

VECTOR-BORNE DISEASES IN SOUTH CAROLINA: WHAT'S BITING YOUR PATIENTS

South Carolina Infectious Disease Society
Annual Conference and Summer Meeting, Greenville, SC
21 June 2025

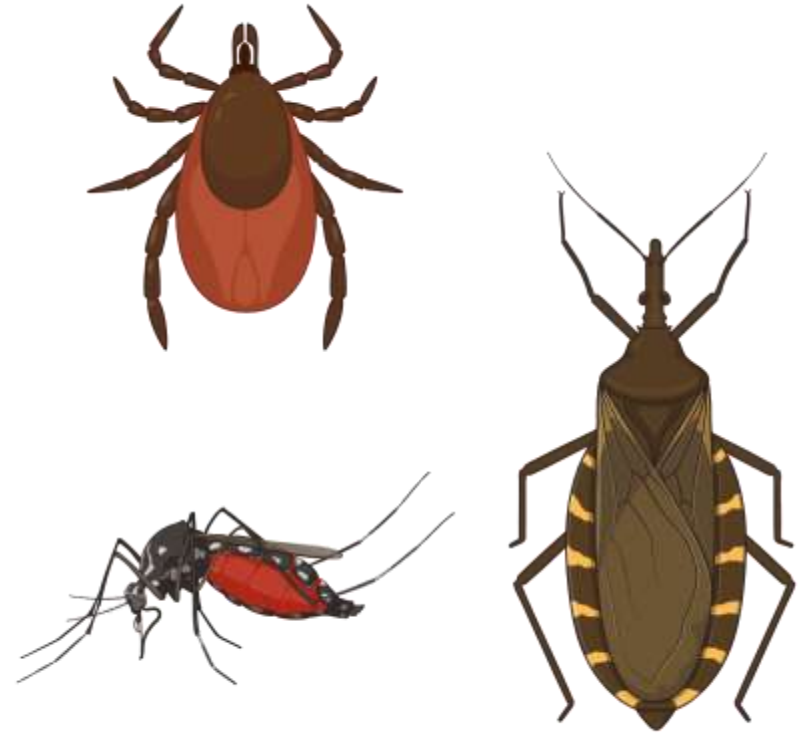
Melissa Nolan, PhD, MPH



USC Institute for Infectious
Disease Translational Research

TALK OVERVIEW

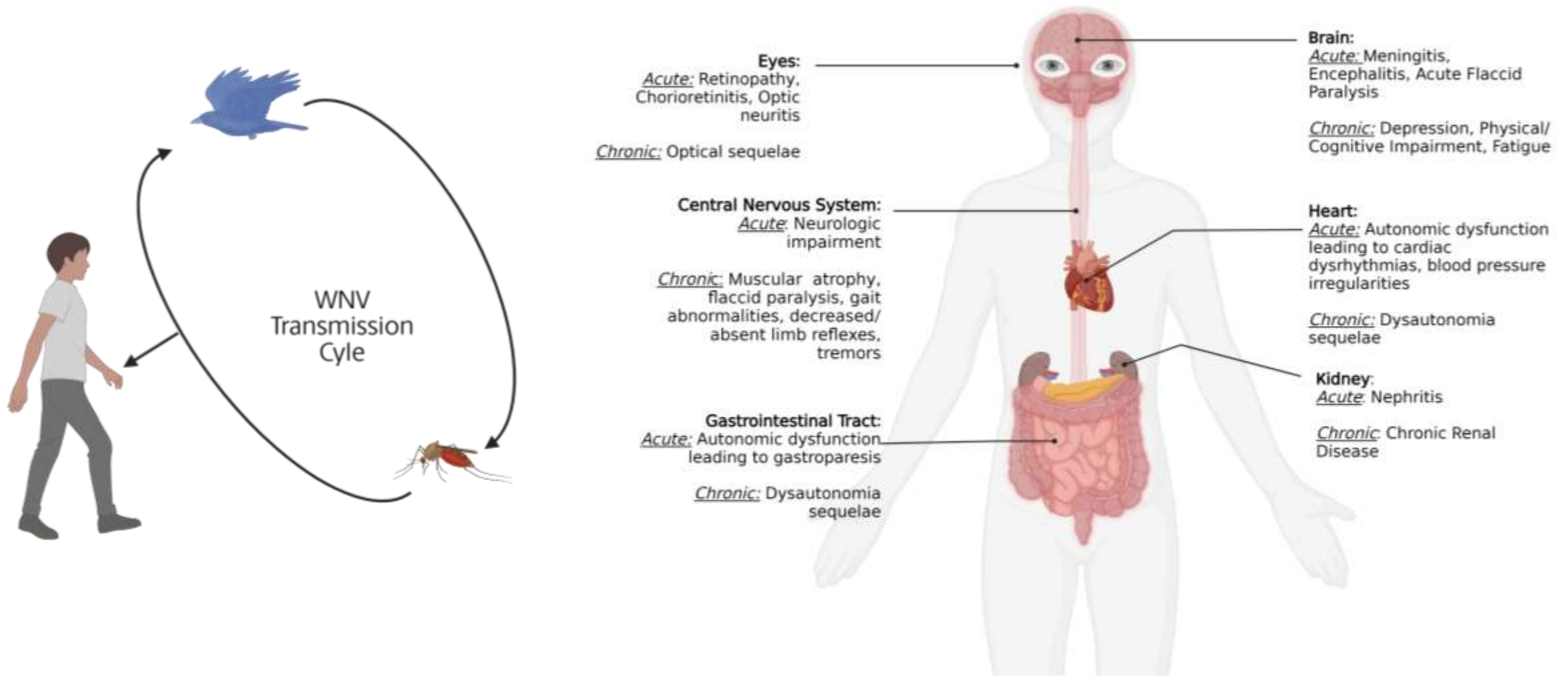
- Mosquito-borne diseases
 - West Nile virus
 - Malaria and Oropouche virus
- Tick-borne diseases
 - Lone star tick & diseases
 - Black-legged tick & Lyme disease
- Other vectored diseases
 - Chagas disease



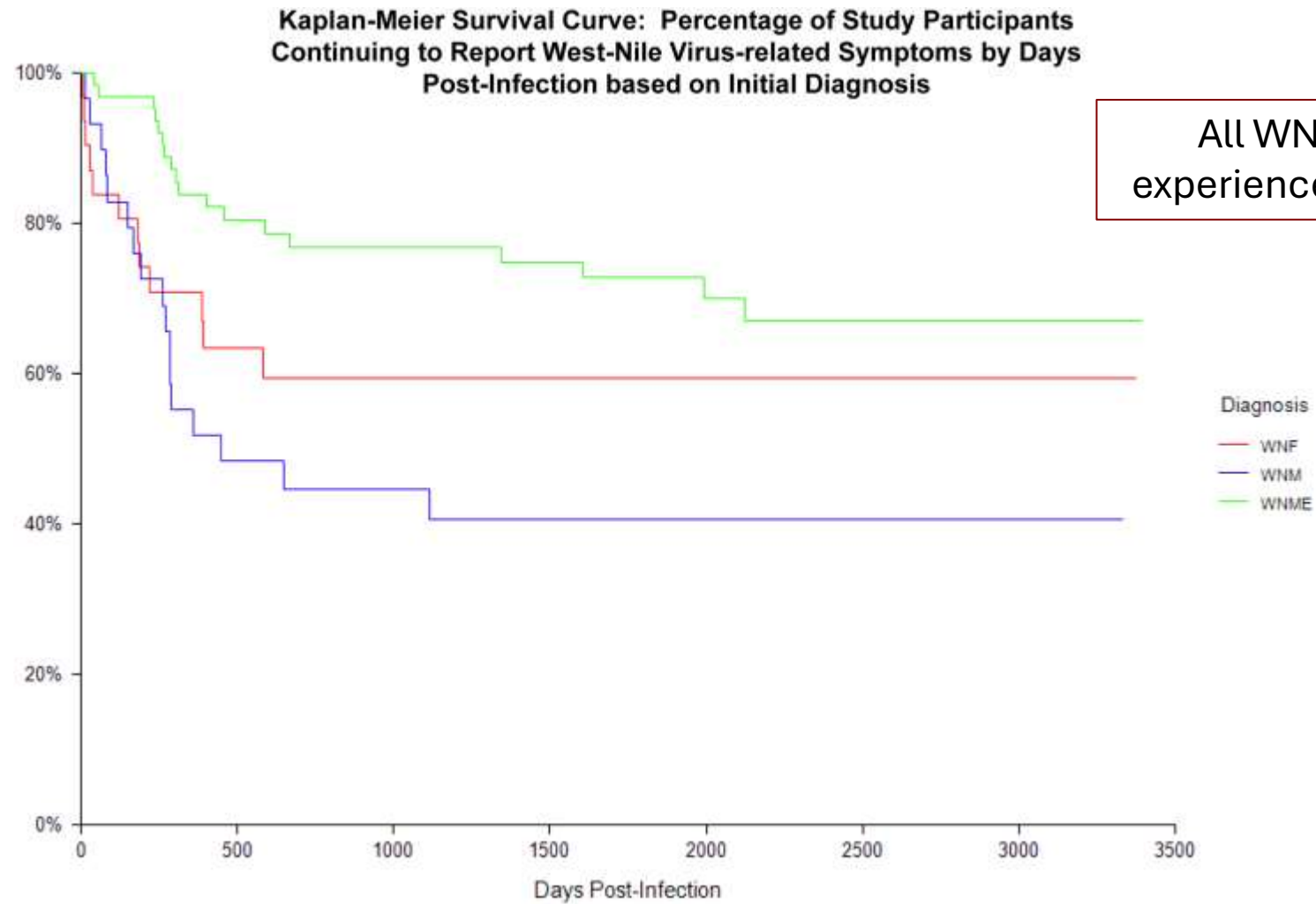
ENDEMIC & (RE)EMERGING MOSQUITO-BORNE DISEASES



WEST NILE VIRUS CLINICAL MANIFESTATIONS



WNV LONG-TERM OUTCOMES



All WNV disease groups experience long-term sequelae

WEST NILE VIRUS ESTABLISHMENT IN THE USA



WNV HUMAN SEROPREVALENCE IN SOUTH CAROLINA

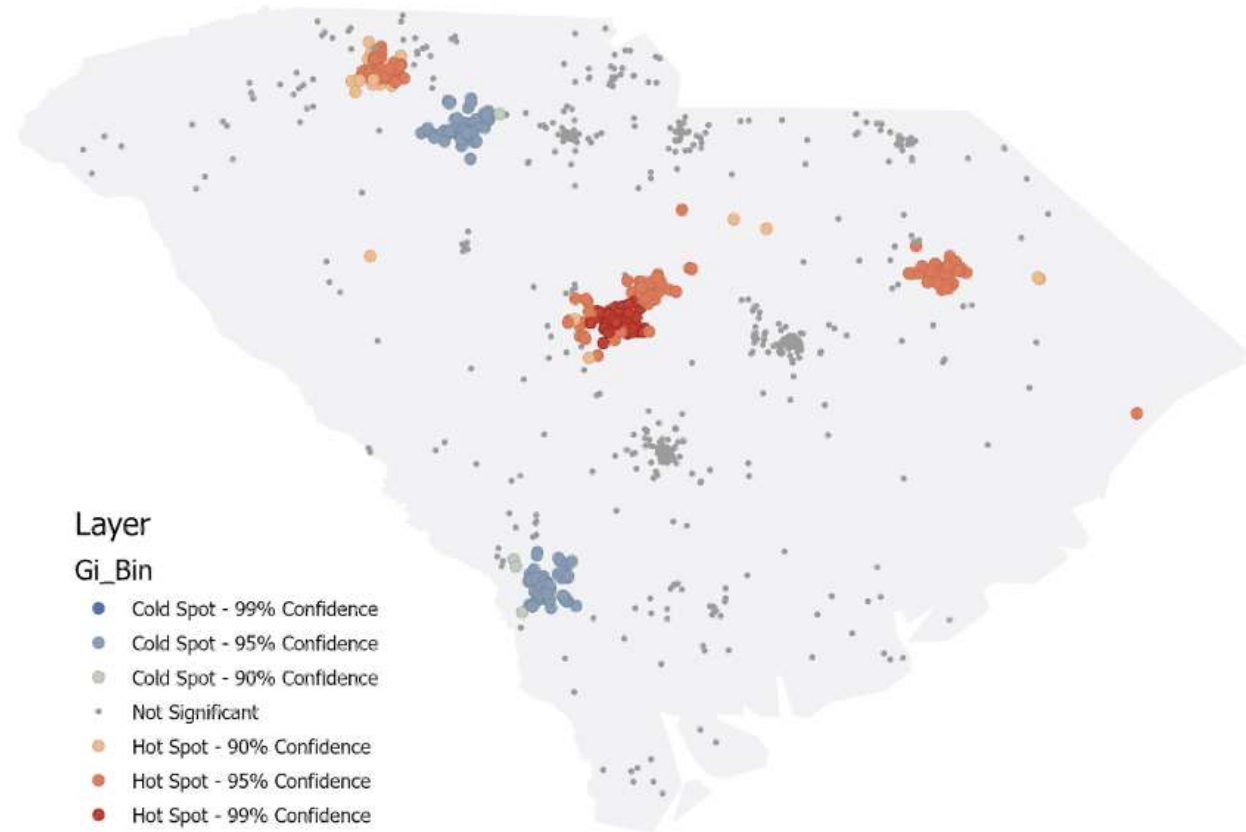
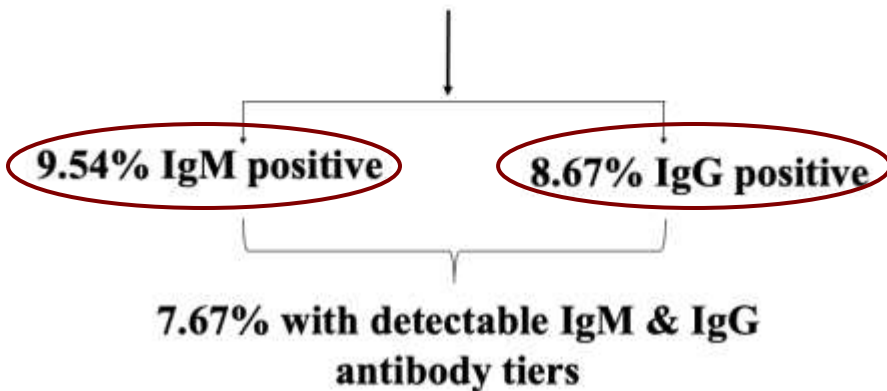


ALL-IN SOUTH CAROLINA

Advancing Community Equity in Public Health
Leadership and Lawmaker Decision Making in SC

N = 1,402 Participants that took part in the original ALL-IN SC project during March – August in years 2022 & 2023

↓
N = 1,385 Participants were SC residents, aged 7 to 95, with available biobanked blood sample that underwent testing with Abbexa's Human West Nile Virus IgM and IgG ELISA Kit



WNV HUMAN SEROPREVALENCE IN RICHLAND CO

4.62% IgM seroprevalence

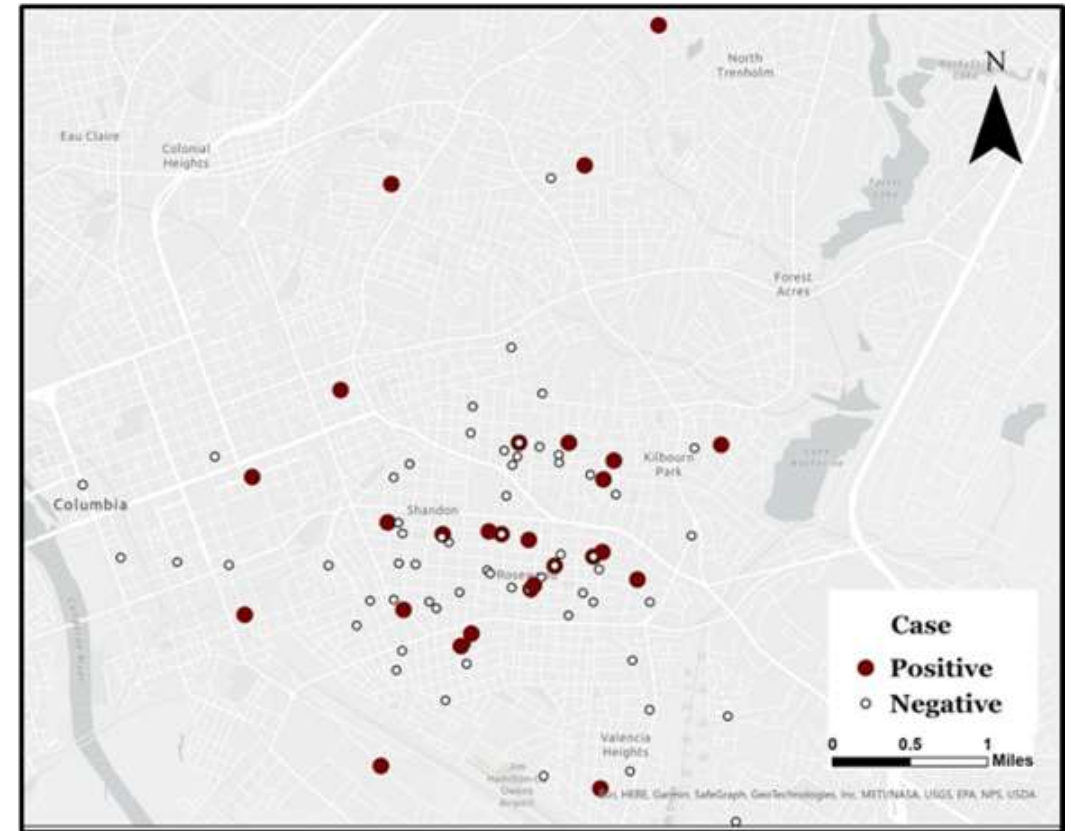
17.52% IgG seroprevalence

21.90% combined seroprevalence

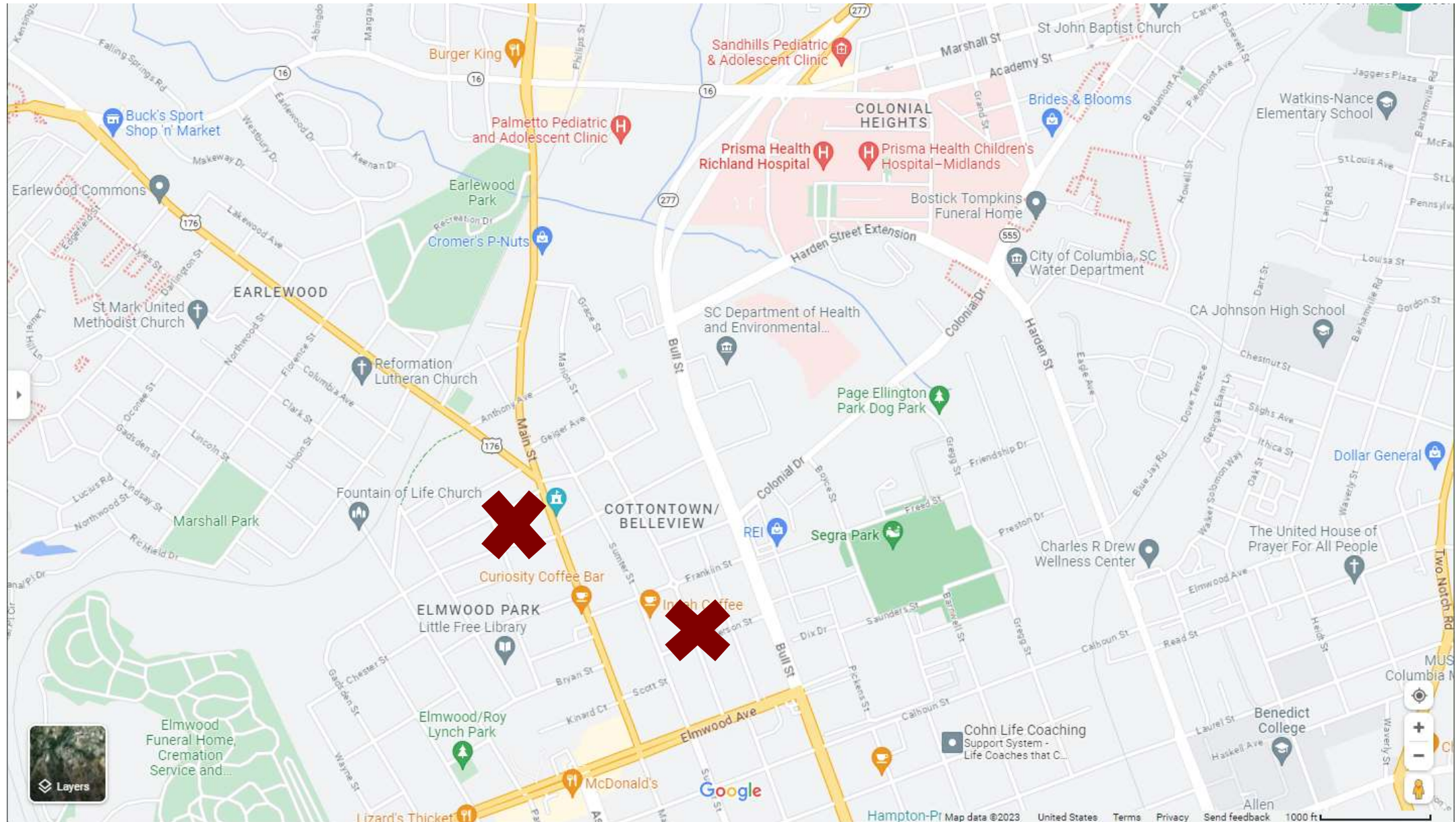
2% national cumulative incidence average

24.7% South Dakota vs. 0.1% New Hampshire

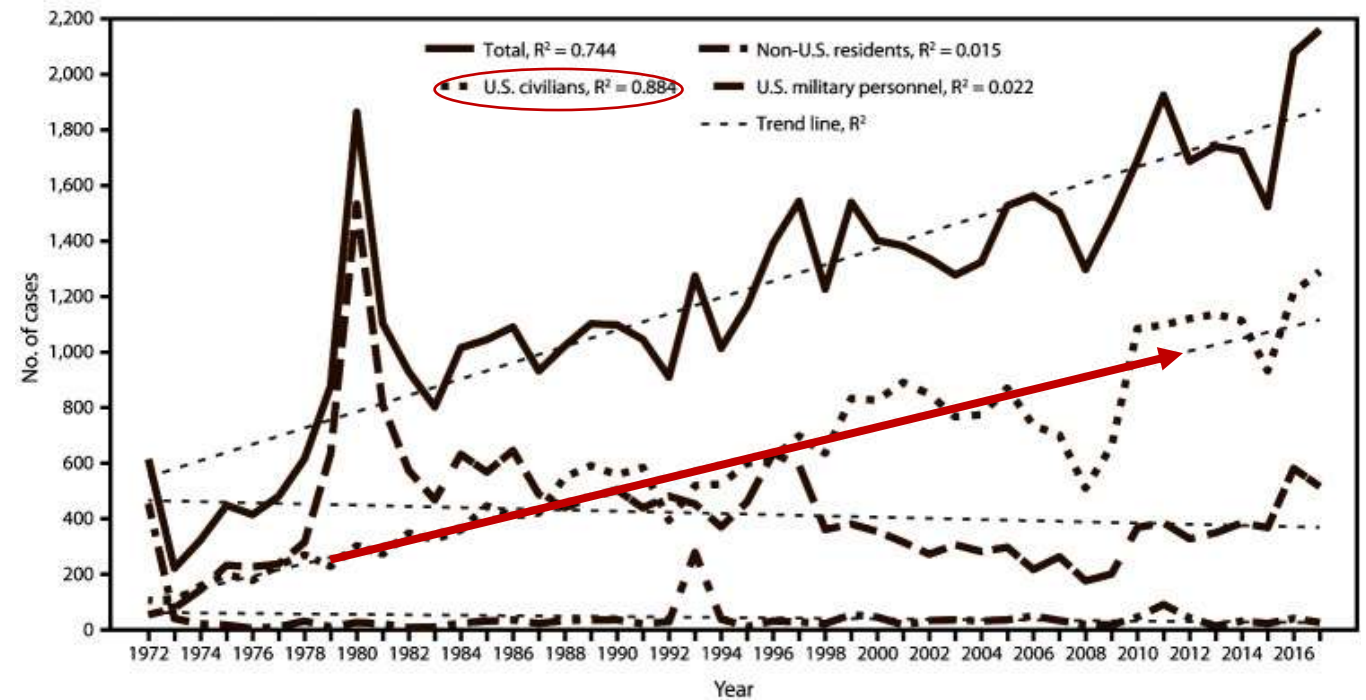
0.2% seroprevalence South Carolina



VALUE OF WNV TESTING



RE-EMERGENCE OF MALARIA IN THE USA



1942

Office of Malaria Control in War
Areas established in Atlanta, GA

(1957 – 2003)

Sporadic outbreaks

2023

Autochthonous cases in
4 states

1951

Malaria eliminated in the
contiguous USA

Blackburn et al, 2023, MMWR Morb Mortal Wkly Rep
Duwell et al, 2023, MMWR Morb Mortal Wkly Rep
Courtney et al, 2024, MMWR Morb Mortal Wkly Rep
Mace et al 2021, Morb Mortal Wkly Rep

WILL MALARIA RE-EMERGE IN SC?

3 medically relevant Anopheles

species identified:

- *Anopheles quadrimaculatus*: 62
- *Anopheles crucians*: 330
- *Anopheles punctipennis*: 2

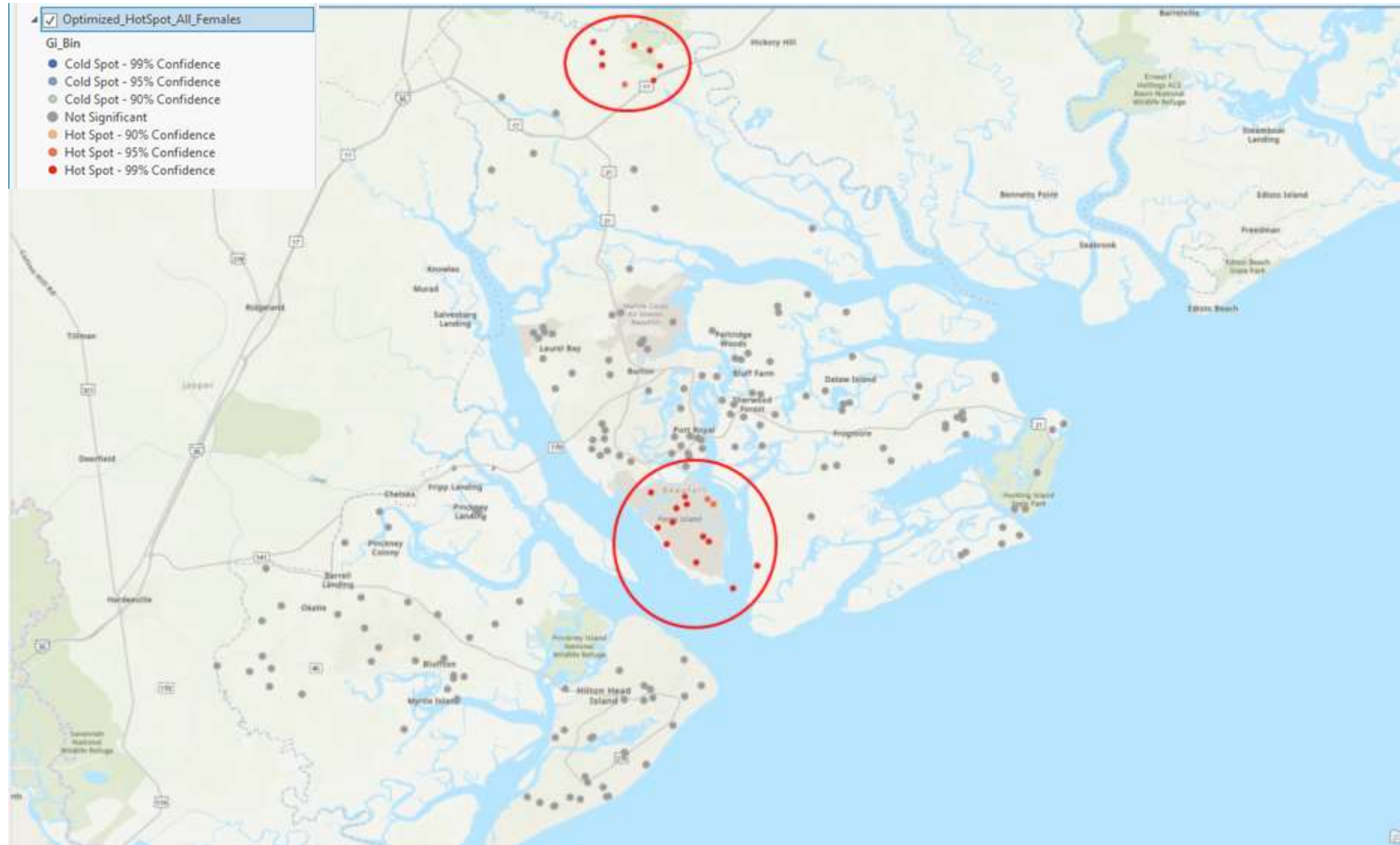
6 trapping locations yielded
Plasmodium PCR Positive
Pools

Plasmodium spp positive mosquito pools
were associated with seasonality,
location and abundance, but not climate

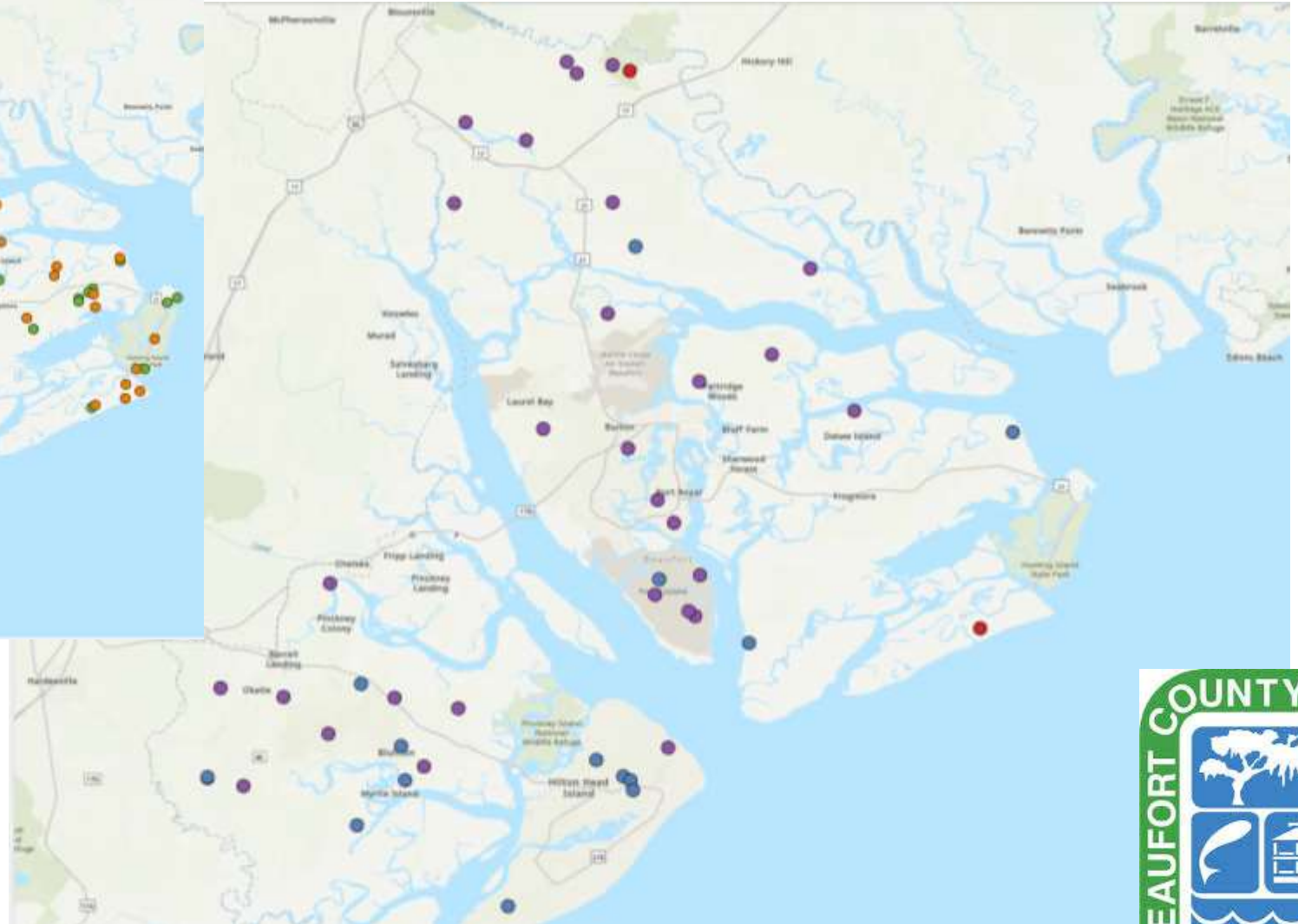
	Univariate	Multivariate Model		
	p-value	p-value	OR	95% CI
Collection Week	0.055	0.022	1.12	1.03 to 1.44
Location	0.021	0.045	1.2	1.00 to 1.43
Total Mosquito Count	0.003			
Total <i>Anopheles</i> spp Count	0.002	0.001	1.14	1.05 to 1.22
Total <i>Anopheles quadrimaculatus</i> Count	0.007			
Minimum Temperature	0.097			
Maximum Temperature	0.039			
Precipitation	0.108			
Windspeed	0.285			



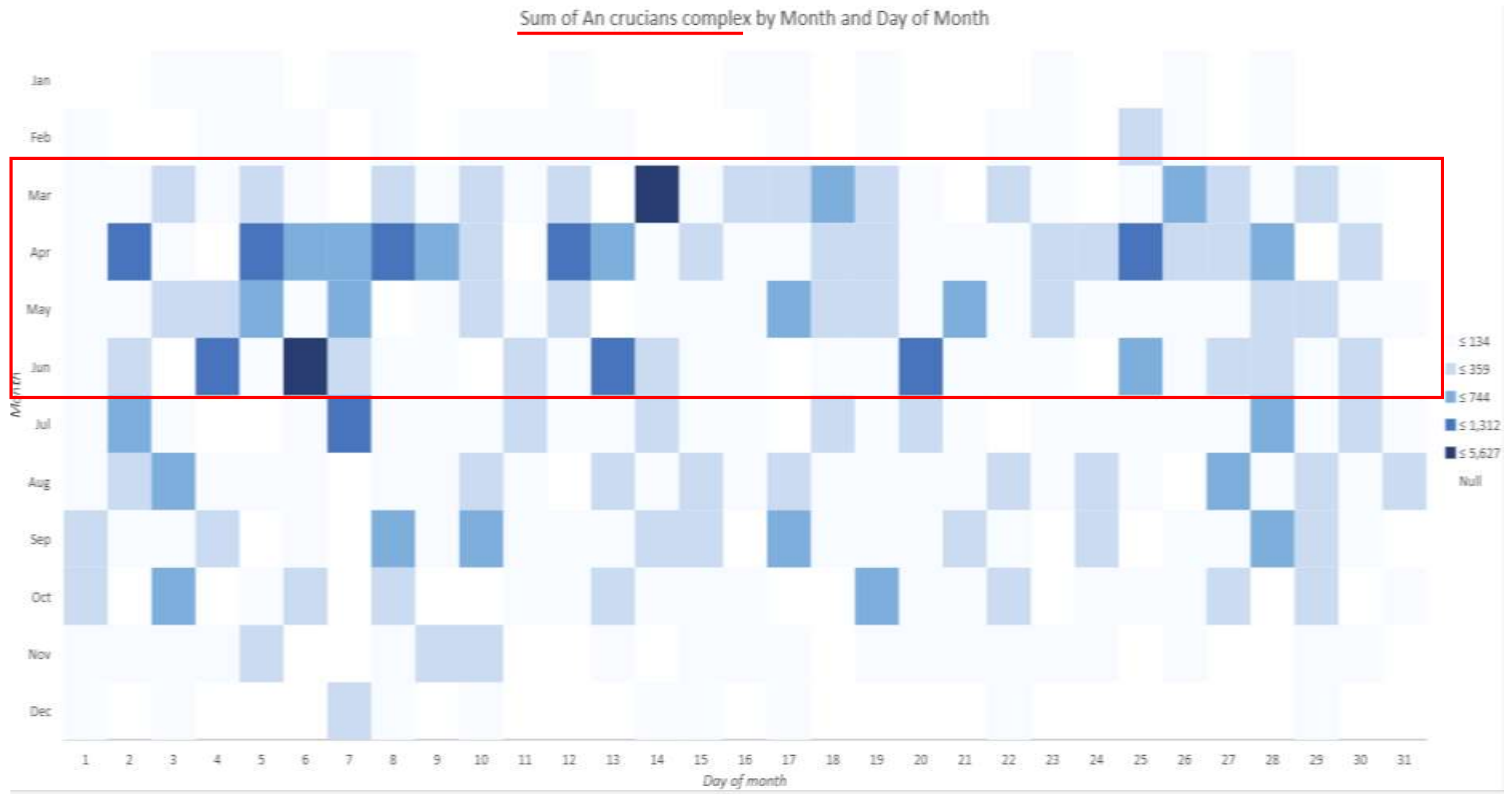
STATISTICAL HOTSPOTS OF MALARIA VECTORS



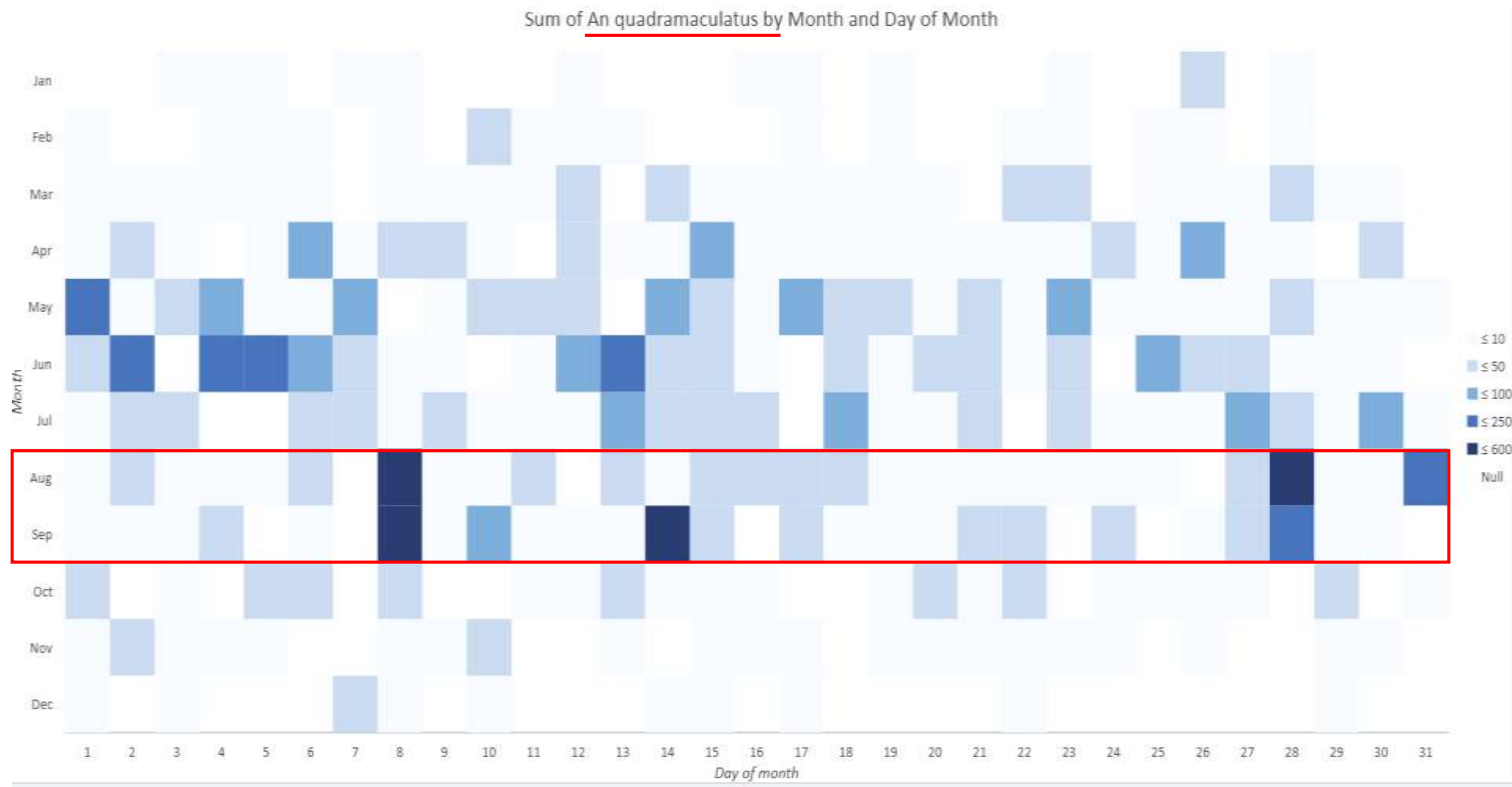
GEOSPATIAL VARIANCE OF MALARIA VECTORS



SEASONALITY OF MALARIA VECTOR SPECIES



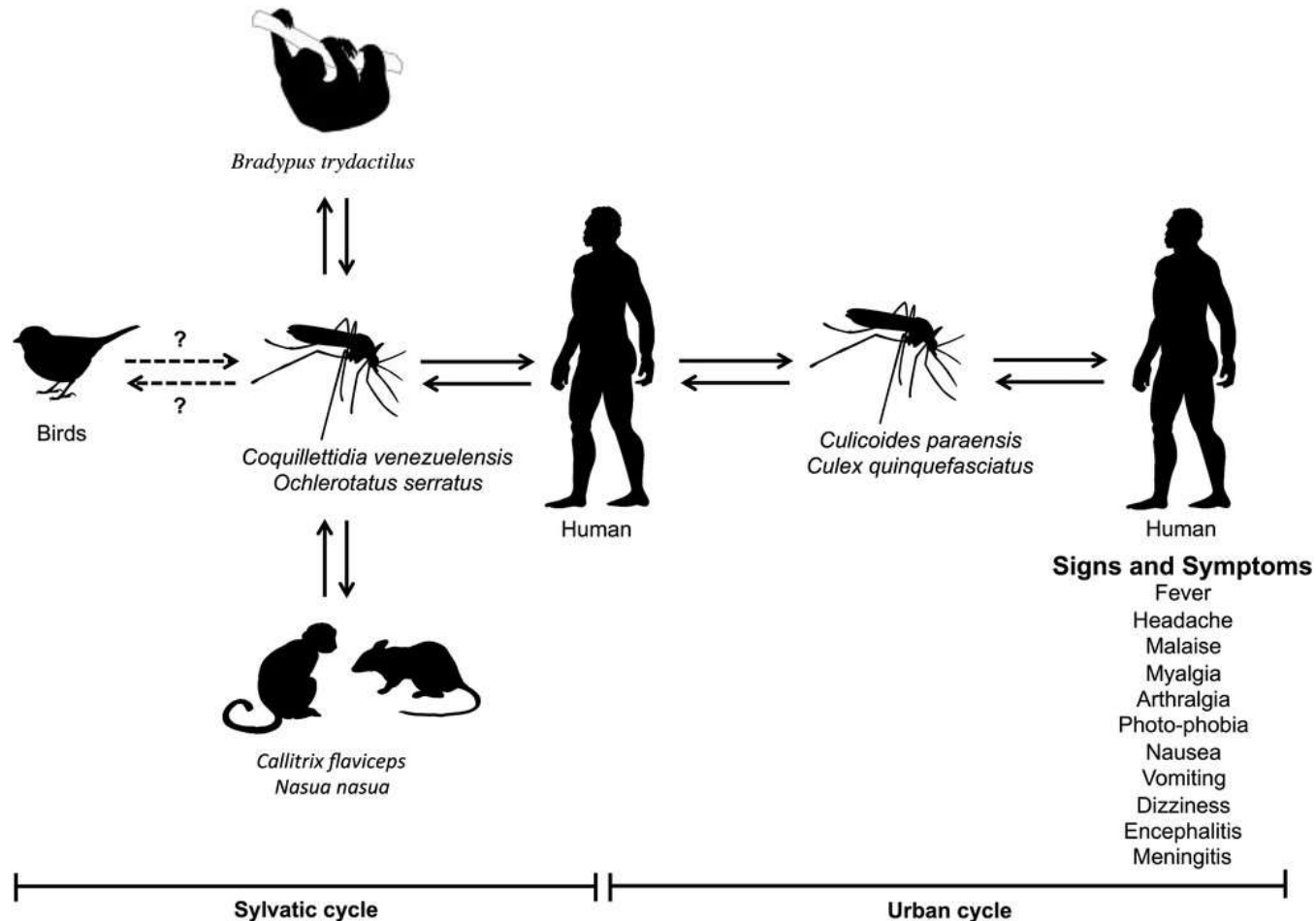
SEASONALITY OF MALARIA VECTOR SPECIES



NEXT STEPS & KEY KNOWLEDGE GAPS: MALARIA EMERGENCE IN THE USA



EMERGING VECTOR-BORNE PATHOGEN OF PUBLIC HEALTH CONCERN: OROPOUCHE VIRUS



2024-2025 outbreak

- 19,917 cases in Latin America
 - Across 9 countries
 - South America, Central America & Caribbean
- 109 imported cases in the USA

ORPOUCHE VIRUS: ALTERNATE TRANSMISSION



Ministério da Saúde
Secretaria de Vigilância em Saúde e Ambiente

NOTA TÉCNICA Nº 15/2024-SVSA/MS

4. TRANSMISSÃO VERTICAL

4.1. Estudos em animais infectados com outros vírus do grupo Simbu, o mesmo que o do OROV e também transmitidos por Culicoides spp., como os vírus Akabane (AKAV) e Schmallenberg (SBV), demonstraram a ocorrência de transmissão vertical dos agentes, resultando em abortamento e teratogenicidade fetal (Endalew et al., 2019; Inaba et al., 1975; Pinheiro et al., 1981). Com base nesses resultados, a possibilidade de transmissão do OROV da mãe infectada para o bebê durante a gestação é considerada desde os primeiros surtos identificados no Brasil, porém sem evidências científicas consistentes sobre a ocorrência da transmissão vertical e o efeito da infecção de OROV sobre teratogenia ou aborto.

4.2. Em junho de 2024, a Seção de Arbovirologia e Febres Hemorrágicas do Instituto Evandro Chagas (SEARB/IEC/SVSA/MS) realizou análise retrospectiva de amostras de soro e líquido armazenadas na instituição, coletadas para investigação de arboviroses neuroinvasivas e com resultado negativo para Dengue, Chikungunya, Zika e Vírus do Nilo Ocidental. Nesse estudo foi detectada em quatro recém-nascidos: com microcefalia (três com 1 dia de vida e um com 27 dias de vida) a presença de anticorpos da classe IgM contra OROV em amostras de soro (2 casos) e líquido (2 casos). Essa é uma evidência de que ocorre transmissão vertical do OROV, porém as limitações do estudo não permitem estabelecer relação causal entre a infecção por OROV durante a vida intrauterina e malformações neurológicas nos bebês.

4.3. Em julho de 2024, em investigação laboratorial de um caso de óbito fetal com 30 semanas de gestação, a SEARB/IEC/SVSA/MS identificou material genético do OROV em sangue de cordão umbilical, placenta e diversos órgãos fetais incluindo tecido cerebral, fígado, rins, pulmões, coração e baço. Essa é uma evidência da ocorrência de transmissão vertical do vírus. Análises laboratoriais e de dados epidemiológicos e clínicos estão sendo realizadas para a conclusão e classificação final desse caso.

EMERGING INFECTIOUS DISEASES®

ISSN: 1080-6059

Volume 30, Number 12—December 2024

Research Letter

Replication-Competent Oropouche Virus in Semen of Traveler Returning to Italy from Cuba, 2024

Concetta Castilletti¹, Ralph Huits^{1,2}, Rebeca Passarelli Mantovani, Silvia Accordini, Francesca Alladio, and Federico Gobbi

Author affiliations: IRCCS Sacro Cuore Don Calabria Hospital, Negrar di Valpolicella, Italy (C. Castilletti, R. Huits, R. Passarelli Mantovani, S. Accordini, F. Alladio, F. Gobbi); University of Brescia, Brescia, Italy (F. Gobbi)

[Cite This Article](#)

Abstract

A febrile man in Italy who had traveled to Cuba in July 2024 was diagnosed with Oropouche fever. Reverse transcription PCR detected prolonged shedding of Oropouche virus RNA in whole blood, serum, urine, and semen. Sixteen days after symptom onset, replication-competent virus was detected in semen, suggesting risk for sexual transmission.

On This Page

[Research Letter](#)

[Cite This Article](#)

Figures

[Figure 1](#)

[Figure 2](#)

EMERGING INFECTIOUS DISEASES®

ISSN: 1080-6059

Volume 31, Number 4—April 2025

Synopsis

Maternal and Fetal Implications of Oropouche Fever, Espírito Santo State, Brazil, 2024

João Paulo Cola¹, Ana Paula Brioschi dos Santos¹, Raphael Lubiana Zanotti, Adriana Endlich da Silva Dela Costa, Karina Bertazo Del Carro, Leslieane de Amorim

Lacerda Coelho, Angelica Espinosa Miranda², and Creuza Rachel Vicente^{2,3}

Author affiliation: Secretaria de Estado da Saúde do Espírito Santo, Vitória, Brazil (J.P. Cola, A.P. Brioschi dos Santos, R. Lubiana Zanotti, A. Endlich da Silva Dela Costa, K. Bertazo Del Carro, L. de Amorim Lacerda Coelho); Universidade Federal do Espírito Santo, Programa de Pós-Graduação em Doenças Infecciosas, Vitória (A.E. Miranda, C.R. Vicente)

[Main Article](#)

TICKS & PANDORA'S PATHOGEN BOX



TICK BASICS

3 life stages



1 host vs 3 hosts

veterinary importance medical importance

Soft vs Hard

Argasidae

Ixodidae

Ixodes

Metastriate

Seasonal peaks, Life average of 2 – 3 years

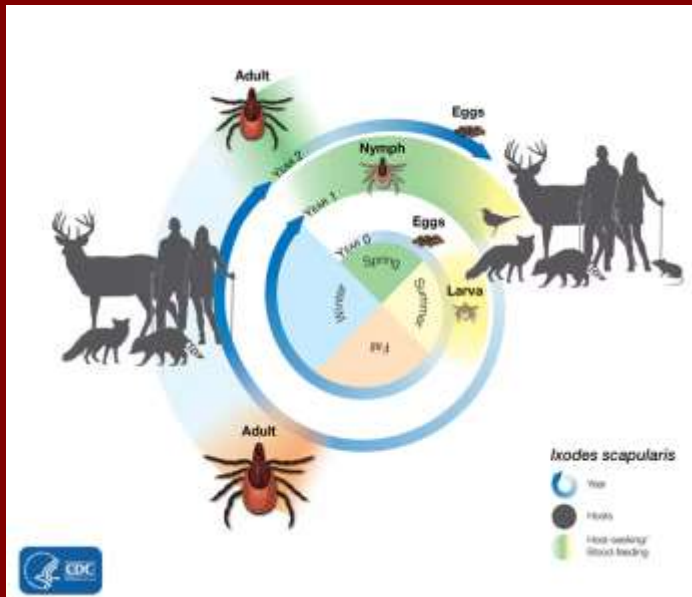


Exhibit questing behaviors

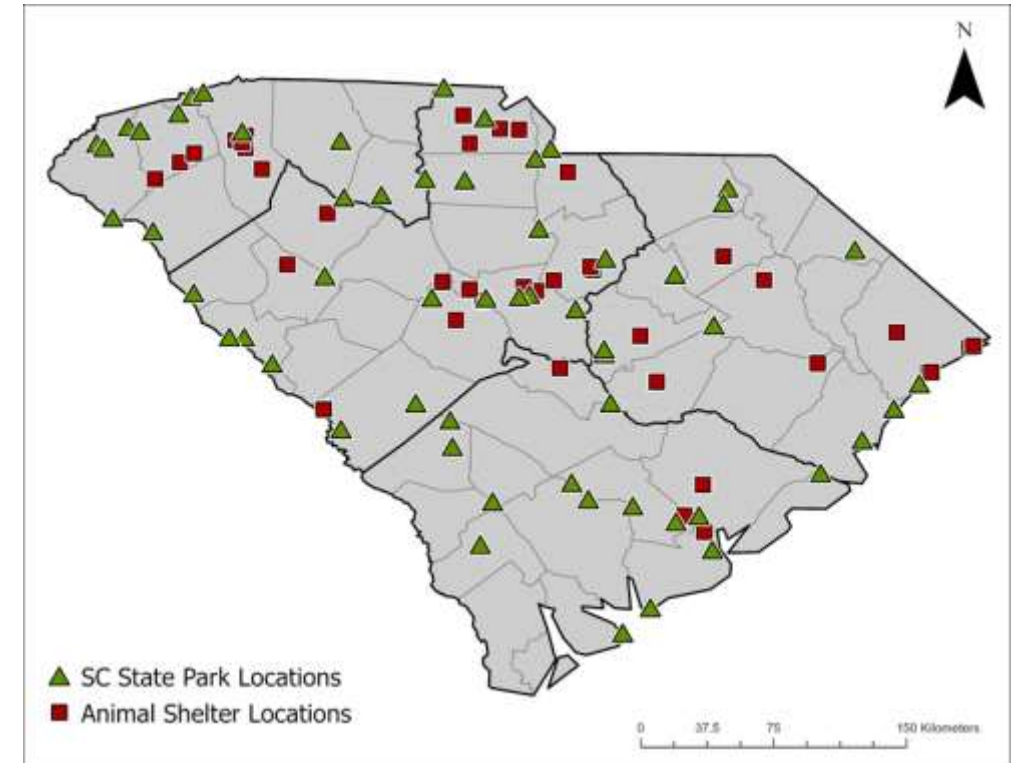


SOUTH CAROLINA TICKS

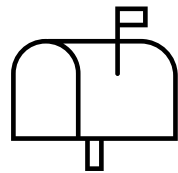
Total ~20,000 ticks since 2020

Eight species collected since 2020

- *Amblyomma americanum***
- *Am. maculatum*
- *Haemaphysalis longicornis*
- *Dermacentor variabilis*
- *Rhipicephalus sanguineus*
- *Ixodes scapularis*
- *Ix. keiransi* (affinis)
- *Ha. leporispalustris*



Passive



Active @ State Parks



Veterinarian



Amblyomma americanum

Lone Star tick

Very aggressive tick, feeds on humans readily

Vectors pathogens that cause:

Ehrlichiosis

Tularemia

SFGR

Heartland virus disease

Bourbon virus disease

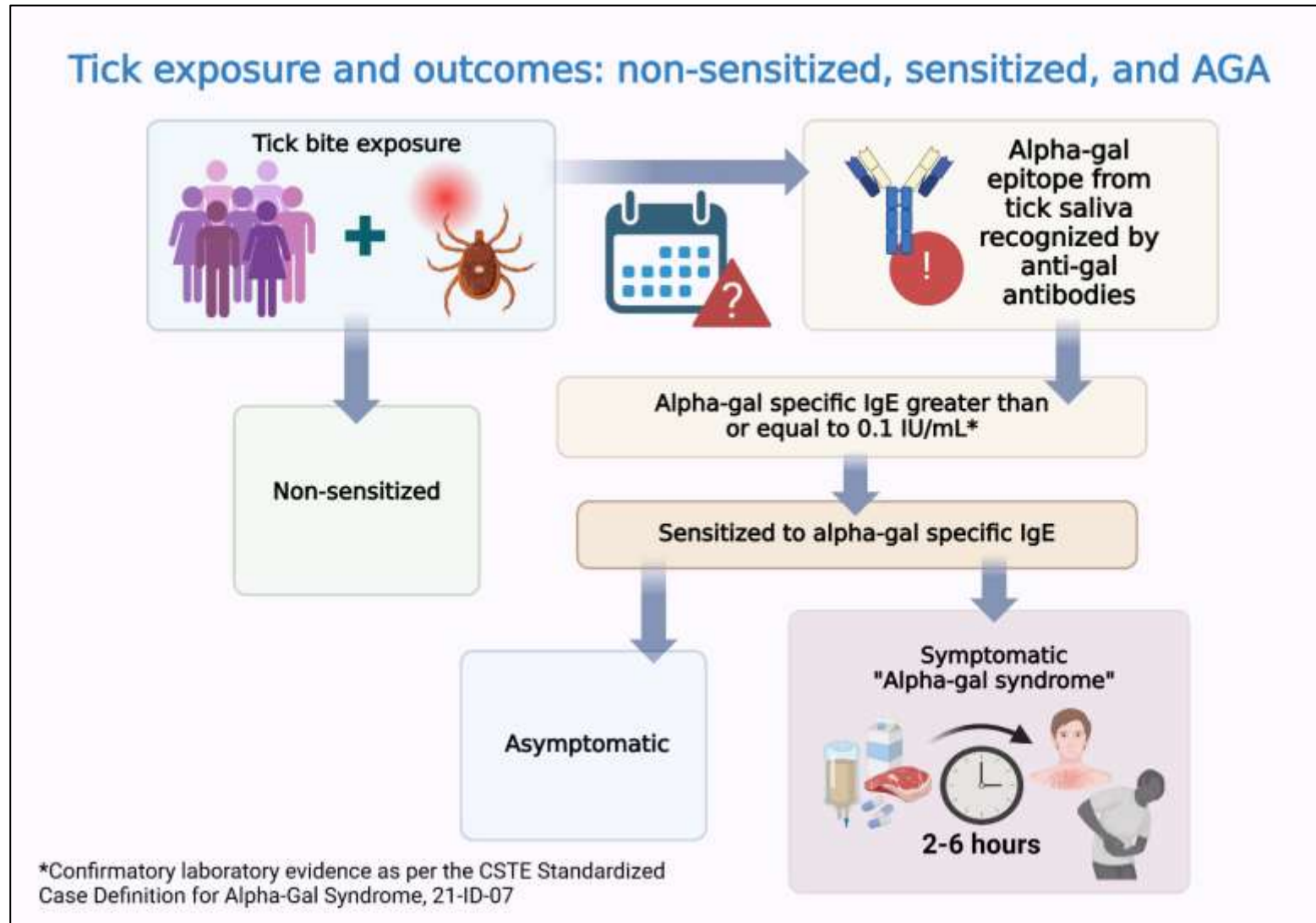
STARI

Alpha-gal allergy (**not** caused by a pathogen)

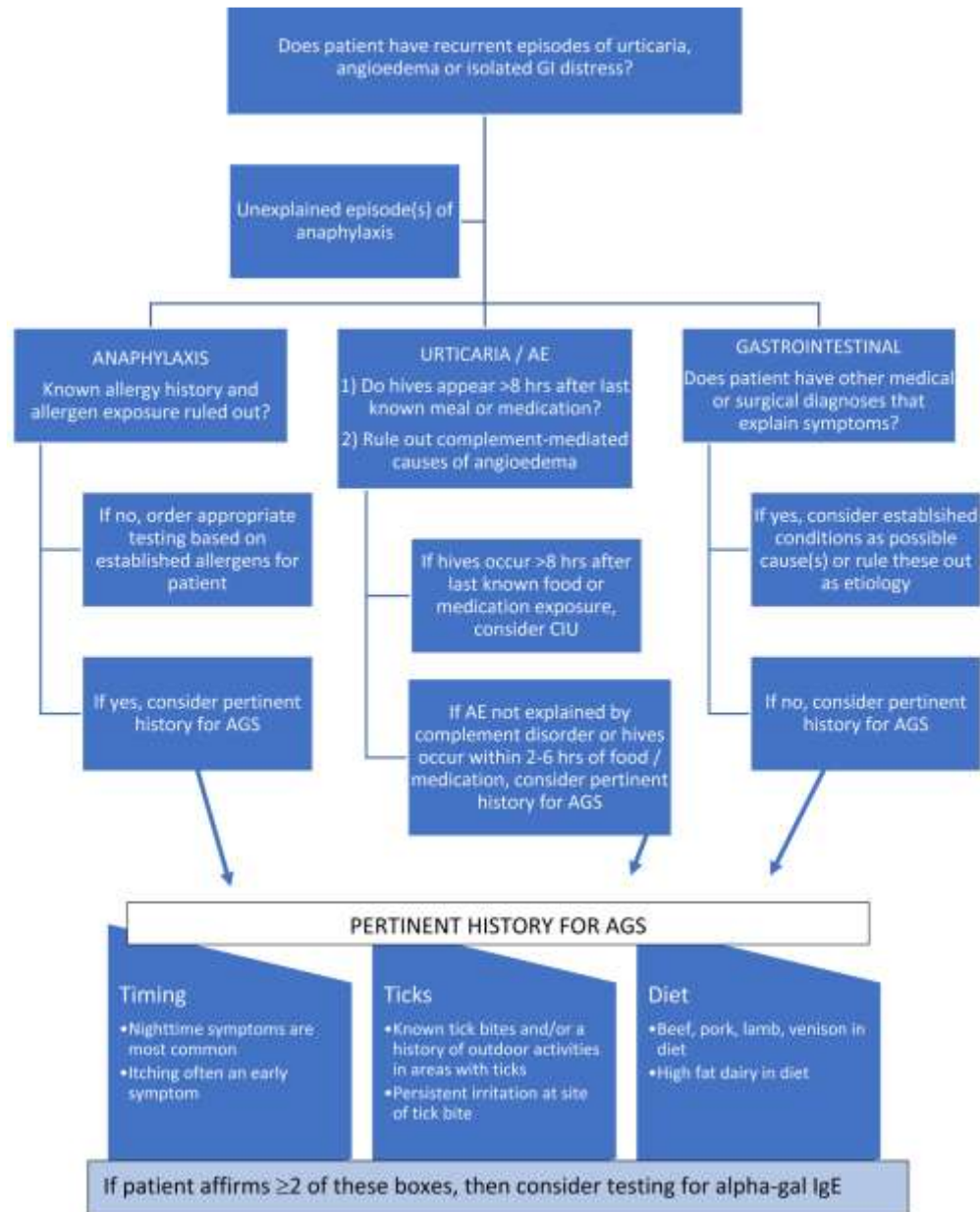


larva nymph ♂ adults ♀

WHAT IS ALPHA-GAL ALLERGY?



WHAT IS ALPHA-GAL ALLERGY?



NON-RED MEAT PRODUCTS WITH ALPHA-GAL

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Cetuximab-Induced Anaphylaxis and IgE Specific for Galactose- α -1,3-Galactose

Christine H. Chung, M.D., Beloo Mirakhur, M.D., Ph.D.,
Emily Chan, M.D., Ph.D., Quynh-Thu Le, M.D., Jordan Berlin, M.D.,
Michael Morse, M.D., Barbara A. Murphy, M.D., Shama M. Satinover, M.S.,
Jacob Hosen, B.S., David Mauro, M.D., Ph.D., Robbert J. Slebos, Ph.D.,
Qinwei Zhou, Ph.D., Diane Gold, M.D., Tina Hatley, M.D.,
Daniel J. Hicklin, Ph.D., and Thomas A.E. Platts-Mills, M.D., Ph.D.

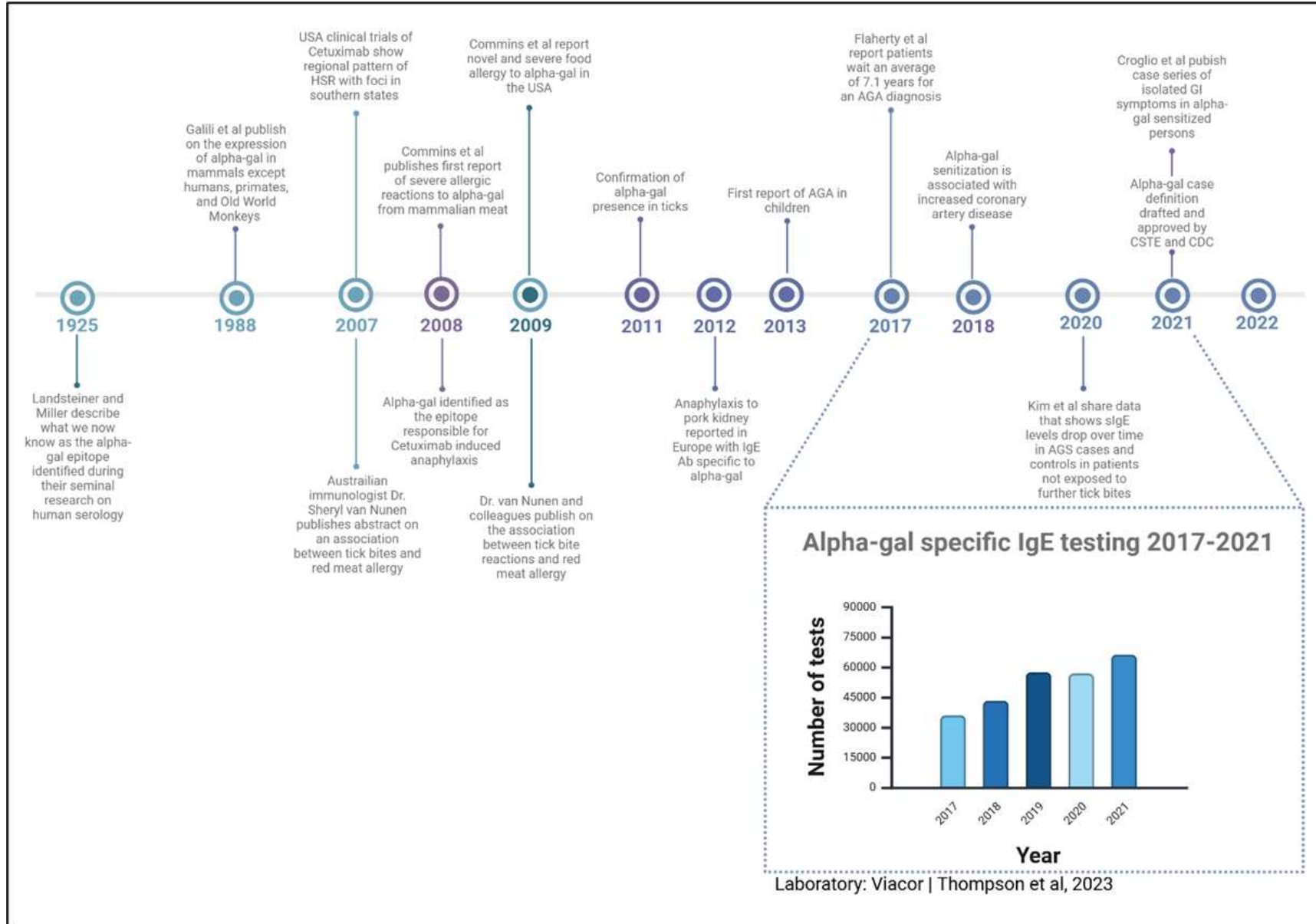
- Rocky mountain oysters
- Anti-venom medication
- Some vaccines
- Some monoclonal antibody therapies for cancer
- Heparin (stroke)
- Products with:
 - Magnesium stearate
 - Glycerin
 - Gelatin



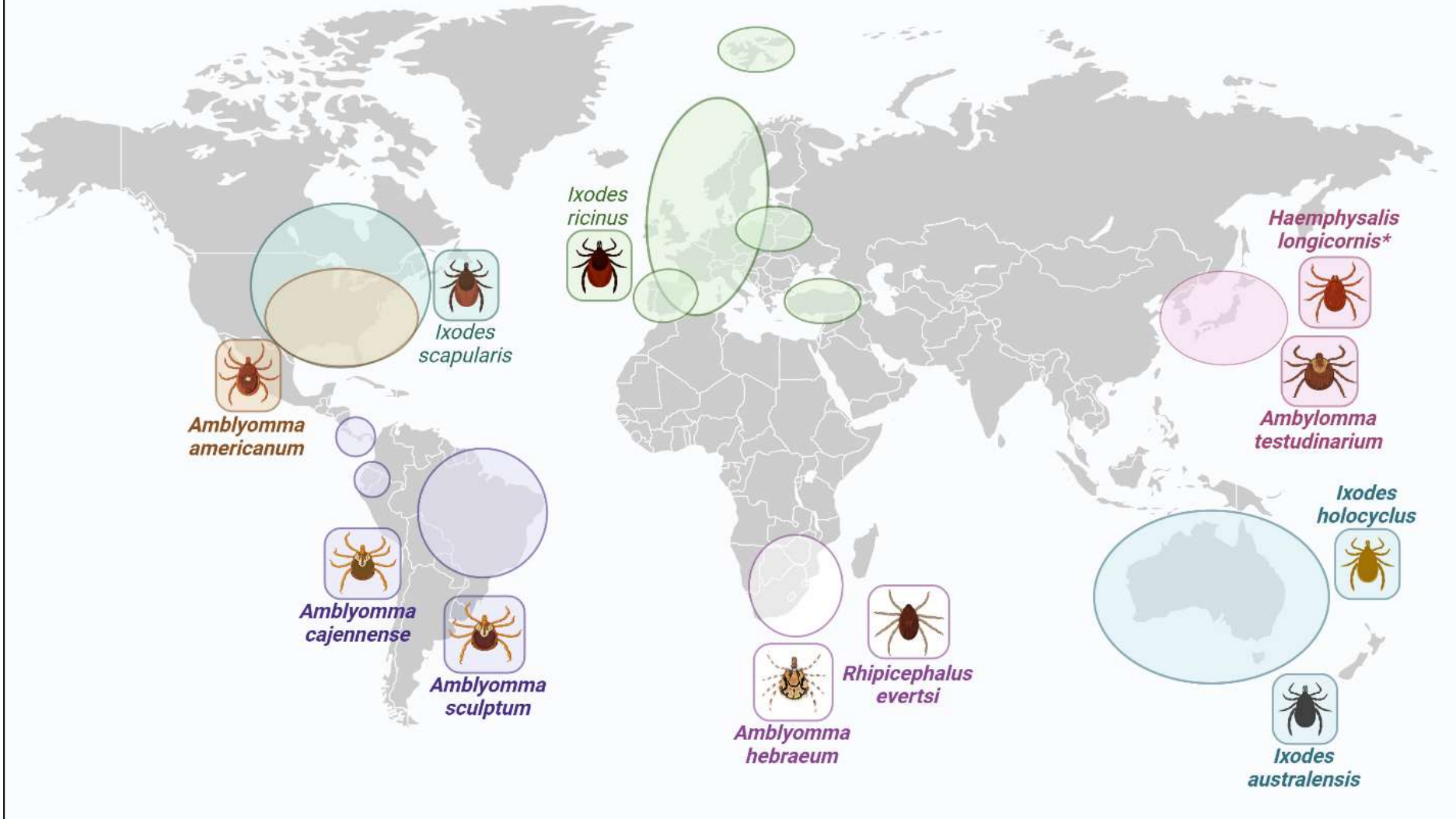
Some products with magnesium stearate:

- Vegetable and coconut oil
- Flaxseeds, walnuts
- Eggs, cheese
- Infant formula

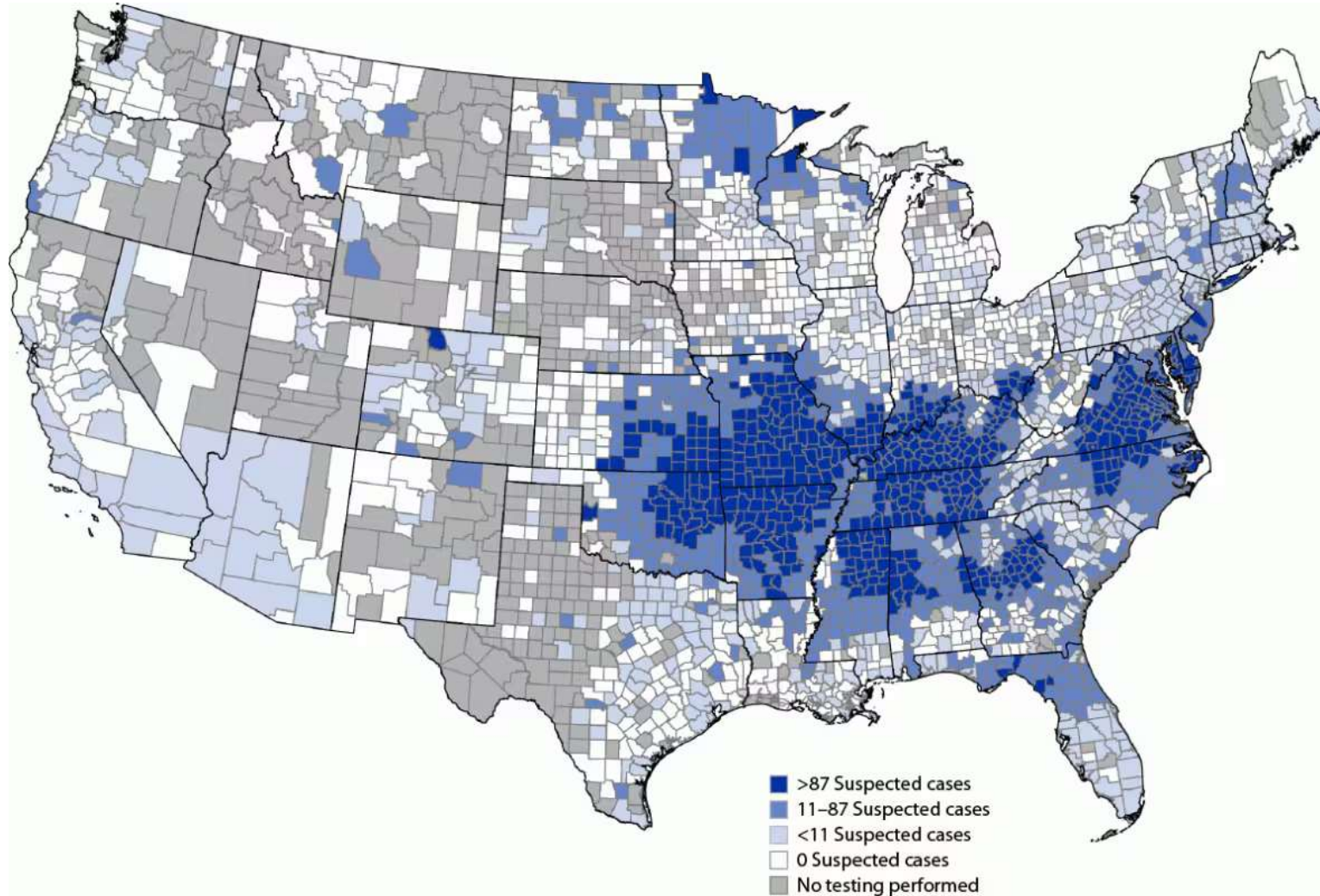
HISTORY OF ALPHA-GAL ALLERGY



Geographic range of tick species associated with reported alpha-gal allergy cases

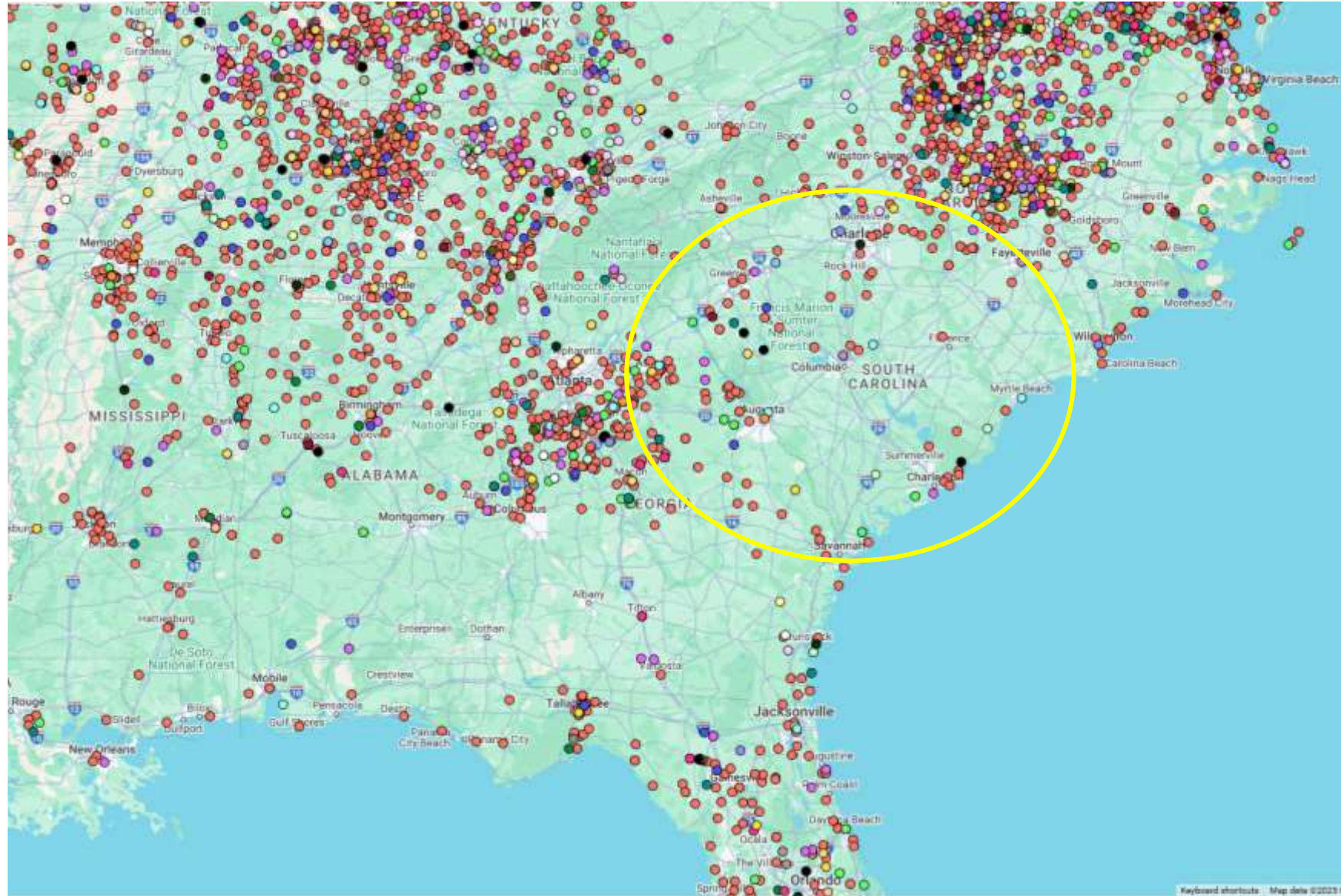


NATIONAL ALPHA-GAL ALLERGY SERO-STUDY



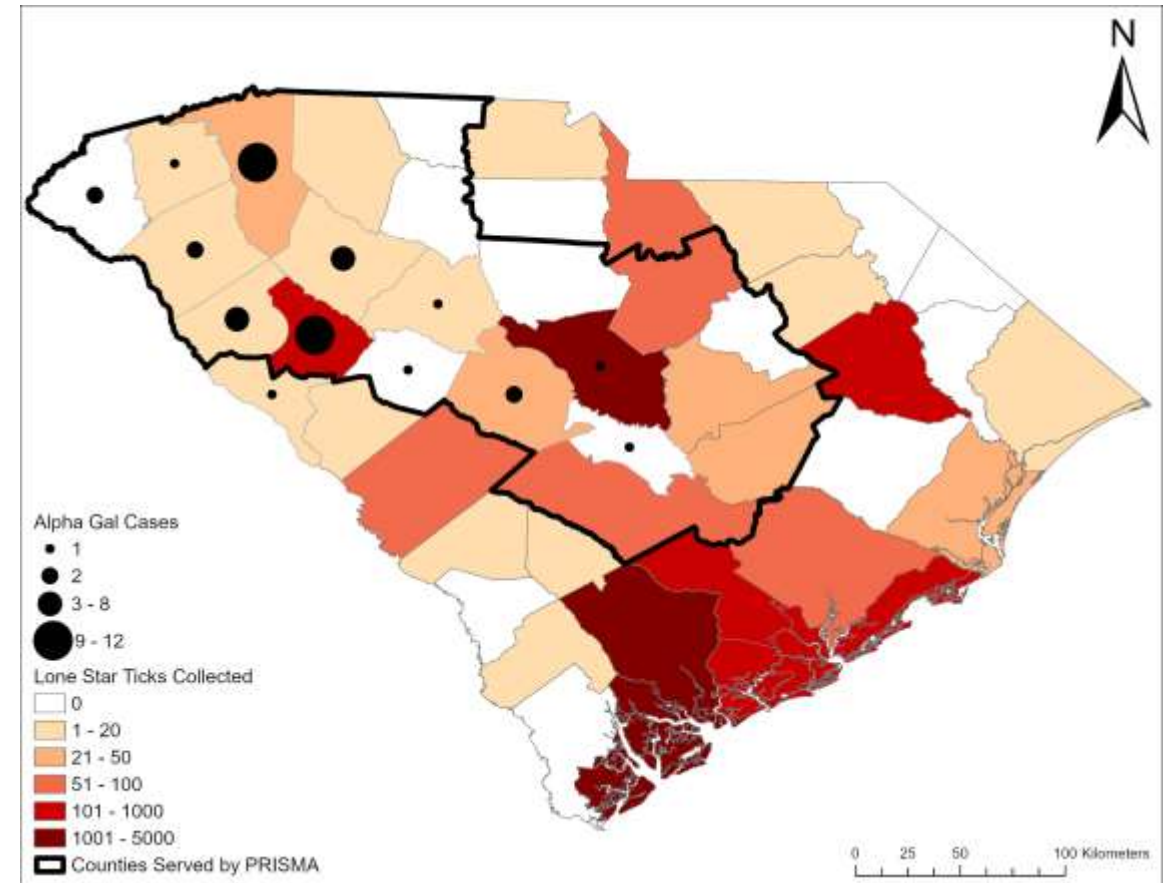
- ~30% of persons tested for AGA have a positive diagnostic test
- Older men were the greatest at-risk group
- Low clinical knowledge. 42% of health care providers have never heard of AGA

CROWD SOURCED PATIENT DATA

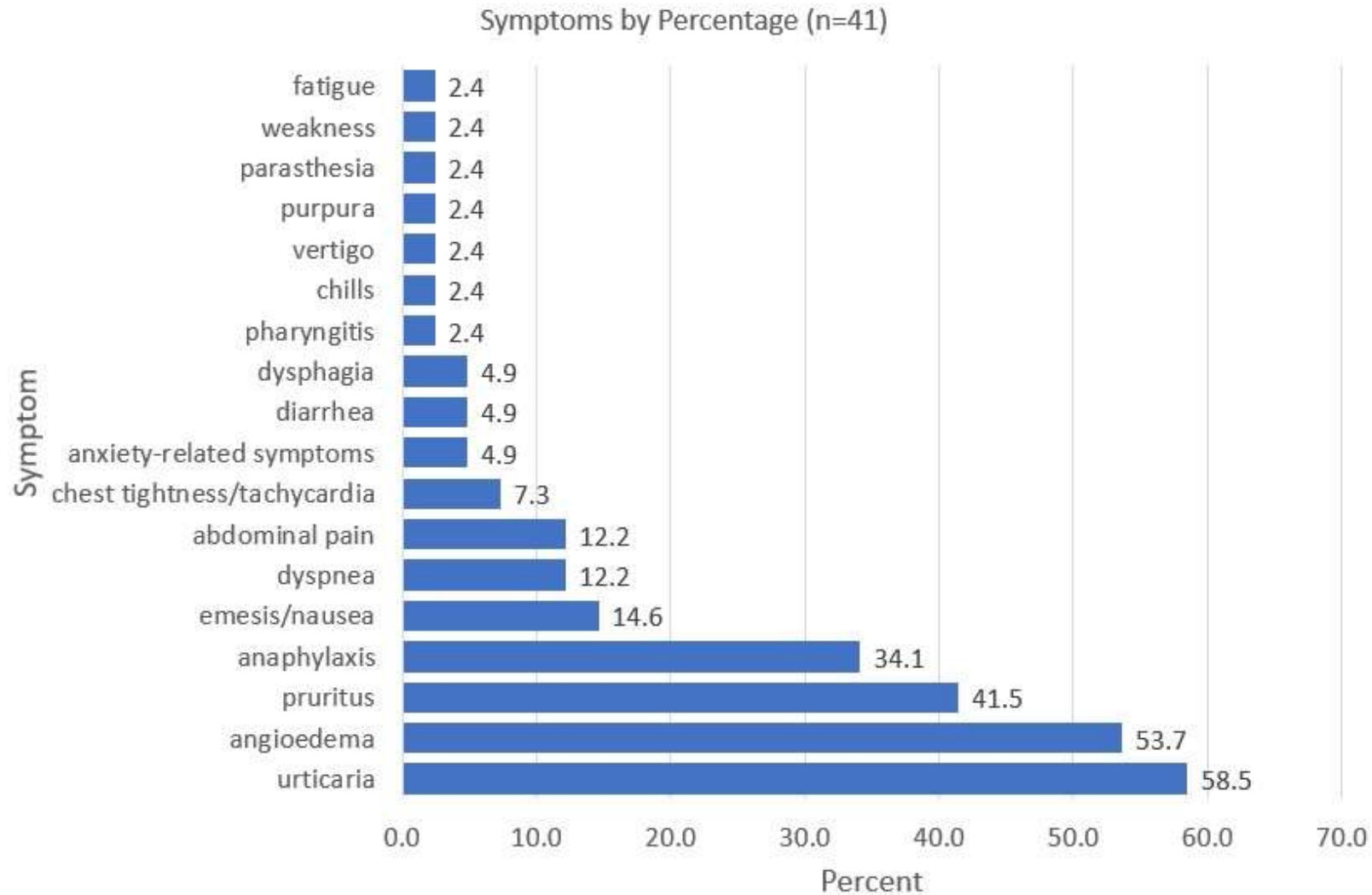


DIAGNOSED ALPHA-GAL ALLERGY @ PRISMA

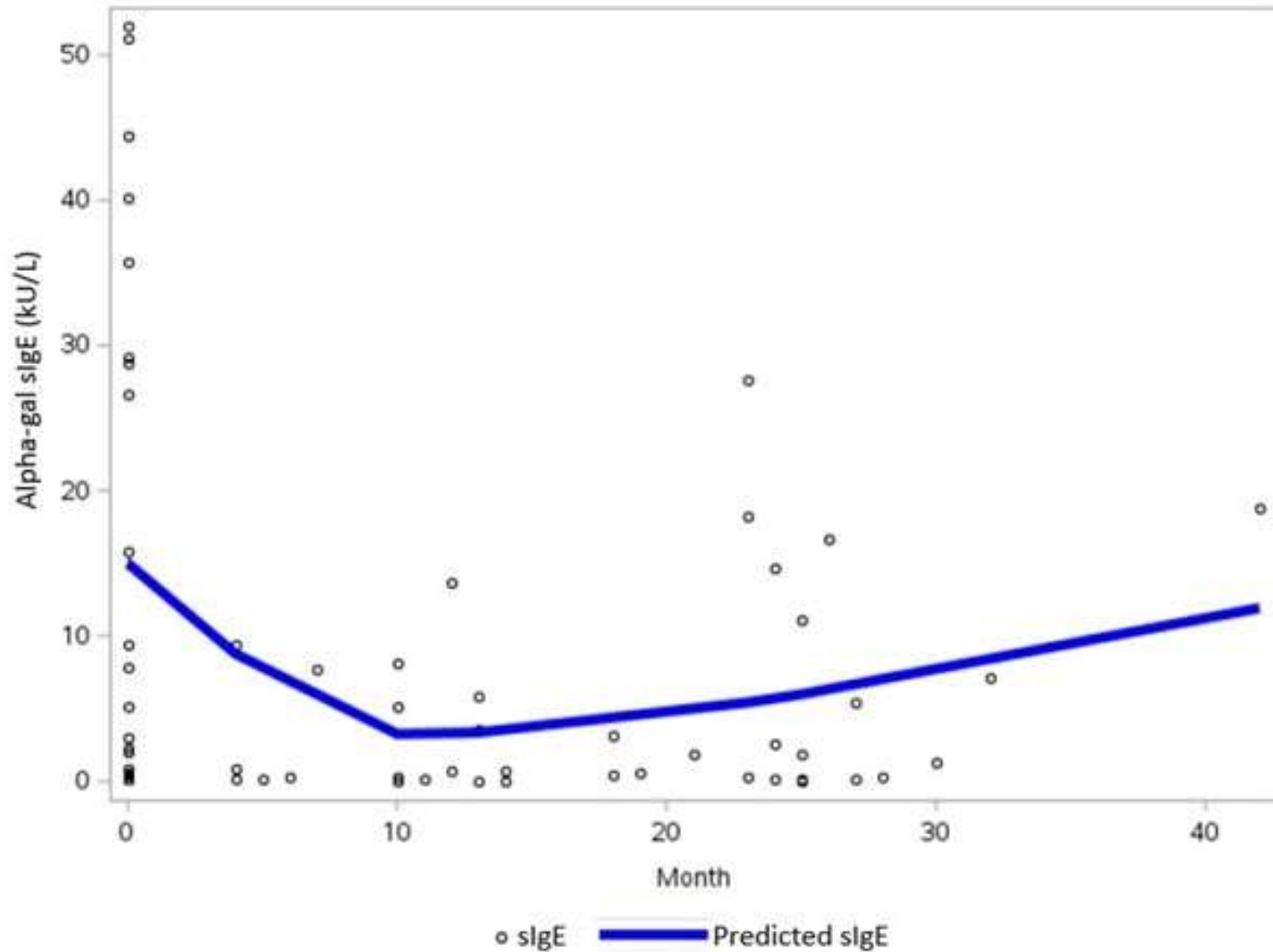
Characteristics (n=50)	
	Number (%) or Mean +/- SD
Median age at diagnosis, y, (range)	59 (10 - 80)
Sex, male (%)	35 (70%)
<i>Race</i>	
White	47 (94%)
Black	3 (6%)
<i>Payment Type</i>	
Public	25 (50%)
Private	20 (40%)
Self-Pay	5 (10%)
<i>Relevant Comorbidities</i>	
Cancer	11 (22%)
Diabetes mellitus (Type II)	4 (8%)
Irritable Bowel Syndrome	3 (6%)
Autoimmune Condition	5 (10%)
<i>Risk Factors</i>	
Reported Tick Bite History (%)	19 (38%)
Reported Tick Bite OR significant time outdoors (%)*	23 (46%)
Reported hx of alcohol use	23 (46%)
<i>Alpha-galactose IgE Values</i>	
Earliest accessible alpha-galactose-1,3-galactose IgE level (kU/L) (n=50) (mean +/- SD)	2.68 +/- 22.96
Diagnostic alpha-galactose-1,3-galactose IgE level (kU/L) (n=37) (mean +/- SD)	2.73 +/- 25.15
*gardening, farming, DIY work on home, beach	



LOCAL SYMPTOMOLOGY PROFILES



AGA ANTIBODY TITERS OVER TIME



CURRENT AGA RESEARCH

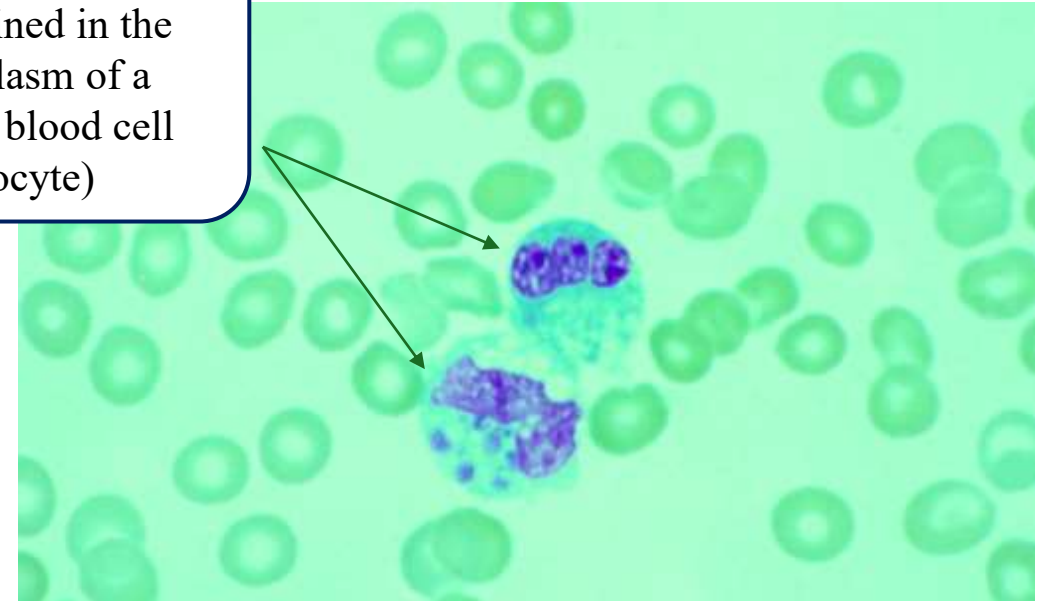


- Seroprevalence of AGA sensitization across the state using a large biobank
- Biomarkers associated with symptoms vs sensitization
- Prospective annual seroconversion risk
- *MUSC Pediatric Allergy group → AGA in kids*

EHRLICHIOSIS

- History of Ehrlichiosis
 - 1920 - First identified in ticks
 - 1986 – Recognized as human pathogen
 - 1999 – Nationally notifiable disease
- Several pathogen species
 - *Ehrlichia chaffeensis*
 - *E. ewingii*
 - *E. ruminantium* (Panola Mountain Ehrlichia)
- Clinical symptoms
 - 1 to 2 week incubation period
 - Flu-like illness, rash
 - Severe disease: meningoencephalitis, organ failure, hemorrhagic leakage

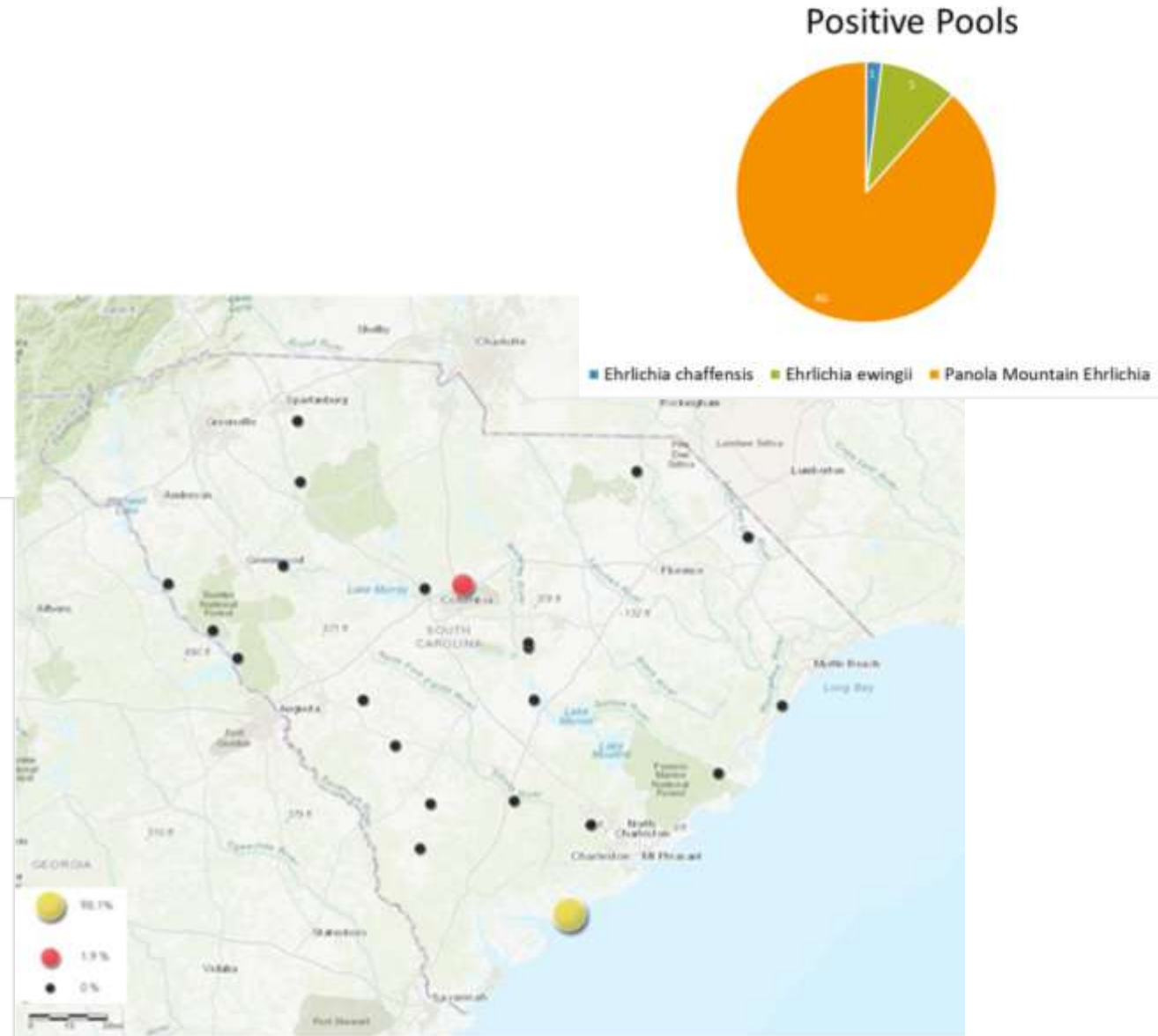
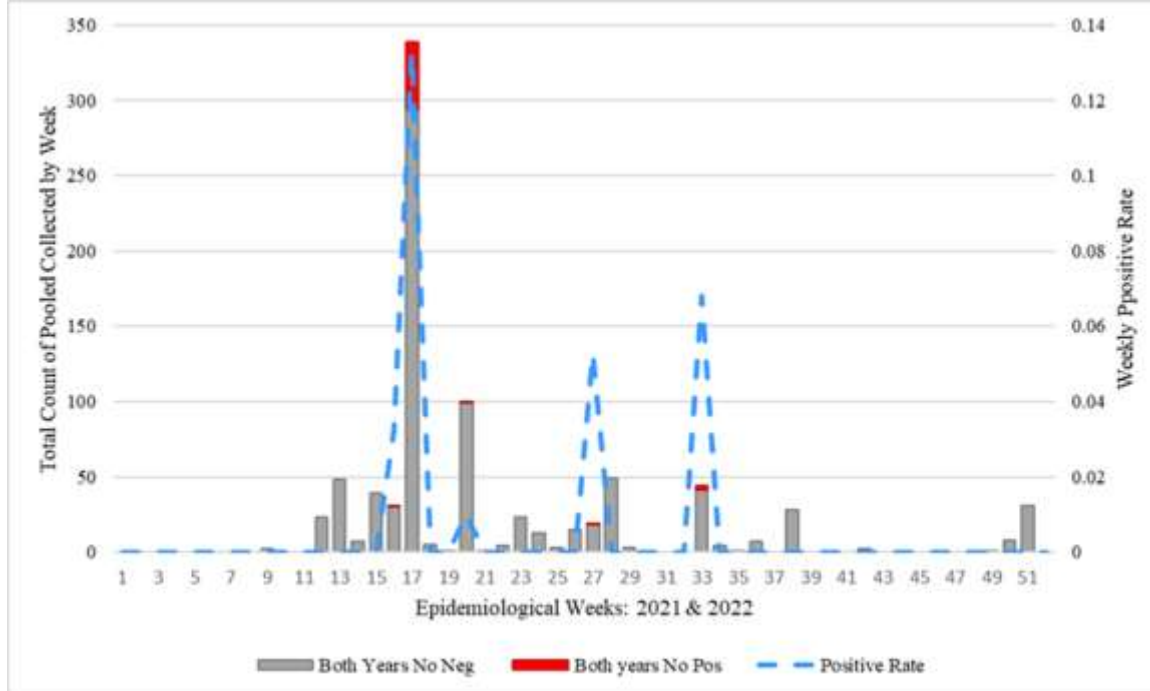
Morulae
contained in the
cytoplasm of a
white blood cell
(monocyte)



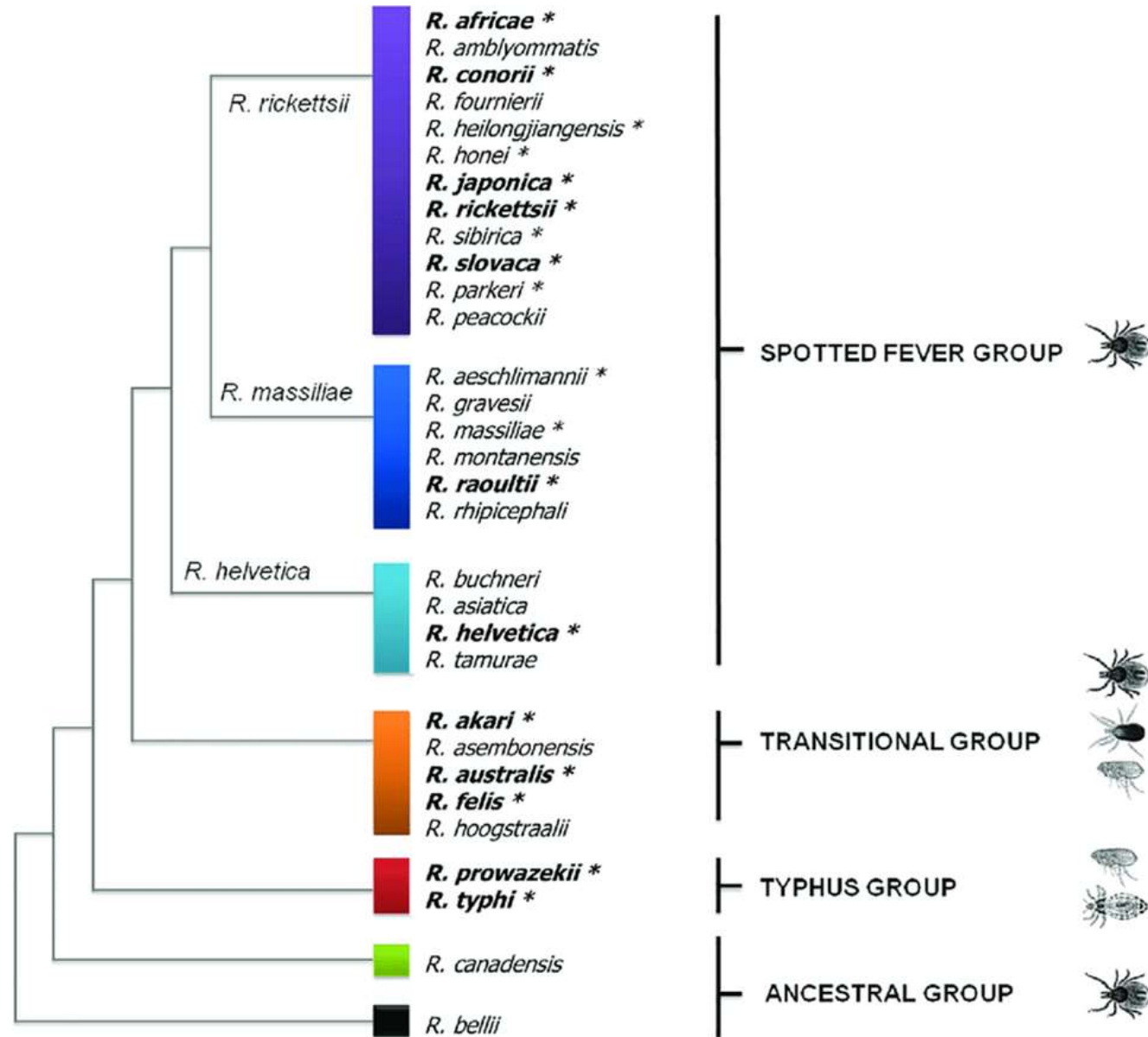
E. chaffeensis contained in vacuoles in the cytoplasm of a monocyte (Paddock & Childs, 2003).

EHRLICHIOSIS IN SOUTH CAROLINA

- 6% of ticks have at least one *Ehrlichia* spp
- Ehrlichia positive ticks were
 - 2x more likely in nymphal ticks
 - 14x more likely in coastal marshes
 - 16X more likely in Colleton County
 - 9x more likely in April
 - More likely on humid and hot days

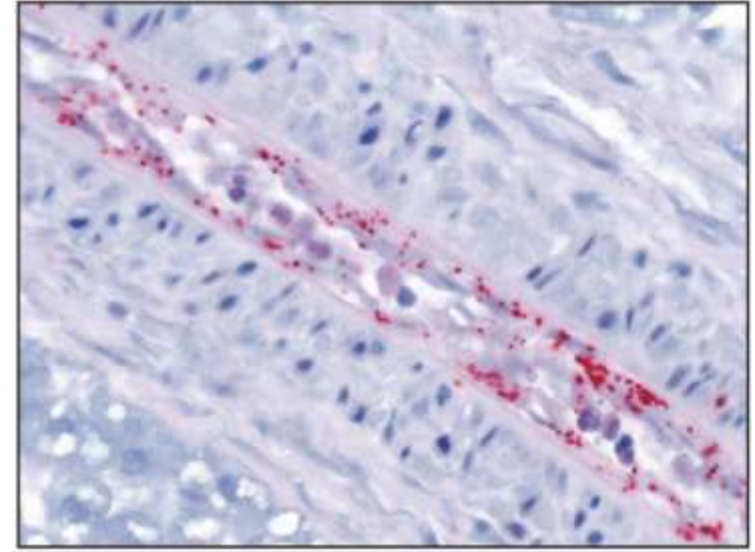


SPOTTED FEVER GROUP *RICKETTSIA*

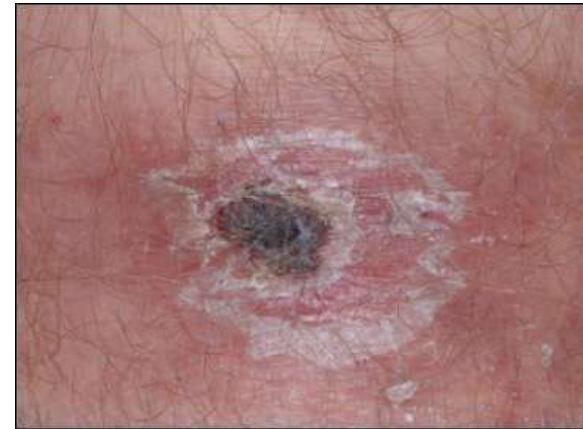


SFGR IN CLINIC

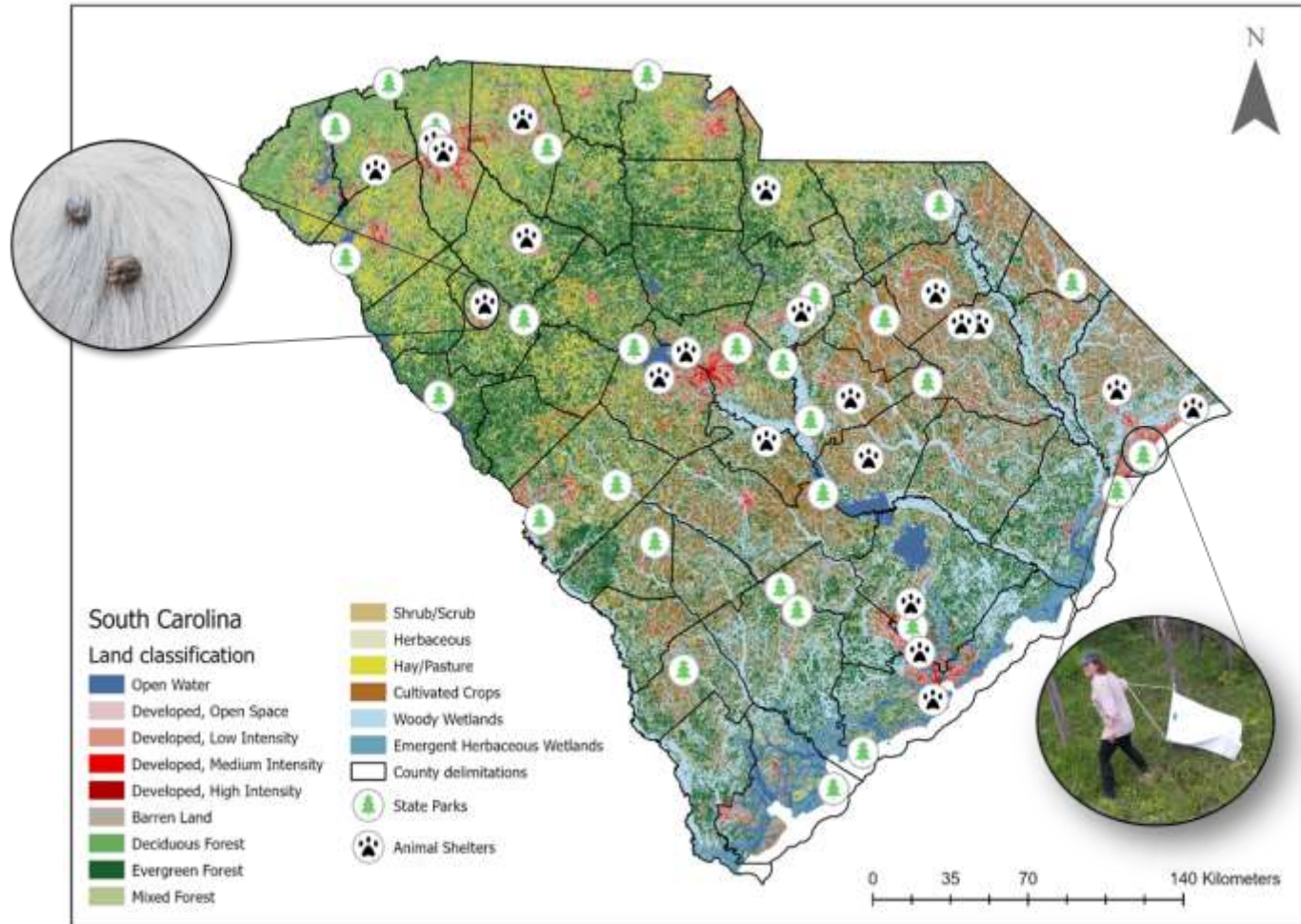
- Antibody titer $>1:128$ OR 4-fold increase over 2 week period
 - *R. rickettsii* focused could be cross-reactive
- SFGR PCR of febrile patient blood OR eschar
- Classic Rocky Mountain Spotted fever triad (*<50% of contemporary cases have this*):
 - Rash
 - Headache
 - Fever
- *Rickettsia parkeri* is characterized by eschar
- *Rickettsia amblyommatis* clinical profile is unknown
- Other clinical indicators:
 - Thrombocytopenia
 - Hyponatremia
 - Elevated hepatic transaminases
- Doxycycline is most effective when given <5 days of symptom onset



Classic pathognomic indicators of
R. parkeri versus *R. rickettsii*



SFGR SPECIES IN SOUTH CAROLINA TICKS



Five competent SFGR vector species

Amblyomma americanum

Amblyomma maculatum

Dermacentor variabilis

Haemaphysalis longicornis

Rhipicephalus sanguineus

SFGR SPECIES IN SOUTH CAROLINA TICKS

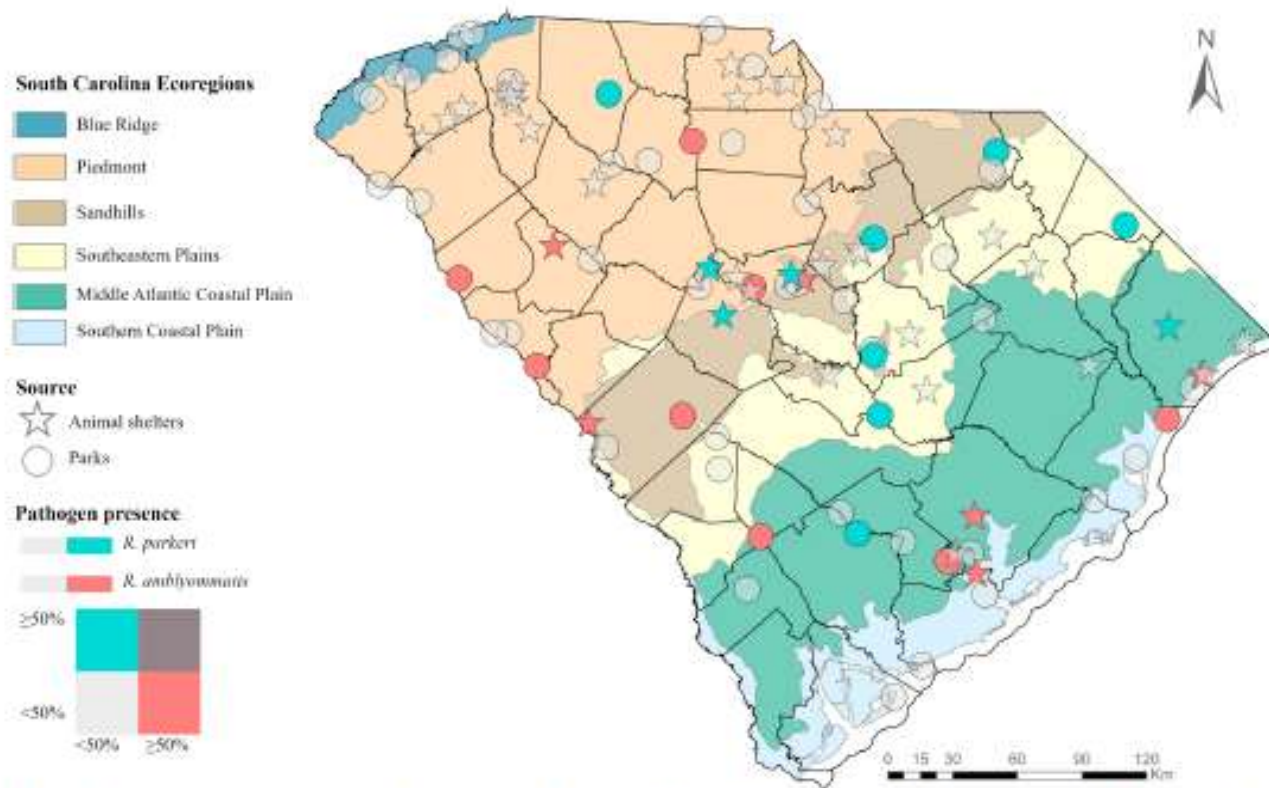


Fig. 2 Bivariate distribution of *R. parkeri* and *R. amblyommatis* metastrongyloid tick positivity by host-seeking status. *Note: Questing ticks were collected at state parks, and host-attached ticks were collected from animal shelters and humane societies

~Half of tested metastrongyloid ticks are SFGR positive

- 25% *R. amblyommatis*
- 19% *R. parkeri*

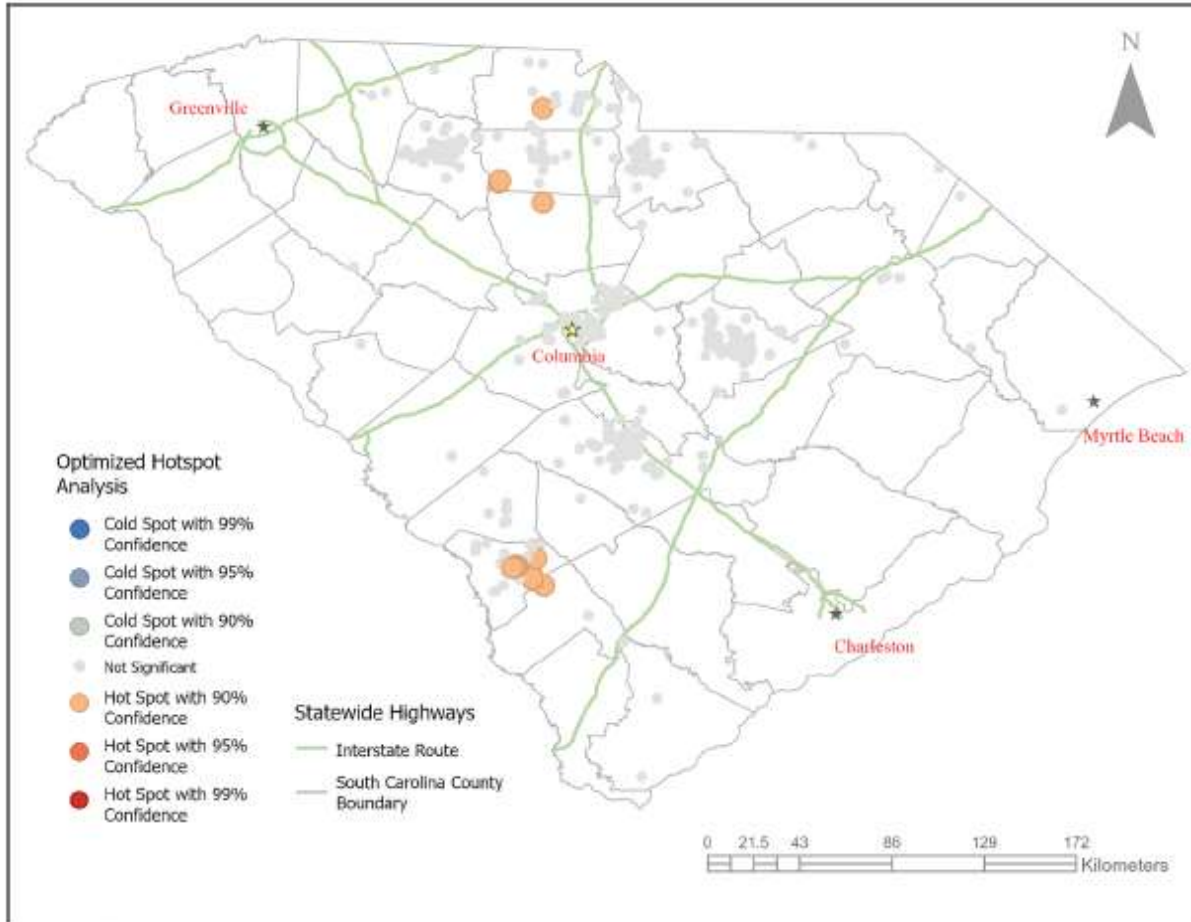
R. amblyommatis tick infection was significantly correlated with:

- Deciduous, evergreen & mixed forests

R. parkeri tick infection was significantly correlated with:

- Deciduous, evergreen & mixed forests
- ***Herbaceous vegetation***
- ***Cultivated cropland***
- ***Wood and emergent wetlands***

CLINICAL SFGR IN SOUTH CAROLINA



3.4% seropositive (>1:128) on *R. rickettsii* IFA slides

- 17% at 1:64 titers

- 0.8% at 1:256 titers
- 0.5% at 1:512 titers

Getis-Ord-Gi statistics identified hot spot clusters in rural counties

CLINICAL SFGR IN SOUTH CAROLINA

Adjusted and unadjusted logistic regression analysis for anti-SFGR-IgG antibody seropositivity at 1:128 titers in South Carolina, USA.

Variables	Unadjusted OR (95 % CI)	P- value	Adjusted [†] OR (95 % CI)	P- value
Male vs female*	3.20 (1.45–7.08)	0.004	3.73 (1.19–11.8)	0.02
Age	1.02 (1.00–1.04)	0.08	1.05 (1.01–1.09)	0.008
Race/Ethnicity				
Other vs white*	0.67 (0.31–1.47)	0.32	1.04 (0.27–4.06)	0.96
Any chronic health problems				
Yes vs no*	0.39 (0.11–1.33)	0.13	0.23 (0.05–1.15)	0.06
Prefer not to answer vs no*	2.24 (0.49–10.4)	0.30	3.81 (0.52–28.2)	0.38
Frequency being bitten by ticks				
Anytime vs never	2.29 (1.03–5.12)	0.04	1.76 (0.52–6.05)	0.10
Do insect/tick bite(s) create a very large mark or reaction (including rash), or take longer than usual to heal?				
Yes vs no*	4.09 (0.55–31.3)	0.17	2.03 (0.24–17.9)	0.23
Spend time working outdoors	5.05 (1.62–16.0)	0.005	2.63 (0.55–12.8)	0.22
Annual household				
Less than \$15,000*	–	–	–	–
\$15,000–\$34,999	0.64 (0.17–2.48)	0.52	0.73 (0.17–3.15)	0.67
\$35,000–\$49,999	0.43 (0.05–3.86)	0.45	0.47 (0.05–4.50)	0.51
\$50,000–\$74,999	0.44 (0.05–3.92)	0.46	0.28 (0.02–3.32)	0.30
\$75,000–\$99,999	2.33 (0.53–10.4)	0.26	1.40 (0.21–9.42)	0.73
\$100,000– \$149,999	3.51 (0.89–14.0)	0.07	3.56 (0.66–19.4)	0.14
More than \$150,000	1.13 (0.13–10.4)	0.91	0.71 (0.04–14.3)	0.22

[†] Adjusted by all the included variables (sex, age, race, chronic disease, frequency of tick bite, insect/tick bite mark, time outdoors, spending time working outdoors, and income).

* Reference group.

**Healthy, wealthy, older white
males with known tick bites and
outdoor activity were highest risk
group for SFGR infection**

LYME DISEASE IN SOUTH CAROLINA



"Looks like a deer tick."

Ixodes scapularis

Blacklegged tick

-Alternative vector: *Ixodes keiransi*, *Ix brunneus*

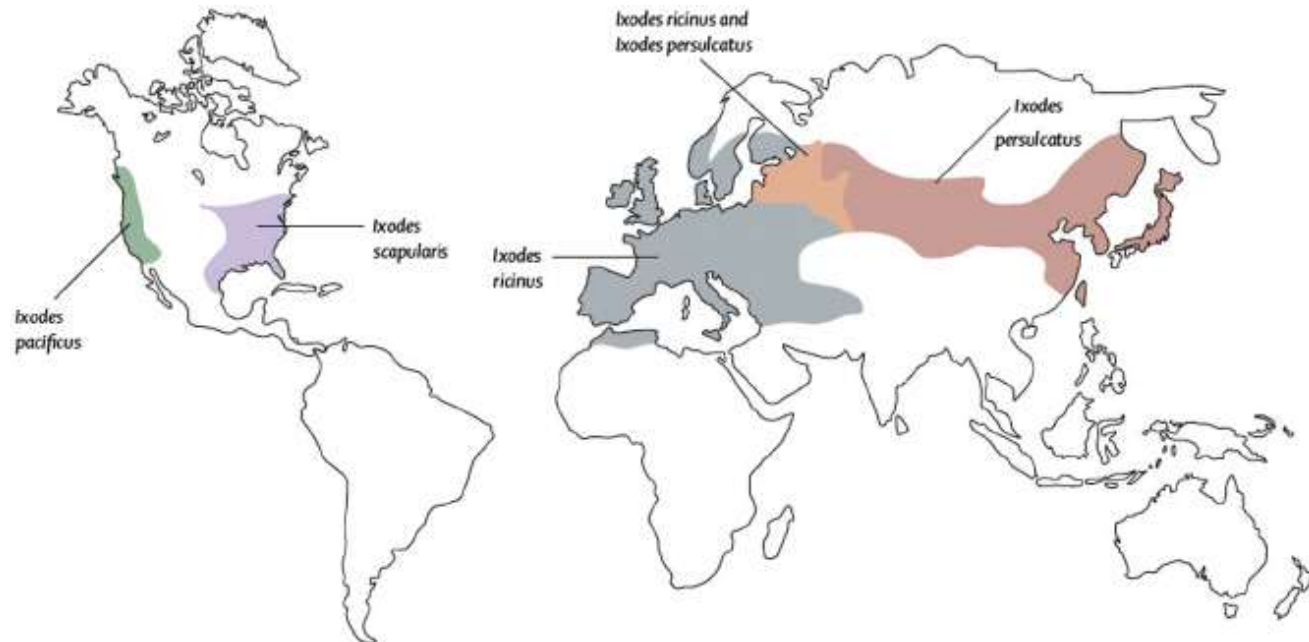
Prefers to feed on rodents, birds and deer. Will bite humans

Vectors pathogens that cause:

- Lyme disease (*Borrelia burgdorferi* complex)
 - *Borrelia mayonii*, *B. garinii* & *B. bissettii*
- Powassan virus
- *Ehrlichia* spp
- *Anaplasma phagocytophilum*
- *Babesia microti*

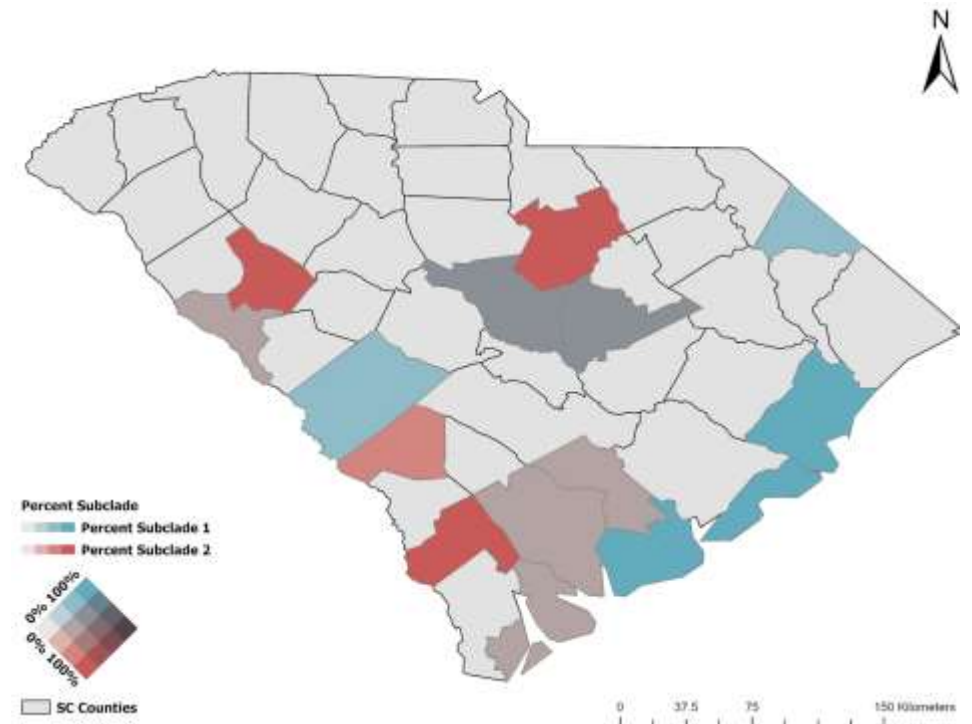
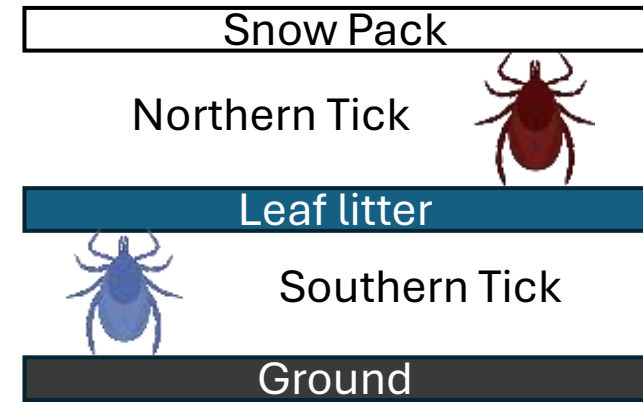


♀ ♂
adults nymph

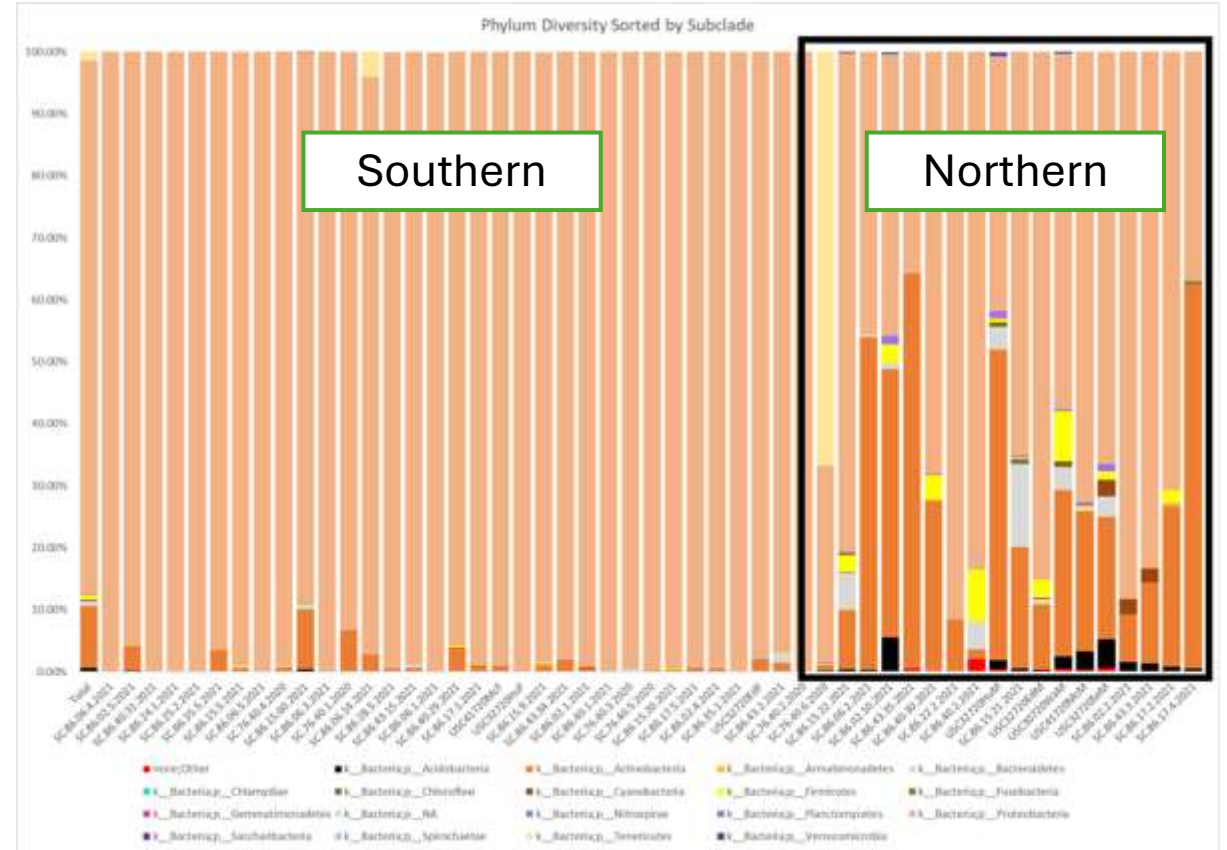
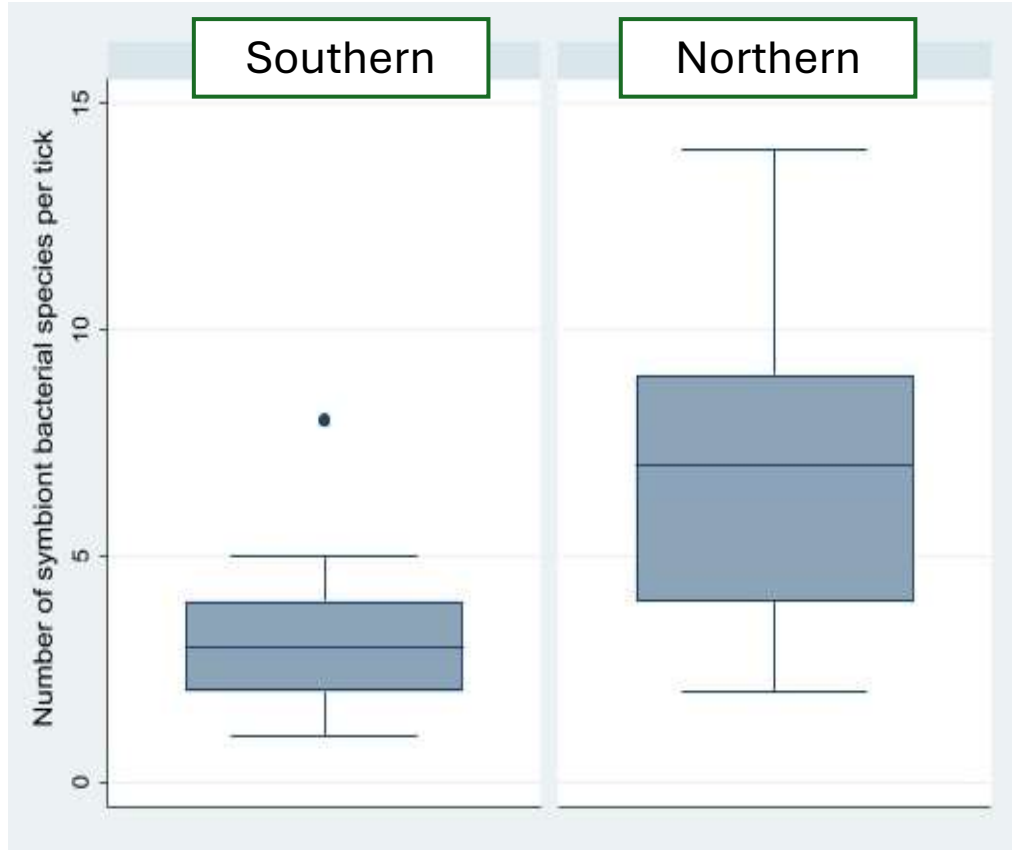


IXODES SCAPULARIS POPULATION STRUCTURE IN SC

- <500 ticks in the last five years
 - Peak in the winter months
- Northern clades associated with greater pathogen infection and overwinter on top of leaf litter
- Southern clades associated with amphibians and overwinter under leaf litter
- Classify the genetics of BLTs in our state
 - 2020-2021 questing *Ixodes scapularis* ticks
 - 16S Sequencing of V3-V4 region
 - DADA2 pipeline with Uclust for taxonomy

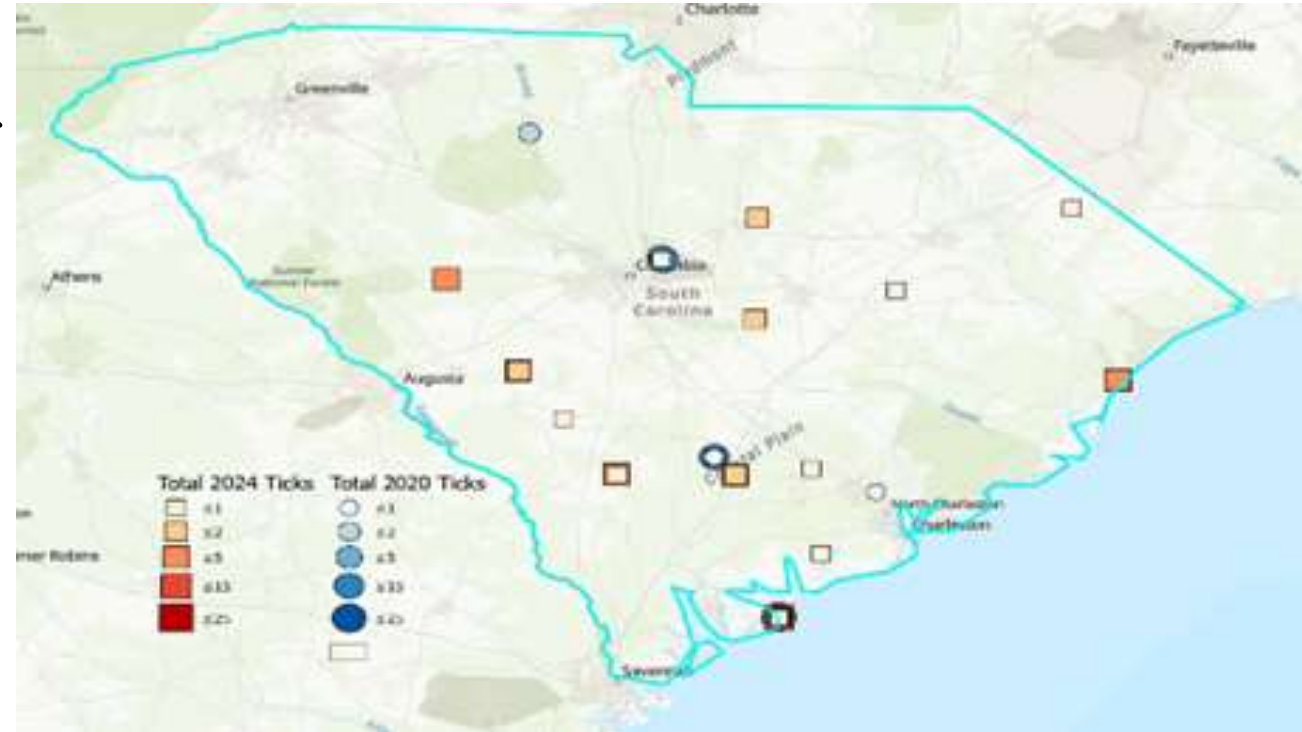


IXODES SCAPULARIS POPULATION STRUCTURE IN SC



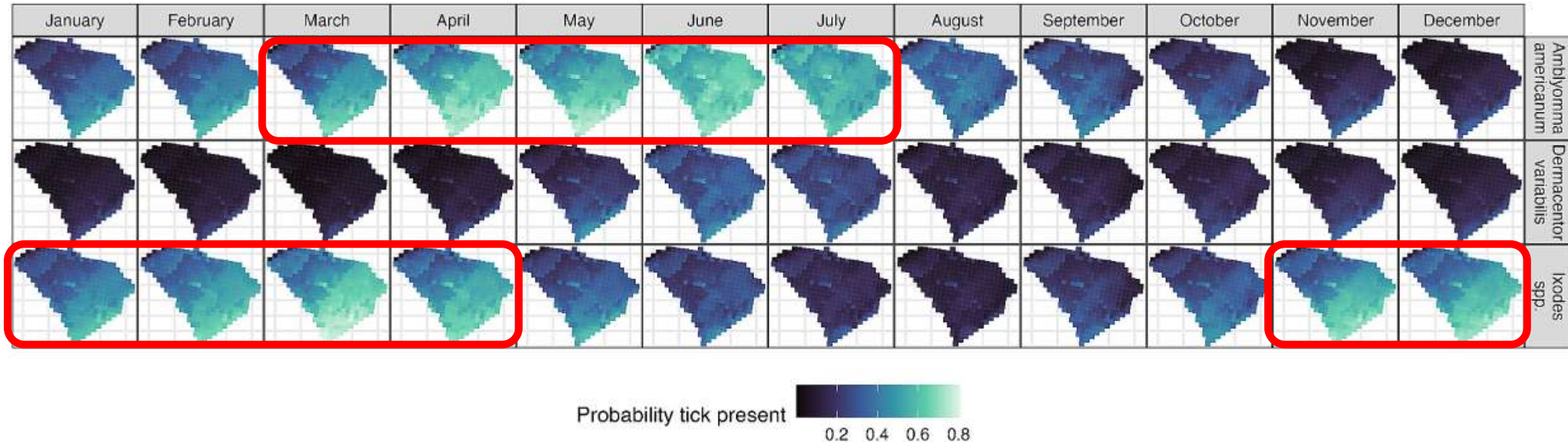
SUMMARY OF *IXODES SCAPULARIS*

- Concern that it will become an emerging species in the Upstate, but currently little evidence of major concern in the state.
 - 5 locations in 2020
 - 13 locations in 2024
- Diseases from this tick are not a major concern:
 - Lyme disease is the not most commonly reported TBD in SC
 - <1% of ticks are *Anaplasma* infected
 - None collected in the last three years
 - 2% of ticks are *Borrelia* infected



Ix. scapularis *Ix. keiransi* *Ix. brunneus*

SUMMARY OF SC TICKS

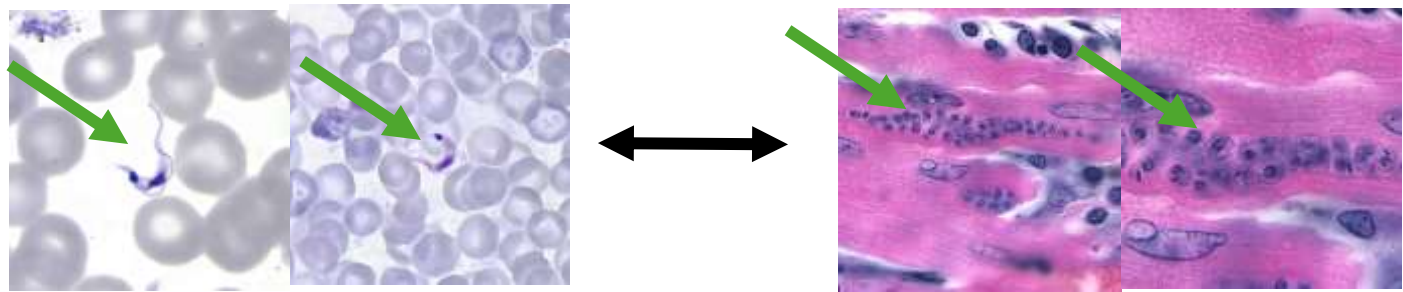
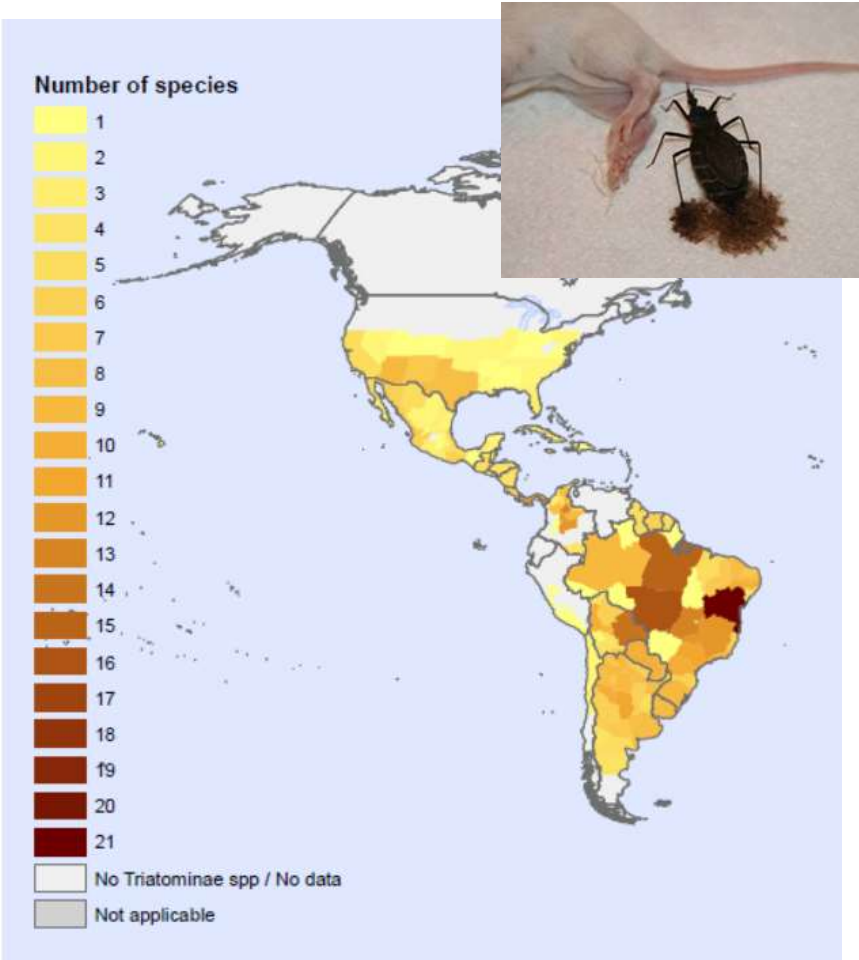
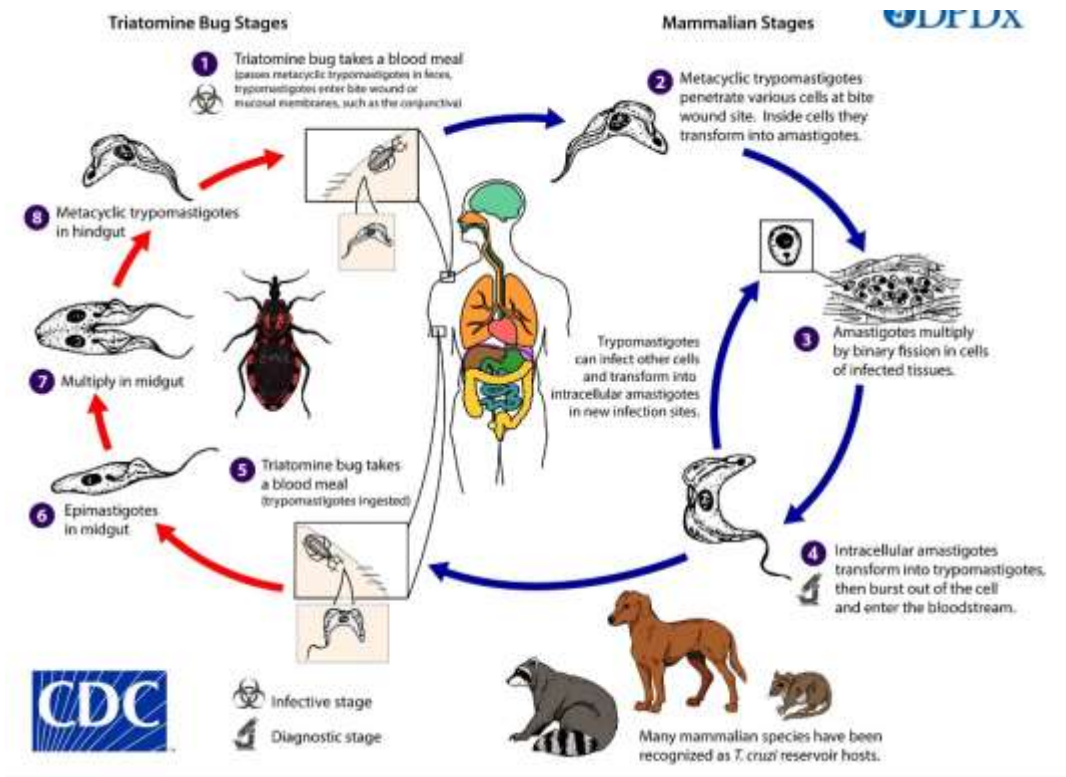


Employed Bayesian joint species distribution models to predict probability of tick presence at a 4 km² resolution

KISSING BUGS & *TRYPANOSOMA CRUZI*



CHAGAS DISEASE, AMERICAN TRYPANOSOMIASIS, OR *TRYPANOSOMA CRUZI*



ALTERNATIVE TRANSMISSION METHODS

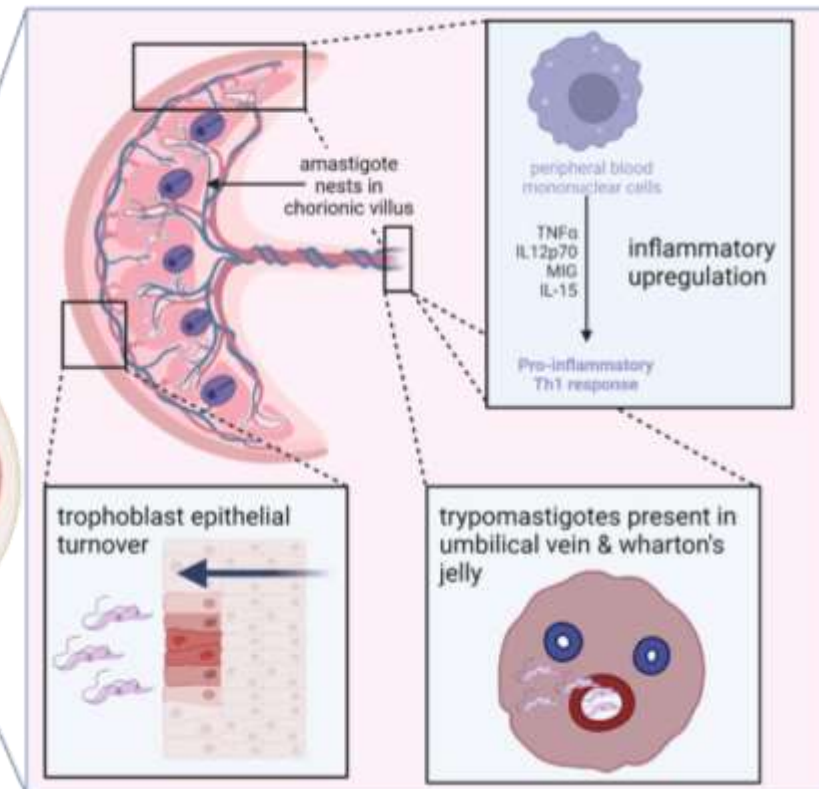
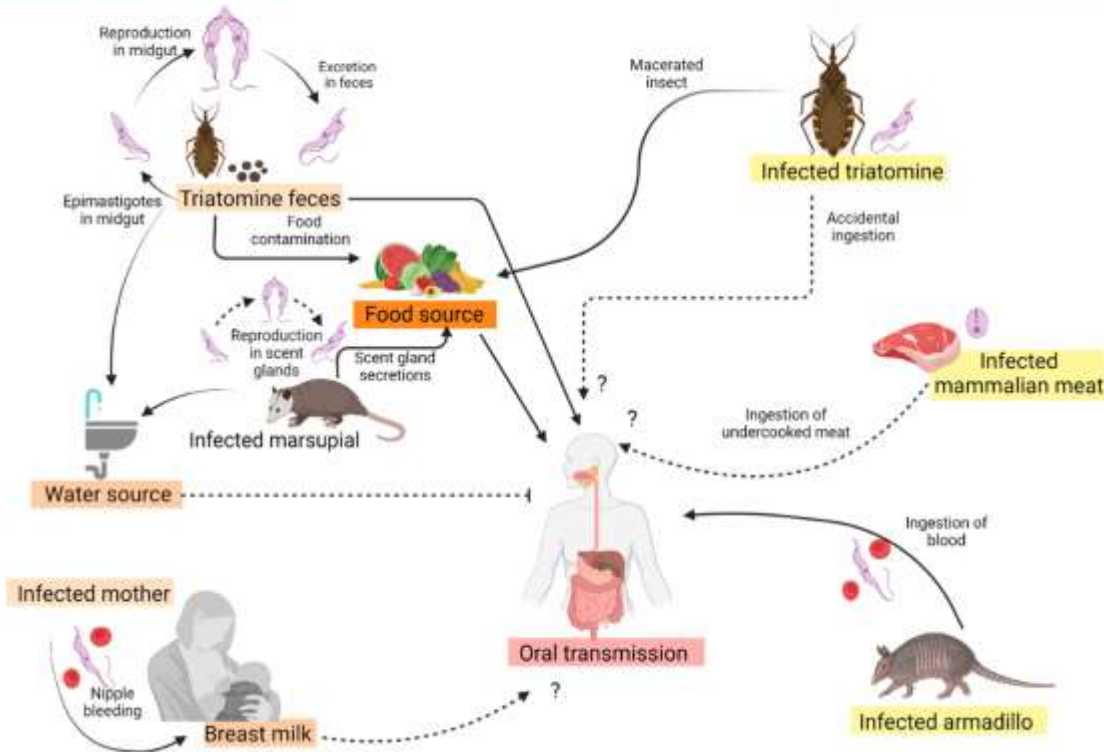
Transplant/Transfusion

Oral Vertical

Up to 315 congenitally infected babies are born every year in USA

Cross-contamination

Direct ingestion



THE CLINICAL CHALLENGE OF DIAGNOSING CHRONIC DISEASE

Parasite DTU

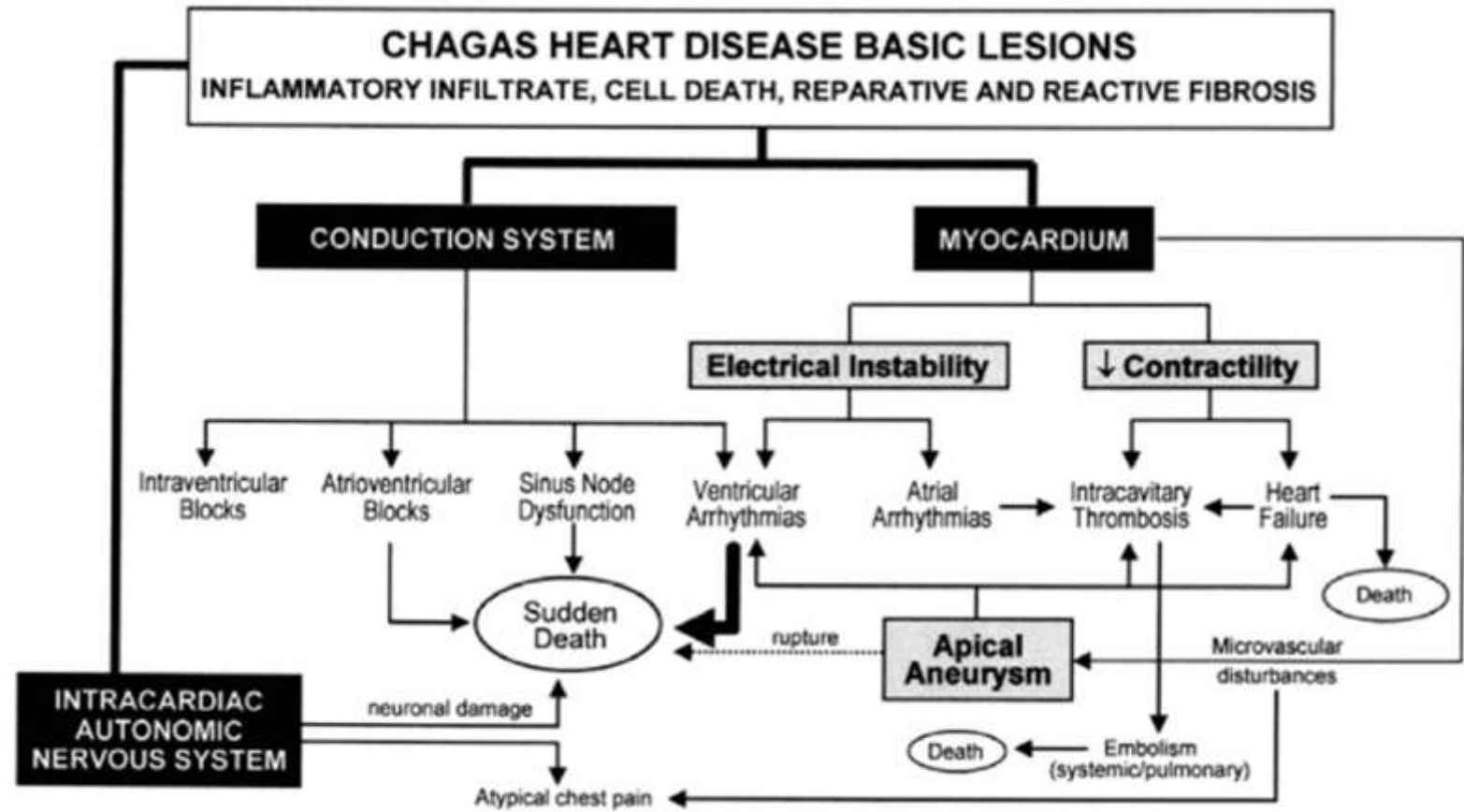
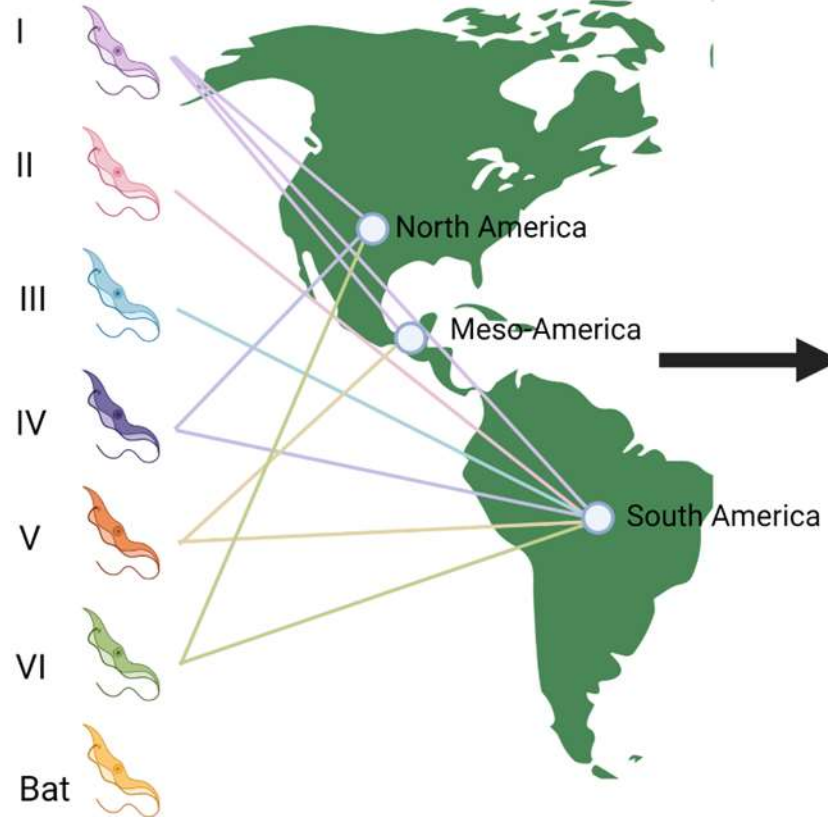


Fig. 2: diagram of the pathophysiology of CHD (adapted from Rassi Jr et al, 2000).

WHAT IS THE CLINICAL IMPACT OF CHAGAS DISEASE IN THE AMERICAN HEALTH SYSTEM?



Volume 27, Number 7—July 2021

Dispatch

Trypanosoma cruzi in Nonischemic Cardiomyopathy Patients, Houston, Texas, USA

Melissa S. Nolan[✉], David Aguilar¹, Arunima Misra², Sarah M. Gunter, Tim Erickson, Rodion Gorchakov³, Hilda Rivera, Susan P. Montgomery, and Kristy O. Murray

Author affiliations: University of South Carolina, Columbia, South Carolina, USA (M.S. Nolan); Baylor College of Medicine, Houston, Texas, USA (M.S. Nolan, D. Aguilar, A. Misra, S.M. Gunter, T. Erickson, R. Gorchakov, K.O. Murray); Harris Health System–Ben Taub Hospital, Houston (A. Misra); Centers for Disease Control and Prevention, Atlanta, Georgia, USA (H. Rivera, S.P. Montgomery)

[Cite This Article](#)

Abstract

To investigate possible cardiac manifestations of Chagas disease, we tested 97 Latinx patients with nonischemic cardiomyopathy in Houston, Texas, USA, for *Trypanosoma cruzi* infection. We noted a high prevalence of underdiagnosed infection and discrepant results in clinical diagnostic assays. Latinx cardiac patients in the United States would benefit from laboratory screening for *T. cruzi* infection.

The clinical manifestations of Chagas disease, caused by infection with the *Trypanosoma cruzi* parasite, are cardiac in approximately one third of patients. Without treatment, the parasite alternates between the trypomastigote and amastigote forms and causes direct smooth muscle tissue damage, myocardial fibrosis.

On This Page

[The Study](#)

[Conclusions](#)

[Cite This Article](#)

Tables

[Table](#)

Downloads

[Article](#) 

[RIS \(TXT - 2 KB\)](#) 

UNDIAGNOSED *CARDIAC* CHAGAS DISEASE IN THE USA

ID	Age	Gender	Race	Ethnicity	State, Country of Birth	True Positive††	BCM Testing		CDC Confirmation Testing	
							Stat-Pak	Hemagen	Weiner EIA	Tesa Blot
CM-013	79	Female	Caucasian	Latino	Guerrero, Mexico	No	Faint Positive	(-)	(-)	NP
CM-014	66	Male	Caucasian	Latino	La Union, El Salvador	Yes	Positive	Positive	Positive	Positive
CM-017	62	Male	Caucasian	Latino	San Salvador, El Salvador	Yes	Positive	Positive	Positive	Positive
CM-037	73	Female	Caucasian	Latino	El Salvador †	Yes	Faint Positive	(-)	Positive	Positive
CM-048	54	Male	Caucasian	Latino	Texas, USA	No	Faint Positive	(-)	(-)	NP
CM-058	68	Female	Caucasian	Latino	Michoacan, Mexico	No	(-)	Positive	(-)	NP
CM-082	70	Female	Caucasian	Latino	Tegucigalpa, Honduras	Yes	Positive	Positive	Positive	Positive
CM-116	34	Male	Caucasian	Latino	Acapulco, Mexico	No	Faint Positive	(-)	(-)	NP
CM-121	77	Male	Caucasian	Latino	Maracay, Venezuela	Yes	Positive	Positive	Positive	Positive
CM-143	42	Male	Caucasian	Latino	San Miguel, El Salvador	Yes	Positive	Positive	Positive	Positive
CM-155	73	Male	Caucasian	Latino	(Unreported) †	No	Faint Positive	(-)	(-)	NP
CM-174	78	Male	Caucasian	Latino	Guerrero, Mexico	Yes	Positive	Positive	Positive	Positive
CM-197	62	Male	Caucasian	Latino	Tamaulipas, Mexico	No	Positive	(-)	(-)	NP
CM-243	54	Male	Caucasian	Latino	Durango, Mexico	No	Faint Positive	(-)	(-)	NP

14% screened positive

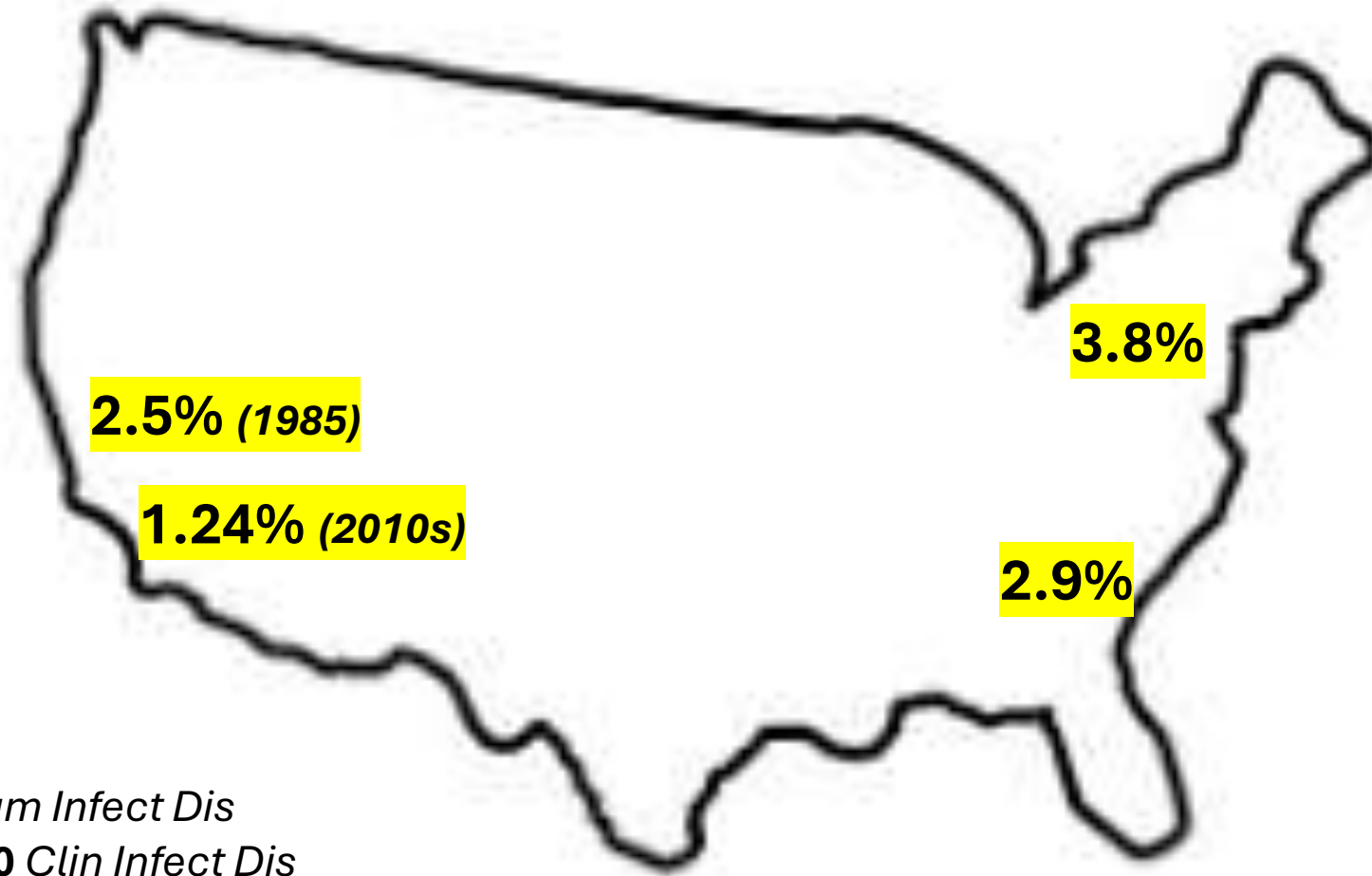


7% confirmed positive

Most were from El Salvador

Only one knew what Chagas disease was

UNDIAGNOSED CHAGAS DISEASE IN THE *HEALTHY* FOREIGN-BORNE AMERICAN



Lynn et al **2025** *Open Forum Infect Dis*
Castro-Sesquen et al **2020** *Clin Infect Dis*
Meymandi et al **2017** *Clin Infect Dis*
Naven et al **1985** *Am J Pub Health*

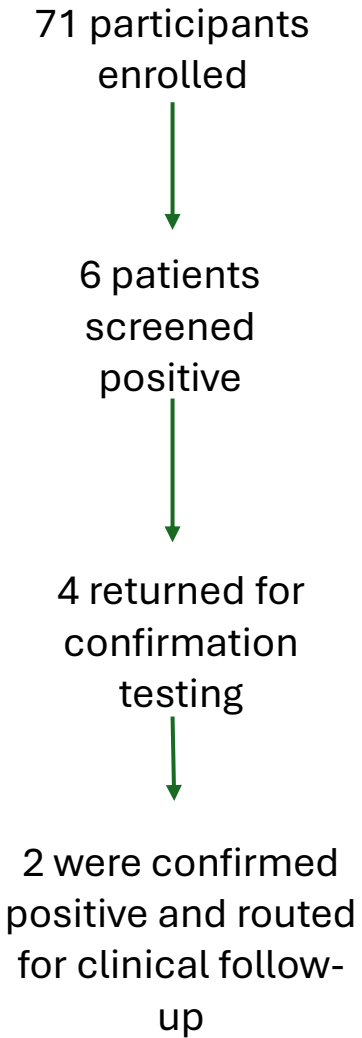
UNDIAGNOSED CHAGAS DISEASE IN THE HEALTHY SOUTH CAROLINIAN

- Prior to starting surveillance study:
 - Worked closely with community partners to design approach
 - Free medical clinics
 - Latinx-serving community organizations
 - Performed several grand round presentations
 - ***Created clinical champions***
 - 14 healthcare personnel across the provider spectrum
 - Targeted educational meetings
 - Connections to other Chagas-knowledgeable clinicians nation-wide

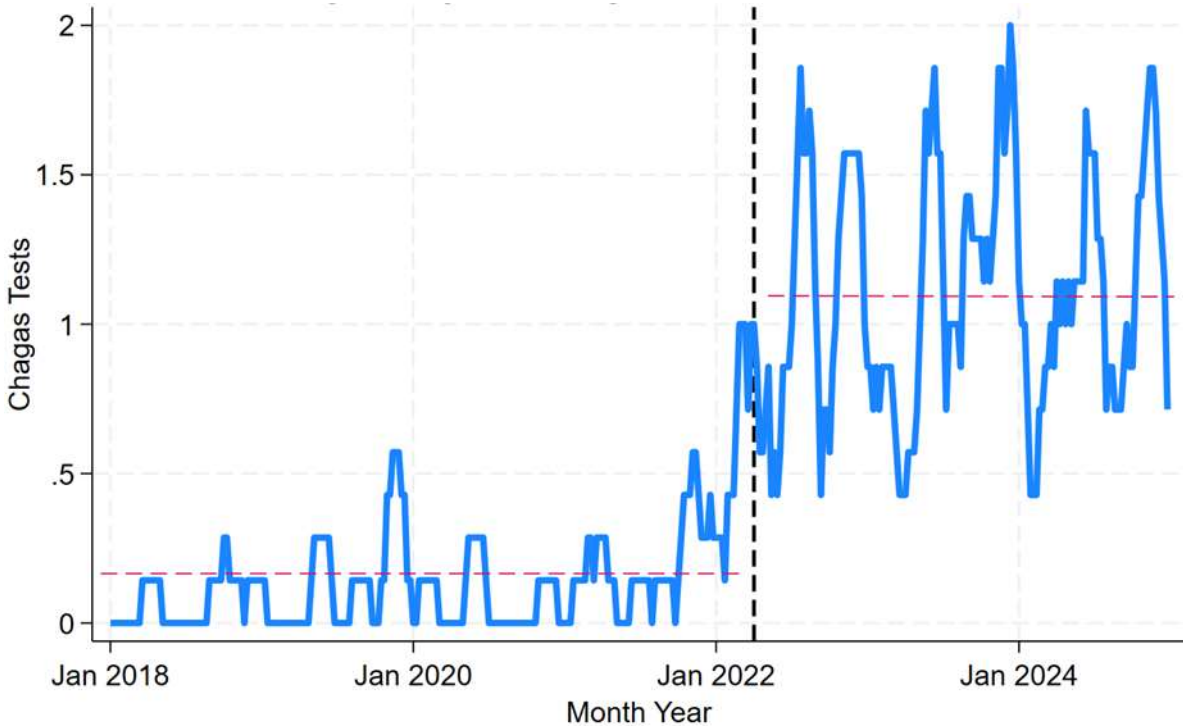


CHAGAS DISEASE HUMAN SURVEILLANCE IN SOUTH CAROLINA

	All Participants (N=69)	<i>T. cruzi</i> Negative Participants (N=67)	<i>T. cruzi</i> Positive Participants (N=2)1
	N (%)	N (%)	N (%)
Country/Region of Origin			
Mexico	40 (58%)	39 (58.2%)	1 (50%)
Central America	19 (27.5%)	18 (26.9%)	1 (50%)
South America	9 (13%)	9 (13.4%)	0 (0%)
Latin American Carribean	1 (1.4%)	1 (1.5%)	0 (0%)
Age range (years)			
18-29	10 (14.5%)	10 (14.9%)	0 (0%)
30-39	18 (26.1%)	17 (25.4%)	1 (50%)
40-49	28 (40.6%)	27 (40.3%)	1 (50%)
50-59	9 (13.0%)	9 (13.4%)	0 (0%)
≥60	4 (5.8%)	4 (6%)	0 (0%)
Education			
≤Secondary school	40 (58%)	38 (56.7%)	2 (100%)
>Secondary school	29 (42%)	29 (43.3%)	0 (0%)
Number living in the household			
1-3	24 (34.8%)	22 (32.8%)	2 (100%)
4-6	32 (46.4%)	32 (47.8%)	0 (0%)
≥7-9	12 (17.4%)	12 (17.9%)	0 (0%)
Health Insurance			
Yes (private/employer, Medicaid)	6 (8.7%)	6 (9%)	0 (0%)
No	63 (91.3%)	61 (91%)	2 (100%)
Reasons for difficulty seeking care			
Language, translation barrier	11 (15.9%)	11 (16.4%)	0 (0%)
Money	3 (4.3%)	3 (4.5%)	0 (0%)
Transportation	7 (10.1%)	7 (10.4%)	0 (0%)
Other	2 (2.9%)	3 (4.5%)	0 (0%)



7-fold increase in testing orders (p=0.009) up to 51 months post-intervention



IS LOCALLY ACQUIRED HUMAN CHAGAS DISEASE POSSIBLE IN SC?

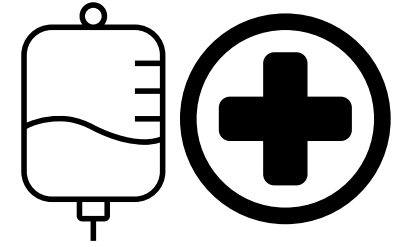
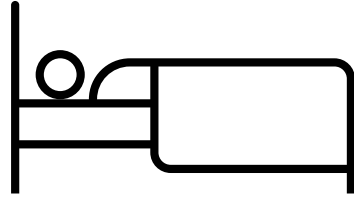
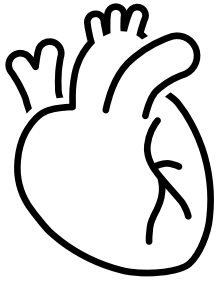


CHAGAS DISEASE HISTORY IN SC

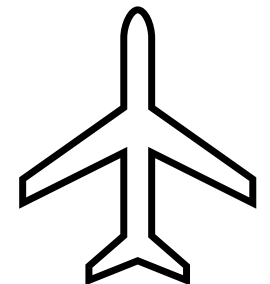
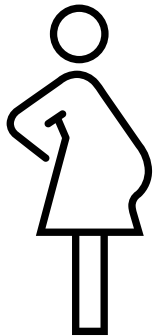
- 1859: *Triatoma lecticulara* described in the Carolinas
- 1934 – today : 35 Triatomine specimens from 14 counties housed in Clemson's state insect collection
- 2002 & 2007: High prevalence of *T. cruzi* positive raccoons and foxes



Yabsley et al 2002, *J Wild Dis*
Rosypal et al 2007, *J Parasit*

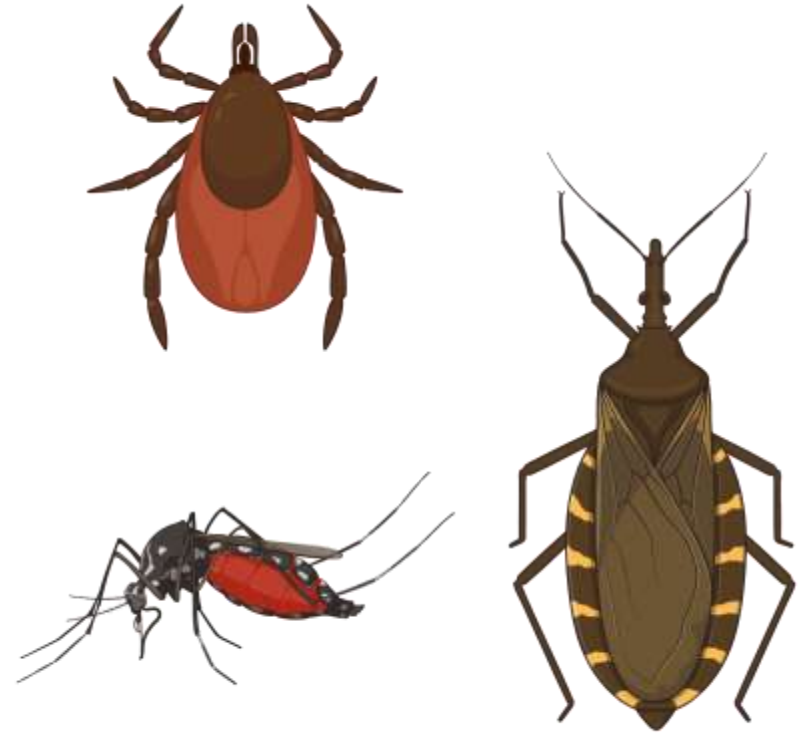


**UNDIAGNOSED CHAGAS DISEASE IS
A PUBLIC HEALTH PROBLEM IN
SOUTH CAROLINA!**



TALK SUMMARY

- Mosquito-borne diseases
 - West Nile virus
 - Malaria and Oropouche virus
- Tick-borne diseases
 - Lone star tick & diseases
 - Black-legged tick & Lyme disease
- Other vectored diseases
 - Chagas disease



ACKNOWLEDGEMENTS

- University of South Carolina
 - Katie Lynn
 - Kia Zellars
 - Lidia Gual Gonzalez
 - Kyndall Dye-Braumuller
 - Sean Sweeney
 - Maddie Meyer
- . Prisma Health
 - Alain Litwin
 - Jeff Hall
- Clemson
 - Michael Neault
- University of Georgia
 - Bren Case
- SC DPH
 - Chris Evans
 - Lauren Rustin

- *Funding was provided by*
 - Brockman Foundation
 - Thrasher Medical Research Foundation
 - USC Office of VPR
 - Prisma Health Foundation

Questions?

msnolan@mailbox.sc.edu