

Classification Of Protozoa

Kingdom: Protista = (Simplest of eukaryotic microorganisms)

Subkingdom: Protozoa

1-Phylum: Sarcomastigophora

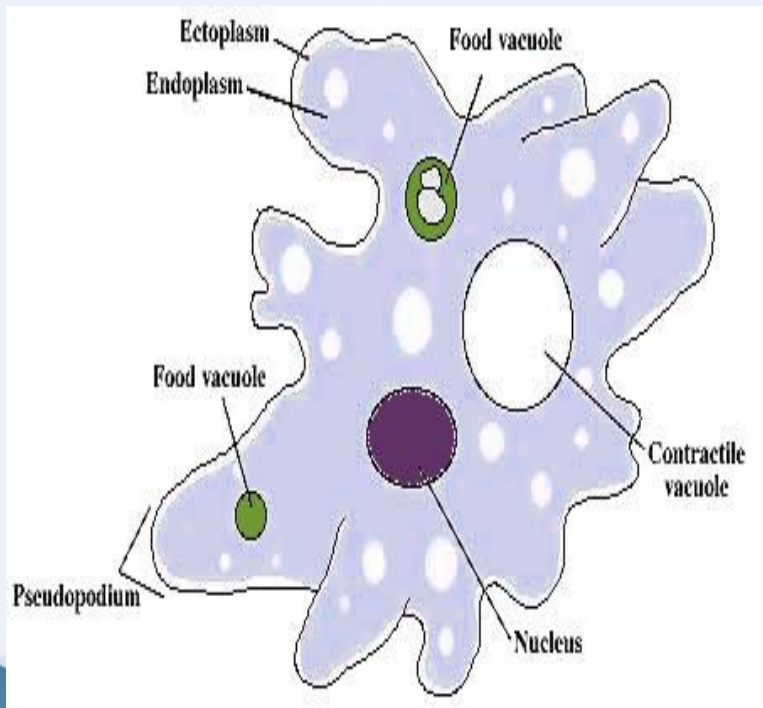
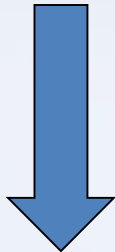
Subphylum:1- Sarcodina ex. *Entamoeba histolytica* and *E.Coli*
2- Mastigophora ex. *Leishmania* Spp.

2-Phylum: Ciliphora (carrying cilia) Ex. *Balantidium coli*

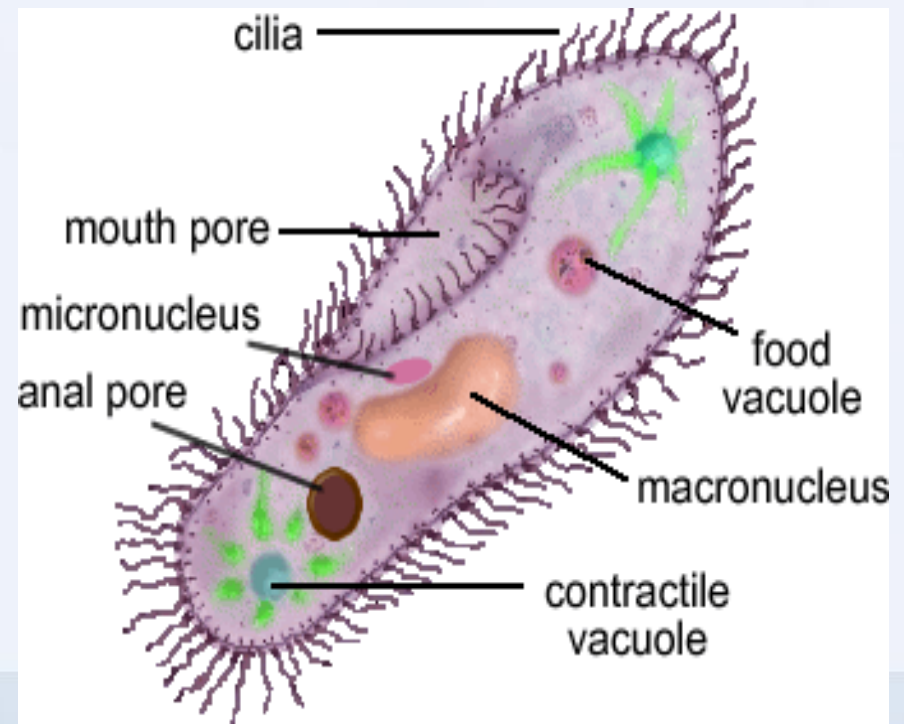
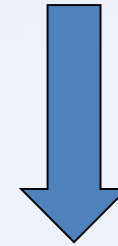
3-Phylum: Apicomplexa: Like *Plasmodium*(Malaria).

BOTH ARE UNICELLULAR (PROTOZOA) PROTISTA

Amoeba



Paramecium



The Parameters of this study

We can study for each parasite

- Morphology of the organism.**
- Life cycle, hosts and Vectors.**
- Disease, symptoms, pathogenesis.**
- Diagnosis, Prevention and control.**
- Treatment.**

Protozoa (PR0TO = PRMITIVE) (ZOA = ANIMAL)

General characters

- 1-Unicellular microorganism (just one cell) eukaryotic with true nucleus, cytoplasm. The nucleus contain karyosome.**
- 2-The most important protozoan size range usually from 10 to 52 microns**
- 3-They are seen by microscope**
- 4-They move by a variety of organs pseudopodia, flagella and cilia.**
- 5-Perfom all metabolic mechanisms(e.g. movement, digesting, excretion, reproduce by asexually and sexually.....etc).**
- 6-They are found in different parts of the body intestine , blood and tissues, cavities like mouth, Uro-genital system.**
- 7-Most intestinal protozoa have direct life cycle. They have either:**

A- cyst stage

It is non motile, non feeding, non active stage, it is the infective stage if the parasite has trophozoite and cyst stage in the life cycle. It is diagnostic stage in case of chronic infection. Transmitted to the human by contamination of food and water.

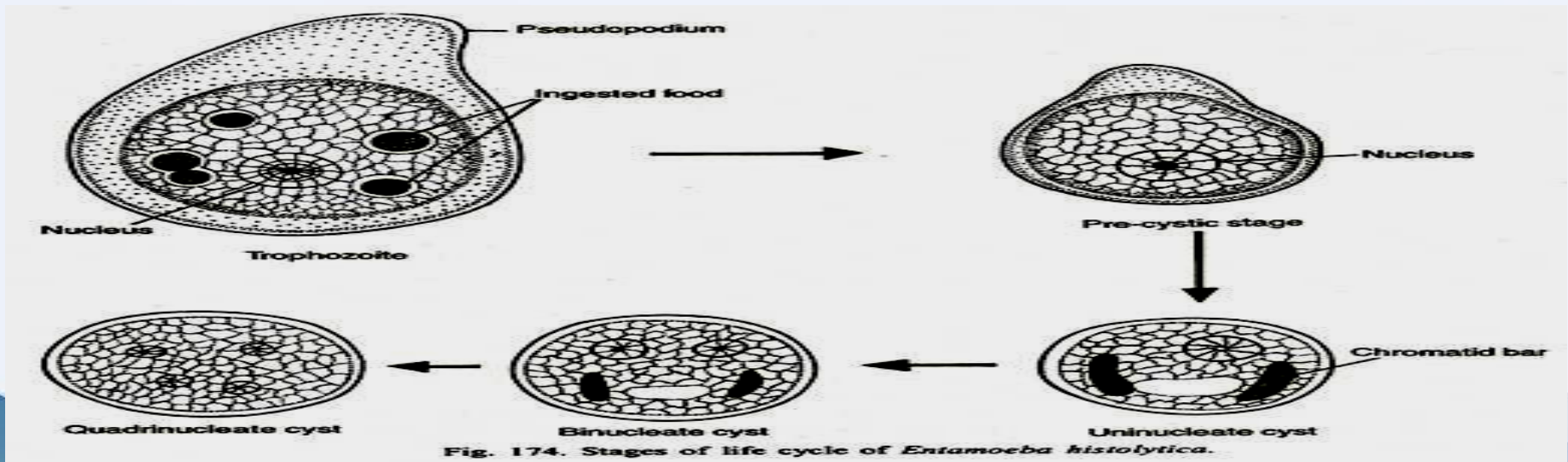
B- Trophozoite stage ..

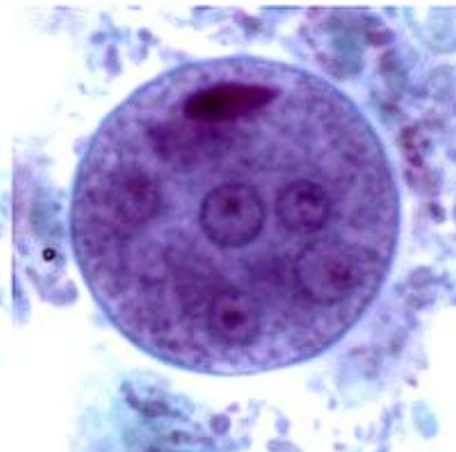
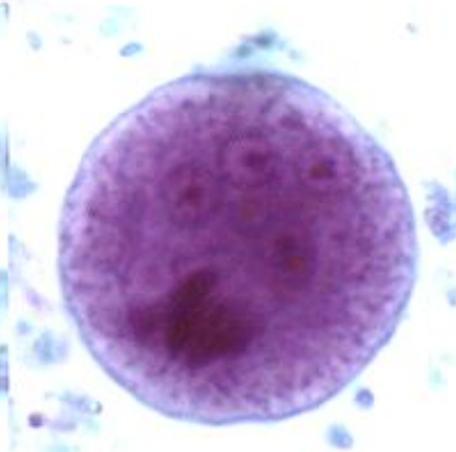
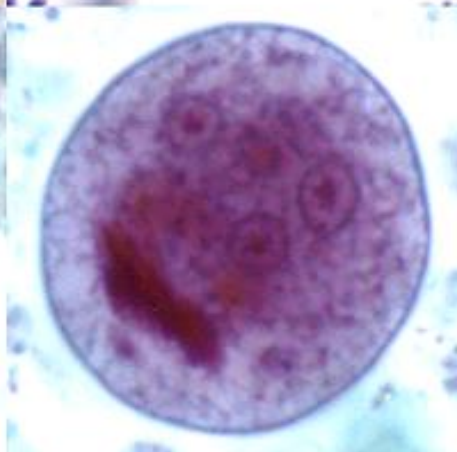
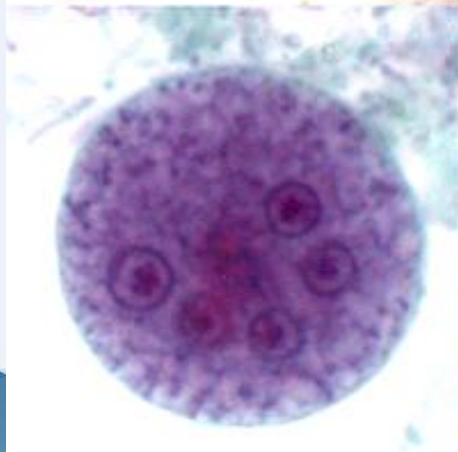
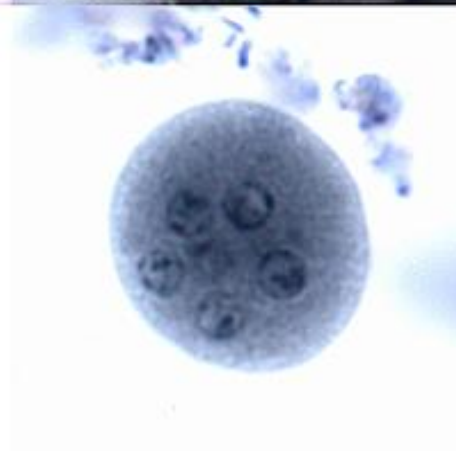
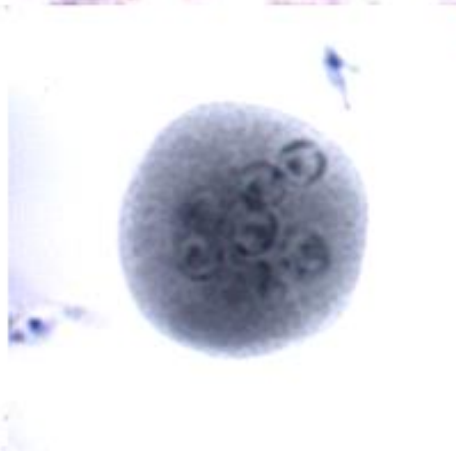
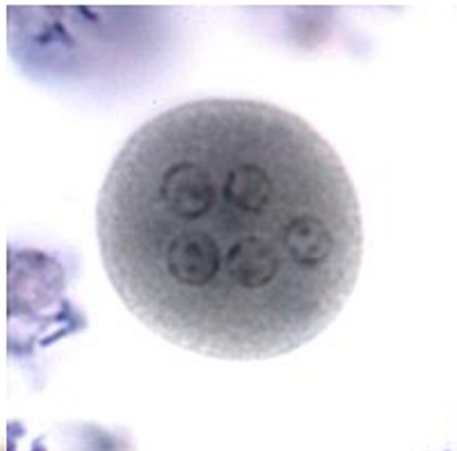
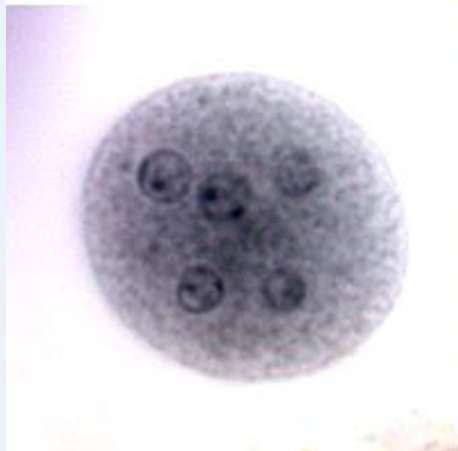
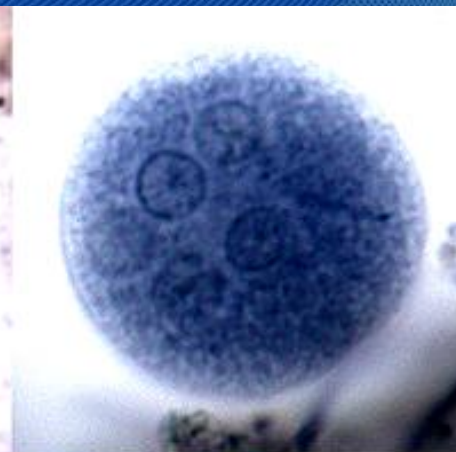
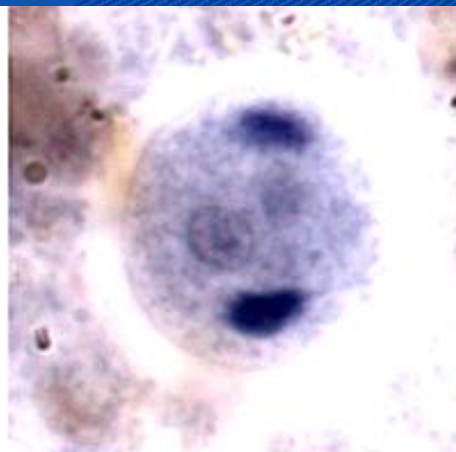
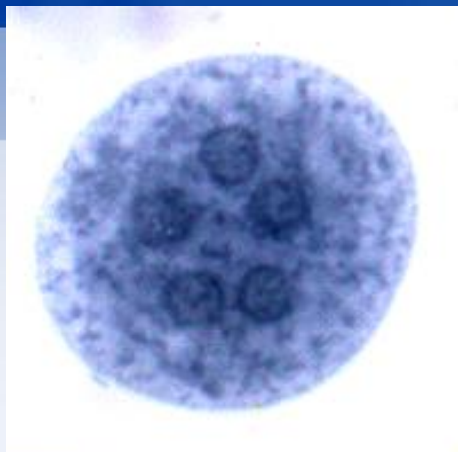
it is active, motile, feeding stage of parasite.

*it is the pathogenic stage of parasite.

*it is the diagnostic stage in case of acute infection.

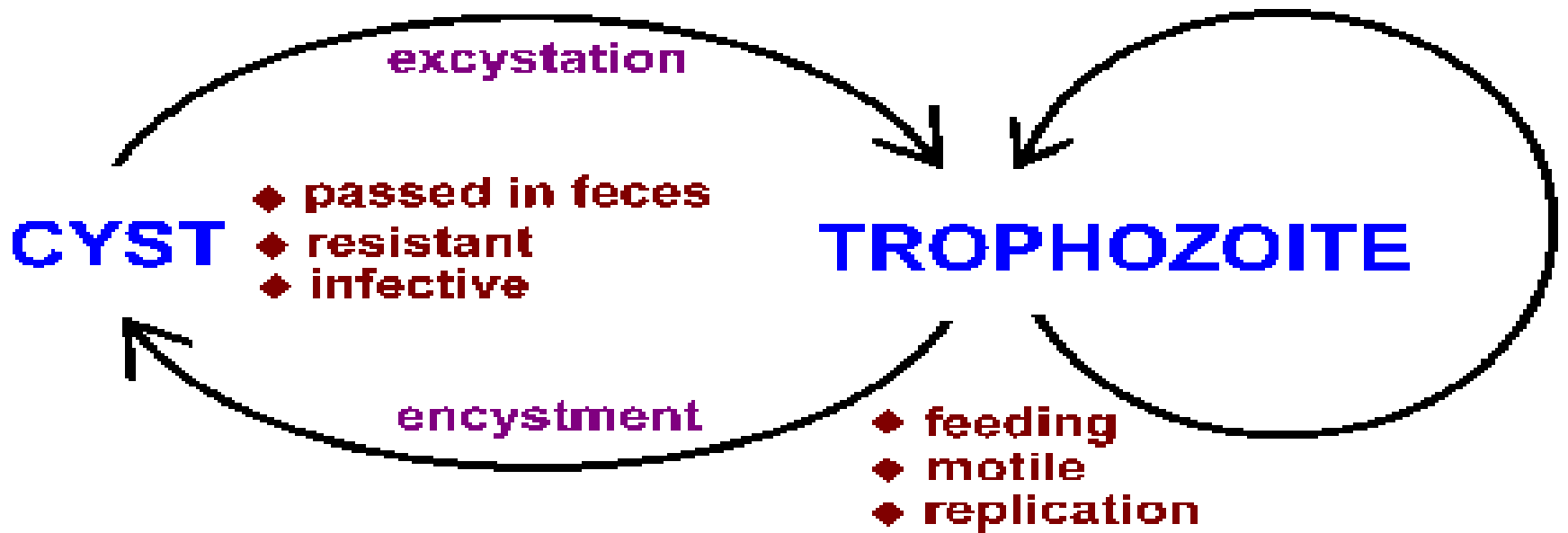
C- Or It has only Trophozoite without cyst stage (trophozoite stage will be the pathogenic, diagnostic and infective stage if the parasite has no cyst stage).





GENERAL LIFE CYCLE OF INTEST.PROTOZOA

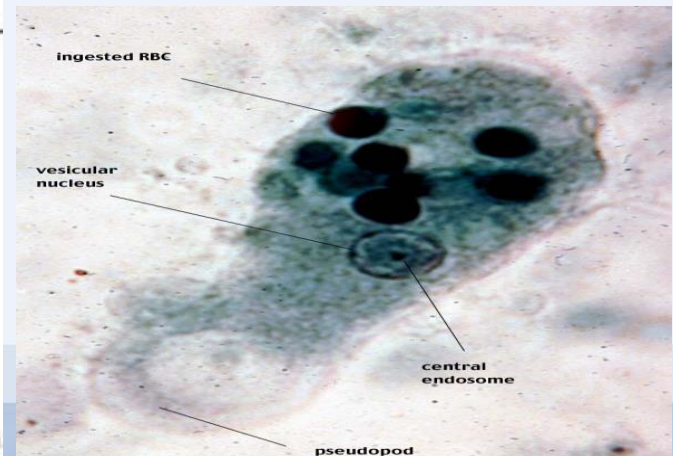
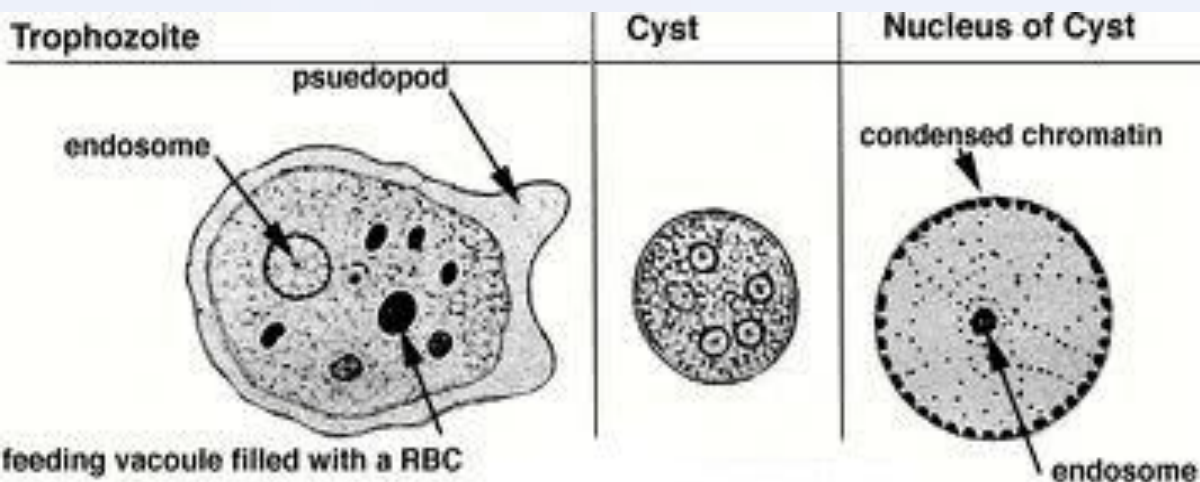
Typical Fecal-Oral Life Cycle



Entamoeba histolytica Morphology

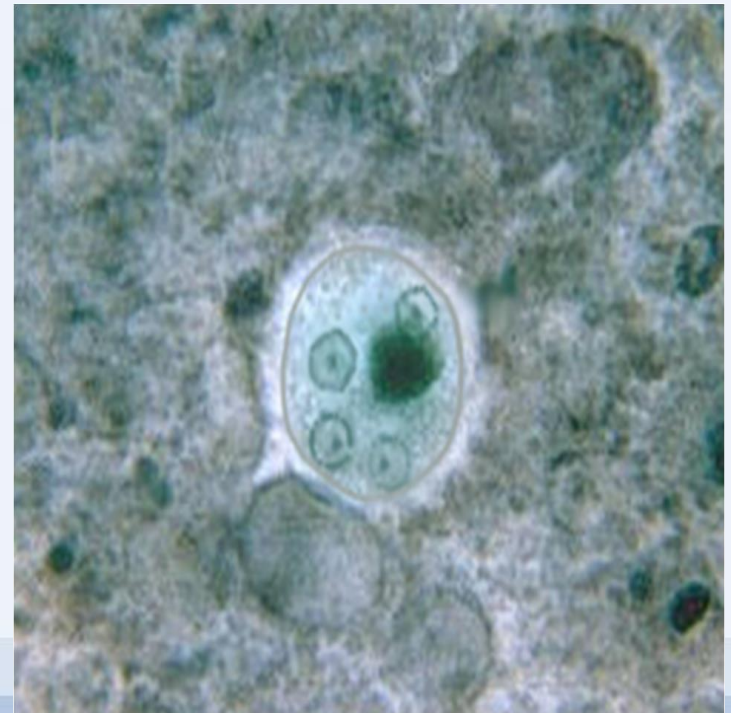
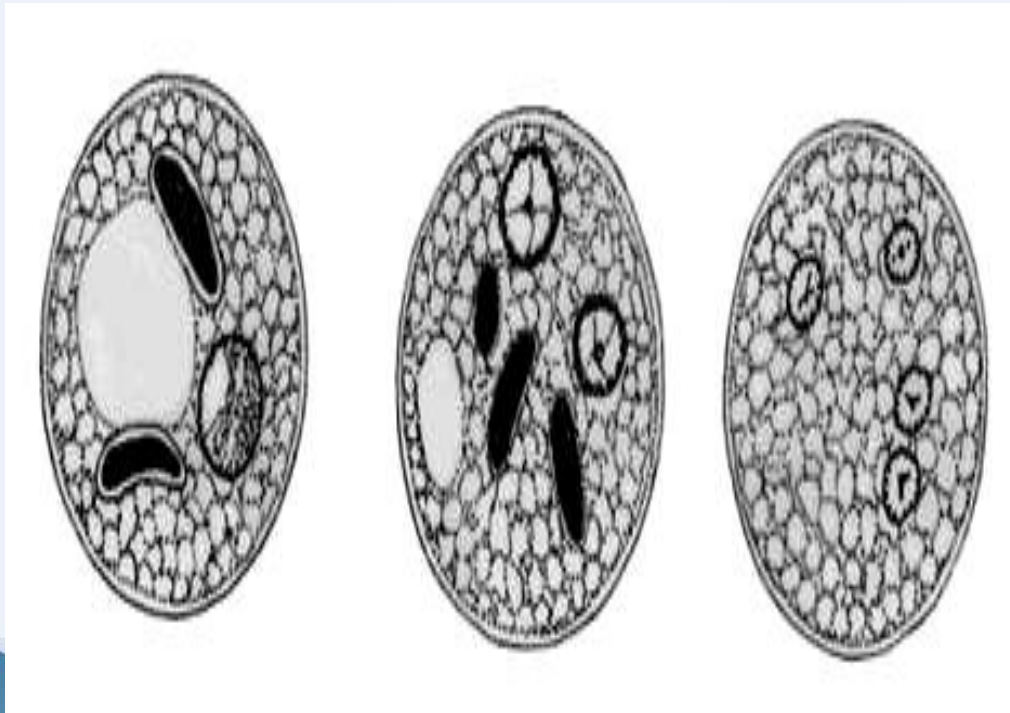
MORPHOLOGY:

- Trophozoite: has no fixed shape small active, motile by pseudopodia.
- Cytoplasm divided into two portions ; a clear ectoplasm and a granular endoplasm.
- Movement is directional and pseudopodium is finger shape.
- The granular endoplasm may contain ingested RBC by food vacuoles.
- The organism has a single nucleus with a distinctive small central karyosome.
- Trophozoite is the only form present in tissues, it is also found in fluid feces during amebic dysentery. Trophozoite also known active vegetative stage.

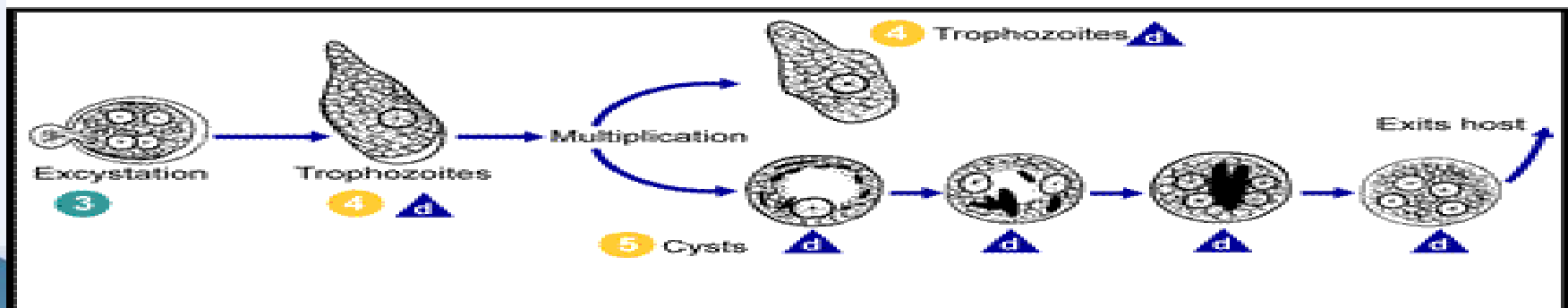
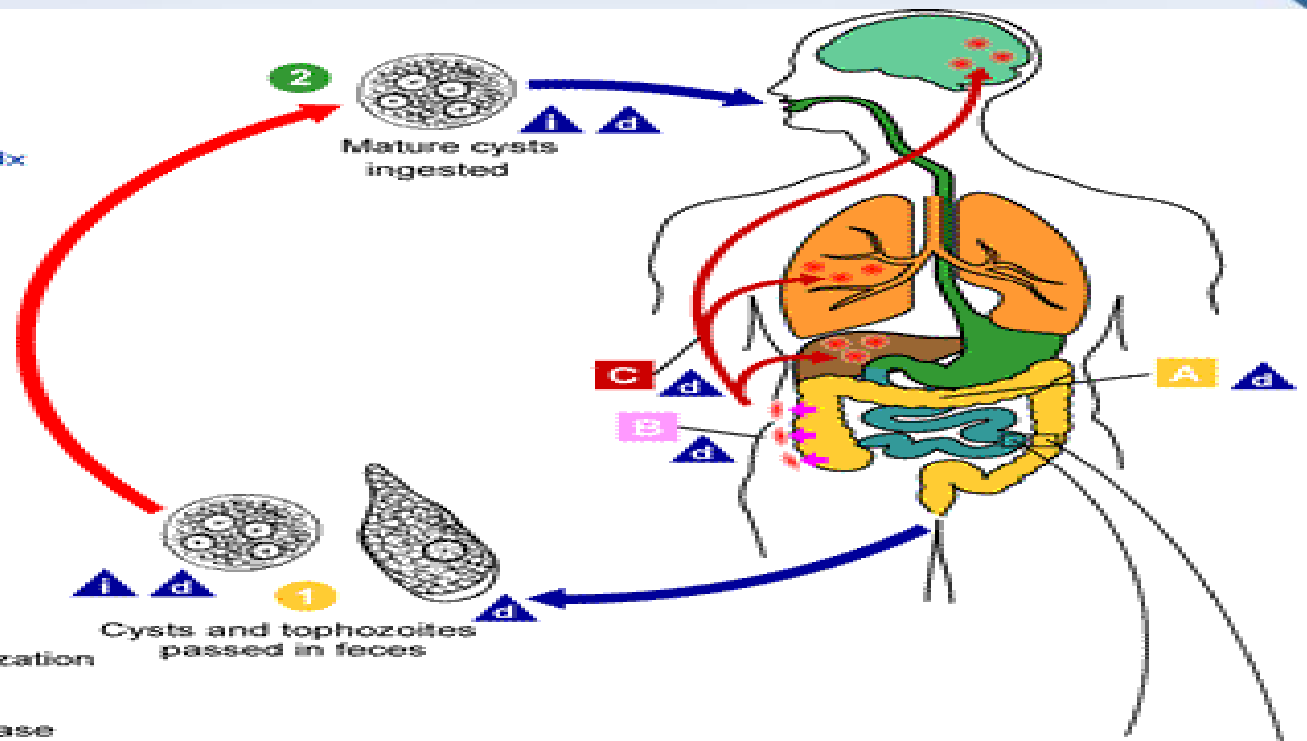


Mature Cyst:

It is both infective stage and diagnostic stage, spherical in shape also contain 1 - 4 nuclei with a central karyosome



Life cycle



Life cycle

- **Intestinal infection:**
- **Infection occurs orally by ingestion of cysts (Orally fecally) contaminated food or hands**
- **They pass into small intestine where it (Excystation) giving four and then eight amoebae which move to the large intestine.**
- **The majority of the organisms are passed out of the body with the feces but, with huge infection, some amoebae attach to and invade the mucosal tissue forming "flask-shaped" lesions (Intestinal amoebiasis).**
- **Encystation happens in the rectum.**
- **There are no intermediate or reservoir hosts.**

Entamoeba histolytica

- ◆ **Disease: AMEBIASIS (Amebic dysentery, amebic hepatitis).**
- ◆ **Epidemiology: worldwide and more in underdeveloped country 50%.**
- ◆ **Habitat: trophozoite in 1-large intestine 2-extraintestinal infection. cyst only in large intestine**
- ◆ **Life cycle: direct no intermediate host.**
- ◆ **Infective stage: is mature quadrinucleated cyst.**
- ◆ **Pathogenic stage: only Trophozoite which seen in diarrheic acute dysentery stool.**
- ◆ **Diagnostic stage: cyst in chronic infection and trophozoite in acute diarrhic infection.**
- ◆ **Mode of infection: contamination of food and water**
- ◆ **Humans are the principal host, although dogs, cats and rodents may be infected**

Symptoms

- **Acute:** Frequent dysentery with necrotic mucosa and abdominal pain. (symptomatic intestinal amoebiasis).
- **Chronic:** Recurrent dysentery with blood and mucus in the feces. There are gastro-intestinal disturbances & constipation cyst are found in stool.
- **Trophozoite** may found in acute bloody dysenteric stool.
- **Cysts** found in the chronic formed stool.
- The organism may invade the liver, lung and brain (**Extra intestinal amoebiasis**) where it produces abscess in liver, lung brain...etc & **this is called systemic infection.**
- **Cysts:** found in the chronic formed stool.

PATHOLOGY

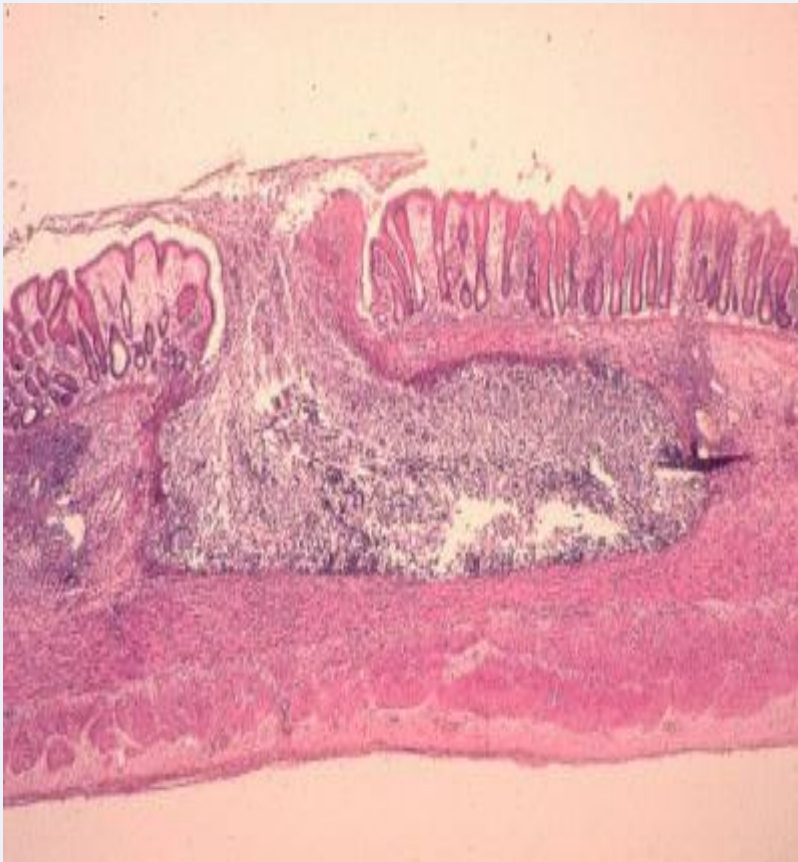
Intestinal infection: Severity of the infection (Virulence factors secreted by the parasite that causing the damage).

Extra-intestinal infection.

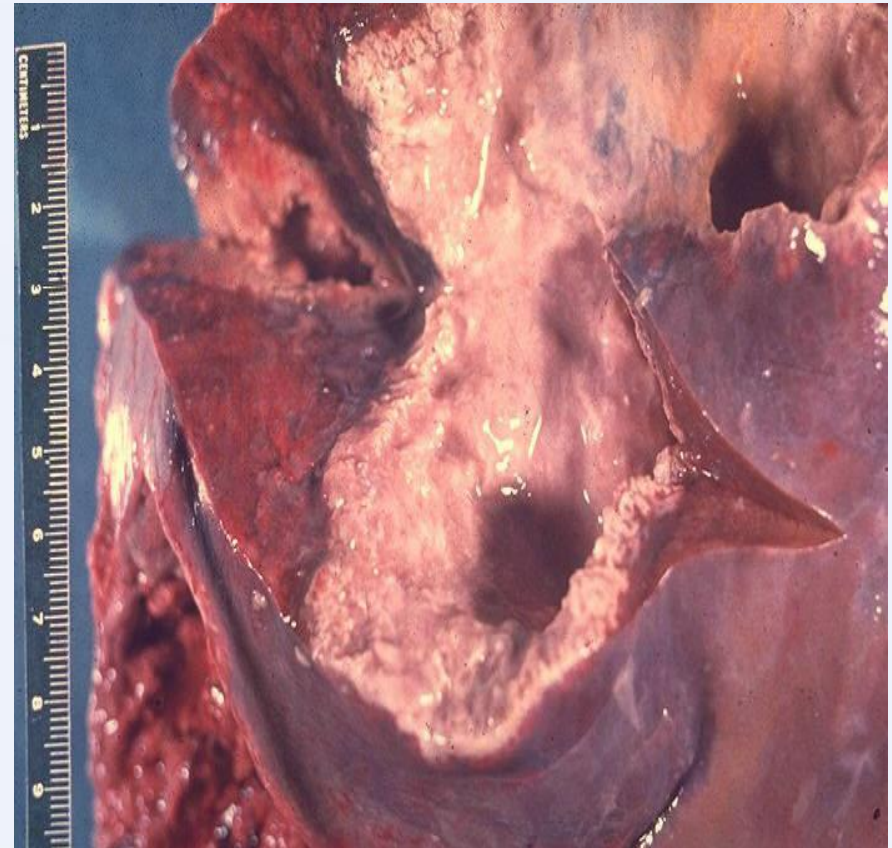
- **Intestinal ulcers /flasks shape ulcer with mouth and neck and wide broad base: these ulcers are formed by trophozoites due tissue lytic substances released by amoeba trophozoite which damage and lysis the mucosal epithelium and then multiply to form colonies inside the ulcer with abscess.**
- **During multiplication of trophozoite in the intestine, it forming a granulomatous growth or amoebic granuloma or Amoeboma.**
- **Extra intestinal: (Systematic Infection). When amoebas penetrate the radical of the portal vein and transport by circulation to the liver causing Amoebic hepatitis and abscess.**
- **Liver is the most common extra-intestinal organ.**
- **sometimes brain, lung and spleen abscesses can also occur.**

PATHOLOGY

FLASK-SHAPED ULCER



LIVER ABSCESS



CLINICAL MANIFESTATION IN SUMMARY

AMOEBIASIS

ASYMPTOMATIC 85-95%

SYMPTOMATIC 5-15%

Intestina amoebiasis

- *Amoebic dysentery
- *Non -dysenteric colitis
- *Amoebic appendicitis
- *Posit-dysenteric colitis
- *Complication of all above

Extraintestina amoebiasis

(5% of symptomatic cases)

- *Amoebic hepatitis
- *Amoebic liver abscess
- *Pulmonary amoebiasis
- *Cerebral amoebiasis
- *Cutaneous amoebiasis
- *Splenic abscess
- *Urogenital tract amoebiasis

LAB. DIAGNOSIS

Symptoms confirmed by finding Trophozoite in blood diarrhea or cysts in the formed stool.

Distinct from bacillary dysentery due to lack and absence PMN.

Differentiation must be made from nonpathogenic intestinal protozoa (*EX. Entamoeba coli*).

Prevention and control:

Determine:

- The source of infection by lab. Tests.**
- Symptomatic cyst carriers detection.**
- Diagnose and treat the cases.**
- Improvement water supply and sewages.**
- Good health education.**

Treatment

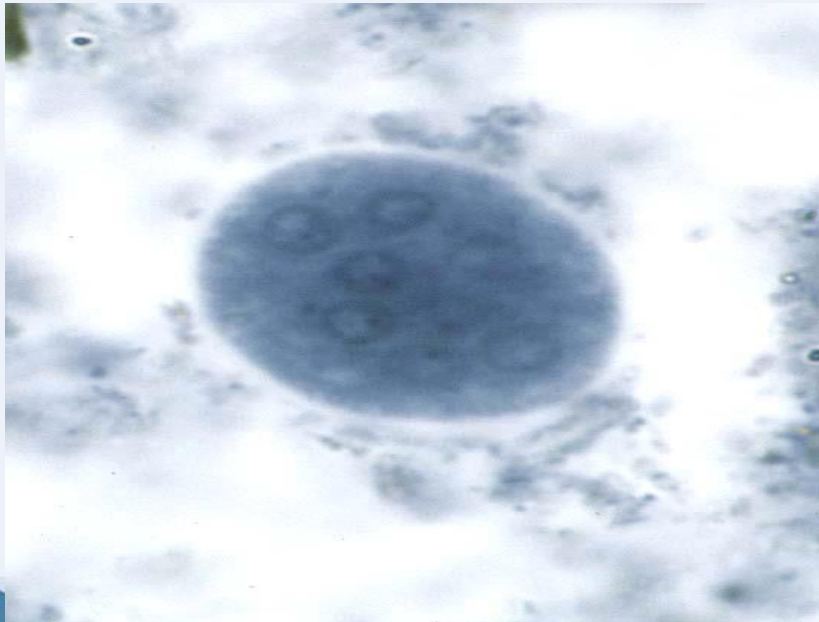
Iodoquinol drug for asymptomatic infections and metronidazole(FLAGYLE) for symptomatic and chronic amebiasis including extra intestinal disease are the drugs of choice

The dose depends on:

- 1-Severity of the infection**
- 2-Age of patients.**
- 3-Infected organ.**

***Entamoeba coli* :**

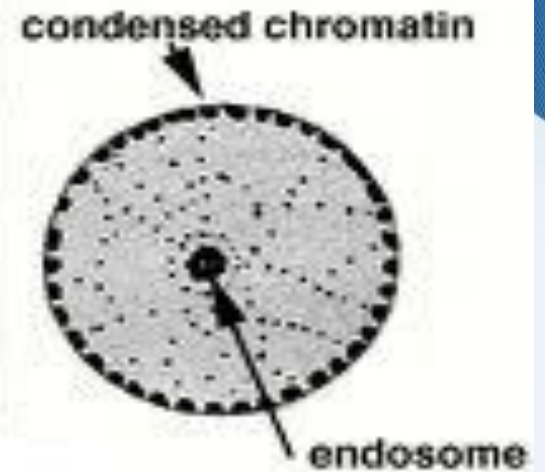
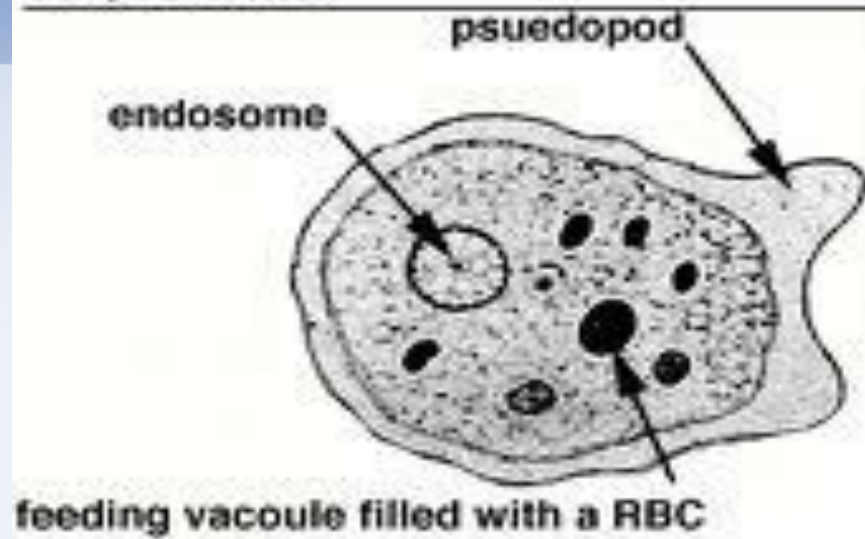
- **This parasite is non- pathogenic and**
- **live commensally in large intestine of human**
- **has the same life cycle of *E.histolytica***
- **but it differ in some properties**



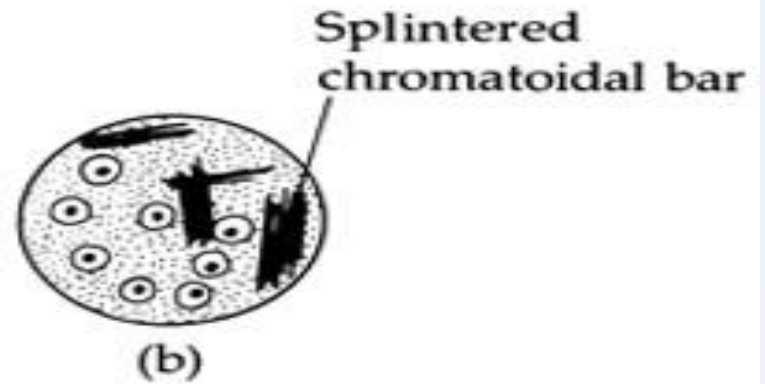
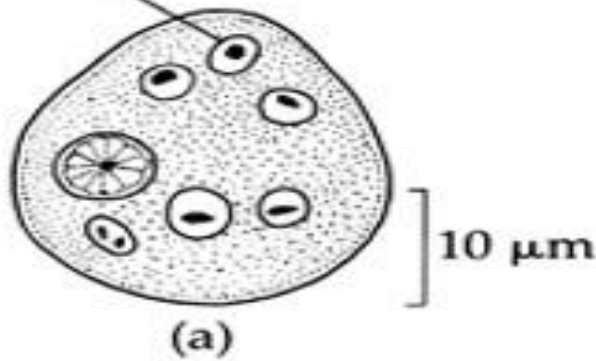
Trophozoite

Cyst

Nucleus of Cyst



Food vacuole with bacteria



Differences between *Entamoeba histolytica* and *E. coli*

<i>Entamoeba histolytica</i>	<i>Entamoeba coli</i>
Trophozoites	Trophozoites
15–20 mm (invasive Eh can be > 20 mm)	20–25 mm
Finger-shaped pseudopodia	Broad blunt pseudopodia
Progressive , directional movement	Sluggish, non-directional movement
Nucleus with centric karyosome	Nucleus with eccentric karyosome
Mature cysts	Mature cysts
12–15 mm	15–25 mm
4 nuclei	8 nuclei
Blunt chromatoid bodies	Broad chromatoid bodies

Small amoeba

1-Entamoeba gingivalis

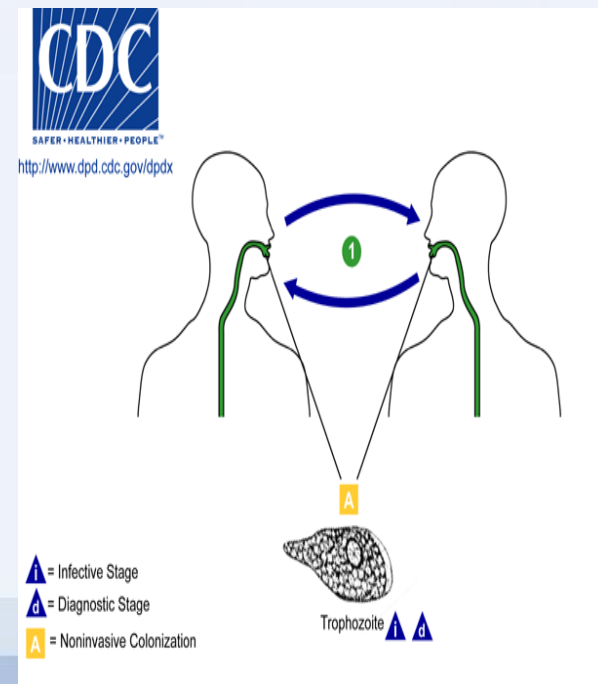
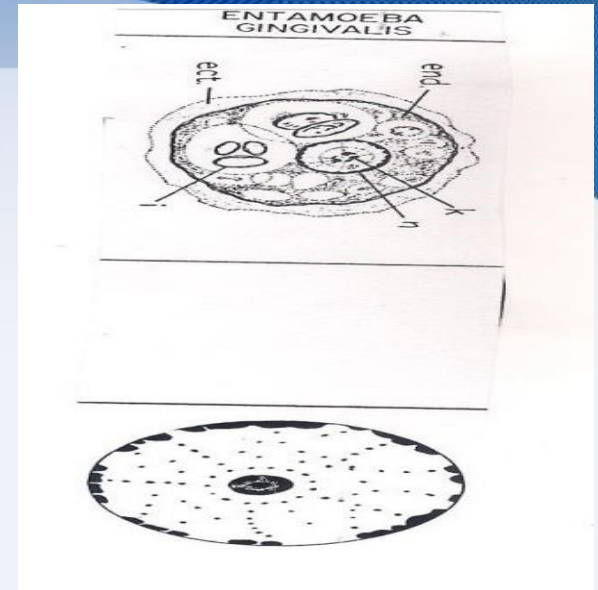
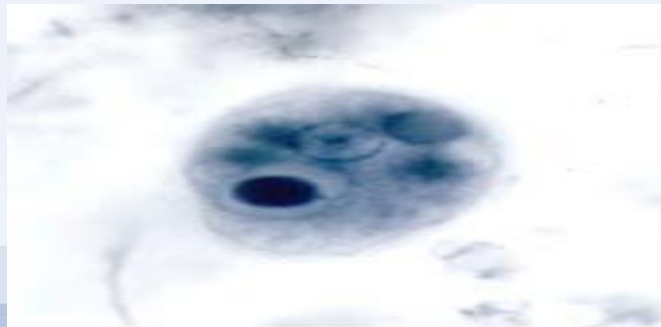
- This parasite live inside the mouth especially in the gingival pockets,
- unable to form the cyst stage, so it's direct transmitted through direct contact or other personal tools like teeth brushes.

Morphology

The tophozoites: ranges between 10 – 20 microns, highly active. No cyst stage.

Diagnosis

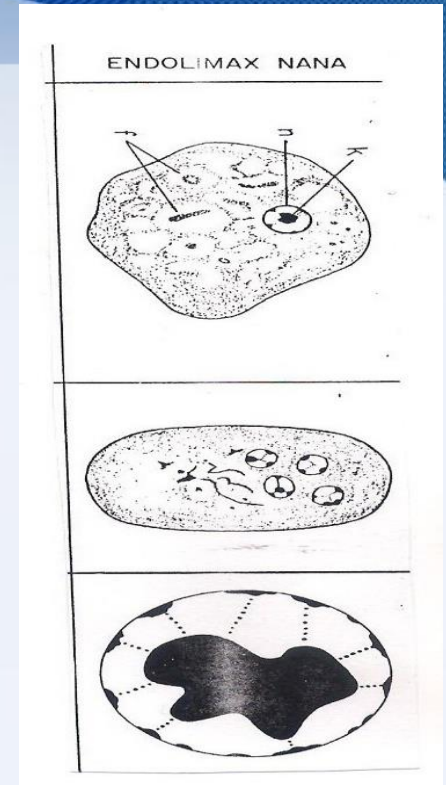
Mouth swab taken from the patient to see the trophozoite of this parasite



Small amoeba

2-Endolimax nana (nana means dwarf or small)

- Normal protozoa live in the human large intestine, very small in size , has direct life cycle, also have two stages trophozoite and cyst
- The trophozoite characteristic by a large blot-like karyosome, and the lack of peripheral chromatin.
- The cysts are mature, they contain four nuclei that are much smaller than the nuclei of the trophozoites and do not have peripheral chromatin.
- The trophozoites are usually 8-10 μm in size, while the cysts are usually 6-8 μm



Small amoeba

3. *Iodamoeba butschilli*

- Normal protozoa nonpathogenic , live in the human large intestine, small in size , has direct life cycle ,also have two stages trophozoite and cyst .
- **Morphology**
- Trophozoite size range between 9 – 13 micron , the nucleus semispherical , have large karyosome surrounded by chromatic granules.
- The cyst size is 8 – 13 micron oval or poly morph , have only one basket shape nucleus in all stages and a large mass of glycogen pushes the nucleus aside.

