




Philogenia realpei sp. nov. (Zygoptera: Philogeniidae), a new damselfly species from Colombia

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Research Article

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All relevant data are within the paper.

Abstract. A new damselfly species, *Philogenia realpei* sp. nov., is described here from 5 ♂♂, 2 ♀♀ collected at Cauca and Putumayo departments in southern Colombia. This species is included in the *P. helena* group and can be differentiated from other species by the unique morphology of its paraprocts. We also provide a distribution map and a taxonomic key for the males of this group.

<https://zoobank.org/References/7bb67e99-4101-4ce7-8a38-818c5b95373b>

Key words. Odonata, dragonfly, Andean mountain range, Cauca, Eastern Cordillera, Putumayo

Resumen. Se describe aquí una nueva especie de libélula, *Philogenia realpei* sp. nov., a partir de 5 ♂♂ y 2 ♀♀ recolectados en los departamentos de Cauca y Putumayo, al sur de Colombia. Esta especie se incluye en el grupo de *P. helena* y se puede diferenciar por la morfología de sus paraproctos. Se brinda además un mapa de distribución y una clave taxonómica para la identificación de los machos de este grupo.

Palabras clave. Odonata, libélula, Cauca, Cordillera de los Andes, Cordillera Oriental, Putumayo

Introduction

The Neotropical genus *Philogenia* Selys, 1862 includes 38 species (Paulson et al., 2023) distributed from Honduras to Bolivia, but it is richest in the northern Andes (Garrison et al., 2010). Most of the species have patchy distributions and inhabit preserved forest where they breed in small streams and hillside seepages (Bota-Sierra et al., 2019; Calvert, 1924; Garrison et al., 2010). In the last revision of this genus, Bick & Bick (1988) proposed six species groups based only on male terminalia morphology; no characteristics from the females were included in this group division given that females of many species are still undescribed.

Here we describe a new *Philogenia* species from the Eastern Cordillera in the Colombian Andes. This species is diagnosed as part of the *P. helena* group, that currently includes ten species distributed from Costa Rica to northern Peru (Table 1, Fig. 1). Both sexes of *P. realpei* sp. nov. are described here. We provide pictures of the morphological characters with diagnostic value, a distribution map, and an updated key for the males of the *P. helena* group.

Materials and methods

We examined specimens deposited at the Entomological Collection of the C. J. Marinkelle Natural History Museum of Universidad de los Andes (ANDES-E, Bogotá, Colombia), the Entomological collection of the Universidad de Antioquia (CEUA, Medellin, Colombia), and the Odonata Collection (SAIA) of the Museum of Biological Collections of Universidad del Atlántico (UARC, Barranquilla, Colombia).

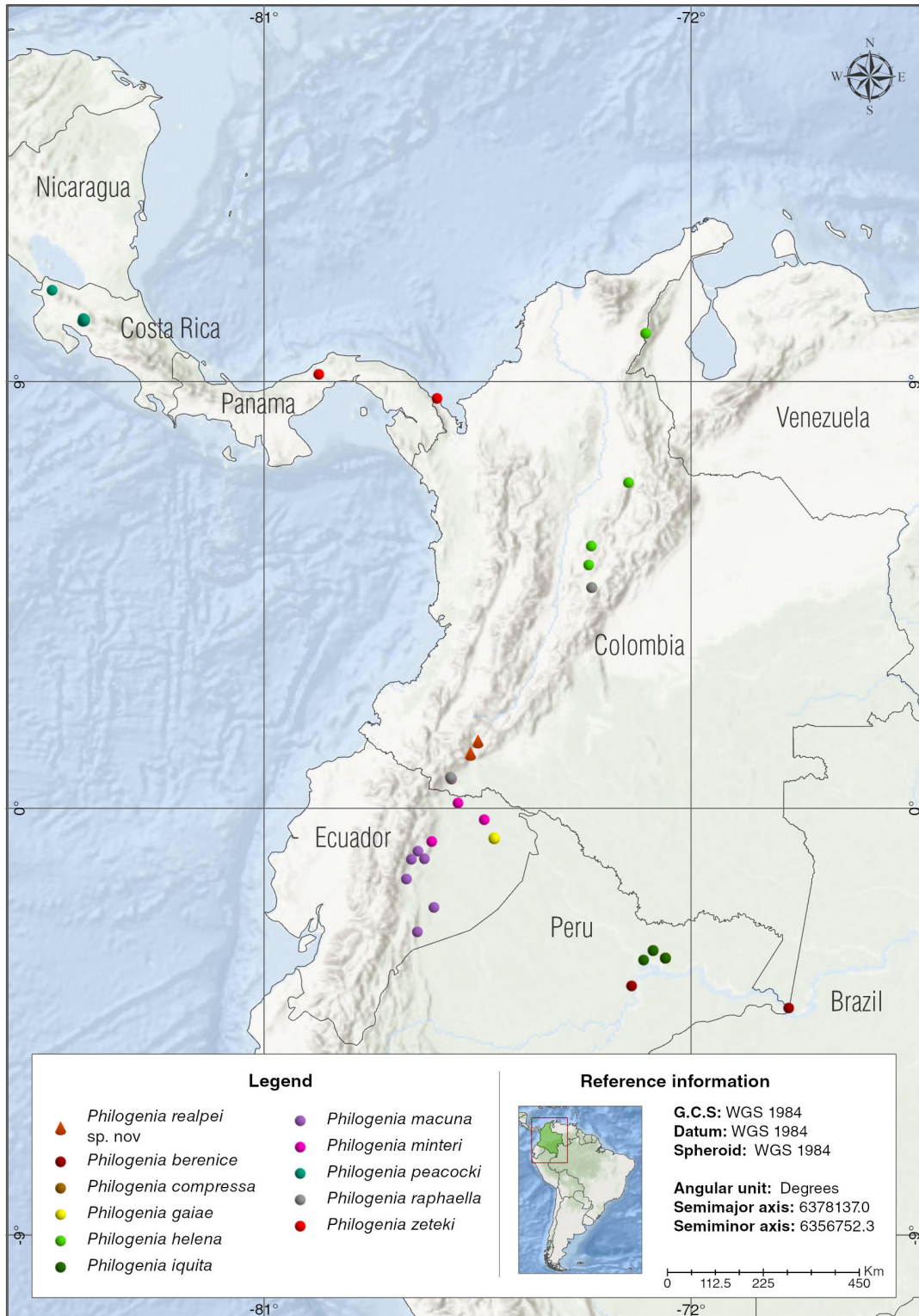


Figure 1. Distribution map of the species within the *P. helena* group.

Table 1. Species in the *P. helena* group, countries of distribution, IUCN status, female description, and main characteristics of males used to make the taxonomic key here presented.

Species in the <i>P. helena</i> group	Distribution	IUCN	Described female	Length of para-procts compared to cerci	Length of cerci compared to S10	Preapical process directed dorsal on paraprocts
<i>Philogenia berenice</i>	Peru and Colombia	DD	No	$\frac{3}{4}$	2	No
<i>Philogenia compressa</i>	Peru	DD	Yes	$\frac{1}{2}$	1.25	No
<i>Philogenia gaiaea</i>	Ecuador	NE	Yes	$\frac{3}{4}$	2	Yes
<i>Philogenia helena</i>	Colombia and Venezuela	NT	No	$\frac{2}{3}$	2	No
<i>Philogenia iquita</i>	Peru	DD	Yes	$\frac{3}{4}$	1.25	Yes
<i>Philogenia macuma</i>	Ecuador	LC	Yes	$\frac{3}{4}$	1.25	No
<i>Philogenia minteri</i>	Colombia and Ecuador	LC	Yes	1	1.25	Yes
<i>Philogenia peacocki</i>	Costa Rica	LC	No	$\frac{2}{3}$	1.25	No
<i>Philogenia raphaella</i>	Colombia	DD	No	$\frac{1}{2}$	2	No
<i>Philogenia zeteki</i>	Colombia and Panama	LC	No	$\frac{1}{2}$	2	No
<i>Philogenia realpei</i> sp. nov.	Colombia	NE	Yes	1	2	Yes

The map shows distribution records from collections and literature sources (Bick & Bick, 1988; Bota-Sierra et al., 2015, 2018; Bota-Sierra, 2017; Brooks, 1989; Dunkle, 1990a, 1990b; Garrison & von Ellenrieder, 2013; Vilela et al., 2019; von Ellenrieder & Garrison, 2011) and was produced with ArcGis Pro 3.1.1.

The diagnosis of the new species was based on the drawings and descriptions in Bick & Bick (1988), Calvert (1924), and Vilela et al. (2019). For the descriptions, measurements were taken using graph paper and a stereoscope grid. Total length and abdominal length do not include appendages. Laboratory photographs were taken with a Leica stereomicroscope EZ4 HD, processed with LAS V4.13, and stacked with Zerene Stacker 1.04. The following abbreviations were used: Fw: forewing; Hw: hind wing; pt: pterostigma; Px: postnodal cross veins; S1–10: abdominal segments 1 to 10. Terminology for the morphology follows Garrison et al. (2010).

Results

Philogenia realpei sp. nov. Cano-Cobos & Bota-Sierra

Etymology

Named *realpei* (genitive noun) after Dr. Emilio Realpe, a passionate and kind teacher, curator of the entomology collection ANDES-E, and pioneer of the studies of Odonata in Colombia, who contributed to the understanding of the diversity of its dragonflies and damselflies.

Material examined

Five males, two females

Holotype

Male, Colombia, Cauca Department, Santa Rosa Municipality, El Dorado Township, El Pato stream,

1.4122670° N, 76.491950° W, 1,130 m a.s.l., 09-09-2021, Y. Cano leg. (ANDES-E 27993). Allotype: Female, same as holotype (ANDES-E 27994).

Paratypes

Four males, one female: three males, Colombia, Putumayo Department, Mocoa Municipality, Sangoyaco Stream, 1.151389° N, 76.651111° W, 650 m a.s.l., 17-01-2010, L. Perez, J. Montes, J. Villamil leg. (SAIA_0342, 0345, 0346); one female, same data (SAIA_0335); one male, same data, but 16-01-2010 (SAIA_0331).

Male holotype

Head. Labium, labrum, base of mandibles and basal half of genae yellow, antennal socket yellow. Clypeus, frons, and upper part of head dark brown with poorly defined lighter brown area between vertex and antennae (Fig. 2b). Postocular area brown, rear of head yellow. Frons slightly rounded. Postocular lobes reaching the level of hind margin of the compound eye.

Thorax. Prothorax (Fig. 2a) brown with a dorsal band and propleuron dark brown; posterior prothoracic lobe rounded and convex. Pterothorax light brown, dark brown antehumeral and mesepimeral stripes, black metepisternal stripe. Coxae and legs yellowish, external carina, armature, apex of femur, and base of tibia brown. Spurs gradually increasing in size towards the apex of femora and towards the base of tibia except for the protibia in which the apical half bears tibial combs on the external sides. Tarsal claws with developed supplementary tooth.

Wings. Hyaline (Fig. 2a). Pt dark brown surmounting four and a half cells in Fw, four cells in left Hw and four and half cells in right Hw. Px 25 in left, 24 in right Fw, 22 in left, 21 in right Hw.

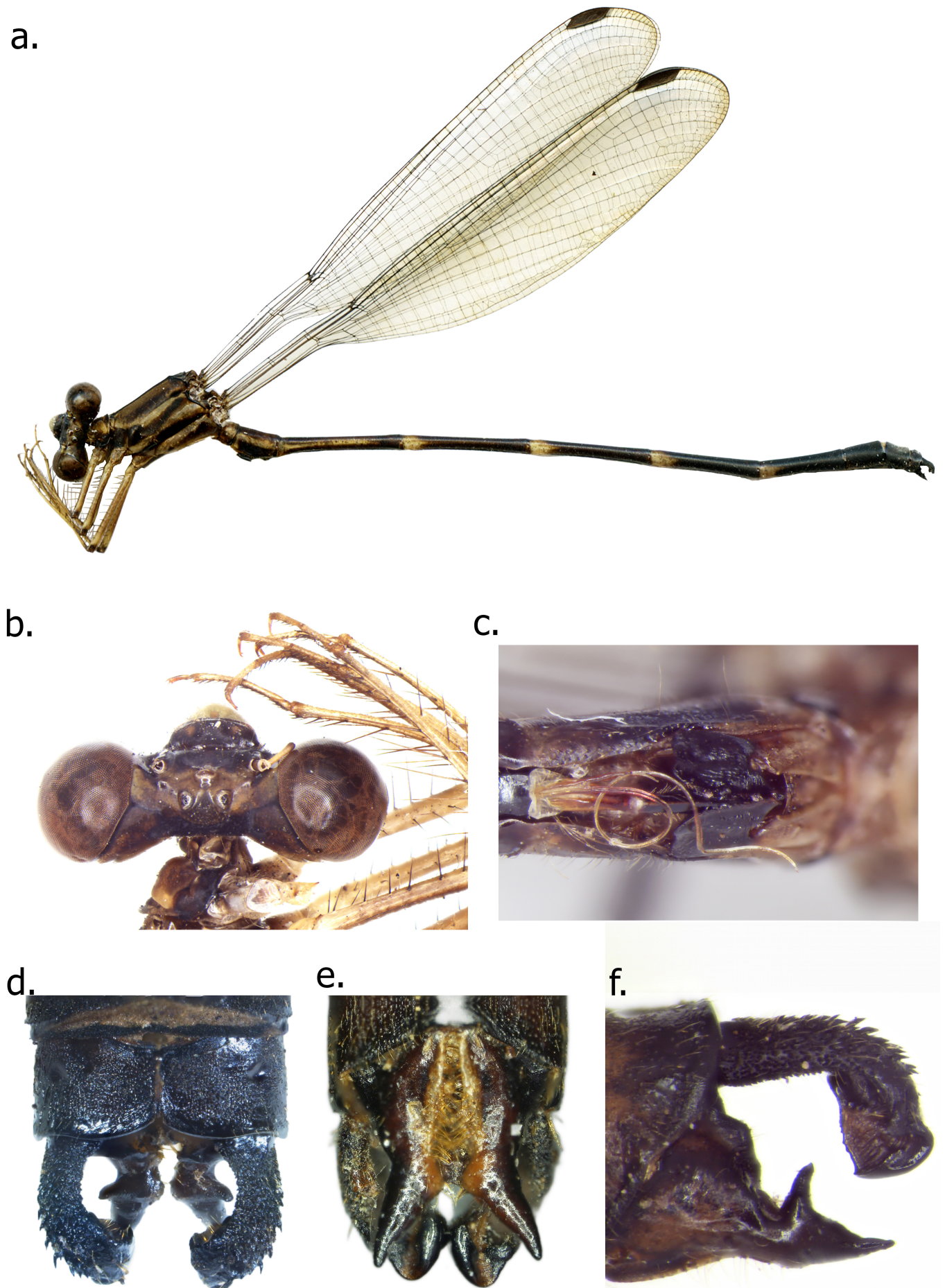


Figure 2. Male holotype: a – habitus; b – head in dorsal view; c – ligula in ventral view; d – Cerci in dorsal view; e – paraprocts in ventral view; f – cercus and paraproct in lateral view.

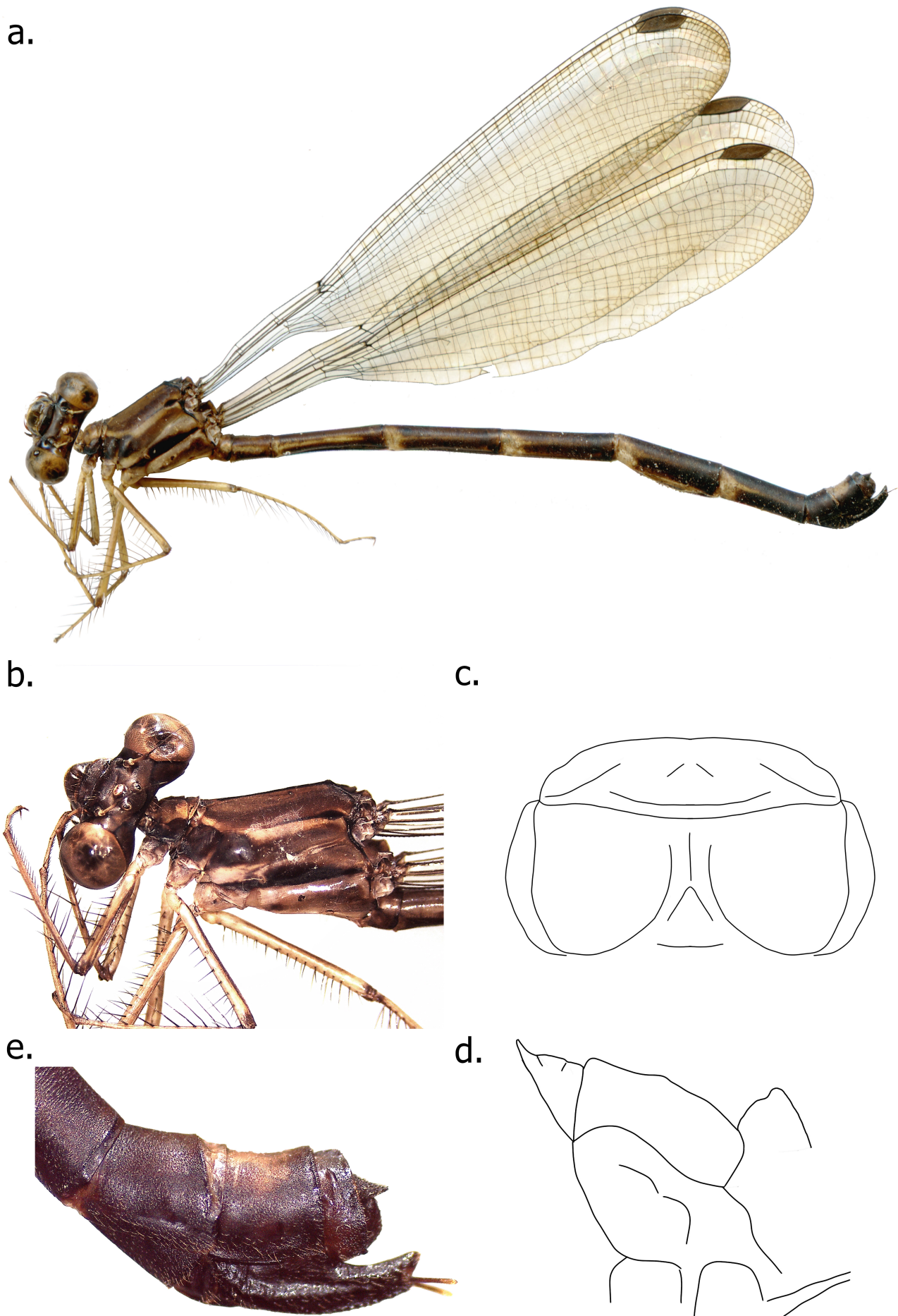


Figure 3. Female allotype: a – habitus; b – head and thorax in dorsal and lateral views. Detail of middle and hind lobes of prothorax in dorsal (c) and lateral (d) views. e – S8–10 lateral view.

Abdomen. S1–2 brown with a pale lateral stripe; S3 brown with a pale lateral stripe until 3/4. S4–6 dark brown with a yellow basal ring; S7 black with a yellow basal ring; S8 black; S9–10 black with dorsal white pruinosity (Fig. 2a). Genital ligula bifurcated in two long flagella (Fig. 2c).

Cerci in lateral view directed downwards at approximately $\frac{2}{3}$ for slightly less than the width of the appendage (Fig. 2f); in dorsal view, curved medially and of uniform width but expanding at apex, covered with strong teeth gradually increasing in size from base to apical portion (Fig. 2d). Paraprocts as long as cerci (Fig. 2e, f), with a medial sharp preapical process directed laterodorsally and with pointed tips.

Measurements (length in mm): Fw 33; Hw 34; abdomen 40; total 50.

Allotype

Similar to the holotype, except for the following:

Head. Labrum and base of mandibles dark brown (Fig. 3a, b).

Thorax. Anterior and posterior lobes of prothorax paler brown (Fig. 3b–d). Intersternite with a blunt point; setifer with tuft of hairs decreasing in size ventrally.

Wings. Pt surmounting four and a half cells in left and three and a half cells in right Fw, four and a half cells in left and five and a half cells in right Hw (Fig. 3a). Px 26 in right, 27 in left Fw, 25 in both Hw.

Abdomen. Paler without white pruinosity on S9–10 (Fig. 3a); $\frac{2}{3}$ of S9 dorsum yellow. Genital valves black (Fig. 3e); with a pointed process above the base of styli. Cerci black and conical. Paraprocts black and rounded.

Measurements (length in mm): Fw 33; Hw 34; abdomen 34; total 43.

Variation among paratypes

Males. Antehumeral stripe coppery red in all paratypes, some males with a paler yellow basal ring on S4–7. The amount of pruinosity in S9–10 varies among the specimens. The variation in coloration between the specimens is probably related to preservation methods and postmortem differences. Pt surmounting four to five cells in Fw and four to four and a half cells in Hw. Px in Fw 24–27, Px in Hw 22–25.

Measurements (length in mm): Fw 32–33; Hw 33–35; abdomen 40–44; total 50–54.

Female. Pt surmounting four and a half cells in Fw and four in left and four and a half cells in right Hw. Px 26 in left, 27 in right Fw, 24 in left, 25 in right Hw.

Measurements (length in mm): Fw 34; Hw 34; abdomen 35; total 45.

Diagnosis

This species belongs to the *Philogenia helena* group *sensu* Bick & Bick (1988) due to the meso-ventral process of cerci projecting ventrad in lateral view less than its width. Ten species have been included in this group (Fig. 1): *Philogenia berenice* Higgins, 1901, *P. compressa* Dunkle, 1990, *P. gaiae* Vilela & Cordero-Rivera, 2019, *P. helena* Hagen, 1869, *P. iquita* Dunkle, 1990, *P. macuma* Dunkle, 1986, *P. minteri* Dunkle, 1986, *P. peacocki* Brooks, 1989, *P. raphaella* Selys, 1886, and *P. zeteki* Westfall & Cumming, 1956 (Bick & Bick, 1988; Brooks, 1989; Dunkle, 1990a, 1990b; Vilela et al., 2019). *Philogenia realpei* sp. nov. can be easily differentiated from all these species by the unique morphology of its paraprocts (Fig. 2c, d) which are almost as long as the cerci, bear a sharp preapical middorsal process and directed laterodorsally, ending in a pointed tip, which is unique not only in the *P. helena* group, but also in the whole genus *Philogenia*.

Distribution

This species is known from two localities in Colombia (Fig. 1), one in the eastern part of the Cauca department, which is known as “Bota Caucana”, and another located in the department of Putumayo. Both localities are found in the western slope of the Eastern Cordillera of Colombia towards the Colombian massif. The Colombian massif divides the Andean mountain range into branches that give rise to multiple tributaries, which are the sources of the rivers that define the Colombian landscape ecologically and culturally (Guhl, 2016).

Biology

Philogenia realpei sp. nov. was found on a fast-flowing, well preserved little stream, with sand and gravel substrates surrounded by a mix of boulders and exposed bedrocks (Fig. 4). It coexisted with other damselflies of the genera *Polythore* Calvert, 1917, *Palaemnema* Selys, 1860, and *Heteragrion* Selys, 1862.

Key (modified from Bick & Bick, 1988)

1. Cercus length is 1.75 times the length of S10 or longer 2
- 1'. Cercus length is 1.5 times the length of S10 or shorter 7
2. Length of paraproct in lateral view close to $\frac{2}{3}$ of the length of cercus or less 3
- 2'. Length of paraproct in lateral view close to $\frac{3}{4}$ of the length of cercus or more 5
3. Paraproct apex divergent laterally 4
- 3'. Paraproct apex parallel *P. raphaella* (Colombia)

4. Paraproct apex with an internal rounded small process; apex of the lateroapical process of paraproct expanded *P. helena*
(Colombia and Venezuela)
- 4'. Paraproct apex without internal process; apex of the lateroapical process of paraproct pointed ...
..... *P. zeteki*
(Colombia and Panama)
5. Without preapical process on paraproct; in lateral view cercus apex slightly curved ventrad ...
..... *P. berenice*
(Peru)
- 5'. With a preapical process directed dorsad on paraproct; in lateral view cercus apex strongly curved ventrad 6
6. Preapical process long and pointed, located at midlength of paraproct; apex of paraproct pointed, almost reaching apex of cercus ...
..... *P. realpei* sp. nov.
(Colombia)
- 6'. Preapical process short and blunt, located at $\frac{3}{4}$ of the paraproct length; apex of paraproct blunt, close to $\frac{3}{4}$ of cercus length *P. gaiaie*
(Ecuador)
7. Length of the paraproct in lateral view close to $\frac{2}{3}$ of the length of cercus or less 8
- 7'. Length of paraproct in lateral view close to $\frac{3}{4}$ of the length of cercus or more 9
8. Cercus apex in lateral view slightly curved ventrad *P. compressa*
(Peru)
- 8'. Cercus apex in lateral view strongly curved ventrad *P. peacocki*
(Costa Rica)
9. Without preapical process on paraproct . *P. macuma*
(Ecuador)
- 9'. With a preapical process directed dorsad on paraproct 10
10. Preapical process on paraproct slightly protruding dorsad *P. minteri*
(Colombia and Ecuador)
- 10'. Preapical process on paraproct strongly protruding dorsad *P. iquita*
(Peru)

Conservation aspects

Philogenia realpei sp. nov. is a native species of the well-known Colombian massif that includes the departments of Huila, Cauca, Nariño, and Putumayo. This place is recognized by UNESCO as a Biosphere Reserve. The orographic convergence, the ecosystem richness, and its type of soil generate special conditions that favor water regulation and the maintenance of a high biological richness, and it is considered the most important “fluvial star” of Colombia.

From a conservation point of view, although the status of the populations of the species is unknown,



Figure 4. El Pato Stream, Santa Rosa, Cauca, Colombia. Habitat of *Philogenia realpei*. Photo by Lorenzo Comoglio.

P. realpei would be influenced by the effects of extractive activities carried out in the Colombian Massif region, such as mining, logging, and wood harvesting, directly related to the social situation and governance of the territory.

According to the climate change scenarios of the Institute of Hydrology, Meteorology and Environmental Studies (IDEAM) of Colombia, the expected effects of climate change in this region are related to a loss of precipitation of 0.2–0.3%/year and a temperature increase of 0.1–0.2°C/decade, with direct consequences on the páramos and glaciers, and the increase in desertification, thus the species that inhabit it could be considered vulnerable in the long term.

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