



## BIOLOGICAL SCIENCES

# *Erythrodiplax nataliae* sp. nov., a new species for the state of Mato Grosso, Brazil

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**Abstract:** *Erythrodiplax nataliae* sp. nov. (5 males), collected in Vereda wetlands (a unique Neotropical savanna environment) in Mato Grosso, Brazil is described and illustrated. The new species fits in Borrór's Juliana Group, and can be distinguished from other species by the combination of the following traits: blue pruinosity on thorax (more dense dorsally); sides of the pterothorax yellowish, darkening dorsally; face ivory, dorsally black with a metallic blue reflection; wings hyaline with a small basal brown spot; vesica spermalis with long lateral lobes, enclosing the median process and median process elongated with a pair of conspicuous rectangular and elongated lateral lobes, with a middle dorso-ventral furrow.

**Key words:** Odonata, Libellulidae, new species, Veredas, Palm swamps.

## INTRODUCTION

The genus *Erythrodiplax* Brauer is the most speciose libellulid genus in the New World, currently comprising 58 species distributed from southern Canada to 45° S in Patagonia (Garrison et al. 2006, del Palacio & Muzón 2019). Their species are inhabitants of different types of wetlands, and many of them can be abundant in temporary ponds, marshes and stream pools.

Since the last revision of this genus (Borrór 1942) eight new species has been described from the Caribbean (Jamaica and Cuba), Central America (Costa Rica) and South America (Venezuela and Brazil) (Borrór 1957, Guillermo-Ferreira et al. 2016, Haber et al. 2015, Machado et al. 1995, Dos Santos 1946, 1956, Needham et al. 2000). Borrór (1942, 1957) proposed 13 species groups based mainly on the vesica spermalis morphology, including the monotypic Juliana, characterized by the presence of big lateral lobes in the median process.

The aim of this work to describe a new species of *Erythrodiplax* belonging to the Juliana Group from the state of Mato Grosso, Brazil and to provide a modification of the specific key proposed by Borrór (1942).

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## MATERIALS AND METHODS

Type specimens are deposited in the following collections: Colección Entomológica Del Museo de La Plata (MLP), Coleção Zoobotânica James Alexander Ratte Laboratório de Entomologia de Nova Xavantina, Universidade do Estado de Mato Grosso (CZNX) and Coleção de Zoologia of the Museu Paraense Emílio Goeldi (MPEG).

All drawings were made with the aid of a Zeiss Discovery V20 stereomicroscope coupled to a digital camera Axio CAM ICc5 and the use of graphic design software and photo editor.

Photographs were taken with the aid of a digital camera setup on a stereomicroscope and the microphotographies were taken with the aid of a Scanning Electron Microscope (SEM) JEOL JSM-T100. Specimen preparation for microphotographies follows the method proposed by del Palacio et al. 2017. Maps with distributional records were where prepared with the use of the free software Quantum Gis.

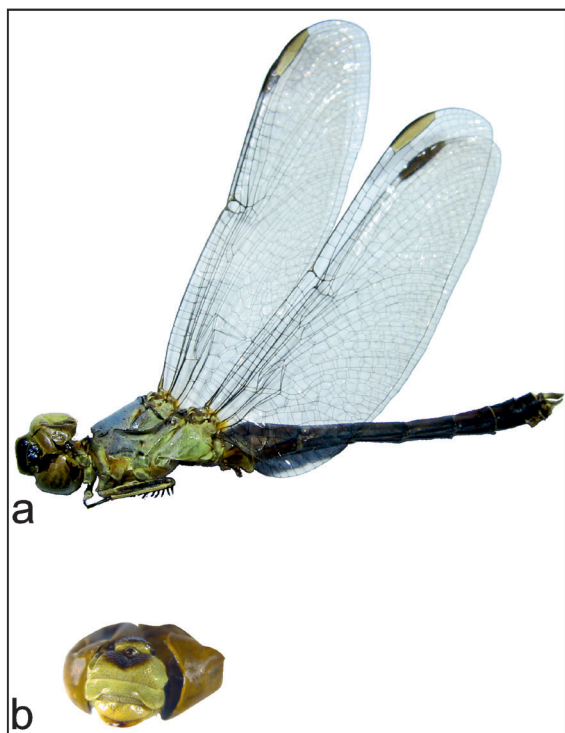
Vesica spermalis terminology follows Borror (1942). Wing terminology follows Riek & Kukulova-Peck (1984). Abbreviations: S1–10 = abdominal segments 1–10, FW = forewing, HW = hind wing. Measurements are given in mm.

HW = hind wing. Measurements are given in mm.

## RESULTS

### *Erythrodiplax nataliae* sp. nov. (Figure 1a)

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**Figure 1. a.** *Erythrodiplax nataliae* (Barra do Garças, Nova Xantina): a lateral view; **b.** Head, anterior view.

*Etymology.* The specific epithet *nataliae* is in honor to Natalia G. Bareiro, the beloved wife of the first author.

### Male holotype description (Figures 1-4)

**Head.** Ivory, except dorsal margin of the frons black with metallic blue reflections; labrum white; vertex basally ivory to black, metallic blue dorsally, without tubercles (Figure 1b).

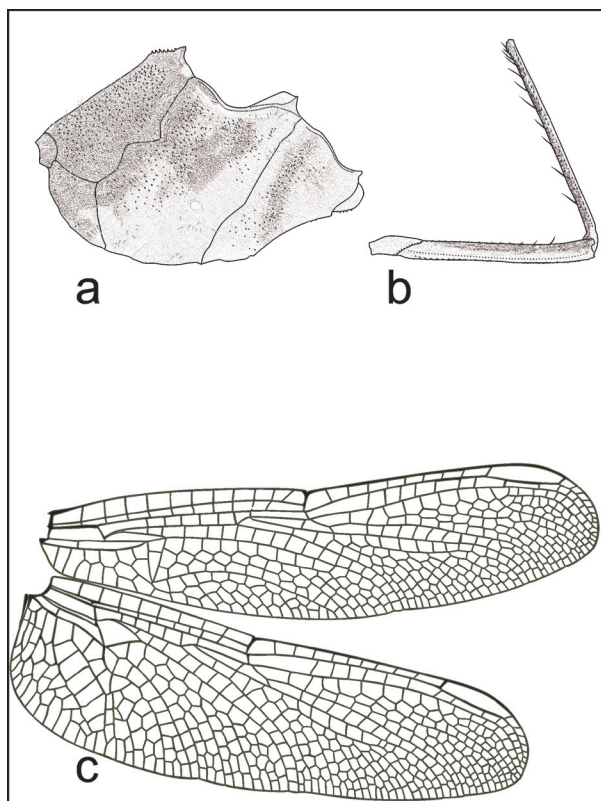
**Thorax.** Prothorax light brown, wider at its base. Pterothorax yellowish, darkening dorsally; dorsally covered with dense pruinosity, turning to patches near the sutures (Figure 2a).

**Legs.** (Figure 2b). Coxae and trochanters brown; femora and tarsi light brown, with flexor margin black. Femur III with 12 spines, last spine two times as long as penultimate one.

**Wings** (Figure 2c). Hyaline, veins black, pterostigma light brown; FW with a proximal faint dark spot between C and R (in one specimen almost absent); HW with a small basal spot reaching basal half of median space. FW: 9 ½ antenodals; 10 post nodals; triangle 2-celled; subtriangle 3-celled; discoidal field starting with three rows of cells, finishing with 5; one bridge crossvein. HW: 8 antenodals; 9 postnodals; triangle free; CuP origin separated from anal angle of triangle.

**Abdomen.** S1-S2 light brown, S3 to S10 black with a dark brown lateral band (ventrally light brown). Without pruinosity. Cerci light brown, with 6-8 denticles starting at distal half from the base (Figure 3a). Outer branch of hamules longer than inner, genital lobe rounded, strongly overlying posteriorly (Figure 3b).

**Vesica spermalis** (Figures 3-4). Hood developed as two processes; apical tubercle absent but a semicircular membranous area can be observed in its position (although it doesn't inflate); median lobe small, (Figures 5a, b); lateral lobes long, narrowing distally and enclosing the median process, meeting each other dorsally



**Figure 2.** *Erythrodiplax nataliae*: a. Pterothorax lateral view; b. Femur III; c. cleft wings.

(Figures 4a, b). Median process elongated with a pair of conspicuous rectangular and elongated lateral lobes (“U” shaped in frontal view) and with a middle dorso-ventral furrow (Figure 3c). Whether they are in fact a pair of internal lobes it is uncertain (Figures 4a, b). The apical lobe has several rows of bristles; posterior lobe present but greatly reduced.

Measurements. (n=1): total length (without cerci and head) 25.15; femur III 4.11; FW length 28.7; HW length 27.22; FW pterostigma length 3.11; HW pterostigma length 3.26.

### Females remains unknown

#### Paratypes

Thorax. Pterothorax greenish with pruinosity covering most of the thorax.

Legs. Femora III with 12-16 spines.

Wings. FW: 9 ½ antenodals to 10 (only in 1 wing) or 10 ½; 8-10 postnodals; triangle 2-celled (only on one wing 3-celled); subtriangle 3-celled; discoidal field starting with 3 rows of cells, finishing with 5-8; one bridge crossvein. HW: 8-9 antenodals; 9-10 postnodals; triangle free; CuP origin at, slightly separated or distinctly separated from the anal angle of triangle.

Abdomen. Cerci with 6-9 denticles. Pruinosity from S1 up to S5-S6.

Measurements. (n=4) range in square brackets: total length (without cerci and head) 24.5 [23.04-25.40], femur III 3.89 [3.73-4.06], FW length 23.73 [22.04-24.53], HW length 23.73 [22.04-24.53], FW pterostigma length 3.21 [2.92-3.40], HW pterostigma length 3.30 [3.02-3.45].

### Ecological data

The specimens were collected in the “Veredas” (Figure 5), one of the 11 phytophysognomies found in the “Bioma Cerrado” of the “Planalto Central Brasileiro” (Ribeiro & Walter 2008). The “Veredas” are open and linear phytosomies that occur along narrow water courses with a substrate constituted primarily by hydromorphic clay, so the soil is limp and soaked (Boaventura 2007, Oliveira-Filho & Ratter 2002). There were two types of vegetation, one with herbaceous-graminous species that occupies the largest area, consisting mainly of species of the families Cyperaceae, Eriocaulaceae and Poaceae, and the other arboreal-shrub in the central region adjacent to the water course dominated by palms such as buriti (*Mauritia flexuosa* L.) (Bastos & Ferreira 2010, Carvalho 1991).

### Specimens examined

COD: collection code from Coleção Zoobotânica James Alexander Ratte.

Holotype male: Fazenda Campo Belo, Nova Xavantina (14° 49' 53.6" S - 52° 31' 07.3"

W), 21/01/15, COD 15151 [MPEG]. Paratypes (all males): one male, Fazenda da Abonizia, Nova Xavantina-MT(14° 45' 52" S - 52° 33' 02" W), 07/07/15, COD 15655 [CZNX]; one male, Fazenda Populina, Nova Xavantina (14° 49' 03" S - 52° 34' 35" W), 11/07/15, COD 15663 [CZNX]; one male, Fazenda Populina, Nova Xavantina (14° 49' 03" S - 52° 34' 35" W), 11/07/15, COD 15666 [MLP]; one male, Fazenda Novo horizonte I, Barra do Garças (15° 40'39.6" S, 52° 27'23.4"W), 15/07/15, COD 15742 [MLP].

### Diagnosis

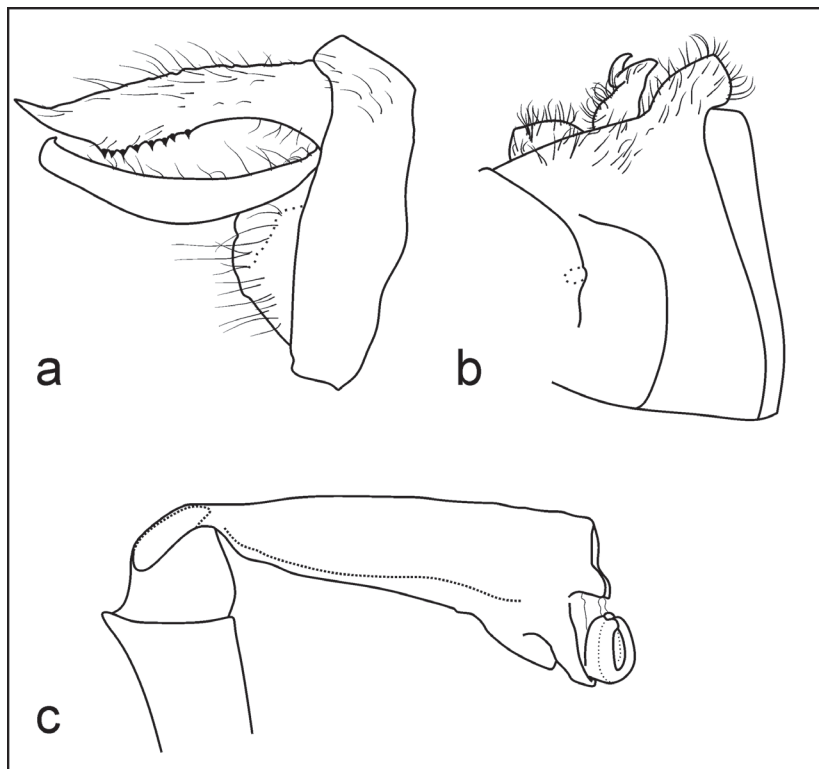
*Erythrodiplax nataliae* n. sp. fits in the Juliana Group proposed by Borror (1942) because it shares its conspicuous elongated IV segment of the vesica spermalis, presence of lateral lobes at the median process, small posterior lobe and lack of an apical tubercle.

*Erythrodiplax nataliae* differs from *E. juliana* in the brownish, not uniformly colored body color pattern (uniformly black in *E. juliana*);

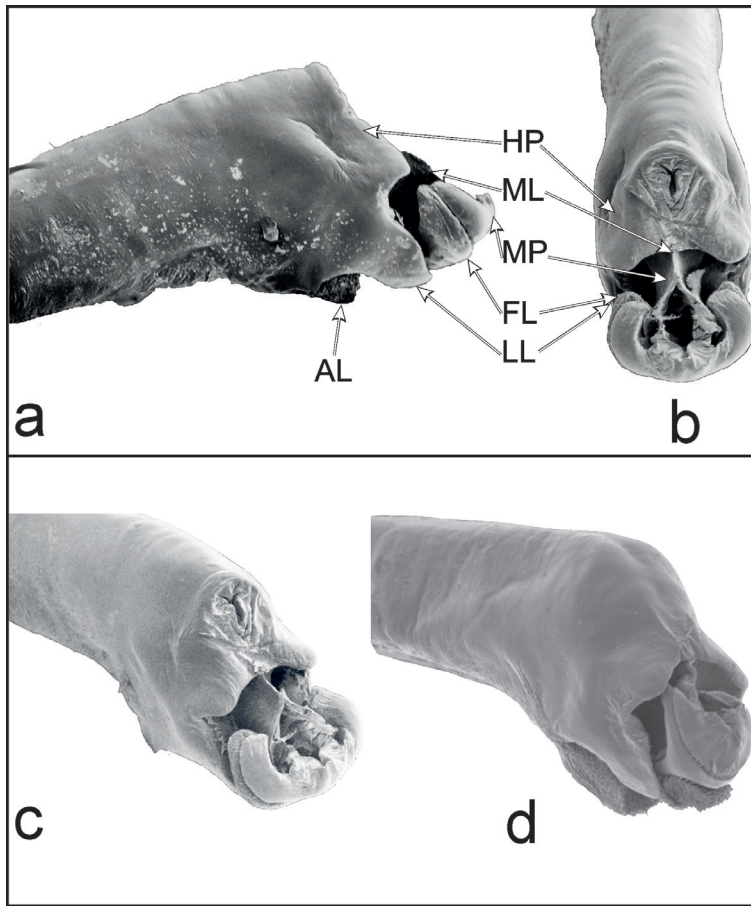
anterior margin of the frons without a ridge (present in *E. juliana*) and by the shape of the lateral lobes of the vesica spermalis (short in *E. juliana*) as shown in Figures 4c-d.

This species color pattern resembles *Erythrodiplax pallida* and *E. ana* due to its bluish pruinosity alongside the thorax and the whitish frons. From *E. pallida* it can be distinguished by its frons entirely white (dorsally black in *E. nataliae*), femora mostly black or dark brown (flexor margin black, remainder yellowish in *E. nataliae*), cerci dark red (ivory in *E. nataliae*), HW with a medium sized basal spot (small or absent in *E. nataliae*), posterior lobe of the vesical spermalis with rows of setae (without setae in *E. nataliae*); from *E. ana* by its metallic blue vertex (ivory and dorsally black in *E. nataliae*), wing tips with a brown tinged (hyaline in *E. nataliae*); hammuli external arm bigger than inner (smaller or equal in *E. nataliae*).

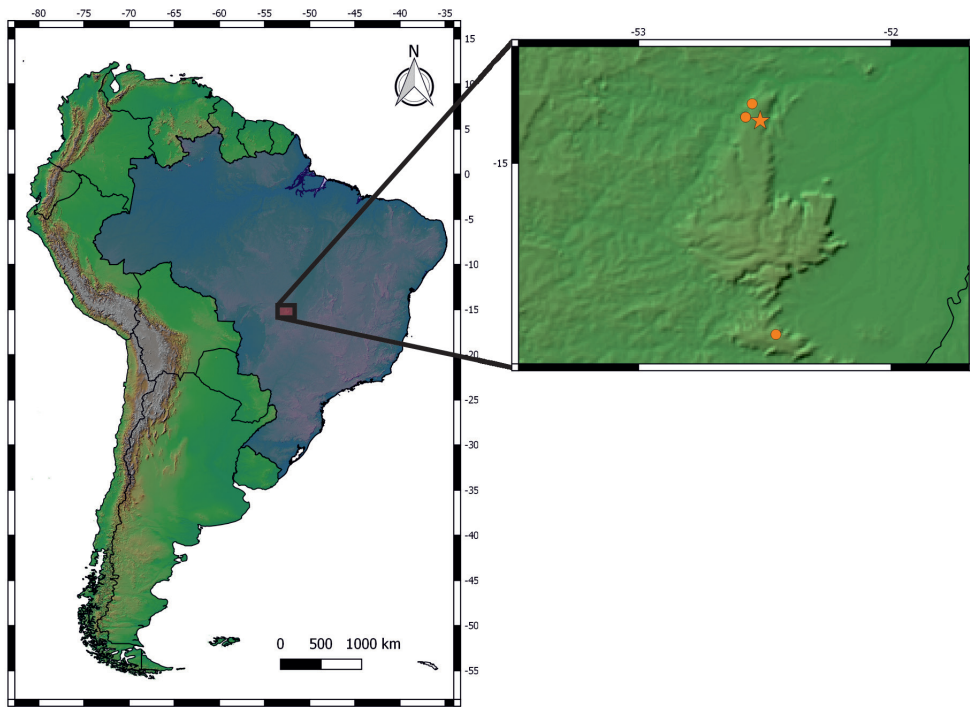
The vesica spermalis shows many differences between both species and *E. nataliae*, such as



**Figure 3.** *Erythrodiplax nataliae*: **a.** S10, lateral view; **b.** accessory genitalia, lateral view; **c.** Hammulus, dorsal view.



**Figure 4.** *Erythrodiplax nataliae* vesica spermalis SEM microphotographies: a lateral view; b frontal view; c fronto-lateral view; d fronto-lateral view of *Erythrodiplax juliana*. AL: Apical Lobe, FL: Flat Lobes of the MP, HP: Hood Process, LL: Lateral Lobe, ML: Median Lobe, MP: Median process.



**Figure 5.** *Erythrodiplax nataliae*, distribution map. ☆: Holotype locality; O: Paratypes localities.

the median process without lobes (with in *E. nataliae*), lateral lobes not meeting dorsally (as described before in *E. nataliae*), small to medium size posterior lobe (reduced in *E. nataliae*).

### Modification of Borror's key (1942) for the genus *Erythrodiplax*

*Erythrodiplax nataliae* run to couplet 26, this couplet was already amended by del Palacio & Muzón (2019) to include *E. chromoptera*, so a modification in order to include males of the species should be added to include *E. nataliae*:

26. Median process of the penis (=vesica spermalis) bilobed, the lobes extending ventrad (Figures 172-174); frons somewhat flattened, metallic blue to black, with a violet luster (Figure 358); hind wing 20.0-26.0 mm, basal spot never extends distad of Cu crossvein, or caudad of the apex of the membranule..... Juliana Group

Juliana Group:

A. Lateral lobes of median process triangular on lateral view; body black (except for the cerci); frons black, with an anterior ridge.....*juliana*

A'. Lateral lobes of median process rectangular on lateral view; body light brown with blue pruinosity, except for the cerci; frons whitish, without an anterior ridge.....*nataliae*

26'. Median process of the penis, when erect, bilobed at apex of the median process, extending dorsally; frons not flattened, black and vertex biturbeculated; median process extending beyond apex of lateral lobes; wings with basal extending up to the 3rd antenodal and at least the triangle, with a distinct pattern as shown in Figure 1b.....*chromoptera*

26''. Median process of penis not bilobed or if it is only in apically to the median process, frons variable in shape; basal spot variable, never as couplet 26'.....27

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#### Author contributions

The author Alejandro del Palacio is responsible for the article writing and made the figures. Authors Ferreira Victor Rennan Santos and Batista Joana Darc are responsible for the project funding and specimens collections. Javier Muzón and Leandro Juen participated in the description of the specimens and the revision of the manuscript critically content. All author approved the final version submitted for publication.

