New record of *Brachycyrtus* Kriechbaumer, 1880 (Hymenoptera: Ichneumonidae) from Venezuela and notes about their association with some chrysopid species

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**Scientific Note**

**Abstract.** *Brachycyrtus pretiosus* Cushman, 1936 is recorded from Venezuela for the first time. The green-lacewing species *Ceraeochrysa valida* (Banks, 1851) and *Ceraeochrysa fairchildi* (Banks, 1946) are considered as the first known recorded hosts of *Brachycyrtus costatus* (Walkley, 1956). Illustrations of the studied *Brachycyrtus* spp., adults, final larval instar cephalic structures of *B. cosmetus* and maps with geographical distribution are provided.

**Keywords:** Brachycyrtinae, *Brachycyrtus costatus*, *Brachycyrtus pretiosus*, green lacewing, parasitoids.

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*Brachycyrtus* Kriechbaumer, 1880 (Hymenoptera: Ichneumonidae: Brachycyrtinae) is cosmopolitan with half of the known species found in the Neotropical region where ~ 10 species are known (Gauld & Ward 2000; Onody et al. 2009). However, some species are widely distributed in the New World (e.g. *Brachycyrtus pretiosus* Cushman, 1936) (Gauld & Ward 2000) and in the Holarctic region (e.g. *Brachycyrtus ornatus* Kriechbaumer, 1880) (Cushman 1936; Walkley 1956).

*Brachycyrtus* species are considered solitary ectoparasitoids of the cocooned prepupae and pupae of Chrysopidae (Neuroptera) (Gauld & Ward 2000). The larva presents features characteristic of this lifestyle, the mandibles with dorsal blade margin denticulated, labral sclerite present, and spiracular closing apparatus separated from the atrium by a section of trachea (Wahl & Gauld 2002). However, Wahl & Gauld commented that they were unable to observe the antennae and the determination of its condition is necessary.

The Venezuelan Brachycyrtinae fauna is practically unknown and only three species: *Brachycyrtus costatus* (Walkley, 1956), *Brachycyrtus oculatus* Cushman, 1936, and *Brachycyrtus veriatrix* Gauld & Ward, 2000 have been recorded. Herein, *B. pretiosus* is recorded from Venezuela for the first time. Illustration of both *B. pretiosus* and *B. cosmetus* species and final larval cephalic capsule of *B. cosmetus* are provided.

The samples were carried out sporadically in a citrus orchard in the “Estación experimental Miguel Luna Lugo” Universidad Centroccidental Lisandro Alvarado, Lara state, Venezuela (10° 01’ N - 69° 16’ W, 520 m) during the period of July 2007 to July 2011.

Cocoon of chrysopids were collected manually and placed in separate voile-stoppered vials until the emergence of chrysopids or parasitoids. The species of chrysopids host genus, however the known previous records associate with *B. cosmetus* and two were *B. pretiosus*.

Adults of *B. pretiosus* (Figure 1A-B) were obtained from cocooned pupae of both *Ceraeochrysa fairchildi* (Banks, 1946) and *Ceraeochrysa valida* (Banks, 1895), these being the first host records known to the parasitoid.

The species *B. pretiosus* (Figure 1C-D) is recorded from Venezuela for the first time. We were unable to determine the cocooned chrysopids host genus, however the known previous records associate this species with cocooned prepupae of *Nodita pavida* (Hagen, 1861) [=*Leucocrysa* (Nodita) *pavida*] (Cushman, 1936) and *Chrysopa bimaculata* McCleod, 1901 (=*C. valida*) (Muma 1959). The final larva instar has been previously studied by Short (1978).

The cephalic capsule of the third instar larva of *B. cosmetus* was found, mounted on a slide and photographed, and all their structures were duly labeled (Figure 2) and compared with Wahl (1993). Similarly, with Wahl’s evidence, the antenna was not observed, being the essential structure to help elucidate if the species is ecto- or endoparasitoid. However, another *Brachycyrtus* specimen from Amazon Basin exhibits disc-shaped antenna localized in the upper region of the cephalic capsule, which was observed by Sosa-Duque (unpublished personal observations). This fact will require profound studies, due analysis and comparison of the cephalic structures that are very important to help in the determination of parasitoids after the emergence of adults, as well as to define the parasitoid behavior.
Figure 1. *Brachycyrtus* spp.. A. *Brachycyrtus cosmetus* (male, Cabudare, Lara, Venezuela), lateral; B. *Brachycyrtus cosmetus*, dorsolateral; C. *Brachycyrtus pretiosus* (male, Sanare, Lara, Venezuela), lateral; D. *B. pretiosus*, frontal. Arrow indicates the characteristic eye with a deep impression.

Figure 2. Cephalic structures of the final larval instar of *Brachycyrtus cosmetus*. A. Cephalic structures; B. Details of the palpi and labral structure. Note the inverted U shape of the silk press glandule; C. Details of the mandible shape and denticulated blade. Ep= Epistome; H.s= Hypostomal spurt; H= Hypostome; I.p.p= Inferior pleurostomal process; L.p= Labial palp; L.s= Labial sclerite; M.b= Madibular blade; M.p= Maxillary palp; M= Mandible Pl= Pleurostome; S.p.p= superior pleurostomal process; S.p= Silk press; S.s= Stipital sclerite; S= Sensorium

We recommended future studies aimed for knowing the *Brachycyrtus* behavior, opening of some chrysopid cocoons and make external observations and internal dissection of the host to be able to note the presence of the parasitoid. We are aware that this process will lead to the death of the parasitoid, but it could be useful to obtain the larva in the host, and finally observe the cephalic structures attached to the larva in order to observe the presence of antennal disc, which can be lost during the molting process, or slide preparation, because of which the structure has never been documented.

*Brachycyrtus cosmetus* (Walkley, 1956)

(Fig. 3)

Material examined: Venezuela, Lara, Tarabana, (10°01'N - 69°16'W) 514 m, vi.2007, 1♂, pupa of *C. fairchildi*, A. Yanez (MJMO); viii.2007, 1♂, pupae of *Ceraeochrysa* sp., A. Yanez (MJMO); ii.2008, 1♀, pupa of *Ceraeochrysa* sp., A. Yanez (MJMO); v.2010, 1♀, pupa of *Ceraeochrysa* sp. A. Yanez (MJMO); vii.2010, 1♀, pupa of *C. valida*, A. Yanez (MJMO); iii.2011, 1♀, pupa of *Ceraeochrysa* sp., (MJMO); iv.2011, 1♂, pupa of *Ceraeochrysa* sp., A. Yanez (MJMO).

Current known distribution. Brazil, Costa Rica, Mexico, Panamá, Suriname, Trinidad & Tobago and Venezuela (Gauld & Ward 2000; Onody. et al. 2009; González-Moreno & Bordera 2011; Yu et al. 2016; Fernandes et al. 2020a; Fernandes et al. 2020b).

New record locality. Venezuela, Lara state.

Figure 3. Map of the geographic distribution of *Brachycyrtus cosmetus*. Red circle = previous records of *Brachycyrtus cosmetus*; blue circle = new records of *Brachycyrtus cosmetus*.

*Brachycyrtus pretiosus* Cushman, 1936

(Fig. 4)

Material examined: Venezuela, Lara, Tarabana, (10°01' N - 69°16' W) 514 m, vi.2007, 1♂, pupa of Chrysopidae, A. Yanez (MJMO); Sanare, Minas de Arcilla La Rosa, (9°45' N 69°35' W) 1050 m, v.2010, 1♀, pupa of Chrysopidae, E. Arcaya, J. Morales, B. Carrero (MJMO).

Current known distribution. Argentina, Brazil, Costa Rica, Ecuador, Mexico, Peru and USA (Walkley 1956; Gauld & Ward 2000; Onody et al. 2009; Yu et al. 2016; Fernandes et al. 2020a; Fernandes et al. 2020b).

New locality record. Venezuela, Lara state.
Figure 4. Map of the geographic distribution of *Brachycyrtus pretiosus*. Red square = previous records of *Brachycyrtus pretiosus*; blue square = new records of *Brachycyrtus pretiosus*.

**Authors’ Contributions**

AY planned the sampling design and carried out the collection and maintenance of the analyzed material; FD and FJSD identified the *Brachycyrtus* and chrysopids species respectively.

**References**

Bennett, A. M. R.; Cardinal, S.; Gauld, I. D.; Wahl, D. B. (2019) Phylogeny of the subfamilies of Ichneumonidae (Hymenoptera). *Journal of Hymenoptera Research*, 71: 1-156. doi: 10.3897/jhr.71.32375

Collantes, G. R. D. (2011) Primer registro para Panamá de *Brachycyrtus cosmetus* (Walkley, 1956) (Hymenoptera, Ichneumonidae, Brachycyrtinae). *Tecnociencia*, 13: 37-41.

Cushman, R. A. (1936) The Ichneumon-flies of the genus *Brachycyrtus* Kriechbaumer. *Proceeding of the United States National Museum*, 84: 17-24.

Fernandes, D. R. R.; Santos, B. F.; Pádua, D. G.; Araujo, R. O. (2020a) Ichneumonidae. In: *Catálogo Taxonômico da Fauna do Brasil*. PNUD. Available in: <http://fauna.jbrj.gov.br/fauna/faunadobrasil/2248>. Access on: 24 Nov. 2020

Fernandes, D. R. R.; Lara, R. I. R.; Perioto, N. W. (2020b) New records of Ichneumonidae (Hymenoptera: Ichneumoidea) from a coffee agroecosystem of southeastern Brazil. *Entomological Communications*, 2: ec02031. doi: 10.37486/2675-1305.ec02031

Gauld, I. D.; Ward, S. (2000) Subfamily Brachycyrtinae. In: Gauld, I.D. 2000. *The Ichneumonidae of Costa Rica*. 63: 453pp. Memoirs of the American Entomological Institute.

González-Moreno, A.; Bordera, S. (2011) New records of Ichneumonidae (Hymenoptera: Ichneumoidea) from Mexico. *Zootaxa*, 2879: 1-21.

Howar, E. E. (1987) Order Hymenoptera. In: Stehr, F. W (Ed.) The *Immature Insects*: volume 1, pp. 597-708. Kendal Hunt publishing.

Muma, M. H. (1959) Chrysopidae associated with *Citrus* in Florida. *Journal Florida Entomologist*, 42 (1): 21-29.

Onody, H. C.; Loffredo, A. P. S.; Penteado-Dias, A. M. (2009) Notes on the Brazilian *Brachycyrtus* Kriechbaumer species (Hymenoptera, Ichneumonidae: Brachycyrtinae). *Brazilian Journal of Biology*, 69: 981-982.

Short, J. R. T. (1978) The final larval instar of the Ichneumonidae. *Memoirs of the American Entomological Institute*, 25: 1-508.

Shorthouse, D. P. (2010) SimpleMappr, an online tool to produce publication-quality point maps. Available in: <http://www.simplemappr.net>.

Yu, D. S.; Van Achtenberg, C.; Horstmann, K. (2016) *World Ichneumoidea* 2015. Ottawa, Taxapad. Database on flash-drive. Access on: 18.x.2019.