



First Report of *Lutzomyia edwardsi* and *Lutzomyia gasparviannai* Infected by Nematodes in a Rio de Janeiro Cave

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Abstract

In 1984, a case of a wild rodent (*Proechimys iheringi*) infected with *Leishmania (Leishmania) forattinii* was reported. *Lutzomyia gasparviannai* is considered the vector of this etiological agent. In 2001, infection of the species *Lutzomyia edwardsi* by *Leishmania (Viannia) braziliensis* was described, suggesting the involvement of *L. edwardsi* in the transmission cycle of cutaneous leishmaniasis. In 2002, in the Lapinha cave, Belo Horizonte, Minas Gerais, Brazil, specimens of *Lutzomyia longipalpis* infected by nematodes were captured, providing motivation for studies on the biological control of phlebotominae. Thus, the aim of this study was to collect data from phlebotominae species in Sumidouro, Rio de Janeiro, Brazil. Specimens were captured in a cave and the surrounding Atlantic Forest using Center of Disease Control traps, twice a month, overnight from 18h to 6h. The collection periods were from June 2009 to May 2010 and from March 2015 to February 2016. The phlebotominae were mounted on slides and covered with coverslips at the Oswaldo Cruz Institute. A female *L. edwardsi* specimen infected with nematodes, captured in 2009, and a female *Lutzomyia gasparviannai* specimen infected with *Wuchereria bancrofti*, captured in 2015, were among the collected specimens. Phlebotominae and nematodes were identified by morphological analysis, using an optical microscope. The nematode species *W. bancrofti* was identified by the curator of the Helminth Collection of the Oswaldo Cruz Institute, where it was deposited along with the *L. gasparviannai* specimen. Exemplars of *L. gasparviannai* were deposited in the Entomological Collection of the Oswaldo Cruz Institute. The slide containing *L. edwardsi* and the nematodes was deposited in the Entomological Biodiversity Laboratory. This is the first report of *W. bancrofti* nematodes in these species, in a cave, and in the state of Rio de Janeiro. Thirteen species of phlebotominae were collected. *L. gasparviannai* was the most frequent, followed by *L. edwardsi*. The predominance of these two species, considered vectors of the etiological agents of leishmaniasis, and their nematode infections suggest that studies on the biological control of nematodes should be conducted and that cases of filariasis in this region should be assessed.

Keywords: Cave; Phlebotominae; Nematodes; Sumidouro

Introduction

In 1984, a wild rodent (*Proechimys iheringi*) infected with *Leishmania (Leishmania) forattinii* was reported in Viana, Espírito Santo, Brazil, an area endemic for leishmaniasis. *Lutzomyia gasparviannai* is considered the vector of this etiological agent [1]. *L. gasparviannai* Martins, Godoy & Silva, 1962 was captured for the first time outside the municipality of Nova Iguaçu, the type locality (Rio de Janeiro, Brazil) which is 113 km away from the locality studied [2-7]. In 2001, the species *Lutzomyia edwardsi* was reported to be infected by *Leishmania (Viannia) braziliensis*, indicating the involvement of *L. edwardsi* in the transmission cycle of cutaneous leishmaniasis [3]. A year later, in the Lapinha cave, near Belo Horizonte, Minas Gerais, Brazil, specimens of *Lutzomyia longipalpis* infected by nematodes were captured, inspiring studies on the biological control of phlebotominae [4]. Accordingly, the objective of this study was to collect data from phlebotominae species inhabiting Sumidouro, Rio de Janeiro, Brazil (Figure 1).

Material and Methods

Specimens were captured in a cave and the surrounding Atlantic Forest overnight between 18h and 6h, using Center of Disease Control traps. The captures were conducted twice per month, from June 2009 to May 2010 and from March 2015 to February 2016. The phlebotominae were mounted on slides and covered with coverslips at the Oswaldo Cruz Institute. Phlebotominae and nematodes were identified via morphological analysis, using an optical microscope [5,6].

Results and Discussion

A total of 4,079 phlebotominae were collected, comprising 13 species: 2 of the genus *Brumptomyia*, *B. brumpti* (Larrouse, 1920) and *B. guimaraesi* (Coutinho & Barreto, 1941^a), and 11 of the genus *Lutzomyia*, *L. gasparviannai* (Martins, Godoy & Silva, 1962b), *L. edwardsi* (Mangabeira, 1946), *L. tupyambai* (Mangabeira, 1942b), *L. hirsuta* (Mangabeira, 1942b), *L. whitmani* (Antunes & Coutinho, 1939), *L. migonei* (França, 1920), *L. intermedia* (Lutz & Neiva, 1912), *L. davisii* (Root, 1934), *L. cortezezzii* (Brethés, 1923), *L. microps* (Mangabeira, 1942^a), and *L. quinquefer* (Dyar, 1929).

Lutzomyia gasparviannai was the most common species, comprising 55.8% of the total, followed by *L. edwardsi*, at 20.47% [7]. A female *L. edwardsi* specimen infected by nematodes and a female *L. gasparviannai* specimen infected by *Wuchereria bancrofti*, captured in 2009 and 2015, respectively, were recorded (Figures 2 & 3). The nematode species *W. bancrofti* was identified by the curator of the Helminth Collection of the Oswaldo Cruz Institute, where it was deposited along with the *L. gasparviannai* specimen (Figure 5). *L. gasparviannai* specimens from the same collection were deposited in the Entomological Collection of the Oswaldo Cruz Institute (Figure 4). The slide containing *L. edwardsi* and the nematodes was deposited in the Entomological Biodiversity Laboratory. This is the first time that these nematodes have been reported in these species, in a cave, and in the state of Rio de Janeiro [6].



Figure 1: Geographical location of the municipality of Sumidouro, latitude 22°02'59" south and longitude 42°40'29" west, in the mountainous region of the state of Rio de Janeiro, RJ, Brazil.

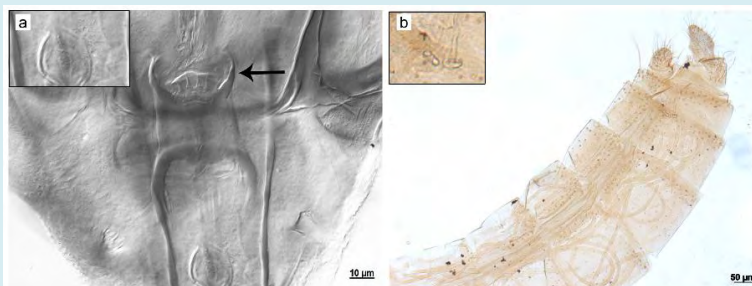


Figure 2: a: Cibarium of a female *L. edwardsi* specimen, showing a nematode in detail. b: Abdomen with nematodes, spermatheca of *L. edwardsi*.

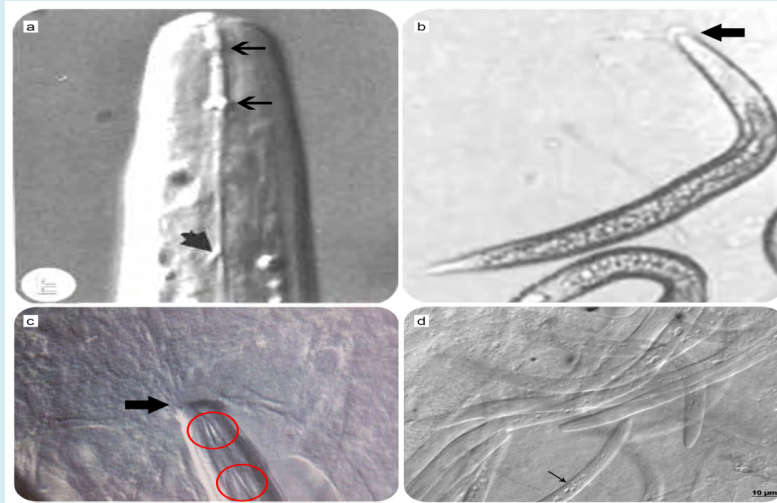


Figure 3: **a** and **b:** *Anandranema phlebotophaga*, described by Poinar et al, 1993. **c** and **d:** the species collected in this work. The red circle and thick black arrow indicate the stylet (a and c); arrows (b and c) indicate the cuticles. The thin black arrows indicate the subventral opening of the gonads (a).

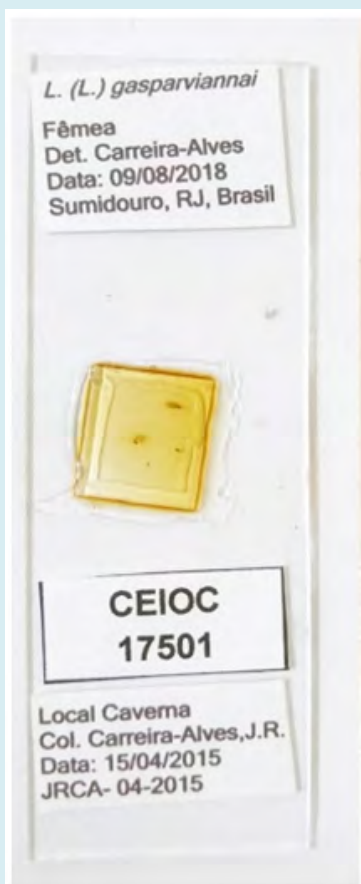


Figure 4: Slide containing *L. (L.) gasparviannai*, deposited in the Entomological Collection of the Oswaldo Cruz Institute (*Coleção Entomológica do Instituto Oswaldo Cruz; CEIOC*).



Figure 5: Slide containing *L. gasparviannai* infected with *Wuchereria bancrofti*, deposited in the Helminth Collection of the Oswaldo Cruz Institute (*Coleção Helminológica do Instituto Oswaldo Cruz; CHIOC*).

Conclusion

The predominance of *L. gasparviannai* and *L. edwardsi*, considered vectors of etiological agents of leishmaniasis, and their infection by nematodes suggest that further studies on

the control of biological vectors with nematodes should be conducted and that cases of filariasis in this location should be assessed.

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