



Haemoflagellates

are a group of protozoan parasites that belong to the family Trypanosomatidae. They have a single nucleus, a kinetoplast, (A kinetoplast is a network of circular DNA (called kDNA) located inside a mitochondrion), and a **single flagellum**. They **live in the blood** and tissues of humans and other vertebrates and the gut of insect vectors. They cause diseases such as leishmaniasis and trypanosomiasis, also known as sleeping sickness.

There are two main genera of haemoflagellates that infect humans: *Leishmania* and *Trypanosoma*. They have different morphological stages, such as amastigote, promastigote, epimastigote, and trypomastigote, depending on the position of the flagellum and the kinetoplast to the nucleus. They also have different modes of transmission, clinical manifestations, diagnosis, and treatment

Leishmania spp.

Leishmania spp. are a group of protozoan parasites that cause leishmaniasis, a disease that affects humans and other animals. Leishmaniasis has different clinical forms, depending on the species of *Leishmania* and the immune response of the host. The main forms are:

- **Visceral leishmaniasis (VL)**, also known as kala-azar, which affects the internal organs such as the spleen, liver, and bone marrow. It is caused by *Leishmania donovani* and *Leishmania infantum*, and transmitted by the **bite of sandflies** of the genus *Phlebotomus* in the Old World and *Lutzomyia* in the New World. VL is fatal if left untreated.
- **Cutaneous leishmaniasis (CL)**, which causes skin lesions that can heal spontaneously or persist for a long time. It is caused by several species of *Leishmania*, such as *Leishmania tropica* and *Leishmania mexicana*, and transmitted by various species of sandflies. CL can lead to scarring, disfigurement, and secondary infections¹.
- **Mucocutaneous leishmaniasis (MCL)**, which affects the mucous membranes of the nose, mouth, and throat, causing ulcers and tissue damage. It is caused by *Leishmania*

braziliensis and other related species, and transmitted by sand flies of the genus *Lutzomyia*.

life cycle

The life cycle of *Leishmania* spp. involves two hosts:

1- a **vertebrate** host (human or animal)

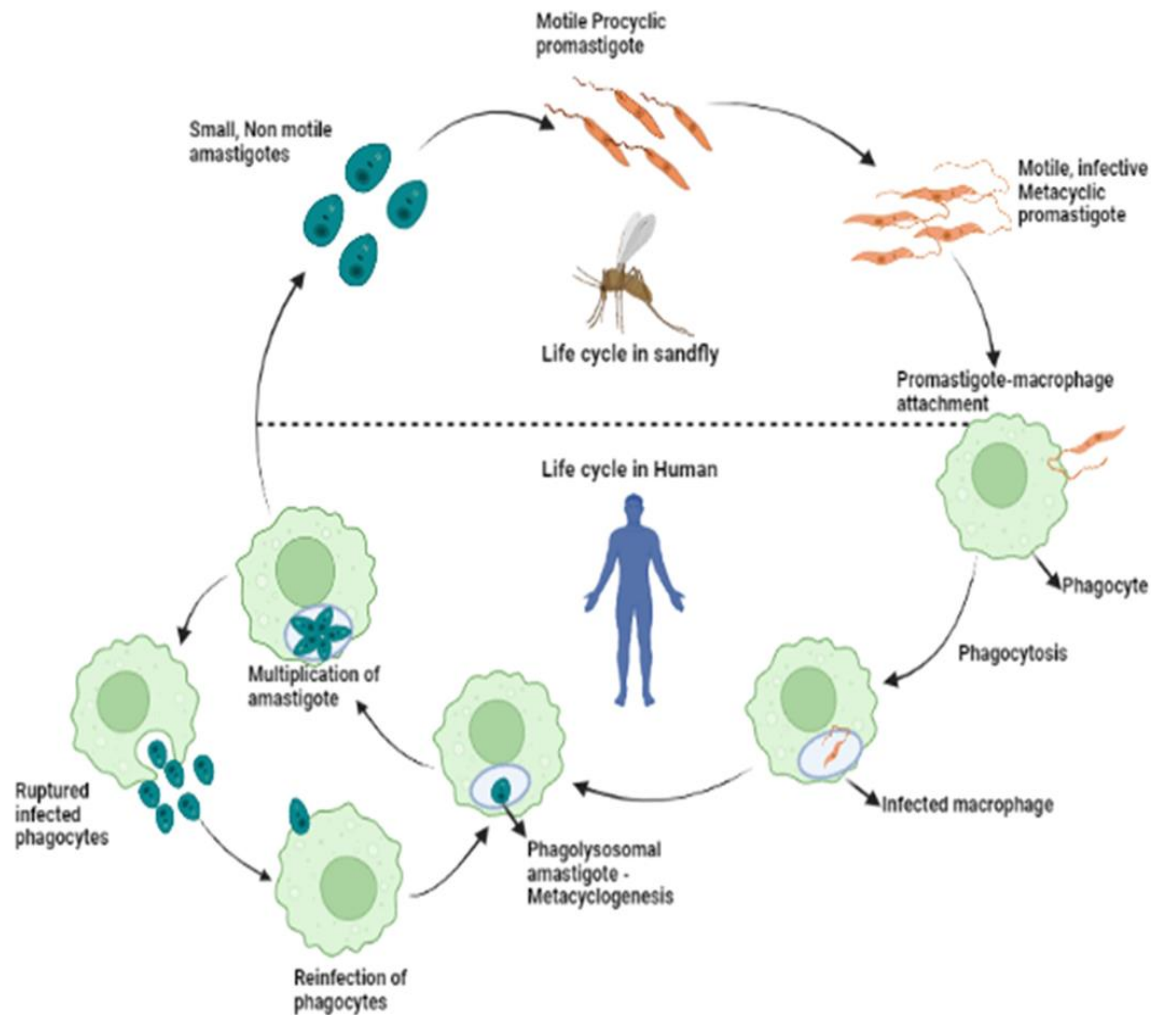
2- an **invertebrate** host (sand fly). In the sand fly, the parasite exists as a flagellated form called

promastigote, which multiplies in the gut and migrates to the mouthparts. When the sand fly bites a vertebrate host, it

injects the promastigotes into the skin. In the vertebrate host, the parasite is taken up by macrophages and other immune cells, where it transforms into a non-flagellated form called amastigote. The amastigotes multiply inside the cells and cause tissue damage. Some amastigotes can be released into the bloodstream and infect other cells or be ingested by another sand fly, completing the cycle.

Diagnosis of leishmaniasis

is based on the clinical signs and symptoms, the history of exposure to sand flies, and the laboratory tests.



The laboratory tests include:

- microscopic examination of tissue samples or smears for the presence of amastigotes, culture of tissue samples or aspirates for the growth of promastigotes.
- molecular methods such as polymerase chain reaction (PCR) for the detection and identification of Leishmania DNA.
- serological tests such as enzyme-linked immunosorbent assay (ELISA) or rapid diagnostic tests (RDTs) for the detection of antibodies or antigens, and immunological tests such as the leishmanin skin test or the interferon-gamma release assay (IGRA) for the measurement of cellular immunity.

The treatment of leishmaniasis are (sodium stibogluconate, amphotericin B).

Trypanosomes**Introduction**

Definition: Trypanosomes are unicellular, parasitic, and flagellated protozoans.

Etymology: The name “Trypanosoma” is derived from the Greek words “trypano” (meaning “borer”) and “soma” (meaning “body”), reflecting their characteristic corkscrew-like motion.

Genus: Trypanosoma belongs to the zooflagellate protozoan genus and is referred to as a trypanosome.

Morphology of Trypanosomes

-Flagellum: Trypanosomes have a single flagellum that runs across their entire surface.

-Cell Shape: They exhibit various shapes, including elongated, spindle-like forms.

-Kinetoplast: Trypanosomes possess a unique structure called the kinetoplast, which contains extranuclear DNA.

Life Cycle of Trypanosomes

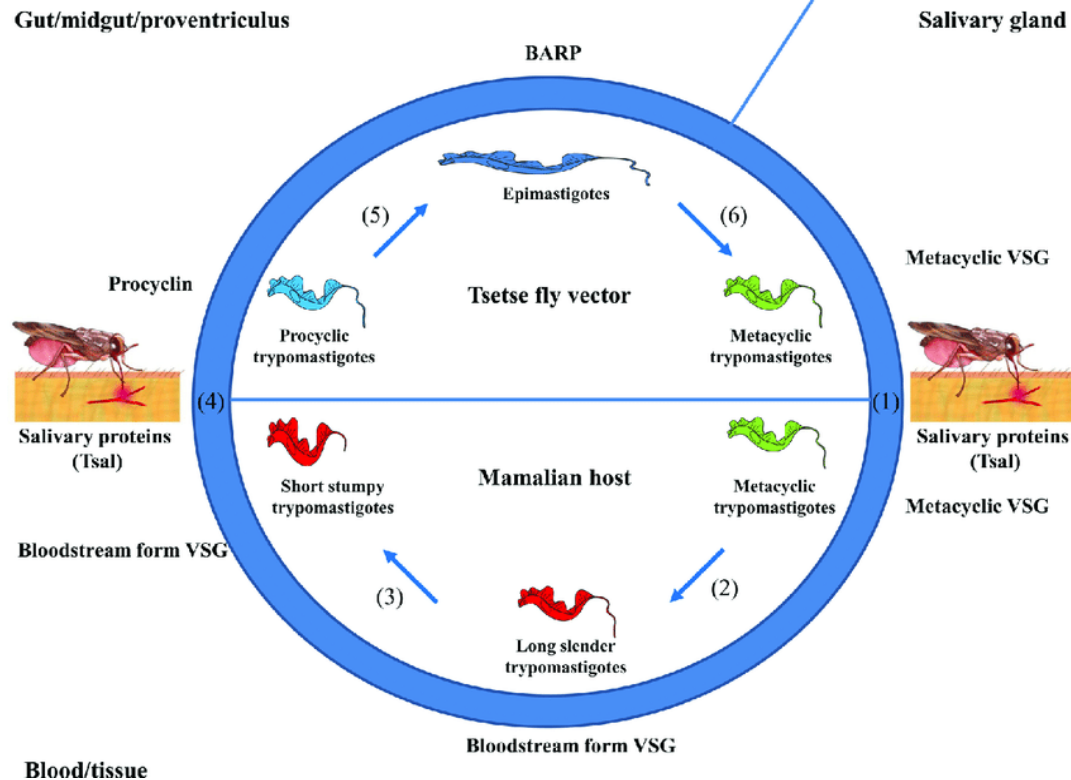
Vector Transmission:

Trypanosomes are mainly transmitted by insect vectors. For example:

Tsetse Flies: Responsible for transmitting African trypanosomes (e.g., *Trypanosoma brucei*).

Geographical Distribution:

Tsetse flies occur in specific areas of Africa.



Pathogenesis of Trypanosomiasis

Antigenic Variation: Trypanosomes evade the host's immune system by changing their surface glycoproteins (variant surface glycoproteins or VSGs).

Inflammation: Trypanosomes induce inflammation, affecting tissue function and systemic effects.

Apoptosis: Trypanosomes can trigger apoptosis in host cells, impairing immune defense and tissue repair.

Diagnosis of Trypanosomiasis

Methods: Diagnosis involves detecting parasites, their DNA, or antibodies in blood or tissues.

Techniques: **Microscopy**, molecular tests, serological tests, and antigen tests are commonly used.

Treatment of Trypanosomiasis: Specific Drugs: Drugs like **Pentamidine**, and **Suramin**.