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Short Communication

Flying with the enemy: An endoparasitic fly larva in Brazilian bumblebees

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In the south of Brazil some species of bumblebees are disappearing, such as: *Bombus bellicosus* in Paraná State. Insecticides and other pesticides and global warming are possible candidates for such phenomena, but none of them has been deeply studied. In forest fragments at southeast of Brazil (Sorocaba City, São Paulo State) tachinid fly larvae were found inside the abdomen of foraging females of *Bombus morio* and *Bombus atratus*. It is the first time that the occurrence of such parasitism is described for these species and it could be of some relationship to the disappearance of the genus *Bombus*.

Key words: Bumblebee, *Bombus atratus, Bombus morio,* parasitism, tachinidae.

INTRODUCTION

In Brazil, the extinction of the bumblebee *Bombus bellicosus* in Paraná State is an irrefutable reality. According to Martins and Melo (2010), the species was relatively abundant in Paraná until early 1980s, but disappeared of the State from 2002. The same mysterious disappearance of bumblebee species has been observed in other southern states of Brazil (Martins and Melo, 2010). A plethora of reasons for the disappearance of these bees has been considered, like anthropic disturbance with extensive agricultural activity, increasing the environmental amount of pesticides and insecticides and also global warming, but all of them are not conclusive (Gregorc and Ellis, 2011; De Jong, 2009). One of the most difficult attempts to study the Brazilian bumblebees is the scarce knowledge of their biology, the great difficulty to find them, and to maintain their nests in the laboratory. The present work reveals a hitherto undescribed parasitism found in the Brazilian bumblebees *Bombus morio* and *Bombus atratus* (Apidae, Bombini), collected in the degraded forest fragments during foraging on flowers.

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METHODOLOGY

During the daily collection of bees for morphological studies in a forest area fragment (23°34'53.1"S 47°31'29.5") in the Federal University of São Carlos (Campus Sorocaba, São Paulo, Brazil), 12 bumblebees were collected on flowers of *Cassia* sp (Fabaceae) at 10 a.m, and 4 other bees, at 5 p.m. In the first collection three of them were females of *B. morio* and in the second, one female of *B. atratus*. The bees were collected using entomological net on flowers and immediately conditioned in amber flasks to be dissected in laboratory.

RESULTS AND DISCUSSION

During dissection for studies of the bee ovaries we found one larva hosted in the anterior portion of the abdomen of a female of *B. morio* (Figure 1). Another two females of *B. morio* collected in the same forest fragment area presented one tachinid larva hosted on the same position inside of the abdomen. Each bee analyzed, presented one different hosted larva's size, suggesting that each bee hosted three different larval instars (Figure 2). In the field the bees did not show any signal of anatomic and abnormal behavior, like integument injures, or motor and flying disorder. Damage on the ventral nerve cord was not observed, but the ovaries were completely reduced and damaged (Figure 1). The midgut right below the

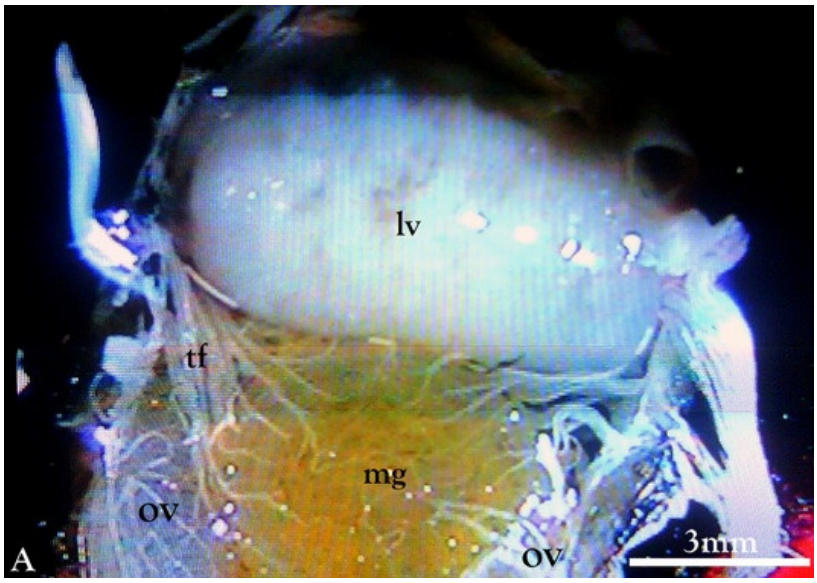

Figure 1. Micrography of the larva inside *B. morio* abdomen. The bees were collected using entomological net on flowers and immediately conditioned in amber flasks to be dissected in laboratory. The dissection was done in paraffin Petri dishes with saline solution for insect under a stereomicroscope Leica L2 connected to a TV screen. lv = larva, mg= midgut, ov = ovary, tf = terminal filament.

Figure 2. Detail of the tachinidae larvae found in *B. morio* abdomen. The larvae were photographed in the same stereomicroscope connected to a digital camera DFC 290 (Leica). The internal organs were carefully dissected with ophthalmological chirurgical instruments. All the collected bees, after dissection, are stored in the entomological insectaria of the Structural and Functional Biology Laboratory.

larva's lodge was intact (Figure 1). Therefore, the larva could parasitize the bee's ovary, since no male was parasitized, and also use hemolymph as food source (Consoli and Parra, 1996). Since all of them were hosted with the parasite, the collected *B. morio* may be from the same nest. The other 9 bumblebees collected at 10 a.m belong to the species *B. atratus*, but none of them presented tachinid larvae, except for the unique female

collected at 5 p.m. during the second collection.

This is the first time that a tachinid fly is described as endoparasite of *Bombus*, being barely described as a bee parasite only for *Apis mellifera* in 1921 (Skaife, 1921). We suspect that the adult flies oviposit the eggs into the adult female of *B. morio* and *B. atratus* during the foraging (Durrer and Schmid- Hempel, 1994; Schmid-Hempel and Stauffer, 1998; Stireman et al., 2006), when the bees expose their intersegmental membranes of the tergites to collect pollen on the flowers. The tachinid fly larvae are parasitic of butterfly caterpillars, hemiptera and some coleoptera (Costa et al., 2006). Studies to rear the tachinid larvae and observations in the field are carried out to identify the adult fly and to understand the real impact of parasitism in the population of this important pollinator species.

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