

The introduced predatory snail, *Gulella bicolor*, in Singapore

Lau Wing Lup & Chan Sow-Yan

suiseki1984@yahoo.com.sg (Lau), chansowyan@gmail.com (Chan)

Subjects: Two-toned gulella snail, *Gulella bicolor* (Mollusca: Gastropoda: Streptaxidae).

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

Locations, dates and time: Two locations on Singapore Island -

- 1) Commonwealth Close and Commonwealth Crescent; 6 June 2020; around 1100 hrs.
- 2) Jalan Kukoh; 29 June 2020; around 1215 hrs.

Habitat: Urban parkland.

- 1) At Commonwealth Close, on damp and mossy slabs of concrete along the bottom of a chain link fence along the perimeter of the Ministry of Education Heritage Centre (Fig. 1). At Commonwealth Crescent, in a small drain beneath a high wall with weep holes, between a bus stop and a residential high-rise building (Fig. 3). There was some lentic water in the drain. Both places were sheltered by rain trees (*Samanea saman*).
- 2) At Jalan Kukoh, on top of a raised concrete kerb below a grassy slope and signboard (Fig. 5).

Observer: Lau Wing Lup.

Observations: 1) At Commonwealth, three live examples of around 7 mm shell length (Fig. 10) were encountered after rain in the morning. Along Commonwealth Close, two *Gulella bicolor* were on the side of moss-covered concrete slabs (Fig. 2, 8 & 9) with *Liardetia doliolum* and *Liardetia scandens* snails. Three relatively undamaged empty shells of *Liardetia scandens* were in close proximity to the two *Gulella bicolor*. The third example of *Gulella bicolor* was found retracted in its shell in a small drain with lentic water and dead leaves of rain tree alongside live pond snails (*Orientalba viridis*) (Fig. 4). The examples were conspicuously exposed, after morning rain.

2) At Jalan Kukoh, two live specimens (adult and juvenile) of *Gulella bicolor* were seen on the concrete kerb (Fig. 5) under grass, alongside other snails (i.e. *Allopeas clavulinum* and *Kaliella barrakporensis*), as well as an unidentified cricket (Fig. 6). The juvenile, about 2.5 mm in shell length, is illustrated ex-situ in Fig. 7 alongside a shell of *Allopeas clavulinum* from the same site.

Remarks: *Gulella bicolor* is thus far the only introduced molluscivorous land snail in Singapore (see Ho, 1995; Tan et al., 2012). Despite being a common synanthropic species with brightly coloured flesh, it is seldom noticed, and thus featured here. It was described by Hutton (1834 as *Pupa bicolor*) from specimens obtained from beneath garden pots and at the base of a wall of the author's bungalow in Mirzapur, India. The species has been widely introduced, and has a circumtropical distribution today (e.g., Clench, 1964; Vermeulen, 2007; Budha et al., 2015; Christensen & Kahn, 2017; Castillo-Rodríguez et al., 2018). Reports of the species in the Pleistocene of India (Bhatia & Mathur, 1973; Kotlia & Joshi, 2006) show that it is native to that region.

Gulella bicolor is an effective micro-predator of the awl snail (*Subulina octona*) and various species of snails in the family Vertiginidae (Mead, 1961; Dundee & Baerwald, 1984), and has also been found to prefer young giant African snails (*Lissachatina fulica*) in lab conditions by Srivastava (1968). In the featured observations, the empty shells of *Liardetia scandens* suggest they could have been eaten by *Gulella bicolor*. The close proximity of a *Gulella bicolor* in the wet drain to living *Orientalba viridis* (Fig. 4) suggests that the aquatic snail is a potential prey, as are the other snails noted at the Jalan Kukoh site.



Fig. 1. Habitat at Commonwealth Close where *Gulella bicolor* snails were found under the fence and trees.

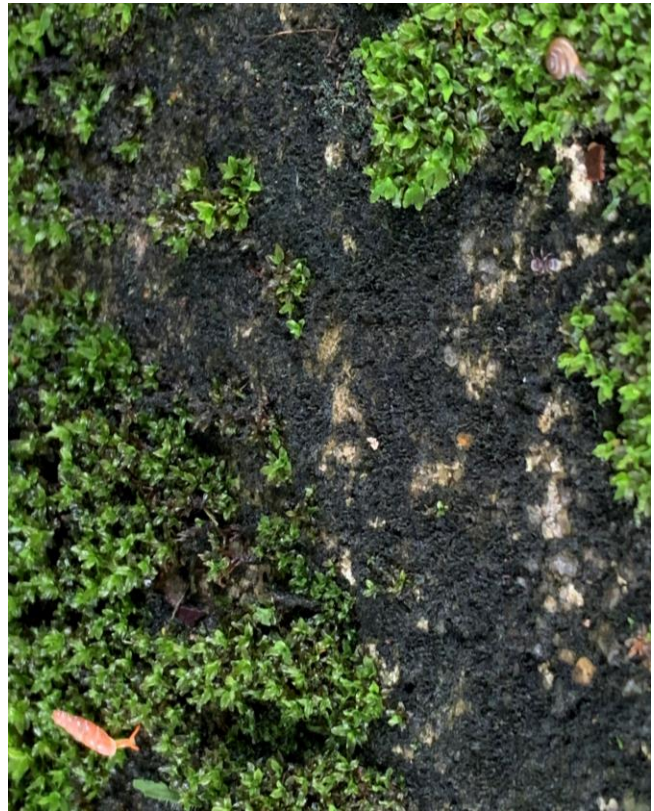


Fig. 2: A *Gulella bicolor* (bottom left corner) on mossy concrete slab near its potential prey, *Liardetia* sp. (top right corner) on a mossy slab of concrete.



Fig. 3. Small drain at Commonwealth Crescent where a live *Gulella bicolor* snail was found.



Fig. 4. A retracted *Gulella bicolor* snail (bottom) with pond snails *Orientogalba viridis* in a small drain.

Photographs by Lau Wing Lup



Fig. 5. The kerb at Jalan Kukoh where two live specimens were found (in red circle).



Fig. 6. Adult *Gulella bicolor* near a cricket on the kerb.



Fig. 7. A juvenile *Gulella bicolor* of around 2.5 mm shell length next to the empty shell of a juvenile spike awl snail (*Allopeas clavulinum*), ex-situ. Both were found together at Jalan Kukoh.



Photographs by Lau Wing Lup



Fig.8. Dorsal view of an adult snail.

Fig.9. Side view of an adult snail.

Fig.10. Three live snails, ex-situ, from Commonwealth. Space between black bars = 1 mm.

Photographs by Lau Wing Lup

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