

# First inventory of the sandfly fauna (Diptera: Psychodidae, Phlebotominae) in the municipality of Juiz de Fora, State of Minas Gerais, Brazil

**Izabella de Oliveira Pinheiro<sup>[1]</sup>, Milton Ferreira de Castro<sup>[1]</sup>, Murilo Gonçalves<sup>[1]</sup>,  
Adilson da Costa Lima<sup>[1]</sup>, Glênia Maria de Magalhães Campos<sup>[1]</sup>,  
Adalberto Mitterofhe<sup>[1]</sup>, Ricardo José de Paula Souza e Guimarães<sup>[2]</sup>,  
José Dilermando Andrade Filho<sup>[3]</sup> and Elaine Soares Coimbra<sup>[4]</sup>**

[1]. Núcleo de Vigilância Epidemiológica, Ambiental e Saúde do Trabalhador, Superintendência Regional de Saúde, Secretaria de Estado da Saúde de Minas Gerais, Juiz de Fora, MG. [2]. Laboratório de Geoprocessamento, Instituto Evandro Chagas, Ananindeua, PA. [3]. Laboratório de Leishmanioses, Centro de Referência Nacional e Internacional para Flebotomíneos, Centro de Pesquisas René Rachou, Fundação Oswaldo Cruz, Belo Horizonte, MG. [4]. Departamento de Parasitologia, Microbiologia e Imunologia, Instituto de Ciências Biológicas, Universidade Federal de Juiz de Fora, Juiz de Fora, MG.

## ABSTRACT

**Introduction:** This study aimed to inventory the phlebotomine sandfly fauna present in the urban area of Juiz de Fora, with an emphasis on the genus *Lutzomyia*. **Methods:** Capture was performed from March to September 2012, using HP light traps placed at peridomestic sites, in a municipal kennel and a forest biome. **Results:** A total of 133 specimens were captured, representing eight species of the genus *Lutzomyia*. *Lutzomyia pascalei* was the most prevalent species. **Conclusions:** This research provides an inventory and description of the spatial locations of the phlebotomine sandfly fauna of Juiz de Fora.

**Keywords:** *Lutzomyia*. Juiz de Fora. Phlebotomine sandfly fauna.

Popularly known as *mosquito-palha*, *birigui*, *cangalhinha*, *tatuquira*, *asa dura*, *asa branca* or *anjinho* in Brazil, phlebotomine sandflies (Diptera: Psychodidae) are small insects of great importance in the epidemiology of various diseases, including the leishmaniasis, in animals and humans<sup>1</sup>. Between 1907 and 1940, a total of 33 phlebotomine species were identified in the Americas. Since then, interest in these insects has increased that number dramatically, and approximately 400 new species and subspecies have been described<sup>1</sup>. Among these, *Lutzomyia longipalpis* is considered particularly important as the main vector of visceral leishmaniasis. Perfectly adapted to the urban environment, it can also be widely found in forest, transitional and *cerrado* biomes, reflecting its wide variety of suitable habitats and eclectic alimentary preferences<sup>2</sup>.

The municipality of Juiz de Fora (21°41'20"S/43°20'40"W) is situated in southeastern Minas Gerais, 283km from the State capital, Belo Horizonte, and canine visceral leishmaniasis is considered endemic in this city<sup>3</sup>. Juiz de Fora has a humid subtropical climate, a mean annual temperature ranging from 15°C to 24°C and an average annual humidity of 80%. Annual

rainfall<sup>4</sup> varies between 1,300 and 1,500mm. The urban area includes several remaining areas of Atlantic rainforest. In 2008, the first cases of autochthonous canine visceral leishmaniasis were diagnosed by the *Secretaria Municipal de Saúde* of Juiz de Fora. However, no research on the local sandfly fauna has been conducted.

The entomological sampling was performed from March to September 2012, during 39 overnight monitoring events held in twelve neighborhoods of the eastern region of the city (*Alto Grajaú*, *Linhares*, *Nossa Senhora de Lourdes*, *Parque Burnier/JK*, *Progresso*, *Santa Rita*, *Santo Antônio*, *São Benedito*, *São Bernardo*, *São Dimas*, *Tiguerá* and *Vila Ideal*). With the exception of the *São Benedito* neighborhood, in which both a peridomestic environment and forest biome site were investigated, one HP light trap<sup>5</sup> was set in a peridomestic site for each household surveyed. One point of capture was also placed at the municipal kennel. In total, thirteen traps were installed, with attention given to the presence of bird and/or mammal shelters as well as of banana trees, organic matter accumulation in the soil, humidity, shade and vegetation. The traps were set from 5pm to 8am for three consecutive nights of two weeks per month (except for July, during which the collections were performed in just one week). After screening, the captured sandflies were mounted on slides. The taxonomic identification was conducted according to Young & Duncan<sup>6</sup>. Samples were sent to the *Centro de Pesquisas René Rachou, Fundação Oswaldo Cruz/Belo Horizonte* to confirm the identities. The slides were stored in the permanent collection of the *Laboratório de Entomologia, Superintendência Regional de Saúde/Juiz de Fora*.

**Address to:** Dr<sup>ª</sup> Elaine Soares Coimbra. Dept<sup>o</sup> de Parasitologia, Microbiologia e Imunologia/ICB/UFJF. Rua José Lourenço Kelmer s/n, Campus Universitário, Bairro Martelos, 36036-900 Juiz de Fora, MG, Brasil.

**Phone:** 55 32 2102-3219; **Fax:** 55 32 2102-3214

**e-mail:** elaine.coimbra@ufjf.edu.br

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The locations were georeferenced using a Global Positioning System (GPS), Garmin Model II-12, and imported into a Geographic Information System (GIS) to permit the visualization of their spatial distribution.

As shown in **Table 1**, a total of 133 phlebotomine sandflies were captured, including 65 (48.9%) males and 68 (51.1%) females, from the forest biome (91.7%) and peridomestic sites (8.3%) surveyed. Eight species of the genus *Lutzomyia* were captured: *Lutzomyia (Psathyromyia) pascalei* (Coutinho & Barretto, 1940), *Lutzomyia (Psychodopygus) ayrozai* (Barretto & Coutinho, 1940), *Lutzomyia (Psychodopygus) hirsuta* (Mangabeira, 1942), *Lutzomyia (Psychodopygus) matosi* (Barretto & Zago, 1956) *Lutzomyia (Psychodopygus) lloydi* (Antunes, 1937), *Lutzomyia (Evandromyia) edwardsi* (Mangabeira, 1941), *Lutzomyia (Evandromyia) sallesi* (Galvão & Coutinho, 1939) and *Lutzomyia (Lutzomyia) amarali* (Barretto & Coutinho, 1940). The most prevalent species was *Lu. pascalei* (42.9%), followed by *Lu. ayrozai* (21.1%) and *Lu. hirsuta* (15%). With the exception of four specimens of the genus *Brumptomyia*, which were not of interest in this research, all of the captured specimens belonged to the genus *Lutzomyia*. Furthermore, three specimens of the genus *Lutzomyia* were damaged and thus could not be identified. These specimens composed 5.3% of the specimens captured and were found in the *São Benedito* neighborhood (**Table 1**).

This study covered the eastern region of the City of Juiz de Fora. **Figure 1** shows the spatial distribution of the phlebotomine sandflies. All species found were concentrated in a single area of the region surveyed, within the *São Benedito* neighborhood. Together, the two *São Benedito* sites accounted for 94.7% of the total number of sandflies captured (126 specimens).

No phlebotomine sandflies were captured in seven of the twelve neighborhoods surveyed (*Alto Grajaú, Linhares, Parque Burnier/JK, Progresso, Santo Antônio, São Bernardo and São Dimas*). Both *Lu. lloydi* (*Nossa Senhora de Lourdes* and *São Benedito*) and *Lu. sallesi* (*Vila Ideal*) were found only in peridomestic sites. *Lutzomyia amarali*, *Lu. matosi* and *Lu. pascalei* were found exclusively in the forest biome (*São Benedito*). *Lutzomyia ayrozai*, *Lu. edwardsi* and *Lu. hirsuta* were captured from both peridomestic sites and the forest site (*São Benedito, Santa Rita and Tiguera*, respectively).

This study is the first inventory of phlebotomine sandfly fauna held in Juiz de Fora. The species *Lutzomyia intermedia*, *Lutzomyia migonei* and *Lutzomyia quinquefer* have previously been found in this municipality<sup>7,8</sup>. Therefore, the data obtained in this work add to the available information on the local fauna, identifying eight species of the genus *Lutzomyia* that have not been previously reported in this city, namely *Lu. amarali*, *Lu. ayrozai*, *Lu. edwardsi*, *Lu. hirsuta*, *Lu. lloydi*, *Lu. matosi*, *Lu. pascalei* and *Lu. sallesi*. Notably, none of the formerly reported species were found in the present study, possibly because they were captured at different sites within the city or because of possible changes related to biotic and/or abiotic factors. The most prevalent species captured in the present study (*Lu. pascalei*) has been shown to be in a process of geographical expansion. Restricted to the northeastern and southeastern regions of Brazil until recently, it has already been found in southern Brazil<sup>9,10</sup>.

The subgenus *Psychodopygus* was represented by four species. Some species of this group, i.e., *Lu. hirsuta* and *Lu. lloydi*, have been found to be naturally infected with *Leishmania* in Minas Gerais<sup>11,12</sup>. *Lutzomyia lloydi* was found in Juiz de Fora, but at a low frequency.

TABLE 1 - Total numbers and percentages of sandflies captured from thirteen sites in the eastern region of the municipality of Juiz de Fora, State of Minas Gerais, Brazil, from March to September 2012, distributed according to species, sex and habitat.

Species	Peridomestic site				Rainforest biome				Total	
	males		females		males		Females			
	n	%	n	%	n	%	n	%	n	%
<i>Lutzomyia amarali</i>	-	-	-	-	-	-	1	1.6	1	0.7
<i>Lutzomyia ayrozai</i>	1	14.3	1	25.0	17	29.3	9	14.1	28	21.1
<i>Lutzomyia edwardsi</i>	-	-	1	25.0	-	-	1	1.6	2	1.5
<i>Lutzomyia hirsuta</i>	1	14.3	-	-	10	17.2	9	14.1	20	15.0
<i>Lutzomyia lloydi</i>	5	71.4	-	-	-	-	-	-	5	3.8
<i>Lutzomyia matosi</i>	-	-	-	-	11	18.9	9	14.1	12	9.0
<i>Lutzomyia pascalei</i>	-	-	-	-	17	29.3	40	62.5	57	42.9
<i>Lutzomyia sallesi</i>	-	-	1	25.0	-	-	-	-	1	0.8
<i>Lutzomyia</i> sp.	-	-	1	25.0	2	3.4	-	-	3	2.2
<i>Brumptomyia</i> sp.	-	-	-	-	1	1.7	3	4.7	4	3.0
Subtotal	7	5.3	4	3.0	58	43.6	64	48.1	-	-
Total	11		8.3		122		91.7		133	100.0

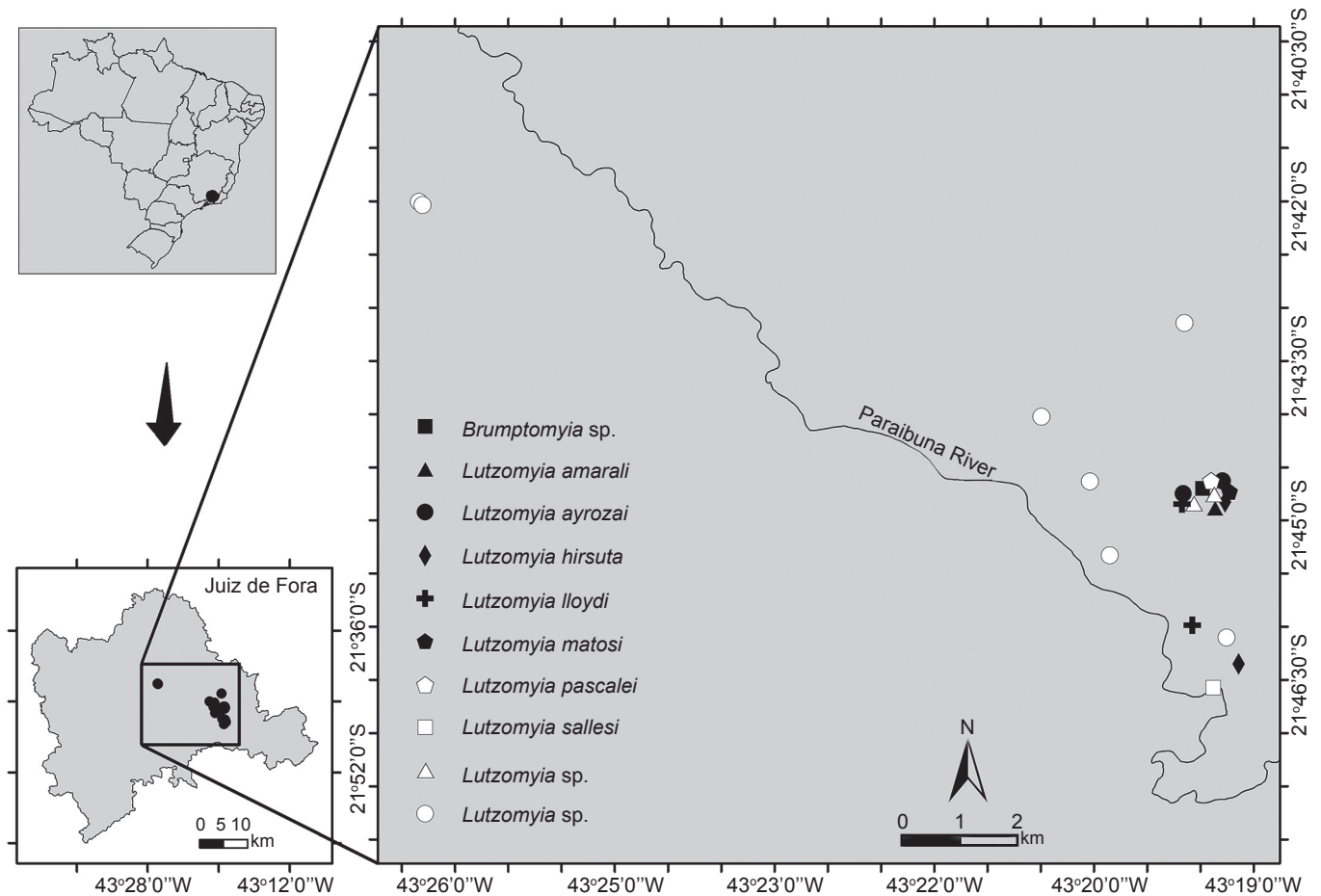


FIGURE 1 - Spatial distribution of sandflies in the municipality of Juiz de Fora, State of Minas Gerais, Brazil. Coverage area of the city showing the sandflies captured in the eastern region from March to September 2012.

In this work, the capture sites were chosen based on reports of the occurrence of asymptomatic dogs seropositive for canine visceral leishmaniasis. However, none of the eight *Lutzomyia* species found is considered of epidemiological importance in the transmission of this disease. In addition, this research showed that within the study area, a more diverse phlebotomine fauna existed in the natural environment than in those environments subject to anthropic impacts, consistent with the data from the literature<sup>1</sup>. Further surveys will be performed in other areas of the city.

In a recent review, Andrade & Dantas-Torres showed that at least 93 species included in 16 genera of phlebotomine sandflies identified in Brazil have already been found in the State of Minas Gerais<sup>13</sup>. However, the authors added that many municipalities have not yet been surveyed thoroughly. Thus, our research contributes to the knowledge of the species diversity and spatial locations of the phlebotomine sandfly fauna in Minas Gerais as well as to future studies of the behavior of these insects.

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## CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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