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PENSOFT

First report of *Psammolestes tertius* Lent & Jurberg, 1965 (Hemiptera, Reduviidae, Triatominae) in Rio Grande do Norte state, Brazil

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Abstract

We report the first known occurrence of *Psammolestes tertius* Lent & Jurberg, 1965 (Hemiptera, Reduviidae, Triatominae) in the state of Rio Grande do Norte, Brazil. In 2009 and 2017, 2 adult specimens, a female and a male respectively, were collected at the Seridó Ecological Station, which is located in the municipality of Serra Negra do Norte. These records broadens the geographical distribution of *P. tertius* in Brazil and the biodiversity of triatomines in Rio Grande do Norte.

Key words

Chagas disease; vector; conservation units; ecological station; caatinga; geographical distribution.

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Introduction

Triatomines (Hemiptera, Reduviidae, Triatominae) are hematophagous insects widely scattered in natural and artificial ecotopes (Schofield 2000). Various species are important vectors of *Trypanosoma cruzi* (Chagas, 1909), the etiologic agent of Chagas disease, while others are of little importance from an epidemiological point of view, especially those with low adaptability to artificial ecotopes. Currently, the subfamily Triatominae contains more than 150 species, grouped in 5 tribes and 18 genera (Mendonça et al. 2016, Souza et al. 2016, Oliveira and Alevi 2017, Monteiro et al. 2018, Oliveira et al. 2018).

The genus *Psammolestes* Bergroth, 1911 comprises only 3 species: *Psammolestes arthuri* Pinto, 1926; *Psammolestes coreodes* Bergroth, 1911, and *Psammolestes tertius* Lent & Jurberg, 1965. These species are strongly associated with bird nests. Thus, the rates of *T. cruzi* infection tend to be low and the role of these species in the epidemiology of human disease remains uncertain (Lent and Wygodzinsky 1979).

Psammolestes arthuri can be found in Colombia and Venezuela. However, *P. coreodes* has a distribution that includes Argentina, Bolivia, Brazil (Mato Grosso, Mato Grosso do Sul, and Pernambuco states) and Paraguay. *Psammolestes tertius* occurs in Southeast (Minas Gerais and São Paulo), Midwest (Goiás and Mato Grosso), North (Pará, Tocantins), and Northeast (Alagoas, Bahia, Ceará, Maranhão, Paraíba, Pernambuco and Piauí) regions of Brazil and Peru (San Martín) (Silveira et al. 1984, Cabrera 2006, Galvão et al. 2014). Species of the genus *Psammolestes* have known to occur in nests of the following families of birds: Dendrocolaptidae, Troglodytidae, Furnariidae, Mimidae, and Icteridae (Pinto and Lent, 1935, Pifano 1938, Barretto and Albuquerque 1969, Sherlock and Guitton 1973, Sick 1997, Cruz-Guzmán et al. 2014).

In a comparison using RAPD markers of 2 different populations of *P. tertius* from Ceará and Minas Gerais states and associated with different species of birds (Furnariidae), Soares et al. (2001) demonstrated intraspecific variability, which was probably related to differences in the characteristics of the Caatinga and Cerrado biomes. However, this variability was not corroborated by Oliveira et al. (2016) in a study that compared 2 populations, from Bahia and Ceará states, by means of cytogenetics.

In Rio Grande do Norte state, in the Northeast region of Brazil, at least 8 triatomine species occur naturally: *Panstrongylus lutzi* Neiva & Pinto, 1926, *Panstrongylus megistus* Burmeister, 1835, *Rhodnius nasutus* Stal, 1859, *Triatoma brasiliensis* Neiva, 1911, *Triatoma melanocephala* Neiva & Pinto, 1923, *Triatoma pseudomaculata* Corrêa & Spínola, 1964, *Triatoma petrocchiae* Pinto & Barreto, 1925, and *Triatoma rubrofasciata* (De Geer, 1773) were already identified (Castro-Filho and Silveira 1979, Silveira 2011, Gurgel-Gonçalves et al. 2012, Galvão 2014). One record of *Rhodnius neglectus* Lent, 1954 by Silveira (2011) from Rio Grande do Norte could represent a labeling error or a misidentification; it probably was *R. nasutus*. Despite Rio Grande do Norte having borders with Ceará and Paraíba, where occurrences of *P. tertius* are known, our new record is the first for this species in Rio Grande do Norte.

Methods

The Ecological Station of Seridó (ESEC-Seridó), in Rio Grande do Norte, where insects were collected is located in the municipality of Serra Negra do Norte (Fig. 1). This ecological station is within the Caatinga biome of Seridó region. This region is characterized by high solar irradiance, high average annual temperature and potential evapotranspiration, and low relative humidity and precipitation, which is erratic most of the year and occurs only during a short period (Prado 2003).

Station employees collected specimens on the external wall of the accommodation for researchers by manual capture. These specimens were sent to the Universidade Federal do Rio Grande do Norte, where they were morphologically identified according the characteristics of the head and anterolateral angle of the pronotum described by Lent and Wygodzinsky (1979) for the 2 species of genus *Psammolestes* that occur in Brazil. The specimens were deposited in the Collection of Chagas Disease Vectors (Fiocruz-COLVEC), René Rachou Institute, regional unit of the Oswaldo Cruz Foundation (IRR/Fiocruz). The measurements were made using a Leica M205-C stereomicroscope with a DMC 2900 Leica and LAS software v. 4.9, with a magnification of 7.7×.

Results

New records. Brazil: Rio Grande do Norte: municipality of Serra Negra do Norte, Ecological Station of Seridó (06°34′74″ S, 037°15′88″ W), coll. by Adalberto Antônio Varela-Freire, 5 May 2009 at 0:30 h (1 female, Fiocruz-COLVEC 9966) (Fig. 2A). Brazil: Rio Grande do Norte: municipality of Serra Negra do Norte, within the Ecological Station of Seridó (06°34′26″ S, 037°15′49″ W), coll. by Ramayana Morais de Medeiros Brito, 26 October 2017, at 20:00 h (1 male, Fiocruz-COLVEC 9980) (Fig. 2B).

Identification. Both specimens were identified as *Psammolestes tertius* based on head characteristics: head a little longer than broad, at the level of eyes and excluding neck, with moderate slope behind of the ocelli and the pronotal anterolateral angles very short and obtuse. *Psammolestes coreodes* presents a head with length equal to or slightly smaller than width, at the level of eyes and excluding neck, with a sharp slope behind of the ocelli, and anterolateral angles of the pronotum cuspidal.

Discussion

The genus *Psammolestes* comprised 3 species and seem to have specialized to exploit bird nest microhabitats (Lent and Wygodzinsky 1979). These species are distributed in South America, with a clear ecological niche differences. A recent study predicted the potential geographical distribution for the 3 *Psammolestes* species using ecological niche modeling. The models support that *P. arthuri* occurs in warm and humid areas, *P. coreodes* occupies the driest and coldest areas, and *P. tertius* lives in climatically intermediate areas in the higher altitudes. For *Psammolestes tertius*, this potential area includes the Rio Grande do Norte state (Gurgel-Gonçalves and Silva 2009). Thus, the new records are an important basis for future study and reinforce Gurgel-Gonçalves and Silva's (2009) theoretical model of *Psammolestes* species distribution.

Specimens of *Prosopis juliflora* (Sw) DC 1753 (Leguminosae, Mimosodea) were being removed during 2009 in an effort to eliminate non-native tree species from the semi-arid reserve area. In some of these trees, a species of bird, *Pseudoseisura cristata* Spix, 1824 (Passeriforme, Furnariidae), were observed alive. According to Hughes

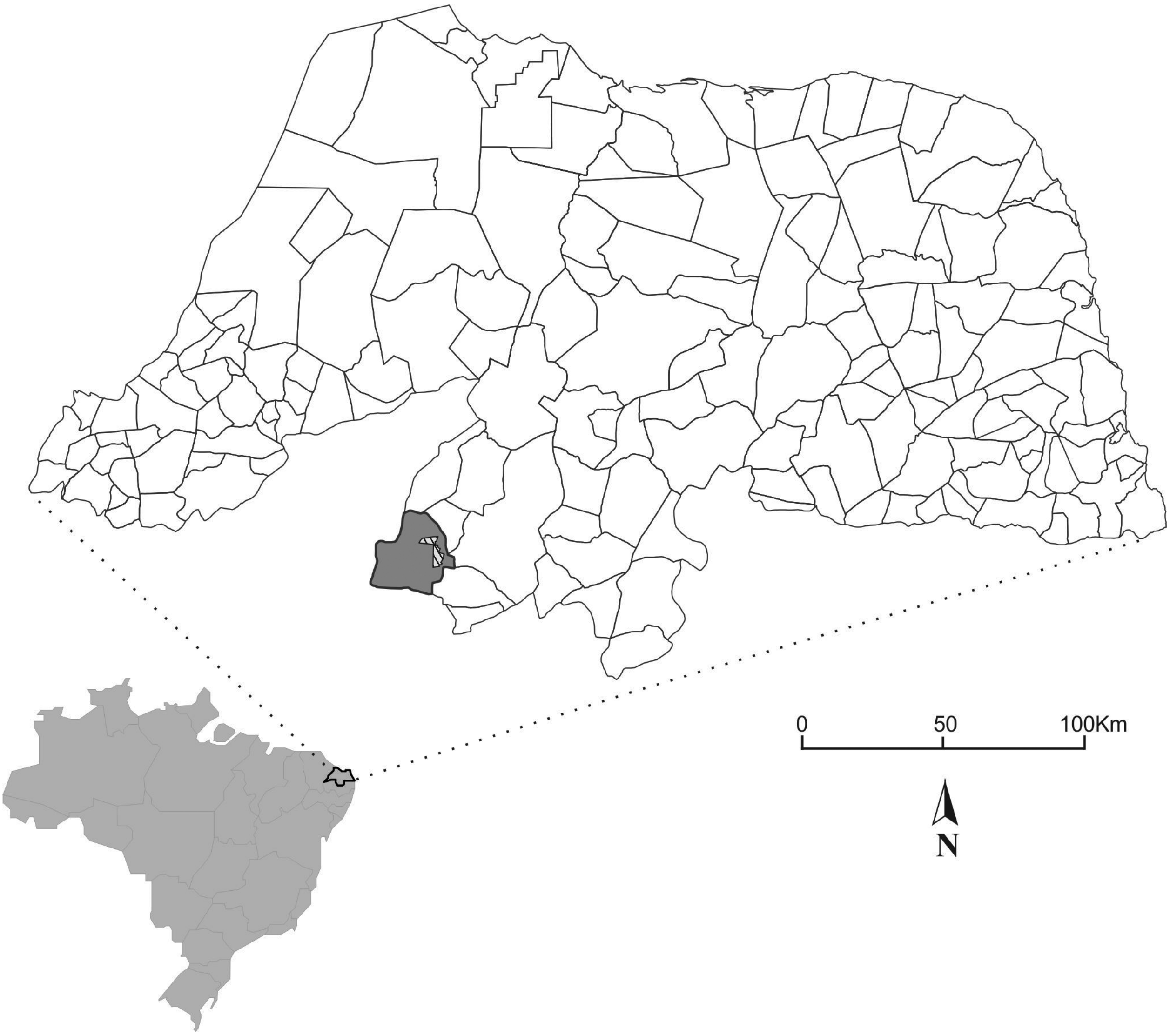

Figure 1. Geographical localization of the Rio Grande do Norte state (Brazil). Highlighting to Serra Negra do Norte municipality and the Estação Ecológica do Seridó (hatched area), where *Psammolestes tertius* were caught.

and Santos (2008), these birds exhibit a marked preference to nest in *P. cristata*. After the removal of these trees, it is possible that the specimens of *P. tertius* were attracted by light of the building on which they were found.

With regards to the male specimen of *P. tertius*, 2017 was the sixth year in a row in which lower than average rainfall was recorded in the region. This, in turn, might have resulted in a scarcity of food resources that might have induced wider than usual dispersion of this insect species.

Based on the 2 new records, we propose that the distribution of *P. tertius* be expanded to include Rio Grande do Norte state, which brings the number of autochthonous triatomine to at least 9 (Castro-Filho and Silveira 1979, Silveira 2011, Gurgel-Gonçalves et al. 2012, Galvão 2014). The dispersion mechanisms of *P. tertius* are not fully understood, although there is evidence that passive dispersion of eggs adhered to bird feathers may occur (Schofield 1994). We do not know the degree to which the park is infested by *P. tertius*, as an active search was not carried out, but probably the infestation is closely related to seasonal variables, such as the nesting period of the birds, which constitute the main feeding source for these insects (Espinola 1985).

The ESEC-Seridó, despite of its small area, is of great importance within the context of conserving the biodiversity of the Caatinga biome. This place shelters a great diversity of animal and plant species, including the first known occurrence of P. *tertius* in Rio Grande do Norte. The preservation and maintenance of this reserve should be a priority.

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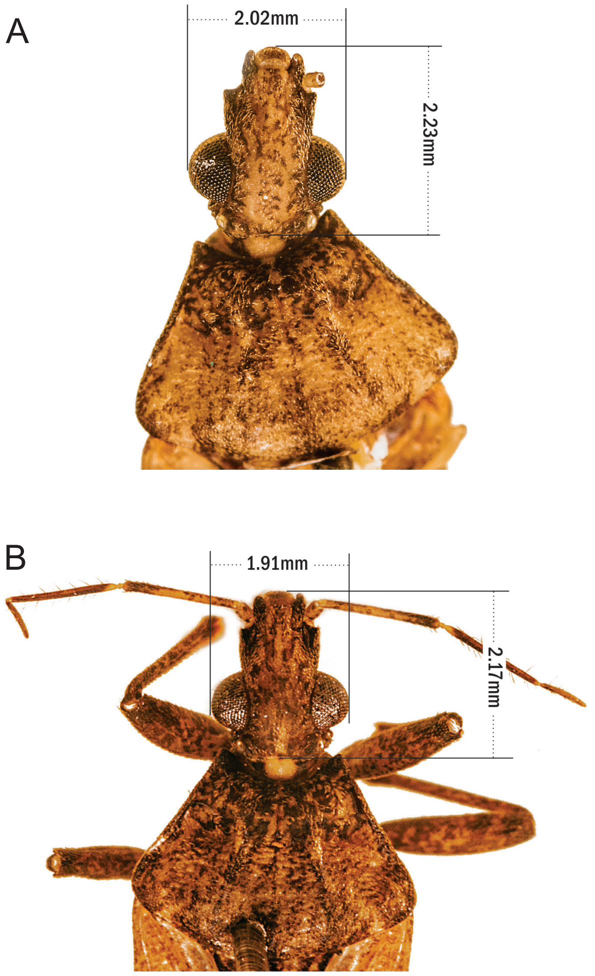

Figure 2. Head measurements of *Psammolestes tertius*. **A.** Female. **B.** Male. Both captured in the municipality of Serra Negra do Norte, Ecological Station of Seridó, RN, Brazil.

da Biodiversidade (ICMBio), Collection of Chagas Disease Vectors (Fiocruz-Colvec). Dr Paloma Helena Fernandes Shimabukuro (IRR/Fiocruz Minas) and Cyro José generously provided us measurements and photographs, respectively. We thank the late Adalberto Antônio Varela-Freire from the Departamento de Microbiologia e Parasitologia and Carlos Varela-Freire for their technical assistance. Finally, our appreciation is extended to the reviewers and the academic editor for their constructive suggestions that greatly improved the manuscript.

Authors' Contributions

ACJC collected the data; EC and ACJC sought financial support for this study; ACJC and RCMS identified the specimens; ANBS, RCMS, LD, LMCG and PICO wrote the text. ANBS produced the map; all authors revised the text.

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