

Full Length Research Paper

The First occurrence of *Spalangia drosophilae* Ashmead (Hymenoptera: Pteromalidae) as parasitoid of *Brontaea debilis* (Thomson) (Diptera: Muscidae)

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ABSTRACT

The study reports the new host species for the parasitoid *Spalangia drosophilae* Ashmead (Hymenoptera: Pteromalidae) in bovine dung Central State of Goiás, Brazil. The pupae were obtained by the flotation method. They were individually placed in gelatin capsules until the emergence of adult flies or their parasitoids. The overall percentage of parasitism was 2.2%. This paper report the first occurrence of *S. drosophilae* as parasitoid of *Brontaea debilis* (Thomson) (Diptera: Muscidae) in the world.

Keywords: dipterous, natural control, natural enemy, Goiânia, Goiás

INTRODUCTION

The flies included in the infra-order Muscomorpha have medical and veterinary importance, since they may produce myiasis and act in carrying pathogens to man and animals (Marcondes, 2001). They have been found to carry more than 100 species of disease-causing organisms such as bacteria, protozoa and helminthes (Greenberg, 1971).

Parasitoids are responsible for reducing the populations of flies that proliferate on various substrates. Evaluation of these species for natural control over these insects is important for enabling studies that aim towards subsequent selection of species for use in biological control programs (Marchiori *et al.*, 2000).

The Pteromalidae is cosmopolitan in distribution and is one of the largest families of Chalcidoidea, containing 3000 recognized species belonging to nearly 600 genera. The Pteromalidae hosts are diversified and members of many other insects orders such as Hemiptera, Neuroptera, Coleoptera, Lepidoptera, Diptera, Siphonaptera, Hymenoptera and Dermaptera. They attack eggs, larvae, pupae and more rarely, adults. It seems that the main contribution of pteromalids is their control on flies, especially the housefly and the stable fly (Gauld and Bolton, 1988; Hanson and Gauld, 1995).

The genera *Spalangia* (Hymenoptera: Pteromalidae) presents pupal parasitoids associated with flies of the families Muscidae, Calliphoridae, Sarcophagidae, Drosophilidae, Chloropidae, Sepsidae and others (Mendes and Linhares, 1993; Marchiori and Linhares, 1999; Marchiori *et al.*, 2001; Marchiori *et al.* 2004). Many known species develop in hosts that live in feces, and decaying meat plant tissues. *Spalangia* species, predominantly associated with manure, are parasitoids of pupae. Many data show that its biology are hosts of *Musca domestica* L. (Diptera: Muscidae) (Rueda and Axtell, 1985). The main species found parasitizing flies are: *Spalangia cameroni* (Perkins), *Spalangia endius* (Walker), *Spalangia nigra* Latrielle and *Spalangia nigroaenea* (Curtis) (Hymenoptera: Pteromalidae). The main hosts species are: *Ravinia belforti* Prado & Fonseca (Diptera: Sarcophagidae), *Brontaea quadristigma* (Williston), *M. domestica*, *Archiseopsis scabra* Loew, *Palaeosepsis* spp. (Diptera: Sepsidae), *Stomoxys calcitrans* L. (Diptera: Muscidae), *Sarcophagula occidua* (Fabricius) (Diptera: Sarcophagidae) and *Cyrtoneurina paraescita* Couri (Diptera: Muscidae) (Silveira *et al.*, 1989; Marchiori *et al.*, 2001)

Spalangia drosophilae Ashmead (Hymenoptera: Pteromalidae) is cited in the literature as parasitoid pupae of Diptera small families Drosophilidae and Chloropidae (Boucek, 1963), but also of *Haematobia irritans* L. (Diptera: Muscidae) (Depner, 1968). Marchiori and Linhares (1999) also collected in these parasitoid pupae Muscidae, Sarcophagidae and Sepsidae (*Palaeosepsis* spp.) (Marchiori *et al.*, 2013).

The aim of the present paper was to report on a new host for *S. drosophilae*.

MATERIAL AND METHODS

The study were conducted at the cattle farm of the Veterinary and Zootecnics School of the Federal University of Goiás, in the municipality of Goiânia (16°40'S and 49°16'W), Brazil. The study was conducted from February 2011 to January 2012. Every fortnight, 10 plates of fecal cake (of approximately 3 kg each) were produced from fresh bovine feces that were collected immediately after defecation in pastures of *Brachiaria brizantha* (Hochst ex. A. Rich) and in corrals. The material was collected in plastic buckets and was homogenized. It was then placed in 10 round plastic supports of 20 cm in diameter, with a hole to allow rainwater to drain away. This methodology was used for precise determination of the time between the emission

of the fecal cake and its collection. The feces remained exposed (five in the pastures and five in the corrals) for 15 days. After this period, the feces were taken to the laboratory for extraction of pupae by means of the flotation method (Marchiori and Linhares, 1999). The pupae were removed with the aid of a sieve; they were counted and individually stored in gelatin capsules (number 00) until the flies and/or parasitoids emerged. The parasitoids and flies that emerged were identified with the aid of a stereoscopic and were conserved in 70% alcohol.

The percentage parasitism was calculated as the number of parasitized pupae divided by the total number of pupae collected, multiplied by 100.

The adult parasitoids were identified using the keys of Legner *et al.* (1976), Rueda and Axtell (1985) and Boucek (1963) and the hosts were identified in accordance with Carvalho *et al.* (2002).

RESULTS AND DISCUSSION

Between March and December 2012, 92 pupae of *Brontaea debilis* (Thomson) (Diptera: Muscidae) from bovine feces, from which 31 specimens of *B. debilis* were emerged. The percentage of parasitism was 2.2%. The parasitism successful rate can be influenced by the availability of resources, density hosts and to the searching capacity of the parasitoids.

Spalangia drosophilae is cited in the literature as parasitoid of the pupae of Diptera including Chloropidae, Drosophilidae, Muscidae, Sarcophagidae and Sepsidae (Marchiori *et al.*, 2001; Marchiori, 2002; Marchiori *et al.*, 2002).

Brontaea debilis had previously been found to be parasitized by the following parasitoids: *S. cameroni*, *S. nigra* and *nigroaenea* (Marchiori, *et al.*, 2007). However, there is no record hitherto on the parasitism of *B. debilis* by *S. drosophilae*.

Among the means for controlling flies, chemical insecticides are the most widely used. However, these may lose their efficiency as populations gradually become insecticide-resistant. The resistance to insecticides shows the growing need to introduce alternative insect control programs, for instance the biological control.

It is possible to control these insects, by using the natural regulators such as parasitoids, which are the responsible agents for the reduction of the insects pests populations.

To our knowledge, this paper reports the first occurrence of *S. drosophilae* parasitizing *B. debilis*. Further studies are required on the bioecology of *S. drosophilae* in Brazil.

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