

First record of *Aglae caerulea* (Hymenoptera, Apidae, Euglossini) in Brazilian Cerrado east of the Amazon Region, Maranhão State, Brazil

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1. Introduction

Aglae caerulea Lepelletier & Serville, a monospecific genus of Euglossini is characterized by its small body size (20 to 28 mm) and blue color (Dressler, 1982). Females of this species are cleptoparasites of *Eufriesea* and *Eulaema* nests (Moure, 1964). The males are rarely found in flowers or in other natural sources of aromatic substances, or even in baited traps. For this reason, they are underrepresented in entomological collections (Morato, 2001). *A. caerulea* males attracted to aromatic substances under natural conditions (as is characteristic of Euglossini bees) were first observed recently in inflorescences of *Anthurium rubrinervium* (Link) G. Don (Araceae) in an area of tropical forest in French Guiana (Hentrich et al., 2007). Moreover, three specimens of this species had been attracted and collected using methyl cinnamate baits in Dawa, British Guiana (Williams and Dodson, 1972).

Until recently, *A. caerulea* was considered endemic to the Amazon region (Cameron, 2004), and was found in the Amazon rainforest of Brazil, Colombia, French Guiana, and Guyana (Ramirez et al., 2002). In Brazil, records indicate the presence of *A. caerulea* in the states of Acre, Amazonas, Amapá, and Pará (Silveira et al., 2002). Recently, its presence was recorded in phytophysiological studies of gallery forests within areas of Cerrado in Mato Grosso State, Brazil, where males were attracted and captured in methyl cinnamate baited traps (Anjos-Silva et al., 2006; Silva et al., 2013). Although several entomological surveys have used a variety of chemical baits (Rebêlo and Silva, 1999; Albuquerque et al., 2001; Brito and Rêgo, 2001; Silva and Rêbo, 2002; Carvalho et al., 2006; Mendes et al., 2008; Silva et al., 2009; Silva, 2012), *A. caerulea* was not previously found in any of the areas studied in Maranhão State. The absence of this species, especially in rainforests, is most likely because methyl cinnamate baits, for which *A. caerulea* has an affinity, were not used. This was also observed by Morato (2001) in studies performed in the Parque Nacional da Serra do Divisor in Acre State, and by Anjos-Silva et al. (2006) in a gallery forest in the Chapada

dos Guimarães Brazilian National Park in Mato Grosso State. The main goal of the present study was to check if *Aglae caerulea* occurs in the Cerrado domain east of the Amazon Region.

2. Material and Methods

The study was conducted in a gallery forest in the savannah of the Parque Estadual do Mirador within the limits of the municipality of Formosa da Serra Negra (6° 37' 56.29" S; 45° 53' 4.25" W), Maranhão State, Brazil. It is Maranhão State's largest conservation unit and is located between the sources of the Alpercatas and Itapecuru rivers (6° 37' 30.15" S; 45° 52' 30.70" W, respectively), occupying approximately 450 ha within the south central region of the state. The park extends through portions of Mirador, Grajaú, São Raimundo das Mangabeiras, and Formosa da Serra Negra (Conceição and Rodrigues, 2010). The climate is sub-humid, with an annual rainfall of 1,200 mm. The mean maximum temperature ranges from 31.4 °C to 33 °C and the mean minimum temperature ranges from 19.5 °C to 21 °C (Conceição et al., 2011).

The sampling was done between January 2012 and December 2013. Five aromatic compounds were used to attract the male euglossine bees: methyl cinnamate, eucalyptol, eugenol, methyl salicylate, and vanillin (modified from Campos et al., 1989). For each aromatic compound, we used three baits that were exposed for 10 consecutive hours (from 7 to 17 h). In total, 15 baits were installed 8 meters apart from each other along the riverbank. The captured specimens were deposited in the bee collection of the Laboratory of Bee Studies of the Biology Department of the Federal University of Maranhão, Brazil.

3. Results and Discussion

In this study, two *A. caerulea* males (Figure 1) were obtained in August 2013 and November 2013 during a survey performed in a gallery forest. The area where the

male *A. caerulea* specimens were found is part of a polygon of possible occurrence, which extends throughout the gallery forests in Pará, Amazonas, Mato Grosso (northern region), and Tocantins states, according to Silva et al. (2013) (Figure 2).

The occurrence of species from the Amazon region in other nearby ecosystems is most likely due to the presence of closed areas such as gallery forests, coconut forests, and sandbanks, which comprise denser vegetation and

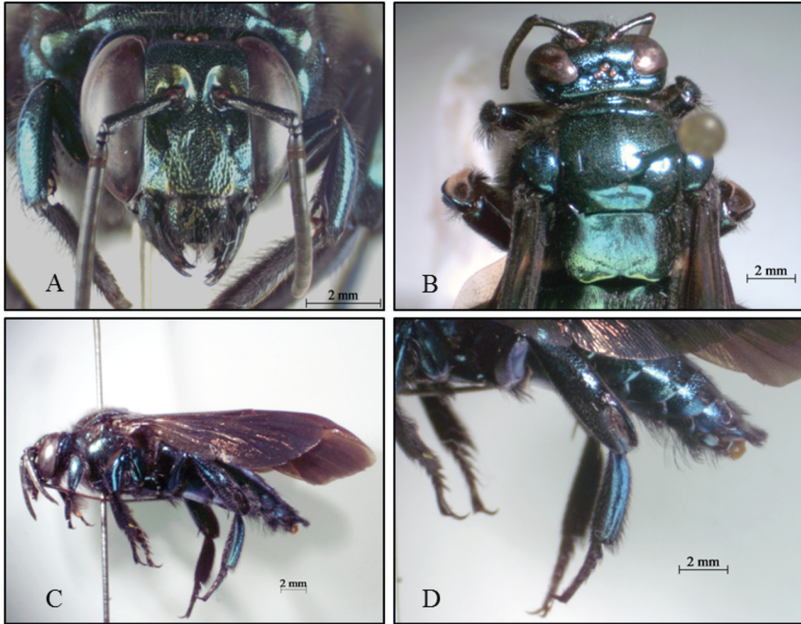


Figure 1. *Aglae caerulea* male collected using methyl cinnamate baited traps: (A) anterior view, slightly greenish clypeus; (B) dorsal view, showing the flat scutellum; (C) lateral view, mesosome; (D) very elongated and straight hind tibia, with tibial groove in terminal position.

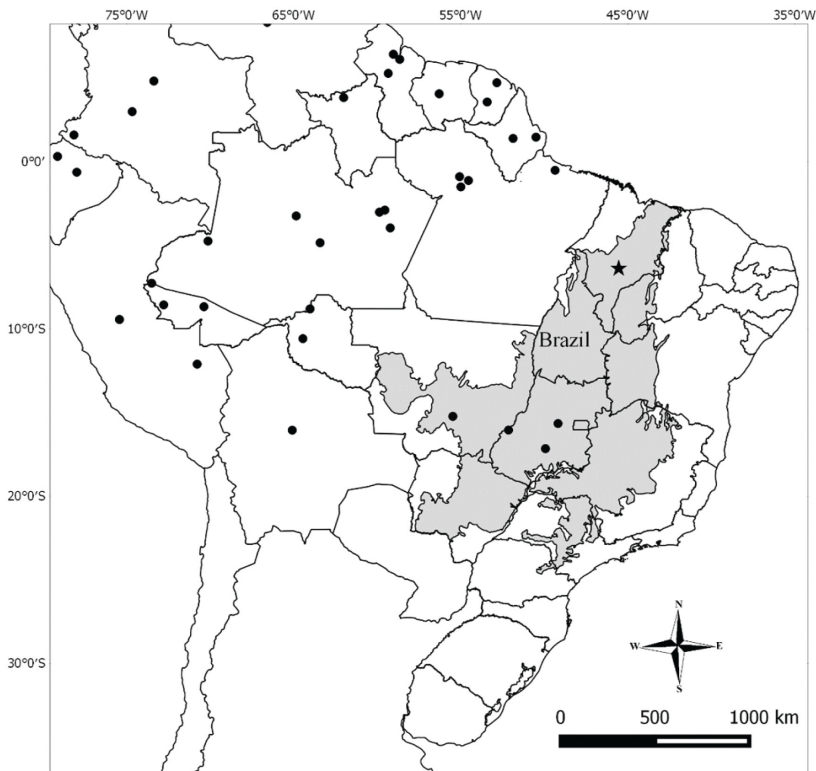


Figure 2. Map showing the Brazilian Cerrado (grey area) and known geographic distribution of *Aglae caerulea* (black circles) according to Silva et al. (2013), with highlight for the new record found in the Maranhão state (star).

thus favor the dispersal of Euglossini species, which are considered common in forest environments (Dressler, 1982). The results obtained by Moura and Schlindwein (2009) in studies on riparian forests of the São Francisco River corroborate this hypothesis, highlighting that these environments are used as wildlife corridors, harboring and maintaining Euglossini species that are only common in tropical rainforests.

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