

Biodiversity Record: The snail, *Ditropopsis cf. koperbergi*, at Bukit Timah Nature Reserve

Chan Sow-Yan* & Lau Wing Lup

Email: chansowyan@gmail.com (*corresponding author), suiseki1984@yahoo.com.sg

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Subjects: Forest snail, *Ditropopsis cf. koperbergi* (Mollusca: Gastropoda: Cyclophoridae).

Subjects identified by: Chan Sow-Yan and Lau Wing Lup.

Location, date, and time: Singapore Island, Bukit Timah Nature Reserve; 9 May 2020; around 1620 hrs.

Habitat: Primary forest. On the ground, among decomposing and damp leaf litter beside a path (Fig. 1).

Observer: Lau Wing Lup.

Observation: Three live specimens, one adult and two subadults were encountered among leaf litter at the side of a path (Figs. 2–6). They were found singly on the underside of dead leaves (Fig. 2). Compared with the adult, young snails have thin peristomes, and more translucent and glossier shells. The flesh is greyish white, and the sensory tentacles dark grey with a pair of round black eyes at the base (Figs. 3 & 4). There is a pinkish patch on the head between the eyes (Fig. 4). The entrails are orange-brown with irregular black patches. The shell has a conical, angular outline, a conspicuous and proportionally large teleoconch, distinct spiral cords, fine radial growth lines, and a deep and wide umbilicus (Figs. 2–4, 6). The operculum is reddish brown and multi-spiral with a central depression (Fig. 5).

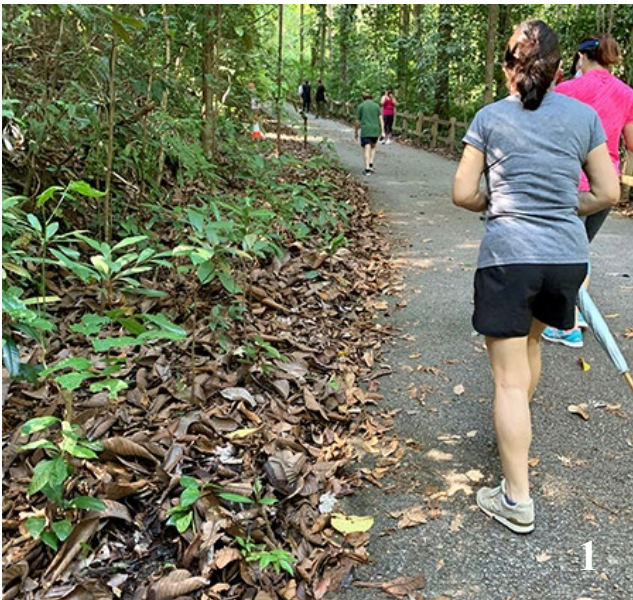


Fig. 1. Leaf litter alongside the path where the snails were found. Fig. 2. Frontal view of a snail grazing in-situ on a dead leaf. Note the shiny, yellow, translucent shell with conical and angular profile, spiral carina, fine radial growth lines and a proportionally large and white teleoconch (Photographs by: Lau Wing Lup).

Remarks: The genus *Ditropopsis* comprises tiny land snails that inhabit soil and leaf litter of tropical rainforests. This greatly understudied group demonstrates high levels of local endemism, being confined to moist microhabitats. Species tend to have limited distributions, coupled with high degrees of intra-species isolation, and these make them especially vulnerable to anthropogenic activities (Greke, 2014).

Previous attempts at identifying local specimens to species level have proven futile, despite specimens having been sent to the Senckenberg Museum in Germany for comparison with type and congeneric material (Ho, 1995). Specimens

from Singapore closely resemble photographs and line drawings of the shell of *Ditropopsis koperbergi*, which is assumed to be endemic to Borneo (see Phung et al., 2017; Vermeulen et al., 2015). The species in Singapore was recorded as '*Ditropis cf. koperbergi*' by Ho (1995), '*?Ditropopsis koperbergi*' by Maassen (2001) and '*Ditropopsis cf. koperbergi*' by Tan & Woo (2010). However, it was not featured by Tan et al. (2012), and until the present record, no illustrations of the shell or living animal could be found in local literature.

The operculum resembles a ball seat and socket washer used in aircraft mechanics (Fig. 5). Such peculiar structures in the opercula of some *Ditropopsis* species are hypothesised to be an adaptation by this group of ground-dwelling snails to floods caused by heavy tropical rains. The modified opercula apparently trap air bubbles and help the snails to float on the water (Greke, 2014).

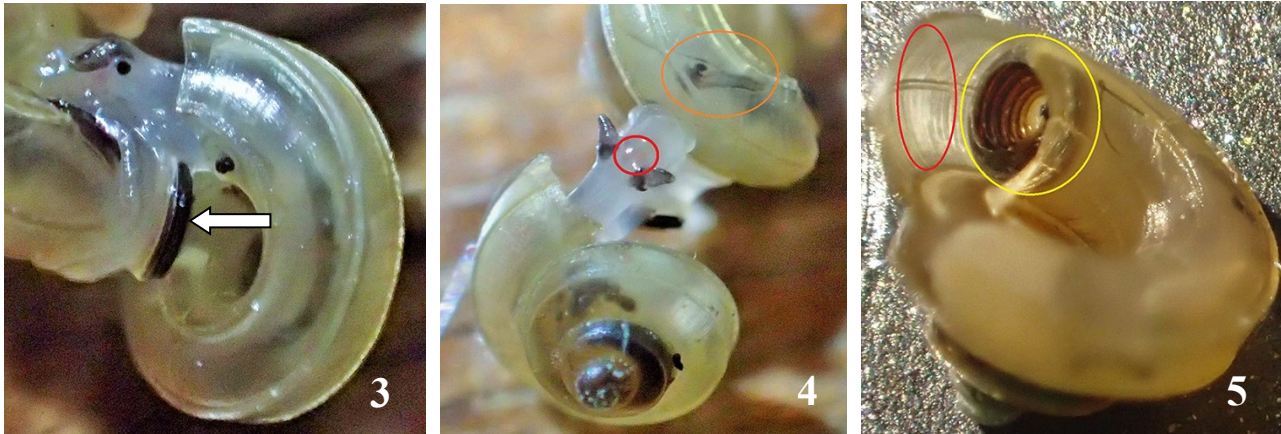


Fig. 3. The greyish and dark brown flesh is visible through the glossy and translucent shell of the subadult snail. Note the shell's wide and open umbilicus, proportionally thick operculum (indicated by arrow), blackish sensory tentacle with a black eye at its base. Fig. 4. A pinkish patch (in red circle) is discernible on the snail's head between the sensory tentacles and eyes. The eye and tentacle (in orange circle) of the other snail are visible through its thin shell. Fig. 5. The operculum is reddish brown and multi-spiraled with a central depression (circled yellow). Also note the fine radial growth lines on the shell's periphery (circled red) (Photographs by: Lau Wing Lup).

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Fig. 6. The three live specimens of *Ditropopsis* cf. *koperbergi* temporarily removed from their natural substrate for photography of the apical (A), apertural (B), basal (C), dorso-lateral (D) and fronto-lateral (E) views of their shells. The adult snail is on the left, the other two are sub-adults. Note that their flesh, including the eyes and tentacles, and entrails can be seen through the thin shells. The adult shell on the left has a thicker outer lip and thicker shell than the other two. The subadult shell on the right lacks the prominent protoconch. Space between the black bars on the green ruler on the bottom margin = 1 mm (Photographs by: Lau Wing Lup).