



**Medical Analysis
Department**

Trypanosoma cruzi (Chaga's disease)

Parasitology (MA 301)

Summer School

Lecture 7

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Case Study

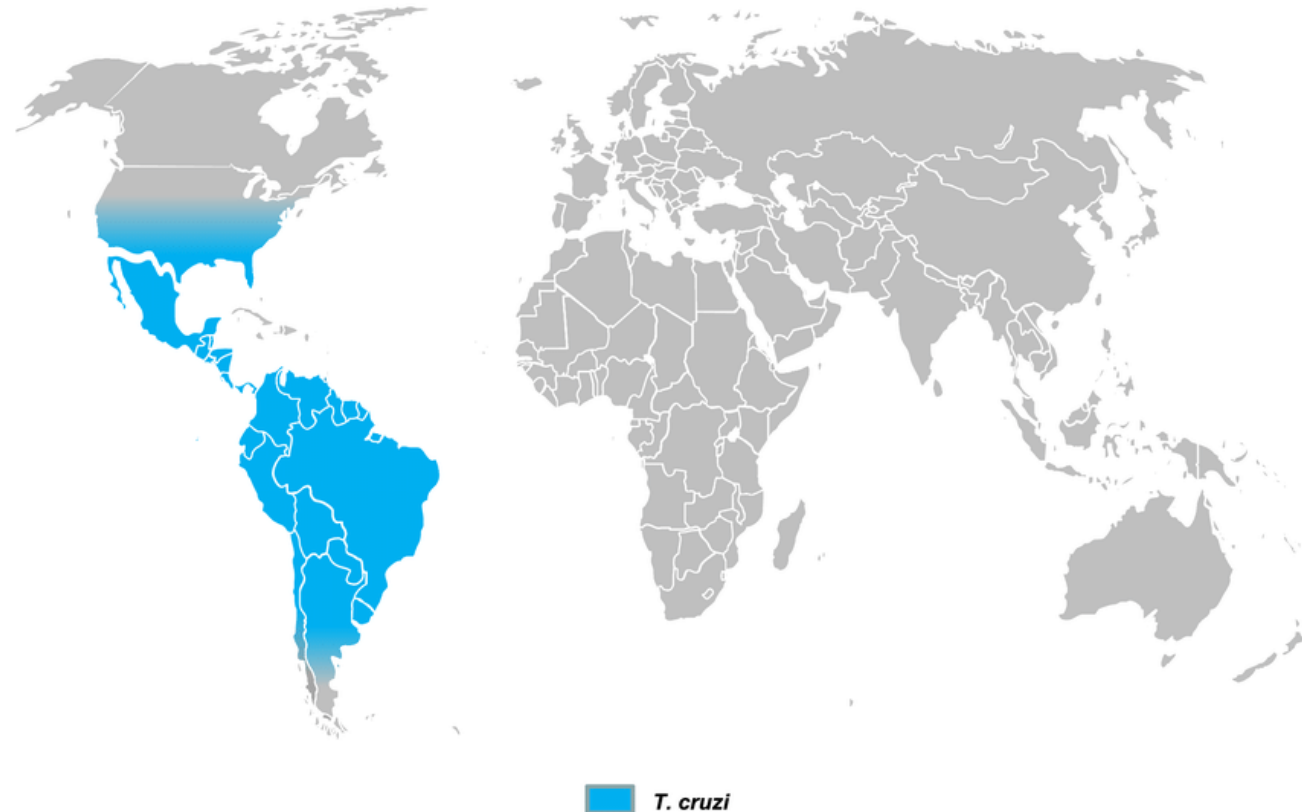
A 28-year-old man from a rural region presented with fever, fatigue, and swelling around one eye several weeks after living in a house where triatomine bugs were common. Blood examination demonstrated **Trypanosoma cruzi** trypomastigotes. He was treated with benznidazole and advised on measures to prevent exposure to triatomine bugs, including improving housing conditions and insect control, leading to clinical improvement.

Introduction

The blood and tissue flagellates belong to the family *Trypanosomatidae*.
T. cruzi is the causative organism of Chagas disease or South American trypanosomiasis.

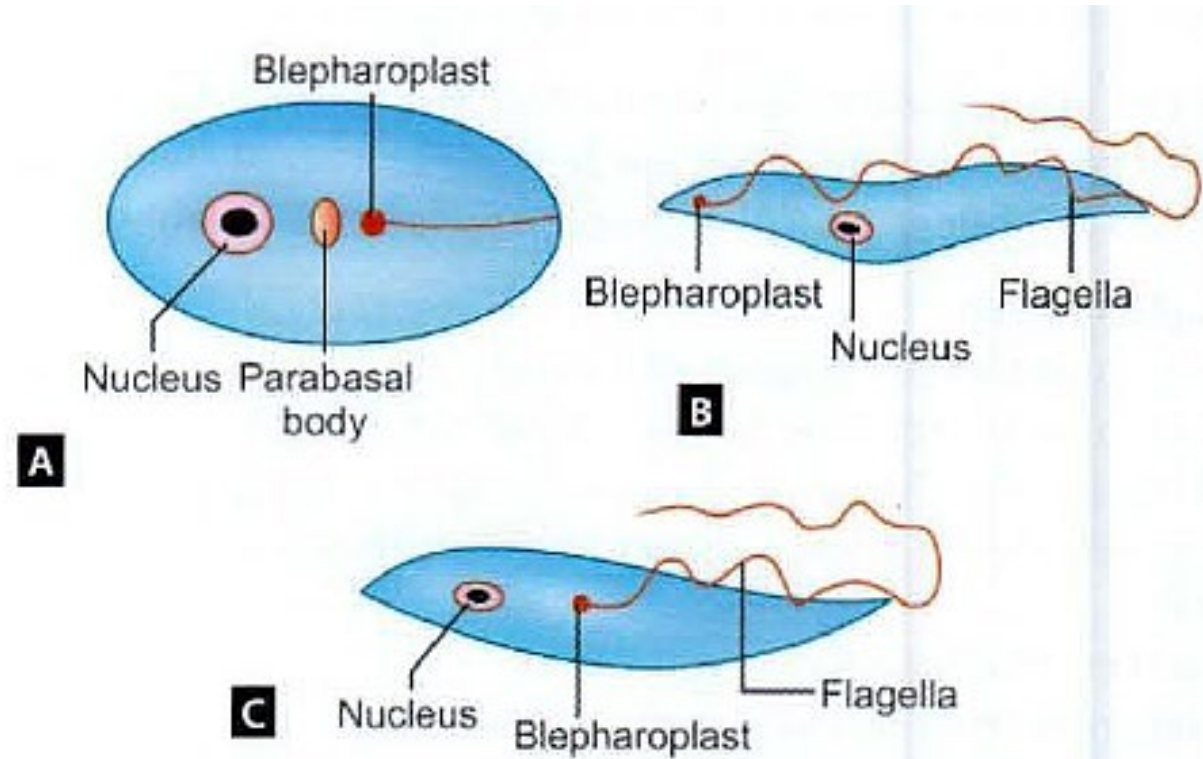
Distribution

- It is a zoonotic disease and is limited to South and Central America.



Stages of *Trypanosoma cruzi*

- 1- Amastigote
- 2- Trypomastigote
- 3- Epimastigote



Figs 5A to C: *Trypanosoma cruzi*. (A) Amastigote; (B) Trypomastigote; and (C) Epimastigote

Habitat

- Amastigotes are the intracellular parasites. They are found in muscular tissue, nervous tissue and reticuloendothelial system.
- Trypomastigotes are found in the peripheral blood.
- In Triatomine bugs, Epimastigote forms are found in the midgut, and metacyclic trypomastigote forms are present in hindgut and feces.

Morphology

Amastigote:

- Amastigotes are oval bodies measuring 2-4 μm in diameter having a nucleus and kinetoplast.
- Flagellum is absent. Morphologically, it resembles the amastigote of *Leishmania* spp., hence, it is frequently called as *leishmanial form*.
- Multiplication of the parasite occurs in this stage.
- This form is found in muscles, nerve cells, and reticuloendothelial systems.

Morphology

Trypomastigote:

- Trypomastigotes are nonmultiplying forms found in the peripheral blood of man and other mammalian hosts.
- In the blood, they appear either as long, thin flagellates about (20 μm long) or short, stumpy form (15 μm long).
- Posterior end is wedge-shaped.
- In stained blood smears, they are shaped like alphabet "C"; "U"; or "S"; having a free flagellum of about one-third the length of the body.
- These forms do not multiply in humans and are taken up by the insect vectors.

Morphology

- **Epimastigote form:**
- Epimastigote forms are found in the insect vector, the reduviid bug, and in culture also.
- It has a kinetoplast adjacent to the nucleus.
- An undulating membrane runs along the anterior half of the parasite.
- Epimastigotes divide by binary fission in the hindgut of the vector.

Vector

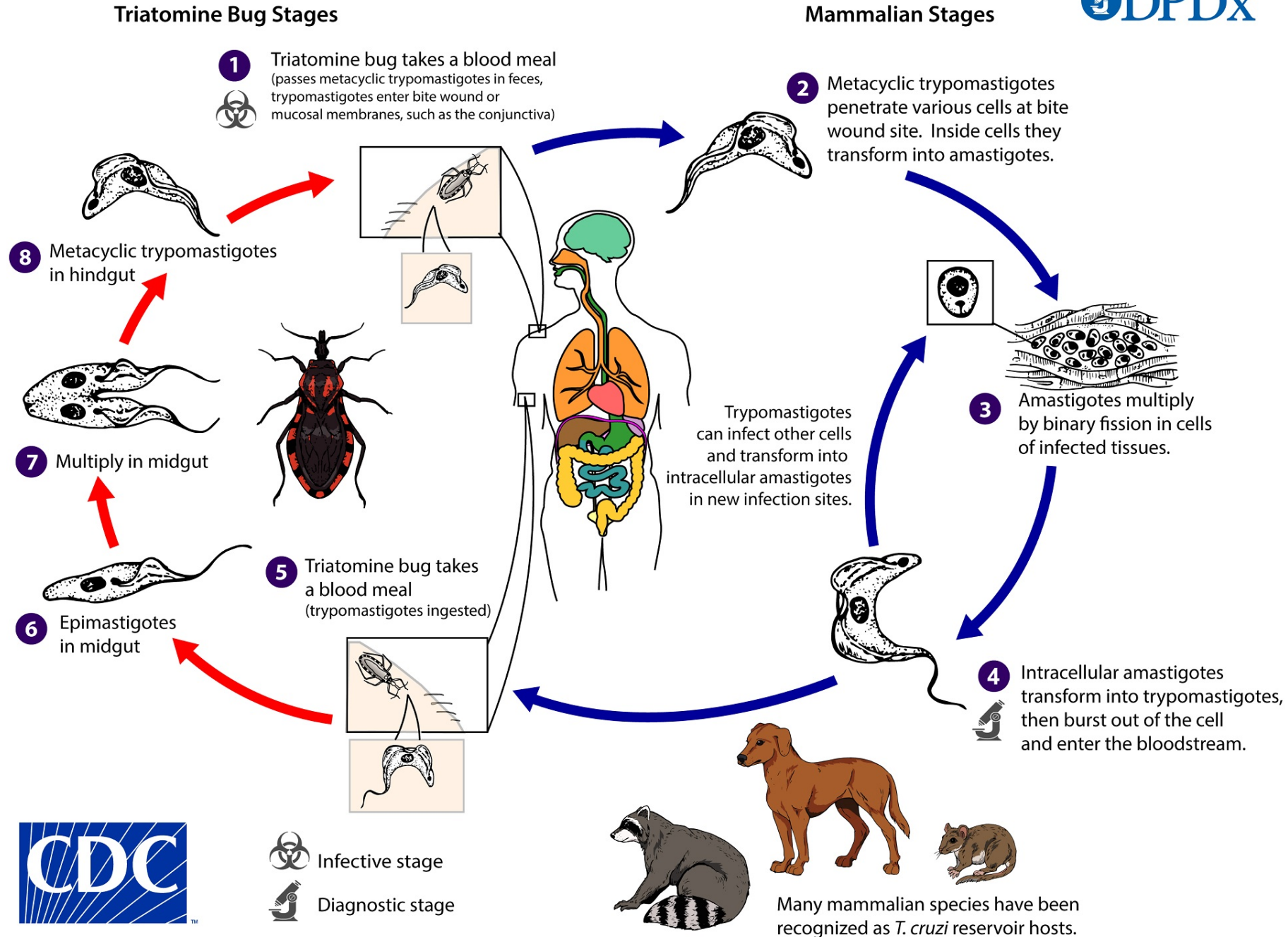
Triatoma infestans (Kissing bug)



Life cycle

- Infection begins when triatomine bugs (kissing bugs) feed on human blood and release infective metacyclic trypomastigotes in their feces near the bite site.
- The parasites enter the body through mucous membranes or breaks in the skin.
- Inside host cells, trypomastigotes transform into amastigotes, which multiply by binary fission.
- Amastigotes differentiate back into trypomastigotes, which burst out of cells and spread via the bloodstream to infect new tissues.
- Triatomine bugs ingest bloodstream trypomastigotes during a blood meal.
- In the insect midgut, parasites become epimastigotes, multiply, and then transform into infective metacyclic trypomastigotes in the hindgut.
- The cycle repeats when the infected bug bites another host.

Trypanosoma cruzi



Signs and Symptoms

1- Acute Chagas disease

- lasts 1–4 months, often in young children, with chagoma or Romana's sign as classic findings.
- May present with fever, lymphadenopathy, hepatosplenomegaly, and rarely fatal myocarditis or meningoencephalitis.
- Symptoms resolve in weeks, leading to the asymptomatic chronic phase.



Signs and Symptoms

2- Chronic Chagas disease

- It appears years after infection, mainly in adults and older children.
- It causes inflammation, muscle and nerve damage, leading to cardiomyopathy, megaesophagus, and megacolon.

Signs and Symptoms

3- Congenital infection :

Congenital transmission is possible in both acute and chronic phase of the disease, causing myocardial and neurological damage in the fetus.

Diagnosis

Diagnosis is made by demonstrating *T. cruzi* in blood or tissues, or by serology.

1- Microscopy:

- The diagnosis of acute Chagas disease requires the detection of parasites.
- In a wet mount, trypomastigotes are faintly visible, but their snake-like motion against red blood cells (RBCs) makes their presence apparent.
- Trypomastigotes can also be seen in thick and thin peripheral blood smear, stained with Giemsa stain

Note: Serologic testing plays no role in diagnosing acute Chagas disease.

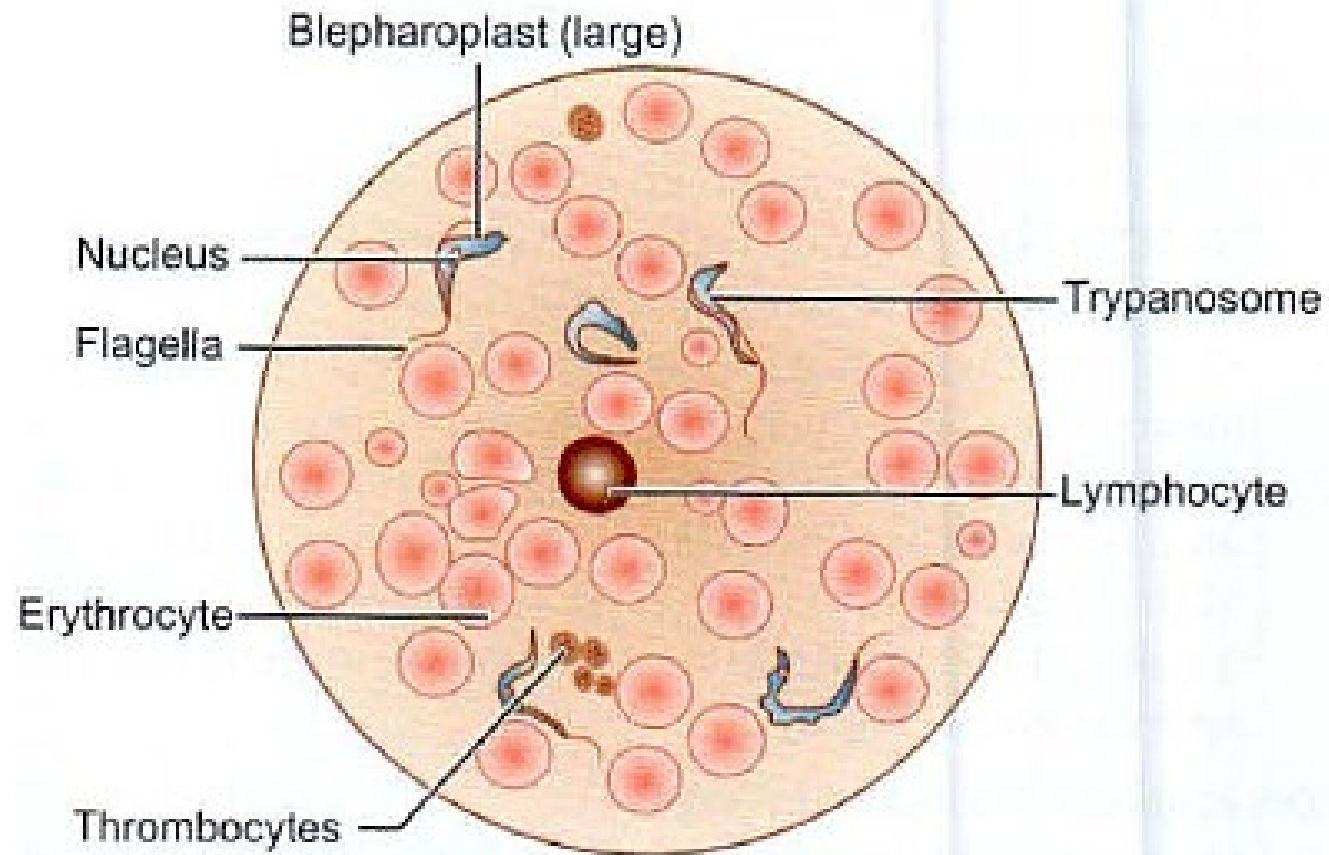


Fig. 7: *Trypanosoma cruzi*, blood smear Giemsa stain, magnification 1100X

Diagnosis

Serology:

Antigen detection: T. cruzi antigen can be detected in urine and serum in patients with chronic Chagas disease. ELISA has been developed for the detection of antigens.

Antibody detection: Antibodies (IgG) against T. cruzi may be detected by ELISA

Treatment

No effective specific treatment is available for treating Chagas disease. **Nifurtimox** and **benznidazole** have been used with some success in both acute and chronic Chagas disease.

These drugs kill only the extracellular trypanosomes but not the intracellular forms.

References

- Paniker, C. K. J. & Ghosh, S. 2021. *Paniker's textbook of medical parasitology*, New Delhi, Jaypee Brothers Medical Publishers.