

Biodiversity Record: Nesting of the Singapore leafcutter bee at Thomson Nature Park

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Subject: Singapore leafcutter bee, *Megachile (Aethomegachile) ramera* (Insecta: Hymenoptera: Megachilidae).

Subject identified by: Zestin W. W. Soh.

Location and date: Singapore Island, Thomson Nature Park; 1–5 December 2020.

Habitat: Secondary forest.

Observers: Marcus C. F. Ng, Eunice J. Y. Soh, Chui Shao Xiong and Zestin W. W. Soh.



Fig. 1. Rock wall used for nesting. (Photograph by: Zestin W. W. Soh).

Observations: Observations were made over three days.

1) On 1 December 2020, at around 1300 hrs, M.F.C. Ng photographed a single female *Megachile ramera* (body length about 12 mm) flying near a granite rock wall covered with moss and creeping plants (Fig. 1). He then observed her repeatedly entering and leaving a crevice after staying inside for about a minute at a time.

2) On 3 December 2020, further observations at the site between 0930 to 1130 hrs by E.J.Y. Soh and Chui S.X. revealed that the bee, presumably the same one observed two days before, was carrying pollen and provisioning her nest (Fig. 2). The bee was recorded making a total of six pollen-collecting trips, but no leaf-collecting trips were seen. Timed records of the bees' observed behaviour are recorded as follows:

Provisioning trip no.	Time spent outside the nest before returning with pollen	Time spent inside the nest
1	Not recorded	2 minutes 18 seconds
2	7 minutes 50 seconds	1 minute 30 seconds
3	20 minutes 54 seconds	1 minute 58 seconds
4	17 minutes 4 seconds	2 minutes 28 seconds
5	23 minutes 30 seconds	1 minute 50 seconds
6	24 minutes 50 seconds	2 minutes 30 seconds

Note that each row in the above table represents a provisioning trip consisting of two alternating phases: a foraging phase outside the nest, and a pollen deposition phase after entering the nest (third column).

3) Finally on 5 December 2020, Z.W.W. Soh visited the nesting site at about 0940 hrs and observed a completed nest. It was capped with dead leaves (Fig. 3). The area was observed from 0940 to 1030 hrs, however the bee was not seen.



Fig. 2. Female *Megachile ramera* at Thomson Nature Park: a) emerging from her nest in a crevice in a rock wall, and b) returning with pollen. (Photographs by: Chui Shao Xiong).

Remarks: *Megachile ramera* is a rare and poorly studied solitary bee species described from Singapore in 1918 by T.D.A. Cockerell. It was rediscovered locally in 2012 at Dairy Farm Nature Park and later photographed in 2014 at Zhenghua Park visiting tiger orchids (Soh & Ngiam, 2013; Ascher et al., 2016; Soh & Ascher, 2020). The male is not yet known or described (Ascher et al., 2016).

This record likely represents the first observations of this species nesting, and they shed some light on its resource requirements and foraging behaviour. A single *Megachile ramera* brood cell required at least six foraging trips, with each trip lasting around 20 minutes, aside from the provisioning trip no. 2 (see Observations). Although the duration is likely dependent on the nest's distance to the floral resource, it appears to be similar to a distantly related but also relatively large-sized species, *Megachile atrata*, which was observed in Singapore to make 10 pollen-collecting trips (mean time per trip = 12.6 minutes) before switching to collecting leaves (Soh, 2014). It is also noteworthy that the bee was seen utilising a crevice in a rock wall, as the main nesting sites for cavity-nesting *Megachile* in forest settings are often thought to be abandoned beetle burrows in dead wood (Sydenham et al., 2016).

This observation also adds to our understanding of the species' seasonality, as previous records of it were in July (2011) and August (2014) respectively. *Megachile* species are often considered highly seasonal—timing their flight activity with the flowering of their host plants (Ascher et al., 2016), and it is fascinating to note that the species has begun nesting in the monsoonal period. A key aspect of this bee that needs to be determined, however, is the identities of the native plants it relies on for pollen and leaves for nesting material. DNA barcoding of its nest provisions and leaves in the nest may reveal such in the future (Soh et al., 2016).

Much remains to be understood about the life histories of Southeast Asian bees, and the serendipitous encounters and documentation of such nesting bees by both professional and citizen scientists alike will surely contribute to improved understanding of these crucial pollinators.



Fig. 3. Entrance of the completed nest sealed with dead leaves (Photograph by Zestin W. W. Soh)

Literature cited:

- Ascher JS, Risch S, Soh ZWW, Lee JXL & Soh EJY (2016) *Megachile* leaf-cutter and resin bees of Singapore (Hymenoptera: Apoidea: Megachilidae). Raffles Bulletin of Zoology, Supplement 32: 33–55.
- Cockerell TDA (1918) Descriptions and records of bees - LXXX. Annals and Magazine of Natural History, 9: 384–390.
- Soh EJY (2014) Diversity and trap-nesting studies of Singaporean *Megachile* bees to inform monitoring and management of tropical pollinators. Unpublished BSc Thesis, Department of Biological Sciences, National University of Singapore, 110 pp.
- Soh EJY, Soh ZWW, Chui SX & Ascher JS (2016) The bee tribe Anthidiini in Singapore (Anthophila: Megachilidae: Anthidiini) with notes on the regional fauna. Nature in Singapore, 9: 49–62.
- Soh ZWW & Ascher JS (2020) A Guide to the Bees of Singapore. National Parks Board, Singapore, 148 pp.
- Soh ZWW & Ngiam RWJ (2013) Flower-visiting bees and wasps in Singapore parks (Insecta: Hymenoptera). Nature in Singapore, 6: 153–172.
- Sydenham MA, Häusler LD, Moe SR & Eldegard K (2016). Inter-assembly facilitation: The functional diversity of cavity-producing beetles drives the size diversity of cavity-nesting bees. Ecology and Evolution, 6: 412–425.