

Preliminary list of Odonata from the Colombian Amazon, with descriptions of *Inpabasis nigradorsum* sp. nov. & *Diaphlebia richteri* sp. nov. (Coenagrionidae & Gomphidae)

C. A. Bota-Sierra^{a*}, C. Moreno-Arias^b and T. Faasen^c

^aGrupo de Entomología Universidad de Antioquia (GEUA), Universidad de Antioquia, Medellín, Colombia; ^bGrupo de Ictiología Universidad de Antioquia (GIUA), Universidad de Antioquia, Medellín, Colombia; ^cEcologica, Maarheeze, the Netherlands

(Received 17 May 2015; final version received 5 August 2015)

The Colombian Amazon is one of the most biodiverse and unexplored regions in the world. Inventories and deeper research are needed for most of its biota, including for dragonflies. This work reports the results of a trip to the Amazon region in order to collect Odonata. It includes revision of CBUCES, CEUA and ICN entomological collections and a literature survey of Colombian Amazon Odonata. Two undescribed species in the genera *Diaphlebia* and *Inpabasis* were found. Five genera and 21 species are recorded for the first time in Colombia. Accounts for undescribed species, new records for the country, natural history notes and a discussed list of Colombian Amazon Odonata are provided.

<http://zoobank.org/urn:lsid:zoobank.org:pub:6E6FF0A0-28AC-454B-A36B-BCC6F120636B>

Keywords: dragonfly; damselfly; Putumayo; Vaupes; Guaviare; Guainía; Caquetá; Amazonas; new records; Atacuari River; Tarapoto Lake

Introduction

The Amazon basin is the biggest interconnected fluvial system in the world, with an approximate area of 7 million km² shared by nine countries: Brazil has the largest area with *c.*4.3 million km² (63% of total area) followed by Peru, Colombia, Bolivia, Guyana, French Guyana, Suriname and Ecuador (Albert, Petry, & Reis, 2011; Ruiz & Valencia, 2007). This region has a great biotic richness, and many species are still undiscovered (Galvis et al., 2006; Thieme et al., 2007).

There are two major ecosystems in the Amazonian rainforest: *terra firme* and floodplains. The former corresponds to non-flooded land (intermixed with small water courses), located at the highest areas. *Terra firme* soils are washed by runoff into the river, causing low fertility (Richey & Góes, 1987); however, they support an extraordinary diversity and a large forest biomass, which is maintained through rapid and efficient recycling of materials (Luizão & Schubart, 1987). Floodplains are ecosystems with high heterogeneity due to a cyclic change between terrestrial and aquatic conditions, which can last from three to 11 months each year, having a strong biotic impact and making floodplains among the most species-rich environments (Turić et al., 2012; Ward, Tockner, & Schiemer, 1999). Within the floodplains permanent lakes provide a

*Corresponding author. Email: corneliobota@gmail.com

great abundance of food and shelter, crucial for the life cycles of most of the aquatic inhabitants (Junk, 2005). The lowest and most severely flooded floodplains are classified as Várzea or Igapó, depending on the flood pulse origin, the former flooded by Andean nutrient rich rivers with high sediment load and the latter by Amazonian low nutrient rivers which have little sediment load (Parolin & Junk, 2002; Renó & Novo, 2011). Higher areas, which experience seasonal flooding only for short periods, are generally classified as *restinga* (Myster, 2009).

Most Amazonian biotic studies have been performed in Brazil, which has a large research station, the Instituto Nacional de Pesquisas da Amazônia, at Manaus; notable research has also been carried out in other regions, for example Suriname and Peru (Heckman, 2008). A large number of species of dragonflies have been recorded for these countries. Biological research in Colombia has been relatively sparse, as it has been neglected by governmental organizations (Palacio, 2007), although in the last two decades it has started to increase, due to the creation of Instituto SINCHI (Instituto Amazónico de Investigaciones Científicas) in 1993, the Universidad Nacional sectionals, and some non-governmental organizations. This has boosted investigations of vascular plants, vertebrates, and native cultures.

The Colombian Amazon is about 483.164 km², and it is politically divided into six departments: Amazonas, Caquetá, Guainía, Guaviare, Putumayo, and Vaupés. Dragonflies in this area are almost unknown, with only 80 species recorded (Borrór, 1931; Bota-Sierra, 2012; Fraser, 1946a, 1946b; Palacino-Rodríguez, 2009, 2013; Pérez-Gutiérrez & Palacino-Rodríguez, 2011; Rojas-Riaño, 2011; von Ellenrieder, 2008, 2013). This is a small number when compared with its neighbors Amazonas State (Brazil) with 187 species (Heckman, 2006, 2008), Loreto Department (Peru) with 259 species (Hoffmann, 2009; Faasen, unpubl.), and the Ecuadorian locality of Tiputini (Orellana Province) with 71 species recorded within just 6.5 km² (von Ellenrieder & Garrison, 2011). Here we present the results of a field trip to collect dragonflies and a compilation of the species known from the Colombian Amazon, with some biological notes and the descriptions of *Diaphlebia richteri* sp. nov. and *Inpabasis nigradorsum* sp. nov., hoping this will provide a good base for future works on this subject.

Materials and methods

Collecting trip

Localities sampled by the second author (CMA) are situated at Puerto Nariño and San Juan de Atacuari towns in Amazonas, Colombia (Figure 1; note that locality names are given in the figure legend). This area is classified as humid tropical forest with mean annual precipitation of c.3500 mm and an average temperature of 26°C. There is a rainy season from November to May and a dry season from June to October, marking a great variation in habitat conditions in floodplain lands (Albert & Reis, 2011; Junk, 2001). Sampling was conducted during the late dry season in the central Amazon (2–6 November 2012) in both lotic and lentic habitats.

Lotic habitats included two small tributaries of Loretoyacu River, first and second order streams and their surrounding vegetation, and some sections of vegetated shore of the Atacuari River. Both Loretoyacu and Atacuari Rivers are tributaries of the Amazon River. Streams and river shore substrates were composed mainly of coarse litter and sand patches with a few submerged trunks and tree branches. Surrounding vegetation in the Loretoyacu basin corresponds to secondary forest and some *Manihot* sp., *Musa* sp. and fruit crops. At the Atacuari shoreline a small indigenous community is located, and vegetation is composed of primary forest. Water from these systems is mixed (with tributaries from Andes and Amazon) (Ricaurte, 2000).

Lentic habitats include Tarapoto Lake and an oxbow at the Atacuari River shore. In Tarapoto Lake several creek mouths and shores were sampled. Dragonflies were common on floating

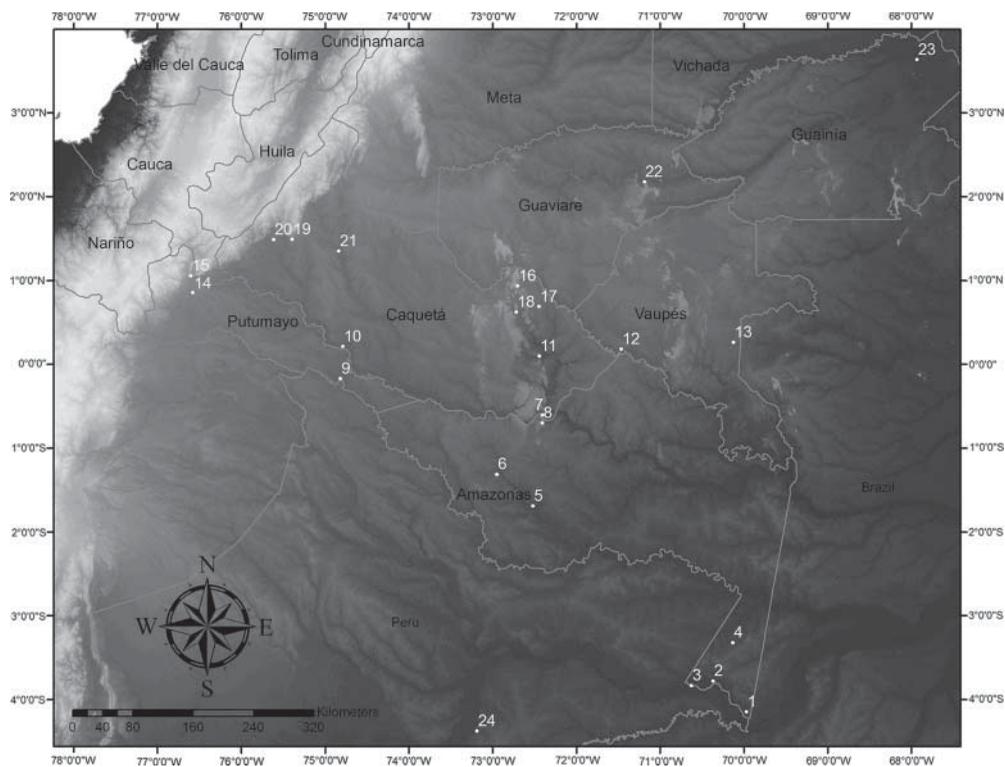


Figure 1. Colombian Amazon map with Odonata records: 1 Amazonas, Leticia (include Km 9 Tarapacá road, Monilla-Amena Indigenous community, Km 22 Tarapacá road, Tucano reserve, Yahuaracaca stream, and Leticia city localities), 2 Amazonas, Puerto Nariño (include Loreto Yacu River, Tarapoto Lake, Correo Lake and a stream in terra firme), 3 Amazonas, Leticia, Atacuari River, 4 Amazonas, Leticia Amacayacu National Park, 5 Amazonas, Igará Paraná River, 6 Amazonas, Leticia, La Chorrera town, 7 Caquetá, Solano, Araracuara town, 8 Amazonas, Leticia, Puerto Santañer town, 9 Putumayo, Puerto Leguizamo, Caucayá River, 10 Caquetá, Orteguaza River, 11 Caquetá, Puerto Abeja town, 12 Vaupes, Soratama River, 13 Vaupes, Mitú, Bella Vista de Abigo, 14 Putumayo, Villa Garzón, Puerto Umbría town, 15 Putumayo, Mocoa, Planadas 16 Caquetá, Chiribiquete National Park, 17 Caquetá, Chiribiquete National Park, south-east sector of Mesa River and Puerto Abeja basin, 18 Caquetá Chiribiquete mountain range, 19 Caquetá, Montañita, Palma Azul town, Coconuco stream, 20 Caquetá, 10 km to the south of Florencia, 21 Caquetá, Cartagena del Chairá, 22 Guaviare, Nukak Maku reserve, Caño Cucuy in Moyano hill, 23 Guanía, Inirida, (include La Ceiba community, Lombriz lagoon and Inirida River), 24 Peru, Loreto Department, Tamshiyacu-Tahuayo Reserve.

aquatic macrophytes and emergent vegetation. The substrate was composed mainly of coarse litter with submerged grasses. The oxbow at Atacuari River was very similar.

Laboratory phase

Amazonian specimens (Andean foothills were not included) deposited in Colección de Entomología de la Universidad de Antioquia (CEUA) and Museo de Historia Natural del Instituto de Ciencias Naturales (ICN-MHN) were examined and identified in order to complete the Colombian Amazon checklist. All specimens collected were identified and deposited in CEUA. Measurements were taken using a ruler and stereoscope grid. Total length and abdominal length does not include appendages. Drawings were made by free hand with the aid of an AM Scope (Irvine, Canada) stereoscope and its grid. The map was composed using Shuttle Radar Topographic Mission digital elevation models with 30 m spatial resolution, downloaded from <http://srtm.csi.cgiar.org> (Jarvis, Reuter, Nelson, & Guevara, 2008), and a shape file of Colombian departmental political divisions, using ArcGIS 10.1 and ArcMAP 10.1 (<http://www.arcgis.com>).

Elevation data and longitude/latitude coordinates were taken in the field with a Garmin Etrex GPS (Garmin (Asia) Corporation, New Taipei, Taiwan). Museum specimens without geographic coordinates were georeferenced using Google Earth 6.2 (<http://www.earth.google.com>). Abbreviations for structures are as follows: FW: forewing; HW: hind wing; pt: pterostigma; Ax: antenodal cross veins; Px: postnodal cross veins; S1–10: abdominal segments one to 10. Terminology follows Riek and Kukalová-Peck (1984) and Garrison, von Ellenrieder, and Louton (2010).

Literature sources

The following references were used to build the preliminary list of Odonata for the Colombian Amazon: Borror's (1931) revision of *Oligoclada*; Fraser's (1946a, 1946b) notes on Amazonian Odonata; Palacino-Rodríguez's (2009) list of Anisoptera at the ICN, and his (2013) records from Putumayo Department; the literature review by Pérez-Gutiérrez and Palacino-Rodríguez (2011) for the Odonata check list of Colombia; Rojas-Riaño's (2011) master's thesis; the CAB 2011 collecting trip (Bota-Sierra, 2012), and von Ellenrieder's (2013) revision of *Metaleptobasis*.

Results

CMA's collecting trip

Sixty-one specimens were collected and identified to species level, with the exception of one female of the genus *Microstigma*. Twenty-six species were recorded (Table 1), among them 10 new records for Colombia (detailed collection data appear in Table 1).

Diastatops pullata

This species was recorded from Argentina, Bolivia, Brazil, Ecuador, French Guiana, Guyana, Peru, Suriname, and Venezuela (Montgomery, 1940; von Ellenrieder, 2009), where it was recorded inhabiting lentic ecosystems, especially near sunny brush (Montgomery, 1940). In the Colombian Amazon it was observed actively flying near the shore of lakes and rivers close to noon.

Oligoclada pachystigma

This species was recorded by Borror (1931) for Leticia, Peru. Since Leticia became a Colombian locality after the culmination of the Colombo-Peruvian conflict in 1932 (Palacio, 2007; Pineda, 2010), it must be included in the Colombian Odonata list; nevertheless, Perez-Gutierrez & Palacino-Rodriguez (2011) did not list it. On this trip it was observed perching on macrophytes in the lakes.

Aeolagrion dorsale

This widespread species is recorded from Bolivia, Brazil, Ecuador, Peru, Suriname, Trinidad, and Venezuela (Tennessee, 2009). Its presence in Colombia was therefore expected but had not been confirmed to date. In the Colombian Amazon it was found on emergent plants close to the shore of a blackwater stream connecting two lakes, especially in shaded places.

Table 1. Species collected by CMA.

Family	Species	Specimens	Locality
Libellulidae	<i>Diastatops pullata</i> *	1♂	Atacuari Oxbow
	<i>Erythemis peruviana</i>	1♂	Tarapoto Lake
	<i>Erythemis vesiculosa</i>	1♂	Tarapoto Lake
	<i>Miathyria simplex</i>	1♂	Tarapoto Lake
	<i>Oligoclada pachystigma</i> *	1♀	Tarapoto Lake
	<i>Orthemis cultriformis</i>	1♂	1st order stream
	<i>Perithemis thais</i>	1♂	“El Salto” Stream
	<i>Perithemis lais</i>	1♂	Tarapoto Lake
	<i>Perithemis bella</i>	1♂	Tarapoto Lake
Calopterygidae	<i>Hetaerina sanguinea</i>	4♂	1st order stream
	<i>Mnesarete fulgida</i>	1♂	“El Salto” Stream
Coenagrionidae	<i>Acanthagrion apicale</i>	4♂	1st order stream
	<i>Acanthagrion lancea</i>	1♂	Tarapoto Lake & Atacuari Oxbow
	<i>Acanthagrion ascendens</i>	1♂	1st order stream
	<i>Aeolagrion dorsale</i> *	1♂, 1♀	Tarapoto Lake
	<i>Denticulobasis garrisoni</i> †	1♀	Atacuari river
	<i>Ischnura capreolus</i>	3♂, 3♀	Tarapoto Lake
	<i>Metaleptobasis maufrayi</i> *	3♂	1st order stream
	<i>Telebasis dunklei</i> *	5♂, 2♀	Tarapoto Lake
	<i>Telebasis inalata</i> *	2♂	Tarapoto Lake
	<i>Telebasis obsoleta</i> *	2♂, 1♀	Tarapoto Lake
	Coenagrionidae, Protoneurinae	<i>Drepanoneura muzoni</i> *	3♂, 1♀
<i>Protoneura paucinervis</i> *		3♂, 4♀	Atacuari river & Atacuari Oxbow
<i>Protoneura scintilla</i> *		2♂	“El Salto” Stream
<i>Psaironeura tenuissima</i> *		2♂	1st order stream
Coenagrionidae, Pseudostigmatinae	<i>Microstigma</i> sp.	1♀	1st order stream

*First record of the species from Colombia. †First record of the genus from Colombia.

Atacuari River 3°49'52"S, 70°37'46"W, 125 m. Tarapoto Lake 3°47' S, 70°26'W, 75 m. Second order stream: El Salto 3°46'15.2"S, 70°21'53.4"W, 87 m. First order stream 3°45'54.8"S, 70°21'50.6"W, 103 m.

Denticulobasis garrisoni

The genus *Denticulobasis* has been recorded in the Amazon forest in Brazil and Peru (Garrison et al., 2010; Machado, 2009). A female of *D. garrisoni* was collected inside a *terra firme* forest, close to Atacuari river shore in the Colombian Amazon.

Telebasis dunklei

Recorded in the Amazon region from Bolivia, Ecuador, and Peru, it inhabits blackwater lakes, pastures and ponds (Garrison, 2009). In the Colombian Amazon it was a conspicuous and abundant species; pairs were observed in tandem ovipositing under floating macrophytes (*Salvinia* sp.) at blackwater lakes.

Telebasis obsoleta

A widespread species occurring from the Amazon region of Ecuador and along the Amazon River in Brazil south through Peru, Bolivia, Paraguay and northern Argentina (Garrison, 2009), where it has been recorded inhabiting ponds, roadside pools, marshy areas, lake shores, *várzea* (canopy areas within whitewater inundated forest), and it was commonly associated with beds of

floating vegetation in wooded wetlands (Garrison, 2009). Its presence in Colombia was therefore expected but had not been confirmed to date. It was collected at blackwater lake shores.

Telebasis inalata

A widespread species along Western South America recorded from North Eastern Argentina, Bolivia, Ecuador, Paraguay, and Peru (Garrison, 2009). A pond inhabitant, its small size and rapidity of flight from mat to mat make it difficult to see so that the brilliant red abdomen is not as conspicuous as one might expect (Garrison, 2009). Commonly associated with mats of *Pistia* (Garrison, 2009). At Colombian Amazon it was collected in a blackwater lake, where it was common close to floating macrophytes, sharing habitat with *T. dunklei*.

Drepanoneura muzoni

This species was recorded in the Amazon region of Ecuador and Peru, where it is sympatric with *D. tennesse* in the former and with *D. loutoni* in the latter (von Ellenrieder & Garrison, 2008). This species was difficult to detect in the Colombian Amazon due to its somber coloration. It was observed at completely shaded pools in a first order stream inside the *terra firme* forest.

Protoneura paucinervis

This species was recorded in the Amazon region of Brazil, Ecuador, and Peru (Heckman, 2008; Hoffmann, 2009). Bota-Sierra (2012) was not able to identify a female specimen of this genus collected at Correo Lake (Puerto Nariño, Amazonas); however, by comparison with recent mated pairs, this specimen was classified as *P. paucinervis*. In the Colombian Amazon multiple pairs in tandem were observed flying along river shores or ovipositing in emergent macrophytes at shaded shores of blackwater lakes.

Protoneura scintilla

This species was recorded in the Amazon regions of Brazil, Ecuador and Peru (Gloyd, 1939; Haber, 2011; Faasen, unpubl.). Gloyd (1939) stated “According to Mr. J. H. Williamson’s field notes the specimens of *scintilla* were taken at a season of considerable rain. They were found in the darkest places on shallow creeks that were about one foot deep and four to six feet wide and in thick woods . . . they were generally seen hovering and darting a few inches above the water”. This coincides with the observed habitat and behavior for this species in the Colombian Amazon, where it was uncommon and difficult to detect due to its quick erratic movements in the shaded first order *terra firme* streams. In Loreto, Peru, it was found in similar small streams in *terra firme* and *restinga* forest both in the wet and dry season.

Psaironeura tenuissima

This species is widespread across the Amazon region. It is recorded from Brazil, Ecuador, French Guiana, Guyana, Peru, and Venezuela (Garrison, 2004). In the Colombian Amazon, it was observed at pools in a first order stream where it perched in sun flecks.

Colombian Amazon Odonata preliminary checklist

We recorded 108 species for the region (Table 2), among them seven genera and 31 species not recorded in the last checklist of the Odonata known from Colombia (Pérez-Gutiérrez & Palacino-Rodríguez, 2011). Furthermore, *Erythrodiplax connata* was excluded from the Colombian checklist based on Paulson (2003), thus increasing the number of Odonata species reported for Colombia from 373 (Bota-Sierra, 2014a, 2014b; Bota-Sierra & Wolff, 2013; Rache, Acero, Alfonso, & Rincón, 2013; von Ellenrieder, 2008, 2013) to 403.

Lack of sampling is evidenced in the three northeastern departments of Guainía, Guaviare, and Vaupes which cover almost half of the Colombian Amazon region. Only 17 species were recorded in these departments, a poor number for this extraordinarily biodiverse region (Table 2, Figure 1). Also no representatives of Corduliidae or *Micrathyria* are recorded, and only low numbers of Gomphidae, confirming the sparse sampling.

CBUCES, CEUA and ICN specimens

A total of 146 Amazonian specimens were found in these museums (nine in CBUCES (Colecciones Biológicas de la Universidad CES), 85 in CEUA and 52 in ICN) representing 40 species. Among them 16 were new records for Colombia (Table 2), including two undescribed species, *Diaphlebia richteri* sp. nov. and *Inpabasis nigradorsum* sp. nov. Remarkably, at ICN there were 18 specimens collected by the late German entomologist Leopold Richter from some of the most remote regions of Colombian Amazon between 1946 and 1952, during at least five different expeditions. Unfortunately these historic collections are in poor preservation state, and most of them lack last abdominal segments, making their accurate identification very difficult.

Inpabasis nigradorsum Bota-Sierra & Faasen sp. nov.

Figures 2a–f (diagnostic traits ♂), 3a (habitus ♀), b–d (diagnostic traits ♀), e (habitus ♂).

Etymology

From Latin *nigrum*, black, and *dorsum*, back. The name refers to its dark tergum, especially on abdominal segments 4–7, which contrast with the other known species in the genus.

Examined material

Total: 5♂ 1♀. Holotype ♂ Colombia, Amazonas Department, Leticia Municipality, La Chorrera, San Francisco Township, 1°18'41''S, 72°56'59''W. 14 September 2011. Leg: R. A. Gallego. CEUA 74121. Paratypes all Peru, Loreto Department, Tamshiyacu-Tahuayo Reserve, leg. T.J.A. Faasen. 1♂ and 1♀ Terra Firme, 4°22'22''S, 73°11'9''W, elevation: 117 m. 6 August 2009, ♂ RMNH, ♀ MUSM. 1♂ Aguajal within *restinga*, 4°23'2''S, 73°14'38''W, elevation: 107 m. 25 February 2010, RMNH, 2♂ Aguajal within *restinga*, 4°24'6''S, 73°14'40''W, elevation: 106 m. 7 February 2015, RMNH.

Description

Male holotype. Head. Black except: labium; horizontal stripe on apical third of labrum; apical half of gena; base of mandible edges forming a “C” mark; two diagonal symmetric stripes on antefrons; and a spot between the compound eye and antenna base, which are pale yellowish. Postfrons, antenna base, and first antennomere dull due to fine punctation;

Table 2. List of Odonata in Colombian Amazon.

Family	Species	Source ^a	Department	Locality on the map
Lestidae	<i>Lestes helix</i> Ris, 1918	6	Gv, Va	22, 12
Perilestidae	<i>Perissolestes cornutus</i> (Selys, 1886)*	6	Am	8
Platystictidae	<i>Palaemnema peruviana</i> Ris, 1918*	6	Am	1
Calopterygidae	<i>Hetaerina sanguinea</i> Selys, 1853	2, 3, 6, 10	Am, Ca, Pu	1, 2, 3, 18
	<i>Hetaerina westfalli</i> Rácenis, 1968*	6	Am, Gu	23
	<i>Mnesarete fulgida</i> (Selys, 1879)	1, 3, 10	Am, Ca, Pu	2
	<i>Mnesarete metallica</i> (Selys, 1869)	1, 10	Pu	14
Dicteriadidae	<i>Heliocharis amazona</i> Selys, 1853	10	Pu	9, 14
Heteragrionidae	<i>Heteragrion inca</i> Calvert, 1909*	6, 10	Am	1, 2
Megapodagrionidae	<i>Megapodagrion megalopus</i> (Selys, 1869) [†]	6	Ca, Gu, Gv	7, 22, 23
	<i>Teinopodagrion curtum</i> (Selys, 1886)	1	Am	6
Philogeniidae	<i>Philogenia berenice</i> Higgins, 1901*	5	Am	1
Polythoridae	<i>Chalcopteryx scintillans</i> McLachlan, 1870 [†]	6	Ca, Va	12, 16, 18
	<i>Polythore beata</i> (McLachlan, 1869)	1, 6, 7	Am, Ca, Pu	7, 9, 10
	<i>Polythore chiribiquete</i> (Zloty & Pritchard, 2001)	1, 7	Ca	17
	<i>Polythore concinna</i> (McLachlan, 1881)	1, 7, 10	Ca, Pu	14, 28
	<i>Polythore derivata</i> (McLachlan, 1881)	1, 7, 10	Ca, Pu	14
	<i>Polythore mutata</i> (McLachlan, 1881)	1, 10	Pu	14
	Coenagrionidae	<i>Acanthagrion apicale</i> Selys, 1876	2, 3	Am
<i>Acanthagrion ascendens</i> Calvert, 1909		3	Am	12
<i>Acanthagrion floridense</i> Fraser, 1946		10	Pu	14
<i>Acanthagrion lancea</i> Selys, 1876		2, 3	Am	1, 2
<i>Acanthagrion obsoletum</i> (Förster, 1914)		10	Pu	1, 14
<i>Aeolagrion dorsale</i> (Burmeister, 1839)*		3	Am	10
<i>Aeolagrion inca</i> (Selys, 1876)		2	Am	2
<i>Argia indicatrix</i> Calvert, 1902		10	Pu	14
<i>Argia infrequentula</i> Fraser, 1946		10	Pu	14
<i>Argia pulla</i> Hagen in Selys, 1865		1	Ca	?
<i>Argia variegata</i> Förster, 1914		10	Pu	14
<i>Calvertagrion</i> sp. nov.		2	Am	2
<i>Denticulobasis garrisoni</i> Machado, 2009 [†]		3	Am	3
<i>Ischnura capreolus</i> (Hagen, 1861)		2, 3	Am	2
<i>Inpabasis nigradorsum</i> sp. nov. [†]		5	Am	6
<i>Mesoleptobasis elongata</i> Garrison & von Ellenrieder, 2009*		6	?	?
<i>Mesoleptobasis incus</i> Sjöstedt, 1918		2	Am	2
<i>Metaleptobasis mauffrayi</i> Daigle, 2000*		3, 9	Am	2
<i>Phoenicagrion flammeum</i> (Selys, 1876) [†]		5, 9	Am, Ca	1, 10
<i>Telebasis corbeti</i> Garrison, 2009*		6	Pu	9
<i>Telebasis dunklei</i> Bick & Bick, 1995*		3	Am	2
<i>Telebasis inalata</i> (Calvert, 1961)*	3	Am	2	
<i>Telebasis obsoleta</i> (Selys, 1876)*	3	Am	2	
<i>Telebasis rubricauda</i> Bick & Bick, 1995	11	Va	24	
<i>Telebasis versicolor</i> Fraser, 1946	1, 10	Pu	14	
Coenagrionidae, Protoneurinae	<i>Drepanoneura flinti</i> von Ellenrieder & Garrison, 2008	1	Ca	17
	<i>Drepanoneura muzoni</i> von Ellenrieder & Garrison, 2008*	3, 6	Am	1, 2
	<i>Epipleoneura</i> cf. <i>haroldoi</i>	5	Am	1
	<i>Neoneura bilinearis</i> Selys, 1860	2	Am	2
	<i>Neoneura rufithorax</i> Selys, 1886	2	Am	2
	<i>Neoneura</i> cf. <i>rubriventris</i>	6	Am	5
	<i>Proneura prolongata</i> Selys, 1889	2	Am	1

(Continued).

Table 2. Continued.

Family	Species	Source ^a	Department	Locality on the map
	<i>Protoneura paucinervis</i> Selys, 1886*	3	Am	2, 3
	<i>Protoneura scintilla</i> Gloyd, 1939*	3	Am	2
	<i>Psaironeura tenuissima</i> (Selys, 1886)*	3	Am	2
Coenagrionidae,	<i>Anomisma abnorme</i> McLachlan, 1877	1, 10	Am, Va, Pu	14
Pseudostigmatinae	<i>Mecistogaster jocaste vicentius</i> Ris, 1918	10	Pu	14
	<i>Mecistogaster linearis</i> (Fabricius, 1776)	5, 10	Am, Ca, Pu	1
	<i>Mecistogaster lucretia</i> (Drury, 1773)*	5	Am	1
	<i>Microstigma</i> cf. <i>rotundatum</i>	3, 6	Am, Ca	1, 2, 4, 11
Aeshnidae	<i>Gynacantha klagesi</i> Williamson, 1923*	6	Gu	23
	<i>Gynacantha litoralis</i> Williamson, 1923*	5	Am	1
	<i>Gynacantha membranalis</i> Karsch, 1891	1, 6	Am	1
	<i>Gynacantha mexicana</i> Selys, 1869	6	Ca	17
	<i>Triacanthagyna septima</i> (Selys in Sagra, 1857)	6	Am	2
Gomphidae	<i>Aphylla boliviana</i> Belle, 1972*	5	Pu	15
	<i>Diaphlebia richteri</i> sp. nov. [†]	6	Gu	23
	<i>Desmogomphus paucinervis</i> (Selys, 1873)	1, 6	Gu	23
	<i>Zonophora wucherpfennigi</i> Schmidt, 1941 [†]	5	Va	13
Libellulidae	<i>Brachymesia furcata</i> (Hagen, 1861)	2	Am	1
	<i>Brachymesia herbida</i> (Gundlach, 1889)	2	Am	2
	<i>Dasythemis esmeralda</i> Ris, 1910	1, 10	Ca, Pu	14
	<i>Diastatops obscura</i> (Fabricius, 1775)	6	Ca	11, 19
	<i>Diastatops</i> cf. <i>nigra</i>	6	Am	?
	<i>Diastatops pullata</i> (Burmeister, 1839)*	3	Am	3
	<i>Dythemis nigra</i> Martin, 1897	5	Ca	21
	<i>Elga leptostyla</i> Ris, 1911	6	Am	1
	<i>Erythemis attala</i> (Selys in Sagra, 1857)	2	Am	2
	<i>Erythemis credula</i> (Hagen, 1861)	1	Am	?
	<i>Erythemis haematogastra</i> (Burmeister, 1839)	1	Gv	?
	<i>Erythemis peruviana</i> (Rambur, 1842)	1, 3	Am	2
	<i>Erythemis vesiculosa</i> (Fabricius, 1775)	1, 3, 8	Am, Pu	2
	<i>Erythrodiplax attenuata</i> (Kirby, 1889)	1, 2	Am	2
	<i>Erythrodiplax basalis</i> (Kirby, 1887)	1, 5, 8	Am, Pu	1
	<i>Erythrodiplax castanea</i> (Burmeister, 1839)	1, 10	Am, Pu	14
	<i>Erythrodiplax fusca</i> (Rambur, 1842)	1, 5, 8, 10, 11	Am, Pu, Va	1, 14, 24
	<i>Erythrodiplax kimminsi</i> Borror, 1942	1	Pu	14
	<i>Erythrodiplax lativittata</i> Borror, 1942	5	Am	1
	<i>Erythrodiplax ochracea</i> Burmeister, 1839	10, 11	Pu, Va	14, 24
	<i>Erythrodiplax parvimaculata</i> Borror, 1942	11	Va	24
	<i>Erythrodiplax umbrata</i> (Linnaeus, 1758)	1, 8	Am, Ca, Pu	?
	<i>Erythrodiplax unimaculata</i> (De Geer, 1773)	1, 2, 8	Am, Ca, Pu	1, 2
	<i>Gynothemis pumila</i> (Karsch, 1889)	10	Pu	14
	<i>Miathyria simplex</i> (Rambur, 1842)	3	Am	2
	<i>Micrathyria</i> sp.	2	Am, Ca	10
	<i>Nephepeltia flavifrons</i> (Karsch, 1889)	1	Ca	?
	<i>Oligoclada monosticha</i> Borror, 1931*	4	Am	1
	<i>Oligoclada pachystigma</i> Karsch, 1890*	4	Am	1, 2
	<i>Oligoclada walkeri</i> Geijskes, 1931*	4	Am	1
	<i>Orthemis biolleyi</i> Calvert, 1906	10	Pu	14
	<i>Orthemis cultriformis</i> Calvert, 1899	1, 3, 10	Am, Pu	12, 14
	<i>Orthemis discolor</i> (Burmeister, 1839)	1, 8	Am, Gu, Pu	?
	<i>Perithemis bella</i> Kirby, 1889	2, 3	Am	2
	<i>Perithemis lais</i> (Perty, 1834)	2, 3	Am	2

(Continued).

Table 2. Continued.

Family	Species	Source ^a	Department	Locality on the map
	<i>Perithemis thais</i> Kirby, 1889	3	Am	2
	<i>Rhodopygia cardinalis</i> (Erichson, 1848)	1, 11	Ca, Va	24
	<i>Tholymis citrina</i> Hagen, 1867	1	Am	?
	<i>Uracis fastigiata</i> (Burmeister, 1839)	1, 2, 5	Am, Ca	1, 2
	<i>Uracis imbuta</i> (Burmeister, 1839)	1, 2, 5	Am, Ca, Gu, Gv, Pu	1, 2, 21
	<i>Uracis infumata</i> (Rambur, 1842)	1	Am, Ca	6
	<i>Uracis siemensi</i> Kirby, 1897	6, 10	Am, Pu	14
	<i>Zenithoptera fasciata</i> (Linnaeus, 1758)	1, 5, 6, 10	Am, Ca, Pu	1, 11, 14, 19

^a1, Pérez-Gutiérrez and Palacino-Rodríguez (2011); 2, Bota-Sierra (2012); 3, CMA field trip; 4, Borror (1931); 5, CEUA; 6, ICN collection and online database; 7, Rojas- Riaño (2011); 8, Palacino-Rodríguez (2013); 9, von Ellenrieder (2008, 2013); 10, Fraser (1946a, 1946b); 11, CBUCES

†First records of the genus in Colombia; *first records of the species in Colombia.

rear of head, antefrons, clypeus, labrum, gena and base of mandible smooth and shiny. Frons angled. Postocular lobes not protruding backwards beyond level of hind margin of compound eyes.

Thorax. Prothorax black with apical portions of pleura and posterolateral angles of posterior lobe pale, posterior prothoracic lobe subquadrate, with some sinuosity in its posterior edge (Figures 2, 3e). Pterothorax pale yellowish except: mid-dorsal black stripe, mesepisternum iridescent green, black antehumeral stripe with little pale triangle before antealar sinus, mesepimeron iridescent red, metepisternum with iridescent green spot in its dorsodistal corner touching upper red iridescent band, black spot on posterior fourth of metapleural suture. Legs and coxae pale except tarsi, spurs, claws, external surface of front legs and apical portions of femora and tibiae, which are black (Figure 3e). Six spurs on anterior side of right metafemur and seven on left metafemur, as long as space between them or shorter, gradually increasing in size toward apex. Nine spurs on anterior side of right metatibia and seven on left metatibia, longer than space between them, gradually decreasing in size toward apex. Tarsal claws with poorly developed supplementary tooth. Wings hyaline. Pt red, ratio between distal and proximal length about 1:1. CuP reaching hind margin of wing at a distance greater than its own length to confluence of CuPAA with hind margin of wing. Px 12 in FW, Px 11 in HW. RP2 branching under Px 6 in FW, and under Px 5 in HW.

Abdomen. Venter pale. S1–3 and S8–10 red except laterodistal margin of S1 and distal portion of S3, which are black; S4–7 black (Figure 3e), distal edge of S10 protruding backwards, diverging in two processes with pointed apices. Genital ligula (Figure 2b, c) thin, apex concave with a pair of sinusoidal, long and slender lateroapical processes directed proximad. Cerci and paraprocts red with black tips (Figure 2d–f); cerci subquadrate, ending in a point, about two-thirds paraproct length. Paraprocts conical, curving inwards.

Dimensions. Total length 35 mm. Abdomen length 29 mm (without caudal appendages). FW length 19 mm. HW length 18 mm.

Female paratype Head. As in holotype, but rear of head not smooth and shiny, instead punctated and rather dull.

Thorax. Prothorax with a transverse row of four light spots on anterior lobe. Posterior lobe colored as in holotype but enlarged. Posterior edge forming two thin, almost transparent, leaflike lobes which extend posteriorly past mesostigmal plates. At their base these lobes separated from each other only by a narrow suture, but this suture widens posteriorly, as each lobe has a rounded edge (Figure 3c, d).

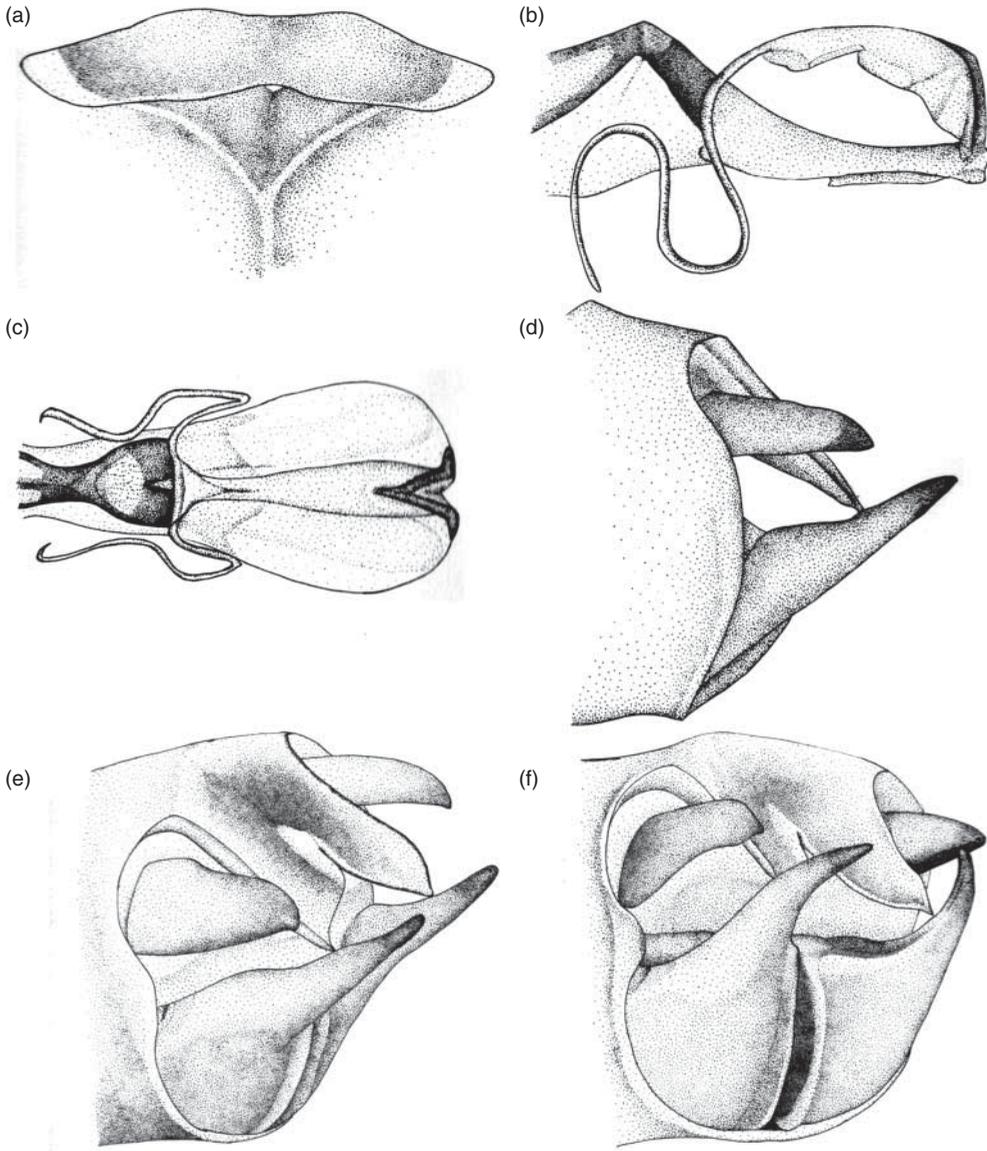


Figure 2. *Inpabasis nigradorsum* (Holotype ♂): (a) posterior lobe of prothorax (dorsal view); (b) genital ligula (lateral view); (c) genital ligula (ventral view); (d) S10 and caudal appendages (lateral view); (e) S10 and caudal appendages (laterodorsal view); (f) S10 and caudal appendages (lateroventral view). Illustrations by Natalia Uribe.

Pterothorax as in holotype but entirely iridescent dorsad, including mid-dorsal carina. Femora, tibiae and tarsal segments partly darkened to reddish and brown, but not black (Figure 3a). Seven spurs on anterior side of right metafemur; left metafemur missing. Six spurs on anterior side of right metatibia; left metatibia missing, Wings as in holotype, but Px 11 in FW, 10 in left HW.

Abdomen. S1–8 entirely black dorsally and pale ventrally, sharply divided. S9 with basal two-thirds blackish dorsally, gradually becoming reddish apically and ventrally (Figure 3a). S10, paraprocts and cerci completely red. Ovipositor pale, with a black tip, about the same length as S8 + 9, significantly surpassing S10. Vulvar spine absent (see Figure 3b).

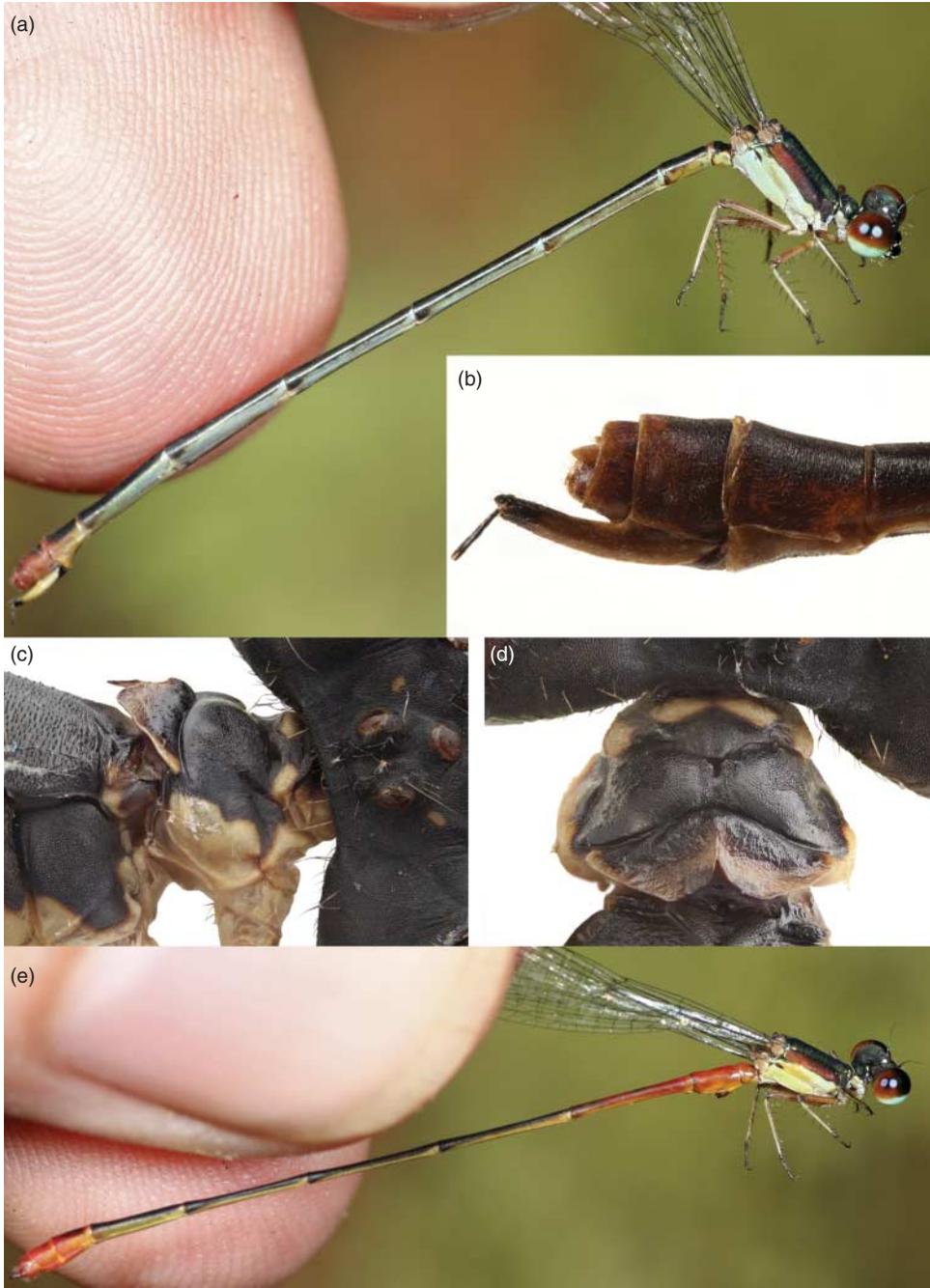


Figure 3. *Inpabasis nigradorsum* (Paratype ♀): (a) habitus; (b) S8–S10 (lateral view); (c) prothorax (lateral view); (d) prothorax (dorsal view); (e) (Paratype ♂) habitus. Photographs Tim Faasen. 169 × 236 mm (100 × 100 DPI).

Dimensions. Total length 32 mm (excluding ovipositor). Abdomen 26 mm (excluding ovipositor). Wing length as in holotype.

Variations in male paratypes Head. Base of mandibles largely pale, with a black spot. Dorsal punctated part of head with a slight green iridescence.

Thorax. Prothorax with a transverse row of four short light stripes on anterior lobe, middle two narrowly connected in two specimens, and an entirely pale posterior edge on posterior lobe. Pterothorax of two specimens entirely iridescent dorsad, including mid-dorsal carina. Antehumeral black stripe very narrow, hardly visible. Femora and tarsal segments reddish, somewhat darkened near apex. Eight spurs on anterior side of right metafemur and seven on metatibia in two specimens. Seven spurs on anterior side of right metafemur in one specimen. Six spurs on anterior side of right metatibia in two specimens (left hind leg missing in all specimens). Spurs on metafemur do not increase in size toward apex in one specimen. Px 11 in right FW of one specimen, in left FW in one specimen and both FW in one specimen. Px 10 in left HW of one specimen and both HW of one specimen. In one specimen RP2 branching slightly proximal to Px 7 in left FW, at Px 7 in right FW and slightly proximal to Px 6 in HW. In two specimens RP2 branching slightly proximal to Px 6 in left HW. In one of those specimens RP2 branches distal to Px 6 in left FW (other wing characteristics conform to holotype).

Abdomen. Dorsal surface of S8 somewhat darkened, without sharp borders. Processes on distal edge of S10 with rounded apices.

Dimensions. Total length 33–35 mm. Abdomen length 28–29 mm (without caudal appendages). FW length 17–18 mm. HW length 16–17 mm.

Diagnosis

Besides the species described here, three other species of *Inpabasis* are known to science: *Inpabasis rosea* (Selys, 1877), *Inpabasis hubelli* Santos, 1961, and *Inpabasis machadoi* Santos, 1961. They are all medium-sized coenagrionids with the dorsum of the head and thorax dark with metallic reflections and a red abdomen. The male of *I. nigradorsum* differs from them by its dorsally black abdominal segments 3–7 and length of the paraprocts, which are about 50% longer than the cerci (see Figures 2d–f, 3e). In the other species the paraprocts do not surpass the cerci posteriorly or only slightly. Under a microscope the form of the genital ligula of *I. nigradorsum* is easily recognizable by its long, slender sinusoidal lateroapical flagella (Figure 3b, c). Of the other known *Inpabasis* species, only *I. rosea* has the apex of its ligula elongated into slender flagella, but these flagella are simply curved and not sinusoidal. The apices of the ligula of *machadoi* and *hubelli* both end in a blunt structure.

The female of *I. nigradorsum* differs from the other species by the form of the posterior lobe of its prothorax, which is enlarged and distinctly bilobed with a narrow suture at the base (Figure 2c, d). In all other known *Inpabasis* species the posterior lobe of the prothorax is entire. Furthermore, *I. nigradorsum* is the only species in which the female has the last abdominal segments reddish (see Figure 2a). In the other species all abdominal segments are dark dorsally.

Some additional characteristics to separate *I. nigradorsum* from other *Inpabasis* species:

- *hubelli* has an irregular border between the dark dorsal side and light ventral side of the thorax; on the metepisternum it has a blunt dark marking pointing apicoventrally toward the metacoxa. In *I. nigradorsum* the border between the dark dorsal side and light ventral side of the thorax is more or less straight.
- *rosea* usually has a thin pale line on the mesopleural suture lacking in *I. nigradorsum*.
- *machadoi* male has a dorsal tooth on its paraprocts lacking in male *I. nigradorsum*.

Biology

The Peruvian specimens were caught in both the wet and dry season, subcanopy in primary lowland rainforest in *terra firme* or near *terra firme* in *restinga* and palm swamp habitat. No indications of reproduction were seen. As specimens of *Inpabasis* that are not (yet) reproducing

are known to spend much time in seemingly unsuited places, it is uncertain in what habitat the larvae of *I. nigradorsum* can be expected. Most likely it seems that the species reproduces in more or less stagnant waters, and subcanopy in permanently swampy areas within primary forests that experience little or no seasonal flooding from nearby rivers.

Distribution

Known from the Amazon region in Colombia (Amazonas department) and Peru (Loreto department) (Figure 1).

Diaphlebia richteri Bota-Sierra sp. nov.
Figure 4a–g (diagnostic traits ♂).

Etymology

Named *richteri* (noun in the genitive case) after the late German naturalist, entomologist and artist Leopold Richter, who was a pioneer in the study of Colombian insects during the early twentieth century, collecting a significant part of the Odonata here reported and promoting Colombian entomology.

Examined material

Holotype: ICN-MHN: 1♂: Guainía, Inirida, Comunidad La Ceiba, Quebrada La Ceja, 3°37'N, 67°53'W, 100 m above sea level, 20 March 1998, Leg: J. Lynch.

Description

Probably the specimen was not treated with acetone after collection. The pale coloration is in poor condition: it looks like greenish yellow, and dark coloration is dark brown, so we only refer to pale or dark colors.

Holotype. Head. Dark with labium, base of mandibles, gena, anteclypeus, a horizontal stripe on dorsal part of postclypeus continuous with ventral stripe on antefrons, symmetrical spots on each side of labrum and dorsum of antefrons, a triangular spot between the projections of postocellar ridge, mid of occipital foramen, and ventral half on rear of head pale (Figure 4a, b).

Thorax. Prothorax dark, median lobe with a pale spot on middle and two symmetric pale spots on each side, posterior lobe convex, widest at base. Pterothoracic dorsum brown, anterior margin, median carina, and two antehumeral connected stripes on each side pale. Thorax pale in lateral view with exception of dark humeral stripe, dark stripe between mesepimeron and mesepisternum and dark stripe surrounding metepimeron except on its posterior edge (Figure 4b). Dark legs except pale coxae and flexor surface on femora. Wings with brown reticulation, lacking basal subcostal crossveins; 4–5 crossveins in HW space between arculus branches and point of branching of RP; subtriangles free, supratrangles crossed; 2 cubitoanal crossveins in FW and HW; CuA and MP in HW divergent, 18–19 antenodal crossveins in FW, 13–14 antenodal crossveins in HW, 12 postnodal crossveins in FW, 12–13 postnodal crossveins in HW. Pterostigma ocher, surmounting 4–5 cells.

Abdomen. Pale on venter, dark on dorsum except S1 completely pale, S2 pale with mid-dorsal triangular spot on posterior half, two dark stripes, one before and one after the auricle crossing the segment; S4–6 with posteroventral $\frac{3}{4}$ dark, S7 apical third pale with mid-dorsal dark stripe,

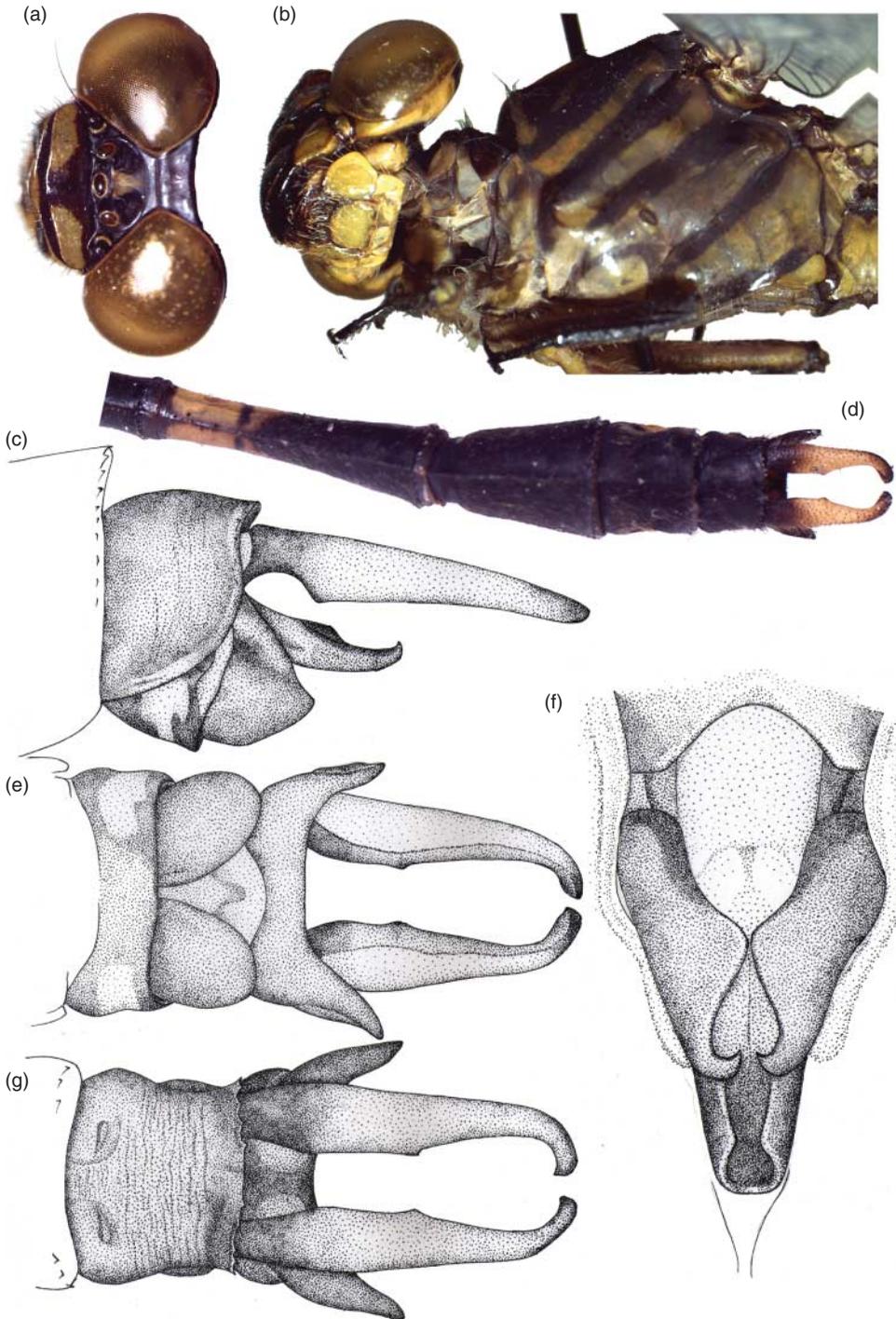


Figure 4. *Diaphlebia richteri* (Holotype ♂): (a) head (dorsal view); (b) head and thorax (lateral view); (c) S10 and caudal appendages (lateral view); (d) S7–S10 and caudal appendages (dorsal view); (e) S10 and caudal appendages (ventral view); (f) genital fossa and hamule (ventral view); (g) S10 and caudal appendages (dorsal view). Illustrations by Natalia Uribe, photographs CAB. 169 × 249 mm (100 × 100 DPI).

S10 completely dark (Figure 4d). Auricles rounded and pale with a few very minute black denticles. Genital fossa and hamule dark, anterior hamule reduced, posterior hamule with distal tip curved inwards (Figure 4f). Cercus pale with proximal $\frac{1}{4}$ and apex dark, twice as long as S10, external side straight but curving inward at apex, internal side straight until half length, where a small bump is located, and then slightly curved concavely (Figure 4c, e, g); epiproct dark with two symmetrical laterodistal processes as long as S10, which have a little upcurved indentation at apex; paraprocts dark, rounded, half as long as epiproct processes (Figure 4c, e, g). Vesica spermalis is not described because it was not extracted when the specimen was collected, and the posterior hamules are strongly covering it. These important structures could be damaged during extraction of the vesica spermalis, resulting in an invaluable loss, as this is the only known specimen of the species.

Dimensions. Total length 60 mm. Abdomen length 42 mm (without caudal appendages). FW length 36 mm. HW length 35 mm.

Diagnosis

Based on descriptions, diagnosis and illustrations provided by Calvert (1903), Belle (1977) and Garrison, von Ellenrieder, and Louton (2006) for the other species known in the genus, *Diaphlebia angustipennis* Selys, 1854, and *Diaphlebia nexans* Calvert, 1903, *D. richteri* differs in these characters: large epiproct, as long as S10 (shorter than $\frac{3}{4}$ of S10 in the other species); internal side of cercus with a small bump at midlength (no bump in the other species); posterior hamules curved inward at their tip (straight in *D. angustipennis*, not described or illustrated for *D. nexans*); pale anterior band on superior surface of frons widely interrupted in middle (shared with *D. angustipennis*, complete in *D. nexans*).

Biology

The only known specimen was collected at a forested stream.

Distribution.

Only known from one locality in Guainía Department.

Literature sources

The major source used to build this preliminary checklist was Pérez-Gutiérrez & Palacino-Rodríguez (2011). In that list, 46 species were recorded for the Colombian Amazon. The following species were excluded from the list due to the inconsistencies explained below:

- *Cora inca* Selys, 1873, and *Euthore fassli* Ris, 1914, were recorded by Bick and Bick (1990, 1992) from Leticia, based on two specimens deposited in the Rosser Garrison Collection with the following label: Loreto, Leticia, Leg: C. Farrell. This is suspicious, because in Colombia both are Andean forest stream dwellers in the Cordillera Central and Cordillera Occidental. According to Garrison these specimens are correctly identified, so the problem must be the locality: “Chris Farrell is (or was??) an insect dealer and these specimens came to me years ago. I am sure that the data are incorrect as Leticia is – or was – a catch-all for specimens labeled Colombia that were collected elsewhere” (Rosser Garrison personal communication, 24 February 2014).

- *Euthore fasciata fastigiata* (Selys, 1859) was recorded for Amazonas Department in the Colombian checklist erroneously based on Ris (1918) and Bick and Bick (1992), who stated this species is present in Cundinamarca and Meta departments in the Cordillera Oriental.
- *Perissolestes magdalenae* (Williamson & Williamson, 1924) was recorded for Amazonas Department in the Colombian checklist erroneously based on Garrison, von Ellenrieder, and O'Brien (2003), who mentioned this species is from La Cristalina, a locality surveyed by the Williamson cousins in 1917, located in the Magdalena river valley at Puerto Berrio (Antioquia, Department) (Williamson, 1918; Williamson & Williamson, 1924). Also the ICN electronic database has this species registered from Puerto Santander (Amazonas Department). These specimens were re-examined, and our conclusion is they are *Perissolestes cornutus* (Selys, 1886), which is consistent with the known distribution of *P. magdalenae*, from interandean valleys of the Magdalena and Cauca rivers to Mexico (Esquivel, 2006; Williamson & Williamson, 1924).
- *Palaemnema croceicauda* Calvert, 1931, is recorded in the Colombian checklist for Putumayo Department erroneously based on Garrison et al. (2003), which mentioned this species from La Cristalina. As explained for *P. magdalenae*, this locality is located in the Magdalena river valley.
- *Teinopodagrion macropus* (Selys, 1862) is recorded in the Colombian checklist for Caquetá Department erroneously based on De Marmels (2001), who only gives Villavicencio (Meta Department) as a locality for this species in Colombia.
- *Teinopodagrion temporale* (Selys, 1862) is recorded in the Colombian checklist for Caquetá Department erroneously based on Navás (1935), who only gives Choachí (Cundinamarca Department) as a locality for this species.
- *Erythrodiplax abjecta* (Rambur, 1842) is recorded for Amazonas Department. Borrer (1942) recorded this species from the Colombian Andes north to Mexico. According to Paulson (2003), this is a highland Andean inhabitant, not an Amazonian resident.
- *Erythrodiplax connata* (Burmeister, 1839) is recorded from Caquetá Department, Borrer (1942) recorded subspecies *E. connata connata*, and *E. connata fusca* from Amazon region, both elevated to species by Paulson (2003), who also limited *E. connata* distribution to Chile, so this species should be excluded from the Colombian checklist.
- *Erythrodiplax fervida* (Erichson, 1848) is recorded from Caquetá Department. This species is distributed along Central America, the Antilles, and the Caribbean regions of South America, and was not recorded from Amazon region before (Borrer, 1942; Esquivel, 2006).

Four references were not included in the Pérez-Gutiérrez and Palacino-Rodríguez (2011) Colombian checklist. Borrer (1931) revised the genus *Oligoclada* and listed three species (*O. monosticha*, *O. pachystigma*, and *O. walkeri*) from Leticia (then a Peruvian locality). Fraser (1946a, 1946b) listed Amazon Odonata in the Leeds Museum, recording 23 species in Putumayo Department, of which one third of the species have been synonymized (Table 3). Finally, von

Table 3. List of synonymies by Fraser (1946a, 1946b).

Fraser's records	Synonymized as
<i>Mnesarete hincksi</i>	<i>Mnesarete metallica</i>
<i>Acanthagrion gracile floridense</i>	<i>Acanthagrion floridense</i>
<i>Acanthagrion apicale luna</i>	<i>Acanthagrion obsoletum</i>
<i>Heliocharis libera</i>	<i>Heliocharis amazona</i>
<i>Argia trifoliata</i>	<i>Argia variegata</i>
<i>Argia umbriaca</i>	<i>Argia indicatrix</i>
<i>Erythrodiplax connata fusca</i>	<i>Erythrodiplax fusca</i>
<i>Zenithoptera americana</i>	<i>Zenithoptera fasciata</i>

Ellenrieder (2008) revised the genus *Phoenicagrion* and recorded the species *P. flammeum* in Caquetá department.

Acknowledgments

We wish to thank the people of Fundación Omacha in Puerto Nariño for financial support, and especially to Carlitos Ferrer and Rodolfo Macedo for their help and guidance in the forest and lakes during CMA's visit. Our thanks to Alejandra Clavijo, Yenny Correa, Rodrigo Gallego, Lina Urrea, Alejandro Campuzano, Sergio Bota, Tiberio Bota, Juliana Cardona, Carolina Velez, and all the people who collected dragonflies in the Colombian Amazon. Our gratitude also to Natalia Uribe for the illustrations, to Jerrell Daigle for his help with the English syntax and comments in the manuscript, to Ana Palacio and Camilo Flórez for the critical reading of the manuscript, to Natalia von Ellenrieder and Rosser Garrison for advice and sharing literature, to CBUCES (Juliana Cardona and Wendy Valencia), CEUA (Martha Wolff and Andrés Vélez), ICN-MHN (Fernando Fernández, don Carlos and Margarita López) for all the support during the revision of the respective museums and to MUSM (Dra. Diana Silva Dávila) for sending important specimens on loan. Collection of the Peruvian *Inpabasis* specimens was financially supported by the Uyttenboogaart-Eliassen Foundation (the Netherlands; SUB.2014.12.21) and also made possible by the support of the Peruvian government (research permits 164-2009-AG-DGFFS-DGEFFS and 0010-2015-SERFOR-DGGSPFFS), the support of Dr. Paul Beaver of Amazonia Expeditions and the support of Dra. Ana Huamantínco Araujo of the UNMSM in Lima.

References

- Albert, J., Petry, P., & Reis, R.E. (2011). Major biogeographic and phylogenetic patterns. In J. Albert & Reis, R. E. (Eds.). *Historical Biogeography of Neotropical Freshwater Fishes* (pp. 21–57). California: University of California Press.
- Albert, J., & Reis, R. E. (2011). Historical biogeography of Neotropical freshwater fishes. In: J. Albert & Reis, R. E. (Eds.). *Introduction to Neotropical Freshwater* (pp. 3–19). California: University of California Press.
- Belle, J. (1977). Revisional notes on *Diaphlebia* Selys, 1854 (Anisoptera: Gomphidae). *Odonatologica*, 6, 111–117.
- Bick, G. H., & Bick, J. C. (1990). A revision of the Neotropical genus *Cora* Selys 1853 (Zygoptera: Polythoridae). *Odonatologica*, 19, 117–143.
- Bick G. H., & Bick J. C. (1992). A study of family Polythoridae, with details on the genus *Euthore* Selys, 1869 (Zygoptera). *Odonatologica*, 21, 275–288.
- Borror, D. J. (1931). The genus *Oligoclada* (Odonata). *Miscellaneous Publications of the Museum of Zoology, University of Michigan*, 23, 1–42. Retrieved from <http://deepblue.lib.umich.edu/bitstream/handle/2027.42/56267/MP022.pdf>
- Borror, D. J. (1942). A revision of the Libelluline genus *Erythrodiplax* (Odonata). Ohio State University: Columbus. Retrieved from <http://babel.hathitrust.org/cgi/pt?id=mdp.39015069710781;view=1up;seq=17>
- Bota-Sierra, C. A. (2012). Rediscovery of *Proneura prolongata* (Zygoptera: Protoneuridae) and other new Odonata records from Colombian Amazon. *Agrion*, 16, 1–8. Retrieved from http://worlddragonfly.org/wp-content/uploads/2013/11/Agrion_16_2_July2012_lq.pdf
- Bota-Sierra, C. A. (2014a). A brief look at the Odonata from the Páramo ecosystems in Colombia, with the descriptions of *Oxyallagma colombianum* sp. nov. and *Rhionaeschna caligo* sp. nov. (Odonata: Coenagrionidae, Aeshnidae, Libellulidae). *Zootaxa*, 3856, 192–210. doi:10.11646/zootaxa.3856.2.2
- Bota-Sierra, C. A. (2014b). Nine new records of Odonata for Colombia from the Orinoco Basin (Lestidae, Calopterygidae, Heteragrionidae, Coenagrionidae, Libellulidae). *Notulae Odonatologica*, 8(4), 97–100. Retrieved from <http://www.odonatologica.com/wp-content/uploads/2015/05/Bota-Sierra-small.pdf>
- Bota-Sierra, C. A., & Wolff, M. (2013). Taxonomic revision of *Mesamphiagrion* Kennedy, 1920 from Colombia (Odonata: Coenagrionidae), with the description of four new species. *Zootaxa*, 3718, 401–440. doi:10.11646/zootaxa.3718.5.1
- Calvert, P. P. (1903). On some American Gomphinae. *Entomological News*, 14, 183–192. Retrieved from <http://www.biodiversityheritagelibrary.org/page/4614808#page/213/mode/1up>
- De Marmels, J. (2001). *Revision of Megapodagrion Selys, 1886 (Insecta, Odonata: Megapodagrionidae)* (Unpublished doctoral dissertation). Universität Zürich, Zurich.
- Esquivel, C. (2006). *Libélulas de Mesoamérica y el Caribe*. Instituto Nacional de Biodiversidad, INBio: Santo Domingo de Heredia.
- Fraser, F. C. (1946a). Notes on Amazonian Odonata in the Leeds Museum. *Transactions of the Royal Entomological Society of London*, 96, 11–46. doi:10.1111/j.1365-2311.1946.tb00441.x
- Fraser, F. C. (1946b). Notes on Amazonian Odonata in the Leeds Museum. *Transactions of the Royal Entomological Society of London*, 97, 443–472. doi:10.1111/j.1365-2311.1946.tb00272.x
- Galvis, G., Mojica, J. I., Duque, S. R., Castellanos, C., Sánchez-Duarte, P., Arce, M., Gutiérrez, A., Jiménez, L. F., Santos, M., Vejarano-Rivadenerira, S., Arbelaez, F., Prieto, E., & Leiva, M. (2006). *Peces del Medio Amazonas: Región de Leticia*. Editorial Panamericana: Colombia.
- Garrison, R. W. (2004). An analysis of the *Psaironeura tenuissima* complex, including synonymy of *P. machadoi* De Marmels with *P. bifurcata* Sjöstedt (Odonata: Protoneuridae). *Odonatologica*, 33, 83–89. Retrieved from [http://www.researchgate.net/publication/262449787_An_analysis_of_the_Psaironeura_tenuissima_complex_including_synonymy_of_P_machadoi_De_Marmels_with_P_bifurcata_Sjstedt_\(Odonata_Protoneuridae\)](http://www.researchgate.net/publication/262449787_An_analysis_of_the_Psaironeura_tenuissima_complex_including_synonymy_of_P_machadoi_De_Marmels_with_P_bifurcata_Sjstedt_(Odonata_Protoneuridae))

- Garrison, R. W. (2009). A synopsis of the genus *Telebasis* (Odonata: Coenagrionidae). *International Journal of Odonatology*, 12, 1–121. doi:10.1080/13887890.2009.9748331
- Garrison, R. W., von Ellenrieder, N., & Louton, J. A. (2006). *Dragonfly genera of the New World: An illustrated and annotated key to the Anisoptera*. The Johns Hopkins University Press: Baltimore.
- Garrison, R. W., von Ellenrieder, N., & Louton, J. A. (2010). *Damselfly genera of the New World: An Illustrated and Annotated Key to the Zygoptera*. The Johns Hopkins University Press: Baltimore.
- Garrison, R. W., von Ellenrieder, N., & O'Brien, M. F. (2003). An annotated list of the name-bearing types of species-group names in Odonata preserved in the University of Michigan Museum of Zoology. *Occasional Papers of the Museum of Zoology, University of Michigan*, 736, 1–73. Retrieved from <http://deepblue.lib.umich.edu/bitstream/handle/2027.42/57172/OP736.pdf?sequence=1&isAllowed=y>
- Gloyd, L. K. (1939). Two new species of *Protonевра* from South America (Odonata). *Occasional Papers of the Museum of Zoology, University of Michigan*, 415, 1–17. Retrieved from <http://deepblue.lib.umich.edu/bitstream/handle/2027.42/56847/OP408.pdf?sequence=1&isAllowed=y>
- Heckman, C. W. (2006). *Encyclopedia of South American aquatic insects: Odonata – Anisoptera: Illustrated keys to known families, genera, and species in South America*. Springer: Dordrecht.
- Heckman, C. W. (2008). *Encyclopedia of South American aquatic insects: Odonata – Zygoptera: Illustrated keys to known families, genera, and species in South America*. Springer: Dordrecht.
- Haber, W. (2011). Odonata of Ecuador, list of recorded species. Retrieved from http://efg.cs.umb.edu/~whaber/Odonata_of_Ecuador/Species%20list1.html
- Hoffmann, J. (2009). Summary catalogue of the Odonata of Peru. Kommentiertes Faksimile des Manuscripts von J. COWLEY, Cambridge, 20.05.1933 und aktuelle Liste der Odonaten Perus mit Fundortangaben sowie Historie zu Sammlern und Odonatologen in Peru. *International Dragonfly Fund Report*, 16, 1–117. Retrieved from http://www.dragonflyfund.org/images/reports/IDF_Report_16_Hoffmann_Cowley_2009_small.pdf
- Jarvis, A., Reuter, H. I., Nelson, A., & Guevara, E. (2008). *Hole-filled seamless SRTM data V4*. [Data set]. Retrieved February 25, 2014 from <http://srtm.csi.cgiar.org>.
- Junk, W. J. (2001). Sustainable use of the Amazon River floodplain: problems and possibilities. *Aquatic Ecosystem Health and Management*, 4, 225–233. doi:10.1080/146349801753509122
- Junk, W. J. (2005). Flood pulsing and the linkage between terrestrial, aquatic, and wetland systems. *Verhandlungen der Internationale Vereinigung für Theoretische und Angewandte Limnologie*, 29, 11–38. Retrieved from <http://hdl.handle.net/11858/00-001M-0000-000F-D9E6-3>
- Luizão, F. J., & Schubart, H. O. R. (1987). Litter production and decomposition in a terra-firme forest of Central Amazonia. *Experientia*, 43, 259–265.
- Machado, A. B. M. (2009). *Denticulobasis* and *Tuberculobasis*, new genera close to *Leptobasis*, with description of ten new species (Odonata: Coenagrionidae). *Zootaxa*, 2108, 1–36. Retrieved from <http://www.mapress.com/zootaxa/2009/f/z02108p036f.pdf>
- Montgomery, B. E. (1940). A revision of the genus *Diastatops* (Libellulidae, Odonata) and a study of the leg characteristics of related genera. *Lloydia*, 3, 213–280. Retrieved from <http://lib.dr.iastate.edu/cgi/viewcontent.cgi?article=14726&context=rtd>
- Myster, R. W. (2009). Plant communities of Western Amazonia. *The Botanical Review*, 75, 271–291. doi:10.1007/s12229-009-9032-1
- Navás, L. (1935). Odonatos de Colombia. *Boletín de la Sociedad Entomológica de España*, 17(1–3), 33–38.
- Palacino-Rodríguez, F. (2009). Dragonflies (Odonata: Anisoptera) of the collection of the Instituto de Ciencias Naturales, Universidad Nacional de Colombia. *Boletín del Museo de Entomología de la Universidad del Valle*, 10(1), 37–41. Retrieved from <http://entomologia.univalle.edu.co/boletin/5Palacino.pdf>
- Palacino-Rodríguez, F. (2013). Five new records of dragonflies (Odonata: Anisoptera) from Putumayo department (Colombia). *Boletín del Museo de Entomología de la Universidad del Valle*, 14(2), 16–21. Retrieved from <http://entomologia.univalle.edu.co/boletin/4Palacino.pdf>
- Palacio, G. (2007). Amazonia: complejidad, imaginarios y opciones de futuro. In Nieto, V., & Palacio, G. (Eds.). *Amazonia desde dentro* (pp. 11–22). Bogotá: Editora Guadalupe.
- Parolin, P., & Junk, W. J. (2002). Germination in white- and black-water floodplains of Amazonia. In Lieberei, R., Bianchi, H., Boehm, V., & Reisdorff, C. (Eds.), *Neotropical ecosystems: Proceedings of the German-Brazilian Workshop* (pp. 613–617). GKSS: Geesthacht.
- Paulson, D. (2003). Comments on the *Erythrodiplax connata* (Burmeister, 1839) group, with the elevation of *E. fusca* (Rambur, 1842), *E. minuscula* (Rambur, 1842), and *E. basifusca* (Calvert, 1895) to full species (Anisoptera: Libellulidae). *Bulletin of American Odonatology*, 6, 101–110. Retrieved from https://www.academia.edu/11636524/Comments_on_the_Erythrodiplax_connata_Burmeister_1839_group_with_the_elevation_of_E_fusca_Rambur_1842_E_minuscula_Rambur_1842_and_E_basifusca_Calvert_1895_to_full_species_Anisoptera_Libellulidae
- Pérez-Gutiérrez, L. A., & Palacino-Rodríguez, F. (2011). Updated checklist of the Odonata known from Colombia. *Odonatologica*, 40, 203–225. Retrieved from <http://wikifoundryattachments.com/giVK8vQ1lg5vEmrdpNt9ig312925>
- Pineda, R. (2010). Amazonia: entre una historia estructural y una historia virtual. In: M. A. Tobón & S. R. Duque (Eds.), *Imani Mundo IV: Remando a varias manos* (pp. 25–38.). Leticia: Impresol Ediciones.
- Rache, L., Acero, A., Alfonso, S., & Rincón, J. D. (2013). Primer registro de los géneros *Diaphlebia* Selys, 1854, *Argyrothemis* Ris 1909 y *Fylgia* Kirby 1889 para Colombia (Odonata: Gomphidae, Libellulidae). *Entomotropica*, 28, 95–97. Retrieved from <http://www.entomotropica.org/index.php/entomotropica/article/viewFile/395/440>

- Renó, V. F., & Novo, E. M. (2011). Utilização de imagens ALOS/PALSAR para o mapeamento das áreas periodicamente inundadas do Baixo Amazonas e sua relação com o grau de antropização das várzeas. *Anais XV Simposio Brasileiro de Sensoriamento Remoto – SBSR, 1*, 5426–5432. Retrieved from <http://www.dsr.inpe.br/sbsr2011/files/p1051.pdf>
- Ricaurte, L. L. F. (2000). *Los humedales de la Amazonia colombiana: Conocimiento para su conservación*. Bogotá: Produmedios.
- Richey, J. E., & Góes, M. N. (1987). Element cycling in the Amazon basin: A riverine perspective. In R. E. Dickinson (Ed.), *The geophysiology of Amazonia* (pp. 91–101). New York: Wiley.
- Riek, E. J., & Kukalová-Peck, J. (1984). A new interpretation of dragonfly wing venation based upon Early Upper Carboniferous fossils from Argentina (Insecta: Odonatoidea) and basic character states in pterygote wings. *Canadian Journal of Zoology*, *62*, 1150–1166. <http://dx.doi.org/10.1139/z84-166>
- Ris, F. (1918). Libellen (Odonata) aus der Region der amerikanischen Kordilleren von Costarica bis Catamarca. *Archiv für Naturgeschichte, A(9)*, 1–197. Retrieved from <http://biostor.org/reference/66155>
- Rojas-Riaño, N. C. (2011). *Sistemática del género Polythore Calvert, 1917 (Odonata: Polythoridae)* (Unpublished master's thesis). Universidad Nacional de Colombia, Bogotá.
- Ruiz, S. L., & Valencia, M. (2007). Contextualización del sur de la Amazonia colombiana. In Ruiz, S. L., Sánchez, E., Tabares, E., Prieto, A., Arias, J. C., Gómez, R., Castellanos, D., García, P., & Rodríguez, L. (Eds.), *Diversidad Biológica y Cultural Del Sur De La Amazonia Colombiana – Diagnóstico* (pp. 31–34). Bogotá: Ramos López Editorial Fotomecánica.
- Santos, N. D. (1961). *Inpabasis* g.n. e três espécies novas (Coenagriidae: Odonata). *Boletim do Museu Paraense Emílio Goeldi (Nova série) Zoologia*, *34*, 1–7.
- Tennessen, K. (2009). *Aeolagrion philipi* sp. nov. from Bolivia, and a review of the genus *Aeolagrion* (Odonata: Coenagrionidae). *International Journal of Odonatology*, *12*, 309–322. doi:10.1080/13887890.2009.9748347
- Thieme, M., Lehner, B., Abell, R., Hamilton, S. K., Kellendorfer, J., Powell, G., & Riveros, J. C. (2007). Freshwater conservation planning in data-poor areas: An example from a remote Amazonian basin (Madre de Dios River, Peru and Bolivia). *Biological Conservation*, *135*, 484–501. doi:10.1016/j.biocon.2006.10.054
- Turić, N., Merdić, E., Hackenberger, B. K., Jeličić, Ž., Vignjević, G., & Csabai, Z. (2012). Structure of aquatic assemblages of Coleoptera and Heteroptera in relation to habitat type and flood dynamic structure. *Aquatic Insects*, *34*, 189–205. doi:10.1080/01650424.2012.643059
- von Ellenrieder, N. (2008). *Phoenicagrion* gen. nov. for *Leptagrion flammeum*, with description of a new species, *P. paulsoni*, from Peru (Odonata: Coenagrionidae). *International Journal of Odonatology*, *11*, 81–93. doi:10.1080/13887890.2008.9748314
- von Ellenrieder, N. (2009). IUCN red list: *Diastatops pullata*. Retrieved from <http://www.iucnredlist.org>
- von Ellenrieder, N. (2013). A revision of *Metaleptobasis* Calvert (Odonata: Coenagrionidae) with seven synonymies and the description of eighteen new species from South America. *Zootaxa*, *3738*, 1–155. doi:10.11646/zootaxa.3738.1.1
- von Ellenrieder, N., & Garrison, R. W. (2008). *Drepanoneura* gen. nov. for *Epipleoneura letitia* and *Protoneura peruviansis*, with descriptions of eight new Protoneuridae from South America (Odonata: Protoneuridae). *Zootaxa*, *1842*, 1–34. Retrieved from <http://www.mapress.com/zootaxa/list/2008/zt01842.html>
- von Ellenrieder, N., & Garrison, R. W. (2011). Odonata from Tiputini, Orellana Province, Ecuador. *Agrion*, *15*, 40–46. Retrieved from http://worlddragonfly.org/wp-content/uploads/2013/11/Agrion_15_2_July2011_lq.pdf
- Ward, J. V., Tockner, K., & Schiemer, F. (1999). Biodiversity of floodplain river ecosystems: Ecotones and connectivity. *Regulated Rivers: Research & Management*, *15*, 125–139. doi:10.1002/(SICI)1099-1646(199901/06)15:1/3 < 125::AID-RRR523 > 3.0.CO;2-E
- Williamson, E. B. (1918). A collecting trip to Colombia, South America. *Miscellaneous Publications of the Museum of Zoology, University of Michigan*, *3*, 1–24. Retrieved from <http://deepblue.lib.umich.edu/bitstream/handle/2027.42/56248/MP003.pdf?sequence=1>
- Williamson, E. B., & Williamson, J. H. (1924). The genus *Perilestes* (Odonata). *Miscellaneous Publications of the Museum of Zoology, University of Michigan*, *14*, 1–38. Retrieved from <http://deepblue.lib.umich.edu/bitstream/handle/2027.42/56259/MP014.pdf?sequence=1&isAllowed=y>