# Luminal and Atrial flagellates

## *Trichomonas spp (T. hominis, T. tenax)*

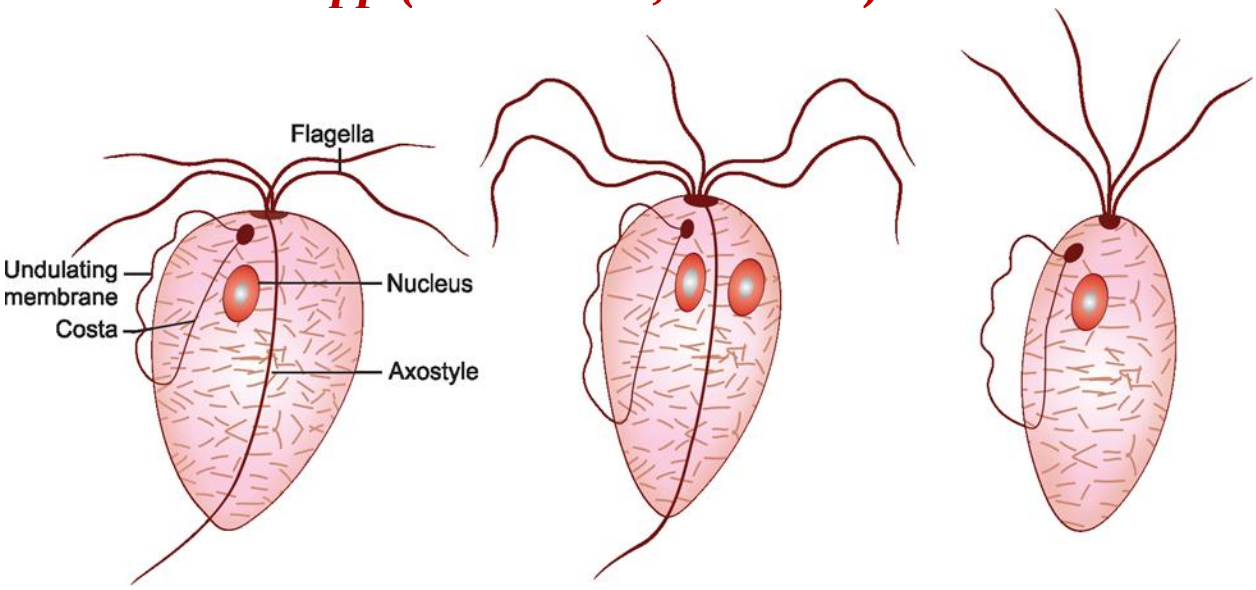



**Fig.7. Trichomonas species. A. T. vaginalis; B. T. hominis; C. T. tenax**

**Trichomonas**

*Trichomonas* differs from other flagellates, as it exists only in the trophozoite stage. Cystic stage is not seen.

## *Trichomonas vaginalis*

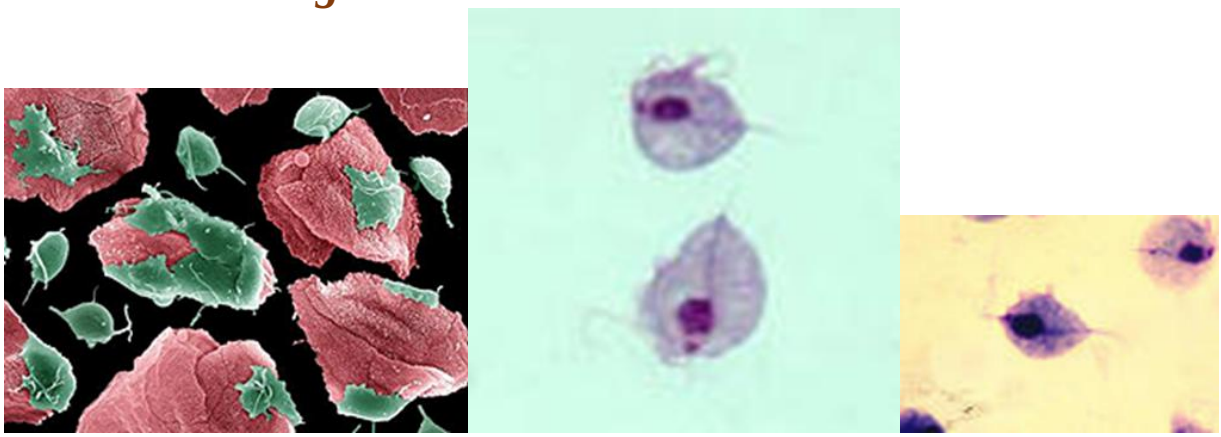
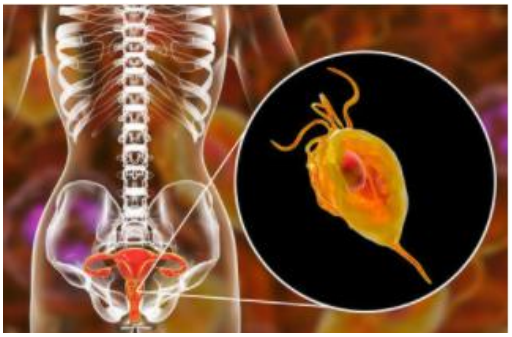


Fig. 8 ***Trichomonas vaginalis***

## *Habitat*

- ✓ In **females,** it lives in the **vagina and cervix** and may also be found in Bartholin's glands**, urethra, and urinary bladder**.
- ✓ In **males**, it occurs mainly in the **anterior urethra**, but may also be found in the **prostate and preputial sac**.



## *Life Cycle:*

The life cycle of T. vaginalis is completed in a single host, **either male or female**.

- ✓ **Mode of transmission:**
  The trophozoite **cannot survive outside**, and so infection has to be transmitted directly from person to person. **Sexual** transmission is the usual mode of infection.
- ✓ Babies may get infected **during birth.**
- ✓ Fomites such as towels have been implicated in transmission.
- ✓ Trophozoites divide by **binary fission**.
- ✓ As cysts are not formed, the **trophozite** itself is the **infective form**.
- ✓ Incubation period is **roughly 10 days**.

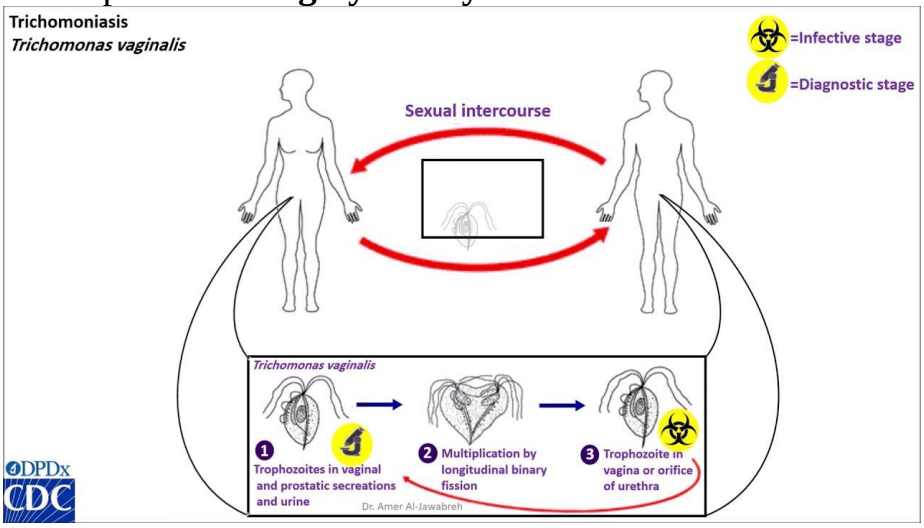



Fig. 9 ***Trichomonas vaginalis*** life cycle

# Pathogenesis

- ✓ *T. vaginalis* particularly infects **squamous epithelium** and **not columnar epithelium**. It secretes cystine proteases, lactic acid, and acetic acid, which disrupt the **glycogen levels and lower the pH of the vaginal fluid**.
- ✓ It is an **obligate parasite** and cannot live without close **association with the vaginal, urethral, or prostatic tissues.**
- ✓ Parasite causes petechial hemorrhage (**strawberry mucosa**), metaplastic changes, and desquamation of the vaginal epithelium.
- ✓ Intracellular edema and so-called chicken-like epithelium are the most characteristic features of **trichomoniasis.**

# Clinical Features

- ✓ Infection is often **asymptomatic**, particularly in males, although some may develop **urethritis, epididymitis, and prostatitis**.
- ✓ In females, it may produce **severe pruritic vaginitis** with an offensive, **yellowish green, often frothy discharge**, **dysuria, and dyspareunia. Cervical erosion is common**.
- ✓ Endometritis and pyosalpingitis are infrequent complications.
- ✓ Rarely, neonatal **pneumonia and conjunctivitis** have been reported in infants born to infected mothers.
- ✓ The incubation period of trichomoniasis is 4 days to 4 weeks.

## *Laboratory Diagnosis*

## *Microscopic examination*

- ✓ Vaginal or urethral discharge is examined microscopically. In males, trophozoites may be found in urine or prostatic secretions.
- ✓ Direct fluorescent antibody (DFA) is another method of detection of parasites and is more sensitive than the wet mount.

# Treatment

Simultaneous treatment of both partners is recommended.

- ✓ Metronidazole is the drug of choice.
- ✓ In pregnancy, metronidazole is **safe in the second and third trimesters.**

# Tissue flagellate:

All members of the genus *Leishmania* are **obligate intracellular parasites** that pass their life cycle in **2 hosts**—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**.
- ✓ In the sandfly, they occur in the **promastigote form**.
  - ➢ **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

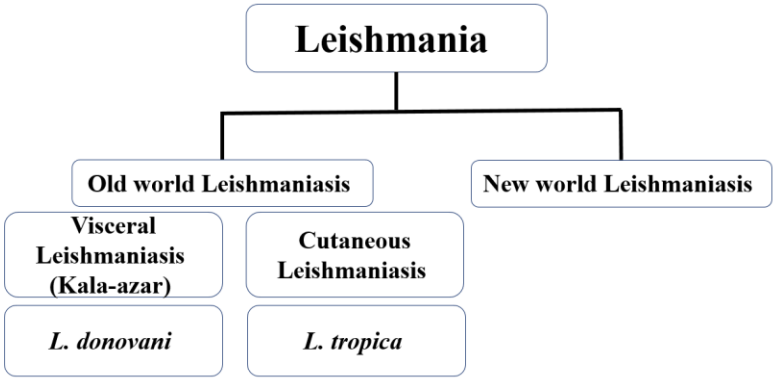



Fig 1; types of leishmanial

## *Leishmania Donovani*

*L. donovani* causes **visceral leishmaniasis or Kala-azar.**

## Morphology:

The parasite exists in 2 forms (Fig. 5.9).

- ➢ **Amastigote form:** in humans and other mammals.
- ➢ **Promastigote form:** in **the sandfly** and in **artificial culture**.

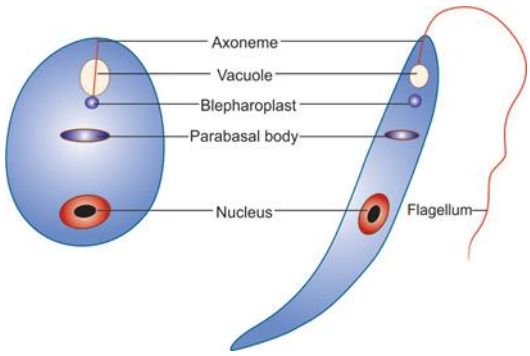



Fig .3. Morphology of Leishmania donovani. A. Amastigote (LD body); B. Promastigote

## Life Cycle:

- *L. donovani* completes its life cycle in **2 hosts**

- Definitive host: **Man, dog, and other mammals**.
- Vector: Female sandfly
- Infective form: **Promastigote form present in midgut of female sandfly**.

**Mode of transmission:**

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

- ✓ The sandfly regurgitates the **promastigotes** in the wound caused by its proboscis.
- ✓ These are **engulfed** by the cells of reticuloendothelial system **(macrophages, monocytes,)** and change into **amastigote (LD body)** within the cells.
- ✓ The amastigote **multiplies by binary fission**, producing numerous daughter cells that distend the macrophage and **rupture it**.
- ✓ When a vector **sandfly feeds on an infected person,** the amastigotes present in peripheral blood and tissue fluids enter the insect along with its blood meal.
- ✓ In the sandfly, they migrate from the **midgut to the pharynx and hypostome**, where they accumulate and block the passage.

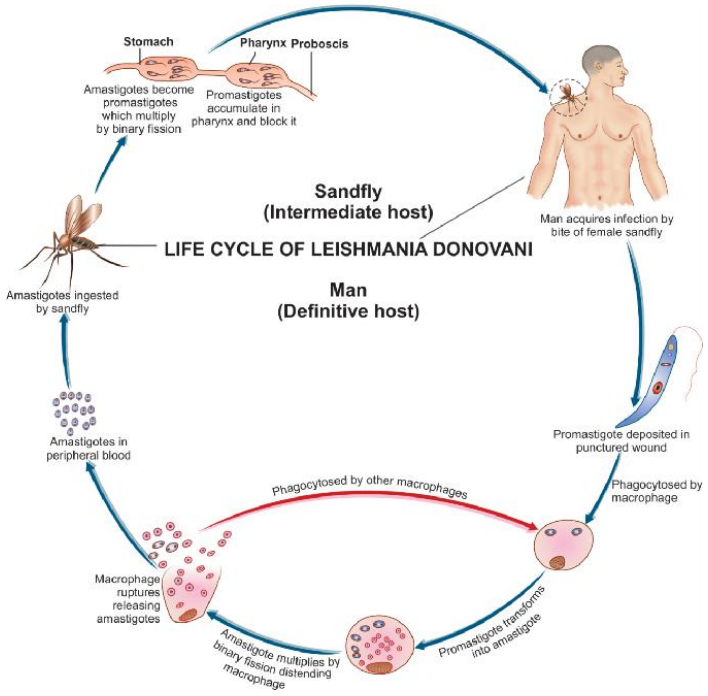



Fig. 4. Life cycle of *L. donovani*

## Pathogenicity:

*L. donovani* causes **visceral leishmaniasis or kala-azar**.

- ✓ **Kala-azar** is a reticuloendotheliosis resulting from the invasion of reticuloendothelial system by *L. donovani*.

✓ The **parasitized macrophages** disseminate the infection to all parts of the body.

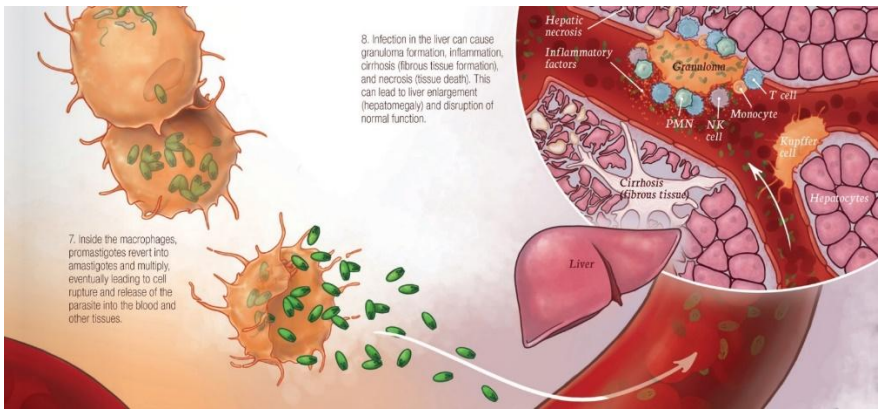



Fig. 6. **visceral leishmaniasis**

## Clinical Features of Kala-Azar

- ✓ The clinical illness begins with fever, which may be continuous.
- ✓ **Splenomegaly** starts early and is **progressive and massive** .
- ✓ **Skin becomes dry**, rough, and **darkly pigmented** (hence, the name Kala-azar).

## Laboratory Diagnosis:

- ✓ Demonstration of amastigotes in smears of tissue aspirates is the **gold standard** for diagnosis of visceral leishmaniasis.
- ✓ For microscopic demonstration of the parasite, the materials collected are:
  - o Peripheral blood, Bone marrow, and Splenic aspirate

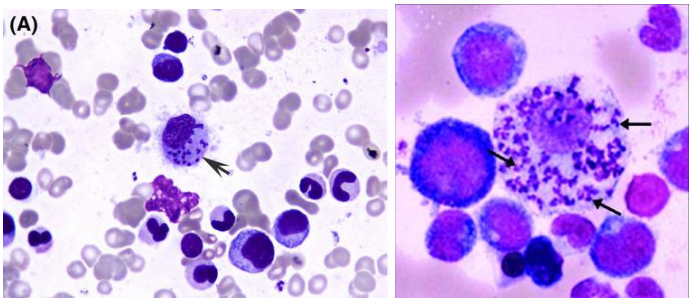



Fig.7.A- Leishmania donovani bodies in macrophages of bone marrow B. Leishmania donovani bodies in macrophages of Peripheral blood

## Treatment:

The standard treatment consists pentavalent antimonial compound, which is the drug of choice.

## *Leishmania Tropica*:

### Habitat

*L. tropica* causing **cutanaeous leishmaniasis** (**old world cutaneous leishmaniasis**) are essentially the **parasite of skin**. The amastigote forms occur in the **reticuloendothelial cells** of the skin, whereas **promastigote forms are seen in sandfly vector.**

**Mode of transmission:**

- ✓ The most common mode of infection **is through bite of sandflies**.
- ✓ Infection may also sometimes occur by **direct contact**.
- ✓ Infection may be transmitted from **man-to-man or animal-to-man by direct inoculation of amastigotes**
- ✓ Infection may also occur by **autoinoculation**.

## Pathology:

**Early lesions are papular, followed by ulceration necrosis. Papule and ulcer are** the main pathological lesions. They heal over months to years, leaving **scars**.

Fig.8. *L. tropica* Scars

# Clinical Features:

## *L. tropica* causes Old World Cutaneous leishmaniasis.

- ✓ Causes **tropic sore or Baghdad boil,** oriental sore, and **cutaneous Leishmaniasis**.
- ✓ 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.

## Laboratory Diagnosis

### *Microscopy*

- ✓ Smear is made from the material obtained from the **indurated edge of a nodule or sore and stained by Giemsa or Leishman stain**.

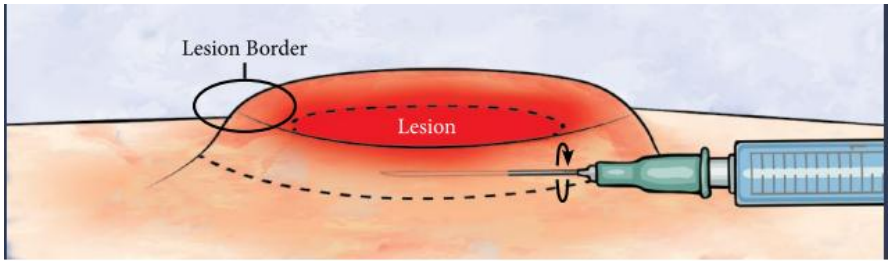



Fig. 9. Taking a sample from the **edge of a nodule or sore of cutaneous leishmaniasis**

- ✓ Amastigotes are found in large **numbers inside the macrophages.**

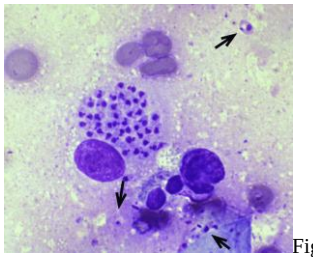


Fig.10. Amastigote inside the macrophages

### Treatment

The specific treatment of cutaneous leishmaniasis is same as visceral leishmaniasis.

## ❖ 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.