

An unusual prey record for *Astata lugens* Taschenberg (Hymenoptera, Apoidea, Astatidae)

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Abstract

Astatid wasps are referred to in literature as specialized predators of hemipterans. We present an unusual prey record for the genus *Astata* in a Cerrado area (Savannah), at Chapada dos Veadeiros National Park, Goiás State, Brazil. We collected one specimen of *Astata lugens* Taschenberg carrying an immature cricket (Gryllidae) as prey.

Keywords

Apoidea Wasps, Digger Wasp, Gryllidae, Neotropical Savannah, Orthoptera, Prey association

Introduction

Wasps of the family Astatidae are specialized predators of Hemiptera (Bohart and Menke 1976; Hanson and Menke 1995; O'Neill 2001; Amarante 2006). Females dig a nest in the soil, which ends in single or multiple cells. They hunt hemipterans that they completely paralyze, to feed their offspring (Evans 1957).

This family has 161 species described in four genera: *Astata* Latreille, 1796; *Diploplectron* Fox, 1893; *Dryudella* Spinola, 1843; and *Uniplectron* Parker, 1966 (Pulawski 2018). These four genera were traditionally placed in the subfamily Astatinae (Bohart and Menke 1976), however, Sann et al. (2018) elevated Astatinae to full family rank.

The only genus present in South America is *Astata*. This genus is distributed world-wide except absent in Australia. It is the most diverse genus in the family, with 82 described species (Pulawski 2018). Twenty-five species have been recorded from the Neotropical Region, ten species from South America, and at least six from Brazil (Parker 1968; Nascimento and Overall 1980; Amarante 2002, 2005).

The prey of this wasps are immature and adult hemipterans; of *Astata* mainly Pentatomidae (Evans 1957), but other Hemiptera families as well, e.g., Acanthosomatidae, Cydnidae, Lygaeidae, and Scutelleridae (Tsuneki 1947; Herting 1971; Krombein 1972; Bitsch et al. 2007; Gros 2008). There are no prey records for *Astata lugens*, and herein we present our observations on the prey of this species, which is highly unusual for the genus.

Material and methods

The observation was carried out on the border at Chapada dos Veadeiros National Park, São Jorge, Alto Paraíso de Goiás, Goiás State, Brazil (-14.160958° -47.791376°, 1,086 m a.s.l.) (Figure 1). The vegetation is composed mainly of tropical savannah (Cerrado). This area is considered a biodiversity hotspot (Cardoso da Silva and Bates 2002), with a high rate of endemism (Mendonça et al. 1998). According to Morrone (2014), this area is located in Cerrado Biogeographical Province, at Chacoan sub-region. Following the Köppen's (1936) classification, the predominant climate is tropical with dry winter (Aw) (Alvares et al. 2013). The annual average temperature is 25°C, and annual average precipitation is 1,600 mm. The rainy season runs from October to April, the dry season extends from May until September (Nimer 1989; Felfili et al. 2007).

Results

On April 07 2009, around sunset, on a trail in Cerrado *sensu stricto* formation, two of us (BMT and VC) observed a wasp carrying her prey. This individual was grasping the prey by the antennal base with her mandibles, walking forward, jumping, and flying short distances close to the soil level. The wasp and her prey were caught using a transparent plastic bag from a cigarette pack, the only thing that we had in our hands at that moment. We did not find the nest due to our anxiety to collect the prey. The voucher specimens of both specimens were pinned and deposited in the Hymenoptera Collection of the Museu da Biodiversidade at Universidade Federal da Grande Dourados (MuBio/UFGD), with number: Hym-00165-S.

The wasp was identified using the key of Parker (1968). The cricket specimen (Figures 2 A, B, and C) was determined as a juvenile gryllid with keys of Triplehorn and Johnson (2005). The identification was confirmed by Dr. Edison Zefa at Universidade Federal de Pelotas, Rio Grande do Sul State, Brazil.

The wasp agrees with Parker's (1962, 1968) diagnosis of *Astata lugens* Taschenberg, 1870 in the following: 1. second labial palpal segment asymmetrical (Figure 3A); 2.

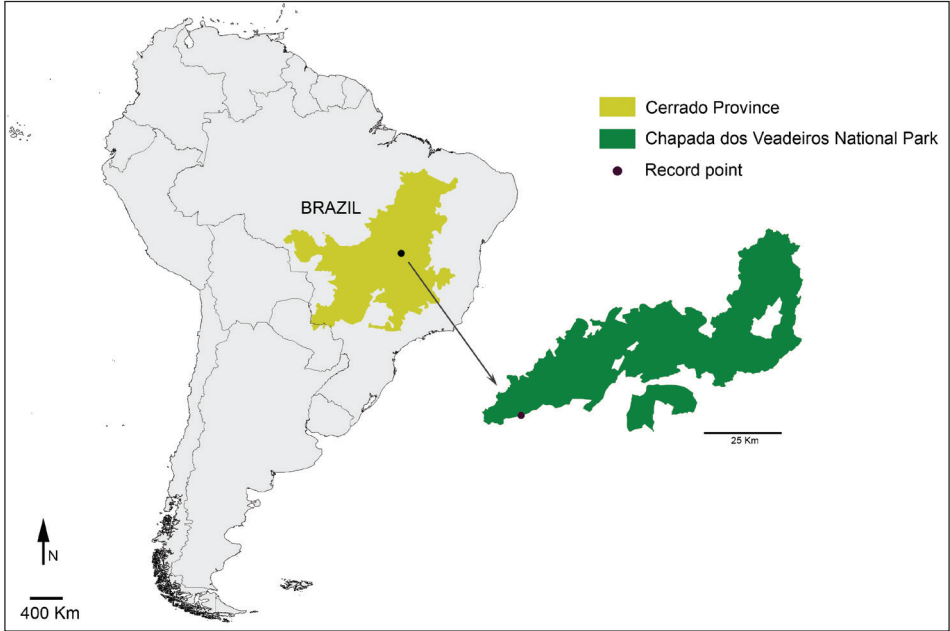


Figure 1. Map illustrating South America with Cerrado Province (Morrone 2014), and the observation point at Chapada dos Veadeiros National Park.



Figure 2. Habitus of juvenile Gryllidae, prey of *Astata lugens* Taschenberg, 1870; [BRASIL: Goiás, PN Chapada dos Veadeiros, -14.160958°, -47.791376°, 1.086 m, v.2009, Silvestre R. et al. col., MuBio-UF-GD Hym-00165-S] **A** head frontal, scale bar: 500 µm **B** dorsal, scale bar: 1 mm **C** lateral, scale bar: 1 mm.

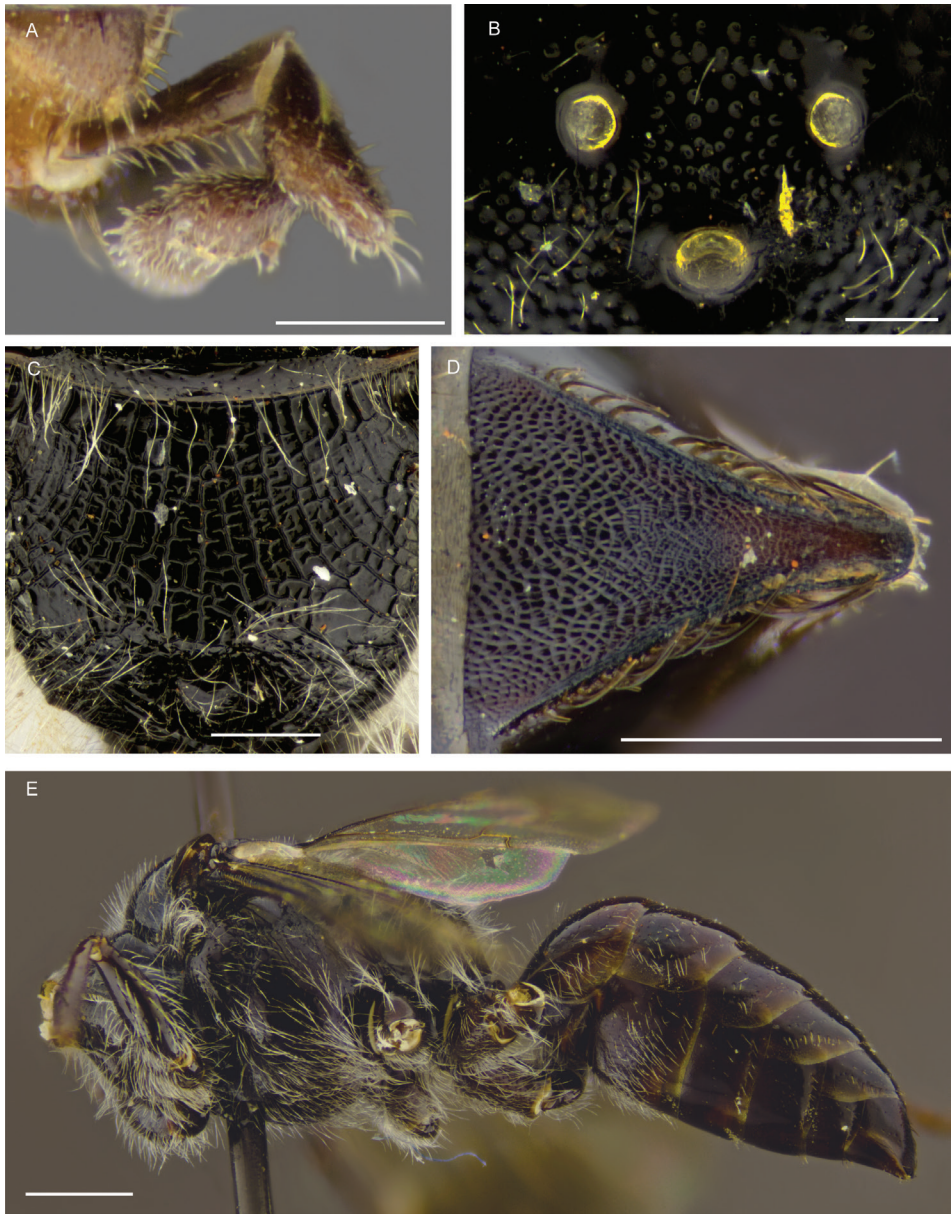


Figure 3. *Astata lugens* Taschenberg, 1870 ♀ [BRASIL: Goiás, PN Chapada dos Veadeiros, -14.160958° -47.791376°, 1.086 m, v.2009, Silvestre R. et al. col., MuBio-UFGD Hym-00165-S] **A** labial palpus, scale bar: 200 µm **B** ocellar region, scale bar: 200 µm **C** propodeal enclosure, scale bar: 500 µm **D** pygidial plate, scale bar: 500 µm **E** thorax and abdomen in lateral view, scale bar: 1 mm.

interocellar area with about 50 punctures (Figure 3B); 3. propodeal enclosure irregularly reticulate-striate (Figure 3C); 4. pygidial plate bordered with conspicuous setae recurved posteriorly (Figure 3D); 5. body surface sparsely pitted (Figure 3E); 6. gaster



Figure 4. *Astata lugens* Taschenberg, 1870 ♀ [BRASIL: Goiás, PN Chapada dos Veadeiros, -14.160958° -47.791376°, 1.086 m, v.2009, Silvestre R. et al. col., MuBio-UFGD Hym-00165-S] **A** terga I and II, scale bar: 500 µm **B** sternum II, scale bar: 200 µm **C** wings, scale bar: 1 mm.

finely micropunctate (Figure 4A); 7. sternum II slightly humped (Figure 4B); 8. wings hyaline, forewing with a light brown band on marginal cell (Figure 4C); 9. prosternum, mesosternum, metasternum, coxae, sternum I and II densely covered with white long setae (Figure 3E). The only difference is that the gaster and legs are fuscous/brown, not completely black as described by Parker.

Discussion

The biological records for *Astata* species comes from North America, Central America and Eurasia. This prey record of a different order of insects is completely unusual for this genus; expose the lack of knowledge about the biology of Neotropical species.

This record may have been an occasional prey, or it is possible that in the Neotropical Region, this wasp genus exhibits different trophic interactions of species from Holarctic origin. To elucidate this hypothesis, objective studies must be carried out.

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