Collecting Records of Spalangia Latreille, 1805 (Hymenoptera: Pteromalidae) Parasitic on Pupae of Stomoxys calcitrans (Linnaeus, 1758) and Musca domestica Linnaeus, 1758 (Diptera: Muscidae) in Japan

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Abstract. The present study provided new collecting records of the following *Spalangia* species in Japan: *S. cameroni* Perkins, 1910; *S. endius* Walker, 1839; *S. nigra* Latreille, 1805; and *S. nigroaenea* Curtis, 1839.

Key words: Distribution, pupal parasitoid, the house fly, the stable fly.

Introduction

Members of *Spalangia* Latreille, 1805 (Hymenoptera: Pteromalidae) are known as pupal parasitoids of Diptera, such as Calliphoridae, Muscidae, and Tephritidae (Gibson 2009; Noyes 2019). Until now, six species of *Spalangia* have been known to Japan: *S. cameroni* Perkins, 1910 (Matsuo 2020); *S. endius* Walker, 1839 (Tachikawa 1965); *S. gemina* Bouček, 1963 (Ogawa *et al*. 2009); *S. nigra* Latreille, 1805 (Nakasuji 1963; Kamijo & Yamamoto 2000); *S. nigroaenea* Curtis, 1839 (Ogawa *et al*. 2009); and *S. simplex* Perkins, 1910 (Nagase 2004). Because some of *Spalangia* species have been known as biological control agents against the stable fly, *Stomoxys calcitrans* (Linnaeus, 1758) and the house fly, *Musca domestica* Linnaeus, 1758 (Diptera: Muscidae) (Morgan *et al*. 1975; Morgan & Patterson 1990; Legner 1995; Skovgård 2004), we are accumulating their collecting records in Japan. Fly pupae that were collected from bovine manure were identified based on shape of the posterior spiracles mentioned in Rochon *et al*. (2021). Parasitoids were identified by using a key to species provided by Gibson (2009) and Matsuo (2020)

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Table. Specimens of *Spalangia* spp. examined. They have been kept in the collection of the BLKU.

Species name and No. of individuals	Host	Collecting site (collector*)	Date of collecting	Date of emergence
Spalangia cameroni				
1♀	*Stomoxys calcitrans*	Kawasaki, Fukuoka, Japan (KM)	21 November 2018	December 2018
1♀1♂	*Stomoxys calcitrans*	Chiran, Minamikyushu, Kagoshima, Japan (KM, HA, KA, MS)	28 October 2021	30 November 2021
2♀1♂	*Stomoxys calcitrans*	Chiran, Minamikyushu, Kagoshima, Japan (KM, HA, KA, MS)	28 October 2021	8 December 2021
1♀	*Musca domestica*	Nakijin, Kunigami, Okinawa, Japan (KM, HA, KA, MS)	18 October 2021	29 November 2021
1♂	*Musca domestica*	Nakijin, Kunigami, Okinawa, Japan (KM, HA, KA, MS)	18 October 2021	30 November 2021
Spalangia endius				
2♀1♂	*Stomoxys calcitrans*	Miyako, Fukuoka, Japan (KM)	14 November 2018	December 2018
4♀	*Stomoxys calcitrans*	Yazakosagamine, Nagakute, Aichi, Japan (HT)	9 August 2021	11 August 2021
2♀	*Stomoxys calcitrans*	Ono, Hyogo, Japan (KM, HA)	12 October 2021	25 October 2021
1♂	*Musca domestica*	Ei, Minamikyushu, Kagoshima, Japan (KM, HA, KA, MS)	29 October 2021	8 December 2021
1♀	*Musca domestica*	Ei, Minamikyushu, Kagoshima, Japan (KM, HA, KA, MS)	29 October 2021	10 December 2021
1♀	*Musca domestica*	Nakijin, Kunigami, Okinawa, Japan (KM, HA, KA, MS)	18 October 2021	15 November 2021
1♀	*Musca domestica*	Nakijin, Kunigami, Okinawa, Japan (KM, HA, KA, MS)	18 October 2021	24 November 2021
Spalangia nigra				
1♀1♂	*Chrysomya pinguis*	Miyako, Fukuoka, Japan (KM)	17 May 2018	18 June 2018
2♀	*Stomoxys calcitrans*	Yazakosagamine, Nagakute, Aichi, Japan (HT)	10 June 2021	17 June 2021
Spalangia nigroaenea				
4♀2♂	*Stomoxys calcitrans*	Miyako, Fukuoka, Japan (KM)	15 May 2019	3-4 June 2019
4♀2♂	*Stomoxys calcitrans*	Yazakosagamine, Nagakute, Aichi, Japan (HT)	9 August 2021	11 August 2021
1♂	*Stomoxys calcitrans*	Ei, Minamikyushu, Kagoshima, Japan (KM, HA, KA, MS)	29 October 2021	4 November 2021
1♂	*Stomoxys calcitrans*	Nakijin, Kunigami, Okinawa, Japan (KM, HA, KA, MS)	18 October 2021	17 November 2021

*Names of collectors: KM Kazunori Matsuo, HA Hiromitsu Araki, HT Hiro Takahashi, KA Koshi Asami, MS Makito Shindo

as well as reference specimens kept in the Hokkaido University Museum (HUM) and the Natural History Museum, London (BMNH). Specimens obtained in this study were deposited in the collection of the Biosystematics Laboratory, Faculty of Social and Cultural Studies, Kyushu University, Japan (BLKU).

Results

Spalangia cameroni Perkins, 1910

(Table)

Distribution. Afrotropic, Australasia, Nearctic, Neotropic, Oriental, and Palaearctic (Noyes 2019). Japan (Fukuoka, Kagoshima, and Okinawa). The present study newly recorded *S. cameroni* from Kagoshima and Okinawa Prefectures, Japan.

Spalangia endius Walker, 1839

(Table)

Distribution. Afrotropic, Australasia, Nearctic, Neotropic, Oriental, and Palaearctic (Noyes 2019). Japan (Aichi, Hyogo, Fukuoka, Kagoshima, and Okinawa). The present study newly recorded *S. endius* from Aichi, Hyogo, Kagoshima, and Okinawa Prefectures, Japan.

Spalangia nigra Latreille, 1805

(Table)

Distribution. Afrotropic, Australasia, Nearctic, Neotropic, Oriental, and Palaearctic (Noyes 2019). Japan (Kanagawa, Aichi, Yamaguchi, Ehime, and Fukuoka). The present study newly recorded *S. nigra* from Aichi Prefecture, Japan.

Spalangia nigroaenea Curtis, 1839

(Table)

Distribution. Afrotropic, Australasia, Nearctic, Neotropic, Oriental, and Palaearctic (Noyes 2019). Japan (Aichi, Kochi, Fukuoka, Kagoshima, and Okinawa). The present study newly recorded *S. nigroaenea* from Aichi, Kagoshima, and Okinawa Prefectures, Japan.

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