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Short Communication

Occurrence of triatomines (Hemiptera: Reduviidae) in domestic and natural environments in Novo Remanso, Itacoatiara, Amazonas, Brazil

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Abstract

Introduction: The present study reports the presence of triatomines in natural, peridomestic, and intradomicile environments in Itacoatiara municipality, state of Amazonas, a non-endemic region for Chagas disease. **Methods**: Active search was performed inside tree trunks, and palm trees, residences, and peridomiciles localized near the forest area. **Results:** Twenty adults and ten triatomines nymphs were collected, fifteen of which were from natural forests, thirteen from intradomiciles, and two from peridomicile areas. **Conclusions:** The new records of adults and nymphs of triatomines in the intra- and peridomiciles suggest the adoption of prophylactic measures for vector surveillance in the study area.

Keywords: Triatominae. Vector. Entomological surveillance.

Insects belonging to the subfamily Triatominae (Hemiptera: Reduviidae) are responsible for transmitting the flagellate parasite *Trypanosoma cruzi* (Kinetoplastida: Trypanosomatidae), the etiological agent of Chagas disease, a complex anthropozoonosis involving distinct domestic and sylvatic mammal species acting as potential reservoirs[1]. Currently, the Triatominae subfamily comprises 18 genera that include 151 valid species, all being potential vectors for the transmission of *T. cruzi* to man and other mammals[2]. In the Amazon, 25 species of triatomines present in natural environments have been reported. Among them, six species offer a high risk to human populations due to their high rates of infection with *T. cruzi*: *Rhodnius pictipes* Stål, 1872; *R. robustus* Larrousse, 1927; *R. stali* Lent, Jurberg & Galvao, 1993; *Panstrongylus geniculatus* (Latreille, 1811); *P. lignarius* (Walker, 1873), and *Triatoma maculata* (Erichson, 1848)[3].

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Records of triatomines colonization in domestic environments from the Brazilian Amazon region are rare. Studies have demonstrated the presence of *P. geniculatus* colonies in pigsties in Ilha de Marajó, state of Pará[4], and of *T. maculata* colonizing houses and chicken houses in Roraima[5]. The occasional observation of colonies in houses and peridomestic sites, as well as the relatively high frequency with which adult specimens are collected inside human domiciles (apparently attracted to light), have been interpreted by some researchers as indicatory signs of their involvement in human Chagas disease outbreaks[5]. However, the lack of reports regarding the presence of triatomines in the intradomicile, peridomicile, and even in the natural environment of the Brazilian Amazon, poses a challenge for understanding the magnitude of the risk of contracting a *T. cruzi* infection. Thus, the present study aimed to report the presence of triatomines in natural, peri-, and intradomicile environments in a non-endemic region for Chagas disease.

This work was developed in the community of Novo Remanso (3° 7' 2.69" S and 59° 4' 16.39" W), approximately 210 km from Manaus, constituting part of the Itacoatiara municipality. The region has a rainy and humid tropical

climate, with temperatures ranging from 23 °C to 40 °C, with an average of 27.1 °C. The collected material was taken to the Laboratory of Animal Biology from the Universidade Federal do Amazonas (UFAM), where the specimens were identified by the dichotomous key of Lent & Wygodzinsky (1979)[6] and the identification guide by Galvão et al. (2014)[7].

For triatomine collection, we searched both natural (forests) and domestic environments. The natural environment was composed of 111 ha divided into plots (40 × 250 m each) without evidence of anthropic action (i.e., without traces of logging or silvicultural activities). Active manual search was performed inside all tree trunks of fallen or standing trees, and by dissection of some palm trees inside each plot. Collections were conducted monthly, from July 2016 to July 2017.

Hollow trunks were first opened and inspected to localize possible food sources for triatomines, or whether there were traces of other food remains or mammalian nests. Whenever necessary, a small opening was made in the trunks with a chainsaw to visualize its inside. If any triatomine was found, the trunks were cut opened along their length. For the investigation of palms, leaves were first dissected with special attention to the petioles and axils. Fibers and other materials accumulated in the axillary area were removed for further observation on a plastic canvas. In some cases, the inflorescence and its spathe were also separated and observed.

Collected triatomines were stored in 50 mL plastic vials (collector type). A small fraction of the substrate from which the triatomine had been collected was also stored. Vials were identified with the corresponding date and place of collection and taken to the Laboratory of Animal Biology (UFAM).

The epidemiological investigation of the domestic environment (homes and peridomiciles) was carried out in 11 residences at different distances from the forest plots. Peridomicile was defined as the existing area around a domicile, within a 100-m radius. After searching in a peridomicile, collection vials, procedure gloves, and a folder with photos and information about triatomines were delivered to the residents, and they were also briefed about the risks of handling an infected triatomine. This measure aimed to enlighten the residents and stimulate their participation to collect some triatomines if they were observed inside their residences.

The present work was submitted to and authorized by the Chico Mendes Institute for Biodiversity Conservation - ICMBio, System of Authorization and Information on Biodiversity – SISBio. It received an authorization for the collection and temporary maintenance of invertebrates. Collections were authorized according to the registration number 54621-1 and the authentication code 94864885.

After the searching period, 30 triatomine specimens (10 nymphs and 20 adults) were collected. Out of these, 13 were found in intradomicile and 2 in peridomicile areas, and 15 in the forest.

Regarding investigated residences, 4 out of 11 harbored triatomines intradomiciliary; collected specimens were adults either dead or in a state of complete immobility that belonged to the species *Eratyrus mucronatus*, *P. geniculatus*, *P. lignarius*, and *R. pictipes*. Only two specimens were found in peridomicile areas, one in a wood pile (an adult of *E. mucronatus*) and the other in a sheepfold (a fourth-instar nymph of *P. geniculatus*) (**Table 1**).

Among the triatomines collected in the natural environment, 7 were nymphs of *R. pictipes*, found between the palm leaves of *Attalea maripa* (inajá), at different developmental stages: 1 at 1st stage, 1 at 2nd stage, 4 at 3rd stage, and 1 at 5th stage. The rest were 8 specimens of *P. geniculatus* collected in hollow logs lying on the forest floor; from these, 6 were nymphs at 3rd stage and 2 were nymphs at 5th stage (**Table 1**).

Our results increased the number of triatomine species recorded in the village of Novo Remanso from one to five: *E. mucronatus*, *P. geniculatus*, *P. lignarius*, *R. amazonicus*, and *R. pictipes*. These Triatominae species have previously been reported as present in Amapá and Rondônia states[8,9,10]. Among these newly reported species of triatomines present in Itacoatiara, only *R. amazonicus* has not yet been found naturally infected with *T. cruzi*[7,11]. Additionally, *R. pictipes* adults were found inside the houses and nymphs were present in *A. maripa* palm. Adults of *P. geniculatus* were also collected inside the houses and nymphs were found in sheep shelter and inside tree trunks in the forest. *P. lignarius* and *E. mucronatus*, were only found inside houses. As no evidence of colonization was found and individuals were localized near an artificial light source, it is suggested that triatomines might be attracted into the houses

TABLE 1: Triatomine species collected in the Village of Novo Remanso, Itacoatiara, AM, Brazil, from July 2016 to July 2017, in wild and domestic environments.

	Collection zone				
Triatomine species	**Trunk**	**House**	**Palm-tree**	**Peridomicile**	**Total**
Eratyrus mucronatus	0	3	0	1	4
Panstrongylus geniculatus	8	4	0	1	13
Panstrongylus lignarius	0	1	0	0	1
Rhodnius pictipes	0	5	7	0	12
Total	8	13	7	2	30

by artificial light. Despite the sylvatic habitats of Amazonian triatomines, epidemiological and entomological data suggest that sporadic contact between vectors infected with *T. cruzi* and humans may occur in different scenarios[3,4,12]. Therefore, the sporadic encounter of adult triatomines within households may be motivated by several factors[3,13,14], but the main one may be related to the presence of light sources.

Some populations of domestic and peridomestic triatomine vectors have been described in different regions of the Amazon basin: *T. maculata*, *R. robustus*, *P. geniculatus*, and *R. pictipes* have been found in urban and rural areas of Roraima, Brazil; while *P. geniculatus* has been found infesting pigsties in Ilha de Marajó, Pará, Brazil; *R. stali* in Alto Beni, Bolivia; *P. lignarius*, in Marañón Valley, Peru; and *T. sordida* in nests of *Gallus gallus* on Acre[12,15]. The genus *Panstrongylus* has several specimens adapted to live inside caverns, either dwelling in hollow trunks or in holes on the forest floor[13]. Both *R. robustus* and *R. pictipes* have been observed inside human dwellings in the Brazilian Amazon, but the frequency of finding *R. pictipes* is much greater, almost 86%[13]. In addition, *R. brethesi* has been reported as an active vector in the Amazon region, considering the rates of *T. cruzi* transmission to people involved in plant extraction activities[13].

Thus, the presence of adults and nymphs of triatomines in intra- and peridomiciles, indicates that it would be important to reinforce the adoption of transmission prevention programs to control Chagas disease in the state of Amazonas. This research also shows the importance for further studies on vectors in the Brazilian Amazon.

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Conflict of interest

The authors declare they have no conflict of interest to disclose.

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