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Are rare velvet ants (Hymenoptera: Mutillidae) to feed on extrafloral nectar?

Eduardo Soares Calixto[a], Bruno Sousa-Lopes[a], Kleber Del-Claro[a]

[a] Universidade de São Paulo-USP, Laboratório de Ecologia Comportamental e de Interações, Programa de Pós-Graduação em Entomologia, Ribeirão Preto-SP, Brasil. E-mail: calixtos.edu@gmail.com, brunoslopes@usp.br, delclaro@ufu.br.

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ABSTRACT

Solitary aculeate wasps represent the family Mutillidae (Hymenoptera) with high sexual dimorphism. The adult females are wingless and usually immature parasitoids of other insects and males are most often winged and generally feed on nectar. There are few records in the literature of adults of Mutillidae wasps feeding on extrafloral nectaries (EFNs) and still less in Brazil. Here, we report six fortuitous observations of mutillid wasps feeding on extrafloral nectar and their behavior in different plants in a reserve of cerrado *stricto sensu*, in Uberlândia, Brazil. We observed six species of mutillid wasps: *Traumatomutilla* sp. and *T. latevittata* (Cresson, 1902) feeding on EFNs of *Stryphnodendron polyphyllum* (Mart.), *Hoplocrates* sp. feeding on the EFNs of *Eriotheca gracilipes* (K. Schum.), *Timulla* sp. feeding on the EFNs of *Banisteriopsis malifolia* (Nees & Mart.), *Hoplomutilla* sp. feeding on the EFNs of *Qualea grandiflora* (Mart.) and an unidentified male species in *Q. multiflora* (Mart.). All mutillid wasps showed similar behavior on the plants. They quickly climbed on to the plant and foraged over with frequent movements of the antennas until they found the EFNs. We suggest that it is not a fortuitous observation, neither rare. We are just not looking with the needed attention to EFNs.

Keywords: Mutillid wasps, extrafloral nectaries, insect-plant interaction.

Introduction

Extrafloral nectaries (EFNs) are secretory glands present in plants, which produce nectar rich in carbohydrates (mainly sucrose and fructose), with diluted compounds of lipids, enzymes, amino acids, phenols, alkaloids and volatile organic compounds (González-Teuber & Heil, 2009). These structures can be found in approximately 4,000 species belonging to 108 vascular plant families (Weber & Keeler, 2013), ranging from 8 to 31% of arboreal individuals and from 15 to 26% of tree species in the Cerrado (Oliveira & Leitão-Filho, 1987).

It is known that extrafloral nectar positively interferes with the survival, body size of individuals and egg numbers of ant colonies (Byk & Del-Claro, 2011) and attracts a great diversity of insects and other arthropods, like spiders (Stefani et al., 2015; Nahas et al., 2016) and wasps (Koptur et al., 2015). According to Koptur (1992), insects from 10 orders have already been reported feeding on nectar or visiting EFNs (see also Almeida et al., 2011). Nevertheless, Hymenoptera is the most common order, especially ants, which act as a biotic defense for plants (Rico-Gray & Oliveira, 2007; Del-Claro et al., 2016).

The family Mutillidae (Hymenoptera) comprises about 4,200 species and is represented by solitary aculeate wasps with high sexual dimorphism (Lelej, 2007). The adult females are wingless and usually immature parasitoids of other insects, especially bees and wasps, and males are most often winged and generally feed on nectar (Brothers, 1989). Furthermore, exudates from hemipterans and extrafloral nectar can also be collected by both females and males (Brothers, 1989; Luz et al., 2016). Therefore, this study aimed to report six fortuitous observations of velvet ants (mutillid wasps, Hymenoptera: Mutillidae) feeding on extrafloral nectar in different EFNs-bearing plants.

Material and Methods

The six fortuitous observations of velvet ants feeding on extrafloral nectar were observed in a reserve of cerrado *stricto sensu*, in Uberlândia, MG, Brazil, in November and December of 2016 and 2017. The reserve area is composed of trees of 2-8 meters tall with shrubs and grasses in the

understory. The climate at this time of year is humid and rainy, where most EFNs-bearing plants have active EFNs.

Results

We observed *Traumatomutilla* sp. (https://youtu.be/RY_HM1ELkM4) and *T. latevittata* (Cresson, 1902) (Sphaeropthalminae) (Figure 1A) feeding on EFNs of *Stryphnodendron polyphyllum* (Fabaceae), which bears EFNs at the base and at the apex of petiole; *Hoplocrates* sp. (Sphaeropthalminae) feeding on the EFNs of *Eriotheca gracilipes* (Malvaceae) (Figure 1B), which bears EFNs at the base of the petiole; and *Timulla* sp. (Mutillinae) (Figure 1C) feeding on the EFNs of *Banisteriopsis malifolia* (Malpighiaceae), which bears EFNs at the base of the leaves. Also, we observed two individuals of *Hoplomutilla* sp. feeding on the EFNs of *Qualea grandiflora* (Vochysiaceae) (https://youtu.be/RY_HM1ELkM4) and an unidentified male species in *Q. multiflora* (Vochysiaceae) (https://youtu.be/RY_HM1ELkM4) – both species of *Qualea* present EFNs at the base of leaf petiole.

It is important to mention that we did not collect specimens and they were identified based on photos and videos and with the help of specialists. All observations occurred during the day except in *Q. grandiflora* and all plants had between 0.5 and 2 meters in height.

All mutillid wasps showed similar behavior on the plants. They quickly climbed on to the plant and foraged over with frequent movements of the antennas until they found the EFNs (https://youtu.be/RY_HM1ELkM4). After that, they spent between 2- and 9-seconds drinking nectar in one EFN and that moving to other ones searching for more nectar. *Traumatomutilla latevittata, T.* sp. and *Hoplomutilla* spent about three minutes foraging on each plant, *Hoplocrates* sp. spent about 1 minute. We were not able to measure the time spent by *Timulla* sp., because during registration it jumped from the plant. This behavior seems to be common for mutillid wasps.

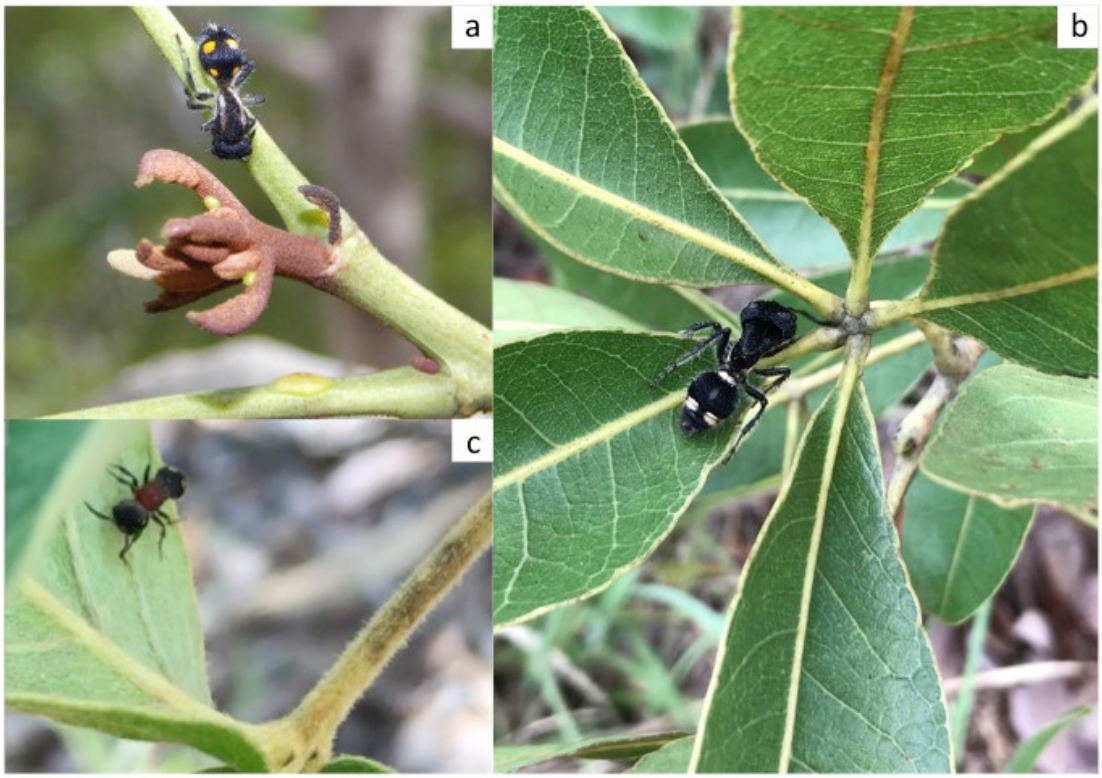

Figure 1. Velvet ant species foraging on EFNs-bearing plants in the cerrado. a. *Traumatomutilla latevittata* (Cresson, 1902) female on *Stryphnodendron polyphyllum* (Mart.) (Fabaceae); b. *Hoplocrates* sp. female on *Eriotheca gracilipes* (K. Schum.) (Malvaceae); c. *Timulla* sp. female on *Banisteriopsis malifolia* (Nees & Mart.) (Malpighiaceae).

Discussion

There are few records in the literature of adults of mutillidae wasps feeding on EFNs and still less in Brazil (Luz et al., 2016). However, we can see some evidence as showed by Luz (2016), which observed thirteen specimens feeding on EFNs of *Banisteriopsis campestris* and *B. vernoniifolia*. Furthermore, a study by Lenko (1970) showed females of *T. latevittata* in *Mimosa* sp. (Fabaceae).

Nectar-feeding is not commonly observed in mutillids. So, why they do that? The most obvious argument is an opportunity. Mutillids are complementing their diet with an energetic, rich resource (Byk & Del-Claro, 2011). However, what is precisely the feeding behavior of adult mutillids? In a recent paper on the Brazilian Mutillidae, Luz et al. (2017) recorded 114 species from Mato Grosso do Sul without any comment about adult feeding habits.

Brothers (1972) pointed out that males generally fly and feed on nectar whereas females run and may feed on adults or immatures of the host in addition to nectar or honeydew from hemipterans. All of our observations occurred during the rainy season when the most of EFNs-bearing plants have active EFNs (Lange et al., 2013), and we only observed females feeding on extrafloral nectar.

Conclusion

We suggest that it is not a fortuitous observation, neither rare. We suggest that we are just not looking with the needed attention to EFNs. Indeed, when looking for EFNs, we are generally oriented to search for ants. Then, why not use a so abundant, rich, easy to obtain resource in the tropical systems like the Brazilian savannas? We need more studies about natural history.

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