# PHYLUM:**SARCOMASTIGOPHORA**

Locomotion by pseudopodia and /or flagella

**Subphylum**: **SARCODINA**- Locomotion by pseudopodia (amoeboid movement by pseudopodia), flagella found in developmental stage, reproduction by asexual means (binary fission).

Family: Endamoebidae- GI parasites

Genus: *Entamoeba* contains pathogenic species of veterinary significance. Nucleus is vesicular type with endosome near the centre.

There are four groups based on the trophozoite and cyst morphology.

- Histolytica group: Quadrinucleate cysts

  Species: *Entamoeba histolytica, E. hartmanni* etc.
- Coli group: Octanucleate cysts. Eccentric and larger endosome.

  Species*: Entamoeba coli, E. muris* etc.
- Bovis group: Uninucleate cysts

  Species: *E. bovis, E. ovis, E. suis* etc.
- Gingivalis group: No cysts

  Species: *E. gingivalis*

Dientamoeba: Have two nuclei. No cysts.

***Entamoeba histolytica*** (Ent for enterocyte means cell of intestine, amoeba- protozoa, histo- tissue and lytica- lysis).

**Host**: Man, dog, cat, monkey, pig, rat, gorilla, chimpanzee, langur, monkey etc. lab animals. **Kittens and mice are highly susceptible**. It is an anthropozoonosis in dog.

**Location**: Large intestine (liver, lungs, brain and spleen).

**Morphology**: The **trophozoite** is 10-60 µm in size.

Locomotion is **amoeboid type** by use of pseudopodia. The pseudopodia appear suddenly as long as finger like projection and the endosome flow into it. Ectoplasm is **hyaline** and endoplasm is **granular**. The spherical nucleus is 4-7 µm in size and has a distinct central zone

0.5µm in diameter which is lined by fine chromatin granules giving a beaded appearance. Some erythrocytes may present in the cytoplasm.

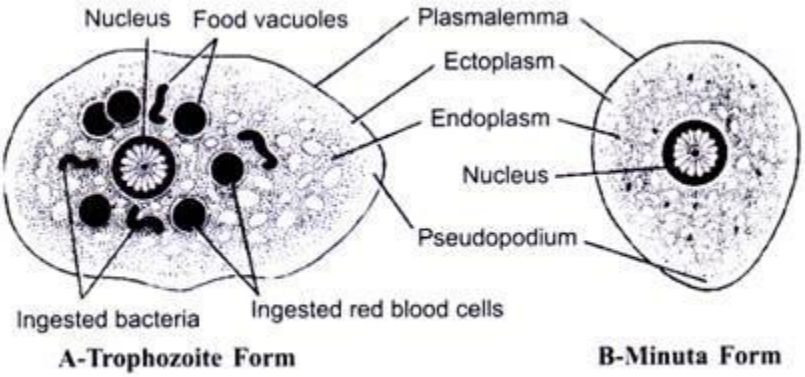


**Fig. 9.1** A & B *E. histolytica*

Fig: Trophozoites

**Cyst** is spherical or oval 5-20µm in size and quadrinucleate. Trophozoites with one nucleus round up before getting themselves encysted are called precysts which divide twice to form two nuclei and then four nuclei cysts called metacysts/mature cyst. Cysts having one or two nuclei are called as immature cysts. Young cyst contains glycogen bodies and hence stains with iodine solution. This is used as reserve food. Because of protection conferred by their walls, cysts can survive for days to weeks in the external environment and act as source of infection for susceptible hosts.

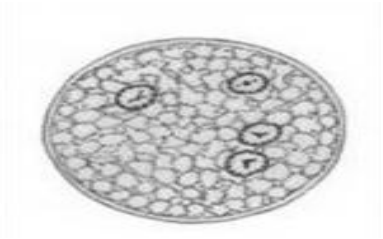

Fig: Cyst (quadrinucleate)

**Transmission:**

Transmission is mainly by faeco-oral with contaminated feed and water with cysts. Trophozoites survive only for 30 minutes after being passed out with faeces. Man is the main source of infection to animals. Cysts are not affected by water chlorination and killed at temperature 40ºC. House flies transmit cysts mechanically.

**Life cycle:** *E. histolytica* is a **monogenetic** endoparasite i.e. life cycle is completed in one host. Host get infection by the ingestion of metacysts with contaminated feed and water. Excystment occurs in the small intestine followed by cytoplasmic and nuclear division to form eight small metacystic trophozoites.

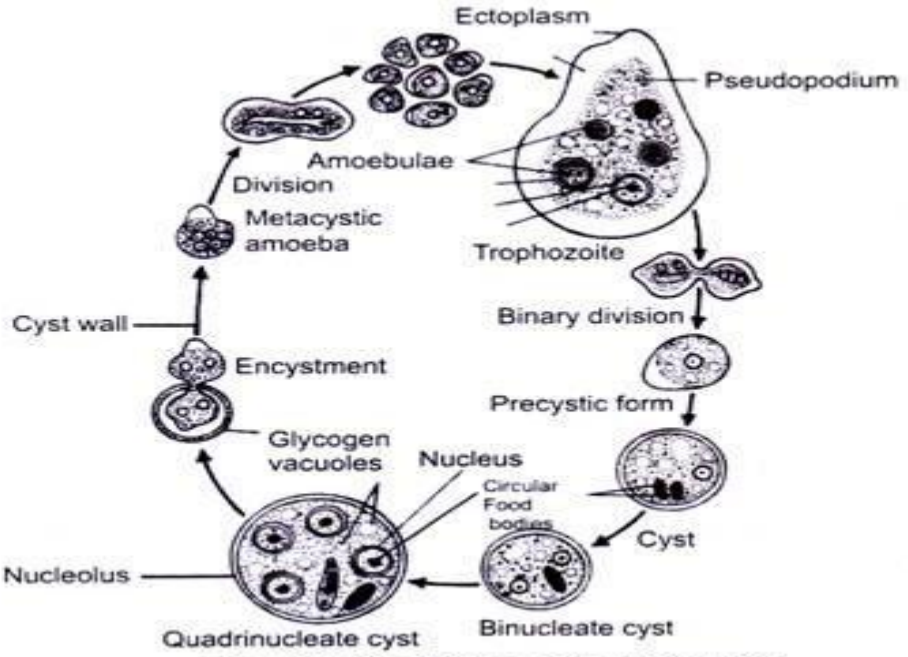


**Fig. 9.2** Life Cycle of *E. histolytica*

These trophozoites migrate to large intestine where they reproduce asexually by binary fission. If the infection is acute trophozoites are passed out with the diarrhoeic faeces. In later stage of infection some of these trophozoites become round to form precyst having single nucleus and large glycogen body then they dived to become binucleate and then quadrinucleate cysts/metacysts. These quadrinucleatemetacysts are mature cysts which are passed with faeces and act as infective stage for the susceptible hosts. Some of the trophozoites invade the mucosa and then to submuscularis and get into circulation to reach the liver, lungs and brain and cause abscess in these organs. Trophozoites are found at the periphery of abscess in theses organs.

**Pathogenesis**:

Disease condition is known as **amoebosis** or **amoebic dysentery**. Depending upon the number of cysts ingested it may be acute or chronic. Other factors like strain of amoeba, nutritional status of patient, nature of intestinal flora, concurrent infections etc. also come into the play.

It may be of two types, **non-invasive** and **invasive type**.

In **non-invasive amoebiosis**, trophozoites don't invade intestinal epithelium and multiply asexually by binary fission in the lumen of intestine. After certain generations some of daughter trophozoites grow to normal adults while others stop growing and round up to form precyst and then cysts before getting expelled out. This form of infection is usually non-pathogenic and asymptomatic.

In **invasive amoebiosis**, after excystation trophozoites multiply asexually and some of them invade the intestinal epithelium with the help of proteolytic enzymes, trypsin, chymotrypsin etc., sometimes they may go up to sub mucosa and muscularis layer and form flask shaped ulcers. These ulcers have narrow opening in the lumen and broad end filled with necrotic tissues in the sub mucosa. This form is characterised by **severe diarrhoea with blood** and **mucous**. Severe **abdominal pain** and **tenesmus** is also noticed.

In some cases, trophozoites may get into circulation by invading the veins and are transported to the liver, rarely in the lungs and brain and form abscess in these organs. The liver abscesses are due to entrapment of trophozoites in the interlobular veins and lytic necrosis of the walls. Older abscesses are surrounded by fibrous tissues.

**Diagnosis:**

- Based on the clinical signs including bloody diarrhoea large amount of mucous etc.
- Demonstration of trophozoites in faeces in acute infection by direct smear method.
- Demonstration of cysts which are common in formed faeces by direct and concentration method of faecal examination.

Immunodiagnostic: CIEPT, IHAT, IFAT, ELISA

**Treatment:**

1. Metranidazole
2. Tinidazole
3. Ornidazole
4. Secnidazole

**Control:**

1. Personal hygiene
2. Provision of modern sanitization
3. Avoid consuming contaminated of feed and water

4. Fly control etc.