Scientific Electronic Archives
Issue ID: Sci. Elec. Arch. 8:1 (2015)
February 2015
Article link:
http://www.seasinop.com.br/revista/index.php?journal=SEA&page=article&op=view&path%5B%5D=164
Included in DOAJ, AGRIS, Latindex, Journal TOCs, CORE, Discoursio Open Science, Science Gate, GFAR, CIARDRING, Academic Journals Database and NTHRYS Technologies.

ISSN 2316-9281

Expanding the area of distribution of *Eufriesea fragrocara* Kimsey (Hymenoptera, Apidae) in the Brazilian Amazon Forest

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Abstract. The expansion of agriculture in the Arc of Deforestation causes deforestation and habitat loss. Euglossines sampling was done near Juruena River, Cotriguaçu municipality, northern Mato Grosso State. The bees were collected on understory and canopy using different baits. A total of 41 males of *Eufriesea fragrocara* Kimsey were collected. This is a rare species in collections and catalogued only in Huánuco (Peru), Napo (Ecuador), Ouro Preto D'Oeste and Ariquemes, Rondônia, Brazil. This new records increase the geographic distribution of *E. fragrocara* in 500 km to the western Amazon Basin, reducing the filling gaps in their distribution range in the Neotropics.

Keywords: Rainforest, Apinae, euglossines, orchid bees, species distribution.

Background

The Euglossini Latreille is represented by five genera, all of them are widespread in the Neotropics, except *Aglae* Lepeletier de Saint-Fargeau and Serville (Anjos-Silva et al., 2006; Silva et al., 2013). After the discovery in the late 1960s, that euglossine males could be attracted to pure chemicals synthesized in the laboratory, and similar to those produced by flowers of orchids (see Dodson et al., 1969) many species have been described, and studies on the biology, diversity, genetics and distribution of euglossines could be carried out in different locations, regardless of vegetation type (*e.g.* Dressler, 1982; Morato et al., 1992; Ramírez *et al*., 2010).

However, some species that were once attracted to chemical baits, have not been collected in recent decades in several locations studied (see Nemésio & Silveira, 2004). Some of these species belong to *Eufriesea* Cockerell. Currently 64 species have been described for this genus (see Ramirez et al, 2002; Ayala & Engel 2008), but many of these species have biological aspects and geographical distribution poorly known being thus considered rare and / or endemic to some regions (Dressler, 1982; Cameron, 2004).

Eufriesea fragrocara Kimsey, for example, is considered a rare and endemic to the Amazon Basin species. Although individuals of this species can be attracted to vanillin, one of the chemicals commonly used in studies involving euglossines, so far, there were only four records of its occurrence in the literature. After 25 years since some individuals were collected in Brazil, we again found this species and the first time we recorded its occurrence in the state of Mato Grosso, expanding its distribution ca 500 km East Amazon of Mato Grosso.

The *E. fragrocara* belongs to the *caerulescens* group and shows remarkable sexual dimorphism, the females show a strong violaceous coloration, similar to the *E. violacea* (Blanchard) females and the males present a vivid green color (Moure, 1999). The holotype and paratypes are males collected in the Pachitea region (10°02'S; 75°47'W), lowland Huánuco Province, Peru, using vanillin as attractant, and other specimens were subsequently collected in the Tambopata Reserved Zone, Madre de Dios, Peru (Dressler, 1985) and Napo Province (1°24'S; 77°43'W), Ecuador (Kimsey, 1977; Kimsey, 1982).

In Brazil, specimens of *E. fragrocara* were collected in Ouro Preto D'Oeste (10°42'S; 62°14'W) and Ariquemes (9°54'S; 63°21'W), municipalities of

Rondônia State (Moure, 1999). We found for the first time *E. fragrocara* in Mato Grosso State, Brazil, expanding its occurrence in ca. 2,300 km from the type locality and ca. 500 km from the Rondônia sites.

We surveyed orchid bees at the São Nicolau Farm (09°52'24"S; 58°13'17"W), municipality of Cotriguaçu (Fig 1), northern Mato Grosso, in an undisturbed Amazon Forest close to the Juruena River. The area is characterized as a terra firme dense rainforest inserted in the Brazilian Meridional Amazonia (Veloso et al., 1991) and is located in an agriculture expansion area named as Arch of Deforestation. The climate is tropical wet (Am) (Köppen, 1948), temperature annual average of 24 °C, humidity of 85%, and 2,300 mm of precipitation (see Anjos Silva, 2010 for additional information's).

The samplings were done in the Biodiversity Research Program (PPBio) plots, following the RAPELD method (see Costa & Magnusson, 2010 for details). Two field expeditions were made at October and December 2012 using 144 baited traps, distributed among 12 plots, being 12 traps in each plot, when six pure substances used as baits were installed in the understory and six in the canopy. The benzyl acetate, cineole, eugenol, methyl cinnamate, methyl salicylate and vanillin were used to attract the males, only one chemical for trap. The identified specimens were deposited in the Acervo Biológico da Amazônia Meridional (ABAM), Universidade Federal de Mato Grosso, Sinop, Mato Grosso, and in the Insect Collection of Laboratório de Abelhas e Vespas Neotropicais (LABEVE), in the Universidade do Estado de Mato Grosso, Cáceres, Mato Grosso.

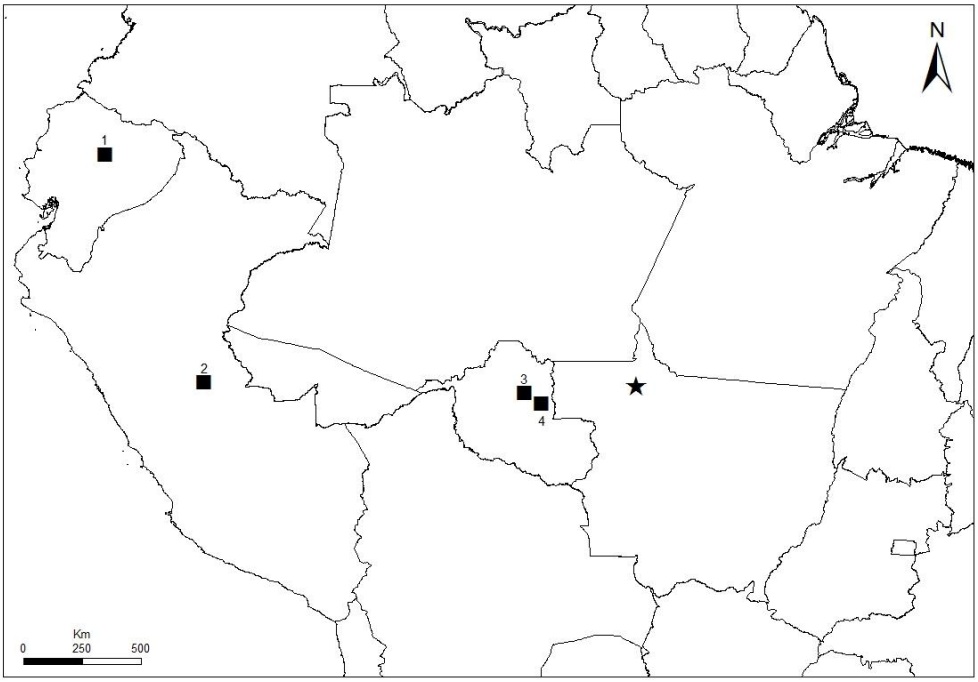

Fig 1. Distribution map of *Eufriesea fragrocara*. (1) Napo, Ecuador. (2) Huánuco, Peru. (3) Ariquemes, Rondônia, Brazil. (4) Ouro Preto do Oeste, Rondônia, Brazil. (★) Cotriguaçu, Mato Grosso, Brazil.

During the two field expeditions in 2012, a total of 41 males of *E. fragrocara* (Fig 2) were collected. Bees of the genus *Eufriesea* are known for its high seasonality, occurring during only 2-3 months per year, generally in the wet season (Kimsey, 1982; Anjos-Silva, 2006; Anjos-Silva, 2010). This was confirmed by one previous study developed in the same area during the dry season, when only three *E. pulchra* males were recorded (Anjos-Silva, 2010). However, excessive rainfall may also influence the number of individuals and species found. Of the 41 males of *E. fragrocara* collected, 39 occurred in October and only two in December. Was also in the month of October 1987 laying the only one known female of *E. fragrocara* was collected (Moure, 1999). Thus, future surveys focusing on euglossines, and particularly on *Eufriesea* species (Anjos-Silva, 2011), must be conducted on rainy season but avoiding periods of intense rainfall.

These new record for *E. fragrocara* increase its distribution in ca. 500 km to the East Amazon of Mato Grosso and shows that this species can be frequent and widespread than, reducing the filling gaps in its distribution. Our study shows the need of more studies on the biology of orchid bees, especially in the southern of Amazonia, region called Arch of Deforestation, where the species and habitat loss are evident (Fearnside, 2005).

In the absence of more data, this new record imposes a question: Does endemic Amazonian species exist? Hypothesis on endemic patterns to some other species was indicated by Nemésio and Silveira (2007), that proposed that 1/3 of orchid bees are endemic to the Amazon Forest. Endemic

patterns are important conservation issues to address, but this hypothesis face several problems in reason of the absence or scarcity of surveys.

Other species considered as rare species and restrict to Amazonian Basin, as *A*. *caerulea* and *E. flaviventris*, for example, was recently collected in several Amazon locations, but also on Pantanal (Anjos-Silva, 2006) and Cerrado (Anjos-Silva, 2010; Silva et al., 2013). Nevertheless, other studies employing potential distribution models (*e.g*. Hinojosa-Díaz et al., 2008; Silva et al., 2013) should be necessary to understand the real or potential distribution patterns of euglossines in the Neotropics and the factors that cause its distribution pattern.

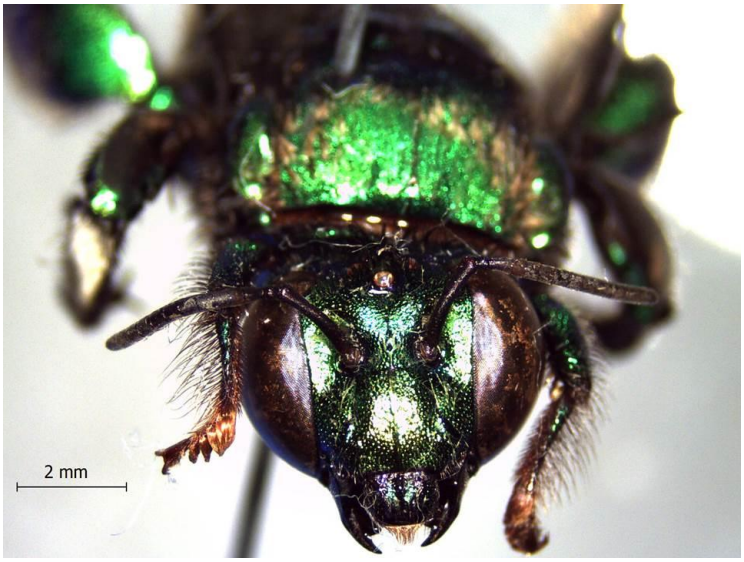

Fig 2. Frontal habitus of *Eufriesea fragrocara* species, male.

Acknowledgements

We thanks to Jonh David Bagnall did the English revision of this manuscript. To the Graduate Program in Environmental Sciences from UFMT, and Office Natural des Forêts ONF-Brasil, São Nicolau Farm, for kindly field assistance. The Brazilian Government, through IBAMA and ICMBio, provided license (#12778) to EJAS. EJAS was supported by FAPEMAT (Proc. n^{o} 737955/2008; and 258060/2010).

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