

Kissing Bugs/Allergic Reactions/and Chagas Disease

Stephen A. Klotz

University of Arizona

Division of Infectious Disease/Arizona
Telemedicine Program

Webinar, July 24, 2024



What is the Diagnosis?

- A 68 year-old man from Sahuarita awakened suddenly at 2:00 AM with SOB and diffuse urticaria in August, 2014. He vomited, felt palpitations and fainted getting out of bed. He was brought to the ER with hypotension and tachycardia. He took amoxicillin the previous morning for a UTI, ate strawberries at lunch, shrimp at dinner and had peanuts with a cocktail the evening before. (His wife found a bug in the bed.)





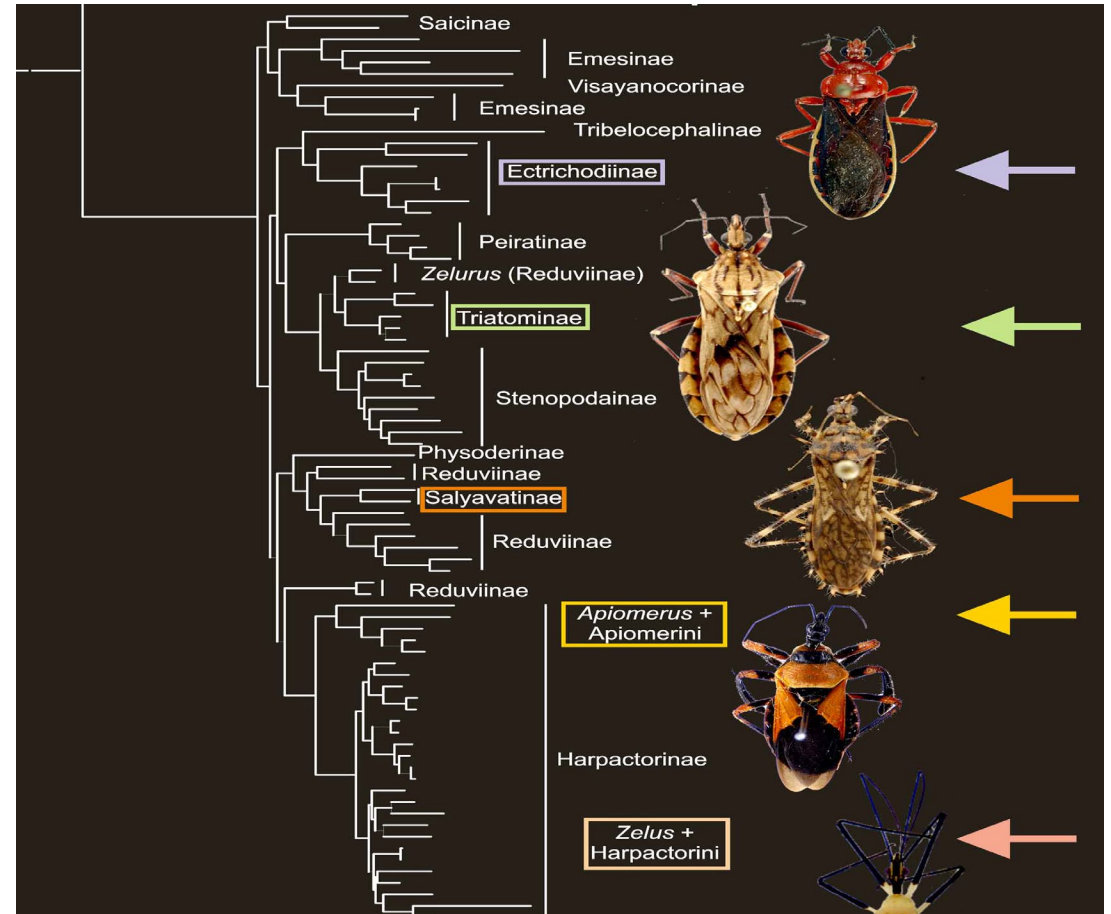
The answer is...

- Anaphylaxis
- Caused by kissing bug saliva introduced during feeding (blood sucking)
- A follow-on talk by Dr. York will briefly address anaphylaxis

Kissing Bugs are True Bugs: Hemiptera:Reduviidae

Originated in Oligocene

- Neotropical in origin coinciding with radiation of new neotropical species
- Hematophagous lifestyle required adapting to living in vertebrate nests
- **Unspecialized** feeders unlike bed bug (humans) or bat bug (bats)
- Evolutionary History of Assassin Bugs (Insecta: Hemiptera: Reduviidae): Insights from Divergence Dating and Ancestral State Reconstruction. WS Hwang, C. Weirauch September 28, 2012;





Often confused with kissing bugs: Wheel bug

Adults, nymphal



Often confused with kissing bugs

Kissing bugs

- Some 150 species
- Most common genus is *Triatoma*
- Very common in Arizona, up to 7 species found in the state, 11 in USA
- Although species may look quite different from one another, they all behave the same: obligate blood suckers and all may harbor the blood parasite, *Trypanosoma cruzi* in the bug's rectum, that is passed in the feces.

Why is this an Important Topic?

- Kissing bugs in the US harbor *Trypanosoma cruzi*, the cause of Chagas disease.
- Kissing bug bites are associated with allergic reactions; two people have died of anaphylaxis (one in Phoenix).
- AIDS patients with *T. cruzi* infection often present with severe cerebritis; transplant patients with rejection look-alike.
- It is estimated perhaps as many as 300,000 immigrants from Latin America are infected with *T. cruzi* and living in the US.

And...

- Estimated 3 million people with Chagas in Mexico, 30 million at risk.
- 8 autochthonous cases in US
- Perhaps 100 cases inferred from positive serologies

Triatoma life cycle



Eggs



Hatched egg



Young immature



Last immature



Adult

Main Triatome species in Tucson



Triatoma rubida adult
“red kissing bug”



Triatoma rubida teneral adult

Main Triatome species in Tucson



Triatoma protracta adult
“little black kissing bug”

Triatoma feeding apparatus



Side view adult



Close up of head

Triatoma feeding



Probing



Fed

Chagas is a parasitic disease vectored by kissing bugs

Bug takes blood and parasite while feeding on an infected mammal

The parasite is stored in the rectum of the bug and passed in feces when defecating and rubbed into bite wound or passed on:

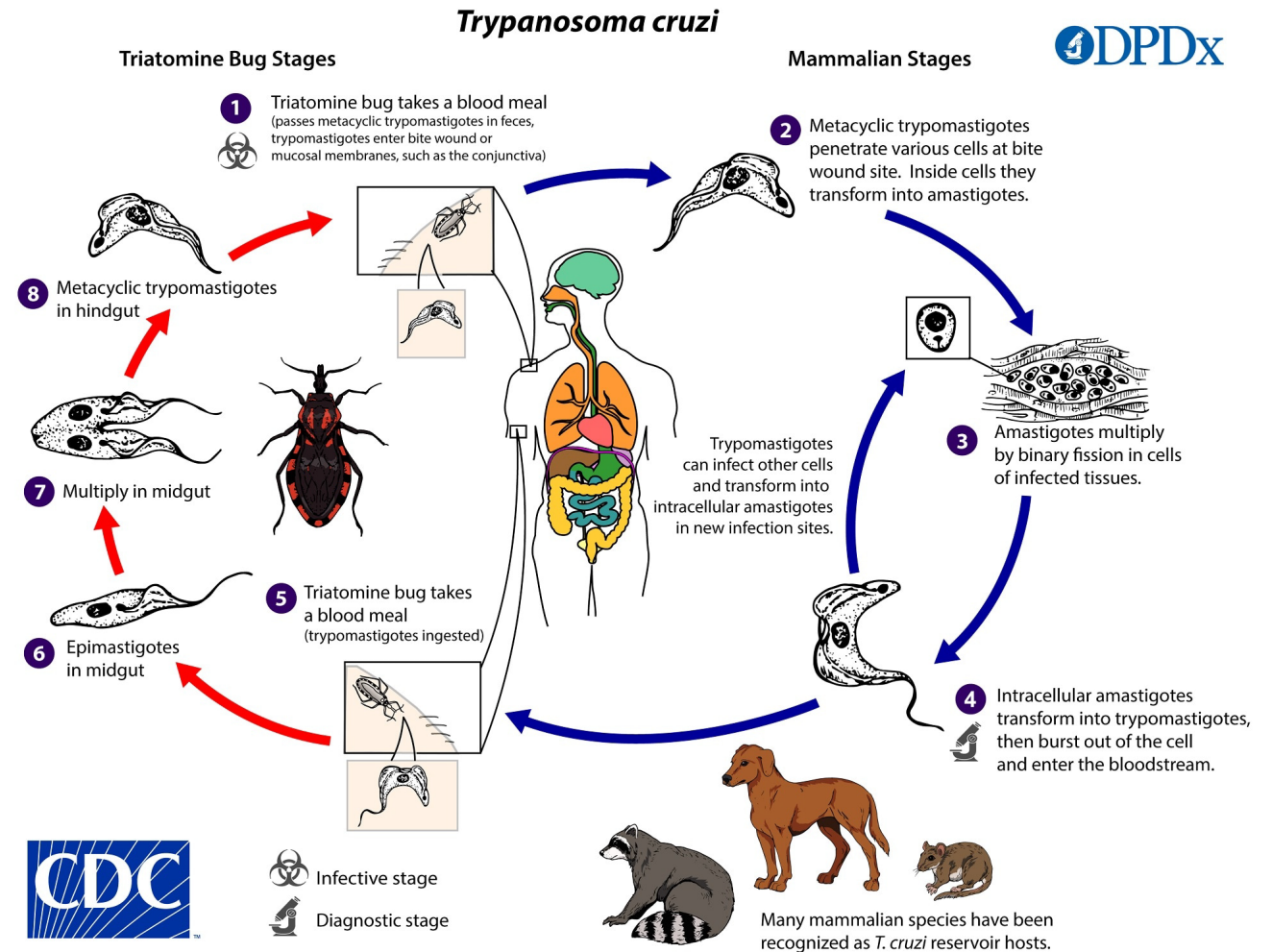
Congenitally

Blood transfusion

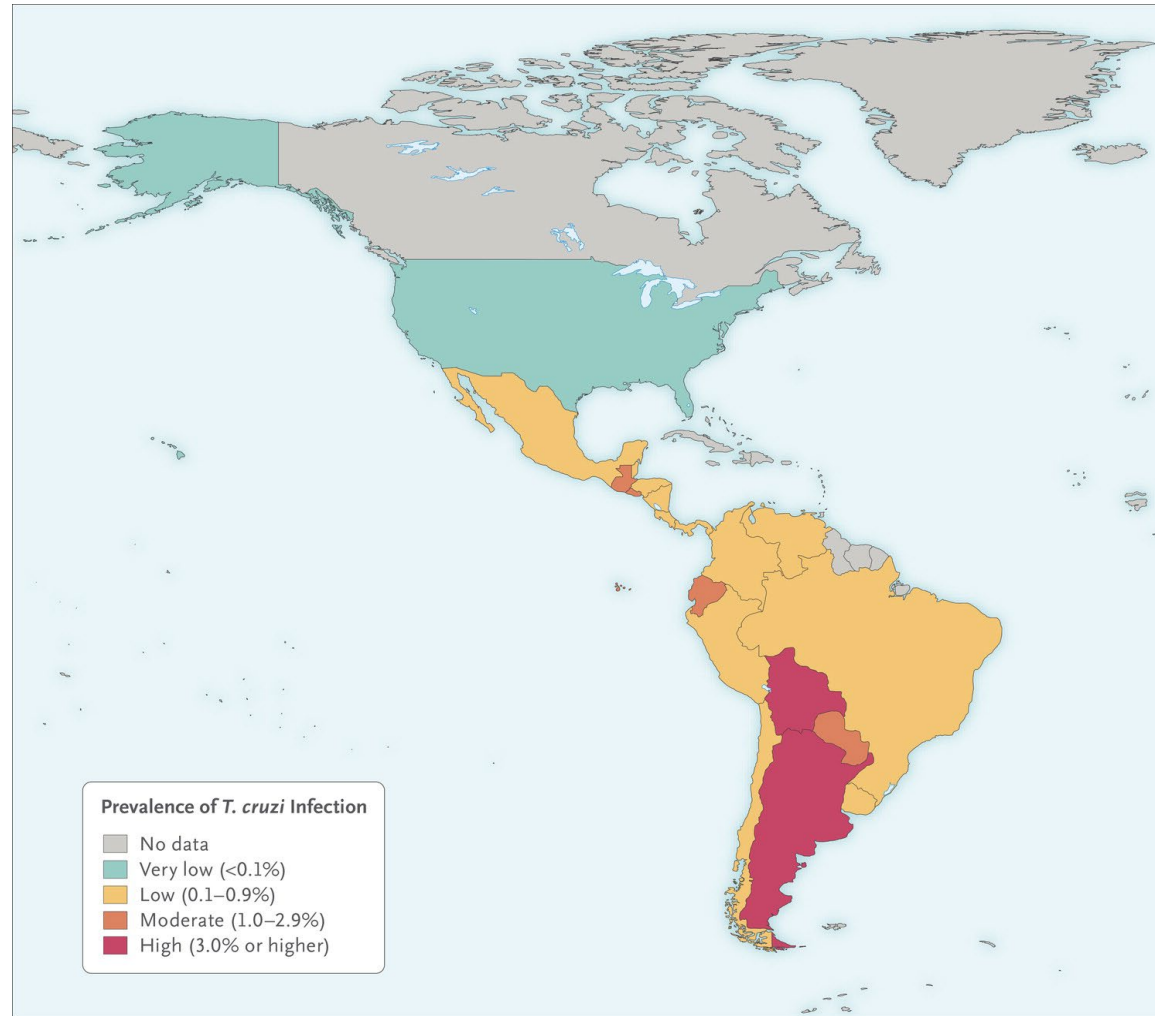
Organ donation

Through contamination of food or drink

Bug eaten by another mammal



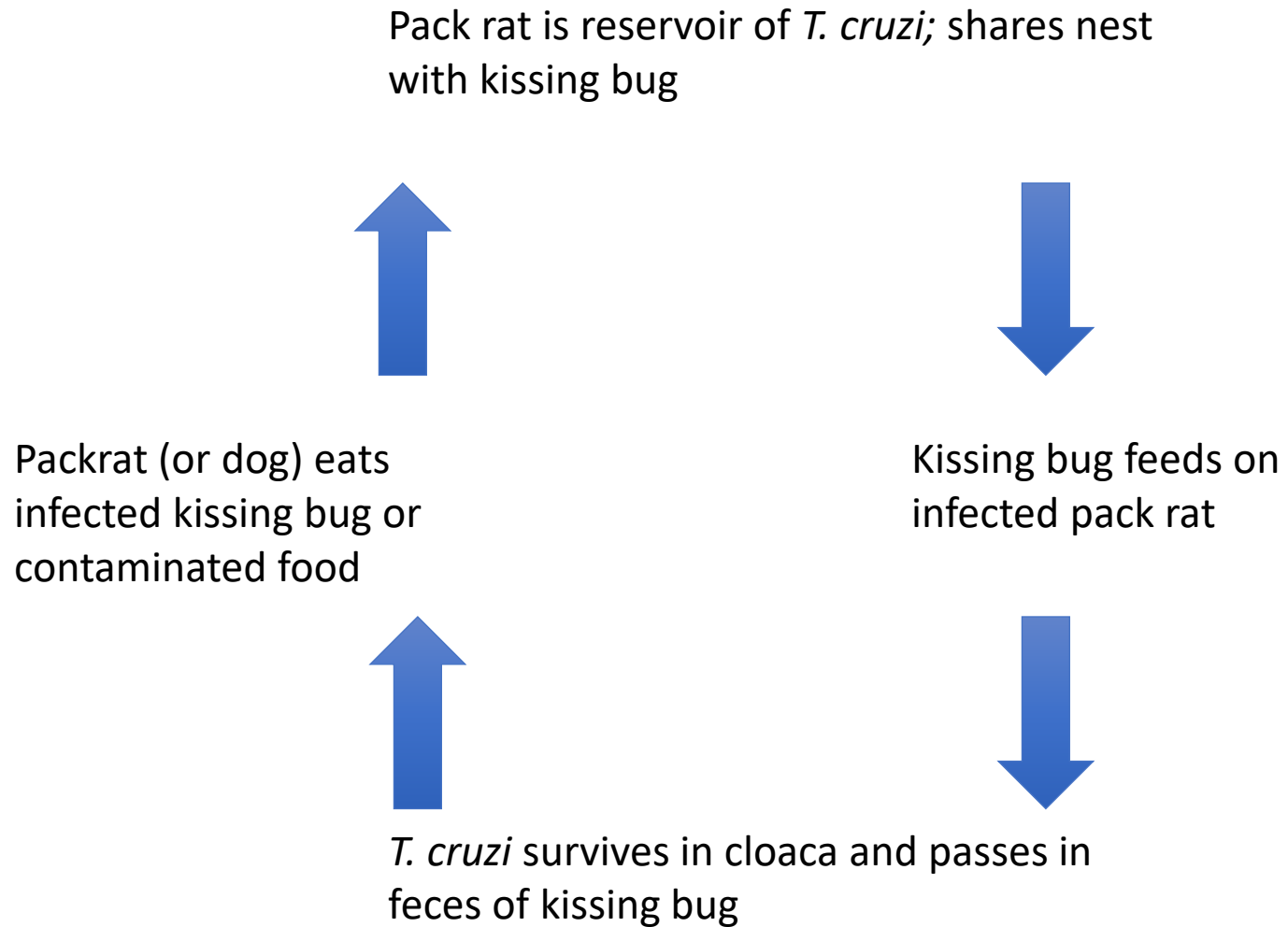
Epidemiology of *Trypanosoma cruzi*



Stercoral transmission of Chagas

- What is taught?
- Humans usually become infected when the triatomine vector defecates during its blood meal and fecal material containing the parasite is inoculated through the bite wound or intact mucous membranes (Up To Date, 8/23)
- What is the evidence?
- No evidence exists in the US for this mode of pathogenesis.
- Does it matter?

Local issues in Arizona. Role of packrat in maintaining *Trypanosoma cruzi* in nature in the Southwest



***Triatoma* activity periods**

Main adult flight period – May and June

**Main adult flight time – 1 hour after
sunset until 10:00 PM**

Feeding season – late April to October

Who *Triatoma* feed on

Traditional wisdom said packrats in Tucson

**We discovered they are more catholic:
rodents, javelinas, mammals and birds in
general, snakes, likely lizards and toads**

Even cockroaches!

The remaining problems with kissing bugs:

- Kissing bugs (triatomes) have become an emerging medical problem in the US because of movement of humans into their habitat (Tucson, Phoenix and San Diego).
- Kissing bug bites cause local allergic reactions frequently and on occasion, anaphylaxis.
- The rate of carriage of *Trypanosoma cruzi* by bugs is greater now than historical records.

We have found that...

- Local species of kissing bugs do not defecate on the host.
- Anaphylaxis and other allergic reactions are common in Arizona.
- One community in Southeast Arizona may have year-round colonization of houses by kissing bugs which live out their life stages in the home.

What kind of housing predisposes to kissing bug domiciliation?

- In Vera Cruz, Mexico: unplastered walls and wood walls with *T. dimidiata*: Sandoval-Ruiz, C.A. Salud Publica de Mexico;56, 2014.
- In Costa Rica: dirt floors and firewood in the house with *T. dimidiata*: Zeledon, R. Am.J.Trop.Med.Hyg 33, 1984
- Northeastern Brazil: peridomiciliary ecotopes around the house;f goat and pig pens with *T. brasiliensis*: Sarquis, O. Mem Inst Oswaldo Cruz 10: 2006.



Bisbee, Arizona

BITE VICTIM CHARACTERISTICS (n = 10)	RESULT
Age of house	37 years (range 8–77 years)
Screens on windows	80%
Outside night lights	50%
Pets in house	90%
Homeowner saw bugs in house within past month	90%
History of allergy to kissing bug bite	50%
Local skin reaction to bite	100%
Local erythema and itching	90%
Sought medical care for bite	30%
Dizziness after bite	40%
Breathing difficulty after bite	20%

Note: Individuals called the Arizona Poison and Drug Information Center following a kissing bug bite in 2015.

Non-chemical measures to reduce risk of household infestation

- Reduce clutter inside houses (Monroy et al., 2009)
- Eliminate junk, wood or rock piles, trash, and other objects in peridomestic environments (Ferral et al., 2010)
- Manage surrounding vegetation and conserve local fauna (Teixeira et al., 2009)
- Replace outside white lights with yellow lights (Gouge et al., 2010)
- Seal structural cracks and crevices (Gouge et al., 2010)

Kissing Bugs in Southwest

- Bloodsuckers on a wide variety of vertebrates (hematophagy)
- Probably diurnal feeders in nature on packrats
- ~Nocturnal feeders in our homes

Conclusions and Some Thoughts

- No solid evidence of bite/feces- associated human infection in the US
- Likely, most cases in Latin America and in US due to oral ingestion (food contaminated with feces or perhaps swallowing a bug)
- The public is going to continue to associate the bite with disease
- Public health focus should be on accurate identification, eradication, prevention of bugs in the home. We should stress good home hygiene and other measures where necessary