

Nesting observation of the Sculptured Resin bee *Megachile sculpturalis* F. Smith, 1853 (Hymenoptera: Megachilidae) in Bulgaria

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Abstract. Establishing of the East Asian bee species *Megachile sculpturalis* F. Smith, 1853 (Hymenoptera: Megachilidae) is documented in Bulgaria. Nesting of the species on two old trees of *Styphnolobium japonicum* (L.) Schott was observed in the Sea Garden of Varna City, NE Bulgaria. A single female of the same species was also collected in Banitsa Vill., NW Bulgaria.

Key words: *Megachile sculpturalis*, Bulgaria, alien bee species.

Introduction

Megachile sculpturalis F. Smith, 1853 (Hymenoptera: Megachilidae) is a solitary bee with body length of 14 – 19 mm in males and 22 – 27 mm in females, native to East Asia (Mangum & Brooks 1997; Vereecken & Barbier 2009). Outside its native range, the species was first established in North America (Mangum & Brooks 1997). In Europe, the first finding of *M. sculpturalis* is from Southern France in 2008 (Vereecken & Barbier 2009). Since 2009, the species has been recorded in several countries from Western and Central Europe (Dubaić *et al.* 2022). In the Balkan Peninsula, *M. sculpturalis* was firstly found in Serbia (Četković & Plečaš 2017). In Southeastern Europe, the species has been also collected or observed in Croatia, Bosnia and Herzegovina, Montenegro, Romania, as well as in Bulgaria (a single observation from Stara Zagora) (Dubaić *et al.* 2022). Nesting of the species in Bulgaria has not been yet documented and according to the later authors, the species establishment in the country needs confirmation. Thus, *M. sculpturalis* has not been quoted as a member of Bulgarian wild bee fauna in the last published data concerned with the national species lists for bees and hoverflies for the countries in Europe (Reverté *et al.* 2023).

Both males and females of *M. sculpturalis* can be found on flowers, which serve as a source of pollen and nectar (Mangum & Brooks 1997; Le Féon & Geslin 2018). In Europe, the species seems to be polylectic but shows the same preference for flowers of *Styphnolobium japonicum* (L.) Schott and *Ligustrum* spp. as food sources (Le Féon & Geslin 2018).

The females build larval cells in plant stems of suitable diameter, old trees and dead wood, using pre-existing cavities (Le Féon & Geslin 2018). Often the females use cavities dug by other bees, as well as bee hotels in urban areas (Le Féon & Geslin 2018). Larval cells are constructed of plant resin and a small amount of mud (Le Féon & Geslin 2018).

In the present work we provide the first record of nesting of *M. sculpturalis* in NE Bulgaria, as well as a new record of the species from NW Bulgaria.

Materials and Methods

Observations on nesting behavior were conducted by the first author in the Sea Garden of Varna City in the period 17–20 August 2023. Bees were observed on two old trees of *S. japonicum*, with numerous holes, dug by beetle larvae, probably of *Aegosoma scabricorne* (Scopoli, 1763) (Coleoptera: Cerambycidae) (Fig. 1). The trees were about three hundred meters apart (referred to as “site 1” and “site 2” in the text below). A single female from Banitsa Village (Municipality of Vratsa) was collected accidentally by the last author in July 2023. The abbreviations of the scientific collections, in which the material was deposited, are as follows: BFUS – Zoological Collection of Sofia University, Sofia, Bulgaria; IBER – Collection of the Institute of Biodiversity and Ecosystem Research, Bulgarian Academy of Sciences, Sofia, Bulgaria.



Fig. 1. *Styphnolobium japonicum* trees with nests of *Megachile sculpturalis* in the Sea Garden of Varna City, Bulgaria. A – site 1, 18.viii.2023; B – site 2, 20.viii.2023.

Results and discussion

Megachile sculpturalis F. Smith, 1853 (Figs. 2, 3)

Material examined: Bulgaria, Banitsa Vill., 43°20'19.3"N 23°41'06.4"E, 276 m a.s.l., 19.vii.2023, 1 ♀, on the ground, T. Ljubomirov leg. (IBER); Bulgaria, Varna City, Sea Garden, 43°12'09.9"N 27°55'19.4"E, 14 m a.s.l. (site 1), 18.viii.2023, 2 ♀♀, on trunk of *S. japonicum*, D. Gradinarov leg. (BFUS).

Only two specimens from site 1 of the Sea Garden of Varna City were collected, but on the 17th and 18th of August, on the same tree, we observed 3 to 4 females simultaneously entering different holes in the bark. In proximity, at site 2 (43°12'17.8"N 27°55'25.3"E, 22 m a.s.l.), on the 19th and 20th of August several females were observed and photographed (Fig. 3). At both sites, the bees exhibited the same behavior pattern: repeated entering – exiting

nesting holes and fetching materials in their mandibles inside (probably for a nest). The other observations include crawling on the tree trunk near the hole openings and sideways, as well as alight and crawl on polypore fungi on the same tree.

Our data indicates that the species is established in Bulgaria, including the east of the country. It is desirable to obtain more data of the species distribution in Bulgaria as well as of its preferences for plant species and nesting sites. The current records of its presence in the country concern only urban or rural areas and it is important to observe if it invades the natural ecosystems.

According to Russo (2016) the potential negative impact of *M. sculpturalis* consists of the competition for nesting sites, the pollination of invasive weeds, and the associated alteration of the resident pollination networks (Russo 2016). In particular, *M. sculpturalis* can occupy active nests of species of the genera *Xylocopa* Latreille, 1802, *Osmia* Panzer, 1806 as well as of *Isodontia mexicana* (de Saussure, 1867) (Laport & Minckley 2012; Le Féon & Geslin 2018).

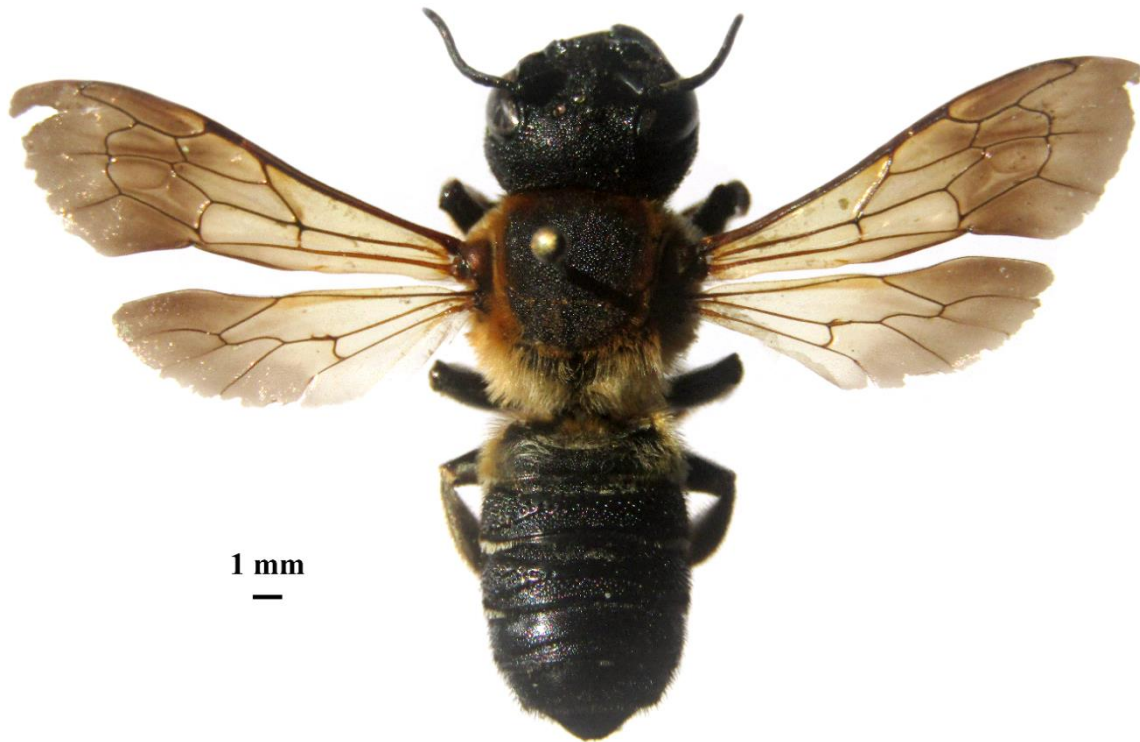


Fig. 2. *Megachile sculpturalis* female, Bulgaria, Varna City, 18.viii.2023.

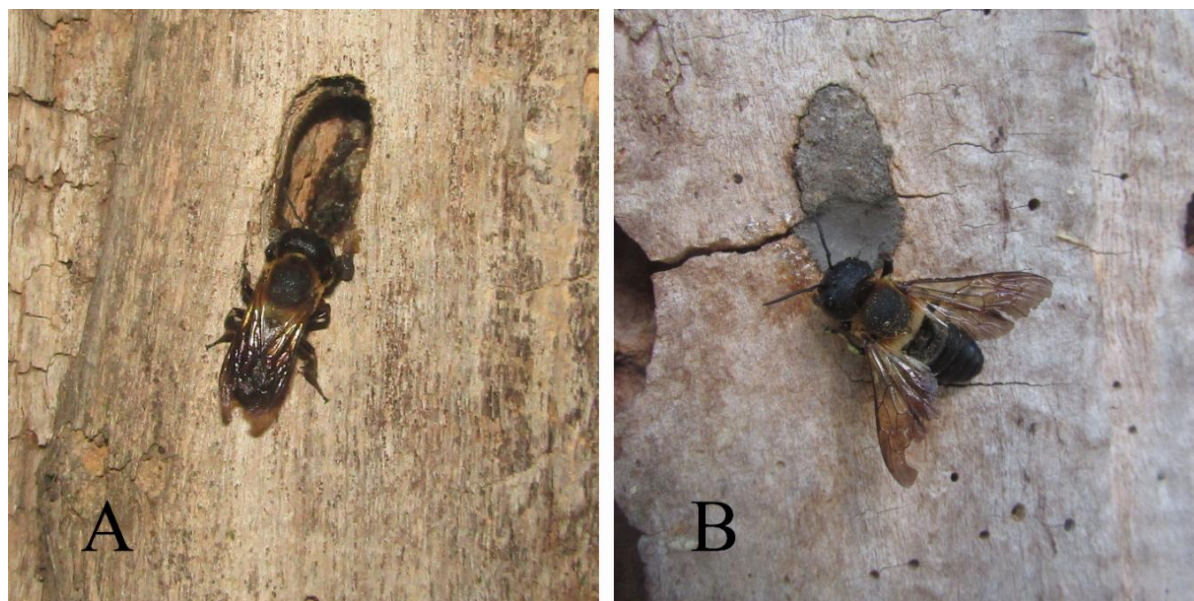


Fig. 3. Females at the nest entrance on the trunk of *Styphnolobium japonicum* in Sea Garden of Varna City, Bulgaria (site 2). A – 19.viii.2023, 20:00 p.m.; B – 20.viii.2023, 08:50 a.m.

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