



***Coarazuphium tapiaguassu* (Coleoptera: Carabidae: Zuphiini), a new Brazilian troglobitic beetle, with ultrastructural analysis and ecological considerations**

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Abstract

Coarazuphium tapiaguassu sp. n. was collected in caves SL 30, SL 31 and SL 35 located in Curionópolis (Pará, Brazil). *C. tapiaguassu* is readily differentiated by the absence of setae on the dorsal surface of the head close to the posterior margin, as the other species of the genus show one, two or three pairs of setae. Taxa of *Coarazuphium* exhibit advanced troglobiomorphic characters in comparison to other Brazilian cave beetles. Increased extra-optic sensory structures, presence of particular sensilla, and sensory and gustatory receptors are characters not detected under routine microscopy and thus require ultrastructural methods for their study. Similar analyses are needed in other epigeal Zuphiini species for a better interpretation of their functional meaning.

Key words: *Coarazuphium*, ground beetle, cave dwelling, sensilla, antenna, mouthparts, legs

Introduction

Few Zuphiine species have been reported with adaptive features to the subterranean environment. To date, only four genera featuring troglobitic species have been described. The first record was from the genus *Ildobates*, with troglobitic species *Ildobates neboti* (Español *et al.*, 1966). Recently, molecular data have supported the inclusion of *Ildobates neboti* into Zuphiini (Ribera *et al.*, 2006). Moore (1995) recorded two other new genera of troglobitic Zuphiini—*Speozuphium* and *Speothalpius*—each featuring a new species—*Speozuphium poulteri* and *Speothalpius grayi*, respectively. Both were found in the cave systems of the Nullarbor Plain, Australia. The fourth genus, *Coarazuphium*, is found exclusively in Brazil, with five troglobitic species already described. They are: *C. tessai*, *C. cessaima*, *C. bezerra*, *C. pains* and *C. formoso* (Godoy & Vanin, 1990; Gnaspini *et al.* 1998; Álvares & Ferreira, 2002; Pellegrini & Ferreira, 2011).

Our objective is to describe a new species of troglobitic Zuphiini, *Coarazuphium tapiaguassu*, found in iron ore caves located in the ferriferous formation of Carajás (Pará State, Brazil). This description focuses on an ultrastructural analysis of the antennae, mouthparts, and legs, which were compared with the only species of the same genus (*C. formoso*) for which those data are available. According to Moldovan *et al.* (2004), these structures indicate the degree of adaptation to life in caves. They also provide adequate criteria to identify cave species with otherwise similar morphology.

Material and methods

Twenty specimens were collected in three caves: SL 30 Cave (E 0650160m/N 9339706m; 7 specimens), SL 31 Cave (E 0650189m/N 9339714m; 3 specimens) and SL 35 Cave (E 0650799m/N 9339330m; 10 specimens), all located in Curionópolis, Pará, Brazil.

Carabids were thoroughly searched visually throughout the base and walls of the caves. Special attention was also paid to decaying vegetation (e.g. leaves and tree bark), animal carcasses, and vertebrate feces, though this