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

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Biota Colombiana, vol. 23, núm. 2, 2022, Julio-Diciembre, pp. 1-8
Instituto de Investigación de Recursos Biológicos "Alexander von Humboldt"
Bogotá, Colombia

DOI: https://doi.org/10.21068/2539200X.1061

Disponible en: https://www.redalyc.org/articulo.oa?id=49172322006

Artículos

New species records in *Acanthagrion, Nehalennia,* and *Perilestes* (Odonata: Zygoptera) for Colombia

Nuevos registros de especies en *Acanthagrion, Nehalennia* y *Perilestes* (Odonata: Zygoptera) para Colombia

Karen Lineke Álvarez-Álvarez, Cornelio Andrés Bota-Sierra, Jesús Manuel Vásquez-Ramos

Abstract

We record for the first time *Acanthagrion jessei*, *Nehalennia minuta,* and *Perilestes solutus* in Colombia, based on males and females taken at the campus Barcelona at the Universidad de Los Llanos, located in the foothills of the Colombian Eastern Andes in the Orinoco river basin.

Key words. Coenagrionidae. Damselfly. Meta. Orinoquia. Perilestidae.

Resumen

Registramos *Acanthagrion jessei*, *Nehalennia minuta* y *Perilestes solutus* por primera vez en Colombia, con base en machos y hembras recolectados en el campus Barcelona de la Universidad de Los Llanos, ubicado en las estribaciones de los Andes Orientales colombianos en la cuenca del río Orinoco.

Palabras clave. Caballito del diablo. Coenagrionidae. Meta. Orinoquia. Perilestidae.

Introduction

Colombia is a megadiverse country, as its forests and freshwater ecosystems create ideal conditions for the establishment of various species of fauna and flora (Rangel, 2015). Within the fauna, insects correspond to 65.3% of the diversity of invertebrates recorded in the country (Escobar *et al.*, 2020). The odonates in Colombia currently include more than 471 documented species (Álvarez-Álvarez *et al.* 2021, Stand-Pérez *et al.* 2021), and although they do not represent the highest diversity among insects, it is one of the most studied groups of insects (Bota-Sierra *et al.*, 2016).

The genus *Acanthagrion* has a Neotropical distribution, from southeastern United States to central Argentina (Garrison *et al.*, 2010), and comprises 42 species, 16 of which are known to occur in Colombia: *Acanthagrion abunae*, *A. apicale*, *A. adustum*, *A. ascendens*, *A. floridense*, *A. fluviatile, A. inexpectum*, *A. kennedii*, *A. minutum*, *A. lancea*, *A. obsoletum*, *A. trilobatum*, *A. vidua*, *A. cuyabae*, *A. williamsoni*, and *A. yungarum* (Pérez-Gutiérrez & Palacino-Rodríguez, 2011).

The genus *Nehalennia* groups six species with a wide distribution, one in Eurasia and the other five in the New World, from Canada to Brazil (Garrison *et al.*, 2010), but there are no records from Colombia in the literature. The genus *Perilestes* has a South American distribution, occurring in the tropical rainforests of Colombia, Venezuela, Guyana, Surinam, Ecuador, Peru, Bolivia, and Brazil (Garrison *et al.*, 2010). Eight species are recognized in the genus, one of them in Colombia, *Perilestes kahli* (Pérez-Gutiérrez & Palacino-Rodríguez, 2011).

Several sampling efforts have been carried out in the Colombian Orinoco basin (e. g., Bota-Sierra, 2014; Pérez-Gutiérrez & Palacino-Rodríguez, 2011), and new records keep being reported from this rich area (Álvarez-Álvarez *et al.* 2021), showing that an intensive exploration of this region is needed to assess the real number of Odonata species inhabiting this place. Here we present three new records for the region and the country in the genera *Acanthagrion, Nehalennia*, and *Perilestes*.

Materials and methods

Study site and habitat. Sampling was done in January and December 2020 at the Colombian Eastern Andes foothills in the Meta department (4°04'20.8"N, 73°34'55.1"W, 380 m a.s.l.; Figure 1), on the Barcelona Campus (Universidad de los Llanos), where the natural vegetation corresponded to savanna ecosystem (Jaramillo-Justinico & Rangel-Ch., 2014). The climatic regime is unimodal, with a rainy season from April to November and a dry season from December to March (Minorta-Cely & Rangel-Ch., 2014). The maximum temperature reported is 32°C and the minimum is 20°C (IDEAM, 2019).

Map elaboration. A search for historic records of the species was carried out via Google Academic, using the following keywords: checklist, distribution, Odonata, Coenagrionidae, Perilestidae, *Acanthagrion, Nehalennia, Perilestes,* new records, *A. jessei, N. minuta*, and *P. solutus*. The resulting localities lacking geographic coordinates were approximated using Google Earth. Records from the Global Biodiversity Information Facility (GBIF, 2021) were included. The resulting map was generated by entering the records in the free access program Quantum GIS, version 3.18.2 (QGIS, 2021).

Specimen identifications. Specimens were deposited in the entomological collection at the Museo de Historia Natural Unillanos (MHNU-E). The specimens of *A. jessei* under the codes MHNU-E 2983, 3141,3193, 3228, 3268, 3269 and 3293; *N. minuta* with MHNU-E 3052 and 3056, and *P. solutus* with MHNU-E 3194 and 3230. Specimens were identified using an S9i Leica stereoscope and the taxonomic keys in Leonard (1977), Garrison *et al.* (2010), De Marmels (1984) and Williamson & Williamson (1924). Photographs were made using a Nikon D3300 camera, the software Adobe Photoshop 22.4.3 was used to align, stack and edit the photographs. Measurements were made using a digital caliper with a deviation of 0.05 mm for the abdomen (Ab), fore wing (FW), hind wing (HW) and total length (TL).

Results

The specimens of *P. solutus* were captured within a secondary forest composed of plants of the genera *Poeppigia, Didymopanax, Zebrina,* and *Monstera,* which are distributed around a drainage channel that crosses through the university campus. *A. jessei* was captured flying within secondary forest and around artificial ponds used for fish farming by the Instituto de Acuicultura de la Universidad de los Llanos (IALL). *N. minuta* was captured flying in an urban area, characterized by infrastructure such as classrooms, administrative buildings and laboratories, surrounded by vegetation predominated by *Poeppigia, Erythrina, Bauhinia, Swietenia, Ceiba,* and *Ficus*.

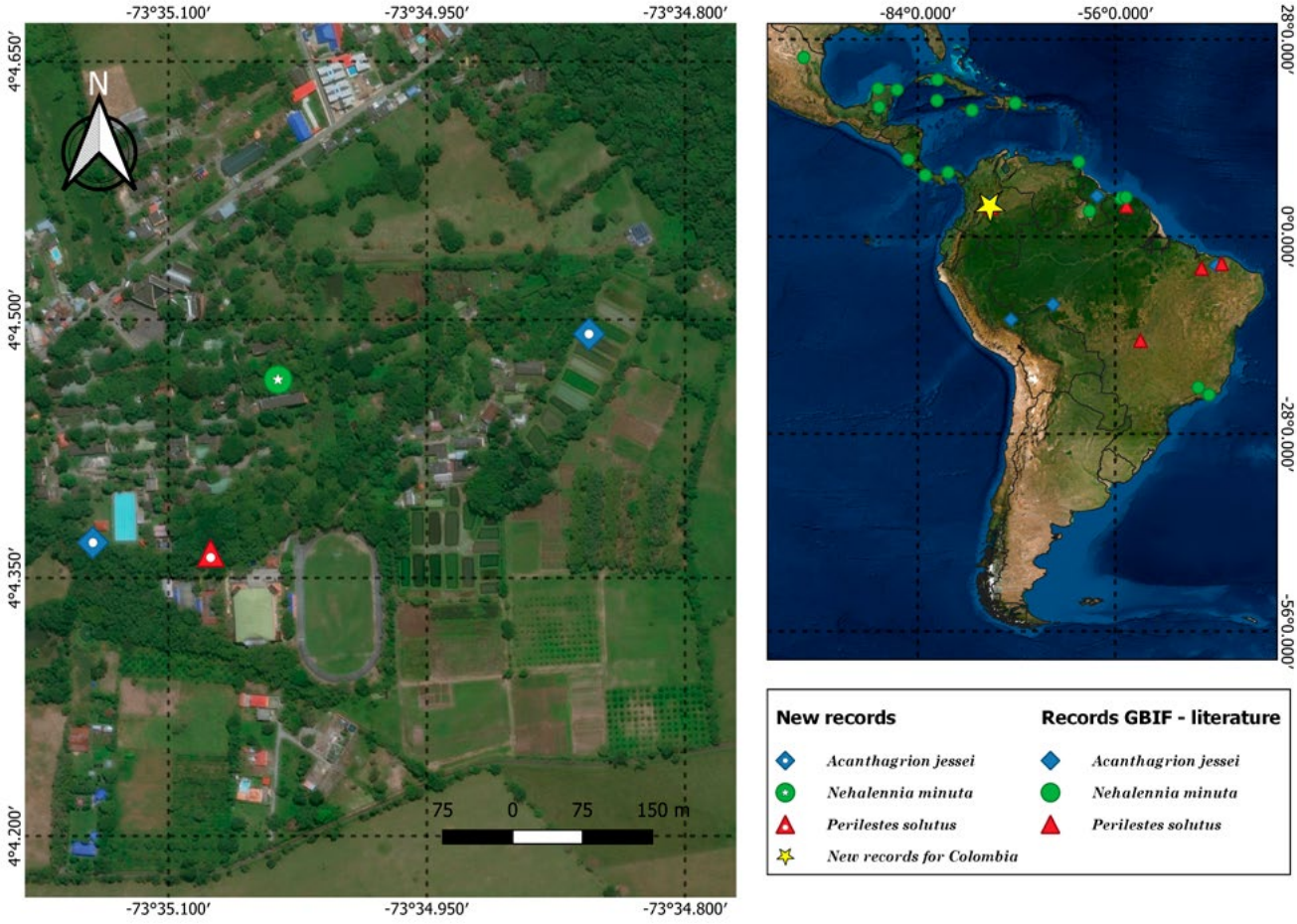

Figure 1. Geographic distribution of *Acanthagrion jessei, Perilestes solutus,* and *Nehalennia minuta,* obtained from literature, GBIF records, and the new record for Colombia.

We collected seven adults of *Acanthagrion jessei* Leonard, 1977 (Figure 2a), two adults *Nehalennia minuta* (Selys in Sagra, 1857) (Figure 2b), and two adults of *Perilestes solutus* Williamson & Williamson, 1924 (Figure 3). All of them recorded for the first time for Colombia (Figure 1).

All identified specimens agree with the descriptions and characteristics known for each of the species. The specimens of *N. minuta* match descriptions known for the species, according to De Marmels (1984), both males and females present frons sharply angulate (Figure 4a) and anterior portion of female mesepisterna with a pair of tubercles (Figure 4b). Measurements (mm) Ab, 21.90; FW, 12.77; HW, 12.20; TL, 26.78. Female (mm) Ab,23.12; FW,14.30; HW,14.67; TL, 29.03. *P. solutus* matches descriptions known for the species according to Williamson & Williamson (1924), including males with sternum 7-10 bright blue and females with segment 9 each side with a large lateral light brown spot (Figure 5). Measurements: males, Ab, 41.96; FW, 21.40; HW, 20.25; TL, 39.87 (mm). Females, Ab, 37.87; FW, 22.55; HW, 21.88; TL, 43.06 (mm). Specimens of *A. jessei* and *A. temporale* are usually very similar, Leonard (1977) mainly uses the ligula shape to separate these species (Figure 6a), but we also found that the shape of the cerci allows to differentiate them *A. jessei* has a dorsoapical bifurcated tubercle in the cercus, which can be observed in posterior view (Figure 6b); this same tubercle is present in *A. temporale,* but in this species it is not bifurcated. Also, in lateral view the external border of cercus of *A. temporale* is sinuous while in *A. jessei* it is straight (Figure 6c). Measurements of the four male specimens were (mm): Ab, 21.11; FW, 14.35; HW, 13.58; TL, 25.50. Measurements of the three female specimens were (mm): Ab, 24.07; FW, 18.42; HW, 17.12; TL, 28.72.

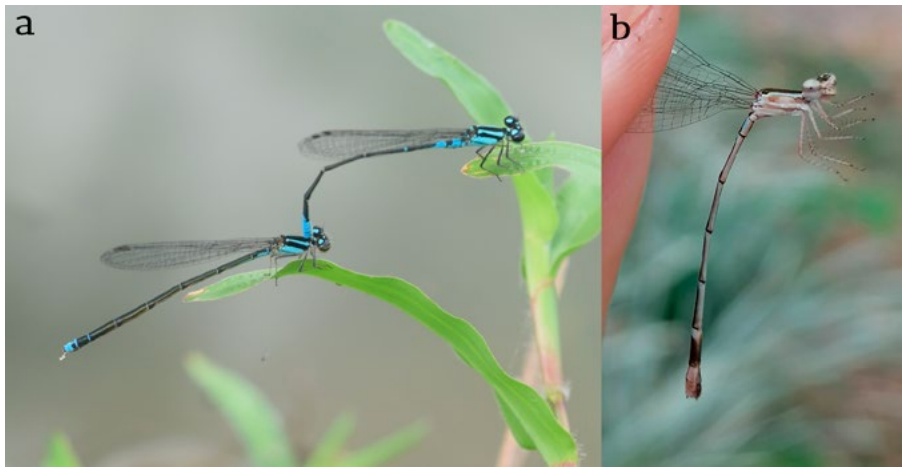

Figure 2. Adult Odonata collected at the Universidad de los Llanos, Meta, Colombia. A, *Acanthagrion jessei* couple; B, *Nehalennia minuta* female.

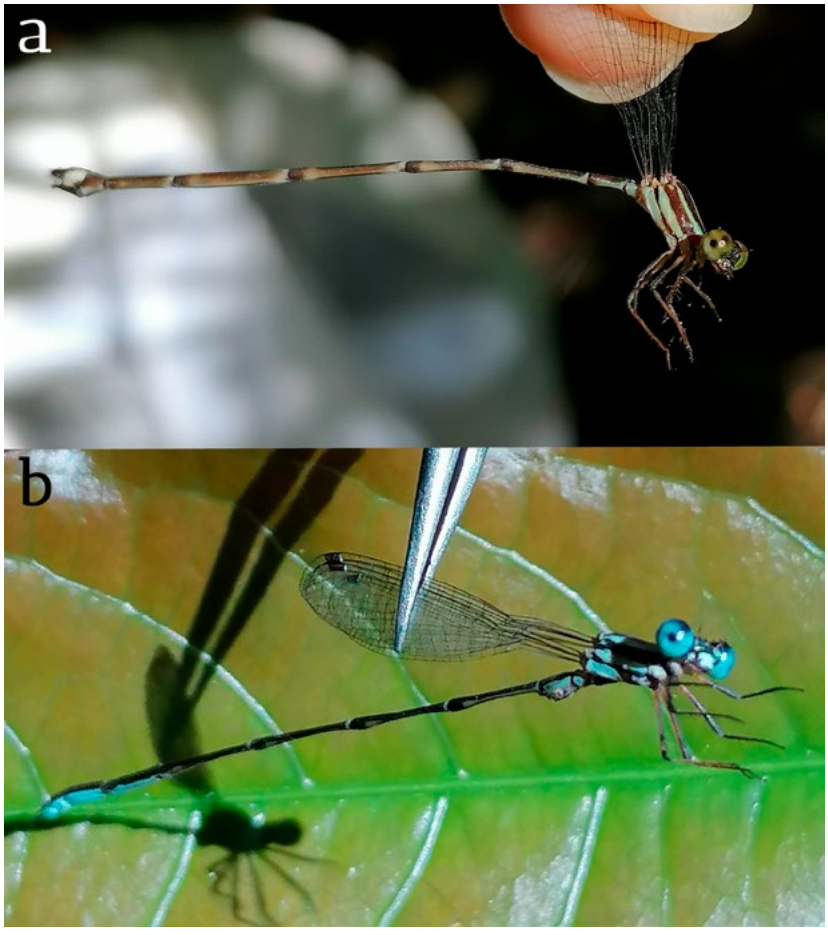

Figure 3. Adults of *Perilestes solutus* collected at the Universidad de los Llanos, Colombia. A, female; B, male.

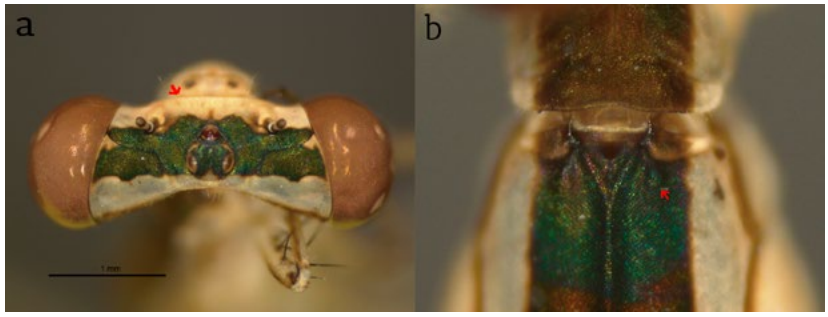

Figure 4. Morphological details of *Nehalennia minuta* female captured at Universidad de los Llanos, Meta, Colombia. A, frons sharply angulate; B, mesepisterna with a pair of tubercles.

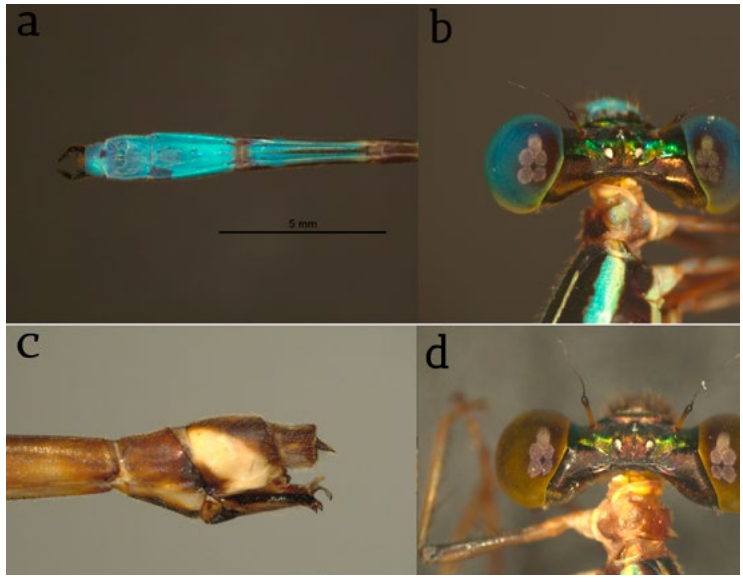

Figure 5. Morphological details of *Perilestes solutus* captured at Universidad de los Llanos, Meta, Colombia. A, males with sternum 7-10 bright blue; B, male head in dorsal view; C, abdominal segments 7-10 of female in lateral view; D, female head in dorsal view.

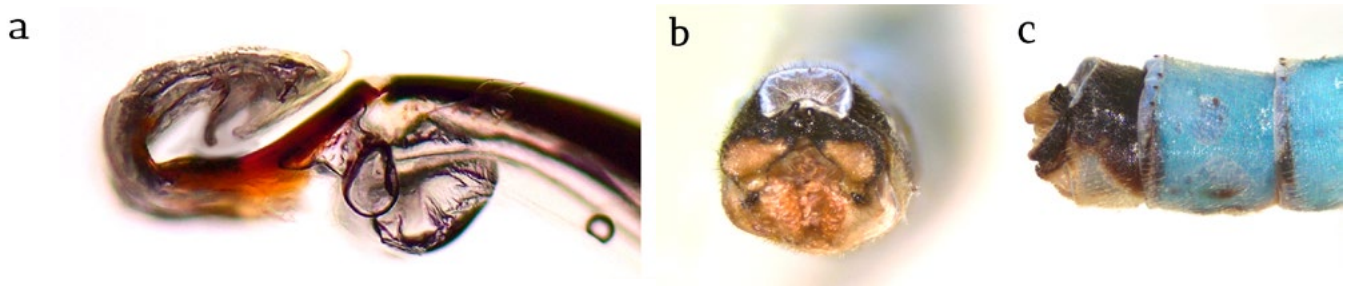

Figure 6. Morphological details of *Acanthagrion jessei* captured at Universidad de los Llanos, Meta, Colombia. A, ligula in lateral view; B, cerci in dorsoapical view; C, cerci in lateral view.

Discussion

Habitat use recorded here for the three species coincides with those described for each of the genera. *N. minuta* was captured in the urban area of the university campus, 100 m from the drainage channel that crosses it and the ponds used for fish farming. Adults of the genus *Nehalennia* are known to inhabit grasslands around ponds or streams with slow moving water (Garrison *et al.*, 2010). The adults of genus *Perilestes* are forest stream dwellers (Williamson & Williamson, 1924); *P. solutus* was found in the secondary forest, which together with the drainage channel, create the ideal conditions for the establishment of this specie. Finally, slow backwaters of streams and ponds are the most frequent habitats of the genus *Acanthagrion* (Garrison *et al.*, 2010); *A. jessei* was found in both habitats generated by anthropic intervention within the university campus.

The three species have wide distributions, and all of them were previously recorded in countries neighboring with Colombia. *A. jessei* was previously recorded at Guyana, Peru and Brazil (Leonard, 1977; IUCN, 2020); *P. solutus* includes Brazil and Suriname (Bastos *et al.*, 2019; Belle, 2002; Calvão *et al.*, 2014; Garcia-Júnior & Picanco-Souto, 2021; Machado, 2015); and *N. minuta* has a broader distribution including Cuba, Suriname, Costa Rica, Mexico, Dominican Republic, Guyana, United States of America, Guatemala, Jamaica, Trinidad and Tobago (De Marmels, 1984; Belle, 2002; Ramírez *et al.*, 2000; Paulson & Dunkle, 2021; GBIF, 2021). The new reports of these species for Colombia highlight the importance of studying the odonatofauna, as much remains to be discovered.

Acknowledgements

We thank the Museo de Historia Natural Unillanos (MHNU), for the loan of the facilities and equipment necessary for identification; the Biology Laboratory of the Universidad de Los Llanos, for the loan of the S9i Leica stereoscopic microscope equipment for taking photographs; Miguel Ángel Cortés and Jorge Enrique García Melo, for their help in photo editing, and the reviewers for their comments that improved the manuscript. This is publication number 13 of the MHNU.

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Citation: Álvarez-Álvarez, K. L., Bota-Sierra, C. A. & Vásquez-Ramos, J. M. (2022). New species records in *Acanthagrion*, *Nehalennia*, and Perilestes (Odonata: Zygoptera) for Colombia. *Biota Colombiana*, 23(2), e1061.

https://doi.org/10.21068/2539200X.1061

Received: August 14, 2021
Accepted: March 1, 2022