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Triatomines know no boundaries: *Triatoma delpontei* Romaña & Abalos, 1947 (Heteroptera: Reduviidae) discovered in Mato Grosso do Sul State, Brazil

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Abstract: Triatominae are recognized as vectors of *Trypanosoma cruzi*, a protozoan which is the etiological agent of Chagas disease. A specimen of *Triatoma delpontei* was found at Porto Murtinho in Mato Grosso do Sul State, Brazil. This is the first report of the occurrence of *T. delpontei* to the state of Mato Grosso do Sul, Brazil. With the present finding, the total number of triatomines recorded in Mato do Grosso do Sul reaches 17 species, while *T. delpontei*, previously recorded only from Rio Grande do Sul, is now recorded to a second Brazilian state. Based on the information available in the literature, a meticulous and organized compilation has been crafted, highlighting the cytogenetics differentiations of the species occurring in this state. This work emphasizes the importance of continuous research and surveillance on Triatominae, recognized as vectors of *T. cruzi*.

Key words: Biogeography, kissing bugs, Triatomini, surveillance, vectors.

INTRODUCTION

Since the discovery of the Chagas disease, blood-sucking bugs of the subfamily Triatominae (Hemiptera: Heteroptera: Reduviidae) have been recognized as proved or potential vectors of Chagas disease, caused by the protozoan *Trypanosoma cruzi* (Chagas, 1909) (Kinetoplastida: Trypanosomatidae), and which is still of major importance in Public Health in Latin America (Lent & Wygodzinsky 1979, Monteiro et al. 2018).

Currently, about 159 species of Triatominae are considered as valid (Oliveira et al. 2023, Alevi et al. 2021, Correia et al. 2022, Gil-Santana et al. 2022, Téllez-Réndon et al. 2023, Zhao et al. 2023, Galvão et al. 2003, Galvão 2014). The two latter works summarized the known distribution of triatomines species to the World and Brazil, respectively. Yet, regional surveys of these insects have increased the knowledge of the species which occur in the Brazilian state of Mato Grosso do Sul (MS) (Almeida et al. 2008, Cominetti & Andreotti 2021, Almeida et al. 2023). As a result, 17 species of Triatominae had been recorded to MS state so far (taken into consideration the first report of *T. delpontei* presented here) (Galvão et al. 2003, Galvão 2014, Almeida et al. 2023) (Table I).

Triatoma delpontei Romaña & Abalos, 1947 was described from Argentina, based on several male and female specimens (Romaña & Abalos 1947). Besides Argentina, *T. delpontei* has been recorded from Bolivia, Paraguay, Uruguay (Lent & Wygodzinsky 1979, Galvão et al. 2003), and in Brazil, previously only from the state of Rio Grande do Sul (Agrelo et al. 1993). The

Table I. Triatominae species currently recorded from Mato Grosso do Sul by Galvão et al. (2003), Galvão (2014), Almeida et al. (2023) and this work.

Tribe	Species	Inaturalist record
Cavernicolini	*Cavernicola pilosa* Barber, 1937	
Rhodniini	*Psammolestes coreodes* Bergroth, 1911	
	Rhodnius neglectus Lent, 1954	
	Rhodnius pictipes Stål, 1872	
	Rhodnius stali Lent, Jurberg & Galvão, 1993	
Triatomini	*Panstrongylus diasi* Pinto & Lent, 1946	https://www.inaturalist.org/observations/126754495
	Panstrongylus geniculatus (Latreille, 1811)	https://www.inaturalist.org/observations/68920364
	Panstrongylus guentheri Berg, 1879	
	Panstrongylus megistus (Burmeister, 1835)	https://www.inaturalist.org/observations/109635127
	Triatoma baratai Carcavallo & Jurberg, 2000	
	Triatoma costalimai Verano & Galvão, 1958	
	Triatoma delpontei Romaña & Abalos, 1947 (**new record**)	
	Triatoma matogrossensis Leite & Barbosa, 1953	
	Triatoma pseudomaculata Côrrea & Spínola, 1964	
	Triatoma sordida (Stål, 1859)	
	Triatoma vandae Carcavallo et al., 2002	
	Triatoma williami Galvão et al., 1965	

species is basically ornitophilic, but has been found naturally infected with *T. cruzi* (Lent & Wygodzinsky 1979). *Triatoma delpontei* seems closer to *T. platensis* Neiva, 1913 from which it is separated by a well-defined set of characters (Romaña & Abalos 1947, Lent & Wygodzinsky 1979, Galvão 2014).

We meticulously compiled cytogenetic data from relevant literature sources, marking the first-ever compilation of such information for the state. This allowed us to propose a table of distinguishing characters.

MATERIALS AND METHODS

The collection was carried out on March 27, 2023, through the retrieval of the specimen in a bedroom inside an intradomiciliary environment. The resident responsible for the collection made the necessary efforts to transport the specimen to the surveillance service. The residence is located at "*Fazenda Barranco Branco*", in the municipality of Porto Murtinho, MS, Brazil (Figure 1).

The specimen was studied and identified as *T. delpontei*, following the dichotomous keys of Lent & Wygodzinsky (1979) and Galvão (2014).

This action reveals a specific interest in scientific investigation, aiming to deepen the knowledge about the species in question. Such an approach provides a valuable context for the analysis and understanding of domestic ecosystems, enabling the identification of possible interactions and impacts that may affect the health and well-being of the population.

Additionally, the collection plays a fundamental role in formulating preventive and control measures aimed at promoting a safe and healthy residential environment through passive surveillance. The records of the

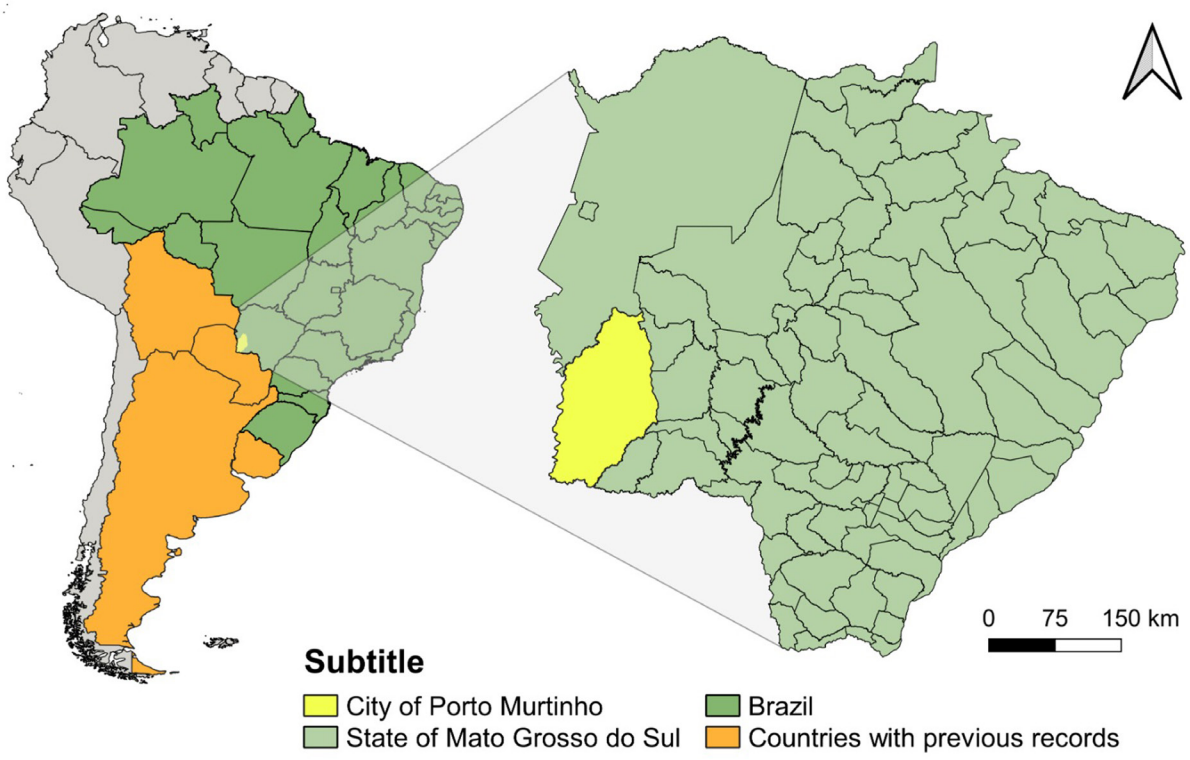

Figure 1. Location of *Triatoma delpontei* Romaña & Abalos, 1947 collection in the municipality of Porto murtinho, Mato Grosso do Sul, Brazil.

Panstrongylus Berg, 1879 species were retrieved from the iNaturalist platform, and the images were graciously provided by the naturalist photographer, Vinicius Rodrigues de Souza.

RESULTS AND DISCUSSION

The specimen (Figure 2) was identified as *T. delpontei* following the consultation of keys, diagnosis and descriptions available in the literature (Romaña & Abalos 1947, Lent & Wygodzinsky 1979, Carcavallo et al. 71998, Galvão 2014) and showed complete concordance with all these sources of information. In short, the following characteristics allowed the identification of the specimen (Figure 2): a medium sized triatomine (total length of 23.5 mm); general coloration black to brownish black; a pair of lateral orange markings on neck and anterolateral portions of hind lobe of pronotum; corium of hemelytra irregularly marked with pale portions; membrane dark orange mottled with dark, with an irregular central dark marking which includes the median portion of both cells; femora and tibiae dark, without markings; connexivum blackish with subapical (segments II-VI) or submedian (segment VII) whitish pale markings, which are narrower on their middle portion on segments III-VII. Surface of the body, including corium and legs, with numerous adpressed pale to golden setae. Head slightly longer than pronotum; scape relatively short, far from attaining apex of clypeus; first visible labial segment slightly shorter than the last one, the second visible labial segment approximately twice longer than each of the others; scutellum without prominent anterior tubercles; legs stout; fore and middle femora with a pair of small subapical acute prominences, ventrally. The specimen was deposited in the Triatominae

Figure 2. *Triatoma delpontei* Romaña & Abalos, 1947, male from Mato Grosso do Sul, Brazil, dorsal view, scale bar 5.0 mm.

Collection of the Oswaldo Cruz Institute (CTIOC) (under No. 14007).

New record. BRAZIL – **Mato Grosso do Sul** • Porto Murtinho/Fazenda Fazenda Barranco Branco; 23.III.2023; leg. dweller of the residence. CTIOC 14007, 1 ♂ (Figure 2).

Another important fact is that when checking iNaturalist, we found records of three species already reported for the state of Mato Grosso do Sul: *P. diasi* Pinto & Lent, 1946 (Figure 3a-b), *P. megistus* (Burmeister, 1835), and *P. geniculatus* (Latreille, 1811) (Table I). It is worth noting that the live record of *P. diasi* is the first reported in the literature. This species had never been reported alive before, and it was documented living in a graveyard in the municipality of Cassilândia, MS. This occurrence reinforces the distribution of triatomines in different habitats, as discussed by Cruz et al. (2023). Triatomines have been previously reported in sylvatic cemeteries (Di Primio 1952, 1963, Buitrago et al. 2010, Paiva et al. 2021). This time we documented their occurrence in an urban graveyard (Figure 3c).

In this sense, the use of this information from iNaturalist demonstrates the importance of citizen science. By involving ordinary people in scientific activities, citizen science expands the reach and capacity of research. It allows non-scientists to contribute to data collection, observations, and analyses, playing an active role in the production of scientific knowledge. In the case of conservation science, in particular, the participation of citizens is crucial for addressing complex environmental challenges and gaining a broader understanding of issues related to biodiversity and the biology of a vector species.

Citizen science provides a way to engage society more widely, promoting awareness and public engagement in scientific research. Furthermore, it contributes to a more inclusive and democratic approach to science, allowing different perspectives to be considered and incorporated into decision-making processes. With more diverse participation, citizen science can also help build a more comprehensive and representative knowledge base, addressing gaps and expanding the collective understanding of the environmental challenges we face. In the literature, there are already numerous studies that have highlighted and demonstrated the importance and effectiveness of citizen science, such as Cull (2021), Hamer et al. (2018) and Bonney et al. (2015).

Almeida et al. (2008) highlighted the presence of *T. b. brasiliensis* Neiva, 1911 in the state of MS. However, after a reevaluation of the

Figure 3. ***Panstrongylus diasi*** **Pinto & Lent, 1946, a-Dorsal view; b-Lateral view; c-Graveyard where the specimen was photographed.**

identification, 15 years later, the second author (PSA) confirmed that the previous identification was incorrect, and the specimen is actually a specimen of *T. matogrossensis* Leite & Barbosa, 1953. As a conclusion, with the current report, a total of 17 species of Triatominae are recorded to the state of MS (Table I) and *T. delpontei* has its occurrence extended to two Brazilian states.

Recently, Nhapulo et al. (2023) and Mello et al. (2023) developed dichotomous keys based on cytogenetic data to assist in the correct identification of triatomines reported in Brazilian states with an outbreak of oral transmission of Chagas disease (Paraíba, Pernambuco and Rio Grande do Norte). The authors highlighted the importance of cytogenetic data for differentiating morphologically related species, such as *T. b. brasilensis* and *T. petrocchiae* (Pinto & Barreto, 1925), as well as *T. maculata* (Erichson, 1848) and *T. pseudomaculata* Corrêa & Espínola, 1964.

Triatoma b. brasiliensis and *T. matogrossensis* present cytogenetic differences: presence of 45S rDNA present in a pair of autosomes and in X and Y sex chromosomes, respectively (Pita et al. 2022). This information is important, because if cytogenetic studies were applied by Almeida et al. (2008), the misidentification would not have happened. Thus, we compiled all cytogenetic information from fluorescence *in situ* hybridization (FISH) of triatomine species from MS (Table II) (Pita et al. 2022), and we emphasize that *T. delpontei* presents totally different markings from the other taxa (Table II), which can be used for the diagnosis of the species.

It is important to highlight that *T. delpontei*, previously recorded only in the state of Rio Grande do Sul, has now been identified in a second Brazilian state. These findings are crucial for understanding the diversity and distribution

Table II. Cytogenetic information from fluorescence *in situ* hybridization (FISH) of triatomine species from Mato Grosso do Sul. X: X sex chromosome; Y: Y sex chromosome Y; A: autosomes.

Species	X	X and Y	A	X and A
Psammolestes coreodes				
Rhodnius neglectus				
Rhodnius pictipes				
Rhodnius stali				
Panstrongylus geniculatus				
Panstrongylus megistus				
Triatoma baratai				
Triatoma costalimai				
Triatoma delpontei				
Triatoma matogrossensis				
Triatoma pseudomaculata				
Triatoma sordida				
Triatoma vandae				
Triatoma williami				

of triatomine in Brazil, providing valuable information for the control and prevention of Chagas disease, especially in states bordering other countries. Additionally, the record of *T. delpontei* in MS underscores the need for constant monitoring and effective control strategies to address the geographic expansion of these vector insects and the threat they pose to public health.

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REFERENCES

AGRELO RS, BASMADJIAN Y, ROSA R & PUIME A. 1993. *Triatoma delpontei* Romaña & Abalos, 1947 (Hemiptera, Triatominae) en el estado Brasileño de "Rio Grande do Sul. Rev Inst Med Trop 35: 73-76.

ALEVI KCC, OLIVEIRA J, ROCHA DS & GALVÃO C. 2021. Trends in taxonomy of Chagas disease vectors (Hemiptera, Reduviidae, Triatominae): from Linnaean to integrative taxonomy. Pathogens 10: 1627.

ALMEIDA OS, CERETTI JÚNIOR W, OBARA MT, SANTOS HR, BARATA JMS & FACCENDA O. 2008. Levantamento da fauna de Triatominae (Hemiptera: Reduviidae) em ambiente domiciliar e infecção natural por Trypanosomatidae no Estado de Mato Grosso do Sul. Rev Soc Med Trop 41: 374-380.

ALMEIDA OS, RAMOS EP, SOUZA MS, REIS GBS, GALVÃO C, ALEVI KCC & OLIVEIRA J. 2023. New occurrence of *Triatoma costalimai* Verano e Galvão, 1958 (Hemiptera, Triatominae) in Mato Grosso do Sul, Brazil, a vector of Chagas disease endemic to the Brazilian Cerrado. J Vector Ecol 48(2): 138-140.

BONNEY R, PHILLIPS T, BALLARD H & ENCK J. 2015. Can citizen science enhance public understanding of science? Pub Underst Sci 25: 2-16.

BUITRAGO R, WALECKX E, BOSSENO MF, ZOVEDA F, VIDAURRE P, SALAS R, MAMANI E, NOIREAU F & BRENIÈRE SF. 2010. First report of widespread wild populations of *Triatoma infestans* (Reduviidae, Triatominae) in the valleys of La Paz, Bolivia. Am J Trop Med Hyg 82: 574-579.

CARCAVALLO RU, GIRÓN IG, JURBERG J, GALVÃO C & LENT H. 1998. Chaves gráficas para as tribos, gêneros e espécies da subfamília Triatominae. In: Carcavallo RU, Girón IG, Jurberg J & Lent H (Eds), Atlas dos vetores da doença de Chagas nas Américas. Rio de Janeiro, Brasil: Editora Fiocruz, p. 107-244.

COMINETTI MC & ANDREOTTI R. 2021. Triatominae fauna (Hemiptera: Reduviidae) in Mato Grosso do Sul, Brazil, and the influence of climatic elements on their populations. Med Res Arch 9: 1-15.

CORREIA JPSO, GIL-SANTANA HR, DALE C & GALVÃO C. 2022. *Triatoma guazu* Lent and Wygodzinsky is a junior synonym of *Triatoma williami* Galvão, Souza and Lima. Insects 13: 591.

CRUZ KSD, RIBEIRO MAL, MADEIRA FP, PAIXÃO DDS, JESUS AC, CAMARGO LMA, ROSA JA, OLIVEIRA J, BERNARDE OS & MENEGUETTI DUO. 2023. Occurrence of triatomines in public spaces: An atypical case in the Southwestern Brazilian Amazon. Rev Inst Med Trop 56: e0605-2022.

CULL B. 2021. Potential for online crowdsourced biological recording data to complement surveillance for arthropod vectors. PLoS ONE 16: e0250382.

DI PRIMIO R. 1952. Transmissores da Doença de Chagas e respectivos índices de infecção no Rio Grande do Sul. An Fac Med Porto Alegre 13: 57-92.

DI PRIMIO R. 1963. Presença de triatomíneos em novas áreas do Rio Grande do Sul. An Fac Med Porto Alegre 23: 87-91.

GALVÃO C. 2014. Vetores da doença de Chagas no Brasil. Curitiba, Paraná: Sociedade Brasileira de Zoologia.

GALVÃO C, CARCAVALLO R, ROCHA DS & JURBERG J. 2003. A checklist of the current valid species of the subfamily Triatominae Jeannel, 1919 (Hemiptera, Reduviidae) and their geographical distribution, with nomenclatural and taxonomic notes. Zootaxa 202: 1-36.

GIL-SANTANA HR, CHAVEZ T, PITA S, PANZERA F & GALVÃO C. 2022. *Panstrongylus noireaui*, a remarkable new species of Triatominae (Hemiptera, Reduviidae) from Bolivia. ZooKeys 1104: 203-225.

HAMER SA, CURTIS-ROBLES R & HAMER GL. 2018. Contributions of citizen scientists to arthropod vector data in the age of digital epidemiology. Curr Res Insect Sci 28: 98-104.

LENT H & WYGODZINSKY P. 1979. Revision of the Triatominae (Hemiptera: Reduviidae) and their significance as vectors of Chagas' disease. Bull Am Mus Nat Hist 163: 123-520.

MELLO DV, NHAPULO EF, CESARETTO LP, ALEVI JJ, CRISTAL DC, MONTANARI G, GALVÃO C & ALEVI KCC. 2023. Dichotomous Keys Based on Cytogenetic Data for Triatomines Reported in Brazilian Regions with Outbreaks of Orally Transmitted Chagas Disease (Pernambuco and Rio Grande Do Norte). Trop Med Infecti Dis 8: 196.

MONTEIRO FA, WEIRAUCH C, FÉLIX M, LAZOSKI C & ABAD-FRANCH F. 2018. Evolution, systematics, and biogeography of the Triatominae, vectors of Chagas disease. Adv Parasit 99: 265-344.

NHAPULO EF, MELLO DV, CESARETTO LP, ALEVI JJ, CRISTAL DC, MONTANARI G, AZEVEDO LMS, MASARIN IDS, GALVÃO C & ALEVI KCC. 2023. Cytogenetic Key to Identification of Triatominae Species Reported in an Outbreak Region of Oral Transmission of Chagas Disease in the Brazilian Northeast. Am J Trop Med Hyg 108: 1161-1163.

OLIVEIRA J, ALEVI KCC, ALMEIDA CE, OLAIA N, CACINI GLM, GALVÃO C, HERRERA HM, SANTOS FM & ROSA JÁ. 2023. Exploring the Hidden World of Vectors of Chagas Disease: A Fascinating Look at the Taxonomic Aspects of the *Psammolestes* Genus (Hemiptera, Triatominae). Life 13: 1081.

PAIVA VF, BELINTANI T, OLIVEIRA J, SILVA LA, MELLO F, BRITO MO, BEDIN C & ROSA JA. 2021. Entomoepidemiologia da doença de Chagas na região sul do Brasil: coletas de Triatominae em sete municípios do Rio Grande do Sul. In: Oliveira J, Alevi KCC, Camargo LMA & Meneguetti DUO (Eds), Atualidades em Medicina Tropical na América do Sul: Vetores. Rio Branco, Acre: Strictu Sensu Editora, p. 135-145.

PITA S ET AL. 2022. High chromosomal mobility of rDNA clusters in holocentric chromosomes of Triatominae, vectors of Chagas disease (Hemiptera-Reduviidae). Med Vet Entomol 36: 66-80.

ROMAÑA C & ABALOS J. 1947. *Triatoma delpontei* n. sp. (Hemiptera, Reduviidae). An Inst Med Reg 2: 79-93.

TÉLLEZ-RENDÓN J, ESTEBAN L, RENGIFO-CORREA L, DÍAZ-ALBITER H, HUERTA H & DALE C. 2023. *Triatoma yelapensis* sp. nov.

(Hemiptera: Reduviidae) from Mexico, with a Key of *Triatoma* Species Recorded in Mexico. Insects 14: 331.

ZHAO Y, FAN M, LI H & CAI W. 2023. Review of Kissing Bugs (Hemiptera: Reduviidae: Triatominae) from China with Descriptions of Two New Species. Insects 14: 450.

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