First report of *Exomalopsis fulvofasciata* (Hymenoptera: Anthophoridae) as host of two *Timulla* species (Hymenoptera: Mutillidae)

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Abstract: Two species of *Timulla* Ashmead that parasitize nests of *Exomalopsis fulvofasciata* (Hymenoptera: Apidae) in riparian vegetation in the Miranda Pantanal, Mato Grosso do Sul, Brazil were recorded. Also, the behavior of *Timulla* species, and first report of *T. intermissa* in the Brazilian Pantanal was reported.
Keywords: *parasitoidism, Pantanal, host report, velvet ant, Mutillini.*

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Resumo: Registramos duas espécies de *Timulla* Ashmead parasitando ninhos de *Exomalopsis fulvofasciata* (Hymenoptera: Apidae) em mata ciliar na região do Pantanal de Miranda, Mato Grosso do Sul, Brasil. Foram observados comportamentos das espécies de *Timulla* e primeiro registro de *T. intermissa* para o Pantanal Brasileiro.
Palavras-chave: *parasitoidismo, Pantanal, registro de hospedeiro, piolho-de-onça, Mutillini.*

Introduction

Mutillidae are wasps that parasitize mature larvae or pre-pupae of other insects, especially other aculeate Hymenoptera (Brothers et al. 2000). Among the Hymenoptera, their known hosts are Vespidae (Polistinae, Eumeninae), seveval Halictinae and Bombinae (Apidae) (Brothers et al. 2000), Sphecidae and Crabronidae (Quintero & Cambra 1996, Cambra & Quintero 1993). About 2-3% of Mutillidae hosts are known in the world (Brothers 2006). In the Neotropical region, there were an increasing number of records in recent years (e.g. Mickel 1969, Yanega 1994, Cunha 2004, Lima et al. 2008, Bergamaschi et al. 2010, 2011, 2012).

The mutillid *Timulla* Ashmead includes species from Africa, Asia, Australia and islands of Pacific Ocean (Mickel 1938). One hundred sixty-one Neotropical species were described and little is known about their biology and hosts (Cambra & Quintero 1993). Most *Timulla* species have restricted geographic distribution (Mickel 1938) and show high level of host specificity (Wilson 2010). Twenty-seven *Timulla* species were described in Brazil (Mickel 1938), with 12 species recorded in Mato Grosso do Sul state. There is little information on Neotropical *Timulla* hosts, having records only for *T. centroamericana* (Dalla Torre, 1897) (Quintero & Cambra 1996), and *T. pictoria* Mickel, 1938 (Rocha-Filho et al. 2008). The *Timulla* fauna is scarcely known in Neotropical region, particularly in the Pantanal, the biggest wetland in the world where only 7 species were recorded (Cresson 1902, Mickel 1938, Aranda & Catian 2008). In this paper we reported the activity of two species of *Timulla* parasitizing nests of *Exomalopsis fulvofasciata* (Smith, 1879) and a new record for *T. intermissa* (Gerstaecker, 1958) in the Brazilian Pantanal.

Material and Methods

We collected samples in the riparian forest of Miranda River (19° 4' 29.85 "S, 57° 1' 9.02" W). The Pantanal is a vast floodplain, of approximately 140,000 km^2, which floods in pulses, characterized by dry periods and low water levels. Flooding is considered one the most selective forces acting on the biota (Junk et al. 1989).

The species of Mutillidae and bee hosts were manually collected, with the use of forceps and entomological hand net, from 14:00 to 17:50h on February 23 and 24, in the rainy season of 2011. Bees' nests were located in an area with sparse vegetation and exposed soil. We counted the number of complete nests and those under construction in five plots of 1m^2. Specimens of *Timulla* (Mutillidae) were identified with the use of specific keys (Mickel 1938) and comparison with type material from the National Museum of the Universidade Federal do Rio de Janeiro. Specimens of *E. fulvofasciata* were identified by comparison of deposited material from the Zoological Reference Collection of the Universidade Federal de Mato Grosso do Sul (CEUFMS1936-1940), in Campo Grande identified by Dr. Samuel Viera Boff. The specimens were deposited in the Zoological Reference Collection of Universidade Federal de Mato Grosso do Sul (CEUFMS 2785-2790, 2797-2803).

Results and Discussion

Two species of *Timulla* that parasitize *Exomalopsis fulvofasciata* nests were collected, as follows: 20 individuals of *Timulla terminalis* (Gerstaecker, 1958), and 6 individuals of *Timulla intermissa* Mickel, 1938, parasitizing *E. fulvofasciata* nests. *Timulla intermissa* has been recorded for the Cerrado and Atlantic Forest biomes (Mickel 1938, Aranda & Catian 2008) and our study reports for the first time this species in Pantanal floodplain.

Exomalopsis Michener (Hymenoptera: Apidae, Anthophorinae) are solitary bees that nest in the soil, where individuals provide resources for the development of their larvae (Rozen Junior 1984, Norden et al. 1994). Here we observed that females of *E. fulsvofasciata* built their nests in open areas with sandy soil, in a high concentration of nests: 83% were complete and 17% under construction in five plots of 1m^2. *Timulla* females were observed in this area, entering and staying there for about five minutes in the complete nests and in those under construction.

Our study shows the first record of *E. fulvofasciata* as a potential host of *Timulla* species. Species of *Timulla* have already been recorded parasitizing other hymenopterans: *Solenopsis invicta* Buren, 1972 (Formicidae) (Brothers et al. 2000), *Epicharis* sp. (Apidae) (Rocha-Filho et al. 2008) and species of Sphecidae and Eumeninae (Vespidae) (Quintero & Cambra 1996, Cambra & Quintero 1993). Other species of *Exomalopis* have already been recorded as hosts of mutillids. *Exomalopsis solani* Cockerell, 1896, was parasitized by *Pseudomethoca bethae* Krombein, 1992 in Arizona and New Mexico, USA (Norden et al. 1994) and *Horcomutilla* sp. in Mato Grosso do Sul, Brazil (Lima et al. 2008).

The nests were monitored over six months, but due to Pantanal flood pulses, nest openings were destroyed and the emergence of hosts and parasitoids could not be monitored, and, thus, it has not been possible to obtain data on the frequency of parasitism for the species. The considerable number of *Timulla* seen upon entering bee nests over a short time interval indicates that the use of *E. fulsvofasciata* nests in the Pantanal region is not accidental. We consider the behavior of *Timulla* females in the nests of *E. fulsvofasciata* as an evidence of parasitism, however future research is also necessary to better understand the ecological relationships involving these species.

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