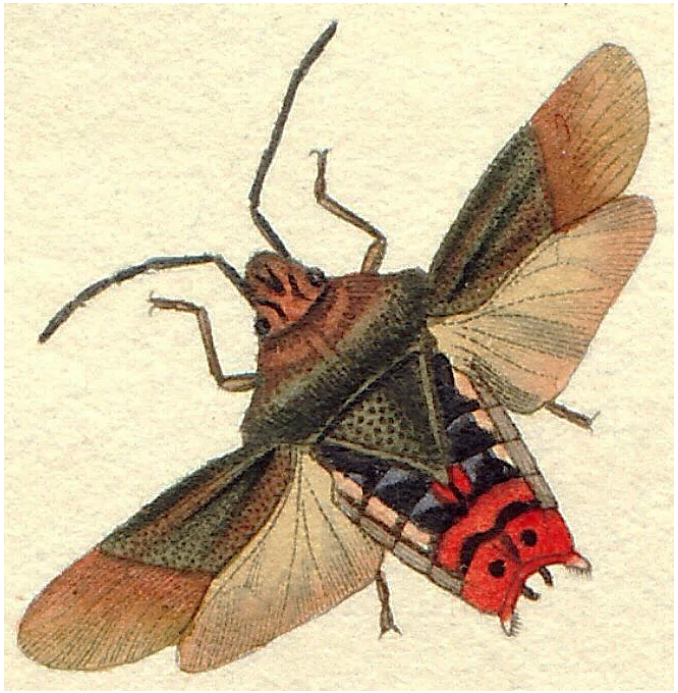
MEDICAL AND VETERINARY ENTOMOLOGY

HEMIPTERA



Asst. Prof. Vlatka Mičetić Stanković, senior curator

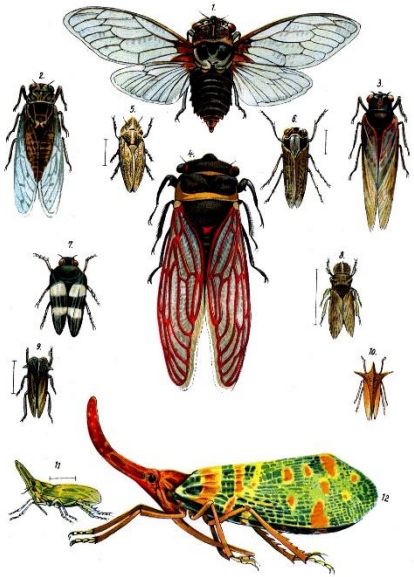
HRVATSKI PRIRODOSLOVNI MUZEJ
CROATIAN NATURAL-HISTORY MUSEUM

* vlatkams@hpm.hr

Hemiptera Linnaeus, 1758

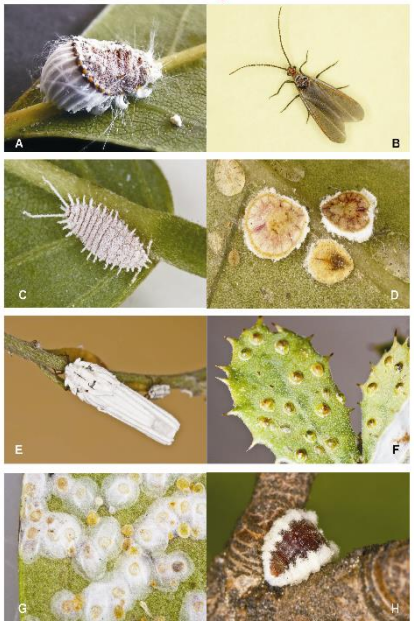
Lat. *hemipterus* – half-winged

~ 90 000 species in 37 families



Auchenorrhyncha

Heteroptera



Sternorrhyncha

Coleorrhyncha

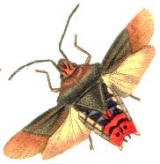
Pyrrhocoris apterus (Linnaeus, 1758)

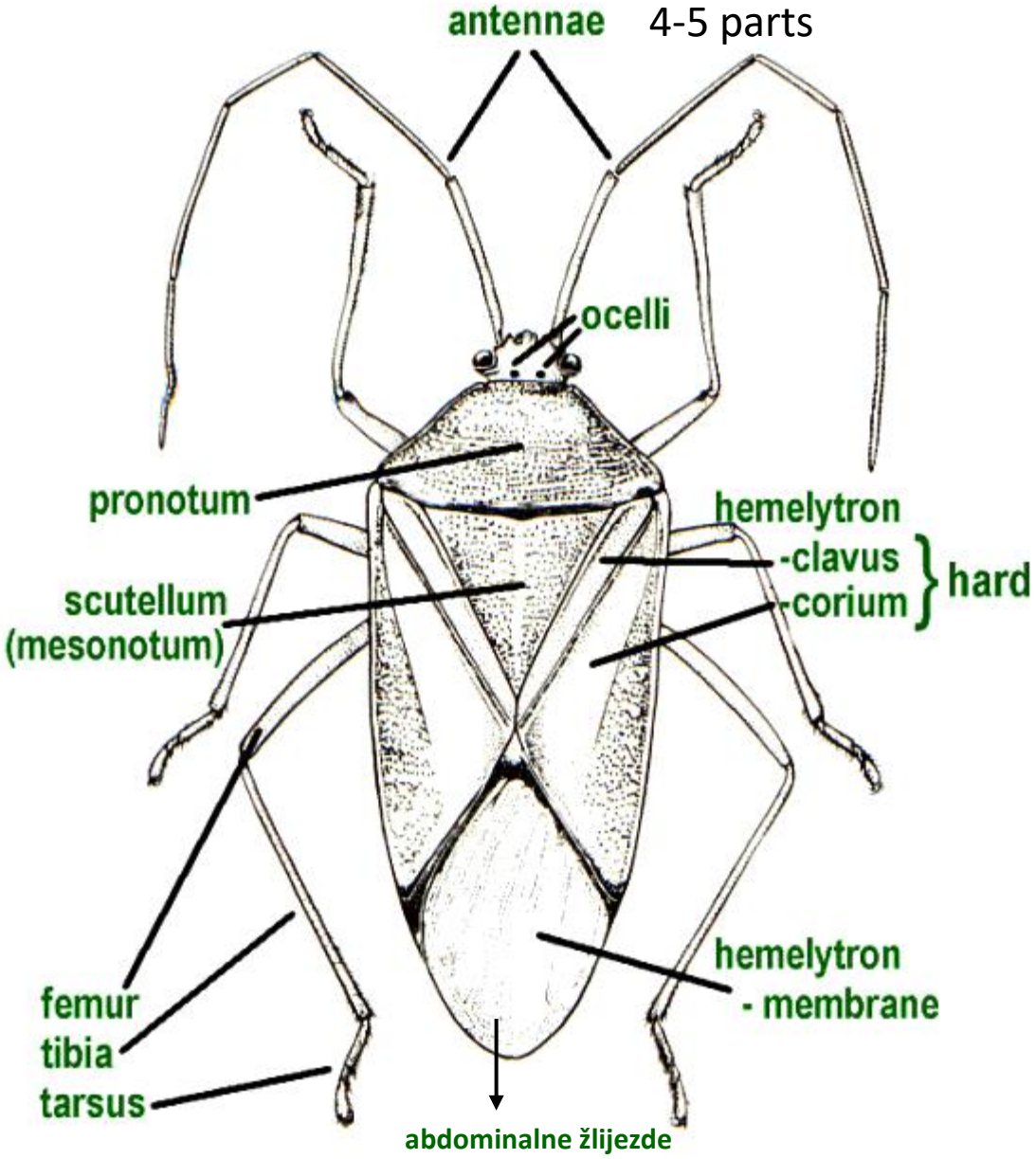
Micronecta scholtzi (Fieber, 1860)

*Halyomorpha halys (*Stål, 1855)

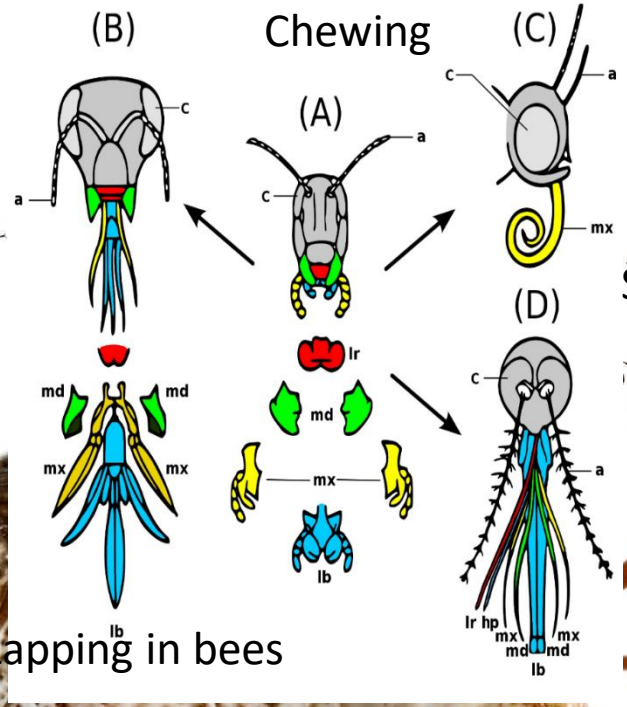
Corythucha ciliata Aay, 1832
PLANE TREES

Corythucha arcuata (Say, 1832)
OAK





*Slater and Baranowski, 1978



Lapping in bees

Siphoning type

Piercing and sucking

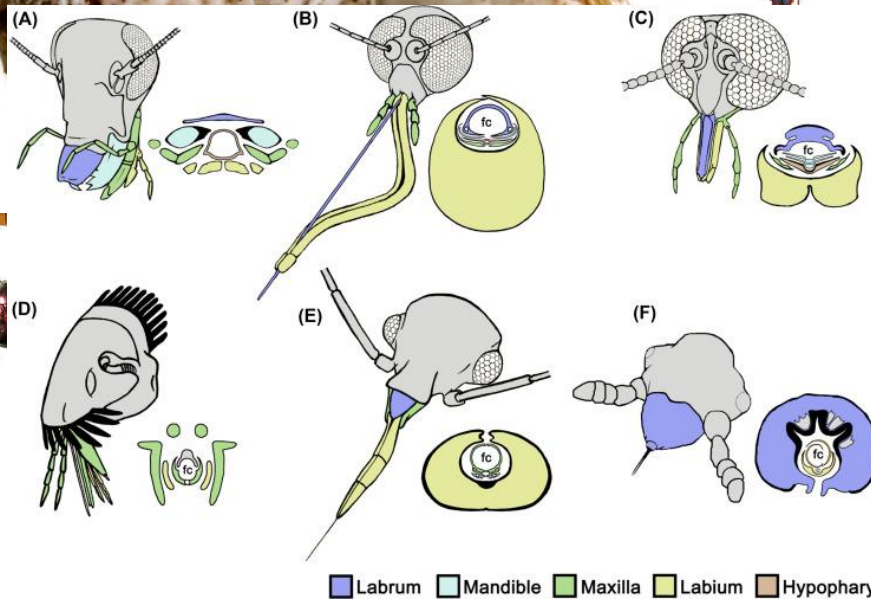


Diagram of *Hemipterous* mouth-parts. Shows the appearance, if it could be seen in perspective, with successive layers removed.

Possible unpleasant encounter with:

Cicadelidae

Cicadidae

Fulgoridae

Membracidae

Belostomatidae

Notonectidae

Holotrichius innesi Horvath, 1909 – neurotoxic and hemotoxic sting
Middle East

MEDICAL AND VETERINARY IMPORTANCE

- ECTOPARASITES
- OBLIGATORY HEMATOPHAGOUS

Triatominae (fam. Reduviidae)
Assassin bugs

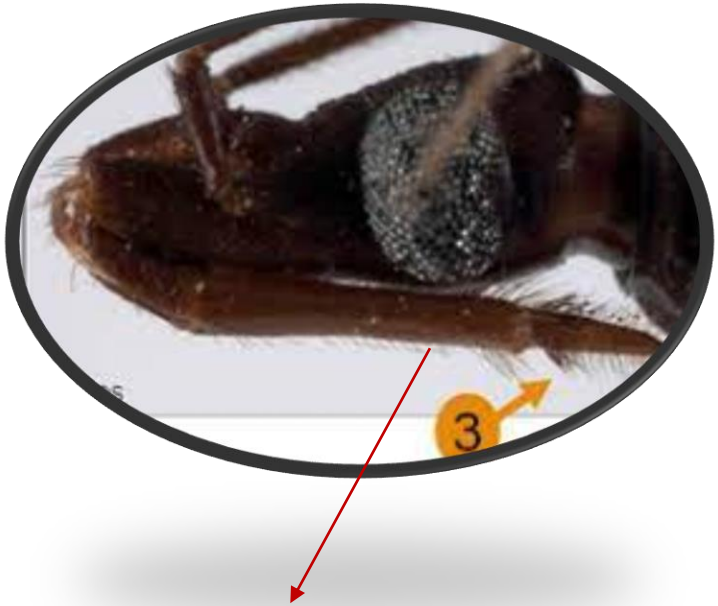
Cimicidae
Bed bugs

VECTORS OF PATHOGENS

*Krinsky (2002)

Triatominae (*kissing, assasing bugs*)

- 17 genera, 151 species – New World
- 5 – 45 mm body size
- Elongated head
- Compound eyes
- Antennae 4 parts
- Large proboscis – with 2 channels:
  1. for saliva
  2. for food



1. channel for food
2. channel for saliva

Big compound eyes

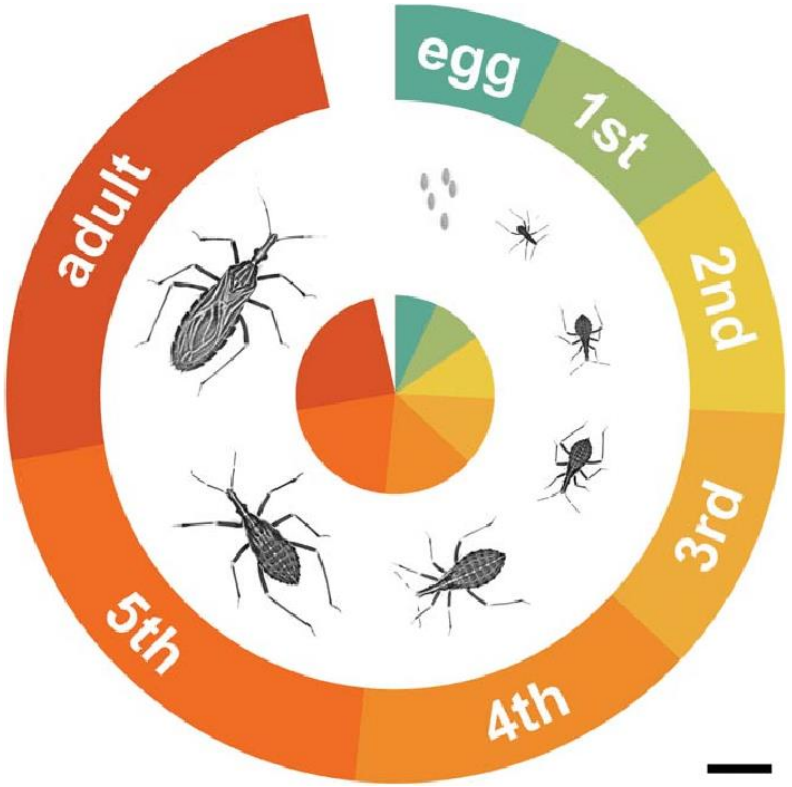
pronotum

scutellum

11 segments

* Berreto Vieria et al., 2018

Triatominae (*kissing, assasing bugs*)



3 - 4 months to 1 – 2 years

incomplete metamorphosis

NYMPHS:

- Small eyes
- Without ocelli
- No wings

T °C

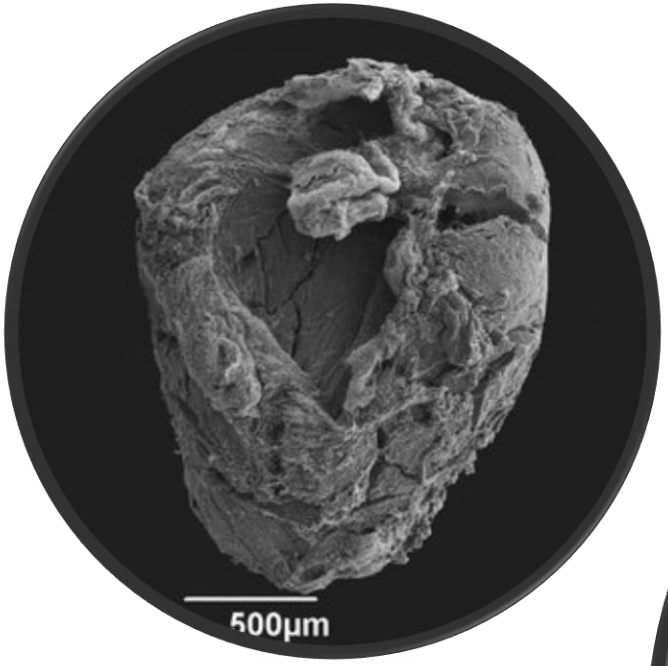
%

Feeding intervals

Host behaviour

*Krinsky (2002)

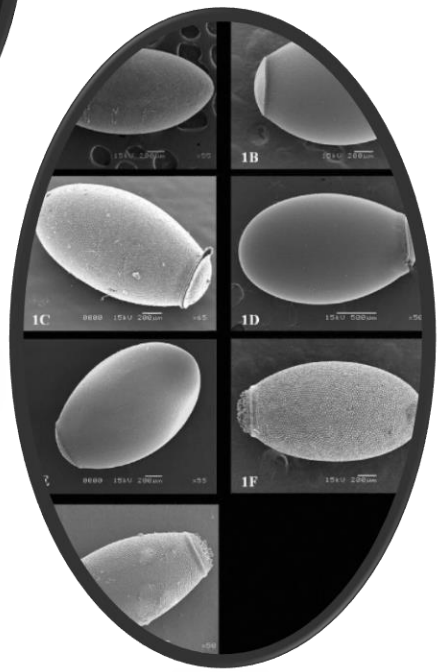
Triatominae (*kissing, assasing bugs*)



Spermatophore

1 – 3 days after last moulting

5 – 15’



10 – 30 days after

Females hatches to 1000 eggs/life

*Krinsky (2002)

Triatominae (*kissing, assasing bugs*)

Feeding 3 – 30 ’

Heat

CO_2

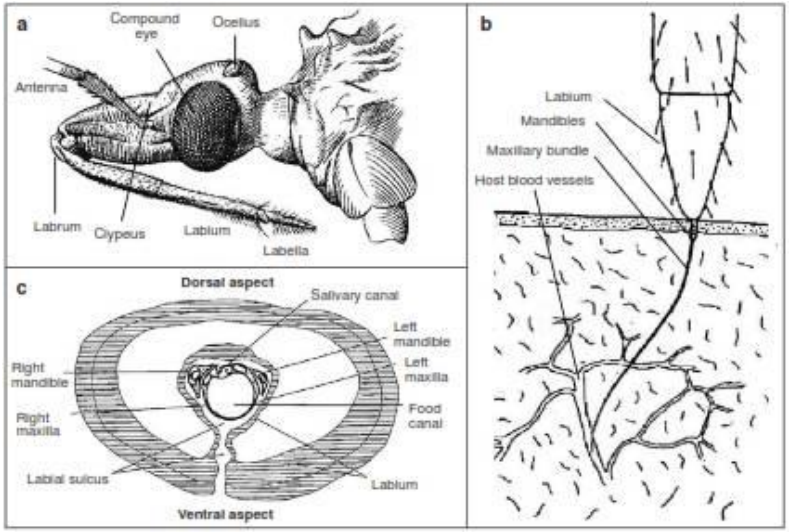
Pheromones

Increase in body size - 3 x;

nymphs even to 12 x!

Duration of feeding :

- Chemical content of blood
- Abdominal receptors

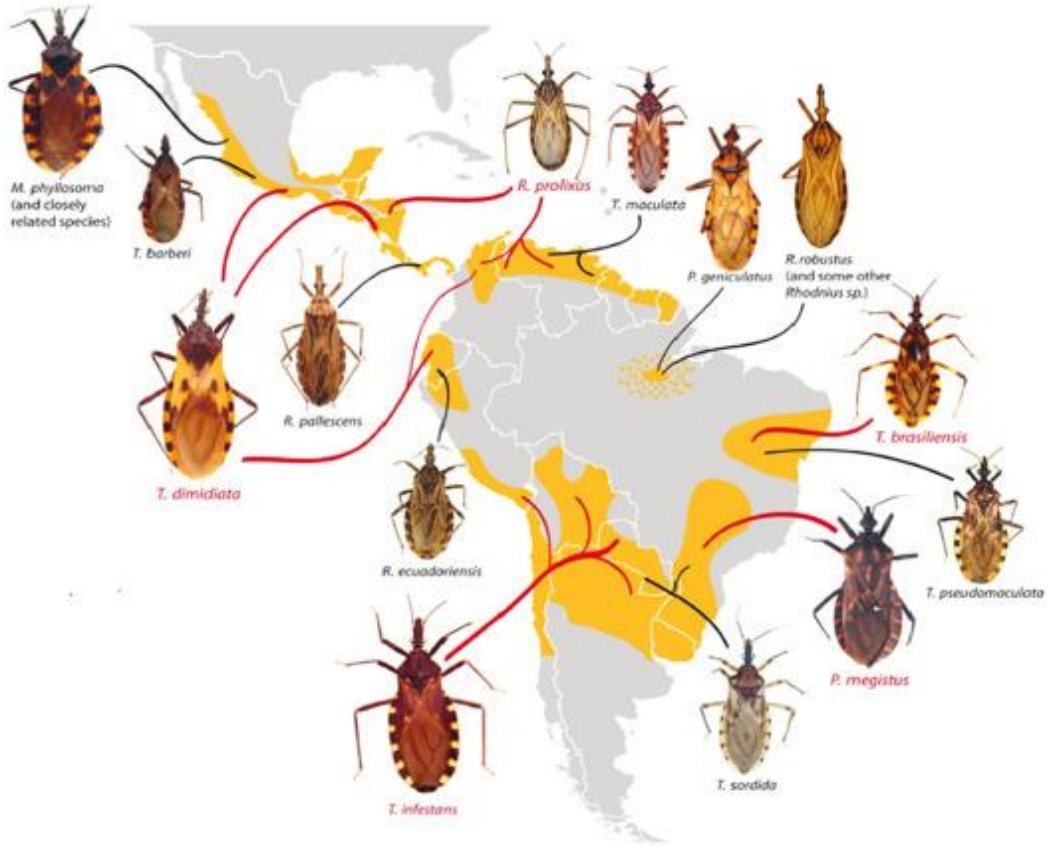


anticoagulants + NO_3 + analgetics

…irritations are rare at the injection site…

* Escandón-Vargas et al., 2017

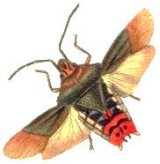
Triatominae (*kissing, assasing bugs*)



…deforestation make habitats loss and they get closer to humans…

* Guhl, 2017; Pinto et al. 2015

Triatominae (*kissing, assasing bugs*)



3 groups:

1 – silvatic: nests, dens, holes, epiphytes, logs, reptiles, bats, oposums, rodents

2 – peridomestic: host are domestic animals, chickens, rabbits and guinea pigs

3 – domestic: exclusively connected with humans and their pets

Habitat type

Habitat conditions

Change of habitat

….different materials, artifical and natural, holes in walls, beds, furniture, clothes, linen…

- Activity by night – *kissing bugs*
- Can live for months without meal – e.g. life in nests of migratory birds
- When host present – feeding every 4 to 9 days

* Krinsky (2002)

Triatominae (*kissing, assasing bugs*)

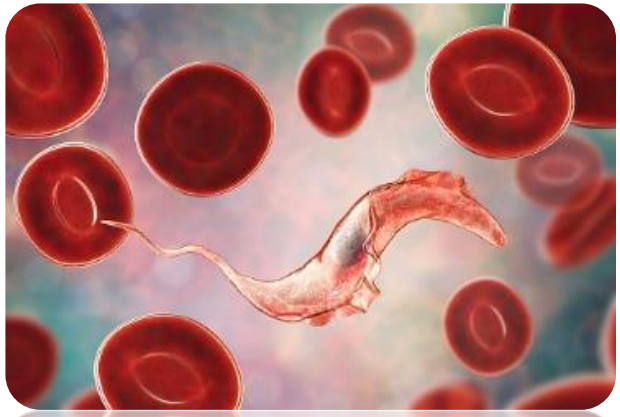
Chagas disease

- 1907. Minas Gerais, Brazil
- American trypanosmiasis

Carlos Chagas (1879 – 1934)

Triatoma infestans Klug, 1834

Rhodnius prolixus Stål, 1859

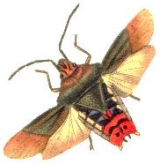


Trypanosoma cruzi Chagas, 1909

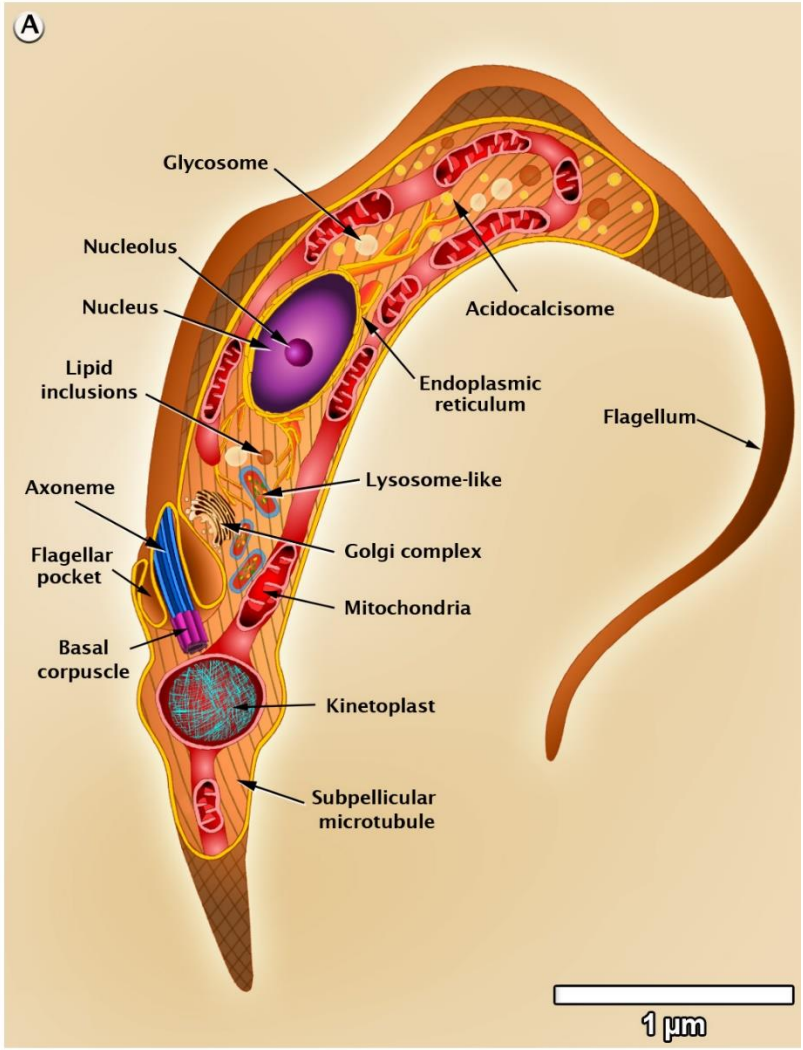
Triatoma dimidiata Klug, 1834

*Bern, 2015

Triatominae (*kissing, assasing bugs*)

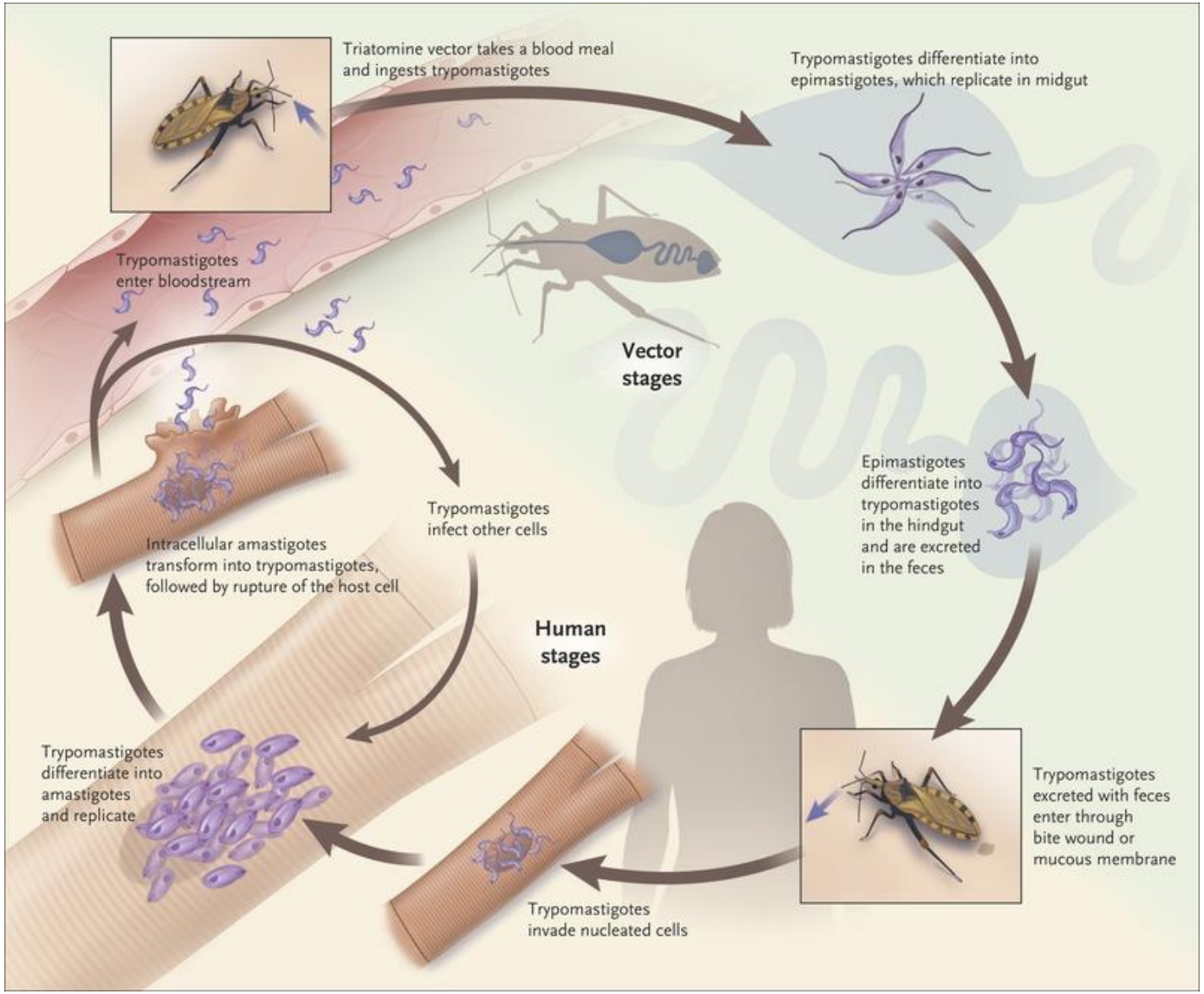


Genus *Trypanosoma* – all obligatory parasites



Trypanosoma cruzi Chagas, 1909

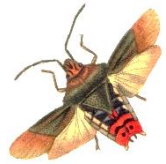
*https://plos.altmetric.com/details/917869



Cycle ends within 6 to 15 days

Triatominae (*kissing, assasing bugs*)

Chagas disease



Ways of infection:

Food and drink

Faecal rain

Random contact

Treatement

Triatoma barberi Usinger 1939

Aphrodisiac

Triatoma picturata (Usinger 1939)

Breast feeding

Blood transfuzion

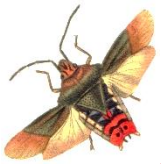
!!high vectors diversity!!

30 days after host dies *Trypansoma cruzi* is still ALIVE

*Krinsky (2002)

Triatominae (*kissing, assasing bugs*)

Chagas disease



- Acute (healing 80%)
  - chagoma – irritated skin
  - Romaña sign – swollen eyes
  - fever
  - enlargement of limpahtic nodes
  - skin rash
  - myocarditis
  - meningoencephalitis
  - morbidity

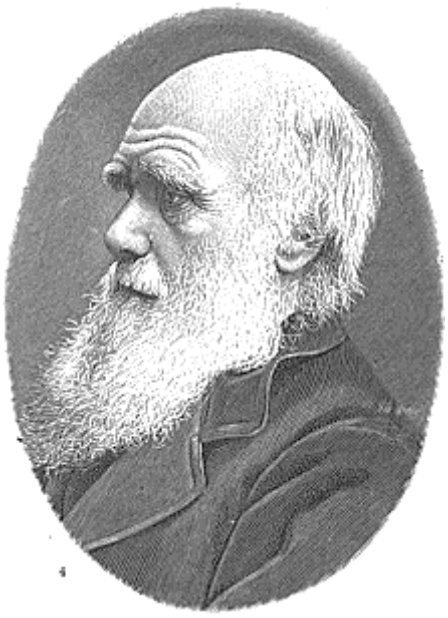
Diagnosis:

- ✓ blood analysis
- ✓ PCR
- ✓ ELISA test with IgG antibodies

- Chronical (healing 5 – 20 %)
  - chest pain
  - nausea
  - dizzines and swoon
  - thromboembolic
  - heart insufficiency
  - heart anomaly
  - constipation
  - insomnia
  - irritability
  - neurosis

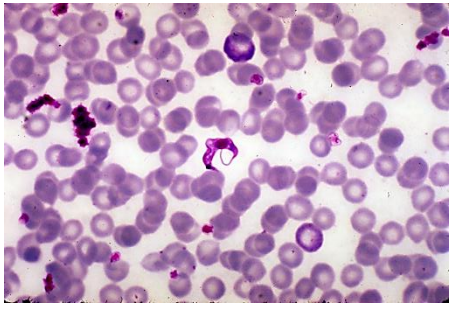
Diagnosis:

- ✓ antibodies serologiocal tests



Charles Darwin (1809. – 1882.)

XENODIAGNOSIS ⟹ LAB. CULTIVATION



The *Benchuca* bug of Pampas

*Krinsky (2002)

Triatominae (*kissing, assasing bugs*)

Chagas disease

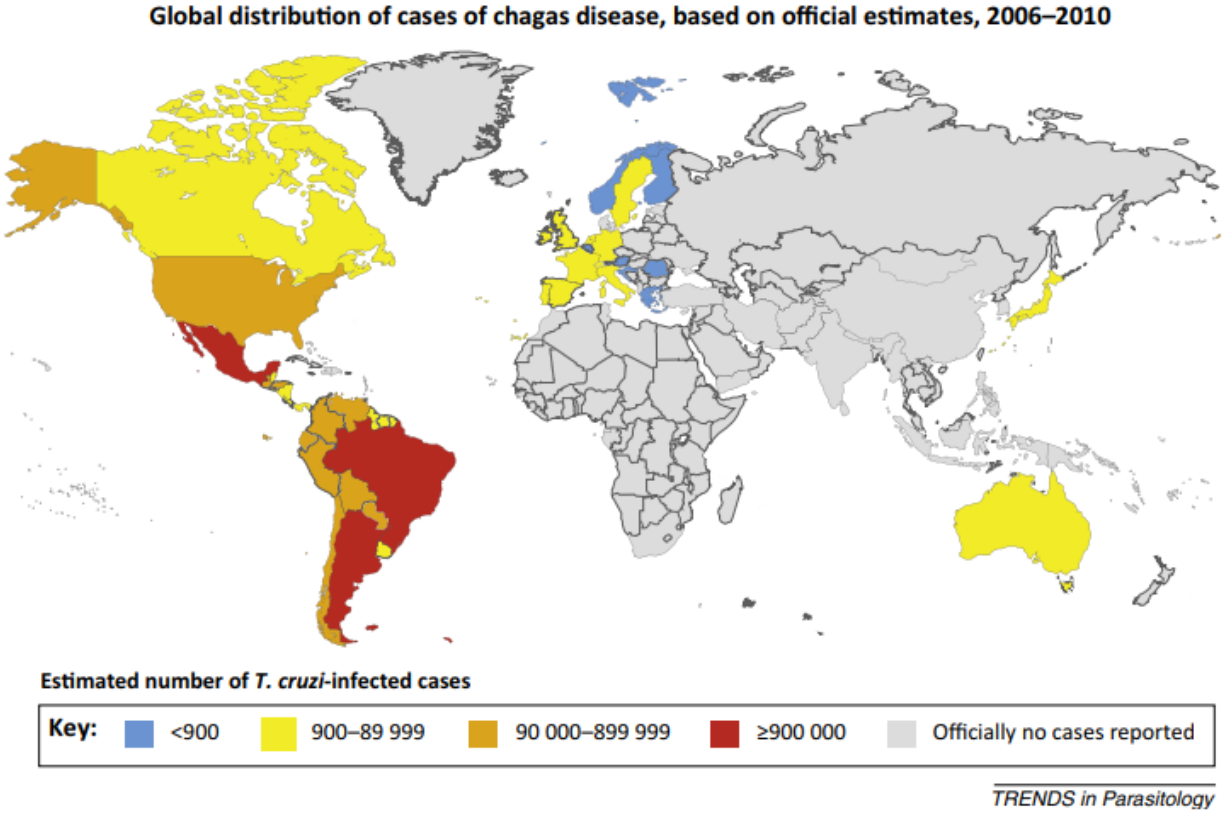


Figure 1. **The Global Distribution of Cases of Chagas Disease (CD).** Global migration has led to an increasing incidence of CD across the world within regions previously thought to be nonendemic for infection. The spread of CD throughout these areas may be problematic due to the presence of native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

PREVENTION:

- insecticides
- sanitary standard
- control of blood transfusion
- allocation of animal dwellings

DETECTION:

- white sheets of paper in houses
- sensorics boxes

TREATEMENT:

NIFURTIMOX

BENZNIDAZOLE

In South America to **5 times higher**

mortality compared to malaria

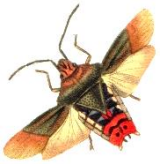
30 000 new cases per year

12 000 deaths per year

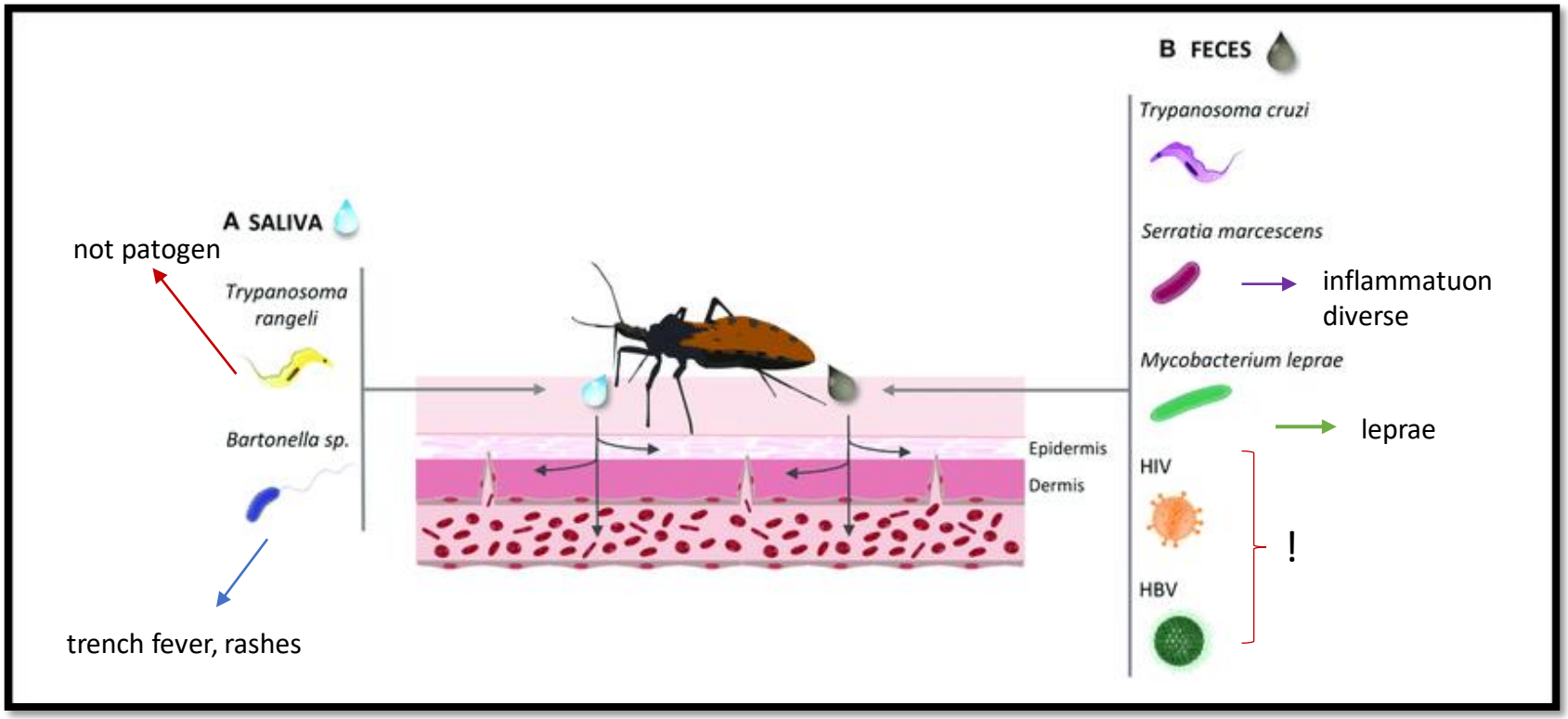
The Southern Cone Initiative **(Argentina, Bolivia, Brasil, Chile, Paraguay and Uruguay)**

* Perez et al., 2015

Triatominae (*kissing, assasing bugs*)



Potential vectors:

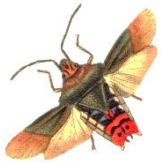


Veterinary significance:

- Trypanosimiasis in dogs - increase
- Blood loss in hens and chickens

* Baretto Vieria et al., 2018

Bed bugs – Cimicidae (*swallow bugs, bat bugs)*



- 6 subfamilies; 23 genera, 91 species
- 5 – 7 mm, 2,5 – 3 mm
- Wingless
- Obligatory hematophagous ectoparasites
- ✓ *Cimex lectularius* Linnaeus, 1758– „bed bug"

  (lat. *Cimex* – bug; *lectularius* – bed)

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 species ecotparasites at humans

moderate climate

Leptocimex boueti (Brumpt, 1910)

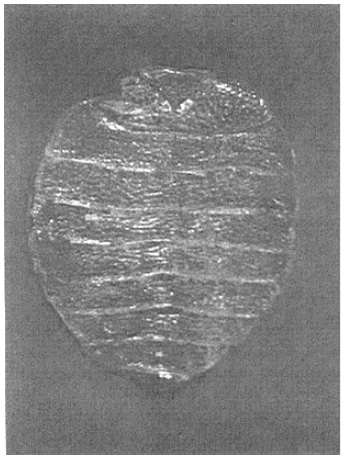
Cimex hemipterus (J.C.Fabricius, 1803)

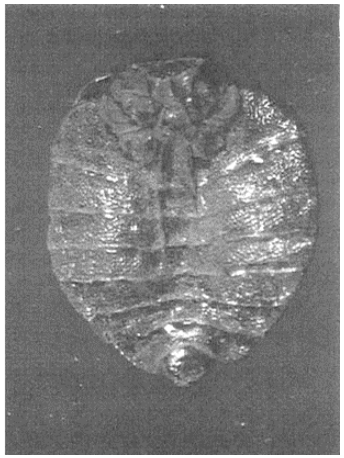
tropical area

*Krinsky (2002)

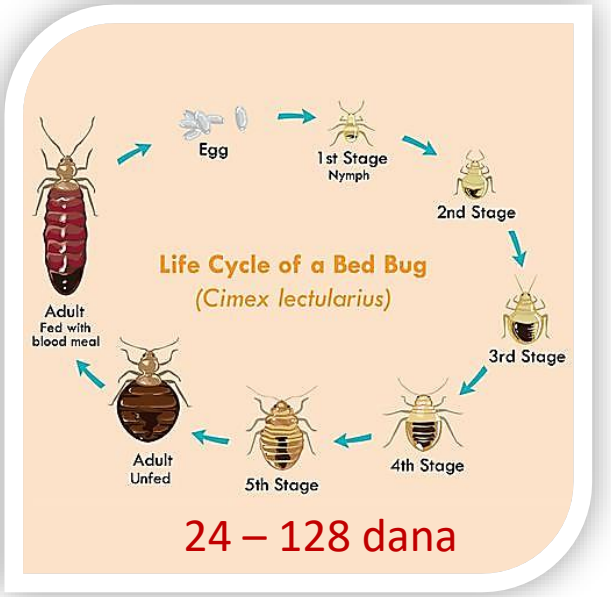
Bed bugs – Cimicidae (*swallow bugs, bat bugs)*

- Middle East – cohabitation in caves with bats
- Ancient Greece - 400 years before Christ





3500 yr. before Christ - a bed bug from clothes of farmer, village Amama, Egypt



- Caves, dwellings, nests, tree hollows
- Paper, wood, textile

30 – 18 °C ideal conditions

5 – 6 months without food

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

Bed bugs – Cimicidae (*swallow bugs, bat bugs)*

- phototaxia

CO_2

anticoagulants + NO_3

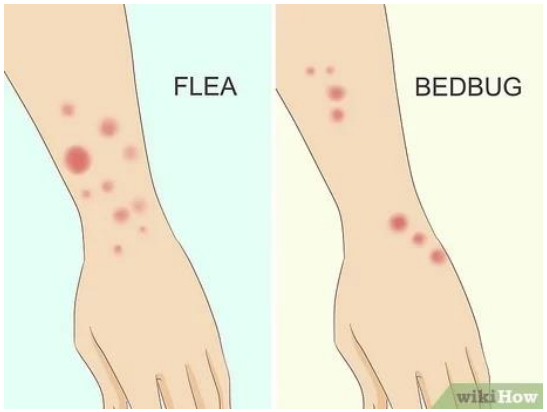
> 10 °C

….27 human pathogens potentially can survive in bed bugs…..

…secondary bacterial infection…

Infestation symptoms:

- ✓ Pain and swelling
- ✓ Blood loss
- ✓ Anaphylaxis
- ✓ Erythema - rashes
- ✓ Anaemia
- ✓ Neurosis
- ✓ Insomnia
- ✓ Irritability
- ✓ Paranoia

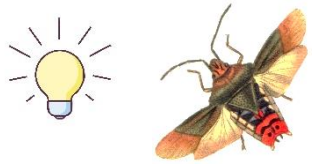


Flea Bed bug

!!often wrong diagnosis!!

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

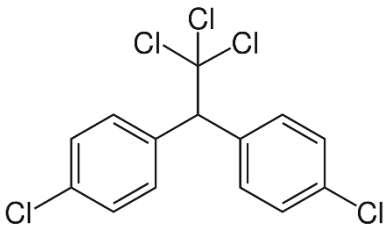
Bed bugs – Cimicidae (*swallow bugs, bat bugs)*



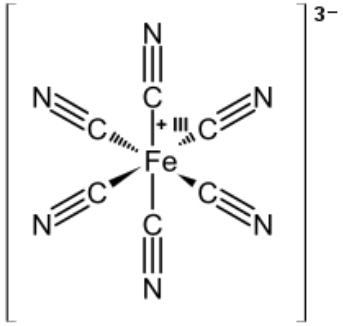
!!resistence!!

Behavioural
Physiological

!!population increase!!

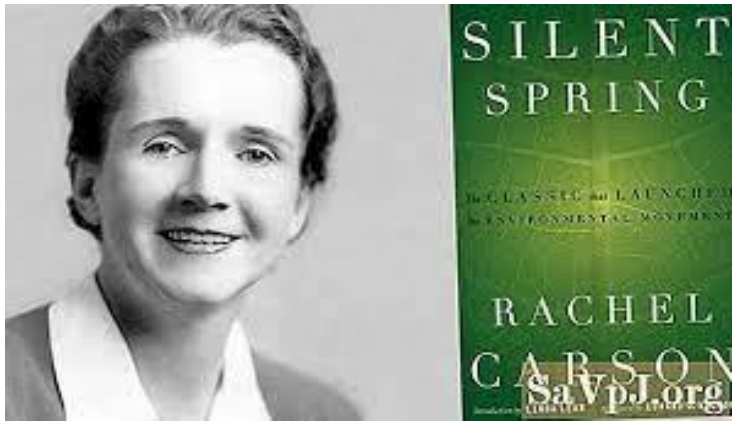


Dichloro-diphenyl-trichloroethane
DDT



Hydrogen cyanide

2001. Stockholm Convention



Rachel Carson (1907 – 1964)

chemical + mechanical control

Pyrethroids
Neonicotinoids

Vacuum
Isolation of infected material

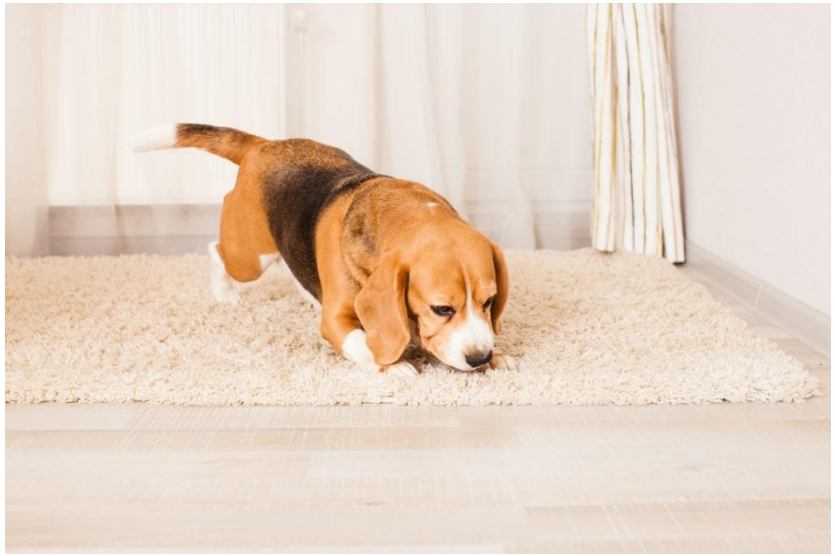
* Froggett, 1919; Doggett & Russell, 2008

Bed bugs – Cimicidae (*swallow bugs, bat bugs)*

Occasionally humans can be host to:

- ✓ Swallow bug
- ✓ Bat bug
- ✓ Mexican chicken bug

CO_2 TRAPS



Veterinary importance

Damage in polutry

INDICATION – faecal spots
skin lesions
decreased eggs production

Bed bugs – Cimicidae (*swallow bugs, bat bugs)*

Today - resurrection of bed bugs with significant increase of populations worldwide

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 a 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 the 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

SHARE

A bedbug joins the United Nations. | Getty

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

MOST READ

How seriously should we take Jon Stewart?

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."

My Week In New York
A week-in-review newsletter from the people who make New York

Enter your email SIGN UP

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

Share 1.9k shares 248 View comments

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.

© Alamy

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


hr
VIJESTI SPORT SHOWBIZZ LIFESTYLE PUTOVANJA TECH ZDRAVLJE ZABAVA TEEN FAKS TV
OBAVIJESTI
PRETRAŽITE
destinaciji Slavonija
i Podravina
SAZNAJ VIŠE
OD SADA
11,90
35 G
NAPASNI KUKCI
Riječki neboder vrvi stjenicama, građani očajni: "Ne može se spavati, djeca se boje ući u sobu." Stručnjakinja savjetuje kako se riješiti ovih krvopija
Nakon velikih europskih gradova, stjenice su stigle i u Rijeku. Očajni građani traže rješenje. Više donosi reporterka Dnevnika Nove TV Katarina Jusić Mezga.


POHARALE EUROPU
Pošast stjenica došla i u Hrvatsku, a evo gdje se pojavljuju i kako se šire
~4 min
I.Ba.
12.10.2023 u 10:32
19968.jpeg
OGLAS
INSTAR
VAŠ OMILJENI TEHNO CENTAR
BLACK
TECH
MARKET
POPUSTI DO 50%!


NOVOSTI MIROVINE PRIČE ZDRAVLJE CRNA KRONIKA FOTO DANA
Najezda stjenica i u Hrvatskoj: Kakvi su ovo kukci, jesu li opasni i kako se zaštiti?
Ana Kanazir 13. listopada 2023. ZDRAVLJE
A- A+
Stjenice su se u kratkom vremenu razmnožile diljem Francuske, a pojavile su se i u Londonu, a nažalost ni Hrvatska nije ostala pošteđena. Tako su se nastanile u nekoliko stanova jedne zgrade u Rijeci, a njihov broj se munjevito širi. Ovi kukci su se nekada smatrali simbolom prljavštine, dok se danas šire kod putovanja. Ne prenose bolesti, ali izazivaju kožne alergijske reakcije. Dobra vijest je da se mogu suzbiti uz pomoć stručnjaka.
Ad by CRITEO
Report this ad
Ad choices

2019-01-13 Hitchhiking Bed bugs

Hitchhiking
BED BUGS
infest Quad-Cities, the world

The New York Times

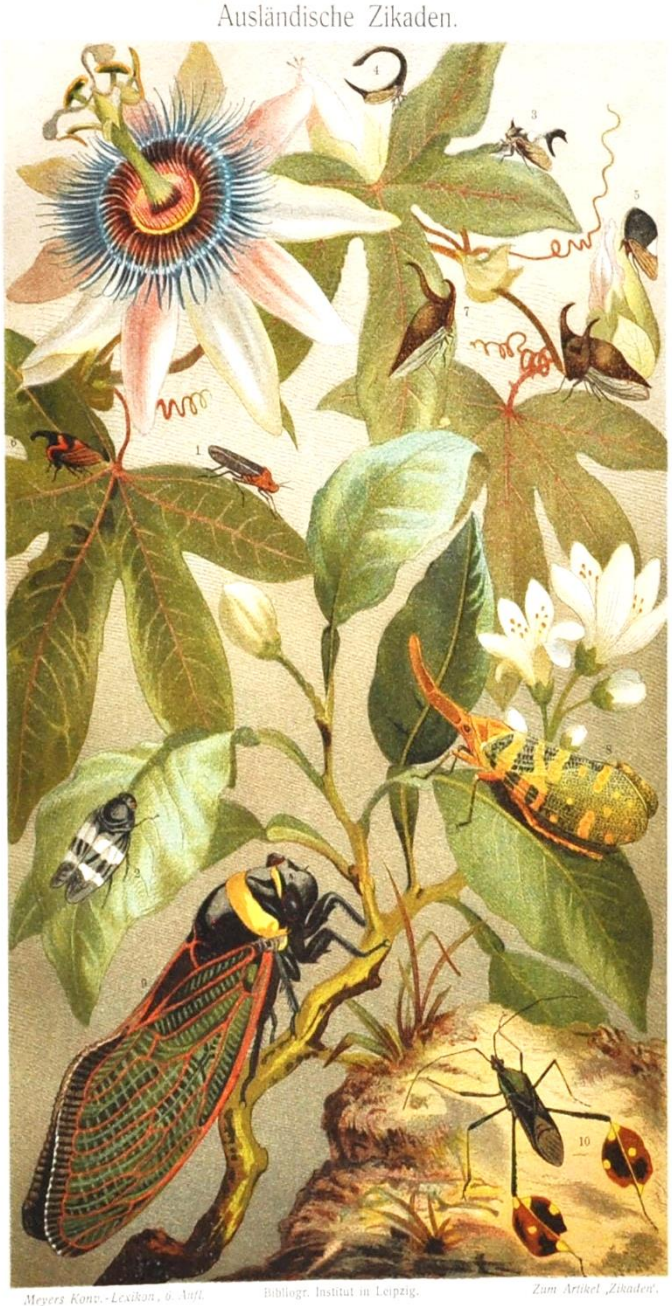
PERSONAL HEALTH

The Pandemic May Spare Us From Another Plague: Bedbugs

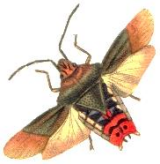
Given the drastic pandemic-induced reductions in travel, the chances of bringing home these uninvited guests have been greatly curtailed.

74

Gracia Lam



What tomorrow brings?

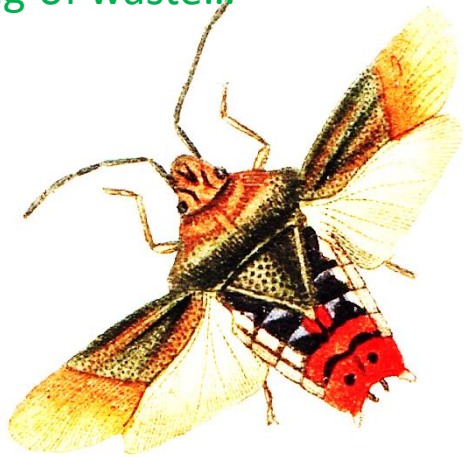


...if pandemic continues – serious consequences on tourism and economy..

...costs in billions of dollars – replacement of electronic devices (computers, tv, radio..), furniture and textiles from households..

...higher energy consumption – minimum washing of textile at 60 °C ...

....increased use of insecticides and toxic chemicals as well as producing of waste...



LITERATURE

Bern C (2015) Chagas' Disease. N Engl J Med 373:456-466 DOI: 10.1056/NEJMra1410150

Cruz-López, L., Malo, E.A., Rojas, J.C. and Morgan, E.D. (2001), Chemical ecology of triatomine bugs: vectors of Chagas disease. Medical and Veterinary Entomology, 15: 351-357. https://doi.org/10.1046/j.0269-283x.2001.00340.x

Changlu Wang, Kurt Saltzmann, Eva Chin, Gary W. Bennett, Timothy Gibb, Characteristics of Cimex lectularius (Hemiptera: Cimicidae), Infestation and Dispersal in a High-Rise Apartment Building, Journal of Economic Entomology, Volume 103, Issue 1, 1 February 2010, Pages 172–177, https://doi.org/10.1603/EC09230

Cooper R., Changlu Wang, Narinderpal Singh, Accuracy of Trained Canines for Detecting Bed Bugs (Hemiptera: Cimicidae), Journal of Economic Entomology, Volume 107, Issue 6, 1 December 2014, Pages 2171–2181, https://doi.org/10.1603/EC14195

Doggett, S.L., Russell, R.C., Robinson, W.H., & Bajomi, D. (2008). The resurgence of bed bugs, Cimex spp. (Hemiptera: Cimicidae) in Australia. 6th International Conference on Urban Pests, Budapest, Hungary, 13-16 July 2008 pp.407-425

Dang, K., Doggett, S.L., Veera Singham, G. et al. Insecticide resistance and resistance mechanisms in bed bugs, Cimex spp. (Hemiptera: Cimicidae). Parasites Vectors 10, 318 (2017). https://doi.org/10.1186/s13071-017-2232-3

Doggett, S.L., Geary, M.J. & Russell, R.C. (2003) Has the tropical bed bug, Cimex hemipterus (Hemiptera: Cimicidae), invaded Australia? Environmental Health, 3, 80– 82.

Davies, T.G.E., Field, l.M., Williamson, M.S. (2012), The re-emergence of the bed bug as a nuisance pest: implications of resistance to the pyrethroid insecticides. Medical and Veterinary Entomology, 26: 241-254. https://doi.org/10.1111/j.1365-2915.2011.01006.x

Escandón-Vargas K, Muñoz-Zuluaga CA, Salazar L (2017) Blood-feeding of *Rhodnius prolixus*. Biomédica, 37, no.3, doi: 10.7705/biomedica.v34i2.3304.

Krinsky WL (2002) True bugs (Hemiptera). U: Mullen, G & Durden L (ur.) Medical and Veterinary Entomology. Elsevier Inc. Doi: 10.1016/B978-0-12-510451-7.X5000-2.

Murillo-Solano, C., López-Domínguez, J., Gongora, R. et al. Diversity and interactions among triatomine bugs, their blood feeding sources, gut microbiota and Trypanosoma cruzi in the Sierra Nevada de Santa Marta in Colombia. Sci Rep 11, 12306 (2021). https://doi.org/10.1038/s41598-021-91783-2

Pinto CM, Ocaña-Mayorga S, Tapia EE, Lobos SE, Zurita AP, Aguirre-Villacís F, et al. (2015) Bats, Trypanosomes, and Triatomines in Ecuador: New Insights into the Diversity, Transmission, and Origins of Trypanosoma cruzi and Chagas Disease. PLoS ONE 10(10): e0139999. https://doi.org/10.1371/journal.pone.0139999

Perez CJ, Lymbery AJ, Thompson RCA (2015) Reactivation of Chagas Disease: implications for global health. Trends in Parasitology, 31 (11): 595-603, doi: 10.1016/j.pt.2015.06.006.

Panagiotakopulu, E., & Buckland, P. (1999). Cimex lectularius L., the common bed bug from Pharaonic Egypt. Antiquity, 73(282), 908-911. doi:10.1017/S0003598X00065674

Wang, L., Xu, Y., & Zeng, L. (2013). RESURGENCE OF BED BUGS (HEMIPTERA: CIMICIDAE) IN MAINLAND CHINA. The Florida Entomologist, 96(1), 131–136. http://www.jstor.org/stable/23608882

MEDICAL AND VETERINARY ENTOMOLOGY

COLEOPTERA

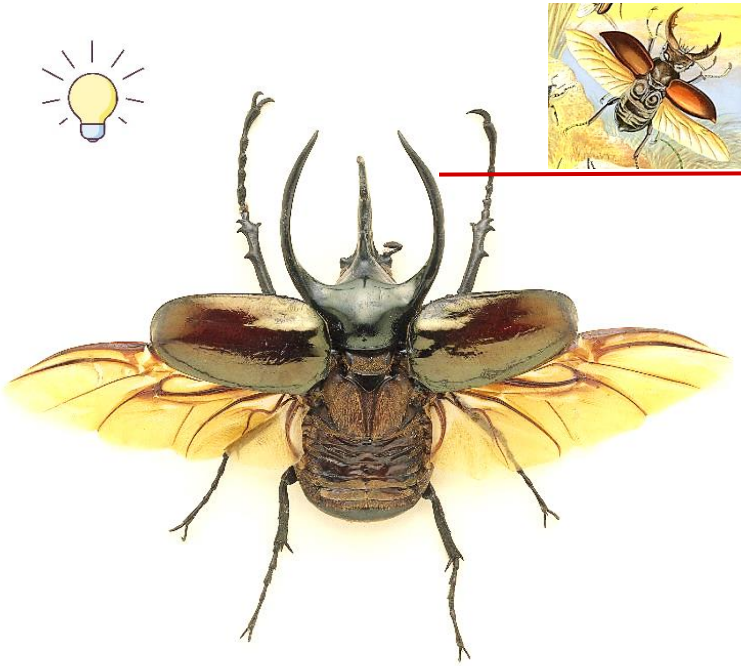
Asst. Prof. Vlatka Mičetić Stanković, senior curator

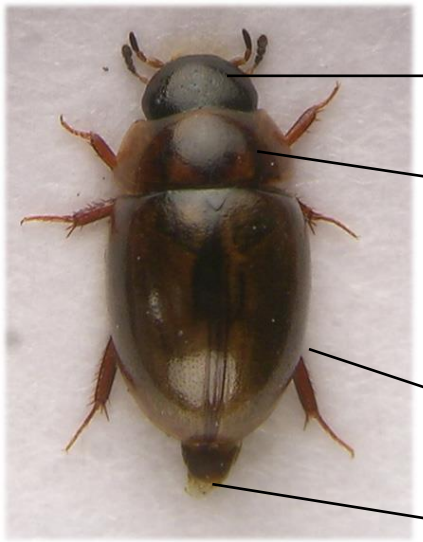
HRVATSKI PRIRODOSLOVNI MUZEJ
CROATIAN NATURAL-HISTORY MUSEUM

* vlatkams@hpm.hr

Order COLEOPTERA - beetles

- > 350 000 species
- holometabolous
- veterinary and medical significance < 100 species
- grč. *elytron* – cover, sheath
- antennae 11 segments; sexual dimorphism
- chewing mouthparts





head (caput)

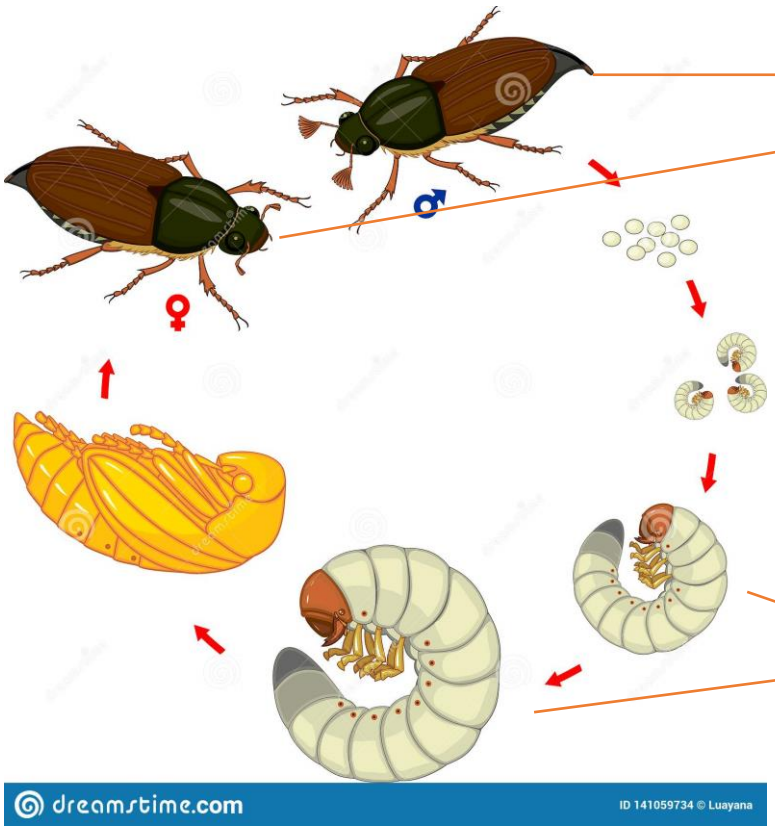
1. thorax segment (prothorax)

2. and 3. thorax segment + abdomen (pterothorax-abdomen)

genitalia

*Crowson, 1981

Order COLEOPTERA - beetles



scarabiasis

cantharidiasis

blisters

irritation

respiratory allergies

gastrointestinal disturbances

toxins

pathogen vectors

mechanical damage

intermediate hosts

*Krinsky, 2015

Order COLEOPTERA - beetles

vectors of pathogens

Salmonella sp.

Escherichia sp.

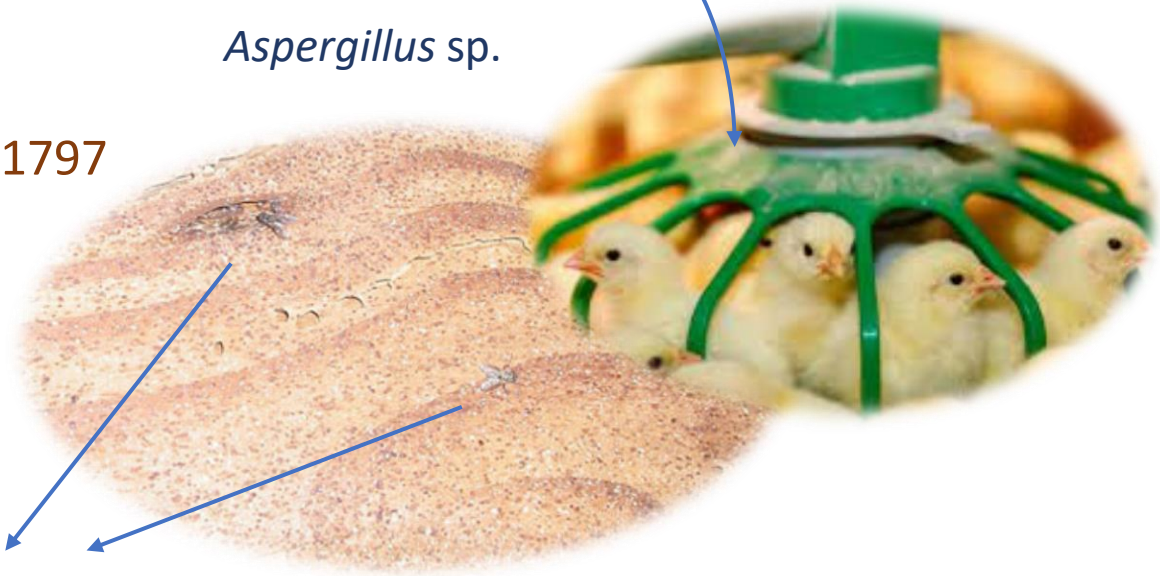
Streptococcus sp.

Bacillus sp.

Aspergillus sp.

Alphitobius diaperinus Panzer, 1797

Lesser mealworm



Virus of bird flue

Virus of chickenpox

Rotaviruses

pupae

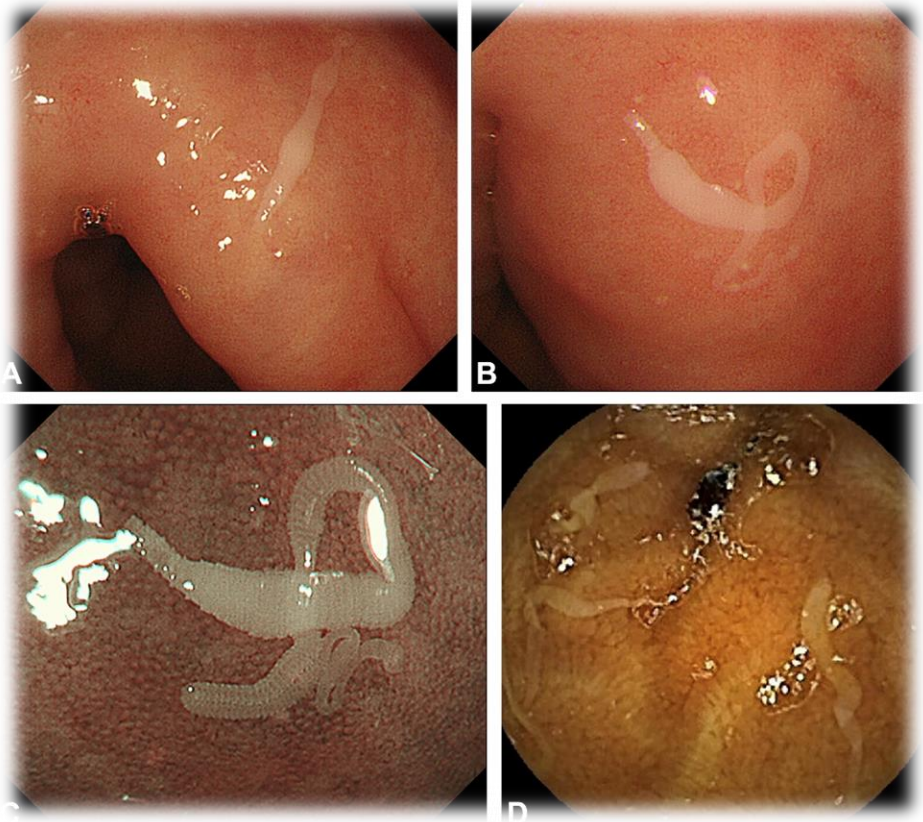
*Krinsky, 2015; Axtell, 1999

Order COLEOPTERA - beetles

intermediate hosts

Hymenolepis diminuta (Rudolphi, 1819)
rat tapeworm

Tenebrio molitor Linnaeus, 1758
mealworm



Hymenolepis nana Ransom, 1901 –
dwarf tapeworm; human infection

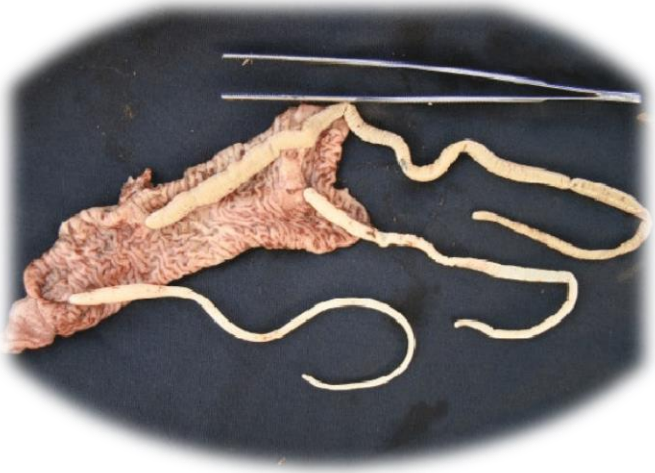
*Tanaka i sur., 2017

Order COLEOPTERA - beetles

intermediate hosts

Raillietina cesticillus Molin, 1858
broad-headed tapeworm

Gongylonema pulchrum
Molin, 1857



Taenia saginata
Goeze, 1782 – cattle tapeworm

Macracanthorhynchus hirudinaceus (Pallas, 1781) - the giant thorny headed worm

Order COLEOPTERA - beetles

toxins

Family Meloidae – blister beetles

Lytta vesicatoria (Linnaeus, 1758) – spanish fly

Cantharidin

18-24 hours after contact

*Krinsky, 2013

Order COLEOPTERA - beetles

toxins

Family Staphylinidae – rove beetles

- toxin pederin – extremely strong – synthesis by *Pseudomonas spp.* (20 species) ♀
- irritation 24 – 72 hours after contact

Mirror irritations; purulent ulcers

Paederus sp.

*Uzunoğlu i sur., 2017; Pierce i sur., 2018

Order COLEOPTERA - beetles

mechanical damages

Dermestidae – skin beetles

Dermestes maculatus
De Geer, 1774 – hide beetle

Scarabaeidae – scarab beetles

Onthophagus sp.

Caccobius sp.

Copris sp.

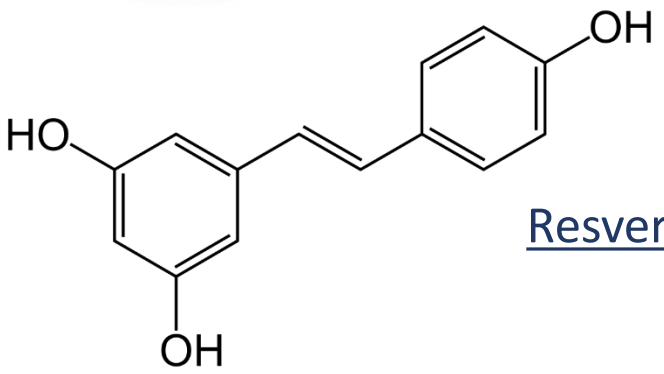
*Krinsky, 2015

Order COLEOPTERA - beetles

Family Coccinellidae – ladybugs

Harmonia axyridis (Pallas, 1773)

Alkaloids



Resveratrol

*Mičetić Stanković i sur., 2011

Order COLEOPTERA - beetles

Veterinary importance

ingestion

Macrodactylus subspinosus (Fabricius, 1775)

fever

dehydration

gastritis

death

fever

dehydration

death

*Krinsky, 2013

POPIS KORIŠTENE LITERATURE

Axtell RC (1999) Poultry integrated pest management: status and future. Integrated Pest Management Reviews 4: 53-73.

Crowson RA(1981) The biology of the Coleoptera. Academic Press, London, 802 pp.

Forbes AA, Bagley RK, Beer MA *et al*. (2018) Quantifying the unquantifiable: why Hymenoptera, not Coleoptera, is the most speciose animal order. BMC Ecol 18, 21. https://doi.org/10.1186/s12898-018-0176-x

Gullan PJ, Cranston PS (2010) An Outline of Entomology. 4th ed. , Wiley-Blackwell.

Kamal M, Khan W, Nisa NU, Yasmeen G, Hassan HU, Ihsanullah (2020) Acute raillietiniasis in domestic pigeon (Columba livia domestica). Adv. Anim. Vet. Sci. 8(11): 1180-1183. http://dx.doi.org/10.17582/journal.aavs/2020/8.11.1180.1183

Kariyawasam H, James L (2020) Chronic Rhinosinusitis with Nasal Polyps: Targeting IgE with Anti-IgE Omalizumab Therapy. Drug Design, Development and Therapy. 14: 5483-5494. 10.2147/DDDT.S226575.

Krinsky WL (2013) Medical Entomology for Students. Fifth Edition, Proceedings of the Entomological Society of Washington 115(1): 112-114 https://doi.org/10.4289/082.115.0103

Jeandron A, Rinaldi L, Abdyldaieva G, Usubalieva J, Steinmann P, Cringoli G, Utzinger J (2011) Human Infections with *Dicrocoelium dendriticum* in Kyrgyzstan: The Tip of the Iceberg? The Journal of Parasitology 97 (6): 1170-1172.

Junior V, Lastória J (2014) Envenomation by caterpillars (erucism): Proposal for simple pain relief treatment. Journal of Venomous Animals and Toxins including Tropical Diseases 20, doi:10.1186/1678-9199-20-21.

Mičetić Stanković, V., Koren, T. & Stanković, I. The Harlequin ladybird continues to invade southeastern Europe. Biol Invasions 13, 1711–1716 (2011). https://doi.org/10.1007/s10530-010-9929-y

Pierce JW, Rittman B, Raybould JE (2018) Case Report: *Paederus* Dermatitis in the Returning Traveler. The American Journal of Tropical Medicine and Hygiene. 98(5):1523-1525. doi: 10.4269/ajtmh.17-0976. PMID: 29611499; PMCID: PMC5953392.

Tanaka K, Hamada Y, Nakamura M, Yamada R, Takei Y (2017) *Hymenolepis nana* infection detected by magnifying colonoscopy with narrow-band imaging. PlumX Metrics 86(5): 923-924. https://doi.org/10.1016/j.gie.2017.05.029

Uzunoğlu E, Oguz ID, Kir B, Akdemir C (2017) Clinical and epidemiological features of *Paederus* dermatitis among nut farm workers in Turkey. The American Society of Tropical Medicine and Hygiene, 96(2): 483-487. https://www.ajtmh.org/view/journals/tpmd/96/2/article-p483.xml