

Lecture 3

Flagellate of tissue and blood

(Leishmania and Trypanosoma)

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introduction

General characters

- 1- Present in blood and tissue
- 2- Move by single flagellum
- 3- Require vector (blood sucking insect)
- 4- Multiply by simple binary fission

Leishmania spp

1. *Leishmania donovani* (visceral Leishmaniasis)

2. *Leishmania tropica*: (cutaneous Leishmaniasis)

Old world leishmaniasis include *Leishmania donovani* & *Leishmania tropica*

transmitted to human by female sand fly genus *phlebotomus*

life cycle pass in two hosts vertebrate & invertebrate host

in invertebrate host the parasite are extracellular in the gut and transmission via the mouth parts during blood feeding.

Leishmania tropica

- Table (1) Leishmania tropica Amastigote : Typical characteristics

size	3 by 5 μm
shape	Round to oval
nucleus	One , usually off center
Other features	Kinetoplast present , consisting of : Dotlike belpharoplast from which emerges a small axoneme Parabasal body located adjacent to the belpharoplast .

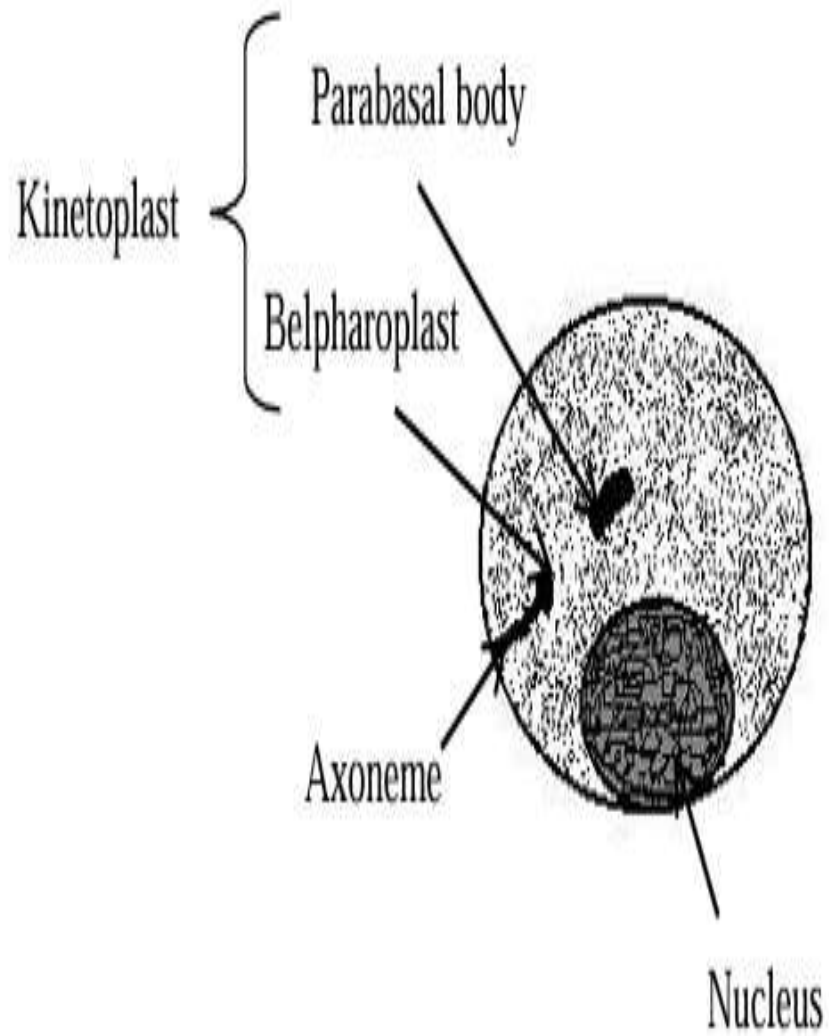
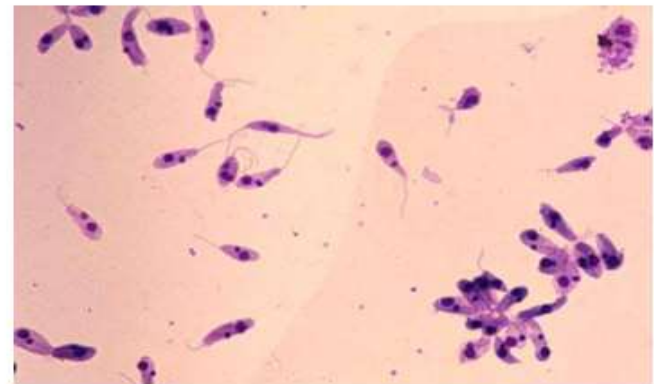
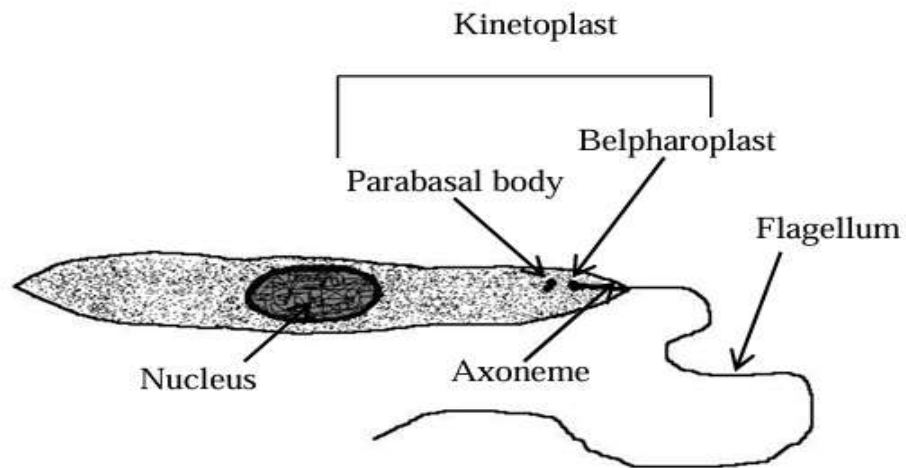


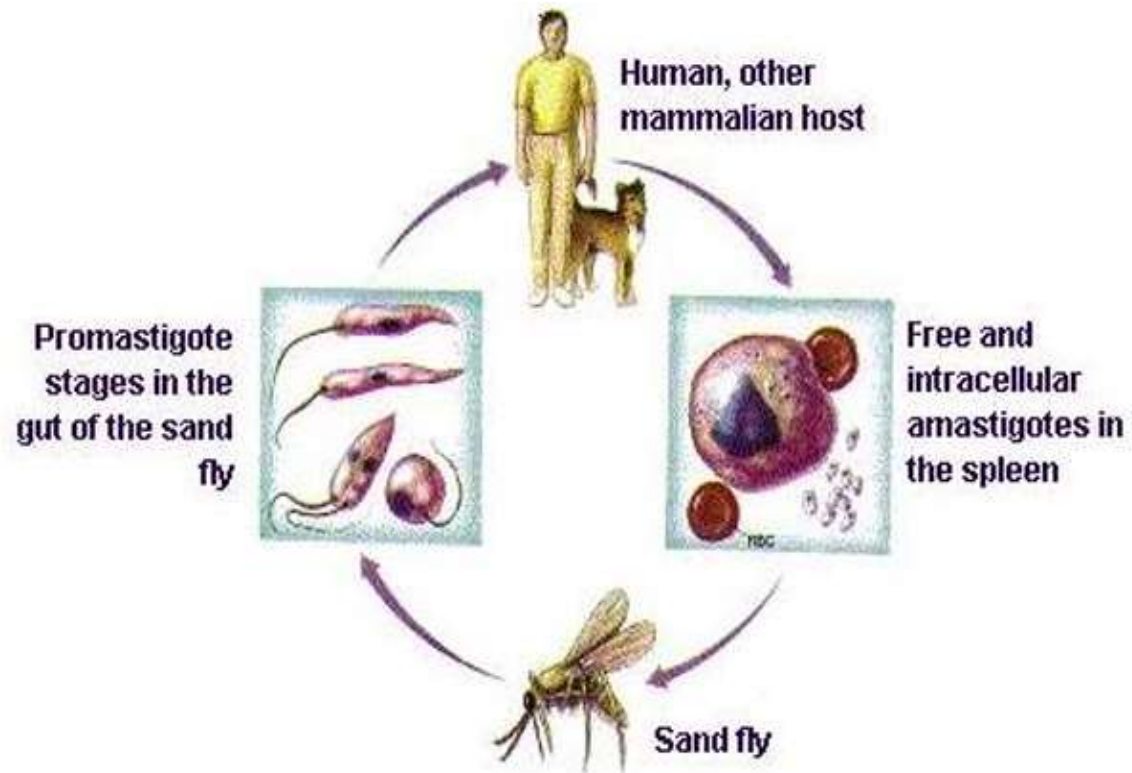
Table (2) *Leishmania tropica* promastigote : Typical characteristics

size	5 to 15 μm long
shape	Long and slender
nucleus	One , located in or near center
Other features	Kinetoplast located in anterior end Single free flagellum , extending from anterior end



Life cycle

Sandflies of the genera *Phlebotomus* are responsible for transmitting *Leishmania tropica* promastigotes into unsuspecting humans via blood meal, resulting in a skin bite. The promastigotes quickly invade the reticulo endothelial cells and transform into amastigotes, which actively reproduce, causing tissue destruction, reproduction and invasion of additional cells then occurs. The skin and mucous membrane areas of the body are primarily affected. The amastigote serves as the infective stage for the sandfly. Upon ingestion, during a blood meal of an infected human, the amastigotes transform back into promastigotes in the fly midgut. These promastigotes multiply, and the resulting developed forms eventually migrate into the salivary gland of the fly, where they are ready to be transferred to a new human during a blood meal. Thus the cycle repeats itself.



Clinical symptoms

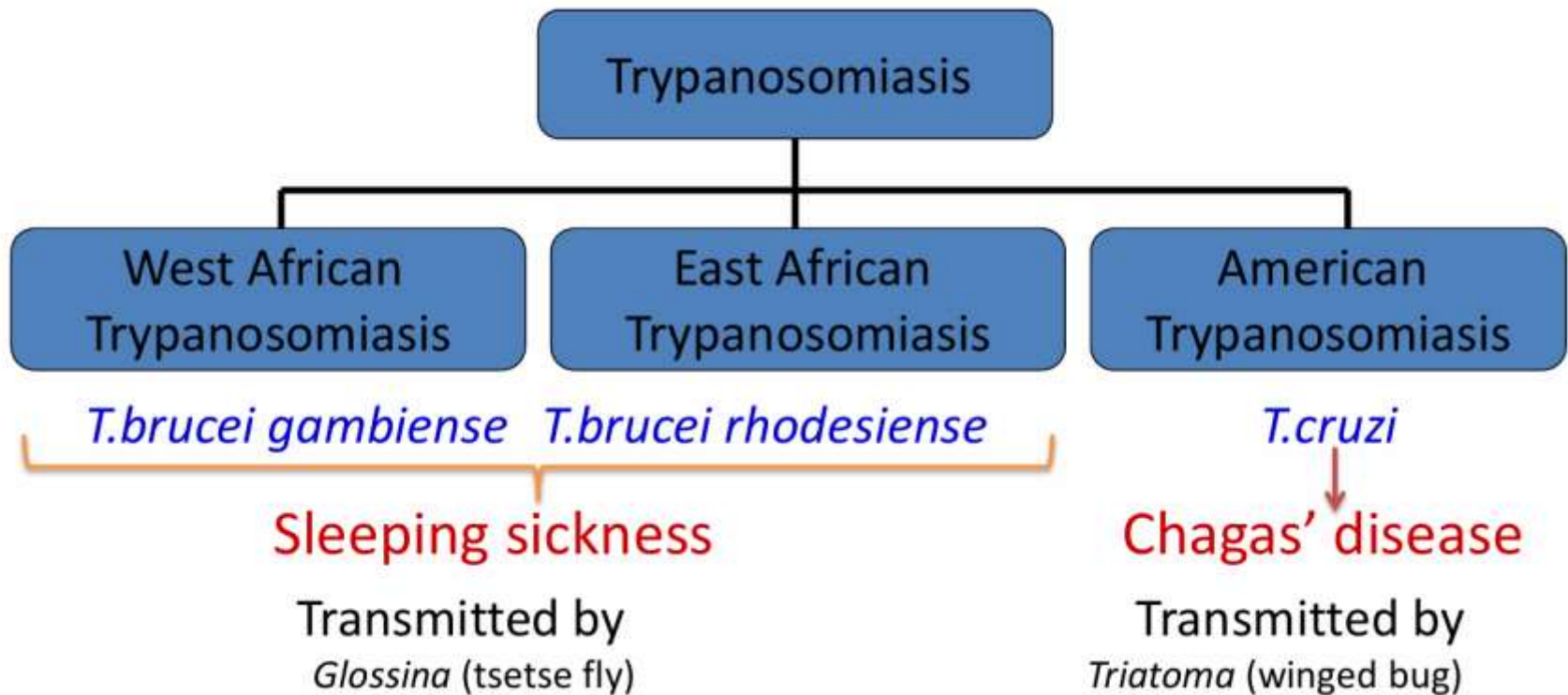
- Cutaneous Leishmaniasis. Also known as Old World leishmaniasis, Oriental sore, and Baghdad or Delhi boil, cutaneous leishmaniasis is characterized by one or more ulcers containing pus that generally self – heal. Infected patients initially develop a small red papule , located at the bite site , that a typically 2cm or more in diameter and may cause intense itching . the incubation time and the appearance of the papule vary with each sub species . diffuse cutaneous leishmaniasis (DCL) occurs especially on the limbs and face when immune response fails to take place .



Laboratory diagnosis

- Laboratory diagnosis of *L. tropica* consists of microscopic examination of Giemsa – stained slides of aspiration of fluid underneath the ulcer bed for the typical amastigotes. Culture of the ulcer tissue may also reveal the promastigote forms.

Trypanosoma Spp.



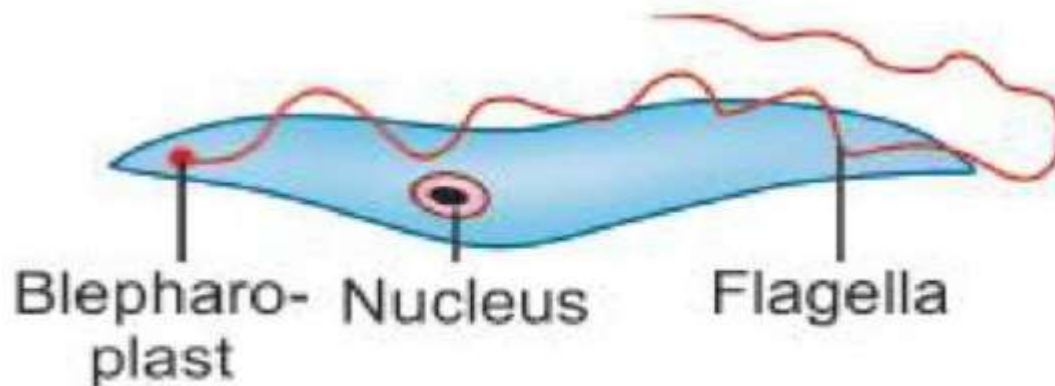
Trepanosoma brucei Gambiense

- *T. brucei. Gambiense*
- Cause Gambian trypanosomiasis chronic sleeping sickness.
- Vector/ intermediate host:(*Glossina*) tsetse fly.



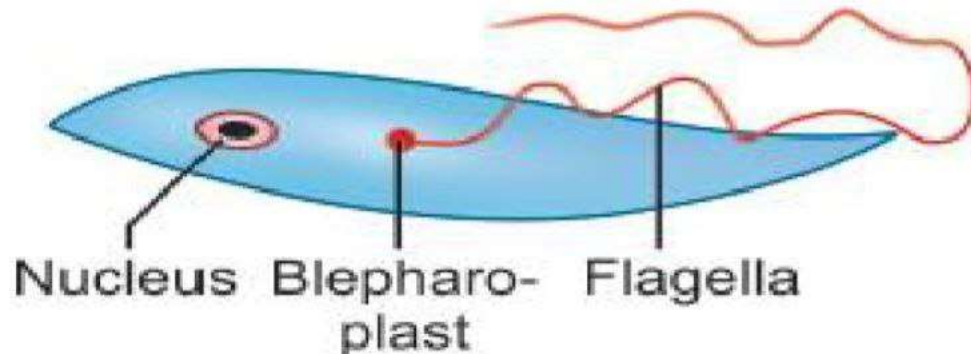
T. brucei. Gambiense Trypomastigote : Typical characteristics

size	18-30 μm
shape	elongated, spindle shaped
nucleus	central nucleus
Other features	kinetoplast is posterior to the nucleus , The flagellum runs alongside the entire length of the cell to form a long undulating membrane before emerging as a free flagellum from the anterior end



T. brucei. Gambiense epimastigote: Typical characteristics

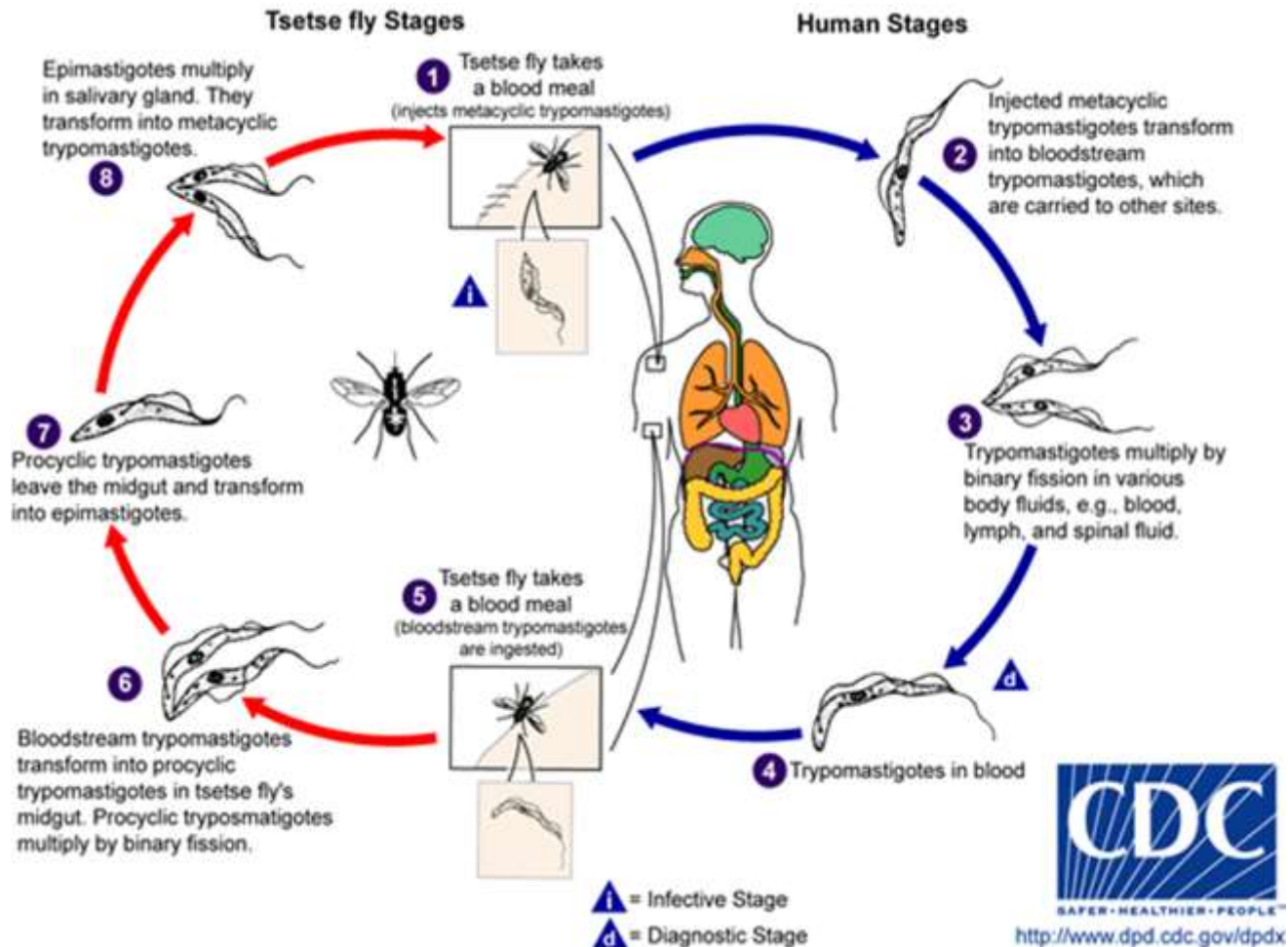
size	15-20 μm
shape	Elongated
nucleus	Single with karyosome
Other features	kinetoplast placed more posteriorly, though close to and in front of the nucleus , flagellum runs alongside the body as a short undulating membrane, before emerging from the anterior end



Life cycle

- During a blood meal on the mammalian host, an infected tsetse fly (genus *Glossina*) injects metacyclic trypomastigotes into skin tissue. The parasites enter the lymphatic system and pass into the bloodstream. Inside the host, they transform into bloodstream trypomastigotes, are carried to other sites throughout the body, reach other blood fluids (e.g., lymph, spinal fluid), and continue the replication by binary fission. The tsetse fly becomes infected with bloodstream trypomastigotes when taking a blood meal on an infected mammalian host. In the fly's midgut, the parasites transform into procyclic trypomastigotes, multiply by binary fission, leave the midgut, and transform into epimastigotes. The epimastigotes reach the fly's salivary glands and continue multiplication by binary fission and transform into metacyclic trypomastigotes. The cycle in the fly takes approximately 3 weeks. Humans are the main reservoir for *Trypanosoma brucei gambiense*, but this species can also be found in animals. Wild game animals are the main reservoir of *T. b. rhodesiense*.

Life cycle of *Trypanosoma brucei* *Gambiense*



Clinical symptoms

T. brucei gambiense causes African trypanosomiasis (West African sleeping sickness).

A painless chancre (trypanosomal chancre) appears on skin at the site of bite by tsetse fly, followed by intermittent fever, chills, rash, anemia, weight loss, and headache.

hepatosplenomegaly and lymphadenopathy, particularly in the posterior cervical region (Winterbottom's sign).

Hematological manifestations seen in stage I include anemia, moderate leucocytosis, and thrombocytopenia. High levels of immunoglobulins mainly immunoglobulin (IgM) are a constant feature.

invasion of central nervous system. With the invasion of central nervous system, which occurs after several months, the 'sleeping sickness' starts. This is marked by increasing headache, mental dullness, apathy, and day time sleepiness. The patient falls into profound coma followed by death from asthenia

Laboratory diagnosis

- . Microscopic examination:(Trypomastigotes in the blood smear). examination of Giemsa stained thick peripheral blood smears reveals the presence of the trypomastigotes
- . Examination of wet mount and stained smear of the CSF may also show trypanosomes
- . Enzyme –Linked Immunosorbent Assay(ELISA)
- .Blood or CSF culture

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