Scientific Note

Social Wasps (Vespidae: Polistinae) in an Urban Park from Piauí, Brazil

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Abstract. Studies of social wasps (Vespidae: Polistinae) in Piauí State are scarce and only two have been carried out. Due to the lack of studies, we surveyed the wasp species in the Zoobotanical State Park in the urban area of Teresina, Piauí, Brazil. From December 2017 to May 2018, 10 expeditions were carried out using active collection with entomological nets and attractive traps with guava juice. A total of 282 individuals were collected distributed in six genera and 12 species. *Parachartergus fraternus* Gribodo, 1892 and *Synoeca surinama* (Linnaeus, 1767) are new records for Piauí, which now has 12 genera and 24 species registered for the state. Such data reveals the need to continue studying Polistinae in Piauí, in order to determine their real species distributions, help conserve natural areas and accurately manage these sites.

Keywords: Cerrado, Northeastern, Polistinae, Teresina, Urban Area.

Over the years, Northeastern Brazil has been neglected due to the claim that its semi-arid climate cannot support a high richness of social wasp species (Vespidae: Polistinae), which has also been aggravated by the lack of researchers in this region, as demonstrated by Andena & Carpenter (2014) and dos Santos et al. (2020).

Compared to the rest of Brazil, Piauí State presents very few studies about these animals (Barbosa et al. 2016). Only two works have been carried out by Rocha & Silveira (2014) and Somavilla et al. (2017) in Caatinga areas within Conservation Units (Serra da Capivara National Park, Serra das Confusões National Park and Sete Cidades National Park) in the Piauí territory. Despite the short collection period, these studies recorded 20 new wasp occurrences using different sampling methods approximately 36 years after the first records by Richards (1978). These updates demonstrate a high richness that could still be discovered with new collections, especially in other biomes such as the Piauí cerrado, which has not yet been sampled. However, so far there have been no studies in urban areas or in northeastern Brazil, much less for Piauí. Due to the lack of information about social wasp (Polistinae) species of Piauí, we surveyed this group from the Zoobotanical Park, in Teresina, Piauí, Brazil.

The collections were carried out in the Zoobotanical Park of Teresina (05° 05' 12" S, 42° 48' 48" W) from December 2017 to May 2018. The Zoobotanical Park (~136 hectares) is located on the east side of the city between the Poty River and the PI-112 highway that connects the city to the northern part of the state and is one of the largest natural reserves within the Teresina municipality, presenting characteristics of *Cerradão* with mixed palm forest (Ponte et al. 2003).

Every 15 days, collections were carried out from 9:00 to 14:00 (time with highest wasp activity) (Prezoto & Machado 1999; Elisei et al. 2005). We used two methods for sampling: Active collection with entomological networks on the Main and Ecological trails each 1.5 km long, two collectors together traversed the two trails with an average time of 5 hours on each trail per collection (Prezoto et al. 2020); and Passive collection with traps made from 2L PET bottles with four equidistant 3cm diameter holes. In the traps, 1 liter of artificial guava juice with 200g/L of sugar was used as bait (Sousa & Prezoto 2006). In the forest, the bottles were tied to tree trunks with relative heights

of 1.5m and arranged in a 1 km transect with a bottle every 100m to prevent/reduce pseudoreplications (Locher et al. 2014; Prezoto et al. 2020). After seven days, the traps were collected and the material was filtered, screened, and stored in pots with 70% alcohol.

Wasps were identified using dichotomous keys proposed by Richards (1978), Carpenter & Marques (2001) and Somavilla & Carpenter (2020) and confirmed by a specialist. All vouchers species were deposited in the Entomology Laboratory at the Department of Biology of the Federal University of Piauí - CMPP. The obtained data was statistically analyzed using the Dominance index, which calculates the quantity of each species by multiplying the total collected by 100%, classifying them as eudominant with more than 10% of the sample; dominant between 5-10%; subdominant between 2-5%; eventual between 1-2%; and rare as less than 1%; and the constancy of individuals, classified according to the values found, with 50% or more signifying a constant species, between 25% to 50% an accessory species and below 25% an accidental species.

Ten forest expeditions were carried out, and a total of 282 individuals distributed in 12 species in six genera were collected, with *Polybia* Lepeletier, 1836 representing half of the collected species (Tab. 1). *Parachartergus fraternus* Gribodo, 1892 and *Synoeca surinama* (Linnaeus, 1767) are new records for Piauí extend the distribution of these species on Brazil territory and increasing the number of described species in the state to 24.

Additionally, the genera *Parachartergus* R. von Ihering, 1904 is a new record for the state, enriching the fauna of the Piauí ecotone, now with 12 genera described. This genus is formed by 11 species in Brazil, of these, two are in the Northeast: *Pa. fraternus* and *Pa. pseudoapicalis* (Willink, 1959) (Santos et al. 2009; Barbosa et al. 2016). *Synoeca virginea* (Fabricius, 1804) was the only species on Piauí (Richards 1978) until the publications by Rocha & Silveira (2014) and Somavilla et al. (2017), now we registry another species.

The other species collect are *Agelaia pallipes* (Olivier, 1792), *Apoica pallens* (Fabricius, 1804), *Chartergus globiventris* de Saussure, 1854, *Polybia chrysothorax* (Lichtenstein, 1796), *P. ignobilis* (Haliday, 1836), *P. occidentalis* (Olivier, 1792), *P. rejecta* (Fabricius, 1798), *P. ruficeps* Schrottky, 1902, *P. sericea* (Olivier, 1792) and *Protopolybia*

Table 1. Wasp species, number of specimens, collection methods, total (%) species collected in the Zoobotanical State Park in Teresina, Piauí. Dominance: E = eudominant; D = dominant; S = subdominant; EV= eventual; R = rare. Constancy: A = accidental; B = accessory; C = constant. * new records for Piauí.

Species	Specimens	(Dominance) (Constancy)	Method	
			Active	Passive
<i>Agelaia pallipes</i> (Olivier, 1792)	15	5.41% (D) (A)	-	15
<i>Apoica pallens</i> (Fabricius, 1804)	4	1.40% (EV) (A)	-	4
<i>Chartergus globiventris</i> de Saussure, 1854	1	0.35% (R) (B)	1	-
<i>Parachartergus fraternus</i> Gribodo, 1892 *	8	2.82% (S) (B)	8	-
<i>Polybia chrysothorax</i> (Lichtenstein, 1796)	19	6.72% (D) (C)	-	19
<i>P. ignobilis</i> (Haliday, 1836)	59	21.15% (E) (C)	20	39
<i>P. occidentalis</i> (Olivier, 1792)	33	11.70% (E) (C)	19	14
<i>P. rejecta</i> (Fabricius, 1798)	61	21.60% (E) (A)	54	7
<i>P. ruficeps</i> Schrottky, 1902	2	0.70% (R) (A)	2	-
<i>P. sericea</i> (Olivier, 1792)	32	11.32% (E) (B)	16	16
<i>Protopolybia chatergoides</i> (Gribodo, 1891)	9	3.30% (S) (A)	9	-
<i>Synoeca surinama</i> (Linnaeus, 1767) *	39	13.82% (E) (B)	39	-
TOTAL	282	100%	168	114

chatergoides (Gribodo, 1891). All of these species are described for the covered portion of Caatinga in Piauí, and now, on the Cerrado too (Rocha & Silveira 2014; Somavilla et al. 2017).

In this study, the active collection was more efficient as it collected 75% of the sampled species, with *C. globiventris*, *Pa. fraternus*, *P. ruficeps*, *Pr. chartergoides* and *S. surinama* collected exclusively through this method. In the attractive trap method, we collected three exclusive species, *Ag. pallipes*, *Ap. pallens* and *P. chrysothorax*, what supports Maciel et al. (2016), who stated that using one or more methods for faunal sampling is valid, even if they only collect one species. All other species were collected in both sampling methods. *Polybia* is the most common genus in South America, as its species present highly populated colonies and active foraging (Richards 1978), explaining why it was so abundant in this survey, as well as in the other surveys from Piauí (Rocha & Silveira 2014; Somavilla et al. 2017).

The other genera each presented only a single species, with differences in abundance likely due to different habits as nocturnal habits (*Apoica* Lepeletier, 1836), preferences for protein-rich nutrient substrate (e.g. decomposing meat) (*Agelaia* Lepeletier, 1836) (Richards 1978) or even the inefficiency of the methods in capturing other Polistinae genera (Maciel et al. 2016; Prezoto et al. 2020).

Regarding the dominance calculation, five species were eudominant, two were dominant, two subdominant, one eventual and two rare. For the eudominant species, only *P. rejecta* and *P. occidentalis* were constant in the survey, representing one third of the animals collected. Notably, Epiponini was the only tribe sampled in this work, possibly due to the swarm- founding habit and for presenting many individuals (from tens to thousands) in their colonies, generally being the most prevalent in surveys.

Rocha & Silveira (2014) and Somavilla et al. (2017) also managed to only capture individuals from the Epiponini tribe in Piauí. However, there are records of species from the Polistini tribe (*Polistes* Latreille, 1802) for Piauí State (Richards 1978), in addition to Maranhão, Ceará, Rio Grande do Norte, Pernambuco, Paraíba, Alagoas, Bahia. As well as *Mischocyttarus* (*Mischocyttarus* de Saussure, 1853) for Maranhão, Ceará, Pernambuco, Alagoas and Bahia (Silva et al. 2011; Andena & Carpenter 2014; Barbosa et al. 2016; Somavilla et al. 2017), indicating that *Mischocyttarus* could be present in Piauí, but have not yet been sampled.

This is the first survey on Cerrado of Piauí, we recorded two new social wasp species for the state, *Parachartergus fraternus* and *Synoeca surinama*, as well as the genus *Parachartergus*, increasing its total to 12 genera and 24 species. Such data reveals the need to continue studying polistines in Piauí, even in urban areas that act as refuges for these wasps, in order to record their actual species distributions, help conserve natural areas and appropriately manage these sites.

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Authors' Contributions

We attest that all authors participated in the research, writing and discussion of this scientific note and that there are no conflicts of interest between the authors of the publication.

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