**Scientific Note**

**New records of Ichneumonidae (Hymenoptera: Ichneumonoidea) from a coffee agroecosystem of southeastern Brazil**

Daniell R. R. Fernandes¹,², Rogério I. R. Lara², Nelson W. Perioto²

¹Instituto Nacional de Pesquisas da Amazônia, Manaus, Amazonas, Brazil. ²Instituto Biológico, Ribeirão Preto, São Paulo, Brazil.

*Corresponding author: daniellrffernandes@gmail.com*

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**Abstract.** We identified 614 specimens of Ichneumonidae (Hymenoptera: Ichneumonoidea) collected in a coffee agroecosystem located at Cravinhos, São Paulo, Brazil. As a result, 34 nominal species were found belonging to 22 genera and 10 subfamilies. *Temelucha hilux* Gauld, 2000 and *Xiphosomella bonera* Gauld, 2000 were registered for the first time in South America, *Colpotrochia diabellla* Gauld & Sithole, 2002 for the first time in Brazil, and *Acerastes pertinax* (Cresson, 1872), *Colpotrochia mexicana* (Cresson, 1868), *Colpotrochia neblina* Gauld & Sithole, 2002, *Colpotrochia texana* (Cresson, 1872), *Dipazon muleolus* Dasch, 1964, *Eiphosoma nigrovittatum* Cresson, 1865, *Enicospilus flaurus* (Fabricius, 1775), *Enicospilus glabratus* (Say, 1835), *Enicospilus purgatus* (Say, 1835), *Lymeon haemorrhoidalis* (Taschenberg, 1876), *Mesostenus alvarengae* Porter, 1973, *Microarchos psammanni* Gupta, 1987, *Nonnus niger* (Brullé, 1846), *Ophiogastrella maculithorax* Brues, 1912, *Pachysomoides stupidus* (Cresson, 1874), *Polycyrtus albolineatus* Cameron, 1911, and *Trieces horisme* Gauld & Sithole, 2002 for the first time in the state of São Paulo. Other 14 species that are already registered for the state of São Paulo, were found for the first time in a coffee agroecosystem.

**Keywords:** Biological control, *Coffea arabica*, Darwin wasps, parasitoids.

Ichneumonidae is the largest family within Hymenoptera, currently divided into 39 subfamilies with more than 25,000 described species (Yu et al. 2016; Bennett et al. 2019). In general, they are solitary parasitoids, and most of the species attack larvae and pupae of Lepidoptera, Coleoptera, Neuroptera, Diptera and even Hymenoptera itself. This family is economically important as a biological control agent of pests from several cultures (Gauld 1991; Gauld 2006; Palacio & Wahl 2006). In Brazil, the family is represented by 1,025 species distributed in 235 genera and 28 subfamilies (Fernandes et al. 2020a).

Despite its economic and ecological importance, this group of insects has not been adequately studied in most regions of Brazil; the majority of surveys have been conducted in Atlantic forest ecosystems (Kumagai & Graf 2000; 2002; Guerra & Penteado-Dias 2002; Kumagai 2002; Tanque et al. 2010, 2015), Cerrado (Pádua et al. 2014), Caatinga (Fernandes et al. 2019; Fernandes et al. 2020b), and specific agroecosystems, such as rubber tree (Hevea brasiliensis - Euphorbiaceae) (Tempest et al. 1998), green dwarf coconut trees (Cocos nucifera - Areaceae) (Comério et al. 2012), organic farms (Sandonato et al. 2010) and guaraná plantations (Paulinia cupana - Sapindaceae) (Antunes & Fernandes 2020).

In general, the assemblage of crop-associated parasitoids is determined by the features of the agroecosystem. Conventional cultures simplify the physical structure of the agricultural landscape, increasing the dependence on the use of agricultural inputs, and decreasing the diversity of parasitoid species (Estrada 2008). However, in less disturbed agroecosystems, without the intensive use of agricultural inputs, the parasitoid assembly is related to crop diversity, soil cover, weeds and vegetation adjacent to the crop (Estrada 2008; Sandonato et al. 2010).

The material examined was collected between May 2005 and April 2007 in a coffee plantation (*Coffea arabica* - Rubiaceae) at Cravinhos (21°18’54”S 47°47’39”W), in the state of São Paulo, Brazil. The insects were sampled with: (a) Moericke traps - fixed on wooden stakes on the lower thirds of the plant (hereinafter referred as IYPT) and middle thirds (hereinafter referred as SYPT) of the plant and, (b) with two Jermy model light traps (hereinafter referred as LT) installed on poles about 50 m apart from each other (more details about sampling methodology see Lara et al. 2010 and Tango et al. 2014).

The geographic distribution of the species was verified with Mazón & Bordera (2016) and Alvarado & Figueroa (2019) for Metopiinae, Yu et al. (2016) for other ichneumonids, and with Fernandes et al. (2020a) for the occurrence in Brazilian states. New records for Brazil are indicated with an asterisk (*), and for the state of São Paulo with two asterisks (**). The distribution maps were made using SimpleMapper online software (Shorthouse 2010).

In total, 1803 specimens of Ichneumonidae were collected, distributed in 16 subfamilies, 62 genera and 109 species/morphospecies. Of these, 614 specimens were analyzed, and 34 nominal species were identified belonging to 22 genera and 10 subfamilies. We have enlisted below only those specimens, which were identified to the species level. The other 1189 specimens were identified only in morphospecies until now and are not listed here.

Two species were found for the first time in South America, three in Brazil, and 20 in the state of São Paulo. Fourteen species already registered for the state of São Paulo are, for the first time, being documented in a coffee agroecosystem.

**Brachycyrtinae**

**Brachycyrtus cosmetus** (Walkley, 1956)

**Material examined.** SYPT, 01.xii.2005, [1 female].

**Distribution.** Brazil (MT, MG, PB, RR, SP), Costa Rica, Mexico, Suriname, Trinidad & Tobago and Venezuela.

**Campopleginae**

**Campopletis flavicincta** (Ashmead, 1890)

**Material examined.** SYPT, 22.vii.2005, [1 male]; LT, 28.vii.2005, [1 male]; LT, 17.viii.2005, [1 male]; IYPT, 14.ix.2005, [1 female]; SYPT, 14.ix.2005, [1 female]; LT, 14.ix.2005, [1 male]; SYPT, 10.x.2005, [1 male]; IYPT, 09.xi.2005, [1 female]; IYPT, 22.xii.2005, [1 female]; SYPT,
Material examined. SYPT, 12.v.2005, [1 female and 1 male]; SYPT, 2.vi.2005, [1 female]; SYPT, 9.vi.2005, [2 males]; SYPT, 22.vi.2005, [1 male]; SYPT, 28.vii.2005, [1 female and 1 male]; SYPT, 3.viii.2005, [1 male]; SYPT, 14.x.2005, [2 females]; SYPT, 21.x.2005, [1 female]; SYPT, 26.x.2005, [1 male]; SYPT, 16.x.2005, [2 females and 2 males]; IYPT, 1.xii.2005, [2 females]; SYPT, 1.xii.2005, [1 male]; SYPT, 8.xii.2005, [1 male]; SYPT, 15.xii.2005, [1 female]; SYPT, 29.xii.2005, [1 female]; SYPT, 29.xii.2005, [1 female]; SYPT, 12.i.2006, [1 male]; SYPT, 19.i.2006, [3 females and 1 male]; SYPT, 26.i.2006, [1 female]; SYPT, 26.i.2006, [2 females and 1 male]; SYPT, 2.ii.2006, [1 female and 1 male]; SYPT, 9.ii.2006, [3 females]; SYPT, 9.iii.2006, [2 females and 1 male]; SYPT, 9.iii.2006, [2 females]; IYPT, 31.iii.2006, [1 female]; IYPT, 27.iv.2006, [1 female]; SYPT, 22.vii.2005, [1 female and 1 male]; IYPT, 28.vii.2005, [1 female]; SYPT, 3.ix.2006, [1 female]; SYPT, 5.viii.2006, [1 male]; IYPT, 23.ii.2006, [2 females and 2 males]; IYPT, 3.iii.2006, [1 female and 1 male]; IYPT, 9.iii.2006, [3 females]; SYPT, 17.iii.2006, [4 females]; SYPT, 24.iii.2006, [3 females and 3 males]; SYPT, 31.iii.2006, [4 females and 4 males]; SYPT, 6.iv.2006, [3 females and 4 males]; SYPT, 6.iv.2006, [2 females and 1 male]; SYPT, 12.iv.2006, [2 females and 3 males]; LT, 12.iv.2006, [1 male]; SYPT, 4.v.2006, [1 female]; LT, 13.xii.2006, [1 female]; LT, 7.iii.2007, [1 male].

Distribution. Argentina and Brazil (PA, RJ, SP**).

Messenator variargatus (Szépligeti, 1913)

Material examined. SYPT, 30.ix.2005, [1 female].

Distribution. Argentina, Bolivia, Brazil (RO, BA, ES, SP, PR, SC), Trinidad & Tobago and Uruguay.

Pachysomoides stupidus (Cresson, 1874)

Material examined. SYPT, 22.xii.2005, [1 female].

Distribution. Brazil (RJ, SP**), Costa Rica, Mexico, Panama, Paraguay, Puerto Rico, Trinidad & Tobago, United States of America and Venezuela.

Polycyrtus albolineatus Cameron, 1911

Material examined. SYPT, 26.x.2005, [1 female]; SYPT, 15.i.2006, [1 male]; SYPT, 3.iii.2006, [1 female and 1 male]; SYPT, 16.iii.2006, [1 male]; SYPT, 31.iii.2006, [1 male]; SYPT, 6.iv.2006, [1 male]; SYPT, 12.iv.2006, [1 male].

Distribution. Bolivia, Brazil (PE, SP**) and Guyana.

Diplazoninae

Diplazon laetatorius (Fabricius, 1781)

Material examined. SYPT, 5.x.2005, [1 female]; SYPT, 9.xi.2005, [1 female]; SYPT, 6.iv.2006, [1 female]; SYPT, 13.vii.2006, [1 female]; LT, 13.vii.2006, [1 female]; SYPT, 20.vii.2006, [1 female].

Distribution. Worldwide, Brazil (RJ, SP, PR).

Diplazon mullenolus Dasch, 1964

Material examined. SYPT, 14.x.2005, [1 female]; LT, 10.x.2005, [1 male].

Distribution. Brazil (SP**, SC).

Metopinae

Colpotrochia diabella Gauld & Sithole, 2002 (Fig. 1)

Material examined. LT, 26.i.2006, [1 male].
Material examined. LT, 19.i.2007, [1 male].
Distribution. Brazil (MG, SP**), Costa Rica and Mexico.

Colpotrochia mexicana (Cresson, 1868)

Material examined. LT, 20.iv.2006, [1 female and 2 males]; LT, 1.xi.2006, [1 female]; LT, 19.i.2007, [1 female]; LT, 20.xii.2006, [1 female]; LT, 19.i.2007, [1 female]; LT, 12.i.2006, [1 male]; LT, 19.x.2006, [1 male]; LT, 6.iv.2006, [1 male]; LT, 27.i.2006, [1 male]; LT, 6.vi.2006, [1 female]; LT, 20.xii.2006, [1 female]; LT, 28.xii.2006, [1 female]; LT, 19.i.2007, [1 female].

Distribution. Argentina, Argentina, Bermuda, Bolivia, Brazil (AM, BA, MG, SP**, SC), Canada, Costa Rica, Cuba, Dominican Republic, Ecuador, Guyana, Jamaica, Juan Fernandez Islands, Mexico, Nicaragua, Panama, Peru, Puerto Rico, St. Vicent, Trinidad & Tobago, United States of America, Venezuela and Virgin Islands.

Ophiogastrella maculithorax Brues, 1912

Material examined. LT, 21.i.2005, [1 male]; LT, 25.x.2006, [1 female].
Distribution. Brazil (PB, SP**), Costa Rica and Mexico.

Ophion flavidus Brullé, 1846

Material examined. IYPT, 5.v.2005, [1 male]; IYPT, 16.iii.2006, [1 female].
Distribution. Argentina, Argentina, Bahamas, Belize, Bolivia, Brazil (PA, CE, PE, BA, MT, MG, ES, RJ, SP, PR, SC), Chile, Colombia, Costa Rica, Cuba, Dominican Republic, Ecuador, El Salvador, Galapagos Islands, Grenada, Guatemala, Guyana, Haiti, Honduras, Jamaica, Martinique, Mexico, Montserrat, Panama, Paraguay, Peru, Puerto Rico, St. Lucia, St. Vicent, Suriname, Trinidad & Tobago, United States of America and Venezuela.

Chilocerus carinatus Townes, 1971

Material examined. SYPT, 10.x.2005, [1 female]; IYPT, 16.xi.2005, [1 female]; IYPT, 26.i.2006, [1 female]; LT, 6.xii.2006, [1 male]; IYPT, 28.xii.2006, [1 female]; SYPT, 25.i.2007, [1 female]; SYPT, 14.ii.2007, [1 male].
Distribution. Argentina and Brazil (SP, PR, SC).

Zaglyptus simonis (Marshall, 1892)

Material examined. SYPT, 5.v.2005, [1 male]; SYPT, 12.v.2005, [1 male]; IYPT, 3.viii.2005, [1 male]; SYPT, 10.viii.2005, [2 females]; IYPT, 8.vii.2005, [1 male]; SYPT, 17.vii.2005, [1 male]; IYPT, 24.xi.2005, [1 female]; SYPT, 8.xii.2005, [1 male]; IYPT, 12.i.2006, [1 female]; SYPT, 19.i.2006, [1 male]; IYPT, 3.iii.2006, [1 female]; SYPT, 16.iii.2006, [1 male]; IYPT, 24.iii.2006, [1 male]; SYPT, 31.iii.2006, [1 male]; SYPT, 6.iv.2006, [1 female]; SYPT, 12.iv.2006, [2 females]; SYPT, 12.iv.2006, [1 male]; IYPT, 20.iv.2006, [1 male]; IYPT, 27.iv.2006, [2 males]; IYPT, 25.v.2006, [1 female and 1 male]; IYPT, 16.vi.2006, [1 female]; SYPT, 25.x.2006, [1 female]; SYPT, 1.xii.2006, [1 female]; IYPT, 13.xii.2006, [1 male]; SYPT, 20.xii.2006, [1 male].

Distribution. Brazil (MG, SP, PR, SC), Costa Rica, Panama, Trinidad & Tobago and Venezuela.
Figure 1. Distribution records of Colpotrochia diabella, Temelucha hilux and Xiphosomella bonera. Red circle = previous records of Colpotrochia diabella; green triangle = previous records of Temelucha hilux; blue square = previous records of Xiphosomella bonera; yellow star = new records of Colpotrochia diabella, Temelucha hilux and Xiphosomella bonera; gray area = São Paulo state.

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Author’s Contributions

DRRF identified the specimens; DRRF, RIRL and NWP wrote the manuscript.

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