RECORDS OF INSECTS IN THE DIET OF SOCIAL WASPS OF THE GENUS *Polybia* LEPELETIER, 1836 (VESPIDAE: POLISTINAE) IN SOUTHEASTERN BRAZIL

REGISTROS DE INSETOS NA DIETA DE VESPAS SOCIAIS DO GÊNERO *Polybia* LEPELETIER, 1836 (VESPIDAE: POLISTINAE) NO SUDESTE DO BRASIL

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Abstract

Social wasps of the genus *Polybia* Lepeletier, 1836, have a generalist feeding habit and are predators of a wide variety of other insects, however there are no reports of the feeding of hemipterans and odonates by *Polybia fastidiosuscula* Saussure, 1864 and *Polybia platycephala* Richards, 1951, respectively. Therefore, this study aims to record the predation of a Dictyopharidae individual by *P. fastidiosuscula* and the feeding of a Coenagrionidae individual by *P. platycephala*. Both records occurred occasionally in Southeast Brazil and contribute to the knowledge about the diet of these vespids.
Keywords: Predation. Hemiptera. Odonata.

Resumo

Vespas sociais do gênero *Polybia* Lepeletier, 1836, possuem hábito alimentar generalista e são predadores de uma grande variedade de outros insetos, entretanto não há relatos da alimentação de hemipteras e odonatas por *Polybia fastidiosuscula* Saussure, 1864 e *Polybia platycephala* Richards, 1951, respectivamente. Desta forma, esse estudo tem como objetivo registrar a predação de um indivíduo Dictyopharidae por *P. fastidiosuscula* e a alimentação de um indivíduo de Coenagrionidae por *P. platycephala*. Ambos registros ocorreram de forma ocasional no Sudeste do Brasil e contribuem para o conhecimento sobre a dieta desses vespídeos.
Palavras-chave: Predação. Hemiptera. Odonata.

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1. INTRODUCTION

Social wasps (Hymenoptera: Vespidae) are insects considered generalists regarding the exploitation of food resources, using both plant and animal products, especially other insects (Prezoto; Giannotti; Machado, 2005; Brügger *et al*., 2019; Somavilla *et al*., 2019; Brock; Cini; Sumner, 2021). Because of this varied feeding habit, these insects play important ecosystem services, such as biological control of agricultural pests (Southon *et al*., 2019), pollination (Brock; Cini; Sumner, 2021), and trophic regulation in food chains (McGruddy *et al*., 2021).

For instance, the genus *Polybia* Lepeletier, 1836, encompasses 51 species occurring in Brazil (Somavilla *et al*., 2021), some of which have a wide geographic occurrence and inhabit different biomes such as *Polybia fastidiosuscula* Saussure, 1864 and *Polybia platycephala* Richards, 1951 (Souza *et al*., 2020a, b). The diet of these wasps consists mainly of lepidoptera larvae and larvae of other insect orders (Prezoto; Giannotti; Machado, 2005; Brügger *et al*., 2019). However, there are no records of Hemiptera and Odonata, respectively, in the diet of these two species of social wasps.

Therefore, the aim of this study is to record the occurrence of Hemiptera in the diet of *P. fastidiosuscula* and Odonata in the diet of *P. platycephala* in areas of Atlantic Forest and transition to the Cerrado biome in the state of Minas Gerais, Southeast Brazil.

2. MATERIAL AND METHODS

The records occurred occasionally, and in both cases photographic records were taken (Nikon D90 and Xiaomi Redmi 9T cellphone). The individuals of social wasps and their respective prey were captured, stored in 70% alcohol, and sent to the Coleção Biológica de Vespas Sociais (CBVS) at the Zoology Laboratory of the Federal Institute of Education, Science, and Technology of Southern Minas Gerais (IFSULDEMINAS), Inconfidentes Campus, where they were identified and subsequently deposited (Registration number: *P. platycephala*: 11436/23; *P. fastidiosuscula*: 11437/23). The social wasps were identified by comparison with the mentioned collection and dichotomous keys (Richards, 1978). The Odonata specimens were identified by Dr. Diogo Silva Vilela, and the Hemiptera by Dr. Luiz Carlos Dias da Rocha, both from IFSULDEMINAS, Inconfidentes Campus.

3. RESULTS AND DISCUSSION

The predation of Hemiptera by *P. fastidiosuscula* occurred in a fragment of forest associated with coffee and banana cultivation, in the coffee experimentation area at the School Farm of IFSULDEMINAS, Inconfidentes Campus (22°18'32.7"S 46°19'46.1"W), on October 23, 2023. On the other hand, the use of Odonata as a food resource by *P. platycephala* was recorded on August 12, 2023, around 4 p.m., in a marginal lagoon (21°07'33.67"S 44°13'32.28"W) to the Rio das Mortes, in the municipality of Santa Cruz de Minas, Campos das Vertentes, south-central Minas Gerais.

In the first record, it was witnessed the individual of *P. fastidiosuscula* carrying a hemipteran in flight (Auchenorrhyncha: Dictyopharidae), using its mandibles, which later landed with the prey on an unidentified herbaceous plant (Figure 1).

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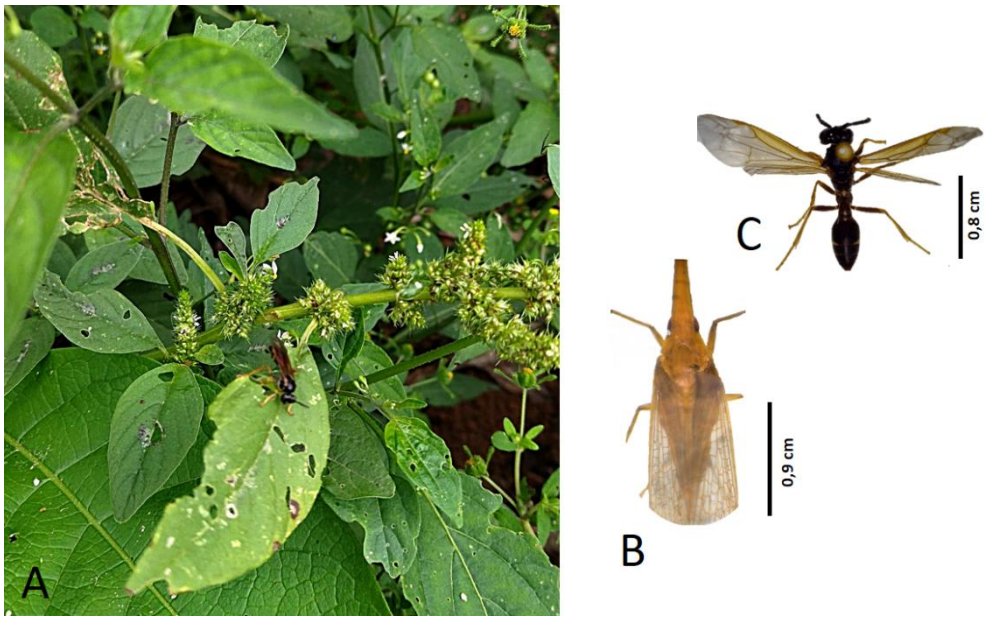
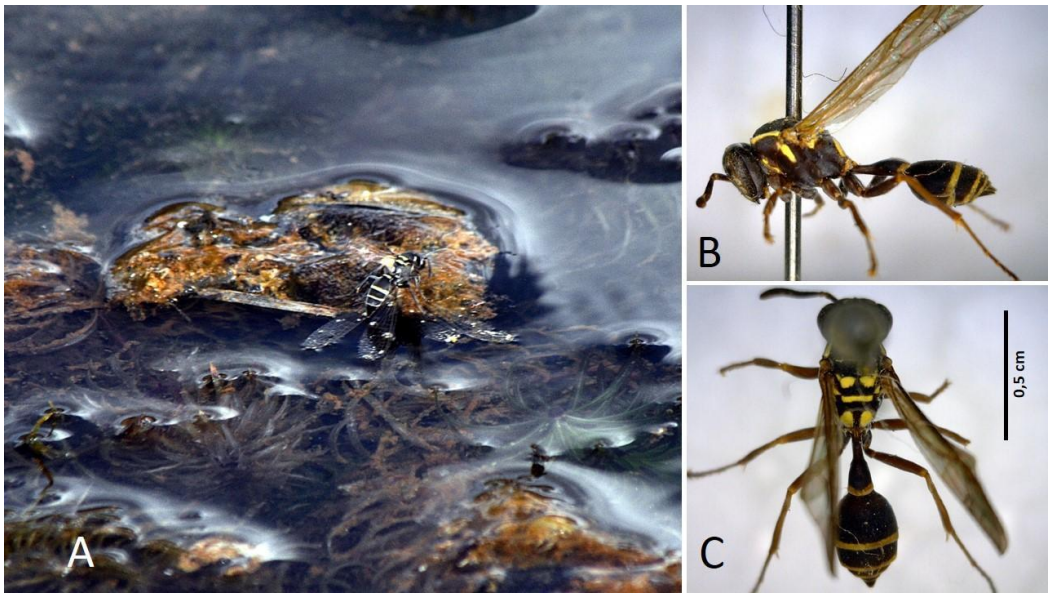
Figure 1. Predation of *Polybia fastidiosuscula* on Dictyopharidae sp.; A - *P. fastidiosuscula* perched on vegetation with Dictyopharidae sp. caught by its mandibles; B - Dictyopharidae sp. in detail, dorsal view; C - *P. fastidiosuscula* in detail, dorsal view.



Source: Oliveira *et al.* (2024)

In the second record, an individual of *P. platycephala* was observed feeding on a recently emerged adult odonate from the Coenagrionidae family, on the aquatic macrophyte *Egeria najas* Planch. (Hydrocharitaceae) (Figure 2). At the time of observation the dragonfly was entirely consumed, with only the wings left (the only parts we have collected), so it was not possible to determine if it was the social wasp that actally killed it, and due to the preservation state, it was only possible to identify it at the family level.

Figura 2. A - Specimen of *Polybia platycephala* feeding on an individual of Coenagrionidae on *Egeria najas* plants; B - *P. platycephala* in detail, lateral view; C - *P. platycephala* in detail, dorsal view.



Source: Oliveira *et al.* (2024)

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Predation on prey of different sizes and orders illustrates the opportunistic and generalist behavior of these two species (Prezoto; Giannotti; Machado, 2005; Brügger *et al*., 2019). *Polybia fastidiosuscula* also preys on spiders, dipterans, orthopterans, and mainly lepidopteran caterpillars (Brügger *et al*., 2019), besides feeding on pollen (Hermes; Köhler, 2006; Somavilla; Köhler, 2012), fruits (Barbosa; Paschoaline; Prezoto, 2014), and extrafloral nectar (Oliveira; Rubim; Souza, 2023). As for *P. platycephala*, there are records of predation on dipterans, lepidopterans, hemipterans, hymenopterans, and coleopterans (Prezoto; Giannotti; Machado, 2005), besides feeding on fruits (Barbosa *et al*., 2014) and act as floral visitors (Hermes; Köhler, 2006).

Dragonflies apparently are not a usual prey of social wasps (Polistinae), but there are records of Odonata in the diet of *Polybia sericea* (Oliver, 1792) in southeastern Brazil (Machado; Gobbi; Alves Jr., 1988). In this report, it was also not possible to determine if the social wasp preyed on or took advantage of an already dead individual. It is possible that *P. platycephala* preyed on the dragonfly individual. Since it was newly emerged, they are particularly vulnerable at this teneral stage, mainly due to the fragile condition of the body cuticle and wings, which are not yet hardened, so the dragonfly remains at rest and tries to fly only when threatened by a possible predator (Corbet, 1999). Another possibility would be that the *P. platycephala* individual took advantage of the dragonfly carcass as food. The necrophagous habit has already been recorded for other species of *Polybia* (Simões *et al*., 2013).

On the other hand, hemipterans are commonly found in the diet of Polistinae (*e.g.* Jeanne, 1972; Gobbi; Machado; Tavares Filho, 1984; Gobbi; Machado, 1985; Machado; Gobbi; Simões, 1987; Machado; Gobbi; Alves Jr., 1988; Prezoto; Giannotti; Machado, 1994; Clapperton, 1999; Nannoni; Cervo; Turillazzi, 2001; Prezoto; Giannotti; Machado, 2005; Bichara Filho *et al*., 2009; Hernández; Sarmiento; Fernández, 2009; Oliveira; Noll; Wenzel, 2010; López; Hernández; Caraballo, 2013; Jeon *et al*., 2019). Since many species of hemipterans of the suborder Auchenorrhyncha are of phytosanitary relevance, as they are vectors of pathogens with the potential to cause severe damage to various commercial crops (Paradell *et al*., 2014; Thanou; Kontogiannis; Tsagkarakis, 2021), the predation reported here needs to be further investigated, as social wasps may be useful in the biological control of these hemipterans, an ecosystem service already documented for different species of social wasps in various agricultural crops (Southon *et al*., 2019; Brock; Cini; Sumner, 2021).

4. FINAL CONSIDERATIONS

As these are isolated records, caution is needed to assert that hemipterans and odonates are frequent prey of *P. fastidiosuscula* and *P. platycephala*, respectively, and thus significantly affect the population of these insects, or if they were simply opportunities for obtaining food resources due to the opportunistic and generalist behavior of these wasp species. Therefore, more detailed studies are recommended for a better understanding of the impact of these interactions.

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