

Two new species of *Cantharoctonus* Viereck (Hymenoptera: Braconidae: Rhysipolinae) from Brazil

E.M. Shimbori, M.V. Yamada & A.M. Penteado-Dias

Shimbori, E.M., M.V. Yamada & A.M. Penteado-Dias. Two new species of *Cantharoctonus* Viereck (Hymenoptera: Braconidae: Rhysipolinae) from Brazil.

Zool. Med. Leiden 86 (4), 14.xii.2012: 497-504, figs 1-9. — ISSN 0024-0672.

Eduardo Mitio Shimbori, Magda Viviane Yamada & Angélica Maria Penteado-Dias, Federal University of São Carlos, Department of Ecology and Evolutionary Biology, São Carlos, SP, Brazil (emitio2004@yahoo.com.br).

Key words: taxonomy; description; new species; *Cantharoctonus*; Neotropical; Brazil.

Two new species of *Cantharoctonus* Viereck, 1912 (Hymenoptera: Braconidae: Rhysipolinae) are described: *Cantharoctonus jaragua* spec. nov. and *C. braziliensis* spec. nov. The distribution range of the genus is extended to Brazil.

Duas novas espécies de *Cantharoctonus* Viereck, 1912 (Hymenoptera: Braconidae: Rhysipolinae) são descritas: *Cantharoctonus jaragua* spec. nov. e *Cantharoctonus braziliensis* spec. nov., aumentando para seis o número de espécies vivas conhecidas. A distribuição do gênero é estendida para o Brasil.

Introduction

The genus *Cantharoctonus* Viereck, 1912, includes four nominal extant species from the New World: *C. pomifoliellae* (Ashmead 1889), *C. stramineus* Viereck, 1912, *C. brunneus* Hedqvist, 1963, *C. canadensis* Mason, 1968; and three fossil species from Germany: *C. rottensis* (Meunier 1915), *C. oligocenensis* Brues, 1933, and *C. bruesii* (Statz 1936) (Yu *et al.* 2004). The genus has commonly been assigned into Rhysipolinae Belokobylskij, 1984 (Scatolini *et al.* 2002) or Rhysipolini (Whitfield & Wagner 1991), though the relationships with other members of the group were not discussed. Phylogenetic studies including *Cantharoctonus* are scarce and did not resolve the relationships of this genus (Whitfield 1992; Quicke 1993). In fact, some diagnostic characters for Rhysipolinae, such as the extension of the occipital and hypostomal carina (van Achterberg 1993, 1995), are not present in *Cantharoctonus* species (Whitfield & van Achterberg 1987), while others are present and resemble species of the genus *Rhysipolis* Foerster, 1862 (Spencer & Whitfield 1999). In a molecular based study by Zaldivar-Riverón *et al.* (2006), Rhysipolinae was recovered as a clade, however, *Cantharoctonus* was not included in their analyses.

Despite the lack of resolution, morphological plus biological data justify the current classification of this genus within the Rhysipolinae, which is represented by two genera in the New World: *Rhysipolis* and *Cantharoctonus*. Two New World genera previously placed in Rhysipolinae: *Pseudorhysipolis* Scatolini & Penteado-Dias, 2002 (Scatolini *et al.* 2002) and *Andesipolis* Whitfield & Choi, 2004 (Townsend & Shaw 2009); are supported by phylogenetic works, respectively, as a sister group of *Pambolus* Halliday, 1836 (Pambolinae), and within Mesostoinae (Zaldivar-Riverón *et al.* 2006; Sharanovsky *et al.* 2011). Members of this subfamily are known to be solitary koinobiont ectoparasitoids of concealed Lepidoptera, i.e., leaf-mining and shelter-

building caterpillars (Townsend & Shaw 2009). *Cantharoctonus* host records include two species of leaf-mining Lepidoptera (Lyonetiidae): *Bucculatrix pomifoliella* Clemens, 1860, and *B. canadensisella* Chambers, 1875 (Ashmead 1889; Mason 1968).

The distribution range of *Cantharoctonus* is restricted to North and South American countries, with most occurrence records known from Canada and USA. In South America the occurrence of *Cantharoctonus* was restricted to Peru (Yu *et al.* 2005). At least two specimens, deposited in UANL collection, are known from Mexico, though without specific designation (UANL database, accessed in November 2010)

Material and Methods

Identification of specimens was carried out with the keys to subfamily and genera in the manual of New World Braconidae (Wharton *et al.* 1997). In this publication Hormiinae is treated in a broad sense including several small subfamilies or tribes not related to each other. Nevertheless, it is possible to identify *Cantharoctonus* reliably with the key to genera of the Hormiinae (Whitfield & Wharton 1997). Wing venation nomenclature follows Wharton *et al.* (1997).

The only specimen from Cerrado was collected in a Malaise trap at the IBGE Ecological Reserve, DF. All other specimens were obtained in projects undertaken by the two junior authors, one in Atlantic rain forest of the Brazilian coast, and another in Jaraguá State Park, which encompasses an area of the Atlantic mesophytic forest. The specimens from these projects were collected by Moericke (or yellow pan) traps or by sweeping the vegetation. All specimens are deposited in DCBU Collection (Departamento de Ecologia e Biologia Evolutiva, Universidade Federal de São Carlos, São Carlos, SP, Brasil) unless otherwise stated.

Colour pictures were taken with a stereomicroscope and treated in automontage software. Grayscale pictures were taken by SEM.

Results

This is the first record of *Cantharoctonus* from Brazil, expanding its Southern limits of distribution. Specimens sampled at high altitudes and latitudes form a homogeneous group treated as a new species: *Cantharoctonus jaragua* spec. nov. Three other specimens from lower latitudes and/or altitudes are described as *C. braziliensis* spec. nov. Two additional specimens were not included in type series. Collection sites of all examined specimens are presented in Table 1. Biology of specimens is unknown.

Table 1. Examined specimens by sample site.

Material Examined	Sample District	Coordinates	Altitude
<i>C. jaragua</i> spec. nov., ♀	São Bento do Sul (SC)	26°19'25"S, 9°18'26"W	~600 m
<i>C. jaragua</i> spec. nov., ♀, ♂	São Paulo (SP)	23°27'42"S, 46°45'44"W	1020 m
<i>C. spec.</i> , ♀	Ubatuba (SP)	~23°27'S, 45°04'W	~6 m
<i>C. braziliensis</i> spec. nov., ♀	Ilhéus (BA)	15°00'54"S, 39°00'10"W	200 m
<i>C. braziliensis</i> spec. nov., ♂	Mata de São João (BA)	16°23'33"S, 39°10'99"W	200 m
<i>C. braziliensis</i> spec. nov., ♀	Brasília (DF)	~15°58'S, 47°55"W	~1100 m
<i>C. spec.</i> , ♀	Recife (PE)	08°03'14"S, 34°52'52"W	200 m

Cantharoctonus jaragua Shimbori & Yamada, spec. nov.
(figs 1, 3-5, 9)

Material. — Holotype ♀ (DCBU), “Brazil, SP, São Paulo, Parque Estadual do Jaraguá, 1020 m, 28.vii.2000. Moericke trap (= yellow pan trap), M.V. Yamada”. Paratypes (9 ♀ + 2 ♂): 3 ♀ + 1 ♂, same locality as holotype; 1 ♀ + 1 ♂, 3.xi.1999, sweeping; 1 ♀, 2.xii.1999, sweeping; 1 ♀, 27.vii.2000, Moericke; 1 ♀, 29.vii.2000, Moericke trap; 1 ♀, 1.viii.2000, sweeping; 1 ♀: CEPA Rugendas, São Bento do Sul, SC, Brazil, 15.x.2001, sweeping. A.M. Penteadó. Two ♀ in RMNH Collection (Naturalis Biodiversity Center), Leiden, Netherlands with same data as holotype.

Diagnosis. — *C. jaragua* spec. nov. is similar to *C. stramineus*. It differs from all known species by its dark colour. Differs from *C. stramineus* also by the granulate-rugose surface of the first metasomal tergite; the dark patch on the hind coxa, the head uniformly coloured, not darker than the body except for the pronotum.

Holotype female: body length: 2.4 mm.

Head. — In dorsal view subtriangular, 1.3 times wider than mesoscutum; ocellar triangle equilateral, its basal length equal to distance between eye and ocelli; vertex 3.5 times wider than eye and temples 0.6 times height of eye (fig. 3). In lateral view eyes flattened basally, 1.3 times wider than high; malar space large, 0.5 times height of eye; malar suture present. Occipital carina strong, arched in dorsal view and meeting hypostomal carina. Face smooth; clypeus as wide as high, strongly convex. Antenna 1.5 times longer than body; flagellum 24-segmented; all joints at least 3 times longer than wide.

Mesosoma (fig. 4). — Surface of mesosoma mostly smooth. Pronotum granular. Mesoscutum almost circular in outline; notauli well defined and smooth anteriorly, weakly defined posteriorly, meeting in a granulate area in front of scutellar sulcus. Precoxal sulcus smooth and shallow, absent posteriorly; mesosternal sulcus smooth.



Fig. 1. *Cantharoctonus jaragua* spec. nov.; habitus, lateral aspect.



Fig. 2. *C. braziliensis* spec. nov.; habitus, lateral aspect.

Metapleuron granulate-rugose. Propodeum with well-defined areola, transverse carina almost reaching lateral carina; surface smooth posteriorly and granulate anteriorly; transverse anterior groove wide, with a median ridge and several weak crenulae (fig. 5). Hind leg with long setae; longest setae of hind femur equal to its width; hind coxa with coarsely granular surface. Fore wing: vein (RS+M)a slightly sinuate; vein (RS+M)b long, same length of vein r; second submarginal cell large, 3RSb about 1.4 times vein 3RSa, 3RSa 1.75 times (3RSb 2.35) vein 2RS; vein 2CUa present but short (fig. 9).

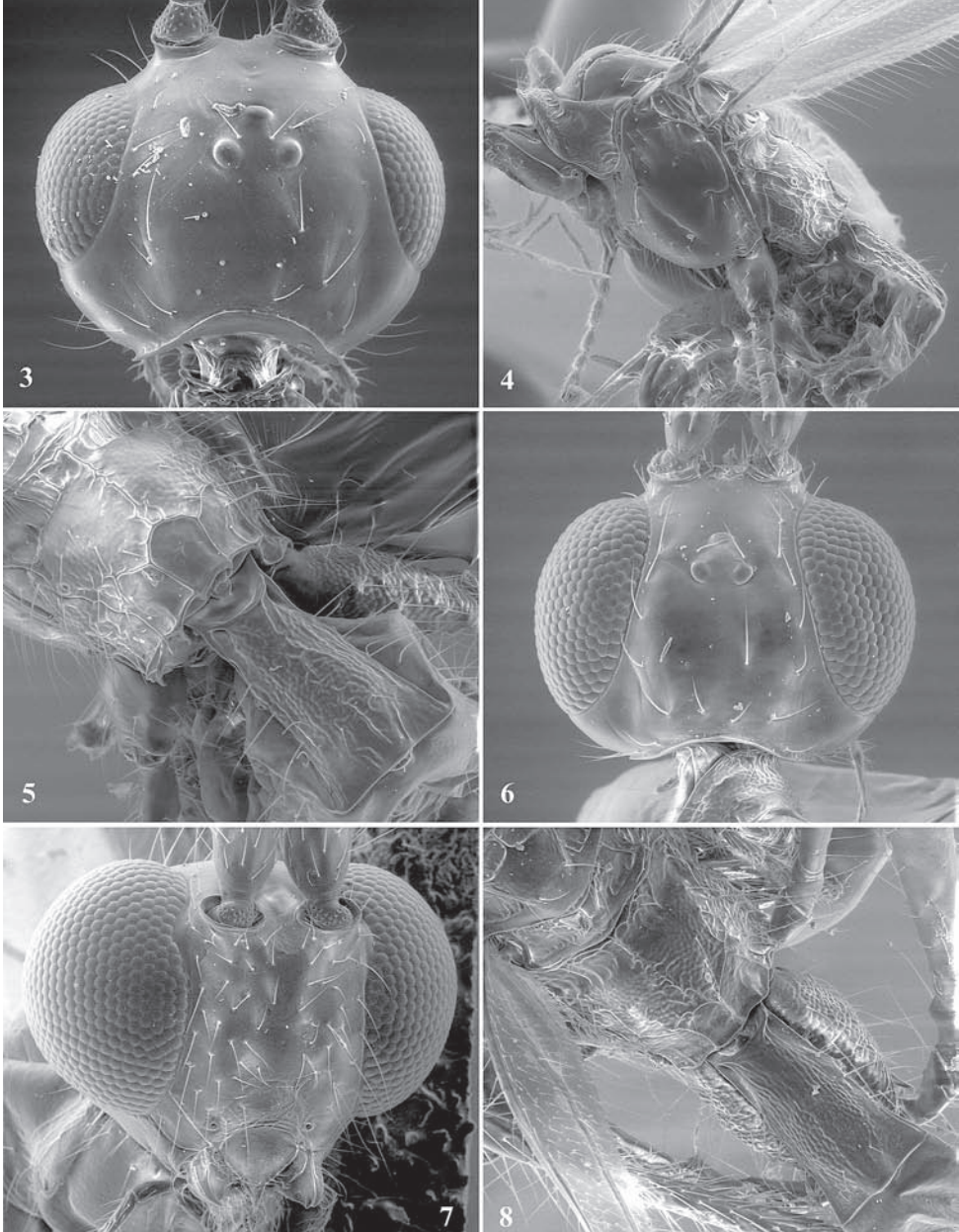
Metasoma. — First metasomal tergite 3 times longer than apical width, apparently parallel-sided, but apical width 1.8 times basal width, with a basal semicircular area; surface granulate-rugose except near second tergite (fig. 5). Second tergite weakly sclerotized baso-laterally. Remainder of metasomal tergites membranous. Ovipositor sheath about half as long as hind basitarsus.

Colour. — Dark brown; pronotum, propleuron, metanotum, legs, mandibles and antenna yellowish; mandible tips brownish; hind coxa with a dark lateral patch; all telotarsi dark brown; wing venation brownish, but costal and anal veins and part of pterostigma whitish.

Variation. — Body length: 2.2-2.7 mm. Flagellum with 23-24 segments. Body/antenna proportion: 1.4-1.5. Head proportions: in dorsal view temple/eye height: 0.6-0.7, vertex/eye width: 2.7-3.5; in lateral view: malar space/eye height: 0.4-0.6. Mesoscutum width/height: 1.1-1.3. Scutellum smooth to very weakly granulate. First metasomal tergites height/apical width: 2.8-3.4; apical/basal width: 1.6-2.0. The anterior part more or less defined anteriorly depending on granulate sculpture. Propodeal transverse groove vary in crenulation. Some paratypes have parts of face, notauli and propodeal transverse groove paler coloured.

Male. — Nearly identical to female; differs only by the slightly larger eyes.

Etymology. — Specific name refers to the first collection site, Jaraguá Peak in the Parque Estadual do Jaraguá.



Figs 3-5. *Cantharoctonus jaragua* spec. nov.; figs 6-8, *C. braziliensis* spec. nov. 3, 6, head, dorsal aspect; 4, mesosoma, lateral aspect; 5, 7, propodeum and first tergite, dorsal aspect.

Cantharoctonus braziliensis Shimbori & Penteadó-Dias, spec. nov.
(figs 2, 6-8)

Material.— Holotype ♀ ((DCBU), “Brazil, DF, Brasília, Res. Ecol. IBGE, km 0, BR 251, 26.xi-3.x.1980, Malaise trap”. Paratypes (1 ♀ + 1 ♂): 1 ♀, Mata da Boa Esperança, Ilhéus, BA, Brazil. 19.v.2002. Sweeping. A.M. Penteadó & equip.; 1 ♂, Reserva de Sapiranga, Mata de São João, BA, Brazil. 21.vii.2001, sweeping, M.T. Tavares & equip.

Holotype female: body length: 2.1 mm.

Head.— In dorsal view globose; 1.4 times wider than mesoscutum; ocellar triangle equilateral, its base length 1.5 times distance between eye and ocelli; eyes large, shortest distance between eyes about equal to width of eye, temples 0.3 times height of eye (fig. 6). In lateral view eyes nearly circular, flattened ventrally; malar space very short, 0.2 times eye height in frontal view; malar suture present. Occipital carina complete, and meeting hypostomal carina. Face smooth; clypeus as wide as high, very convex (fig. 7). Antenna 1.5 times longer than body; flagellum 25-segmented; all joints at least 4 times longer than wide.

Mesosoma.— Surface of mesosoma mostly smooth. Pronotal collar granulate, remainder of pronotum smooth and shining. Mesoscutum as high as wide; notauli well-defined anteriorly, less developed posteriorly, meeting in a weakly granulate area with a few weak striations just in front of scutellar sulcus. Scutellar sulcus wide, with a single longitudinal carina. Scutellum weakly punctate. Precoxal sulcus smooth and shallow, absent posteriorly; mesosternal sulcus narrow scrobiculate. Metapleuron granulate. Propodeum anteriorly with open areola, medio-longitudinal carina extending from metanotum to posterior area; surface smooth posteriorly and granulate anteriorly; transverse anterior groove wide and crenulate (fig. 8). Hind leg with long setae; longest setae of hind femur equal to its width; hind coxa with coarsely granulate sculpture. Fore wing vein (RS+M)b long, as long as vein r; vein 2RS about equal to 3RSa; vein 3RSb about 1.4 times 3RSa; vein 2CU almost in line with 1CU.

Metasoma.— First metasomal tergite 1.8 times longer than its apical width, apical width 1.7 times basal width; with a basal semicircular area; surface granulate, apicolateral corners smooth (fig. 8). Second tergite weakly sclerotized basally. Remainder of metasomal tergite membranous. Ovipositor sheath about half as long as hind basitarsus.

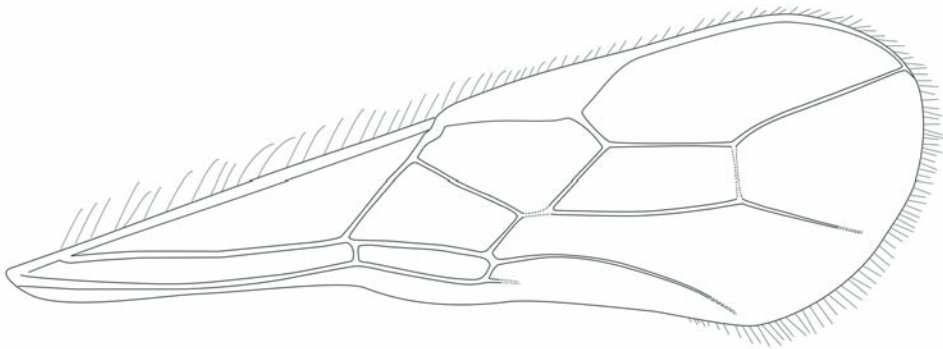


Fig. 9. *Cantharoctonus jaragua* spec. nov., fore wing.

Colour. — Yellowish; pronotum, propleuron, coxae, trochanters and trochantelli, labial and maxillary palpi whitish; medio-longitudinal carina of propodeum and first metasomal tergite brown; ocellar triangle in a blackish area; wing venation brownish.

Variation. — Body length 1.8-2.1 mm; first metasomal tergite 1.5-1.8 times longer than its apical width; propodeum and first metasomal tergite more or less darkened.

Male. — Body length: 2.0 mm. Similar to female, but eyes relatively larger.

Diagnosis. — Resembles *C. canadensis* in colour and head shape but differs by the following: face smooth, first metasomal tergite without a pair of dorsal carinae, areola un-defined anteriorly and body smaller.

Etymology. — Species is named after Brazil because the genus is reported for the first time from Brazil.

Acknowledgements

For financial support we thank Fundação de Amparo à Pesquisa do Estado de São Paulo (FAPESP), Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq), and Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES). For the SEM pictures we thank Luciana B.R. Fernandes. We are grateful to INCT-Hymenoptera Sudeste for the use of photographic equipment.

References

- Achterberg, C. van, 1993. Illustrated key to the subfamilies of the Braconidae (Hymenoptera: Ichneumonoidea). — Zoologische Verhandlungen Leiden 283: 1-189.
- Achterberg, C. van, 1995. Generic revision of the subfamily Betylobraconinae (Hymenoptera: Braconidae) and other groups with modified fore tarsus. — Zoologische Verhandlungen Leiden 298: 1-243.
- Ashmead, W.H., 1889. Descriptions of new Braconidae in the collection of the U.S. National Museum. — Proceedings of the U.S. National Museum 11(1888): 611-671.
- Mason, W.R.M., 1968. New Canadian Braconidae (Hymenoptera). — Canadian Entomologist 100: 715-728.
- Quicke, D.L.J. & Achterberg, C. van, 1990. Phylogeny of the subfamilies of the family Braconidae (Hymenoptera). — Zoologische Verhandlungen Leiden 258: 1-95.
- Quicke, D.L.J., 1993. The polyphyletic origin of endoparasitism in the cyclostome lineages of Braconidae (Hymenoptera): a reassessment. — Zoologische Mededelingen Leiden 67 (10):159-177.
- Scatolini, D., Pentead-Dias A.M. & van Achterberg, C., 2002. *Pseudorhysipolis* gen. nov. (Hymenoptera: Braconidae: Rhysipolinae), with nine new species from Brazil, Suriname and Panama. — Zoologische Mededelingen Leiden 76: 109-131.
- Sharanovsky, B.J., A.P.G. Dowling & M.J. Sharkey, 2011. Molecular phylogenetics of Braconidae (Hymenoptera: Ichneumonoidea), based on multiple nuclear genes, and implications for classification. — Systematic Entomology 36: 549-572.
- Spencer, L. & Whitfield J.B., 1999. Revision of the Nearctic Species of *Rhysipolis* Foerster (Hymenoptera: Braconidae). — Transactions of the American Entomological Society 125(3): 295-324.
- Townsend, A.C. & Shaw S.R., 2009. A new species of *Andesipolis* Whitfield & Choi from the eastern Andes of Ecuador with notes on biology and classification (Hymenoptera: Braconidae: Rhysipolinae). — Journal of Insect Science 9(36): 1-7. Available from: insectscience.org/9.36.
- Universidad Autónoma de Nuevo León (UANL) database Himenópteros Parasíticos en México (accessed through GBIF data portal, <http://data.gbif.org/datasets/resource/11120>, 2010-10-24, in November 2010).
- Wharton, R.A., P.M. Marsh & M.J. Sharkey (eds), 1997. Identification manual to the New World genera of the family Braconidae (Hymenoptera). — International Society of Hymenopterists, Special Publication 1: 1-43.

- Whitfield, J.B. & Achterberg, C. van, 1987. Clarification of taxonomic status of the genera *Cantharoctonus* Viereck, *Noserus* Foerster, and *Pseudavga* Tobias (Hymenoptera: Braconidae).— Systematic Entomology 12: 509-518.
- Whitfield, J.B., 1988. Taxonomic notes on Rhyssalinae and Rhysipolini (Hymenoptera: Braconidae) with first Nearctic records of three genera.— Proceedings of the Entomological Society of Washington 90: 471-473.
- Whitfield, J.B. & Wagner, D.L., 1991. Annotated key to the genera of Braconidae (Hymenoptera) attacking leafmining Lepidoptera in the Holarctic Region.— Journal of Natural History 25: 733-754.
- Whitfield, J.B., 1992. The polyphyletic origin of endoparasitism in the cyclostome lineages of Braconidae (Hymenoptera).— Systematic Entomology 17: 273-286.
- Whitfield, J.B. & R.A. Wharton, 1997. Subfamily Hormiinae: 284-301. In: Wharton, R.A., P.M. Marsh & M.J. Sharkey (eds). Identification manual to the New World genera of the family Braconidae (Hymenoptera).— International Society of Hymenopterists, Special Publication 1: 1-439.
- Zaldivar-Riverón, A., Mori M. & Quicke D.L.J., 2006. Systematics of the cyclostome subfamilies of braconid parasitic wasps (Hymenoptera: Ichneumonoidea): A simultaneous molecular and morphological Bayesian approach.— Molecular Phylogenetics and Evolution 38: 130-145.
- Yu, D.S., Achterberg, C. van & Horstmann, K., 2005. World Ichneumonoidea 2004: taxonomy, biology and distribution.— Taxapad, Vancouver.

Received: 21.xi.2011

Accepted: 19.iii.2012

Edited: C. van Achterberg