

# Hemencyrtus herbertii Ashmead (Hymenoptera: Encyrtidae) collected in Brazil

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## Abstract

Some species of flies are of fundamental medical and veterinary importance, since it can produce myiasis and act in the transmission of pathogens to humans and animals. Insecticides may also be used as the natural control of insect regulators known both in agriculture and in animal breeding. Some authors believe it is necessary to search for new methodologies that aim to control flies. As a possibility to control these insects, the natural regulators can be used, such as parasitoids that are the responsible agents for the reduction of the insects pests populations. The study determined the species of hosts of the parasitoid *Hemencyrtus herbertii* Ashmead (Hymenoptera: Encyrtidae), in the states of Goiás and Minas Gerais. The pupae were obtained by the flotation method. They were individually placed in gelatin capsules until the emergence of adult flies or their parasitoids. The overall prevalence of parasitism was 2.3%.

Keywords: baits, traps, flies, enemy natural, biocontrol

## 1-Introduction

Some species of flies are of fundamental medical and veterinary importance, since it can produce myiasis and act in the transmission of pathogens to humans and animals (Greenberg, 1971). They have been found conveying more than 100 species of disease-causing organisms such as bacteria, protozoa and helminths (Greenberg, 1971). Insecticides may also be used as the natural control of insect regulators known both in agriculture and in animal breeding (Silveira et al. 1989). Some authors believe it is necessary to search for new methodologies that aim to control flies (Mendes and Linhares, 1993).

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populations (Vilela et al., 1999).

Several species of Encyrtidae family have been successfully used in biological control programs. *Hemencyrtus herbertii* Ashmead (Hymenoptera: Encyrtidae) behaves as parasitoid larvae, developing internally in the host body and emerging from the puparium (Noyes, 1980; Gauld and Bolton, 1988).

The objective of this research was to extend the knowledge of the biology of the parasitoid *H. herbertii* in Brazil.

## 2. Material and Methods

The flies were collected by using traps, made of dark cans measuring 19 cm in height and 9 cm in diameter, with two openings resembling blinders, located in the lowest third of the can, to allow flies to enter. The top of the can was connected to a nylon funnel that was open at both ends, with the base pointing down. This was wrapped in plastic bags, so that when they were removed, the flies and parasitoids could be collected. The following items were used as baits: human feces, cattle kidneys and cattle liver which were placed inside the cans, over a layer of earth. Five traps were used and they were hung on trees at a height of one meter above the ground, two meters apart from each other.

The insects collected were taken to the laboratory, sacrificed with ethyl ether and kept in 70% alcohol for further identification. To obtain the parasitoids, the contents of the traps were placed in plastic containers with a layer of sand for use as a substrate for transformation of the larvae into pupae. This sand was sifted after being in the fields for 15 days and the pupae were extracted from it and were individually placed in gelatin capsules (number 00) in order to obtain the flies and/or parasitoids.

Each pitfall traps consisted of a plastic receptacle (basin) of 15 cm in diameter by 10 cm in height. Each receptacle was buried in earth, such that its upper extremity was at the ground surface level. One liter of water, 20 ml of detergent and 2 ml of formol were placed in each receptacle. A 200 ml pot was attached to the basin by means of a thin wire that went across it close to its edge, so as to keep the pot hanging and centralized in the basin. The bait, consisting of human feces, was placed in this pot. This trap was protected by another plastic receptacle of the same measurements (15 x 10 cm), which functioned as a cover. This contained four diametrically opposite holes of around 5 cm in diameter and 7 cm in height, and was supported on a metal wire suspended 10 cm from the group. Six traps were used, with separations of two meters between each other, placed randomly. The bait was replaced every 15 days. The pupae that were found in the bait were separated out by means of the floatation method. These were then individually

packed in gelatin capsules until the parasitoids emerged.

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The total percentage parasitism was calculated by means of the number of pupae parasitized, divided by the total number of pupae collected, and multiplied by 100. The percentage parasitism of each parasitoid species was calculated by means of the number of pupae parasitized per species of parasitoid, divided by the total number of pupae from that host, and multiplied by 100.

### 3. Results and Discussion

Between March 2001 and June 2006, 1.336 flies pupae were collected 167 specimens *Hemencyrtus herbertii* Ashmead (Hymenoptera: Encyrtidae) in 31 pupae (Table 1). The overall percentage of parasitism was observed in 2.3%. Probably due to the availability of resources, to the density of hosts and to the searching capacity of the parasitoids.

*Sarcodexia lambens* (Wiedemann) (Diptera: Sarcophagidae) was the fly that had a higher percentage of parasitism, 29.4%. Probably the percentage of parasitism was influenced by variations in the quality and availability of resources, the density of hosts and the gregarious parasitoid behavior. *Sarcodexia lambens* is widely distributed in the Americas, being found from the southern United States to Argentina (Lopes and Leite, 1989).

This species colonizes animals in organic matter such as human feces, feces of cattle and beef liver used as baits (Rocha and Mendes, 1996).

Among the hosts collected, the species *Chrysomya albiceps* (Wiedemann) (Diptera: Calliphoridae), *Chrysomya megacephala* (Fabricius) (Diptera: Calliphoridae) and *Musca domestica* L. (Diptera: Muscidae) stood out regarding their importance (medical-veterinary).

*Chrysomya albiceps* is of major medical and sanitary interest, because it is responsible for secondary myiasis and is a vector for pathogenic microorganisms. *M. domestica* is a

species of great sanitary interest because of its synanthropic characteristic, abundance in urban areas, capacity to develop in several sorts of substrates and high reproductive capacity (Marchiori, 2013).

*Chrysomya megacephala* is often found associated with the modified human environment with creating their larvae into an animal decomposing organic matter. This is of great interest Diptera medical sanitary and their occurrence, distribution and prevalence in metropolitan areas are very important factors. Have been observed in human bodies and pets. Adults can be attracted by substances in the fermentation process, decomposing, blood and wounds (Carvalho and Ribeiro, 2000; D'Almeida, 1993; 1994).

Among the means for controlling flies, chemical insecticides are the most widely used. However, these may lose their efficiency as populations gradually become insecticide-resistant. The resistance to insecticides shows the growing need to introduce alternative insect control programs, for instance the biological control. It is possible to control these insects, by using the natural regulators such as parasitoids, which are the responsible agents for the reduction of the insects pests populations (Marchiori, 2013).

#### 4. Conclusion

Among the hosts collected, the species *C. albiceps*, *C. megacephala* and *M. domestica* stood out regarding their importance medical-veterinary. Several species of Encyrtidae family (*H. herbertii*). have been successfully used in biological control programs.

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Table 1. Hosts of the parasitoid *Hemencyrtus herbertii* collected from March 2001 to June 2006 in Brazil.

Taxonomic Group	Number of pupae	Number of pupae parasitized	Percentage
<b>Calliphoridae:</b>			
<i>Chrysomya albiceps</i>	74	3	4.1
<i>Chrysomya megacephala</i>	76	1	1.3
<i>Hemilucilia flavifacies</i>	16	3	18.8
<i>Lucilia eximia</i>	268	3	1.1
<b>Muscidae:</b>			
<i>Euboettcheria collusor</i>	412	1	3.2
<i>Musca domestica</i>	20	1	5.0
<i>Ophyra</i> sp.	64	3	4.7
<b>Sarcophagidae:</b>			
<i>Oxysarcodexia thornax</i>	109	2	1.8
<i>Peckia chrysostoma</i>	280	9	3.2
<i>Sarcodexia lambens</i>	17	5	29.4
Total	1336	31	

Figure