



Overview of Stingless Bees in Brazil (Hymenoptera: Apidae: Meliponini)

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Abstract. Species richness of stingless bees (Hymenoptera: Apidae: Meliponini) was organized and updated from previously published data. From this research, we found 28 genera with 259 valid species and 62 undescribed species, in addition, brief comments on the classification used and geographical occurrences were included.

Keywords: classification; geographic distribution; survey; species; taxonomy.

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The stingless (Hymenoptera: Apidae: Meliponini) have a Pan-tropical distribution and are very rich, especially in the Neotropic, with approximately 440 valid species (ROUBIK 1989; CAMARGO 2008; ASCHER & PICKERING 2022). Brazil is the country with the highest number of species of Meliponini recorded, with approximately 240 valid species (PEDRO 2014; ASCHER & PICKERING 2022). This set of species encompasses a great diversity of behaviors, life habits and nesting substrates, since it is distributed in various types of landscape composition, where the species can coexist both in urbanized and natural areas (ROUBIK 1989).

The last survey of species that occur specifically in Brazil was carried out by PEDRO (2014) who included exactly 244 species and 89 more not described until then. Several of the genera still needed revision (some still do), and some species underwent taxonomic and classification changes, as some authors treated genera such as *Tetragona* and *Trigona* in species groups (RASMUSSEN & CAMARGO 2008; NOGUEIRA *et al.* 2020b), and recently ENGEL *et al.* (2021) divided them into subgenera, in some cases partially following classification of MICHENER (2007). Recently validated species were added to the Brazilian Fauna Catalog (OLIVEIRA & NOGUEIRA 2023), but there are no records of undescribed or species that need revision, as done by PEDRO (2014).

The aim of the present study was to carry out an update of the data contained in CAMARGO *et al.* (2013), PEDRO (2014) and OLIVEIRA & NOGUEIRA (2023) on the stingless bee species that occur in Brazil, containing data on the endemic species, the number of undescribed species and state geographic records for the country.

MATERIAL AND METHODS

The data presented here are in agreement with CAMARGO *et al.* (2013) and PEDRO (2014), as well as other publications dealing with taxonomic decisions, species/subgenera descriptions or new geographic records after PEDRO (2014) (LAROCA & ALMEIDA 2015, 2017; MELO 2015, 2021; PEDRO & CORDEIRO 2015; MASCENA *et al.* 2017; RASMUSSEN & GONZALEZ 2017; ALVAREZ & LUCIA 2018; JARAMILLO *et al.* 2019; NOGUEIRA 2016; NOGUEIRA *et al.* 2017, 2019, 2020a, 2020b, 2021, 2022a, 2022b; GUEVARA *et al.* 2020; OLIVEIRA *et al.* 2020; ALVAREZ *et al.* 2021; ALVES *et al.* 2021; ENGEL 2021a, 2021b; ENGEL *et al.* 2021; FELIX & FREITAS 2021; BARROS *et al.* 2022; ENGEL 2022a, 2022b, 2022c, 2022d; FERREIRA *et al.* 2022; RIBEIRO *et al.* 2023).

It is important to note that interpretations of undescribed species and under review species may differ from PEDRO (2014) for the interpretation presented here.

RESULTS

From the analysis of the data, a total of 28 genera with 259 valid species (Figure 1) were found along with 62 species not yet described (previous surveys partially based on PEDRO (2014)). Of the total number of valid species, 103 (40%) are endemic to Brazil and 20 (7.8%) still need revision (Table 1 and Table S1).

When we studied the regions of Brazil separately, we obtained a richness of 194 species that occur in the North, 99 in the Midwest, 96 in the Northeast, 70 in the Southeast and 36 in the South (Figure 1).

Regarding the number of species, *Melipona* Illiger, 1806 was the genus with the highest

Table 1. Comparative data from this study with data from PEDRO (2014).

	PEDRO (2014)	This study
Total valid species	418	462*
Brazilian valid species	244	259
Endemic species	87 (35,65%)	103 (40,23%)
Species under review	33	20
Species not described	89	62
Genera considered	29	28

*Species counted from the genera/subgenera that occur in Brazil, for example, the species of *Parapartamona* Schwarz, 1948 did not enter this count, because their species do not occur in Brazil.

number, totaling 40 from Brazil (76 in total), followed by *Plebeia* Schwarz, 1938, with 17 from Brazil (47 in total) and *Scaptotrigona* Moure, 1942 with 16 from Brazil (47 in total) (Figure 2).

DISCUSSION

Systematic. Since PEDRO (2014), 59 new species of stingless bees have been described for the Neotropical region, 16 of them with occurrence records for Brazil. The largest increase in new species was in the genus *Scaptotrigona* Moure, 1942, with a total of 26 described in eight years (2015-2022), seven of which with records for Brazil (LAROCA & ALMEIDA 2015, 2017; ENGEL 2022a, 2022b, 2022c; NOGUEIRA et al. 2022a).

Despite the increase in the number of valid species, the following synonyms were compiled: *Frieseomelitta meadewaldoi* (= *F. francoi* Moure, 1946 and = *F. freiremaiai* Moure, 1963) (OLIVEIRA et al. 2011), *Scaura latitarsis* (= *S. tenuis*

(Ducke, 1916) (NOGUEIRA et al. 2017) and *Tetragona clavipes* (= *T. elongata* (Lepeletier, 1836) and = *T. dissecta* Moure, 2000) (NOGUEIRA et al. 2022b).

Although ENGEL et al. (2021) have described *Nanoplebeia* Engel, 2021 as a subgenus of *Plebeia* Schwarz, 1938, here we consider it as a valid genus to better position it in relation to the phylogenetic analysis of RASMUSSEN & CAMERON (2010), which recovered *Plebeia* as a polyphyletic genus, since it had *Friesella* Moure, 1946 and *Lestrimelitta* Friese, 1903 as part of the same clade "Plebeia".

Regarding the clade *Scaura*+*Schwarzula*, although some authors have considered *Schwarzula* Moure, 1946 as a subgenus of *Scaura* (GRÜTER 2020; ENGEL et al. 2021), here we consider them as distinct genera, since we performed a phylogenetic analysis based on in morphological data that recovered both as sister genera, supported by one and two synapomorphic characters, respectively (NOGUEIRA 2016),

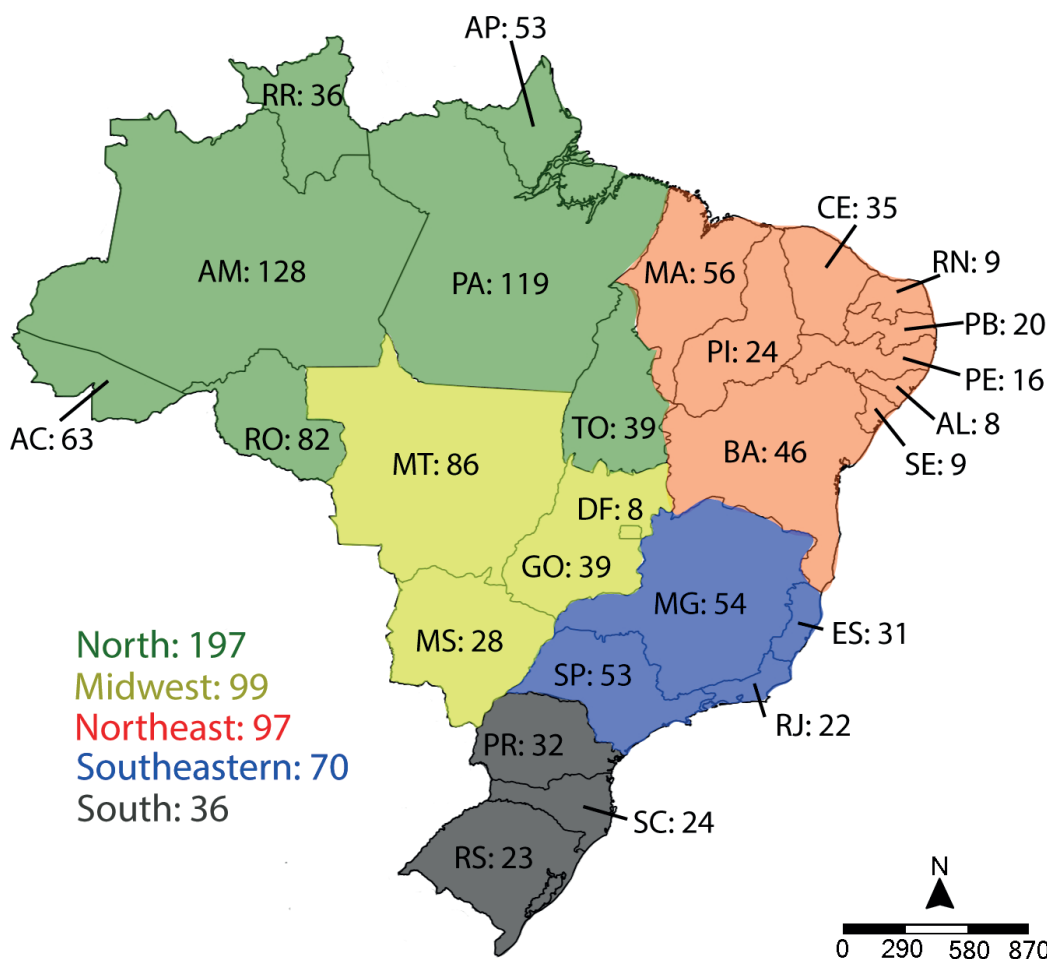


Figure 1. Number of valid species of stingless bees in Brazil. North region: Acre (AC), Amazonas (AM), Amapá (AP), Pará (PA), Rondônia (RO), Roraima (RR) and Tocantins (TO). Midwest region: Distrito Federal (DF), Goiás (GO), Mato Grosso (MT) and Mato Grosso do Sul (MS). Southeast region: Espírito Santo (ES), Minas Gerais (MG), Rio de Janeiro (RJ) and São Paulo (SP). Northeast region: Alagoas (AL), Bahia (BA), Ceará (CE), Maranhão (MA), Paraíba (PB), Pernambuco (PE), Piauí (PI), Rio Grande do Norte (RN) and Sergipe (SE). South region: Paraná (PR), Santa Catarina (SC) and Rio Grande do Sul (RS). Scale bar in kilometers.

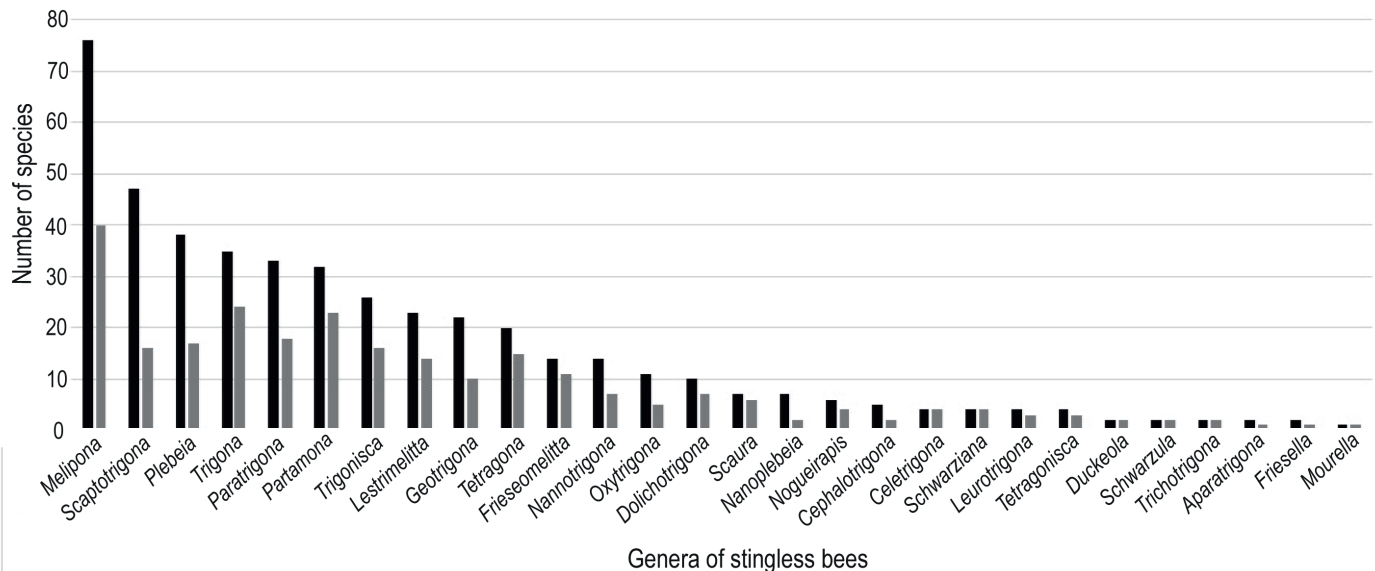


Figure 2. Number of valid species of stingless bees that occur both in the entire Neotropical region and only in Brazil.

unlike the resolution found by RASMUSSEN & CAMERON (2010), based on molecular data, in which *Scaura* was recovered as paraphyletic genus.

Regarding the classification adopted for *Tetragona* Lepelletier & Serville, 1828, *Ptilotrigona* Moure, 1951 and *Camargoia* Moure, 1989, we prefer to keep only *Tetragona* as a valid genus, containing the others as their subgenera. This classification is similar to that of MICHENER (2007), who treats *Tetragona* as a subgenus of *Trigona*, with *Ptilotrigona* and *Camargoia* as synonyms of *T. (Tetragona)*.

Regarding the genus *Trigona* Jurine, 1807, the classification into species groups adopted by RASMUSSEN & CAMARGO (2008) and NOGUEIRA *et al.* (2020b) was similar to that proposed by ENGEL *et al.* (2021), except for the taxonomic formalization of groups into subgenera. Although we considered the division of the genus into subgenera according to ENGEL *et al.* (2021), the groups of *amalthea* species [*T. amalthea* (Olivier, 1789) and *T. truculenta* Almeida, 1984] and *spinipes* [*T. spinipes* (Fabricius, 1793), *T. hyalinata* (Lepelletier, 1836), *T. dallatorreana* Friese, 1900, *T. branneri* Cockerell, 1912 e *T. amazonensis* (Ducke, 1916)] are morphologically different and can be considered as distinct subgenera.

Richness of bees. Regarding species richness, in addition to the update from PEDRO (2014), we organized these data into states and regions of Brazil, thus, the northern region was clearly highlighted, with almost twice as many species (n=197, totaling 39.47%) compared to the Midwest (n=99). This highlight was main for the following states: Amazonas (n=128), Pará (n=119) and Rondônia (n=82) (Figure 1). These numbers are promising, since the Amazon region has areas with low sampling rates compared to other Brazilian biomes, in addition to the great logistical difficulty and sampling standardization (SILVEIRA *et al.* 2002).

The Midwest region is composed of part of the Amazon Forest and the Pantanal, but its largest area is Cerrado. In this region there is intense agricultural exploitation and although there are few surveys (e.g., FERREIRA *et al.* 2022), this area demonstrates a considerable richness of bees, including the Meliponini, since they totaled 99 species (totaling 19.83%) being below only the North region.

For the Northeast region, which has a mosaic of dunes, remnants of the Atlantic Forest and where the Caatinga biome predominates, there is generally low bee richness and a low number of species per genus (ZANELLA 2000; ZANELLA & MARTINS 2003), contradicting these data, we obtained 97

species of Meliponini (19.83%), being above Southeastern (n=70, totaling 14.02%) and South (n=36, totaling 7.21%).

The southeast region has many researches and surveys, so a great sampling effort has already been used to collect bees in this region (VIOTTI *et al.* 2013; ANDRADE *et al.* 2021), thus, a richness of 70 species for this region (totaling 14.02%), being only above the South region (7.21%).

The species richness in the South region was the lowest (n=36, totaling 7.21%), and this was already expected, since the species richness of Meliponini decreases as the distance from the equator increases and in the more species are concentrated in humid forests that make use of preexisting cavities, such as trunks (ROUBIK 1989; SILVEIRA *et al.* 2002).

Fauna surveys are essential to improve knowledge about the different taxa and also serve as a basis for several studies, as well as the elaboration of laws, such as, for example, the use and management of stingless bees according to the place of occurrence, as it already happens in Brazil.

It is undeniable that much of what is known today about stingless bees in terms of taxonomy or classification can be modified, since there are still many groups that need revision and have many species to be described, in addition there are few studies on phylogeny of specific groups. Like *Scaptotrigona* and *Plebeia* which although some species have been recently described, most of them do not occur in Brazil, which makes a systematic review of Brazilian species necessary, as well as a phylogenetic analysis to improve knowledge about these groups.

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Table S1. Stingless bees found in Brazil (Hymenoptera: Apidae: Meliponini). # Species is under taxonomic review, so its validity or occurrence records may change in the future. \$ Species found only in Brazilian territory. * Geographical record uncertain. Brazilian states: Acre (AC); Alagoas (AL); Amapá (AP); Amazonas (AM); Bahia (BA); Ceará (CE); Distrito Federal (DF), Espírito Santo (ES); Goiás (GO); Maranhão (MA); Mato Grosso (MT); Mato Grosso do Sul (MS); Minas Gerais (MG); Pará (PA); Paraíba (PB); Paraná (PR); Pernambuco (PE); Piauí (PI); Rio de Janeiro (RJ); Rio Grande do Norte (RN); Rio Grande do Sul (RS); Rondônia (RO); Roraima (RR); Santa Catarina (SC); São Paulo (SP); Sergipe (SE) and Tocantins (TO).

Genus/subgenus	Number of valid and undescribed species (between square brackets)		Species found in Brazil					
	Total	Brazil	Species	Author	States			
<i>Aparatrigona</i>	2	1	<i>A. impuctata</i>	(Ducke, 1916)	AC, AP, AM, MT, PA, RO, RR			
<i>Celetrigona</i>	4	4	<i>C. euclydiana</i>	Camargo & Pedro, 2009	AC			
			<i>C. hirsuticornis</i>	Camargo & Pedro, 2009 \$	AC, AM, MT, RO			
			<i>C. longicornis</i>	(Friese, 1900)	AM, GO, MA, MT, PA, RO			
			<i>C. manauara</i>	Camargo & Pedro, 2009	AP, AM, PA			
<i>Cephalotrigona</i>	5	2[+1]	<i>C. capitata</i>	(Smith, 1854) #	AP, BA, CE, ES, MT, MG, PA, PR, SC, SP			
			<i>C. femorata</i>	(Smith, 1854)	AP, AM, MA, PA, RO, TO			
<i>Dolichotrigona</i>	10	7	<i>D. browni</i>	Camargo & Pedro, 2005	AC, MT, RO			
			<i>D. clavicornis</i>	Camargo & Pedro, 2005 \$	AC, AM, RO			
			<i>D. longitarsis</i>	(Ducke, 1916)	AC, AM, MA, MT, PA, RO			
			<i>D. mendersoni</i>	Camargo & Pedro, 2005 \$	AC, AM, RO			
			<i>D. moratoi</i>	Camargo & Pedro, 2005 \$	AC, AM			
			<i>D. rondoni</i>	Camargo & Pedro, 2005 \$	RO			
			<i>D. tavaresi</i>	Camargo & Pedro, 2005 \$	AC, AM			
<i>Duckeola</i>	2	2	<i>D. ghiliani</i>	(Spinola, 1853)	AP, AM, MT, PA, RO			
			<i>D. pavani</i>	Moure, 1963	AM			
<i>Friesella</i>	1	1[+1]	<i>F. schrottkyi</i>	(Friese, 1900) \$	ES, MG, PR, SP			
			<i>F. dispar</i>	(Moure, 1950) \$	BA, ES, MG, PB			
			<i>F. doederleini</i>	(Friese, 1900) \$	BA, CE, MA, MT, MG, PB, PE, PI, RN			
			<i>F. flavicornis</i>	(Fabricius, 1798)	AP, AM, PA, RR			
			<i>F. languida</i>	Moure, 1990 \$	BA, GO, MG, SP			
			<i>F. longipes</i>	(Smith, 1854)	AM, PA			
			<i>F. meadewaldoi</i>	(Cockerell, 1915) \$	BA, ES, PB, PE, SE			
			<i>F. paranigra</i>	(Schwarz, 1940)	AM			
			<i>F. portoi</i>	(Friese, 1900) \$	AM, MA, PA			
			<i>F. silvestrii</i>	(Friese, 1902) \$	MT			
<i>Frieseomelitta</i>	14	11[+5]	<i>trichocerata</i>	Moure, 1990	AP, AM, PA			
			<i>F. varia</i>	(Lepeletier, 1836)	BA, CE, GO, MT, MG, SP, TO			
			<i>Geotrigona</i>	22	10[+1]			
			<i>G. (Chthnotrigona)</i>	9	1	<i>G. (C.) fulvohirta</i>	(Friese, 1900)	AC, AM
						<i>G. (G.) aequinoctialis</i>	(Ducke, 1925) \$	CE, MA, PA, TO
			<i>G. (Geotrigona)</i>	13	9[+1]	<i>G. (G.) kwyrakai</i>	Camargo & Moure, 1996 \$	PA, RO
						<i>G. (G.) mattogrossensis</i>	(Ducke, 1925)	MT, PA, RO
						<i>G. (G.) mombuca</i>	(Smith, 1863)	BA, GO, MA, MT, MS, MG, PA, PI, SP, TO
						<i>G. (G.) subfulva</i>	Camargo & Moure, 1996 \$	AM
						<i>G. (G.) subgrisea</i>	(Cockerell, 1920)	RR
<i>G. (G.) subnigra</i>	(Schwarz, 1940)	AP, AM, PA						
<i>G. (G.) subterranea</i>	(Friese, 1901) \$	BA, MG, PR, SP						
<i>G. (G.) xanthopoda</i>	Camargo & Moure, 1996 \$	PB, PE						

to be continued...

Table S1. Continue...

Genus/subgenus	Number of valid and undescribed species (between square brackets)		Species found in Brazil		
	Total	Brazil	Species	Author	States
<i>Lestrimelitta</i>	24	14	<i>L. ciliata</i>	Marchi & Melo, 2006 \$	PA
			<i>L. ehrhardti</i>	(Friese, 1931) \$	AL, ES, MG, PR, RJ, SC, SP
			<i>L. glaberrima</i>	Oliveira & Marchi, 2005	AP
			<i>L. glabrata</i>	Camargo & Moure, 1996	AC, AM, MT, RR
			<i>L. limao</i>	(Smith, 1863) \$	BA, CE, DF, GO, MA, MG, RO, SP
			<i>L. maracaia</i>	Marchi & Melo, 2006 \$	AM, RO, RR
			<i>L. monodonta</i>	Camargo & Moure, 1989 \$	AM, MA, PA, RR
			<i>L. nana</i>	Melo, 2003 \$	AP
			<i>L. rufa</i>	(Friese, 1903)	AM, CE, MT, PA, RO
			<i>L. rufipes</i>	(Friese, 1903)	AM, BA, CE, ES, GO, MA, MT, MG, PA, PR, PI, RS, RO, RR, SC, SP, TO
			<i>L. similis</i>	Marchi & Melo, 2006 \$	PA
			<i>L. spinosa</i>	Marchi & Melo, 2006	PA
			<i>L. sulina</i>	Marchi & Melo, 2006	PR, RS, SC
			<i>L. tropica</i>	Marchi & Melo, 2006 \$	BA, CE, RJ
<i>Leurotrigona</i>	4	3	<i>L. gracilis</i>	Pedro & Camargo, 2009 \$	AC, AM, RO
			<i>L. muelleri</i>	(Friese, 1900) #	BA, ES, GO, MA, MT, MS, MG, PR, PB, RO, SC, SP
			<i>L. pusilla</i>	Moure & Camargo, 1988	AP, AM, PA
<i>Melipona</i>	76	40[+14]			
<i>M. (Eomelipona)</i>	13	8[+2]	<i>M. (E.) amazonica</i>	Schulz, 1905 \$	AC, AP, AM, PA, RO
			<i>M. (E.) asilvai</i>	Moure, 1971 \$	AL, BA, CE, MG, PB, PE, PI, RN, SE
			<i>M. (E.) bicolor</i>	Lepeletier, 1836	BA, ES, MG, PR, RJ, RS, SC, SP
			<i>M. (E.) marginata</i>	Schwarz, 1932 \$	AP, AM, MT, PA, RO, RR
			<i>M. (E.) ogilviei</i>	Schwarz, 1932	PA, MT
			<i>M. (E.) puncticollis</i>	Friese, 1902	AM*, MA, PA
			<i>M. (E.) torrida</i>	Friese, 1916	MT*, PR, RS, SC, SP
<i>M. (E.) tumupasae</i>	Schwarz, 1932	AC			
<i>M. (Meliponiella)</i>	4	2	<i>M. (M.) illustris</i>	Schwarz, 1932	PA, MT
			<i>M. (M.) bradleyi</i>	Schwarz, 1932	AP, AM, MT, PA, RO, RR
<i>M. (Mouremelia)</i>	3	2	<i>M. (M.) fuliginosa</i>	Lepeletier, 1836	AC, AM, BA, ES, MT, PA, PI*, SP
			<i>M. (M.) titania</i>	Gribodo, 1893	AM
<i>M. (Melikerria)</i>	10	5[+1]	<i>M. (M.) compressipes</i>	(Fabricius, 1804)	AP, AM, RR, TO
			<i>M. (M.) fasciculata</i>	Smith, 1854 \$	MA, MT, PA, PI, TO
			<i>M. (M.) grandis</i>	Guérin, 1834	AC, AM, MT, RO
			<i>M. (M.) interrupta</i>	Latreille, 1811	AP, AM, PA
			<i>M. (M.) quinquefasciata</i>	Lepeletier, 1836 #	CE, DF, ES, GO, MT, MS, MG, PR, RJ, RS, RO, SC, SP, TO
<i>M. (Melipona)</i>	13	5[+1]	<i>M. (M.) favosa</i>	(Fabricius, 1798)	RR
			<i>M. (M.) mandacaia</i>	Smith, 1863 \$	AL, BA, CE, PB, PE, PI, RN, SE

to be continued...

Table S1. Continue...

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	Total	Brazil	Species	Author	States
<i>M. (Melipona)</i> (cont...)			<i>M. (M.) orbigny</i>	(Guérin, 1844)	MT, MS
			<i>M. (M.) quadrifasciata</i>	Lepeletier, 1836	AL, BA, ES, GO, MS, MG, PB, PR, PE, RJ, RS, SC, SP, SE
			<i>M. (M.) subnitida</i>	Ducke, 1910 \$	AL, BA, CE, MA, PB, PE, PI, RN, SE
<i>M. (Michmelia)</i>	33	18[+10]	<i>M. (M.) brachychaeta</i>	Moure, 1950	MT, RO
			<i>M. (M.) captiosa</i>	Moure, 1962	AP, AM
			<i>M. (M.) capixaba</i>	Moure & Camargo, 1994 \$	ES
			<i>M. (M.) cramptoni</i>	Cockerell, 1920	RR
			<i>M. (M.) crinita</i>	Moure & Kerr, 1950	AC, AM, RO
			<i>M. (M.) dubia</i>	Moure & Kerr, 1950 \$	AC, AM, RO
			<i>M. (M.) eburnea</i>	Friese, 1900	AC, AM
			<i>M. (M.) flavolineata</i>	Friese, 1900 # \$	CE, MA, PA, TO
			<i>M. (M.) fulva</i>	Lepeletier, 1836	AP, AM, PA, RR
			<i>M. (M.) fuscopilosa</i>	Moure & Kerr, 1950	AC, AM
			<i>M. (M.) lateralis</i>	Erichson, 1848	AP, AM, PA, RR
			<i>M. (M.) melanoventer</i>	Schwarz, 1932 \$	AC*, AM, MA, MT, PA, RO
			<i>M. (M.) mondury</i>	Smith, 1863 \$	BA, CE, ES, MG, PR, RJ, RS*, SC, SP
			<i>M. (M.) nebulosa</i>	Camargo, 1988	AC, AM, PA
			<i>M. (M.) paraensis</i>	Ducke, 1916 #	AP, AM, PA
			<i>M. (M.) rufiventris</i>	Lepeletier, 1836 # \$	BA, GO, MT, MS, MG, PI, SP
<i>M. (M.) scutellaris</i>	Latreille, 1811 \$	AL, BA, CE, PB, PE, RN, SE			
<i>M. (M.) seminigra</i>	Friese, 1903 #	AC, AM, MA, MT, PA, RO, RR, TO			
<i>Mourella</i>	1	1	<i>M. caerulea</i>	(Friese, 1900)	PR, RS, SC
<i>Nannotrigona</i>	14	7[+1]	<i>N. chapadana</i>	(Schwarz, 1938)	GO, MT
			<i>N. dutrae</i>	(Friese, 1901) \$	PA
			<i>N. melanocera</i>	(Schwarz, 1938)	AC, AM
			<i>N. minuta</i>	(Lepeletier, 1836) \$	PA
			<i>N. punctata</i>	(Smith, 1854)	AP, PA
			<i>N. schultzei</i>	(Friese, 1901)	AP, AM, MT, PA
			<i>N. testaceicornis</i>	(Lepeletier, 1836)	BA, ES, GO, MS, MG, PR, RJ, RS, SC, SP
<i>Nogueirapis</i>	6	4	<i>N. batistai</i>	Nogueira, 2020	AM, RR
			<i>N. butteli</i>	(Friese, 1900)	AM
			<i>N. minor</i>	(Moure & Camargo, 1982)	AP, AM, PA
			<i>N. rosariae</i>	Nogueira, 2020	AM
<i>Oxytrigona</i>	11	5[+5]	<i>O. flaveola</i>	(Friese, 1900) #	ES
			<i>O. ignis</i>	Camargo, 1984 \$	AM, MA, PA
			<i>O. mulfordi</i>	(Schwarz, 1948)	AC, RO
			<i>O. obscura</i>	(Friese, 1900) #	AP, AM, MT, PA, RO
			<i>O. tataira</i>	(Smith, 1863) #	BA, CE*, ES, MS, MG, PR, RJ, SC, SP
<i>Paratrigona</i>	33	18[+2]	<i>P. catabolonota</i>	Camargo & Moure, 1994 \$	AM
			<i>P. compsa</i>	Camargo & Moure, 1994 \$	AM

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Table S1. Continue...

Genus/subgenus	Number of valid and undescribed species (between square brackets)		Species found in Brazil		
	Total	Brazil	Species	Author	States
<i>Paratrigona</i> (cont...)			<i>P. crassicornis</i>	Camargo & Moure, 1994 \$	PA
			<i>P. euxanthospila</i>	Camargo & Moure, 1994 \$	AM
			<i>P. femoralis</i>	Camargo & Moure, 1994	AP
			<i>P. haeckeli</i>	(Friese, 1900)	MT, PA, RO
			<i>P. incerta</i>	Camargo & Moure, 1994 \$	BA, M
			<i>P. lineata</i>	(Lepeletier, 1836)	PA, GO, MG, BA, MT, SP, PR, TO
			<i>P. intermedia</i>	Oliveira, Madella-Auricchio & Freitas, 2020 \$	MA, PI, PB, CE
			<i>P. lineatifrons</i>	(Schwarz, 1938) \$	AM, PA
			<i>P. melanaspis</i>	Camargo & Moure, 1994 \$	AM
			<i>P. nuda</i>	(Schwarz, 1943)	AC
			<i>P. myrmecophila</i>	Moure, 1989 \$	RO
			<i>P. pacifica</i>	(Schwarz, 1943)	RO
			<i>P. pannosa</i>	Moure, 1989	AP, AM, PA
			<i>P. peltata</i>	(Spinola, 1853) \$	MA, PA
			<i>P. prosopiformis</i>	(Gribodo, 1893)	AC, AM, PA, RO
		<i>P. subnuda</i>	Moure, 1947 \$	BA, MG, PA, PR, RJ, RS, SC, SP	
<i>Partamona</i>	32	23[+3]	<i>P. ailyae</i>	Camargo, 1980	AC, AM, CE, GO, MA, MT, MS, MG, PA, PI, RO, SP, TO
			<i>P. auripennis</i>	Pedro & Camargo, 2003	AP, AM, PA
			<i>P. batesi</i>	Pedro & Camargo, 2003 \$	AC, AM
			<i>P. chapadicola</i>	Pedro & Camargo, 2003 \$	MA, PA, PE, PI, TO
			<i>P. combinata</i>	Pedro & Camargo, 2003	AC, DF, GO, MA, MT, MS, MG, PA, RO, SP, TO
			<i>P. criptica</i>	Pedro & Camargo, 2003 \$	ES, MG, RJ, SP
			<i>P. cupira</i>	(Smith, 1863) \$	CE*, DF, GO, MS, MG, SP, TO
			<i>P. epiphytophila</i>	Pedro & Camargo, 2003	AC, AM
			<i>P. ferreirai</i>	Pedro & Camargo, 2003	AP, AM, PA, RR
			<i>P. gregaria</i>	Pedro & Camargo, 2003 \$	AM, PA
			<i>P. helleri</i>	(Friese, 1900) \$	BA, ES, MG, PR, RJ, SC, SP
			<i>P. littoralis</i>	Pedro & Camargo, 2003 \$	PB, RN
			<i>P. mourei</i>	Camargo, 1980	AM, PA, RR
			<i>P. mulata</i>	Moure, in Camargo, 1980	MT, MS
			<i>P. nhambiquara</i>	Pedro & Camargo, 2003	GO, MT, MS, PA, RO
			<i>P. nigrior</i>	(Cockerell, 1925)	RR
			<i>P. pearsoni</i>	Pedro & Camargo, 2003	AP, AM, MA, PA
			<i>P. rustica</i>	Pedro & Camargo, 2003 \$	BA, CE*, MG
			<i>P. seridoensis</i>	Pedro & Camargo, 2003 \$	CE, MA, PB, PE, RN
			<i>P. sooretamae</i>	Pedro & Camargo, 2003 \$	BA, ES
<i>P. subtilis</i>	Pedro & Camargo, 2003	AC			
<i>P. testacea</i>	(Klug, 1807)	AC, AP, AM, CE, MA, PA, RO			
<i>P. vicina</i>	Camargo, 1980	AC, AP, AM, MT, PA, RO, RR			

to be continued...

Table S1. Continue...

Genus/subgenus	Number of valid and undescribed species (between square brackets)		Species found in Brazil		
	Total	Brazil	Species	Author	States
<i>Nanoplebeia</i>	7	2	<i>N. margaritae</i>	(Moure, 1962)	AM, MT, RO
			<i>N. minima</i>	(Gribodo, 1893) #	AC, AP, AM, MA, MT, PA, TO
<i>Plebeia</i>	47	17[+5]	<i>P. alvarengai</i>	Moure, 1994 \$	AM, MT, PA, RO, TO
			<i>P. catamarcensis</i>	(Holmberg, 1903)	MS, RS
			<i>P. droryana</i>	(Friese, 1900) #	BA, ES, MG, PA, PE, RJ, RS, SC, SP
			<i>P. emerina</i>	(Friese, 1900)	PR, RS, SC, SP
			<i>P. flavocincta</i>	(Cockerell, 1912) \$	BA, CE, PB, PE, PI
			<i>P. grapiuna</i>	Melo & Costa, 2009 \$	BA
			<i>P. julianii</i>	Moure, 1962 #	PR
			<i>P. lucii</i>	Moure, 2004 \$	ES, MG
			<i>P. meridionalis</i>	(Ducke, 1916) #	ES, MG, PR, RJ
			<i>P. mosquito</i>	(Smith, 1863) # \$	MG, RJ
			<i>P. nigriceps</i>	(Friese, 1901)	PR, RS, SC, SP
			<i>P. phrynostoma</i>	Moure, 2004 \$	ES, MG
			<i>P. poecilochroa</i>	Moure & Camargo, 1993 \$	ES, MG
			<i>P. remota</i>	(Holmberg, 1903)	ES, MG, PR, RS, SC, SP
			<i>P. saiqui</i>	(Friese, 1900) \$	MG, PR, RS, SC, SP
			<i>P. variicolor</i>	(Ducke, 1916)	AM, PA, RO
<i>P. wittmanni</i>	Moure & Camargo, 1989	RS			
<i>Scaptotrigona</i>	47	16[+3]			
<i>S. (Baryorygma)</i>			<i>S. (B.) bipunctata</i>	(Lepeletier, 1836)	AC, CE, MA, MG, PA, PR, RJ, RS, SC
			<i>S. (B.) tricolorata</i>	Camargo, 1988	AM, MT, RO
<i>S. (Dasytrigona)</i>			<i>S. (D.) fulvicutis</i>	(Moure, 1964)	AP, AM
<i>S. (Eoscaptotrigona)</i>			<i>S. (E.) polysticta</i>	Moure, 1950	AC, GO, MA, MT, MG, PA, PI, RO, SP, TO
			<i>S. (G.) depilis</i>	(Moure, 1942)	CE*, MS, MG, PR, RS, SP
<i>S. (Gymnotrigona)</i>			<i>S. (G.) stipula</i>	Engel, 2022 \$	SP
			<i>S. (G.) guimaraesensis</i>	Laroca & Almeida, 2017 \$	GO, MT, RO
			<i>S. (S.) affabra</i>	(Moure, 1989) \$	PA, RO
<i>S. (Sakagamilla)</i>			<i>S. (S.) hylaeana</i>	Nogueira & Santos-Silva, 2022	AM, RR
			<i>S. (S.) marialiceae</i>	Laroca & Almeida, 2015 \$	PR
			<i>S. (S.) silviae</i>	Engel, 2022 \$	BA, CE, MA, MT, MG, PA, PB, PE, PI, SP, SE
			<i>S. (S.) tubiba</i>	(Smith, 1863) # \$	AP, AM, MT, PA
			<i>S. (S.) faviziae</i>	Engel, 2022 \$	AM
<i>S. (Scaptotrigona)</i>			<i>S. (S.) nigrohirta</i>	Nogueira & Santos-Silva, 2022	AC, AM, MA, PA, RO, RR
			<i>S. (S.) xanthotricha</i>	Moure, 1950 \$	BA, ES, MG, PR, RJ, SC, SP
			<i>S. (S.) postica</i>	(Latreille, 1807) #	BA, CE, GO, MA, MT, MS, MG, PA, PE, PI, SP, TO
<i>Scaura</i>	7	6	<i>S. latitarsis</i>	(Friese, 1900)	AC, AM, PA, RO, RR, MT
			<i>S. longula</i>	(Lepeletier, 1836)	AC, AP, AM, BA, GO, MT, MS, MG, PA, RO, RR, SP

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Table S1. Continue...

Genus/subgenus	Number of valid and undescribed species (between square brackets)		Species found in Brazil		
	Total	Brazil	Species	Author	States
<i>Scaura</i> (cont..)			<i>S. amazonica</i>	Nogueira, Oliveira & Oliveira, 2019	AC, AP, AM, GO, MA, MT, PA, RO, RR, TO
			<i>S. aspera</i>	Nogueira & Oliveira, 2019 \$	GO, MS, MG, PR, RJ, SP
			<i>S. cearensis</i>	Nogueira, Santos Junior & Oliveira, 2019 \$	CE
			<i>S. atlantica</i>	Melo, 2004	BA, ES, MG
<i>Schwarzula</i>	2	2	<i>S. coccidophila</i>	Camargo & Pedro, 2002	AC, AM, RO
			<i>S. timida</i>	(Silvestri, 1902)	AC, AM, MT, MS, MG, PA, RO, SP
<i>Schwarziana</i>	4	4[+1]	<i>S. bocainensis</i>	Melo, 2015 \$	SP
			<i>S. chapadensis</i>	Melo, 2015 \$	GO
			<i>S. mourei</i>	Melo, 2003	GO, MS, MG, TO
			<i>S. quadripunctata</i>	(Lepeletier, 1836)	BA, ES, GO, MG, PR, RJ, RS, SC, SP
<i>Tetragona</i>	20	15[+6]			
<i>T. (Tetragona)</i>	14	10[+6]	<i>T. (T.) beebei</i>	(Schwarz, 1938)	AC, AP, AM, MT, PA, RO, RR
			<i>T. (T.) clavipes</i>	(Fabricius, 1804)	AC, AP, AM, BA, DF, ES, GO, MA, MT, MS, MG, PA, PR, PI, RS, RJ, SC, RO, RR, SP, TO
			<i>T. (T.) dorsalis</i>	(Smith, 1854)	AP, AM, CE, MA, MT, PA, RO, RR, TO
			<i>T. (T.) essequeboensis</i>	(Schwarz, 1940)	AM, RO
			<i>T. (T.) goettei</i>	(Friese, 1900)	AC, AM, MA, MT, PA, RO, RR
			<i>T. (T.) handlirschii</i>	(Friese, 1900)	AP, AM PA, RO, RR
			<i>T. (T.) kaieteurensis</i>	(Schwarz, 1938)	AM, PA, RR
			<i>T. (T.) quadrangula</i>	(Lepeletier, 1836) \$	AM, DF, GO, MA, MT, MS, MG, PA, PI, SP, TO
			<i>T. (T.) truncata</i>	Moure, 1971	AC, AM, GO, MA, MT, PA, RO, TO
			<i>T. (T.) mourei</i>	Nogueira, 2022 \$	GO, MA, MT, MS, PA, PI, TO
<i>T. (Ptilotrigona)</i>	3	2	<i>T. (P.) lurida</i>	(Smith, 1854)	AC, AP, AM, MA, MT, PA, RO, RR
			<i>T. (P.) pereneae</i>	(Schwarz, 1943)	AC, AM
<i>T. (Camargoia)</i>	3	3	<i>T. (C.) camargoi</i>	Moure, 1989	AP, AM
			<i>T. (C.) nordestina</i>	Camargo, 1996 \$	BA, CE, PI, TO
			<i>T. (C.) pilicornis</i>	(Ducke, 1910) \$	MA, PA
<i>Tetragonisca</i>	4	3[+2]	<i>T. angustula</i>	(Latreille, 1811) #	BRASIL
			<i>T. fiebrigi</i>	(Schwarz, 1938)	MT, MS, PR, RS, SP
			<i>T. weyrauchi</i>	(Schwarz, 1943)	AC, MT, RO
<i>Trichotrigona</i>	2	2	<i>T. extranea</i>	Camargo & Moure, 1983 \$	AM
			<i>T. camargoiana</i>	Pedro & Cordeiro, 2015 \$	RO
<i>Trigona</i>	32	21[+2]			
<i>T. (Trigona)</i>	11	7	<i>T. (T.) amalthea</i>	(Olivier, 1789)	AC, AM, MT, RO
			<i>T. (T.) truculenta</i>	Almeida, 1984	AC, AP, AM, BA, GO, MA, MT, MS, MG, PA, RO, SP, TO

to be continued...

Table S1. Continue...

Genus/subgenus	Number of valid and undescribed species (between square brackets)		Species found in Brazil		
	Total	Brazil	Species	Author	States
<i>T. (Trigona)</i> (cont...)			<i>T. (T.) spinipes</i>	(Fabricius, 1793)	AL, BA, CE, ES, GO, MA, MT, MS, MG, PA, PB, PR, PE, PI, RJ, RN, RS, SC, SP, SE, TO
			<i>T. (T.) hyalinata</i>	(Lepeletier, 1836)	BA, DF, GO, MA, MT, MS, MG, PA, PI, SP, TO
			<i>T. (T.) dallatorreana</i>	Friese, 1900	AP, AM, MA, MT, PA, RO, TO
			<i>T. (T.) branneri</i>	Cockerell, 1912	AM, GO, MA, MT, PA, RO, TO
			<i>T. (T.) amazonensis</i>	(Ducke, 1916)	AC, AM, MT, PA, RO, TO
<i>T. (Koilotrigona)</i>	3	2	<i>T. (K.) braueri</i>	Friese, 1900 #	BA, CE, ES, PR, RJ, SP
			<i>T. (K.) guianae</i>	Cockerell, 1910 #	AC, AP, AM, MT, PA, PB, RO, TO
<i>T. (Ktinotrofia)</i>	2	1[+1]	<i>T. (K.) albipennis</i>	Almeida, 1995	AC, AM, MT, PA, RO
<i>T. (Aphaneuropsis)</i>	3	3	<i>T. (A.) cilipes</i>	(Fabricius, 1804)	AC, AP, AM, GO, MG, MT, PA, RO, RR, SP
			<i>T. (A.) lacteipennis</i>	Friese, 1900	AC, AM, GO, MT, PA, RO, RR
			<i>T. (A.) pellucida</i>	Cockerell, 1912 \$	MT, PA, RO
<i>T. (Necrotrigona)</i>	3	2[+1]	<i>T. (N.) crassipes</i>	(Fabricius, 1793)	AP, AM, MT, PA
			<i>T. (N.) hypogea</i>	Silvestri, 1902	AM, MA, MT, PA, SP
<i>T. (Dichrotrigona)</i>	3	2	<i>T. (D.) dimidiata</i>	Smith, 1854	AM, MT, PA, RO
			<i>T. (D.) sesquipedalis</i>	Almeida, 1984	AP
<i>T. (Nostotrigona)</i>	2	4	<i>T. (N.) recursa</i>	Smith, 1863	AC, AM, CE, GO, MA, MT, MG, PA, PI, RO, SP, TO
			<i>T. (N.) daianeae</i>	Ribeiro, 2023	AM, MA, PA, RO
			<i>T. (N.) juvenili</i>	Ribeiro, 2023	AC, RO
			<i>T. (N.) mandaloriana</i>	Ribeiro, 2023	AC, AM
<i>T. (Aphaneura)</i>	5	3	<i>T. (A.) pallens</i>	(Fabricius, 1798)	AC, AP, AM, GO, MA, PA, RO, RR, TO
			<i>T. (A.) williana</i>	Friese, 1900	AC, AP, AM, MA, MT, PA, RO, RR
			<i>T. (A.) chanchamaioensis</i>	Schwarz, 1948	AC, AM, MT, PA, RO
<i>Trigonisca</i>	26	16[+10]	<i>T. bidentata</i>	Albuquerque & Camargo, 2007 \$	RO
			<i>T. ceophloeii</i>	(Schwarz, 1938)	AM
			<i>T. dobzhanskyi</i>	(Moure, 1950)	AM, PA
			<i>T. duckei</i>	(Friese, 1900)	AM, CE, MA, MT, PA, RR
			<i>T. extrema</i>	Albuquerque & Camargo, 2007 \$	AM, CE*
			<i>T. flavicans</i>	(Moure, 1950) \$	AM
			<i>T. fraissei</i>	(Friese, 1901) \$	AM, MT, PA, RO
			<i>T. graeffei</i>	(Friese, 1900)	AM
			<i>T. hirticornis</i>	Albuquerque & Camargo, 2007 \$	RO
			<i>T. intermedia</i>	Moure, 1990 \$	BA, ES, MT, MG, SP
<i>T. meridionalis</i>	Albuquerque & Camargo, 2007 \$	MA, MT, MG, PA, SP			
<i>T. nataliae</i>	(Moure, 1950) \$	MA, MT, PA, RO			

to be continued...

Table S1. Continue...

Genus/subgenus	Number of valid and undescribed species (between square brackets)		Species found in Brazil		
	Total	Brazil	Species	Author	States
<i>Trigonisca</i> (cont...)			<i>T. pediculana</i>	(Fabricius, 1804)	BA, CE, MA, PB, TO*
			<i>T. unidentata</i>	Albuquerque & Camargo, 2007 \$	AM
			<i>T. variegatifrons</i>	Albuquerque & Camargo, 2007 \$	MT, PA, RO
			<i>T. vitrifrons</i>	Albuquerque & Camargo, 2007 \$	AM, PA, TO
TOTAL	459	259[+62]			