

**NEW GEOGRAPHICAL RECORDS OF THE GENUS *UROSIGALPHUS* ASHMEAD, 1889
(HYMENOPTERA: BRACONIDAE, HELCONINAE) FOR COLOMBIA**

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RESUMEN

Urosigalphus Ashmead, 1889 es uno de los géneros más común de la tribu Brachistini (Braconidae: Helconinae) con aproximadamente 100 especies restringidas al hemisferio occidental. Son avispas endoparasitoides, principalmente de Curculionidae y Chrysomelidae (Bruchinae) y han sido poco registradas en Colombia. En el presente estudio se hizo una revisión de este género, con 5072 muestras provenientes de 31 áreas, en el marco del proyecto “Diversidad de Insectos de Colombia”. Se tenían registros previos sólo para los departamentos del Amazonas y Antioquia. En este artículo se reportan un total de 45 especímenes y siete nuevas distribuciones geográficas para el país. Se registra por vez primera el rango altitudinal del género para el país. Del material examinado, se separaron 22 morfotipos que corresponden a especies nuevas colombianas que están en proceso de descripción. De esta manera el número de especies para el hemisferio occidental aumenta considerablemente de 83 a 105. Sur América sería la Región con el mayor número de especies, seguida por Norte y Centro América. Los especímenes se encuentran depositados en la colección Entomológica del Museo Jorge Ignacio Hernández Camacho del Instituto de Investigación de Recursos Biológicos Alexander von Humboldt (IAvH) Villa de Leyva (Boyacá, Colombia).

Palabras clave: Avispas parasitoideas, Brachistini, Ichneumonoidea.

SUMMARY

Urosigalphus Ashmead, 1889 is one of the most common genera belonging to the Brachistini tribe (Braconidae: Helconinae) with approximately 100 species restricted to the western hemisphere. These wasps are parasites of beetles (mainly, Curculionidae and Chrysomelidae -Bruchinae-) and had been rarely reported in Colombia. After a close inspection of 5072 samples collected throughout 31 areas from the project “Colombia Biodiversity Inventory” “Diversidad de Insectos de Colombia”, a total of 45 specimens of these parasitoid wasps were found. As a result, seven new localities are reported for Colombia. The genus was previously known only from the Departments of Amazonas and Antioquia. In Colombia, 22 morphotypes are new species, in description process, therefore the total number of species for America would increase considerably from 83 up to 105. After these descriptions, South America will be the region with the largest number of *Urosigalphus* species, followed by North and Central America. The specimens are deposited in the entomological collection Jorge Ignacio Hernández Camacho Museum of the Alexander von Humboldt Institute, Villa de Leyva (Boyacá, Colombia).

Key words: parasitoid wasps, Brachistini, Ichneumonoidea.

INTRODUCTION

The cosmopolitan Braconidae (Ichneumonoidea) is the second largest family of Hymenoptera with about 40.000 described species and 29 subfamilies recognized in the world (Sharkey 1993). A total of 26 subfamilies and 180 genera have been reported from Colombia (Campos 2004). The family occurs all around the world and has shown to be di-

verse in all areas, with no striking preference for tropical or temperate regions or for wet or dry habitats. Members of Braconidae are biologically diverse. Common hosts are larvae of Holometabola, although nymphs of Hemimetabola and adults of both Holometabola and Hemimetabola are also parasitized (Sharkey 1993).

The subfamily Helconinae (Figure 1) contains

about 41 genera in the world, fifteen in the Americas (Sharkey 1997) and eleven in Colombia (Campos 2004). Helconinae has four tribes, three

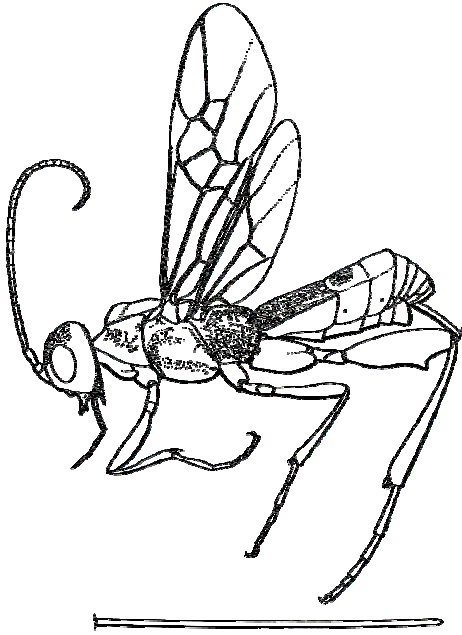


Figure 1. Habitus of Helconinae (Sharkey 1997, pp. 260).

of which occur in the New World: Helconini, Diospilini and Brachistini. Each tribe is very distinctive from others, some of these may be monophyletic whereas others e.g. Diospilini, have a number of species that do not fit into the current generic concept (Sharkey 1997). Helconinae is recognized by the following characters: 1) scutellar disc not margined by carinae (Figure 2), 2) first three metasomal terga sometimes (30%) forming a carapace (Figure 3), 3) dorsope not so deep (Figure 3) and 4) fore wing with vein (RS+M)b present, origin of m-cu distinctly separated from base of 2RS (Figure 4) (Sharkey 1997a).

The position of *Urosigalphus* has varied through the years. It has belonged to different subfamilies as Sigalphinae (Ashmead 1889, 1900, Dalla Torre 1898, Cameron 1904, Szepliget 1904, Brues 1910) and Blacinae (Muesebeck & Walkey 1951, Martin 1956, Muesebeck 1958, 1967, Marsh 1963, Gibson 1972). Nowadays it is accepted that *Urosigalphus* belongs to the subfamily Helconinae (Čapek 1970) and the tribe Brachistini (Sharkey 1997). *Urosigalphus* is distributed only in the western hemisphere, thus, in the New World

members of the genus have been reported from Canada to Argentina.

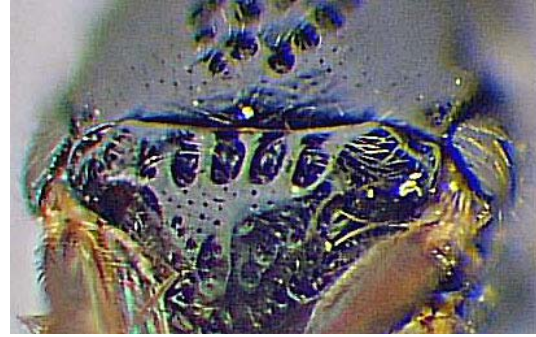


Figure 2. Scutellum of *Urosigalphus* sp., dorsal view.

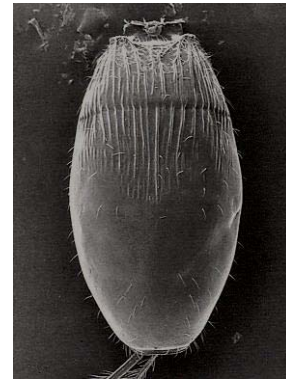


Figure 3. Metasomal terga of *Schizoprymnus* sp., dorsal view (Sharkey 1997, pp.271)

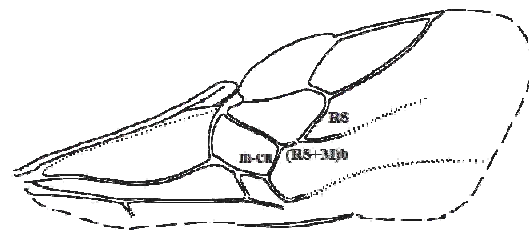


Figure 4. Fore wing of *Urosigalphus* sp. (Sharkey 1997, pp.269).

Urosigalphus is a monophyletic group. It can be distinguished from all Brachistini genera by the outer claw of the hind tarsi which is much larger than the inner claw (Figure 5) and usually lacks a basal tooth (Gibson 1972, Sharkey 1997). Gibson carried out the revision of *Urosigalphus* of the United States and Canada (1972), Mexico and

Central America (1972a, 1982) and, South America (1974, 1982a). Gibson (1972) subdivided the genus into five subgenera according to the kind of vein 3RSb (tubular or spectral), shape of lower face (rounded or flat) and ocellar triangle (raised or not raised into pyramidal projection), and level of scutellum in reference to metanotum (at same level or medially at higher level). He also keyed the species of the genus and examined material from entomological collections, where most species are represented by very few specimens. Only in a few cases have there been extensive collections, and these have been obtained through rearing specimens from host material mainly in North American collections (Gibson 1972). Since 1982, nobody has carried out a revision or an update of the species of *Urosigalphus* from America. There are no reports or studies regarding local fauna or regional nature specific for the species of this genus.

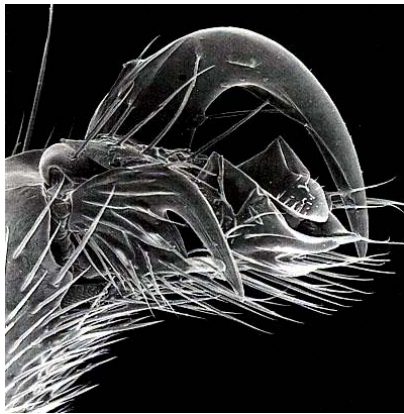


Figure 5. Hind leg of *Urosigalphus* sp. showing enlarged outer tarsal claw. (Sharkey 1997, pp. 271).

MATERIALS AND METHODS

The intensive survey of Hymenoptera developed recently in Colombia under the project Colombia Biodiversity Inventory "Diversidad de Insectos de Colombia" collected samples in 31 areas, 25 of these are protected areas managed by government authorities. Five thousand seventy two samples were collected with different techniques (Malaise, "pitfall", Winkler, sweeping net and other methods). At present, 85% of these samples have been sorted (Table 1). More than a million insects are deposited in the entomological collection Jorge Ignacio Hernández Camacho Museum of the Instituto de Investigación de Recursos Biológicos

Alexander von Humboldt (IAvH), Villa de Leyva (Boyacá, Colombia). The specimens were determined using the keys of Sharkey (1997, 1997a).

RESULTS

The Malaise trap was the best capture method in collecting the largest number of samples. This kind of trap is advantageous because it is able to collect flying specimens both during day and night. It acts as an invisible barrier where the insects get caught. In each sample area, three traps were set keeping in mind the structure of the forest, e.g. natural "corridors", places near streams, gaps or animal trails. The sample in each Malaise trap represents a two week collection interval in contrast with the occasional use of sweeping nets (Table 2).

From 4264 samples sorted only 45 specimens of *Urosigalphus* were found. It is unclear whether the individuals are demographically scarce, but they are rarely collected by both Malaise traps and sweeping. The Colombian *Urosigalphus* were collected from January 2000 through December 2003. The range of altitude is between 2 and 900 meters above sea level although higher places located in the Andean Region were sampled, too (Table 1). Almost all individuals were collected in Malaise traps; only one specimen was collected by sweeping net.

In Colombia the genus has been previously reported in Amazonas: PNN Amacayacu and Antioquia: Santafé de Antioquia, Tarazá and Amagá (Campos 2004). Here, three more sites in Amazonas and seven new geographical records of the genus are reported for the country: Amazonas: Municipio Leticia; Parque Nacional Natural Amacayacu (San Martín and Cabaña Lorena); Bolívar: Santuario de Fauna y Flora Los Colorados (Alto El Mirador, La Suiris and Villa Roca); Chocó: Parque Nacional Natural Utría (Centro de visitantes and Cocalito); Magdalena: Parque Nacional Natural Tayrona (Cañaveral, Cerro San Lucas, Neguanje and Palangana); Meta: Parque Nacional Natural Sierra de La Macarena (Cabaña Cerrillo and Caño Curía, sendero Cachicamos), Parque Nacional Natural Sumapaz (Cabaña las Mirlas), PNN Tinigua (Vereda Bajo Raudal); Putumayo: Parque Nacional Natural La Paya (Cabaña La Paya and Resguardo Cecilio Cocha); Valle del Cauca: Parque Nacional Natural Farallones de Cali (Anchicayá); Vaupés: Estación Biológica Caparú (Terrazas, antigua Cabaña and Centro Ambiental).

Table 1. Total samples of *Urosigalphus* caught during the Colombia diversity inventory indicating the biogeographical altitude ranges and samples collected by place.

Biogeographical regions	Protected areas	Altitude range	Total samples	S	NS
Caribbean	PNN Sierra Nevada de Santa Marta (Magdalena)	1500-2500	181	181	----
	PNN Tayrona (Magdalena)	5-700	209	209	----
	SFF Los Colorados (Bolívar)	126-400	275	275	----
	*Estación Privada de Monterrey, Zambrano (Bolívar)	70	44	44	----
Pacific	PNN Utría (Chocó)	2-20	43	43	----
	PNN Farallones de Cali (Valle del Cauca)	650-2200	255	255	----
	PNN Gorgona (Cauca)	5-180	320	320	----
	*R.N. La Planada (Nariño)	1500-1930	460	437	23
	PNN Los Katíos (Chocó)	30	116	83	33
Andean	SFF Iguaque (Boyacá)	2466-2860	560	475	85
	ÁNU Los Estoraques (Norte de Santander)	1480- 1850	42	42	----
	PNN Tamá (Norte de Santander)	1000-3095	228	108	120
	SFF Otún Quimbaya (Risaralda)	1960-2220	215	73	142
	PNN Chingaza (Cundinamarca)	2290-3880	519	414	105
	PNN Sumapaz (Cundinamarca)	3510-3560	14	14	----
	PNN Munchique (Cauca)	2640	49	25	24
	PNN Cueva de Los Guácharos (Huila)	1950-2150	160	103	57
Orinoquian	PNN El Tuparro (Vichada)	110-250	62	62	----
	PNN Sierra de La Macarena (Meta)	100-493	104	59	45
	PNN Sumapaz (Meta)	535-779	38	20	18
	PNN Tinigua (Meta)	290-460	30	19	11
Amazonian	PNN Amacayacu (Amazonas)	150-210	450	450	----
	*PNN Serranía de Chiribiquete (Caquetá)	250-300	126	126	----
	PNN La Paya (Putumayo)	190-350	230	198	32
	*Leticia Vía Tarapacá (Amazonas)	150-200	19	19	0
	*Estación Biológica Caparú (Vaupés)	60	201	118	83
Other sites			122	122	----
Total			5072	4294	778

* =Areas not belonging to the Special Administrative Unit of the System of Natural National Parks from Colombia (UAESPNN). PNN= National Parks, SFF= Sanctuaries of Flora and Fauna, RN=Natural Reserves, ANU=Unique Natural Area, S = Sorted samples, NS = Not sorted samples.

Table 2. Colombian localities where specimens of *Urosigalphus* were collected, specifying the total of samples sorted by each method.

Province	Protected areas	Malaise	Winkler	"Pitfall"	Sweeping net	Other traps
Magdalena	PNN Tayrona	123	28	47	8	3
Bolívar	SFF Los Colorados	87	93	94	----	1
Chocó	PNN Utría	35	6	----	2	----
Valle del Cauca	PNN Farallones de Cali	116	70	69	----	----
Meta	PNN Sierra de La Macarena	45	3	2	1	7
	PNN Sumapaz	15	----	1	3	1
	PNN Tinigua	12	3	3	1	----
Amazonas	PNN Amacayacu	217	59	78	80	16
	Leticia Vía Tarapacá	11	----	----	7	1
Putumayo	PNN La Paya	74	45	46	22	11
Vaupés	Estación Biológica Caparú	68	28	12	1	9
Total		803	335	352	125	49

PNN= National Parks, SFF= Sanctuaries of Flora and Fauna.

Material examined: AMAZONAS. Municipio Leticia: 1 F, Kilómetro 22, vía Calderón, bosque de tierra firme, 4°2'42"S 64°59'32"W, 150m, Malaise, 4Sep-1997, M. Sharkey, [IAvH 34303]. Parque Nacional Natural Amacayacu Matamata 3°41'S 70°15'W, 150m: 1 F, Malaise 1, 2-15Oct-2001, D. Chota, M.2239, [IAvH 34297]. 1 F, Malaise, 31Jul-7Aug-2000, A. Parente, M.686, [IAvH 34298]. 1 F, Malaise, 15-22May-2000, A. Parente, M.683, [IAvH 34299]. 1F, Malaise 11-17Dec-2000, A. Parente, M.1118, [IAvH 34302]. 1 F, Malaise, 28May-11Jun-2001, A. Parente, M.1859, [IAvH 34304]. 1 F, Malaise 2, 2-15Oct-2001, D. Chota, M.2248, [IAvH 34305]. 1 F, Malaise, 4Aug-11Sep-2000, A. Parente, M.847, [IAvH 34306]. 1 M, Malaise, 11-13Sep-2000. A. Parente, M.1124, [IAvH 34310]. Parque Nacional Natural Amacayacu Matamata m2, 3°41'S 70°15'W, 150m, Malaise: 2 F, 20-26Mar-2000, A. Parente, M.96, [IAvH 34311] & [IAvH 34312]. Parque Nacional Natural Amacayacu Cabaña Lorena, 3°0'S 69°59'W, 210m: 1 F, Malaise dosel, 27Aug-1Sep-2001, D. Campos, M.2233, [IAvH 34307]. 1 F, Malaise, 1-15Sep-2001, D. Deaza, M.2203, [IAvH 34308]. Parque Nacional Natural Amacayacu, San Martín: 1 F, 3°46'S 70°18'W, 150m, Malaise, 24Apr-5May-2000, A. Parente, M.88, [IAvH 64535].

BOLÍVAR. Santuario de Fauna y Flora Los Colorados, Alto el Mirador, 9°54'N 75°7'W, 400m, Malaise: 1 F, 22May-7Jun-2001, E. Deulufeut, M.1725, [IAvH 64517]. 1 M, 6-21Dec-2001, E. Deulufeut, M.2628, [IAvH 34295]; 1 M, 22Apr-7May-2001, E. Deulufeut, M.1605, [IAvH 64523]; 1 F, 14-30Jan-2002, E. Deulufeut, M.2935, [IAvH 64526]; 1 F, 3-18Aug-2001, E. Deulufeut, M.2048, [IAvH 64530]. 1 M, 14-30Feb-2002, E. Deulufeut, M.2935, [IAvH 64524]. 1 M, 14-30Feb-2002, E. Deulufeut, M.2935, [IAvH 64525]. Santuario de Fauna y Flora Los Colorados, La Suiris: 1 F, 9°54'N 75°7'W, 126m, Malaise, 2-17Oct-2000, E. Deulufeut, M.763, [IAvH 34309]. Santuario de Fauna y Flora Los Colorados, Villa Roca: 1 F, 9°54'N 75°7'W, 400m, Malaise, 23May-7Jun-2001, E. Deulufeut, M.1723, [IAvH 64532].

CHOCÓ. Parque Nacional Natural Utría, Centro de Visitantes: 1 M, 6°1'N 77°20'W, 2m, Malaise, 2-15Aug-2000, J. Pérez, M.818, [IAvH 64519]. Parque Nacional Natural Utría, Cocalito: 1 F, 6°1'N 77°20'W, 20m, Malaise, 1-4Jul-2000, B. Brown, M.3312, [IAvH 64521].

MAGDALENA. Parque Nacional Natural Tayrona, Cañaverál: 1 F, 11°20'N 74°2'W, 30m, Red, 18-20Jul-2002. M. Sharkey, D. Arias & E. Torres,

M.4171, [IAvH 64518]. Parque Nacional Natural Tayrona, Neguanje, 11°20'N 74°2'W, 10m, Malaise: 1 F, 5-20Apr-2001, R. Henríquez, M.1597, [IAvH 34313]. 1 M, 20Apr-4May-2001, R. Henríquez, M.1599, [IAvH 34314]. 1 F, 11°19'N 73°59'W, 10m, Malaise, 9-17Sep-2001, R. Henríquez, M.2137, [IAvH 64528]. Parque Nacional Natural Tayrona, Cerro San Lucas, 11°19'N 73°59'W, 550m: 1 M, Malaise 1, 11-16Jan-2003, C. Sarmiento, M.3425, [IAvH 34315]. 1 F, Malaise 2, 11-16Jan-2003, C. Sarmiento, M.3426, [IAvH 64527]. Parque Nacional Natural Tayrona, Palangana, 11°20'N 74°2'W, 30m, Malaise: 1 F, 18-31Oct-2001, R. Henríquez, M.2227, [IAvH 64529]. 1 F, 9-17Sep-2001, R. Henríquez, M.2134, [IAvH 64531]. 1 F, 20Apr-4May-2001, R. Henríquez, M.1596.

META. Parque Nacional Natural Sierra de La Macarena, Cabaña Cerrillo: 1 F, 3°21'N 73°56'W, 460m, Malaise, 10Nov-21Dec-2002, A. Herrera & W. Villalba, M.2982, [IAvH 64536]. Parque Nacional Natural Sierra de La Macarena, Caño Curia, sendero Cachicamos: 1 F, 3°21'N 73°56'W, 460m, Malaise, 24-31Dec-2001, D. Campos, M.2608, [IAvH 64537]. Parque Nacional Natural Sumapaz, Cabaña Las Mirlas: 1 F, 3°48'N 73°52'W, 710m, Malaise, 3-30Apr-2002, H. Vargas, M. 3111, [IAvH 64522]. Parque Nacional Natural Tinigua, Vereda Bajo Raudal: 1 M, 2°16'N 73°48'W, 460m, Malaise, 19Jan-2Feb-2002, C. Sánchez, M.2331, [IAvH 34316].

PUTUMAYO. Parque Nacional Natural La Paya, Cabaña La Paya: 1 F, 0°2'S 75°12'W, 330m, Malaise, 20Nov-5Dec-2001, E. Lozano, M.2798, [IAvH 34301]. Parque Nacional Natural La Paya, Resguardo Cecilio Cocha: 1 M, 0°11'S 74°55'W, 190m, Malaise, 20-24Jan-2003, C. Sarmiento, M.3419, [IAvH 34318].

VALLE DEL CAUCA. Parque Nacional Natural Farallones de Cali, Anchicayá: 1 F, 3°26'N 76°48'W, 900m, Malaise, 1Aug-10Oct-2000, S. Sarria, M.1105, [IAvH 34300].

VAUPÉS. Estación Biológica Caparú, Terrazas: 1 F, 1°4'S 69°31'W, 60m, Malaise, 7-22Oct-2002, L. Benavides, M.3400, [IAvH 34317]; Estación Biológica Caparú, antigua cabaña, 1°4'S 69°31'W, 60m, Malaise: 1 F, 9-25Jan-2003, J. Pinzón, M.3629, [IAvH 64516]. 1 F, 25Jan-4Mar-2003, J. Pinzón, M.3618, [IAvH 64533]. Estación Biológica Caparú, Centro Ambiental: 1 F, 1°4'S 69°31'W, 60m, Malaise, 9-25Jan-2003, J. Pinzón, M.3639, [IAvH 64520].

DISCUSSION

All *Urosigalphus* specimens reported in this study were collected mainly in the understory stratum of the forest in preserved areas. In contrast, the material collected in other regions as North America, was obtained from rearing hosts. Very few speci-

mens have been collected on flowers, on grass, oak foliage and forest floor (Gibson 1972). Although there are no host records of *Urosigalphus* from Colombia, usually 90% of the examined specimens have ovipositors shorter than the metasoma, suggesting that they may attack exposed hosts.

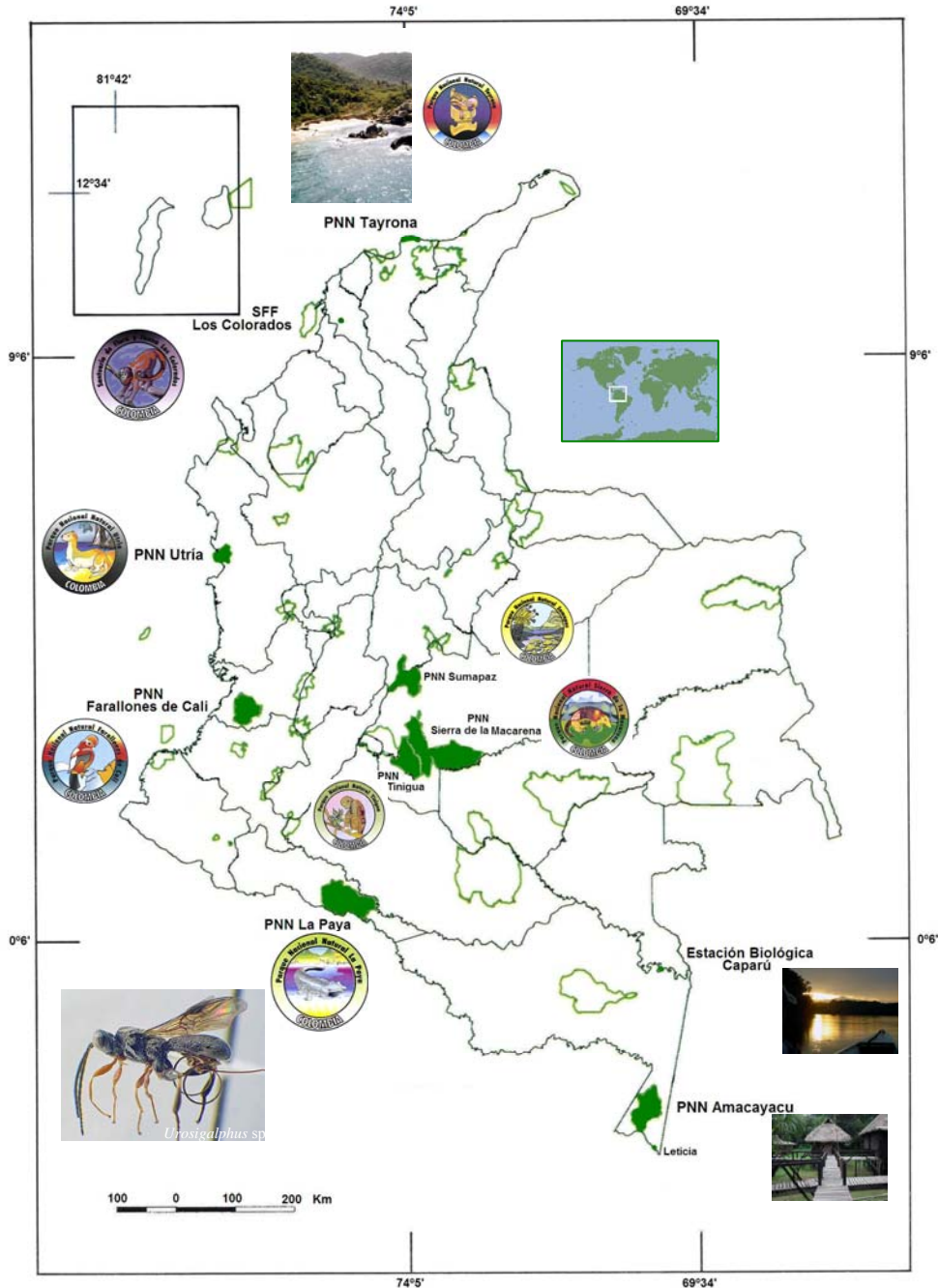


Figure 6. Geographical distribution of Colombian *Urosigalphus* specimens recorded in the paper (Map of Humboldt Institute).

The distribution of *Urosigalphus* species is limited to the New World. In Colombia very few specimens were collected, despite the fact that *Urosigalphus* is considered a common genus of Brachistini. Of the 45 specimens examined, 35 are females and 10 are males. The fact that a vast majority of morphotypes is represented by only one specimen, suggests that there are many more species yet to be discovered. This situation is similar to other genera of Braconidae such as *Amputoearinus*, Agathidinae (Lindsay & Sharkey 2006).

In this paper, seven new geographical records of the genus are reported from Colombia, in addition to three more sites in the Amazonas Department. Colombia is considered a diverse country of the tropics. Its extreme richness is evidenced, in part, by a high number of species that are in description process, as in the case of *Urosigalphus*. This result suggests that probably the number of New World *Urosigalphus* species can increase considerably if studies included the faunas of other highly diverse countries or regions such as Costa Rica and the Amazonian of Brazil, Peru and Bolivia.

Colombian *Urosigalphus* range in length from 2.2 to 5.9mm excluding antennae. In contrast, Central American species do not exceed 3.5mm in length (Gibson 1972a), while the species with the largest size, 7.8mm, is in North American, *U. armatus* Ashmead (Gibson 1972). In Colombia, the largest specimens were collected in the Amazonian Region while those caught in the Caribbean and Pacific regions have the smallest body size. The number of antennal segments reported in both South and Central America is 14-17. In North America this number reaches 18 (Gibson 1972, 1972a, 1974). The Colombian specimens have 12-14 flagellomeres excluding scape and pedicel. This is the first time that *Urosigalphus* with 12 and 13 flagellomeres are reported. Although Colombian *Urosigalphus* were only collected in areas 900m above sea level, it is possible that the range of elevation reaches 1.500m. In Costa Rica, material of *Urosigalphus* has been collected at altitudes from 10 to 1400 meters above sea level, this information was obtained thanks to a loan material from Instituto Nacional de Biodiversidad (INBio).

One difference between the North, Central and South American fauna is the surface color of individuals. The carapace color in North American

species has a wide range of yellow, orange, red, brown or black. In Central American species it is red-brown, black with red (*U. anthonomi* Crawford) or black. In South American species the carapace may be black, orange (*U. rubicarpus* Gibson) or, if the color is red, it is combined with maroon. As to the color of the head, the North American species have different combinations such as reddish-brown, reddish-black, brownish-black, brown or black. In Central America, it is reddish-brown (*U. yucatanensis* Gibson and *U. schwarzi* Gibson) or black. In South American species, the head can be red (*U. ornatus* Gibson), reddish black, red-brown, brown or black. As far as their thorax is concerned, the *Urosigalphus* from North, Central and South American have very similar colorations, it can be reddish-brown, reddish-black, brownish-black, brown, blackish-maroon or black with red (*U. sanguineus* Gibson) or black. In South America a red thorax is reported for *U. chalcodermis* Wilkinson. The coloration of Colombian *Urosigalphus* does not vary widely. All examined specimens show a black colored head and thorax, but the carapace can be dark brown-black or black.

Biological inventories constitute an invaluable tool that allows us to know, in a great extent, the identities of the species that live in a certain area. In this way, we will be able to determine which regions are the most diverse, and also propose hypotheses about the reason for the number and identities of species. If a great part of the existing species is inventoried, we will be able to determine ecological relationships among them, ecological functions carried out by their populations, and how to conserve them.

An important part of the biological diversity of Colombia is located at the protected areas managed by the Colombian state. As a whole, these conservation areas represent the different ecosystems, latitudinal gradients, and characteristic landscapes of the country. The Humboldt Institute has an important entomological collection which has grown in strength because many protected areas have been sampled (National Parks, Sanctuaries of Flora and Fauna, Natural Reserves, Biological stations and a Unique Natural Area). The material deposited here is very important and the collection is an essential reference material for many investigators as well as undergraduate and graduate students who are carrying out taxonomic revision of Colombian flying insects.

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