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Scientific Note

First record of *Leptoconops brasiliensis* (Lutz, 1913) (Diptera: Ceratopogonidae) for the Northeast region of Brazil

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Abstract. The genus *Leptoconops* Skuse, 1889 (Diptera: Ceratopogonidae), is a small haemotophagic biting midge that comprises 173 described species with a broad global distribution. Despite its evolutionary, biological, and vector importance, the genus remains poorly studied, particularly in the Neotropical region, where only 13 species are known across five subgenera: *Leptoconops* (*Brachyconops*) Wirth & Atchley, 1973, *Leptoconops* (*Holoconops*) Keiffer, 1918, *Leptoconops* (*Leptoconops*) Skuse, 1889, *Leptoconops* (*Megaconops*) Wirth, 1973 and *Leptoconops* (*Proleptoconops*) Clastrier, 1974. In Brazil, *Leptoconops* (*Holoconops*) *knowltoni* Clastrier & Wirth, 1978, and *Leptoconops* (*Megaconops*) *floridensis* Wirth, 1951 are known from Santa Catarina, while *Leptoconops* (*Leptoconops*) *brasiliensis* (Lutz, 1913) has been reported from Pará (type locality), Acre, Amazonas, and Goiás. Here, we update the expanding geographic distribution of the genus in Brazil, reporting the first occurrence of *L.* (*L.*) *brasiliensis* in the state of Maranhão, expanding its known range and underscoring the need for further taxonomic and faunistic research.

Keywords: Ceratopogonidae, *Leptoconops,* diversity, geographic distribution, Neotropical fauna.

The genus *Leptoconops* Skuse, 1889 (Diptera: Ceratopogonidae) comprises diurnal biting midges with a wide global distribution and is well known for its painful bites, capable of causing intense irritation and allergic reactions in humans and animals (Whitsel & Schoeppner 1966). Due to their larval development in sandy coastal habitats, some tropical species are recognized as significant nuisance pests, even disrupting tourism in parts of the Caribbean (Strickman et al. 1995). *Leptoconops* (*Leptoconops*) *irritans* (Noè, 1905), for example, exhibits high biting activity in coastal dunes, particularly targeting the head and extremities of human hosts (González et al. 2024). Experimental studies in Bayeux, Haiti showed that the biting midge, *Leptoconops* (*Megaconops*) *bequaerti* Kieffer, 1925, can support the complete development of *Mansonella ozzardi* (Manson, 1897) (Lowrie et al. 1983).

Diagnostic traits of *Leptoconops* include hyaline wings lacking the r–m crossvein, fused radial cells forming an enlarged stigma in females, widely separated eyes, and antennae with 13 flagellomeres in males and 11–12 in females. Additional characters include an elongated apical flagellomere, fused palpal segments 4–5 and enlarged anal cerci bearing elongate lamellae. Males of the subgenus *Leptoconops* have a single apical peg on the gonostylus (Downes & Wirth 1981).

Globally, 173 species are currently recognized across seven subgenera (Borkent et al. 2025). Despite this diversity, the genus remains poorly studied in Neotropics, where only 13 species have been recorded, including the recently documented subgenus *Leptoconops* (*Proleptoconops*) Clastrier, 1974 (Spinelli et al. 2022).

Specimens were collected at Mangue Seco Beach (2°27'05" S, 44°09'37" W), located in the municipality of Raposa, state of Maranhão, Brazil (Fig. 1). The area is characterized as a coastal region dominated by mangroves and sandy soils, presenting an Aw' climate, hot and humid tropical, with mean annual temperatures ranging from 25°C to 28°C, according to the Köppen classification (Alvares et al. 2013). The

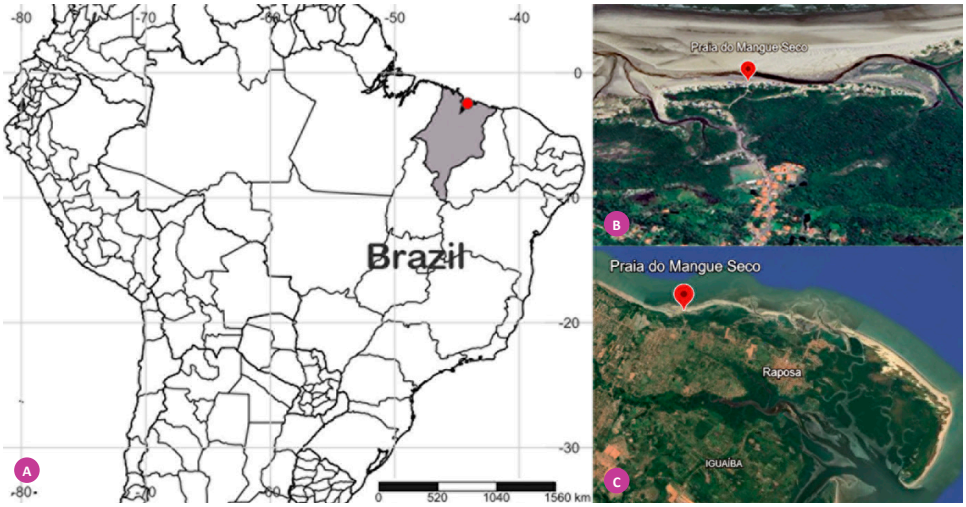

Figure 1. Geographic location of the collection site of *Leptoconops* (*Leptoconops*) *brasiliensis* (Lutz, 1913) (Diptera: Ceratopogonidae) in Maranhão, Brazil, representing the first record of the species for the state.

regional climate is marked by a rainy season from January to June and a drier period between July and December. Specimens were preserved in 100% ethanol, cleared in KOH, dissected, and mounted on microscope slides in a eugenol–Canada balsam medium following Cerqueira (1943). The images and measurements were obtained using a digital system (Synoptics, Cambridge, UK) attached toan optical microscope (Leica DM 1000, Frankfurt, Germany). The images were taken with a digital camera (JVC3CCDTM, Wayne, USA), and Auto Montage 4.0 was used to obtain the final images. Terminology follows the *Manual of Central American* Diptera (Brown et al. 2009), North American *Leptoconops* (Wirth & Atchley 1973), and the redescription by Santarém et al. (2023). The studied specimens were housed in the Ecology Laboratory of Infectious Disease in Amazon, Leônidas and Maria Deane Institute (ILMD).

All examined specimens exhibited the diagnostic characters of *Leptoconops* (*Leptoconops*) *brasiliensis* (Lutz, 1913) females: widely separated eyes (Fig. 2A, D), absence of a frontal suture, and a four-segmented palpus, with segment 3 subequal to segment 4, which bears a pale basal ring (Fig. 2D). The apical flagellomere was elongate, approximately four times longer than wide (Fig. 2A). Wings were hyaline, with longitudinal veins reaching the margin, lacking macrotrichia, and with fused radial cells forming an expanded stigma due to the absence of the r–m crossvein (Fig. 2B). The costal ratio was close to 0.5. Leg morphology included a moderately strong spine on the foreleg and robust ventral spines on tarsomere 1 and the apices of distal tarsomeres (Fig. 2C). Abdominal structures included two spermathecae and large cerci bearing elongate lamellae (Fig. 2E), consistent with previous descriptions of the species.

This study provides the first confirmed record of *L.* (*L.*) *brasiliensis* in

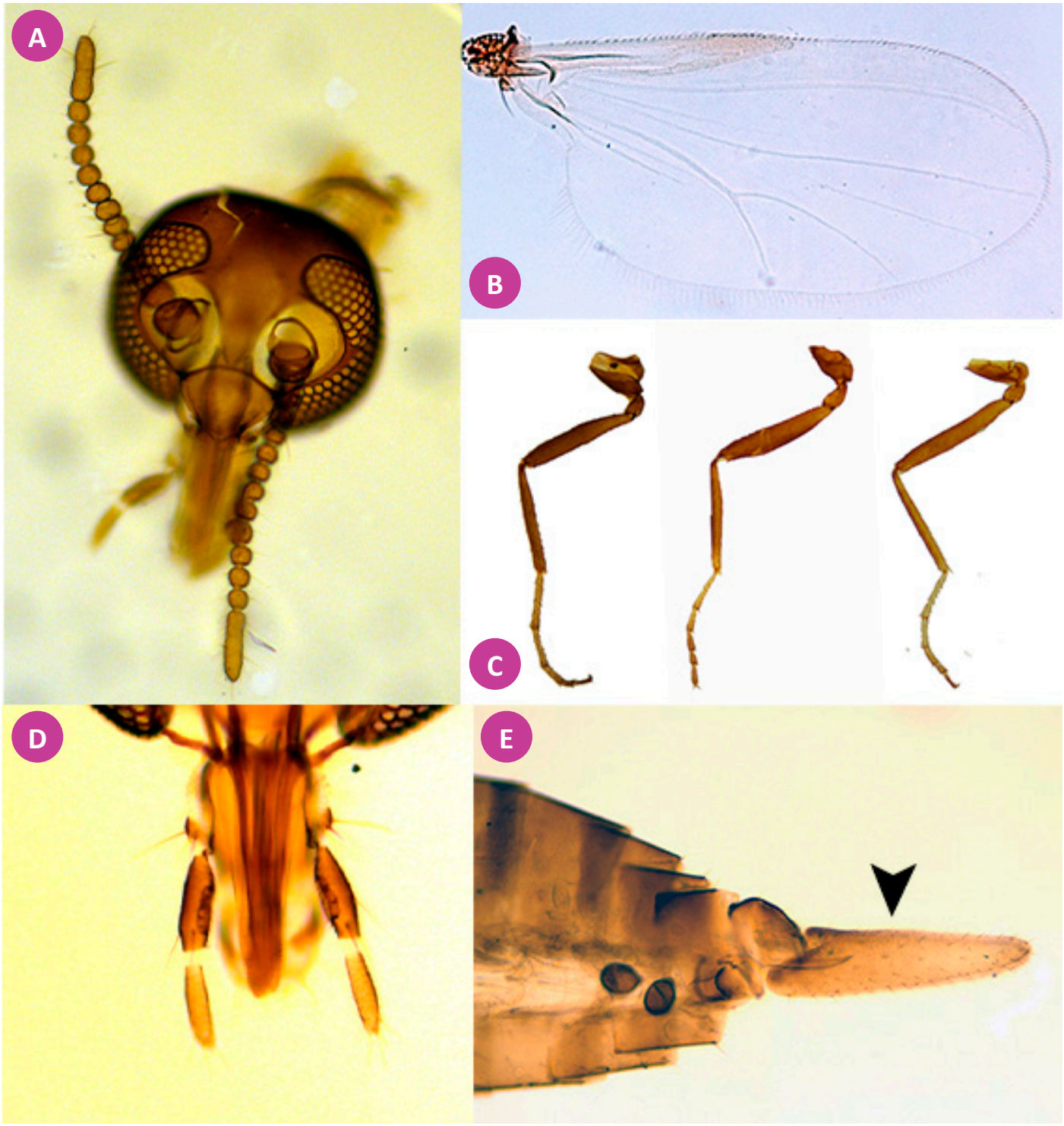

Figure 2. *Leptoconops* (*Leptoconops*) *brasiliensis* (Lutz, 1913) (Diptera: Ceratopogonidae), female. **A**: Head, anterior view. **B**: Wing. **C:** Fore, middle and hind legs. **D:** Palps, evidencing third palpal segments. **E:** Spermathecae, Arrowhead: genital lamellae.

Maranhão, extending its known distribution along the northern coast, Cerrado (Savanna) vegetation and now Northern Brazilian. The species, originally described from the lower Tocantins River in Pará (Lutz 1913; Trindade & Gorayeb 2005), had been previously recorded in Acre (Pessoa et al. 2012), Amazonas (Farias et al. 2015) and Goiás (Santarém et al. 2023). These records indicate that *L.* (*L.*) *brasiliensis* occupies a broad range of environments, including Amazonian forests, coastal ecosystems influenced by dunes and mangroves, and Cerrado areas, indicating a high degree of ecological plasticity. In Brazil, other species of the genus recorded to date include *Leptoconops* (*Holoconops*) *knowltoni* Clastrier & Wirth, 1978 and *Leptoconops* (*Megaconops*) *floridensis* Wirth, 1951, both currently restricted to the state of Santa Catarina.

The genus *Leptoconops* is strongly associated with coastal environments, particularly sandy substrates and areas under marine influence, where larval development is favored. According to Santarém et al. (2023), *L.* (*L.*) *brasiliensis* is typically found in areas with high humidity, a condition commonly observed in coastal zones influenced by mangroves and tidal dynamics. Therefore, the occurrence of this species in the study area was expected, given the local environmental conditions characterized by sandy soils, high moisture, and proximity to mangrove systems.

In addition, the study area represents an important coastal region with significant tourism potential, where human activity is intense, especially in recreational areas such as beaches. Species of *Leptoconops* are known to be hematophagous and can bite humans, often causing irritation, allergic reactions, and discomfort. In some regions, high population densities of these biting midges can negatively affect outdoor activities and tourism, reducing the attractiveness of these environments. Thus, the presence of *L.* (*L.*) *brasiliensis* may have implications not only for local ecology but also for public health and tourism, particularly in areas with frequent human exposure. These findings reinforce the importance of understanding the ecology and distribution of *Leptoconops* species in coastal regions, especially in the context of human use and environmental changes.

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Authors' Contributions

JAS: Conceptualization, Investigation, Methodology, Writing – original draft, Writing – review & editing; LPC: Investigation, Data curation, Writing – original draft; FACP: Supervision, Validation, Writing – original draft, Writing – review & editing; ESF: Conceptualization, Formal analysis, Supervision, Validation, Writing – original draft, Writing – review & editing.

Conflict of Interest Statement

The authors declare that they have no conflict of interest related to the publication of this manuscript.

Ethical Approval

Authorization for the collection of sand fly specimens in the studied area was granted under permit nº 12186-9 by the Biodiversity Authorization and Information System (SISBIO) of the Chico Mendes Institute for Biodiversity Conservation (ICMBio).

Data Availability Statement

All data supporting the findings of this study are contained within the article.

Generative AI Statement

The authors used generative artificial intelligence tools exclusively to assist with the translation of the manuscript into English. No AI tools were used in the development of the scientific content, data analysis, or interpretation of results.

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