

Description of the male *Eufriesea nigrohirta* (Friese, 1899) (Hymenoptera: Apidae) with comments on the holotype, species biology and distribution

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Abstract

Eufriesea nigrohirta (Friese, 1899) was described based on a single female from Pará state, northern Brazil. However, no more specimens have ever been collected in northern Brazil, but several specimens which have often been attributed to this species have been collected above 1,000-m elevation in the “campos rupestres” of mountain ranges in Minas Gerais and Bahia states. A comparison of these females to the holotype of *E. nigrohirta* has shown that they belong, in fact, to this species. The male is described for the first time. A list of all plant species known to be visited by *E. nigrohirta* is also presented.

Keywords: *Eufriesea nigrohirta*; Hymenoptera; Apidae; Euglossina; distribution

Introduction

Eufriesea nigrohirta (Friese, 1899) is a medium sized (ca. 16 mm) member of Euglossina (Hymenoptera: Apidae: Apini). Friese (1899:142-143) described the species based on a single female, which is currently deposited at the Zoologisches Museum der Humboldt Universität, Berlin. Since its male was not known when Kimsey (1982) published her monograph on *Eufriesea*, *E. nigrohirta* is only included in her key for females. Now, its male has been known for more than a decade. Silveira & Cure (1993), for instance, assigned six males collected at Parque Estadual do Ibitipoca, southeastern Brazil, in February 1990, to this species. However, it has never been described.

Friese (1899:143) indicated “*Brasilia* (Para)” as the type locality for *Ef. nigrohirta* and it has been generally attributed to Pará state, northern Brazil (Moure, 1967; Kimsey, 1982; Kimsey & Dressler, 1986). Moure (1978) was even more precise, and indicated “Tipo e localidade típica: Holótipo fêmea, Belém, PA, BRASIL” (Moure, 1978:256), considering Belém city (Pará’s capital), near the coast, as the type locality. Later, however, Moure considered that “the type was erroneously labelled as collected in Pará” (pers. comm. to Fernando A. Silveira, in Silveira & Cure, 1993:51). In fact, except for the holotype, all the known individuals of this species have been captured at high elevations (above 1,000 m) in southeastern Brazil (Silveira & Cure, 1993; Silveira et al., 2002). Nevertheless, Ramírez et al.

(2002) included Brazil and French Guiana in the geographic range of the species, suggesting that French Guianan specimens were deposited at the University of Florida Herbarium. These specimens from French Guiana would represent an outstanding find, since they would be the specimens collected closest to the species presumed type locality.

Besides describing the male *E. nigrohirta*, the goals of this paper were to answer the following questions: (i) are the bees mentioned by Ramírez et al. (2002) from French Guiana actually male *E. nigrohirta*?; (ii) is the alleged type locality within the known geographic range of this species?; (iii) are the bees assigned by Silveira & Cure (1993) actually male *E. nigrohirta*?

Material and methods

Specimens identified as *E. nigrohirta* and deposited in the University of Florida Herbarium (UFH – Gainesville, USA), the Universidade Federal da Bahia (UFBA – Salvador, Brazil), the Taxonomic Collections of the Universidade Federal de Minas Gerais (UFMG – Belo Horizonte, Brazil), and the Instituto Nacional de Pesquisas da Amazônia (INPA – Manaus, Brazil) were borrowed for comparison with the holotype, which was borrowed from the Zoologisches Museum der Humboldt Universität (ZM – Berlin, Germany). Terga and sterna are referred to as T1, T2, T3, etc. and S1, S2, S3, etc.

Results

Only one specimen from French Guiana was studied. It was a male and was labeled “French Guiana: Sinnamary 12 Km SE; palm plantation rd. 28 Apr. 1982. D. Roubik coll No. 61”.

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However, it turned out not to be *E. nigrohirta*, but another species resembling *Eufriesea surinamensis* (Linnaeus). All other specimens received from the other institutions proved to be *E. nigrohirta*.

Description of the male

Eufriesea nigrohirta (Friese, 1899)

Euglossa (*Eumorpha*) *nigrohirta* Friese, 1899, Természetrájsi Füzetek, 22:142-143

Male labeled: “Dist.[rito] Capivari, 7178-21203”; “Serro, MG, Brasil, 28/12/2000, F. A. Silveira”; “*Eufriesea nigrohirta* (Friese, 1899), ♂, det. A. Nemésio 2003” (UFMG).

General color and vestiture (Fig. 1): Head metallic green, base of clypeus reddish-purple; top of head dark blue with purplish hues. Anterior third of thorax, dorsally, metallic green, covered with yellow setae, which seen from above form a characteristic yellow stripe at each side of the thorax. Scutellum and dorsal surface of T1 dark bluish-purple, with black setae. T2 metallic green basally and light red apically. T3-T7 predominantly red, with weak green hues; covered with yellow and black setae. Wings brown. Pubescence denser on thorax and sparser on metasoma.

Head (Fig. 3): Width 5.8 mm; superior interorbital distance 3.0 mm; scape 1.8 mm; eye length 3.9 mm; tongue in repose reaching S2; labial palpus with four palpomeres.

Body: Body length ca. 16.5 mm; anterior wing ca. 15 mm; scutellum 3.9 mm wide and 1.7 mm long; metasomal width 7.0 mm.

Legs (Fig. 4): Foretibia and forebasitarsus metallic dark-blue, fringed with long, dense, black hairs; mesotibia inflated; metatibia with hairy glandular scar reaching apex.

Other specimens examined: nine males, with the following data: “Abelhas da Zona Metalúrgica, MG, Pq. Mangabeiras, 0088-0334” and “Belo Horizonte, MG, Brasil, 17/01/1996, F. A. Silveira” (UFMG); “Abelhas da Zona Metalúrgica, MG, Serra da Moeda, 1826-5209” and “Brumadinho, MG, Brasil, 12/12/1997, F. A. Silveira” (UFMG); “755 [handwritten in indelible blue ink], Belo Horizonte, MG, Brasil, 29/10/1999, A. Nemésio, Barreiro Pequeno, PROBIO, 11:30h” (UFMG); “Lima Duarte, MG, Brasil, 20/02/[19]90, F. A. da Silveira, Pq. Florestal do Ibitipoca, 1469/5817” (UFMG); “idem, 1469/5818” (UFMG); “idem, 21/02/[19]90, 1483/5846” (UFMG); “idem, 1483/5845” (FLMNH); “Pai Inácio, 25/04/03, 11:03, Chapada Diamantina, BA, 12°27'41" S - 41°28'34" W, 1067 m” (UFBA); “Depto. Zool. UF-PARANÁ, Lagoa Santa (S.[erra] do Cipó), MG – BRASIL, *Euplusia nigrohirta* (Friese), Pe. J. S. Moure, 1986” (INPA).

Variation: two of the males listed above [“Lima Duarte, MG, Brasil, 20/02/[19]90, F. A. da Silveira, Pq. Florestal do Ibitipoca, 1469/5818” (UFMG), and “Lima Duarte, MG, Brasil, 21/02/[19]90, F. A. da Silveira, Pq. Florestal do Ibitipoca, 1483/5846” (UFMG)] differ from the male described for the following features: T1 coppery, T2 coppery basally and black apically and T3-7 entirely black (Fig. 2); only black setae present in T1-T3, black and yellow setae in T4-T7. From here on, the two variants of *E. nigrohirta* are referred to in this paper as “red morph” (the commonest type) and “black morph”.

Female

Although the holotype was fully redescribed by Moure (1978:254-256), the following additional comments on its coloration as compared to the females examined in this study are given:

Females of *E. nigrohirta* recently collected (see below) present a conspicuous red-bronze metasoma, particularly from the posterior half of T2 to T6 (the basal half of T2 is generally greenish and T1 is dark blue to violet) (Figs. 5-6). The male metasomatic color-pattern is very similar but, in females, the bronze hues are stronger. In the holotype, the coloration is greener than in recently collected specimens, suggesting that the bright red had faded (Figs. 7-8). This may be a consequence of this specimen's age (it was collected in 1890). Probably due to this, Kimsey (1982:68), when describing this species, wrote “T-II-VI green to coppery, depending on angle of light and specimen”. Interestingly, in the following paragraph, she stated that: “only the holotype was seen”! In all specimens examined here, but the holotype, contrary to the description by Kimsey, T2-T6 are consistently coppery (except for the basal half of T2, which is greenish), regardless of the angle of light and specimen.

Twelve females – two from Chapada Diamantina, Bahia state (elevation: 1,067 m, habitat: “campo rupestre”) and ten from different mountain ranges in the Cadeia do Espinhaço, Minas Gerais state (elevation: above 1,000 m, habitat: “campo rupestre”) – were compared to the holotype and all of them are identical to the type, except for the metasomatic coloration, as explained above.

Females examined: “Abelhas da Zona Metalúrgica, MG, Serra do Curral, 889-2266” and “Belo Horizonte, MG, Brasil, 22/12/1996, E. A. B. Almeida” (UFMG); “idem, 933-2383” (UFMG); “Abelhas da Zona Metalúrgica, MG, Serra da Moeda, 1865-5387” and “Brumadinho, MG, Brasil, 17/01/1996, F. A. Silveira” (UFMG); “idem, 1894-5467, 12/12/1997, E. A. B. Almeida” (UFMG); “idem, 1829-5225, F. Silveira & R. Carmo” (UFMG); “idem, 2918-8623, 03/01/1999, E. A. B. Almeida” (UFMG); “idem, 2866-8450”, 23/01/1999, F. A. Silveira” (UFMG); “Abelhas da Zona Metalúrgica, MG, Serra do Caraça, 7266-21521” and “Catas Altas, MG, Brasil, 22/01/2001, F. A. Silveira” (UFMG); “S.[erra] do Cipó, 9106-27246” and “Santana do Riacho, MG, Brasil, 19/12/1999, L. Zanette” (UFMG); “idem, 5872-1615, 01/01/2000, A. A. Azevedo” (UFMG); “Lençóis – BA, 24/04/03 – 14:00, Convolvulaceae [handwritten]” (UFMG), “idem” (UFBA).

Labels of the holotype

Moure (1978:51) mentioned two labels for the holotype. According to him, they had the following data: first label “Brasil – Pará – 1890”; second label “*Euglossa nigrohirta* Fr. ♀ 909 (*sic*) Friese det.” However, eight labels were counted on the holotype and some details are different from those in the description by Moure. From top to bottom, the labels had the following data: First label “Brasil – Pará – 1890”; second label “Coll. Friese”; third label “*Euglossa nigrohirta* – 1909 Fr. ♀ Friese det.”; fourth label “*Euplusia nigrohirta* – ♀ (Friese) – Det. J. S. Moure 1967”; fifth label “Type”; sixth label “Zool. Mus. – Berlin”; seventh label “*E. cordata* L. – det. Dressler”; eighth label “Zool. Mus. – Berlin”.

Description of the male Eufriesea nigrohirta



Figure 1 - Dorsal view of a male *Eufriesea nigrohirta* (red morph).



Figure 2 - Dorsal view of a male *Eufriesea nigrohirta* (black morph).



Figure 3 - Frontal view of the head of a male *Eufriesea nigrohirta* (red morph).



Figure 4 - Lateral view of a male *Eufriesea nigrohirta* (red morph).



Figure 5 - Dorsal view of a recently collected female of *Eufriesea nigrohirta*.



Figure 6 - Lateral view of a recently collected female of *Eufriesea nigrohirta*.



Figure 7 - Dorsal view of the holotype *Eufriesea nigrohirta*.



Figure 8 - Lateral view of the holotype *Eufriesea nigrohirta*.

Discussion

It is important to stress that the black morph was only collected at the Parque Estadual do Ibitipoca, southeastern Minas Gerais state. In this area, both morphs were collected; two of them at the same time on the same bait trap (bait used: *trans*-methyl cinnamate) [labels 1469-5817 (red morph) and 1469-5818 (black morph)]. This color variation may be a polymorphism for this species but other hypotheses should not be discredited, such as color alteration due to high temperatures when drying the bees, excess of ethyl acetate when the bees were killed, or other accidentally-induced chemical factors. Nonetheless, such a profound and permanent color alteration has never been observed by me in orchid bees. Besides, no physical damage, even to the setae, was observed in the two specimens of the black morph, reinforcing the hypothesis that this is a natural color variation.

No nest of this species was ever found and, in such a way, males and females were never collected from the same nest. However, as this is the only *Eufriesea* species found in the “campos rupestres” and due to the similarity of morphological features between males and females, I have no doubt to consider the males collected by Silveira & Cure (1993) and other specimens from high elevations in Minas Gerais and Bahia states as *E. nigrohirta*.

E. nigrohirta seems to be endemic to the “campos rupestres” and associations between this bee and plants of this domain were recorded (Faria, 1994; Carmo & Franceschinelli, 2002 – see also Table I). Carmo & Franceschinelli (2002:359) reported that *E. nigrohirta* is “the most efficient and almost exclusive pollinator of *Clusia arrudae* (Clusiaceae)” at Serra da Calçada, municipality of Brumadinho, Minas Gerais state. They state that the activity period of *E. nigrohirta* in that region (from November to February) is highly coincident with the blooming peak of *Clusia arrudae*, which is also endemic in the “campos rupestres” in southeastern Brazil. To date, *C. arrudae* is the only known source of resin for *E. nigrohirta*. Faria (1994) mentioned that this species visited flowers of *Kielmeyera petiolaris* (Clusiaceae) and E. L. Neves (pers. comm. to AN) collected several females and a male on flowers of *Merremia macrocalix* (Convolvulaceae), at Morro do Pai Inácio, Chapada Diamantina, Bahia state (12°27'41" S - 41°28'34" W; elevation 1,067 m).

Interestingly, in Bahia, the bees were collected in late April (E. L. Neves, pers. comm.). Male *E. nigrohirta* have been attracted to *trans*-methyl cinnamate, cineole, and methyl salicylate (pers. obs.) and a list of the plant species known to be visited by this bee and the resources exploited are given in Table 1.

The apparent strong association of this bee with the “campos rupestres” makes its occurrence in lowland forests of Pará, northern Brazil, improbable. It might occur at high elevations in Pará, such as at Serra dos Carajás, which has topography similar to that of the “campos rupestres” of eastern Brazil. M. L. Oliveira (pers. comm.) presented a similar hypothesis and even suggested that *E. nigrohirta* could occur at Campos do Ariramba, Pará state, since A. Ducke was there at the end of the nineteenth century and he sent several bee specimens to Friese. However, no data are available on who collected and/or sent this bee to Friese.

Conservation status

According to Silveira & Cure (1993:51), *E. nigrohirta* “seems to be a rare species...”. More bee samplings of the “campos rupestres” domain have been carried out since then and, although new local records of *E. nigrohirta* have been assigned, it is present at low frequencies relative to other bees and even to other orchid bees (such as *Euglossa melanotricha* Moure, which also occurs in “campos rupestres” domain). The currently known distribution range of *E. nigrohirta*, however, is quite considerable (almost the entire Cadeia do Espinhaço range, from Minas Gerais state to Bahia state, and other high-elevation areas in Minas Gerais state), and it appears not to be under a strong impact or threat presently. Nevertheless, members of *Eufriesea* genus are generally rarer than other orchid bees and active only during the wet season (Kimsey, 1982). For this reason, populations of such a habitat specialist should be continuously monitored.

The labels of the holotype

On the second label, Moure indicated “909 Friese det.”. When redescribing the holotype of *Eufriesea buchwaldi*, Moure made some comments on the description date and that present on the label of this specimen (Moure, 1978:256), but no comment at

Table 1 – Plants on which *Eufriesea nigrohirta* was recorded collecting resources.

Plant species	Sex of visiting bee	Resource	Source
<i>Clusia arrudae</i> Planchon & Triana (Clusiaceae)	Female	Resin	Carmo & Franceschinelli (2002)
<i>Kielmeyera petiolaris</i> Mart. & Zucc. (Clusiaceae)	Female	?	Faria (1994)
<i>Merremia macrocalix</i> (Ruiz & Pav.) (Convolvulaceae)	Male and Female	?	E. L. Neves (pers. comm.)
<i>Hyptis lippoides</i> Pohl ex. Benth (Lamiaceae)	Female	Nectar	F. A. Silveira (pers. comm.)
Unidentified Fabaceae	Female	Nectar	F. A. Silveira (pers. comm.)
<i>Cyrtopodium pallidum</i> Rchb. f. et Warm (Orchidaceae)	Male	Aromatic compounds	Specimen in the UFMG collection
<i>Stanhopea graveolons</i> Lindl. (Orchidaceae)	Male	Aromatic compounds	Specimen in the UFMG collection

all was made on the date present on the label of *E. nigrohirta*, suggesting that the number “909” was not associated to a date. In fact, the ♀ symbol, handwritten, is exactly over the number “1” of “1909” and, apparently, Moure did not realize that it indicated a date. Then, although the holotype was probably pinned in 1890 and species description published in 1899, the actual label assigning species determination by Friese was only added ten years later (1909).

The seventh label, handwritten “*E. cordata* L. – det. Dressler” (the type of *Euglossa cordata* is in Stockholm and nobody would interpret a female *E. nigrohirta* as *Eg. cordata*), deserves an explanation. Robert L. Dressler (pers. comm.) told me he had some type specimens of *Eufriesea* (including *E. nigrohirta*) from Berlin on loan some years ago and asked a colleague who was going to Europe to return these specimens. Apparently, this colleague had to mail the box with the bees from Netherlands to Germany and some specimens were damaged. He believes “the label must have been loose in the package and was then placed with a specimen of *Eufriesea*”.

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