

## Hymenoptera “Parasitica” in the state of Mato Grosso do Sul, Brazil

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**ABSTRACT.** A checklist composed of 105 species of parasitic Hymenoptera, which includes the non-aculeate Apocrita, recorded in the state of Mato Grosso do Sul (MS), Brazil, is presented. A new list, containing 153 genera obtained in recent surveys is also presented; out of these 131 are new records. The major knowledge gaps for these organisms in the State and the prospects for future studies for these organisms are discussed.

**KEYWORDS.** Parasitoids, species checklist, distribution, biodiversity, new records, Biota-MS Program.

**RESUMO.** Hymenoptera “Parasitica” no Estado do Mato Grosso do Sul, Brasil. Apresentamos o *checklist* com 105 espécies de Hymenoptera “Parasitica”, que inclui os Apocrita não aculeados, registradas no estado de Mato Grosso do Sul (MS) e uma lista inédita com 153 gêneros obtidos em levantamentos recentes, dos quais 131 são novos registros. As principais lacunas do conhecimento para estes organismos no estado e as perspectivas para estudos futuros são discutidas.

**PALAVRAS-CHAVE.** Parasitoides, lista de espécies, distribuição, biodiversidade, novos registros, Programa Biota-MS.

It is widely recognized, among the researchers of the area of invertebrates, that there is a lack of studies for the area in the Center-West region of Brazil, mainly in the state of Mato Grosso do Sul (LEWINSOHN & PRADO, 2002). LEWINSOHN *et al.* (2005) pointed out the wide scientific knowledge gap that exists about biological diversity of biomes in Brazil. According to them, the Amazonian and Atlantic Forests are the best studied ones, whereas the Pantanal and Caatinga are the least known, as seen on recent inventories of species. BRANDÃO *et al.* (2000) reported that after the Northeast region, the Center-West region is classified as the second least known for the invertebrates. In the same study, the authors considered as inexistent the knowledge and collection status for parasitoid wasps (Hymenoptera), represented by the Ichneumonoidea, in the Pantanal area, a biome whose largest portion is in the state of Mato Grosso do Sul (MS).

The difficult access to the region in the past, as well as the low demographic rate and conflicts for land in the area are among the reasons that explain the gaps of knowledge in the region, facts that limited the visit of naturalists, mainly during the period of large expeditions which were common until the middle of the 20<sup>th</sup> century. The entomological knowledge in Brazil was built based on specimens collected by those expeditions and by naturalists from Europe and USA, who

concentrated their efforts in the exuberant wet forests of this country, such as the Atlantic and Amazon Rainforests. Henry W. Bates in the state of Amazonas and Fritz Plaumann in the state of Santa Catarina, are two well-known examples of this phase. The greatest efforts in sampling the fauna of the Center-West region occurred during the last years of the 19<sup>th</sup> century, and were carried out by Herbert H. Smith, a naturalist from the USA, who spent four years in the state of Mato Grosso (SMITH, 1922; KUNZLER *et al.*, 2011). Apart from the geological work he performed, Herbert Smith collected vertebrates, insects and fossils. Although he concentrated his studies in the Chapada dos Guimarães, he also carried out collections in other regions, including Corumbá (MS). During the 20<sup>th</sup> century, a relevant expedition in the region was the “Royal Geographical Society” in Nova Xavantina, state of Mato Grosso, which brought a large contribution for the knowledge of Hymenoptera, in particular eusocial wasps (RICHARDS, 1978).

With the establishment of research centers in the country, the Brazilian Entomology initiated a new phase. However, the concentration of these research centers in the South, Southeast and North regions were determinant for the lack of studies about the Hymenoptera parasitoids fauna in the Center-West region. Within this new context, the situation of the state of Mato Grosso do Sul was aggravated by its relative recent creation.

The Hymenoptera contain approximately 115,000 described species, being the third Order in number of species after Coleoptera and Lepidoptera. When considering the non-described species, it is possible that the Hymenoptera be the richest order in number of species (GASTON, 1991; STORK, 1991; GRISSELL, 1999). GASTON *et al.* (1996) estimated that the number of species could reach as much as three million. More conservative estimates forecast a number of species ranging between 600,000 and 1,200,000 (GRIMALDI & ENGEL, 2005).

The traditional division of the Hymenoptera order into two suborders, Symphyta and Apocrita, is recognized to be artificial, since the former group composes an ancestral grade to the Apocrita + Orussoidea (SHARKEY *et al.*, 2012). The latter compose a clade that theoretically has a common ancestral of ectoparasitoid habit, from which originated the large diversity of habits currently known to be present on the Apocrita, such as endoparasitism, cecidogenesis, predation and eusocial behavior (WHITFIELD, 1992, 2003).

The Apocrita form a monophyletic group, which is also traditionally divided into two groups, the Aculeata (monophyletic) and the parasitoid wasps, also known as "Parasitica". A large proportion of phylogenetic studies point "Parasitica" as a paraphyletic group, being Aculeata a sister group of Evanioidea (SHARKEY *et al.*, 2012). Despite of the predominance of the parasitoid habit found in the non-aculeate Apocrita, some of the evolutionary lineages developed different habits, mainly the associations as and galls formations (WHITFIELD, 2003; ZALDÍVAR-RIVERÓN *et al.*, 2007).

Among the Apocrita, Aculeata and parasitoids have approximately the same number of described species. A large proportion of the non-described species, however, is of Hymenoptera parasitoids (SHARKEY, 2007). In the Neotropical region 24,000 species of Hymenoptera are known, out of which little less than half are of non-aculeate species (FERNÁNDEZ & SHARKEY, 2006). According to FERNÁNDEZ (2006), there is at least 80,000 species in the Neotropical region, although there is not an estimate account for the region.

From the 89 families of Hymenoptera recognized by SHARKEY (2007), 76 occur in the Neotropical region, out of which 41 are within the "Parasitica" series (*i.e.* Apocrita, except Aculeata) (FERNÁNDEZ, 2006; SHARKEY, 2007). Among the groups with the poorest degree of knowledge for the Neotropical region are the Ceraphronoidea, Cynipoidea, Evanioidea, Platygastridae and Chalcidoidea. Considering the number of species, the Ichneumonoidea can also be included within those groups (FERNÁNDEZ & SHARKEY, 2006).

This work analyzed all families belonging to the "Parasitica" series, which includes all Apocrita but Aculeata ones (Chrysidoidea, Vespoidea and Apoidea). A checklist is presented for the species recorded for the state, since most consulted catalogues do not consider, or were elaborated, before the creation of the state of Mato Grosso do Sul (MS). Also, an unprecedented list, containing genera obtained through recent surveys is presented.

## MATERIAL AND METHODS

The composition of the list of species was carried out based on bibliographic material. As a starting point, available catalogues for families and superfamilies were used. The groups of parasitoid wasps with available catalogues are: Chalcidoidea (NOYES, 2013), Ichneumonoidea (YU *et al.*, 2012), Ichneumonidae (TOWNES & TOWNES, 1966), Braconidae (SHENEFELT parts 1 to 16, published between 1965 and 1980), "Parasitica" (for Brazil) (DE SANTIS, 1980), Platygastridae (VLUG, 1995), Proctotrupeoidea *sensu lato* (JOHNSON, 1992), Aulacidae (SMITH, 2001), Stephanidae (AGUIAR, 2004) and Trigonalidae (WEINSTEIN & AUSTIN, 1991).

The locality of the occurrences of all species recorded for the state of Mato Grosso were designated, through the consultation to original descriptions and recent publications, in order to adequate its occurrence to the Brazilian current political division. The toponymies referring to localities within the current state of Mato Grosso do Sul are listed and the occurrences of species in those localities transferred.

A newly elaborated list of genera identified for the state was produced. The material examined was mainly collected in Pantanal area within the municipality of Corumbá, MS. The collection of this material was carried out under the Biota-MS Program (FAPESP 2010/52314-0) using Malaise traps. Material collected in Cerrado area within the municipality of Campo Grande (MS) was also identified. Also, material collected using Malaise traps by students from the Biological Sciences course at Universidade Católica Dom Bosco, under the supervision of Dr. Antonia Railda Roel, was identified. Additional material, deposited in the Coleção de Hymenoptera do Museu de Biodiversidade da Faculdade de Ciências Biológicas e Ambientais/Universidade Federal da Grande Dourados (MuBio-Hym), is also included in the list, only for the Braconidae. This material was collected with Möericke traps in the Parque Nacional da Serra da Bodoquena and in the Municipality of Porto Murtinho, both in the state of Mato Grosso do Sul (MS). In addition to the MuBio-Hym's collection, the collected material is also deposited at the Coleção Entomológica do Museu de Zoologia da USP (MZUSP), at the Coleção Entomológica do Depto. de Ecologia e Biologia Evolutiva da UFSCar (DCBU) and at the Coleção de Invertebrados da Universidade Católica Dom Bosco (UCDB).

The identification was carried out based on current literature and keys for each family in addition to consultations with specialists. The identification in genus level is justified by the high diversity of the group and the lack of revisions that enable a reliable identification at the species level.

## RESULTS AND DISCUSSION

**List of species.** The list of species presented here includes only species with existing records in the literature which, given the precise information about the locality of their collection could be confirmed as belonging to the state

of Mato Grosso do Sul. As much as 139 records for 105 species, belonging to 63 genera in 18 of the 41 known families of "Parasitica" Hymenoptera (Tab. I), were accounted for. This information was obtained from 51 references published between 1904 and 2013. In addition to information taken from the literature, six species of Ichneumonidae are being recorded for the first time in this work.

Taxonomic works are 22 and the remaining 29 were concerned with insects' natural enemies, mostly of economic relevance. The papers on natural enemies were published after the state of Mato Grosso do Sul was established; from all the taxonomic works available, only four were published before this date (Fig. 1). ASHMEAD (1904), for instance, contributed with 39 records of species of Chalcidoidea from a total of 59 records of this superfamily for the state of Mato Grosso do Sul. This valuable contribution was carried out based on specimens collected by Herbert Smith, most of them in Corumbá (MS) (see Fig. 2). Taxonomic works present more species number as expected, but works on natural enemies contain valuable information about the host-parasitoid association, useful not only for biological control programs, also for a better understanding of their interaction patterns at the ecological and evolutionary scale.

The checklist comprises a majority of species with previous record for the state of Mato Grosso, transferred here for the state of Mato Grosso do Sul. Hence, the number of species presented in this list exceeds the sum of the numbers in previous catalogs for this state. However, this number can be at least as three times as bigger considering the number of genera identified in the present study.

In order to avoid possible misunderstandings between the two states, the species with records of occurrence in both states are indicated in Table I. Therefore, all species without indication do not have records for the state of Mato Grosso. Records in other states and countries were not considered.

**List of genera obtained from recent surveys.** A total of 153 genera of "Parasitica" Hymenoptera were identified, out of which 131 (85%) are new records (Tab. II). These genera belong to 20 families, out of which seven are recorded for the first time in the state of Mato Grosso do Sul. The Ceraphronoidea is recorded here for the first time. Most of the identified material was collected in Pantanal area at the municipality of Corumbá.

The families Aulacidae, Diapriidae, Stephanidae and Trichogrammatidae were not found in the examined material. Platygastroidea was relatively commonly collected, although the family was not identified because the lack of keys to genera and specialists in Brazil. Therefore it is not present in the genera list.

**Main research groups.** The main research groups in Hymenoptera parasitoids are concentrated in the Southeast region. A list of these groups, together with their researcher leaders follows: (1) Alexandre Pires Aguiar, Universidade Federal do Espírito Santo (UFES), Vitória, ES; groups of interest: Stephanoidea and Cryptinae (Ichneumonidae); (2) Alice Fumi Kumagai, Universidade Federal de Minas Gerais, Belo Horizonte, MG; group of interest: Ichneumonidae

(Pimplinae); (3) Angélica Maria Pentead-Dias, Universidade Federal de São Carlos (UFSCar), São Carlos, SP; group of interest: Ichneumonidae; (4) Ayres de Oliveira Menezes Júnior, Universidade Estadual de Londrina, Londrina, PR; group of interest: Chalcidoidea (Encyrtidae and Leucospidae); (5) Celso Oliveira Azevedo, Universidade Federal do Espírito Santo (UFES), Vitória, ES; group of interest: Bethyloidea; (6) Jorge Anderson Guimarães, Embrapa Hortaliças, Brasília, DF; group of interest: Figitidae (Eucoilinae); (7) Marcelo Teixeira Tavares, Universidade Federal do Espírito Santo (UFES), Vitória, ES; group of interest: Chalcidoidea; (8) Nelson Wanderley Perito, APTA Ribeirão Preto, Ribeirão Preto, SP; group of interest: Chalcidoidea (Eurytomidae, Eulophidae and Tanaostigmatidae); (9) Ranyse Barbosa Querino da Silva, Embrapa Meio-Norte, Teresina, PI; group of interest: Chalcidoidea (Trichogrammatidae); (10) Roberto Antonio Zucchi, Escola Superior de Agricultura Luiz de Queiroz, Piracicaba, SP; group of interest: Trichogrammatidae; (11) Valmir Antonio Costa, Instituto Biológico, Campinas, SP; group of interest: Chalcidoidea (Eulophidae).

There are not yet research groups in taxonomy and systematic of parasitic Hymenoptera in Mato Grosso do Sul. Regarding the inventory of the Hymenoptera parasitoids in MS, only one M.Sc. dissertation was found, produced by Vander Carbonari under the Graduate Program in Entomology and Biology Conservation at UFGD (Programa de Pós-Graduação em Entomologia e Conservação da Biodiversidade, Universidade Federal da Grande Dourados). Carbonari carried out collections during two years in the Serra da Bodoquena (MS) collecting 1,243 specimens of the Hymenoptera parasitoids; however, the deposited material in the MuBio-UFGD's collection is identified only at the family level (CARBONARI, 2009). Under-graduate and Graduate students at the Universidade Católica Dom Bosco (UCDB) have been carrying out a survey of the entomofauna in the region of Campo Grande (MS), under the supervision of Dr. Antonia Railda Roel with the collaboration of the research group headed by Dr. Angélica Maria Pentead-Dias. Those students are being trained in the collection, preservation and identification of Hymenoptera, mainly the parasitoid ones.

Publications, locally produced, containing records of parasitoid Hymenoptera species were carried out by Dr. Manoel Araújo Uchôa-Fernandes research group at UFGD, in Dourados (MS), whose main group of interest are the fruit flies (Diptera: Tephritoidea) and their interaction with eventual parasitoids. More recently, the research groups led by Dr. Fabrício Fagundes Pereira from UFGD and by Dr. Harley Nonato de Oliveira from Embrapa Agropecuária Oeste, both in Dourados (MS), are researching biological aspects of parasitoid species with a focus on their use as biological controllers.

**Main holdings.** As happens with the research groups, the main holdings in Brazil are mostly concentrated in the Southeast region of the country, such as: DCBU, São Carlos (SP); MZUSP, São Paulo (SP); UFES, Vitória (ES); FIOC, Rio de Janeiro (RJ); MNRJ, Rio de Janeiro (RJ). In the South region, the DZUP and DCMP are both in Curitiba (PR); and

Tab. I. Checklist of Hymenoptera "Parasitica" species recorded in Mato Grosso do Sul State (MS), Brazil (1, species recorded in Mato Grosso and Mato Grosso do Sul States; 2, new record locality; 3, record in distribution map, municipality/locality not provided).

Species	Municipalities/localities* in MS	References
<b>CHALCIDOIDEA</b>		
<b>Aphelinidae</b>		
<i>Encarsia porteri</i> (Mercet, 1928)	Campo Grande	ANDRADE-FILHO <i>et al.</i> , 2012
<b>Chalcididae</b>		
<i>Brachymeria flavopicta</i> (Ashmead, 1904)	Corumbá	ASHMEAD, 1904
<i>Brachymeria implexa</i> (Walker, 1862)	Corumbá	ASHMEAD, 1904
<i>Brachymeria ovata</i> (Say, 1824)	Ribas do Rio Pardo	BERTI-FILHO <i>et al.</i> , 1980
<i>Ceyxia flaviscapus</i> Girault, 1911	Corumbá	ANDRADE & TAVARES, 2009
<i>Ceyxia concitator</i> (Walker, 1862)	Corumbá	ANDRADE & TAVARES, 2009
<i>Ceyxia diminuta</i> Andrade & Tavares, 2009	Corumbá	ANDRADE & TAVARES, 2009
<i>Ceyxia ventrispinosa</i> Girault, 1911	Corumbá	ANDRADE & TAVARES, 2009
<i>Conura acuminata</i> (Ashmead, 1904)	Corumbá	ASHMEAD, 1904
<i>Conura acuta</i> (Fabricius, 1804) <sup>1</sup>	Corumbá	ASHMEAD, 1904
<i>Conura albomaculata</i> (Ashmead, 1904) <sup>1</sup>	Corumbá	ASHMEAD, 1904
<i>Conura brancensis</i> (Ashmead, 1904)	Itaporã	ASHMEAD, 1904
<i>Conura celsa</i> (Walker, 1864)	Corumbá	ASHMEAD, 1904
<i>Conura corumbensis</i> (Ashmead, 1904)	Corumbá	ASHMEAD, 1904
<i>Conura costalimai</i> (De Santis, 1980)	Corumbá	ASHMEAD, 1904; DE SANTIS, 1980
<i>Conura flava</i> (Fabricius, 1804) <sup>1</sup>	Corumbá	ASHMEAD, 1904
<i>Conura fusiformis</i> (Ashmead, 1904)	Itaporã	ASHMEAD, 1904
<i>Conura lineocoxalis</i> (Ashmead, 1904)	Corumbá	ASHMEAD, 1904
<i>Conura media</i> (Ashmead, 1904)	Corumbá	ASHMEAD, 1904
<i>Conura mourei</i> (De Santis, 1980)	Corumbá	ASHMEAD, 1904; DE SANTIS, 1980
<i>Conura quadripunctata</i> (Fabricius, 1804)	Corumbá, Itaporã	ASHMEAD, 1904
<i>Conura timida</i> (Ashmead, 1904)	Corumbá	ASHMEAD, 1904
<i>Corumbichalcis corumbicola</i> (Ashmead, 1904)	Corumbá	ASHMEAD, 1904; DELVARE, 1992
<b>Encyrtidae</b>		
<i>Aenasius tachigaliae</i> (Brues, 1922)	Corumbá	MERCET, 1926; COMPERE, 1937
<i>Hexacladia smithii</i> Ashmead, 1891	Dourados, Ponta Porã, Itaporã, Caarapó	GODOY <i>et al.</i> , 2007; 2010
<b>Eucharitidae</b>		
<i>Orasema rapo</i> (Walker, 1839)	Corumbá	ASHMEAD, 1904
<b>Eulophidae</b>		
<i>Alveoplectrus corumbae</i> (Ashmead, 1904)	Corumbá	ASHMEAD, 1904
<i>Aprostocetus diplodis</i> Crawford, 1907	Selvíria	CAMPOS <i>et al.</i> , 1998
<i>Euderus brasiliensis</i> (Ashmead, 1904) <sup>1</sup>	Corumbá	ASHMEAD, 1904
<i>Euplectrus brasiliensis</i> Ashmead, 1904	Itaporã	ASHMEAD, 1904
<i>Euplectrus floryae</i> Schauff, 2001	Dourados	BELLON <i>et al.</i> , 2013
<i>Horismenus corumbae</i> Ashmead, 1904	Corumbá	ASHMEAD, 1904
<i>Sympiesis obscura</i> (Ashmead, 1904)	Corumbá	ASHMEAD, 1904
<i>Tetrastichus howardi</i> (Olliff, 1893)	Dourados	VARGAS <i>et al.</i> , 2011
<b>Eupelmidae</b>		
<i>Anastatus auriceps</i> Ashmead, 1904 <sup>1</sup>	Corumbá	ASHMEAD, 1904
<i>Brasema corumbae</i> (Ashmead, 1904)	Corumbá	ASHMEAD, 1904
<i>Eupelmus compressiventris</i> Ashmead, 1904	Corumbá	ASHMEAD, 1904
<i>Eupelmus persimilis</i> Ashmead, 1904	Corumbá	ASHMEAD, 1904
<b>Eurytomidae</b>		
<i>Axima brevicornis</i> Ashmead, 1904 <sup>1</sup>	Corumbá	ASHMEAD, 1904
<i>Isosomodes gigantea</i> (Ashmead, 1886)	Corumbá	ASHMEAD, 1904
<b>Mymaridae</b>		
<i>Anagrus urichi</i> Pickles, 1932	Campo Grande	VALÉRIO & OLIVEIRA, 2005
<b>Pteromalidae</b>		
<i>Chalcedectus annulipes</i> Ashmead, 1904 <sup>1</sup>	Corumbá	ASHMEAD, 1904
<i>Lelaps abdominalis</i> Ashmead, 1904	Itaporã	ASHMEAD, 1904
<i>Leptofoenus westwoodi</i> (Ashmead, 1895) <sup>1</sup>	Itaporã, Campo Grande <sup>2</sup>	ASHMEAD, 1904
<i>Lycisca ignicaudata</i> Westwood, 1874 <sup>1</sup>	Corumbá	ASHMEAD, 1904
<i>Psilocera brasiliensis</i> (Ashmead, 1904)	Corumbá	ASHMEAD, 1904
<i>Psilocera clavicornis</i> (Ashmead, 1904)	Corumbá	ASHMEAD, 1904
<i>Spalangia endius</i> Walker, 1839	Anastácio, Terenos, Aquidauana, Rochedo, Corumbá, Parnaíba	SILVEIRA <i>et al.</i> , 1989; SERENO, 2000; SERENO & SERENO, 2000; UCHÔA-FERNANDES <i>et al.</i> , 2003
<i>Spalangia gemina</i> Boucek, 1963	Anastácio, Terenos, Aquidauana, Rochedo	UCHÔA-FERNANDES <i>et al.</i> , 2003
<i>Spalangia nigroaenea</i> Curtis, 1839	Corumbá, Parnaíba	SILVEIRA <i>et al.</i> , 1989; SERENO 2000; SERENO & SERENO, 2000
<i>Spalangia plaumanni</i> Gibson, 2009	Rio Caraguatá* (21°48'S, 52°27'W)	GIBSON, 2009



Tab. I. Cont.

Species	Municipalities/localities* in MS	References
<b>Torymidae</b>		
<i>Plesioctigmodon brasiliensis</i> Ashmead, 1904	Corumbá	ASHMEAD, 1904
<i>Torymus aprilis</i> (Ashmead, 1904)	Corumbá	ASHMEAD, 1904
<i>Torymus holcaspoides</i> (Ashmead, 1904) <sup>1</sup>	Corumbá	ASHMEAD, 1904
<i>Torymus nonacris</i> (Walker, 1842)	Corumbá	ASHMEAD, 1904
<b>Trichogrammatidae</b>		
<i>Trichogramma galloi</i> Zucchi, 1988	Brasilândia	ZUCCHI & MONTEIRO, 1995; BOTELHO <i>et al.</i> , 1999
<i>Trichogramma manicobai</i> Brun, Moares & Soares, 1984	Ivinhema	OLIVEIRA <i>et al.</i> , 2010; GOMEZ <i>et al.</i> , 2006
<i>Trichogramma marandobai</i> Brun, Moraes & Soares, 1986	Dourados, Itaquiraí, Ivinhema	OLIVEIRA <i>et al.</i> , 2010; GOMEZ <i>et al.</i> , 2006
<i>Trichogramma pretiosum</i> Riley, 1879	Dourados, Glória de Dourados, Ivinhema	FERNÁNDEZ <i>et al.</i> , 1999; OLIVEIRA <i>et al.</i> , 2010; GOMEZ <i>et al.</i> , 2006
<b>CYNIPOIDEA</b>		
<b>Figitidae</b>		
<i>Aganaspis nordlanderi</i> Wharton, 1998	Anastácio, Terenos, Aquidauana, Rochedo	UCHÔA-FERNANDES <i>et al.</i> , 2003a, 2003b
<i>Ganaspis fulvocincta</i> Kieffer, 1909	Selvíria	DÍAZ & GALLARDO, 1996; DÍAZ <i>et al.</i> , 2000
<i>Kleidotoma nigra</i> (Hartig, 1840)	Selvíria	DÍAZ & GALLARDO, 1996; DÍAZ <i>et al.</i> , 2000
<i>Lopheucoila anastrephae</i> (Rhower, 1919)	Anastácio, Terenos, Aquidauana, Rochedo	GUIMARÃES <i>et al.</i> , 1999; UCHÔA-FERNANDES <i>et al.</i> , 2003b
<i>Nersalia fossulata</i> (Kieffer, 1909)	Selvíria	DÍAZ & GALLARDO, 1996; DÍAZ <i>et al.</i> , 2000
<i>Odontosema anastrephae</i> (Borgmeier, 1935)	Anastácio, Terenos, Aquidauana, Rochedo	GUIMARÃES <i>et al.</i> , 1999; UCHÔA-FERNANDES <i>et al.</i> , 2003 a, 2003b
<i>Paraganaspis egeria</i> Díaz & Gallardo, 1996	Selvíria	DÍAZ & GALLARDO, 1996; DÍAZ <i>et al.</i> , 2000
<i>Triplasta atrocotalis</i> (Ashmead, 1895)	Selvíria	DÍAZ & GALLARDO, 1996; DÍAZ <i>et al.</i> , 2000
<i>Trybliographa infuscata</i> Gallardo, Díaz & Uchôa-Fernandes, 2000	Anastácio, Terenos, Aquidauana, Rochedo	GALLARDO <i>et al.</i> , 2000; UCHÔA-FERNANDES <i>et al.</i> , 2003a, 2003b
<b>DIAPRIOIDEA</b>		
<b>Diapriidae</b>		
<i>Trichopria haematobiae</i> (Ashmead, 1893)	Corumbá	SERENO, 2000; SERENO & SERENO, 2000
<b>EVANIOIDEA</b>		
<b>Aulacidae</b>		
<i>Pristaulacus petiense</i> Smith, 2010	Rio Caraguatá* (21°48'S, 52°27'W)	SMITH, 2001
<b>ICHNEUMONOIDEA</b>		
<b>Braconidae</b>		
<i>Aivalykus flavus</i> (Marsh, 1993)	Rio Caraguatá* (21°48'S, 52°27'W)	MARSH, 1993
<i>Alabagrus mojos</i> Sharkey, 1988 <sup>1</sup>	Dourados (Itaum)	SHARKEY, 1988
<i>Alabagrus nigriritulus</i> Szepliget, 1902	MS (map) <sup>3</sup>	SHARKEY, 1988
<i>Aleiodes melanopterus</i> (Erichson, 1848) <sup>1</sup>	Campo Grande, Dourados, Serra da Bodoquena <sup>2</sup>	SHIMBORI & PENTEADO-DIAS, 2011
<i>Aphidius uzbekistanicus</i> Luzhetskii, 1960	Dourados	GOMEZ & RUMIATTO, 1989; STARÝ <i>et al.</i> , 2007
<i>Asobara anastrephae</i> (Muesebek, 1958)	Anastácio, Terenos, Aquidauana, Rochedo	UCHÔA-FERNANDES <i>et al.</i> , 2003a,b
<i>Bohartiellus cornutus</i> Marsh, 1983	Rio Caraguatá* (21°48'S, 52°27'W)	MARSH, 1983
<i>Cotesia flavipes</i> (Cameron, 1891)	Brasilândia,	BOTELHO <i>et al.</i> , 1999
<i>Diaeretiella rapae</i> (McIntosh, 1855)	Dourados	MUSSURY & FERNANDES, 2002; GOMEZ & RUMIATTO, 1989; STARÝ <i>et al.</i> , 2007
<i>Doryctobracon areolatus</i> (Szépliget, 1911)	Anastácio, Terenos, Aquidauana, Rochedo	UCHÔA-FERNANDES <i>et al.</i> , 2003
<i>Doryctobracon fluminensis</i> (Costa Lima, 1937)	Anastácio, Terenos, Aquidauana, Rochedo	UCHÔA-FERNANDES <i>et al.</i> , 2003
<i>Doryctopambolus pilcomayensis</i> (Achterberg & Braet, 2004)	Bodoquena	NUNES <i>et al.</i> , 2012
<i>Exasticolus fuscicornis</i> (Cameron, 1887)	Dourados, Itaporã	FIGUEIREDO <i>et al.</i> , 2006
<i>Gnathopleura astarte</i> (Haliday, 1838) <sup>1</sup>	Dourados	AROUCÁ & PENTEADO DIAS, 2009
<i>Gnathopleura semirufa</i> (Brullé, 1846) <sup>1</sup>	Campo Grande, Corumbá	AROUCÁ & PENTEADO DIAS, 2009
<i>Opius anastrephae</i> Viereck, 1913	Anastácio, Aquidauana, Miranda, Terenos, Rochedo	UCHÔA-FERNANDES <i>et al.</i> , 2003; CAIRES <i>et al.</i> , 2009
<i>Opius bellus</i> Gahan, 1930	Anastácio, Terenos, Aquidauana, Rochedo	UCHÔA-FERNANDES <i>et al.</i> , 2003a,b
<i>Pharpa dubiosum</i> (Szépliget, 1914)	MS (map) <sup>3</sup>	SHARKEY, 1986
<i>Praon gallicum</i> Starý, 1971	Dourados	GOMEZ & RUMIATTO, 1989; STARÝ <i>et al.</i> , 2007
<i>Rinamba platyferum</i> (Marsh, 1993)	Rio Caraguatá*	BRAET & VAN ACHTERBERG, 2001
<i>Sharkeyella pilosus</i> Marsh, 1993	Rio Caraguatá* (21°48'S, 52°27'W)	MARSH, 1993
<i>Verae peculya</i> Marsh, 1993	Rio Caraguatá* (21°48'S, 52°27'W)	MARSH, 1993
<b>Ichneumonidae</b>		
<i>Digonocryptus diversicolor</i> (Viereck, 1913)	Dourados (Itaum)	AGUIAR & RAMOS, 2011

Tab. I. Cont.

Species	Municipalities/localities* in MS	References
<i>Eiphosoma dentator</i> (Fabricius, 1804)	Bodoquena, Corumbá <sup>2</sup>	COSTA LIMA, 1953
<i>Eiphosoma laphygmae</i> Costa Lima, 1953	Corumbá <sup>2</sup>	First record
<i>Eiphosoma macrum</i> (Enderlein, 1921)	Corumbá <sup>2</sup>	First record
<i>Eiphosoma matogrossense</i> Costa Lima, 1953	Salobra	COSTA LIMA, 1953
<i>Eiphosoma nigrovittatum</i> Cresson, 1865	Corumbá <sup>2</sup>	First record
<i>Enicospilus flavoscutellatus</i> (Brullé, 1846)	Corumbá <sup>2</sup>	First record
<i>Enicospilus glabratus</i> (Morley, 1913)	Campo Grande <sup>2</sup>	First record
<i>Ophion flavidus</i> Brullé, 1846	Rio Brilhante <sup>2</sup>	First record
PLATYGASTROIDEA		
Platygastridae		
<i>Telenomus pachycoris</i> (Costa Lima, 1928)	Dourados	OLIVEIRA & SILVA, 2011
<i>Telenomus podisi</i> (Ashmead, 1893)	Dourados, Caarapó, Rio Brilhante, Ponta Porã, São Gabriel do Oeste, Itaporã	GODOY & ÁVILA, 2000; GODOY <i>et al.</i> , 2005, 2007; CARVALHO, 2007; ARCE, 2007
<i>Trissolcus basalus</i> (Wollaston, 1858)	São Gabriel do Oeste	GODOY <i>et al.</i> , 2005
STEPHANOIDEA		
Stephanidae		
<i>Aguiarina adustus</i> (Aguiar, 1998)	Rio Caraguatá* (21°48'S, 52°27'W)	AGUIAR, 1998; 2004

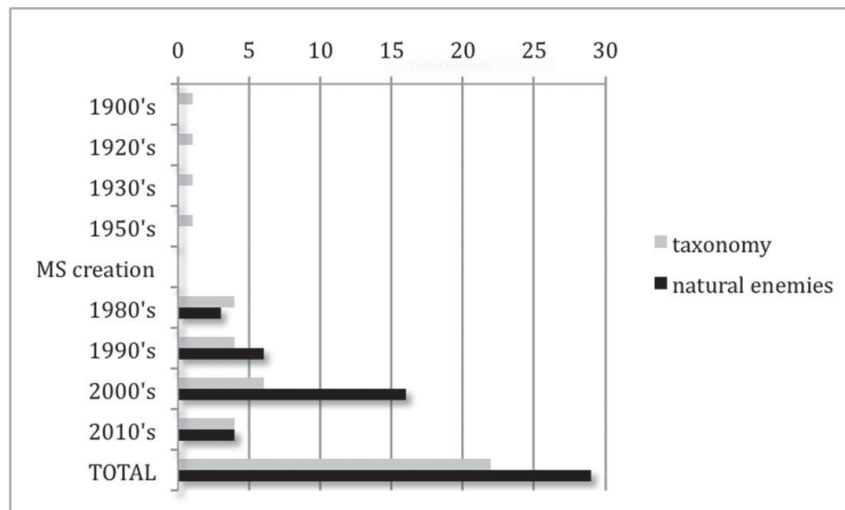


Fig. 1. Number of publications with Hymenoptera "Parasitica" species recorded, grouped by decade. Works are classified according to its subject: taxonomy or natural enemies (see text).

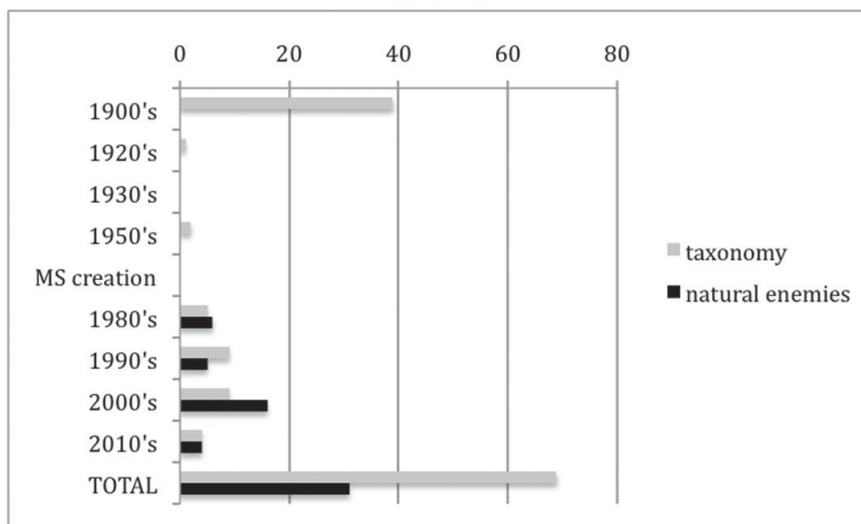


Fig. 2. Number of newly recorded Hymenoptera "Parasitica" species grouped by decade. Works are classified according to its subject: taxonomy or natural enemies (see text).

Tab. II. List of Hymenoptera "Parasitica" genera identified from recent surveys in the state of Mato Grosso do Sul (MS), Brazil (\*, new record for taxon in Mato Grosso do Sul State).

Taxa	Locality in MS
CERAPHRONOIDEA*	
Ceraphronidae*	
<i>Aphanogmus</i> Thomson, 1853*	Corumbá
CHALCIDOIDEA	
Chalcididae	
<i>Aspirrhina</i> Kirby, 1883*	Corumbá
<i>Brachymeria</i> Westwood, 1829	Corumbá
<i>Conura</i> Spinola, 1837	Corumbá
<i>Dirhinus</i> Dalman, 1818*	Corumbá
<i>Haltichella</i> Spinola, 1811*	Corumbá
<i>Hockeria</i> Walker, 1834*	Corumbá
<i>Melanosmicra</i> Ashmead, 1904*	Corumbá
<i>Notaspidium</i> Dalla Torre, 1897*	Campo Grande, Corumbá
<i>Stypiura</i> Kirby, 1883*	Corumbá
Encyrtidae	
<i>Aenasius</i> Walker, 1846	Corumbá
<i>Anagyrus</i> Howard, 1896*	Corumbá
<i>Blepyrus</i> Howard, 1898*	Corumbá
<i>Encyrtus</i> Latreille, 1809*	Corumbá
<i>Gahaniella</i> Timberlake, 1926*	Corumbá
<i>Hemencyrtus</i> Ashmead, 1900*	Corumbá
<i>Leptomastix</i> Förster, 1856*	Corumbá
<i>Metaphycus</i> Mercet, 1917*	Corumbá
<i>Syrphophagus</i> Ashmead, 1900*	Corumbá
Eucharitidae	
<i>Kapala</i> Cameron, 1884*	Corumbá
<i>Lophyrocera</i> Cameron, 1884*	Campo Grande
<i>Obeza</i> Heraty, 1985*	Corumbá
<i>Pseudochalcura</i> Ashmead, 1894*	Corumbá
Eulophidae	
<i>Chrysocharis</i> Förster, 1856*	Corumbá
<i>Closterocerus</i> Hartig, 1847*	Corumbá
<i>Elasmus</i> Westwood, 1833*	Corumbá
<i>Euplectrus</i> Westwood, 1832	Corumbá
<i>Galeopsomyia</i> Girault, 1916*	Corumbá
Eupelmidae	
<i>Arachnophaga</i> Ashmead, 1896*	Corumbá
<i>Eupelmus</i> Dalman, 1820	Corumbá
Eurytomidae	
<i>Bephrata</i> Cameron, 1884*	Corumbá
<i>Eurytoma</i> Illiger, 1807*	Corumbá
<i>Neorileya</i> Ashmead, 1904*	Corumbá
<i>Prodecatoma</i> Ashmead, 1904*	Corumbá
<i>Sycophila</i> Walker, 1871*	Corumbá
Mymaridae	
<i>Alaptus</i> Westwood, 1839*	Corumbá
<i>Gonatocerus</i> Nees, 1834*	Corumbá
<i>Neomymar</i> Crawford, 1913*	Corumbá
<i>Omyomymar</i> Schauff, 1983*	Corumbá
Ormyridae*	
<i>Ormyrus</i> Förster, 1856*	Corumbá
Perilampidae*	
<i>Perilampus</i> Latreille, 1809*	Corumbá
Pteromalidae	
<i>Chalcedectus</i> Walker, 1852	Corumbá
<i>Spalangia</i> Latreille, 1805	Corumbá
Signiphoridae*	
<i>Thysanus</i> Walker, 1840*	Campo Grande
Tanaostigmatidae*	
<i>Tanaostigmodes</i> Ashmead, 1896*	Corumbá
Torymidae	
<i>Podagrion</i> Spinola, 1811*	Corumbá
<i>Torymus</i> Dalman, 1820	Corumbá
CYNIPOIDEA	
Figitidae	

Tab. II. Cont.

Taxa	Locality in MS
<i>Dieucoila</i> Ashmead, 1903*	Corumbá
<i>Ganaspis</i> Förster, 1869	Corumbá
<i>Neralsia</i> Cameron, 1883	Corumbá
<i>Nordlandiella</i> Díaz, 1982*	Corumbá
<i>Rhabdeucoela</i> Kieffer, 1907*	Corumbá
<i>Tropideucoila</i> Ashmead, 1903*	Corumbá
<i>Trybliographa</i> Förster, 1869	Corumbá
DIAPRIOIDEA	
Diapriidae	
<i>Coptera</i> Say, 1836*	Corumbá
EVANIOIDEA*	
Evaniidae*	
<i>Evaniella</i> Bradley, 1905*	Corumbá
<i>Hyptia</i> Illiger, 1807*	Corumbá
<i>Semaemyia</i> Bradley, 1905*	Corumbá
Gasteruptionidae*	
<i>Gasteruption</i> Latreille, 1796*	Corumbá
ICHNEUMONOIDEA	
Braconidae	
<i>Acrophasmus</i> Enderlein, 1912*	Serra da Bodoquena
<i>Alabagrus</i> Enderlein, 1920	Campo Grande, Corumbá, Serra da Bodoquena
<i>Aleiodes</i> Wesmael, 1838	Campo Grande, Corumbá
<i>Allobraccon</i> Gahan, 1915*	Corumbá
<i>Allorhogas</i> Gahan, 1912*	Campo Grande, Corumbá
<i>Alphomelon</i> Mason, 1981*	Corumbá
<i>Apanteles</i> Förster, 1862*	Campo Grande, Corumbá, Porto Murtinho
<i>Aphaereta</i> Förster, 1862*	Serra da Bodoquena
<i>Aridelus</i> Marshall, 1887*	Campo Grande, Serra da Bodoquena, Porto Murtinho
<i>Ascogater</i> Wesmael, 1835*	Porto Murtinho
<i>Bassus</i> Fabricius, 1804*	Corumbá, Serra da Bodoquena
<i>Blacozona</i> van Achterberg, 1976*	Serra da Bodoquena
<i>Blacus</i> Nees, 1819*	Campo Grande, Corumbá
<i>Bracon</i> Fabricius, 1804	Campo Grande, Corumbá, Porto Murtinho, Serra da Bodoquena
<i>Bulborogas</i> van Achterberg, 1995*	Campo Grande
<i>Capitonius</i> Brullé, 1846*	Campo Grande, Corumbá
<i>Cardiochiles</i> Nees, 1819*	Campo Grande, Porto Murtinho
<i>Centistidea</i> Rohwer, 1914*	Corumbá
<i>Chelonus</i> Panzer, 1906*	Campo Grande, Corumbá, Porto Murtinho
<i>Choreborhogas</i> Whitfield, 1990*	Corumbá
<i>Coiba</i> Marsh, 1993*	Corumbá
<i>Compsobraconoides</i> Quicke, 1989*	Serra da Bodoquena
<i>Cotesia</i> Cameron, 1891	Campo Grande, Corumbá, Serra da Bodoquena
<i>Cystomastax</i> Szepligeti, 1904*	Corumbá
<i>Dentigaster</i> Zettel, 1990*	Serra da Bodoquena
<i>Digonogastra</i> Viereck, 1912*	Campo Grande, Corumbá, Serra da Bodoquena
<i>Dinotrema</i> Förster, 1862*	Serra da Bodoquena
<i>Diolcogaster</i> Ashmead, 1900*	Campo Grande, Corumbá, Serra da Bodoquena
<i>Dolichozele</i> Viereck, 1911*	Serra da Bodoquena
<i>Doryctobracon</i> Enderlein, 1920	Corumbá
<i>Doryctopambolus</i> Nunes & Zaldívar-Riverón, 2012	Corumbá
<i>Earinus</i> Wesmael, 1837*	Campo Grande, Porto Murtinho
<i>Eubazus</i> Nees, 1814*	Corumbá
<i>Exasticolus</i> van Achterberg, 1979	Corumbá, Serra da Bodoquena
<i>Glyptapanteles</i> Ashmead, 1905*	Campo Grande, Corumbá, Porto Murtinho, Serra da Bodoquena
<i>Gnamptodon</i> Haliday, 1833*	Campo Grande
<i>Gnathopleura</i> Wharton, 1980	Serra da Bodoquena
<i>Heteropteron</i> Brullé, 1846*	Corumbá
<i>Heterospathius</i> Barbalho & Penteado-Dias, 1999*	Serra da Bodoquena
<i>Heterospilus</i> Haliday, 1836*	Campo Grande, Corumbá, Serra da Bodoquena
<i>Hormius</i> Nees, 1818*	Corumbá, Serra da Bodoquena
<i>Hymenochaonia</i> Dalla Torre, 1898*	Campo Grande, Corumbá
<i>Iconella</i> Mason, 1981*	Corumbá
<i>Liopisa</i> Enderlein, 1920*	Serra da Bodoquena
<i>Lissodoryctes</i> Marsh, 2002*	Corumbá
<i>Megabracon</i> Szépligeti, 1906*	Serra da Bodoquena
<i>Megaloproctus</i> Schulz, 1906*	Corumbá



Tab. II. Cont.

Taxa	Locality in MS
<i>Microctonus</i> Wesmael, 1835*	Campo Grande
<i>Microplitis</i> Förster, 1862 *	Campo Grande, Serra da Bodoquena
<i>Nealiolus</i> Mason, 1974*	Corumbá, Porto Murinho
<i>Notiospathius</i> Matthews & Marsh, 1973*	Campo Grande, Serra da Bodoquena
<i>Oligoneurus</i> Szépligeti, 1902*	Corumbá
<i>Opius</i> Wesmael, 1835	Campo Grande, Corumbá, Porto Murinho, Serra da Bodoquena
<i>Orgilus</i> Haliday, 1833	Campo Grande, Corumbá
<i>Pambolus</i> Haliday, 1836*	Campo Grande, Corumbá, Serra da Bodoquena
<i>Papanteles</i> Mason, 1981*	Porto Murinho
<i>Peristenus</i> Foerster, 1862*	Campo Grande
<i>Phaenocarpa</i> Förster, 1862*	Serra da Bodoquena
<i>Phanerotoma</i> Wesmael, 1838*	Campo Grande, Corumbá
<i>Pioscelus</i> Muesebeck & Walkley, 1951*	Campo Grande
<i>Platydyoryctes</i> Barbalho & Pentead-Dias, 2000*	Corumbá
<i>Promicrogaster</i> Brues & Richardson, 1913*	Campo Grande
<i>Protapanteles</i> Ashmead, 1898*	Serra da Bodoquena, Porto Murinho
<i>Pseudapanteles</i> Ashmead, 1898*	Campo Grande, Corumbá
<i>Pseudognamptodon</i> Fischer, 1964*	Corumbá, Serra da Bodoquena
<i>Rhaconotus</i> Ruthe, 1854*	Corumbá
<i>Rogas</i> Nees, 1818*	Campo Grande, Corumbá
<i>Semirhytus</i> Szépligeti, 1902*	Serra da Bodoquena
<i>Snellenius</i> Westwood, 1882*	Corumbá, Serra da Bodoquena
<i>Stantonia</i> Ashmead, 1904*	Corumbá
<i>Stiropius</i> Cameron, 1911	Corumbá, Serra da Bodoquena
<i>Streblocera</i> Westwood, 1833*	Serra da Bodoquena
<i>Triaspis</i> Haliday, 1835*	Corumbá
<i>Urosigalphus</i> Ashmead, 1888*	Campo Grande, Corumbá
<i>Zelomorpha</i> Ashmead, 1900*	Corumbá, Serra da Bodoquena
Ichneumonidae	
<i>Anomalon</i> Panzer, 1804*	Corumbá
<i>Brachycyrtus</i> Hoffer, 1957*	Campo Grande
<i>Casinaria</i> Holmgren, 1859*	Corumbá, Campo Grande
<i>Colpotrochia</i> Holmgren, 1855*	Corumbá
<i>Dusona</i> Cameron, 1900*	Corumbá
<i>Eiphosoma</i> Cresson, 1865	Corumbá, Campo Grande
<i>Enicospilus</i> Stephens, 1835*	Corumbá, Rio Brilhante
<i>Labena</i> Cresson, 1864*	Corumbá
<i>Lycorina</i> Holmgren, 1859*	Campo Grande
<i>Microcharops</i> Roman, 1910*	Corumbá, Campo Grande
<i>Neotheronia</i> Krieger, 1898*	Corumbá
<i>Netelia</i> Gray, 1860*	Corumbá, Campo Grande
<i>Ophion</i> Fabricius, 1798*	Rio Brilhante
<i>Ophionellus</i> Westwood, 1874*	Campo Grande
<i>Pimpla</i> Fabricius, 1804*	Corumbá
<i>Podogaster</i> Brullé, 1846*	Corumbá
<i>Pristomerus</i> Curtis, 1863*	Corumbá
<i>Trieces</i> Townes, 1946*	Corumbá
<i>Venturia</i> Schrottky, 1902	Campo Grande

in the North region are INPA, Manaus, (AM) and MPEG, Belém (PA). In the Center-West region holdings of insect collections are found in the following institutions: Reserva Ecológica do IBGE, Brasília (DF); Depto. de Zoologia da UNB, Brasília (DF); EMBRAPA-CPAC, Planaltina (DF); UNEMAT *campus* Nova Xavantina, Nova Xavantina (MT); UCDB, Campo Grande (MS); UFMS, Campo Grande (MS); UFGD, Dourados (MS).

**Main knowledge gaps.** As identified by FERNÁNDEZ & SHARKEY (2006), the Neotropical region lacks studies for Ceraphronoidea, Cynipoidea, Evanioidea, Platygastroidea and Chalcidoidea. This list could be added with the Proctotrupeoidea and Diaprioidea, currently with no specialists in Brazil. In despite of the 105 species listed with occurrence

in the state, it is possible to notice that according to the list of genera presented here, little is known about the fauna in the region for all groups studied. The large taxonomic knowledge gap is not a particularity of the state. Among the more urgent efforts in need for research of the group, taxonomic revisions of the Neotropical genera are recognized to be the main ones. This is the first step for any other research program concerned with biodiversity, e.g. conservation, evolution and biogeography.

Efforts like the Biota-MS Program are primary to fulfilling this gap through surveys over this region. Considering the regions and vegetal formations, the need for surveys seems more evident in areas of Pantanal, Chaco and on the state's remaining forest fragments. Our results point

that the best sampled is the Pantanal area that belongs to the Municipality of Corumbá (MS), containing even endemic groups. We believe that there is a need for the integration of local researchers with specialists from the different taxonomic groups in order to establish research lines in that knowledge area.

**Research perspectives for the next ten years.** By analyzing the publications, it can be observed that since the state's creation a significant increase occurred on the number of works involving this fauna. This increase could be even more significant if the country's main research groups on "Parasítica" and local researchers could reach integration. If the gaps being pointed out here could be filled up during the following years, it is possible that a large number of species could be known and described and the distribution of species already known could be extended throughout the state of Mato Grosso do Sul. With a better knowledge about the species and their distribution, it is possible that this group could become useful as a means for the evaluation of priority areas for environmental conservation, since they include a significant percentage of the biota and show quick response to environmental changes.

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