



## Collection of phlebotomines during the AMAZONLOG event in the city of Tabatinga, Amazonas, Brazil

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### Abstract

The Leishmaniasis and Chagas disease laboratory of the National Institute of Amazonian Research (INPA) has been conducting research in the region of the triple borders of the Amazonas state in order to investigate the parasite-vector relationship of leishmaniasis. As such, the objective of the study was to conduct a survey of the phlebotominae entomofauna at the base of the 8<sup>th</sup> Jungle Infantry Battalion in Tabatinga, where the AMAZONLOG base was setup. The survey of the entomofauna was carried out in the forest surrounding the 8<sup>th</sup> Jungle Infantry Battalion. The collection took place on November 10 and 11, 2017, and resulted in a total of 367 specimens. Of these, 261 (71%) were males and 106 (29%) females, which were grouped into eight species and eight genera. In our results, the first record for *Th. auraensis* in the municipality of Tabatinga is a significant finding. Any study that reports the results of surveys of the entomofauna of an area is of extreme importance for epidemiological studies.

**Keywords:** Brazilian army, integumentary Leishmaniasis, Vector-parasite, Potential vectors

**Coleta de flebotomíneo em evento Amazonlog na cidade de Tabatinga, Amazonas, Brasil.** O laboratório de Leishmaniose e doença de Chagas do Instituto Nacional de Pesquisas da Amazônia (INPA) vem conduzindo pesquisas nas áreas de tríplices fronteiras do Amazonas, com a finalidade de averiguar a relação parasita-vetor da Leishmaniose. Diante do exposto, o objetivo do estudo foi realizar um levantamento da entomofauna de flebotomíneos na base do 8º Batalhão de Infantaria de Selva em Tabatinga, local em que foi montada a base do AMAZONLOG. A coleta deu-se nos dias 10 e 11 de novembro de 2017, e resultou na coleta de 367 espécimes. Destes, 261 (71%) eram machos e 106 (29%) eram fêmeas, que foram agrupadas em oito espécies e oito gêneros. Em relação aos resultados, destaca-se o primeiro registro para *Th. auraensis* no município de Tabatinga, AM. As pesquisas que envolvem levantamento da entomofauna de uma área são de extrema importância para os estudos de cunho epidemiológico.

**Palavras-chave:** Exército brasileiro, Leishmaniose Tegumentar, Parasito-vetor, vetor potencial.

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## 1. Introduction

Surveillance based on factors related to arthropods provides a basis for predicting the occurrence of a disease. Thus, vector investigations are aimed at the study of the dynamics and the distribution of potential vectors and relate them to the transmission of a disease at the levels of interactions with human and animal host reservoirs, under the influence of environmental factors, which can provide us with the knowledge necessary to detect any change in the profile of disease transmission (GOMES, 2003; ARAUJO-PEREIRA et al., 2017).

The phlebotomines are hematophagous insects whose size can vary from 2.5 to 3.5 mm, depending on the species. This characteristic allows them to circulate often unnoticed in the forest areas. They are known as the only vectors of leishmaniasis, in addition to the typical diseases of tropical and subtropical areas of the world, such as arboviruses, bartonellosis, *harara*, trypanosomiasis (CABRERA et al., 2003; LAINSON, 2010).

Since 2007, the Leishmaniasis and Chagas Disease Laboratory of the National Institute for Amazonian Research (INPA) has been conducting research in the municipalities of the Amazonas state, in order to investigate the parasite-vector relationship and contribute new information on phlebotomine fauna and the potential vectors of leishmaniasis. The first study was by PINHEIRO (2013), in which the circulation of phlebotomines in the region of São Gabriel da Cachoeira on the triple border shared by Brazil-Colombia-Venezuela was investigated, and, in 2012, Soares evaluated the epidemiology of integumentary leishmaniasis and described of the population of phlebotomines in the

municipality of Tabatinga (triple border Brazil-Colombia-Peru).

Studies in border areas are extremely important, because, according to SILVA-SOBRINHO et al. (2021), these areas have two inherent characteristics regarding the health/disease process, i.e., they are places of entry or exit of people, animals and goods that allow the exchange and diffusion of pathogens between countries and they are areas or zones with particular characteristics, i.e., the inhabitants of neighboring countries experience the effects of proximity, generating particular types of behavior.

Every year, the Brazilian Army conducts an interagency multinational logistics exercise in Tabatinga known as AMAZONLOG. The purpose of the event is to set up an international logistics base composed of integrated multinational logistics units, which are trained in the support of civilians and military personnel, very similar to what occurs in peace operations.

The participation of the Laboratory of leishmaniasis and Chagas disease in the event was to conduct a survey of the phlebotomine entomofauna in an area close to the 8<sup>th</sup> Jungle Infantry Battalion base in Tabatinga, where the AMAZONLOG base was set up.

## 2. Material and methods

### 2.2. Collection of phlebotomine specimens

In this study, a total of ten light traps (CDC miniature, Hausherr Machine Works, New Jersey, USA) were used, which were arranged one meter above the ground, and left in place from 18:00 until 08:00 in the morning of the next day (SHERLOCK and PESSÔA, 1964). The collection took place on November 10 and 11, 2017.

### 2.3. Taxonomic identification

All collected specimens were transported to a makeshift laboratory set up by the army at the site of the event. The specimens were transported in a polyethylene box (Styrofoam type), with a nylon cage inside that was wrapped in a plastic bag containing a cotton pad soaked in distilled water to maintain temperature and humidity inside the container. First, we performed the screening of phlebotomines, which were separated according to sex.

The females were identified and dissected for evaluation of natural infection by *Leishmania* sp. Then, the males were conserved in 70% alcohol, clarified in 10% KOH (potassium hydroxide, Merck®), assembled according to BARRETO and COUTINHO (1940) and identified according to the identification key proposed by GALATI (2003). The natural infection rate (NIR) obtained in the collection

area was calculated by the percentage of the ratio between the number of infected females and the total of dissected females (FREITAS et al., 2002).

### 3. Results and Discussion

A total of 367 specimens were collected, of which 261 (71%) were males and 106 (29%) females, which were grouped into eight species and eight genera. The species are presented in the following distribution:

*Evandromyia* (Aldamyia) *walkeri* (Newstead, 1914) [03]; *Nyssomyia antunesi* (Coutinho, 1939) [02]; *Nyssomyia umbratilis* (Ward & Fraiha, 1977) [12]; *Psathyromyia dendrophyla* (Mangabeira, 1942) [03]; *Psychodopygus ayrozai* (Barretto & Coutinho 1940) [01]; *Trichophoromyia auraensis* (Mangabeira, 1942) [330]; *Th. howardi* (Young, 1979) [01]; and *Viannamyia furcata* (Mangabeira, 1941) [15], according to Table 1.

Table 1 – Total phlebotomines collected during the Amazonlog event in the city of Tabatinga, Amazonas, Brazil.

Genus and subgenera	Species	M	F	TOTAL
<i>Evandromyia</i> (Aldamyia)	<i>Ev. (Ald.) walkeri</i>	2	1	3
<i>Nyssomyia</i>	<i>Ny. antunesi</i>	2	-	2
<i>Nyssomyia</i>	<i>Ny. umbratilis</i>	9	3	12
<i>Psathyromyia</i> ( <i>Psathyromyia</i> )	<i>Pa (Psa) dendrophyla</i>	3	-	3
<i>Psychodopygus</i>	<i>Ps. ayrosai</i>	-	1	1
<i>Trichophoromyia</i>	<i>Th. auraensis</i>	231	99	330
<i>Trichophoromyia</i>	<i>Th. howardi</i>	1	-	1
<i>Viannamyia</i>	<i>Vi. furcata</i>	13	2	15
<b>TOTAL</b>		<b>261</b>	<b>106</b>	<b>367</b>

M: male; F: female; T: total; Collection period: 11/2017

In our results, we highlight the first report of *Th. auraensis* in the municipality of Tabatinga. This species was not recorded in the survey of phlebotomines carried out

by SOARES (2012) in this municipality. However, the author's collection points were in areas of the National Institute of Colonization and Agrarian Reform

- INCRA and Geodésica II, which are between highway markers km 4 and 8 on the highway, such areas being distant from the collection point referred to in our study.

*Th. auraensis* was predominant in the study, and represented 89.7% (330/368) of the sample. It was also the only one that presented dissected females (99/106) for evaluation of natural infection, though with a negative result. There is no record of this species in large quantities in other entomological surveys carried out in the Amazon (PEREIRA JUNIOR et al., 2015). However, in recent studies, this species has become important due to it having been detected with DNA from *Leishmania* in material collected in the municipality of Assis Brasil, in the state of Acre (TELES et al., 2016; ARAUJO- PEREIRA et al., 2017). This species showed an expressive number in the collections performed in this state (ARAUJO-PEREIRA et al., 2014, 2017).

Although the other species present lower numbers in our study, they still deserve to be highlighted since they are considered principal vectors or suspects in the transmission of *Leishmania*. Species such as *Ny. antunesi* are associated in the transmission of *Leishmania* spp in the Meta region, Department of Colombia (VÁSQUEZ-TRUJILLO et al., 2008) and *Ny. umbratilis* is the main vector of *L. (Viannia) guyanensis*, and is found infected with some frequency in area to the north of the Amazon River and in countries such as French Guiana, Suriname, Colombia, Ecuador, Venezuela and in lowland forests in Peru (LAINSON, 2010). However, *Ps. ayrozai* is involved in the transmission of *L. (V.) naiff* in Brazil (LAINSON and SHAW, 1989).

In the Amazon, military training in the forest is frequent and, as such, there is the possibility of infection by leishmaniasis due to the existence

of natural vectors of this disease. Thus, these soldiers are required to enter the jungle without realizing that it is the natural habitat of transmitters of leishmaniasis (PINHEIRO, LUZ and FRANCO, 2008). It should be noted that these training exercises are carried out in periods of high precipitation, and this fact causes an increase in the number of cases of the disease, since it provides greater human contact with the phlebotomine vectors of American tegumentary leishmaniasis.

#### 4. Conclusion

Information on the distribution of phlebotomines on military bases is still scarce. The survey of the species of phlebotomines in areas in which military training takes place is necessary in order to determine the predominance of vector species of leishmaniasis. In this study, we highlight the first report of the species *Th. auraensis* in Tabatinga, Amazonas state, Brazil.

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#### Disclosure

This scientific note is unpublished and is not being considered for publication anywhere else. The authors and reviewers did not report any conflict of interest during their evaluation. Therefore, the journal Scientia Amazonia owns the copyrights and has the approval and the permission of the authors for disclosure of this article by electronic means.

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