

SCIENTIFIC NOTE

Occurrence of *Aglae caerulea* Lepeletier & Serville (Hymenoptera: Apidae: Euglossini) in the Parque Nacional da Chapada dos Guimarães, Mato Grosso State, Brazil

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Ocorrência de *Aglae caerulea* Lepeletier & Serville (Hymenoptera: Apidae: Euglossini) no Parque Nacional da Chapada dos Guimarães, MT

RESUMO - Em um estudo conduzido em uma floresta de galeria do Vale do Véu de Noiva no Parque Nacional da Chapada dos Guimarães, MT, substâncias puras foram utilizadas para atrair e amostrar machos das abelhas das orquídeas. De setembro de 2003 a julho de 2005, uma vez por mês, das 8:00h às 16:00h, os machos foram capturados conforme eles chegavam às iscas-odores. Dos 264 machos coletados, oito eram *Aglae caerulea* Lepeletier & Serville, uma espécie cleptoparasítica com distribuição geográfica restrita à Bacia Amazônica. Portanto, a ocorrência de *A. caerulea* naquela área de estudo amplia aproximadamente em 2.400 km os limites para o sul da América do Sul, estando agora documentada sua presença tanto na Bacia Amazônica como na Bacia Platina.

PALAVRAS-CHAVE: Apinae, abelha das orquídeas, Neotropical

ABSTRACT - In a study conducted in the gallery forest of the Vale do Véu de Noiva in the Parque Nacional da Chapada dos Guimarães, Mato Grosso state, chemical baits were used to attract and sample male orchid bees. From September 2003 to July 2005, male euglossine bees were captured monthly, from 8:00 a.m. to 4:00 p.m. as they arrived at the baits. Of the 264 males captured, eight males belonged to *Aglae caerulea* Lepeletier & Serville, a cleptoparasitic euglossine species that presumably occurred only in the Amazon basin. Therefore, the occurrence of *A. caerulea* in this study area extends its geographical distribution range by approximately 2,400 km southwards in South America, as it is now recorded in both the Amazon and Platina basins.

KEY WORDS: Apinae, orchid bee, Neotropics

The Euglossini comprises three pollen-collecting genera, *Euglossa* Latreille, 1802, *Eulaema* Lepeletier, 1841 and *Eufriesea* Cockerell, 1908, and two cleptoparasitic genera, *Exaerete* Hoffmannsegg, 1817 and *Aglae* Lepeletier & Serville, 1825 (Moure, 1964, 1967; Kimsey 1979). *Euglossa* contains the highest number of species and they are found from Mexico to Paraguay, northern Argentina and also in Jamaica. *Eufriesea* is the most broadly distributed genera, with specimens ranging from Mexico to central Argentina, and *Eulaema* occurs from Rio Grande do Sul (Wittmann *et al.* 1988) (Brazil), Misiones (Argentina) and Paraguay to central Mexico (Moure 1967, Michener 2000, Cameron 2004). Of the two cleptoparasitic genera, *Exaerete* has a broader geographic range, going from Mexico to northern Argentina (Moure 1967, Kimsey 1979).

The species of this genus are known to parasitize *Eulaema* and *Eufriesea* nests (Ducke 1903, 1906; Friese 1941;

Bennett 1972). *Aglae* is a monotypic genus, represented by *Aglae caerulea* Lepeletier & Serville, 1825, reported to be a cleptoparasite of *Eulaema*. The lectotype is a female from French Guiana currently deposited in the Turin Museum, Italy (Moure 1967). The single observation on the parasitic behavior of this species was made by Myers (1935), in Yupukari, Rupununi District of British Guiana. He noticed a large, beautifully metallic green bee buzzing loudly as it hovered at a nest entrance of *Eulaema nigrata* Lepeletier, 1841, and subsequently entering the nest. From the 11 cells found in that nest, two *A. caerulea* males emerged sometime later.

The available information indicates that this species occurs in the Amazon rainforest of northern Bolivia, western Colombia, French Guiana, British Guiana, Peru, Venezuela, Suriname and Panama (Moure 1967, Williams & Dodson 1972, Ramírez *et al.* 2002). According to Cameron (2004) however, the Panamanian record of *A. caerulea* (Moure

1967) should be disregarded until proven otherwise, given that no one has managed to collect another sample of this species in decades of species surveys. More recently, Morato (2001) reported the occurrence of *A. caerulea* in the Parque Nacional da Serra do Divisor, situated at the western part of the state of Acre.

The goal of this study is to record, for the first time, the presence of *A. caerulea* outside the Amazon basin.

The study was conducted in the gallery forest of the Vale do Véu de Noiva in the Parque Nacional da Chapada dos Guimarães (15°24'21"S – 55°50'12"W), southern Mato Grosso State. The Planalto dos Guimarães is the natural boundary between the Amazon, Platina and Araguaia basins and represents the extreme northeastern boundaries of the Alto Paraguai basin, which altitude ranges from 300 m to 836 m, annual rainfall from 1750 mm to 2000 mm, and annual temperature from 13°C to 30°C (PCBAP 1997).

From September 2003 to July 2005, male euglossine bees were collected monthly with an insect collecting net as they arrived at the chemical baits. A total of eight chemicals were used: in the first year benzyl benzoate, 1,8 - cineole, eugenol and vanillin were used and methyl acetate, methyl cinnamate, methyl salicylate and benzyl acetate were used in the second year. The baits were simultaneously applied to absorbent paper pads from 8:00 a.m. to 4:00 p.m. These paper pads were suspended 5.0 m apart from the twigs by a string 1.5 m above the ground. Vanillin and methyl cinnamate crystals were dissolved in water and ethyl alcohol respectively until the saturation point was reached. All paper pads were replenished every 60 min with 1 ml of chemical to prevent losses due to volatility. The collected males were placed in a killing jar containing ethyl acetate and then transferred to plastic vials labeled with the collection date and the bait used. Voucher specimens of all bee species were deposited in the collection of the Departamento de Biologia da Faculdade de Filosofia, Ciências e Letras de Ribeirão Preto-USP.

In the first year, the baits attracted 177 males distributed among four genera and 21 valid species: *Eufriesea* (3 species), *Euglossa* (14 species), *Exaerete* (1 species) and *Eulaema* (3 species). Of the *Eulaema* species, *E. nigrata* males (n = 20) were collected from September to December 2003, and in February, April and July 2004; *E. cingulata* (Fabricius, 1804) males (n = 11) visited the baits in October 2003 and from January to April 2004; finally, the *E. aff. cingulata* males (n = 25) were sampled in October and November 2003 and from January to August 2004.

In the second year, 87 males belonging to 12 valid species and five genera were collected: *Eufriesea* (1 species), *Euglossa* (4 species), *Exaerete* (2 species), *Eulaema* (4 species) and *Aglae* (1 species). Of the 87 males captured, 16 males were of the *Eulaema* species. The *E. cingulata* males (n = 9) were sampled in October and December 2004 and in January, February, May and July 2005; the single *E. bombiformis* male (Packard, 1869) was collected in October 2004; the two *E. meriana* males (Olivier, 1789) were attracted in September 2004 and May 2005 and the *E. aff. cingulata* males (n = 4) were sampled in September 2004 and January and July 2005. The *A. caerulea* males (n = 8) were collected in October 2004 (n = 1) and in February (n = 4), March (n = 2) and May (n = 1) 2005. All *A. caerulea* males were attracted to methyl cinnamate baits.

As reported by Williams & Dodson (1972) and Morato (2001), this study also showed that methyl cinnamate baits attract *A. caerulea* males, indicating that these males have a strong preference for this fragrance. However, Otero & Sandino (2003) collected an *A. caerulea* male using cineole, methyl salicylate and skatole as baits while studying the differences in euglossine bee community structure through a human intervention gradient, at a lowland site in the Chocó biogeographic region of Colombia. Although the authors have not stated which bait attracted the male, its capture shows that methyl cinnamate is not the only fragrance associated with *A. caerulea* males.

The number of *A. caerulea* males collected together with the presence of *E. nigrata*, the only host species known of *A. caerulea* (Myers 1935), in the Parque Nacional da Chapada dos Guimarães, exclude the hypothesis of casual occurrence of this cleptoparasitic species in this region. Additionally, it is possible that other *Eulaema* species sampled in that area are also *A. caerulea* hosts. This supposition is reinforced by the results obtained by Otero & Sandino (2003), who collected one *A. caerulea* male in an area where at least four *Eulaema* species also occur: *E. aff. bombiformis*, *E. chocoana* Ospina & Sandino, 1997, *E. cingulata* and *E. sororia* Dressler & Ospina, 1997. Regardless of whether this suggestion is correct, our results show that the geographical distribution range of *Aglae* increased by approximately 2,400 km southwards in South America and *Aglae* is now recorded in both the Amazon and Platina basins.

According to Pinto & Oliveira-Filho (1999), the floristic composition of the gallery forest, also known as riparian forest (Rizzini 1997) or the valley-forest (Eiten 1994), where this study was done, showed strong links with both the Amazon and Atlantic (*sensu lato*) forests. Of the 172 species sampled, 12.2% of the species occur only in Cerrado, 29.7% of them occur in the Atlantic forest, 28.5% occur in the Amazon forest, and the remaining 29.6% of the species are found in both forests. It has been suggested (Sick 1966, Willis 1992) that gallery forests, one of the most common ecosystems found in Central Brazil (Ab'Sáber 1971), play an important role as mesic corridors, that open the way to the colonization of the Cerrado landscapes by forest-dependent plants and animals with ranges centered in the neighboring Amazon and Atlantic forests. As reported by Silva (1996), studies on the distribution patterns of plants (Ratter 1987, Méio *et al.* 2003), butterflies (Brown 1987), mammals (Redford & Fonseca 1986), birds (Willis 1992, Silva 1996) and lizards (Vanzolini & Williams 1970) have provided numerous examples of Amazon and Atlantic organisms whose range boundaries are located in the gallery forests within the Cerrado domains. Therefore, although the presence of *Aglae* in the Chapada dos Guimarães National Park can be surprising, its occurrence there shows only one more example of the influence of the Amazon forest, in the composition of the fauna of the Cerrado domains.

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References

- Ab'Sáber, A.N. 1971. A organização natural das paisagens inter e subtropicais brasileiras, p.1-14. In M.G. Ferri (coord.), III Simpósio sobre o Cerrado. São Paulo, Edgar Blücher-EDUSP, 239p.
- Bennett, F.D. 1972. Observations on *Exaerete* spp. and their hosts *Eulaema terminata* and *Euplusia surinamensis* (Hymen., Apidae, Euglossinae) in Trinidad. J. N. Y. Entomol. Soc. 80: 118-124.
- Brown Jr., K.S. 1987. Biogeography and evolution of Neotropical butterflies, p.66-104. In T.C. Whitmore & G.T. Prance (eds.), Biogeography and quaternary history in Tropical America. Oxford, Oxford Univ. Press, 214p.
- Cameron, S.A. 2004. Phylogeny and biology of Neotropical orchid bees (Euglossini). Annu. Rev. Entomol. 49: 377-404.
- Ducke, A. 1903. Biologische Notizen über einige südamerikanische Hymenoptera. Allg. Z. Entomol. 8: 368-372.
- Ducke, A. 1906. (Fortsetzung). Z. Wiss. Insektenbiologie 2: 17-21.
- Eiten, G. 1994. Vegetação do Cerrado, p.17-73. In M.N. Pinto (org.), Cerrado – caracterização, ocupação e perspectivas. Brasília, Ed. Universidade de Brasília, 657p.
- Friese, H. 1941. Zur Biologie der *Euglossa*-Arten (Goldbienen Amerikas), mit kurz skizziertem Werdegang unserer Honigbiene. Zool. Jahrb. Abt. Syst. Oekol. Geogr. Tiere 74: 157-160.
- Kimsey, L.S. 1979. An illustrated key to the genus *Exaerete* with descriptions of male genitalia and biology (Hymenoptera: Euglossini, Apidae). J. Kans. Entomol. Soc. 52: 735-746.
- Méio, B.B., C.V. Freitas, L. Jatobá, M.E.F. Silva, J.F. Ribeiro & R.P.B. Henriques. 2003. Influência da flora das florestas Amazônica e Atlântica na vegetação do cerrado *sensu stricto*. Rev. Bras. Bot. 26: 437-444.
- Michener, C.D. 2000. The bees of the world. Baltimore, Johns Hopkins Univ. Press, xiv + 913p.
- Morato, E.F. 2001. Ocorrência de *Aglae caerulea* Lepeletier & Serville (Hymenoptera, Apidae, Apini, Euglossina) no estado do Acre, Brasil. Rev. Bras. Zool. 18: 1031-1034.
- Moure, J.S. 1964. A key to the parasitic Euglossinae bees and a new species of *Exaerete* from Mexico (Hymenoptera-Apoidea). Rev. Biol. Trop. 15: 227-247.
- Moure, J.S. 1967. A check-list of the know euglossine bees (Hymenoptera, Apidae). Atas Simp. Biota Amazônica 5: 395-415.
- Myers, J.G. 1935. Ethological observations on the citrus bee *Trigona silvestriana* Vachal and other neotropical bees. (Hym., Apoidea). Trans. R. Entomol. Soc. Lond. 83:131-142.
- Otero, J.T. & J.C. Sandino. 2003. Capture rates of male euglossine bees across a human intervention gradient, Chocó Region, Colombia. Biotropica 35: 520-529.
- PCBAP. 1997. Plano de Conservação da Bacia do Alto Paraguai. Diagnóstico dos meios físico e biótico – Meio físico. V. II, Tomo I. Brasília, MMA, 334p.
- Pinto, J.R.R. & A.T. Oliveira Filho. 1999. Perfil florístico e estrutura da comunidade arbórea de uma floresta de vale no Parque Nacional da Chapada dos Guimarães, Mato Grosso, Brasil. Rev. Bras. Bot. 22: 53-67.
- Ramírez, S., R.L. Dressler & M. Ospina. 2002. Abejas euglossinas (Hymenoptera: Apidae) de la región Neotropical: Lista de especies con notas sobre su biología. Biota Colombiana 3: 7-118.
- Ratter, J.A. 1987. Notes on the vegetation of the Parque Nacional do Araguaia (Brazil). Notes R. bot. Gdn. Edinb. 44: 311-342.
- Redford, K.H. & G.A.B. Fonseca. 1986. The role of gallery forests in the zoogeography of the cerrado's non-volant mammalian fauna. Biotropica 18: 126-135.
- Rizzini, C.T. 1997. Tratado de fitogeografia do Brasil. Rio de Janeiro, Âmbito Cultural, 747p.
- Sick, H. 1966. As aves do cerrado como fauna arborícola. Anais Acad. Bras. Ciênc. 38: 355-363.
- Silva, J.M.C. 1996. Distribution of Amazonian and Atlantic birds in gallery forests of the Cerrado region, South America. Orn. Neotrop. 7: 1-18.
- Vanzolini, P.E. & E.E. Williams. 1970. South American anoles: Geographic differentiation and evolution of the *Anolis chrysolepis* species group (Sauria, Iguanidae). Arq. Zool. 19: 1-298.
- Williams, N.H. & C. H. Dodson. 1972. Selective attraction of male euglossine bees to orchid floral fragrances and its importance in long distance pollen flow. Evolution 26: 84-95.
- Willis, E.O. 1992. Zoogeographical origins of eastern Brazilian birds. Orn. Neotrop. 3: 1-15.
- Wittmann, D., M. Hoffmann & E. Scholz. 1988. Southern distributional limits of euglossine bees in Brazil linked to habitats of the Atlantic- and subtropical rain forest (Hymenoptera: Apidae: Euglossini). Entomol. Gener. 14: 53-60.

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