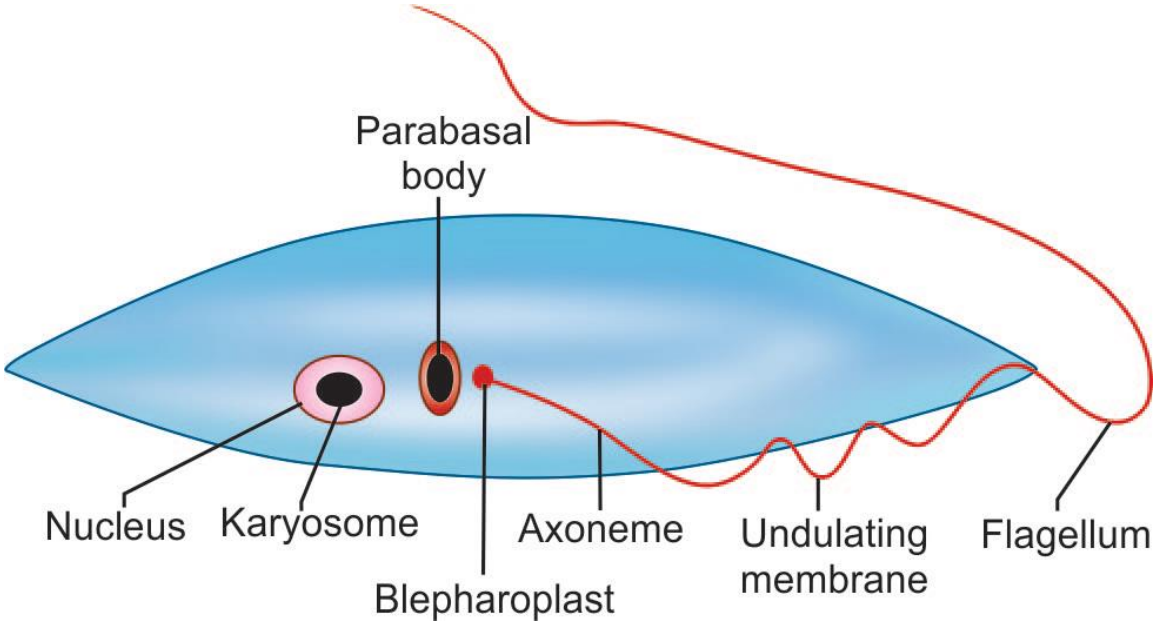
Phylum: Protozoa:

Class: Flagellates.

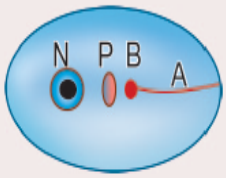
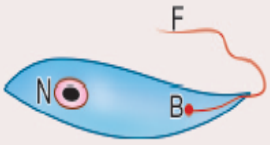
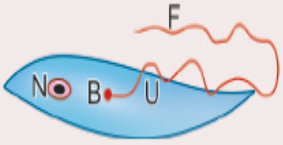
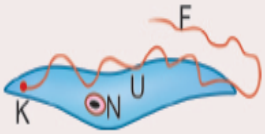
Hemoflagellate:

- They live in the blood and tissues of man and other vertebrate hosts and in the gut of the insect vectors.

- **Flagellum** is a thin, hair like structure, which originates from the blepharoplast. 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**. A free flagellum at the anterior end traverses on the surface of the parasite as a narrow **undulating membrane**



- Hemofagellates exist in two or more of four morphological stages.

	Amastigote	Promastigote	Epimastigote	Trypomastigote
Morphological characteristics	Rounded or ovoid, without any external flagellum. The nucleus, kinetoplast, and axial filaments can be seen. The axoneme extends upto the anterior end of the cell	Lanceolate in shape. Kinetoplast is anterior to the nucleus (antenuclear kineloplast) 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 (juxtanuclear 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	*Trypanosoma cruzi* and *Leishmania* as intracellular form in vertebrate host	It is the infective stage of *Leishmania*, found in the insect vector as well as in cultures *in-vitro*	It is the form in which *Trypanosoma brucei* occur in salivary gland of the vector tsetse fly and *Trypanosoma cruzi* in the midgut of the vector reduviid bug. **Note:** This stage is lacking in *Leishmania*.	This is the infective stage of trypanosomes found in arthropod vector and in the blood of infected vertebrate. **Note:** This stage is lacking in *Leishmania*
Schematic illustration				

*- *Leishmania*

- All members of the genus *Leishmania* are **obligate intracellular parasites** that pass their life cycle in 2hosts—the mammalian host and the insect vector, female sandfly.

- In humans and other mammalian hosts, they multiply within macrophages, in which they occur exclusively in the **amastigote form**, having an ovoid body containing a nucleus and kinetoplast.

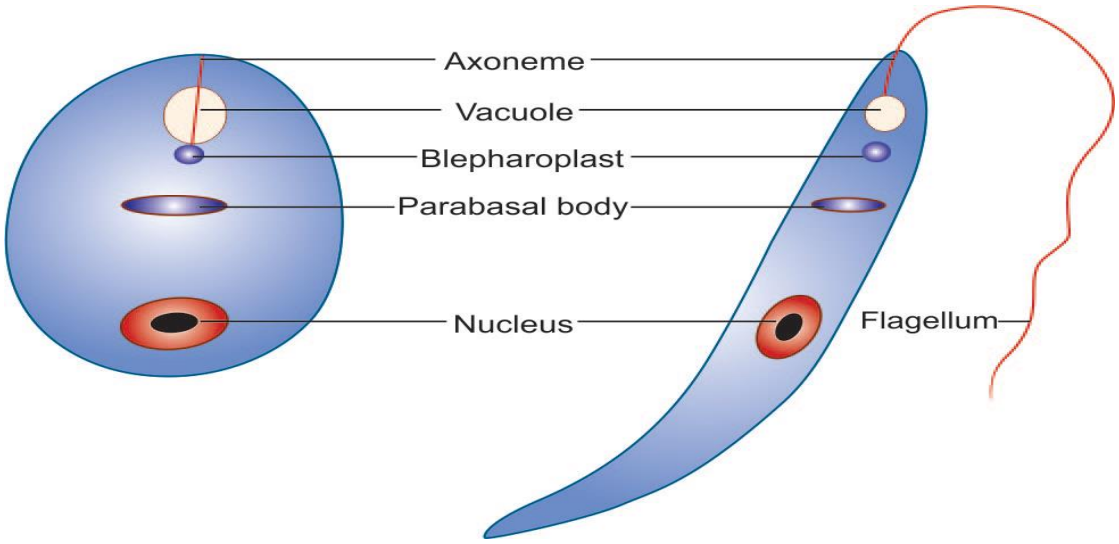
- In the sandfly, they occur in the promastigote form, with a spindle shaped body and a single flagellum arising from anterior end.

Across the tropics, 3 different diseases are caused by various species of genus *Leishmania*. These are:

- **Visceral leishmaniasis:** The species *L. donovani* complex infecting internal organs (liver, spleen, and bone marrow) of human is the causative parasite.
- **Cutaneous leishmaniasis**: The species *L. tropica* complex, *L. aethiopica*, *L. major* and *L. Mexicana complex* are the causative parasite.
- **Mucocutaneous leishmaniasis** : It is caused by the *L. braziliensis* complex .

***Leishmania Donovani* (Old World Leishmaniasis)**

L. donovani causes **visceral leishmaniasis** or **Kala-azar**. It also causes the condition, **Post Kala-azar Dermal Leishmaniasis (PKDL)**.



Habitat

The amastigote (LD body) of *L. donovani* is found in the reticuloendothelial system. They are found mostly within the macrophages in the spleen, liver, bone marrow and less often in other locations such as skin, intestinal mucosa, and mesenteric lymph nodes.

Morphology

The parasite exists in two forms

- **Amastigote form:** in humans and other mammals.
- **Promastigote form:** in the sand fly and in artificial culture

Life Cycle

L. donovani completes its life cycle in two hosts

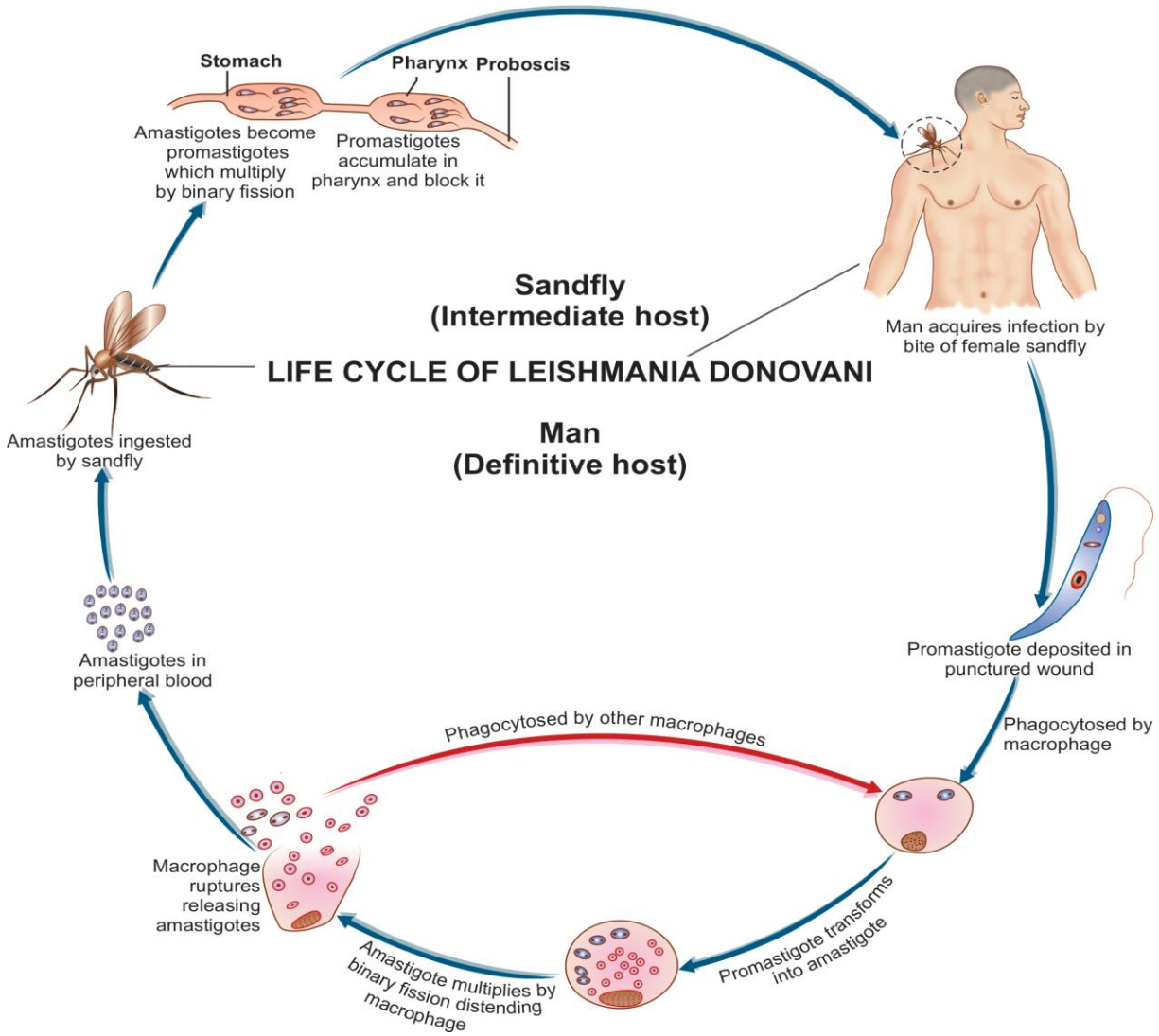
- Definitive host: Man, dog, and other mammals.

- Vector: Female sandfly (*Phlebotomus* species).

Infective form: Promastigote form present in midgut of female sandfly.

Mode of transmission:

- Humans acquire by bite of an infected female sand fly.
- It can also be transmitted vertically from mother to fetus, by blood transfusion, and accidental inoculation in the laboratory.

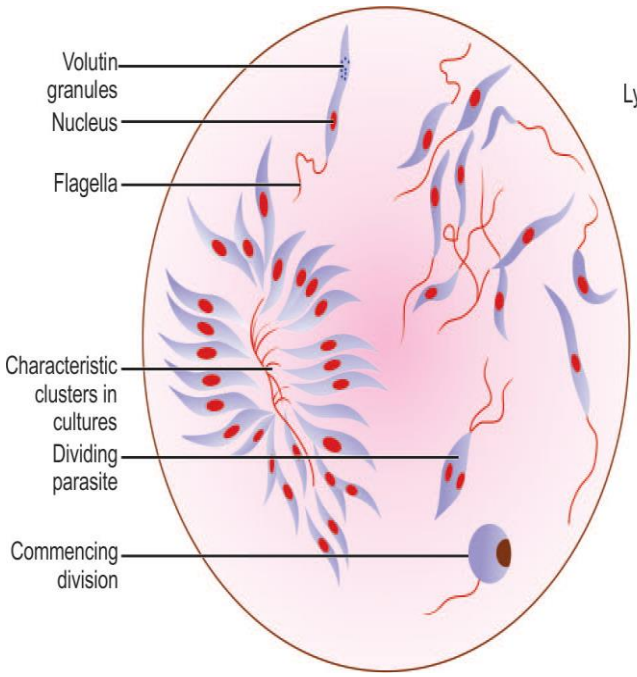


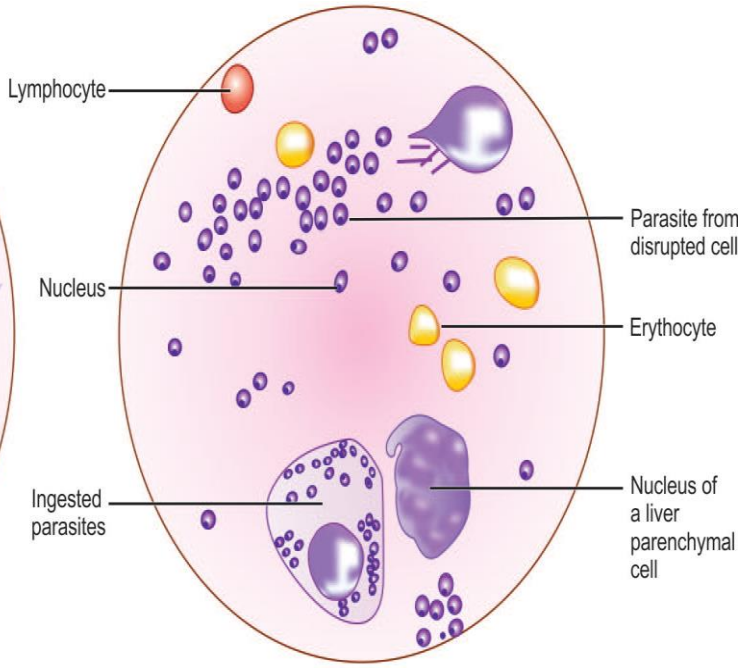
Lecturer 6

Laboratory Diagnosis

For microscopic demonstration of the parasite, the materials collected are:

- Peripheral blood smear
- Bone marrow aspirate
- Splenic aspirate
- Enlarged lymph node aspirates.
- Comparison of aspiration biopsies.





Serodiagnosis

These tests include:

- Indirect immunofl uroscent antibody test (IFAT)
- Counter immunoelectrophoresis (CIEP)
- ELISA and DOTELISA
- DAT