

## Scientific Note

# *Heimbra* Cameron, 1909 (Hymenoptera, Eurytomidae, Heimbrinae): new geographical records on Central Brazil

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**Abstract.** This study focused on species of *Heimbra* Cameron, 1909 (Hymenoptera, Eurytomidae, Heimbrinae), a small genus of chalcid flies poorly represented in entomological collections, from two Brazilian savanna areas in Central Brazil. The surveys were carried out with Malaise, Moericke, light traps and sweep net and lasted from February 2018 to May 2019. Herein we provide new geographical records to *H. opaca* (Ashmead, 1894) and *H. parallela* Stage & Snelling, 1986.

**Keywords:** Brazilian savanna, Buprestidae, Chalcidoidea, Curculionidae, extension of geographic range.

The delimitation of the species distribution area is essential for understanding biodiversity and conservation (Myers et al. 2000; Lamoreux et al. 2006). The range of a species is a complex expression of its ecology and evolutionary history (Brown 1995) and four are the factors that determine its distribution: the biotic and abiotic conditions, its dispersion capacity and its ability to adapt to new conditions (Soberón & Peterson 2005). Almost nothing is known about the geographic distribution of the vast majority of the legion of half a million of species of chalcid flies that may exist, of which only about 22,000 are documented, largely because chalcidoids are minute in size (Noyes 2019).

*Heimbra* Cameron, 1909 (Hymenoptera, Eurytomidae, Heimbrinae) is a small genus of chalcid flies poorly represented in entomological collections (Fernandes et al. 2012). It was described based on *H. acuticollis* Cameron, 1909 and, today, is composed of six extant species: *H. opaca* (Ashmead, 1894), *H. acuticollis*, *H. bicolor* Subba Rao, 1978, *H. nigra* Subba Rao, 1978, *H. pallida* Stage & Snelling, 1986 and *H. parallela* Stage & Snelling, 1986 (Stage & Snelling 1986), most of them distributed exclusively in Neotropical region, except for *H. opaca*, which extends further north reaching central and west regions of the USA (Stage & Snelling 1986; Fernandes et al. 2012; Noyes 2019). Probably species of *Heimbra* act as parasitoids of stem-boring Buprestidae and Curculionidae (Coleoptera) (Stage & Snelling 1986) and nothing more is known about its biology.

The examined material was composed of specimens of *Heimbra* sampled between February 2018 and May 2019 in areas of Brazilian savanna at Parque Nacional da Chapada dos Veadeiros (PNCV), in Alto Paraíso de Goiás, State of Goiás and at Parque Nacional Grande Sertão Veredas (PNGSV), in Chapada Gaúcha, State of Minas Gerais, both in Central Brazil. Studied specimens were deposited at Coleção Entomológica do Laboratório de Sistemática e Bioecologia de Predadores e Parasitoides of the Instituto Biológico (LRRP), in Ribeirão Preto, Brazil (N.W. Perioto, curator).

In areas of Brazilian savanna at PNCV two sets of five Townes' style Malaise traps (Townes 1972) were installed, with 96% ethanol solution as a preservative to collect continuously over the study period; in both sets the Malaise traps were separated from each other by at least 50 m. The insects were removed every two weeks. The first set was located in an area without anthropic action (14°08'36"S, 47°46'0.4"W, ~550 m above sea level [asl]) (Fig. 1) and the second one in an area that suffered a severe fire in November 2016 (14°07'44"S, 47°44'0.4"W,

~550 m asl) (Fig. 2).

In an area of Brazilian savanna without anthropic action at PNGSV it was installed one set of five Malaise traps (15°10'30.6"S, 45°43'16.62"W, ~550 m asl) (Fig. 3); the trap model used, preservative solution, conditions of installation and removal of insects were the same as PNCV. At PNGSV samplings were also carried out on the second new moon of the second month of each season of the year with: a. 300 Moericke traps (disposable plastic yellow dishes, 15 cm in diameter and 4.5 cm height with saline solution and neutral detergent as a preservative) separated from each other by two meters, b. three light traps equipped with compact fluorescent lamps (40W, 6,400K) with 96% ethanol solution as preservative, separated from each other by about 100 m, fixed in trees inside the forest at approximately four meters in height in relation to soil and remained active for three days, from dusk to dawn of the next day and c. two hours of vegetation sweep.

The climate in both localities is Köpen AW type (tropical with wet summers and dry winters); in PNCV the total annual rainfall is 1,792 mm concentrated between October and April, with mean annual temperature 21.7°C and, in PNGSV the total annual rainfall is 1,217 mm concentrated between October and April, with mean annual temperature 22.3°C (CLIMATE-DATA.ORG 2019).

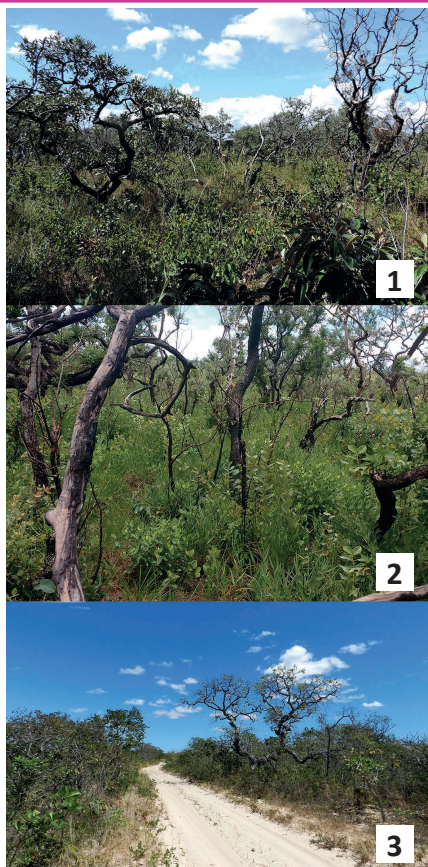
The collections were done under a Brazilian Biodiversity Information and Authorization System (SISBIO) license# 16473-1.

In the laboratory, the specimens of *Heimbra* were separated from other Hymenoptera and later air dried, mounted on entomological pins and labeled.

All studied specimens were identified based in Stage & Snelling (1986). The morphological terms were based on Stage & Snelling (1986) and the surface sculpture follows Harris (1979). Collecting sites indicated on maps are based on Stage & Snelling (1986) and Universal Chalcidoidea Database (Noyes 2019).

Images were taken using a digital camera Leica MC170 HD attached to a stereomicroscope Leica M205C APO and specimens illuminated with high diffuse dome illumination Leica LED5000 HDI. Focus stacking of images was done using Helicon Focus (version 5.3). The figures were prepared using Adobe Photoshop (version 11.0).

The information on the labels of the specimens examined was transcribed in the section "Examined material" as follows: the symbol backslash ( \ ) indicates the different lines on the label and two quotation marks ( " " ) indicate different labels on the same specimen.



**Figures 1-3.** Brazilian savanna areas in Central Brazil where *Heimbra* (Ashmead, 1894) (Hymenoptera, Eurytomidae) species were collected. 1, Parque Nacional da Chapada dos Veadeiros (PNCV), Alto Paraíso de Goiás, State of Goiás: area without antropic action; 2, PNCV: area that suffered a severe fire; 3, Parque Nacional Grande Sertão Veredas, Chapada Gaúcha, State of Minas Gerais: area without antropic action.

In our study, 41 specimens of two species of *Heimbra* were obtained, all of them with Malaise traps: 40 of *H. parallela* (97.6% of the total collected) and only one specimen of *H. opaca* (2.4%). The amount of specimens of *Heimbra* captured was different according to the sampling locations with a higher prevalence observed at PNGSV, where 33 female specimens of *H. parallela* (80.5% of total) were captured (Tab. 1).

At PNCV, the number of specimens captured was smaller in the area affected by severe forest fires than in the area not affected by the fire (Tab. 1), possibly due to the drastic decrease in the population of larvae of Buprestidae and Curculionidae, their possible hosts. The reasons why the captures in PNGSV were about four times greater than those in PNGSV are unknown.

**Table 1.** Specimens of *Heimbra* Cameron, 1909 (Hymenoptera, Eurytomidae, Heimbrinae) collected at Parque Nacional da Chapada dos Veadeiros (PNCV) and Grande Sertão Veredas (PNGSV), in Alto Paraíso de Goiás, Goiás and Chapada Gaúcha, Minas Gerais, Brazil, respectively, between February 2018 and May 2019.

Species	PNCV a	PNCV b	PNGSV	Total	%
<i>Heimbra parallela</i> Stage & Snelling, 1986	5	2	33	40	97.6
<i>Heimbra opaca</i> (Ashmead, 1894)	1			1	2.4
<b>Total</b>	<b>6</b>	<b>2</b>	<b>33</b>	<b>41</b>	<b>100.0</b>
%	14.6	4.9	80.5		

PNCVa= area of Brazilian savanna without anthropic action; PNCVb= area of Brazilian savanna that suffered a severe fire.

### *Heimbra parallela* Stage & Snelling, 1986

Figs. 4-8, 13

**New record.** Alto Paraíso de Goiás, Goiás and Chapada Gaúcha, Minas Gerais, Brazil (Fig. 13)

**Examined material.** "BRA, GO, Alto Paraíso de Goiás \ PARNA

Chapada dos Veadeiros \ 14°08'34"S / 47°46'00"W \ cerrado / arm. Malaise \ 6 / XI / 2018 \ NW. Perioto & RIR Lara, cols.", "*Heimbra parallela* \ Stage & Snelling, 1986 \ NW Perioto, det. 2020", "LRRP #20235-20239", 5 females; same data except 14°07'44"S / 47°44'04"W, cerrado queimado, 20 / XI / 2018, "LRRP #20240", 1 female; 14°07'44"S / 47°44'04"W, cerrado queimado, 4 / XII / 2018, "LRRP #20241", 1 female; "BRA, MG, Chapada Gaúcha \ PARNA Grande Sertão Veredas \ 19°10'30.6"S / 45°43'16.6"W \ cerrado / arm. Malaise \ 31 / VII / 2018 \ NW. Perioto & RIR Lara, cols.", "*Heimbra parallela* \ Stage & Snelling, 1986 \ NW Perioto, det. 2020", "LRRP #20242-20243", 2 females; same data except 14 / VIII / 2018, "LRRP #20244-20251", 8 females; 28 / VIII / 2018, "LRRP #20252-20257", 6 females; 20 / XI / 2018, "LRRP #20258", 1 female; 18 / XII / 2018, "LRRP #20259", 1 female; 15 / I / 2019, "LRRP #20260-20263", 4 females; 29 / I / 2018, "LRRP #20264-20267", 4 females; 12 / II / 2019, "LRRP #20268-20269", 2 females; 26 / II / 2019, "LRRP #20270-20273", 4 females; 12 / III / 2019, "LRRP #20274", 1 female.

**Identification.** *H. parallela* has the integument entirely blackish, except ferruginous on some appendages (Fig. 4); mesopleuron smooth and shine along posterior margin (Fig. 5); scutellum about 0.6 times longer than wide and not at all depressed in profile (Fig. 6); marginal vein slightly longer than stigmal vein (Fig. 7) and tergum 6+7, in lateral view, with dorsal anterior margin not far behind ventral posterior margin, without transverse groove (Fig. 8) (Stage & Snelling 1986).

**Discussion.** All collected samples of *H. parallela* correspond to females and it was not possible to determine the cause of this fact. Before our collections, only three females and one male of *H. parallela* were known (Stage & Snelling 1986). Among the six known species of *Heimbra*, *H. opaca* is the species with the greatest number of known specimens (n = 55), corresponding to a proportion female / male = 1.3 approximately. Prior to our new records from Goiás and Minas Gerais, Stage & Snelling (1986) and Fernandes et al. (2012) reported the presence of *H. parallela* for Argentina (about 1,300 km southwest) and in the states of São Paulo and Paraná (about 1,000 km south), in Brazil (Fig. 13). At PNGSV, 33 specimens of *H. parallela* were collected (80.5% of the total) and there, the highest frequency of capture was observed in July and August, when about 50% of the specimens were captured. One specimen collected at PNGSV in February 2019 is smaller (3.3 mm) than the average size of ten studied specimens (5.2 mm) and as presented in the literature (5.5 mm) (Stage & Snelling 1986).

### *Heimbra opaca* (Ashmead, 1894)

Figs. 9-13.

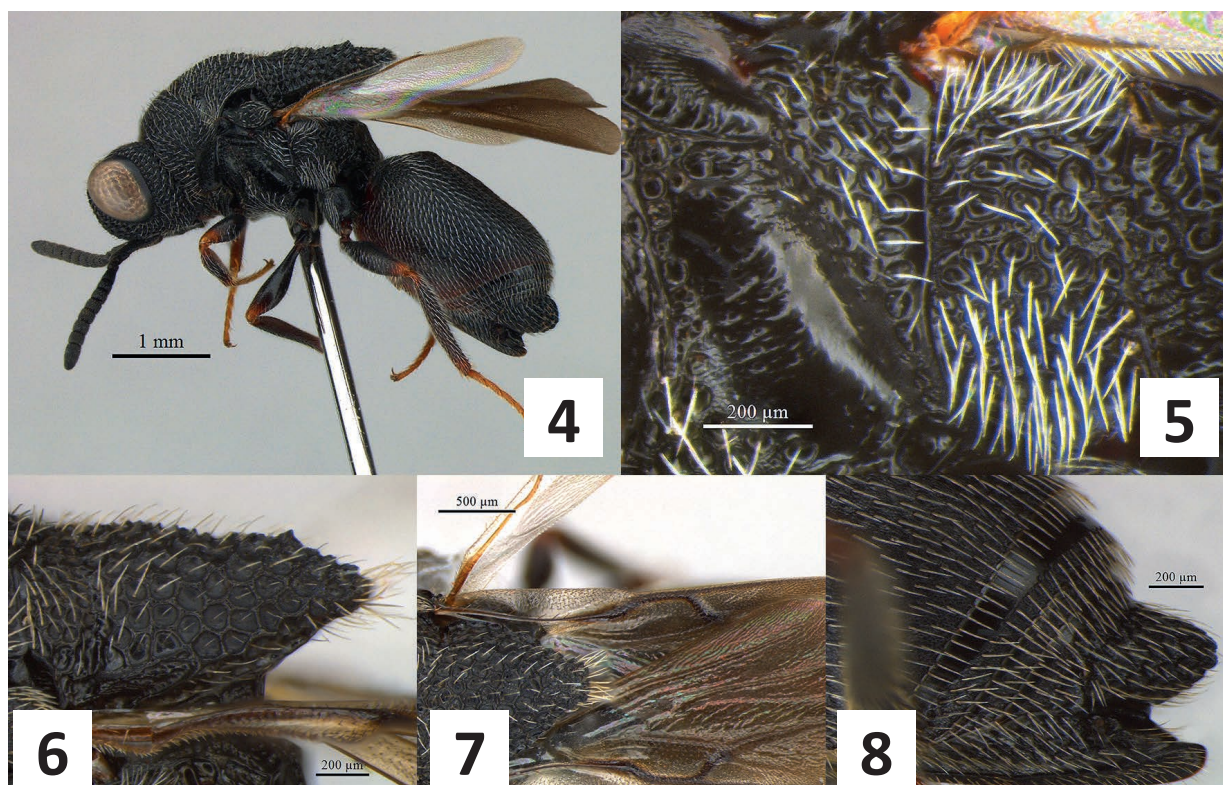
**New record.** Alto Paraíso de Goiás, Goiás, Brazil (Fig. 13).

**Examined material.** "BRA, GO, Alto Paraíso de Goiás \ PARNA Chapada dos Veadeiros \ 14°08'34"S / 47°46'00"W \ cerrado / arm. Malaise \ 9/IV/2019 \ NW. Perioto & RIR Lara, cols.", "*Heimbra opaca* \ (Ashmead, 1894) \ NW Perioto, det. 2020", "LRRP #20234"; 1 female

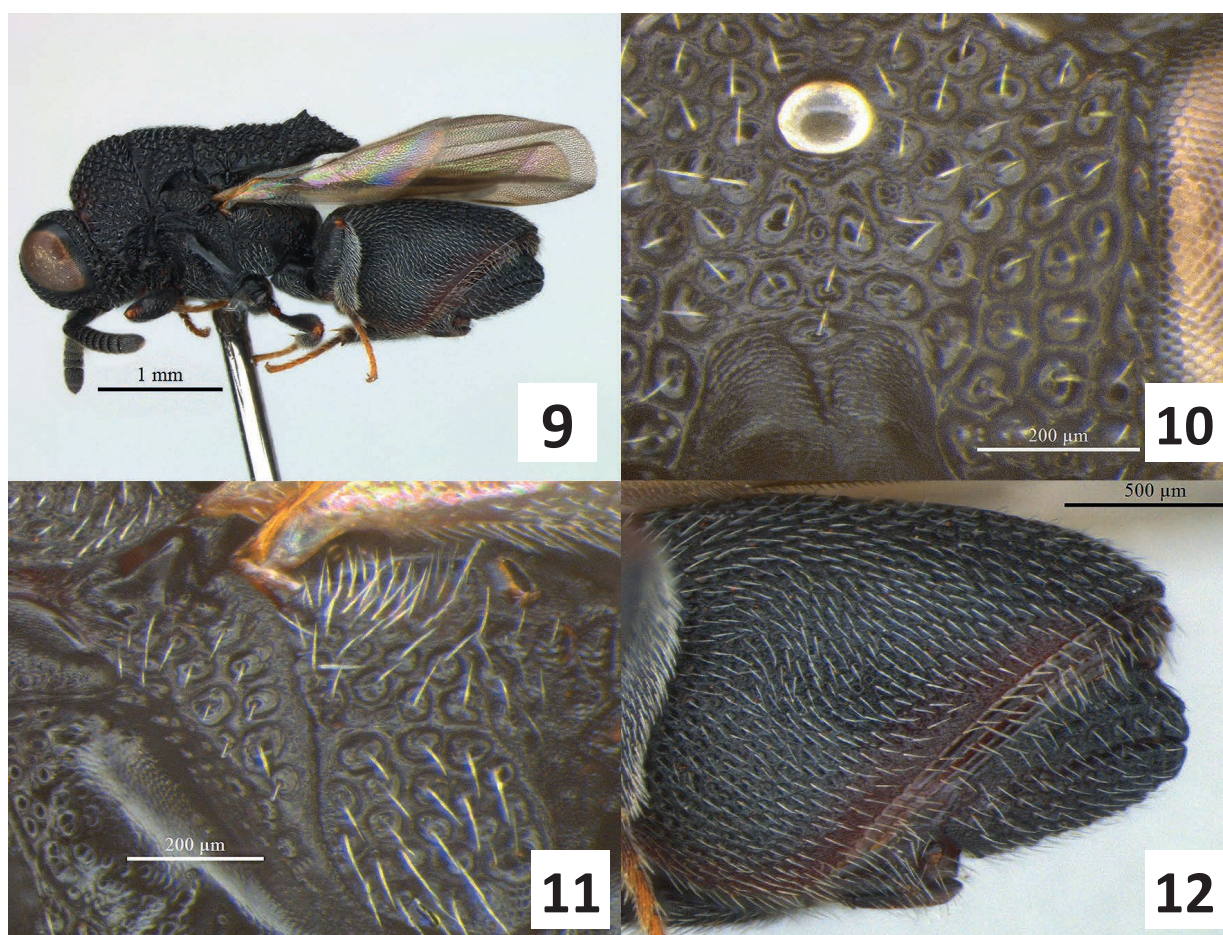
**Identification.** This species has the integument unicolorous black or very dark reddish-brown (Fig. 9); umbilicate punctures on head and thorax with inner surface appearing finely granulose (Fig. 10); mesopleuron contiguously punctured, appearing dull along posterior margin (Fig. 11) and tergum 6+7 with deep transverse groove (Fig. 12) (Stage & Snelling 1986).

**Discussion.** Available records indicate that this species has a wide geographical distribution in arid and semi-arid regions from the western USA and Mexico to Central Brazil, in area of Brazilian savanna at Federal District (Stage & Snelling 1986; Fernandes et al. 2012) (Fig. 13) and its capture in a similar environment at PNCV, distant about 190 km N in a straight line was, in a way, expected. It was not possible to determine the cause of the capture of just one specimen of *H. opaca*.





**Figures 4-8.** *Heimbra parallela* Stage & Snelling, 1986 (Eurytomidae, Heimbrinae). 4, habitus; 5, posterior margin of mesopleuron; 6, lateral view of scutellum; 7, detail of venation of forewing; 8, apical portion of female gaster in lateral view.



**Figures 9-12.** *Heimbra opaca* (Ashmead, 1894) (Eurytomidae, Heimbrinae). 9, habitus; 10, umbilicate punctures on head with inner surface finely granulose; 11, posterior margin of mesopleuron; 12, apical portion of female gaster in lateral view.





**Figure 13.** Records of *Heimbra parallela* Stage & Snelling, 1986 (black dots= previous records; black dots with white center = new records) and *Heimbra opaca* (Ashmead, 1894) (red dots= previous records; red dot with white center = new record).

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