

## Abundance and richness of Calliphoridae (Diptera) of public health importance in the Tinguá Biological Reserve, Nova Iguaçu (RJ), Brazil

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### Abstract

BATISTA-DA-SILVA JA, MOYA-BORJA GE, PINTO DE MELLO R, QUEIROZ MM. 2011. Abundance and richness of Calliphoridae (Diptera) of public health importance in the Tinguá Biological Reserve, Nova Iguaçu (RJ), Brazil. ENTOMOTROPICA 26(3): 137-142.

This work was carried out to determine the species of Calliphoridae occurring in the Tinguá Biological Reserve, Nova Iguaçu, RJ, Brazil. Four plastic traps were used to collect the flies. The traps were suspended 1.20 m above the ground for a period of 48 hours, every two weeks. Fish (sardine) in decomposition was used as bait. A total of 2,519 Calliphoridae flies were captured, belonging to 11 species: *Chloroprocta idioidea* (Robineau-Desvoidy), *Chrysomya albiceps* (Wiedemann), *Chrysomya megacephala* (Fabricius), *Chrysomya putoria* (Wiedemann), *Cochliomyia macellaria* (Fabricius), *Hemilucilia bermanlenti* (Mello), *Hemilucilia segmentaria* (Fabricius), *Hemilucilia semidiaphana* (Rondani), *Lucilia eximia* (Wiedemann), *Paralucilia fulvinota* (Bigot) and *Paralucilia nigrofacialis* (Mello).

**Additional key words:** Forensic Entomology, fly, medical and veterinary importance.

### Resumo

BATISTA-DA-SILVA JA, MOYA-BORJA GE, PINTO DE MELLO R, QUEIROZ MM. 2011. Abundância e riqueza de Calliphoridae (Diptera) de importância para a saúde pública na Reserva Biológica de Tinguá, Nova Iguaçu (RJ), Brasil. ENTOMOTROPICA 26(3): 137-142.

Este trabalho foi realizado com o propósito de identificar as espécies de Calliphoridae que ocorrem na Reserva Biológica de Tinguá, Nova Iguaçu, RJ, Brasil. Foram utilizadas quatro armadilhas para coleta das moscas. As armadilhas foram suspensas a uma altura de 1,20 m acima do solo por um período de 48 horas, a cada duas semanas. Foi utilizada como isca sardinha em decomposição. Foram capturadas 2 519 moscas da família Calliphoridae pertencentes a 11 espécies: *Chloroprocta idioidea* (Robineau-Desvoidy), *Chrysomya albiceps* (Wiedemann), *Chrysomya megacephala* (Fabricius), *Chrysomya putoria* (Wiedemann), *Cochliomyia macellaria* (Fabricius), *Hemilucilia bermanlenti* (Mello), *Hemilucilia segmentaria* (Fabricius), *Hemilucilia semidiaphana* (Rondani), *Lucilia eximia* (Wiedemann), *Paralucilia fulvinota* (Bigot) e *Paralucilia nigrofacialis* (Mello).

**Palavras chaves adicionais:** Entomologia forense, importância médica e veterinária, moscas.

## Introduction

Calliphorid flies are of great public health importance, because some synanthropic species are associated with the mechanical transmission of helminth eggs, protozoan oocysts, bacteria, viruses and fungi (Queiroz et al. 2005). They also can produce myiasis in humans, domestic and wild animals, causing serious economic and public health problems (Zumpt 1965, Queiroz et al. 2005, Batista-da-Silva et al. 2009, Batista-da-Silva et al. 2011). Besides their medical and veterinary importance, calyptrate dipterans are usually found on decomposing human cadavers and are consequently of forensic importance. Biological knowledge of the genera such as *Lucilia* Robineau-Desvoidy, 1830; *Hemilucilia* Brauer, 1895; *Cochliomyia* Townsend, 1915 and *Chrysomya* Robineau-Desvoidy, 1830 is important to determine the post-mortem interval (Salviano et al. 1996).

Establishment of african *Chrysomya* species in the New World (Imbiriba 1977, Guimarães et al. 1978, 1979), has affected the muscoid native fauna, causing species displacement or extinction in certain niches. This is because the allomones released by the larvae of *Chrysomya albiceps* (Wiedemann, 1830) (Aguiar-Coelho et al. 1995) drive the other larvae away.

This was the first study done in the Tinguá Biological Reserve in Nova Iguaçu, using fish bait. The study was carried out to enhance knowledge of Calliphoridae flies, and also to quantify the more prevalent species in terms of public health and forensic importance.

## Material and Methods

The Tinguá Biological Reserve (26,000 ha) is geographically located within the mountain range Serra do Mar, with latitude 22°28'- 22°39' S and longitude 43°13'- 43°34' W in the state of Rio de Janeiro. Altitude ranges from 119 to 1,553 meters. It is part of the Atlantic rain forest and the average annual temperature ranges from

22.8 °C to 25.2 °C, the annual rainfall is 2,250 mm and relative humidity ranges from 76 % to 88 %.

Specimen collection was carried out from March 1995 to February 1996. To collect the flies, four 35 cm high and 15 cm diameter plastic bottle traps were used. The bottom of the plastic bottle trap, which was darkened, had four openings on the sides to allow the insects to enter and reach the bait at the bottom. The upper transparent part was separated from the bottom by a plastic funnel. After passing through the funnel (attracted by the luminosity) the insects were unable to return, and consequently could be collected (trap models were according to Ferreira 1978 and modified according to Batista-da-Silva et al. 2010).

The traps were suspended 1.20 m above the ground for a period of 48 hours, every two weeks. The bait used was decoposing sardines.

At each collection, all specimens were put into plastic containers containing 70 % ethanol. The specimens were taken to the Laboratory of Leishmaniasis Transmitters (Department of Medical and Forensic Entomology) at the Institute Oswaldo Cruz-IOC/FIOCRUZ, RJ, Brazil, where they were separated by collection date, counted and then identified using a stereoscopic microscope and the keys for families and species of Mello (2003). About 10 specimens of each species were pinned.

## Results

Over the study period a total of 4,608 traps-hours (4 traps x 48 hours x 2 monthly collections x 12 months) 2,519 flies were collected. Flies belonged to two subfamilies, Calliphorinae: *Lucilia eximia* (Wiedemann, 1819) (0.75 %), and Chrysomyinae: *Chloroprocta idioidea* (Robineau-Desvoidy, 1930) (4.96 %), *Chrysomya albiceps* (Wiedemann, 1830) (19.81 %), *Chrysomya megacephala* (Fabricius, 1805) (47.20 %), *Chrysomya putoria* (Wiedemann, 1830) (0.24%),

**Table 1.** Total number and percentage per species of flies collected during the four seasons, from February 1995 to February 1996. Average Temperature °C.

Species	Summer 25.2 °C		Fall 24 °C		Winter 20.3 °C		Spring 23 °C				Total	
	n	%	n	%	n	%	n	%	females	males	n	%
<i>Chloroprocta idioides</i>	16	12.8	34	27.2	74	59.2	01	0.8	84	41	125	4.96
<i>Chrysomya megacephala</i>	375	31.53	580	48.78	186	15.64	48	04	845	344	1,189	47.2
<i>Chrysomya albiceps</i>	190	38.07	151	30.26	127	25.45	31	6.21	438	61	499	19.81
<i>Chrysomya putoria</i>	03	50	03	50	00	00	00	00	05	01	06	0.24
<i>Cochliomyia macellaria</i>	07	23.33	09	30	14	46.66	00	00	19	11	30	1.2
<i>Hemilucilia hermanlenti</i>	01	100	00	00	00	00	00	00	01	00	01	0.04
<i>Hemilucilia segmentaria</i>	02	3.57	13	23.21	14	25	27	48.21	38	18	56	2.23
<i>Hemilucilia semidiaphana</i>	25	4.31	165	28.44	299	51.55	91	15.68	464	116	580	23.01
<i>Paralucilia nigrofascialis</i>	00	00	00	00	00	00	01	100	01	00	01	0.04
<i>Paralucilia fulvinotha</i>	00	00	13	100	00	00	00	00	11	02	13	0.52
<i>Lucilia eximia</i>	01	5.26	06	31.57	01	5.26	11	57.89	15	04	19	0.75
Total	620	24.61	974	38.66	715	28.38	210	8.33	1,921	598	2,519	100

*Cochliomyia macellaria* (Fabricius, 1775) (1.20 %), *Hemilucilia hermanlenti* Mello, 1972 (0.04 %), *Hemilucilia segmentaria* (Fabricius, 1805) (2.23 %), *Hemilucilia semidiaphana* (Rondani, 1850) (23.01 %), *Paralucilia fulvinotha* (Bigot, 1877) (0.52 %) and *Paralucilia nigrofascialis* (Mello, 1969) (0.04 %) (Table 1).

## Discussion

The data in Table 1 shows the number of specimens captured for each species and for each seasons of the year. Females were more abundant than males because females need protein for ovarian development (Avancine 1988).

*Chrysomya megacephala* was more numerous in fall and summer, confirming the data of d'Almeida and Almeida (1998) in Rio de Janeiro. *C. putoria* preferred the summer and fall seasons as did *C. megacephala*. Batista-da-Silva et al. (2010) reported that *C. megacephala* had a higher occurrence in temperatures above 21 °C in Itaboraí. This may explain the higher occurrence of this species in the Tinguá Biological Reserve, because the average temperature there reached 25.2 °C. Although *C.*

*putoria* feeds on several types of organic material in decomposition (Greenberg 1971, d'Almeida and Almeida 1998), such as meat -but rarely feces-, the fish bait used in this work proved to be more attractive with 0.24 % of the total captured against the chicken viscera used in the same area by Marinho et al. (2006) with only 0.1 % of all individuals captured.

*Chrysomya albiceps* adults are considered disseminators of microorganisms (Furlanetto et al. 1984), while the larvae, according to Baumgartner and Greenberg (1984), are predators of larvae of other species and may be a serious threat to native muscoids. *C. albiceps* was captured more numerous in summer (190), dropping gradually through the other seasons to only 31 specimens in spring, possibly because the average temperatures are higher in summer, favoring their biological cycle. *H. segmentaria* presented few specimens in the four seasons. Spring was the season with the highest number (27) captured and summer with the lowest (02). According to Ferreira and Barbola (1998) *H. segmentaria* showed preference for forested areas only in the metropolitan region of Curitiba. However, according to Oliveira et al. (1999), in the Rio de Janeiro Zoo (a metropolitan area

with large areas of vegetation), its frequency was higher in winter, while in the Tinguá Biological Reserve, its frequency was highest in spring, although also occurring in the other seasons in lower numbers.

*Hemilucilia semidiaphana* is a species which is most frequently found in forest areas, but not in urban areas in Rio de Janeiro (d'Almeida and Lopes 1983). According to Marinho et al. (2006), in the Tinguá Biological Reserve, this species was found with a percentage of 23.6 %, corroborating our results which were 23.01 % of all individuals captured. Our results show that *H. semidiaphana* is a species that is well adapted to the forest, and is found in all seasons but occurring preferentially in winter, with a frequency of 51.55 %, as shown in Table 1.

*Hemilucilia hermanlenti* is a very abundant species at some mid-altitudes, representing up to 76 % of all blow flies (n= 402) at one site (1,433m) according to Baumgartner and Greenberg (1985), but in this work only one (01) specimen was caught in the summer and none in the other seasons.

*Paralucilia nigrofacialis* showed a low frequency, with only one (01) specimen in the spring and none in the other seasons. Santos et al. (1996) and Marinho et al. (2006) did not record its presence in the same area, so, we can consider it as an accidental species.

*Paralucilia fulvinota* was found in low percentage in this work and Marinho et al. (2006) did not capture this species. According to Ferreira (1983), *P. fulvinota* in Goiânia, Goiás (Brazil), showed a low percentage of specimens, around 3.15 %. In Peru, it predominates in altitudes from 200 m to 1,900 m, with percentages up to 49 % (Baumgartner and Greenberg, 1985), and in Curitiba (Paraná) Ferreira and Barbola (1998) reported the presence of this species in all collections made in forested areas.

In this work *C. macellaria* appeared more frequently in winter, although it was recorded in

summer and fall in lower numbers. This species was mentioned by Linhares (1981) as one of the more abundant and more associated to man. According to Salviano et al. (1996), it may occur frequently in corpses in decomposition. Leite (1995) considered that this species causes secondary myiasis and is of great medical and veterinary importance. Considering the results obtained here, the high presence of *C. albiceps* (19.81 %) and the low presence of *C. macellaria* (1.20 %) may have confirmed the displacement of this species, as reported by Aguiar-Coelho et al. (1995).

According to Ferreira (1978), in Goiânia, Goiás, *L. eximia* was the most frequent species in summer, but was also observed in other seasons, attracted by liver, feces and sardines. Its presence in the Tinguá Biological Reserve occurred through the four seasons of the year with a total of 0.75 % of all specimens captured. This species had low prevalence in Campinas, São Paulo, but higher prevalence in rural areas, being considered hemisynanthropic (Linhares 1981). According to the results obtained by Madeira et al. (1982), in Belo Horizonte (Minas Gerais) and Ferreira (1983), in Goiânia (Goiás), this species showed preference for inhabited rural areas.

*Chloroprocta idioidea* was found by d'Almeida and Lopes (1983), in Rio de Janeiro, in rural, urban and forest areas, but was more abundant in forests, with 76.82 %. Ferreira (1978) in Curitiba and Linhares (1981) in Campinas did not register its presence. In Peru, Baumgartner and Greenberg (1985) recorded it in forest areas, being attracted by fish bait and even fruits. In the Tinguá Biological Reserve, *C. idioidea* represented 4.96 % of all the specimens captured in the four seasons of the year, as shown in Table 1, being more frequent in winter. According to Marinho et al. (2006), in the same area, *C. idioidea* represented 4.9 % of all specimens captured.

This study demonstrated that *C. megacephala* and *C. albiceps* were the most abundant species in Tinguá Biological Reserve, and knowledge of the richness and seasonal behavior of the Calliphoridae family may contribute to a control of Calliphoridae in rural or urban areas close to forested areas. Also this knowledge could assist in forensic investigations at homicidal sites.

### Acknowledgments

To David Graham Straker for the English revision, Instituto Oswaldo Cruz – IOC/FIOCRUZ, to the Instituto Brasileiro do Meio Ambiente (MMA) that gave permission for the collection of the specimens, and to the anonymous reviewers for their suggestions.

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