

Completed description of Bhutanese *Tibetoradix* cf. *hookeri* (Gastropoda, Pulmonata, Lymnaeoidea), with species-specific, environmentally induced decollation

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ably belonging to *Tibetoradix* Bolotov, Vinarski & Aksenova, 2018 (Gittenberger et al., 2021). Since all these shells are decollated, the original apical part could not be described. Later on, the same author collected another sample along that trail, but nearly 700 m lower. These shells are not decollated. This made a description of the complete shell possible. We wonder whether the difference in decollation might have any adaptive significance.

In two samples of *Tibetoradix* cf. *hookeri*, collected at different altitudes, the shells differ by being decollated at the highest locality and not so at the lowest. Potential decollation is hypothesized to be an adaptive character state enabling a longer lifespan at higher altitudes in the Himalaya.

Key words: Gastropoda, Lymnaeidae, *Tibetoradix*, Himalaya, Bhutan, decollation, adaptation

INTRODUCTION

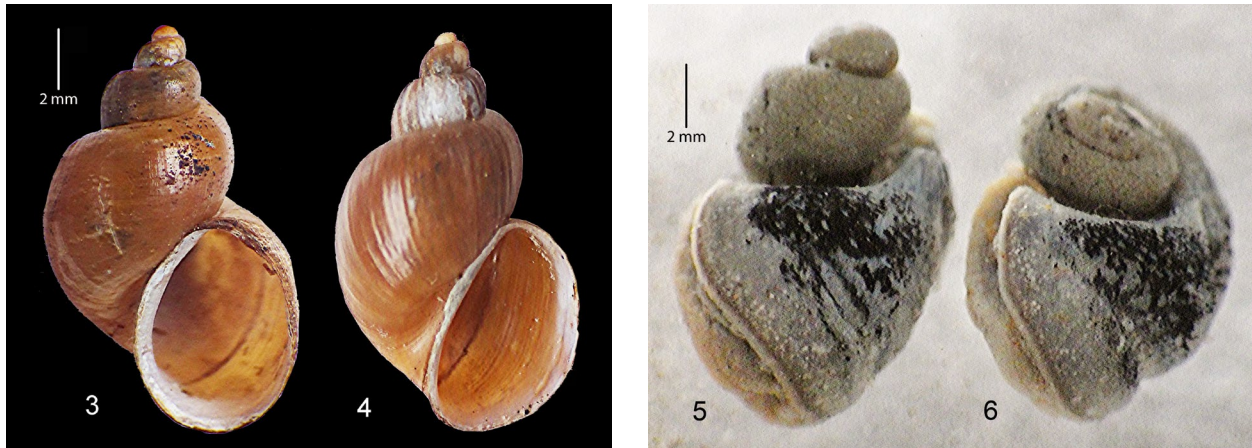
In E Bhutan, along the Jhomolhari trail, the second author collected several shells of a lymnaeid species, most prob-

MATERIAL AND METHODS

A sample of 9 shells of *Tibetoradix* cf. *hookeri* (Reeve, 1850) (NBCB3209/6; RMNH.MOL.346836/3) was collected 24.vii.2019 near Jhomolhari Base Camp, at 4725 m a.s.l. (Fig. 1). Later on, 26.ix.2022, at a lower altitude, i.e., 4040 m a.s.l. (Fig. 2), along the same trail at Jangothang, a sample of 29 very similar shells was collected (NBCB1502/24, RMNH.MOL.453906/5). Two specimens contained soft parts of the animals, but dissecting and DNA sequencing were not successful so that only the shells and the colour pattern of the mantle can be described.



Figs 1-2. Habitats of *Tibetoradix* cf. *hookeri*. Alpine scree at 4725 m a.s.l. (1) and subalpine habitat at 4040 m a.s.l. (2). Photos by K. Tobgay.



Figs 3-6. *Tibetoradix* cf. *hookeri*, collected at 4040 m a.s.l., shells with apical whorls present (NBCB1502) (3, 4) and animals with the shells removed (5, 6). Shell height 12.9 mm (3) and 13.1 mm (4), respectively. Photos by E. Gittenberger.

RESULTS

Shell, completed description (Figs 3-4). — The elongated ovoid shells are yellowish to dark brown, with a conical spire and a sharp apex. There are up to 4½ whorls. The largest shell measures 13.1 × 7.9 mm, the smallest, probably fully grown one is 12.0 × 7.4 mm.

Mantle pigmentation (Figs 5-6). — There is a broad, light band along the frontal border of the mantle, followed posteriorly by a roughly triangular, black part, interspersed with irregular light patches

DISCUSSION

In the sample collected at 4725 m a.s.l. all shells are decollated, so that the number of whorls cannot be determined. Most specimens have a secondary apical shield, closing the apex. In the sample collected at 4040 m a.s.l. only one of the 29 shells is irregularly decollated. We hypothesize that shorter periods of active life because of lower temperatures during the year, may result in a longer lifespan at the highest locality. If so, the snails are longer exposed to the acidity of the water, as compared to exposure at a much lower

locality. The oldest, i.e. apical, part of the shell gets eroded during a longer period of time than at the lowest locality. Potential environmentally induced decollation might be considered a species-specific, adaptive character state in *Tibetoradix* cf. *hookeri*, enabling a longer lifespan in environments with short periods of active life and relatively long periods of contact with the acidity of the water.

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