

Biodiversity Record: Sinistral toothless pupa snails, *Pupisoma dioscoricola*, in Singapore

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Subject: Toothless pupa snail, *Pupisoma dioscoricola* (Mollusca: Gastropoda: Valloniidae).

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

Location, date and time: Singapore Island, Pasir Ris Park, Sungei Api Api; 20 March 2021; 1221 hrs.

Habitat: Mangrove. On vegetation along a creek. In hot and sunny weather.

Observers: Chan Sow-Yan and Lau Wing Lup.

Observation: A lone dextral *Pupisoma dioscoricola* snail was encountered moving on a discarded surgical mask hung on a branch of a sea hibiscus tree (*Hibiscus tiliaceus*) (Fig. 1). On surrounding bushes, about 25 more individuals of various growth sizes were subsequently found aestivating on the underside of largely intact leaves (Figs. 2–4) or on twig joints, alongside a few *Liardetia scandens* snails. Around half of the *Pupisoma dioscoricola* were noted to be sinistral (Figs. 2, 4–8). Both dextral and sinistral specimens have similar soft body colouration (Fig. 8), but sinistral shells appear to be wider (Fig. 7).



Fig. 1. A dextral toothless pupa snail was seen on this discarded surgical mask on a sea hibiscus tree. (Photograph by: Lau Wing Lup).



Fig. 2. Two toothless pupa snails, dextral example on top right, sinistral one on bottom left, on the underside of a leaf. (Photograph by: Lau Wing Lup).

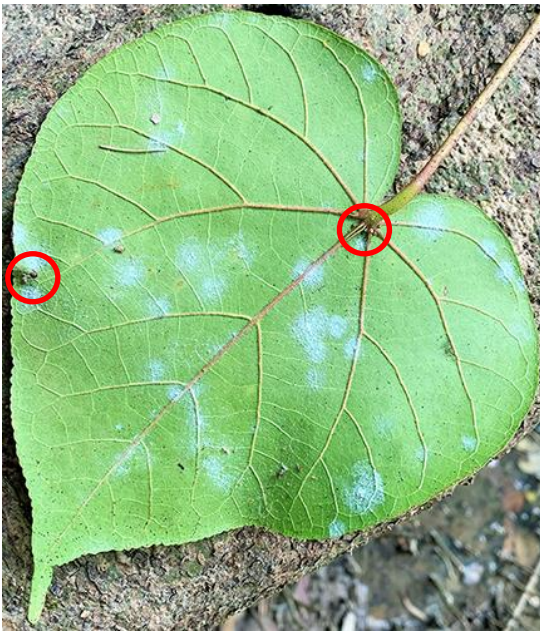


Fig. 3. Two *Pupisoma dioscoricola* (circled red) on the abaxial surface of a sea hibiscus tree leaf. Whitish patches are mycelium of living mould. (Photograph by: Lau Wing Lup).



Fig. 4. A sinistral snail (indicated by arrow) aestivating on the abaxial side of a leaf. White fibrous patches are the mycelia of a living mould, and the leaf slits (circled red) secrete nectar, both potential food for the snails. (Photograph by: Lau Wing Lup).

Remarks: The majority of snails have dextral, or right-handed, shells that spiral clockwise from apex to aperture (versus sinistral, or left-handed, shells that coil anti-clockwise). Enantiomorphy, the phenomenon of different structural forms of the same species appearing to mirror each other, appears to be rare in most snail populations (Tan et al., 2011). This could be due to the physical and anatomical difficulty in copulation between dimorphic specimens that possess genital openings on different sides of the shell and further from each other (Sutcharit et al., 2007). This may be the first record of sinistral *Pupisoma dioscoricola*, for the authors have been unable to locate literature and online resources that mention chiral dimorphism in the species.

Pupisoma dioscoricola was first recorded from Singapore based on a population at Toa Payoh Sensory Park (see Chan & Lau, 2020). Sungei Api Api is probably the first recorded habitat to have a thriving population of *Pupisoma dioscoricola* with both dextral and sinistral shells. This species may also be the only known enantiomorphic micro land snail in Singapore. Interestingly, Singapore populations of the much larger snail, *Amphidromus atricallosus temasek*, also have sinistral and dextral individuals at some sites while apparently having only dextral forms at other locations (Tan, 2014).

Also noted from the featured observation is that most leaves with *Pupisoma dioscoricola* appear largely intact. This suggests that these microsnails do not consume the foliage, but may be grazing on the mycelium of living mould on the surfaces of the leaves (Figs. 3, 4). They may also be feeding on nectar, as snails are found aestivating near leaf stalk slits which are extraflora nectaries (Fig. 4). Live snails tend to have shells coated with detritus, faeces, sand grains, soil and algae (Figs. 2, 5–8), possibly as a means of camouflage to escape the notice of potential predators.

Literature cited:

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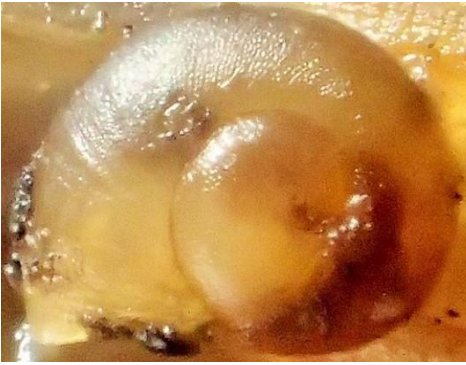


Fig. 5. Apical view of the early whorls of a juvenile sinistral *Pupisoma dioscoricola* (shell height about 0.5 mm). (Photographs by: Lau Wing Lup).

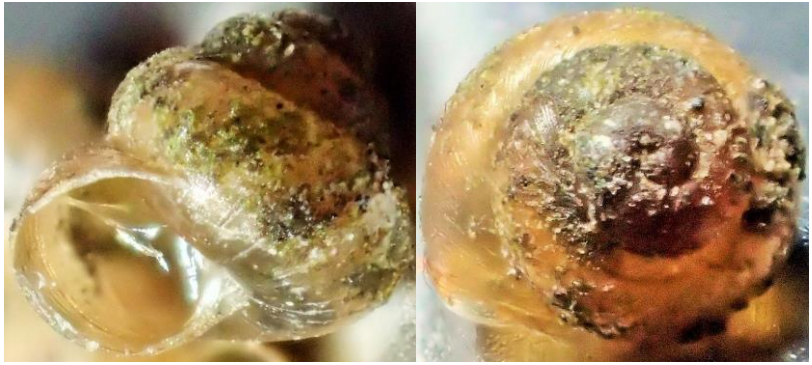


Fig. 6. Two views of a sinistral shell (shell height about 1.5 mm). Apertural view on the left and apical view on the right. Note the extraneous shell coating. (Photographs by: Lau Wing Lup).



Fig. 7. Two views of two mature *Pupisoma dioscoricola* specimens (each about 2 mm in shell height). Sinistral form on the left, dextral form on the right. Note that the sinistral shell appears to be slightly wider in comparison. (Photographs by: Lau Wing Lup).

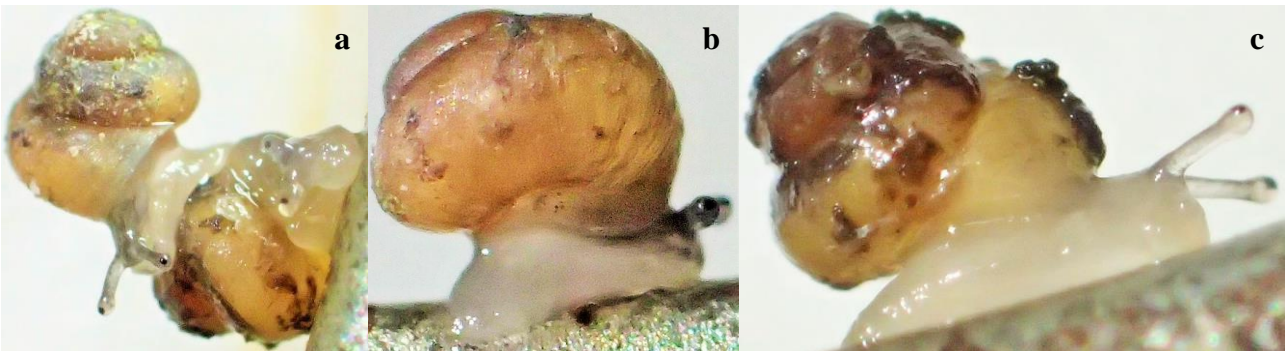


Fig. 8. Live specimens of *Pupisoma dioscoricola*, each about 2 mm in shell height, with animals exposed. a, sinistral individual crawling on the shell of a dextral individual; b, side view of a sinistral snail; c, side view of a dextral snail. (Photographs by: Lau Wing Lup).