

Hemoflagellate

Including genus: Leishmania and Trypanosoma (blood tissue species):

There are four morphological forms of clinical significance associated with the hemoflagellates: Amastigote, promastigote, epimastigote and trypomastigote.

General characteristics


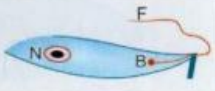
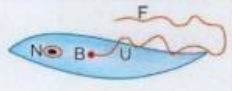

- 1- They live in the blood and tissues of man and other vertebrate hosts and in the gut of the insect vector.
- 2- Members of this family have a single nucleus, a kinetoplast and a single flagellum.
- 3- Nucleus is round or oval and is situated in the central part of the body.
- 4- Kinetoplast consists of a deeply staining parabasal body and adjacent dot-like blepharoplast.
- 5- The parabasal body and blepharoplast are connected by one or more thin fibr.
- 6- Flagellum is a thin, hair-like structure, which originates from the blepharoplast.
- 7- The portion of the flagellum, which is inside the body of the parasite and extends from the blepharoplast to surface of the body is known as axoneme.
- 8- A free flagellum at the anterior end traverses on the surface of the parasite as a narrow undulating membrane.
- 9- Hemoflagellates exist in two or more of four morphological stages.

The transmission of hemoflagellates

Is accomplished by the bite of an arthropod vector. Flagellate protozoa found in blood or tissues of human and there are two genera of medical importance (Leishmania and Trypanosoma). The major difference between these two genera is that primary diagnostic form

found in Leishmania is the amastigote, whereas that of Trypanosoma is the trypomastigote

1. Amastigotes: It is Roundish to oval in shape, Consist of a nucleus and kinetoplast. The large single nucleus is typically located off-center .The dotlike blepharoplast is attached to a small axoneme, this axoneme extends to the edge of the organism.The single parabasal body is located adjacent to the blepharoplast.
2. Promastigotes: It is Long and slender in appearance. The large single nucleus is located in or near the center .The kinetoplast is located in the anterior end of the organism .A single free flagellum extends anteriorly from the axoneme.
3. Epimastigotes: It is long and slightly wider than promastigote form.The large single nucleus is located in posterior end .The kinetoplast located anterior to the nucleus .Undulating membrane extending half of the body length .A single free flagellum extends anteriorly from the axoneme.
4. Trypomastigotes: It is C or U shape in stained blood films .Long and slender in appearance .One nucleus located anterior to the kinetoplast .The kinetoplast is located in the posterior end of the organism .Undulating membrane extending entire body length .A single free flagellum extends anteriorly from the axoneme when present

	<i>Amastigote</i>	<i>Promastigote</i>	<i>Epimastigote</i>	<i>Trypomastigote</i>
Morphological characteristics	Rounded or ovoid, without any external flagellum. The nucleus, kinetoplast and axial filaments can be seen. The axoneme extends up to the anterior end of the cell	Lanceolate in shape. Kinetoplast is anterior to the nucleus (antinuclear kinetoplast) near the anterior end of the cell, from which flagellum emerges. There is no undulating membrane	Elongated, with the kinetoplast placed more posteriorly, though close to and in front of the nucleus (juxtannuclear kinetoplast). The flagellum runs alongside the body as a short undulating membrane, before emerging from the anterior end	This stage is elongated, spindle-shaped with a central nucleus. The kinetoplast is posterior to the nucleus (postnuclear kinetoplast) and situated at the posterior end of the body. 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
Seen in	<i>Trypanosoma cruzi</i> and <i>Leishmania</i> as intracellular form in vertebrate host	It is the infective stage of <i>Leishmania</i> , found in the insect vector as well as in cultures <i>in vitro</i>	It is the form in which <i>Trypanosoma brucei</i> occur in salivary gland of the vector tsetse fly and <i>Trypanosoma cruzi</i> in the midgut of the vector reduviid bug. Note: This stage is lacking in <i>Leishmania</i>	This is the infective stage of trypanosomes found in arthropod vector and in the blood of infected vertebrate. Note: This stage is lacking in <i>Leishmania</i>
Schematic illustration				

Table(1): Morphological form of hemofagellate

Genus *Leishmania*:

Leishmaniasis There are many different species of *Leishmania* and the disease that they cause. directly linked to the species of *Leishmania* with which a person **Several species of *Leishmania* are pathogenic for man: *L. donovani* causes visceral leishmaniasis (Kala-azar, black disease, dum dum fever); *L. tropica* cause cutaneous leishmaniasis (oriental sore, Delhi ulcer, Aleppo, Delhi or Baghdad boil); and *L. braziliensis* (also, *L. mexicana* and *L. peruviana*) are etiologic agents of mucocutaneous leishmaniasis .**

Life Cycle

Leishmania are transmitted by arthropod. In this case it is a small biting fly known as a **sand fly**. *Leishmaniae* spend part of their life cycle in the gut of the sandfly, but their life cycle is completed in a vertebrate host. Within the sandfly gut, the protozoa are carried as extracellular promastigotes, these parasites multiply in the gut and migrate toward the pharynx. Sandflies transferred promastigotes to the vertebrate host when the sandfly takes a meal blood by expelling leishmaniae into the bite

wound of the mammalian host. From where they pass into the blood and tissues of the human host.

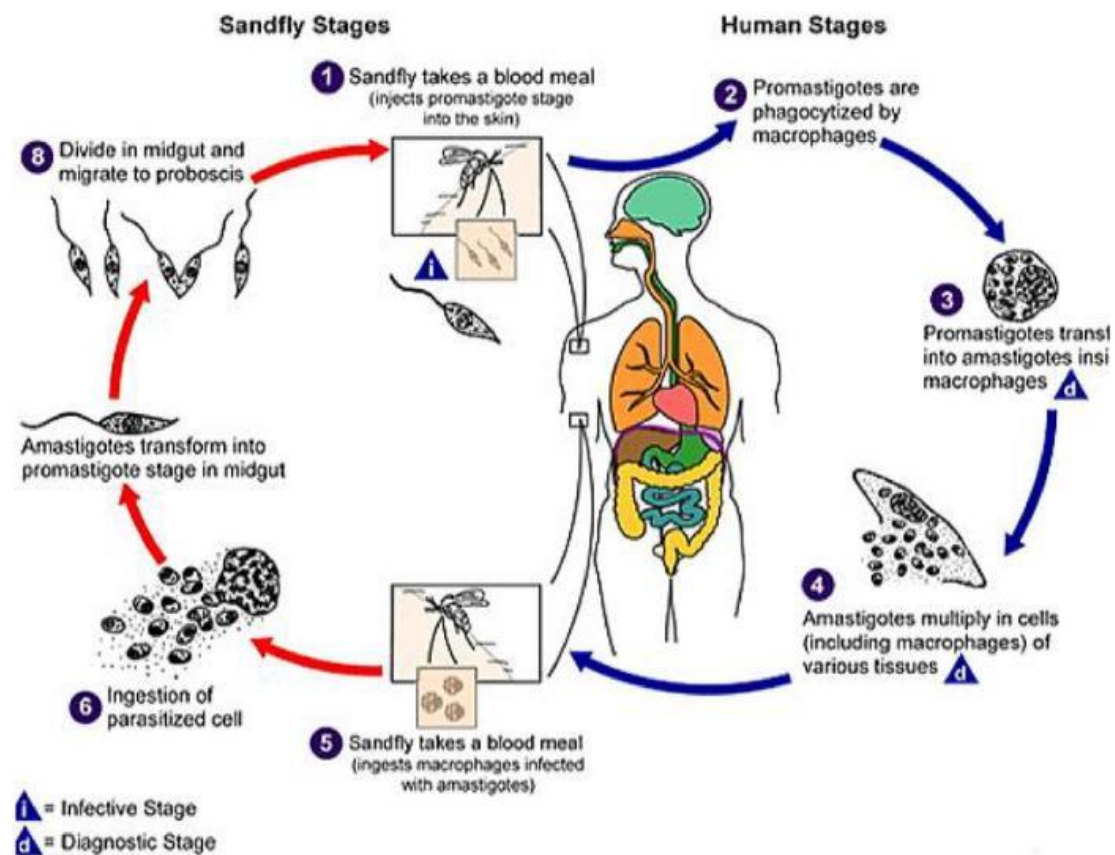


Figure (12): Life Cycle of leishmania spp.

Pathogenesis and clinical finding

Leishmaniasis is a parasitic disease caused by several species of genus *Leishmania*. Different species of *Leishmania* cause different diseases.

A. *L. donovani* causes visceral leishmaniasis also called Kala-azar and Dum Dum fever. Splenomegaly & hepatomegaly the infection is generalized and the parasite is distributed in the internal organs. The parasite may also cause a variety of skin lesions (dermal leishmaniasis) without any visceral manifestations.

Laboratory Diagnosis 1. Giemsa-stained slides of blood, bone marrow, lymph node aspirates and biopsies of the infected areas for the diagnosis of amastigote forms.

2. Culture of blood, bone marrow and other tissues these samples show the promastigote forms.

3. Serological tests.

L. tropica: causes tropic sore or Baghdad boil, oriental sore and cutaneous

Leishmaniasis. The infection is limited to a local lesion of the skin and subcutaneous tissues.

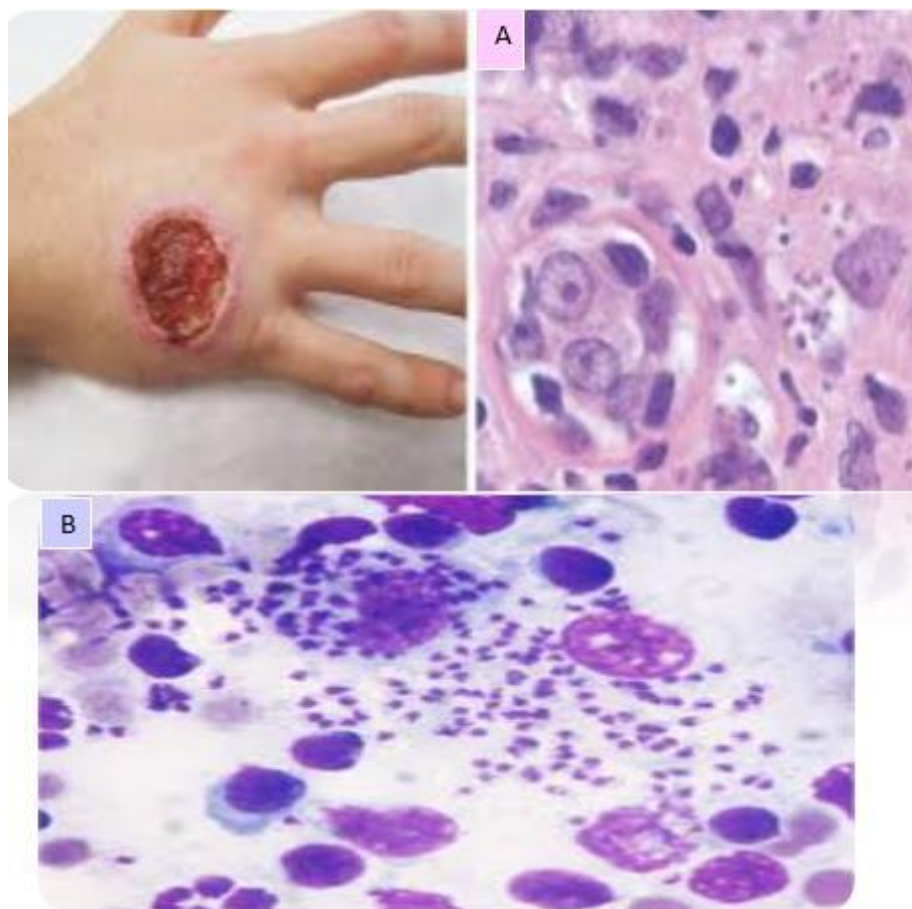


Figure (13): *L. tropica* and *L.major* amastigote a-intracellular b-intercellular.

Laboratory Diagnosis

1. The specimen of choice for identify the amastigotes of *Leishmania braziliensis* is a biopsy of the infected ulcer.
2. Microscopic examination of the Giemsa-stained preparations should reveal the typical amastigotes. Promastigotes may be present when the

sample is collected immediately after introduction into the patient.

3. Culturing the infected material, which often demonstrated the promastigote stage.

4. Serological tests.

Treatment

Pharmacologic therapies include the following:

- Pentavalent antimony (sodium stibogluconate or meglumine antimonate): Used in cutaneous leishmaniasis
- Liposomal amphotericin B (AmBisome): Effective against pentavalent antimony-resistant mucocutaneous disease and visceral leishmaniasis