

Parasitoids of flies collected on human feces in Itumbiara County, Goiás State, Brazil

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Abstract

Different species of parasitoids associated to flies collected on human feces in Itumbiara County, Goiás State, Brazil were identified. Traps of black can with baits and sand were used. Flies pupae were obtained sifted for extraction and individually placed into gelatin capsules until emergence of adult flies and/or parasitoids. The preference of species for their host was tested by the Chi-square test, at 5.0% probability. The total percentage of parasitism was 21.9%. March 2001 to April 2002 were collected 180 specimens of parasitoids in 823 pupae of dipterans. Variable numbers of specimens of 6 different species of parasitoides were obtained of pupae of flies infested: 22 specimens of *Gnathopleura quadridentata* Wharton (Braconidae), 21 specimens of *Brachymeria podagrica* (Fabricius) (Chalcididae), 23 specimens of *Hemencyrtus herbertii* Asmead (Encyrtidae), 1 specimen of *Paraganapis egeria* Díaz and Gallardo (Eucoilidae), 13 specimens of *Nasonia vitripennis* (Walker) and 100 specimens de *Pachycrepoideus vindemiae* (Rondani) (Pteromalidae). The total percentage of parasitism for *Gnathopleura quadridentata*, *Brachymeria podagrica*, *Hemencyrtus herbertii*, *Paraganapis egeria*, *Nasonia vitripennis* and *Pachycrepoideus vindemiae* was 2.7%, 2.5%, 2.8%, 0.1%, 1.5% and 12.1%, respectively. This is the first report on the occurrence of *Brachymeria podagrica* parasitizing pupae of *Ophyra* sp. in Brazil.

Key Words: Insecta, Diptera, Hymenoptera, natural enemy, biocontrol.

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Introduction

Diptera is one of the largest orders of insects, comprising abundant number of species as well as of individuals. Besides, these muscoids dipterous (flies) are of great medical

and veterinary importance since they may produce myiasis and may be vectors of microorganisms pathogenic to men and animals (Chow, 1940; Greenberg, 1971).

Flies have been found to carry diseases causing organisms such as: bacteria, protozoa and helminthes (Greenberg, 1971). The association occurs because flies are explorers of organic material and/or residues, which are produced by human or animal activities, specially feces and vegetal residues.

Together with flies develops, a diverse fauna of parasitoids, which are responsible for the natural control of these dipterous. Since parasitoids occupy a superior trophic level, they act as determining factors on the population densities of their hosts due to the diversity of their physiological and behavioral adaptations.

Besides, being natural enemies of pests they may be used in biological control programs. The use of some insecticides to control this fly may causing damages to the environment and to human health as well. So, search for effective natural enemies may be a viable alternative to control this pest in a long-term control program.

The objective of this study was to identify species of parasitoids that parasitize flies occurring on human feces, under field conditions.

Material and Methods

This study was conducted from March 2001 to April 2002 at the College of Agronomy (Faculdade de Agronomia) located in Itumbiara County, Goias State, Central Brazil (18°25´S;49°13´W). Flies were attracted to traps made of dull black tin foil cans (19 cm tall and 9 cm in diameter) with two blinders-like openings, located at the 1/3rd bottom part to allow flies entry.

To the upper part of each a nylon funnel with opened extremities and base turned down was attached. These traps were then wrapped with plastic bags, which after removal would allow the capture of flies and parasitoids. Human feces, deposited on top of a soil layer, were placed as baits inside each can. Five of these traps were randomly hung on Eucalyptus sp. trees at 1 m above the soils level, 2 m apart from each other and 50 m away from a domestic garbage deposit.

The specimens of parasitoids and flies collected were after remaining 15 days in the field were taken to the laboratory, killed with ethyl ether and stored in 70% ethanol for further

identification. After removal of insects, the content of each trap was individually placed into plastic containers layered with sand to serve as substrate for larvae and pupae development. These substrata were sifted for extraction of pupae obtained under natural environment. The pupae were then individually transferred to gelatin capsules and maintained a environment temperature in the laboratory to obtain flies and/or parasitoids.

The percentage of parasitism was computed using the following formula: $P = (\text{parasitized pupae} / \text{total of pupae}) \times 100$. The preference of species for their host was tested by the Chi-square test, at 5% probability.

Results and Discussion

From March 2001 to April 2002 a total of 823 pupae of dipterans was collected. From these, a total of 180 specimens of parasitoids, representing 6 species from 5 families was obtained.

The total percentage of parasitism observed was 21.9% (Table 1). From the hosts collected, the importance of the specie *Musca domestica* Linnaeus (Diptera: Muscidae) has to be emphasized. This species is of large sanitary importance due to its sinanthropic characteristics, its abundance in urban areas, its capacity of development on several sorts of substrata, its high reproductive power and for being appointed as pathogenic mediator to men and animals.

The prevalence of parasitism for the species *Gnathopleura quadridentata* Wharton (Braconidae), *Brachymeria podagrica* (Fabricius) (Chalcididae), *Hemencyrtus herbertii* (Encyrtidae), *Paraganapis egeria* Díaz and Gallardo (Eucoilidae), *Nasonia vitripennis* (Walker) and *Pachycrepoideus vindemiae* (Rondani) (Pteromalidae) was 2.7%, 2.5%, 2.8%, 0.1%, 1.5% and 12.1%, respectively.

Pachycrepoideus vindemiae was the most frequent species and the species that parasitized the largest diversity of hosts (Table 1). It is probably a polyphagous species and is considered a solitary parasitoid of numerous Diptera from Anthomyiidae, Calliphoridae, Muscidae, Tachinidae and Tephritidae families, among others (Silva, 1993) (Table 1).

Hemencyrtus herbertii has shown preference for pupae of *Oxysarcodexia thornax* Walker (Diptera: Sarcophagidae) and *M. domestica*; *N. vitripennis* for pupae of *Peckia*

chrysostoma (Wiedemann) and *Sarcodexia* sp. (Diptera: Sarcophagidae); *G. quadridentata* for pupae of *O. thornax* and *P. vindemiae* for pupae of *Poecilosomella* sp. (Sphaeroceridae), *Sarcophagula* sp. (Sarcophagidae), *O. thornax*, *Fannia pusio* (Wiedemann) (Fanniidae) and *Sarcodexia* sp. (X²=355.0; DF=35; P=39.3).

Nasonia vitripennis and *Hemencyrtus* sp. behaved as gregarious with four and five individuals emerging from a single host pupa, respectively. According to Rivers and Denlinger (1995), *N. vitripennis* behave as a gregarious parasitoid and is an ectoparasitoid on pupae of several species of the Diptera, especially in the families Calliphoridae, Muscidae, Sarcophagidae and Tachinidae.

Silva (1991) reported *Hemencyrtus* sp. parasitizing pupae of *Chrysomya albiceps* (Wiedemann) (Calliphoridae), *Phaenicia eximia* (Wiedemann) (Calliphoridae), *Synthesiomyia nudiseta* Wulp (Muscidae), *Ophyra* sp. (Muscidae), *Oxysarcodexia* sp. and *Patonella intermutans* (Walker) (Sarcophagidae), collected on rat carcasses in São Carlos County, São Paulo State, Brazil.

Considering the importance of this flies for public health, as vector of diseases-causing agents, it is essential to conduct surveys on these natural enemies to aid in the adequate control of flies through integrated control methods. This paper reports the first occurrence of *B. podagrica* parasitizing pupae of *Ophyra* sp.

References

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TABLE 1 - Number of parasitized pupae or not, number of specimens of parasitoids and percentage of parasitism in different species of synanthropic flies collected in humans feces, in the period from March 2001 to April 2002 in Itumbiara County, Goiás State, Central Brazil.

Fly species	Number of pupae collected	Parasitoid species	Number of parasitized pupae	%
<i>Fannia pusio</i>	157	<i>Pachycrepoideus vindemiae</i>	7	4.5
		<i>Paraganaspis egeria</i>	1	0.6
<i>Musca domestica</i>	20	<i>Hemencyrtus herbertii</i>	5	25.0
<i>Ophyra</i> sp.	06	<i>Brachymeria podagrica</i>	1	16.7
<i>Oxysarcodexia thornax</i>	109	<i>Brachymeria podagrica</i>	1	0.9
		<i>Gnathopleura quadridentata</i>	22	20.2
		<i>Hemencyrtus herbertii</i>	18	16.5
		<i>Pachycrepoideus vindemiae</i>	11	10.1
<i>Peckia chrysostoma</i>	106	<i>Brachymeria podagrica</i>	19	17.9
		<i>Nasonia vitripennis</i>	5	4.7
<i>Poecilomella</i> sp.	230	<i>Pachycrepoideus vindemiae</i>	40	17.4
<i>Sarcodexia</i> sp.	34	<i>Nasonia vitripennis</i>	8	23.5
		<i>Pachycrepoideus vindemiae</i>	6	17.6
<i>Sarcophagula</i> sp.	161	<i>Pachycrepoideus vindemiae</i>	36	22.4
Total	823		180	21.9