

Doryctinae (Hymenoptera: Braconidae) from Estação Ecológica de Caetetus, a seasonal semideciduous forest in Gália, São Paulo, Brazil

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Resumo: O Brasil é um dos países com maior biodiversidade no mundo. No entanto, a fauna de insetos é pobremente conhecida, especialmente a de vespas parasitoides. No presente trabalho, nós fornecemos informação sobre a diversidade de Doryctinae (Hymenoptera: Braconidae), uma das mais diversas subfamílias de Braconidae. O levantamento foi feito em uma floresta estacional semidecídua localizada no Estado de São Paulo (Estação Ecológica de Caetetus) usando três métodos: armadilha Malaise, armadilha Moericke, e Rede de varredura. 788 espécimes foram capturados, distribuídos em 18 gêneros, dos quais *Heterospilus* foi o mais abundantemente coletado com 85,15% do total amostrado. Os métodos de coleta que obtiveram maior captura de indivíduos foram, respectivamente, o de rede de varredura (36,92% da amostra), armadilha Malaise (34,77%) e armadilha Moericke (28,29%). A Estação Ecológica de Caetetus é uma importante área protegida que abriga considerável riqueza de gêneros de *Doryctinae*.

Palavras-chave: Biodiversidade; Caetetus; Mata Atlântica; Parasitoides.

Abstract: Brazil is one of the most biodiverse country in the world. However, the fauna of insects is poorly known, especially parasitic wasps. In the present work we provide information on the diversity of Doryctinae (Hymenoptera: Braconidae), one of the most diverse subfamilies of Braconidae. The survey was conducted in a semideciduous seasonal forest located in the State of São Paulo (Caetetus Ecological Station) using three methods: Malaise trap, Yellow pan-trap, and Sweep net. 788 specimens were caught, distributed in 18 genera, of which *Heterospilus* was by far the most abundantly collected with 85,15% of total sampling. The methods that obtained more individuals captured were, respectively, Sweep net (36.92% of sampling), Malaise trap (34.77%) and Yellow pan-trap (28.29%). The Caetetus Ecological Station is an important protected area that houses a considerable richness of genera of *Doryctinae*.

Keywords: Atlantic Forest; Biodiversity; Caetetus; Parasitoids.

INTRODUCTION

Brazil is considered one of the megadiverse countries in the world. In the last years, researchers from Brazil have been realized several initiatives focusing on the inventory of the biodiversity in a wide world conservational effort to catalog species and gather information about the biodiversity confronting the rapid degradation of natural habitats and global change (MMA/SBF 2002; LEWINSOHN & PRADO 2005; CAMPBELL et al., 2009).

In order to achieve the goal of make the inventory of our biodiversity, we conducted a survey of parasitoid wasps in a semideciduous seasonal forest located in the State of São Paulo. In the present study, we provide information on the diversity of Doryctinae (Hymenoptera: Braconidae).

Doryctinae is one of the most diverse subfamilies of Braconidae and it is mostly tropical and subtropical in distribution, especially in the New World tropics (ZALDÍVAR-RIVERÓN et al., 2008), with 1609 described species and 186 recognized worldwide genera, according Yu et al. (2012), but the exact number of described genera in the moment is 187, considering *Doryctopambolus* (NUNES et al., 2012), being 54 ge-

nera occurs in Brazil (YU et al., 2012). Most species are idiobiont ectoparasitoid of xylophagous Coleoptera, although several taxa attack larvae of Lepidoptera and Symphyta and in unusual cases they are termitophilic (BELOKOBYLSKIJ et al., 2004) or associated with figs and galls (MARSH 2002; BELOKOBYLSKIJ et al., 2004; ZALDÍVAR-RIVERÓN et al., 2008). The group belongs to cyclostome braconids, with circular or oval mouth opening, formed by concave apical margin of clypeus, mandibles and concave labrum. Its diagnostics characters are a row of stout spines along anterior edge at for tibia, double node at apex of the ovipositor, and flange at the apico-lateral corner of the propleuron (MARSH, 2002).

Some authors have already studied Doryctinae wasps at level of genus, among which we mention Nunes (2007) worked in 10 States of Brazil at Atlantic Rain Forest, Yamada (2001) in a State Park at São Paulo State, Cirelli & Pentead-Dias (2003) in a area of environmental protection at São Paulo State, Scatolini & Pentead-Dias (2003) in three different cities at Paraná State, South of Brazil, and Yamada (2006) also worked in 10 States of Brazil at Atlantic Rain Forest. Castro (2010) worked in Brazilian Savannah at São Paulo Sta-

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te, and Zaldívar-Riverón et al. (2010) in Mexico, at Jalisco State.

MATERIALS AND METHODS

In order to expand the information about the diversity and distribution of Doryctinae in Brazil, we conducted a survey of parasitoid wasps in a semideciduous seasonal forest located in the State of São Paulo, known as Estação Ecológica de Caetetus (EEC). The area comprises 2,178.84 ha located in the municipality of Galia and Alvinlândia, State of São Paulo, Brazil, between parallels 22°20' S to 22°30' S, and 49°40' W to 49°45' W. The EEC protects one of the last remnants of the originally continuous Atlantic Forest (seasonal semideciduous forest) in the western São Paulo State (TABANEZ et al., 2005).

The samples were taken weekly using two Malaise traps from December 2002 to May 2004. In addition, we collected eight samples using 50 yellow pan-traps that were taken monthly from June of 2003 to January of 2004. Once per month, we also collected samples by sweeping net during thirty minute. The period of collect using sweep net was from December of 2002 to February of 2004.

The material was deposited at Universidade Federal de São Carlos at Departamento de Ecologia e Biologia Evolutiva, and was preserved in ethanol 70 %. Doryctinae was sorted in the laboratory and identified using the keys provided by Wharton et al. (1997) and Marsh (1993, 2002).

RESULTS AND DISCUSSION

A total of Seven hundred eighty-eight specimens of Doryctinae belonging to 18 genera (Table 1) were collected and identified.

The genus *Heterospilus* Haliday was by far the most abundant genus collected, representing 85.15 % of the total. Several Brazilian authors reported this genus as always the most abundantly collected from Doryctinae (CIRELLI & PENTEADO-DIAS, 2003; YAMADA, 2006; NUNES, 2007; CASTRO, 2010). This genus has one of the most diverse host ranges into the family Braconidae (WHARTON et al., 1997) and the estimated number of species is about 200 in Nearctic Region and 400 in Neotropical Region (MARSH, 2002).

The other four genera collected with frequency above 1 % were: *Notiospathius* Matthews & Marsh (5.46 %), *Barbalhoa* Marsh (1.90 %), *Johnsonius* Marsh (1.90 %) and *Tripteris* Enderlein (1.90 %), representing with *Heterospilus*, 96.31 % of the sampled Doryctinae.

The remaining genera are considered rare in this survey because they were collected at lower abundances than 10 individuals over a year and a half of study with the three sampling techniques, but are no less important and composes the spatial and temporal structure of the community (WHITE, et al., 2006).

Regarding the sampling method, 36.92 % of individuals belonging to 10 genera were caught by sweep net; 34.77 % of specimens distributed in 13 genera were caught by Malaise trap and 28.29 % belonging to four genera were collected by Moericke trap.

If we considered the genera of Doryctinae that were collected exclusively by only one method of collection used in this study, we will notice that eight genera were collected exclusively by Malaise trap, while five genera were collected only by sweep net method. These results highlight the need for multiple methods to study the diversity of Doryctinae.

CONCLUSIONS

Heterospilus is a dominant *Doryctinae* genus in the seasonal forest of Caetetus Ecological Station, followed by *Notiospathius*, *Barbalhoa*, *Johnsonius* and *Tripteris* that were the most important genera in this study.

The sampling methods used in this study may be selective for certain genera, so it is recommended the use of multiple methods for this subfamily.

The Estação Ecológica de Caetetus is an important protected area that houses a considerable richness of genera of Doryctinae.

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Table 1: Numbers of individuals (by genus) collected from December 2002 to May 2004 using Malaise trap, Yellow pan-trap, and Sweep net.

Genus/Thecnique	Malaise	Moericke	Sweep net
<i>Doryctinus</i> Roman, 1910	1	0	0
<i>Allorhogas</i> Gahan, 1912	4	1	2
<i>Barbalhoa</i> Marsh, 2002	10	3	2
<i>Callihormius</i> Ashmead, 1900	0	0	1
<i>Ecphylus</i> Foerster, 1862	4	0	0
<i>Glyptocolastes</i> Ashmead, 1900	0	0	2
<i>Heterospathius</i> Barbalho & Penteado-Dias, 1999	3	0	0
<i>Heterospilus</i> Haliday, 1836	211	192	268
<i>Johnsonius</i> Marsh, 1993	11	0	4
<i>Megaloproctus</i> Schulz, 1906	0	0	1
<i>Notiospathius</i> Matthews & Marsh, 1976	7	27	9
<i>Parallorhogas</i> Marsh, 1993	1	0	0
<i>Pedinotus</i> Szépligeti, 1902	0	0	1
<i>Pioscelus</i> Muesebeck & Walkley, 1951	2	0	0
<i>Ptesimogastroides</i> Braet & van Achterberg, 2001	0	0	1
<i>Rinamba</i> Cameron, 1912	2	0	0
<i>Spathiospilus</i> Marsh, 1999	3	0	0
<i>Tripteria</i> Enderlein, 1912	15	0	0
Total	274	223	291

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