

Ueslei Teodoro^I

Demilson R dos Santos^{II}

Ademar R dos Santos^{II}

Otílio de Oliveira^{II}

Luís Paschoal Poiani^{II}

Allan Martins da Silva^{III}

Herintha Coeto Neitzke^{IV}

Wuelton Marcelo Monteiro^{IV}

Maria V Campana Lonardon^I

Thaís G Verzignassi Silveira^I

Preliminary information on sandflies in the north of Paraná State, Brazil

ABSTRACT

The results from sandfly collections in 10 municipalities in Paraná State, Brazil are reported. The captures were done using Falcão traps in homes, domestic animal shelters and forested areas, from 1999 to 2002. A total of 13,653 sandflies were collected from 10 species of the genera *Brumptomyia*, *Expapillata*, *Evandromyia*, *Migonemyia*, *Pintomyia*, *Nyssomyia* and *Psathyromyia*. The species *Nyssomyia neivai* was predominant in five municipalities. *N. whitmani* predominated in the other five, in greater numbers than for *N. neivai* in the first five municipalities. High frequencies of sand flies were found in forests, homes, pigpens and henhouses. Investigations on the participation of domestic animals and phlebotomine fauna in the epidemiology of tegumentary leishmaniasis should be routine in health surveillance, especially where this disease is endemic.

KEYWORDS: Leishmaniasis, cutaneous, epidemiology. Psychodidae. Phlebotominae. Paraná.

^I Departamento de Análises Clínicas. Universidade Estadual de Maringá. Maringá, PR, Brasil

^{II} Núcleo de Entomologia de Maringá. XV Regional de Saúde. Secretaria de Saúde do Paraná. Maringá, PR, Brasil

^{III} Seção de Ação sobre o Meio. XIX Regional de Saúde. Secretaria de Estado da Saúde do Paraná. Jacarezinho, PR, Brasil

^{IV} Curso de Farmácia. Universidade Estadual de Maringá. Maringá, PR, Brasil

Correspondence:

Ueslei Teodoro
Universidade Estadual de Maringá - DAC
Av. Colombo, 5790
87020-900 Maringá, PR, Brasil
E-mail: uteodoro@uem.br

INTRODUCTION

The prevalence of American tegumentary leishmaniasis (ATL) has been increasing in Latin America over the 20 years, especially in Brazil. It is present in all Brazilian states, and affects people of all ages and both sexes. In Paraná State, ATL is endemic and occurs in 276 of the 399 municipalities in this state. Between 1980 and 2003, 12,304 cases of the disease were recorded in southern Brazil, of which 12,220 (99.3%) were in Paraná,* occurring in the majority of the municipalities, especially those in the northern and western parts of the state.

The results from investigations carried out in Paraná^{3,4} have shown that *Pintomyia fischeri*, *Nyssomyia intermedia*, *Migonemyia migonei*, *Pintomyia pessoai* and *Nyssomyia whitmani* are the sandfly (phlebotomine) species most frequently found, among which *N. whitmani* and *N. intermedia* s.l. are prominent. Thus, there is predominance of one or both of these two species, according to the characteristics of the environments and the methods used in the investigations.

Among the five most abundant species of sandflies observed in Paraná, four have been shown to present natural infection by protozoa of the genus *Leishmania* in other regions of Brazil. Thus, infection of *N. intermedia* and *M. migonei* has given evidence of the vector potential of these diptera. Recently, infection of *N. whitmani* by *Leishmania (Viannia) braziliensis* has been proven in Paraná.²

Investigations on the participation of domestic animals and phlebotomine fauna in the epidemiology of ATL ought to form part of the routine for health services, especially in the areas where the disease is endemic. Thus, the objectives of the present work were to collect and identify sandflies from areas that are foci for ATL, and from this to gain preliminary knowledge about this fauna, and its frequency within homes, areas surrounding homes and forest environments.

METHODS

The collecting of sandflies was done in municipalities within the central northern mesoregion (Colorado, Lobato, Mandaguaçu, Mandaguari, Marialva, Maringá, Munhoz de Melo, Nova Esperança and Santa Fé) and central western mesoregion (Fênix) of Paraná, located between 51°30'W and 52°30'W and between 22°30'S and 24°S.

Rural locations within these municipalities were se-

lected for capturing sandfly specimens. These were localities where several cases of ATL had been recorded, thus constituting foci of the disease.

The sandflies were captured within the following ecotopes: banana plantations, sheds for rearing silkworms, dog kennels, cattle, goat and sheep shelters, henhouses, garages, forests, pigpens, orchards and homes. Falcão traps were set up for one or two nights per locality, between 8:00 p.m. and 12:00 midnight, on a variety of dates between July 1999 and September 2002 (Table). The number of traps per locality varied according to which of the above ecotopes existed, and their quantities. For this reason, at a single locality, it was possible to have more than one trap set up within the same ecotope. For example, at the farm Fazenda Água Azul, in the municipality of Fênix (Table), the captures were carried out on 23 separate nights: eight nights between July 1999 and November 2000, from 11:00 p.m. to 1:00 a.m. (total of 24 hours), and 15 nights between January and June 2000, from 9:00 p.m. to 1.00 a.m. (total of 60 hours). The phlebotomine species were identified in the laboratories of the Núcleo de Entomologia da 15.^a Regional de Saúde de Maringá (Entomology Center of the 15th Regional Health District of Paraná, in the city of Maringá) and in the Parasitologia Básica da Universidade Estadual de Maringá (Basic Parasitology Laboratory of the Universidade Estadual de Maringá).

The nomenclature for the species follows Galati.¹

RESULTS

The phlebotomine species collected were *Brumptomyia brumpti*, *Expapillata firmatoi*, *Evandromyia cortelezii*, *Migonemyia migonei*, *Pintomyia fischeri*, *Pintomyia pessoai*, *Nyssomyia neivai*, *Nyssomyia whitmani*, *Psathyromyia shannoni* and *Pintomyia monticola* (Table).

N. whitmani, *N. neivai*, *M. migonei* and *P. fischeri* together represented 98.5% of the sandflies captured. The greatest mean number of sandflies collected per hour (MH) was in the municipality of Mandaguari, at the smallholding Sítio Flor de Maio (MH=764.3). In the municipalities of Marialva (Sítio Leonarda Galdione) and Colorado (Sítio Paraná), the MH was 672.5 and 402.8 specimens collected, respectively. *N. whitmani* and *N. neivai* were the species most frequently found, representing 62.9% and 20.1%, respectively, of the sandflies captured. In the municipality of Colorado, at the locality Água do Cedro, there was predominance of *N. whitmani* in one col-

*Ministério da Saúde. Secretaria da Vigilância Sanitária. Leishmaniose tegumentar americana: distribuição de casos confirmados, por unidade federada, Brasil, 1980-2003. Available at URL: http://dtr2001.saude.gov.br/svs/epi/situacao_doencas/lt.a.pdf [2005, Aug 4].

Table - Sandflies collected from municipalities in the north of Paraná State, Brazil, from July 1999 to September 2002.

| Municipality/Locality | Species | | | | | | | | | | | Total | MH | Collection date (d/m/y) |
|------------------------------------|---------|-------|-------|-----|-----|-----|-----|-----|----|-----|--------|-------|------------------|----------------------------|
| | Nw | Nn | Mm | Pf | Pp | Pmo | Ef | Ps | Ec | Bb | | | | |
| Colorado/Café Colorado | 4 | - | - | - | - | - | - | - | - | - | - | 4 | 1.0 | 7/5/01 |
| Colorado/Água do Cedro | 236 | 183 | 26 | 3 | 13 | - | - | - | - | - | 8 | 469 | 117.3 | 5/6/01; 11/4/02 |
| Colorado/Sítio Paraná | 632 | 545 | 393 | 41 | - | - | - | - | - | - | - | 1,611 | 402.8 | 24/4/03 |
| Colorado/Sítio São Pedro | - | 56 | - | - | - | - | - | - | - | - | - | 56 | 14.0 | 24/4/03 |
| Fênix/Fazenda Água Azul | 1,599 | 1 | 52 | 18 | 2 | 3 | 3 | - | - | 9 | 1,687 | 18.1 | 7/99 to 11/00* | |
| Lobato /Fazenda Remanso | 198 | 269 | 5 | 4 | 3 | - | - | - | - | 8 | 487 | 121.8 | 3/4/01 | |
| Mandaguaçu/Granja Suin | 42 | 121 | - | - | - | - | - | - | - | - | 163 | 40.8 | 25/10/01 | |
| Mandaguaçu /Sítio Alto Alegre | 100 | 26 | 3 | - | 2 | 6 | - | 1 | - | 3 | 141 | 35.3 | 16/10/01 | |
| Mandaguaçu/Sítio Matãozinho | 20 | 106 | 2 | 1 | - | - | - | - | - | - | 129 | 32.3 | 23/9/03 | |
| Mandaguari/Sítio São José | 58 | 21 | 3 | 2 | 1 | - | 2 | - | - | - | 87 | 21.3 | 16/8/01; 9/4/02 | |
| Mandaguari/Sítio Lombo da Égua | 52 | 162 | 2 | 6 | 5 | - | - | - | - | 5 | 232 | 58.0 | 2/5/02; 6/6/02 | |
| Mandaguari/Sítio São João | 94 | 3 | - | 11 | - | - | - | - | - | - | 108 | 27.0 | 20/3/03 | |
| Mandaguari/Sítio Flor de Maio | 2,739 | 31 | 66 | 220 | - | - | - | 1 | - | - | 3,057 | 764.3 | 7/4/03 | |
| Marialva/Sítio Miyamoto | 1,173 | 12 | 477 | 79 | 7 | 9 | 6 | 9 | - | 4 | 1,776 | 443.6 | 28/9/00; 16/4/02 | |
| Marialva/Sítio Leonarda Galdione | 2,397 | 43 | 277 | 368 | 2 | 7 | - | 13 | - | - | 3,107 | 776.7 | 28/9/00; 16/4/02 | |
| Marialva/Sítio dos Crentes | 8 | 179 | 8 | 14 | - | - | - | - | - | - | 209 | 52.3 | 23/7/03 | |
| Marialva/Sítio Santo Antonio | 154 | 3 | 6 | 13 | - | - | 1 | - | - | - | 177 | 44.3 | 21/8/03 | |
| Maringá/Cemitério Parque | 16 | 7 | - | 1 | - | - | - | - | - | - | 24 | 6.0 | 23/8/01 | |
| Maringá/Fazenda Araribóia | 210 | 1 | 64 | 32 | 24 | 3 | 4 | 8 | - | - | 346 | 86.5 | 20/6/02 | |
| Maringá/Sítios Reunidos | 254 | 23 | 21 | - | 1 | 2 | 1 | - | - | - | 302 | 75.5 | 6/8/02 | |
| Maringá/ Conjunto Thais | 9 | 88 | - | - | - | - | - | - | - | - | 97 | 24.3 | 12/12/02 | |
| Maringá/Conjunto Parigot de Souza | 2 | 1 | - | - | - | - | 24 | - | - | - | 27 | 6.8 | 8/8/02 | |
| Maringá/Estância Zauna | 8 | - | 3 | 3 | - | - | - | - | - | - | 14 | 3.5 | 9/1/03 | |
| Munhoz de Melo/Fazenda Felicíssima | 10 | 17 | 15 | 4 | - | - | 4 | - | - | - | 50 | 12.5 | 11/9/02 | |
| Munhoz de Melo/Sítio do Jaime | 87 | 177 | 1 | - | 3 | - | - | - | 1 | - | 269 | 67.3 | 5/12/02 | |
| Nova Esperança/Chácara São Pedro | 2 | 195 | - | 1 | - | - | - | - | - | - | 198 | 49.5 | 30/9/02 | |
| Nova Esperança/Sítio Buenos Aires | 94 | 102 | 5 | 1 | - | - | - | - | - | - | 202 | 50.5 | 1/10/02 | |
| Nova Esperança/Faz. Sto. Antonio | 59 | 66 | 3 | - | 1 | - | - | - | - | - | 129 | 32.3 | 14/10/02 | |
| Santa Fé/Café Acácia | 263 | 416 | 8 | 1 | 16 | - | - | - | - | - | 704 | 176.0 | 4/12/01; 11/6/01 | |
| Total | 10,520 | 2,853 | 1,440 | 823 | 80 | 31 | 45 | 32 | 1 | 37 | 15,862 | | | |
| % | 66.3 | 18.0 | 9.1 | 5.2 | 0.5 | 0.2 | 0.3 | 0.2 | - | 0.2 | - | | | |

*The collections were done on 23 separate nights between July 1999 and November 2000.

Bb: *Brumptomyia brumpti*; Ec: *Evandromyia cortelezzi*; Ef: *Expapillata firmato*; Mm: *Migonemyia migonei*; Nw: *Nyssomyia whitmani*; Nn: *Nyssomyia neivai*; Pf: *Pintomyia fischeri*; Pp: *Pintomyia pessoai*; Ps: *Psathyromyia shannoni*; Pmo: *Pintomyia monticola*.

MH: mean number of sandflies per hour.

lection and *N. neivai* in another. The same occurred in the municipality of Mandaguaçu, but in different localities. In this municipality, *N. whitmani* predominated at the smallholdings São José, São João and Flor de Maio, while at the smallholding Lombo da Égua, *N. neivai* was predominant. In the municipality of Marialva, *N. whitmani* predominated in all localities. The same was found in the municipality of Maringá, except in the Conjunto Thais district (on the urban outskirts), where *N. neivai* was predominant. In various localities in the municipalities of Munhoz de Melo, Nova Esperança and Santa Fé, there was predominance of *N. neivai*. In Mandaguari (Sítio Flor de Maio) and on one night in Marialva (Sítio Leonarda Galdione), the second commonest species was *P. fischeri*. In Maringá (Fazenda Araribóia), *N. whitmani* was predominant, followed by *M. migonei*.

In the municipalities of Colorado, Mandaguaçu (Sítio Alto Alegre), Maringá (Fazenda Araribóia) and Nova Esperança (Chácara São Pedro) there was greatest concentration of sandflies in the forest. In the municipalities of Mandaguari (São João and Flor de Maio smallholdings), Maringá (Reunidos smallholdings) and Santa Fé (Café Acácia), there was greatest concentration of sandflies in the pigpens. In the municipalities of Lobato (Fazenda Remanso), Marialva

(Sítio Miyamoto), Munhoz de Melo (Sítio do Jaime) and Nova Esperança (Fazenda Santo Antonio), the sandflies were concentrated more in homes. In Marialva (Sítio Leonarda Galdione), there was greater capture of sandflies in the pigpen on one night and in the home on another night.

DISCUSSION

In all the rural localities studied, several cases of ATL involving women, children and dogs had been recorded, which gives rise to the hypothesis that infection was occurring in the home and in the area surrounding the home. Moreover, the environmental characteristics may have favored infection by *Leishmania*, since it is very common in such localities for the home and its outhouses (henhouses, pigsties, barns and others) to be close to remnant forests, where enzootic foci of *Leishmania* may still persist.

The sandflies were captured in greatest numbers in homes, forests and pigpens. The fact that these ecotopes are the commonest ones in the localities investigated may have contributed towards these results. At the farm Fazenda Remanso (municipality of Lobato) and in the Conjunto Thais district of Maringá, where the majority of the sandflies were captured in

homes, there were no domestic animals during the collection period. At the smallholdings Miyamoto and Leonarda Galdione (municipality of Mandaguari), the homes are very close to pigpens, within an environmental context of great neglect with regard to the cleanliness of the yards and shelters for the domestic animals. This is perhaps why a large number of sandflies was captured inside these homes. In previous investigations in northern Paraná, it was seen that the greatest numbers of sandflies were collected from shelters for domestic animals, in a neglected environment around the home, where the soil was damp, rich in organic matter and shaded.^{3,4} Large numbers of specimens were also captured inside homes, when these were located close to the shelters for domestic animals.

The species *N. neivai* was predominant in Lobato, Mandaguaçu, Munhoz de Melo, Nova Esperança and Santa Fé. *N. whitmani* was predominant in the remaining municipalities. However, the latter species was present in much larger numbers than the former. This predominance leads to the belief that *N. neivai* occurs more frequently in areas with well-drained, sandier soils derived from the Caiuá sandstone. On the other hand, *N. whitmani* occurs more frequently

in areas of red and red-yellow latosol or nitosol, which retain more moisture. The prevalence of *N. whitmani* in some places and *N. neivai* in others, and the high frequency of sandflies in shelters for domestic animals and in nearby homes, are facts that have already been observed in northern Paraná.^{4,5}

The presence or absence of domestic animals in the areas surrounding the home and the distance of the animal shelters from the home may be a determining factor for the quantity of sandflies in the home. The frequency and density of sandflies in and around homes in northern Paraná depends on the presence of forest and its distance from the domestic environments.

In conclusion, ten phlebotomine species have so far been recorded at ATL foci; there is alternation between the predominance of *N. whitmani* and *N. neivai*; and there is high frequency of these insects in the home environment, shelters for domestic animals, especially pigpens, and the forest remnants at these localities.

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