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Biodiversity of Insects in the Amazon: survey of social wasps (Vespidae: Polistinae) in Amazon rainforest areas in Amazonas state, Brazil

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Abstract

The thematic network 'Biodiversity of Insects in the Amazon' is the first network among researchers of the Brazilian Amazon in terms of the increase of knowledge and provision of subsidies for the conservation of Amazonian biodiversity, focusing on insects, aiming as well to disseminate this knowledge to different sectors of society. In this way, expeditions to six localities in the Amazonas State were carried out and we present here the results for social wasps (Vespidae: Polistinae). We used three modified *Malaise* traps traps from July 2016 to June 2017. A total of 140 species and 20 genera were collected: 92 species and 18 genera in ZF-2-Manaus area, which presented the greatest diversity, followed by Tefé (73 species, 16 genera), Careiro-Castanho (72 species, 17 genera), Novo Airão (71 species, 16 genera), Presidente Figueiredo (62 species, 16 genera), and Ipixuna (58 species, 17 genera). *Metapolybia rufata* Richards, 1978 and *Polybia diguetana* du Buysson, 1905 were new records for Brazil, and other six species were first records for Amazonas state. The results indicate that further investigations should significantly increase the knowledge of wasp species diversity in the Amazon region and add more information on Polistinae diversity.

Introduction

The biodiversity of insects in Brazil is one of the highest of the world, representing around 10% of all known insects (Marinoni et al., 2006; Hermes et al., 2015), distributed in six main Brazilian biomes (Amazon Rainforest, Atlantic Forest, Caatinga, Cerrado, Pantanal, and Pampa). The Amazon Rainforest is the biggest biome within Brazilian territory, covering an area of 4,196,943 Km² (Ministério do Meio Ambiente, 2018). The Amazon biodiversity is considered as rich as unknown and one of the great challenges to its conservation is the establishment of a solid database on the distribution and abundance of organisms (Borges et al., 2004). Knowledge about biodiversity remains inadequate because most species living on earth were still not formally described (the *Linnean shortfall*) and because geographical distributions of most species are poorly understood and usually contain many gaps (the *Wallacean shortfall*) (Bini et al., 2006).

Even today, mainly the geographic distribution of most organisms in the Amazon is still poorly known, even among those most studied groups such as birds, primates and plants (Borges et al., 2004; Lomolino, 2004). Regarding insects, the paucity of geographic distribution knowledge is much more dramatic, exemplifying very well both *Linnean* and *Wallacean shortfalls* (Lomolino, 2004, Bini et al., 2006). For Vespidae, the knowledge on the geographic distribution of most species is incomplete, being most times inadequate at all scales.

For this reason, a thematic network 'Biodiversity of Insects in the Amazon' was created by a group of researchers and students interconnected by processing modules through a communication system about insects in the Amazon. The network has as main objective to create and promote the exchange of the first entomologists network researchers of the Brazilian Amazon in terms of the increase of knowledge and provision of subsidies for the conservation of Amazonian biodiversity, focusing on insects, aiming as well to disseminate this knowledge to different sectors of society.

The Brazilian Amazon rainforest has one of the greatest biodiversities in the world, including the greatest diversity of social wasps (Silveira, 2002; Somavilla et al., 2014a; Barbosa et al., 2016). Polistinae is the most diverse group among the social wasps, with more than 950 species described (Pickett & Carpenter, 2010). The subfamily is divided in the tribes Ropalidiini, Polistini, Mischocyttarini and Epiponini, but the first not occurring in Brazil (Carpenter & Marques 2001; Carpenter, 2004). *Polistes* Latreille, *Mischocyttarus* de Saussure, and the 19 genera of Epiponini compose the Brazilian fauna of wasps, totalizing about 350 species, of which 104 are endemic (Carpenter & Marques 2001; Carpenter, 2004; Hermes et al., 2017).

The knowledge of social wasps comes from some few studies carried out in forest fragments. Ducke (1904, 1907) conducted one of the first surveys of wasp fauna in the eastern region of the Brazilian Amazon, mainly in Pará State. Recently, similar works have been carried out in the Brazilian Amazon, as follow in Acre State (Morato et al., 2008; Gomes et al., 2018), Amapá State (Silveira et al., 2008), Maranhão State (Somavilla et al., 2014b), Pará State (Silveira, 2002; Silva & Silveira, 2009) and Roraima State (Raw, 1998; Barroso et al., 2017). In the state of Amazonas, six surveys have been carried out: Mamirauá and Alvarães Reserves, with 46 and 42 species, respectively (Silveira et al., 2008), Jaú National Park with 49 species (Somavilla et al., 2015), Madeira–Purus rivers with 38 species (Oliveira et al., 2015), Embrapa-Manaus with 52 species (Somavilla et al., 2016), and Ducke Reserve with 103 species (Somavilla & Oliveira, 2017).

Despite the contributions of these works, Somavilla et al., (2014a) stated "there are many sample gaps in the Amazon region and distribution and occurrence studies are necessary for improving this prior knowledge". In this way, several expeditions were carried out within the network 'Biodiversity of Insects in the Amazon' and we present here the results of six different areas sampled in the Amazonas State.

Amazonas is the largest Brazilian state, and it has the largest tropical forest in the world. The Amazon forest, also is part of Bolivia, Ecuador, Colombia, Guyana, French Guiana, Peru, Suriname, and Venezuela in South America. Amazonas state has most of its land occupied by forest reserves and water, and the access to the region is mainly made by waterway or by planes. It is located in the North of Brazil, bordering the States of Mato Grosso, Rondônia, and Acre to the South; Pará and Roraima, in the North East beyond the republics of Peru, Colombia, and Venezuela to the Southwest and Northwest respectively (Ministério do Meio Ambiente, 2018). Most of the state is in the tropical rainforest climate zone (Barbosa, 2015). The equatorial climate is denoted *Af* in the Köppen (1948) climate classification. The average temperature varies very little by season, between 26 and 28 °C, and relative humidity is around 80% (Barbosa, 2015). Regardless of the relief type, the region is formed basically by two geomorphologic types: upland and lowland or floodplains, locally known as "terra-firme" and "várzeas", respectively (Telles et al., 2003).

Material and Methods

Amazonas State areas

The social wasps were collected in six areas in Amazonas state: ZF-2, in Manaus (2°35'21"S, 60°06'55"W), and Presidente Figueiredo (1°41'50.1"S, 59°36'43.5"W) to the North of the Amazonas River; Careiro-Castanho (4°12'48"S, 60°49'04"W), Ipixuna (7°21'46"S, 71°52'07"W), and Tefé (3°25'19"S, 64°37'05"W) to the South of the Amazonas river. Finally, Novo Airão (2°48'58"S, 60°55'18"W) in the interfluvial area Solimões and Negro rivers (Figure 1).

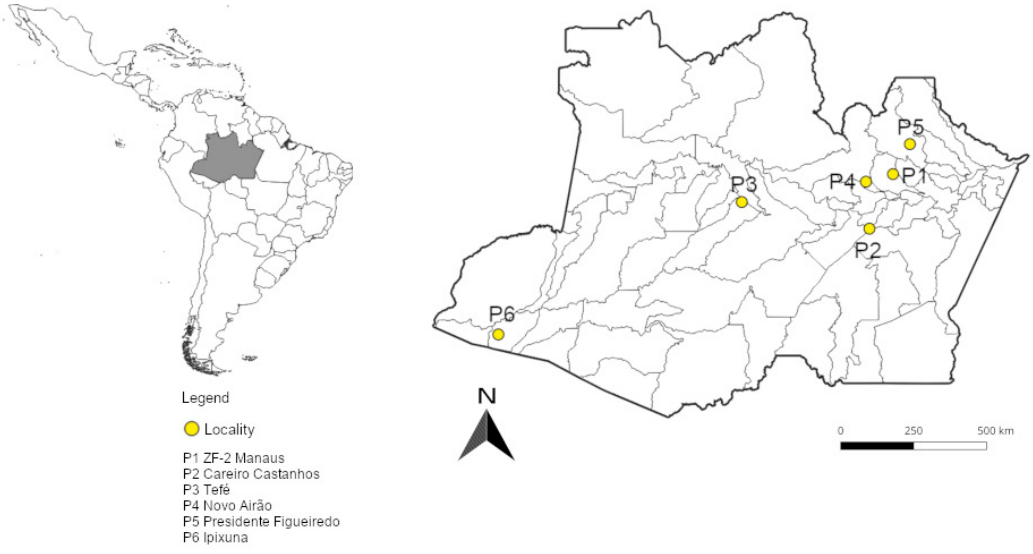

Figure 1. Location of ZF-2 Manaus, Careiro-Castanho, Tefé, Novo Airão, Presidente Figueiredo and Ipixuna areas in Amazonas state, Brazil.

Wasp collection

The wasps were collected in the forests using three modified Malaise traps model: 1. Townes (1972) model 2-meter long; 2. Gressit and Gressit (1972) model 6-meter long with two collector vials in understory, and 3. suspended traps (Rafael and Gorayeb 1982) model in the canopy. Both traps were active for fifteen consecutive days each month, for a period of one year between July 2016 to June 2017.

The Polistinae specimens were sorted and identified at the Hymenoptera Laboratory of the National Institute of Amazonian Research (INPA). The vouchers were deposited into the INPA's Invertebrate Collection. Specimens were identified using the keys proposed by Richards (1978), Carpenter and Marques (2001), and Carpenter (2004) and were compared to previously identified species from the INPA Invertebrate Collection.

Data analysis

We used the Euclidean Distance Analysis to verify the similarity between the species composition in the six Amazonas areas, according to the presence or absence of each species. This analysis was conducted in R version 3.3.3. (R Core Team, 2017) using vegan package 2.4-0 (Oksanen et al., 2016).

Results

A total of 140 species and 20 genera were collected (Table 1). ZF-2 Manaus area presented the greatest diversity, with 92 species and 18 genera, on the other hand, Ipixuna fragment presented the lowest diversity, with 58 and 17, respectively (Figure 2). *Protonectarina* Ducke was the only genus not collected in these areas, and there are no records of its occurrence for the Amazon biome.

Polybia Lepeletier, 1836 was the richest genus for all studied areas with 33 species, followed by *Mischocyttarus* de Saussure (24), *Agelaia* Lepeletier (16), *Protopolybia* Ducke (11), and *Polistes* Latreille (10 species) (Table 1). *Agelaia* was the most abundant genus followed by *Polybia*.

Regarding species composition, only 33 species were sampled in all six areas, 31 from Epiponini and just one for *Mischocyttarus* and *Polistes*. Of this number, ten of the 16 species of *Agelaia*, nine of 33 *Polybia* species, four of the seven *Apoica* Lepeletier species, two of the three *Angiopolybia* Araujo species, two of the three *Synoeca* Saussure species, and one species of *Brachygastra* Perty, *Chatergellus* Bequaert, *Clypearia* Saussure, and *Leipomeles* Möbius were collected in the all six sampled areas.

Still to species composition, 43 species were exclusive of only one fragment area, 12 *Mischocyttarus*, seven *Protopolybia* and six *Polybia*. According to the Euclidean distance analysis between the social wasps' composition from six different areas in the Amazonas, the relationship between the species of Careiro-Castanho and Tefé fragments were the closest, sharing 59 species, followed by Presidente Figueiredo and Ipixuna fragment with 45 shared species. The ZF-2 Manaus area presented the most diverse and the largest number of exclusive species, with 19 species, and in the analysis was the area with the longest distance between all sampled areas (Figure 3).

Discussion

Silva and Silveira (2009) and Somavilla at al. (2014a) showed that fast inventories were efficient for sampling the most abundant species, recording three genera: *Polybia*, *Mischocyttarus* and *Agelaia*. Herein, we found the same most specious genera, which constituted more than 50% of the species collected. Specimens of *Polybia* has a very active foraging behavior, which facilitates the collection of the specimens in trap, and the genus with largest number

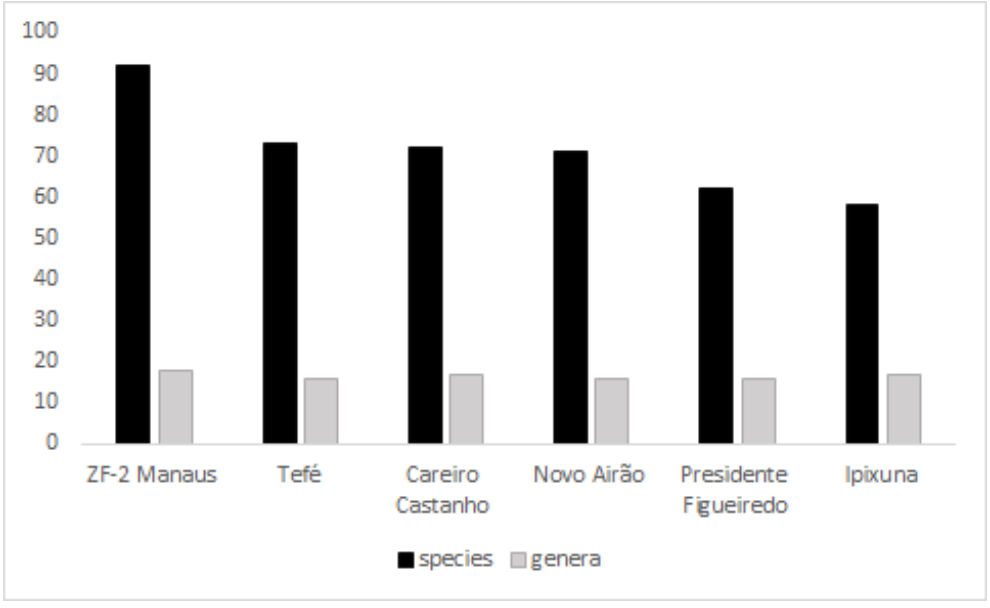

Figure 2. Graph with the species and genera numbers, respectively, collected in the six different Amazonas areas.

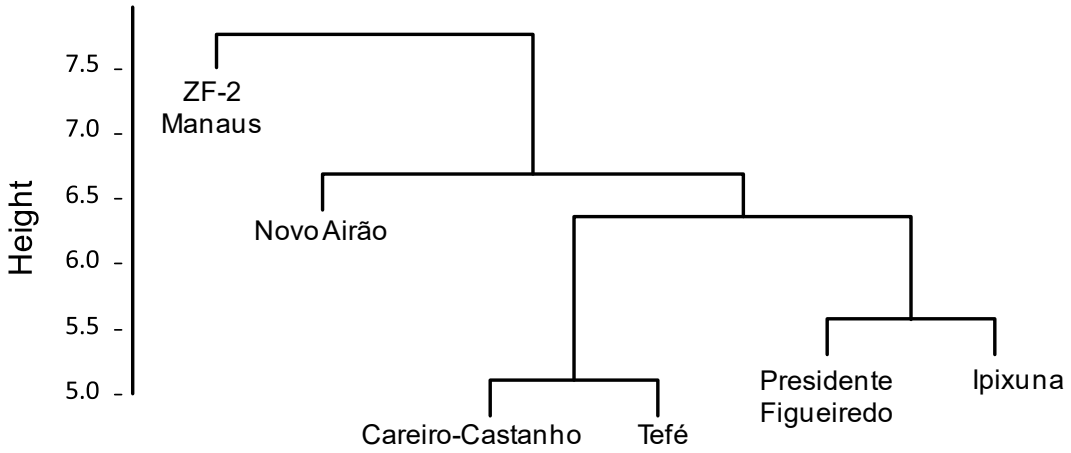

Figure 3. Cluster Dendrogram for Euclidean Distance Analysis to verify the similarity between the species composition in the six different Amazonas areas.

of species within Epiponini (Carpenter & Marques, 2001). *Mischocyttarus* is the genus with more species in social wasps (around 240), of which 117 occur in Brazil, that can support the high diversity in this study (Silveira, 2002). *Agelaia* species usually form large colonies with millions of individuals (Zucchi et al., 1995), and, consequently, they are more likely to be captured (Silva & Silveira, 2009), an expected result as they are present in all inventories of social wasps in Amazonian rainforest (Silveira, 2002; Somavilla et al., 2014a).

The Amazon region has the highest diversity of Polistinae species of the World (Richards, 1978; Carpenter & Marques, 2001; Silveira 2002; Barbosa et al., 2016). In the Brazilian Amazon, 20 genera and more than 220 species have been recorded, which represents about two thirds of the Brazilian diversity of social wasps (Silveira, 2002; Somavilla & Oliveira, 2017). Currently 161 species have been reported for the state of Amazonas, despite six studies on social wasps having been carried out in the state to date (Silveira et al., 2008; Somavilla et al., 2014a; Oliveira et al., 2015; Somavilla et al., 2016; Somavilla & Oliveira, 2017) and reported by Richards (1978) in your social Neotropical wasps' revision, which clearly indicates that the diversity of wasps in the region is still vastly underestimated.

The records of *Chartergellus jeannei* Andena & Soleman, 2015, *Necterinella manauara* Silveira & Santos Jr., 2016 and *Protopolybia rotundata* Ducke, 1910 represented the second record for each species, both of which were recorded only for the type locality so far, Ducke Reserve (Amazonas) the first two and Base Camp (Mato Grosso), respectively. Also, we produced the first records of *Metapolybia rufata* Richards, 1978 and *Polybia diguetana* du Buysson, 1905 for Brazil, previously only registered for Colombia and Ecuador, and Mexico to Bolivia, respectively. We made the first records of *Agelaia lobipleura* (Richards, 1978), *Polybia minarum* Ducke, 1906*, Protopolybia nitida* (Ducke, 1904)*, Protopolybia rotundata, Protopolybia sedula* (de Saussure, 1854), and *Mischocyttarus punctatus* (Ducke, 1904) for Amazonas State in Brazil.

The higher richness found at this six areas when compared to other biomes can be explained by the high effort of collection as well as by the higher structural complexity of these Amazonian environments. They are composed by dense forest, clearings, bottomlands, streams, plateaus and canopies, that allow the establishment and survival of more species of social wasps, providing microhabitats for the organisms, greater protection from predators, and increased availability and diversity of food resources and nesting substrates (Lawton, 1983; Santos et al., 2007). Vegetation exerts direct influence on social wasp communities, providing support for nesting and food resources, indirectly affecting those communities by variations in temperature, humidity, and amount of shade in the environment (Wenzel, 1998; Diniz & Kitayama, 1994; Dejean et al., 1998).

The similarities of social wasp species composition between Tefé and Careiro-Castanho areas was not surprising since they are both reserves located in comb of two distinctive areas - lowland and terra-firme areas, in the South of Solimões River. In compensation, the high diversity of social wasps in ZF-2 Manaus follows the results found in the Ducke Reserve (Somavilla & Oliveira, 2017), both in North of Manaus, geographically close (100 km apart) and both areas have the same phytophysiognomy characteristics (ombrophilous dense and humid forest) (Telles et al., 2003). But the proximity of Presidente Figueiredo and Ipixuna species composition is something that needs to be better investigated, probably the wide geographical distribution of most species explains this, since the limiting is the lack of sampling in parts of Amazon Rainforest.

Despite the difficulties of collecting in Amazonian environments due the difficult access to some isolate areas, and in the canopy height, the permanent collection is a good strategy. When comparing other areas already sampled in the Brazilian Amazon, such as Mamirauá and Alvarães Reserves

in Amazonas (Silveira et al., 2008), Caxiuanã, Pará (Silveira, 2002), Lagos region, Amapá (Silveira et al., 2008), Serra do Divisor, Acre (Morato et al., 2006), and Gurupi Park, Maranhão (Somavilla et al., 2014b), the diversity is lower than these six fragments sampled. In those studies, using a greater number of *Malaise* traps per site, but the collections were made quickly at most seven days.

Regarding the methods used for samples, there are different methods to sample social wasps; however, few studies have attempted to propose a standardization of these methods or to establish comparable and adequate protocols to survey the fauna of a given site. An important factor to consider in the implementation of novel social wasp sampling protocols is the distribution pattern of these organisms (Silveira, 2002; Silva & Silveira, 2009) or, when using traps, finding the most efficient ones to collect the target group and dispose them in a standardized manner (Noll & Gomes, 2009). Somavilla et al (2014a) proposed the best would be to use active search + *Malaise* trap, and for exploring other forest strata, such as the canopy (suspended *Malaise* trap) or attraction traps. In this study, it was not possible to make active search for wasps, due to the long distances between the sampled areas, for that reason, we standardized the use combined use of *Malaise* traps and suspended traps in each collected area, for 15 direct days.

Conclusion

Here was recorded 140 species of social wasps in six forest areas in the Amazonas state, in the central Brazilian Amazon. This represents a little more than 85% of the species of social wasps known to the Amazonas State, and based on this percentage is possible to conclude that the continuous collection effort overlaps on short collection efforts usually applied here in the Amazon biome. *Metapolybia rufata* and *Polybia diguetana* were new records for Brazil, and other six species were first records for Amazonas state, these new records significantly increased the range for some species and filled distribution gaps for others. The results obtained in this study indicate that further investigations should significantly increase the species diversity of wasps in the Amazon region and add more information to the knowledge of Polistinae diversity.

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Appendix

Table 1. Species of social wasps (Vespidae: Polistinae) collected at the ZF-2 Manaus, Careiro-Castanho, Tefé, Novo Airão, Presidente Figueiredo, and Ipixuna areas over the network "Biodiversity of Insects in the Amazon".

Taxa	ZF-2 Manaus	Careiro-Castanho	Tefé	Novo Airão	Presidente Figueiredo	Ipixuna
Agelaia angulata (Fabricius, 1804)	X	X	X	X	X	X
Agelaia brevistigma (Richards, 1978)		X	X			
Agelaia cajennensis (Fabricius, 1798)	X	X	X	X	X	X
Agelaia centralis (Cameron, 1907)	X	X	X	X	X	X
Agelaia constructor (de Saussure, 1854)	X	X	X	X	X	X
Agelaia flavipennis (Ducke 1905)	X	X	X	X	X	X
Agelaia fulvofasciata (DeGeer, 1773)	X	X	X	X	X	X
Agelaia hamiltoni (Richards, 1978)	X	X	X	X	X	X
Agelaia lobipleura (Richards, 1978)				X		
Agelaia myrmecophila (Ducke, 1905)	X	X	X		X	X
Agelaia ornata (Ducke, 1905)	X	X	X	X	X	X
Agelaia pallidiventris (Richards, 1978)	X					
Agelaia pallipes (Olivier, 1792)	X	X	X	X	X	X
Agelaia pleuralis Cooper, 2002						X
Agelaia testacea (Fabricius, 1804)	X	X	X	X	X	X
Agelaia vicina (de Saussure, 1854)			X			
Angiopolybia obidens (Ducke, 1904)					X	
Angiopolybia pallens (Lepeletier, 1836)	X	X	X	X	X	X
Angiopolybia paraensis (Spinola, 1851)	X	X	X	X	X	X
Apoica albimacula (Fabricius, 1804)	X				X	X
Apoica arborea de Saussure, 1854	X	X	X	X	X	X
Apoica gelida (van der Vecht 1972)	X	X	X	X	X	
Apoica pallens (Fabricius, 1804)	X	X	X	X	X	X
Apoica pallida (Olivier, 1791)	X	X	X	X	X	X
Apoica strigata Richards, 1978	X					X
Apoica thoracica du Buysson, 1906	X	X	X	X	X	X
Asteloeca traili (Cameron, 1906)					X	
Brachygastra augusti (de Saussure, 1854)		X	X	X	X	X
Brachygastra bilineolata Spinola, 1841	X	X	X	X		X
Brachygastra lecheguana (Latreille, 1824)	X	X	X	X	X	X
Brachygastra scutellaris (Fabricius, 1804)	X			X		X

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Taxa	ZF-2 Manaus	Careiro-Castanho	Tefé	Novo Airão	Presidente Figueiredo	Ipixuna
Chartergellus amazonicus Richards, 1978	X	X	X	X	X	X
Chartergellus jeannei Andena & Soleman, 2015			X			
Chartergellus nigerrimus Richards, 1978	X					
Charterginus fulvus Fox, 1898	X	X	X			X
Chartergus artifex (Christ, 1791)				X		
Chartergus globiventris de Saussure, 1854		X	X			
Clypearia apicipennis (Spinola, 1851)	X					
Clypearia duckei Richards, 1978	X				X	
Clypearia sulcata (de Saussure, 1854)	X	X	X	X	X	X
Epipona tatua (Cuvier, 1797)	X		X			X
Leipomeles dorsata (Fabricius, 1804)	X	X	X	X	X	X
Leipomeles spilogastra (Cameron, 1912)	X	X	X		X	X
Metapolybia decorata (Gribodo, 1896)	X					
Metapolybia docilis Richards, 1978						X
Metapolybia nigra Richards, 1978	X			X		
Metapolybia rufata Richards, 1978	X					
Metapolybia unilineata (R. Von Ihering, 1904)	X				X	X
Mischocyttarus adolphi Zikán, 1949		X				
Mischocyttarus bertonii Ducke, 1918	X			X		
Mischocyttarus carbonarius (de Saussure, 1854)		X				
Mischocyttarus cerberus Ducke, 1918				X		
Mischocyttarus collaris (Ducke, 1904)	X				X	
Mischocyttarus drewseni de Saussure, 1857	X			X		
Mischocyttarus flavicans (Fabricius, 1804)		X	X		X	X
Mischocyttarus flavicornis Zikán, 1935	X					X
Mischocyttarus foveatus Richards, 1941			X			
Mischocyttarus imitator (Ducke, 1904)	X					X
Mischocyttarus injucundus (de Saussure, 1854)			X			
Mischocyttarus labiatus (Fabricius, 1804)	X	X	X	X	X	X
Mischocyttarus lecointei Ducke, 1904	X	X	X			
Mischocyttarus metathoracicus (de Saussure, 1854)	X			X		
Mischocyttarus omicron Richards, 1978	X					
Mischocyttarus prominulus Richards, 1941			X	X		
Mischocyttarus punctatus (Ducke, 1904)	X					
Mischocyttarus rotundicollis (Cameron, 1912)				X		
Mischocyttarus smithii de Saussure, 1853	X					
Mischocyttarus socialis (de Saussure, 1854)				X		
Mischocyttarus surinamensis de Saussure, 1854	X		X	X		

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Taxa	ZF-2 Manaus	Careiro-Castanho	Tefé	Novo Airão	Presidente Figueiredo	Ipixuna
Mischocyttarus synoecus Richards, 1940	X					
Mischocyttarus tomentosus Zikán, 1935	X					
Mischocyttarus xanvante Silveira, 2010		X		X		
Nectarinella manauara Silveira & Nazareno Jr, 2016	X					
Nectarinella xavantinensis Mateus & Noll, 1998		X				
Parachartegus amazonensis Ducke, 1905	X	X				
Parachartergus fasciipennis Ducke, 1905		X	X			
Parachartergus flavofasciatus (Cameron, 1906)		X				
Parachartergus fraternus (Gribodo, 1892)	X			X	X	X
Parachartergus richardsi Willink, 1951	X	X				
Polistes canadensis (Linnaeus, 1758)		X	X	X	X	X
Polistes carnifex (Fabricius, 1775)			X	X	X	
Polistes claripennis Ducke, 1904	X					
Polistes goeldi Ducke, 1904					X	X
Polistes lanio (Fabricius, 1775)		X	X		X	
Polistes niger Brèthes, 1930			X			
Polistes occipitalis Ducke, 1904		X	X			
Polistes pacificus Fabricius, 1804		X	X			
Polistes testaceicolor Bequaert, 1937		X				
Polistes versicolor (Olivier, 1792)	X	X	X	X	X	X
Polybia affinis du Buysson, 1908				X		
Polybia belemensis Richards, 1970	X	X	X	X		
Polybia bifaciata de Saussure, 1854	X			X	X	
Polybia bistriata (Fabricius, 1804)	X	X	X	X	X	X
Polybia catillifex Möbius, 1856					X	
Polybia chrysothorax (Lichtenstein, 1796)		X			X	
Polybia depressa (Ducke, 1905)	X			X		
Polybia diguetana du Buysson, 1905		X	X			
Polybia dimidiata (Olivier, 1792)	X	X	X	X	X	X
Polybia dimorpha Richards, 1978	X	X	X	X	X	X
Polybia emaciata Lucas,1879	X	X	X	X	X	X
Polybia gorytoides Ducke, 1904		X	X	X	X	
Polybia ignobilis (Haliday, 1836)	X	X	X	X	X	X
Polybia incerta Ducke, 1907	X		X			
Polybia jurinei de Saussure, 1854	X	X	X	X	X	X
Polybia juruana R. von Ihering, 1904	X					
Polybia liliacea (Fabricius, 1804)	X	X	X	X	X	X
Polybia micans Ducke, 1904		X		X		

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Taxa	ZF-2 Manaus	Careiro-Castanho	Tefé	Novo Airão	Presidente Figueiredo	Ipixuna
Polybia minarum Ducke, 1906	X		X			
Polybia occidentalis (Olivier, 1792)	X	X	X	X	X	X
Polybia parvulina Richards, 1970	X		X		X	
Polybia platycephala Richards, 1951	X				X	
Polybia procelosa Zavattari, 1906	X	X	X			
Polybia quadricincta Saussure, 1854		X	X	X		
Polybia rejecta (Fabricius, 1798)	X	X	X	X	X	X
Polybia rufitarsis Ducke, 1904				X		
Polybia scrobalis Richards, 1970	X	X	X	X		X
Polybia sericea (Olivier, 1792)		X	X		X	X
Polybia signata Ducke, 1905	X	X		X		
Polybia singularis Ducke, 1905	X		X	X	X	
Polybia striata (Fabricius, 1787)	X		X			
Polybia tinctipennis Fox, 1898		X		X		X
Polybia velutina Ducke, 1907		X	X	X	X	
Protopolybia acutiscutis (Cameron, 1906)		X	X			
Protopolybia bituberculata Silveira & Carpenter, 1995	X			X		X
Protopolybia chartergoides Gribodo, 1892		X	X	X	X	X
Protopolybia emortualis de Saussure, 1855	X					
Protopolybia exigua (de Saussure, 1854)	X					
Protopolybia holoxantha (Ducke, 194)	X	X	X	X	X	X
Protopolybia minutissima Spinola, 1851				X	X	
Protopolybia nitida (Ducke, 1904)	X					
Protopolybia rotundata Ducke, 1910	X					
Protopolybia rugulosa Ducke, 1907	X					
Protopolybia sedula (de Saussure, 1854)				X		
Pseudopolybia compressa (de Saussure, 1854)	X					X
Pseudopolybia difficillis (Ducke, 1905)	X					
Pseudopolybia langi Bequaert, 1944	X	X				
Pseudopolybia vespiceps (de Saussure, 1863)	X			X	X	
Synoeca chalibea de Saussure, 1852					X	
Synoeca surinama (Linnaeus, 1767)	X	X	X	X	X	X
Synoeca virginea (Fabricius, 1804)	X	X	X	X	X	X