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

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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, tatuíra, 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 leishmaniases, in animals and humans. Between 1907 and 1940, a total of 33 phlebotome 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. 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.

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. 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 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, Tiguera 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 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. 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 Fora.

ABSTRACT
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) lloydii (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 Lutzomyia hirsuta (42.9%), followed by Lutzomyia pascalei (21.1%) and Lutzomyia lloydi (14.1%). 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 species 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 Lutzomyia lloydi (Nossa Senhora de Lourdes and São Benedito) and Lutzomyia sallesi (Vila Ideal) were found only in peridomestic sites. Lutzomyia amarali, L. matosi and Lutzomyia pascalei were found exclusively in the forest biome (São Benedito). Lutzomyia ayrozai, L. edwardsi and Lutzomyia 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 municipality7,8. 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 Lutzomyia amarali, Lutzomyia ayrozai, Lutzomyia edwardsi, Lutzomyia hirsuta, Lutzomyia lloydi, Lutzomyia matosi, Lutzomyia pascalei and Lutzomyia 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 (Lutzomyia 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 Brazil9,10.

The subgenus Psychodopygus was represented by four species. Some species of this group, i.e., Lutzomyia hirsuta and Lutzomyia lloydi, have been found to be naturally infected with Leishmania in Minas Gerais9,12. Lutzomyia lloydi was found in Juiz de Fora, but at a low frequency.

<table>
<thead>
<tr>
<th>Species</th>
<th>Peridomestic site</th>
<th>Rainforest biome</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>males</td>
<td>females</td>
</tr>
<tr>
<td>Lutzomyia amarali</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Lutzomyia ayrozai</td>
<td>-</td>
<td>14.3</td>
</tr>
<tr>
<td>Lutzomyia edwardsi</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Lutzomyia hirsuta</td>
<td>-</td>
<td>14.3</td>
</tr>
<tr>
<td>Lutzomyia lloydi</td>
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</tr>
<tr>
<td>Lutzomyia matosi</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Lutzomyia pascalei</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Lutzomyia sallesi</td>
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<td>1</td>
</tr>
<tr>
<td>Lutzomyia sp.</td>
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<td>-</td>
</tr>
<tr>
<td>Brumptomyia sp.</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Subtotal</td>
<td>7</td>
<td>5.3</td>
</tr>
</tbody>
</table>

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.
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. 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. 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.

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.

ACKNOWLEDGMENTS

We are thankful to the superintendent of the Superintendência Regional de Saúde de Juiz de Fora (SRS/JF), Dr. Cláudio Moisés Lacerda Reis; to the coordinator of the Núcleo de Vigilância Epidemiológica, Ambiental e Saúde do Trabalhador, Lourdes Maria Tasca Tavares; to the researchers of the Centro de Pesquisas René Rachou, Rogério Pereira, Juliana Xavier Faustino and Cristiani de Castilho Sanguinette; to Thamiris Mariane de Almeida, Hélio Soares Gomes, Liliane de Souza Vieira, Nívea Maria Farinazzo; and to those responsible for the sites where the traps were placed, for their essential collaboration in this research.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.
This work was supported by Fundação de Amparo à Pesquisa Científica do Estado de Minas Gerais (FAPEMIG).

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