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**A Newly Found Nesting Site of *Megachile rixator sakishimana*
Yasumatsu *et* Hirashima in Iriomote Island, Southernmost
Archipelago, Japan (Hymenoptera, Megachilidae)**

Ryoichi MIYANAGA and Yasuo MAETA

A Newly Found Nesting Site of *Megachile rixator sakishimana* Yasumatsu *et* Hirashima in Iriomote Island, Southernmost Archipelago, Japan (Hymenoptera, Megachilidae)

Ryoichi MIYANAGA¹⁾ and Yasuo MAETA²⁾

Abstract : A newly found nesting site of *Megachile rixator sakishimana* was reported from Iriomote Island (N24° 20'). This leaf-cutting bee is principally a burrowing species, and usually nidificates in sand dunes. However, they occasionally selected pre-existing cavities as nesting sites, interspaces formed between bundles of reed tubes set in the trap nest box, depending on the available nesting circumstance.

Key words : Nesting sites, leaf pieces, leaf-cutting bees, *Megachile*

Six species of the genus *Megachile* are known to occur from Iriomote Island (N24° 20'), southernmost archipelago of Japan (Yamane *et al.*, 1999; Maeta *et al.*, 2004), 1) *M. esakii* Yasumatsu, 2) *M. monticola* Smith, 3) *M. disjunctiformis* Cockerell, 4) *M. rixator sakishimana* Yasumatsu *et* Hirashima, 5) *M. igniscopata* Cockerell and 6) *M. yaeyamaensis* Yasumatsu *et* Hirashima. Brood cells are made by partitioned walls, adhering partially masticated small leaf pieces in 1), by resin in 2) and 3), and by oval- and round-shaped leaf pieces in 4), 5) and 6). Among the later 3 species (4, 5 and 6) the first is a burrowing species, and the last two are non-burrowing species. *Megachile rixator sakishimana* nidificates in sand dune (Kitamura *et al.*, 2001). *Megachile igniscopata* chooses a variety of pre-existing cavities, such as a decayed hollow in a trunk of *Pandanus odoratissimus*, reed tubes, and calcareous holes of a coral boulder (Maeta *et al.*, 1997; Maeta, 1999b; Hannan *et al.*, 2005), whereas *M. yaeyamaensis* uses deserted cavities excavated by lizards, *Eumeces stimpsoni* Thompson (Maeta *et al.*, 2006). We newly found a nesting site of *M. r. sakishimana* at Iriomote Island as described below.

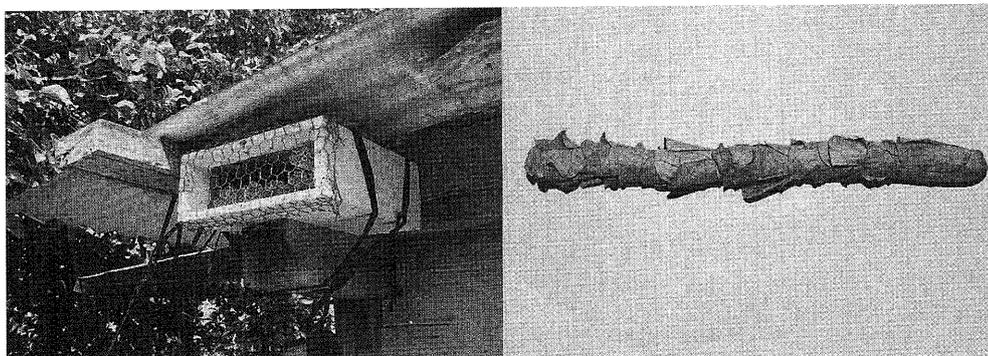
The trap nest box (inner dimensions : 22.5cm [width] ; 7.5cm [height] ; 25cm [depth], Fig. 1) filled with 8 bundles of the reed tubes was prepared for *M. esakii* and set at Mimikiri-hama, near a beach. Fortunately, we found three series of brood cells of *M. r. sakishimana* in the trap nest box, when these reed tubes were withdrawn on July 25, 2007. They were linearly arranged. The first and second series of brood cells were situated in an inter-space between two bundles of reed tubes on the box floor of the trap nest box, and the third in an inter-space between the wall and bundles of reed tubes. The first (Fig. 2) and second cell series were arranged toward the opening side of the trap box, but the third transversely. Each cell series was composed of 7 (the

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¹⁾ Faculty of Life and Environmental Science, Shimane University, Matsue, Shimane 690-8504, Japan

²⁾ Higashitsuda 2168-218, Matsue, Shimane 690-0011, Japan

Correspondence : Ryoichi Miyanaga, E-mail : miyanaga@life.shimane-u.ac.jp



Figs 1 and 2 Trap nest box and a series of brood cells. 1 : Trap nest box set under the eaves of a farming hut in Iriomote Island. 2 : A series of brood cells (the first cell series) found on the floor of the nest box, composed of 7 brood cells, but the last one was uncompleted. The direction of the entrance is the left hand side.

Table 1 Number of leaf pieces used for construction of a single brood cell in *Megachile rixator sakishimana*

Category of leaf pieces ¹⁾	Place used	Types of leaf pieces ³⁾	Range, mean numbers/cell ⁴⁾ (N)
Filler leaf	Cell cup	Large oval-shaped (A-1)	0-11, 4.2±3.6 (23)
		Small oval-shaped (A-2)	0-13, 3.5±4.2 (23)
		Semiround-shaped (A-3)	0-2, 0.1±0.4 (23)
Firm leaf	Cell cup	Large oval-shaped (A-1)	0-7, 2.3±2.1 (23)
		Small oval-shaped (A-2)	0-7, 2.0±2.2 (23)
		Semiround-shaped (A-3)	0-2, 0.1±0.5 (23)
Filler+firm leaf ²⁾	Cell cap	Round-shaped (B-1)	2-4, 2.5±0.6 (21)

¹⁾ Follows Michener (1953)

²⁾ Combined all leaves, because the filler leaves were unseparable from the firm leaves.

³⁾ Terminology of these leaf pieces is mentioned in Kitamura *et al.* (2001).

⁴⁾ Three cell series were examined. Values are given as mean±SD.

last brood cell was uncompleted), 9 (ditto) and 7 brood cells. No vestibular cell was made at the front of the last brood cells even in the third cell series. Presumably, this species has no habit to close the nest entrance with leaf pieces.

Four different types of leaf pieces were used for construction of brood cells: large oval-shaped (A-1), small oval shaped (A-2), semi-round shaped (A-3) for forming the cup, and round-shaped (B-1) for closing the cap. Terminology and dimensions of these leaf pieces are mentioned in Kitamura *et al.* (2001). A-3 is one of characteristics in *M. r. sakishimana* (Maeta *et al.*, 2001). Among a total of 21 provisioned cells obtained, 20 contained cocoons and all were infested by *Melittobia sosui* Dahms. One was infested by fungus. Consequently, determination of the bee species was made by morphological characters of cocoons and leaf pieces. Especially, the existence of A-3 was useful for identification of the bee species (Maeta *et al.*, 2001).

The number of these leaves used for constructing a single brood cell is shown in Table 1. Similarity and difference in the use of leaf pieces between nest box cells (N) and sand dune cells (S) (Kitamura *et al.*, 2001) are as follows: 1) The same types of leaf pieces are recognized. 2) The

size of each type of leaf piece is almost the same. 3) Total number of leaf pieces used for cups was almost the same, but the number of filler leaves (Michener, 1953) was larger in N than in S. 4) The ratio of each type of leaf piece that composed a single cell cup was uniform in S, but varied in N, *e.g.*, A-1 were not used to form the cup in the third cell series. 5) Total number of B-1 used for a single cell cap was fewer in N than in S. These findings show that bees did not increase the number of leaf pieces to form the cups of the brood cells, but reduced the number of firm leaves (Michener, 1953), so as to compensate for the extra number of filler leaves used to fill the excess surrounding space.

Bees could not use reed tubes set in the box, because the diameters of these tubes were smaller than their bodies. We also set reed tubes with various diameters as trap nests at many places on the island for several years, but none of them nidificated by *M. r. sakishimana* was found. As mentioned the above, this species seems occasionally to select pre-existing cavities above the ground as their nesting sites depending on available nesting circumstances. However, the thick layer of cocoons (0.05mm, Kitamura *et al.*, 2001) indicates that *M. r. sakishimana* is a typical burrowing species, as in other Japanese species of burrowing leaf-cutting bees (Maeta, 1999a). As other leaf-cutting bee species, who exhibit both burrowing and non-burrowing, *M. nipponicola* Cockerell and *M. sumizome* Hirashima *et* Maeta are known in Japan (Maeta, 1971 ; Maeta *et al.*, 1996).

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