

Contribution to the knowledge of the Brazilian Ephialtini Darwin wasps (Ichneumonidae: Pimplinae)

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Received 25 - XI - 2022 | Accepted 17 - II - 2023 | Published 31 - III - 2023

<https://doi.org/10.25085/rsea.820108>

Contribución al conocimiento de las avispas de Darwin Ephialtini de Brasil (Ichneumonidae: Pimplinae)

RESUMEN. Las avispas parasitoides *Clistopyga misionensis* Bordera & Sääksjärvi e *Hymenoepimecis pucallpina* Pádua & Sääksjärvi fueron descritas recientemente y solo se conocen de Perú y Argentina. Para ambas especies, los machos siguen siendo desconocidos. Aquí proporcionamos el primer registro de *H. pucallpina* para Brasil, Mato Grosso, y el macho se describe e ilustra por primera vez. También proporcionamos un nuevo registro de distribución de *C. misionensis* para Brasil, Minas Gerais. Se proporciona un mapa de distribución e imágenes.

PALABRAS CLAVE. América del Sur. Avispas parasitoides. Hymenoptera. Ichneumonoidea. Región Neotropical. Taxonomía.

ABSTRACT. The parasitoid wasps *Clistopyga misionensis* Bordera & Sääksjärvi and *Hymenoepimecis pucallpina* Pádua & Sääksjärvi were described recently and were known only from Peru and Argentina, respectively. The males of both species remain unknown. Here, we provide the first record of *H. pucallpina* for Brazil, Mato Grosso, and its male is described and illustrated for the first time. We also provide a new distribution record of *C. misionensis* for Brazil, Minas Gerais. A distribution map and images are provided.

KEYWORDS. Hymenoptera. Ichneumonoidea. Neotropical region. Parasitoid wasps. Pimplinae. South America. Taxonomy.

Ichneumonidae Latreille is a parasitoid wasps family known as Darwin wasps (Klopstein et al., 2019) and is one of the richest families with more than 24000 extant species (Yu et al., 2016). Despite their diversity, little is known about their basic knowledge of taxonomy, biology, geographic distribution, and evolution (Quicke, 2015).

The subfamily Pimplinae Wesmael has more than 77 genera and 1737 species occurring worldwide (Yu et al., 2016). In Brazil, 25 genera and 138 species were recorded (Fernandes et al., 2022). These wasps are ecto-

and endoparasitoids of eggs, larvae, and pupae of Lepidoptera, Coleoptera, Hymenoptera, and Diptera orders, and Araneae and its offspring (Fitton et al., 1988; Gauld et al., 2002). Pimplinae has three tribes, including Ephialtini (Broad et al., 2018), that includes the genera *Clistopyga* Gravenhorst and *Hymenoepimecis* Viereck, aims of this study. Ephialtini occurs worldwide and can be recognized by the following characters: (1) mesopleural suture slightly angled centrally; (2) dorsal carinae of propodeum reduced, with at most lateromedian

longitudinal ones discernible; (3) females with basally lobate tarsal claws (lacking in a few taxa); (4) ovipositor almost always projecting beyond apex of metasoma by more than the length of the hind tibia; (5) male with subgenital plate transverse and unspecialized; (6) distal tarsal segment and pulvillus unspecialized; (7) fore wing with areolet usually present; (8) mandible bidentate (Gauld, 1991).

There are 66 known *Clistopyga* species worldwide, most of which (43 species) are distributed in the Neotropical region (Bordera et al., 2016; Yu et al., 2016; Palacio et al., 2018; Varga, 2018; Bordera & Palacio, 2019; Bordera et al., 2019; Palacio et al., 2019). Some of the species are reported to be idiobiont or koinobiont ectoparasitoids of spiders or spider egg sacs (Fitton et al., 1988; Gauld, 1991; Gauld et al., 1998). As happens with most Darwin wasps, most *Clistopyga* species are rarely observed or collected, and thus little is known about their biology (Bordera et al., 2016). Until now, seven species of *Clistopyga* are registered for Brazil (Fernandes et al., 2022).

There are 28 described *Hymenoepimecis* species, known as spider-attacking Darwin wasps (Yu et al., 2016; Pádua et al., 2020; Kloss et al., 2022; Pádua, 2022). They are known to be koinobiont ectoparasitoids attacking sub-adult and adult spiders belonging to the families Araneidae and Tetragnathidae (Pádua et al., 2016; Eberhard & Gonzaga, 2019). This genus occurs exclusively in the Neotropical region (Pádua et al., 2020; Pádua, 2022), with 17 species occurring in Brazil (Fernandes et al., 2022).

The aims of this paper are to report the occurrence of *C. misionensis* Bordera & Sääksjärvi, 2016 and *H. pucallpina* Pádua & Sääksjärvi, 2020 for the first time in Brazil, to describe the male of *H. pucallpina*, and to provide diagnosis, digital images, and distribution maps.

General morphological terminology and measurements are according to Broad et al. (2018). The examined specimens were deposited at Coleção Zoológica, Universidade Federal do Mato Grosso (UFMT), Mato Grosso, Brazil (curator: Fernando Z. Vaz-de-Mello) and Coleção de Invertebrados, Instituto Nacional de Pesquisas da Amazônia (INPA), Manaus, Amazonas, Brazil (curators: José A. Rafael and Marcio L. Oliveira).

Photographs were prepared using a Leica DMC4500 digital camera attached to a Leica M205A stereomicroscope and multiple layers were stacked by using the software Helicon Focus 5.3 Pro. All images were treated using the website Adobe Express (<https://express.adobe.com>). The maps were made using the website SimpleMappr (Shorthouse, 2010). New distribution records are indicated by an asterisk (*).

***Clistopyga misionensis* Bordera & Sääksjärvi, 2016** (Fig. 1): The male of this species is unknown. According to Bordera et al. (2016), this species can be distinguished from other species by the combination of the following characters: 1) clypeal suture slightly curved (Fig. 1b); 2)

occipital carina moderately raised, forming a flat dorsomedial flange, slightly upcurved posteriorly; 3) epicnemial carina weak, its dorsal end considerably below the level of the center of pronotum; 4) wings hyaline with a slightly yellowish tint; 5) hind coxa dorsally white, ventrally dark brown to black (Fig. 1a, 1c); 6) propodeum and metapleuron entirely orange; 7) metasomal tergites IV-VI with the dark brown area extending laterally backward on the white posterior band (Fig. 1c); 8) ovipositor stout, at apical 0.3–0.4 strongly upcurved.

Material examined: 1 female: BRAZIL, Minas Gerais, Cássia, Sítio Genoveva, Região do Lajeado, 04.XII.2016–04.I.2017, Malaise trap (near córrego), [S 20°35'05" W 46°55'09"], D.G. Pádua & A.G. Pádua cols. (INPA) (Fig. 1d).

Distribution: ARGENTINA: *Misiones*, Loreto, Ruinas Jesuíticas S 27°19' W 55°32'. PERU: *Marcapata*, S 13°35' W 70°58' (Bordera et al., 2016); * BRAZIL: *Minas Gerais*: Cássia, Sítio Genoveva, Região do Lajeado, S 20°35'05" W 46°55'09" (Fig. 1d).

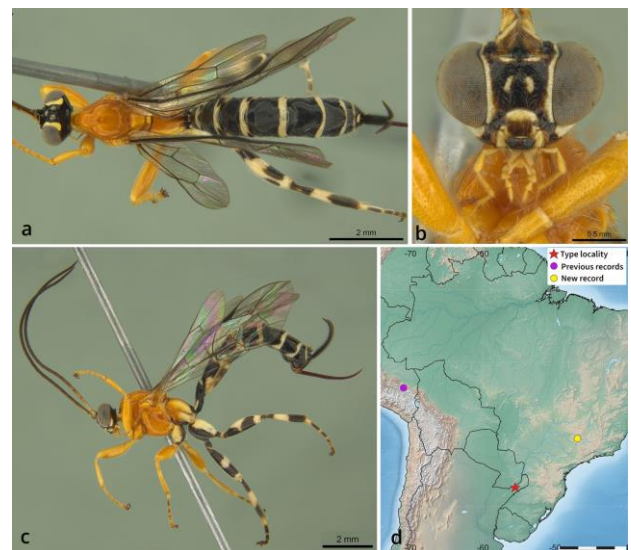


Fig. 1. *Clistopyga misionensis* Bordera & Sääksjärvi, 2016. **a.** Habitus of the female in dorsal view. (Scale = 2 mm) **b.** Head of the female in frontal view. (Scale = 0.5 mm) **c.** Habitus of the female in lateral view. (Scale = 2 mm) **d.** Distribution map.

***Hymenoepimecis pucallpina* Pádua & Sääksjärvi, 2020** (Fig. 2): This species can be distinguished from other *Hymenoepimecis* by the combination of the following characters: 1) fore wing black, with a yellowish band between junction of vein R1 up to pterostigma until half vein M (Fig. 2a); 2) metasoma entirely black; 3) hind leg black; 4) occipital carina projected and curved upwards dorsally (Fig. 2c) (Pádua et al., 2020).

Male description. (Figs. 2a, 2b, 2c) Body 15.51 mm; **Head.** Face about 0.69× minimum face width to the high of the eye, smooth, slightly convex with few spaced bristles; head in dorsal view, with gena slightly narrowed behind eyes; posterior ocelli separated from eyes by about 1.04× its own maximum diameter; occipital carina projected and

curved upwards dorsally. **Mesosoma.** Pronotum long, smooth and polished, with distance from tegula to head greater than about 0.60x distance from tegula to hind margin of propodeum, and in anterior part with opening pocket-like structure not reduced longitudinally; mesoscutum smooth and polished; scutellum, in profile, convex; mesopleuron smooth and polished, with anterodorsal and posterodorsal parts bearing sparse, fine setiferous punctures; metapleuron smooth and polished, with few sparse, fine setiferous punctures; propodeum smooth, polished, with sparse, fine setiferous punctures and with lateral longitudinal carina present only posteriorly. Fore wing 12.45 mm; *1cu-a* postfurcal to the base of *M&RS*; *2rs-m* about 0.75x as long as abscissa of *M* between *2rs-m* and *2m-cu*; hind wing with abscissa of *CU* meet *cu-a* equidistant between *M+CU* and *AA*. Hind leg with tibia + tarsus about 0.60x the fore wing length; tarsal claw simple. **Metasoma.** Slender; tergite I about 1.46x as long as posteriorly width, centrally quite strongly convex with lateral carinae present only at extreme anterior end flanking the anterior concavity; sternite I with a low, rounded swelling posteriorly; tergite II about 1.22x as long as posteriorly width; paramere rounded apically. **Coloration.** Head black with apical margin of clypeus and mouthparts (except apex mandible black) yellowish (Fig. 2b); antenna blackish. Mesosoma entirely orange. Fore and mid leg orange, the hind leg black. Fore wing black, with the yellowish hyaline band between the junction of vein *RA* up to pterostigma until half vein *M*; pterostigma black, except apical margin yellowish (Fig. 2c); hind wing black with basal region and apex yellowish. Metasoma entirely black, except T1 yellowish centrally, and TII yellowish in anterior part.

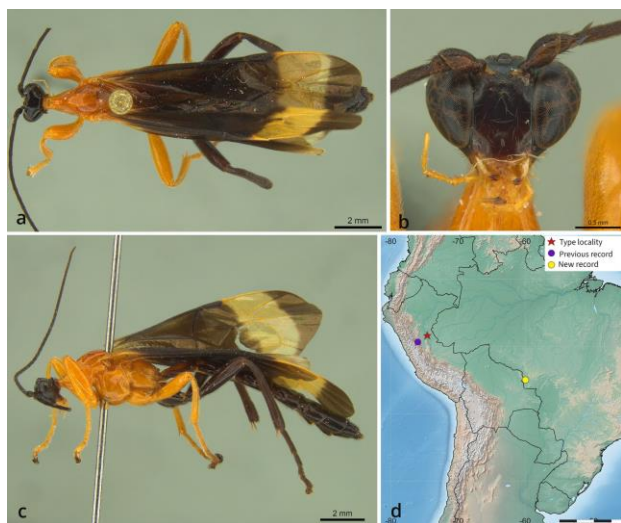


Fig. 2. *Hymenopimecis pucallpina* Pádua & Sääksjärvi, 2020. **a.** Habitus of the male in dorsal view. (Scale = 2 mm) **b.** Head of the male in frontal view. (Scale = 0.5 mm) **c.** Habitus of the male in lateral view. (Scale = 2 mm) **d.** Distribution map.

Material examined: 1 male: BRAZIL, Mato Grosso, Vila Bela, Cascata C. Augusto, Capoeira, Light trap, 18.I.1985, S 15°00'18" W 59°56'52", S. Marcolino col. (UFMT).

Distribution: PERU: Loreto, Pucallpa, S 8°23'0" W 74°33'0". Huánuco, Tingo Maria, Cueva de Las Pavas S 9°22'31" W 75°57'40" (Pádua et al., 2020); *BRAZIL: Mato Grosso: Vila Bela, Cascata C. Augusto S 15°00'18" W 59°56'52" (Fig. 2d).

ACKNOWLEDGMENTS

We thank the curators for the specimens loaned. We thank the Invertebrate Collection of INPA for allowing the use of photographic equipment used in this work. This study was financed in part by the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - Brasil (CAPES) - Finance Code 001. Araujo RO thanks the "Agencia Nacional de Investigación y Desarrollo (ANID)", Chile, through the international collaboration with researchers that also contribute to the following projects: FONDECYT Iniciación n° 11200014 and FONDECYT Regular n° 1221879.

LITERATURE CITED

- Bordera, S., & Palacio, E. (2019) The Neotropical species of *Clistopyga* (Hymenoptera, Ichneumonidae, Pimplinae). Part IV: the *C. eldae* species group, with the description of three new species. *Zootaxa*, **4564**(2), 327-346. <https://doi.org/10.11646/zootaxa.4564.2.2>
- Bordera, S., Sääksjärvi, I.E., Castillo, C., Palacio, E., & González-Moreno, A. (2016) The Neotropical species of *Clistopyga* (Hymenoptera, Ichneumonidae, Pimplinae). Part I: the *C. chaconi* species group, with the description of eleven new species. *European Journal of Taxonomy*, **206**, 1-37. <https://doi.org/10.5852/ejt.2016.206>
- Bordera, S., Palacio, E., & Martínez, J. (2019) The Neotropical species of *Clistopyga* (Hymenoptera, Ichneumonidae, Pimplinae). Part V: the *C. diazi* species group, with the description of three new species. *Zootaxa*, **4661**(3), 545-565. <https://doi.org/10.11646/zootaxa.4661.3.8>
- Broad, G.R., Shaw, M.R., & Fitton, M.G. (2018) *Ichneumonid Wasps (Hymenoptera: Ichneumonoidea): their Classification and Biology*. Royal Entomological Society, Vol 7 part 13, 418 pp.
- Eberhard, W.G., & Gonzaga, M.O. (2019) Evidence that *Polysphincta*-group wasps (Hymenoptera: Ichneumonidae) use ecdysteroids to manipulate the web-construction behavior of their spiderhosts. *Biological Journal of the Linnean Society*, **127**, 429-471. <https://doi.org/10.1093/biolinnean/blz044>.
- Fernandes, D.R.R., Santos, B.F., Pádua, D.G., & Araujo, R.O. (2022) Ichneumonidae in Catálogo Taxonômico da Fauna do Brasil. PNUD. Disponível em: <<http://fauna.jbrj.gov.br/fauna/faunadobrasil/3585>> (Accessed 12 October 2022)
- Fitton, M.G., Shaw, M.R., & Gauld, I.D. (1988) Pimpline Ichneumon-flies. Hymenoptera, Ichneumonidae (Pimplinae). *Handbook for the Identification of British Insects*, **7**, 1-110.

- Gauld, I.D. (1991) The Ichneumonidae of Costa Rica, 1. *Memoirs of the American Entomological Institute*, **47**, 1-589
- Gauld, I.D., Ugalde Gómez, J.A., & Hanson, P. (1998) Guía de los Pimplinae de Costa Rica (Hymenoptera: Ichneumonidae). *Revista de Biología Tropical*, **46**, 1-189. <https://doi.org/10.11646/zootaxa.4661.3.8>
- Gauld, I.D., Wahl, D.B., & Broad, G.R. (2002) The suprageneric groups of the Pimplinae (Hymenoptera: Ichneumonidae): a cladistic re-evaluation and evolutionary biological study. *Biological Journal of the Linnean Society*, **136**, 421-485.
- Klopfstein, S., Santos, B.F., Shaw, M.R., Alvarado, M., Bennett, A.M.R., Dal Pos, D., Giannotta, M., Herrera Florez, A.F., Karlsson, D., et al. (2019) Darwin wasps: a new name heralds renewed efforts to unravel the evolutionary history of Ichneumonidae. *Entomological Communications*, **1**, ec01006. <https://doi.org/10.37486/2675-1305.ec01006>
- Kloss, T.G., Pádua, D.G., Almeida, S.S., Penteado-Dias, A.M., Mendes-Pereira, T., Sobczak, J.F., Lacerda, F.G., & Gonzaga, M.O. (2022) A New Darwin Wasp (Hymenoptera: Ichneumonidae) and New Records of Behavioral Manipulation of the Host Spider *Leucauge volupis* (Araneae: Tetragnathidae). *Neotropical Entomology*, **2022**, 1-9. <https://doi.org/10.1007/s13744-022-00991-6>
- Pádua, D.G., Salvatierra, L., Sobczak, J.F., & Oliveira, M.L. (2016) Parasitism of *Hymenoepimecis manauara* Pádua & Oliveira (Hymenoptera: Ichneumonidae: Pimplinae) on *Leucauge henryi* Mello-Leitão (Araneae: Tetragnathidae) in Brazilian Amazonian. *Biodiversity Data Journal*, **4**, e11219. <https://doi.org/10.3897/BDJ.4.e11219>
- Pádua, D.G., Sääksjärvi, I.E., Monteiro, R.F., & Oliveira, M.L. (2020) Seven new species of spider-attacking *Hymenoepimecis* Viereck (Hymenoptera, Ichneumonidae, Pimplinae) from Ecuador, French Guiana and Peru, with an identification key to the world species. *ZooKeys*, **935**, 57-92. <https://doi.org/10.3897/zookeys.935.50492>
- Pádua, D.G. (2022) First record of the Darwin wasp *Hymenoepimecis* Viereck, 1912 (Hymenoptera: Ichneumonidae: Pimplinae) from Argentina and Bolivia, with description of a new species. *Zootaxa*, **5169**, 049-060. <https://doi.org/10.11646/zootaxa.5169.1.4>
- Palacio, E., Bordera, S., & Francisco, D. (2019) The Neotropical species of *Clistopyga* (Hymenoptera, Ichneumonidae, Pimplinae). Part III: the *C. henryi* species group, with the description of three new species. *Zootaxa*, **4563**(1), 103-118. <https://doi.org/10.11646/zootaxa.4563.1.5>
- Palacio, E., Bordera, S., Sääksjärvi, I.E., & Francisco, D. (2018) The Neotropical species of *Clistopyga* (Hymenoptera, Ichneumonidae, Pimplinae). Part II: the *C. isayae* species group, with the description of seven new species. *Zootaxa*, **4442**(1), 101-121. <https://doi.org/10.11646/zootaxa.4563.1.5>
- Quicke, D.L.J. (2015) *The braconid and ichneumonid parasitoid wasps: biology, systematics, evolution and ecology*. John Wiley & Sons, Ltd, New Jersey, United States of America.
- Shorthouse, D.P. (2010) SimpleMappr, an online tool to produce publication-quality point maps. Available from: <https://www.simplemappr.net> (accessed 11 October 2022).
- Varga, O. (2018) New species of the genus *Clistopyga* (Hymenoptera, Ichneumonidae, Pimplinae) from the Afrotropical region. *Zooiversity*, **55**, 421-424. <https://doi.org/10.15407/zoo2021.05.421>
- Yu, D.S.; van Achterberg, C., & Horstmann, K. (2016) *World Ichneumonoidea 2015: Taxonomy, Biology, Morphology and Distribution*. Taxapad 2016. Database on flash-drive.