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DEVELOPMENT OF COLOMBIAN ISOLATES OF *LEISHMANIA (VIANNIA) PANAMENSIS, LE. (V.) GUYANENSIS* AND *LE. (V.) BRAZILIENSIS* IN THE SANDFLY *LUTZOMYIA INTERMEDIA* (LUTZ & NEIVA, 1912) UNDER EXPERIMENTAL CONDITIONS

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The development of Colombian Leishmania *species of the subgenus* Viannia *in* Lutzomyia intermedia *was similar to that observed with Brazilian* Le. (V.) braziliensis: *colonization of the pylorus by paramastigotes; promastigotes in the midgut and massive infection of stomodeal valve. Difference was observed in the number of paramastigotes colonizing the pylorus, which was smaller in Colombian* Leishmania *species than Brazilian* Le. braziliensis.

Key words: *Lutzomyia intermedia* – *Leishmania* subgenus *Viannia* – susceptibility

Entomological observations regarding the epidemiology of leishmaniasis suggest that some degree of invertebrate host-parasite specificity may exist (Killick-Kendrick, 1979; Walters et al., 1989; Saf'janova, 1991). In nature, one or more sandfly species can be found infected with the same *Leishmania* species, implying that host-parasite associations are not as strict as originally postulated. Although threre is no consensus with respect to the essential traits of vector competence, it is clear that the presence of promastigotes in the digestive tract of the sandly is not a definite characteristic for considering a vector as such. Migration and colonization of the foregut by promastigotes after complete digestion of blood would be essential events compatible with vector capacity.

Epidemiological and experimental evidence has suggested that *Lutzomyia intermedia* is the principal vector of *Leishmania (Viannia) braziliensis* in southeast Brazil (Aragão, 1922; Guimarães, 1955; Araujo Filho, 1979; Rangel et al., 1984, 1986, 1990, 1992). The present work evaluated the vector competence of this Brazilian sandfly species when exposed to *Leishmania (Viannia)* spp. from unrelated transmission foci of Colombian origin.

MATERIALS AND METHODS

Experimental infection – Batches of 100 day-old females of *L. intermedia* from our colony in Rio de Janeiro State were infected by feeding on hamster's skin lesions of 1-2 months of evolution, and were subsequently maintained at 25 oC, according to the technique described by Rangel et al. (1985). For *Le. (V.) braziliensis* and *Le. (V.) panamensis* were used two batches of females, and for *Le. (V.) guyanensis* were used three. As a control, were used two batches of females of *L. intermedia* infected by *Leishmania (V.) braziliensis* from Rio de Janeiro State, Brazil.

Leishmania strains – All three strains of *Leishmania* were isolated from patients inhabiting endemic foci of Colombia: *Leishmania (V.) panamensis* (HOM/COL/81/13); *Leishmania (V.) guyanensis* (HOM/COL/84/1096); and *Leishmania (V.) braziliensis* (HOM/COL/86/1257).

Examination of sandflies – Specimens were dissected between the 4th and 7th day following the infective blood meal, and the complete digestive tract was examined under a phase contrast microscope. Evaluation was based on the percentage of infected specimens, and the presence of promastigotes at different sites of the alimentary canal.

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The authors used the abbreviations *Le.* for *Leishmania* and *L.* for *Lutzomyia*.

TABLE

Percentage of infection and densities of parasites in *Lutzomyia intermedia* females at 5-6 days pos-infection with Colombia *Leishmania* species

Species	No. exposed	No. dissected	No. infected by batche	% infected (total)	Density of infection PY	MG	SV
L. (V.) braziliensis	200	172	30/32	30.2	+	++	+++
L. (V.) guyanensis	300	264	53/57/62	46.2	+	+++	+++
L. (V.) panamensis	200	181	21/25	25.4	+	++	++

PY = pylorus; MG = midgut; SV = stomodeal valve.
Density of parasites = light (+); medium (++); heavy (+++).

RESULTS

The proportion of females infected after feeding on hamsters lesions varied according to the *Leishmania* species to which they were exposed. The infection rates observed in different batches of *L. intermedia* suggested that this species is more susceptible to *Le. guyanensis* than to the other *Leishmania* species from Colombia (Table). Nevertheless, dissections performed between the 5th and 6th day post-infection showed that insects infected with all three species of *Leishmania* harbored promastigotes in the foregut. Infections were characterized by the presence of promastigotes and paramastigotes attached to the pylorus, and large numbers of promastigotes in the midgut and colonizing of the stomodeal valve. No parasites were observed in the ileum, with the exception of specimens infected with *Le. braziliensis* in which a few paramastigotes could be detected.

DISCUSSION

Recently, Rangel et al. (1992) described the development of *Le. (V.) braziliensis* in *L. intermedia,* recording colonization of the hindgut, migration of flagellates towards the foregut, and massive infection of the cardia subsequent to blood meal digestion. This together with previous epidemiological data, was considered the main criterium incriminating *L. intermedia* as vector of *Le. braziliensis* in Rio de Janeiro State, Brazil.

According to Killick-Kendrick (1979), anterior migration of promastigotes towards the thoracic midgut, subsequent to colonization of the pylorus and ileum is characteristic of the subgenus *Viannia.*

In other experimental infections involving *Le. panamensis* and *Le. braziliensis, L. trapidoi* and *L. gomezi,* the principal anthropophilic sand flies of the Colombian Pacific coast (Travi et al., 1988), the same pattern of development has shown to occur, one of several traits indicative of natural host-parasite associations.

The infection of *L. intermedia* with three Colombian *Leishmania* species was similar to that observed with Brazilian *Le. braziliensis,* i.e., colonization of the pylorus by paramastigotes, and massive infection of the stomodeal valve. The only noticeable difference was the smaller number of parasites colonizing the pylorus of all three Colombian *Leishmania* spp. as compared with *Le. braziliensis* from Brazil. The paramastigotes are found in life cycle of *Leishmania* of the *braziliensis* complex only, and we think that the commented behaviour could be considered as result of an abnormal *Leishmania* sandfly vector interaction.

The results obtained in *L. intermedia,* with geographically unrelated leishmaniae, implying that other factors essential for vector competence, such as geographical distribution, biting behavior, sandfly-man interaction, etc., must be considered. Susceptibility of *L. intermedia* to other *Leishmania (V.)* spp. is not surprising since epidemiological information has shown that in the New World several vectors could share the same species of *Leishmania* in different endemic areas (Young & Arias, 1991). Experimental infections, when carried out under special conditions that offer an unusually large number of parasites to sandflies, have shown that phlebotomine species which are not related with transmission foci can support development of *Leishmania (Viannia)* spp., with patterns of development similar to natural vectors (Warburg et al., 1991). For this reason, we believe that rapid assessment of vector competence, with the aim of targeting control programs, cannot rely solely on ex-

perimental infections. Laboratory data should be complemented by field work, involving biological and ecological studies of the putative vectors.

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