



ECOSYSTEMS

New species records of Gasteruptiidae (Hymenoptera, Evanioidea) from Eastern Uruguay

NELSON W. PERIOTO, ROGÉRIA I.R. LARA, ANTONIO C.C. MACEDO, NATALIA ARBULO, JUAN P. BURLA & ENRIQUE CASTIGLIONI

Abstract: In this study, the Gasteruptiidae (Hymenoptera, Evanioidea) collected in three environments at the Department of Rocha, in Eastern Uruguay, were documented based on a survey carried out with Malaise traps between December 2014 and December 2016. During the samplings, four species of *Gasteruption* Latreille, 1796 were captured, being 14 females and three males of *Gasteruption brachychaetun* Schrottky, 1906; eight females and five males of *Gasteruption brasiliense* (Blanchard, 1840); one female of *Gasteruption helenae* Macedo, 2011 and one female of *Gasteruption brandaoi* Macedo, 2011. *Gasteruption brachychaetun*, *G. helenae* and *G. brandaoi* are recorded by the first time from Uruguay.

Key words: *Gasteruption brachychaetun*, *Gasteruption brasiliense*, *Gasteruption helenae*, *Gasteruption brandaoi*, Neotropical Region.

INTRODUCTION

Gasteruptiidae (Hymenoptera: Evanioidea) is a small and distinctive group of parasitoid wasps whose larvae develop as predator-inquilines in nests of solitary bees including Apidae, Colletidae, Halictidae, Megachilidae and Stenotritidae (Hymenoptera) (Jennings & Austin 2004, Zhao et al. 2012) and there is no direct evidence indicating that such insects may have wasps as hosts (Crosskey 1951, Gauld 1995, Jennings & Austin 1997a, b, 2004).

The family has a worldwide distribution (Gauld 2006, Zhao et al. 2012) and comprises about 600 described species, divided in two subfamilies: Gasteruptiinae, composed by the cosmopolitan *Gasteruption* Latreille, 1796 with about 500 species, and three other genera, with seven species in total, restricted to the Neotropical region: *Plutofoenus* Kieffer, 1911, *Trilobitofoenus* Macedo, 2009 and *Spinolafoenus* Macedo, 2009;

and Hyptiogastrinae whose Neotropical fauna includes only two *Pseudofoenus* Kieffer species (Crosskey 1953, Jennings & Austin 1997b, 2002, Gauld 2006, Smith 2006, Macedo 2009, 2011, Parslow et al. 2020).

The only Gasteruptiidae species ever recorded in Uruguay was *Gasteruption brasiliense* (Blanchard, 1840), with only one female collected in 1963 in the central-north of the country (Macedo 2011). There have not been any records of other three genera of Gasteruptiinae (Macedo 2009), nor *Pseudofoenus* (Hyptiogastrinae) (Jennings & Austin 1997b, 2002).

The knowledge about the hosts of the Neotropical Gasteruptiidae was summarized by Perito et al. (2020).

The present study aimed to characterize the diversity of Gasteruptiidae collected at the Department of Rocha, in the east of Uruguay, incorporating new distributional records for *G. brachychaetun* Schrottky, 1906, *G. helenae*

Macedo, 2011 and *G. brandaoi* Macedo, 2011, and represents the first effort directed towards filling in information gaps about the Gasteruptiidae in that country. We provide a key to Gasteruptiidae species of Uruguay and their known distribution based on the literature, new records and material examined. We also provide maps with the geographic distribution of each species.

MATERIALS AND METHODS

The Hymenoptera sampling in each of the environments studied was performed every two weeks with two Malaise traps (Townes 1972) separated from each other by about 100 m between December 2014 and December 2016. For the preservation of the captured insects was used ETOH 95 °GL. The traps remained active throughout the study period in three environments at the municipality of Castillos, Rocha Department, Uruguay. The environments studied were: a) natural field area, predominant grassland surrounded by native forest, with low cattle grazing intensity (NFA) (34°05'1.07"S, 53°45'43.08"W); b) natural grassland area associated to palm forest under grazing of cattle and sheep (GCS) (34°05'26.8"S, 53°52'14.4"W) and, c) areas under integrated livestock production system with winter-summer agriculture associated to pastures and natural vegetation covered water drains (ILP1) (34°02'33.7"S, 53°50'02.7"W, between December 2014 and December 2015) and (ILP2) (34°24'7.04"S, 54°08'1.48"W, between January and December 2016).

The separation, cataloging and quantification of the insects contained in each sample were carried out in the Laboratorio de Biología Animal of the Centro Universitario Regional del Este of the Universidad de La República, in the city of Rocha, Uruguay. There,

the parasitoid Hymenoptera were separated from the other insects and sent to the Laboratório de Sistemática e Bioecologia de Parasitoides e Predadores (LSBPP) of the Instituto Biológico, in Ribeirão Preto, Brazil, where the families were identified. At the LSBPP the Gasteruptiidae were separated stored in plastic vials with 70% ethanol and later air dried, mounted on entomological pins and labeled.

The specific identifications of the studied specimens were made by A.C.C. Macedo. Images were taken using a digital camera (Leica MC170 HD, Leica Microsystems, Germany) attached to a stereomicroscope (Leica M205C APO, Leica Microsystems, Singapore) and specimens illuminated with high diffuse dome illumination (Leica LED5000 HDI, Leica Microsystems, China). Focus stacking of images was done using Helicon Focus (version 5.3). The figures were prepared using Adobe Photoshop (version 11.0).

The voucher specimens examined in this study have been deposited in the Coleção Entomológica do Laboratório de Sistemática e Bioecologia de Parasitoides e Predadores (LRRP# 2695-2703, 5305-5308), of the Instituto Biológico / Ribeirão Preto (Ribeirão Preto, SP, Brazil), N.W. Perito, curator.

RESULTS

This study resulted in the capture of 17 specimens of *Gasteruption brachychaetun* Schrottky, 1906 (14 females, 3 males), 13 of *Gasteruption brasiliense* (Blanchard, 1840) (8 females, 5 males), one female of *Gasteruption brandaoi* Macedo, 2011 and one female of *Gasteruption helenae* Macedo, 2011, totaling 32 specimens (Table I).

Table I. Species of *Gasteruption* Latreille, 1796 obtained near the municipality of Castillos, Rocha Department, Uruguay, between December 2014 and December 2016: number of specimens per locality sampled, and sample effort in trap-days.

Species of <i>Gasteruption</i>	n	Locality sampled	Sampling effort (in trap-days)
<i>G. brasiliense</i> (Blanchard, 1840)	7	NFA	208,6
<i>G. brasiliense</i> (Blanchard, 1840)	6	GCS	243,3
<i>G. brachychaetum</i> Schrottky, 1906	3	NFA	486,7
<i>G. brachychaetum</i> Schrottky, 1906	14	GCS	104,3
<i>G. helenae</i> Macedo, 2011	1	GCS	1460
<i>G. brandaoi</i> Macedo, 2011	1	GCS	1460

NFA: natural field area, with low cattle grazing intensity; GCS: natural grassland area associated to palm forest under grazing of cattle and sheep.

Key to species of *Gasteruption* of Uruguay

1. Ovipositor sheath short (0.60–1.41 × as long as hind tibia); hypopygium notched, V-shaped
Gasteruption brachychaetum Schrottky

– Ovipositor sheath long (3.42–8.23 × as long as hind tibia); hypopygium notched, Y-shaped
 2

2. Discal cell of fore wing absent
Gasteruption brandaoi Macedo

– Discal cell of fore wing present
 3

3. Occipital carina wider laterally; head as long as wide; metacoxa with well-defined striae; propleuron with irregular striae
Gasteruption brasiliense (Blanchard)

– Occipital carina narrow; head longer than wide; metacoxa without or with ill-defined striae; propleuron without striae
Gasteruption helenae Macedo

Taxonomy

Gasteruption brachychaetum Schrottky, 1906

Figure 1a

Gasteruption brachychaetum Schrottky, 1906: 61–62 (description); Kieffer, 1912: 238 (in key), 308–309 (redescription); Hedicke, 1939: 34 (catalog); Macedo, 2009: 7 (*brachycaetum* misprint, cladistic analysis); Rasmussen et al. 2009: 23 (catalog); Macedo, 2011: 18 (redescription); Macedo et al., 2012 (behavior, host record).

Diagnosis. *Gasteruption brachychaetum* is easily distinguished from other Uruguayan species of *Gasteruption* by having the ovipositor sheath short (0.21–0.35 × as long as metasoma; 0.60–1.41 × as long as hind tibia); the hypopygium notched, V-shaped; the propleuron longer than the pronotum; and the mesoscutum punctate.

New country record. Uruguay (Rocha Department, Castillos).

Geographical distribution (Figure 1b). Argentina (Buenos Aires, Jujuy, Misiones, Salta, Tucumán), Brazil (Espírito Santo, Minas Gerais, Pará, Rio de Janeiro, Santa Catarina, São Paulo), Colombia, Costa Rica, Guatemala, Mexico (Quintana Roo), Paraguay, Peru, Suriname, Trinidad and Tobago, Venezuela (Macedo 2011).

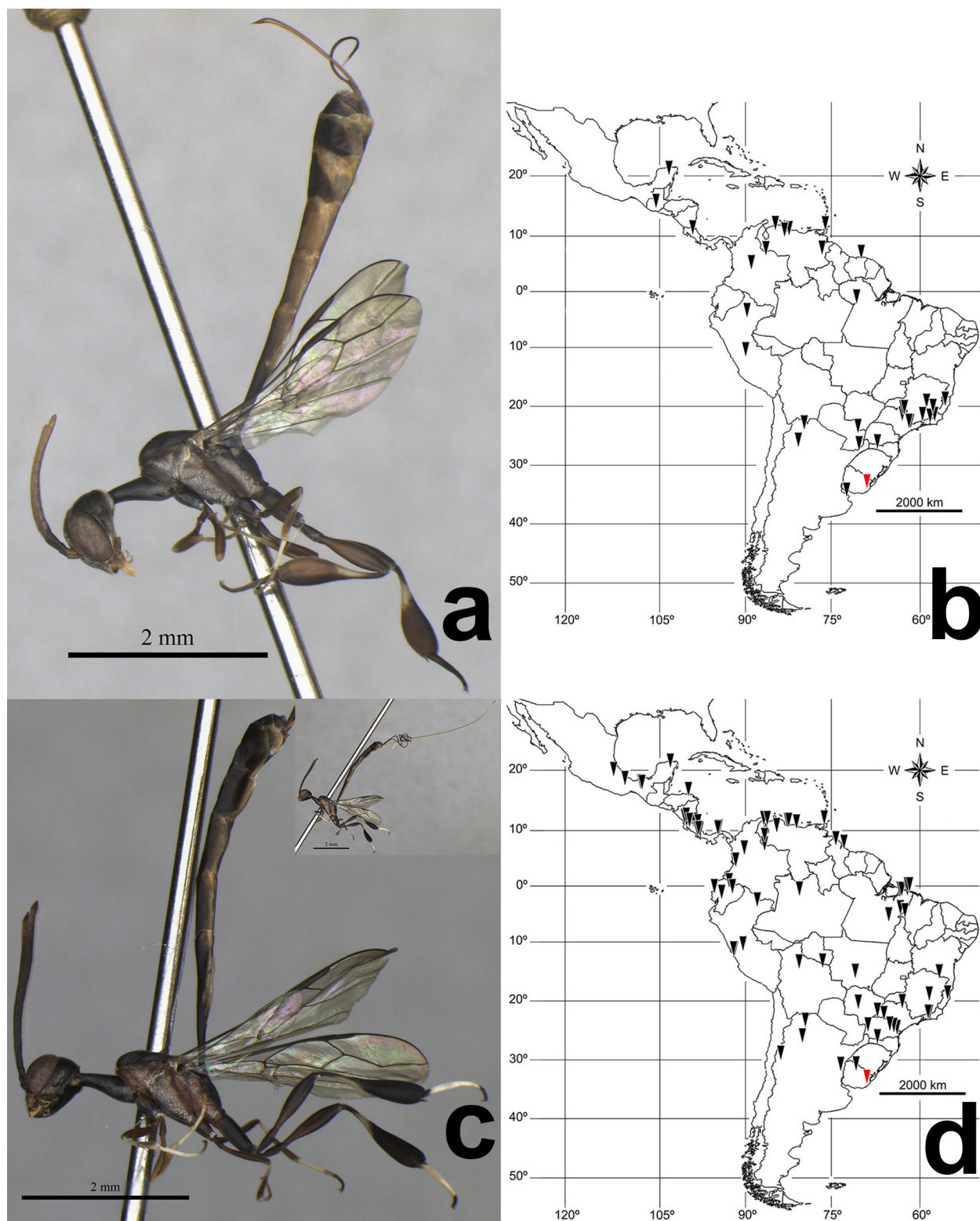


Figure 1. a. *Gasteruption brachychaetum* Schrottky, 1906, female, habitus lateral. b. Map of known distribution of *Gasteruption brachychaetum* Schrottky, 1906. c. *Gasteruption brasiliense* (Blanchard, 1840), female without ovipositor; in detail, habitus lateral. d. Map of known distribution of *Gasteruption brasiliense* (Blanchard, 1840). Black triangles are previous records (Macedo 2011), the red ones new records to Uruguay.

Material examined. Uruguay, Rocha, Castillos, Don Bosco / bosque-campo, 34°05'1.07"S, 53°45'43.08"W, arm. Malaise, 14/I/2016, E. Castiglioni e equipe, cols., LRRP# 4338, 1 female (LRRP); same data except 15/III/2016, LRRP# 4334, 4335, 2 females (LRRP); Uruguay, Rocha, Castillos, Cardoso / campo natural, 34°05'26.8"S, 53°52'14.4"W, arm. Malaise, 26/II/2015, E. Castiglioni e equipe, cols., LRRP# 4331, 4332, 2 females (LRRP); 29/III/2015, LRRP# 4339, 1 female (LRRP); same data except 28/I/2016, LRRP# 4341, 4342, 2 females (LRRP); same data except 11/II/2016, LRRP# 4345, 1 female (LRRP); same data except 28/II/2016, LRRP# 4329, 4330, 4340, 1 male, 2 females (LRRP); same data except 15/III/2016, LRRP# 4336, 4337, 4343, 4344, 2 males, 2 females (LRRP); same data except 28/XI/2016, LRRP# 4333, 1 female (LRRP).

***Gasteruption brasiliense* (Blanchard, 1840)**

Figure 1c

Foenus brasiliensis Blanchard, 1840: 300 (description); Westwood, 1843: 260 (museum data); Guérin-Ménéville, 1844: 406; Brullé, 1846: 530–531 (redescription); Westwood, 1851: 219 (redescription).

Gasteruption brasiliense: Schletterer, 1885: 304 (redescription), 317 (catalog); Schletterer, 1890: 469–470 (redescription); Dalla Torre, 1902: 1065 (catalog); Kieffer, 1902: 7 (catalog); Kieffer, 1912: 238 (in key), 311–312 (redescription); Hedicke, 1939: 35 (catalog); De Santis, 1980: 297 (catalog); Macedo, 2009: 7 (cladistic analysis); Macedo, 2011 (redescription).

Foenus gracillimus Westwood, 1843: 258 (description).

Gasteruption gracillimum: Schletterer, 1885: 307 (redescription), 319 (catalog); Schletterer, 1890: 471–472 (=tenuicollis); Kieffer, 1902: 10 (catalog); Kieffer, 1912: 239 (in key), 315 (redescription); Hedicke, 1939: 35 (catalog).

Gasteruption longicauda Kieffer, 1904: 18 (description); Kieffer, 1912: 239 (in key), 313–314 (redescription); Hedicke, 1939: 35 (catalog); De Santis, 1980: 297 (catalog).

Gasteruption annulitarse Schrottky, 1906: 59 (description), 61 (in key); Kieffer, 1912: 239 (in key), 312 (redescription); Hedicke, 1939: 34 (catalog); Rasmussen et al., 2009: 20 (catalog).

Gasteruption petroselini Schrottky, 1906: 57–58 (description), 61 (in key); Kieffer, 1912: 239 (in key), 312–313 (redescription); Hedicke, 1939: 36 (catalog); Rasmussen et al., 2009: 36 (catalog).

Gasteruption subtropicale Schrottky, 1906: 58 (description), 61 (in key); Kieffer, 1912: 239 (in key), 313 (redescription); Hedicke, 1939: 36 (catalog); Rasmussen et al., 2009: 39 (catalog).

Foenus torridus Bradley, 1908: 118 (description); Cresson, 1928: 11 (lectotype). *Gasteruption torridum* Kieffer, 1912: 238–239 (in key), 315 (redescription); Hedicke, 1939: 36 (catalog).

Gasteruption Brasiliae Kieffer, 1911a: 305 (description). *Gasteruption brasiliae*: Kieffer, 1912: 413–414 (redescription); Hedicke, 1939: 35 (in key); De Santis, 1980: 297 (catalog).

Diagnosis. *Gasteruption brasiliense* differs from other Uruguayan species by having the ovipositor sheath long (1.16–1.65 × as long as metasoma; 3.51–8.23 × as long as hind tibia), and dark brown, with apex yellow brown; the hypopygium notched, Y-shaped; the discal cell of fore wing present; the occipital carina wider laterally; the propleuron longer than or as long as the pronotum; the mesoscutum punctate; the mesepisternum and the propodeum areolate; and the metacoxa with well-defined striae.

New locality record for Uruguay. Rocha Department.

Geographical distribution (Figure 1d): Argentina (Entre Rios, Jujuy, La Rioja, Santiago del Estero), Bolivia, Brazil (Amazonas, Espírito Santo, Goiás, Maranhão, Minas Gerais, Mato Grosso, Pará, Paraná, Rio de Janeiro, Santa Catarina, São

Paulo), Colombia, Costa Rica, Ecuador, Guyana, Honduras, Mexico (Chiapas, Oaxaca, Puebla, Quintana Roo, Veracruz), Panama, Paraguay, Peru, Trinidad and Tobago, Uruguay (Tucuaembó), Venezuela (Macedo 2011).

Material examined. Uruguay, Rocha, Castillos, Don Bosco / bosque-campo, 34°05'1.07"S, 53°45'43.08"W, arm. Malaise, 29/XII/2014, E. Castiglioni e equipe, cols., LRRP# 4352, 1 female (LRRP); same data except 11/II/2015, LRRP# 4349, 4350, 4351, 3 males (LRRP); same data except 26/II/2015, LRRP# 4347, 1 male (LRRP); same data except 14/I/2016, LRRP# 4348, 1 female (LRRP); same data except 15/III/2016, LRRP# 4346, 1 female (LRRP); Uruguay, Rocha, Castillos, Cardoso / campo natural, 34°05'26.8"S, 53°52'14.4"W, arm. Malaise, 26/II/2015, E. Castiglioni e equipe, cols., LRRP# 4358, 1 female (LRRP); same data except 29/XII/2015, LRRP# 4355, 1 male (LRRP); same data except 28/I/2016, LRRP# 4353, 4354, 2 females (LRRP); same data except 15/III/2016, LRRP# 4356; 1 female (LRRP); same data except 21/XII/2016, LRRP# 4356, 1 female (LRRP).

***Gasteruption brandaoi* Macedo, 2011**

Figure 2a.

Gasteruption brandaoi Macedo, 2011: 20-22 (description).

Diagnosis. *Gasteruption brandaoi* differs from other Uruguayan species by having the ovipositor sheath long (1.40–1.76 × as long as metasoma; 3.56–4.79 × as long as hind tibia); the hypopygium notched, Y-shaped; the discal cell of fore wing absent; the head longer than wide; the occipital carina wide, the mesoscutum punctate rugose; and the metacoxa striate.

New country record. Uruguay (Rocha Department, Castillos).

Geographical distribution (Figure 2b). Argentina (Jujuy, Misiones, Salta), Brazil (Paraná, São Paulo, Tocantins) (Macedo 2011).

Material examined. Uruguay, Rocha, Castillos, Cardoso / campo natural, 34°05'26.8"S, 53°52'14.4"W, arm. Malaise, 27/III/2015, E. Castiglioni e equipe, cols., LRRP# 4360, 1 female (LRRP).

***Gasteruption helenae* Macedo, 2011**

Figure 2c.

Gasteruption helenae Macedo, 2011: 32–33 (description)

Diagnosis. Differs from other Uruguayan species by having the ovipositor sheath long (1.32–1.58 × as long as metasoma; 3.42–5.82 × as long as hind tibia), and dark brown, with apex yellow brown; the hypopygium notched, Y-shaped; the discal cell of fore wing present; the head longer than wide; the occipital carina narrow; propleuron without striae; the mesepisternum imbricate dorsally and with ill-defined areoles ventrally; the propodeum areolate; and metacoxa without or with ill-defined striae.

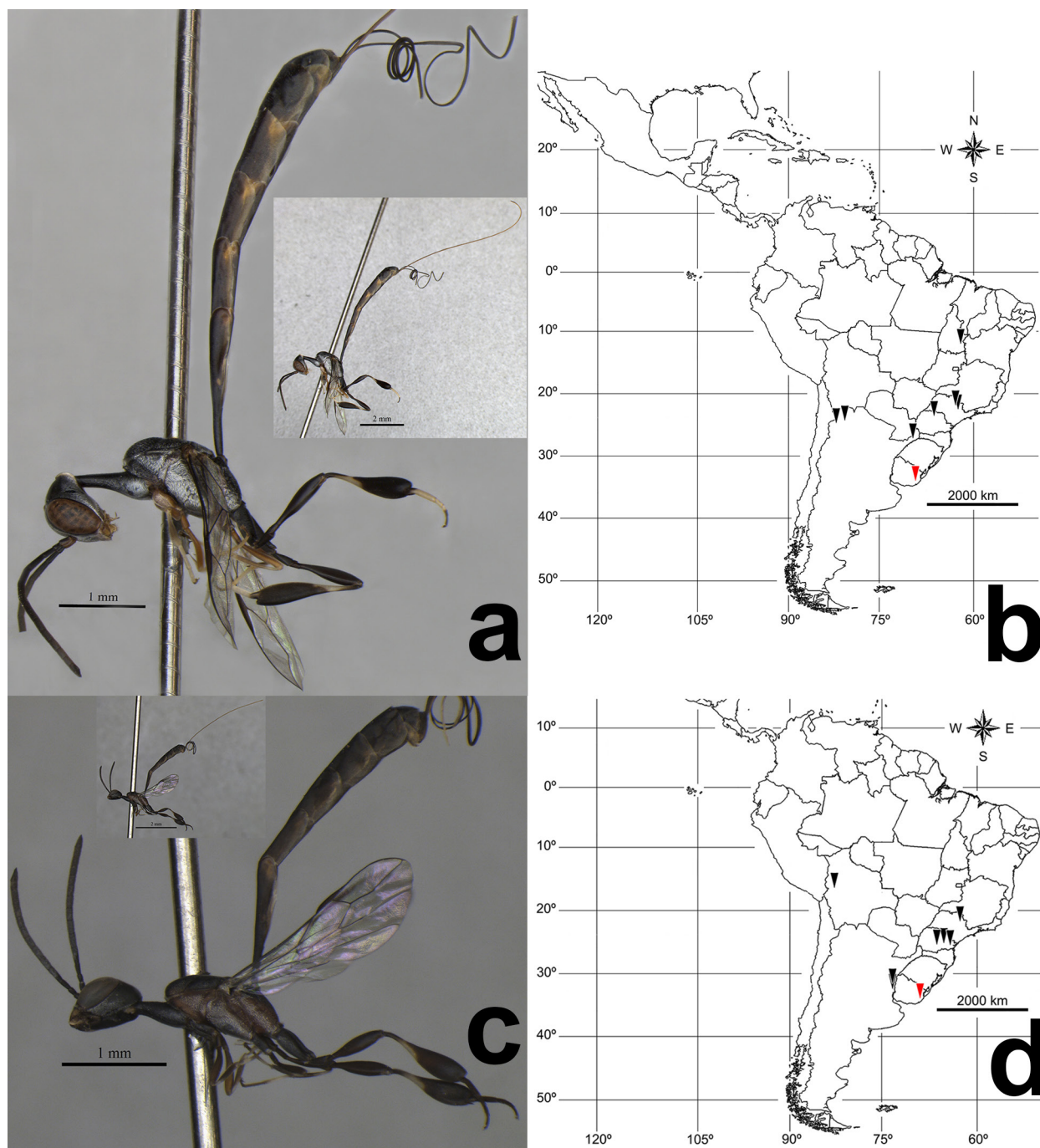
New country record. Uruguay (Rocha Department, Castillos).

Geographical distribution (Figure 2d). Argentina (Entre Rios), Bolivia (La Paz), Brazil (Paraná) (Macedo 2011).

Material examined. Uruguay, Rocha, Castillos, Cardoso / campo natural, 34°05'26.8"S, 53°52'14.4"W, arm. Malaise, 12/I/2015, E. Castiglioni e equipe, cols., LRRP# 4359, 1 female (LRRP).

DISCUSSION

The Uruguay is, comparatively, a relatively small landmass, with about 175,000 km² located between 53 and 58 west longitude and 30 and 35 south latitude. The country is surrounded by southern temperate grasslands, northern tropical formations, eastern maritime coastlines



Figures 2. a. *Gasteruption brandaoi* Macedo, 2011, 1906, female without ovipositor; in detail, habitus lateral. b. Map of known distribution of *Gasteruption brandaoi* Macedo, 2011. c. *Gasteruption helenae* Macedo, 2011, female without ovipositor; in detail, habitus lateral. d. Map of known distribution of *Gasteruption helenae* Macedo, 2011. Black triangles are previous records (Macedo 2011), the red ones new records to Uruguay.

and a western zone area delimited by the large Uruguay and Paraná Rivers. Physically, Uruguay is continuous with Brazil to the north and contiguous with Argentina to the west; to the south, Uruguay and Argentina are separated by Rio de la Plata, which acts as a natural separating barrier (Gillespie 1990).

Gasteruptiidae are occasionally collected on insect surveys with Malaise traps but, in several studies carried out in Brazil in areas of Atlantic Forest (Azevedo et al. 2002, 2003, Perito & Lara 2003, Perito et al. 2005, Sobczak & Vasconcellos Neto 2015, among others), Brazilian savannah (Perito et al. 2008, Lara et al. 2015) and in cultivated areas (Klesener et al. 2013) none of these insects were obtained.

In this study, carried out during two years in eastern Uruguay, a large sampling effort was employed to capture parasitoid Hymenoptera: 4,380 trap-days with Malaise traps, divided into 1,460 trap-days in each one of the three studied environments. This effort resulted in the capture 32 specimens, belonging to four species of *Gasteruption* (Table I) which represented only 0.06% of the 52,740 parasitoid Hymenoptera captured. In other words, were necessary in average, about 137 trap-days for the capture of each specimen of *Gasteruption*.

This effort was 6.85 times smaller than that obtained by Perito et al. (2020) that, in a similar study carried out in a conservation area of Brazilian savannah located in the state of São Paulo, Brazil, also employed a great effort of sampling (6,570 trap-days) to capture parasitoid Hymenoptera with Malaise traps and obtained four specimens of *G. bispinosum* Kieffer, 1904, two of *G. brasiliense* (Blanchard, 1840) and a single specimen of *G. helenae* Macedo, 2011, totaling only seven specimens.

In the present study 22 specimens of *Gasteruption* (68.7% of total) were obtained in GCS and 10 (31.3%) in the NFA. No one specimen

of Gasteruptiidae was captured in ILP1 and ILP2 and this fact can be credited to the loss of habitat for wild flowers in intensively farmed areas, with the consequent decrease of populations of their hosts, the solitary bees, combined with the deleterious effects of the used pesticides.

As discussed in Perito et al. (2020), that studied the gasteruptiids of an area of Brazilian savannah in Brazil, the small number of specimens collected precludes more sophisticated analyzes of abundance and population fluctuation. The reasons that lead to this small catch rate are unknown and factors such as their development in small populations, placement (including orientation) and/or the low efficiency of the traps used should be taken into account.

The fact that all Gasteruptiidae obtained were collected between November and March allows us to infer that, at the studied locality, the highest frequency of Gasteruptiidae occurs in the hottest and humid months of the year.

Of the four species recorded for Uruguay in this survey only *G. brasiliense* was recorded before by Macedo (2011), based on a specimen from Tacuarembó collected in 1963. *Gasteruption brachychaetum*, *G. brandaoi* and *G. helenae* are reported here for the first time from Uruguay (Figures 1b, 2b and d). The other three Gasteruptiinae genera and *Pseudofoenus* (Hyptiogastrinae) have not been found.

Our records contribute to the knowledge and distribution of the Gasteruptiidae fauna throughout the Neotropical region and help to filling the gaps about the knowledge of these evanioid wasps in that region. It also shows that the lack of sampling in still under-explored places contributes to the late record of a widely distributed species.

Acknowledgments

We thank the Instituto Nacional de Investigación Agropecuaria of the República Oriental del Uruguay (INIA) (Proyecto FTPA 312, Convocatoria 2012) and the Instituto Nacional de Ciência e Tecnologia dos Hymenoptera Parasitoides (Conselho Nacional de Desenvolvimento Científico e Tecnológico / Fundação de Amparo à Pesquisa do Estado de São Paulo / Coordenação de Aperfeiçoamento de Pessoal de Nível Superior) for the financial support and to the anonymous reviewers for their critical reading. We thank to Carlos Roberto Ferreira Brandão and Helen Ferreira for supporting in the Museu de Zoologia da Universidade de São Paulo.

REFERENCES

- AZEVEDO CO, CORRÊA MS, GOBBI FT, KAWADA R, LANES GO, MOREIRA AR, REDIGHIERI ES, SANTOS LM & WAICHERT C. 2003. Perfil das famílias de vespas parasitoides (Hymenoptera) em uma área de Mata Atlântica da Estação Biológica de Santa Lúcia, Santa Tereza, ES, Brasil. *Bol Mus Biol Mello Leitão* 16: 39-46.
- AZEVEDO CO, KAWADA R, TAVARES MT & PERIOTO NW. 2002. Perfil da fauna de himenópteros parasitoides (Insecta, Hymenoptera) em uma área de Mata Atlântica do Parque Estadual da Fonte Grande, Vitória, ES, Brasil. *Rev Bras Entomol* 46: 133-137.
- BLANCHARD E. 1840. *Histoire Naturelle des Insectes*. Vol. 3. Orthoptères, Neuroptères, Hemiptères, Hymenoptères, Lepidoptères et Diptères. Paris, Dumenil, 672 p.
- BRADLEY JC. 1908. The Evaniidae, ensign-flies, an archaic family of Hymenoptera. *Trans Am Entomol Soc* 34: 101-194.
- BRULLÉ A. 1846. Hyménoptères. In: Lepeletier A (Ed). *Histoire Naturelle des Insectes*, vol. 4, Paris, Roret, p. 1-680.
- CRESSON ET. 1928. The types of Hymenoptera in the Academy of Natural Sciences of Philadelphia other than those of Ezra T. Cresson. *Mem Am Entomol Soc* 5: 1-90.
- CROSSKEY RW. 1951. The morphology, taxonomy and biology of the British Evanioidea (Hymenoptera). *Trans R Entomol Soc Lond* 102: 247-301.
- CROSSKEY RW. 1953. A revision of the genus *Hyptiogaster* Kieffer (Hymenoptera: Gasteruptionidae). with descriptions of two new genera and three new species. *Trans R Entomol Soc Lond* 104: 347-384.
- DALLA TORRE CG. 1902. *Catalogus Hymenopterorum*, volumen III, Trigonalidae, Megalyridae, Stephanidae, Ichneumonidae, Agriotypidae, Evaniidae, Peleciniidae. Lipsiae: Guilelmi Engelmann, p. 545-1141.
- DESANTIS L. 1980. *Catalogo de los himenopteros brasileños de la serie Parasítica*, incluyendo Bethyloidea, Curitiba, Editora da Universidade Federal do Paraná, 395 p.
- GAULD ID. 1995. The evaniomorph parasitoid families. Gasteruptionidae. In: Hanson PE and Gauld ID (Eds). *The Hymenoptera of Costa Rica*, Oxford, New York, London: Oxford University Press, p. 193-195.
- GAULD ID. 2006. Familia Gasteruptionidae. In: Hanson PE and Gauld ID (Eds). *Hymenoptera de la Región Neotropical*, Gainesville: The American Entomological Institute, p. 221-223.
- GILLESPIE CG. 1990. The society and its environment. In: Hudson RA and Meditz SW (Eds). *Uruguay: a country study*, Washington, GPO for the Library of Congress, p. 49-94.
- GUÉRIN-MÉNEVILLE MFE. 1844. *Iconographie du Règne Animal de G. Cuvier, ou Représentation d'après Nature de l'une des Espèces les plus Remarquables, et souvent non encore Figurées, de chaque genre d'Animaux*, vol. 3, Insectes, Paris, 576 p.
- HEDICKE H. 1939. Gasteruptionidae. In: Hedicke H (Ed). *Hymenopterorum Catalogus*, pars 11, Graveinlage, Dr. W. Junk, p. 1-54.
- JENNINGS JT & AUSTIN AD. 1997a. Revision of the Australian endemic genus *Hyptiogaster* Kieffer (Hymenoptera: Gasteruptionidae). with descriptions of seven new species. *J Nat Hist* 31: 1533-1562.
- JENNINGS JT & AUSTIN AD. 1997b. Revision of *Aulacofoenus* Kieffer (Hymenoptera: Gasteruptionidae). hyptiogastrine wasps with a restricted Gondwanic distribution. *Invertebr Taxon* 11: 943-976.
- JENNINGS JT & AUSTIN AD. 2002. Systematics and distribution of world hyptiogastrine wasps (Hymenoptera: Gasteruptionidae). *Invertebr Syst* 16: 735-811.
- JENNINGS JT & AUSTIN AD. 2004. Biology and host relationships of aulacid and gasteruptionid wasps (Hymenoptera: Evanioidea): a review. In: Rajmohana K, Sudheer K, Kumar PG and Santhosh S (Eds). *Perspectives on Biosystematics and Biodiversity*, Kerala: University of Calicut, Systematic Entomology Research Scholars Association, p. 187-215.
- KIEFFER JJ. 1902. Hymenoptera, Fam. Evaniidae. In: Wystman P (Ed). *Genera Insectorum* 2: 1-13.

- KIEFFER JJ. 1904. Description de stéphanides et d'évaniids nouveaux. *Bull Soc Hist Nat Metz* 11: 1-30.
- KIEFFER JJ. 1911. Diagnoses de nouveaux Évaniides (Hym). *Bull Soc Entomol France* 1911: 303-305.
- KIEFFER JJ. 1912. Hymenoptera, Ichneumonidea, Evaniidae. *Tierreich* 30: 1-431.
- KLESENER DF, SANTOS RSS & MENEZES JR AO. 2013. Diversidade e atividade de voo de himenópteros parasitóides em pomar de macieira em Vacaria, RS. *EntomoBrasilis* 6: 108-112.
- LARA RIR, FERNANDES DRR, VERSUTI DR, TANGO MFA & PERIOTO NW. 2015. Sampling and diversity of Hymenoptera (Insecta) in an orange orchard/Brazilian savannah fragment interface. *Entomobrasilis* 8: 51-57.
- LATREILLE PA. 1796. *Précis des caractères génériques des insectes, disposés dans un ordre naturel*, Bordoux, 201 p.
- MACEDO ACC. 2009. Generic classification for the Gasteruptiinae (Hymenoptera: Gasteruptiidae) based on a cladistic analysis, with the description of two new Neotropical genera and the revalidation of *Plutofoenus* Kieffer. *Zootaxa* 2075: 1-32.
- MACEDO ACC. 2011. A revision of *Gasteruption* Latreille (Hymenoptera: Gasteruptiidae) in the Neotropical Region. *Zootaxa* 3030: 1-62.
- MACEDO ACC, CORDEIRO GD & ALVES-DOS-SANTOS I. 2012. Entering behavior of *Gasteruption brachychaetum* Schrottky (Hymenoptera, Gasteruptiidae) into a nest of *Hylaeus* Fabricius (Hymenoptera, Colletidae). *Rev Bras Entomol* 56: 325-328.
- PARSLOW BA, SCHWARZ MP & STEVENS MI. 2020. Review of the biology and host associations of the wasp genus *Gasteruption* (Evaniioidea: Gasteruptiidae). *Zool j Linn Soc* 189: 1105-1122.
- PERIOTO NW & LARA RIR. 2003. Himenópteros parasitoides (Insecta: Hymenoptera) da Mata Atlântica. I. Parque Estadual da Serra do Mar, Ubatuba, SP, Brasil. *Arq Inst Biol* 70: 441-445.
- PERIOTO NW, LARA RIR & MACEDO ACC. 2020. Gasteruptiidae (Hymenoptera, Evaniioidea) of three savannah phytophysognomies of the Estação Ecológica do Jataí, in southeastern Brazil, under three sampling methods and a new record for *Gasteruption helenae* Macedo, 2011. *An Acad Bras Cienc* 92: e20181073.
- PERIOTO NW, LARA RIR, VACARI AM, FAVORETO L, MIRANDA NF, CHAGAS FILHO NR & PESSOA R. 2008. Diversidade de himenópteros parasitoides (Hymenoptera) na Estação Ecológica de Jataí, Luiz Antônio, SP, Brasil. *Rev Agric* 83: 125-135.
- RASMUSSEN C, GARCETE-BARRETT BR & GONÇALVES RB. 2009. Curt Schrottky (1874-1937): South American entomology at the beginning of the 20th century (Hymenoptera, Lepidoptera, Diptera). *Zootaxa* 2282: 1-50.
- SCHLETTERER A. 1885. Die Hymenopteren-Gattung *Gasteruption* Latr. (Foenus aut.). *Verhandlungen der Zoologisch-Botanischen Gesellschaft in Wien* 35: 267-326.
- SCHLETTERER A. 1890. Die Hymenopteren-Gruppe der Evaniiden. III. Abteilung. *Annalen des K. K. Naturhistorischen Hofmuseums*, 1890, 373-546.
- SCHROTTKY C. 1906. Neue Evaniiden aus Paraguay. *Zeitschrift für Systematische Hymenopterologie und Dipterologie* 6: 56-62.
- SMITH DR. 2006. Familia Gasteruptiidae. In: Fernández F and Sharkey MJ (Eds). *Introducción a los Hymenoptera de la Región Neotropical*, Bogotá D.C.: Sociedad Colombiana de Entomología y Universidad Nacional de Colombia, p. 807-809.
- SOBCZAK JF & VASCONCELLOS NETO J. 2015. Famílias de himenópteros parasitoides na Serra do Japi, Jundiá, São Paulo, Brasil. *Arq Inst Biol* 82: 1-4.
- TOWNES H. 1972. A light-weight Malaise trap. *Ent News* 83: 239-247.
- WESTWOOD JO. 1843. XXXVIII. On *Evania* and some allied genera of hymenopterous insects. *Trans R Entomol Soc Lond* 3: 237-278.
- WESTWOOD JO. 1851. XXVI. Descriptions of some new species of exotic Hymenoptera belonging to *Evania* and allied genera, being a supplement to a memoir on these insects published in the third volume of the Transactions of the Entomological Society. *Trans R Entomol Soc Lond* 1: 213-234.
- ZHAO KX, VAN ACHTERBERG C & XU ZF. 2012. A revision of the Chinese Gasteruptiidae (Hymenoptera, Evaniioidea). *ZooKeys* 237: 1-123.

How to cite

PERIOTO NW, LARA RIR, MACEDO ACC, ARBULO N, BURLA JP & CASTIGLIONI E. 2021. New species records of Gasteruptiidae (Hymenoptera, Evaniioidea) from Eastern Uruguay. *An Acad Bras Cienc* 93: e20190801. DOI 10.1590/0001-3765202120190801.

*Manuscript received on July 15, 2019;
accepted for publication on January 27, 2020*

NELSON W. PERIOTO¹

<https://orcid.org/0000-0002-2648-0730>

ROGÉRIA I.R. LARA¹

<https://orcid.org/0000-0002-5080-9081>

ANTONIO C.C. MACEDO²

<https://orcid.org/0000-0002-6695-0362>

NATALIA ARBULO³

<https://orcid.org/0000-0001-8553-4703>

JUAN P. BURLA³

<https://orcid.org/0000-0002-7550-2203>

ENRIQUE CASTIGLIONI³

<https://orcid.org/0000-0003-2743-0628>

¹Instituto Biológico, Laboratório de Sistemática e Bioecologia de Parasitoides e Predadores, Av. Bandeirantes, 2419, 14030-670 Ribeirão Preto, SP, Brazil

²Secretaria Estadual do Meio Ambiente do Estado de São Paulo, CBRN, Av. Professor Frederico Hermann Junior, 345, 05459-900, São Paulo, SP, Brazil

³Universidad de la República, Centro Universitario Regional del Este/CURE, Ruta 9 y Ruta 5, Rocha, Uruguay

Correspondence to: **Nelson W. Perito**

E-mail: nperito2@gmail.com, nperito@sp.gov.br

Author contributions

N.W.P., R.I.R.L., N.A., J.P.B. and E.C. participated in the design, planning, and development of the experiment and contributed with the sample preparation. A.C.C.M. identified the material studied. The authors have discussed the results and contributed to its final version.

