

NEW RECORDS OF CHRYSOPIDAE (NEUROPTERA) IN BRAZIL

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ABSTRACT

This work reports certain species of Chrysopidae for the first time in the Brazilian state of Roraima, and in Brazil as well. The chrysopids were collected with McPhail traps in four municipalities of the state of Roraima, Amajari, Boa Vista, Bonfim and Pacaraima. All nine species of *Leucochrysa* identified in this work were reported for the first time in the state of Roraima, and *L. (Nodita) amazonica* (Navás) and *L. (N.) pavidata* (Hagen) were reported for the first time in Brazil. Three species of *Ceraeochrysa*, namely *C. acmon* (Penny), *C. caligata* (Banks) and *C. cincta* (Schneider), were reported for the first time in Roraima; and *C. valida* (Banks) was reported for the first time in Brazil. Within the genus *Plesiochrysa*, *P. brasiliensis* (Schneider) was reported for the first time in Roraima. Species description is still required for the two new species identified in this work as *Plesiochrysa* sp. and *Leucochrysa (N.)* sp.

Key words: Amazon, *Ceraeochrysa*, *Leucochrysa*, *Plesiochrysa*, Roraima

NOVOS REGISTROS DE CHRYSOPIDAE (NEUROPTERA) NO BRAZIL

RESUMO

No presente trabalho foram feitos novos registros de espécies de Chrysopidae para o Estado de Roraima e para o Brasil. Os crisopídeos foram coletados com armadilhas tipo McPhail em quatro municípios de Roraima, Brasil: Amajari, Boa Vista, Bonfim e Pacaraima. Todas as nove espécies de *Leucochrysa* identificadas neste trabalho são reportadas pela primeira vez para o estado de Roraima, sendo que as espécies *L. (Nodita) amazonica* (Navás) e *L. (N.) pavidata* (Hagen) foram registradas pela primeira vez no Brasil. Três espécies de *Ceraeochrysa*, *C. acmon* (Penny), *C. caligata* (Banks) e *C. cincta* (Schneider), foram registradas pela primeira vez em Roraima; e *C. valida* (Banks) foi registrada pela primeira vez no Brasil. No gênero *Plesiochrysa*, *P. brasiliensis* (Schneider) foi registrada pela primeira vez para Roraima. Duas novas espécies, denominadas neste trabalho *Plesiochrysa* sp. e *Leucochrysa (N.)* sp., ainda precisarão ser descritas.

Palavras-chave: Amazônia, *Ceraeochrysa*, *Leucochrysa*, *Plesiochrysa*, Roraima

INTRODUCTION

Chrysopidae is the largest family of the Order Neuroptera, with approximately 1,200 species and subspecies distributed into 86 genera and subgenera grouped into the subfamilies Nothochrysinæ, Chrysopinae and Apochrysinæ. Chrysopinae stands out for its large number of species, which are grouped into four tribes: Ankylopterigini, Belonopterigini, Chrysopini, and Leucochrysinini. Two of these tribes contain species that can potentially be used in biological control programs: Chrysopini (30 genera and 7 subgenera) and Leucochrysinini (7 genera) (Brooks & Barnard 1990).

Chrysopids are important agents for the biological control of pests, and surveys of these predators have already been completed in several states in most regions of Brazil: Northeast (Freitas 2005; Macedo & Freitas 2008; Macedo & Freitas 2011), Southeast (Galli *et al.* 2004; Souza *et al.* 2004; Freitas 2007; Montes *et al.* 2007a,b; Costa *et al.* 2010; Silva *et al.* 2011), South (Cardoso *et al.* 2003; Barbosa *et al.* 2009), and North (Adams & Penny 1985; Maia *et al.* 2010).

The state of Roraima is located in the extreme north of the Brazilian Amazon, occupying an area of 224,298.98 km² between the latitudes 5°16' N and 1°25' S; and the longitudes 58°55' W and 64°48' W (IBGE 2010), corresponding to 2.6% of the Brazilian territory or 5.3% of the Amazonian Biome (Funcate 2006).

Chrysopidae specimens were captured with McPhail traps in the state of Roraima during intensive surveys of fruit flies (Diptera: Tephritidae). This work reports the captured species, the number of collected specimens and the respective municipalities where they were found.

MATERIAL AND METHODS

The chrysopids were captured with plastic McPhail traps containing 400 mL of food bait (hydrolyzed corn protein at 5%, stabilized with borax – BioAnastrepha®), which is traditionally used in fruit fly surveys and monitoring programs.

The traps were set up on fruit trees (about 1.70 m above the ground) in the domestic orchards of small rural properties in four municipalities of the state of Roraima: Boa Vista, Bonfim, Pacaraima, and Amajari (Figure 1).

The predominant vegetation at the collection sites is the Cerrado biome, with the exception of Amajari, where the Amazon Forest biome prevails. The number of installed traps and their duration of exposure in each municipality were as follows: Boa Vista – 6 traps, October/2007 through December/2008; Bonfim – 2 traps, October/2007 through December/2008; Pacaraima – 2 traps, January through December/2008; and Amajari – 2 traps, April through June/2009.

The captured chrysopids were taken from the traps, placed in 70% ethanol, and sent to the Universidade Estadual Paulista (UNESP) in Jaboticabal, São Paulo, for identification. The abdomens of the insects were macerated in a 10% potassium hydroxide solution for one hour and colored in a solution of Chlorazol Black. The genitalia were subsequently externalized and the species were identified according to the morphological characteristics of these structures. Voucher specimens were deposited in the entomological collection of the Departamento de Fitossanidade at UNESP, Jaboticabal Campus.



Figure 1. Map of the state of Roraima showing the locations of the McPhail* traps used for chrysopid collection in the four studied municipalities.

***Point 1** (Pacaraima, 2 traps; N 04°29'19.7", W 61°07'52.0"; N 04°28'52.1", W 61°08'51.3"); **Point 2** (Amajari, 2 traps; N 03°45'20.4", W 61°42'58.5"; N 03°46'47.9", W 61°43'50.7"); **Point 3** (Bonfim, 2 traps; N 03°21'39.2", W 59°50'00.5"; N 03°22'47.0", W 59°48'52.5"); **Point 4** (Boa Vista, 4 traps; N 02°51'43.4", W 60°40'06.2"; N 02°53'56.3", W 60°39'34.4"; N 02°53'51.6", W 60°39'35.2"; N 02°57'03.6", W 60°42'21.3"); **Point 5** (Boa Vista, 2 traps; N 02°45'24.1", W 60°42'54.0"; N 02°45'25.0", W 60°43'47.7").

RESULTS AND DISCUSSION

We collected 459 specimens of Chrysopidae belonging to three genera: *Leucochrysa*, *Ceraeochrysa*, and *Plesiochrysa* (Table 1). *Leucochrysa* presented the highest species richness, namely nine identified species and one new

species that still requires description. *Ceraeochrysa* presented the second highest species richness, namely seven identified species. We identified only one of the two collected species of *Plesiochrysa*. The other still requires description.

In the municipality of Boa Vista, *Leucochrysa (Nodita) cruentata* (Schneider)

was the most abundant species (54.2% of all collected individuals), followed by *Ceraeochrysa valida* (Banks) (29.3%) (Table 1). The opposite occurred in Bonfim: the most abundant species was *C. valida* (60.4%), followed by *L. (N.) cruentata* (14.6%). The species with the broadest distribution was *L. (N.) cruentata*, which we collected in three of the four municipalities (Table 1).

The higher species richness and larger number of Chrysopidae specimens obtained in Boa Vista may have been due to the higher number and longer exposure of the traps installed in that municipality, as compared to the other three. Therefore we cannot affirm that Boa Vista presents the highest species richness among the sampled municipalities. New studies using equivalent numbers of traps and exposure times should be performed to provide consistent data of which municipality contains the highest species richness.

Among the *Leucochrysa* species collected in this work, *L. (N.) cruentata*, *L. (N.) marquezii* (Navás), *L. (N.) camposi* (Navás), *L. (N.) heriocles* (Banks), *L. (N.) marginalis* (Banks), *L. (N.) squamisetosa* Freitas & Penny, and *L. (N.) vittata* Freitas & Penny have already been reported in Brazil. The species *L. (N.) cruentata* has previously been collected in a mango orchard (Montes *et al.* 2007a) and in a coffee plantation (Agostini *et al.* 2007), both in the State of São Paulo. *L. (N.) marquezii* has been collected in a cucurbit plantation, also in São Paulo (Lavagnini *et al.* 2007). *L. (N.) camposi* has previously been collected in eucalyptus plantations in São Paulo (Montes *et al.* 2007b) and in citrus plantations in the State of Pará (Maia *et al.* 2010), and *L. (N.) vittata* has been collected in a mango orchard in São Paulo (Montes *et al.* 2007a).

All of the *Leucochrysa* species collected and identified in this work are first-time reports for the state of Roraima. *L. (N.) amazonica* (Navás) and *L. (N.) pavidata* (Hagen) are reported herein for the first time in Brazil. We also collected one new species of *Leucochrysa*, referred to in this work as *Leucochrysa (Nodita)* sp., which is still pending description.

Six of the *Ceraeochrysa* species collected in this work, namely *C. acmon* (Penny), *C. caligata* (Banks), *C. scapularis* (Navás), *C. fairchildi* (Banks), *C. acutipuppis* (Adams & Penny), and *C. cincta* (Schneider), have already been reported in Brazil. *C. acmon* and *C. caligata* have previously been collected in eucalyptus plantations in the state of São Paulo (Montes *et al.* 2007b) and in citrus plantations in the State of Pará (Maia *et al.* 2010). *C. acutipuppis* has been reported in Roraima by Adams & Penny (1985), and *C. fairchildi* has previously been collected in Roraima on citrus and myrtle plants, by Marsaro Júnior *et al.* (2010). The species *C. scapularis* has already been reported in Roraima (Adams & Penny 1985) and Pernambuco (Macedo & Freitas 2008), and *C. cincta* has been observed in Pará (Maia *et al.* 2010), São Paulo (Agostini *et al.* 2007) and Paraná (Barbosa *et al.* 2009). This work comprises the first report of *C. acmon*, *C. caligata* and *C. cincta* in Roraima, and the first report of *C. valida* in Brazil.

Within the genus *Plesiochrysa*, we identified the species *P. brasiliensis* (Schneider). This species has previously been collected in a cucurbit plantation in São Paulo (Lavagnini *et al.* 2007), but this is the first report in the state of Roraima. One new species of *Plesiochrysa*, designated in this work as *Plesiochrysa* sp., was also collected and requires description.

Table 1. Chrysopidae species captured with McPhail traps in four municipalities of the State of Roraima: Boa Vista (October/2007 through December/2008), Bonfim (October/2007 through December/2008), Pacaraima (January through December/2008), and Amajari (April through June/2009).

Species	Municipalities in Roraima								Total	
	Boa Vista ¹		Bonfim ²		Pacaraima ²		Amajari ²		Specimens	%
	Specimens	%	Specimens	%	Specimens	%	Specimens	%	Specimens	%
<i>Ceraeochrysa acmon</i> *	3	0.7	0	0.0	0	0.0	0	0	3	0.7
<i>Ceraeochrysa acutipuppis</i>	0	0	1	2.1	0	0.0	0	0	1	0.2
<i>Ceraeochrysa caligata</i> *	2	0.5	0	0.0	1	33.3	0	0	3	0.7
<i>Ceraeochrysa cincta</i> *	0	0	1	2.1	0	0.0	0	0	1	0.2
<i>Ceraeochrysa fairchildi</i>	5	1.2	5	10.4	0	0.0	0	0	10	2.2
<i>Ceraeochrysa scapularis</i>	10	2.5	0	0.0	0	0.0	0	0	10	2.2
<i>Ceraeochrysa valida</i> **	119	29.3	29	60.4	0	0.0	0	0	148	32.2
<i>Leucochrysa (Nodita) amazonica</i> **	0	0	1	2.1	0	0.0	0	0	1	0.2
<i>Leucochrysa (Nodita) camposi</i> *	7	1.7	0	0.0	0	0.0	0	0	7	1.5
<i>Leucochrysa (Nodita) cruentata</i> *	220	54.2	7	14.6	2	66.7	0	0	229	49.9
<i>Leucochrysa (Nodita) heriocles</i> *	0	0	0	0.0	0	0.0	1	50	1	0.2
<i>Leucochrysa (Nodita) marginalis</i> *	8	2	2	4.2	0	0.0	0	0	10	2.2
<i>Leucochrysa (Nodita) marquezii</i> *	21	5.2	0	0.0	0	0.0	0	0	21	4.6
<i>Leucochrysa (Nodita) pavidia</i> **	0	0	0	0.0	0	0.0	1	50	1	0.2
<i>Leucochrysa (Nodita) squamisetosa</i> *	1	0.2	0	0.0	0	0.0	0	0	1	0.2
<i>Leucochrysa (Nodita) vittata</i> *	1	0.2	0	0.0	0	0.0	0	0	1	0.2
<i>Leucochrysa (Nodita) sp.</i>	3	0.7	0	0.0	0	0.0	0	0	3	0.7
<i>Plesiochrysa brasiliensis</i> *	6	1.5	0	0.0	0	0.0	0	0	6	1.3
<i>Plesiochrysa sp.</i>	0	0	2	4.2	0	0.0	0	0	2	0.4
Total	406	100	48	100	3	100	2	100	459	100

¹six traps, ²two traps

*first report in Roraima

**first report in Brazil

The obtained results indicate that Roraima presents a high richness of Chrysopidae species, which were partially surveyed in the four studied municipalities. Hence, for in-depth knowledge on species diversity in this important neuropteran family, we suggest that new surveys be completed in the state's many different ecosystems, covering a larger number of municipalities. Moreover, with regard to the collected species, we suggest that studies should be performed to assess their potential as agents for biological control of pests under the edaphoclimatic conditions found in Roraima.

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