



**Medical Analysis
Department**

Trypanosoma brucei (African sleeping sickness)

Parasitology (MA 301)

Summer School

Lecture 6

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September 08, 2026

Introduction

- The blood and tissue flagellates belong to the family *Trypanosomatidae*.
- The family consists of six genera, of which two genera *Trypanosoma* and *Leishmania* are pathogenic to humans.

General characteristics

- These parasites live in the blood and tissues of humans, other vertebrates, and in the gut of insect vectors.
- They possess a single nucleus (centrally located), a kinetoplast with a parabasal body and blepharoplast connected by fibrils, and a single flagellum.
- The flagellum arises from the blepharoplast; its internal part forms the axoneme, while the external part runs along the parasite surface as an undulating membrane.

Stages of Family Trypanosomatidae

Hemoflagellates pass through four morphological stages:

- Amastigote
- Promastigote
- Epimastigote
- Trypomastigote

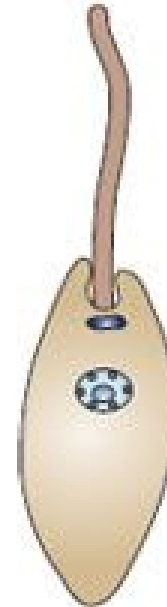
Morphology of family: Trypanosomatidae



Trypomastigote



Amastigote



Promastigote



Epimastigote

Trypanosoma Brucei

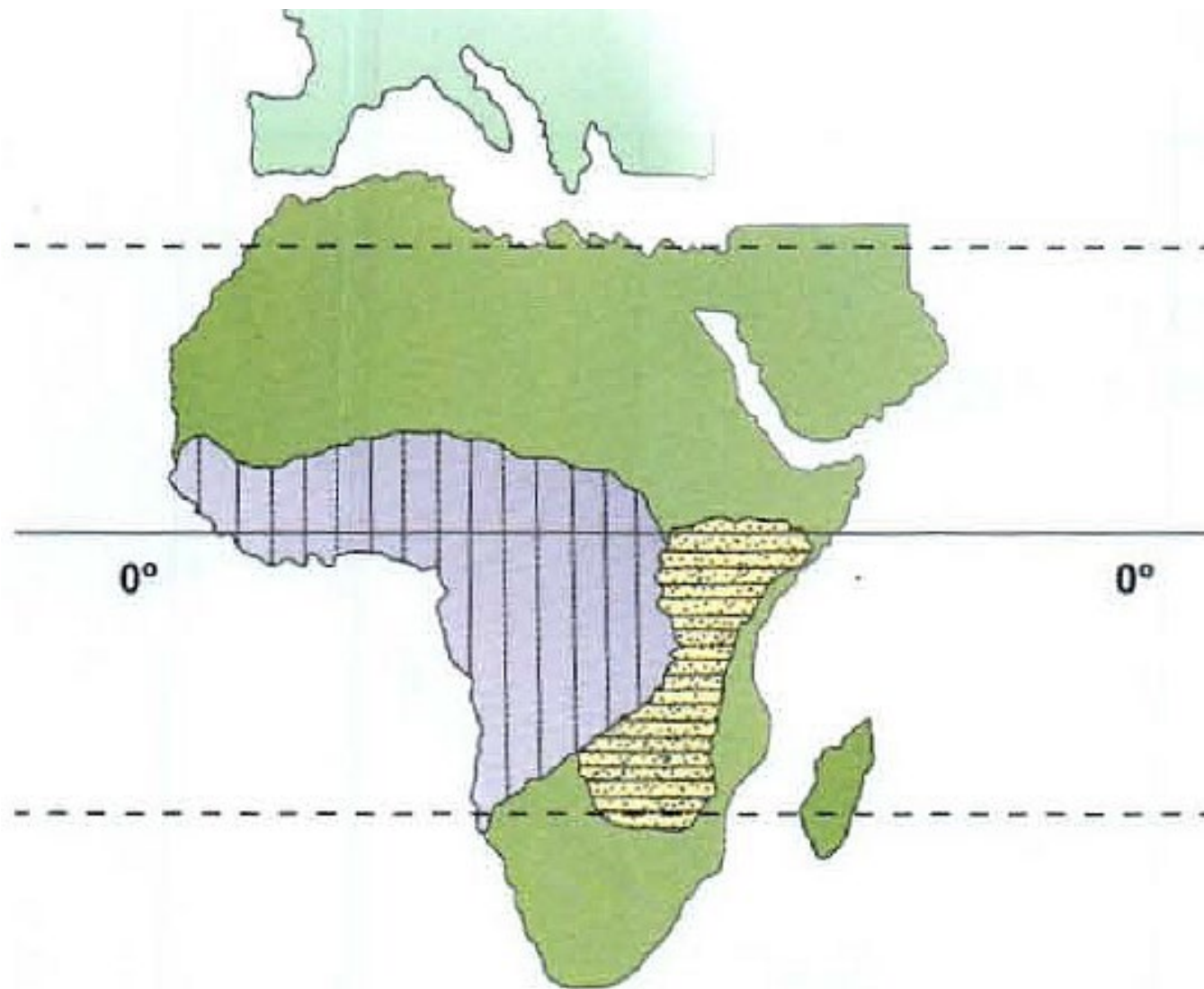
Case Study

A 31-year-old man from a rural area presented with recurrent fever, headache, fatigue, and enlarged cervical lymph nodes. He reported frequent exposure to areas where tsetse flies were common. Examination of a blood sample revealed slender, flagellated trypomastigotes of **Trypanosoma brucei**. He was referred for species- and disease-stage-specific treatment and advised to reduce exposure to tsetse flies, leading to clinical improvement.

Trypanosoma Brucei Gambiense

Distribution

- Trypanosomiasis is believed to have been existing in tropical Africa from antiquity
- It is endemic in scattered foci in West and Central Africa.



Habitat

Trypanosomes infect humans and other vertebrates. They primarily multiply in connective tissues, then spread to lymph nodes, blood, and eventually the central nervous system.

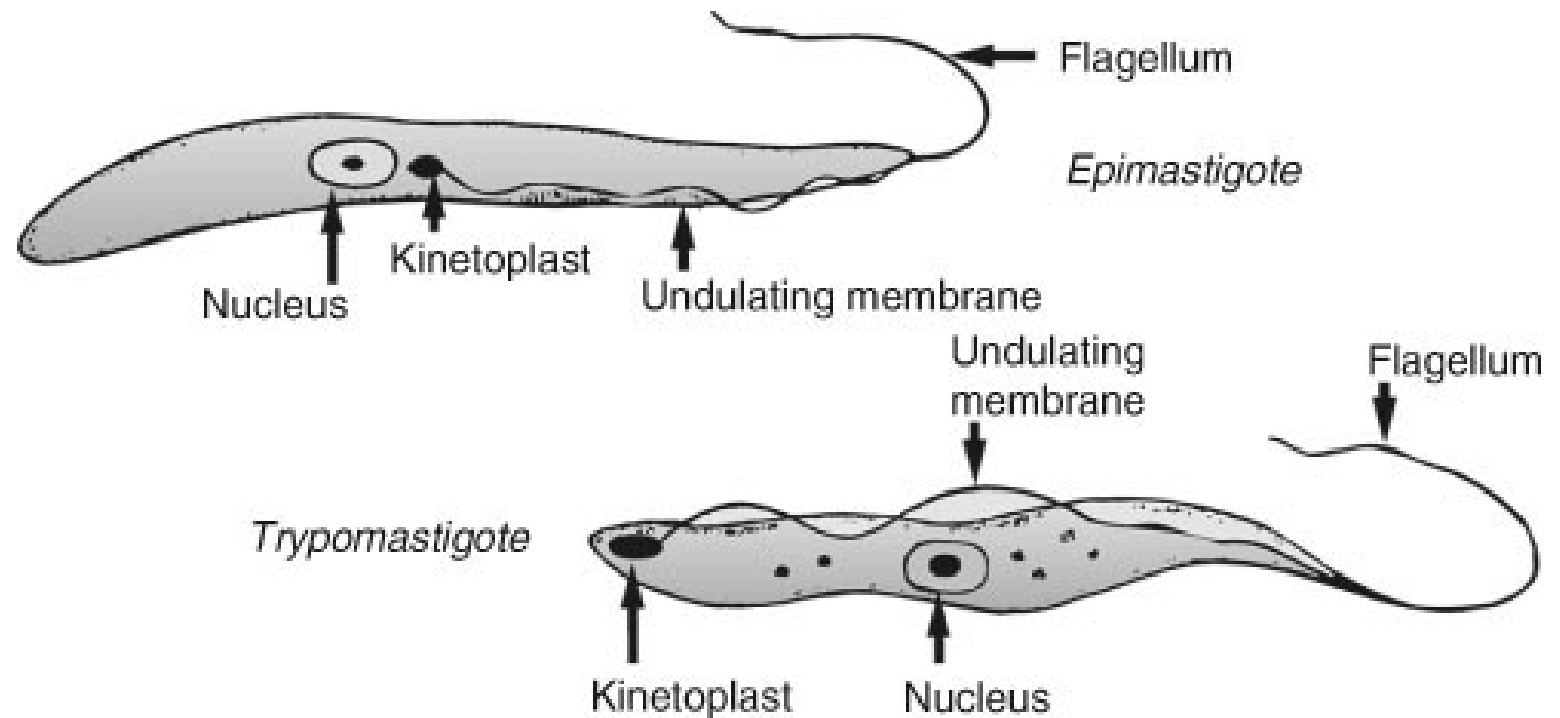
Morphology

- In vertebrate hosts, *T. brucei gambiense* appears as pleomorphic **trypomastigotes**: long slender, short stumpy, or intermediate forms
- In fresh blood, they are motile, spindle-shaped, and spin around RBCs.
- In insect vectors, they occur as **epimastigote** and **metacyclic trypomastigote** forms.

Stages of *Trypanosoma Brucei*

1- Epimastigote Stage:

2- Trypomastigote Stage:



Vector

- *Glossina* sp. (Tsetse Fly)

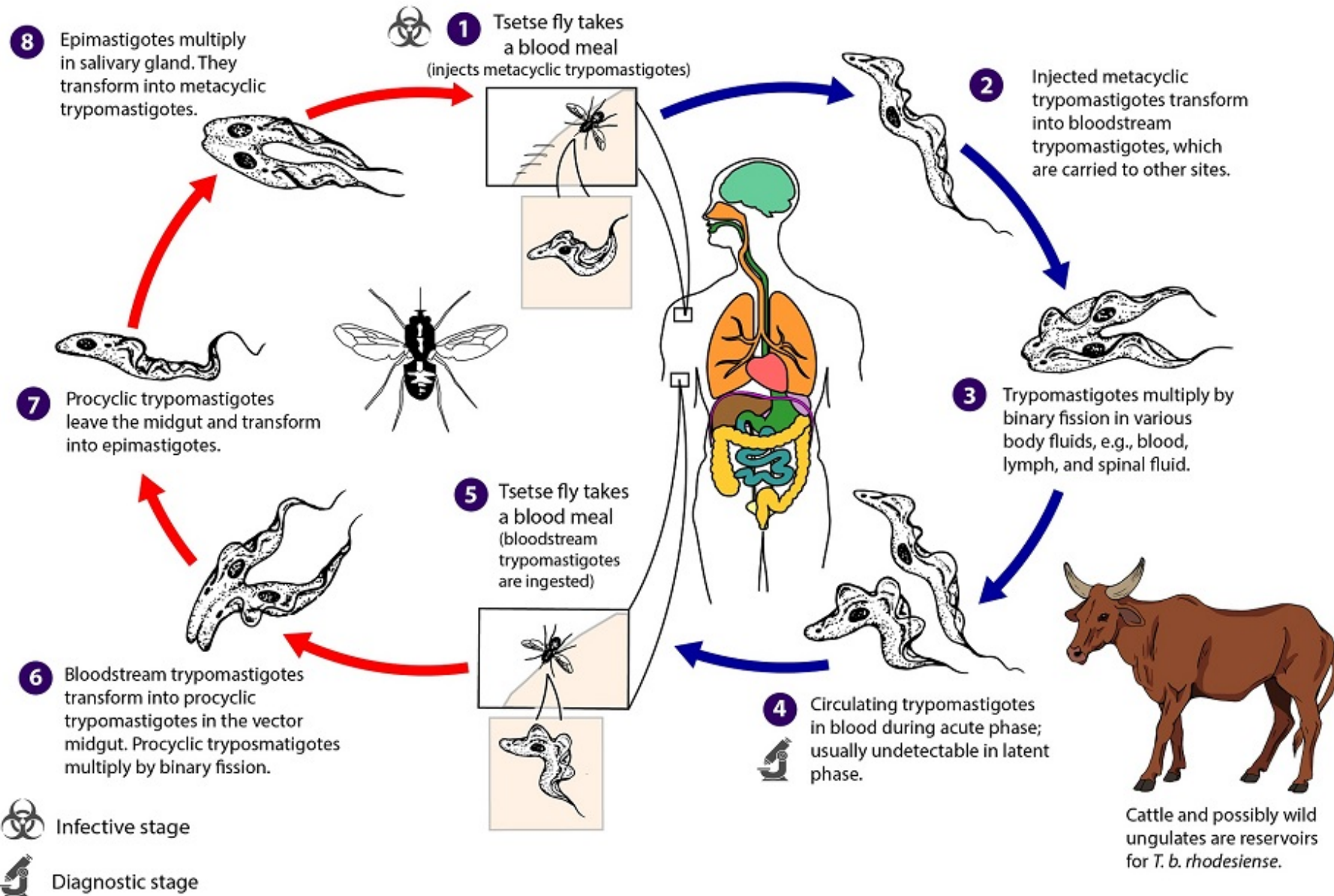


Life cycle

- The cycle starts when an infected tsetse fly bites a human and injects metacyclic trypomastigotes.
- Inside the human host, these transform into bloodstream trypomastigotes, multiplying by binary fission in the blood, lymph, and later in the cerebrospinal fluid.
- When another tsetse fly feeds on an infected person, it ingests the bloodstream trypomastigotes.
- In the fly's midgut, the parasites multiply and then move to the salivary glands as epimastigotes.
- The epimastigotes develop into metacyclic trypomastigotes, which are the infective stage for humans.
- Finally, during the next blood meal, the tsetse fly injects these infective forms into another human, continuing the cycle.

Tsetse Fly Stages

Mammalian Stages



Signs and Symptoms

Early stage (Stage I): Parasitemia followed by localization in lymph nodes. A painless chancre appears at the bite site, with intermittent fever, chills, rash, anemia, weight loss, and headache. Lymphadenopathy (notably posterior cervical—**Winterbottom's sign**) and hepatosplenomegaly occur. Myocarditis, anemia, leukocytosis, thrombocytopenia, and raised IgM are common.

Late stage (Stage II): Parasites invade the CNS, leading to sleeping sickness (headache, apathy, mental dullness, daytime sleepiness, coma, and death).



Trypanosoma brucei rhodesiense

Sign and symptoms

- *T. brucei rhodesiense* causes **East African sleeping sickness**, which is **more acute and severe** than the Gambian form, with onset about **4 weeks after infection** and often fatal within a year.
- **Features:** More edema, myocarditis, and weakness; frequent/severe febrile paroxysms; headache, muscle and joint pain common.
- **Lymphadenitis:** Less prominent than in *T. brucei gambiense*.
- **Parasitemia:** Higher parasite load in peripheral blood.
- **CNS involvement:** Occurs early, presenting with mania and delusions, but **without marked somnolence** seen in West African disease.

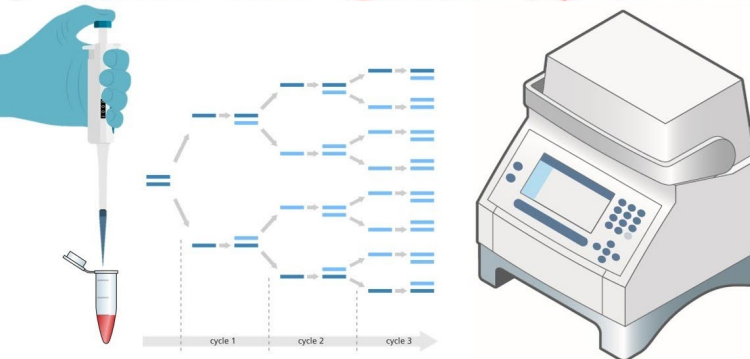
Sample do we take for Trypanosomiasis

- 1- Blood
- 2- Lymph Aspiration
- 3- Cerebrospinal fluid





Polymerase Chain Reaction



Diagnosis

- Microscopical Examination: Blood Smear with Giemsa stain
- ELISA: IgM Detection
- Molecular technique: PCR

Treatment

- *Trypanosoma brucei gambiense*: **pentamidine** is the drug of choice for human African trypanosomiasis (HAT)
- **Suramin** is the drug of choice for *Trypanosoma brucei rhodesiense* HAT.

References

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