MEDICAL PROTOZOOLOGY

A NOTE ON TAXONOMY

Taxonomy is the science of defining groups of biological organisms on the

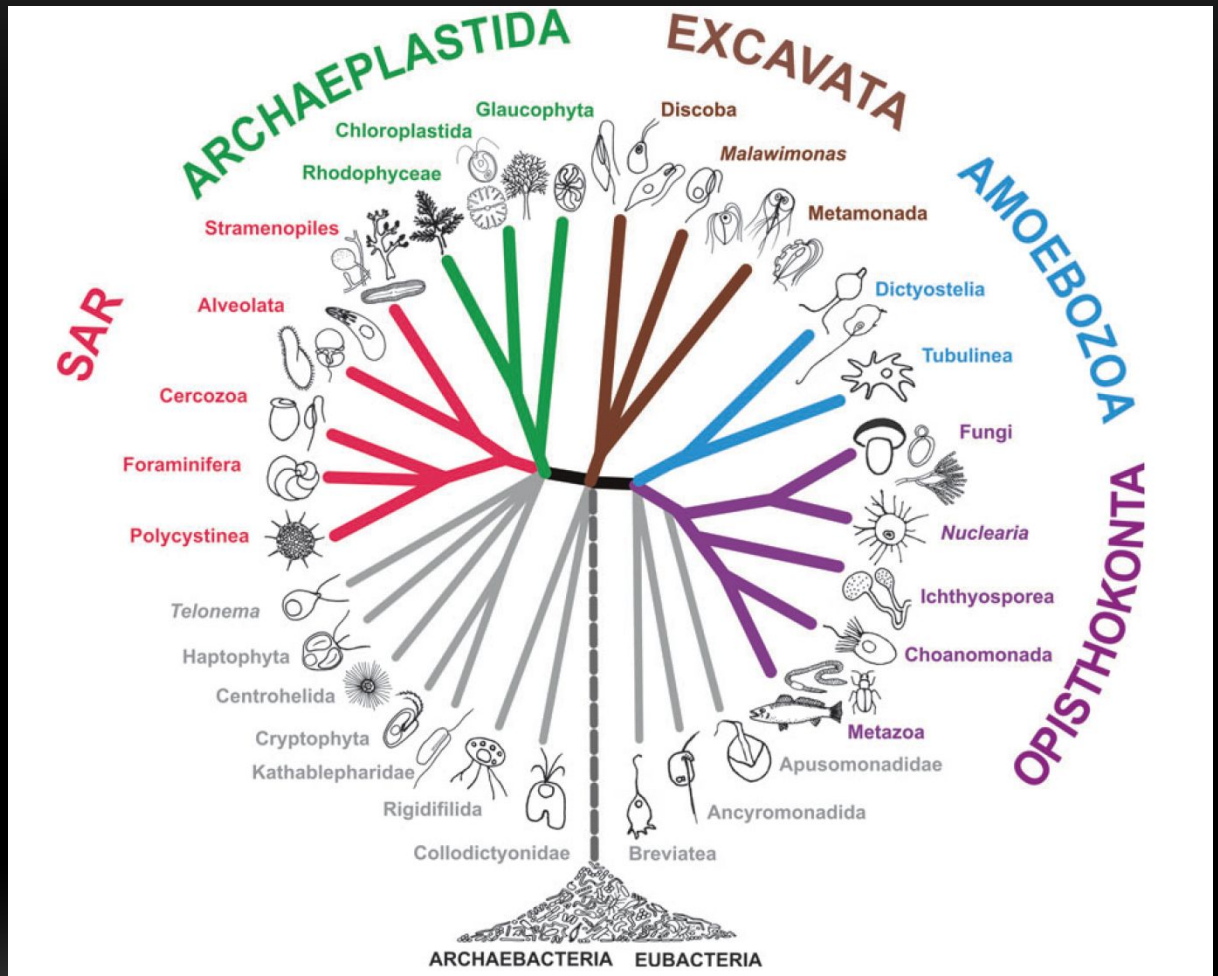

Fig. 1. A view of eukaryote phylogeny reflecting the classification presented herein.

PROTIST VS. PROTOZOA

- Kingdom Protista (single-celled eukaryotic
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IMPORTANT TERMS

- Trophozoite – actively motile feeding stage.
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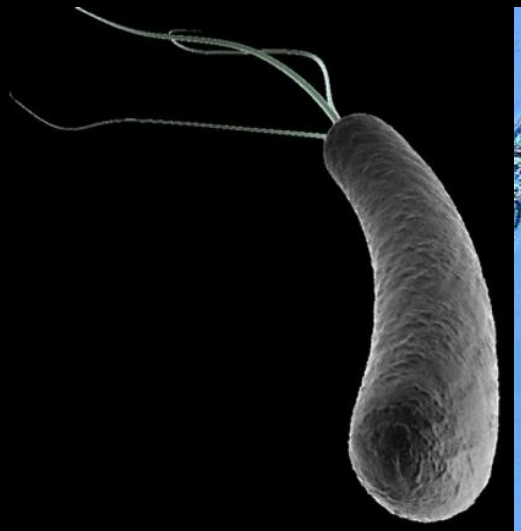
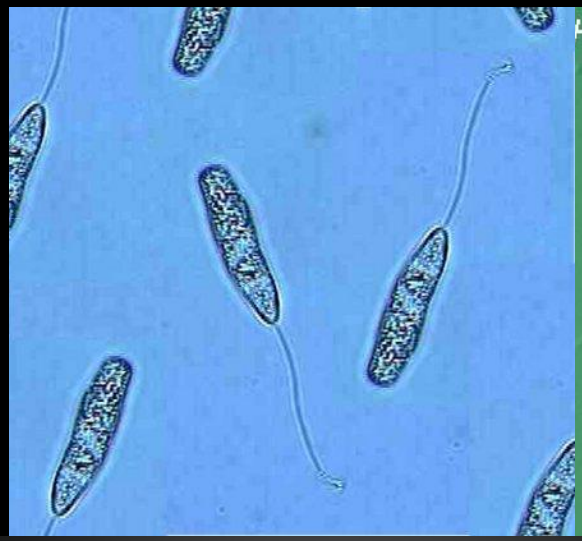
MORPHOLOGY-BASED TAXONOMY

- Depending on the locomotion mode protozoa divided into four major groups:
  -





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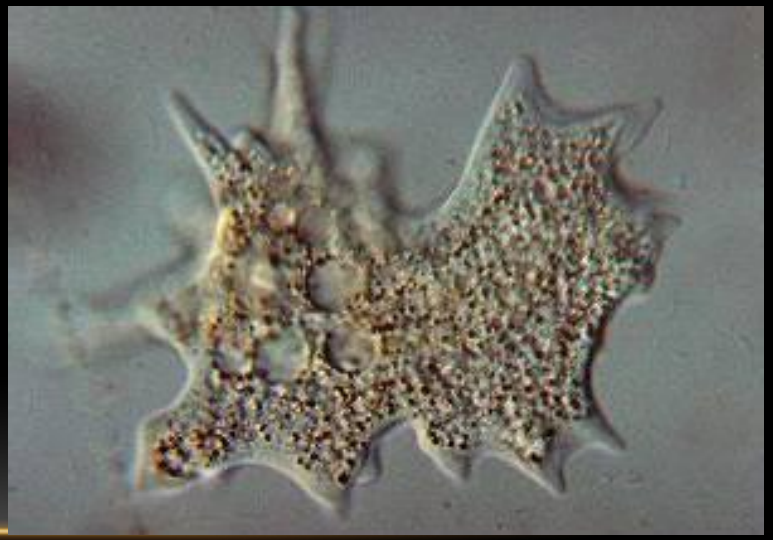

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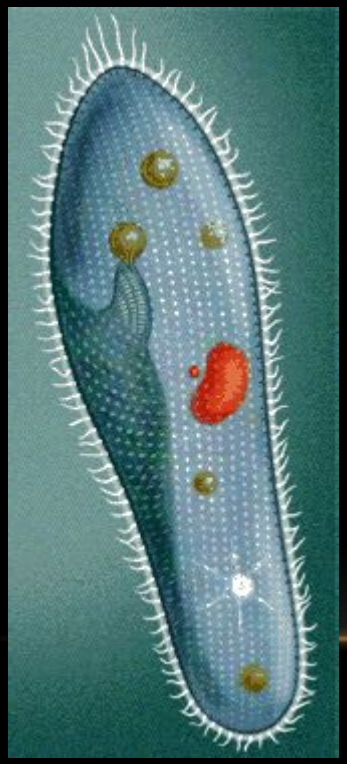

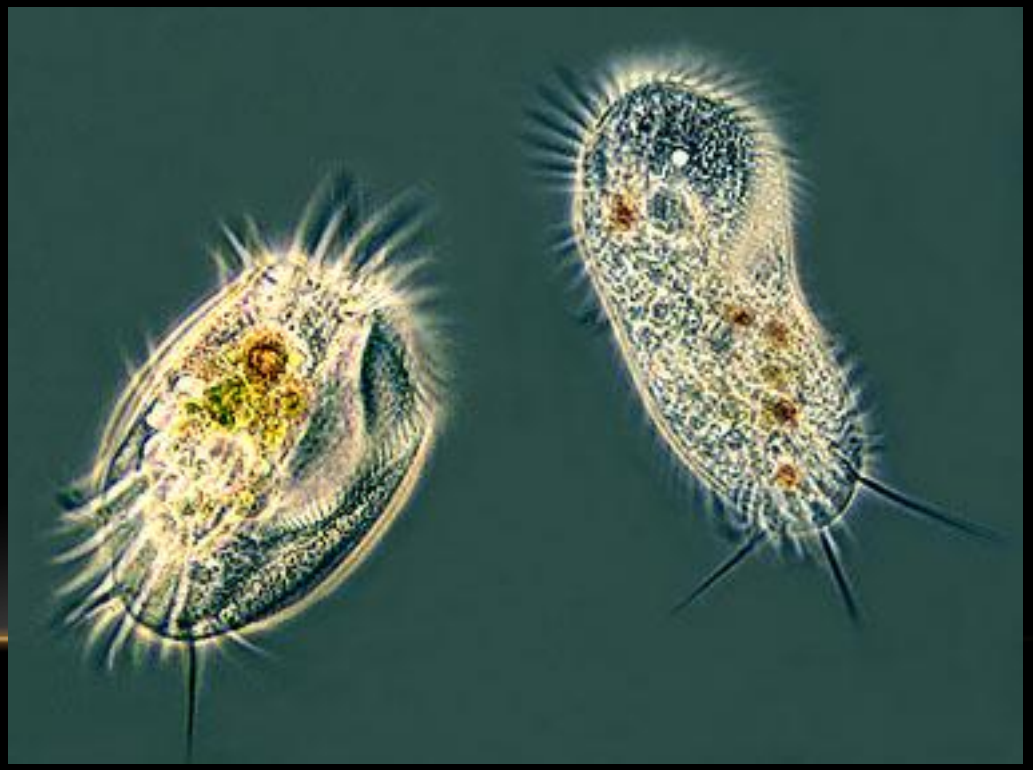

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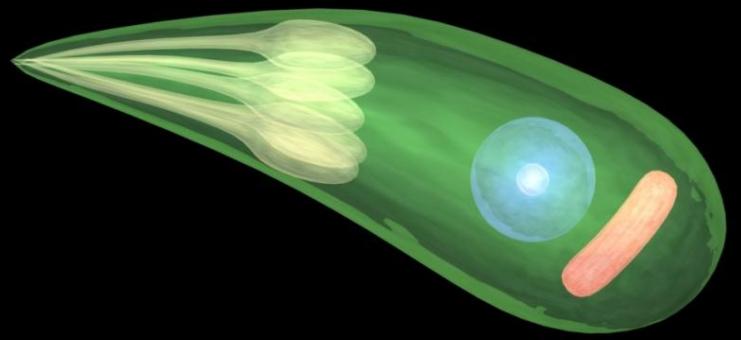
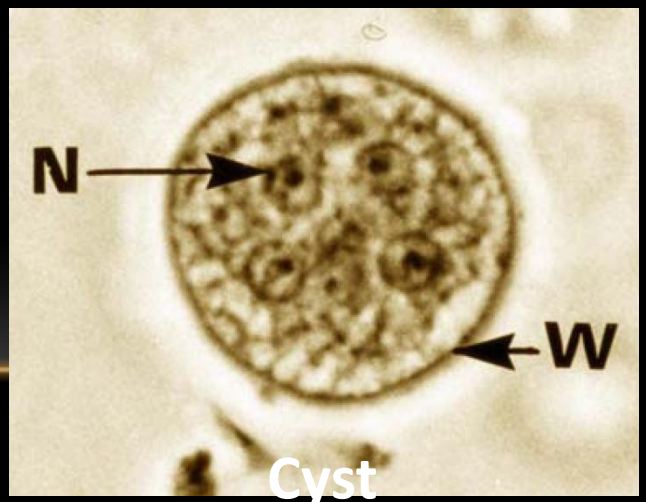


PARASITIC AMOEBAE

- Six species of amoebae are common in humans in most parts of the world but only one, *Entamoeba histolytica,* is an important pathogen.
  - *Dientamoeba fragilis*
  - *Entamoeba coli*
  - *Entamoeba hartmanni*
  - *Endolimax nana*
  - *Iodamoeba buetschlii*

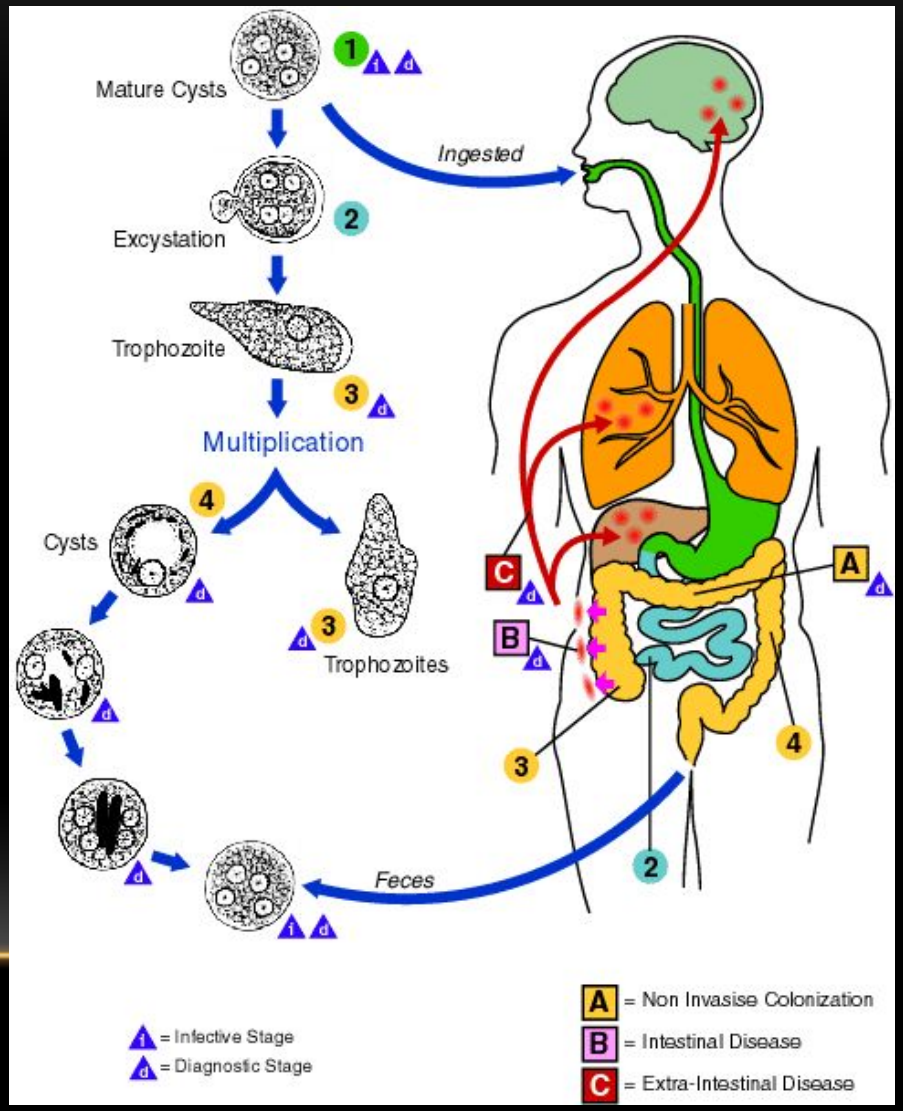
AMOEBIASIS (OR AMEBIC DYSENTERY)

- *Entamoeba histolytica*
- Distribution: worldwide
- The trophozoite inhabits the lower small intestine and colon



LIFE CYCLE OF *E. HISTOLYTICA*

- Infective stage: cyst
- Mode of infection: ingestion cysts-contaminated food or water
- Main clinical symptoms: abdominal pain, bloody-slimy diarrhoea, liver dysfunction in case of liver abscess



DIAGNOSIS AND PREVENTION OF AMOEBIASIS

- Diagnosis: Microscopical determination of cysts in fecal samples, serology.

- Prevention: Avoidance of uncooked food/water in endemic regions.

NON-INTESTINE PARASITIC AMOEBAE

- … human infection is not an obligate part of their life cycle.

- *Naegleria fowleri* (causes Primary amoebic meningoencephalitis)
- *Acanthamoebae castellanii*
- *Balamuthia mandrillaris* (causes Granulomatous amoebic encephalitis and Primary amoebic meningoencephalitis)

PARASITIC CILIATES

- The only ciliates known to infect human is *Balantidium coli* – Balantidiosis (dysentery)
- Distribution: Worldwide
- Reservoir hosts: pigs
- *Balantidium's* habitats

in humans are

the cecum and colon

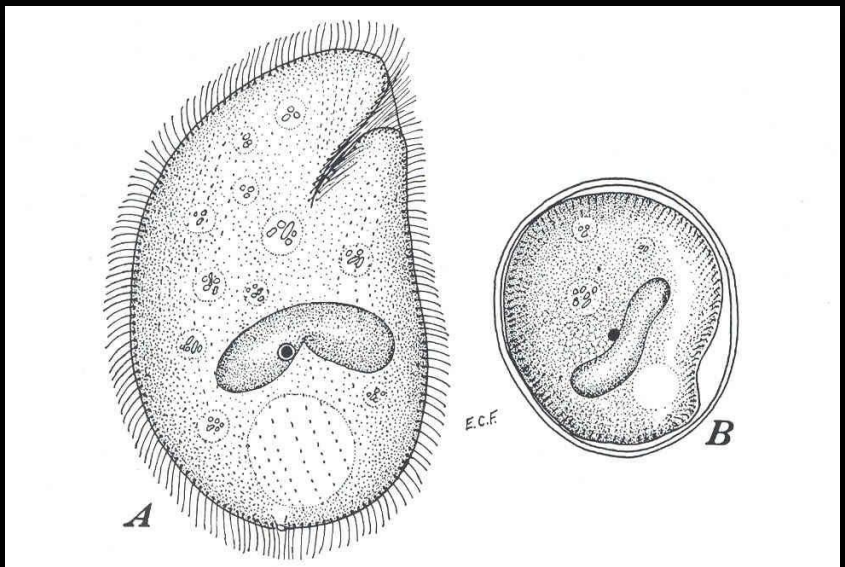
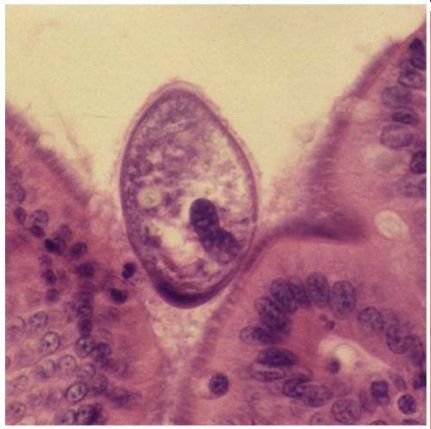
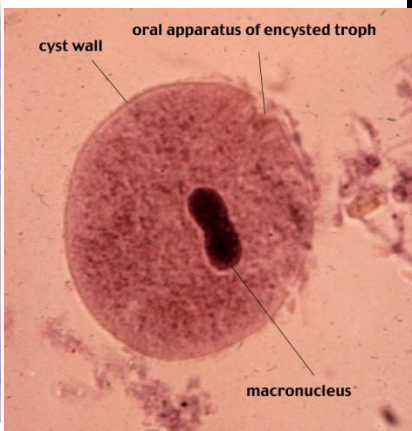


Fig. 15-1. *Balantidium coli*. *A*, trofozoito; *B*, quiste. (750 aumentos.) (Original de Faust.)





LIFE CYCLE OF *B. COLI*

- Infective stage: cyst
- Mode of infection: ingestion cysts-contaminated food or water
- Clinical forms: asymptomatic carrier, acute cases with diarrhoea or chronic cases

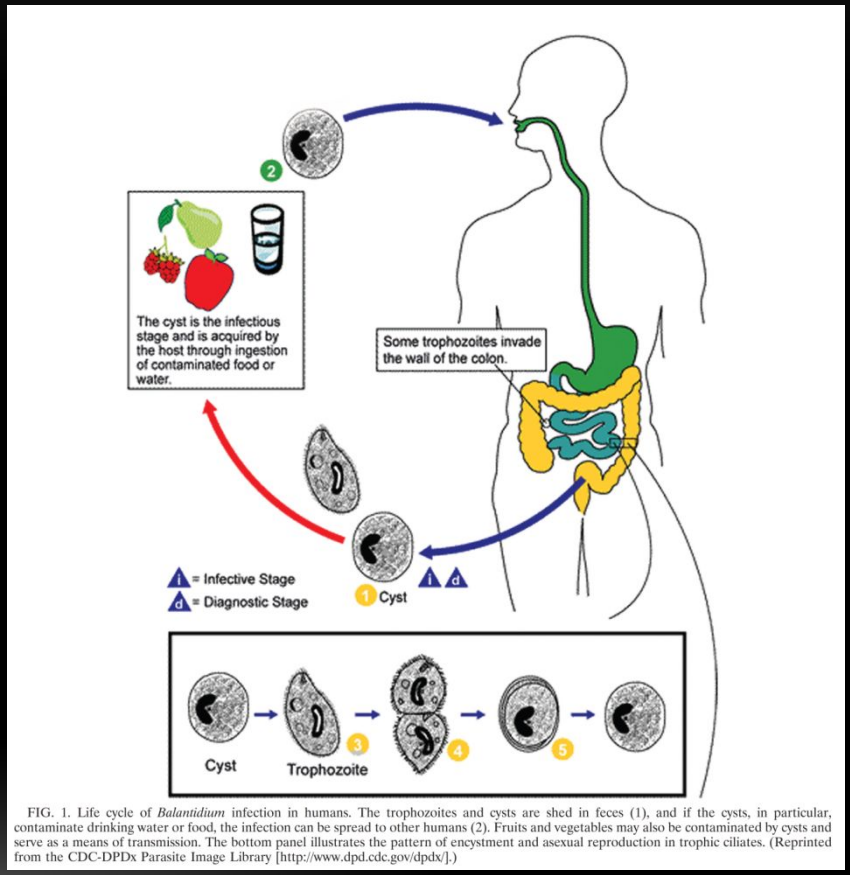


FIG. 1. Life cycle of *Balantidium* infection in humans. The trophozoites and cysts are shed in feces (1), and if the cysts, in particular, contaminate drinking water or food, the infection can be spread to other humans (2). Fruits and vegetables may also be contaminated by cysts and serve as a means of transmission. The bottom panel illustrates the pattern of encystment and asexual reproduction in trophic ciliates. (Reprinted from the CDC-DPDx Parasite Image Library [http://www.dpd.cdc.gov/dpdx/].)

PARASITIC FLAGELLATES

- Depending on the infected organs, parasitic flagellates might be
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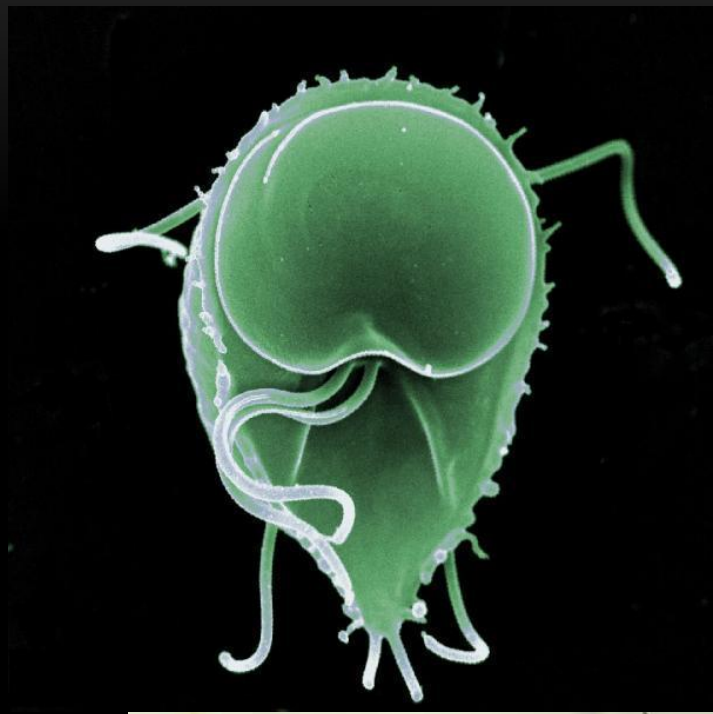
    - *monas tenax* (mouth)
    -

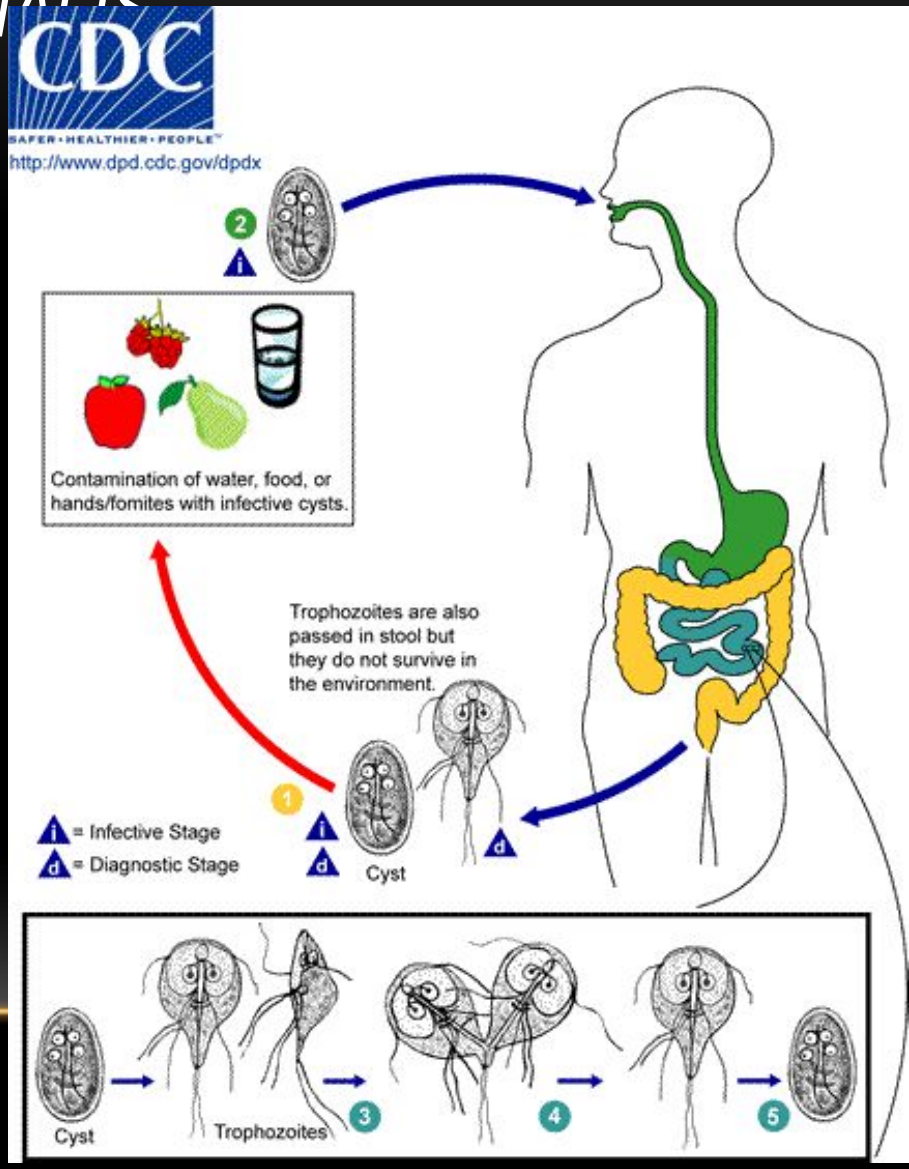
LAMBLIASIS (GIARDIASIS)

- *Giardia duodenalis* (a.k.a G. *lamblia, G. intestinalis* or *Lamblia intestinalis*)
- Distribution: Worldwide
- The parasite lives in the duodenum and upper small intestine, where it is closely applied or attached to the epithelium by means of a suction disk.



LIFE CYCLE OF *G. DUODENALIS*

- **Infective stage**: cyst
- **Mode of infection**: ingestion cysts-contaminated food or water
- **Main clinical symptoms:** Abdominal pain, slimy non-bloody, diarrhoea, malabsorption.



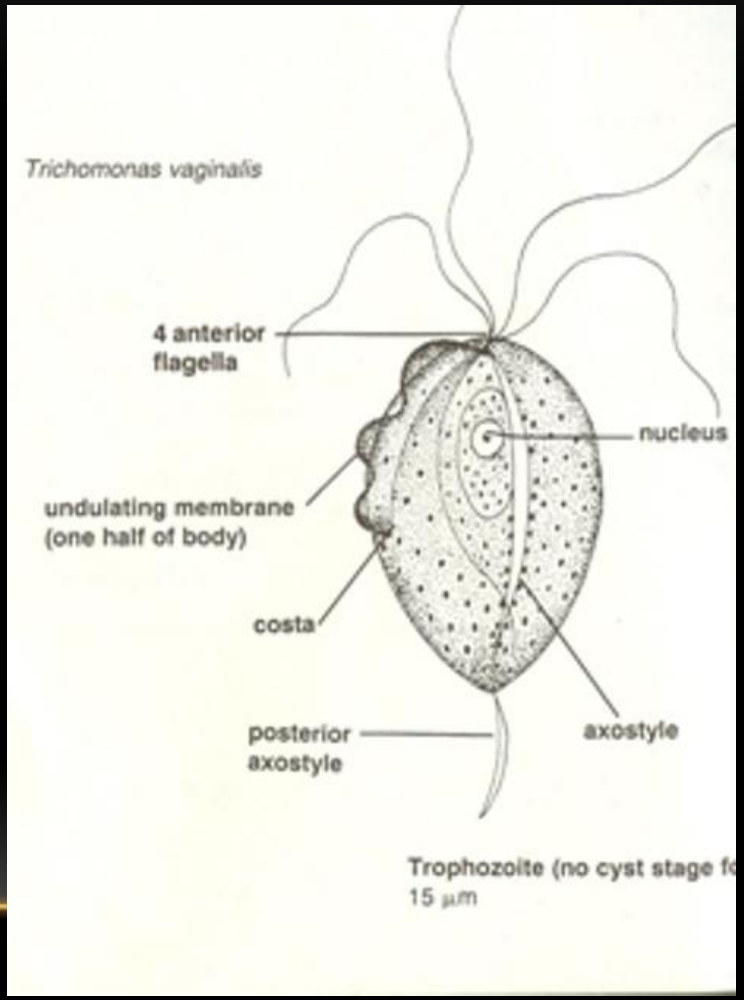
DIAGNOSIS AND PREVENTION OF LAMBLIASIS

- Diagnosis: Microscopic determination of trophozoites and cysts in faecal samples.

- Prevention: Avoid contact with human or animal faeces.

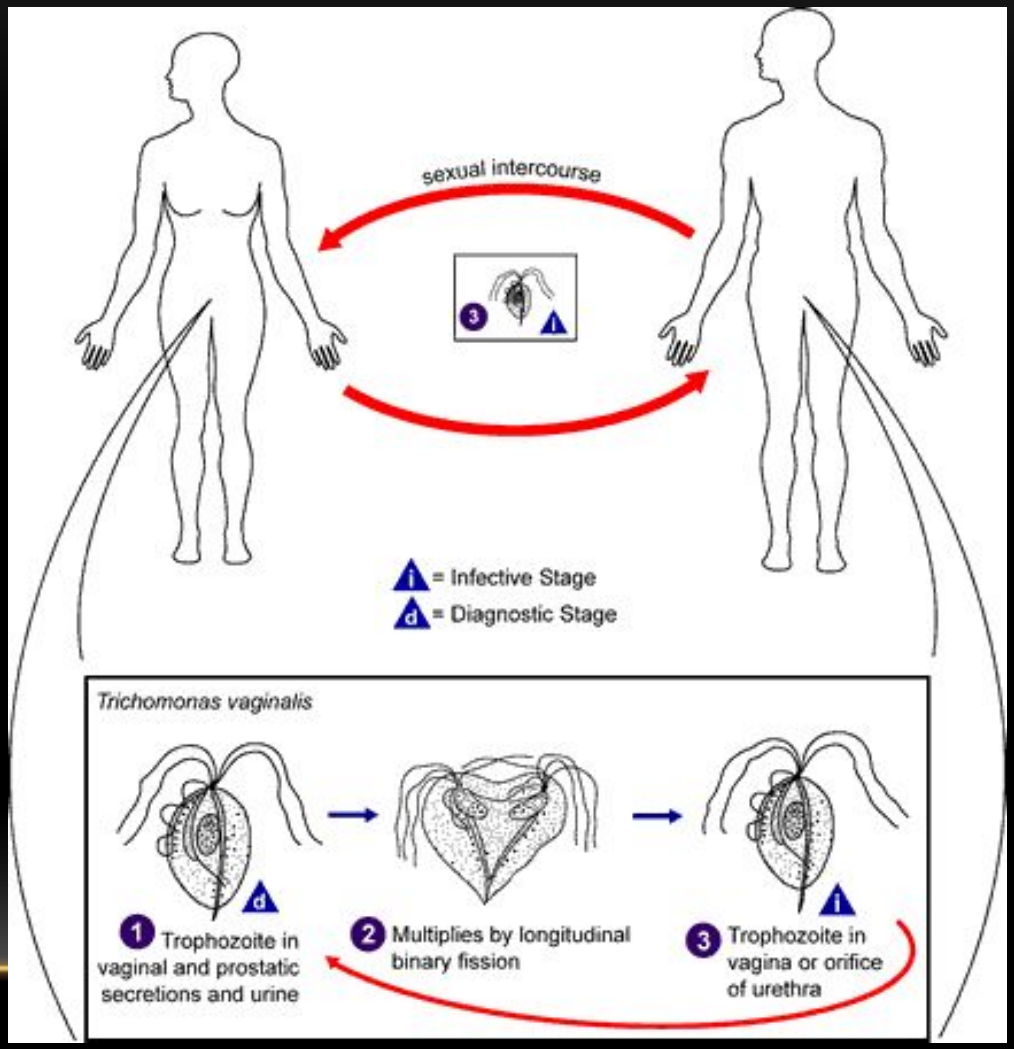
HUMAN TRICHOMONIASIS

- *Trichomonas vaginalis*
- Distribution: Worldwide
- Trophozoites live in the vagina and prostate gland.



LIFE CYCLE OF *T. VAGINALIS*

- Infective stage: trophozoites
- Mode of infection: through sexual or genital contact
- Main clinical symptoms: Occurrence of whitish mucus, feeling of burning in vaginal and urethral regions

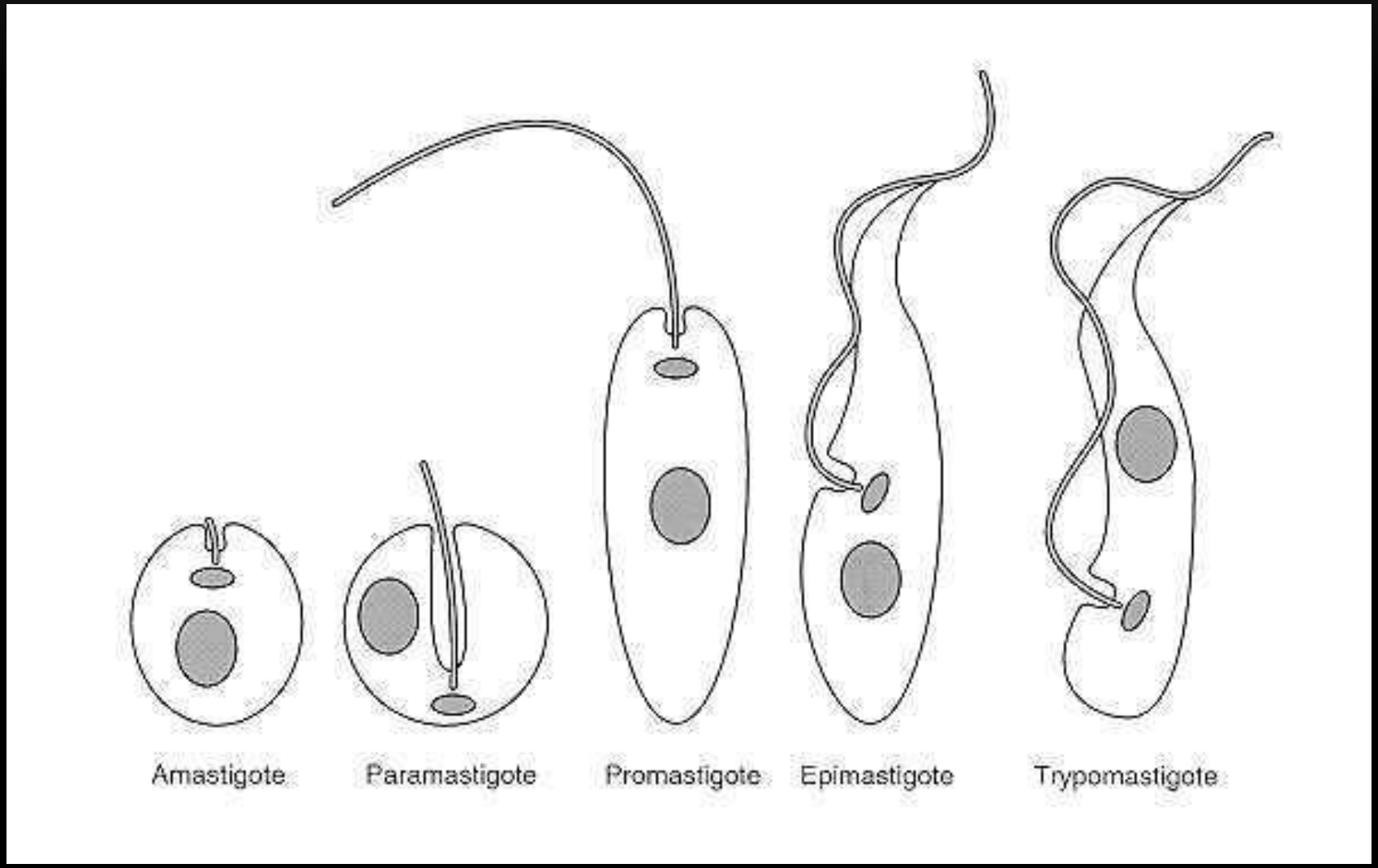


DIAGNOSIS AND PREVENTION OF TRICHOMONIASIS

- Diagnosis: Microscopic detection of trophozoites in mucus samples.

- Prophylaxis: Avoid unprotected sexual intercourse.

MORPHOLOGICAL STAGES OF HAEMOFLAGELLATES



TRYPANOSOMIASIS OR TRYPANOSOMOSIS

... several diseases in vertebrates

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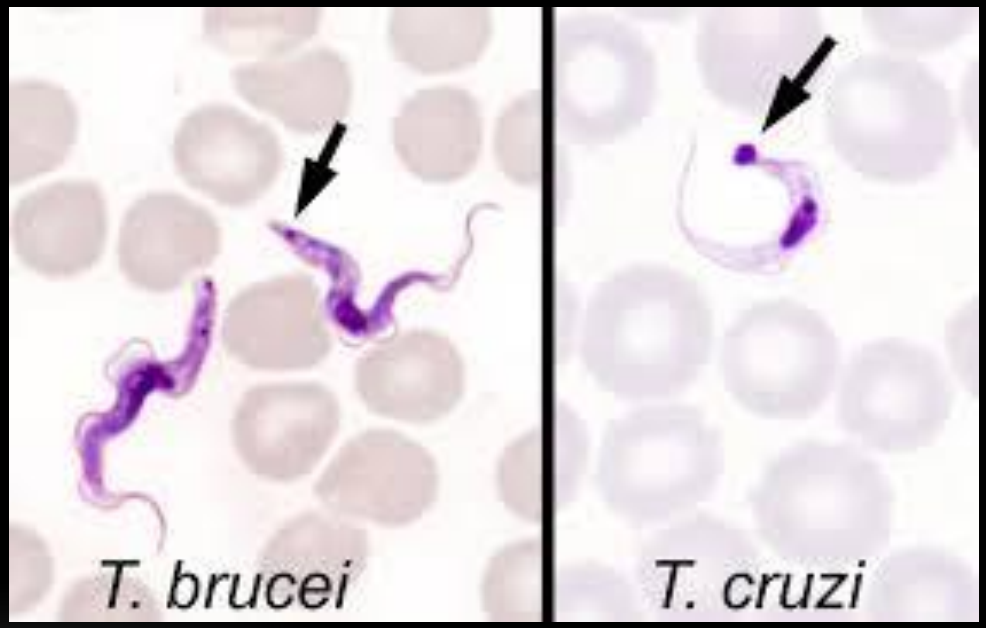

CHAGAS DISEASE (OR AMERICAN TRYPANOSOMIASIS)

- Distribution: Mainly in Latin America
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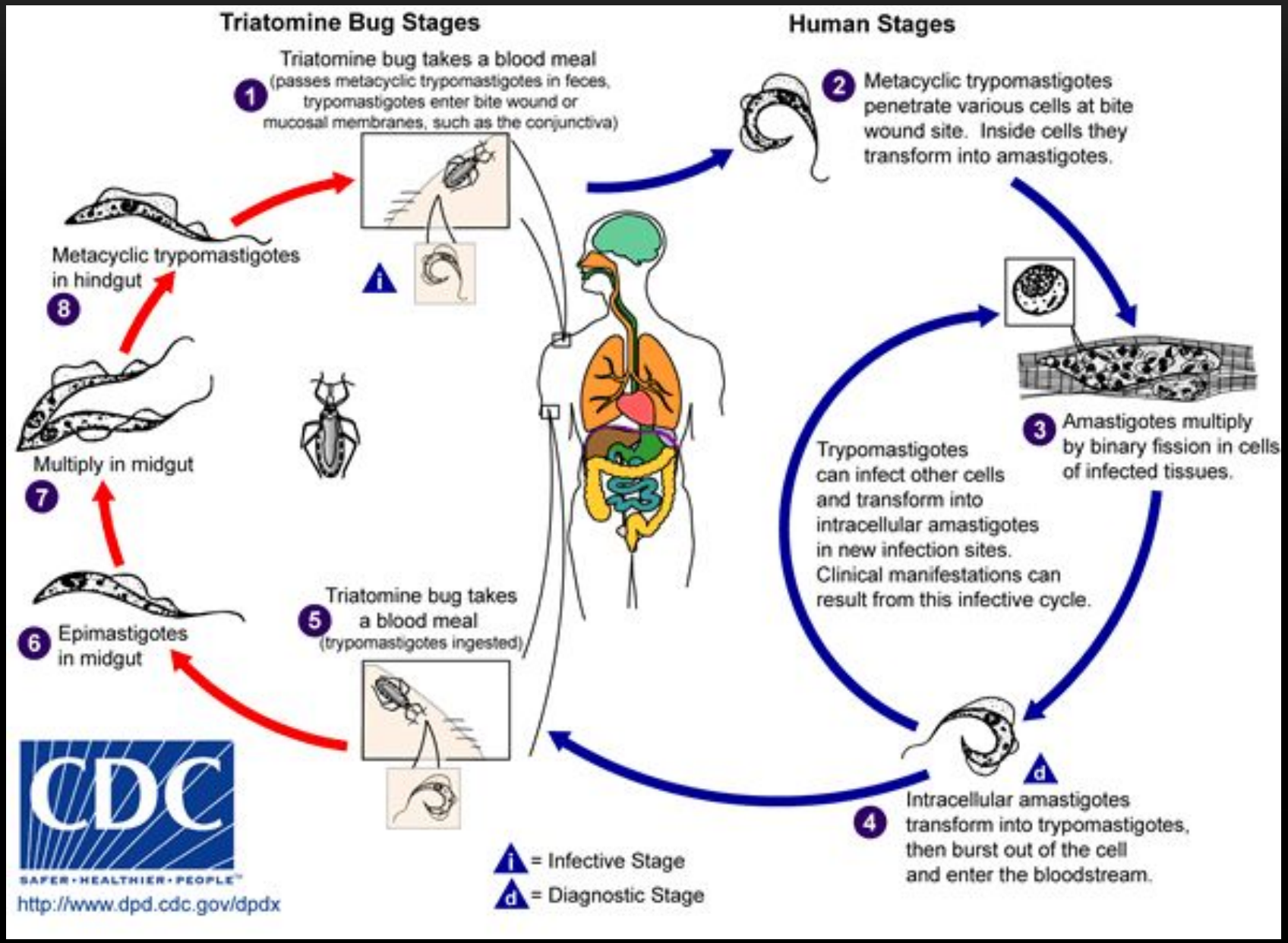
LIFE CYCLE OF *T. CRUZI*



CLINICAL SYMPTOMS, DIAGNOSIS AND PREVENTION

- Main clinical symptoms: Chagom at bite site, fever,
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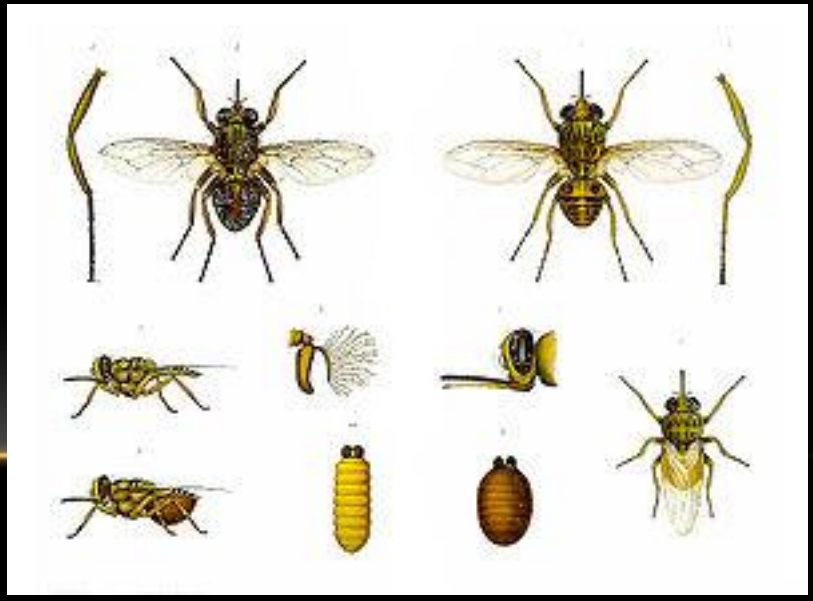
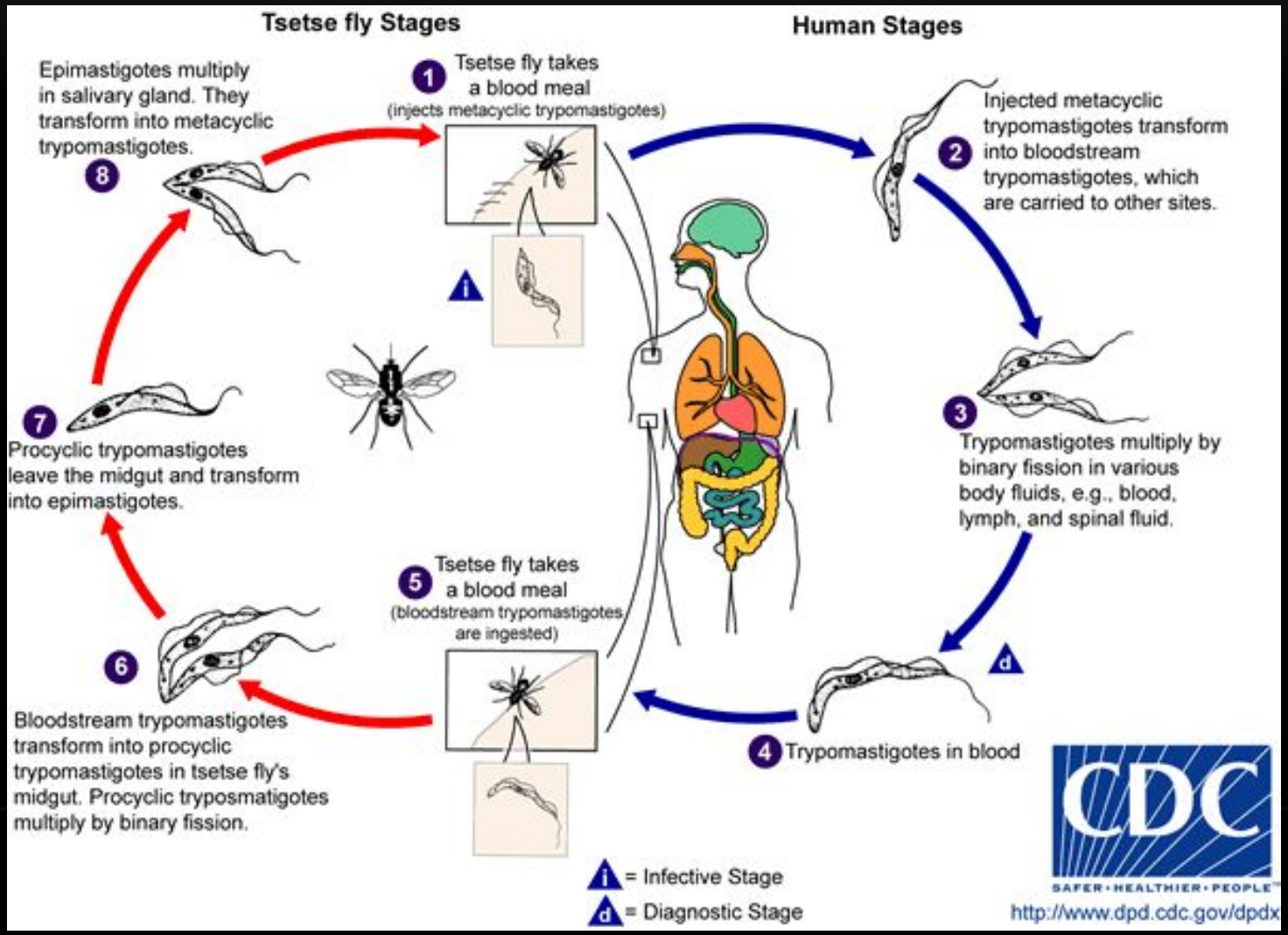
SLEEPING SICKNESS OR AFRICAN TRYPANOSOMIASIS

- Distribution: 36 countries of sub Saharan Africa



LIFE CYCLE OF *T. BRUCEI*



CLINICAL SYMPTOMS, DIAGNOSIS AND PREVENTION

- Main clinical symptoms: Fever, local edema, possibly polyadenitis,
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LEISHMANIASIS

- More than 20 species of *Leishmania* infect humans
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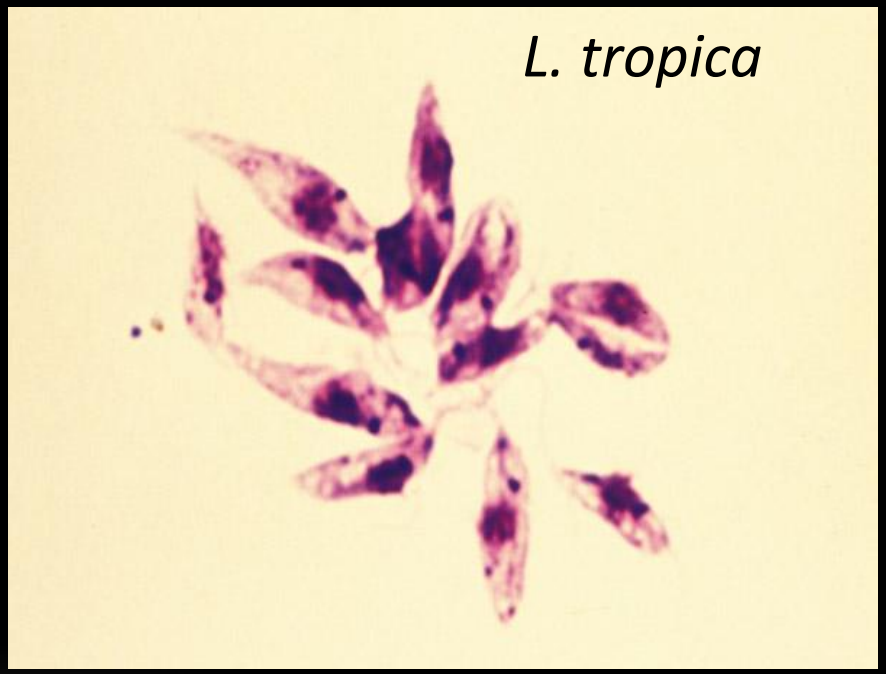
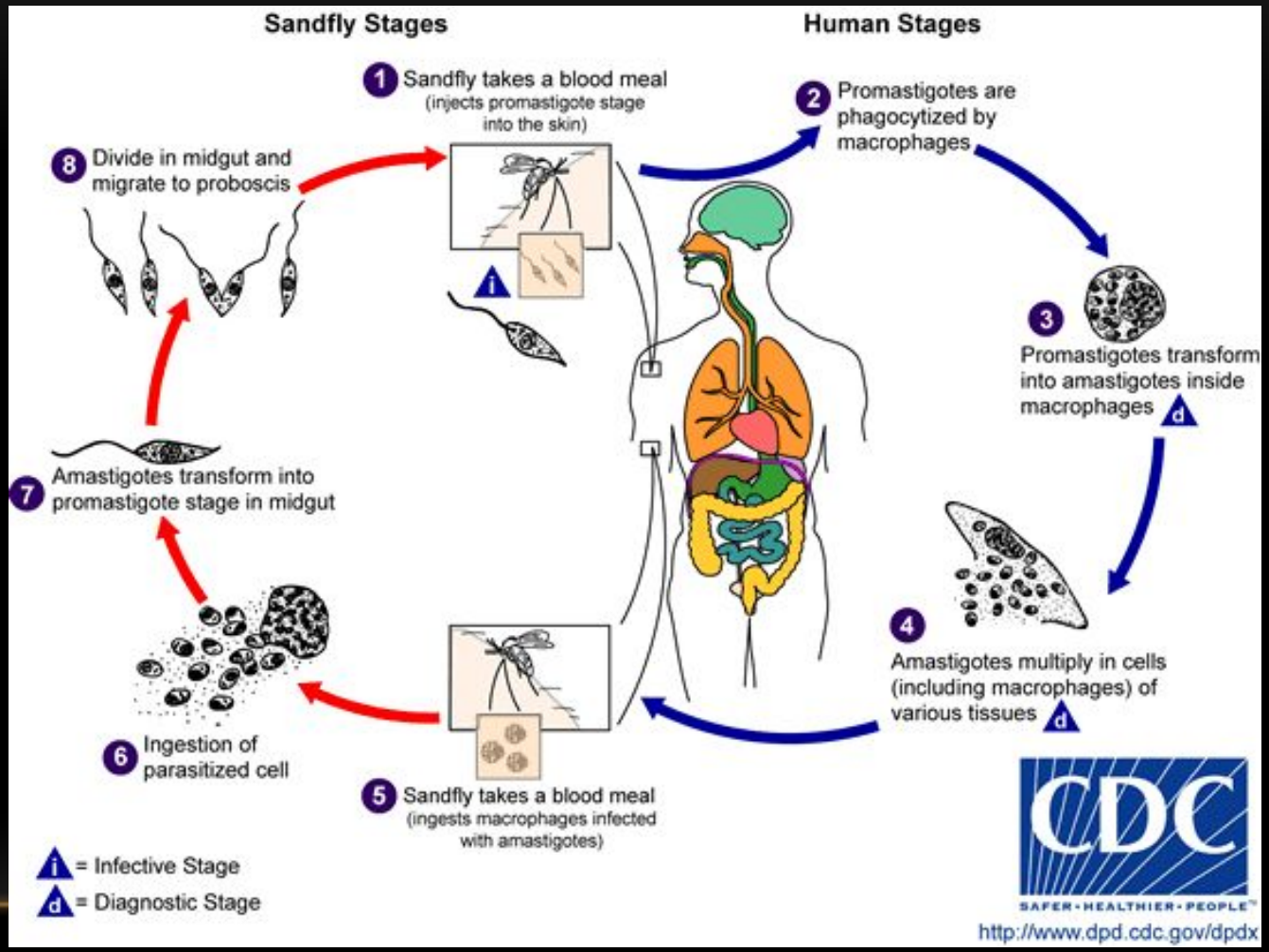


LIFE CYCLE OF *LEISHMANIA*

- **Infective stage:** Promastigote



CLINICAL SYMPTOMS, DIAGNOSIS AND PREVENTION

- Cutaneous Leishmaniasis (CL)
  - Main clinical symptoms: Skin

Leishmaniasis, Man. Figure 4 *Leishmania*-sore in the face.

CLINICAL SYMPTOMS, DIAGNOSIS AND PREVENTION

- Cutaneous Leishmaniasis (CL)
  - Main clinical symptoms: Skin nodules, ulceration, necrosis.
  -
-
  -
  -
    - the bite of the vector.

DIAGNOSIS AND PREVENTION OF BALANTIDIASIS

- Diagnosis: Microscopic determination of cysts and trophozoites in fecal smears.

- Prevention: Avoid contact with human or pork faeces.

PARASITIC APICOMPLEXA (FORMER SPOROZOA)

- a large group of parasitic protists, most of which possess a unique organelle, a type of plastid called an apicoplast, and anapical complex structure involved in penetrating a host's cell.
- Diseases caused by apicomplexan organisms include, but are not limited to:
  - Babesiosis (Babesia)
  - Malaria (Plasmodium)
  - Forms of coccidiosis including:
    - Cryptosporidiosis (Cryptosporidium parvum)
    - Cyclosporiasis (Cyclospora cayetanensis)
    - Isosporiasis (Isospora belli)
    - Toxoplasmosis (Toxoplasma gondii)