NATURE IN SINGAPORE **15**: e2022061
Date of Publication: 30 June 2022
DOI: 10.26107/NIS-2022-0061

Biodiversity Record: Amber snails, *Indosuccinea minuta*, found without shells

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Recommended citation. Chan S-Y & Lau WL (2022) Biodiversity Record: Amber snails, *Indosuccinea minuta*, found without shells. Nature in Singapore, 15: e2022061. DOI: 10.26107/NIS-2022-0061

Subjects: Amber snail, *Indosuccinea minuta* (Mollusca: Gastropoda: Succineidae).

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

Location, date and time: Singapore Island, Punggol Park; 3 April 2022; around 1800 hrs.

Habitat: Freshwater. Pond with vegetation along the edges, and organic debris on the bottom.

Observer: Lau Wing Lup.

Observation: It was cloudy after rain. Six amber snails were found close together on a blackish fallen fruit near some aquatic vegetation at the edge of the pond (Fig. 1). Two of the snails, an adult and a juvenile, were noted to be without shells. Despite missing its shell, the adult individual appeared active, roaming about on the fallen fruit (Fig. 2). However, the naked juvenile snail appeared immobile.

An intact shell about 4 mm in length (Fig. 3), which seemed to fit the shell-less adult snail, was found close by. The empty shell has two aberrant features – 1) a dark brown band along the growth line near the edge of the last whorl, encircling the peristome; 2) parts of the shell exterior (parietal callus and whorls) appear pockmarked with indentations. Another individual was noted to have a double lipped shell (Fig. 4), which is an aberrant feature.

Remarks: This appears to be the first record of an *Indosuccinea minuta* snail being able to survive without its shell. However, it is believed that the snail's lifespan would be drastically reduced as the exposed soft tissue would be prone to infection and desiccation, and vulnerable to predators such as ants. It is not known how the snails lost their shells. One possibility is accidental dislodging of the animal when the snail is picked up, perhaps by a curious human.

On the empty shell (Fig. 3), the dark brown band on the last whorl may be caused by the snail's prolonged inactivity to conserve energy and prevent excessive loss of moisture loss. Instead of producing shell, the snail produced thicker layers of periostracum to effectively seal its large aperture, together with an epiphragm of dried mucus (see Fig. 5 of Chan & Lau, 2021). The thicker layer of periostracum appears darker brown than the rest of the shell. The double lip anomaly on one particular *Indosuccinea minuta* shell (Fig. 4) may be related to a prolonged period of stunted growth, possibly while the snail is aestivating. The second lip was formed when the snail re-emerged during favorable conditions, and continued growing its shell again.

Literature cited:

Chan S-Y & Lau WL (2021) Biodiversity Record: The amber snail, *Indosuccinea minuta*, in Singapore. Nature in Singapore, 14: e2021045.

Fig. 1. Dorsal view of *Indosuccinea minuta* snails gazing together in-situ. The two shell-less snails are indicated with arrows. The smaller shell-less individual at the bottom right appeared lifeless. (Photograph by: Lau Wing Lup)

Fig. 2. Dorso-lateral profile of the larger and more active shell-less snail. Fig. 3. Apertural view of the empty shell showing the dark brown band and pitted surface of the last whorl. Fig. 4. Frontal view of a snail with double lipped shell. (Photographs by: Lau Wing Lup)