

# Triatomines in New Mexico: Species Diversity and *Trypanosoma cruzi* Prevalence in Communities with Frequent Exposure and Home Intrusion

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## ABSTRACT

Triatomine insects are hematophagous assassin bugs, and the vector for *Trypanosoma cruzi*, commonly known as Chagas disease. Human exposure to triatomines is high in certain regions of the US Southwest, prompting increased research attention to clarify infection risk-profiles in most southwestern states. Despite anecdotal reports of frequent triatomine-human exposure and home intrusion in parts of New Mexico, there is a paucity of triatomine and *T. cruzi* research in the state. Between March and December 2024, 244 triatomines were collected from six New Mexico counties through study team trapping and community scientist submissions.

*Triatoma rubida* (n = 188) and *Hospesneotomae protracta* (n = 49) were most frequently collected with 80% of insects obtained inside, or immediately outside, of human dwellings. Overall *T. cruzi* infection was 9% among tested insects, and 11% among triatomines collected inside or surrounding homes. Among collected species, we identified *Triatoma recurva* (n = 5), a species not previously considered to inhabit New Mexico. This study highlights the fact that human-triatomine exposures to *T. cruzi* infected triatomines are occurring in the state. Coupled with the differential transmission efficacy of triatomine species and lack of disease reportability in the state, our results support a need for further triatomine and *T. cruzi* research in New Mexico.

**KEYWORDS:** Triatominae, Kissing Bugs, *Trypanosoma cruzi*, Chagas disease

## 1 INTRODUCTION

Triatomines are hematophagous reduviid insects capable of transmitting *Trypanosoma cruzi*, the parasite responsible for Chagas disease (Bern, Messenger et al. 2019). In addition to their role in disease transmission, the insects are vectors of public health importance due to their potential to induce allergic and anaphylactic reactions in humans following the insect bite (Anderson and Belnap 2015). Though both U.S.-acquired Chagas disease and triatomine-bite-induced anaphylaxis are considered uncommon, these conditions have been primarily reported in southwestern states, where triatomine species richness and vector-human interaction is considered highest in the nation (Bern, Messenger et al. 2019, Valdez-Tah and Ibarra-Cerdeña 2021).

*T. cruzi*-infected triatomines primarily cause human infection through stercorian transmission (Bern, Messenger et al. 2019). After taking a blood meal, triatomines excrete parasite-laden fecal material that may enter mucosal membranes or abrasions of the skin, establishing infection. A potentially fatal but treatable condition, Chagas disease will subclinically progress to dilated cardiomyopathy in 20–30% of chronic cases (Bern, Messenger et al. 2019). Understanding triatomine vector ecology is thus important for public health efforts, as parasite transmission capacity is thought to vary among triatomine species (Chaves, Meyers et al. 2023). In the U.S., *Triatoma gerstaeckeri* is considered the most efficient vector due to its greater affinity for *T. cruzi* acquisition and behavioral blood-feeding-to-defecation timeline compared to other U.S. species (Bern, Messenger et al. 2019, Chaves, Meyers et al. 2023).

The state of Texas has historically been the epicenter of the U.S.-triatomine and *T. cruzi* research, supported by more than a decade of continuous vector ecology efforts through academic and community scientist insect collections (TAMU 2024). Seven triatomine species have been reported in Texas, with *T. gerstaeckeri* the most frequently collected. Among the three documented species in California, *Hospesneotomae protracta* (formerly classified *Triatoma protracta*) is most frequently observed (de Paiva, de Oliveira et al. 2025). Among the six documented species in Arizona, *Triatoma rubida* predominates in the majority of the state with *Triatoma recurva* most frequently observed in the Bisbee district, close to the U.S.-Mexico border (Behrens-Bradley, Smith et al. 2020). As of 2024, six triatomine species were documented in NM (Bern, Messenger et al. 2019, CDC 2024) (*T. rubida*, *H. protracta*, *T. gerstaeckeri*, *Triatoma indictiva*, *Paratriatoma lecticularia*, and *Paratriatoma hirsuta*) where a paucity of current triatomine vector, human, and animal studies exist.

*T. cruzi* infected triatomines and mammalian reservoirs have been previously identified in NM; however, much of this research is derived from studies of neighboring states that included a handful of locally collected specimens (Rodriguez, Luna et al. 2021, Chaves, Meyers et al. 2023). Ectoparasitic-mite parasitism of triatomines has also been previously documented in the state, though the role of these insects in the triatomine-*T. cruzi* transmission cycle is unclear (Dye-Braumuller, Waltz et al. 2021). No contemporary studies have yet focused on triatomine vector ecology or human infection risk in NM. To date, no locally acquired human cases have been documented, and the disease is not reportable to the state health department. Anecdotal evidence from a NM community scientist network suggests triatomines are a major pest species in certain regions, with frequent home intrusion (*personal communication*). In order to better clarify the public health risk triatomines pose to communities in NM, this study had two primary aims. First, we reviewed what is known about triatomine species diversity across NM from the literature and biodiversity

databases. Second, we present the results of a 2024 triatomine sampling initiative to determine the public health risk these insects pose to NM communities with frequent exposure.

## 2 METHODS AND MATERIALS

### 2.1 Triatomine Species Diversity Review

We conducted a review of the NM triatomine and *T. cruzi* literature and the following biodiversity collection occurrence databases: iNaturalist (verifiable, research grade observations), The Global Biodiversity Information Facility (GBIF), and the vetted, triatomine databank DataTri (Ceccarelli, Balsalobre et al. 2018, Ceccarelli, Balsalobre et al. 2022). Observations were included if the following criteria were met: having available coordinates, coordinate location in the state of NM, and observed insect(s) identified to species. Articles from the literature were selected for inclusion when triatomine species and geographic location were noted. We used Google Scholar and Pubmed with search terms including: “*T. cruzi*,” “*Trypanosoma cruzi*,” “Chagas disease,” “Triatomine,” “Kissing bug,” and “New Mexico.” A final database of literature and databank observations was compiled and examined to remove duplicate occurrences. Species observations derived from reviews of the literature and original research were recorded in the final database as a singular observation. A species observation diversity map was then created from the final database of biodiversity databank observations and the peer-reviewed literature (Ceccarelli S 2022, User 2025). All maps included in this study were rendered using ArcGIS Pro v. 2.6 (ESRI, Redlands, CA) using a Mercator Auxiliary Sphere projection, WGS 1984 coordinate system, and D WGS 1984 datum.

### 2.2 Study Team Triatomine Sampling Initiative

#### *2.21 Collection of Triatomine Insects*

The study team sampling initiative included triatomine submissions from a network of community scientists as well as active trapping efforts by the study team. The community scientist network primarily comprised individuals living in anecdotally high triatomine-human exposure regions of NM, with history of commonly encountering triatomines on their property. Participants were asked to collect and immediately store live insects in the freezer (-18 °C) for transfer to a local researcher for preliminary insect identification. The study team also actively trapped for triatomines via sheetlighting (Dye-Braumuller, Waltz et al. 2021). When trapping events occurred near community scientist homes, sheet lighting was conducted with an additional search for insects near homes and other structures within approximately 80 m from the sheet. All insects identified as triatomines were then placed in 70% ethanol and shipped to the Nolan Laboratory at the University of South Carolina for species verification and testing.

#### *2.22 Insect Trapping and Morphological Identification*

All adult triatomines were morphologically identified to species using a dichotomous key for triatomines in the U.S. under a dissecting microscope (Lent and Wygodzinsky 1979). Insects were sexed and the presence of ectoparasitic mites was recorded. Mites were carefully removed from triatomines using a single round, synthetic, size 0 paintbrush (Michaels Stores, Inc., Irving, TX), and stored at ambient temperature in labeled, 1.5 mL microcentrifuge tubes with 70% ethanol. Mites that were found within the original collection vial (and had become detached from the triatomine prior to speciation) were also recorded and stored until identification.

Mites were shipped to the Mississippi Entomological Museum for species identification. All mite specimens were individually slide mounted and viewed under a dissecting microscope and identified, when possible, to species using a dichotomous key.

### 2.23 Laboratory Analysis

All triatomines obtained during the study period were stored in 70% ethanol until processing, and (n = 233) speciated, adult insects were selected for *T. cruzi* testing. The abdomens of each triatomine were cut at the mesothorax, and hindgut tissue was obtained for DNA extraction using the QIAGEN DNeasy Blood and Tissue Kit (QIAGEN, Hilden Germany). Quantitative polymerase chain reaction (qPCR) was then conducted targeting a highly conserved 166 base pair region of the *T. cruzi* kinetoplast satellite DNA (Duffy, Cura et al. 2013). Amplification reactions of 25  $\mu$ L total volume were set up as follows: 10  $\mu$ L Fast Start Universal Probe Master Mix (Roche Diagnostics GmbH Corp, Mannheim, Germany), 0.0625  $\mu$ L forward primer (5'-ASTCGGCTGATCGTTTTCGA-3'), 0.0625  $\mu$ L reverse primer (5'-AATTCCTCCAAGCAGCGGATA-3'), 0.0625  $\mu$ L probe (5'Fam-CACACACTGGACACCAA-NFQ-MGB-3'), 9.81 nuclease free water, and 5  $\mu$ L sample DNA (Duffy, Cura et al. 2013). A positive control (genomic *T. cruzi* DNA) (ATCC, Manassas, VA, USA) and a negative control (no template control with nuclease free water) were used to optimize and ensure quality of the reaction. All qPCR reactions were performed in a QuantStudio 5 Real-Time PCR system (Applied Biosystems, Foster City, CA, USA) with conditions as follows: 95 °C for 2 min, followed by 40 cycles of 95 °C for 15 s and 60 °C for 30 s. Samples were considered *T. cruzi*-positive when the cycle threshold (Ct) value was  $\leq 36$ .

### 2.24 Statistical Analyses

Univariate logistic regression was performed to ascertain the likelihood of two separate binary outcome variables, (1) *T. cruzi* positivity status and (2) ectoparasitic mite presence, within collected triatomines related to various ecological characteristics. Statistics were conducted using SAS statistical software (SAS Institute Inc., Version 9.4M9, Cary, NC, USA).

## 3 RESULTS

### 3.1 Triatomine Species Diversity Review

From the peer-reviewed scientific literature and biodiversity databases a total of eight triatomine species were documented across the state of NM (*H. protracta*, *T. rubida*, *T. recurva*, *T. gerstaeckeri*, *T. indictiva*, *P. hirsuta*, *P. lecticularia*, and *T. sanguisuga*). Observations with years reported (89.2%) occurred between 1936 and 2025. A total of 186 observations were included, with all but 20 originating from biodiversity databanks. These 20 observations were obtained from two publications from the literature, one review and one original research article (Bern, Kjos et al. 2011, Rodriguez, Luna et al. 2021). Among cited species observations, 64% (n = 119) were *H. protracta*, which was documented across 19 counties, shown in Figure 1. *Triatoma rubida* was identified in 11 counties and comprised over one-quarter of observations (n = 48). *Paratriatoma hirsuta* (n = 5) was reported in five counties (Grant, Eddy, Lincoln, Luna, and McKinley), with the remaining species observed in three or fewer counties. *Triatoma indictiva* (n = 4) was observed in Grant, Hidalgo, and Eddy Counties, *T. gerstaeckeri* (n = 4) in Chaves and Eddy Counties, and *T. sanguisuga* (n = 3), *P. lecticularia* (n = 2) and *H. incrassata* (n = 1) from Doña Ana County.

### 3.2 Study Team Triatomine Sampling Initiative

Between March and December 2024, the study team sampling initiative yielded 249 triatomine insects from 21 sites in NM. The majority of these sites represented community scientist households, four of which doubled as study team trapping locations. Five sites were not associated with a household. Aside from one suburban community scientist residence, all locations where community scientist submissions or study team insect trapping occurred, were rural. Shown in Figure 2, community scientists submitted insects from Catron, Chaves, De Baca, Grant, and Hidalgo counties. Study team trapping efforts occurred in Doña Ana, Grant, and Hidalgo Counties.

Eight insects included in the study were opportunistically captured in 2023 by community scientists and submitted to the study team along with any collections from the study period. Among the 244 adult triatomines obtained by the study team, five distinct species were represented (*T. rubida*, *H. protracta*, *T. recurva*, *T. gerstaeckeri*, and *T. indictiva*), shown in Table 1. The majority of insects were submitted by community scientists (n = 145), over one-third were confirmed as collected inside the home (n = 87), and most specimens were obtained from Grant (n = 97) and Hidalgo (n = 137) Counties. Overall *T. cruzi* infection prevalence among all tested insects was 9.0% (n = 21/233) and 11% (n = 20/188) among triatomines collected from inside or directly outside community scientist homes.

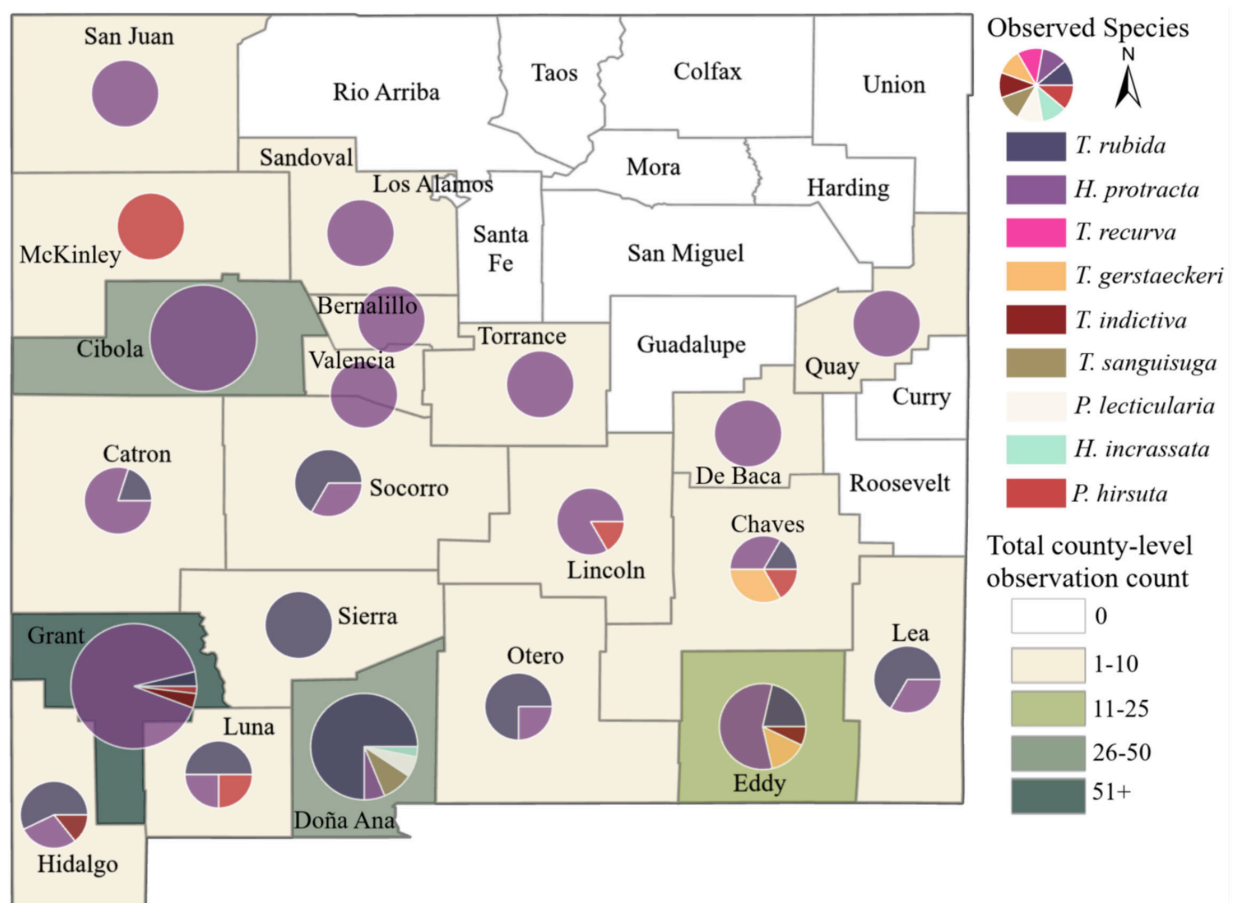


Figure 1. Observed NM triatomine species reported from the literature and biodiversity databanks by county.

*Trypanosoma cruzi* positive insects were found only in Grant and Hidalgo Counties, with infection prevalence higher among *H. protracta* species (15.2%) compared to *T. rubida* (7.7%). Infection was also higher in Grant County triatomines compared to Hidalgo County triatomines. Approximately 22% of collected triatomines were found to be parasitized by ectoparasitic mites.

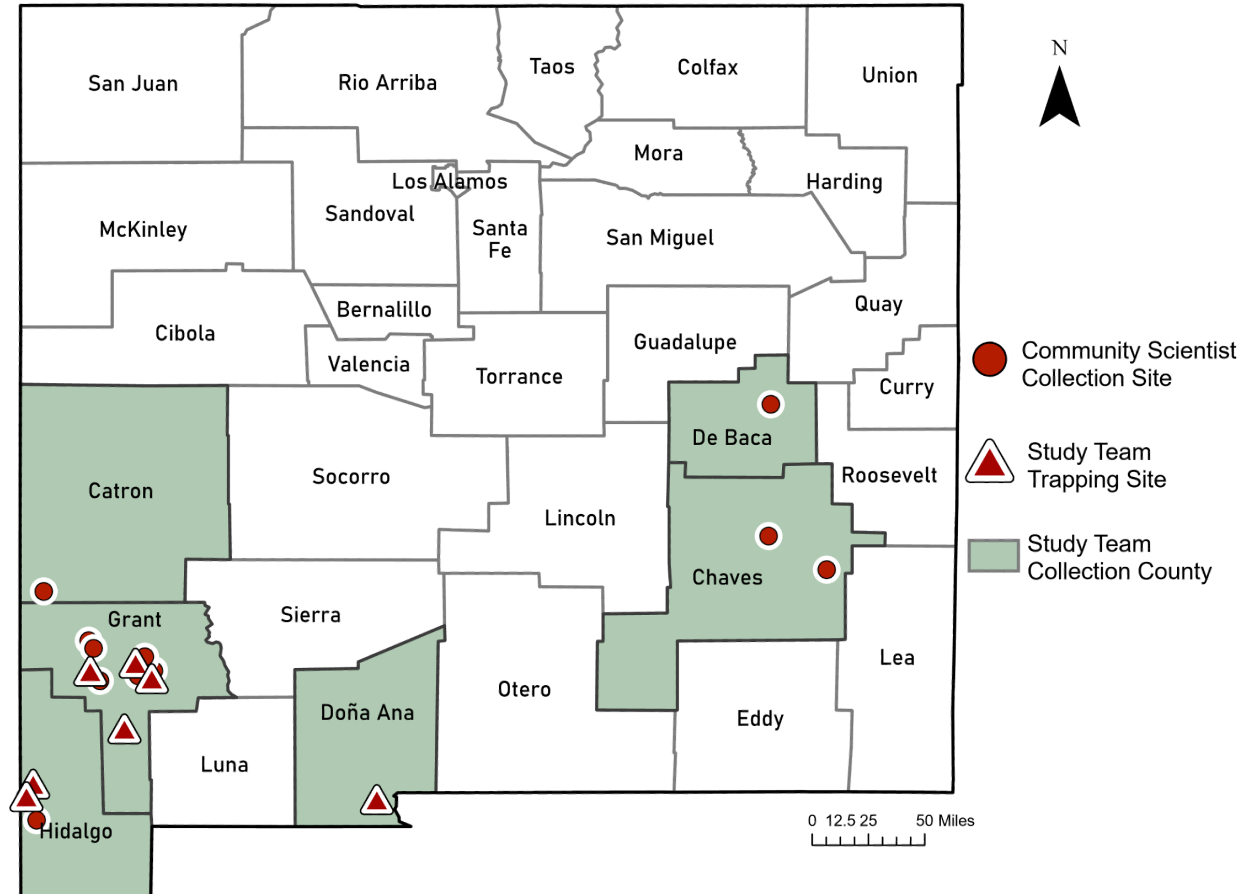


Figure 2. Triatomines were obtained through active trapping efforts by the study team, as well as community scientist submissions. Sampling effort was higher in Grant and Hidalgo Counties due to the extent of the community scientist network in these counties.

**TABLE 1. Triatomine species diversity, ectoparasitic mite parasitism, and *T. cruzi* infection for specciated adults triatomines obtained by the study team (n = 244).**

Species	%(n) <i>Spp.</i> of total adults collected	%(n) Found with mites of total <i>spp.</i> count	%(n) <i>T. cruzi</i> (+) of total tested	%(n) <i>T. cruzi</i> (+) of tested insects collected inside/near home
<i>T. rubida</i>	77.0%(188/244)	26.6%(50/188)	7.7%(14/183)	8.6%(13/152)
<i>H. protracta</i>	20.1%(49/244)	8.2%(4/49)	15.2%(7/46)	20.0%(7/35)
<i>T. recurva</i>	2.0%(5/244)	0.0%(0/5)	0.0%(0/2)	0.0%(0/1)
<i>T. gerstaeckeri</i>	0.4%(1/244)	0.0%(0/1)	0.0%(0/1)	0.0%(0/0)
<i>T. indictiva</i>	0.4%(1/244)	0.0%(0/1)	0.0%(0/1)	0.0%(0/0)

*T. cruzi* positivity was 2.0% (n = 1/51) among tested insects found with ectoparasitic mites, while 11.0% of those without mites (n = 20/182) were positive. Mites were identified as *Pimeliaphilus andersoni*, shown in Figure 3. with the exception of three specimens that could not be identified to species. These specimens were attached to two triatomines from Grant (*H. protracta*) and Hidalgo (*T. rubida*) Counties and belonged to the taxonomic family Erythraeidae.



Figure 3. Ectoparasitic mites colonizing NM triatomines were identified as *Pimeliaphilus andersoni*.

Multiple variables were statistically associated with both *T. cruzi* infection and mite presence in collected and tested triatomines (Table 2). The numbered week within the year (EpiWeek) triatomines were collected was statistically associated with triatomine *T. cruzi* positive status. As the week number increased (as time proceeded chronologically), the odds of triatomines testing positive for *T. cruzi* increased (OR: 1.13; 95% CI: 1.022–1.242). This relationship was not significant when months were examined instead of weeks; however, the trend is suggested within the data. Triatomines collected inside of homes had 3.6 times the odds of *T. cruzi* infection compared to those collected outside of homes (OR: 3.57; 95% CI: 1.205–10.556). Triatomines collected within Hidalgo County had 0.17 times the odds of infection with *T. cruzi* compared to those collected in Grant County (OR: 0.168; 95% CI: 0.059–0.479). Mite presence and triatomine species were not statistically associated with *T. cruzi* infection. EpiWeek and month of collection were both statistically associated with mite presence on collected triatomines: as chronological time proceeded, the odds of mite attachment to triatomines significantly decreased (EpiWeek OR: 0.683; 95% CI: 0.549–0.851; Month OR: 0.544; 95% CI: 0.323–0.915). Lastly, where triatomines were collected in relation to the home (inside or outside), was not statistically significant for mite presence.

Shown in Figure 4, triatomines collected as part of the sampling initiative differed from species observations identified in the triatomine species diversity review. The study team collected five *T. recurva* specimens in Hidalgo county, compared to zero *T. recurva* observations recorded from the review. The combined observations from study team efforts and the review of the literature indicate high triatomine species diversity in the state.

#### 4 DISCUSSION

This study identified 11% *T. cruzi* prevalence among triatomines collected from inside or directly surrounding NM community scientist homes. We found that the week of collection was associated with likelihood of *T. cruzi* infection in triatomines; suggesting that as the preferred triatomine season progresses, bugs are more likely to acquire an infectious blood meal and are

**TABLE 2. Logistic Regressions**

<b>Outcome of <i>T. cruzi</i> infection</b>				
	<i>T. cruzi</i> Positive (N = 21) n (%)	<i>T. cruzi</i> Negative (N = 212) n (%)	Odds Ratio (95% CI)	p-value
<b>EpiWeek Collected</b>	-		1.127 (1.022– 1.242)	0.0167
<b>Month Collected</b>	-		1.542 (0.997– 2.387)	0.0518
<b>Collected Inside Home</b>				
No (home exterior, or away from home)	5 (23.8%)	107 (50.5%)	ref	-
Yes (collected inside the home)	12 (57.1%)	72 (34.0%)	3.566 (1.205–10.556)	0.0216
Unknown (unclear location)	4 (19.0%)	33 (15.6%)	2.594 (0.658–10.222)	0.1732
<b>Mites on Triatomine</b>	1 (4.8%)	50 (23.6%)	0.162 (0.021–1.238)	0.793
<b>Species</b>				
<i>Hospesneotomae protracta</i>	7 (33.3%)	39 (18.4%)	ref	-
<i>Triatoma rubida</i>	14 (66.7%)	161 (75.9%)	0.462 (0.175–1.220)	0.1189
Other species ( <i>T. indictiva</i> , <i>T. recurva</i> , <i>T. gerstaeckeri</i> )	0 (0%)	4 (1.9%)	-*	-*
<b>County Collected</b>				
Grant	16 (76.2%)	69 (32.5%)	ref	-
Hidalgo	5 (23.8%)	128 (60.4%)	0.168 (0.059–0.479)	0.0008
Other (De Baca, Dona Ana, Chaves, Catron)	0 (0%)	15 (7.1%)	-**	-**
<b>Outcome of Mites</b>				
	Mites (Yes) (N=51) n (%)	Mites (No) (N=182) N (%)	Odds Ratio (95% CI)	p-value
<b>EpiWeek Collected</b>	-	-	0.683 (0.549–0.851)	0.0007
<b>Month Collected</b>	-	-	0.544 (0.323– 0.915)	0.0219
<b>Collected Inside Home</b>				
No (home exterior, or away from home)	35 (68.6%)	77 (42.3%)	ref	-
Yes (collected inside the home)	16 (31.4%)	68 (37.4%)	0.518 (0.263– 1.017)	0.056
Unknown (unclear location)	0 (0%)	37 (20.3%)	-***	-***

Statistical analyses of questions related to public health importance from this study: univariate logistic regression analyses of various variables related to *T. cruzi* infection of and mite presence on triatomines. Analyses were conducted on tested triatomines (total = 233).

\*There were no triatomines that were both positive for *T. cruzi* and one of the following species: *Triatoma indictiva*, *Triatoma recurva*, or *Triatoma gerstaeckeri*. There is no OR or p-value. \*\*There were no triatomines that were both positive for *T. cruzi* and collected from the counties of De Baca, Dona Ana, Chaves, or Catron. There is no OR or p-value. \*\*\*There were no triatomines that had mites on them and were collected from an unknown location related to inside or outside the home. There is no OR or p-value.

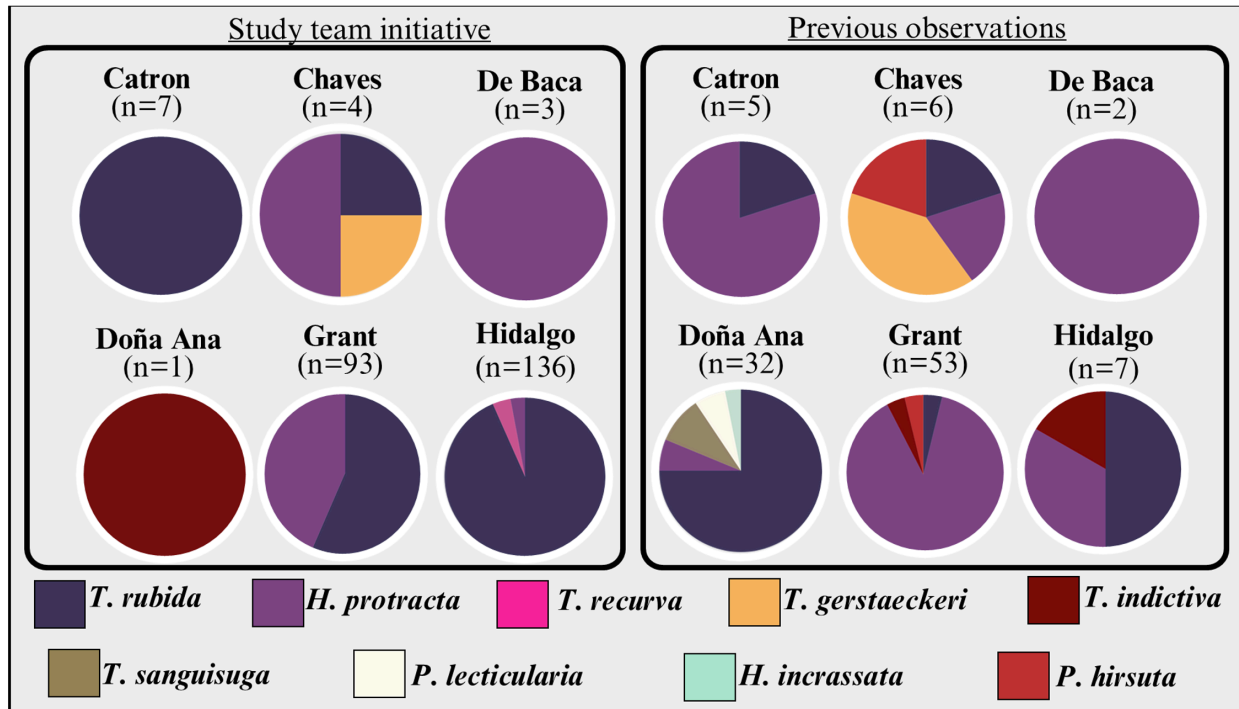


Figure 4. Triatomine species diversity by county from the 2024 study team sampling initiative (left) was distinct from previously reported observations from biodiversity databanks and the academic literature (right). \*Study team collections include only speciated adults (n = 244) insects. \*Previous observations are those gleaned from the ecological literature survey, also shown in Figure 1.

more likely to transmit *T. cruzi* (Curtis-Robles, Auckland et al. 2018). Nearly 80% of all collected insects were obtained inside or on the exterior of human dwellings, with 38 triatomines captured in a single night from the exterior walls of a community scientist home (Hidalgo County). These results indicate residents in some regions of NM are frequently being exposed to triatomines, similar to documented encounters in Bisbee, AZ and Terlingua, TX (Klotz, Shirazi et al. 2016, Behrens-Bradley, Smith et al. 2020, Dye-Braumuller, Lynn et al. 2020).

In AZ, *T. rubida* home intrusion is common in parts of Tucson, and *T. rubida* domiciliation has been reported in the city of Bisbee (Klotz, Shirazi et al. 2016). Three of five total nymphs collected in this study were obtained inside of homes, indicating domiciliation may also be occurring in communities in NM. Additionally, we found that triatomines collected inside homes had 3.6 times the odds of infection with *T. cruzi* compared to those collected outside of the home. Thus, infection studies are needed in NM to determine the risk for Chagas disease and triatomine-bite-derived allergic reactions, particularly in rural communities such as those from this study, where distance can impede timely access to health services.

Shown in Figure 3, Ectoparasitic mites were identified as *Pimeliaphilus andersoni* (Family: Pterogonmatidae), with the exception of three erythraeids that could not be identified to genus nor species. Interestingly, we found that mites are more likely to be found on triatomines earlier in the season compared to later, Table 2. *Pimeliaphilus* mite parasitism of triatomines has previously been reported across a handful of U.S. counties, including Grant County NM (Dye-Braumuller, Waltz et al. 2021), though mites from NM have not previously been identified to species. In total, four

species of mites have previously been identified parasitizing U.S. triatomines (*P. plumifer*, *P. andersoni*, *P. sanguisugae* and *P. calimesae*) (Martí, Balsalobre et al. 2017). In South America, one genus of Erythraeidae, *Leptus*, has previously been reported (González-Moraga, Yañez-Meza et al. 2015, Martí, Balsalobre et al. 2017). Though their role has not been fully clarified, ectoparasitic mites have been hypothesized to act as an indirect biological control in *T. cruzi* transmission (Dye-Braumuller, Waltz et al. 2021). Studies among laboratory-reared triatomines have demonstrated mite interference with triatomine molting, egg production, and overall vector fitness and fecundity (Anderson 1968, González-Moraga, Yañez-Meza et al. 2015). However, future field studies with sufficient statistical power are needed to clarify the association between mite parasitism and *T. cruzi* infection among U.S. triatomines. This study did not find a statistically significant relationship between *T. cruzi* infection and mite presence, though triatomine sample size was comparatively low in this study.

The results of the species observation review highlight the fact that triatomine species diversity is likely higher in NM than previously considered (CDC 2024). The CDC reports only six species present in NM (*P. hirsuta*, *T. gerstaeckeri*, *T. indictiva*, *P. lecticularia*, *H. protracta*, and *T. rubida*) (CDC 2024). However, observations reported from biodiversity databanks and the literature reported a total of eight triatomine species across the state, shown Figure 1. Among all observations, *T. rubida* and *H. protracta* were most frequently recorded. Triatomines were observed in 21 of 33 counties and primarily occurred near the borders with TX and AZ. The total number of observations was comparatively small (N = 186), with <10 observations from all counties except Grant (n = 53), Cibola (n = 31), and Doña Ana (n = 32) County, Figure 1. *H. protracta* observations were widespread, *T. rubida* were primarily found in the southern half of the state, and *T. gerstaeckeri* were observed in southeastern counties.

Study team species diversity differed from previous biodiversity databank and literature observations in the six counties where insects were obtained, shown in Figure 4. To our knowledge, NM *T. recurva* has not been previously documented in the peer-reviewed literature, making the five identified insects from Hidalgo County among the first noted in the state. However, a 2025 graduate thesis regarding triatomine laboratory rearing identified three *T. recurva* collected from Las Cruces and Rodeo NM (Adhikari 2025). *T. recurva* is most commonly collected in southern AZ, particularly near the town of Bisbee, where domiciliation of homes has been frequently documented (Klotz, Smith and Schmidt 2021). Bisbee lies in the Madrean Archipelago ecoregion that extends into Hidalgo County NM. The unique ecologies of this region translate to extensive biodiversity, including small mammals like woodrats, that could provide suitable habitat for *T. recurva* to thrive. As *T. recurva* has been shown to fly over a mile for blood-feeding (Klotz, Dorn et al. 2014) and insects surpass geographical boundaries, it is sensible that populations could be established in parts of NM. As *T. cruzi*-vector-transmission-capacity is higher among some U.S. species than others, documenting NM triatomine species diversity is vital to understanding human and animal risk.

While current peer-reviewed publications from NM are lacking, triatomine and *T. cruzi* research in NM dates back to 1937 (Wood and Wood 1961). Entomological surveys by S.F. Wood and F. D. Wood between 1937 and 1959 identified *T. cruzi* infection in 2.4% (n = 16) of triatomines obtained from woodrat middens and 12.5% (n = 4) of triatomines collected from human dwellings (Wood and Wood 1961). These and later collections by Lent and Wygodzinsky (1979), identified *H. protracta*, *T. rubida*, *T. gerstaeckeri*, and *T. indictiva* in the southern part of state. Surveys in the early 1980s by Ryckman (1984) further report *P. lecticularia* in NM; detailed locations were not provided in the publication (Ryckman 1984, Bern, Kjos et al. 2011). Aside from two scoping reviews of triatomines

and *T. cruzi* in the U.S., which include the aforementioned historical surveys, only one published manuscript from the previous decade has reported detailed triatomine and *T. cruzi* testing activities from NM. This study of *T. cruzi* vectors and hosts from TX and NM identified approximately 69% (n = 118) *T. cruzi* positivity among 171 *T. rubida* collected from two cities in Doña Ana County (Rodriguez, Luna et al. 2021). Unpublished research of NM triatomine *T. cruzi* prevalence and colony rearing studies, highlight a potential for more extensive research from the state (Pierce, Hanson and Bendixsen 2016, Indacochea, Gard et al. 2017). Peer-reviewed articles focused on other states have also included *T. cruzi* testing among triatomines collected from NM. However, NM specimens represent a small proportion of overall sampling counts and thus details regarding location of collection, species, and *T. cruzi* infection are limited (Curtis-Robles, Auckland et al. 2018, Curtis-Robles, Hamer et al. 2018, Dye-Braumuller, Waltz et al. 2021).

A 2017 investigation of government working dogs identified Chagas parasite seroprevalence up to 18.5% and 11.6% in two NM working-dog training centers (Meyers, Meinders and Hamer 2017). A recent modeling study based on data from the previous work also identified higher *T. cruzi* transmission potential in NM and TX compared to AZ and CA (Chaves, Meyers et al. 2023). Canine infections have been identified in at least eight southern states, with 431 cases reported in TX between 2013 and 2015 (Meyers, Meinders and Hamer 2017, DSHS 2025). Rarely screened for during routine veterinary care, canine infection risk may be elevated compared to humans due to an affinity for some dogs to ingest the insects. Disease symptoms may also present in canine infection, with cardiac sequelae similar to those present in human infections (Madigan, Majoy et al. 2019, Busselman and Hamer 2022, Durães-Oliveira, Palma-Marques et al. 2024). Unlike in humans, canine infections diagnosed in younger dogs have been associated with shorter survival (Durães-Oliveira, Palma-Marques et al. 2024). No standard treatment is available for animal infection, though combination antiparasitic treatment has improved canine survival as reported in recent works (Durães-Oliveira, Palma-Marques et al. 2024). Thus, while the emphasis surrounding Chagas disease is primarily placed in human infection, canine infection may also present a cause of veterinary concern in NM.

U.S.-acquired Chagas disease has not been reported in NM despite the presence of parasite, disease vector, and infected host species. Recent estimates suggest approximately 10,000 locally acquired cases nationally, the majority of which have been identified in Texas (Irish, Whitman et al. 2022, DSHS 2025). The TX department of State Health Services (2025) reports 51 locally acquired human cases identified between 2013 and 2023 alone. In AZ, three U.S.-acquired cases have been reported (Beatty and Klotz 2020, Lynn, Dye-Braumuller et al. 2022). Given a lack of disease reportability, coupled with limited clinician and public awareness of the infection, the majority of U.S. cases remain undiagnosed and untreated (Forsyth, Meymandi et al. 2019). Currently, the infection is mandatory reportable in 8 states (AZ, AR, LA, MS, TN, TX, UT, WA), plus Los Angeles County, CA (Bennett, Straily et al. 2018, UDH 2022, WSDOH 2022, LADPH 2023). Therefore, the lack of identified autochthonous cases from NM is likely a product of lacking disease reportability and awareness rather than a lack of veritable human infection in the state.

A 2022 triatomine blood-meal study identified *T. rubida* from Doña Ana County with blood-meal sources corresponding to mice, humans, squirrels, rabbits, bats, dogs, cats, and horses (Rodriguez, Luna et al. 2021). Additionally, the most efficient U.S. vector, *T. gerstaeckeri*, has been documented in the state since the early 20th century (Wood and Wood 1961). The presence of this vector may contribute to the elevated locally acquired human Chagas disease case numbers seen

in TX. However, autochthonous human infection in the U.S. as whole remains rare, and human seroprevalence studies will be necessary to clarify risk to NM communities.

This study is not without limitations. Though triatomine databank observations must meet a certain level of quality inspection criteria, each documented observation from these databanks could not be verified. Though requested, the authors of this manuscript were not able to obtain photo-records of those species rarely documented in NM for confirmatory identification. For example, it is possible that databank observations of *T. sanguisuga* represent misidentifications of *T. indictiva* species, as *T. indictiva* was previously considered a subspecies of *T. sanguisuga* until 1979, reported in early works as *T. sanguisuga indictiva* (Lent and Wygodzinsky 1979, de Paiva, Belintani et al. 2022). Though *P. lecticularia* was also previously considered a subspecies of *T. indictiva*, it has been classified as a unique species since 1944 (Bern, Kjos et al. 2011). Additionally, outside of dedicated scientific collections, geographic coordinate data is often buffered within a certain range for user privacy. Therefore, a certain level of ambiguity may exist within observations with respect to county within the state. All observations were logged as having been observed within NM.

Additionally, this study relied on a convenience sample of triatomines obtained from a combination of community scientist submissions and study team trapping efforts. Therefore, the geographic range of sample sites were inherently biased, both for active trapping and community scientist contributions. The community scientist network was overwhelmingly composed of individuals from Grant and Hidalgo Counties, and resource constraints limited the number of study team trapping nights. While there were only two nights of trapping in Hidalgo County at two locations, the sites were highly productive for collections, yielding 102 triatomines. Additional triatomines collected in Hidalgo County came from one household, which doubled as a trapping site. Therefore, the high collection counts from Grant and Hidalgo Counties are indicative of sampling effort, and not necessarily due to higher triatomine activity in these regions.

This manuscript presents the first review of NM triatomine-vector-ecology in in over 60 years (Wood and Wood, 1961). Siloed research efforts and suboptimal *T. cruzi* surveillance in the U.S. have contributed to an incomplete understanding of triatomine vectors diversity and Chagas disease risk in NM. In all, this study revealed that triatomine diversity in NM may exceed the current generally accepted species distribution data from the literature, biodiversity databanks, and Centers for Disease Control and Prevention (Bern, Kjos et al. 2011, Bern, Messenger et al. 2019, CDC 2024). Approximately 80% of insects obtained for our study were collected inside or directly outside of homes. Triatomines collected inside of homes in this study were 3 times as likely to be infected with *T. cruzi* compared to those collected outside or away from homes. Therefore this study highlights the fact that human and animal exposures to *T. cruzi* infected triatomines are occurring in NM. As Chagas disease has only recently been declared endemic (in summer 2025) (Beatty, Hamer et al. 2025), future studies are warranted to clarify the public health implications of triatomine exposure in NM communities.

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