#1281 Spatio-temporal analysis and *Trypanosoma cruzi* infection in triatomines across the southern USA

R. Curtis-Robles[1], L.D. Auckland[1], S. Lane[2,3], M.Z. Levy[4], G.L. Hamer[5], S.A. Hamer[1]

[1]Department of Veterinary Integrative Biosciences, Texas A&M University, College Station, Texas, USA; [2]School of Public Health, Texas A&M Health Science Center, College Station, Texas, USA; [3]Epsilon Data Management, Denver, CO, USA; [4]Department of Biostatistics and Epidemiology, University of Pennsylvania, Philadelphia, Pennsylvania, USA; [5]Department of Entomology, Texas A&M University, College Station, Texas, USA

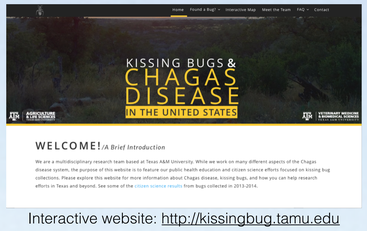
Contacts: RCurtis@cvm.tamu.edu and SHamer@cvm.tamu.edu

Defining spatial and temporal occurrence of triatomine vectors and *Trypanosoma cruzi* infection in the US is critical for public and veterinary health protective measures. Through a citizen science program and field collections from 2013 to 2015, we collected 2,638 kissing bugs of 7 species from the southern USA. Data from this collection were used to examine spatial and temporal patterns of triatomine activity across Texas and the southern USA.

Specimen Collection

We conducted field collections and a citizen science program from 2013 to 2015.

Informational pamphlets



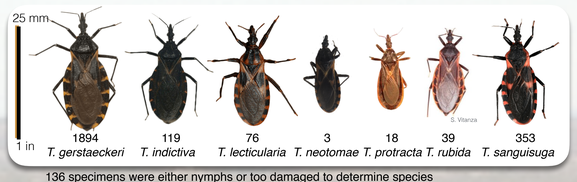
Interactive website: http://kissingbug.tamu.edu

Citizen Science submissions

Public outreach

Field collection from *Neotoma* woodrat nests

Collections resulted in 2,638 kissing bugs of 7 species from the southern US.



136 specimens were either nymphs or too damaged to determine species

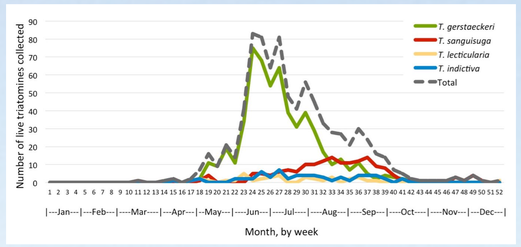
In contrast to other areas, kissing bugs in the USA do not generally colonize houses. The majority of citizen-collected bugs were dispersing adults found in homes, kennels, patios, or other peridomestic settings.

Triatomines were frequently collected from

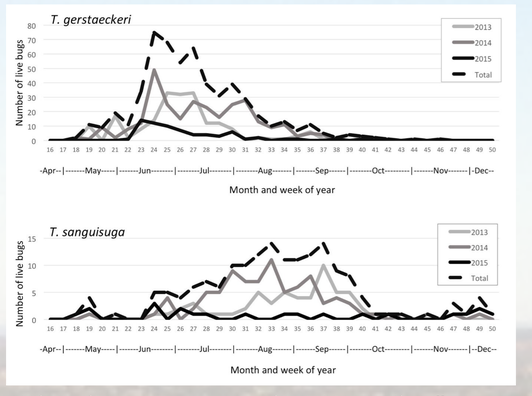
To learn more about our Citizen Science program, please visit: http://kissingbug.tamu.edu or see Curtis-Robles *et al* (2015) PLoS NTD 9(12):e0004235

Temporal Distribution

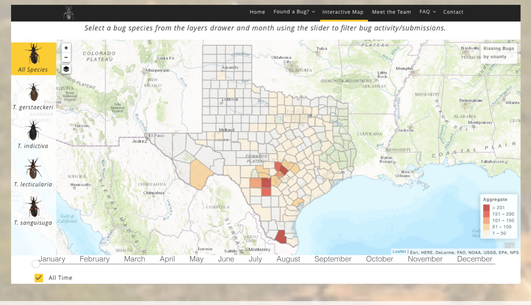
Most commonly (97% of adults), triatomines were encountered between May and October



The two most common species, *T. gerstaeckeri* and *T. sanguisuga*, exhibited activity peaks in mid-summer and early fall, respectively.

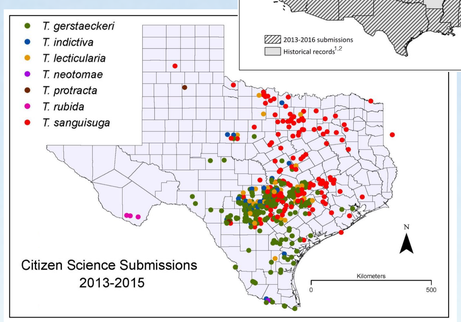


The interactive map on our outreach website allows people to explore the temporal and spatial occurrences of triatomines across Texas.

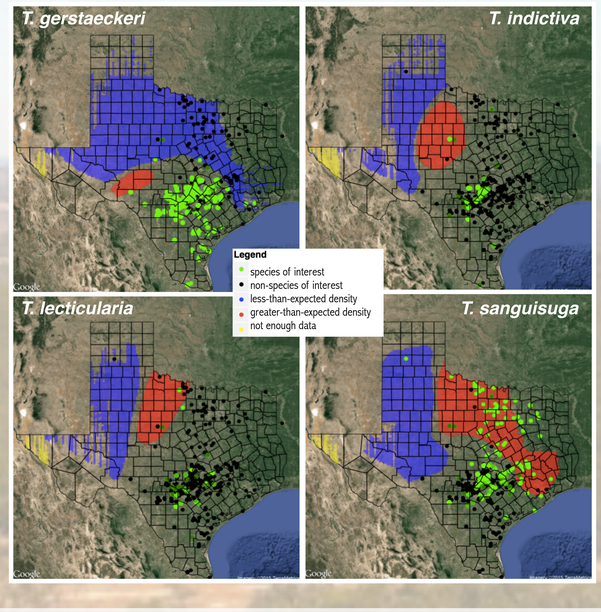


Spatial Distribution

Species were collected from diverse ecological regions in Texas, as well as other southern states.



A point pattern analysis revealed unique geographic occurrences of the different *Triatoma* spp., suggesting varying habitat suitability for triatomine species.

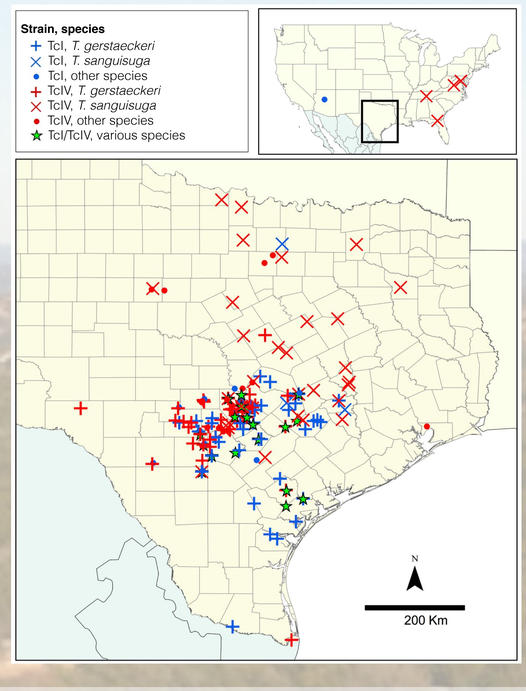


Infection Characterization

Using real-time PCR[3] to detect *T. cruzi* DNA in bug hindguts, we found an overall *T. cruzi* infection prevalence of 60%, with significant variation across triatomine species.

Species	Total tested	Infection Prevalence	Odds Ratio	95% CI	p-value	TcI	TcIV	TcI/TcIV mixed
T. gerstaeckeri	794	64.7%	Referent	Referent	Referent	91	94	20
T. indictiva	57	50.9%	0.56	0.34-0.97	0.038	7	17	2
T. lecticularia	52	71.2%	1.34	0.74-2.56	0.348	9	18	5
T. protracta	11	18.2%	0.12	0.02-0.47	0.007	2	0	0
T. rubida	24	29.2%	0.22	0.09-0.53	0.001	2	0	0
T. sanguisuga	221	53.4%	0.62	0.46-0.84	0.002	7	43	1
Total	1159	60.1%	-	-	-	118	172	28

Parasite lineages revealed through strain typing[4,5] were DTUs (discrete typing units) TcI and TcIV. There was differential distribution of DTUs across the state, likely related to triatomine species distributions.



Findings

Triatomine vectors are widespread across Texas, with *T. cruzi* infection of strain types TcI and/or TcIV. However, heterogeneity exists in triatomine species' spatial and temporal occurrences, and infection with different strains of *T. cruzi*. Consideration of local temporal and spatial heterogeneity of *Triatoma* spp. will refine vector control and outreach initiatives to reduce disease risk.

Acknowledgements and Funding

We thank many citizen scientists for their submissions, as well as many field and laboratory assistants. Funding was provided by the Texas A&M University One Health Initiative, the Texas EcoLab Program, and NSF Graduate Research Fellowship, Grant No. 125521 (RC-R).

References

[1]Bern, *et al*, 2011 *Clinical Microbiology Reviews* 24(4): 655-681. [2]Swanson, 2011 *The Great Lakes Entomologist* 44(3-4): 117-138. [3]Duffy, *et al*, 2013 *PLoS Neglected Tropical Diseases* 7(1): e2000. [4]Cosentino and Agüero, 2012 *PLoS Neglected Tropical Diseases* 6(7): e1777. [5]Cura, *et al*, 2015 *PLoS Neglected Tropical Diseases* 9(5): e0003765.