Scientific Note

New records of predation of Harpactorinae (Hemiptera: Reduviidae) over Euglossini and Xylocopini bees (Hymenoptera: Apidae) in Brazil

Nuevos registros de depredación de especies de Harpactorinae (Hemiptera: Reduviidae) en abejas Euglossini y Xylocopini (Hymenoptera: Apidae) en Brasil

Alberto Luiz Marsaro Júnior[1], Danielle Storck-Tonon[2], Rosana Halinski[3], Gersonval Leandro Silva Monte[4] and Hélcio Reinaldo Gil-Santana[5*]

[1]Embrapa Trigo, Passo Fundo, Rio Grande do Sul, Brazil. E-mail: alberto.marsaro@embrapa.br. [2]Universidade do Estado de Mato Grosso, Programa de Pós-graduação em Ambiente e Sistemas de Produção Agrícola, Rod. MT 358, km 7 - Jardim Aeroporto, Tangará da Serra, MT. 78300.000, Brazil. E-mail: danistorck@gmail.com. [3]Pontifícia Universidade Católica do Rio Grande do Sul - Escola Politécnica, Porto Alegre, Rio Grande do Sul, Brazil. E-mail: ro.halinski@gmail.com. [4]ESBAM – Escola Superior Batista do Amazonas, Manaus, Amazonas, Brazil. E-mail: gersonvall@yahoo.com.br. [5]Laboratório de Diptera, Instituto Oswaldo Cruz, Av. Brasil, 4365, 21040-360, Rio de Janeiro, Brazil. *helciogil@uol.com.br*

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Abstract. The predatory activities of *Apiomerus duckei* Costa Lima, Seabra & Hathaway, 1951, *Apiomerus pilipes* (Fabricius, 1787) and *Apiomerus luctuosus* Costa Lima, Seabra & Hathaway, 1951 (Hemiptera: Reduviidae: Harpactorinae: Apiomerini) on orchid bees (Hymenoptera: Apidae: Apinae: Euglossini) in odoriferous traps in the influence area of Santo Antônio Hydroelectric Power Plant, Rondônia State, Brazil, and of *Cosmoclopius annulosus* Stål, 1872 (Hemiptera: Reduviidae: Harpactorinae: Harpactorini) on the bee *Ceratina rupestris* Holmberg, 1884 (Hymenoptera: Apidae: Apinae: Xylocopini: Ceratinina), in an experimental area cultivated with canola in Passo Fundo, Rio Grande do Sul State, Brazil, are recorded by the first time.

Key words: Assassin bugs; behavior; Heteroptera; pollinators.

Resumen. Se registran por primera vez las actividades depredadoras de *Apiomerus duckei* Costa Lima, Seabra y Hathaway, 1951, *Apiomerus pilipes* (Fabricius, 1787) y *Apiomerus luctuosus* Costa Lima, Seabra y Hathaway, 1951 (Hemiptera: Reduviidae: Harpactorinae: Apiomerini) sobre abejas orquídeas (Hymenoptera: Apidae: Apinae: Euglossini) en trampas odoríferas ubicadas en el área de influencia de la Central Hidroeléctrica Santo Antônio (HEP), Estado de Rondônia, Brasil, y de *Cosmoclopius annulosus* Stål, 1872 (Hemiptera: Reduviidae: Harpactorinae: Harpactorini) sobre la abeja *Ceratina rupestris* Holmberg, 1884 (Hymenoptera: Apidae: Apinae: Xylocopini: Ceratinina), en un área experimental cultivada con canola en Passo Fundo, Rio Grande do Sul State, Brasil.

Palabras clave: Chinches asesinas; comportamiento; Heteroptera; polinizadores.

Containing more than 7,000 species described, Reduviidae, a large group of predatory insects, is one of the three families with more species of the suborder Heteroptera of the

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order Hemiptera (Gil-Santana *et al*. 2015). About 24 subfamilies are recognized, among which, Harpactorinae has the greatest number of genera and species of Reduviidae in the Neotropical region and worldwide. The harpactorines are diurnal and found over plants where they catch their prey, being polyphagous in general. Only two of the seven recognized tribes of the subfamily, Apiomerini, and Harpactorini, occur in the New World (Gil-Santana *et al*. 2015; Schuh & Weirauch 2020).

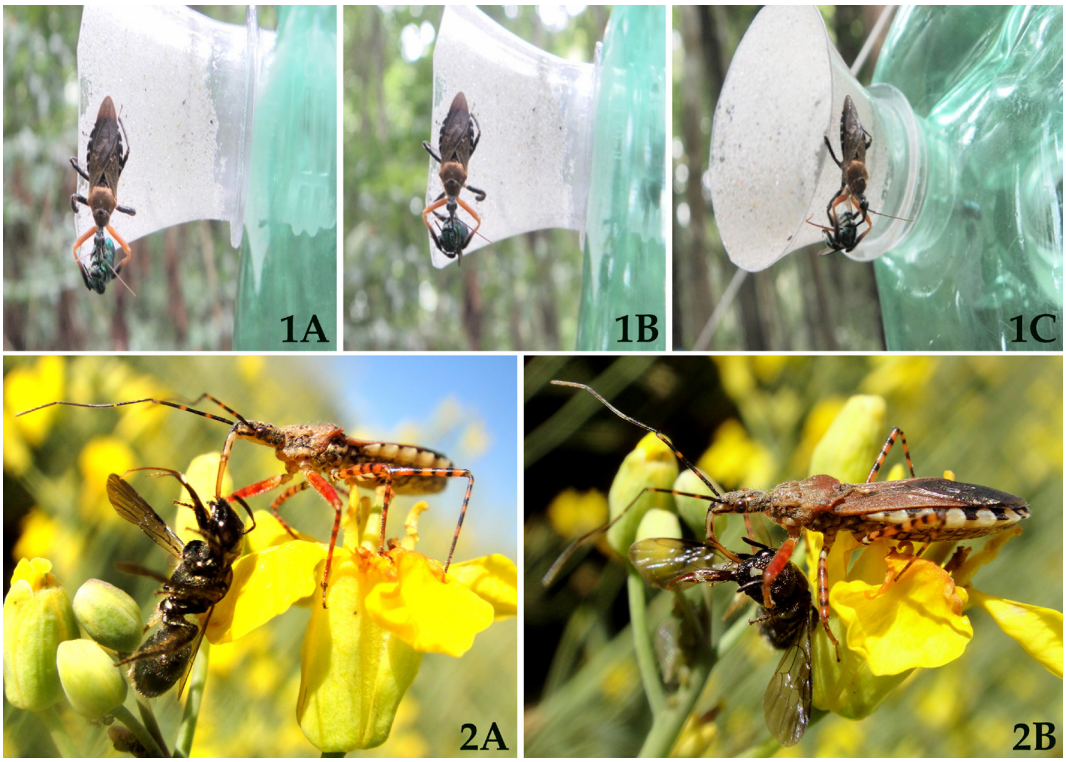
Currently, there are 12 extant genera in Apiomerini, among which *Apiomerus* Hahn, 1831 is the more species-rich genus, containing more than 100 species (Gil-Santana *et al*. 2003, 2015; Berniker *et al*. 2011). Some *Apiomerus* species are known to use sticky material (resins) on the anterior tibia to hold prey (Forero *et al*. 2011). Although Apiomerini, and specially *Apiomerus* species have been observed to be polyphagous, they are commonly known as "bee assassins" given the numerous reports by authors on their substantial predatory activity on bees (Hymenoptera: Apidae); such as *Apis mellifera* Linnaeus, 1758 (Apinae: Apini) (Gil-Santana *et al*. 2015; Marques *et al*. 2003). In addition, some species of *Apiomerus* resemble meliponine bees (Apinae: Meliponini) (Hogue 1993) and are suspected to mimic them (Gil-Santana *et al*. 2003) and undoubtedly prey on them (Silva & Gil-Santana 2004; Gil-Santana *et al*. 2015). Gil-Santana (2002) and Gil-Santana *et al*. (2003) provided summaries of reports of predation of *Apiomerus* spp. upon insects in general and Marques *et al*. (2003) of them upon bees.

Orchid bees (Apinae: Euglossini) have a mainly Neotropical distribution; males of this group visit flowers of various plant families to collect odoriferous substances, in particular Orchidaceae (Roubik & Hanson 2004). Therefore, synthetic odoriferous substances similar to those produced by these sources have been used to attract the male bees belonging to this group (Williams & Whitten 1983). Thus, these traps can be a good opportunity for bee predators. During Entomological Monitoring conducted by Probiota Consultoria Ambiental in the influence area of Santo Antônio Hydroelectric Power Plant, which is located on the Madeira River in Porto Velho, Rondônia, Brazil (8°50'17"-9°27'38" S / 64°3'55"- 64°23'0" W), *Apiomerus* species were observed preying on Euglossini bees in traps made with two-liter plastic bottles (Figs. 1A-C), which contained four aromatic compounds (cineole, methyl cinnamate, methyl salicylate, and vanillin) that were used to attract the male bees. At each site, a set of four traps were placed between 7 am and 8 am on the first day of sampling, inspected on the second day, and removed on the third day. The traps were hung approximately 1.7 m above the ground, with at least a 1.5 m distance between them, in the rainy and dry seasons between November 2010 and December 2011.

During removal of the traps, apiomerines both within and at the entrances of the traps were collected. All specimens collected are deposited in the Coleção Entomológica do Instituto Nacional de Pesquisas da Amazônia (INPA) and the species of *Apiomerus* were identified following Costa Lima *et al*. (1951). Twenty individuals belonging to the genus *Apiomerus* were captured inside the traps. *Apiomerus pilipes* (Fabricius, 1787) was the most abundant species with 13 specimens collected, including nine males and four females. Silva & Gil-Santana (2004) observed only females of *A. pilipes* preying on bees at a meliponary in Manaus, state of Amazonas, Brazil. *Apiomerus duckei* Costa Lima, Seabra & Hathaway, 1951 was represented by four specimens, including three males and one female. *Apiomerus luctuosus* Costa Lima, Seabra & Hathaway, 1951 was represented by one female and two males. Among the individuals captured, 12 were collected in the traps together with the bees and, thus, predatory activity was not able to be verified. In addition to those caught inside the traps, other eight specimens were captured alive while waiting for bees at trap entrances (Figs. 1A-C).

All bees predated were males and belonged to the genus *Euglossa* Latreille, 1802, which are small in size (between 8-18 mm). The following species that were observed as prey - *Euglossa augaspis* Dressler, 1982 (1), *Euglossa avicula* Dressler, 1982 (2), *Euglossa modestior*

Dressler, 1982 (1), *Euglossa mourei* Dressler, 1982 (3) and *Euglossa prasina* Dressler, 1982 (1) were identified by the second author (DS-T) using taxonomic keys. The other four genera of euglossine (*Aglae* Lepeletier & Serville, 1825, *Eulaema* Lepeletier, 1841, *Eufriesea* Cockerell, 1908 and *Exaerete* Hoffmannsegg, 1817) caught in traps were larger in size, which may have hindered capture by the predator. All *Apiomerus* observed were stationed at the entrances of traps, awaiting the arrival of the bees. Using an elevated first pair of legs, the apiomerines captured and manipulated the bees and then inserted the stylets into the membrane between the thorax and head in four cases, between thorax and metasoma in one case and between tergites in three cases. To our knowledge, no previous study has been published involving Apiomerini predation on Euglossini (orchid bees), being this the first record of this predation.



Figures 1-2. 1A-C. *Apiomerus* sp. preying on an orchid bee in an odoriferous trap in the Santo Antônio Hydroelectric Plant (HEP) area of influence, Rondônia State, Brazil (Photographs by Bárbara Oliveira De Loreto). 2A-B. Female of *Cosmoclopius annulosus* preying on *Ceratina rupestris* on canola flower (Photographs by A. L. Marsaro Júnior). / *Apiomerus* sp. depredando sobre una abeja orquídea en una trampa odorífera en el área de influencia de la Central Hidroeléctrica Santo Antônio (HEP), Estado de Rondônia, Brasil (Fotografías de Bárbara Oliveira De Loreto). 2A-B. Hembra de *Cosmoclopius annulosus* alimentandose de *Ceratina rupestris* en una flor de canola (Fotografías de A. L. Marsaro Júnior).

Regarding Harpactorini, it is the tribe with the greatest number of species in Reduviidae, comprising more than 50 genera in the Neotropical region (Schuh & Weirauch 2020; Gil-Santana *et al*. 2015). Among them, *Cosmoclopius* Stål, 1866, currently including eight species, is largely distributed from Curaçao to Argentina, including Brazil (Melo & Coscarón 2004; Varela & Melo 2021). The species of *Cosmoclopius* are considered polyphagous predators. *Cosmoclopius nigroannulatus* Stål, 1872 was associated with tobacco (*Nicotiana tabacum* L.) plantations in Brazil, with several records of preys summarized by several authors, *e.g*.,

Jahnke *et al*. (2002) and Marques *et al*. (2006). Concerning *Cosmoclopius annulosus* Stål, 1872, the species was described from specimens from Santa Catarina, Brazil (Stål, 1872), and later recorded in Argentina (Melo & Coscarón 2004). Besides the geographical distribution, information about this species is scarce.

In August 2015, while collecting data on bees in an area grown with canola, *Brassica napus* L. var. *oleifera*, Hyola 433 hybrid, in the experimental area of Embrapa Wheat, Passo Fundo, state of Rio Grande do Sul, Brazil, 28°14' S / 52°24' W, it was observed a reduviid predating a bee on a canola flower from this crop (Figs. 2A-B). The Reduviidae, a female, was identified by the last author (HRG-S) as *Cosmoclopius annulosus* Stål, 1872 based on Stål (1872), Cobben & Wygodzinsky (1975), and Melo & Coscarón (2004), and the bee was identified by the third author (RH) as *Ceratina rupestris* Holmberg, 1884 (Apinae: Xylocopini: Ceratinina), based on comparison with vouchers deposited in the Coleção de Abelhas, do Museu de Ciência e Tecnologia, da Pontifícia Universidade Católica do Rio Grande do Sul (MCT-PUCRS). The specimen of *C. annulosus* will be deposited in the collection of the Museu Nacional da Universidade Federal do Rio de Janeiro (MNRJ), while the bee was deposited at the MCT. This is the first record of predation of *Ceratina rupestris* by *Cosmoclopius annulosus*. *Ceratina* bees nest at the ends of arboreal branches (Michener 2007), a fact that signals the importance of forest remnants around canola crops for the presence of these and other bee species in the cultivation.

Although harpactorines are considered as polyphagous in general, it is important to document previously unrecorded predatory activities of some species on certain insects, such as bees, as presented here, to enhance the knowledge of the feeding preferences and behavior of these reduviids.

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