Domiciliation Trend of *Panstrongylus rufotuberculatus* in Colombia

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The present paper presents evidence of the domiciliation of Panstrongylus rufotuberculatus *in La Gardenia, Colombia through the collection of 2 unhatched eggs, 81 nymphs and 10 adults (4 males and 6 females), from 2 rural houses. The transmission risk indicators of* Trypanosoma cruzi *by* P. rufotuberculatus *in La Gardenia, were: domiciliary infestation 7.5%, density 2.35, colonization 66.6%, overcrowding 31.33, natural infection 4.6%, and relative infection 2.5%.*

These results and findings in Peru and Argentina, show that P. rufotuberculatus *has a potential success in domiciliation and could some day become an alternate vector of American trypanosomiasis.*

Key words: Triatominae - domiciliation - *Panstrongylus rufotuberculatus* - Colombia

Panstrongylus rufotuberculatus (Hemiptera, Reduviidae, Triatominae) has a wide distribution in Mexico, Costa Rica, Panama, Colombia, Venezuela, Ecuador, Peru, Bolivia, Brazil and Argentina (Lent & Jurberg 1969, Lent & Wygodzinsky 1979, Schofield 1994, Salomon et al. 1999).

Though frequently attracted to human dwellings by electric light (Lent & Wygodzinsky 1979, Salomon et al. 1999), *P. rufotuberculatus* has been found in refuges of sylvatic animals, such as kinkajous (*Potos flavus*), vampire bats (*Desmodus rotundus*), armadillos and opossums (Lent & Wygodzinsky 1979, D' Alessandro et al. 1981, Miles et al. 1981), being frequently found naturally infected with *Trypanosoma cruzi* (Lent & Pifano 1940, Lent & Wygodzinsky 1979, Dujardin et al. 1998). Domestic colonies of *P. geniculatus* have also been reported from Peru (Calderón et al. 1985) and Bolivia (Dujardin et al. 1998).

Of the 23 species of Triatominae found in Colombia (Molina et al. 2000), *P. rufotuberculatus* has been reported in Antioquia (Moreno 1991), Boyacá (Pinto et al. 1999), Cauca (D' Alessandro et al. 1981, Barreto et al. 1988), Cundinamarca (Molina et al. 2000), Meta (Marinkelle 1972), Santander (Angulo et al. 1999) and, between 650 and 1100 m above sea level, in Valle del Cauca, humid tropical forest of the Pacific (D' Alessandro et al. 1981, Barreto & Barreto 1984, Barreto et al. 1988).

In order to study the ecoepidemiology of Chagas disease in the northeast of Antioquia, Colombia, we determined the domiciliation and situation of potential vectors of *T. cruzi* in a rural coffee growing area considered not endemic. The constant complaints of the rural inhabitants bitten by an unknown insect was the principal motivation of this research.

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MATERIALS AND METHODS

Area of study - The study was carried out in the locality of La Gardenia, 1,500 m asl, located in the municipality of Amalfi, northeast of the Department of Antioquia, Colombia (Lat N 6º55'58'' and Long W 75º05'30''). The region is considered a transition zone between the tropical rain forest and the pre-montane humid forest. It has an average temperature of 18 to 24ºC and annual rains ranging from 1,000 to 2,000 mm (Espinal 1985) (Fig. 1). The locality of La Gardenia lacks electric light and consists of 40 dwellings situated in a forest environment where the main activities are agriculture and hunting.

Sampling - The sampling of insects was performed in 40 houses, in order to determine risk indicators, according to the Indicator Definition Workshop for the *Triatoma infestans* Elimination Certification (OPS 1993). Having this as an aim, the search for triatomines was undertaken in the intra, peri and extra-domicile. In the intradomicile: in beds, cracks and wall interstices, on ground floors, under wooden floors and in clothes boxes and other household goods. In the peridomicile (around the dwelling, up to 10 m away from it): mainly in resting places of wild animals (rodents and fowl) and domestic ones (dogs, chickens, hogs), and in the extra-domicile (around the dwelling, more than 10 m away from it), in abandoned or inhabited places of refuge of wild vertebrates of the zone, such as *Didelphis mar-supialis*, *Proechimys* sp., *Philander opossum*, *Oryzomus* sp., *Hoplomys gymnurus*, *Marmosa robinsoni* and *Dasypus novemcinctus* (Arboleda et al. 2000) and in trunks of trees, axillae of palm trees, fowl nests; in order to achieve this abandoned nests and samples of soil from refuges were taken to the laboratory. The material was revised under a stereomicroscope in search of some evidence indicating the presence of triatomines.

Taxonomic determination of collected bugs followed Lent and Wygodzinsky (1979); immature forms were reared to adult and the eggs were examined by scanning electron microscope to compare the external chorionic ornamentation of field collected and laboratory reared eggs of *P. geniculatus* (Figs 2, 3).

Detection of natural infection by T. cruzi - The live triatomines were evaluated using the spontaneous ejec-

Fig. 1: study area. La Gardenia, Antioquia, Colombia, where *Panstrongylus rufotuberculatus* was found reproducing in intradomicile.

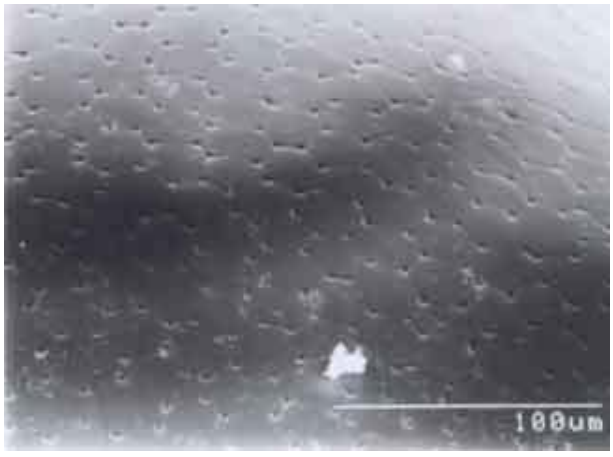

Fig. 2: scanning electron microscopy (500 x). Details of the external cover of egg of *Panstrongylus rufotuberculatus* from indoors, in La Gardenia, Antioquia, Colombia.

tion technique (García Da Silva et al. 1993); they were submitted to feces revision, in order to evaluate positivity for *Trypanosoma,* upon arrival in the laboratory, after 30 and 45 days.

Triatominae dying during transportation to the laboratory or those collected dead were evaluated by aspiration of the intestine. This was done by injecting the insect's abdomen with 0.1ml of PBS using a tuberculin syringe, and then aspiring the intestinal content.

In both cases, feces were diluted in sterile PBS (pH 7.2) and colored with Giemsa (Carvajal et al. 1995) to determine by morphology the species of *Trypanosoma*.

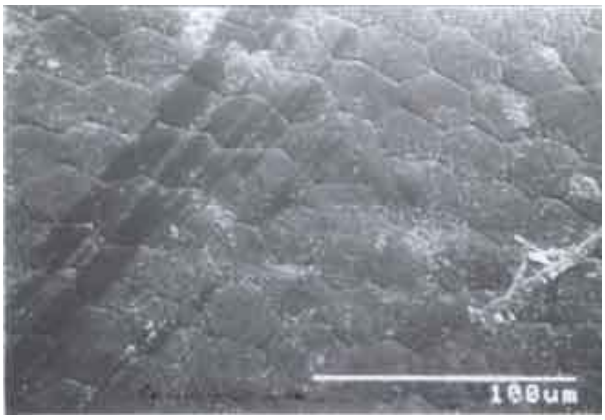

Fig. 3: scanning electron microscopy (500 x). Details of the external cover of egg of *Panstrongylus geniculatus* originating laboratory colony. University of Antioquia, Colombia.

RESULTS

In the locality of La Gardenia, a total of 94 specimens of *P. rufotuberculatus* were found inside 3 rural houses: 2 eggs, 81 nymphs in all instars and adults of both sexes, 4 males and 6 females (Table I); besides, further evidence of intradomiciliary reproduction was found, such as 16 hatched eggs, exuviae and fragments of one dead insect. From these insects a laboratory colony was founded following Wolff and González (1998). At present, it has reached the third generation.

With respect to places of capture, 100% (N = 94) of the insects were found indoors: in beds, 10.6% (n = 10); on walls, 6.38% (n = 6); under a wooden floor, 82.9% (n = 78).

The microscopic examination of faeces of 86 bugs showed 4 positive individuals as (2 fifth instar nymphs, 1 third instar nymph, and 1 female), giving a 4.6% rate of natural infection by *T. cruzi*.

Transmission risk indicators of T. cruzi - Table II shows the transmission risk indicators of *T. cruzi* by *P. rufotuberculatus*, for the locality of La Gardenia, according to the Indicator Definition Workshop for the *Triatoma infestans* Elimination Certification (OPS 1993).

TABLE I

Number of individuals, by instar, of *Panstrongylus rufotuberculatus* captured in La Gardenia, Amalfi, Colombia

	Stages	No.
Eggs		2
Nymphs	I	6
	II	9
	III	11
	IV	10
	V	15
	Between I and III instar	15
	Between I and V instar	15
Adults	Males	4
	Females	6
	Incomplete body (head, thorax and wings)	1
Total		94

TABLE II

Transmission Risk Indicators of *Trypanosoma cruzi* by *Panstrongylus rufotuberculatus* in La Gardenia, Antioquia, Colombia

Índicators La Gardenia (*P. rufotuberculatus*)	Transmission Risk Index	Value
Density (*P. rufotuberculatus*)	N° of triatomines captured / N° of residences of the locality = 94/40	2.35
Domiciliary infestation (*P. rufotuberculatus*)	N° of residences with triatomines x 100 / N° of residences of the locality = 2/40*100	5.0
Colonization of houses (*P. rufotuberculatus*)	N° of residences with immature triatomines x 100 / N° of residences with triatomines = 2/3*100	66.6
Overcrowding (*P. rufotuberculatus*)	N° of triatomines captured / N° of residences with triatomines = 94/3	31.33
Natural infection by *T. cruzi*	N° of positive triatomines x 100 / N° of evaluated triatomines = 4/86*100	4.6
Relative infection by *T. cruzi*	N° of residences with positive triatomines x 100 / N° of evaluated residences = 1/40*100	2.5

DISCUSSION

For the first time, the domiciliary tendency of *P. rufotuberculatus* in Colombia was shown by finding 94 specimens inside two rural dwellings in a locality of La Gardenia, municipality of Amalfi, Antioquia. Findings included eggs, all nymphal instars, adults of both sexes and other evidences, such as hatched eggs, exuviae and fragments of dead insects. Transmission risk indicators of *T. cruzi* by *P. rufotuberculatus* in La Gardenia (Table II) show the capacity of adaptation shown by this sylvatic species and its potential success in domiciliation.

The dwellings in which immature instars were found are similar regarding construction and location: plastered walls, roofs of zinc sheets and ground floors; one of them was covered with boards, lacked electricity and was situated in a forest (near 80 m from the house) which had been altered by human activities such us agriculture and hunting. These conditions might have favoured the colonizing capacity of *P. rufotuberculatus*, since their prefered habitats are terrestrial, humid and dark.

All of the insects positive for *T. cruzi*, were found inside one rural house; 1 female and 3 nymphs of 3rd, 4th and 5th instars. In that house were found adults forms (1 male and 1 female), 1 nymph 4th and 5 nymphs 5th, hatched eggs and some exuviae. The presence within dwellings of all stages of the life cycle of *P. rufotuberculatus* shows the capacity of this species to reproduce inside rural residences. This together with the 4.6% natural infection by *T. cruzi* shows that the human population of La Gardenia is suffering the epidemiological risk of getting Chagas disease.

The fact that it has been possible to colonize *P. rufotuberculatus* in our laboratory under stable conditions of temperature, humidity (29ºC, 90%) and luminosity, shows the reproductive capacity of this wild species in closed environments and its adaptability to environments with stable conditions, like those provided by the dwellings mentioned.

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