

Al-Mustaqbal University college
Department of pharmacy



2st Class, 2st Semester

PARASITOLOGY

Lab : Leishmania and Balantidium coli

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• Classification of parasites

divided into three main groups:

A –Protozoa single-celled organism, multiply in human host, All protozoans have 2 important stages of life:

Trophozoite and Cyst

1-phylum: Sarcomastigophora

a- subphylum: Sarcodina

b-subPhylum: mastigophora

2- Phylum: Ciliophora

3- Phylum: Sporozoa

B-Helminthes

(worms) multicellular worms, do not normally multiply in human host

1- Phylum: platyhelminthes

الديدان المسطحة

2- Phylum:

Nematoda

الديدان الخيطية

3- Phylum:

Acanthocephala

الديدان شوكية الراس

C-Arthropoda

multicellular worms, do not normally multiply in human host

1- Phylum: insecta

الحشرات

2- Phylum:

Archneida العناكب

Subphylum: mastigophora

Leishmania

Taxonomical classification of Leishmania

Kingdom	Protista
Subkingdom	Protozoa
Phylum	Sarcomastigophora
Subphylum	Mastigophora
Class	Zoomastigophora
Order	Kinetoplastida
Family	Trypanosomatidae
Genus	<u>Leishmania</u>
Species	<u>donovani</u> , <u>tropica</u> , <u>mexicana</u> , <u>braziliensis</u> , <u>aethiopica</u> , <u>infantum</u>

***Leishmania* Parasites and Diseases**

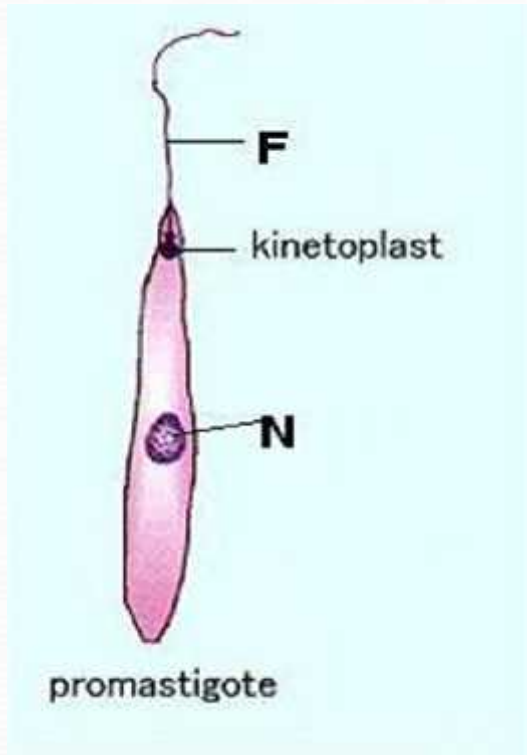
SPECIES	Disease
<u>Leishmania tropica</u> major <u>Leishmania tropica</u> minor <u>Leishmania aethiopica</u> <u>Leishmania mexicana</u>	Cutaneous leishmaniasis
<u>Leishmania braziliensis</u>	Mucocutaneous leishmaniasis
<u>Leishmania donovani</u> <u>Leishmania infantum</u>	Visceral leishmaniasis

Morphology

Digenetic Life Cycle

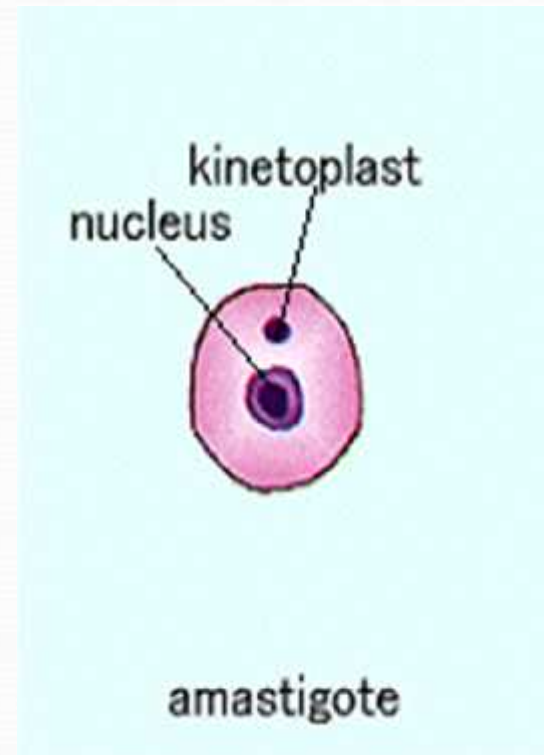
- **1- Promastigote**

- **Insect**
- **Motile**
- **Midgut**

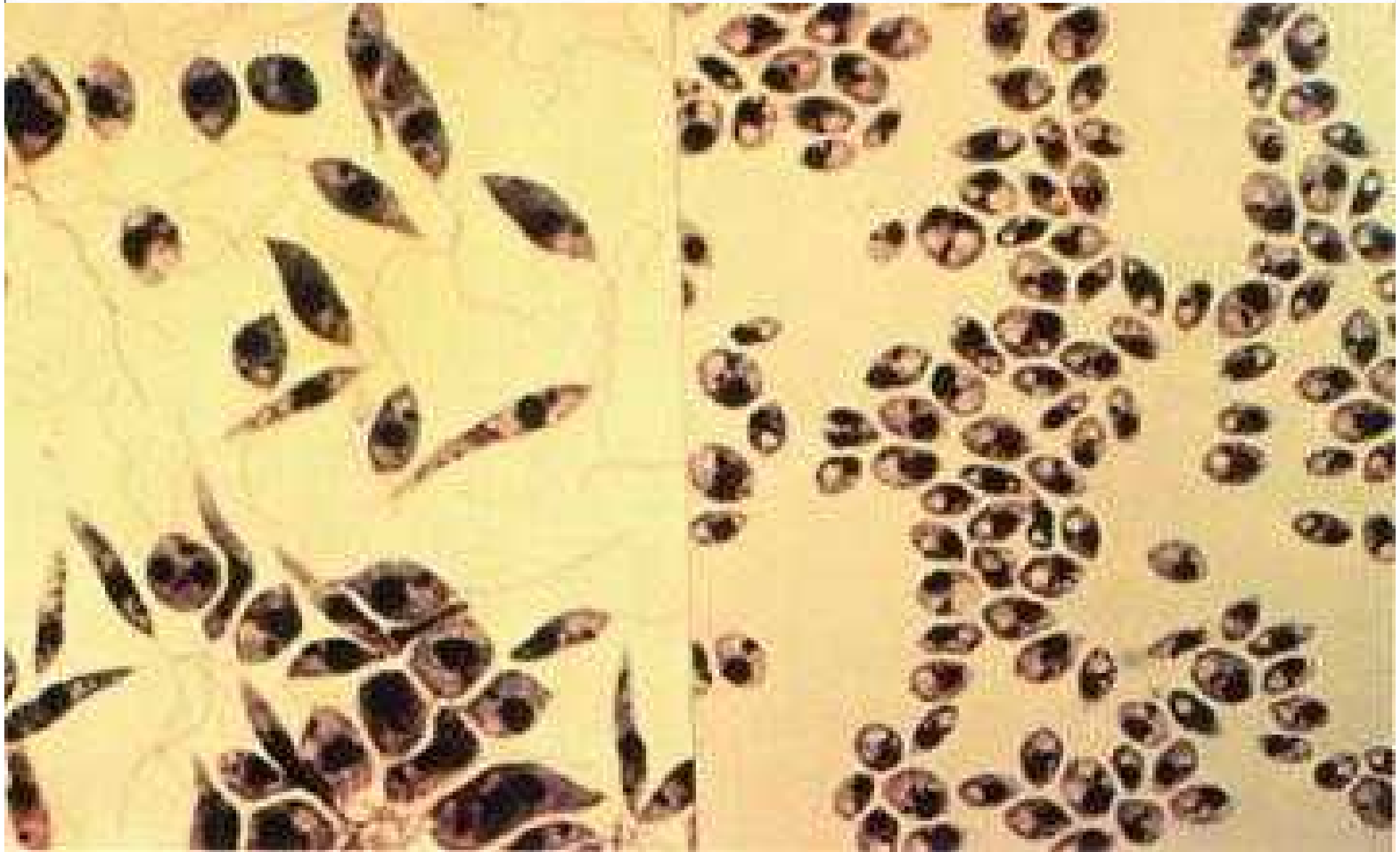


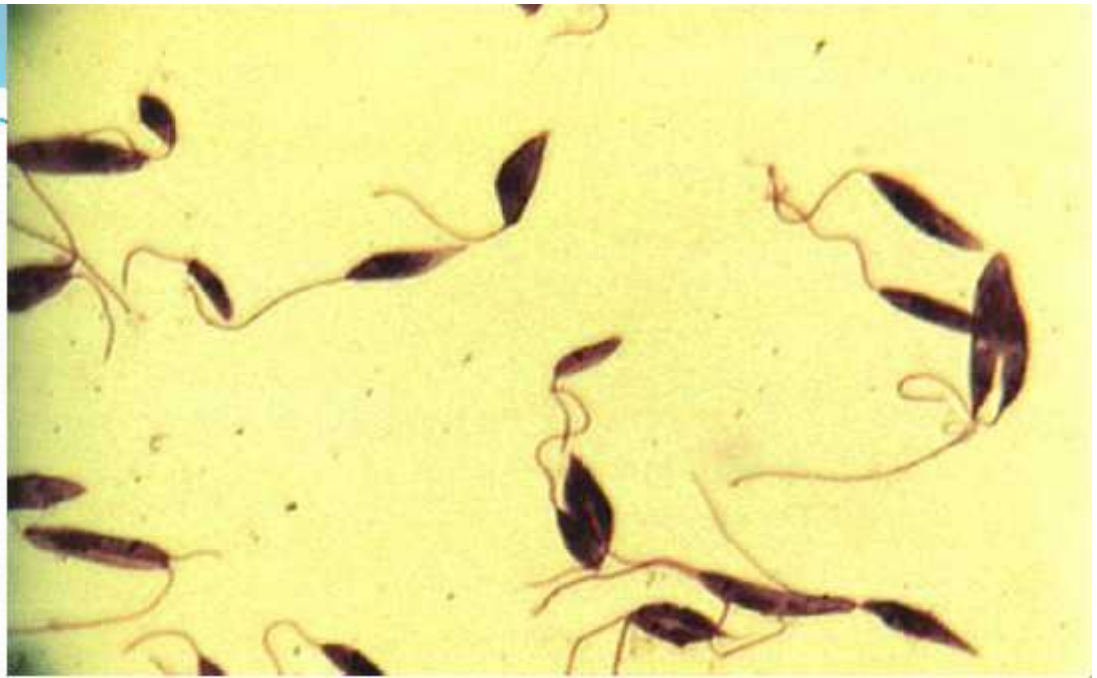
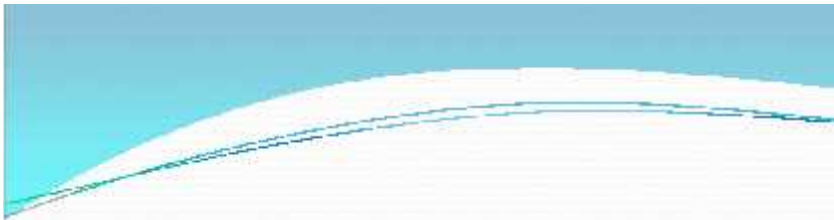
- **2- Amastigote**

- **Mammalian stage**
- **Non-motile**
- **Intracellular**



Promastigote and amastigote



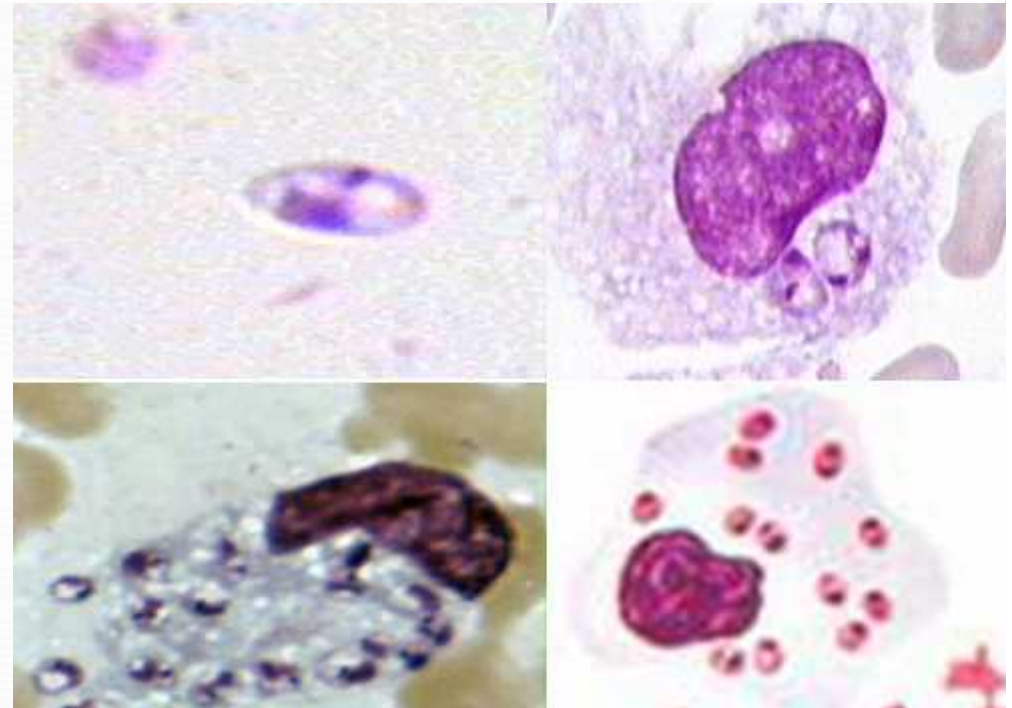


- **1- Promastigote:**

- Vector phase
- Reside in the gut of **sandfly**
- Spindle shaped with 1 free flagellum
- Nucleus; cytoplasm; kinetoplast; basal body; rhizoplast
- Chrysanthemum-like in culture medium

• 2- Amastigote:

- Human phase, reside in macrophage
- Very, very minute elliptical body
- No free flagellum
- Nucleus: deep red, located at one side
- Cytoplasm: blue (after right stain)
- Kinetoplast: basal body;
- rhizoplast



Main Points of Life Cycle

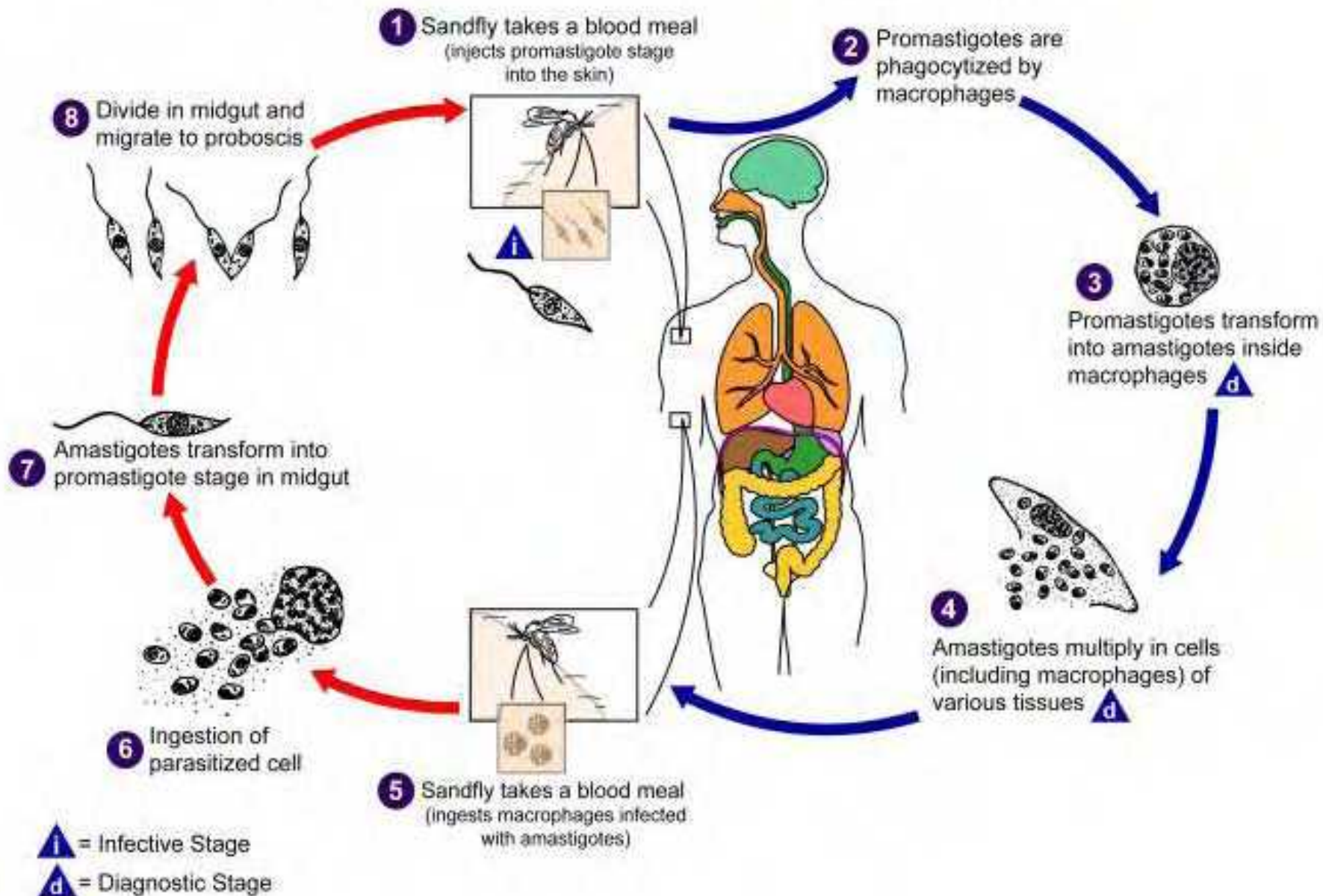
- **Host:** man and sandfly
- **No sexual development** in the host
- **Residing site:** macrophage
- **Infective stage:** promastigote
- **Diagnostic stage:** Amastigote
- **Infective route:** inoculation of sandfly
- **Reservoir host:** dog
- Infection could also via transfusion

Leishmaniasis

(*Leishmania spp.*)

Sandfly Stages

Human Stages



Clinical Spectrum of Leishmaniasis

Cutaneous Leishmaniasis (CL) Skin, Mucous membranes

most common form, relatively benign self-healing skin lesions
(simple CL)

Mucocutaneous Leishmaniasis (MCL)

simple skin lesions that metastasize to mucosae (especially nose and mouth region)

Visceral Leishmaniasis (VL) Liver, Spleen, Bone marrow

Fatal (90% untreated), generalized infection of the reticuloendothelial system, high mortality



Cutaneous leishmaniasis of the face.



A cutaneous leishmaniasis lesion on the arm.

Visceral Leishmaniasis

Skin changes

Dark pigmentation or depigmentation (butterfly pigmentation)

(also called Kala azar means black fever)



Butterfly pigmentation



Depigmented areas



Diagnosis of

C. Leishmaniasis

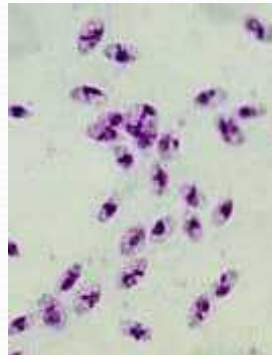
Clinically:

Ulcer with sharp cut indurated margin



Microscopy:

To detect amastigotes at the edge of the ulcer by aspiration or biopsy



Culture:

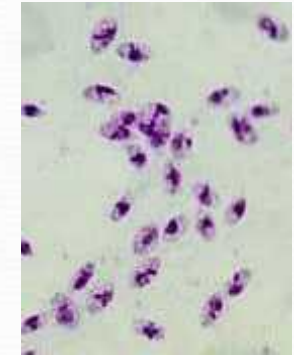
To detect promastigotes

Serological tests

V. Leishmaniasis

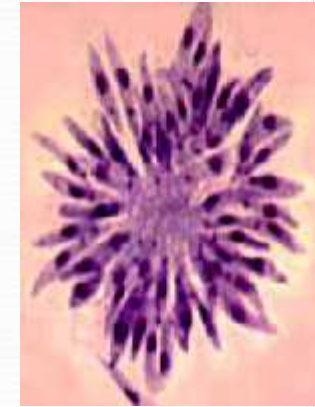
Clinically:

Fever, hepatosplenomegaly



Microscopy:

To detect amastigotes in blood, liver, spleen, lymph node, bone marrow



Culture:

To detect promastigotes

Animal inoculation

Serological tests



Phylum: Ciliophora

Balantidium coli

Taxonomical classification of Balantidium coli

Kingdom: Eukaryota

Subkingdom: Protozoa

Phylum: Ciliophora

Class: Litostomatea

Order: Vestibuliferida

Family: Balantiidae

Genus: Balantidium

Species: coli

Causes: **Balantidiasis, balantidial dysentery**

Affects **man** and **Pigs** are reservoir hosts.

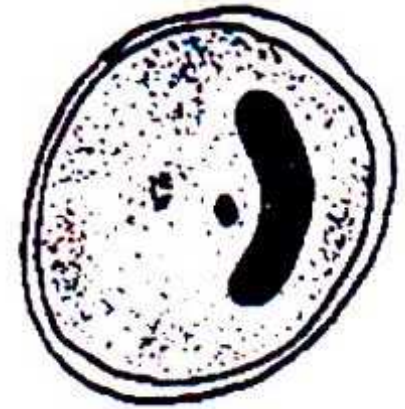
- Habitat : **large intestine esp. the caecum.**
Lives in the lumen, mucosa and submucosa of the large intestine.
- Infective stage : **the cyst.**
- Trophozoites invade and multiply in the intestinal wall

Mode of infection : **ingestion of cyst in contaminated food or water.**

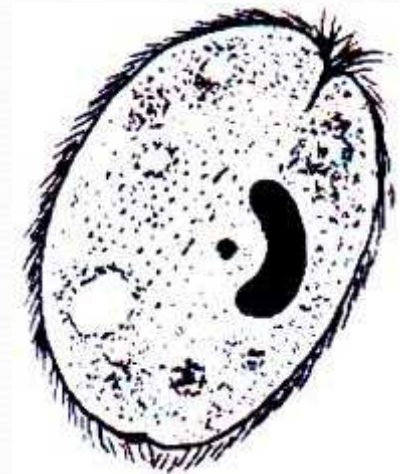
Flies and food handlers. **Heteroinfection**

Faeco-oral. **Autoinfection**

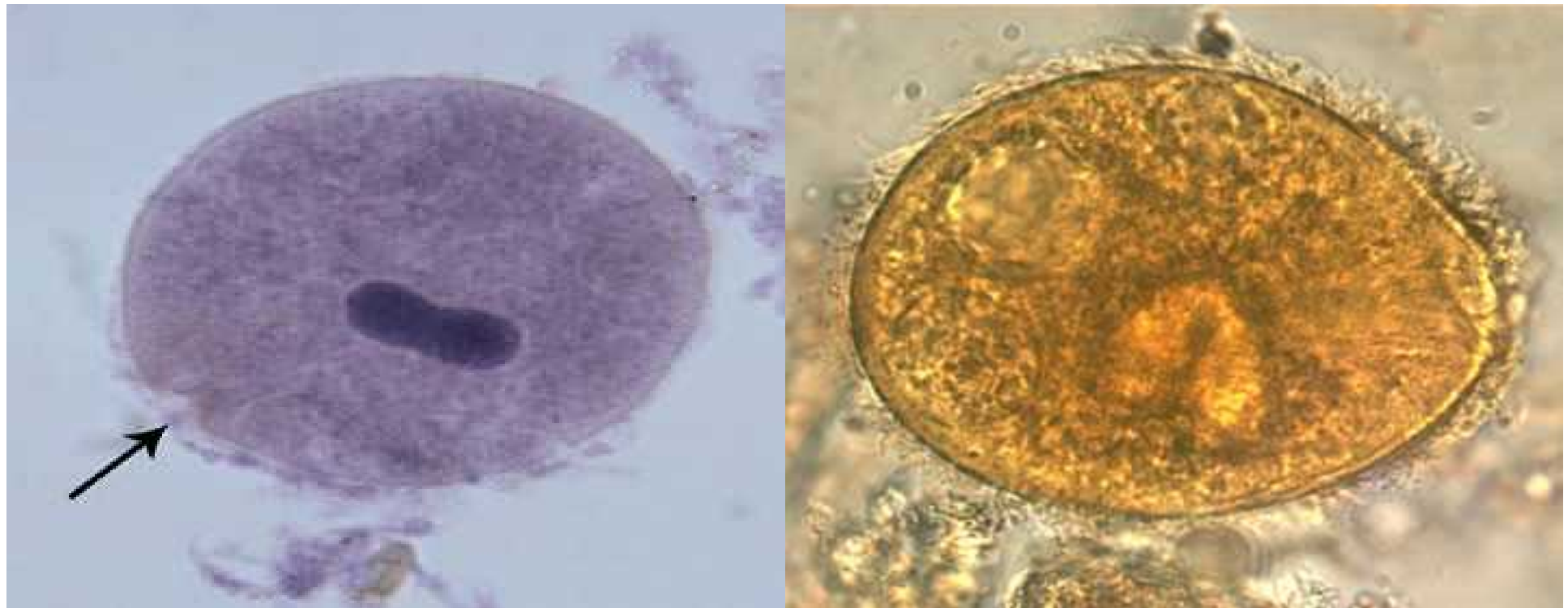
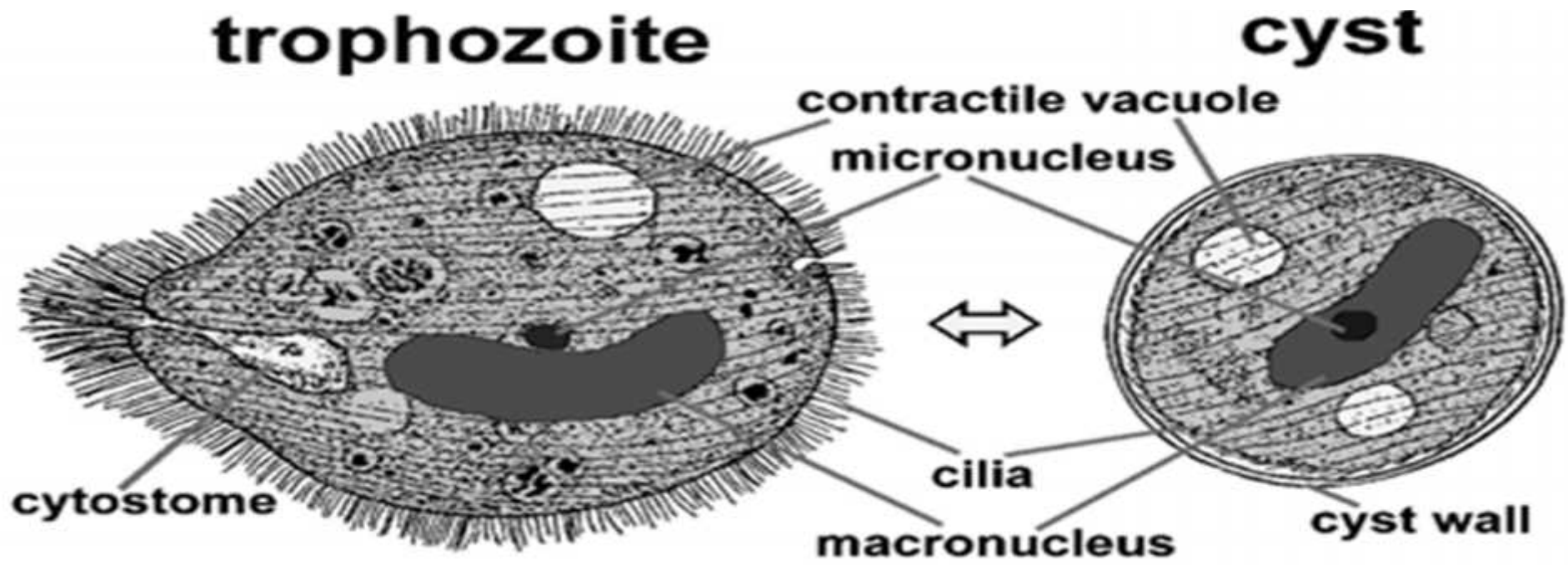
Form nests and necrotic ulcers of the large intestine

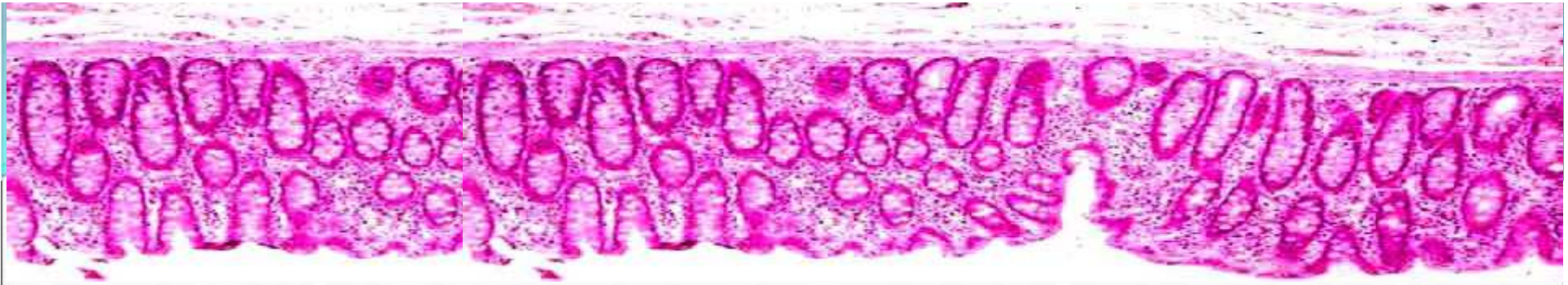


Cyst



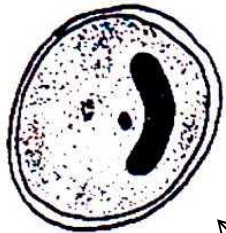
Trophozoite





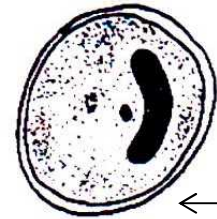
Life cycle

Pass out in stool



In the lumen

Trophozoites multiply by both Transverse binary fission & Conjugation



Cyst enters with food

Attached to mucosa



trophozoite

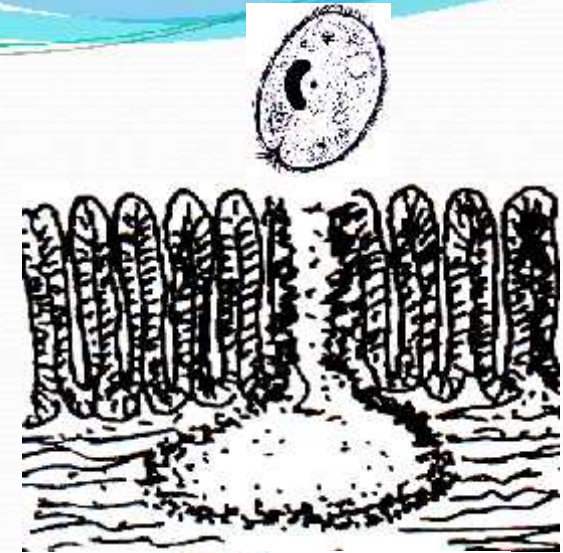


Mucosa of large intestine

Pathogenesis

Trophozoites invade mucosa by :

- hyaluronidase enzyme.
- boring action of cilia.
- Formation of flask-shaped ulcer.
- Secondary bacterial infection.
- Symptoms of dysentery.



Complications:

- Haemorrhage.
- Perforation.
- Peritonitis.
- Appendicitis.



Diagnosis

Stool examination several times.

Treatment

Metronidazole OR Oxytetracycline