

## Sandfly *Lutzomyia longipalpis* in a Cutaneous Leishmaniasis Focus in Central Colombia

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*Lutzomyia longipalpis*, 15 other species of the genus *Lutzomyia*, and one species of *Brumptomyia* were collected in an endemic focus of cutaneous leishmaniasis in a river canyon 450 m above sea-level, in Rio Claro, Antioquia, Colombia. The presence of *Lu. longipalpis* is associated with the destruction of the primary forest and the development of new farmland and rural settlement in this region. The composition of species identified a different habitat for *Lu. longipalpis* in Colombia. *Lu. yuilli* and *Lu. longipalpis* were predominant (68.26%) followed by *Lu. trapidoi*, *Lu. hartmani*, *Lu. triramula*, *Lu. panamensis*, *Lu. gomezi*.

Key words: *Lutzomyia longipalpis* - sand fly - ecology - leishmaniasis - Colombia

*Lutzomyia longipalpis* (Lutz & Neiva) is the main vector of *Leishmania (L.) chagasi*, the aetiologic agent of American visceral leishmaniasis (Ward 1985, Shaw & Lainson 1987, Momen et al. 1987, Grimaldi et al. 1989, Cupolillo et al. 1994, Tesh 1995). This sand fly has a wide geographical distribution in the New World, occurring in tropical areas from Mexico to Argentina (Ward 1985, Young & Duncan 1994). It has been found in a variety of habitats, from arid areas with rock and xerophytic vegetation to moist, lush forest in the Amazon River Basin (Zeledon et al. 1974, Lainson et al. 1990). A common feature of this sand fly is its propensity to move into the peridomestic environment, particularly in rural and suburban communities where domestic animals and their shelters are present (Lainson 1989).

Recent reports from foci of American cutaneous leishmaniasis in a mountainous region of the State of Ceará, Brazil (Queiroz et al. 1991) and in a periurban site near Rio de Janeiro, Brazil (Rangel et al. 1990) agree with Lainson (1989) and Tesh (1995) that, the neotropics ecologic and demographic changes have led to conditions which now support large populations of the vector *Lu. longipalpis*. As a consequence, visceral leishmaniasis occurs now in many regions where it was not found previously. From a public health

perspective, this is one of the most important emerging parasitic diseases (Tesh 1995).

In Colombia, the geographic distribution of visceral leishmaniasis and *Lu. longipalpis* coincide in the upper and middle Magdalena River Valley, with endemic foci in Huila, Tolima, Cundinamarca and Santander, and has been associated with arid and semi-arid zones, at elevations under 1000 m at sea level, characterized by scarce vegetation and small gallery forests (Corredor et al. 1990). Other sand flies species, *Lu. trinidadensis* (Newstead), *Lu. cayenensis* (Floch & Abonnec), *Lu. atrocavata* (Knob) are common in this habitat (Ferro et al. 1995). Despite its ecological similarities with the foci of the Magdalena River Valley, *Lu. longipalpis* has to date not been collected in the northern focus of Colombia. *Lu. evansi* (Nuñez-Tovar) has been implicated as an alternative vector of visceral leishmaniasis there (Travi et al. 1990) (Fig. 1).

We report here the results of sand fly collections, carried out in an endemic focus of cutaneous leishmaniasis, which contained *Lu. longipalpis*. The composition of species identified habitat differences for *Lu. longipalpis* in Colombia. Moreover, this was an unexpected finding because no cases of visceral leishmaniasis have been reported in this area.

### MATERIALS AND METHODS

*Study area* - All sand fly collections were made between September 4-5, 1991 in La Mulata and El Refugio (5° 53' N, 74° 39' W), in the municipality of San Luis, Departament of Antioquia, Colombia. Both sites are part of the Rio Claro Valley (Fig. 2).

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Fig. 1: map of Colombia showing focus of visceral leishmaniasis (G = Guajira, C = Córdoba, S = Sucre, Cu = Cundinamarca, Sa = Santander, T = Tolima, H = Huila).



Fig. 2: location of Rio Claro region in department of Antioquia, Colombia.

The Rio Claro valley is classified as humid tropical forest (Espinal et al. 1978), although in the last 10 years the region has been modify by the massive destruction of the forest, rapid human population growth, and the concomitant development of new farmland and rural settlements.

La Mulata, at 500 m elevation, is a small rural community with 45 inhabitants. The hills encir-

cling La Mulata are covered by small patches of forest and agricultural crops, including manioc, pineapple and cocoa. The nine houses in the community are constructed with wooden plank walls that provide easy access to bloodsucking insects.

El Refugio Natural Forest Reserve, 440 m elevation, is located on the left bank of the River Claro. It consists of approximately 2 km<sup>2</sup> of primary tropical forest vegetation, and large rocks with calcareous surfaces lie along the valley floor (Pérez 1989). A tourist lodge, “El Refugio”, has been built inside the forest. One family resides at the lodge year-round; animals consist of small coop of chickens.

The precipitation of The Rio Claro Valley from 1987 to 1989 consists of heavy rainfall from August to November, followed by a decrease rainfall from December to March. Another peak in precipitation occurs from April to June followed by short dry season during July. The average rainfall was 4,483 mm/year, ranging from 3,621 mm during 1987 to 5,896 mm in 1989. For the period from 1986 to 1989, the mean temperature and relative humidity were 25.6°C (range 18.9°-34.6°C) and 89% (range 83-95%), respectively (Bernal et al. 1989).

*Collection methods and sites* - Sand flies were collected at night, from September 4-5 1991, using CDC light traps, Shannon traps, one hamster-baited Disney trap and human bait. Representative sites associated with peridomestic and extradomestic habitats were selected for sampling.

*Peridomestic habitats* - In “El Refugio” a CDC trap was placed in the chicken house, at a distance of 5 m from the wooden lodge (Fig. 3, site C1). In La Mulata two CDC traps and two Shannon were placed in locations within 5 m of two houses (Fig. 3, sites C3, C4).

*Extradomestic habitats* - A CDC trap and a Disney trap were placed in the forest near an outcrop of rocks, at distance of 400 m from the wooden lodge (Fig. 3, site C2). The CDC and the Disney traps were placed at a height of 1.0 m and 0.2 m, respectively, and operated between 18:00-06:00 hr. A Shannon trap was used between 18:00-21:00 hr. In peridomestic and extradomestic habitats sand fly collections using human bait were carried out between 18:00-21:00 hr.

Captured sand flies were put in vials containing 70% ethanol. All samples were subsequently transported to the Entomology Section of the Laboratory of Public Health of Medellín for species identification and mounting. Sand flies were identified to species, using characters described by Young (1979). *Lu. longipalpis* males possessed pale tergal abdominal spots on segment III and IV as described by Ward et al. (1983).

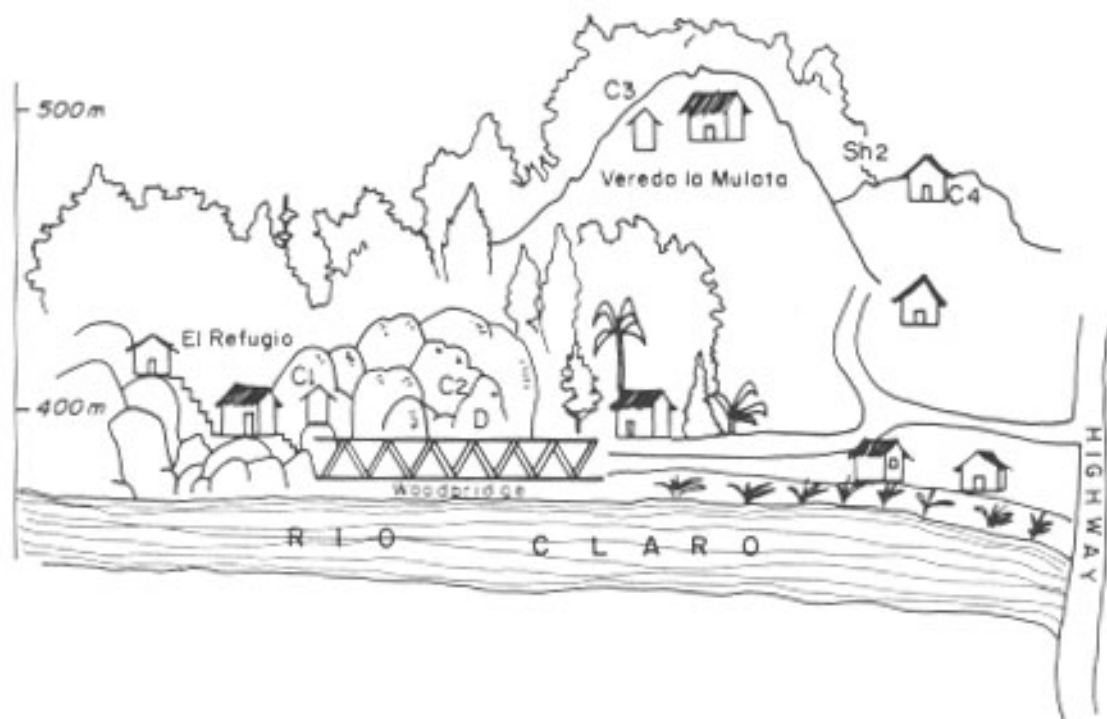


Fig. 3: scheme of trap location in the study. Sites C1, C2, C3 and C4.

TABLE  
Phlebotominae collected according to trapping method, habitat and species in El Refugio and in La Mulata  
September 4-5, 1991

Method of capture	Human bait				CDC Light trap				Shannon trap				Disney trap		Total
	Peri		Extra		Peri		Extra		Peri		Extra		F	M	
Habitat	F	M	F	M	F	M	F	M	F	M	F	M	F	M	
Species															
<i>Lu. longipalpis</i>	-	-	-	-	83	53	3	-	3	-	-	-	-	-	142
<i>Lu. yuilli</i>	1	-	15	-	84	3	2	-	11	1	17	10	-	-	144
<i>Lu. trapidoi</i>	1	-	2	-	14	1	3	-	3	-	7	-	-	-	31
<i>Lu. hartmani</i>	1	-	20	1	-	6	1	-	1	-	1	-	-	-	31
<i>Lu. triramula</i>	-	-	-	-	8	5	8	-	1	-	1	2	-	-	25
<i>Lu. panamensis</i>	-	-	3	-	4	1	3	-	4	1	1	-	-	-	17
<i>Lu. gomezi</i>	2	-	2	-	1	2	-	-	1	-	1	-	-	-	9
<i>Lu. saulensis</i>	-	-	-	-	1	-	4	-	-	-	1	-	-	-	6
<i>Lu. sordelli</i>	-	-	-	-	2	-	-	-	-	-	1	-	-	-	3
<i>Lu. trinidadensis</i>	-	-	-	-	1	-	1	-	1	-	-	-	-	-	3
<i>Lu. ovallesi</i>	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1
<i>Lu. carpenteri</i>	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1
<i>Lu. vespertilionis</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1
<i>Lu. caprina</i>	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1
Subg. <i>Psathyromyia</i>	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1
Subg. <i>Pressatia</i>	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1
<i>B. galindoi</i>	-	-	-	-	-	-	1	1	-	-	-	-	-	-	2
Total	5	-	42	1	199	72	28	1	25	2	31	12	-	1	419

*Lu.*: *Lutzomyia*; Peri: peridomestic; Extra: not associated with houses (forest); F: female; M: male.

## RESULTS

A total of 419 sand flies were collected in this survey, including 16 species of the genus *Lutzomyia* and 1 species of the genus *Brumptomyia*. *Lu. longipalpis* (33.89%) and *Lu. yuilli* (Young & Porter) (34.37%) were the most abundant species (Table). More females than males were captured for *Lu. longipalpis*, *Lu. yuilli*, *Lu. trapidoi* (Fairchild & Hertig) and *Lu. hartmanni* (Fairchild & Hertig). *Lu. longipalpis* males were the most abundant.

*Peridomestic habitat* - Fourteen *Lutzomyia* species were collected. CDC light traps yielded mainly *Lu. longipalpis* and *Lu. yuilli*, while the Shannon trap yielded mainly *Lu. yuilli* (Table).

*Extradomestic habitat* - The CDC light trap and the Shannon trap yielded more species than other methods. *Lu. yuilli* was the most abundant in the Shannon trap and *Lu. panamensis* (Shannon) from the CDC light trap. *Lu. yuilli* and *Lu. trapidoi* were the two most abundant species collected with human bait. The Disney trap caught no sand flies (Table).

## DISCUSSION

The ecological and demographical changes in Latin America have enhanced conditions for the successful colonization of *Lu. longipalpis* in regions where it had not been reported previously (Lainson 1989, Tesh 1995). Mark-recapture studies of *Lu. longipalpis* shown it capable of moving 800-1000 m distances over short period of time. Also, they seem to move readily among cattle corrals at intermediate distances, suggesting that they are searching for food, mates or resting sites (Morrison et al. 1993). If available food determines the flight range of sandflies, as postulated by Alexander (1987), rural settlements along middle Magdalena Valley will move *Lu. longipalpis* into the peridomestic environment. It is probable that this sand fly at present has a continuous distribution through the upper and middle Magdalena Valley but collections have only been carried out where cases of visceral leishmaniasis have been reported.

It has been suggested that *Lu. longipalpis* populations represent a species complex (Ward et al. 1983, Lanzaro et al. 1993). Its members have been found in a variety of habitats (Lainson et al. 1990). The presence of this sand fly in Rio Claro may be due however to its invasion of the forest in association with man and his domestic animals rather than the existence of a native *Lu. longipalpis* population in forest environment.

Visceral leishmaniasis has not till now been reported in La Mulata and El Refugio, but from

the standpoint of public health, the presence of its vector suggests a transmission risk of this disease within all the upper and middle Magdalena Valley, from Huila to canyon river in Rio Claro, Antioquia.

The trapping efficiency of CDC and Shannon traps is of practical importance in short term studies such as the present one for sampling of sand fly species, as is human bait for the anthropophilic species (Table). In this study, human bait collection in peridomestic and extradomestic habitats were negative for *Lu. longipalpis*, although *Lu. hartmanni*, *Lu. trapidoi* and *Lu. yuilli* were caught relatively abundantly in the extradomestic habitat. *Lu. hartmanni* and *Lu. trapidoi* have been incriminated as vectors of *L. panamensis* and *L. colombiensis* respectively in Colombia (Young et al. 1987, Kreutzer et al. 1991). A few specimens of *Lu. panamensis* and *Lu. gomezi* (Nitzulescu) were also captured in this study. Both species are suspected as vectors of *L. panamensis*.

Further studies on the biochemical systematics and genetics try and genetics of *Lu. longipalpis* populations are needed to establish the boundaries of species differences within this complex, as well as its relationship to other associated *Lutzomyia* species in the environment of the Magdalena Valley.

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