

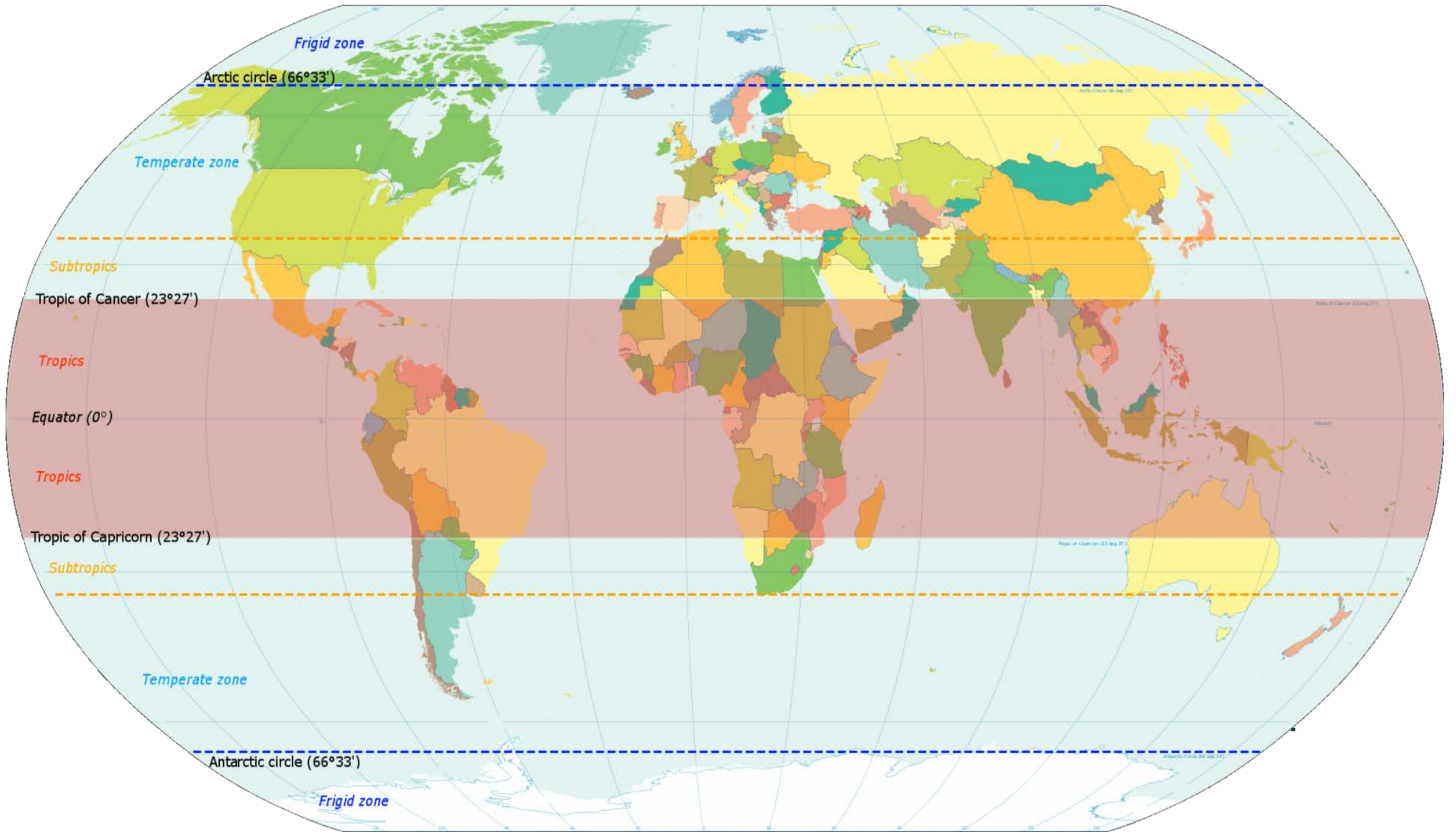


Medical Entomology Lecture 5  
Third Year Students Department of Biology  
College of Education  
Salahaddin University - Erbil  
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Order Hemiptera  
Bedbugs (Cimicidae)

- The family Cimicidae includes bedbugs, of which two common species feed on humans. *Cimex lectularius* is widely distributed in tropical استوائی and nontropical countries while *Cimex hemipterus*, commonly called the tropical bedbug, is essentially a species of the Old and New World tropics although it can also occur in warm areas of some non-tropical countries .
- A third species, *Leptocimex boueti*, is found mainly in West Africa but has also been recorded in South America. This species bites bats and also people, but is much less important as a pest than the Cimex species.





Common



Tropical

**What is the difference between tropical *Cimex hemipterus* and common bed bugs *Cimex lectularius*?**

These two species of bed bugs can be easily distinguished by looking at the prothorax, the first segment of the thorax. The prothorax of the common bed bug is more expanded laterally and the extreme margins are more flattened than that of the tropical bed bug

- Infestations of bedbugs have increased since the 1990s in many countries, possibly due to **increased global travel**. For instance, after the 2000 Olympic Games nearly every hotel in Sydney was infested with bedbugs. Other factors include **insecticide resistance** and **warmer houses**. Bedbugs are not considered important vectors, but in addition to constituting a biting nuisance they have been reported as causing iron deficiency in infants.
- Because both male and female bugs bite it is not medically very important to distinguish the sexes.

- **Bedbug infestations** can be detected by **the presence of live bugs, cast-off nymphal skins, and hatched and unhatched eggs**, all of which may be found in cracks and crevices. In addition, **small dark brown or black marks may be visible on bed sheets, walls and wallpaper**: these are the bedbug's excreta and consist mainly of excess blood ingested during feeding.
- Houses with large bedbug infestations may have a characteristic rather sickly smell رائحه كريهه, but in practice this may not be apparent because the weak odour can be masked by stronger insanitary smells.
- Because bedbugs lack wings they do not disperse far, although occasionally they crawl from one building to another. Bedbugs are usually **spread to new houses** by being **introduced with furniture and bedding**, or more rarely **with clothing and hand baggage**. Buying second hand furniture can result in the introduction of bedbugs into houses.









- External morphology
- Adult bedbugs are oval, wingless insects which are flattened dorsoventrally . They are about 5–7 mm long and when unfed pale yellow or brown, but after a full blood-meal they become a characteristically darker brown. The head is short and broad and has a pair of prominent compound eyes, in front of which is a pair of four-segmented antennae
- The prothorax is much larger than the meso- and metathorax and has distinct wing-like expansions. Two rudimentary and non-functional more or less oval wing pads, termed hemelytra, overlie the meso- and metathorax. The three pairs of legs are slender but well developed.
- The abdomen has 11 segments but only eight are readily visible. In adult males the tip of the abdomen is slightly more pointed than in females



*Cimex hemipterus*



**Geographical origin**

Senegal  
(Wild strain)



Kenya  
(Lab strain)



*Cimex lectularius*



France  
« Marseille »  
(Wild strain)



United Kingdom  
« London »  
(Lab strain)



Germany  
(Lab strain)



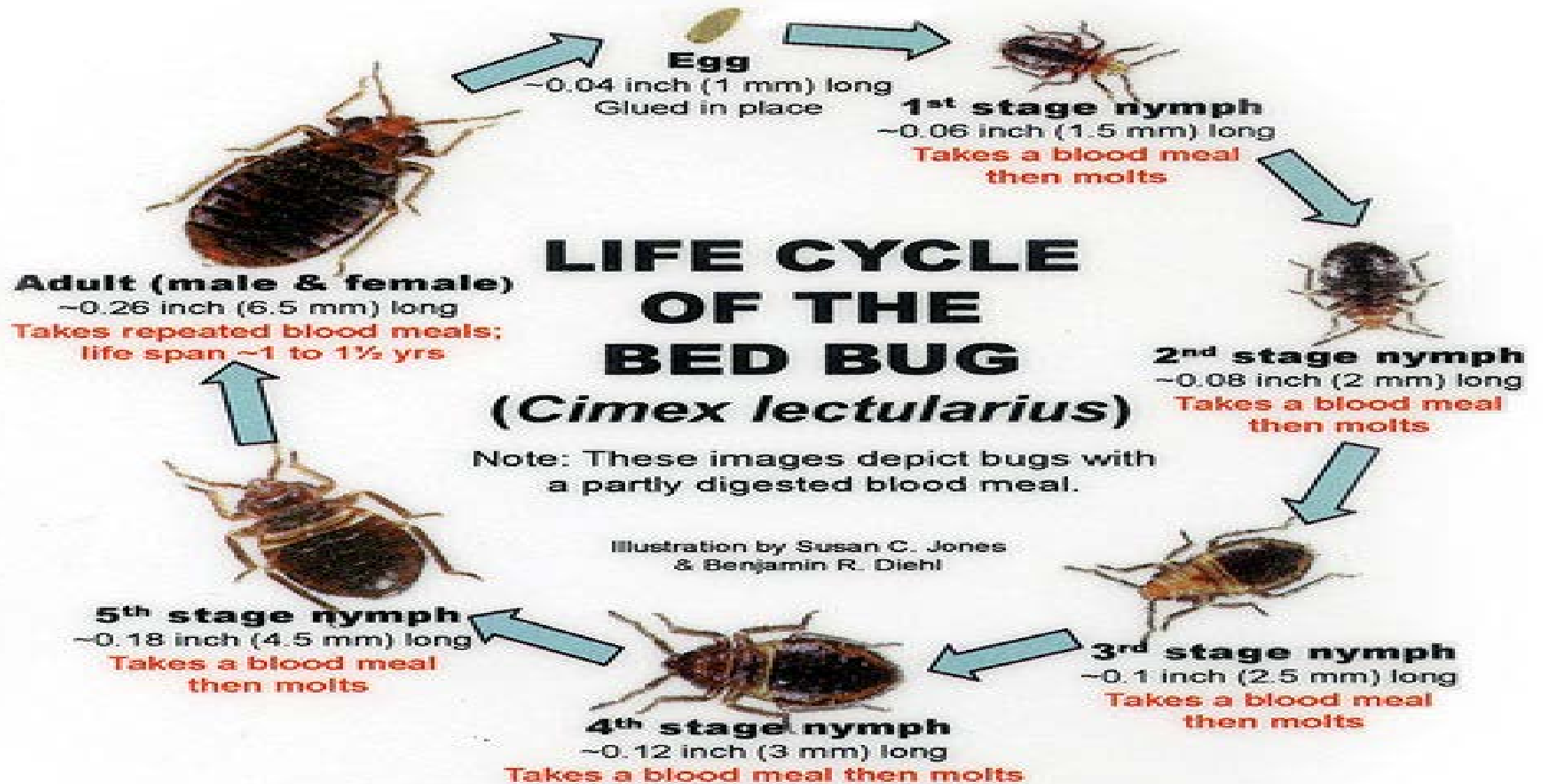
Sweden  
(Lab strain)



- *Cimex lectularius* is a cosmopolitan species but primarily live in temperate regions المناطق المعتدلة whereas *C. hemipterus* is mainly found in tropical areas المناطق الاستوائية
- The two bedbug species can coexist in the same area of some tropical and subtropical regions

- Both sexes of bedbug take blood-meals and are equally important as pests. Feeding usually occurs at night on sleeping people, often just before dawn قبل البزوغ. If, however, bedbugs are starving they will feed during the day, especially in darkened rooms. Unlike lice, bedbugs do not remain on people but stay only to take blood-meals. Very occasionally, however, in temperate climates they may remain on vagrants المتشردون who rarely change their clothes. In the absence of people bedbugs will feed on other hosts including rabbits, rats, mice, bats, poultry and other birds. During the day adults and nymphs are inactive and hide in dark and dry places, such as cracks and crevices in furniture, walls, ceilings السقوف or floorboards ألواح الأرضية, underneath seams of wallpaper الجدران من ورق and between mattresses and beds المراتب والأسرة.
- Bedbugs are gregarious and are frequently found in large numbers. They can move quite rapidly when disturbed.





Females live several weeks to many months, and occasionally a year or more, and during this time they may lay **150–540 eggs**. Eggs usually hatch after about 8–11 days, but as soon as 4–6 days in warmer houses. If, however, temperatures in houses are low, hatching may be delayed for several weeks, and such unhatched eggs can survive for three months.

- Medical importance
- Although hepatitis B virus and 27 other pathogens have been recorded in bedbugs **there is no evidence** that they can transmit any infections to people. They are therefore not considered as vectors. In areas with dilapidated متهدم buildings and poor hygiene standards, bedbug infestations can cause considerable distress. Some people show little or no reaction to their bites, but others may suffer severe reactions and have sleepless nights. Repeated feedings of large numbers of bedbugs can cause iron deficiency in infants and some elderly people.
- **In general they cause the following:**
  - Allergic reactions
  - Secondary bacterial infections
  - Anxiety قلق
  - Insomnia أرق

- Control
- Insect repellents and insecticide can give considerable personal protection against bedbugs. also insect growth regulators (IGRs) could be used
- bedclothes are infested they should be washed in hot water then ironed or dried in the sun. Alternatively clothes can be placed in sealed plastic bags and placed in a freezer ( $-18\text{ }^{\circ}\text{C}$ ) for 24 hours to kill the bedbugs.



# Triatomine bugs (kissing-bugs, cone-nose bugs (family :Reduviidae ,sub family:Triatominae)

- Triatominae comprise more than 138 species in 15–17 genera .The most important are *Triatoma infestans*, *T. dimidiata*, *Rhodnius prolixus* and *Panstrongylus megistus*, all of which spread Chagas disease (*Trypanosoma cruzi*)in Central and South America.
- Most Triatominae occur in the USA to southern Argentina, but 13 species are found in the Old World tropics.
- Triatomines are commonly called kissing-bugs, cone-nose bugs,
- “**Kissing bug**” is the common name for a species of bug called triatomines. The bugs get their common name because they tend to leave bite marks the face..يميلون إلى ترك علامات العض على الوجه.

- Kissing bugs will normally hide during the day and come out at night, biting and feeding on a person's blood while they sleep. Their saliva contains a compound that numbs **يخدر** the area they bite, so the person is often unaware of the bite at all.
- These bugs are attracted to the carbon dioxide that humans exhale **الزفير**. This is why they seem to bite people on the face, near the mouth and around the eyes.

- **External morphology**

- Triatominae vary from 5 to 45 mm in length, but most are 20–30 mm long. They are easily recognized by **their long snout-like head** having a pair of prominent dark-coloured eyes, in front of which is a pair of laterally situated, long and thin four-segmented antennae .The dorsal part of the first thoracic segment of the Triatominae consists of a very conspicuous triangular pronotum .The meso-and metathorax are hidden dorsally by the folded fore-wings, called hemelytra. The 11-segmented abdomen is more or less oval in shape but is mostly hidden by the wings,
- Triatominae are frequently a brown-black colour, but some species are more colourful, having contrasting yellow, orange, pink or red markings, usually as bands on the pronotum, basal part of the fore-wings, legs or abdominal margins.



26mm



*T. gerstaeckeri*

*T. incrassata*

*T. indictiva*

*T. lecticularia*

*T. neotomae*

*T. protracta woodi*

*T. protracta protracta*

*T. recurva*

*T. rubida*

*T. rubrofasciata*

*T. sanguisuga*

*P. hirsuta*

# Life cycle

- Eggs are about 1.5–2.5 mm long, oval in shape, They have a smooth or ornate **مخرف** shell which is pearly white, pink or yellowish depending on the species.
- Eggs are deposited in cracks and crevices in walls, floors, ceilings **السقوف** and furniture of houses, especially dilapidated **متهدم** mud-walled and thatched roofed houses **منازل مسقوفة بالقش** in rural areas,. Some species lay their eggs in rodent burrows **الجحور** and other shelters used by mammalian hosts upon which they feed. Avian feeders deposit their eggs in birds' nests or on leaves of trees. Typically females lay 1–2 eggs a day. laid varies from 50 to 1000, depending on the species, their longevity and the number of blood-meals they take

- The life cycle is **hemimetabolous**. Small pale **nymphs**, which resemble
- adults but lack wings, may hatch from eggs after only 10–15 days, but the incubation period may extend to 37 or rarely up to 60 days. Newly emerged nymphs usually remain hidden in cracks and crevices for 2–3 days before they blood-feed. There are five nymphal instars, each requiring at least one blood-meal before it changes into the succeeding instar



- Nymphs and adults of both sexes feed at night on their hosts, and feeding often lasts 10–25 minutes. People covered with blankets **بطانيات** are bitten on any exposed parts of the body, but especially on the nose and around the eyes and mouth. Biting is usually relatively painless and does not awaken people, although some species cause considerable discomfort and there may be prolonged after-effects. Many **bugs defecate during or soon after feeding**, and this behaviour is very important in the **transmission of Chagas disease**. **Presence of bugs** in houses is often **characterized** by **finding shed skins (exuvia) from moulting nymphs and streaks شريط** of whitish or dark faecal deposits on walls and furniture.
- Because of the relatively long time required to digest their large bloodmeals, the **life cycle** from egg to adult can take 3–10 months. With large triatomine species the life cycle may last 1–2 years. In the absence of hosts, older nymphs and adults can survive 4–6 months of starvation.

## Medical importance

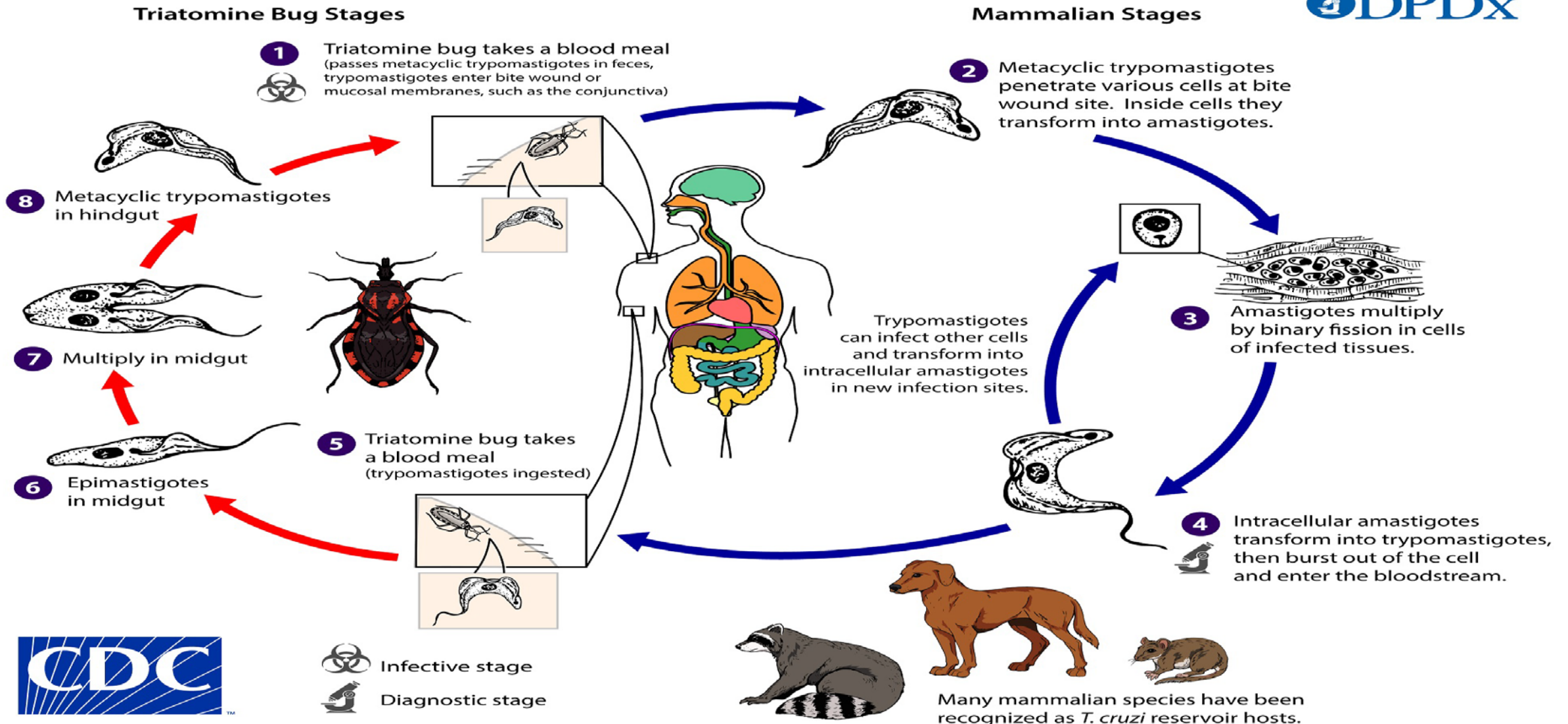
- In rural areas **المناطق الريفية** of the Americas there can be hundreds of triatomine bugs in a house, and this can be very stressful to the occupants **مرهقة للساكين**, who will receive many bites during the night. Typically blood loss can exceed 2 ml per person per night, so it is not surprising that **large bug populations can contribute to anaemia**. Mild hypersensitivity may develop in some people, being expressed as oedema **وذمه**, pruritus **حكة** or erythema **التهاب الجلد**.



# • Chagas disease

- the main importance of the Triatominae is that they transmit *Trypanosoma cruzi*, the causative agent of Chagas disease, sometimes referred to as South American trypanosomiasis.

## *Trypanosoma cruzi*





- Blood-feeding commonly lasts 10–25 minutes or longer, and during this time, or soon afterwards, many species of bugs excrete liquid or semiliquid faeces which may be contaminated with the metacyclic forms of *T. cruzi* derived from a previous blood-meal.
- People become infected when excreta is scratched either into skin abrasions or into the site of the bug's bite, or when it gets rubbed into the eyes or other mucous membranes. If the bug's bite produces local irritation causing the person to scratch, this facilitates infection. **Transmission is not by the bite of the insect, only through its faeces.**
- Rarely people can also acquire infection by eating food contaminated with excrement of infected bugs.. الأظعمة الملوثة بفضلات الحشرات المصابة.

## • Control

- Control of Chagas disease is mainly by spraying the interior surfaces of walls and roofs/ceilings of houses, outhouses, chicken sheds and goat pens with **residual insecticides**.(pyrethroid insecticides: permethrin, bifenthrin, cyfluthrin, esfenvalerate or lambda cyhalothrin.)
- Bug populations can be reduced by making houses unattractive as resting sites: for example, by **plastering walls to cover up cracks** in which the bugs might hide, and by **replacing dilapidated mud** and thatched houses من القش منازل with those built of bricks or cement blocks and having corrugated موج metal roofs.
- The above methods will destroy bugs resting in houses but are less effective against those resting in natural outdoor shelters.

## How do you prevent triatomine bugs?

1. Avoid sleeping in a mud, thatch or adobe house من تجنب النوم في منزل من الطين أو القش أو الطوب. These types of residences are more likely to harbor triatomine bugs.
2. Use insecticide-soaked netting over your bed استخدم الناموسية المبللة when sleeping in thatch, mud or adobe houses.
3. Use insecticides to remove insects from your residence.
4. Use insect repellent on exposed skin.