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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 *Stenodynerus* cf. *australis* para la región Neotropical.

Palabras clave. Arauca. Eumeninae. Lista de especies. Neotropical. Vespídeos.

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 hymenoptera 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); **Araucita:** 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)

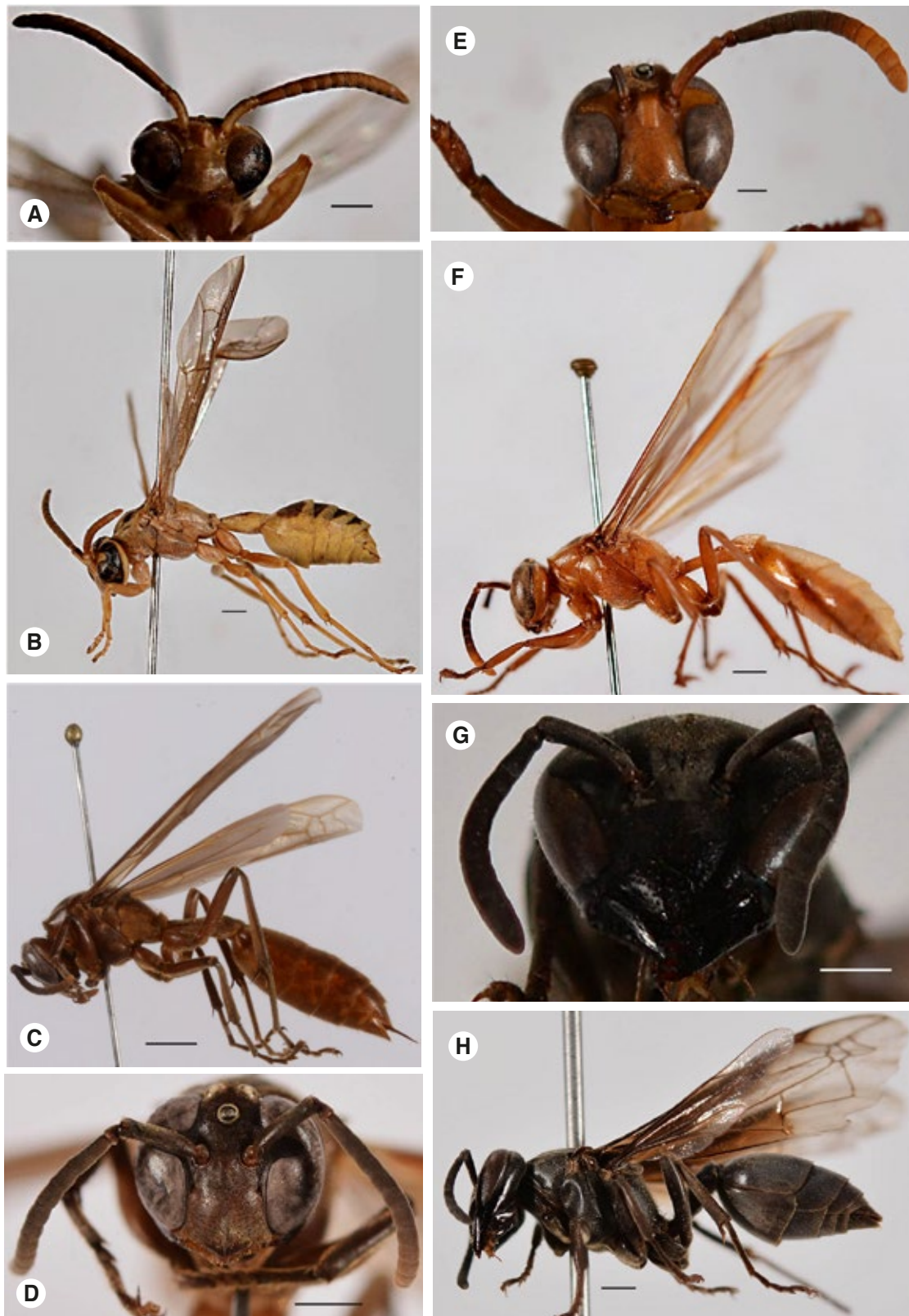


Figure 1. Some wasps from the Orinoco region of Colombia. A. *Agelaja cajennensis*, frontal view. Scale: 1 mm. B. *A. cajennensis*, lateral view. Scale: 1 mm. C. *Apoica pallida*, lateral view. Scale: 2 mm. D. *A. pallida*, frontal view. Scale: 2 mm. E. *Apoica thoracica*, frontal view. Scale: 2 mm. 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.

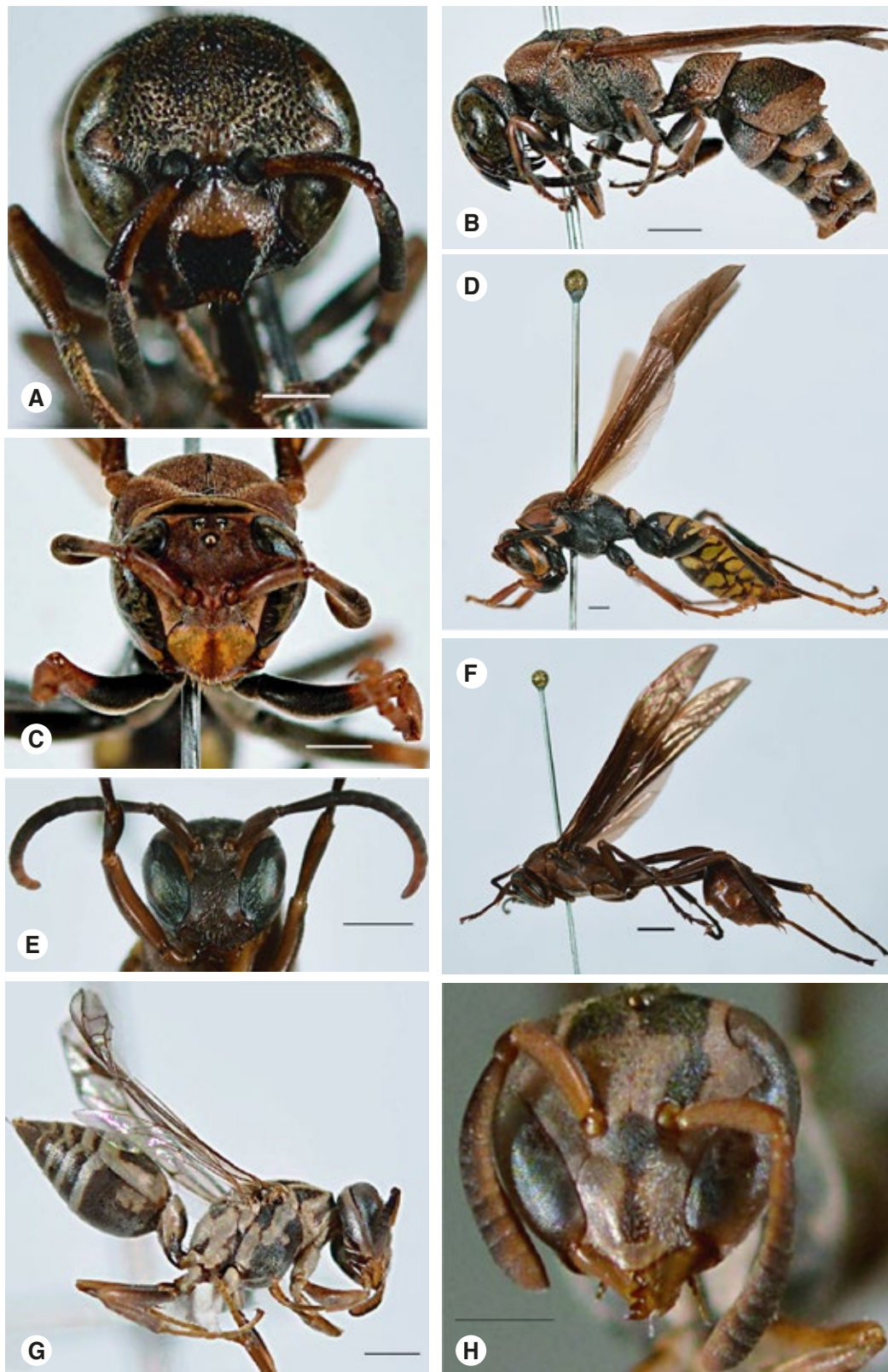


Figure 2. Some wasps from the Orinoco region of Colombia. A. *Stenodynerus cf. australis*, frontal view. Scale: 0.5 mm. B. *S. australis*, lateral view. Scale: 1 mm. C. *Polistes versicolor*, frontal view. Scale: 1 mm. D. *P. versicolor*, lateral view. Scale: 1 mm. E. *Mischocyttarus drewseni*, frontal 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.

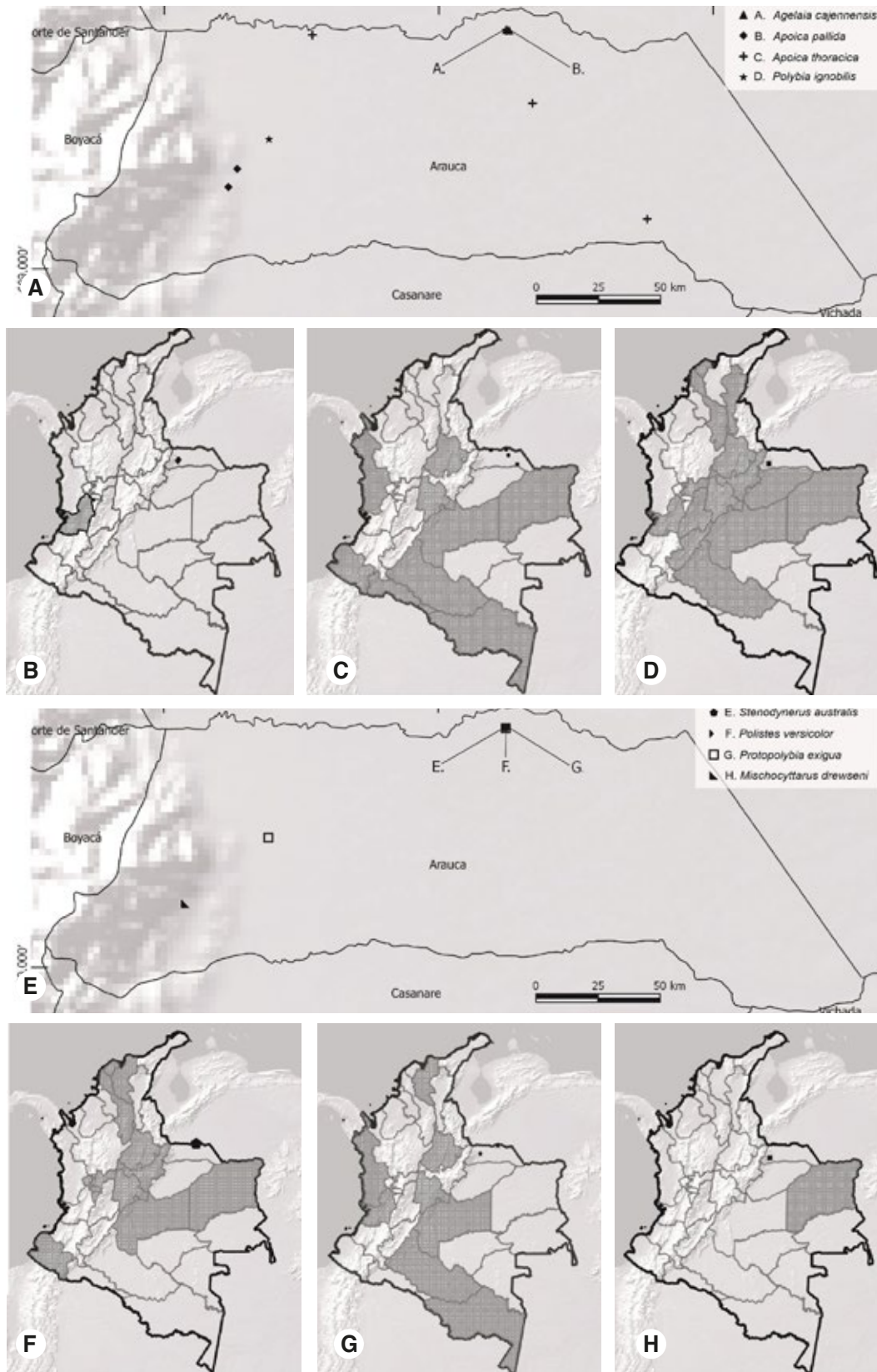


Figure 3. Distribution of vespid wasp species in the department of Arauca, Colombia, and at a national level (Richards, 1978; Sarmiento, 1994; Cubillos & Sarmiento, 1999; Flórez *et al.*, 2016).

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

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