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ARTÍCULO DE ACTUALIZACIÓN

Triatomines (Hemiptera, Reduviidae) prevalent in the northwest of Peru: species with epidemiological vectorial capacity

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ABSTRACT

The development of strategies for the adequate control of the vector transmission of Chagas disease depends on the availability of updated data on the triatomine species present in each region, their geographical distribution, natural infections by ***Trypanosoma cruzi*** *and/or* ***T. rangeli****, eco-biological characteristics and synanthropic behavioral tendencies. This paper summarizes and updates current information, available in previously published reports and obtained by the authors our own field and laboratory studies, mainly in northwest of Peru. Three triatomine species exhibit a strong synanthropic behavior and vector capacity, being present in domestic and peridomestic environments, sometimes showing high infestation rates:* ***Rhodnius ecuadoriensis, Panstrongylus herreri*** *and* ***Triatoma carrioni*** *The three species should be given continuous attention by Peruvian public health authorities. P. chinai and* ***P. rufotuberculatus*** *are bugs with increasing potential in their role as vectors according to their demonstrated synanthropic tendency, wide distribution and trophic eclecticism. Thus far we do not have a scientific explanation for the apparent absence of* ***T. dimidiata*** *from previously reported geographic distributions in Peru. It is recommended, in the Peruvian northeastern Amazon region, the development of field studies on species of the genus* ***Rhodnius****, as well as of other triatominae, to evaluate their present* ***Trypanosomatidae*** *vector capacity.*

Key words: Rhodnius ecuadoriensis, Panstrongylus herreri, Triatoma carrioni, *Geographic distribution, vector capacity,* ***North wester Perú.***

Roughly 6.7 million inhabitants of Peru are estimated to live in Chagas Disease risk areas and approximately 680,000 individuals are infected by the *Trypanosoma cruzi*[1]. Information on the prevalence of human infection by *Trypanosoma rangeli* is practically nonexistent. Even so, the pressing need to implement an American trypanosomiasis control program in Northern Peru continues to be neglected by national public health services. Basic activities on Chagas disease epidemiology, such as large-scale serological and entomological field surveys and the control of donors to regional blood banks are poorly implemented.

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Four Tribes, seven Genera and fifteen species of Triatomines have been reported in the North of Peru. This value corresponds to, approximately, 11% (15/137) of the valid species of the Triatominae Sub-Family described in the World[2]. According to the Triatomine list illustrated in Table 1, it is possible to observe a high species diversity in that region. The referred species are distributed in the Departments and Provinces of the Country, associated to a significant ecological diversity, comprising 15 life zones in the studied areas. Biogeographically, these zones include coastal deserts, a complex pattern of Inter- and Trans-Andean warm valleys and wet tropical forests[3] (Figure 1).

I is also it is known that the basic requirements for the survival of a triatomine are the availability of food sources, shelter, and biological adaptation to the macro and micro-environmental variations where they live and prevail. Table 2 shows a group of insects, according to accepted biogeographical and behavioral aspects.

Considering those species with the greatest vector potential, our experience shows that three of them are the ones species exhibiting a strong synanthropic behavior living in human habitats. Therefore the, can be regarded as possible targets of control initiatives undertaken against domestic and peridomestic populations of vector triatomines. Following, detailed information on the geographic distribution, synanthropic behavior, natural infection, biogeography, and, eco-biological characteristics of those species are given.

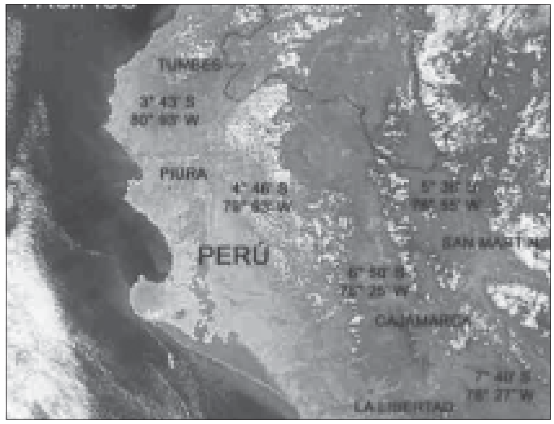

Figure 1. Inter - and Trans-Andean valleys. Satellite Image of Peruvian Northwestern region including the Departments of Tumbes, Piura, Cajamarca, San Martin and La Libertad. GPS geographical records from particular areas studied in this report.

Rhodnius ecuadoriensis

Vector of the *T. rangeli* and/or of the *T. cruzi* in Peru. Our field studies show that in Andean locations, in the Departments of La Libertad and Cajamarca, domicile infestation rates exceed 35% (detected with Gomez-Nuñes sensors and by a 6-month follow-up)[4]. This species frequently lives in intradomiciliary settings, constituting stable and teeming colonies in human dwellings as well as in intradomiciliary breeding corrals of *Cavia porcellus* (mainly in the kitchens). In the peridomicile, they colonize adjacent corrals of domestic animals. The ecosystems filled between the inter and trans-Andean valleys are xerophytic

Table 1. Triatomines (Hemiptera, Reduviidae) described in Northern Peru

Tribe	Species
Bolboderini	*Belminus peruvianus* Herrer, Lent & Wygodzinsky, 1954
Cavernicolini	*Cavernicola pilosa* Barber, 1937
Rhodnini	*Rhodnius ecuadoriensis* Lent & León, 1958
	Rhodnius robustus Larrousse, 1927
	Rhodnius pictipes Stál, 1872
Triatomini	*Eratyrus cuspidatus* Stál, 1859
	Eratyrus mucronatus Stál, 1859
	Hermanlentia matsunoi (Fernández-Loayza, 1989)
	Panstrongylus chinai (Del Ponte, 1929)
	Panstrongylus geniculatus (Latreille, 1811)
	Panstrongylus herreri Wygodzinsky, 1984 (synonym of ***P. lignarius,*** Galvão et al, 2003)
	Panstrongylus rufotuberculatus (Champion, 1899)
	Triatoma carrioni Larrousse, 1926
	Triatoma dimidiata (Latreille, 1811)
	Triatoma nigromaculata (Stal, 1872) (?)

Table 2. Prevailing Triatomine species (Hemiptera, Reduviidae) in departments of Northern Peru, according to their synanthropic behavior and preferred habitat

Species	Departments	Preferred habitats in Northern Peru	Synanthropic behavior
***Panstrongylus herreri*[1]** (synonym of *P. lignarius*[1])	San Martín, Amazonas, Cajamarca, Piura	Domiciliary (strictly), in intradomiciliary breeding corrals of *Cavia porcellus*	
***Triatoma carrioni*[2]**	Cajamarca, Piura,	Domiciliary habitat (chickens nests in the roofs of houses; peridomiciliary)	Domiciliary-peridomiciliary triatomines, with no silvatic ecotopes identified to date
***Rhodnius ecuadoriensis*[2,3]**	Tumbes, Piura Lambayeque, La Libertad, Cajamarca,	Domiciliary (corrals of peridomestic annexes (chicken corrals)	*Cavia porcellus*) and
Triatoma dimidiata	Tumbes[2]	Data not available	
***Panstronglus chinai*[2]**	Tumbes, Piura, Lambayeque, Cajamarca, La Libertad Ancash, Amazonas	Silvatic-Peridomiciliary (hollow trees and rock piles)	Triatomines with strong synanthropy and domiciliation evidence
Panstrongylus rufotuberculatus	Tumbes, Piura	SilvaticDomiciliary (present observations in corrals of *Cavia porcellus*)	
Panstrongylus geniculatus****	Cajamarca, Loreto	Silvatic[4]-Peridomiciliary?	
Rhodnius robustus****	San Martin, Loreto	Sylvatic (palm trees) -peridomiciliary?	
***Rhodnius pictipes*[2]**	San Martín, Loreto	Sylvatic (palms- trees)	Exclusively silvatic triatomines inhabiting multiple and stable ecotopes
Hermanlentia matsunoi	La Libertad	Sylvatic (caves)	
Cavernicola pilosa	Loreto	Sylvatic[4]	
Eratyrus mucronatus	San Martin, Loreto	Sylvatic[4]	
Eratyrus cuspidatus	Tumbes, Piura	Sylvatic[4]	
Belminus peruvianus	Cajamarca, Amazonas	Sylvatic	

[1]Naturally infected with *Trypanosoma cruzi*. [2]Naturally infected with *Trypanosoma rangeli* [3]According to Galvão et al 2003. [4]Lizaraso (1955) and Hidalgo (1957) described its domiciliary presence nearly 50 years ago, but this species have never been found in our studies. [4]Habitat not available.

and dry most of the year (6º 50' S, 78º 25' W)[3,4]. Recently, Patterson et al[5], used morphometry techniques and multivariable statistical analysis of seven measures of head to discriminate triatomine populations collected in Ecuador and Peru. These authors categorized phenotypically sylvatic populations existing in the Manabi Province, Ecuador (1º 6' S, 80º 24 W, 130

Table 3. Frequency of *Trypanosoma rangeli* natural infection in *Rhodnius ecuadoriensis.* The number of bugs examined is presented according to Triatominae stages and parasitism biology. Triatomine population collected inside a dwelling in Alto Chicama Valley, La Libertad, Peru, 2001

Triatomine stages	Number of bugs examined Intestine (feces)		Hemolymph		Salivary glands	
	+	-	+	-	+	-
Nymph 1	0	2	0	2	0	2
Nymph 2	0	9	0	9	0	9
Nymph 3	0	4	0	4	0	4
Nymph 4	1	4	1	4	1	4
Nymph 5	0	0	0	0	0	0
Male	2	1	2	1	0	3
Female	1	0	0	3	1	0
Nymphs Total N°	1	19	1	19	1	19
Adults	3	1	2	4	1	3
% infected	16.6		11.5		8.3	

m.a.s.l.), the domestic populations prevalent in the Southern Ecuadorian Provinces of Loja and El Oro (4º 15' S, 79º 30' W, 1,500 m.a.s.l.)[6,7], in the North of Peru, Suyo (4º 30' S, 511 m.a.s.l.) and in the Alto Chicama Valley (7º 28' S, 78º 49' W, 1,626 m.a.s.l.) (Figure 2). The authors[5] put forward that possibly these insects spread toward Southern Peru carried passively by human beings. Subsequently, Abad-Franch et al[8] analyzed these populations of *R. ecuadoriensis* of different geographical origin and ecotopes (Peru and Ecuador) using molecular markers and confirmed significant differences in the mitochondrial DNA of cytochrome b gene sequences of the Peruvian population (Chicama Valley) when compared to those from Ecuador. This would mean the existence of two diverging populational clades, perhaps associated to ecological micro-habitat adaptations. The Peruvian population would probably be undergoing speciation. Perhaps populations in the Alto Chicama Valley, Cascas, La Libertad (7º 22'48" S, 78º 27' 15" W) and Cajamarca (7º 40'S, 78º 27' W) are *R. ecuadoriensis* populations isolated biogeographically[8].

It should be remembered that sylvatic ecotopes of *R. ecuadoriensis* in *Phytelephas* palm trees in the Manabi province of Ecuador and in southern border locations have been reported in previous literature[9]. There is no evidence to date that this species may have sylvatic ecotopes in Peru, which is of particular importance for the vector control strategy, given the possibility of domiciliary re-infestation, after insecticidal spraying, by this sylvatic populations and their later interference in the entomological evaluation.

Taken into consideration the Trypanosome vector role performed by *R. ecuadoriensis* in the region under study, we know today that it is predominant in *T. rangeli* transmission. So far *T. cruzi* mixed infections have not been described as far and, despite the confirmed infection of salivary glands (8.3% of natural infection in domestic triatomines - Cuba Cuba et al, unpublished data and Table 3), there is no scientific corroboration of its transmission and parasitism in humans. The species is the only one in which the complex biological cycle of *T. rangeli* is naturally completed and transmission occurs by biting and injecting metacyclical trypomastigotes of *T. rangeli*.

Soon after Herrer *et al.*[10] reported the finding, for the first time, of *T. rangeli* in *R. ecuadoriensis*, in the Huancabamba valley in Piura, Peru, other research was carried out[11] in Cajamarca. Further experimental studies with the model: vector insect - *R. ecuadoriensis* and guinea pigs (*Cavia porcellus*), using *T. rangeli* Peruvian strains[12-15] contributed to the knowledge of the parasitism biology and of electro microscopy/morphology aspects of the parasite invading the salivary glands of the vector[16].

Recent research using *T. rangeli* strains isolated from the species, captured in the Alto Chicama valley, La Libertad, has shown the Peruvian strains to possess two mini-circles of k-DNA (KP2 and KP3). Such molecular profile was verified by means of PCR duplex molecular

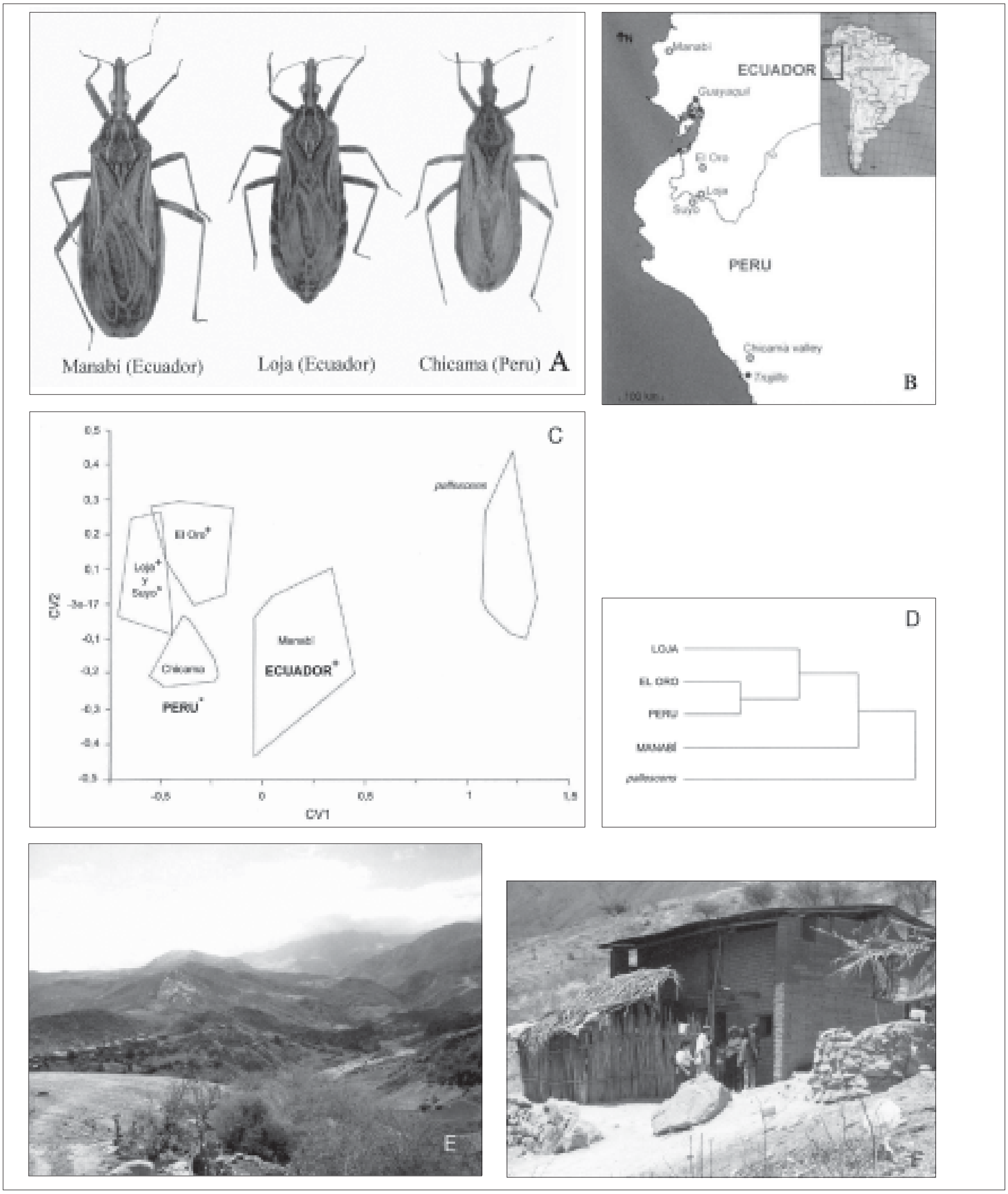

Figure 2. Morphological variation, geographic distribution, ecosystem and ecotopes of *Rhodnius ecuadoriensis* populations in northwestern Peru. A) Morphological variation of *R. ecuadorienis* populations of different geographic origin and sylvatic ecotopes (Manabi, Ecuador), peridomiciliary (Loja, Ecuador), and strictly domiciliary (Alto Chicama, Peru). B) Geographic distribution map of referred population. C) Factorial map resulting from canonic variance analysis of 7 head measurements showing morphometry differentiation of *R. ecuadoriensis* populations. D) Dendrogram derived from Mahalanobis distances showing relations among *R. ecuadoriensis* populations. E) Alto Chicama Valley, preferred ecosystem of *R. ecuadoriensis* in Peru. F) Peridomiciliary habitats of *R. ecuadoriensis* in xerophytic and dry areas.

analysis (k-DNA markers) and analysis of a product of the intergenic region of the 380-bp miniexon gene and, therefore, classified as KP1 (-) as established[17,18].

Later, Urrea et al[19] demonstrate that Peruvian strains of *T. rangeli* are genetically similar to those transmitted by *Rhodnius pallescens* in Panama and *R. colombiensis* in Colombia, when compared to each other. Finally, a very recent study analyzing 66 *T. rangeli*[20] strains shows evidence of a consistent association of *T.rangeli* KP1 (-) with species of the *Rhodnius* Genus belonging to the so-called *pallescens group (R. pallescens, R. colombiensis, R. ecuadoriensis)* which are geographically distributed on the Pacific Ocean side. The authors conclude that the vector and flagellate populations demonstrate a certain degree of co-evolution.

Although being quoted by some authors as an important vector of Chagas Disease[8,9], we can not currently evaluate the vectorial impact of *R. ecuadoriensis*, for *T. cruzi,* despite the fact that it has been identified sometimes as naturally infected by the Trypanosome[21,22,2]. Upon examination of the problem we arrived at the conclusion that there is a lack of studies about the geographical distribution of the triatomine as well as about the evaluation of its real role in the transmission of the Chagas disease agent. This is a relevant fact given that in the neighboring country of Ecuador and in locations near the Peruvian territory, have recently reported 4% of *T. cruzi* infection in domestic populations of *R. ecuadoriensis*[7].

Panstrongylus herreri

This species has been demonstrated to be cytogenetically identical to *Panstrongylus lignarius*[24] and is even considered as a synonym[2] of the latter, based on comparative studies using rDNA molecular markers[25]. Nevertheless, *P. lignarius* has never been found in areas of *P. herreri* geographical dispersion which in Peru lives in intradomiciliary ecotopes very characteristic of the Departments of San Martín[26,27], Amazonas, Cajamarca and Piura[6,7]. As far as we know, there have not been reports of *P. lignarius* in the Peruvian territory. Ecologically, *P. herreri* is different, on its synanthropic behavior, as it has shown to have high adaptability to the human environment. This is in stark contrast to observations on *P. lignarius* populations in Brazil, where they behave as sylvatic species, common in *Attalea*[32,36], *Scheelea* and *Maximiliana* palm trees from which, they can get to human dwellings lured by artificial light[8]. *P. herreri* is, thus far, the main vector of the *T. cruzi* in the Inter- and Trans-Andean valleys and in the "Selva Alta" (high Amazon rainforest of Peru). Its vector role has been known since the pioneer epidemiological work[32, 23]. Recent studies have shown it to transmit the parasite of Chagas Disease in the province of Cutervo, Department of Cajamarca, with acute reported[41]. Recently, Vega et al[42], reported average serum prevalence of anti-*T. cruzi* antibodies among children younger than 15 years old, in the provinces of Uctubamba (Amazonas) and Cutervo (Cajamarca) with values of 5.7% and 3.8%, respectively, with intra-domiciliary presence of *P. herreri*. Thus, *P. herreri* has an active dispersion in the Departments of San Martin (approx. 5º 38' S; 76º 55' W, our observations[27]), Amazonas and Cajamarca[35]. However, currently we do not have field information which could allow us to determine the precise scale of the species' natural infection rate by *T. cruzi* in this vast geographical region of Peru. Reports on these subjects would be of great value for a Chagas Disease Control Program in Northern Peru.

Triatoma carrioni (Figure 3)

Species with wide altitudinal range (500-2,292 m.a.s.l.). Reports on the finding of natural infection by *T. cruzi* of this species in the Cutervo Province, Cajamarca, have been published[23,36]. In our fieldwork we have confirmed that it behaves as a species well suited to the human domicile. The verification in several locations of the Piura Department and, especially, in the Ayabaca Province, (4º46' S; 79º 98' W; monthly average temperature between 19º C; relative humidity 52-31%) shows high intradomiciliary infestation rates. The following entomological parameters have been verified: domiciliary infestation rates (infested/sampled dwellings): 48.3%; density rate (bugs/dwellings sampled): 3.9; crowding rate (bugs/infested dwellings): 8.1; colonization rate (dwellings infested with nymphs/dwellings sampled): 86.6%. Still, *T. carrioni* was not detected in sylvatic environments until now (Cuba Cuba et al, unpublished results). The domiciliary infestation rate was higher in altitudes above 2,100 m.a.s.l., where the high percentage of *T. carrioni* nymphs was a remarkable sign of the existence of stable colonies. However the presence of this species in dwellings located at 530 m.a.s.l. leads us to consider the possibility of its adaptation to other ecosystems of the Peruvian coast. We believe that a greater capturing effort would be necessary in the northern region of Peru in order to confirm and quantify its presence in peridomicile and sylvatic environments and to establish its actual dispersion southward of the country. The existence of sylvatic populations would restrict a program to control the species due to the probability of re-infestation of human domiciles and domestic animal shelters.

In the meantime, emphasis and entomological surveillance should be laid on other triatomine species whose biology, geographical dispersion, habits and synanthropic tendencies characterize them as enzootic vectors of *T. cruzi*. For the studied area, they are the following:

Panstrongylus chinai (Figure 3)

Widely-distributed species in the Departments of Tumbes, Piura, Cajamarca, Amazonas, Lambayeque, La Libertad, and Ancash. Though described as sylvatic vector, it was found living in peridomiciliary/extradomiciliary ecotopes nearby human domiciles. In localalities of Ecuador in the vicinity of the Peruvian Departments of Tumbes and Piura, a 35% rate of domiciliary infestation has been reported[7]. In xerophytic ecosystems of inter and trans-Andean valleys of northwestern Peru, it is common in ecotopes such as hollow trees of *Schinus molle* and specially in stone walls (‘‘pircas’’) built to provide shelter to animals (Figure 3). In these habitats, we could measure temperatures ranging up to 41°C, where teeming colonies of the triatomine are easily found. These ecotopes also harbored marsupials, rodents and reptiles which are an alternative triatomine’s food source, also known as *T. cruzi* reservoirs. This fact could explain, the high rate of natural infection by *T. cruzi*., which is reported in the Peruvian scientific literature[37,38,23].

Pollack et al[39], reported an entomological census in Paredones, San Pablo Province, Cajamarca, Peru (6° 50’ S, 78° 25’ W, 1,350 m.a.s.l.; 14° C average temperature and relative humidity of 70%). A total of 272 specimens of *P. chinai* captured in 25 peridomiciliary ecotopes located in the stone walls (about 50 meters from domiciles, (Figure 3) were randomly selected and examined in each sampling location. The age structure found was as follows: 80 nymphs I; 55 nymphs II; 70 nymphs III, 45 nymphs IV, and 22 nymphs V. There was as significant predominance of I and III nymphs. No male or female adults were found. At the same time, adults captured by the above mentioned authors using artificial light traps, in two extradomiciliary ecotopes in the same location were studied morphometrically, using 8 measurement head points. Variables were analyzed by means of descriptive statistics, variation coefficient, correlation matrix, and multivariate discriminant analysis. Finally, a dendrogram of taxonomic relatedness was constructed using the un-weighted-pair-group-method (UPGM) analysis to demonstrate the relationship between both populations collected. The analysis of head morphometric variables suggests that populations attracted by artificial light show some degree of phenotypic variation, describing 2 morphometric variants of adult *P. chinai* populations. A significant variation coefficient (CV=13.6%) was found in the post-ocular distance variable (not including neck) in male and female samples. The external distance between eyes also showed differences among female specimens studied (CV= 11.9%). The distance dendrogram (Mahalanobis distances) showed unequivocal separation in two branches (taxonomic distance = 0.054), suggesting two *P. chinai* population groups in the region. Could these be valuable morphometric phenotypic markers to identify sylvatic populations of *P. chinai* in transition or moving to a peri/domiciliary ecotope? It is a fact that adult specimens are frequently found inside dwellings despite not having colonized them. Many specimens arrive to the squares of small villages flying at night. On the other hand, the absence, in our studies, of adult specimens in peridomicile ‘‘pircas’’ is striking.

Panstrongylus rufotuberculatus (Figura 4).

This species has a wide biogeographical distribution in Central and South America, with sylvatic habits, though exhibiting synanthropic tendency and possibly being a *T. cruzi* potential vector[40,41]. It is present in several ecosystems of the Peruvian territory, having been reported in the Departments of Tumbes, Piura and, with domicile infestation, in Cuzco[28]. Our studies

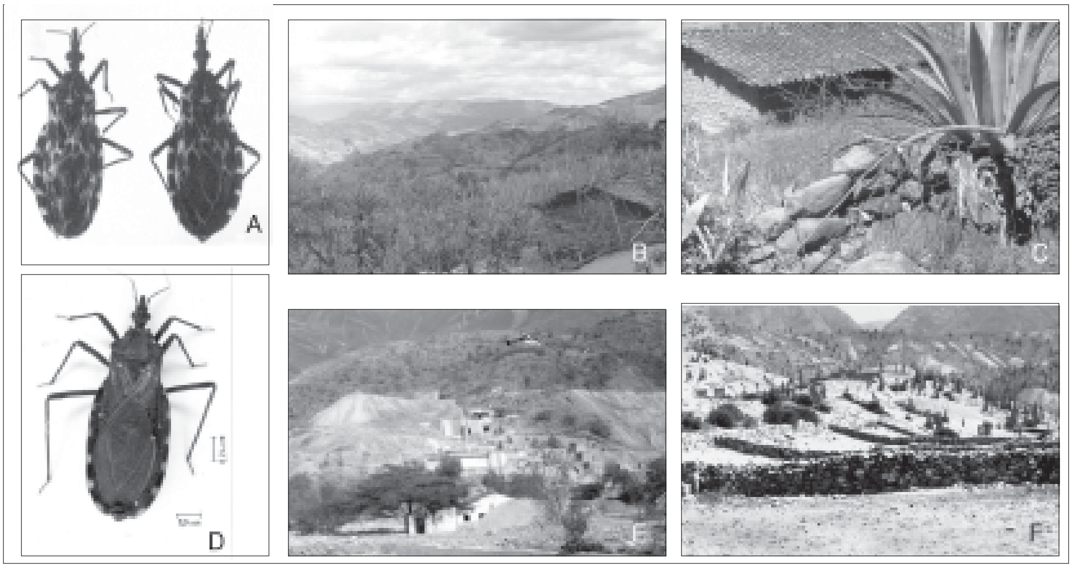

Figure 3. *Triatoma carrioni* and *Panstrongylus chinai*. A) *Triatoma carrioni* male and female specimens B) Trans-Andean valley of Ayabaca, Piura, Perú, mainly ecosystem of *T. carrioni* (4º46'S; 79º93'W). C) Ecotope domiciliar/peridomiciliar of *T. carrioni*. D) *Panstrongylus chinai*, female specimen. E) Ecosystem of *P. chinai* (6º50'S; 78º25W), inter-Andean valley of Paredones, Cajamarca, Perú. F) Man-made artificial sylvatic ecotope ("pircas"), xerophytic areas very common at the Valley of Chicama river, La Libertad, Peru.

provide strong evidence of domiciliation of this species in the location of La Pareja-Chirinos, Suyo District, Ayabaca Province, Piura (4º 46' S, 79º 93' W, 530 m.a.s.l., 26º C average temperature and 52% relative humidity). By hand collecting procedure (men/hour per house), with previous spraying of a chemical irritant (flushing-out aquose cypermetrine 0.1%), 37 specimens were collected in 2/15 houses examined (infestation rate = 13.5%, density = 2.4). The greatest concentration of nymphs of several stages, and adults, occurred in the "cuyero", or guinea pig (*Cavia porcellus*) corral, located in the kitchen of an infested house. This study confirmed the existence of stable intradomiciliary colonies of *P. rufotuberculatus*. None insect was infected with *T. cruzi* (Cuba Cuba et al, unpublished).

Triatoma dimidiata

Peruvian scientific literature described its domiciliary presence at the banks of rivers Zarumilla and Tumbes, in the Tumbes Department, nearly 50 years ago[42,43]. Since then, this species has not been reported in domiciles of the northwestern region of Peru. An exhaustive investigation carried out by our workgroup within dwellings in the locations of the rivers Tumbes and Zarumilla previously reported as infested, was negative to the finding of *T. dimidiata*. We hypothesize that climatic changes brought about by the El Niño and La Niña phenomena, which have a severe impact on the region, and the constant use of insecticides in anti-Malaria campaigns of the Ministry of Health of Peru, have modified the environment for this species. We therefore conclude this species has been eradicated from Peru at the domestic environment. The investigation should be repeated in order to confirm this assertation.

Final Remarks

The theme of Trypanosome vector triatomines in northern Peru has been a subject of concern to the first author of this review for many years. In Peru, a well thought-out program to confront the challenge of Chagas Disease and "rangeliosis", along with aspects of their study and control, is necessary.

This is notorious in northern Peru as a whole, and particularly in the northwestern region. Yet, in order to insist on the obvious need to spread the word and urge the development of new studies on the subject, we put together the following comments which arise from findings

Figure 4. *Panstrongylus rufotuberculatus*. Female specimen collected inside house at Distrito of Suyo, Piura, Peru (4°46'S; 79°93W).

throughout our period of observation:

The task of keeping an updated database on the biogeographical distribution of the Triatominae species in Peru is of paramount importance.

There should be support for field studies that focus on registering the behavior of species regarded as having synanthropic potential and tendencies, trophic eclecticism, and wide geographical dispersion, as is the case of *Panstrongylus rufotuberculatus, Panstrongylus chinai* and *Panstrongylus geniculatus*.

Studies on altitudinal range and remote sensing recording with satellite image geopositioning, will allow for a more precise documentation of species considered as domiciliary and/or peridomiciliary. We lay emphasis on: *Rhodnius ecuadoriensis, Panstrongylus herreri* and *Triatoma carrioni*, which should be under permanent surveillance from the entomological services of the Ministry of Heath.

Likewise, serological surveys of representative populations (school children under 15) in several regions of northern Peru are a priority, in order to establish the real impact of Trypanosomiasis on the public health of the region.

Very little is known about species of *Rhodnius* in order to determine their prevalence in Departments of the Peruvian Amazon region. We do not know the role they play in the enzootic and zoonotic transmission of *Trypanosoma cruzi* and/or *T. rangeli*, as it has been registered in neighboring countries. What actually happens in localities in the "Selva Alta" and in the Departments of Loreto and Madre de Dios of Peru?

Finally, we should support fundamental research in the morphometry and genetic of triatomine populations and their respective Trypanosomes, as this is the only way to plan a rational and effective combat in the entomological control and vectorial transmission control initiatives.

RESUMEN

El desarrollo de estrategias adecuadas para el control de la transmisión vectorial de la Enfermedad de Chagas depende: de la disponibilidad de datos actualizados de las especies de triatominos presentes en cada región, de su distribución geográfica, infección natural por *Trypanosoma cruzi* y/o *T. rangeli,* características eco-biológicas y tendencias de comportamiento sinantrópico. Este trabajo resume y actualiza la información disponible en la literatura y aquella obtenida en nuestros estudios de campo y de laboratorio desarrollados en los últimos años por los autores, predominantemente, en la región Nor-Occidental del Perú. El resultado de esas observaciones es la detección de que, tres especies de triatominos presentan un importante comportamiento sinantrópico y capacidad vectorial, ocupando ambientes intradomiciliares y peridomiciliares: *Rhodnius ecuadoriensis, Panstrongylus herreri* y *Triatoma carrioni*. Las tres especies deben recibir constante atención por parte de las autoridades de Salud Pública Peruana. *P. chinai* y *P. rufotuberculatus* tienen potencial creciente en su papel de vectores, por la comprobada tendencia sinantrópica, distribución geográfica y eclecticismo trófico. Se desconocen las causas de la aparente ausencia actual de *Triatoma dimidiata*, dada su presencia constatada anteriormente en el Perú. Se recomienda que en la región Nor-Oriental Amazónica Peruana se realicen en forma urgente estudios sobre las especies del genero *Rhodnius* y de otros triatominos que permitan evaluar la real capacidad vectorial de los Trypanosomatideos.

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