Hemoflagellates

(blood and tissue flagellates)

Two genera within hemoflagellates infect human which are:

- Genus *Leishmania*
- Genus *Trypanosoma*

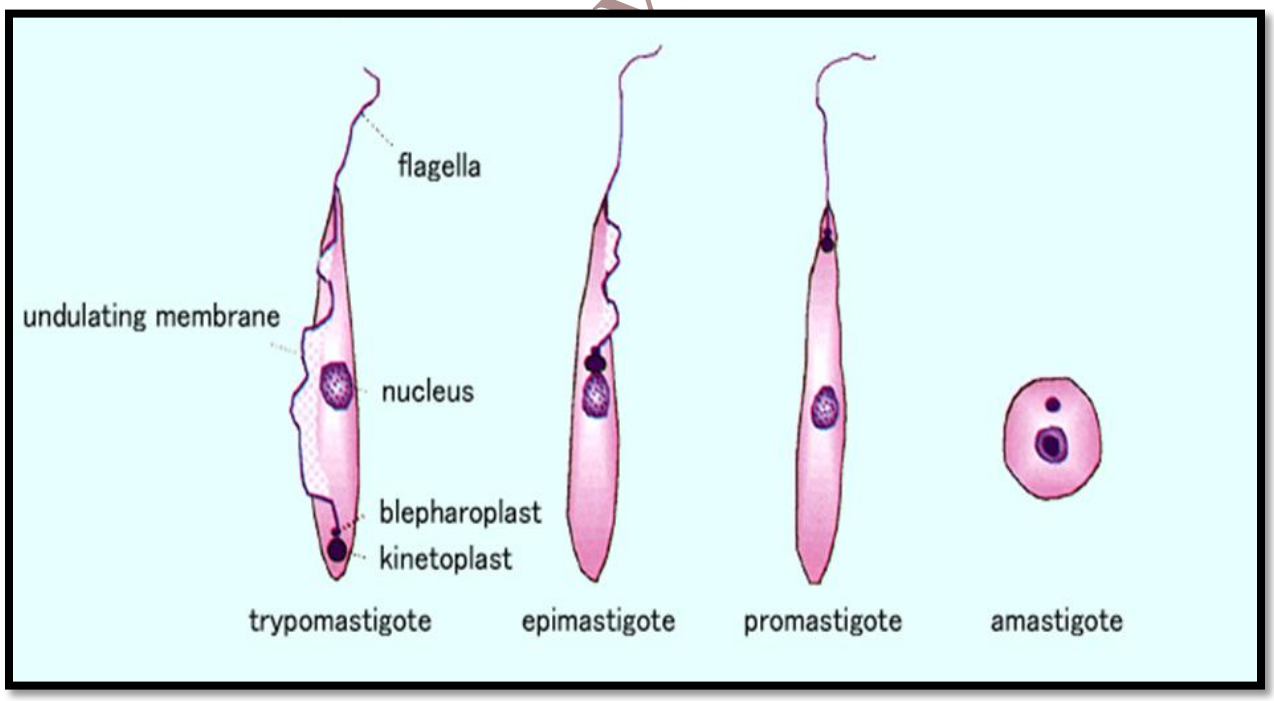
***Morphological forms of hemoflagellates :**

1- Amastigote (Leishmania) form : kinetoplast anterior to nucleus , no free flagellum , usually spherical or oval shape.

2- Promastigote (leptomonad) form : kinetoplast anterior to nucleus , no undulating membrane, usually Elongated (spindle in shape).

3-Epimastigote (crithidia) form : kinetoplast anterior to nucleus , undulating membrane running a portion of the body , Elongated shape.

4-Trypomastigote (Trypanosome) form: kinetoplast posterior to nucleus , undulating membrane runs length of , Elongated form with highly polymorphism.



Leishmania species

Leishmaniasis is caused by parasites of the genus *Leishmania* and is endemic in many parts of Africa, Asia and South America. It is transmitted by *Phlebotomus* species, sandfly.

It causes three diseases in human:

1- Cutaneous Leishmaniasis or (oriented sore).
2- Mucocutaneous Leishmaniasis or (Espondia).
3- Visceral Leishmaniasis or (Kala-azar).

Disease	Leishmania species	Geographical location
Cutaneous leishmainiasis	-*L.tropica complex* as 1-*L. tropica* 2- *L. major* 3-*L. aethiopica* -*L. mexicana complex*as *L. mexicana* and other species	- Old world (Old world cutaneous leishmaniasis) -(New world)New world cutaneous leishmaniasis
Mucocutaneousleishmaniasis	-*L.braziliensis* complex as *L.braziliensis* and other species	-(New world)New world cutaneous leishmaniasis
Visceral leishmaniasis	-*L.donovani* complex as 1- *L.donovani* 2- *L.infantum* 3- *L.chagasi*	 -Old world -Old world -New world

****General characters of genus *Leishmania*:**

1- Life cycle is indirect and completed in two hosts, **vertebrate (human, dog, rodent)** as a **final host** and **invertebrate**; blood sucking insect (**female of sand fly**) as an **intermediate host (vector).**
2- Two developmental forms are found, amastigote and promastigote ,amastigote in the final host (human) and promastigote in the vector (sand fly).
3- The vector is sand fly of genus *Phlebotomus* in Old World and genus *Lutzomyia* in New World.
4- **Promastigote is the infective stage to final host (human)** and **amastigote is infective stage to sand fly (vector)**.
5- The parasite infects the reticuloendothelial cells of skin, mucus membrane or viscera (as liver, spleen and bone marrow) of the final host (human).
6- The parasite multiplies by binary fission (asexual).

➢ **Mode of transmission:**

1- Insect bite: a main mode of transmission (by the bite of female sand fly).
2- Blood transfusion or congenital : a rare mode of transmission.

➢ **Clinical types of cutaneous leishmaniasis**

-***Leishmania major*:** Zoonotic cutaneous leishmaniasis: wet lesions with severe reaction

-***Leishmania tropica*:** Anthroponotic cutaneous leishmaniasis: Dry lesions with minimal ulceration

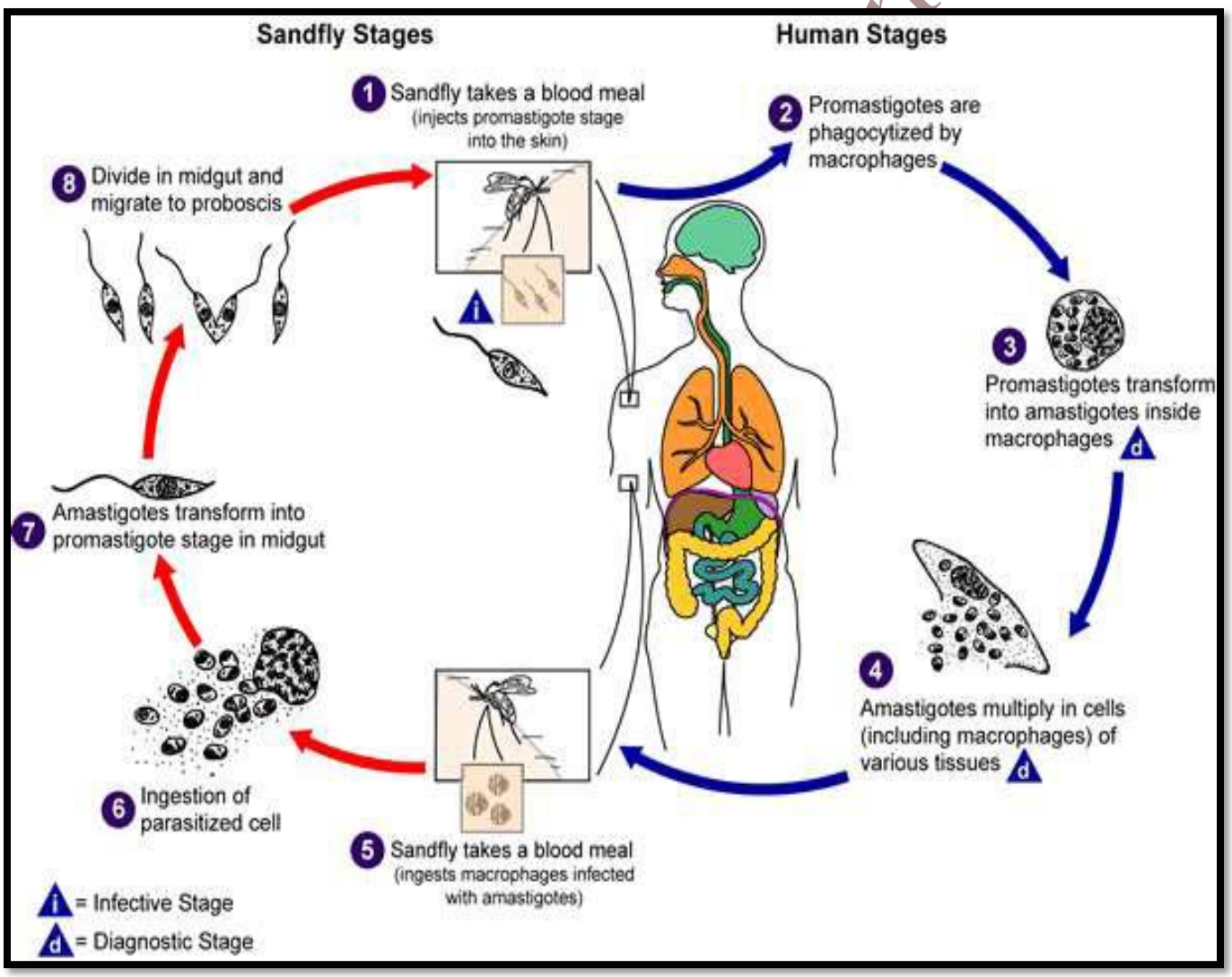
UNCOMMON TYPES OF CUTANEUS LEISHMANIASIS

- **Diffuse cutaneous leishmaniasis** (DCL):
  Caused by *L. aethiopica*, diffuse nodular non-ulcerating lesions, seen in a part of Africa, people with low immunity to *Leishmania* antigens.

- **Leishmaniasis recidiva** (lupoid leishmaniasis):
  Severe immunological reaction to *leishmania* antigen leading to persistent dry skin lesions, few parasites.

➢ **Life cycle**

All forms of infection starts when a female sandfly (*Phlebotomus* species) takes a blood meal from an infected host. Small amounts of blood, lymph and macrophages infected with *Leishmania* amastigotes are ingested. Once ingested the amastigotes transform to promastigotes in the sandfly, the non-infective promastigotes divide and develop into infective metacyclic promastigotes. These are formed in the midgut of the sandfly and migrate to the proboscis. When the sandfly bites, the extracellular inoculated promastigotes at the site of the bite are phagocytosed by macrophages. After phagocytosis, transformation to dividing amastigotes occurs within 24 hours. Reproduction at all stages of the lifecycle is believed to occur by binary fission. No sexual stage has been identified



Life cycle of *leishmania* spp.

- **Diagnosis :**

A- Diagnosis for cutaneous & muco-cutaneous leishmaniasis

-The parasite can be isolated from the margin of the ulcer.

-A diagnostic skin test ,known as **Montenegro (leishmanin) test** is useful.

-**Smear: Giemsa stain** – microscopy for LD bodies (amastigotes).

-**Biopsy:** microscopy for LD bodies

- culture in **NNN** medium for promastigotes.

B- Diagnosis for Visceral leishmaniasis

(1)Parasitological diagnosis:

1. microscopy.

2. culture in NNN medium.

Specimen : (Bone marrow aspirate **,** Splenic aspirate, Lymph node ,Tissue biopsy)

(2)Immunological Diagnosis:

- Specific serologic tests: Direct Agglutination Test (DAT), ELISA, IFAT
- Skin test (leishmanin test) for survey of populations and follow-up after treatment.