Biota Colombiana
ISSN: 0124-5376
ISSN: 2539-200X
biotacol@humboldt.org.co
Instituto de Investigación de Recursos Biológicos "Alexander von Humboldt"
Colombia

Halmenschlager, Matheus; Agudelo Martínez, Juan C; Pérez-Buitrago, Néstor F.
New records of Vespidae (Hymenoptera: Vespoidea) for the Colombian Orinoco Region
Biota Colombiana, vol. 20, no. 1, 2019, January-June, pp. 21-33
Instituto de Investigación de Recursos Biológicos "Alexander von Humboldt"
Colombia

New records of Vespidae (Hymenoptera: Vespoidea) for the Colombian Orinoco Region

Nuevos registros de Vespidae (Hymenoptera: Vespoidea) para la región de la Orinoquía colombiana

Matheus Y. Halmenschlager, Juan C. Agudelo Martínez and Néstor F. Pérez-Buitrago

Abstract

We analyzed 72 specimens from the Arauca (71) and Casanare (1) departments in the Orinoco region of Colombia. The specimens belong to 10 genera and 18 species of vespid wasps. Four species are reported for the first time for the region and 14 are new records for the Arauca department. There is a likely new record of *Stenodynerus* cf. *australis* for the Neotropical region.

Keywords. Arauca. Eumeninae. Neotropic. Species list. Vespid wasps.

Resumen

Analizamos 72 especímenes colectados de los departamentos de Arauca (71) y Casanare (1) en la región de la Orinoquía. Estos pertenecen a 10 géneros y 18 especies de avispas. Cuatro especies son nuevos registros para la región y 14 son nuevas para el departamento de Arauca. Hay también un posible nuevo registro de *Stenodyneus* cf. *australis* para la región Neotropical.

Palabras clave. Arauca. Eumeninae. Lista de especies. Neotrópico. Véspidos.

Introduction

The Polistinae and Eumeninae wasps are medium-size hymenopterans with important ecological roles in ecosystems across the world (Souza & Zanuncio, 2012). These wasps are notable predators and considered important biological controllers of insect plagues (Resende & Gimenes, 2001). In addition, many species have a foraging behavior that includes floral visiting, thus contributing as indirect pollinators of several plant species (Ross & Matthews, 1991; Sühs *et al.*, 2009).

There are four related subfamilies with more than 4000 species in the Neotropical region: 1) Eumeninae (potter wasps, a solitary and protosocial group that is the most diverse among the Vespidae taxon); 2) Masarinae

(solitary pollen wasps); 3) Polistinae (paper wasps, the most collected and abundant group due to their eusocial behavior); 4) Vespinae (hornets, social wasps) (Carpenter & Cumming, 1985; Ross & Matthews, 1991; Carpenter & Marques, 2001; Pickett & Carpenter, 2010; Bank *et al.*, 2017). The first three subfamilies occur naturally in the Neotropical region, while species of Vespinae are considered invaders from European countries recently recorded in Chile and Argentina (Barrera Medina & Vidal Munoz, 2013; Beggs *et al.*, 2011; Masciocchi *et al.*, 2010; Peña *et al.*, 1975).

In Colombia, the species richness of vespids was documented by Sarmiento (1994), accounting up to 236 species, all of them from the subfamily Polistinae. Fernández (1995) compiled the occurrence of 189 vespid wasp species and documented their geographical distribution at a broad regional spatial scale. Colomo & Berta (2005a, b) reported 36 specimens of *Polistes* and *Synoeca* found in the Miguel Lillo Collection (Argentina) from the departments of Antioquia, Valle del Cauca, Chocó, and Cundinamarca. More recently, López *et al.* (2013), Montero *et al.* (2009), and Sarmiento & Saravia (1995) broadened the knowledge about the distribution of vespids in Colombia, using a smaller geographic scale in the departments of Boyacá, Nariño and Sucre.

Despite these studies of Vespidae in Colombia, there are regions with little information on this group, and one of them is the Orinoco region. Fernández (1995) documented the presence of 33 species for this region, according to records in collections located in different places in Colombia and available bibliography. In a comprehensive analysis of Colombian social wasps (subfamily Polistinae), Cubillos & Sarmiento (1998) reported 97 vespid species in 16 genera for the Orinoco region. Recently, one additional species of *Montezumia* from the region was reported from the Miguel Lillo Collection in Argentina (Colomo & Berta, 2005b). Fernández (1995) highlighted the need of studies about hymenopterans in several areas of Colombia, including the Orinoco region.

The Orinoco region—or *Orinoquía* or *Llanos Orientales*—occupies more than 20 % of the Colombian territory and comprises the departments of Arauca, Casanare, Guaviare, Meta and Vichada. The proximity of the Orinoquía with the Amazon and Andes ecosystems is one of the factors explaining its remarkable biodiversity (Hernández-Camacho, 1992). As a biome, the Orinoco region is considered one of the last remaining pristine landscapes of the planet, but also one of the most endangered due to the quick advance of agricultural and oil exploitation and the potential drastic land cover transformation in the near future (Decäens *et al.*, 2001; Lasso *et al.*, 2011). Therefore, it is important for the conservation of local ecosystems to have reliable data about its biodiversity (Arbeláez-Cortés, 2014; Agudelo Martínez & Pérez-Buitrago, 2015, 2017).

The aim of this study was to make a checklist of the vespid wasps deposited in the Entomological Collection of the Orinoco campus of the Universidad Nacional de Colombia, and provide information about the occurrence of these wasps in Arauca and Casanare departments, resulting in a better understanding of the distribution of Polistinae and Eumeninae family in the region.

Materials and methods

The specimens were collected in the department of Arauca and one was collected in the department of Casanare, and stored in Entomological Collection of the Orinoquía (CEO for its initials in Spanish) of the Universidad Nacional de Colombia from May 2008 to October 2017. The specimens were collected using hand nets, and Malaise and van Someren traps. The specimens that expand distribution records were photographed using a Nikon 7100 camera with a 60 mm AF-S micro Nikkor lens and Wireless Speedlight Commander SU-800. Images were merged using CombineZP software. Taxonomic identification to

genus and species levels was made according to literature for Neotropical Vespidae (Richards, 1978; Carpenter, 2004; Picket & Wenzel, 2007; Silveira, 2008; Andena *et al.*, 2009; Silveira *et al.*, 2015; Santos Júnior *et al.*, 2015, 2017). The species' occurrence in CEO was compared with the information reported by literature on social wasps for Colombia (e.g. López *et al.*, 2013; Sarmiento & Saravia, 1996; Montero *et al.*, 2009; Fernández, 1995).

The database from CEO was also checked on biodiversity databases of SiB Colombia and the invertebrate collection of Instituto de Ciencias Naturales – Universidad Nacional de Colombia, Bogotá (Flórez *et al.*, 2016; García, 2017; Jaramillo & Marín, 2017). Reports outside Colombia were also reviewed: Brazil (Hermes & Köhler, 2004; Andena & Carpenter, 2012; Somavilla & Oliveira, 2013; Aragão & Andena, 2016; Somavilla *et al.*, 2016; Somavilla & Köhler, 2017;), Argentina (Colomo & Berta, 2005a, b; Masciocchi *et al.*, 2010; Somavilla & Köhler, 2017), Uruguay (Somavilla & Köhler, 2017), Chile (Barrera-Medina, 2010; Barrera Medina & Vidal Muñoz, 2013), Venezuela (Bequaert, 1948; Stange, 1997; González *et al.*, 2005; Manzanilla *et al.*, 2000;), Ecuador (Donoso *et al.*, 2009), Peru (García, 1978; Rasmussen & Asenjo, 2009; Santos *et al.*, 2015), Paraguay (Garcete-Barrett, 1999), French Guiana (Corbara *et al.*, 2009) and Guatemala (Carpenter *et al.*, 2012).

All the specimens were recorded in the CEO database and the taxonomy was properly updated according to the most recent zoological nomenclature. Our results will be shortly available in the database SiB Colombia and the Global Biodiversity Information Facility – GBIF through our CEO site.

Results

Seventy-two Vespidae specimens were collected and identified, from the municipalities of Arauca, Arauquita, Cravo Norte, Saravena and Tame in the department of Arauca. One specimen was collected in Yopal, department of Casanare. The individuals are distributed in 2 subfamilies (Polistinae and Eumeninae), 11 genera (*Apoica, Agelaia, Brachygastra, Mischocyttarus, Polistes, Polybia, Protopolybia, Stenodynerus, Synoeca*, *Zeta* and *Zethus*) and 18 species. Below, a list of vespid wasp species at the CEO is shown. Table 1 details the previously known geographic distribution of each species in a regional and departmental scale based on available literature (Richards, 1978; Sarmiento, 1994; Fernández, 1995; Cubillos & Sarmiento, 1999; Colomo & Berta, 2005b; Flórez *et al.*, 2016).

Subfamily Polistinae

***Agelaia cajennensis* (Fabricius, 1798) (Figure 1, A-B; Figure 3A)**
Examined material: COLOMBIA. ARAUCA: Arauca: Leg.: Y. Sanabria, #f, 03.XII.2012, (CEO 2564, 2565). Leg.: M. Y. Halmenschlager, #f, 04.X.2017 (CEO 4564).

***Apoica pallida* (Olivier, 1792) (Figure 1, C-D; Figure 3B**
Examined material: COLOMBIA. ARAUCA: Tame: Leg.: Y. Mina, #f, 01.XII.2012, (CEO 1403); Leg.: Pérez, N. B., #f, 06.VIII.2017, (CEO 4571)

***Apoica thoracica* Buysson, 1906 (Figure 1, E-F; Figure 3C)**
Examined material: COLOMBIA. ARAUCA: Arauca: Leg.: Pérez, B.N., #f, 18.III.2012, (CEO 309); Leg.: Sanabria, Y., #f, 03.XII.2012, (CEO 1191); **Arauquita:** Leg.: O. Ardila, #f, 13.IV.2013, (CEO 1404); **Cravo Norte:** Leg.: Mijares, F., #f, 04.V.2008, (CEO 1237).

***Brachygastra lecheguana* (Latreille, 1824)**
Examined material: COLOMBIA. ARAUCA: Tame: Leg.: Matiz A., #f, 26.V.2013, (CEO 1738);

***Brachygastra bilineolata* (Spinosa, 1841)**
Examined material: COLOMBIA. ARAUCA: Arauca: Leg.: S. Peralta, #f, 03.V.2014, (CEO 2600); **Tame:** Leg.: Pérez N. B., #f, 10.XI.2013, (CEO 2323).

***Polybia ignobilis* (Haliday, 1836) (Figure 1, G-H; Figure 3D)**

Examined material: COLOMBIA. ARAUCA: Arauca: Leg.: Miguel, #f, 06.VII.2014, (CEO 4565). **Tame:** Leg.: Amigo, #f, 01.VII.2017, (CEO 4570).

***Polybia liliacea* (Fabricius, 1804)**
Examined material: COLOMBIA. ARAUCA: Tame: Leg.: Riaño, S., #f, 18.VII.2012, (CEO 539).

***Polybia occidentalis* (Olivier, 1791)**
Examined material: COLOMBIA. ARAUCA: Arauca: Leg.: L. Y. Sanabria, #f, 30.V.2012, (CEO 479); Leg.: Y. Sanabria, #f, 02.VIII.2012, (CEO 534); Leg.: Y. Sanabria, #f, 18.X.2012, (CEO 1022); Leg.: Y. Sanabria, #f, 15.XI.2012, (CEO 1099); Leg.: Y. Sanabria, #f, 01.XII.2012, (CEO 1173); Leg.: Y. Sanabria, #f, 03.XII.2012, (CEO 2388, 2391, 2393, 2399, 2403, 2427, 2429, 2449, 2450, 2453, 2460, 2461, 2462, 2464, 2592); Leg.: J. Agudelo, #f, 22.III.2013, (CEO 1414); Leg.: M. Y. Halmenschlager, #f, 17.X.2017 (CEO 4567, 4568, 4569) **Cravo Norte:** Leg.: Mijares F., #f, 11.V.2008, (CEO 1233, 1234); **Tame:** Leg.: Mijares F., #f, 29.XII.2013, (CEO 2423) Mijares F., #f, 02.IV.2015, (CEO 2825).

***Polybia sericea* (Olivier, 1791)**
Examined material: COLOMBIA. ARAUCA: Arauca: Leg.: O. Ardila, A. Wilson, #f, 18.IV.2013, (CEO 1396); Leg.: O. Ardila, #f, 06.V.2013 (CEO 1388); Leg.: M. Y. Halmenschlager, #f, 09.X.2017 (CEO 4566) **Cravo Norte:** Leg.: Mijares F., #f, 14.VII.2008, (CEO 1222, 1223); **Saravena:** Leg.: (?), #f, (CEO 407); **Tame:** Leg.: Mijares F., #f, 26.IV.2012, (CEO 342).

***Protopolybia exigua* (de Saussure, 1906) (Figure 2 G-H; Figure 3H)**
Examined material: COLOMBIA. ARAUCA: Tame: Leg.: A. Matiz, #f, 26.V.2013, (CEO 1745).

***Synoeca septentrionalis* Richards, 1978**
Examined material: COLOMBIA. ARAUCA: Arauca: Leg.: Rosero, P. I., #f, 25.IX.2012, (CEO 774); Leg. Y. Sanabria, #f, 09.X.2012, (CEO 1004, 1005); Leg.: Angel Matiz, #f, 18.IV.2013, (CEO 1395); **Arauquita:** Leg.: O. Ardila, #f, 18.IV.2013, (CEO 1398); **Cravo Norte:** Leg.: Mijares F., #f, 27.VII.2008, (CEO 1227); Leg.: J. Agudelo, #f, 02.III.2013 (CEO 1402)

***Mischocyttarus drewseni* (de Saussure, 1954) (Figure 2, E-F; Figure 3G)**
Examined material: COLOMBIA. ARAUCA: Tame: Leg.: Mijares F., #f, 13.X.2012, (CEO 1016).

***Polistes versicolor* (Olivier) (Figure 2, C-D; Figure 3F)**
Examined material: COLOMBIA. ARAUCA: Tame: Leg.: A. Matiz, #f, 25.XII.2013, (CEO 2488).

***Polistes infuscatus* Lepeletier, 1836**
Examined material: COLOMBIA. ARAUCA: Cravo Norte: Leg.: Mijares F., #f, 05.VI.2008, (CEO 1231).

***Polistes lanio* (Fabricius, 1775)**
Examined material: COLOMBIA. ARAUCA: Tame: Leg.: Riaño S., #f, 20.VII.2012, (CEO 557); Leg.: Pérez N. B., #f, 15.X.2013, (CEO 885); Leg.: Matiz A., 01.VIII.2013, (CEO 2166, 2184); Leg.: A. Matiz, #f, 25.XII.2013, (CEO 2489, 2519); Leg.: A. Matiz, #f, 28.XII.2013, (CEO 2332). **CASANARE: Yopal:** Leg.: Fuentes K., #f, 22.VII.2012, (CEO 605).

Subfamily Eumeninae

***Stenodynerus* cf. *australis* (Robertson, 1901) (Figure 2, A-B; Figure 3E)**
Examined material: COLOMBIA. ARAUCA: Arauca: Leg.: Y. Sanabria, #f, 27.X.2012, (CEO 1432).

***Zeta argillaceum* (Linnaeus, 1758)**
Examined material: COLOMBIA. ARAUCA: Tame: Leg.: Matiz A., #f, 01.VIII.2013, (CEO 2176).

***Zethus brasiliensis* de Saussure, 1852**
Examined material: COLOMBIA. ARAUCA: Tame: Leg.: M. Y. Halmenschlager, J. C. Agudelo, #f, 10.X.2017, (CEO 4572)

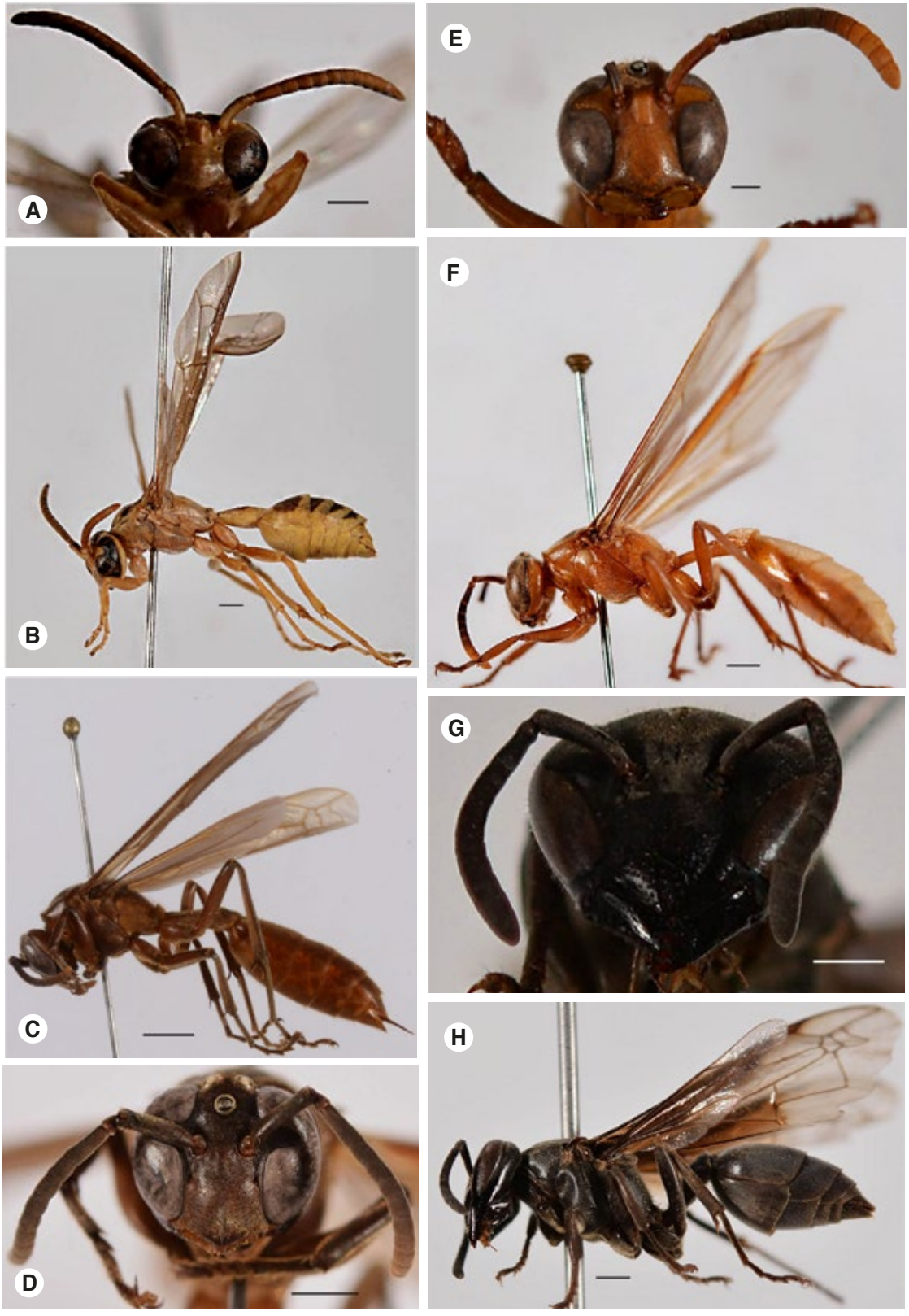

Figure 1. Some wasps from the Orinoco region of Colombia. A. *Agelaia cajennensis,* frontal view. Scale: 1 mm. B. *A. cajennensis,* lateral view. Scale: 1 mm. C. *Apoica pallida,* lateral view. Scale: 2 mm. D. *A. pallida,* frontal view. Scale: 2 mm. E. *Apoica thoracia,* frontal view. Scale: 2 mm. F. *Apoica thoracica,* lateral view. Scale: 2 mm. G. *Polybia ignobilis,* frontal view. Scale: 1 mm. H. *P. ignobilis,* lateral view. Scale: 1 mm. Photos: Néstor F. Pérez-Buitrago.

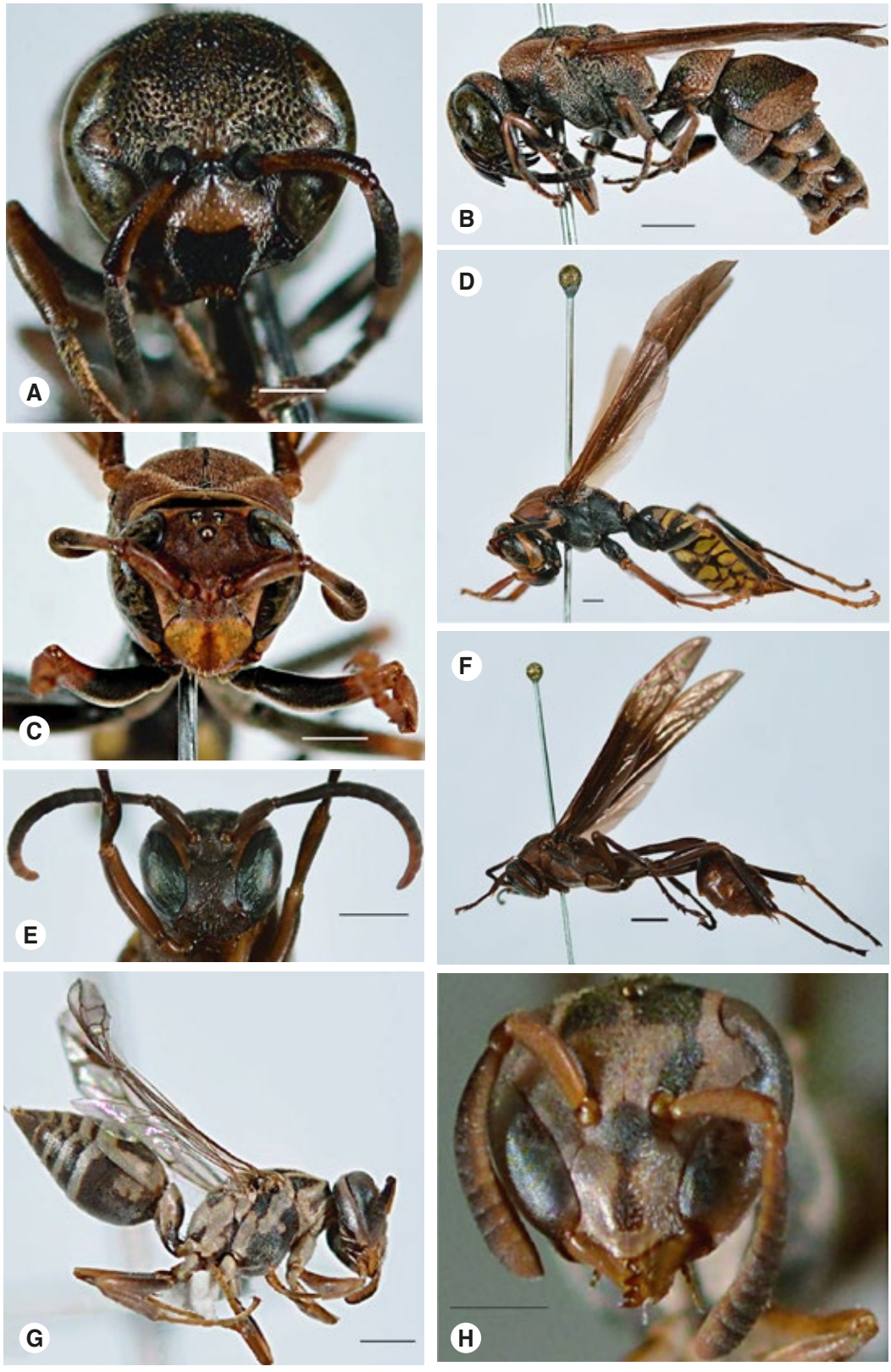

Figure 2. Some wasps from the Orinoco region of Colombia. A. *Stenodynerus cf. australis,* frontal view. Scale: 0.5 mm. B. *S. australis,* lateral view. Scale: 1 mm. C. *Polistes versicolor,* frontal view. Scale: 1 mm. D. *P. versicolor,* lateral view. Scale: 1 mm. E. *Mischocyttarus drewseni,* frontal view. Scale: 1 mm. F. *M. drewseni,* lateral view. Scale: 2 mm. G. *Protopolybia exigua,* frontal view. Scale: 0.25 mm. H. *P. exigua,* lateral view. Scale: 1 mm. Photos: Néstor F. Pérez-Buitrago.

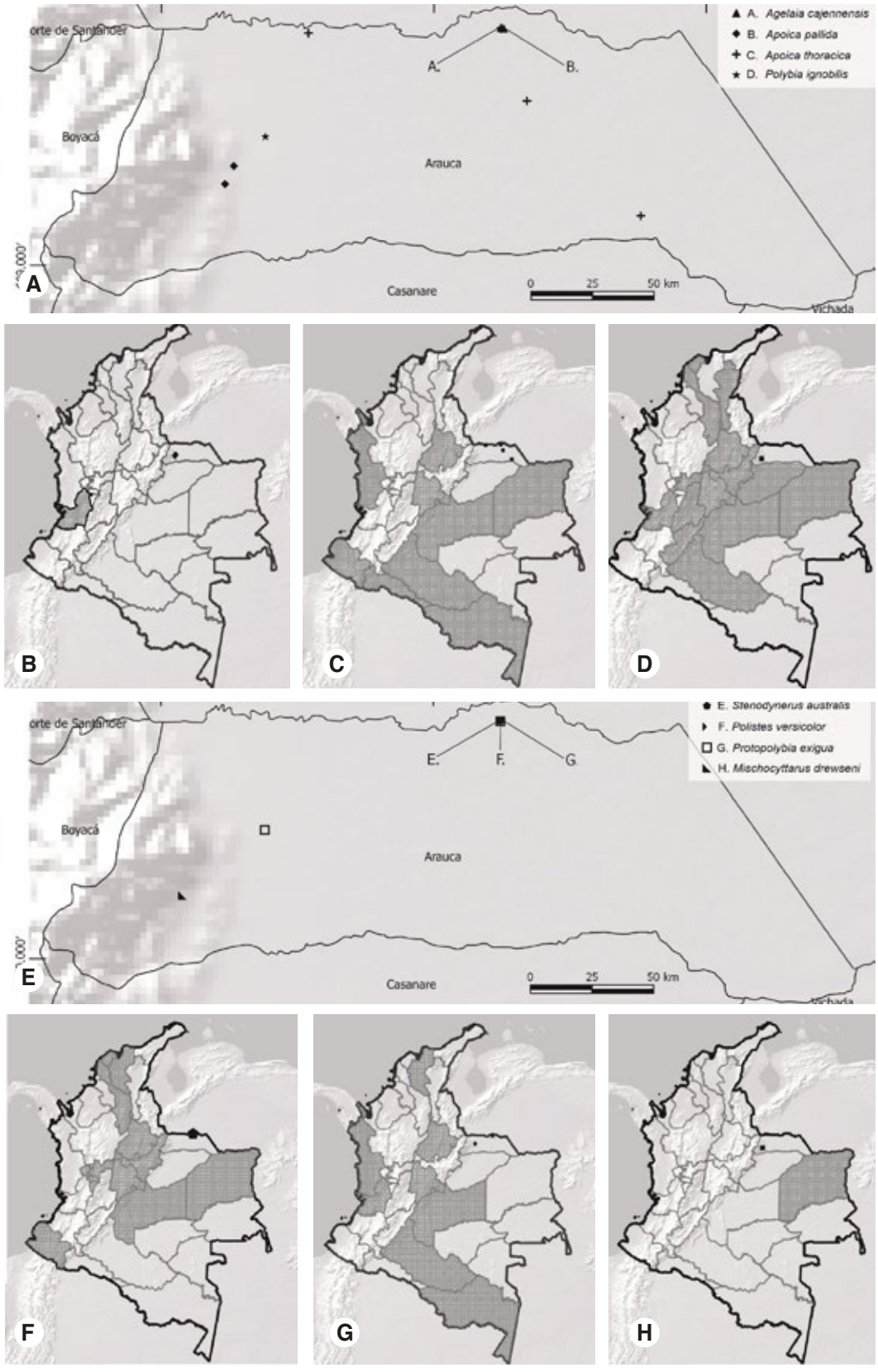

Figure 3. Distribution of vespid wasp species in the department of Arauca, Colombia, and at a national level (Richards, 1978; Sarmiento, 1994; Cubillos & Sarmiento, 1999; Flórez *et al.*, 2016).

Table 1. List of vespid wasp species (Polistinae and Eumeninae) at the *Colección Entomológica de la Orinoquía* (CEO) with distribution details and the number of specimens analyzed. The bold abbreviations indicate new records at regional or department scale from this study.

Subfamily	Species	Regions[1]	Departments[2]	Specimens
Polistinae				
	Agelaia cajennensis	AMA, ORI	ARA	3
	Apoica pallida	AMA, ORI	**ARA**, VAL	2
	Apoica thoracica	AMA, AND, ATL, PAC, **ORI**	AMA, **ARA**, CAQ, CHO, CUN, MET, NAR, PTM, SAN, VAL	4
	Brachygastra bilineolata	AMA, ATL, ORI	**ARA**, BOL, BOY, CAS, MAG, MET, VAL	2
	Brachygastra lecheguana	ORI	ARA	1
	Polybia ignobilis	AMA, AND, ATL, ORI, PAC	ANT, ARA, ATL, BOL, BOY, CAL, CAQ, CAS, CAU, CES, CUN, HUI, MET, SAN, TOL, VAL, VCH	2
	Polybia liliacea	AMA, AND, ORI	AMA, ANT, **ARA**, CAQ, CAS, GUA, MET, PUT, SAN, VAP, VCH	1
	Polybia occidentalis	AMA, AND, ATL, ORI	AMA, ANT, **ARA**, BOL, BOY, COR, CAS, CHO, CUN, HUI, MAG, MET, NAR, SAN, TOL, VDC	28
	Polybia sericea	AMA, AND, ATL, ORI	ARA, ATL, BOL, BOY, CAQ, CAS, CUN, MET, SAN, VCH	7
	Protopolybia exigua	AMA, AND, ORI	AMA, ARA, CAQ, CHO, CUN, MAG, MET, SAN, VDC	1
	Synoeca septentrionalis	AMA, AND, ATL, ORI, PAC	ARA, ATL, BOL, BOY, CAL, CAQ, CAU, CHO, CUN, HUI, MAG, MET, NAR, RIS, SAN, TOL, VAL	7
	Mischocyttarus drewseni	AMA, AND, **ORI**	**ARA**, VAL	1
	Polistes infuscatus	AND, ATL, ORI	**ARA**, ATL, CAL, CHO, CUN, HUI, MET, SAN, VAL	1
	Polistes lanio	ORI	**ARA**	8
	Polistes versicolor	AMA, AND, PAC, ORI	ANT, **ARA**, BOL, BOY, CAL, CUN, DC, MAG, MET, NAR, QUI, RIS, SAN, VAL	1
Eumeninae				
	Stenodynerus cf. australis	**ORI**	**ARA**	1
	Zeta argillaceum	PAC, **ORI**	**ARA**, VDC	1
	Zethus brasiliensis	**ORI**	**ARA**, CAL, MET, RIS	1

[1] Fernández, 1995, Cubillos & Sarmiento, 1998: AMA - Amazonia, AND - Andean, ATL - Atlantic, ORI - Orinoco, PAC – Pacific
[2] Richards, 1978, Sarrmiento, 1994; Cubillos & Sarmiento, 1999, Flórez et al., 2016: AMA, Amazonas; ANT, Antioquia; ARA, Arauca; ATL, Atlántico; BOL, Bolívar; BOY, Boyacá; CAL, Caldas; CAQ,Caquetá; CAS, Casanare; CES, Cesar; CHO, Chocó, CUN, Cundinamarca; DC, Distrito Capital; HUI, Huila; MAG, Magdalena; MET, Meta; NAR, Nariño; PUT, Putumayo; QUI, Quindío; RIS, Risaralda; SAN, Santander; TOL, Tolima; VAL, Valle del Cauca; VIC, Vichada.

Discussion

Previous records by Fernández (1995) documented 33 vespid wasp species for the Orinoco region of Colombia. Later, Cubillos & Sarmiento (1998) reported 97 species and 16 genera of polistine wasps for the region. In our work, we report three new records of species in three genera (*Stenodynerus*, *Zeta* and *Zethus*), all of them from the Eumeninae subfamily. None of these three genera was previously reported for the Orinoco region, though there are species in the two last genera with expected distribution for the area. At the species level, 3 of the 18 species collected for the region are new records (Table 1).

Previous studies on vespid wasps for the department of Arauca reported ten species (Colomo & Berta, 2005a, b; Flórez *et al*., 2016). In this study, 14 of the 18 vespid wasp species records at the CEO are new, increasing from 10 to 24 the known species for the Arauca department. It must be kept in mind, however, that the studies of Sarmiento (1994), Fernández (1995) and Cubillos & Sarmiento (1998), the most important references showing records of Colombian Vespidae, were made at a broad scale (*i. e*. regional) and the departments we sampled here are not specifically mentioned. The differences in the geographical reporting make the comparisons at the departmental level difficult.

An important finding in this study is the collection of an individual of *Stenodynerus* cf. *australis,* a Nearctic species, making it a likely new record for Colombia, and for the Neotropical region. The confirmation of this new finding is hampered by the absence of a comprehensive revision of the genus *Stenodynerus* in the Neotropics (Garcete-Barrett, pers. comm.). Once a more recent and comprehensive study of the genus is available, the taxonomic characterization of the specimen should be revised.

Conclusions

The specimens collected show an important increase in the knowledge about the geographic distribution and the taxonomic composition of Vespidae in the Orinoco region, with four new species documented for the region. Particularly, for the Arauca department, we report 14 new species. The new records contribute to enrich the scarce knowledge about these wasps in isolated and poorly studied localities of Colombia. The registry of a specimen identified as *Stenodynerus* cf. *australis* is probably a new occurrence for the Neotropical region, although further corroboration is needed. More studies about taxonomy and behavior of vespid wasp fauna of the Orinoquía region are needed, considering the ecological and economic importance of this hymenopteran family.

Acknowledgements

We are very thankful with Alexandre Somavilla, (Instituto Nacional de Pesquisas da Amazônia –INPA–, Brazil), Andreas Köhler, (Universidade de Santa Cruz do Sul –UNISC–, Brazil) for the taxonomic advice. We also want to thank Fernando Fernández and Carlos Eduardo Sarmiento (Universidad Nacional de Colombia), and James Michael Carpenter (American Museum of Natural History –AMNH–, USA) for the support and orientations about the Colombian vespid wasps. The contribution of Bolívar Garcete-Barrett (Universidad Nacional de Asunción, Paraguay) and Marcel Gustavo Hermes (Universidade Federal de Lavras, Brazil) with the identification of potter wasps is also acknowledged. Fernando Barbosa Noll (Universidade Estadual Paulista "Júlio de Mesquita Filho" –UNESP–, Brazil) contributed by gently providing literature. Pilar Angulo Sandoval and Laura Schneider kindly reviewed and made important comments to improve this manuscript. This research was funded by Resolution No. 339/2017 of Universidad Nacional de Colombia, according to the Call 2017-0361 by the Dirección de Relaciones Exteriores of UNAL.

References

Agudelo Martínez, J. C. & Pérez-Buitrago, N. (2015). Notas acerca de la distribuición de Papilionidae (Leopidoptera: Papilionoidea) en el norte de la Ori-

noquía colombiana. *Boletín Científico Museo de Historia Natural*, *19*, 203-214.

Agudelo Martínez, J. C. & Pérez-Buitrago, N. (2017). New records of hunting ants (Poneroids and Ectatomminoids) in the northern part of the Colombian Orinoquía region. *Arxius de Miscelània Zoològica*, *15*, 229-248.

Andena, S. R. & Carpenter, J. M. (2012). Checklist das espécies de Polistinae (Hymenoptera, Vespidae) do semiárido brasileiro. In Bravo, F. (Org.), *Artrópodes do Semiárido: biodiversidade e conservação*. Pp. 169-180. Printmídia, Feira de Santana.

Andena, S. R., Carpenter, J. M. & Noll, F. B. (2009). A phylogenetic analysis of *Synoeca* de Saussure, 1852, a Neotropical genus of social wasps (Hymenoptera: Vespidae: Epiponini). *Entomologica Americana*, *115*, 81-89.

Aragão, M. & Andena, S. R. (2016). The social wasps (Hymenoptera: Vespidae: Polistinae) of a fragment of Atlantic Forest in southern Bahia, Brazil. *Journal of Natural History*, *50*, 1411-1426.

Arbeláez-Cortés, E. (2014). Knowledge of Colombian biodiversity : Published and indexed Knowledge of Colombian biodiversity: published and indexed. *Biodiversity and Conservation*, *22*, 2875-2906.

Bank, S., Sann, M., Mayer, C., Meusemann, K., Donath, A., Podsiadlowski, L., Kozlov, A., Petersen, M., Krogmann, L., Meier, R., Schmitt, T., Wurdack, M., Liu, S., Zhou, X., Misof, B., Peters, R. S., Niehuis, O. & Rosa, P. (2017). Transcriptome and target DNA enrichment sequence data provide new insights into the phylogeny of vespid wasps (Hymenoptera: Aculeata: Vespidae). *Molecular phylogenetics and evolution*, *116*, 213-226.

Barrera-Medina, R. (2010). Notas sobre el género *Pachodynerus* Saussure, 1870 (Hymenoptera: Vespidae: Eumeninae) en Chile. *Boletín de Biodiversidad de Chile*, *4*, 94-98.

Barrera Medina, R. & Vidal Munoz, C. (2013). Primer reporte de *Vespula vulgaris* (Linnaeus, 1758) (Hymenoptera: Vespidae) en Chile. *Boletín de la Sociedad Entomológica Aragonesa*, *52*, 277-278.

Beggs, J. R., Brockerhoff, G., Corley, J. C., Masciocchi, M., Muller, F., Rome, Q. & Villemant, C. (2011). Ecological effects and management of invasive alien Vespidae. *BioControl*, *56*, 505-526.

Bequaert, J. (1948). The Vespidae of Venezuela. *Boletín de Entomología Venezolana*, *7*, 123-140.

Carpenter, J. M. (2004). Synonymy of the genus *Marimbonda* Richards, 1978, with *Leipomeles* Möbius, 1856 (Hymenoptera: Vespidae; Polistinae), and a new key to the genera of paper wasps of the New World. *American Museum Novitates*, 1-16.

Carpenter, J. M. & Cumming, J. M. (1985). A character analysis of the North American potter wasps (Hymenoptera: Vespidae; Eumeninae). *Journal of Natural History*, *19*, 877-916.

Carpenter, J. M., Garcete-Barrett, B. R. & Hermes, M. G. (2006). Catalog of the Neotropical Masarinae (Hymenoptera, Vespidae). *Revista Brasileira de Entomologia*, *50*, 335-340.

Carpenter, J. M., Garcete-Barrett, B. R. & López, A. (2012). Las Vespidae (Hymenoptera: Vespoidea) de Guatemala. *Biodiversidad de Guatemala*, *2*, 269-279.

Carpenter, J. M. & Marques, O. M. (2001). Contribuição ao estudo dos vespídeos do Brasil. *Série publicação Digital*, *2*, 147.

Colomo, M. V. & Berta, D. C. (2005a). Los ejemplares tipo de Eumeninae (Hymenoptera: Vespidae) depositados en la Colección del Instituto Fundación Miguel Lillo (IFML), Argentina. *Revista de la Sociedad Entomológica Argentina*, *64*, 23-33.

Colomo, M. V & Berta, D. C. (2005b). Los ejemplares tipo de Masarinae y Polistinae (Hymenoptera: Vespidae) depositados en la Colección del Instituto Fundación Miguel Lillo (IFML), Argentina. *Revista de la Sociedad Entomológica Argentina*, *64*, 23-33.

Cooper, M. (2001). Two new species of *Agelaia* Lepeletier (Hym., Vespidae, Polistinae). *Entomologist's Monthly Magazine*, *137*, 233-235.

Corbara, B., Carpenter, J. M., Céréghino, R., Leponce, M. & Gibernau, M. (2009). Diversity and nest site selection of social wasps along Guianese forest edges: assessing the influence of arboreal ants. *C. R. Biologies*, *332*, 470-479.

Cubillos, W. & Sarmiento, C. (1998). Avispas sociales de Colombia (Hymenoptera: Vespidae: Polistinae). In Andrade-C., M., García, G. A., Fernández, F. (Eds.), *Insectos de Colombia, estudios escogidos.* Pp. 271-342. Bogotá: Academia Colombiana de Ciencias Exactas, Físicas y Naturales-CEJA.

Decäens, T., Lavelle, P., Jiménez, J. J., Escobar, G., Rippstein, G., Schneidmadl, J., Sanz, J. I., Hoyos, P. & Thomas, R. J. (2001). Impact of land management on soil macrofauna in the Eastern Plains of Colombia. In Jiménez, J. J & Thomas, R. J. (Orgs). *Nature's Plow: Soil Macroinvertebrate Communities in the Neotropical Savannas of Colombia*. Centro Internacional de Agricultura Tropical. 389 pp.

Donoso, D. A., Salazar, F., Maza, F., Cárdenas, R. E. & Dangles, O. (2009). Diversity and distribution of type specimens deposited in the Invertebrate section of the Museum of Zoology QCAZ, Quito, Ecuador. *Annales de la Societé Entomologique Française*, *45*, 437-454.

Fernández, F. (1995). La diversidad de los Hymenoptera en Colombia. In Rangel-Ch. J. O. (Ed.). *Colombia diversidad biótica I. Clima. Centros de concentración de especies. Fauna reptiles, arácnidos, himenópteros*. Pp. 373–442. Bogotá: Universidad Nacional de Colombia.

Flórez, E., Raz, L. & Agudelo, H. (2016). *Colección de Entomología del Instituto de Ciencias Naturales* (ICN-MHN-En). Universidad Nacional de Colombia. Dataset/Occurrence. http://doi.org/10.15472/vhqawn

Garcete-Barrett, B. R. (1999). *Avispas sociales del Paraguay*. London: The Natural History Museum.

García, A. L. (2017). *Colección de Insectos de la Universidad del Quindío* (CIUQ). v.2.2. Universidad del Quindío. Dataset/Occurrence. http://doi.org/10.15472/xg8ggf

García, R. J. (1978). Cuatro estudios sobre avispas sociales del Perú (Hymenoptera: Vespidae). *Revista Peruana de Entomología*, *21*, 1-22.

González, J. M., Piñango, E., Blanco, D. & Matthews, R.W. (2005). On the mass aggregations of *Polistes versicolor* (Olivier) (Hymenoptera: Vespidae) along the Northern Cordillera of Venezuela, South America. *Journal of Hymenoptera Research*, *14*, 15-22.

Hermes, M. G. & Köhler, A. (2004). Chave ilustrada para as espécies de Vespidae ocorrentes no Cinturão Verde de Santa Cruz do Sul, RS, Brasil. *Caderno de Pesquisa Série Biologia*, *16*, 65-115.

Hermes, M. G., Melo, G. A. R. & Carpenter, J. M. (2014). The higher-level phylogenetic relationships of the Eumeninae (Insecta, Hymenoptera, Vespidae), with emphasis on *Eumenes* sensu lato. *Cladistics*, *30*, 453-484.

Hernández-Camacho, J. (1992). Caracterización geográfica de Colombia. In Halffter, G. (Org.). *La diversidad biológica de Iberoamérica*. Pp. 45-54. México: Insitituto de Ecología.

Jaramillo, N. & Marín, J. (2017). Colección Entomológica de Piedras Blancas. v1. *Museo Entomológico de Comfenalco - Antioquia*. Retrieved from:http://ipt.biodiversidad.co/sib/resource?r=mepb&v=1.0.

Lasso, C. A., Rial, A., Matallana, C., Ramírez, W., Señaris, J., Díaz-Pulido, A., Corzo, G., & Machado-Allison, A. (Eds.). (2011). *Biodiversidad de la cuenca del Orinoco. II Áreas prioritarias para la conservación y uso sostenible.* Bogotá, D.C., Colombia: Instituto de Investigación de Recursos Biológicos Alexander von Humboldt, Ministerio del Ambiente, Vivienda y Desarrollo Territorial, WWF Colombia, Fundación Omacha, Fundación La Salle de Ciencias Naturales, Instituto de Estudios de la Orinoquia (Universidad Nacional de Colombia). 304 pp.

López, Y. G., Canchila P., S. & Alvarez G., D. (2013). Listado de avispas sociales (Vespidae: Polistinae) del departamento de Sucre, Colombia. *Biota Colombiana*, *14*, 108-113.

Manzanilla, J., De Sousa, L. & Sánchez, D. (2000). Altas densidades de *Polistes versicolor versicolor* (Oliver 1791) (Hymenoptera: Vespidae) en el Cerro La Laguna, Macizo del Turimiquire, Estado Anzoátegui, Venezuela. *Boletín de Entomología Venezolana*, *15*, 245-248.

Masciocchi, M., Beggs, J. R. & Carpenter, J. M. (2010). Primer registro de *Vespula vulgaris* (Hymenoptera : Vespidae) en la Argentina. *Revista de la Sociedad Entomológica Argentina*, *69*, 267-270.

Montero, J. Z., Rojas, E. A. P. & Ibarra, T. B. (2009). Especies de la familia Vespidae presentes en el agroecosistema de la palma aceitera (*Elaeis guineensis*) en Tumaco, Colombia. *Corpoica Ciencia y Tecnología Agropecuaria*, *10*, 159-166.

Peña, L. E., Pérez Arce, R. & Cartagena, L. (1975). La presencia de *Vespula inaculifrons* (Buysson) (Hymenoptera: Vespidae) en Chile. *Revista Chilena de Entomología*, *9*, 167-168.

Pickett, K. M., & Carpenter, J. M. (2010). Simultaneous analysis and the origin of eusociality in the Vespi-

dae (Insecta: Hymenoptera). *Arthropod Systematics and Phylogeny*, *68*(1), 3-33.

Pickett, K. M. & Wenzel, J. W. (2007). Revision and cladistic analysis of the nocturnal social wasp genus, *Apoica* Lepeletier (Hymenoptera: Vespidae; Polistinae, Epiponini). *American Museum Novitates*, *3562*, 1.

Rasmussen, C. & Asenjo, A. (2009). A checklist to the wasps of Peru (Hymenoptera, Aculeata). *ZooKeys*, *78*, 1-78.

Resende, J. J. & Gimenes, M. (2001). Atividade diária de busca de recursos pela vespa social *Polybia occidentalis* (Hymenoptera, Vespidae). *Revista Brasileira de Biociências*, *3*(1), 105-115.

Richards, O. (1978). *The social wasps of the Americas excluding the Vespinae*. London: British Museum (Natural History). 560 pp.

Ross, K. G. & Matthews, R. W. (1991). *The Social Biology of Wasps*. (Orgs). Ithaca: Cornell University Press.

Roy, H. E., Clercq, P. De, Handley, L. L., Poland, R. L., Sloggett, J. J. & Wajnberg, E. (2011). Alien arthropod predators and parasitoids: an ecological approach. *BioControl, 56*, 375-382.

Santos, E. F. D., Grandinete, Y. C. & Noll, F. B. (2015). Additions to the checklist of Scoliidae, Sphecidae, Pompilidae, and Vespidae of Peru, with notes on the endemic status of some species (Hymenoptera, Aculeata). *ZooKeys, 2015*, 33-48.

Santos Júnior, J. N. A. D., Silveira, O. T. & Carpenter, J. M. (2015). Phylogeny of *Protopolybia* Ducke, 1905 and taxonomic revision of the *Protopolybia exigua* species-group (Hymenoptera: Vespidae, Polistinae), with description of four new species. *Zootaxa*, *3956*, 151-182.

Santos Júnior, J. N. A. D., Silveira, O. T. & Carpenter, J. M. (2017). A new species of the genus *Protopolybia* Ducke, 1905 (Hymenoptera, Vespidae, Polistinae), with taxonomic contributions to the *exigua* species-group. *Zootaxa*, *4286*, 432-438.

Sarmiento, C. (1994). Lista de las avispas sociales (Hymenoptera: Vespidae) de Colombia. *Revista de Biología Tropical*, *42*(1/2), 357-363.

Sarmiento, C. E. & Saravia, C. (1995). Avispas sociales (Vespidae : Polistinae) del suroccidente Colombiano, departamento de Nariño. *Acta Biológica Colombiana*, *3*, 81-91.

Silveira, O. T. (2008). Phylogeny of wasps of the genus *Mischocyttarus* de Saussure (Hymenoptera, Vespidae, Polistinae). *Revista Brasileira de Entomologia*, *52*, 510-549.

Silveira, O. T., Silva, S. de S. & Felizardo, S. P. de S. (2015). Notes on social wasps of the group of *Mischocyttarus* (*Omega*) *punctatus* (Ducke), with description of six new species (Hymenoptera, Vespidae, Polistinae). *Revista Brasileira de Entomologia*, *59*, 154-168.

Somavilla, A. & Köhler, A. (2017). Social wasps (Polistinae) from Pampa Biome: South Brazil, Northeastern Argentina and Uruguay. *EntomoBrasilis*, *10*, 139.

Somavilla, A. & Oliveira, M. L. D. (2013). New records of social wasps (Hymenoptera: Vespidae, Polistinae) in Amazonas State, Brazil. *EntomoBrasilis*, *6*, 157-159.

Somavilla, A., Schoeninger, K., Castro, D., Oliveira, M. & Krug, C. (2016). Diversity of wasps (Hymenoptera : Vespidae) in conventional and organic guarana (*Paullinia cupana* var . *sorbilis*) crops in the Brazilian Amazon. *Sociobiology*, *63*, 1051-1057.

Souza, M. D., & Zanuncio, J. C. (2012). *Marimbondos-Vespas sociais (Hymenoptera: Vespidae)*. Viçosa: Editora UFV. 79 pp.

Stange, L. A. (1997). The *Zethus* of Venezuela (Hymenoptera: Eumenidae). *Insecta Mundi*, *11*.

Sühs, R. B., Somavilla, A., Köhler, A. & Putzke, J. (2009). Vespídeos (Hymenoptera, Vespidae) vetores de pólen de *Schinus terebinthifolius* Raddi (Anacardiaceae), Santa Cruz do Sul, RS, Brasil. *Brazilian Journal of Biosciences*, *7*, 138-14.

Matheus Y. Halmenschlager
Universidade de Santa Cruz do Sul,
Departamento de Biologia e Farmácia,
Laboratório de Entomologia
Santa Cruz do Sul, Brasil
matheus.halmenschlager@gmail.com
https://orcid.org/0000-0001-6843-4823

Juan C. Agudelo Martínez
Universidad Nacional de Colombia – Sede Orinoquía,
Colección Entomológica de la Orinoquía (CEO)
Arauca, Colombia
jcagudelo@gmail.com
https://orcid.org/0000-0002-1655-621X

Néstor F. Pérez-Buitrago
Universidad Nacional de Colombia – Sede Orinoquía,
Colección Entomológica de la Orinoquía (CEO)
Arauca, Colombia
nfperezb@unal.edu.co
https://orcid.org/0000-0003-3738-8187

New records of Vespidae (Hymenoptera: Vespoidea) for the Colombian Orinoco Region

Citación del artículo: Halmenschlager, M. Y., Agudelo Martínez, J. C. & Pérez-Buitrago, N. F. (2019). New records of Vespidae (Hymenoptera: Vespoidea) for the Colombian Orinoco Region. *Biota Colombiana*, *20*(1), 21-33. DOI: 10.21068/c2019.v20n01a02.

Recibido: 24 de agosto de 2018
Aceptado: 25 de enero de 2019