

Leishmania spp.

- The leishmaniasis is a group of vector-borne diseases caused by protozoan haemoflagelates of the genus *Leishmania*
- It is spread through females of *Sandflies* of the genus *Phlebotomus* spp. in the Old World, and of the genus *Lutzomyia* in the New World.
- Leishmaniasis is a zoonotic deadly parasitic disease that affects over 12 million people worldwide, with 350 millions are at risk.
- With more than 2 million new cases reported every year.

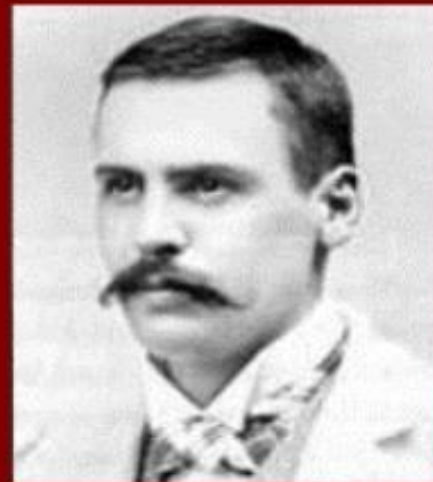
Leishmania spp.

- In 1901, professor William B. Leishman (**Scottish Pathologist**), identified certain organisms in smears taken from the spleen of a patient who had died from "Dum-Dum fever".
- This disease was similar to what Indian physicians called kala-azar (black fever).
- Initially, these organisms were considered to be trypanosomes.



Leishmania spp.

- In 1903, Captain Charles Donovan described them as being new.
- These new microorganisms were given the name 'Leishman-Donovan bodies'
- After that taxonomically designated *Leishmania donovani*.

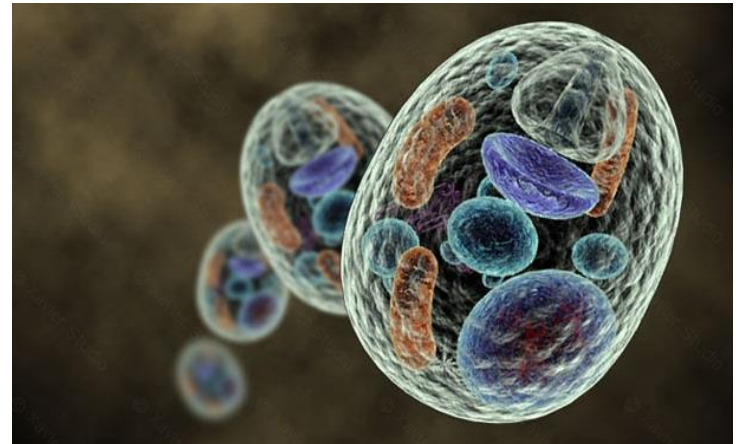


MORPHOLOGY OF HEMOFLAGELLATES

The species of leishmania exist in two forms, amastigote (aflagellar) and promastigote (flagellated) in their life cycle. They are transmitted by certain species of sand flies (Phlebotomus & Lutzomyia)

Trypanosoma Spp. Included three forms in their life cycle. amastigote, trypomastigote and epimastigote

- **1- Amastigote form:** Round to oval, lacks flagellum, found in reticuloendothelial cells of man infected with *Leishmania* and *Trypanosoma cruzi*.

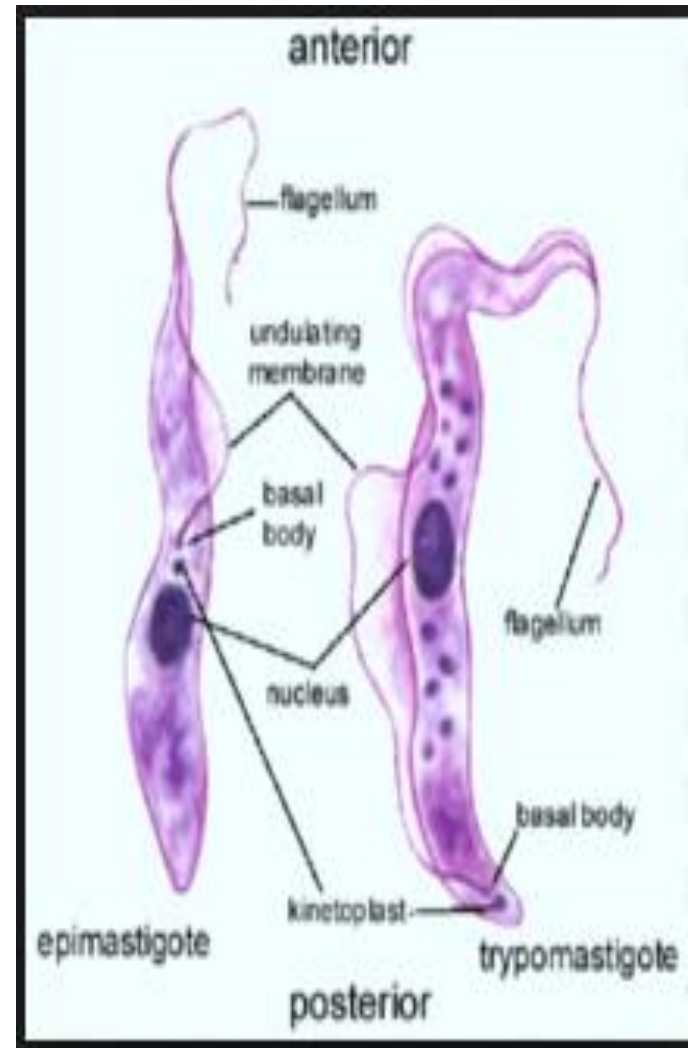


2. Promastigote form:

- Lanceolate shaped; kinetoplast is anterior to nucleus (antenuclear kinetoplast). Flagellum arises from the anterior end. It is found in the mid gut of insect vector. This is the infective stage of *Leishmania to man*.

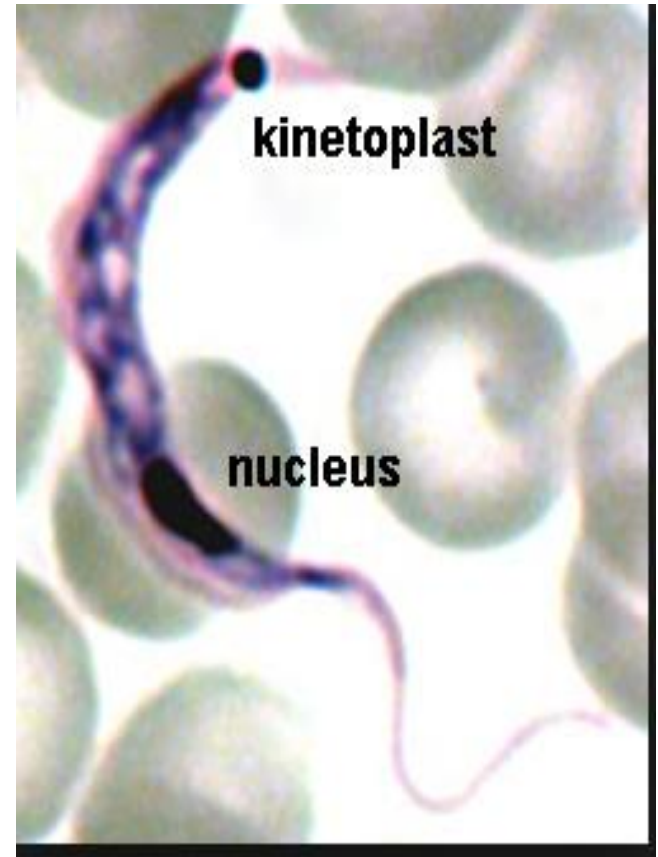


- **3.Epimastigote form:**
Elongated, kinetoplast is placed close to the nucleus (juxtannuclear kinetoplast). Flagellum arises from the lateral side and traverses the body as a short undulating membrane and comes out from the anterior end. This form is seen for *Trypanosoma* in insect vector



4. Trypomastigote form:

Elongated and spindle shaped with central nucleus. Kinetoplast lies near the posterior end. Flagellum arises posteriorly and runs as long undulating membrane. It is the infective stage of *Trypanosoma* found in insect vector and peripheral blood of humans.



***Leishmania* spp.**

In humans, There are different forms of this disease :

- Visceral leishmaniasis: involving liver, spleen, and bone marrow
- Cutaneous leishmaniasis: involving the skin at the site of a sandfly bite
- mucocutaneous leishmaniasis: involving mucous membranes of the mouth and nose after spread from a nearby cutaneous lesion (very rare).

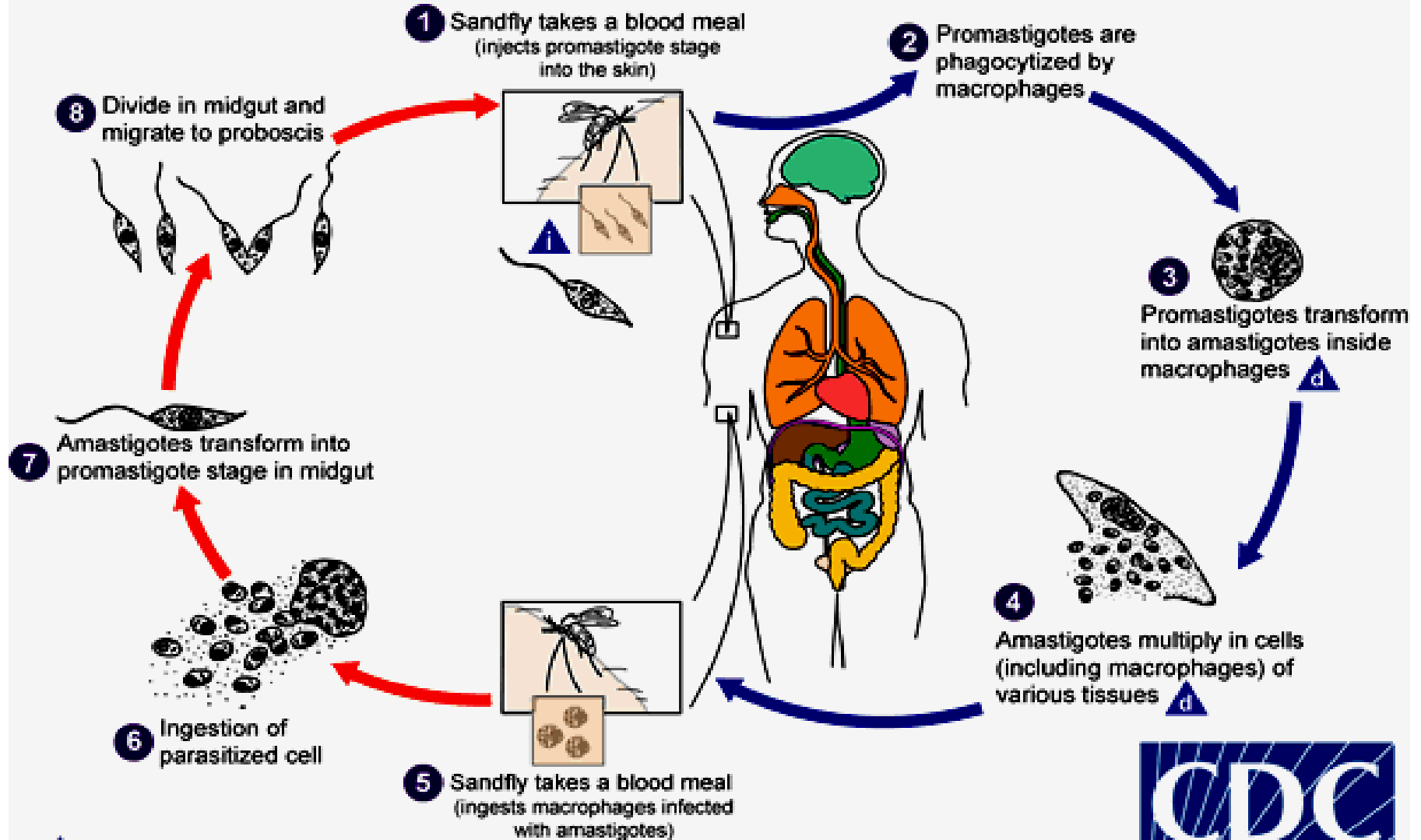
Different species of *Leishmania* cause different forms of disease

While their life cycles are identical and they are morphologically indistinguishable, they differ in the type and location of primary lesions they produce in the human host.

Species	Disease	Geographical distribution	Vector	Reservoir	Transmission
<i>Leishmania donovani</i>	Visceral leishmaniasis (Kala-azar or dumdum fever)	Middle East, Africa, and Indian Subcontinent	<i>Phlebotomus argentipes</i> , <i>Phlebotomus orientalis</i>	Humans	Anthroponotic, occasionally zoonotic
<i>Leishmania infantum</i>	Visceral leishmaniasis, cutaneous leishmaniasis	Mediterranean Coast, Middle East, and China.	<i>Phlebotomus perniciosus</i> , <i>Phlebotomus ariasi</i> , <i>Phlebotomus papatasi</i>	Dog, fox, jackal, and wolf	Zoonotic
<i>Leishmania chagasi</i>	Visceral leishmaniasis	Tropical South America	<i>Lutzomyia longipalpis</i>	Fox and wild canines	Zoonotic
<i>Leishmania tropica</i>	Cutaneous Leishmaniasis (oriental sore, Baghdad boil)	Middle East and Central Asia	<i>Phlebotomus sergenti</i>	Humans	Anthroponotic
<i>Leishmania major</i>	Cutaneous leishmaniasis	Africa, Indian Subcontinent, and Central Asia	<i>Phlebotomus papatasi</i> , <i>Phlebotomus duboscqi</i>	Gerbil	Zoonotic
<i>Leishmania aethiopica</i>	Cutaneous and diffuse cutaneous leishmaniasis	Ethiopia and Kenya	<i>Phlebotomus longipes</i> <i>Phlebotomus pedifer</i>	Hydraxes	Zoonotic
<i>Leishmania braziliensis complex</i>	Mucocutaneous leishmaniasis (Espundia)	Tropical South America	<i>Lutzomyia umbratilis</i>	Forest rodents and peridomestic animals	Zoonotic
<i>Leishmania mexicana complex</i>	Mucocutaneous leishmaniasis (Chiclero's ulcer)	Central America and Amazon basin	<i>Lutzomyia olmeca</i> , <i>Lutzomyia flairscutellata</i>	Forest rodents and marsupials	Zoonotic

Sandfly Stages

Human Stages



LIFE CYCLE



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Life Cycle

1- Leishmaniasis is transmitted by the bite of female phlebotomine sandflies.

the sandflies inject the infective stage, promastigotes, during blood meals

2- Promastigotes that reach the puncture wound are phagocytized by macrophages.

3-.They transform into amastigotes , Amastigotes multiply in infected cells and affect different tissues.

5- Sandflies become infected during blood meals on an infected host when they ingest macrophages infected with amastigotes

6- In the sandfly's midgut, the parasites differentiate into promastigotes.

7-They multiply and migrate to the proboscis .