

[研究文章 Research Article]

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Biological Notes and the Male Description of *Metopius soror* Chiu, 1962 (Hymenoptera: Ichneumonidae: Metopiinae) in Taiwan

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Abstract.

Metopius soror Chiu, 1962 was originally described based on a single female. This study reports the host record of *M. soror* on *Nyctemera albofasciata* (Wileman, 1911) for the first time and female oviposition behavior on the larva of *N. adversata* (Schaller, 1788). We also provide the first description of the male of *M. soror*.

Keywords: Parasitoids, New host record, Oviposition behavior.

Introduction

Metopius Panzer, 1806 is a medium-sized and cosmopolitan genus comprising over 130 species worldwide, with seven species recorded in Taiwan (Chiu, 1962; Kusigemati, 1983; Yu et al., 2016). This genus is characterized by its uniformly concave face surrounded by a strong, shield-shaped carina, thick legs, and a cylindrical metasoma. As endoparasitoids of larval lepidopterans, they have a wide range of hosts, including Geometridae, Lasiocampidae, Noctuidae, Notodontidae, Sphingidae etc. (Tolkanitz, 2015).

Metopius soror Chiu, 1962 was originally described based on a single female specimen, without any additional information. In this study, we report the first host record and oviposition behavior of *M. soror*, and provide the first description of male *M. soror*. The morphological variation of *M. soror* is also discussed based on field observations and a male specimen.

Materials and methods

The third author made a field observation on July 16, 2021, at the Mt. Kantou trail [崁頭山步道] in Dongshan District, Tainan City, Taiwan, using a NIKON D810 camera with a NIKON AF Micro 60mm f/2.8 lens. The identification of field observation was based on comparing live photos (Figs 8–12) with the key and descriptions of Chiu (1962).

In this study, we adopted the morphological terminology and measurement protocols proposed by Broad et al. (2018). The holotype specimen of *M. soror* was examined at the Taiwan Agriculture Research Institute (TARI), Taichung City, Taiwan. The voucher specimen used in this study will also be deposited at TARI. Non-type specimens were examined and measured using a LEICA S8AP0 microscope with a micrometer. Stacked photos were taken with a LEICA DMC5400 camera connected to a LEICA Z16 APO with the auto-stacking system LAS V4.13 (Leica Microsystems, Germany). Figure editing was performed using Adobe Photoshop CC and Adobe Illustrator CC (Adobe Systems Inc., San Jose, CA, USA).

Results

Taxonomy

Metopius (Tylopius) soror Chiu, 1962

姊妹盾臉姬蜂

(Figs 1–12)

Material examined. Holotype. 1♀; Taiwan, Musha [霧社]; 25. VI – 5. VII. 1947; leg. Maa, Chen, and Lin (TARI). **Non-type material.** 1♂; Taiwan, Nantou Cty., Xinyi Twp., Kalibuan Vil., Watchtower forest trail [瞭望台林道/望高寮林道], 23.58825679033767 N, 120.8702248428035 E; 30. VIII. 2016; leg. Y.-M. Hsu; reared from *Nyctemera albofasciata* (Wileman, 1911) (Lepidoptera, Erebidae) [帶紋蝶燈蛾] (TARI).

Diagnosis. This species can be distinguished from other Taiwanese *Metopius* by the following combination of characters: fore wing hyaline, without any dark marking (Fig. 1); metasomal tergite I entirely yellow, profile angularly curved basally in lateral view (Fig. 1); interantennal process flat and lacks median carina (Fig. 3); scutellum and postscutellum apically yellow (Figs 4–5); propodeum anterior transverse carina present, lateromedian carina extend to about apical 0.7 of propodeum, not connect apically, and with short longitudinal carina apically (Fig. 5); metasomal tergite IV at least 1/2 yellow (Fig. 6).

This species is most similar in appearance to *M. (Metopius) rufus browni* Ashmead, 1905 among Taiwanese congeners, but can be distinguished from it by the following characters: fore wing hyaline (antero-apical area of fore wing with a dark spot in *M. rufus browni*), interantennal process flat, lacks median carina (median carina present in *M. rufus browni*), metasomal tergite I entirely yellow (basal 0.3 black in *M. rufus browni*), and pattern of propodeal lateromedian carina extend to about apical 0.7 of propodeum (extend to apex of propodeum in *M. rufus browni*).

Description of male. Male is similar to female (female description see Chiu (1962: 8)) in body structures, but differs as follows:

Measurements. Head about 0.5 as deep as wide; facial shield about 1.3 as long as wide; ocular-ocellus length (OOL) about 2.0 times diameter of lateral ocellus (OD); first flagellomere about 1.3 times as long as second; fore wing vein 3rs-m (= second intercubitus *sensu* Chiu (1962)) about 1.6 times as long as 2rs-m (= first intercubitus *sensu* Chiu (1962)) (Fig. 7); tergite I about 0.75 as long as wide; tergite II about 0.73 as long as wide; tergite III about 0.8 as long as wide; tergite IV about 0.76 as long as wide; hind femur about 2.6 as long as deep.

Coloration. face yellow without black spot; tergite II almost entirely black, with small yellow spots on lateral posterior corners; tergite III black, with apical 0.3 yellow; tergite IV black, with apical 0.5 yellow; tergites V and VI black, with apical margin yellow; metasomal tergites without brown color; tegula yellow; fore and mid legs yellow, except dorso-medial parts of femurs and dorsal side of fore coxa light brown; trochanters yellow; hind coxa blackish brown, with dorso-apical 0.4 and ventro-apical 0.6 yellow; hind femur yellow with one brownish spot in outer side, blackish brown except basal 0.1 and apical 0.3 yellow in dorsal and inner side; hind tibia and tarsus brown; parameres yellow, tapered and pointed apically in lateral view (Fig. 1).

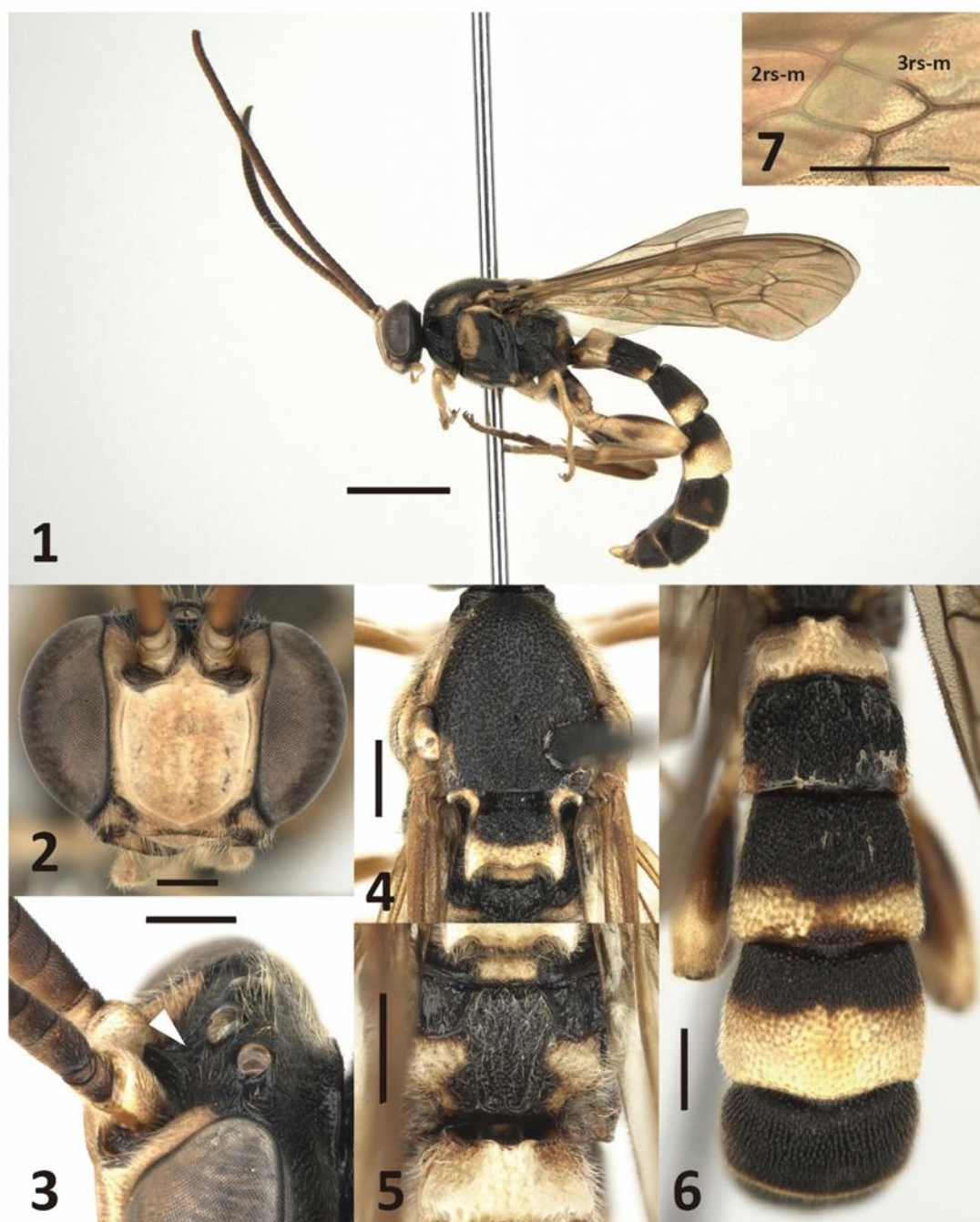
Distribution and bionomics. Taiwan (Nantou, Tainan). *Nyctemera albofasciata* is first reported as the host of *M. soror*.

Remarks. The description of the fore wing vein 3rs-m / 2rs-m ratio in couplet 3 of Chiu's *Metopius* key (Chiu, 1962: 6) was wrongly inverted as 2rs-m / 3rs-m. The revised couplet is shown below:

3. Fore wing second intercubitus about 2.0 times as long as first intercubitus; scutellum and postscutellum entirely black; first abdominal tergite partially black *M. (T.) fuscolatus*
Fore wing second intercubitus about 1.5-1.6 times as long as first intercubitus (Figs 7, 12); scutellum and postscutellum yellow apically (Fig. 4); first abdominal tergite entirely yellow (Fig. 1) *M. (T.) soror*

Field observation

The female *M. soror* was observed ovipositing on the larva of *N. adversata* (Schaller, 1788) (Lepidoptera, Erebidae) [粉蝶燈蛾] roosting on burnweed *Erechtites valerianifolius* (Link ex Spreng.) DC (Asterales, Asteraceae) [飛機草] (Figs 8–10). It was found moving around the host and tried to attack several times by bending its metasoma forward, the host was trying to escape but failed (Figs 8–10).

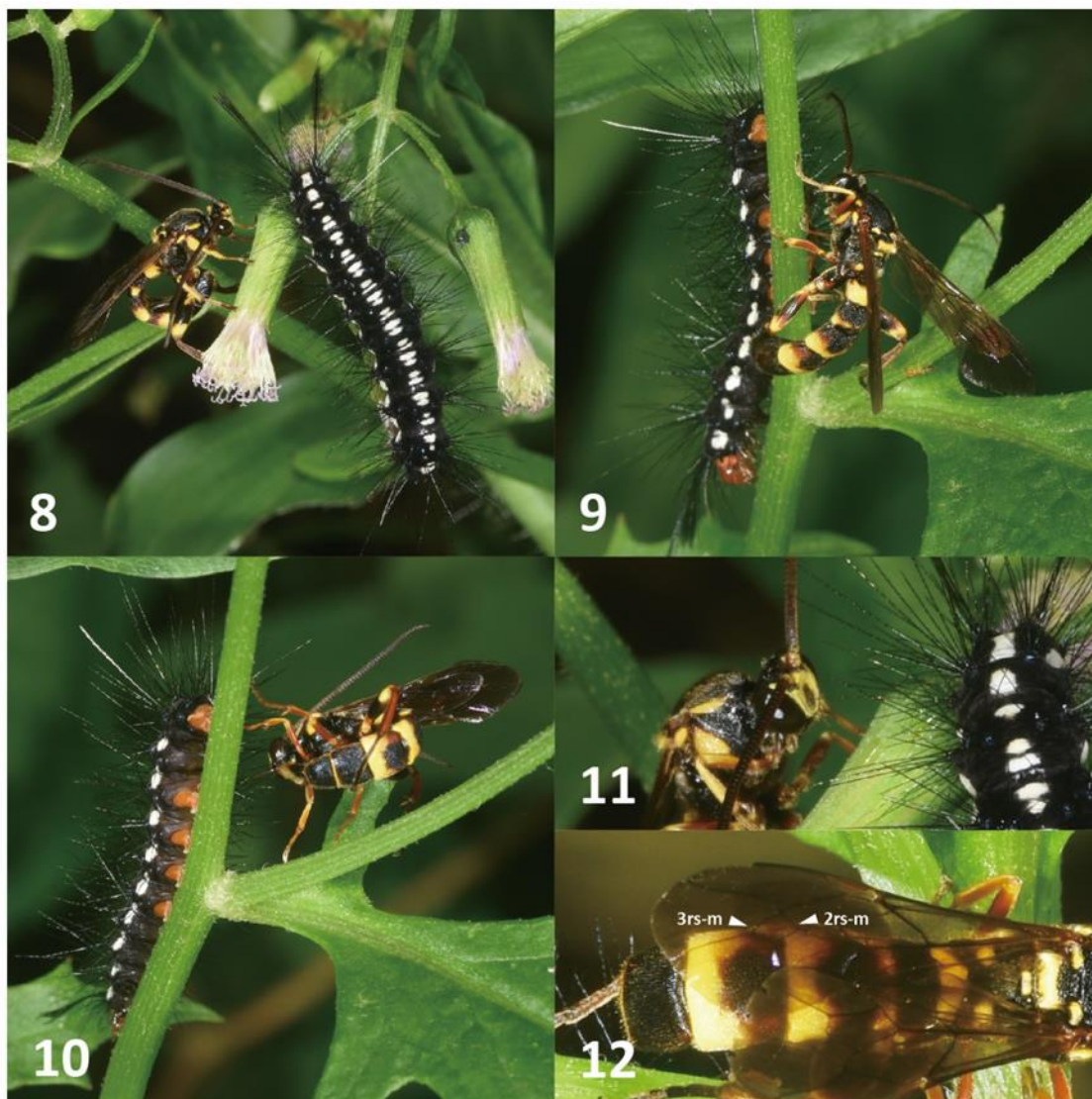


Figs 1–7. Male of *Metopius soror*. 1, habitus in lateral view; 2, head in frontal view; 3, interantennal process, indicated by white triangle; 4, mesoscutum, scutellum and postscutellum in dorsal view; 5, propodeum in dorsal view; 6, metasomal tergites in dorsal view; 7, areolet. Scale bars: 1, 3 mm; 2–3, 0.5 mm; 4–7, 1 mm.

Discussion

This study first discovered the intraspecific variation of *M. soror* whose sexual dimorphism exists in the body shape and coloration of metasomal tergites and legs. The male has a lower depth/width ratio of head, length/width ratio of tergite II, and larger OOL/OD ratio, the coloration is lighter on its legs, and no brown patterns on its metasomal tergites. In the female, variations also exist between the type specimen and the female shown in the photos, whose color pattern of the hind femur is more distinct.

The oviposition behavior observed suggests that *N. adversata* is the potential host of *M. soror*. The male described was also reared up from the larva of the congener *N. albofasciata*. These records suggest that *M. soror* may use mainly *Nyctemera* species as hosts.



Figs 8–12. *M. soror* ovipositing on the larvae of *N. adversata*. 8–10, live female of *M. soror* was moving around the larvae of *N. adversata* and tried to attack by bending its metasoma forward; 11, ditto, the face; 12, ditto, the fore wing (Photographed by Tsai-Wen Hsu).

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姊妹盾臉姬蜂（膜翅目：姬蜂科：盾臉姬蜂亞科）之生物學短記暨雄蟲描述

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摘要：

姊妹盾臉姬蜂 (*Metopius soror* Chiu, 1962) 是僅以一正模式標本所描述的物種，除模式標本再無其他採集與目擊紀錄。本研究首次報導姊妹盾臉姬蜂於帶紋蝶燈蛾 (*Nyctemera albofasciata* (Wileman, 1911)) 之寄主紀錄、其在粉蝶燈蛾 (*N. adversata* (Schaller, 1788)) 幼蟲之產卵行為及雄蟲描述。

關鍵字： 擬寄生昆蟲、新寄主紀錄、產卵行為。