Epidemiology of Chagas Disease in Jaguaruana, Ceará, Brazil. I. Presence of Triatomines and Index of *Trypanosoma cruzi* Infection in Four Localities of a Rural Area

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In order to assay the triatomine infestation and domiciliation in the rural area of Jaguaruana district, state of Ceará, Brazil, we studied, from November 2000 to April 2002, 4 localities comprising 158 domiciles as a whole, with an average of 4 inhabitants/house, who are dwelling in there for more than 7 years. Most houses have tile-covered roofs and the walls built with plaster-covered bricks (57%), followed by bricks without plaster (33%), and mud walls (7.5%). A total of 3082 triatomines were captured from different locations, according to the following capture plan: (a) intradomiciles: 238 Triatoma brasiliensis, *6* T. pseudomaculata, *9* Rhodnius nasutus, *and 2* Panstrongylus lutzi*; (b) peridomiciles (annexes): 2069* T. brasiliensis, *223* T. pseudomaculata, *121* R. nasutus, *and 1* P. lutzi*; (c) wild, in carnauba palms* (Copernicia prunifera)*: 413* R. nasutus. *From the captured triatomines, 1773 (57.5%) were examined. The natural index of* Trypanosoma cruzi *infection ranged from 10.8% to 30.2% (average of 17%), depending on the species and the location from where the triatomines were captured.*

Key words: epidemiology - infestation index - natural infection - *Triatoma brasiliensis* - *Triatoma pseudomaculata* - *Rhodnius nasutus* - *Panstrongylus lutzi* - Ceará - Brazil

In the state of Ceará, the presence of triatomines has been known for a long time, as Alencar (1987) has shown in a research that compiled former surveys carried throughout the state. Alencar et al. (1976) have demonstrated that vectors have not been found in only 9 out of the 141 municipal districts that comprise the geographic division of the whole state of Ceará. The authors have cited the semi-domestic *Triatoma brasiliensis* as being a primary transmitting species and with larger distribution in that state, found in 91.5% houses of municipal districts, many times with high *Trypanosoma cruzi* infection indexes. *Triatoma pseudomaculata*, which is believed less domestic, was found in 68.8% of the municipal districts, with an average infection index of 4.2%. In the distribution ranking, the third species in Ceará was *Panstrongylus megistus*, displaying a variable infection index; this species was found in 61.7% of the municipal districts. *Rhodnius nasutus*, with an average of 1% infection index, was found in 17.7% of the municipal districts; *Panstrongylus lutzi* was found in 18.4% of the municipal districts, presenting an average of 17.9% of infection indexes (Alencar et al. 1976).

The objective of the present work was to determine infestation indexes, colonization, and density of triatomines in domiciliary units (DUs) that include intradomicile, peridomicile, and ecotopes found in wild habitats of the four localities that belong to the rural area of Jaguaruana municipality, Ceará, Brazil, formerly considered to be highly infested by these vectors. The indexes were determined by relating them with variables such as type of house's wall type and number of peridomiciliary annexes. The authors have also determined the indexes of natural *T. cruzi* infection in triatomines captured in each studied habitat and ecotopes.

MATERIALS AND METHODS

Descriptions of the studied localities - Jaguaruana municipality is located about 180 km from Fortaleza and it holds 156 localities in the rural area surrounding the urban center. Among these, 4 localities were selected, taking into account the proximity of the core of the urban center and the similarity of the localities as selection criteria, with regard to the type of the dwellings and their spatial distribution: Coberto, Currais do Felipe, Figueiredo do Bruno, and Figueiredo (Figure). Coberto, the smallest of the 4 localities, has 3 km^2 and it is located 9 km from the town; it has 61 inhabitants living into 15 domiciles. Currais do Felipe has 3.5 km^2, 19 domiciles and 76 inhabitants; it is located 7 km from the town; Figueiredo do Bruno has 4 km^2, 41 domiciles and 146 inhabitants; it is located 10 km from the town; Figueiredo is located 7 km from the town and has 8 km^2 of area, 83 domiciles and 348 inhabitants. These localities are situated in plain areas with loamy and sandy soils, in the domain of Caatinga (shrublands) that is a characteristic vegetation of the semi-arid Northeast region. Caatinga mainly includes small spotty shrubs,

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grassy plants, and carnauba palm, a typical tree of the area. The forests are approximately 1 km away from domiciles, however it is common to find the carnauba palm growing very near to domiciles. In the studied areas, a reduction in the fields of carnauba palm has been observed due to the continuous deforestation in order to build houses, fences and corrals, besides the fires for agricultural purposes.

In all the 4 localities, the domiciles are built with plaster-covered bricks, cement floor, and tile-covered roof; other types such brick without plaster, "taipa" (lath-and-mud wall), and brick and lath-and-mud combined (mixed) are also present.

In the peridomicile are found permanent annexes that include hen-houses, pigsties, and corrals, which are built near the house walls or up to 20 m away. The walls of these annexes are made with trunks or palm leaves from carnauba palm and the roofs are covered with straws or tiles. In this environment, near the houses, there are also the temporary annexes such heaps of firewood, tiles, and bricks. Domestic animals such as dogs and cats, fowl, sheep, goats, pigs, as well as cattle, freely circulate through the areas.

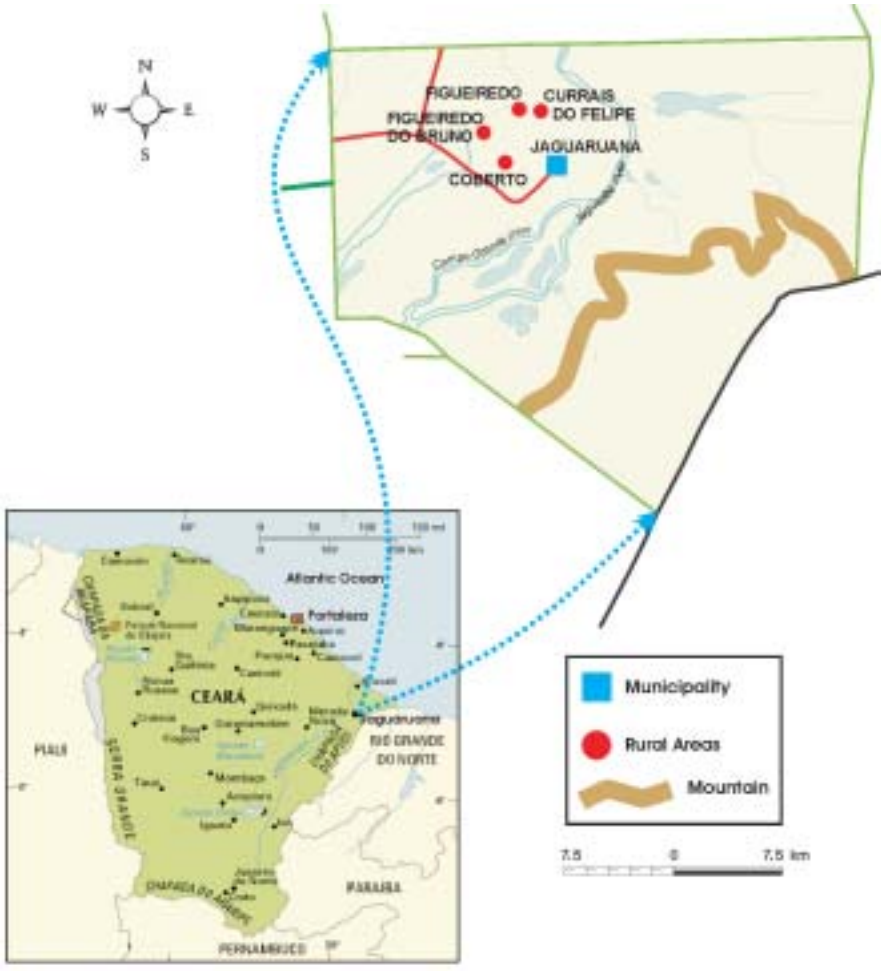
The investigations were performed from November 2000 to April 2002.

The capture of triatomines in artificial and natural ecotopes - In domiciliary units, 4 triatomine captures were performed from November 2000 to November 2001, while in wild habitats, 3 triatomine captures were performed in February, July, November 2001, and April 2002.

In the intradomicile and peridomicile (in all annexes existent), the captures were manually performed by exhaustion, using tweezers.

In the wild habitat, traps having plastic containers of 250 cm^3 were used (Noireau et al. 2002). The traps were installed preferentially in the carnauba palms (*Copernicia prunifera*), in the trunk near to the root, or in the top among the palm, and into cavities existent in the trunks of other trees such as: juazeiro (*Ziziphus joazeiro*), mutamba (*Guazuma ulnifolia*), pau-branco (*Auxemma oncocalyx*), quixabeira (*Boumelia sertarum*), pereiro (*Aspidosperma pirifolium*), oiticica (*Couepia grandiflora*), and aroeira (*Schinus* sp). One hundred and fifty palm trees were investigated in Coberto, 121 in Currais do Felipe, 130 in Figueiredo do Bruno, and 122 in Figueiredo. An average of 30 traps/locality were used for each capture, which were spread over different areas up to 1500 m^2 about 500 m away from homes.

All the captured triatomines were stored in labeled plastic containers and forwarded to the laboratory in Rio



Map of the municipality of Jaguaruana, state of Ceará (Brazil), showing the geographic location of the surveyed areas.

de Janeiro for quantification, and identification by species and evolutionary status. In order to estimate the natural *T. cruzi* infection index, all specimens that arrived alive to laboratory were examined. The stools were removed by abdominal compression, then diluted in saline solution and examined in fresh through optical microscope. All microscopic fields were carefully examined for the presence of the protozoa.

Data analysis and processing - The data obtained from the captured triatomines, as well as the number of the infected ones, made possible to calculate the following entomological indicators, according to WHO (2002): intradomiciliary, peridomiciliary, and domiciliary infestation index; colonization index; domiciliary and peridomiciliary density index; and natural infection index, for each studied locality, habitat, and ecotope. For the statistical analysis of the results, chi-square test was used.

RESULTS

In the 4 localities, 158 dwellings were recorded (Table I), most of them having been built more than 10 years ago. Of these, 91 (57.6%) displayed walls of bricks with plaster; 52 (32.9%) walls of bricks without plaster; 12 (7.6%) walls of mud without plaster ("taipa") and 3 (1.9%) walls of brick and mud without plaster (mixed). Triatomines were captured in 59 (37.3%) dwellings; in 40 of these, the insects were captured exclusively in the peridomicile, in 8, exclusively in the intradomicile and in 11 in both the peridomicile and intradomicile.

Table II shows the entomological indicators observed in the 4 studied localities. Currais do Felipe presented the largest indexes in all indicators, except in relation to the natural infection index, which presented a small variation in Coberto.

Table III presents the results of infestation, density, and colonization of the domiciliary units in relation to the type of dwelling's wall. The statistical analysis comparing the values obtained from plastered brick wall houses with non-plastered brick wall houses showed a significant difference ($X^2 = 5.14$; $p = 0.023$), indicating an association between infestation index and plastered brick wall dwellings. Dwellings with walls of mud without plaster ("taipa") and walls of brick and mud without plaster (mixed) were not statistically compared since they appeared in a reduced number in the 4 localities.

TABLE I

Number of houses with regard to the wall types present in the studied localities of rural area of Jaguaruana, Ceará

	Wall type				
Localities	Plastered brick	Non-plastered brick	"Taipa" [lath-and-mud]	Mixed	Total
Coberto	7	6	1	1	15
Currais do Felipe	14	4	1		19
Figueiredo do Bruno	19	20	2		41
Figueiredo	51	22	8	2	83
Total	91	52	12	3	158

TABLE II

Entomological indicators observed in the 4 investigated localities of rural area of Jaguarana, Ceará, 2002

Entomological indicators (%)	Coberto	Currais do Felipe	Figueiredo do Bruno	Figueiredo	χ^2	p
Domiciliary infestation index	40	78.9	34.1	28.9	16.80	0.001
Intradomiciliary infestation index	0	36.8	17.1	6	16.92	0.001
Peridomiciliary infestation index	40	73.7	24.4	25.3	18.33	0.000
Intradomiciliary colonization index	0	21.1	9.8	0	17.21	0.001
Peridomiciliary colonization index	33.3	63.2	21.9	24.1	12.83	0.005
Natural infection index	25	21.1	4.8	11.5	58.73	0.000
Density index by domiciliary units	18.6	65	17.2	5.4		

TABLE III

Infestation, colonization, and domiciliary and intradomiciliary density indexes, in accordance with the type of house's wall in the studied localities of rural area of Jaguaruana, Ceará

	Wall type			
Indexes	Plastered brick	Non-plastered brick	"Taipa" [lath-and-mud]	Mixed
Domiciliary infestation	46.1	26.9	8.3	66.7
Intradomiciliary infestation	16.5	1.8	0.6	0
Intradomiciliary colonization	2.1	9.6	8.3	0
Intradomiciliary density	4.5	7.5	14.5	0

Types of annexes present in domiciliary units (Dus) - Of the 158 domiciles, 122 (77.2%) presented annexes of permanent type and 49 (31%) of temporary type. Among the permanent annexes, the hen-houses were prevalent, while among the temporary ones the wood heaps were prevalent. The average of permanent annexes by domiciliary unit was 1.37 ± 1.3, while the average of temporary ones was 0.6 ± 0.8, representing a ratio of 2.2 permanent annexes for each temporary annex. The assessment of the distance between the annexes and the house shows that 10% are near the dwelling's walls, 76% are less than 20 m and 14% are more than 20 m.

Infestation and density index in relation to the annexes - Among the 312 permanent and temporary investigated annexes, 71 (22.7%) were infested by triatomines. In 19 (26%) infested annexes it was verified the coexistence of *T. brasiliensis*, *T. pseudomaculata*, and *R. nasutus*, with larger incidence of *T. brasiliensis* and *T. pseudomaculata* that were found mainly in hen-houses. The infestation indexes in the annexes have shown to be higher in the heaps of tiles and bricks and in goat and sheep corrals. However, the triatomines density has shown to be higher in brick heaps (13.8), followed by wood heaps (firewood) (8.8), hen-houses (8.7), pigsties (7.8), goat corrals (7.4), tile heaps (5.3), and perches (0.1).

Distribution of the captured triatomines - In the localities of Coberto, Currais do Felipe, Figueiredo do Bruno, and Figueiredo, peridomicile, intradomicile, and wild habitat, have been captured 3082 triatomine specimens. Among them 2307 (74.8%) were *T. brasiliensis*, 543 (9.7%) *R. nasutus*, 229 (7.4%) *T. pseudomaculata*, and 3 (0.1%) *P. lutzi*.

The largest number of triatomines were captured in the peridomicile of the 4 localities, in the different types of annexes, where *T. brasiliensis*: 2069 (85.7%) was prevalent, followed by *T. pseudomaculata*: 223 (9.2%), *R. nasutus*: 118 (4.8%), and *P. lutzi*: 1 (0.04%).

Regarding the intradomiciles, with the exception of Coberto in whose environment there was no species collected, captures were performed in the remaining intradomiciles, and *T. brasiliensis*: 238 (93.3%) also was prevalent, followed by *R. nasutus*: 9 (3.5%) *T. pseudomaculata*: 6 (2.3%), and *P. lutzi*: 2 (0.78%).

In wild habitat only *R. nasutus* was captured and only in carnauba palm; 413 specimens were collected. Table IV shows the density of triatomines by palm tree.

Assessment of natural triatomines infection with T. cruzi - Of the triatomines captured, 1773 specimens corresponding to 57.5% were examined. Among them, 302 (17.3%) were infected with *T. cruzi*; *R. nasutus* shows the largest infection index (27.2%). Regarding *T. pseudomaculata*, *T. brasiliensis*, and *P. lutzi*, the infection indexes were 18%, 15.3% and zero, respectively. Table V shows that the infection index ranged in accordance with the species and the capture locality.

With relation to the capture locality and environment, the largest infection index was observed in the triatomines that were captured in the wild habitat of Currais do Felipe and the smallest in the peridomicile of Figueiredo do Bruno. However, in a global evaluation, the locality of Currais do Felipe showed the largest infection indexes, once in all environments this index was higher than 20% (Table VI).

TABLE IV

Quantity of investigated palm trees (*Copernicia prunifera*) that were infested and average of triatomines captured by palm tree, in the study localities, in Jaguaruana, Ceará, from February 2001 to April 2002

Localities	Investigated palm trees	Infested palm trees index (%)	*Rhodnius nasutus*		Density of triatomines by infested palm tree
			Adult	Nymph	
Coberto	150	49 (32.67)	8	178	3.79
Currais do Felipe	121	25 (20.66)	3	83	3.44
Figueiredo do Bruno	130	34 (26.15)	4	94	2.88
Figueiredo	122	22 (18.03)	0	43	1.95

TABLE V

The triatomine species examined, positive ones, and *Trypanosoma cruzi* infection index, in accordance with the capture environment in 4 localities of rural area of Jaguaruana, Ceará, from 2000 to 2002

Species	Intradomicile			Peridomicile			Wild			Total		
	Exam	Pos	Inf. index %	Exam	Pos	Inf. Index %	Exam	Pos	Inf. index %	Exam	Pos	Inf. index %
Triatoma brasiliensis	93	10	10.7	1340	210	15.7	0	0	0	1433	220	15.3
Triatoma pseudomaculata	2	0	0	109	20	18.3	0	0	0	111	20	18
Rhodnius nasutus	2	2	100	62	19	30.6	164	41	25	228	62	27.2
Panstrongylus lutzi	0	0	0	1	0	0	0	0	0	1	0	0
Total	97	12	12.4	1512	249	16.5	164	41	25	1773	302	17

Exam: examined; Pos: positive; Inf. Index: infection index

TABLE VI

Infection indexes of examined triatomines from intradomicile, peridomicile, and wild habitat with regard to the studied locality, in Jaguaruana, Ceará, from 2000 to 2002

	Intradomicile			Peridomicile			Wild		
Locality	Exam	Pos	Inf. index %	Exam	Pos	Inf. index %	Exam	Pos	Inf. index %
Coberto	0	0	0	132	33	25	76	17	22.3
Currais do Felipe	8	3	37.5	826	173	20.9	27	11	40.7
Figueiredo do Bruno	82	8	9.7	249	8	3.2	38	12	31.5
Figueiredo	7	1	14.3	305	35	11.5	23	1	4.3
Total	97	12	12.4	1512	249	16.7	164	41	25

Exam: examined; Pos: positive; Inf. index: infection index

DISCUSSION

"Baixo Jaguaribe" is a micro-area where is located the Jaguaruana municipality that has been described for a long time as endemic for triatomines, especially *T. brasiliensis*. In the area of Jaguaribe Valley (Oliveira-Lima et al. 1992), following 16 uninterrupted years of chemical control, a noticeable reduction in building infestation was reached, in density of bugs/house, and in natural infection index within the period, supporting the importance of systematic applications. In the present study, the data from sprayings show that at least in these 4 localities the cleansing was performed with several intermissions that may have contributed to the smaller success in the bug killing.

The literature has shown that plastered brick dwellings, cement floor, and tile-covered roofs, as are most of the dwellings located in the 4 studied areas, represent a type of construction considered inappropriate to triatomine domiciliation (Alencar 1987). Indeed, in our research, the existence of intradomiciliary colonies was not verified in this type of dwellings, however, they are not free from triatomine presence. Proportionally, these dwellings displayed more infestation compared to the other building types, however, in the great majority of the times, the infestation was due to the presence of 1-2 adult *R. nasutus* specimens.

The non-plastered brick dwellings represented the second more common type of dwellings in the studied localities. In those dwellings, differently from the plastered brick ones, we could find the existence of small triatomine colonies in the intradomicile. This fact could suggest that poor conservation of the dwellings with many gaps and holes between the bricks could favor shelter building, therefore originating colonies.

Studies performed by Mott et al. (1978), Dias and Dias (1982), Marsden et al. (1982), and Alencar (1987) have demonstrated that low standard buildings result in dwellings with many appropriate localities to shelter triatomines, besides offering greater danger to their residents. In the studied areas, the "taipa" (lath-and-mud without plaster) dwelling type is very reduced and represents only 7.6% of all buildings found at the 4 localities. Nevertheless, this result may be non-representative of the rural area surrounding Jaguaruana, since investigations that were not included in this work, performed in other localities, have shown that in some of them more than 90% are lath-and-mud buildings (Lima et al. 2003).

A factor that should be considered in intradomiciliary *R. nasutus* infestation process is the nearness between carnauba palms and domiciles that makes possible for the triatomines to invade the domiciles searching for food or attracted by the light. Another factor is the use of the carnauba palm's trunks for structuring the roofs, providing important means of passive transportation for this species from its natural ecotope to domiciles (Dias 2000).

In the studied peridomiciles the large scale of the breeding of domestic animals results in a high density of animals/house, leading to a great number of shelters for these animals. Besides that, there is also a great accumulation of heaps of wood, bricks, and tiles. This combination results in availability of shelter and food sources that propitiate the formation and maintenance of high triatomine density colonies, as the results of the present study demonstrate. The epidemiological importance of peridomicile is more and more emphasized, as a primary focus of a growing number of triatomine species, as *T. brasiliensis* and *T. pseudomaculata* in the caatinga domain, and *T. sordida* for the savanna domain (Forattini 1980), among others, with prevalent concentration in the modified spaces surrounding domiciles.

Oliveira-Lima et al. (2000) have studied the annexes existent in the peridomiciles of a rural area of Boa Viagem, Ceará, assessing the risk of colonization of *T. brasiliensis* and/or *T. pseudomaculata* spreading in the different types of annexes. The most often colonized annexes were the shelters of animals and piles of materials. Covered areas and fences showed a lower colonization rate.

The authors (Oliveira-Lima et al. 2000) also surveyed the adaptability of those species to infest different types of annexes present in the areas, observing no significant differences between each type of annex rate and the number of triatomines specimens found on it. They have stated that the number of triatomines found in an annex does not depend on the type of the annex.

The peridomicile can work as a barrier space to intradomiciliary infestation if it offers favorable conditions to the triatomine survival, but it can also serve as an entrance door for colonizing dwellings that present unfavorable conditions (Forattini et al. 1984, Diotaiuti et al. 1998, Dias 2000). This supposition could explain the in-

festation indexes of peridomiciles in relation to intradomiciles verified in this study, nearly 3-fold higher (33.3% and 12%, respectively). These data indicate that an entomological surveillance in the area should be continuous.

T. brasiliensis, *T. pseudomaculata*, *R. nasutus*, and *P. lutzi*, which are found in the studied localities, have been registered in Jaguaruana municipality for a long time, as the data from Albuquerque et al. (1942), Bustamante (1956), Silveira et al. (1984), and Alencar (1987) have shown. These authors also have registered the presence of *P. megistus* in Jaguaruana, however we have not found any specimen in the surveyed areas. The first 2 species (*T. brasiliensis* and *T. pseudomaculata*) are native and main vectors of *T. cruzi* in Northeast; they are semi-domestic, ubiquitous, with prevalence in peridomiciles (Dias et al. 2000). *T. brasiliensis* is still the species that more frequently and regularly invades and colonizes domiciles of this area. However, recent data has shown the existence of intra-area differences, pointing out the prevalence and frequency of species domiciliation in the states of Piauí and Ceará, while *T. pseudomaculata* is prevalent and much more frequently domiciled in the states of Paraíba, Pernambuco, Alagoas, and Sergipe (Silveira et al. 2001).

Regarding the triatomine distribution by the capture location, some variations were observed: *T. brasiliensis* and *T. pseudomaculata* were found both in peridomicile and intradomicile, with prevalence in peridomicile. *R. nasutus* was found mainly in wild habitat, although the existence of small colonies has been found in the peridomicile; in the intradomicile, only flying specimens of *R. nasutus* were captured, indicating that probably they entered in the dwellings attracted by light or other factors associated to the artificial environment, as the disposability of food sources or micro clime conditions.

In the wild habitat of the studied localities, *R. nasutus* seems to have as its natural ecotope the carnauba palm top that was the only locality where it was captured. The occurrence of other triatomine species inhabiting these palm trees was not registered, although all triatomine species in Ceará establish colonies in wild habitat (Alencar 1987). Regarding the *P. lutzi*, although only 3 specimens, all adults, have been captured, 2 were found in the intradomicile and 1 in a brick heap of one of the peridomiciles of Coberto locality, also, very probably attracted by the house lights.

The palm trees have great ecological and epidemiological importance, as an indicator of natural ecotope of wild triatomines (Romaña et al. 1999) once they propitiate the circulation of the *T. cruzi* among several animals. This happens because such biotopes offer good shelter for vertebrates, mainly birds, rodents, and marsupials (Forattini et al. 1971). According to Dujardin et al. (1991), several authors have mentioned in their studies the frequent domiciliary invasions by species of genus *Rhodnius* from the wild habitat. The authors point out that among the 11 described species, 3, whose natural ecotope is palm tree, started to invade the domiciles more often, thus verifying the shift of the presence of these species to the domestic environment.

The coexistence of 2 or 3 species in artificial ecotopes was another factor observed in the present work. In hen-houses covered with straws the main presence verified was *T. brasiliensis*, *T. pseudomaculata*, and *R. nasutus*. In this situation the prevalence of *R. nasutus* was observed, a fact that can be explained by presence of straws and birds. In the roofs of the goat and sheep corrals and hen-houses *T. brasiliensis* associated to *T. pseudomaculata* was frequently found, however, always with prevalence of the first, as already mentioned by Alencar (1987), Bento et al. (1989), and Gomes (1993).

The results obtained from the presence of triatomines in artificial ecotopes are nearly in accordance with the results found by Souza et al. (1999), who worked in Sobral region, Ceará. These results show that the heaps of bricks, tiles, wood, the hen-houses, as well as goat corrals are very attractive for these bugs, because they find there the largest triatominic densities. One of the components that we believe to be more important for the colony maintenance in these annexes would be the great presence of small rodents in the area surrounding houses, according to intense reports of the inhabitants, besides the presence of other animals, domestic or not.

In relation to *T. cruzi* infection, in all domiciliary environments, the infected *T. brasiliensis* specimens were found, resulting in 15% infection, on average. Similar index (17.9%) in this species was obtained in 121 municipal districts of Ceará that were investigated by Alencar (1987). In Currais do Felipe, *T. brasiliensis* presented higher intradomiciliary and peridomiciliary infection index. Another fact that called our attention was the high index of natural infection of *R. nasutus* specimens captured in wild habitat, mainly of Currais do Felipe, where 40.7% specimens coming from this habitat were infected. The global average obtained from the 4 localities was 25%. This number is quite above the percentage found by Pinto and Bento (1986), who obtained the average infection of 4% for the specimens captured in the same ecotope, in the rural area of Piauí (PI). On the other hand, Bento et al. (1984), who performed a work in the urban area of Teresina (PI), also registered a high infection index (26.2%) of this species. These authors mentioned have found infected marsupials, bats, and rodents inhabiting the same ecotope. And, as Barretto (1979) has reported, the high infection index of triatomines captured in palm trees is due to the frequency of the specimens coexisting with infected vertebrates.

The results here found indicate that the studied localities present ecological features favorable to the growing population density of triatomines and their potential to transmit the Chagas disease.

The high density of *T. brasiliensis* colonies and the small *T. pseudomaculata* and *R. nasutus* colonies that were found in the peridomicile, as well as the infection index by *T. cruzi*, demonstrate the high risk of infection to which the residents of these areas are exposed. We suggest, as a control measure, the displacement of the annexes to localities more distant from domiciles or, then, the non-use of carnauba palm as construction material of shelters, which offer favorable conditions to triatomine colonization.

Until the end of eighties, the vectorial transmission of Chagas disease in the Northeast of Brazil was made through *T. infestans, T. brasiliensis, P. megistus*, and *T. pseudomaculata* (Dias et al. 2000). According to these authors, in the last decade (1990), the chemical control was shown to be effective in the decrease of the synanthropic species, in special regarding to *T. infestans*, which is almost eliminated from the state of Bahia, besides *P. megistus. T. brasiliensis* and *T. pseudomaculata*, species that are autochthonous (Costa et al. 2003) and present in high density in the wild habitats, with concentration in the peridomicile, are considered species difficult to be eradicated, specially *T. brasiliensis*, actually considered the most difficult triatomine to be controlled. The Northeast of Brazil, still according Dias et al. (2000), is the endemic region with more problems, because it is the center of dispersion and holds great concentration of *T. brasiliensis*. These authors state that after the elimination of *T. infestans*, a species with low concentration in Northeast, and the reduction of *P. megistus*, with foci only in Pernambuco and Alagoas, it is evident that *T. brasiliensis* and *T. pseudomaculata* should be considered the vectors of Chagas disease in the region, demanding continued entomological surveillance and continuous measures of control, due to their characteristics.

The high density of *R. nasutus* colonies in wild habitat and small colonies in the peridomicile can indicate or determine the sporadic encounter of adults in the intradomicile, however, without evidence of colonization in this environment, suggesting that this species can be in process of adaptation to domiciliary environments.

The non-identification of wild focuses of *T. brasiliensis* and *T. pseudomaculata*, in the studied localities, deserves more intense investigation that can provide a better knowledge about the speed in which the domiciles and peridomiciles are reinfested by these species.

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