

# L 3:- Parasitology

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## 1. B:Class Haemoflagellates: *Leishmania* & *Trypanosoma*

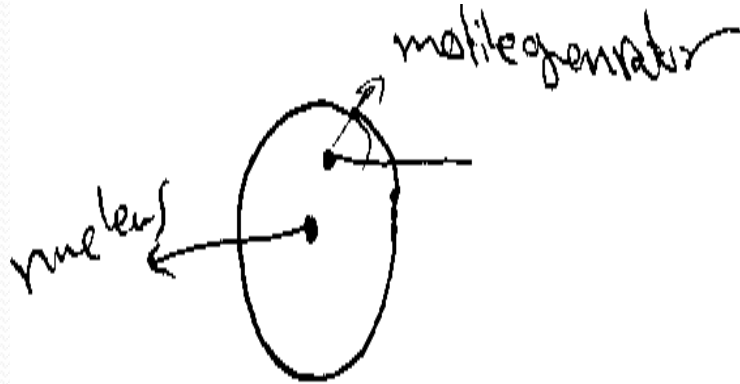
- Blood and Tissue Protozoal Infections
- The major protozoal diseases that involve the blood and internal organs are malaria (*Plasmodium* species), toxoplasmosis (*Toxoplasma* species), trypanosomiasis (*Trypanosoma* species), and leishmaniasis (*Leishmania* species). *Plasmodium* and *Toxoplasma* are sporozoans, whereas *Trypanosoma* and *Leishmania* are flagellates, sometimes referred to as hemoflagellates.
- These parasites are unicellular with flagellum in the beginning of the parasite which helping it in motile.
- *Leishmania* = mediated host= Sand fly
- *Trypanosoma*= mediated host= Tse-Tse fly

1. These parasites invading the blood, the tissues, and endothelial layer of organs and the tissues of skin.
2. These flagellates including two genus that important to human:
  - ***Leishmania***: This genus is circular or ovum in shape with one nucleus located in the center of the cell and in front of the nucleus present the motile generator which is short.
  - ***Trypanosoma***: The cell of this genus is tall with one central nucleus and the motile generator located in the terminal of parasite.

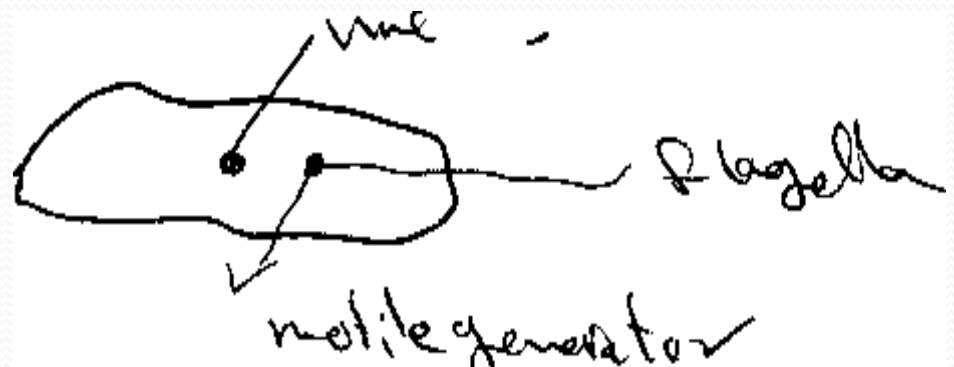
The flagellate belong to these two genus pass through the life cycle; the live cycle .1 between two host: vertebrate host (terminal host like human) and arthropod host (mediated host like the fly) in many stages with different shapes, through the shape of the body, presence of flagellate or absent, the shape locate of motile generator and the presence of waved membrane or absent ,as following:

1. :

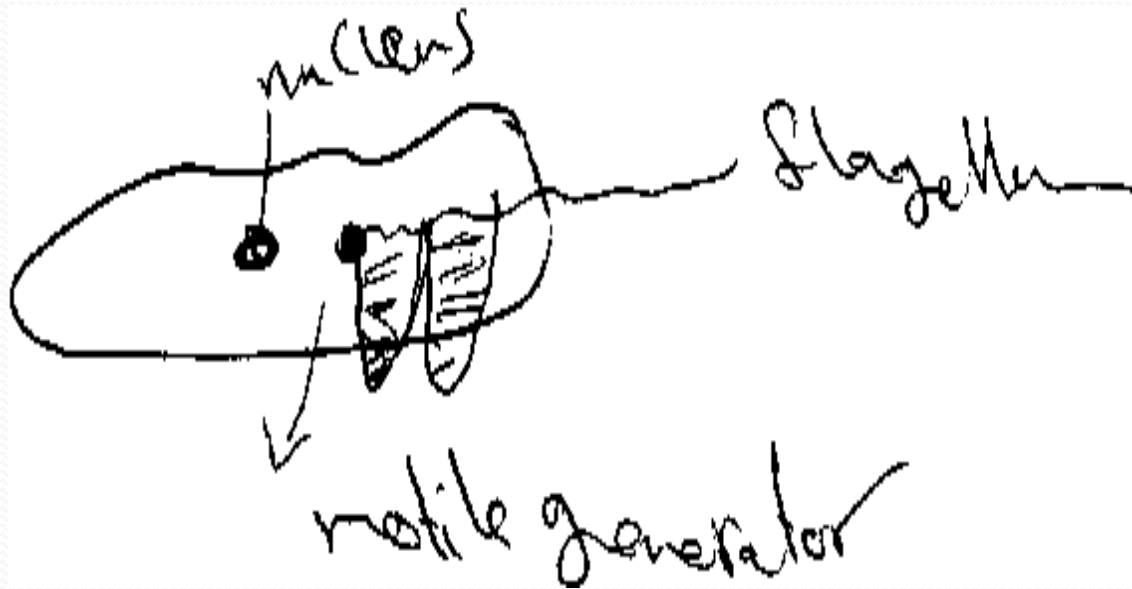
**A. Amastigote:** the parasite circular or ovum in shape, the nucleus lies near the center and in front of it present motile generator which extend short flagella from it and have not waved membrane.



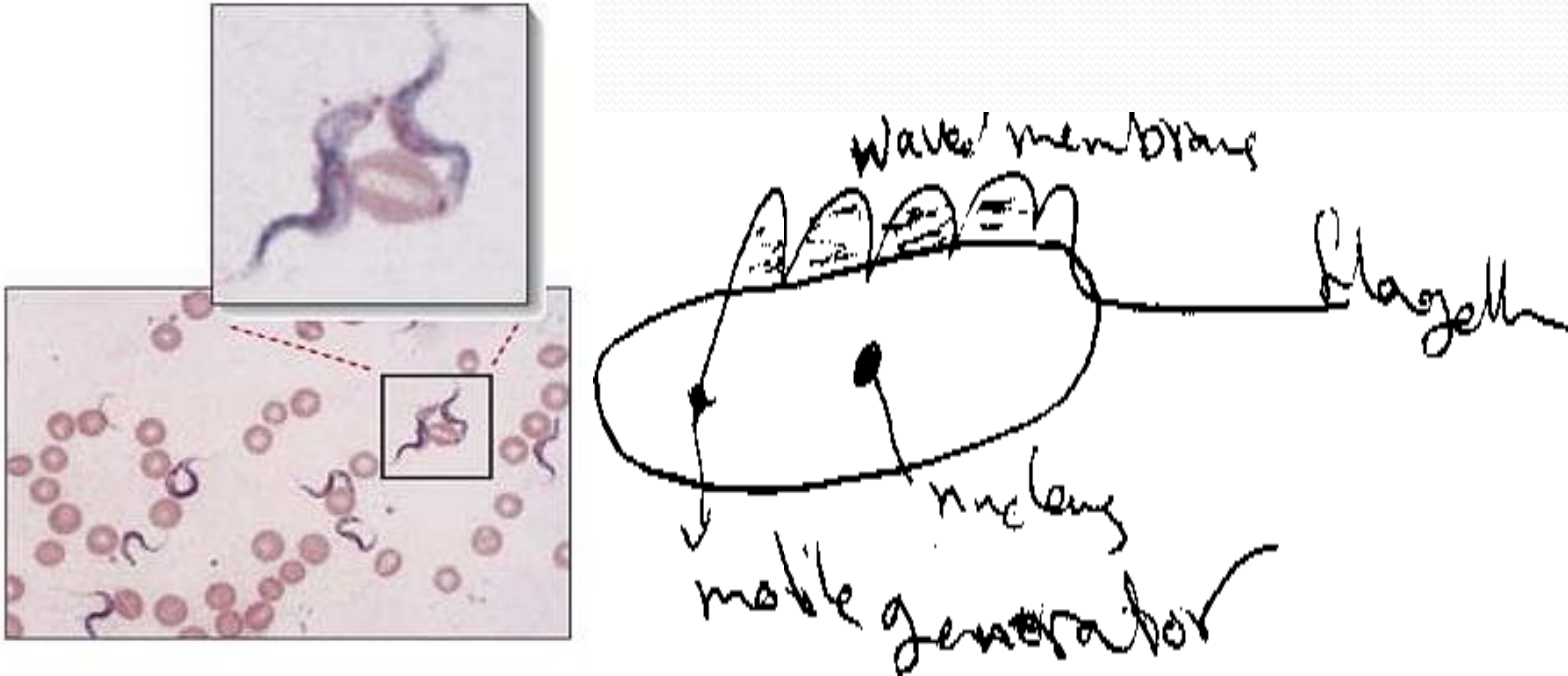
**B. Promastigote:** the body is spindle with nucleus in the center and motile generator located near the beginning of the body arise a flagellate from generator extend out of the body and have not waved membrane.



**C. Epimastigote:** the body is tall and motile generator lies in front of the nucleus that move little away from the center of the body and arise on it flagellate that connect with the body and with the waved membrane therefore extend with free end.



**D. Trypomastigote:** The body is spindle and the nucleus lies in the center, the motile generator lies in the last part of the parasite and arise from it a flagellate extend along the external adage to the waved membrane and the end of flagella is free.



**Note:** the parasite that belong to *Leishmania* pass through the life cycle in amastigote and promastigote forms while *Trypanosoma* pass through the life cycle with all forms.

- **Leishmania:**

Parasite in human present in amastigote (diagnostic stage for human).

while in the insect (Sand fly) promastigote (infective stage for human).

A. *L.donovani*: causes visceral Leishmianiasis, Kalaazar and Dum Dum fever.

Splenomegaly & hepatomegaly.

**1.Visceral leishmaniasis** (local name, kala-azar): This disease is caused by *Leishmania donovani* in India, East Africa, and China. In the visceral disease, the parasite initially infects macrophages, which, in turn, migrate to the spleen, liver, and bone marrow, where the parasite rapidly multiplies.

The spleen and liver enlarge, and jaundice may develop. Most individuals have only minor symptoms, and the disease may resolve spontaneously. However, in some cases, complications resulting from secondary infection and emaciation result in death.

A. *L.tropica* : causes tropic sore or Baghdad boil, oriental sore and cutaneous Leishmaniasis, the insect transport *L.tropica* is sand fly.

- **1.Cutaneous leishmaniasis** (local name, oriental sore): This disease is caused by *Leishmania tropica* in north and west Africa, Iran, and Iraq. The cutaneous form of the disease is characterized by ulcerating single or multiple skin sores. Most cases spontaneously heal, but the ulcers leave unsightly scars. In Mexico and Guatemala, the cutaneous form is due to *Leishmania mexicana*, which produces single lesions that rapidly heal.



- *L. braziliensis* : causes Mucocutaneous leishmaniasis.

**1. Mucocutaneous leishmaniasis** (local name, espundia):

This disease is caused by *Leishmania brasiliensis* in Central and South America, especially the Amazon regions. In this form of the disease, the parasite attacks tissue at the mucosal-dermal junctions of the nose and mouth, producing multiple lesions. Extensive spreading into mucosal tissue can obliterate the nasal septum and the buccal cavity, ending in death from secondary infection.

- ***Trypanosoma:***

- ***T.gambiense***: causing sleeping disease to human and the mediated host is Tse\_Tse fly.
- ***T.cruzi***: cause chagas disease, American trypanosomiasis. Chagas' disease is transmitted to humans by **bugs**

- **Diagnosis of *L.donovani***

1. thick blood film (amastigot).
2. skin test: is used to measure delayed hypersensitivity.
3. detection of antibody by ELISA.
4. can be cultured on NNN media (Novy Macneel Nicolle)

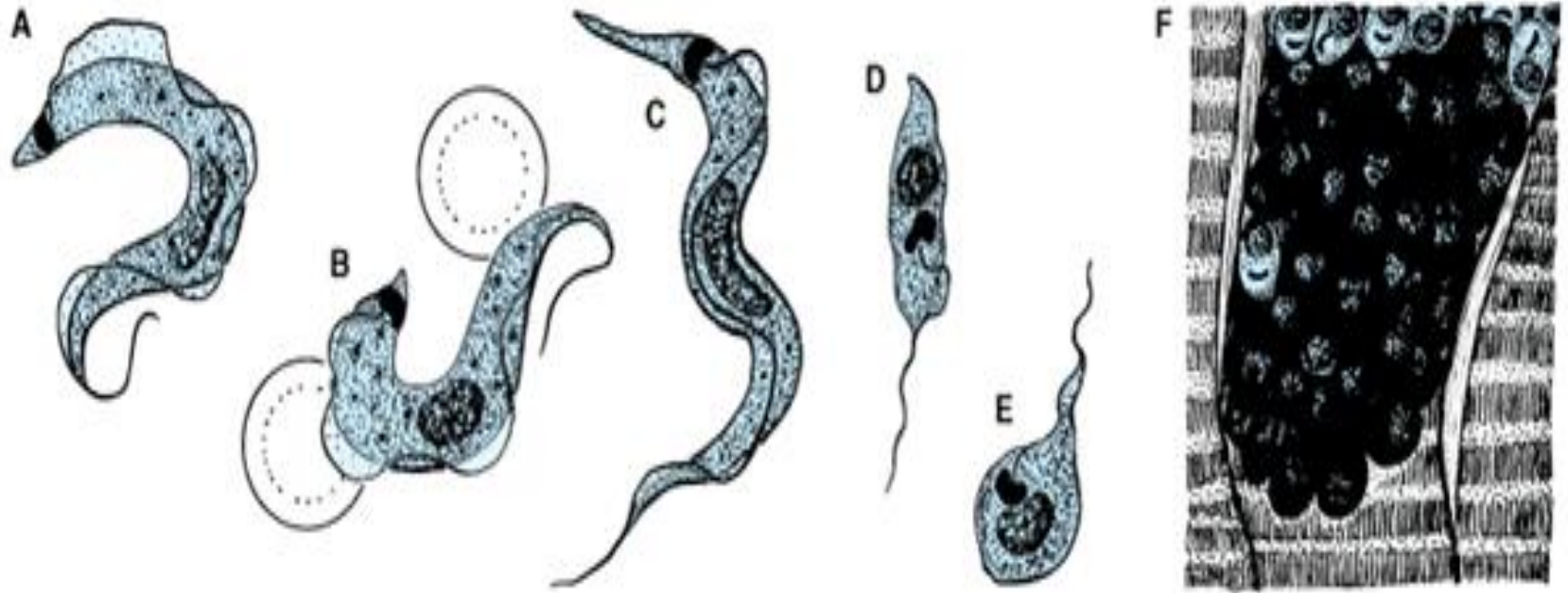
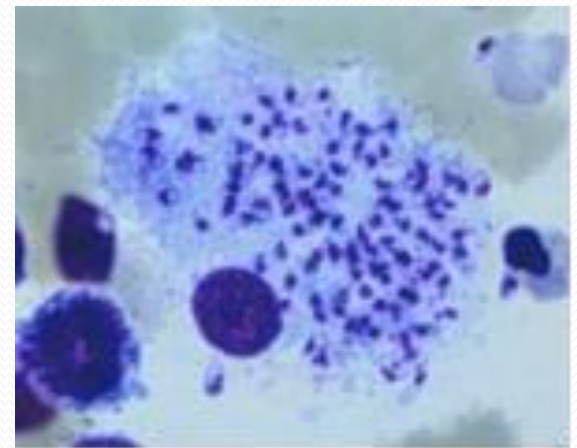
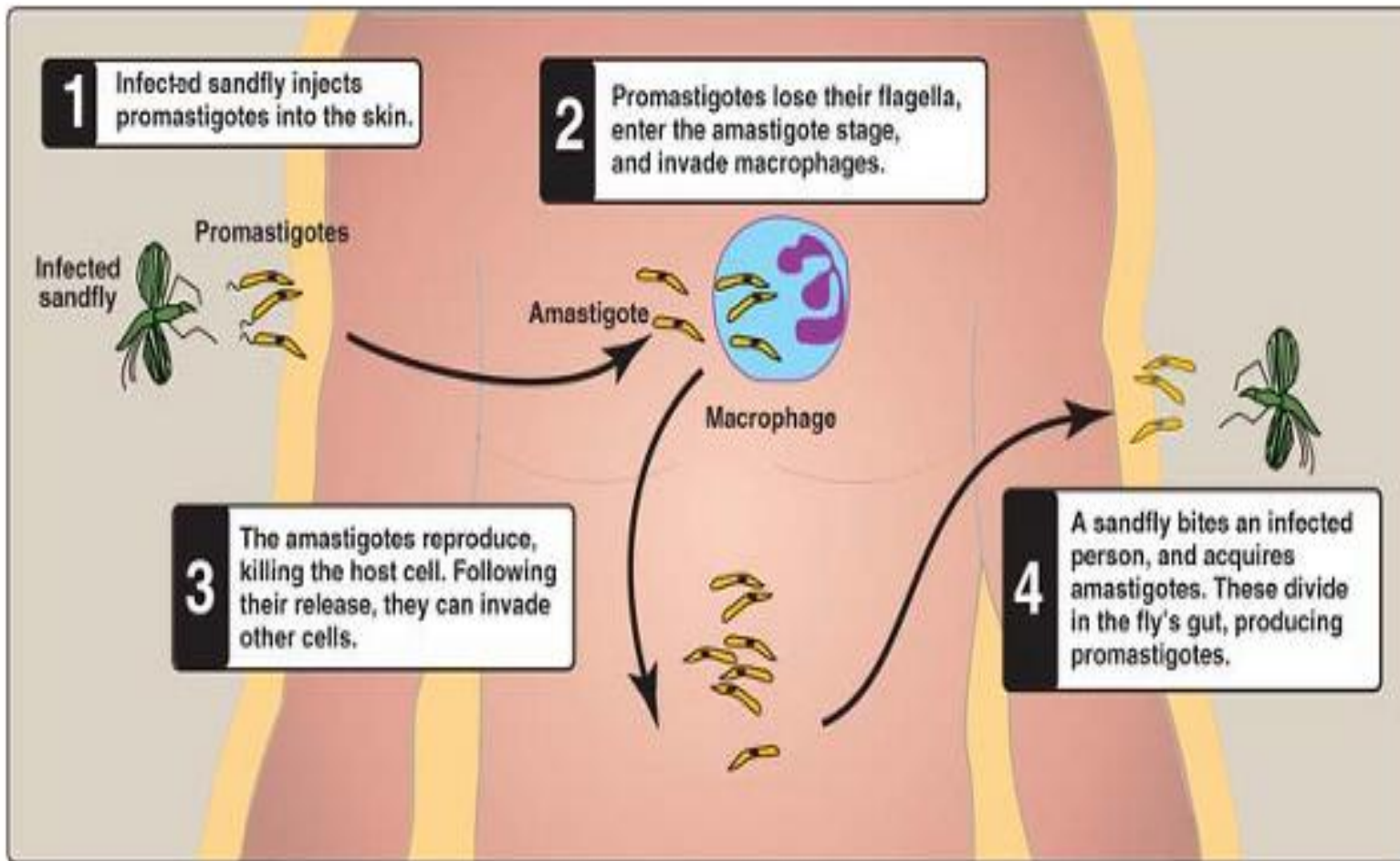


Figure:

A, B, C: Trypomastigotes in blood;  
 D: epimastigote,  
 E: promastigote,  
 F: amastigote colony in heart muscle

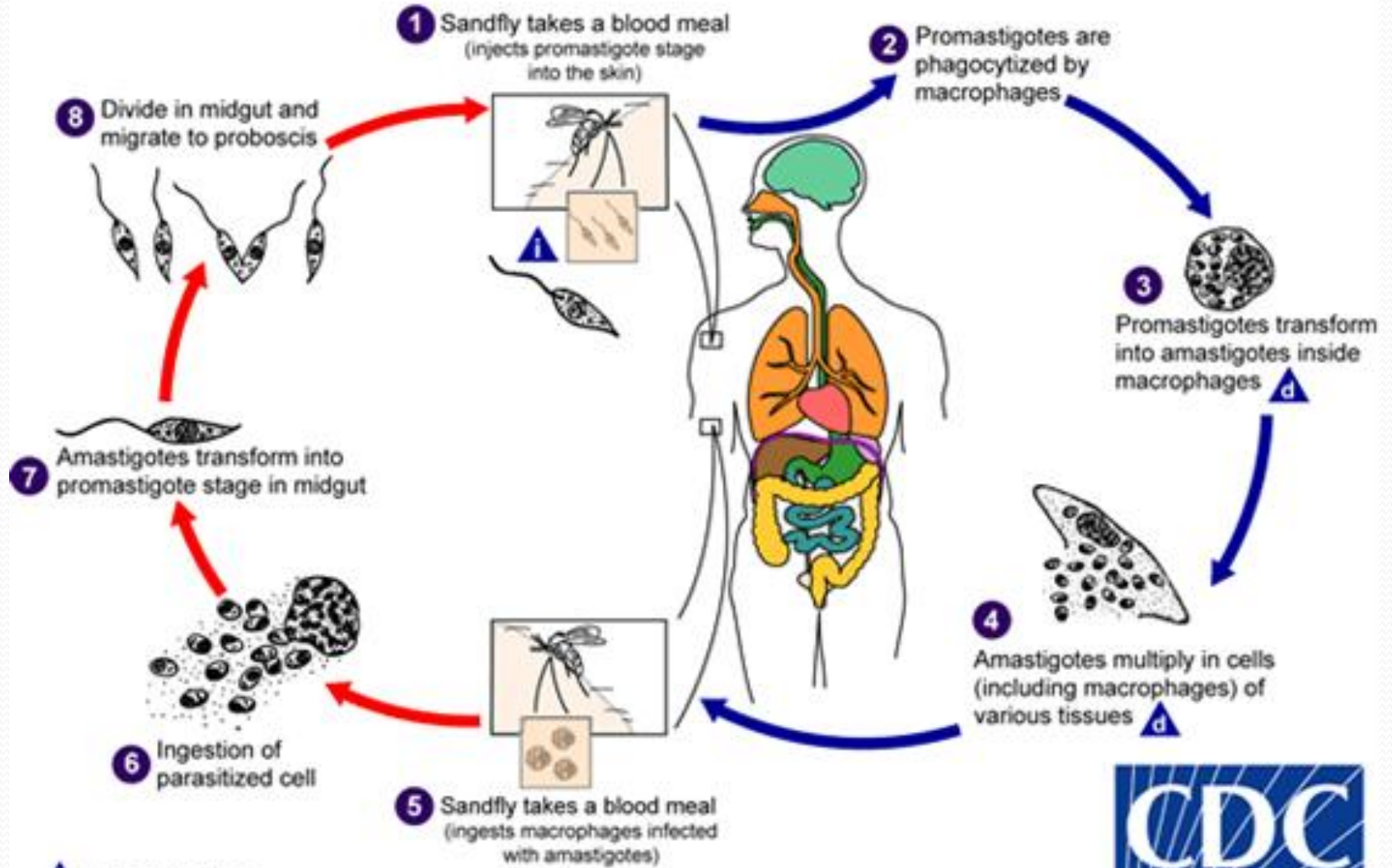




**Figure 21.13** Life cycle of *Leishmania*.

## Sandfly Stages

## Human Stages



**i** = Infective Stage

**d** = Diagnostic Stage



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## Prevention and Control

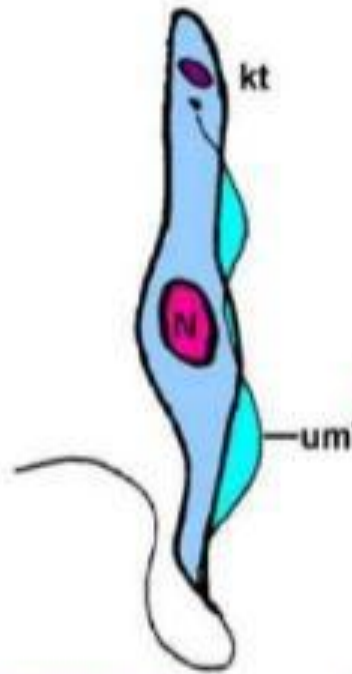
**control** of **Leishmania donovani** = the vector control, and avoidance sand fly

- **control** of **Leishmania tropica** = the vector control, and avoidance sand fly

**Treatment** of **Leishmania donovani** = Pentostam + Sodium Stibogluconate

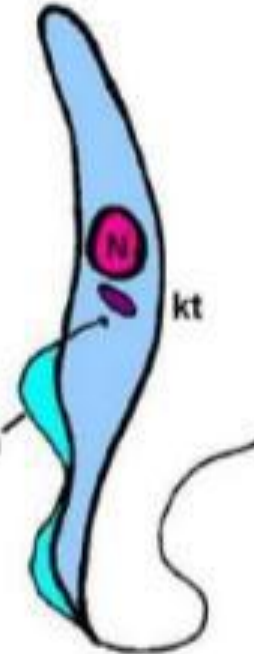
- **Treatment** of **Leishmania tropica** = Paromomycin + Sodium Stibogluconate
- **Treatment** of **Plasmodium** = Primaquine or chloroquine

trypomastigote



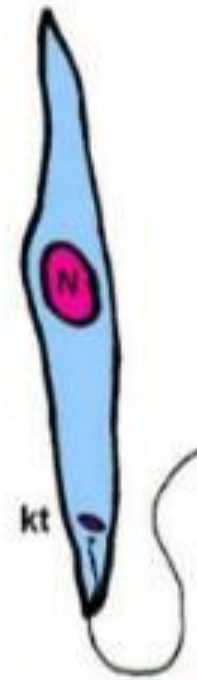
**Trypomastigote:**  
blood stream form;  
infective form  
replicative

epimastigote



**Epimastigote:**  
replicative stage  
in insect

promastigote



**Promastigote:**  
infective stage of  
*Leishmania* spp.

amastigote



non-motile, intracellular

**Amastigote:**  
non-motile;  
intracellular,

