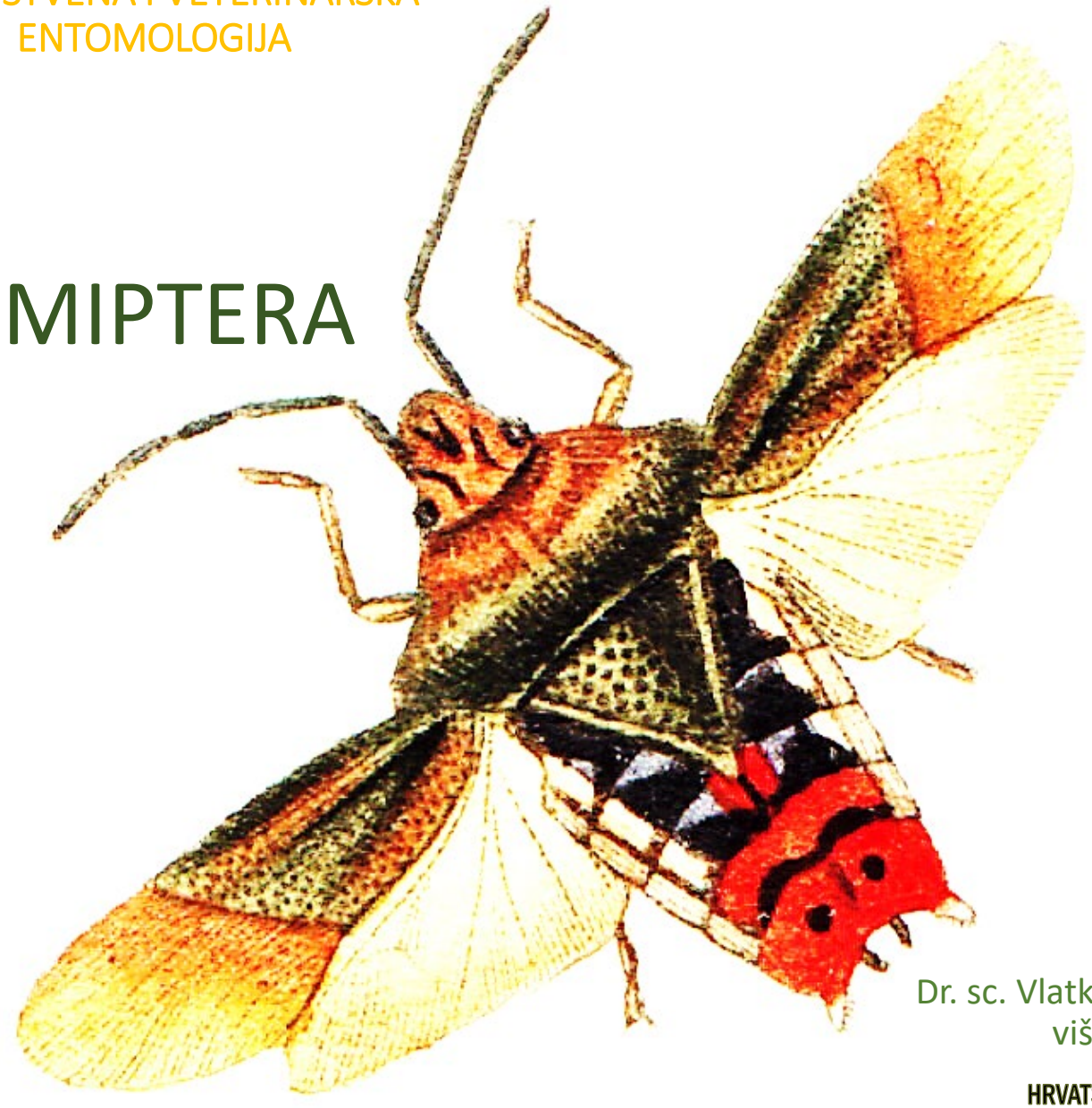
ZDRAVSTVENA I VETERINARSKA ENTOMOLOGIJA

HEMIPTERA



Dr. sc. Vlatka Mičetić Stanković,
viša kustosica

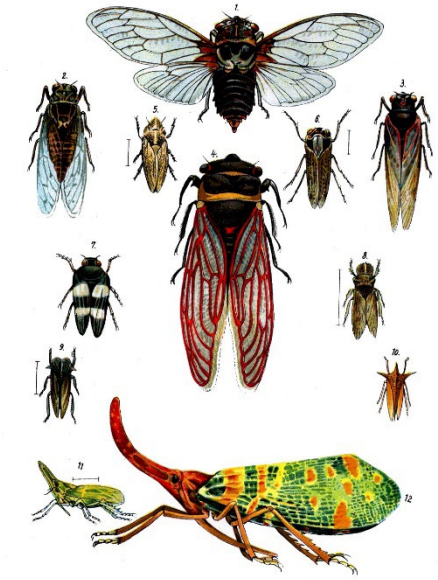
HRVATSKI PRIRODOSLOVNI MUZEJ
CROATIAN NATURAL-HISTORY MUSEUM

* vlatkams@hpm.hr

Hemiptera Linnaeus, 1758

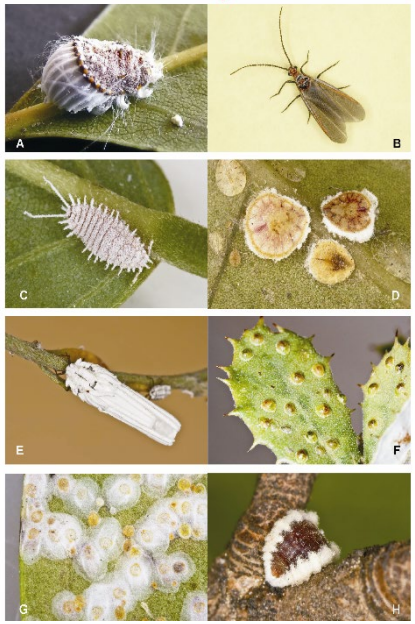
~90 000 vrsta unutar 37 porodica

Lat. *hemipterus* – polukrilni



Auchenorrhyncha

Heteroptera



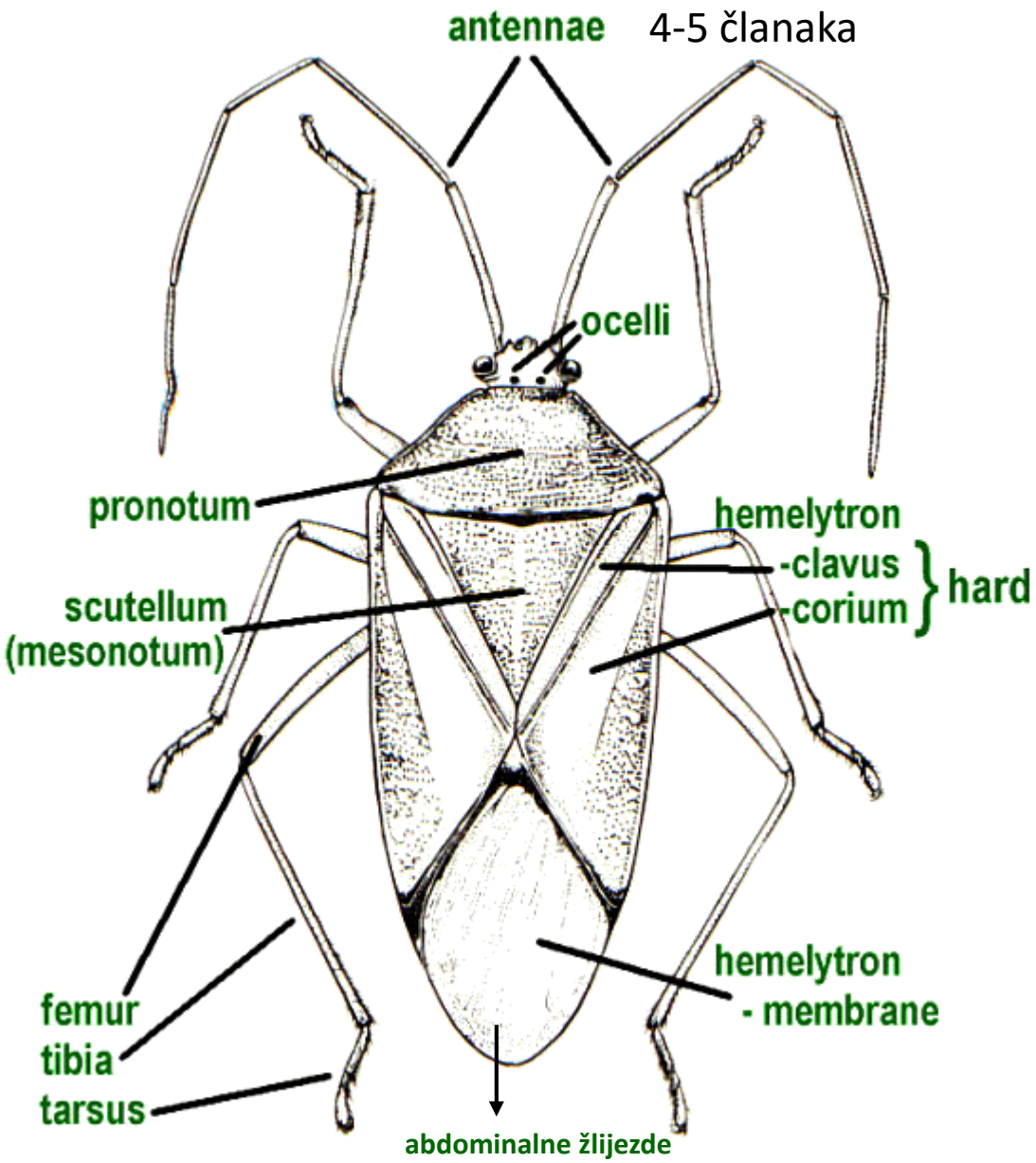
Sternorrhyncha

Coleorrhyncha

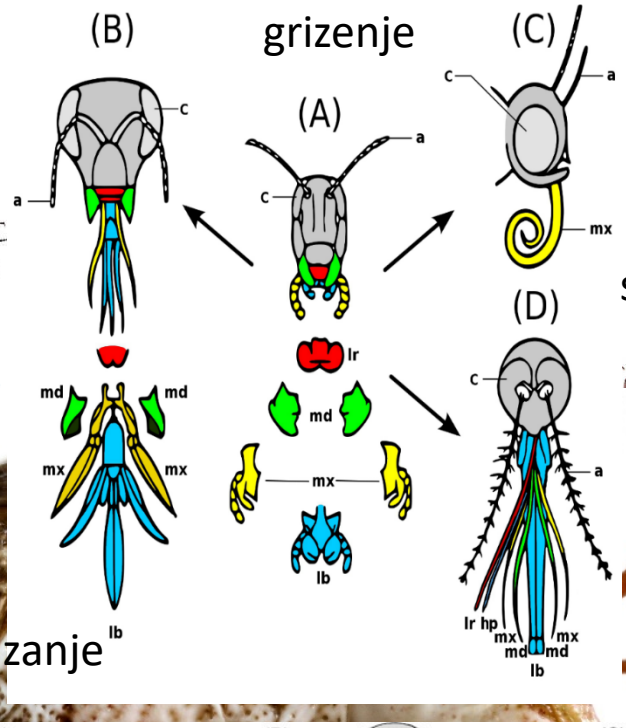
Pyrrhocoris apterus (Linnaeus, 1758)

Corythucha arcuata (Say, 1832)

Micronecta scholtzi (Fieber, 1860)



*Slater and Baranowski, 1978


(B)
grizenje
(C)
(A)
(D)
sisanje
lizanje
bodenje i sisanje
Labrum
Mandible
Maxilla
Labium
Hypopharynx

Moguće da se neugodno susretnete sa:

Cicadelidae
cikade

Cercopidae
pjenuše

Cicadidae
cvrčci

Membracidae
rogati cvrčci

Fulgoridae

Belostomatidae – štipavice

Notonectidae - nauznačarke

Holotrichius innesi Horvath, 1909 - neurotoksican i hemotoksičan ubod
Bliski Istok

OD ZDRAVSTVENOG I MEDICINSKOG ZNAČAJA

- ektoparaziti
- obligatorni hematofagi

Triatominae (por. Reduviidae)
stjenice ubojice

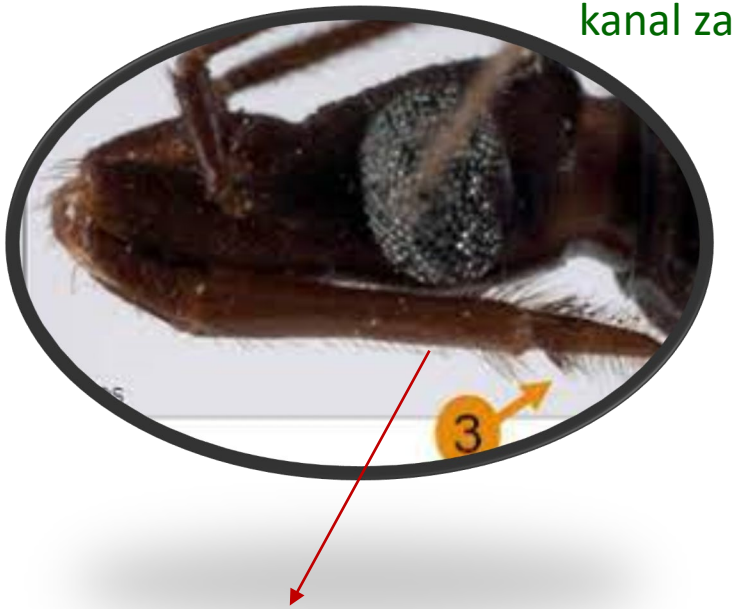
Cimicidae
stjenice cimicidi

*Krinsky (2002)

Stjenice ubojice – Triatominae (*kissing bugs*)

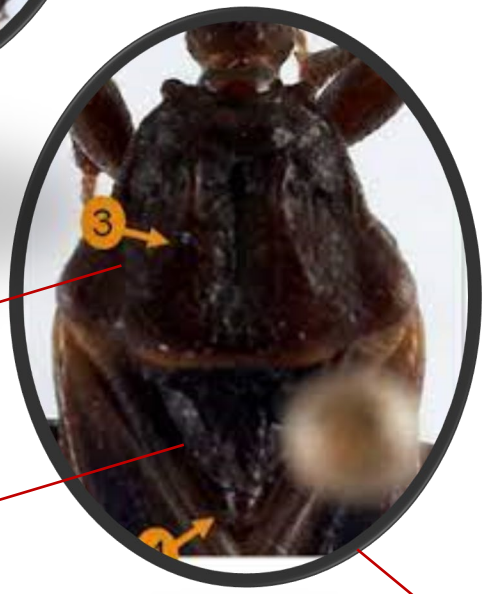
- 17 rodova, 151 vrsta – Novi Svijet
- 5 – 45 mm veličina tijela
- glava konusnog oblika
- velike oči
- ticala 4 segmenta
- veliko rilce – preobrazba usnih organa

kanal za slinu
kanal za hranu



1. kanal za hranu
2. kanal za slinu

velike fasetirane oči



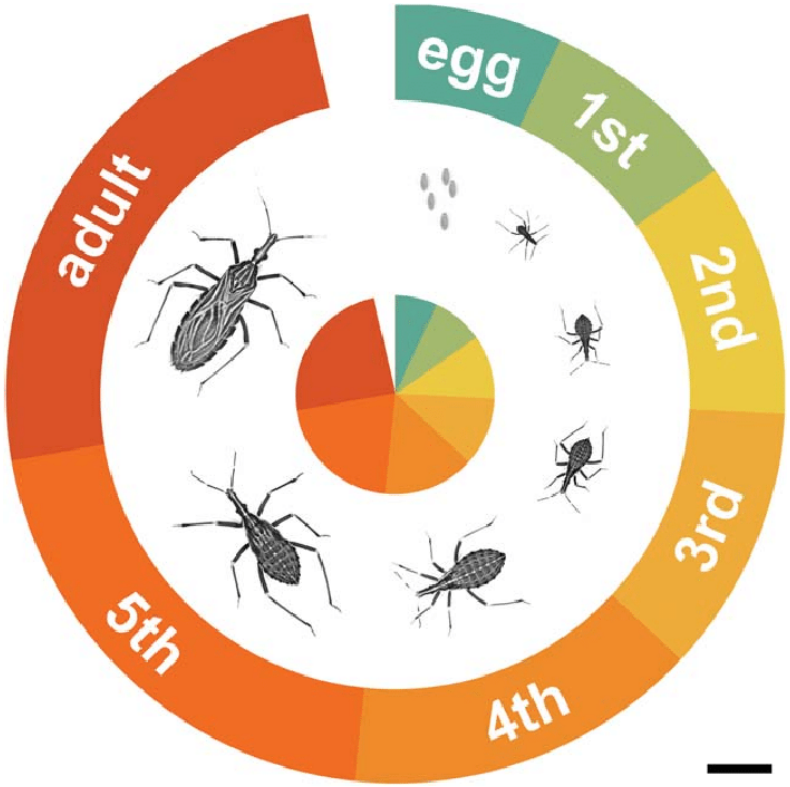
pronotum

scutellum

11 kolutića

* Berreto Vieria et al., 2018

Stjenice ubojice - Triatominae



3 - 4 mjeseca do 1 – 2 godine

nepotpuna preobrazba

NIMFE:

- manje oči
- nema ocella
- nema krila već samo prsni utori

T °C

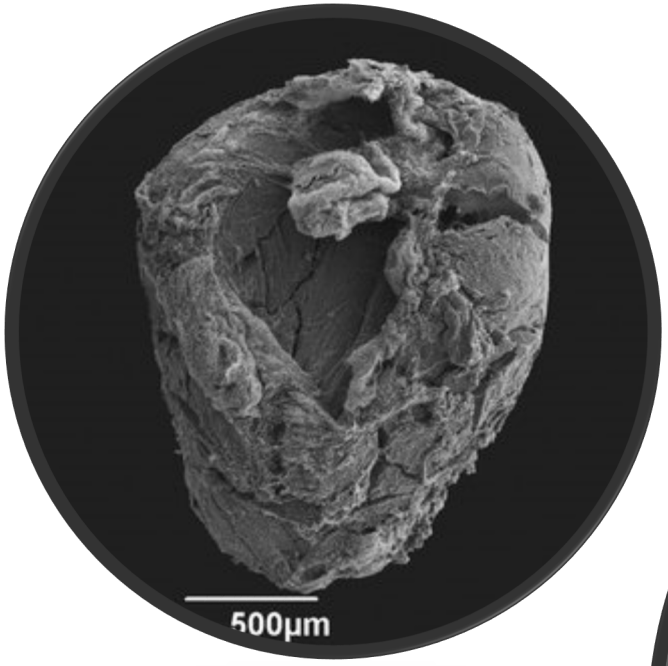
%

Intervali hranjenja

Domaćin

*Krinsky (2002)

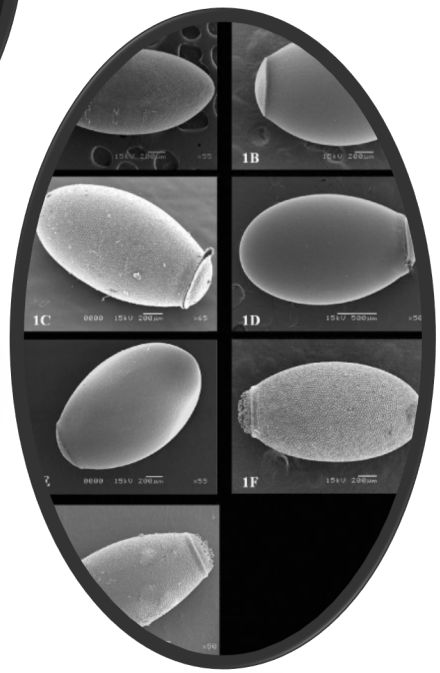
Stjenice ubojice - Triatominae



Spermatofor

1 – 3 dana nakon zadnjeg presvlačenja

5 – 15’

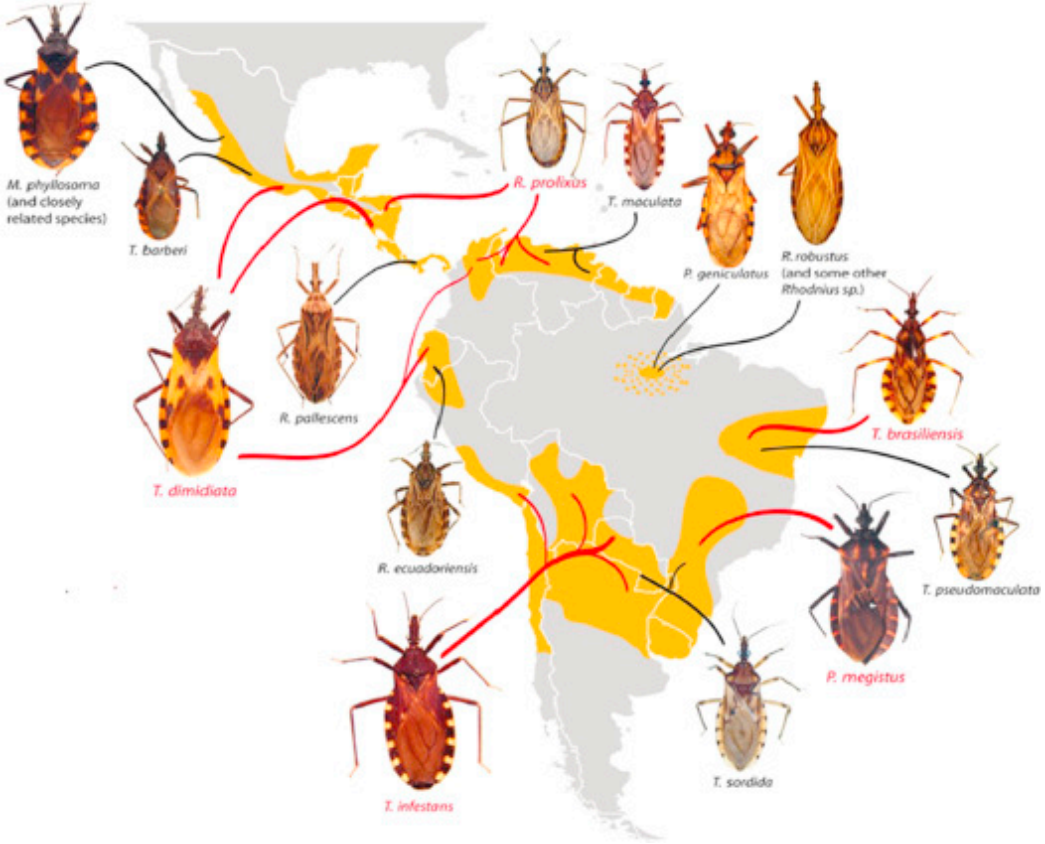


10 – 30 dana poslije

ženka do 1000 jaja tijekom života

*Krinsky (2002)

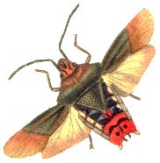
Stjenice ubojice - Triatominae



…deforestacijom i paljenjem gube staništa i time se bliže čovjeku…

* Guhl, 2017; Pinto et al. 2015

Stjenice ubojice - Triatominae



3 grupe:

1 – silvatičke: gnijezda i jazbine, špilje, trupci, epifiti
gmazovi, šišmiši, oposumi, glodavci

2 – peridomesticilne: domaćini su domaće životinje
kokoši, zečevi, zamorci

3 – domesticilne: isključivo ljudi i njihovi kućni ljubimci

tip staništa

uvjeti u staništu

promjena mjesta

….razni materijali, umjetni i prirodni: rupe u zidu, iza slike, madraci, namještaj, roba, posteljina…

- aktivnost noću – *kissing bugs*
- mogu preživjeti mjesecima bez obroka – npr. život u gnijezdima ptica selica
- u prisutnosti domaćina – hranjenje svakih 4 – 9 dana

* Krinsky (2002)

Stjenice ubojice - Triatominae

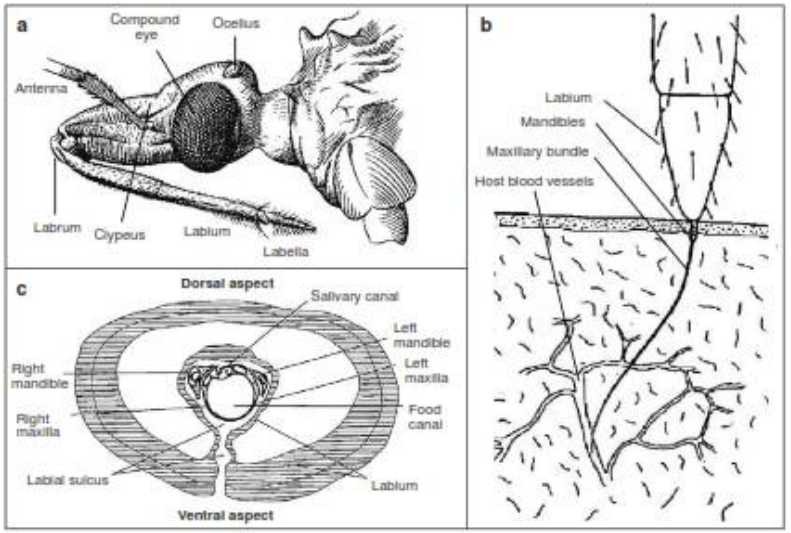
Hranjenje 3 – 30 ’

vrućina

CO_2

feromoni

povećanje do 3x tjelesne mase,
kod nimfe do 12x!



Trajanje hranjenja:

- kemijski sastav krvi domaćina
- receptori u abdomenu

…rijetke iritacije kod mjesta uboda…

Antikoagulanti + NO_3 + analgetici

* Escandón-Vargas et al., 2017

Stjenice ubojice - Triatominae

Chagasova bolest

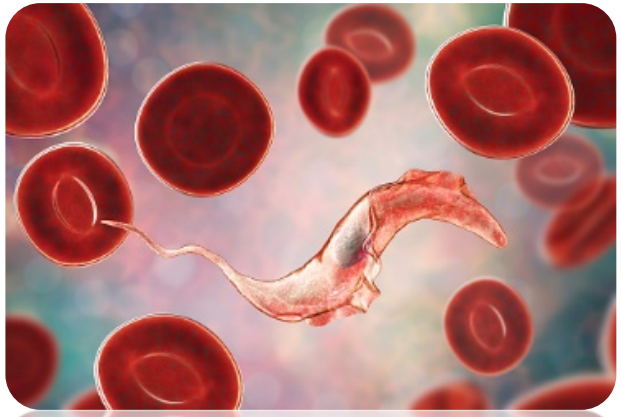
- 1907. Minas Gerais, Brazil
- Američka tripanosomijaza

Carlos Chagas (1879 – 1934)

Triatoma infestans Klug, 1834

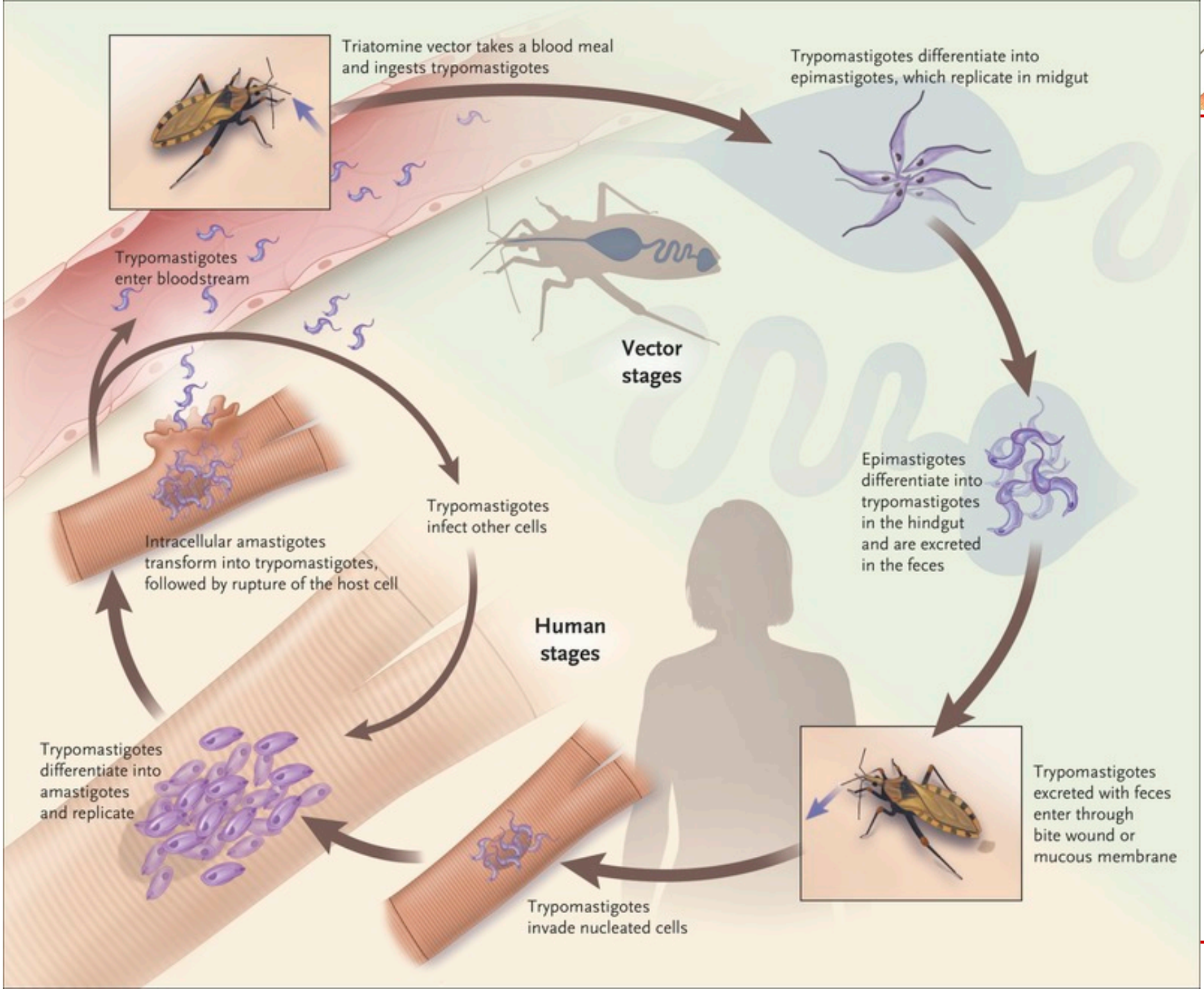
Rhodnius prolixus Stål, 1859

Triatoma dimidiata Klug, 1834

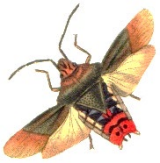


Trypanosoma cruzi Chagas, 1909

*Bern, 2015


Triatomine vector takes a blood meal and ingests trypomastigotes
Trypomastigotes differentiate into epimastigotes, which replicate in midgut
Trypomastigotes enter bloodstream
Vector stages
Epimastigotes differentiate into trypomastigotes in the hindgut and are excreted in the feces
Trypomastigotes infect other cells
Intracellular amastigotes transform into trypomastigotes, followed by rupture of the host cell
Human stages
Trypomastigotes differentiate into amastigotes and replicate
Trypomastigotes excreted with feces enter through bite wound or mucous membrane
Trypomastigotes invade nucleated cells

Stjenice ubojice - Triatominae



Chagasova bolest

Načini zaraze:

- hranom i pićem
- fekalna kiša
- slučajan kontakt
- liječenje
- afrodizijak
- dojenje
- transfuzija krvi

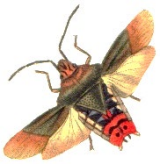
Triatoma barberi Usinger 1939

Triatoma picturata (Usinger 1939)

30 dana nakon uginuća domaćina
Trypansoma cruzi je AKTIVNA

*Krinsky (2002)

Stjenice ubojice - Triatominae

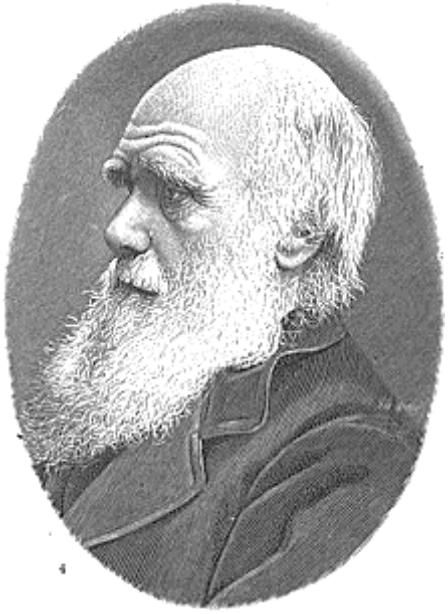


Chagasova bolest

- Akutna (izliječenje 80%)
  - chagoma
  - Romaña znak
  - vrućica
  - povećanje limf. čvorova
  - kožni osip

  - miokarditis
  - meningoencefalitis
  - morbiditet

- Kronična (izliječenje 5 – 20 %)
  - bol u prsima
  - vrtoglavica
  - nesvijest
  - tromboembolija
  - insuficijencija srca
  - srčane anomalije
  - konstipacija
  - insomnija
  - iritabilnost
  - neuroza



Charles Darwin (1809 – 1882)

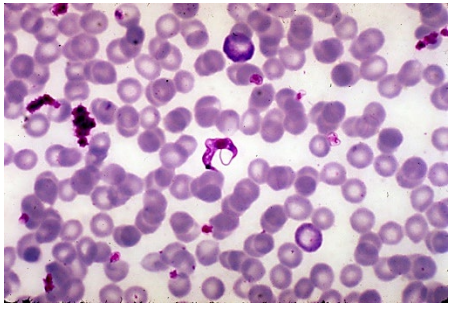
Dijagnostika:

- ✓ analiza krvi
- ✓ PCR
- ✓ ELISA test imunofluorescencija IgG antitijela

Dijagnostika:

- ✓ antitijela

XENODIJAGNOZA ⟹ LAB. UZGOJ



The *Benchuca* bug of Pampas

*Krinsky (2002)

Stjenice ubojice - Triatominae

Chagasova bolest

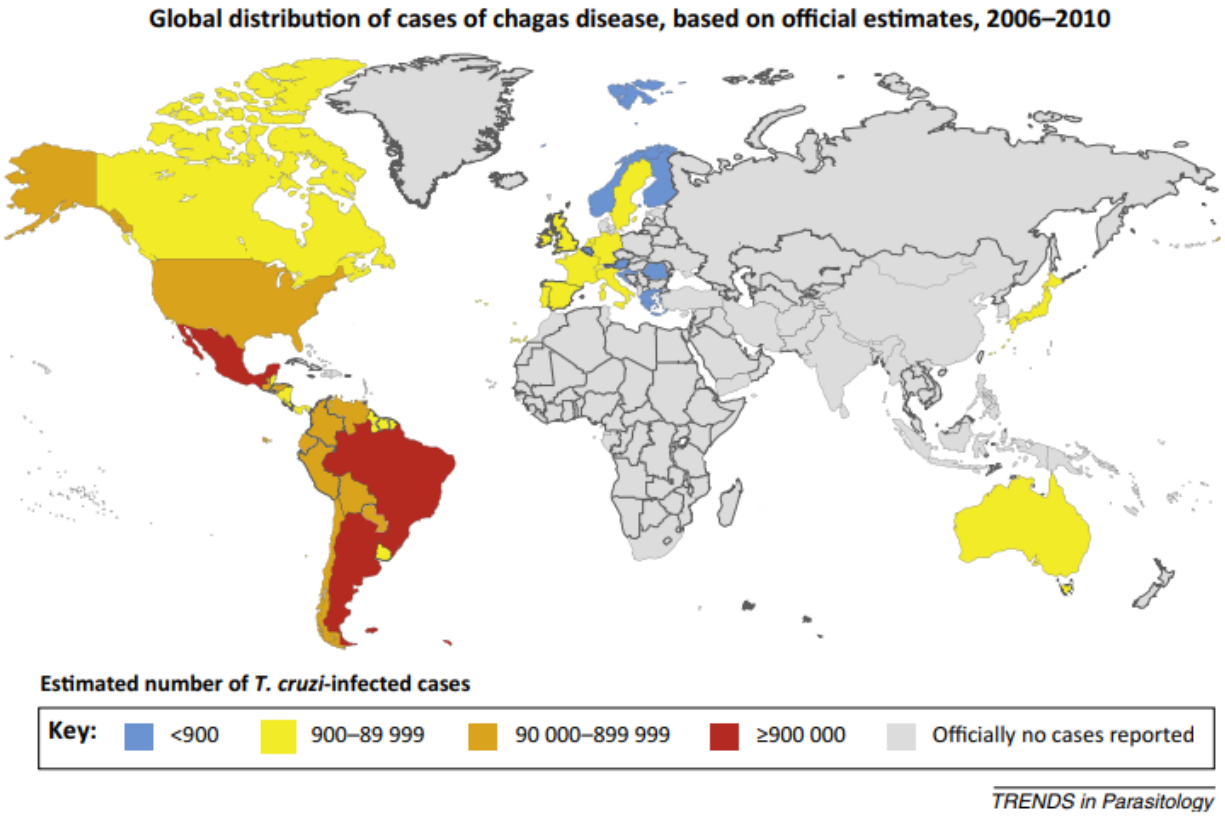


Figure 1. **The Global Distribution of Cases of Chagas Disease (CD).** Global migration has led to an increasing incidence of CD across the world within regions previously thought to be nonendemic for infection. The spread of CD throughout these areas may be problematic due to the presence of native vectors that may support transmission of infection. Data from [65].

PREVENCIJA:

- insekticidi
- sanitarni standard
- kontrola transfuzije krvi
- alociranje živ. nastambi

DETEKCIJA:
bijeli papiri po nastambama
senzorne kutije

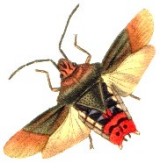
LIJEČENJE:
NIFURTIMOX
BENZNIDAZOLE

U J. Americi do 5x smrtnost > malarija
30 000 novih slučajeva / godišnje
12 000 smrti / godišnje

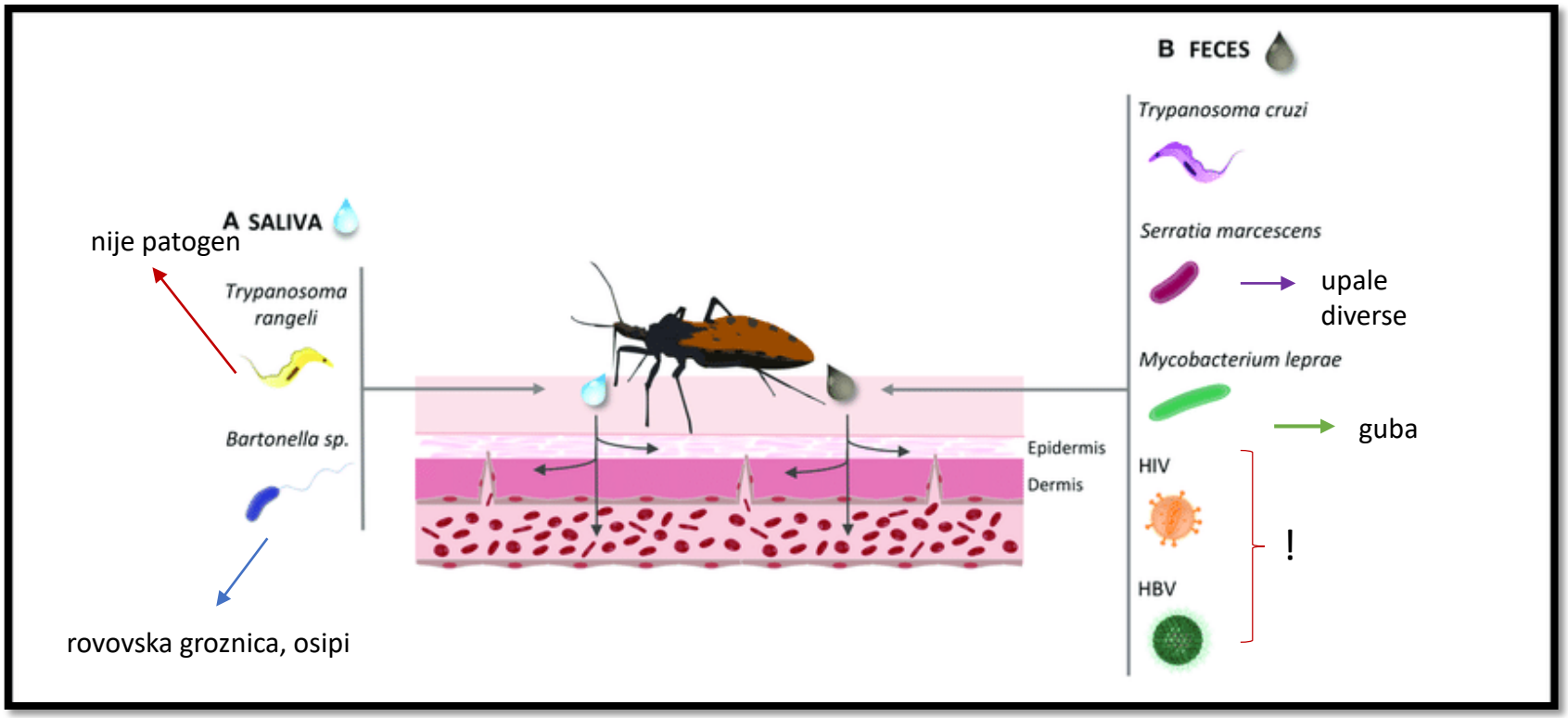
The Southern Cone Intiative **(Argentina, Bolivija, Brazil, Čile, Paragvaj i Urugvaj)**

* Perez et al., 2015

Stjenice ubojice - Triatominae



Potencijalni vektori:

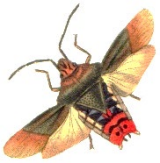


Veterinarski značaj:

Sve više pseće tripanosmijaze;
Kokoši- gubitak krvi

* Baretto Vieria et al., 2018

Stjenice – Cimicidae (*bed bugs, swallow bugs, bat bugs)*



- 6 potpor.; 23 roda, 91 vrsta
- 5 – 7 mm, 2,5 – 3 mm
- Svi bez krila
- Obligatorni hematofagni ektoparaziti
- ✓ *Cimex lectularius* Linnaeus, 1758– „krevetna stjenica”

(lat. *Cimex* – kukac; *lectularius* – krevetno)

mahogany-flat (Baltimore), *heavy dragoon* (Oxford), *red coat* (New York), *wall louse* (Wandlaus, Wegluis, and Wanze [German]), *Wägglus* (Swedish), *Vaeggelus* (Danish), *Piq-seq* (Chinese), *Chinche* (Old Spanish), *Chinga* (Gallic), *Nachtkrabbler* (night crawler, German), *Tapetenflunder* (wallpaper flounder,German), *Punaise* (stinker, French), *Perceveja* (pursuer, Portuguese), *Lude* (Finnish), *Plostice* (flat, Czech), *klop* (Russian), *bug* (ghost, goblin, British), *Buk* (Arabic), *Fusfus* (Syrian), *Pishpesh* (Hebrew), *Ekukulan* (Douala-Bantu), *Kunguni* (Swahili), *Uddamsa* (biter, Sanskrit), *Rep* (Vietnamese), *Nankinmusi* (Nanking bug, Japanese), and *Tokozirami* (bed louse, Japanese).

3 vrste ektoparaziti na čovjeku

umjerena klima

Leptocimex boueti (Brumpt, 1910)

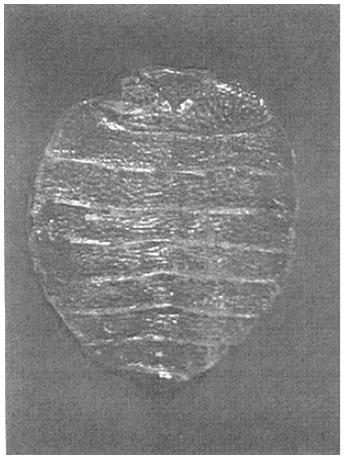
Cimex hemipterus (J.C.Fabricius, 1803)

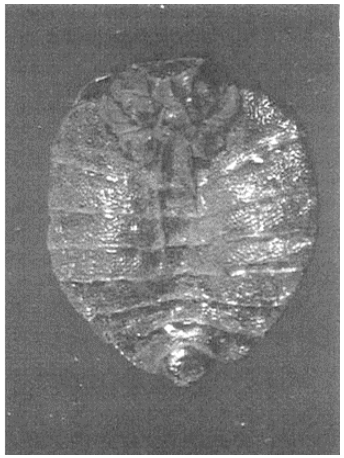
tropi

*Krinsky (2002)

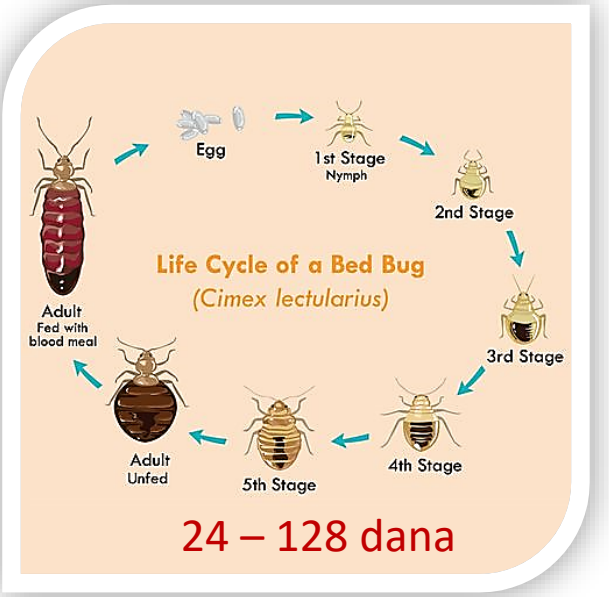
Stjenice – Cimicidae (*bed bugs, swallow bugs, bat bugs*)

- Bliski Istok – suživot u špiljama sa šišmišima
- Zapisi – stara Grčka 400 god. pr. Kr.





3500 god. pr. Kr. krevetna stjenica s odjeće radnika sela Amama, Egipat



- špilje, nastambe, gnijezda, šupljina drveta
- papir, drvo, tekstil

30 – 18 °C idealni uvjeti

5 – 6 mj. bez hrane

*Panagiotakopulu & Buckland (1999); Davies et al. (2012)

Stjenice – Cimicidae (*bed bugs, swallow bugs, bat bugs)*

- fototaksija

CO_2

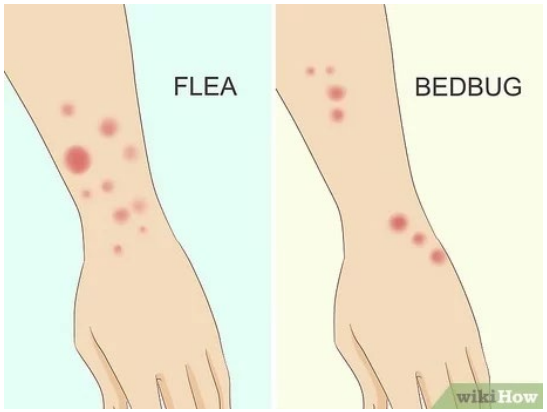
antikoagulant + NO_3

27 ljudskih patogena potencijalno mogu preživjeti u stjenicama

> 10 °C

Simptomi infestacije:

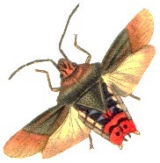
- ✓ bol i oteklina
- ✓ gubitak krvi
- ✓ anafilaksa
- ✓ erythema
- ✓ anemija
- ✓ neuroza
- ✓ insomnija
- ✓ iritabilnost
- ✓ paranoja



buha stjenica

* Froggett, 1919; Usinger, 1966; Doggett & Russell, 2008

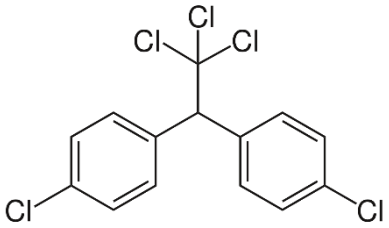
Stjenice – Cimicidae (*bed bugs, swallow bugs, bat bugs)*



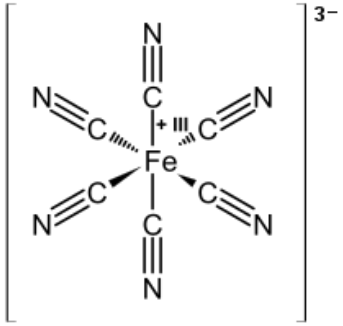
!!rezistencija!!

bihevioralna
fiziološka

!!povećanje populacija!!



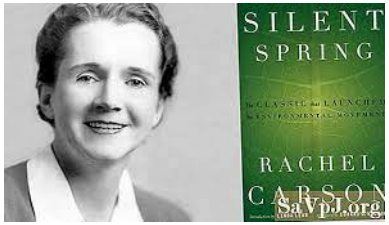
diklor-difenil-trikloretan
DDT



hidrocijanid

Veterinarska važnost
- štete u peradarstvu

INDIKACIJA – fekalne mrlje
lezije kože
smanjena produkcija jaja



Rachel Carson (1907 – 1964)

kemijska + mehanička kontrola

piretroidi

vakumiranje
izolacija inf. materijala

* Froggett, 1919; Doggett & Russell, 2008

Stjenice – Cimicidae (*bed bugs, swallow bugs, bat bugs)*

Ponekad se ljudima hrane i:

- ✓ Lastavičja
- ✓ Šišmiševa
- ✓ Meksička kokošja stjenica

CO_2 klopke

Stjenice – Cimicidae (*bed bugs, swallow bugs, bat bugs)*

Danas svjedočimo SIGNIFIKANTNOM povećanju populacija diljem Svijeta

REUTERS

World Business Markets Breakingviews Video

HEALTHCARE & PHARMA OCTOBER 27, 2010 / 8:53 PM / UPDATED 11 YEARS AGO

NY bedbug epidemic spreads to the United Nations

By Reuters Staff 2 MIN READ

UNITED NATIONS (Reuters) - New York City's bedbug epidemic has spread to yet another landmark in the city that never sleeps -- the United Nations, officials the world organization said on Wednesday.

The pests appeared at places like the Empire State Building and Bloomingdale's before reaching the city's center of international diplomacy on the East Side of Manhattan.

The U.N. press office said a bedbug-sniffing dog had confirmed the presence of bedbugs in furniture in the basement of the Dag Hammarskjold Library, where th offices of the team overseeing the U.N. headquarters' $1.9 billion renovation project are housed.

Bedbugs have joined the United Nations, again

By Margarita Noriega | margarita@vox.com | Jun 24, 2015, 1:50pm EDT

A bedbug joins the United Nations. | Getty

The **newest delegation** to the United Nations is very small.

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What Glenn Youngkin's Virginia win means for Democrats

NEWS POLITICS ENTERTAINMENT LIFE PERSONAL

NEW YORK

Bed Bugs Found At Bloomingdale's

By Danny Shea

11/28/2010 05:12am EST | **Updated** May 25, 2011

Intelligencer

BLOODSUCKERS | JAN. 5, 2011

Waldorf Astoria Bedbugs Drove Woman to Madness

By Jessica Pressler

Unlike the last two people who have filed suit against the Waldorf Astoria hotel, claiming they were attacked by bedbugs in their sleep, Svetlana Tendler did not bring the critters back to her home in Michigan. Her fate was worse. Not only did she suffer a "fungal face infection" and — good god — "severe facial folliculitis" related to the bites, but it ruined her vacation to Bermuda. And it also drove her *insane*.

"For the last 3 years I tried to recover from the bed bugs incident and forget about it," Tendler says. "But I felt like something very important was taken from my life that night and was never returned. I felt like I was eaten alive by bed bugs which have attacked my body." Her lawyer adds, "My client is terrified of staying at hotels after the incident and always carries bed bug spray, a magnifying glass and a flashlight to help her locate bed bugs whenever she is forced to stay at hotels. Mrs. Tendler developed anxiety and sleep disorders. She is always scared that she might bring bed bugs back to her family home after staying at a hotel."

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BED BUGS DON'T DISCRIMINATE AGAINST FIVE STAR HOTELS

It's a universal truth that there is some risk of encountering bed bugs while you are travelling and staying in high traffic areas like hotels and hostels. Bed bugs can be found in nearly every region of the world and all fifty states in the U.S. There are, however, some common misconceptions about the types of places you might find bed bugs, and what that says about the places they're found.

BED BUGS DON'T DISCRIMINATE AGAINST CLEAN HOTELS

Assuming you are safe from bed bugs simply because your hotel room is clean is a mistake. The idea that bed bugs are attracted to dirt and grime is simply untrue. Bed bugs are attracted to three main things: warmth, blood, and carbon dioxide. While cleanliness is certainly a good start to catching in potential bed bug infestations, it is not a foolproof way of prevention. Bed bugs don't discriminate against high class hotels either. From five star hotels to run down hostels, these pests can be found wherever their hosts take them.

Five star hotels 'infested' with BED BUGS after major surge in blood-sucking insects across New York City

- **Reports of bed bugs in New York hotels have increased by 44 per cent**
- **Even plush hotels such as the five star Waldorf Astoria have been affected**
- **Bed bugs were virtually wiped out following the Second World War**
- **Entomologists have warned that bed bugs now have pesticide immunity**

By DARREN BOYLE FOR MAILONLINE
PUBLISHED: 11:26 GMT, 9 February 2016 | **UPDATED:** 16:26 GMT, 9 February 2016

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Tourists visiting some of New York's most prestigious hotels have reported being bitten by bed bugs despite their five star surroundings.

Guests at the Waldorf Astoria and Marriott Marquis hotel are among those to have been affected by the infestation. Reports of bed bugs in the city's hotels have jumped by 44 per cent over the past year.

According to the Bed Bug Registry, which lists reports of alleged incidents, there are almost 6,000 incidents in their databases relating to New York.

Reports of bed bugs in New York hotels have increased by more than 40 per cent between 2014 and 2015

2019-01-13 Hitchhiking Bed bugs

Hitchhiking
BED BUGS
infest Quad-Cities, the world

The New York Times

PERSONAL HEALTH

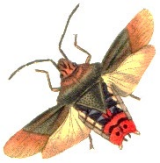
The Pandemic May Spare Us From Another Plague: Bedbugs

Given the drastic pandemic-induced reductions in travel, the chances of bringing home these uninvited guests have been greatly curtailed.

74

Gracia Lam

Što donosi sutra?

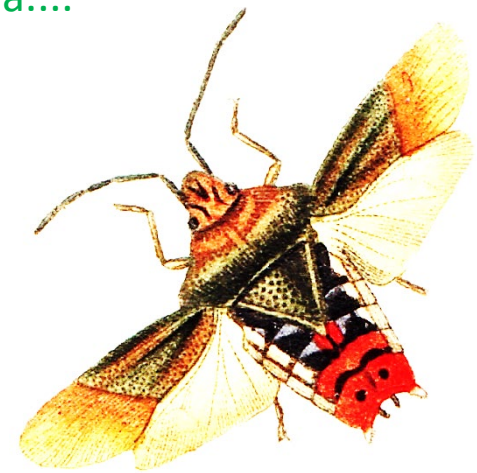


...ako se pandemija nastavi – ozbiljne posljedice - turizam i ekonomija

...troškovi od mlrd dolara – zamjena velike količine elektroničke opreme (kompjuteri, televizori, radio..) namještaja i tekstila iz kućanstva

...veća potrošnja energije – minimalno pranje tekstila na 60 °C ...

....povećana uporaba toksičnih kemikalija te povećana količina otpada....



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