

Survey of sandfly vectors of leishmaniasis in Marambaia Island, municipality of Mangaratiba, State of Rio de Janeiro, Brazil

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ABSTRACT

Introduction: The influx and efflux of military personnel in the possible endemic areas of leishmaniasis provided the impetus for research on the sandflies on Marambaia Island. **Methods:** Sandflies were collected with light traps installed in the 3 ecotypes of 3 areas chosen for their particular landscape aspects. **Results:** In 2009, were collected 32,006 specimens of sandflies belonging to 13 species. The species that showed highest density were *Nyssomyia intermedia* and *Migoneimyia migonei*. **Conclusions:** *N. intermedia* and *M. migonei* are the principal vectors of American tegumentary leishmaniasis (ATL) in Brazil; thus, extension studies related to the eco-epidemiology of these species of Marambaia Island are essential.

Keywords: Leishmaniasis. Sandfly fauna. Marambaia Island.

Several sandfly species have been reported to carry natural infections by *Leishmania* spp. In Brazil, American tegumentary leishmaniasis (ATL) deserves attention due to its considerable magnitude and high risk of deformities in humans¹. In the State of Rio de Janeiro, several studies relating to ATL epidemiology have indicated *Nyssomyia intermedia* as the species with the highest vector potential to transmit ATL in domicile and peridomicile environments in the region, because of its density, anthropophily, and easy adaptation to anthropic environments^{2,3}. More recently, *Migoneimyia migonei* has been documented as another species with high vector potential⁴. According to the Ministry of Health in 2007¹, AVL (also known as kala-azar and *barriga d'água*) has been expanding to urban areas. Its main vectors in Brazil are the *Lutzomyia longipalpis* and *Lutzomyia cruzi* species, which has been found in natural infections in Corumbá and Jaciara in the State of Mato Grosso do Sul^{5,6}.

The risk of parasite transmission depends on the existence of a large number of vector species in addition to the emergence of species that used to be restricted to the wild. The epidemiological importance of these insects is linked to species that are effectively associated with the anthropic environment.

An important factor in Marambaia Island is the influx and efflux of military personnel in the possible endemic areas of leishmaniasis.

The objective of the present study was to determine the number of sandfly species and identify the epidemiologically

important species for the transmission of leishmaniasis in the Center for Military Training in Marambaia Island (CADIM).

Marambaia Island (23°04'51"S - 44°00'39"W 23°03'48"S - 43°33'96"W) consists of an ecological reserve that has very distinct topography and vegetation, with a beach, restinga, hillside woods, and marsh areas⁷. This location is occupied by a quilombola community (remains of a quilombo, i.e., descendants of slaves). A survey carried out by the National Institute for Colonization and Agrarian Reform (INCRA) in 2006 estimated the existence of approximately 262 quilombola families in the region⁸. In addition, the island is visited annually by hundreds of thousands of people coming from different leishmaniasis-endemic regions in Brazil.

The present work was conducted in 3 distinct ecotopes (intradomicile, peridomicile, and woods) in 3 regions of Marambaia Island in the municipality of Mangaratiba: Pescaria Velha, Praia do Sítio, and Praia Grande. These regions were selected according to their landscape, vegetation, and anthropic activity characteristics.

The capture methodology included the use of the suction light trap (Centers for Disease Control [CDC] Model)^{9,10}. Collection with light traps began at 6:00p.m. and ended at 7:00a.m. the next morning, totaling 13h of collection per trap. The collected specimens were placed in plastic tubes containing 70% alcohol. They were duly labeled and sent to the laboratory, where they were prepared and placed between microscope slides and cover slips in Canada Balsam. The collected specimens were then identified according to Galati's taxonomic nomenclature, 2003¹¹.

Throughout the 12 collection months in the study area, we performed monthly collections of sandflies using a CDC-type light trap. A total of 32,006 specimens from 13 species

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Received 09 June 2011

Accepted 30 September 2011

were captured: *N. intermedia*, *Migoneimyia migonei*, *Pintomyia fischeri*, *Lutzomyia longipalpis*, *Evandromyia edwardsi*, *Pintomyia bianchigalatae*, *Brumptomyia brumpti*, *Evandromyia cortellezii*, *Expapillata firmatoi*, *Micropygomyia capixaba*, *Micropygomyia quinquefer*, *Micropygomyia schreiberi*, and *Psathyromyia pelloni*. The species *N. intermedia* and *M. migonei* were predominant, representing 80% and 18.7% of the captured sandflies, respectively (Table 1).

TABLE 1- Sandflies populations captured during 2009 in Marambaia Island, Rio de Janeiro, Brazil

Species	Male		Female		Total	
	n	%	n	%	n	%
<i>Nyssomyia intermedia</i>	12,259	48.0	13,320	52.1	25,579	80.0
<i>Migoneimyia migonei</i>	3,389	56.6	2,598	43.4	5,987	18.7
<i>Pintomyia fischeri</i>	21	12.3	149	87.6	170	0.5
<i>Lutzomyia longipalpis</i>	73	67.6	35	32.4	108	0.3
<i>Evandromyia edwardsi</i>	13	21.0	49	79.3	62	0.2
<i>Pintomyia bianchigalatae</i>	4	11.0	33	89.2	37	0.1
<i>Brumptomyia brumpti</i>	10	30.3	23	70.0	33	0.1
<i>Evandromyia cortellezii</i>	0	0.0	2	100.0	2	0.006
<i>Micropygomyia firmatoi</i>	0	0.0	1	100.0	1	0.003
<i>Micropygomyia capixaba</i>	1	9.1	10	90.9	11	0.03
<i>Micropygomyia quinquefer</i>	1	16.7	5	83.3	6	0.02
<i>Micropygomyia schreiberi</i>	1	100.0	0	0.0	1	0.003
<i>Psathyromyia pelloni</i>	9	100.0	0	0.0	9	0.03
Total	15,781	49.3	16,225	50.7	32,006	100.0

Among the species collected throughout 2009, 4 were of epidemiological importance to leishmaniasis transmission in Brazil: *L. longipalpis*, *M. migonei*, *N. intermedia*, and *P. fischeri*.

The CADIM is a location of national and international traffic of military personnel from several leishmaniasis-endemic regions. Additionally, the location is occupied by a community of quilombola descendants. These facts motivated our team to collect sandflies at this location and to conduct a survey of the sandfly fauna to detect leishmaniasis vectors, as the presence of humans possibly infected with the disease in contact with its vectors enables the presence, increase, or decrease of disease transmission dynamics. The study of sandfly ecology in Rio de Janeiro was initiated when tegumentary leishmaniasis (TL) cases occurred in the former capital of the Republic¹². In the first studies of TL in Brazil, the presence of *N. intermedia* was already evident in modified environments. However, it was only after research conducted by Forattini and Santos¹³ that a high density of this vector was verified. Following this study, the hypothesis of its participation as the main transmitter of *Leishmania braziliensis* appeared¹⁴.

Pitta-Pereira et al.⁴ reported a natural infection in *N. intermedia* and *M. migonei* in studies of natural identification by *L. (Viannia) braziliensis* in specimens collected from different neighborhoods throughout Rio de Janeiro. These species

are highly anthropophilic, and are potential ATL vectors in Brazil.

The main American visceral leishmaniasis (AVL) vector in Brazil, *L. longipalpis*, was appointed by epidemiological evidence as the vector of this protozoonosis in the municipality of Rio de Janeiro¹⁵. In the present study, *L. longipalpis* was captured in relatively low densities compared with species such as *N. intermedia*, an ATL vector. However, it is worth noting that since it was captured in the study locations and in greater density in the peridomiciles, in addition to the presence of seropositive dogs on Marambaia Island, there is a high possibility of the development of this disease.

The present study resulted in a great number of captured *N. intermedia*. This species was collected in all locations and all studied ecotopes, illustrating the high the level of importance of sandfly fauna studies on Marambaia Island. Since this species is of the greatest epidemiological importance for ATL in Brazil, it is vital to expand these studies related to eco-epidemiology on Marambaia Island. A similar result was observed for the *M. migonei* species, considered by many investigators as a secondary ATL vector in Brazil. The fact that there were 2 autochthonous ATL cases in the region, together with the finding of a great number of species that are vectors of this protozoonosis, adds to the importance of this study.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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