45×0.64 mm; **4**, 1.54×0.63 mm. Photographs AJdW.

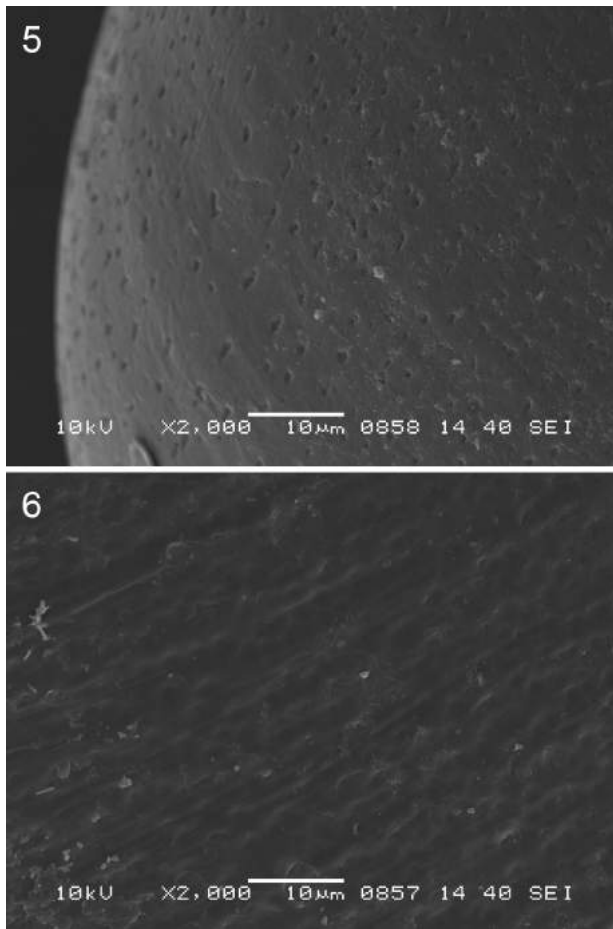
(SEM > 1000), prominent pits are visible on the protoconch and vague indentations on the teleoconch whorls (Figs 5, 6). Apertural lip interrupted by a broad parietal callus, and broadly reflected, with a prominent knob halfway the palatal side. In frontal view, behind the lip, there are a low parietalis and a very low columellaris, spiralling upwards inside the shell -studied in a specimen of NBCB 193 and one of NBCB 194- as two low, simple, columellar lamellae, the upper one of which is the highest.

Measurements (n=7): height 1.31-1.74 mm; breadth

0.57-0.71; the height of the aperture is 33-38% of the total height of the shell. See also Table 1.

Notes. – The earliest, though incorrect, record for *Carychium* from the Himalayan region dates from 1849, when the name *Carychium costatum* showed up for *Bulimus folliculus* L. Pfeiffer, 1846, which became the type species of the caenogastropod genus *Diplommatina* Benson, 1849, later on. See Naggs (1997) for the complete story of this surprising mistake.

The paratype (SMF 192240) of *Carychium minusculum* Gredler, 1888 (see Maassen, 2003), from “Hupé”,



Figs 5, 6. *Carychium indicum* Benson, 1849; microsculpture of the shell; Bhutan, Pemagatshel District, W-side of Pemagatshel, Nangkhon, 27°02'24.4"N 91°23'52.2"E, 1200 m alt. [NBCB193]. **5**, protoconch; **6**, teleoconch. Scale 10 μm.

China as well as a lectotype, also from Hupé (see Zilch, 1974: 203, 224, pl. 8 fig. 13) lack detailed locality information. These shells (ca. 2 mm high, 1 mm wide) are however, larger than *C. indicum*, bear a continuous, nearly circular apertural border and have a more prominent parietalis.

According to Budha et al. (2015), there may be at least two *Carychium* species in Nepal which need to be studied in more detail. The so-called "*Carychium minusculum*" from Nepal, "Kavre, Asi Khola spring near Kaphalbot", cited by Neesemann et al. (2007: 78 pl. 15 fig. 796, 101 pl. 25 fig. 7), cannot be identified to the species level after the description and a figure. Kuznetsov & Schileyko (1997: 140) mention *Carychium minusculum* from E. Nepal, Solukhumbu district, Khari-Khola village, without adding more data.

Carychium indicum was described from the lower Western Himalaya, nearly 1500 km further westward from the site of the new Eastern Himalayan record in Bhutan. Two specimens of *C. indicum* from Shimla

NBCB193				
H	B	HA	W	HA/H
1.31	0.57	0.48	4⅛	0.37
1.38	0.63	0.45	4¼	0.33
1.45	0.64	0.52	4¼	0.36
1.47	0.63	0.56	4¼	0.38
1.54	0.63	0.51	?	0.33
NBCB194				
1.69	0.71	0.6	4½	0.36
1.74	0.7	0.57	4¾	0.33
RMNH233868 (Simla)				
1.66	0.72	0.6	4½	0.36

Table 1. Shell height (H), breadth (B), height of the aperture (HA), and number of whorls (W).

(RMNH 233868, ex H.B. Preston, 1911), one of the two original localities mentioned by Benson (1849: 194), cannot be distinguished from the specimens from Bhutan in any of the characters mentioned here, that are accessible by light microscopy. In dimensions and the number of whorls these topotypical shells are most similar to the shells of NBCB194. The shells from the two available Bhutanese populations are not identical in proportion. The two shells of NBCB194 are clearly larger and wider and are less tightly coiled than those (five) of NBCB193. The nature of this variation can only be addressed with more material from a larger number of sites. The shells from Shimla could not be studied by SEM, so that it remains unclear whether these also have a pitted protoconch, as described and illustrated for *Carychium* species (Burch & Shrader van Devender, 1978; Bank & Gittenberger, 1985; Jochum, 2011).

Carychium boysianum Benson, 1864, was "discovered at the Táji, near Agra, by the late Capt. Boys [and] is closely allied to the Himalayan species *C. Indicum*" (Benson, 1864: 210). *C. boysianum* was found on the banks of the river Yamuna ("Jumna" during the Raj) and very likely is a synonym of *C. indicum*.

This finding of *C. indicum* in the eastern part of the Himalayan Arc greatly extends the known range of this species. Moreover, the large distributional gap may tell less about the species than about the activities of malacologists.

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REFERENCES

- BANK, R.A. & GITTENBERGER, E., 1985. Notes on Azorean and European *Carychium* species (Gastropoda Basommatophora: Ellobiidae). – *Basteria* 49: 85-100.
- BENSON, W.H., 1849. Characters of Diplomatina, a new genus of terrestrial mollusks belonging to the family of Carychiidae, and of a second species contained in it; also a new species of *Carychium* inhabiting the western Himalaya. – *The Annals and Magazine of Natural History, including Zoology, Botany, and Geology* (2) 4 (21): 193-195.
- BENSON, W.H., 1864. Characters of new land-shells from the Mahabaleshwar Hills in western India, and from Agra in the north-west provinces. – *Annals and Magazine of Natural History* (3) 13 (75): 209-211.
- BRIART, A. & CORNET, F.L., 1889. Description des fossils du calcaire grossier de Mons, Quatrième partie. – *Mémoires de l'Académie royale des Sciences, des Lettres et des Beaux-Arts de Belgique* 47: 1-128.
- BUDHA, P.B., NAGGS, F. & BACKELJAU, T., 2015. Annotated checklist of the terrestrial gastropods of Nepal. – *ZooKeys* 492: 1-48.
- BULMAN, K., 1990. Shell variability in *Carychium tridentatum* (Risso, 1826) and its importance for intraspecific taxonomy (Gastropoda, Pulmonata: Ellobiidae). – *Malakologische Abhandlungen Staatliches Museum für Tierkunde Dresden* 15 (4): 37-50.
- BURCH, J.B. & SHRADER VAN DEVENDER, A., 1978. The shell surface sculpture of *Carychium nannodes*. – *Malacological Review* 11: 59-60.
- JOCHUM, A., 2011. Evolution and diversity of the Aroglobitic Carychiidae - A morphological and phylogenetic investigation of the terrestrial ellobiid genera, *Carychium* and *Zospeum*. – *The Malacologist* 57: 16-18.
- JOCHUM, A., MALKOWSKY, Y., KAMPSCHULTE, M., HENEKA, M.J. & KLUSMANN-KOLB, A., 2013. Opening windows in carychiid taxonomy (Ellobioidea: Carychiidae) – a new perspective highlights some known and novel morphological characters in the shell and radula. *World Congress of Malacology 2013*, Ponta Delgada, São Miguel, Açores, July 22-28, 2013. – *Açoreana* 8: 138-139.
- JOCHUM, A., DE WINTER, A.J., WEIGAND, A.M., GÓMEZ, B. & PRIETO, C.E., 2015. Two new species of *Zospeum* Bourguignat, 1856 from the Basque-Cantabrian Mountains, Northern Spain (Eupulmonata, Ellobioidea, Carychiidae). – *ZooKeys* 483: 81-96.
- KUZNETSOV, A.G. & SCHILEYKO, A.A., 1997. New data on Enidae (Gastropoda, Pulmonata) of Nepal. – *Ruthenica* 7 (2): 133-140.
- MAASSEN, W.J.M., 2003. Die Veröffentlichungsdaten der "Jahrbücher der Deutschen Malakozoologischen Gesellschaft". – *De Kreukel* 39 (8): 131-132.
- NAGGS, F., 1997 William Benson and the early study of land snails in British India and Ceylon. – *Archives of Natural History* 24 (1): 37-88.
- NESEMAN, H., SHARMA, S., SHARMA, G., KHANAL, S.N., PRADHAN, B., SHAH, D.N. & TACHAMO, R.D., 2007. Aquatic invertebrates of the Ganga river basin 1 – Mollusca, Annelida, Crustacea (in part.). *Class Gastropoda*: 57-102.
- VILLATTE, J., 1979. Nouvelles données sur les mollusques continentaux du Thanétien inférieur sous-pyrénéen. Interprétation stratigraphique et paléocéologique. – *Geobios-Lyon* 12: 513-533.
- ZILCH, A., 1974. Zur Geschichte der deutschen Malakozoologie, XIV. Vinzenz Gredler und die Erforschung der Weichtiere Chinas durch Franziskaner aus Tirol. – *Archiv für Molluskenkunde* 104 (4-6): 171-228.