First records of melanistic *Euglossa* (Hymenoptera: Apidae): evolutionary implications

Nemésio, A.[a]* and Martins, CF.*[b]

[a]*Instituto de Biologia, Universidade Federal de Uberlândia. Rua Ceará, S/N, Campus Umuarama, CEP 38400-902, Uberlândia, MG, Brazil*
[b]*Departamento de Sistemática e Ecologia, Centro de Ciências Exatas e da Natureza, Universidade Federal da Paraíba, CEP 58059-900 João Pessoa, PB, Brazil*
**e-mail: andre.nemesio@gmail.com*

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Neotropical orchid bees (Hymenoptera: Apidae: Euglossina) are conspicuous due to their vivid and metallic colors. Nevertheless, except for a few comments, usually concerning the appropriateness of using coloration as a taxonomic character (e.g. Rebêlo and Moure, 1996; Nemésio, 2005, 2009; Bembé, 2007), virtually nothing is known about color production and evolution in orchid bees. Based on studies on other organisms, it is hypothesized that orchid-bee setae are primarily pigment-colored, whereas integument due its color to chemical (pigments) and physical (light refraction or reflection) factors (Nemésio, 2009). Very few color aberrations have been noticed among orchid bees, most of them concerning color alteration of setae, especially in *Eulaema* (e.g. Nemésio, 2002). No integumental color alteration has been reported in orchid bees to date.

During surveys of orchid bees in northeastern Brazil (states of Paraíba and Pernambuco), two aberrant specimens of *Euglossa carolina* Nemésio, 2009 were collected. All characters (overall size, shape of metatiba, shape of mesotibial tufts, length of paraocular ivory markings and ivory markings on the scapes, punctation - see Figures 1 and 2) clearly correspond to those of ordinary *E. carolina* specimens, except integument coloration. The specimen from Pernambuco (Figure 1) is entirely blackish, whereas the specimen from Paraíba (Figure 2), presents blackish coloration especially on frons, mesosoma and metasoma (Figure 2A-C). On each tergum, only a tiny distal stripe of green coloration remains (Figure 2A-B).

Among Apini, vivid metallic colors are usually considered an apomorphy of Euglossina (Oliveira, 2006). Nevertheless, members of *Eulaema* usually lack metallic colors and present black integument, except for some metallic hues on terga of members of the subgenus *Eulaema* and on the distal three terga of *Eulaema (Apeulaema) nigrita* Lepeletier, 1841. It is noticeable, however, that *Eulaema* has never been considered a basal clade within Euglossina (see Kimsey, 1982, 1987; Michener, 1990; Engel, 1999; Oliveira, 2006; Ramírez et

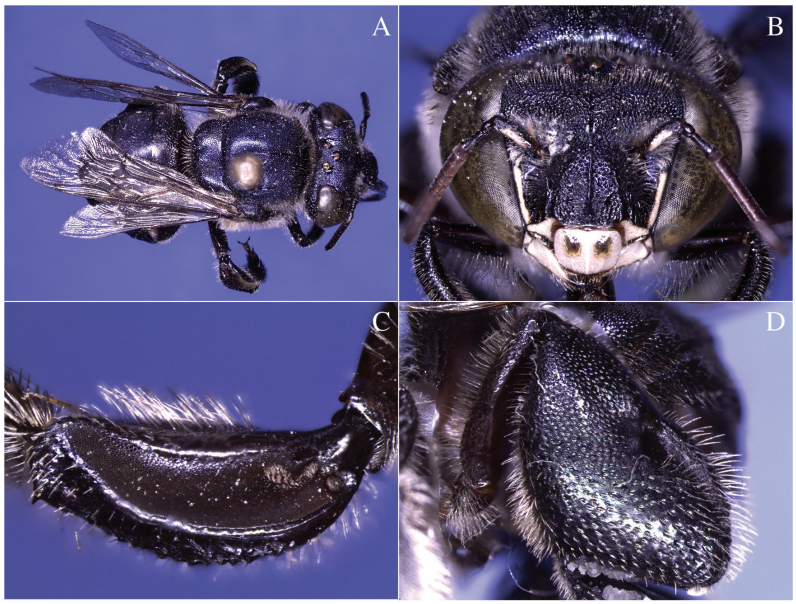

Figure 1 - Melanistic *Euglossa carolina* Nemésio, 2009 from Pernambuco, showing overall blackish integument. A: dorsal view; B: frontal view of face; C: ventral side of mesotibia; D: metatibia.

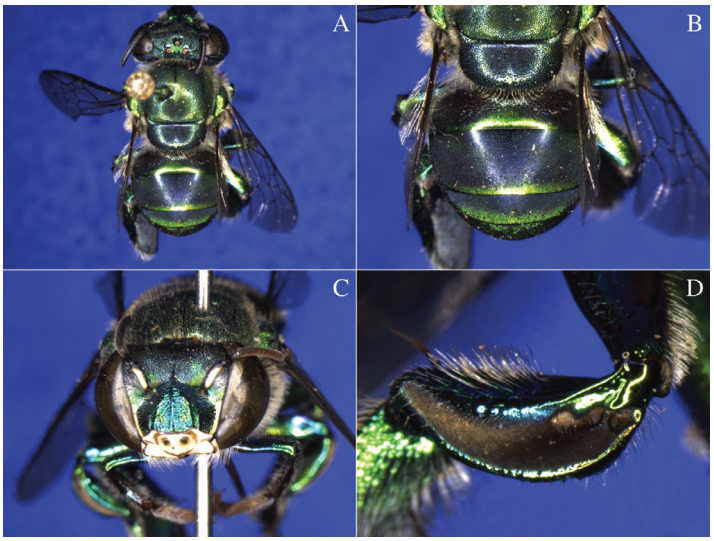

Figure 2 - Partial melanistic *Euglossa carolina* Nemésio, 2009 from Paraíba, showing blackish integument on frons, mesosoma and metasoma. A: dorsal view; B: scutellum and metasoma; C: frontal view of face; D: ventral side of mesotibia.

al., 2010). On the contrary, genera comprising only species with metallic colors have usually been presented as potential basal clades, as *Aglae* (see Kimsey, 1982; Oliveira, 2006) and *Exaerete* (see Ramírez et al., 2010). If our current knowledge is correct, it is highly possible that the common ancestor of all orchid bees presented metallic coloration, and the blackish integument of *Eulaema*, some *Eufriesea* and even some *Euglossa* belonging to the *E. decorata* Smith, 1874 reveals the loss of this character in most (*Eulaema*) or in some parts (*Eufriesea* and *E. decorata* and allies) of their integuments.

The record of these mutant blackish *E. carolina* is the first evidence that reversion of metallic green to blackish integument is possible and occurs naturally, supporting the current view tha *Eulaema* is possibly a derived clade within Euglossina. Hopefully, this finding can call attention to this mostly unexplored and outstanding feature of orchid bees: production and evolution of colors.

The specimens here reported are currently deposited at the Entomological Collection of the `Universidade Federal de Minas Gerais', with the following label data: (i) "Igarassu, PE, Ref. Charles Darwin, Brasil, 02.02.2000, C. Schlindwein leg." and "*Euglossa* (*Euglossa*) sp. n. 2, Moure det. 2000"; (ii) "UFPB Campus I 14431-42596" and "João Pessoa, PB, Brasil, 17/01/2004, D.M. e Silva" and "*Euglossa (Euglossa) carolina*, Nemésio, 2009, A. Nemésio det. 2009".

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