

PROTOZOA: Amoebae

Amebiasis

Entamoeba histolytica

Classification

- Phylum: Sarcomastigophora
- Subphylum: Sarcodina
- Superclass: Rhizopoda
- Order: Amoebida

Classification

Parasitic amoebae

- Entamoeba
- Dientamoeba
- Endolimax
- Iodoamoeba

Free living amoebae

- Naegleria
- Acanthamoeba
- Balamuthia

Amoebae

- A. Pathogenic amoebae:
Intestinal : *E.histolytica*

- B. Nonpathogenic commensals :
 - 1. Mouth amoeba – *E.gingivalis*

 - 2. Intestinal : *E.coli*, *E.nana*,
I.butshclii & *D.fragilis*

Entamoeba histolytica Schaudinn, 1902

- Causing diarrhoea, dysentery, hepatitis and liver abscess in man
- First discovered by Lambi (1859)

Geographical distribution

- More common in tropics and subtropics than in the temperate zone

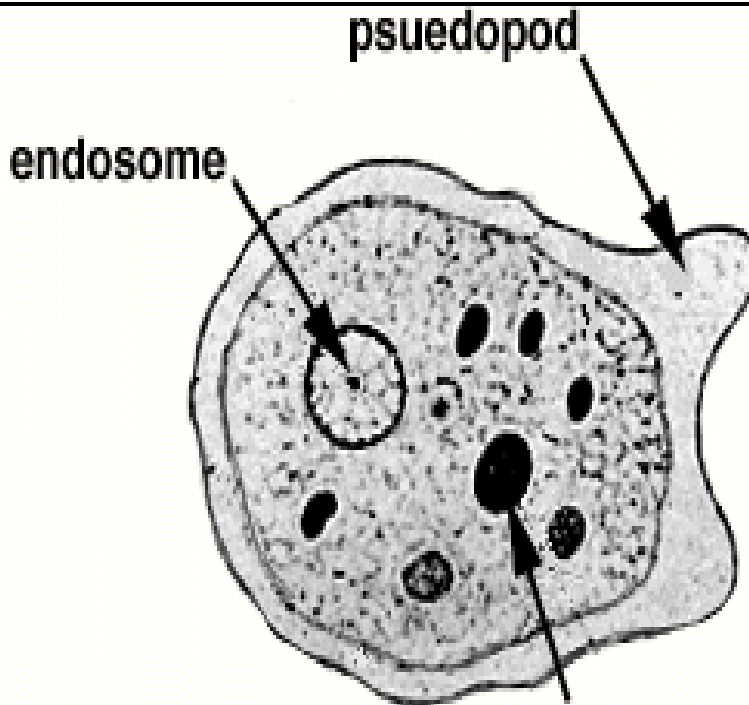
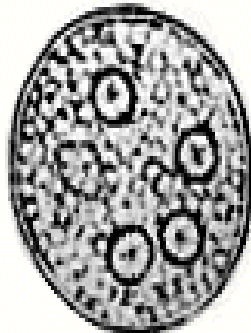
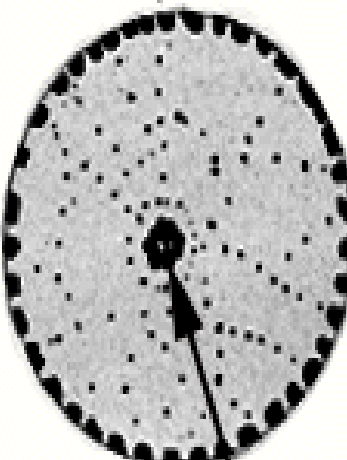
Habitat

- Live in the mucus and submucus layers of large intestine of man

Morphology – Three form

- Trophozoites
- Precystic
- Cystic

E.histolytica - Morphology

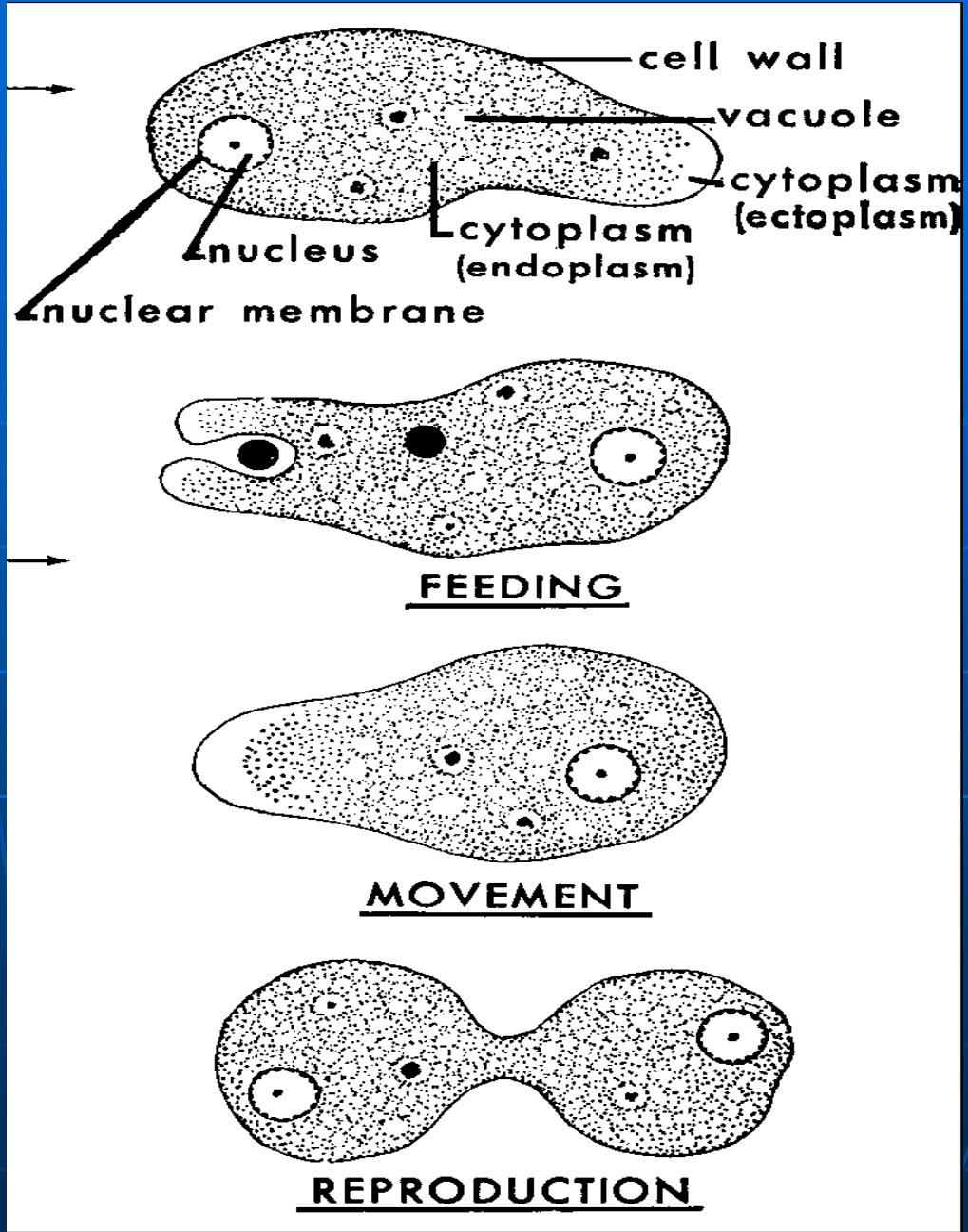
Trophozoite	Cyst	Nucleus of Cyst
 <p>A detailed micrograph of an Entamoeba histolytica trophozoite. The cell is roughly circular with an irregular, wavy outer boundary. It contains several small, dark, oval-shaped endosomes. A large, clear, circular feeding vacuole is visible, containing a red blood cell (RBC). A long, thin, hair-like pseudopod extends from the right side of the cell.</p> <p>psuedopod</p> <p>endosome</p> <p>feeding vacoule filled with a RBC</p>	 <p>A micrograph of an Entamoeba histolytica cyst, which is a spherical, oval-shaped structure. It has a thick, multi-layered wall and contains several smaller, rounded trophozoites within it.</p>	 <p>A high-magnification micrograph of the nucleus of an Entamoeba histolytica cyst. It shows a large, circular nucleus with a prominent, dark, condensed chromatin mass at the periphery. A smaller, dark, oval-shaped endosome is located in the center.</p> <p>condensed chromatin</p> <p>endosome</p>

Entamoeba histolytica

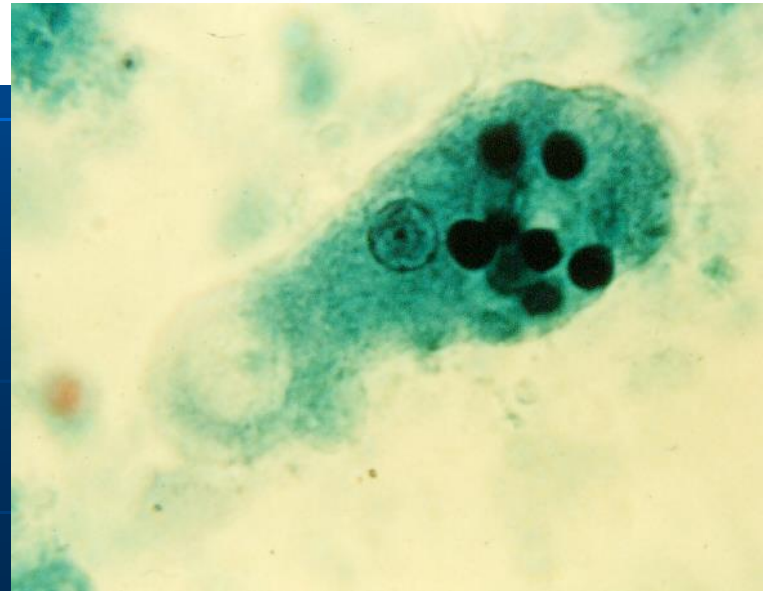
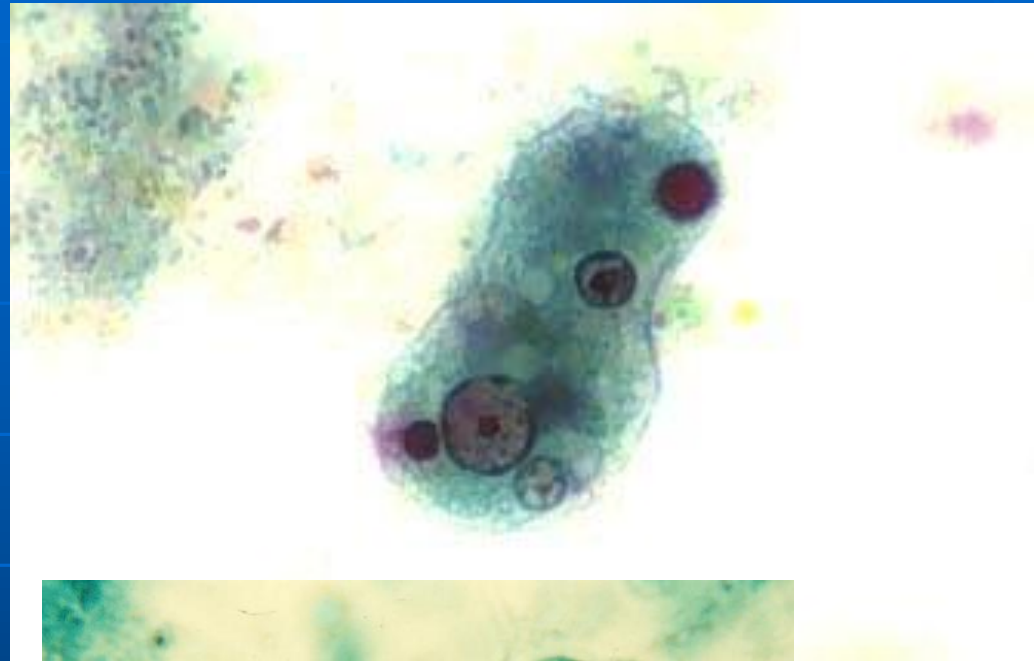
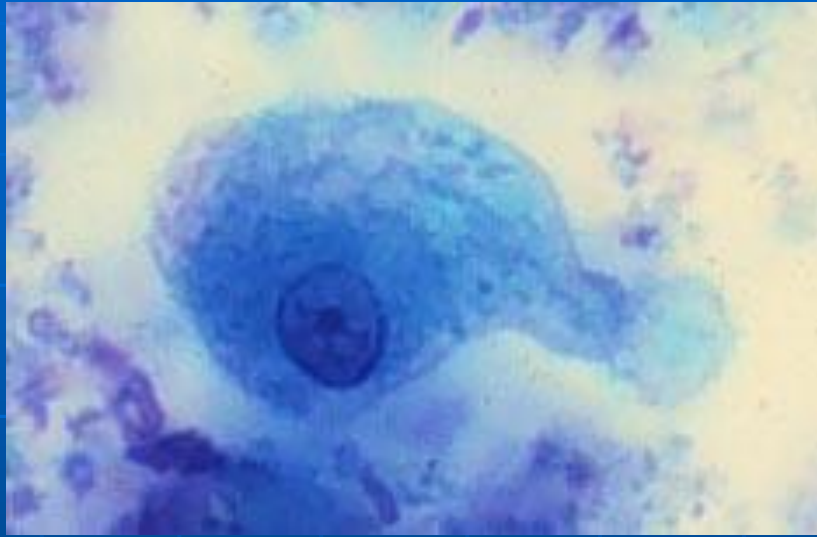
E.histolytica: Trophozoite

- Size: 18-40 μ
 - Exhibit slow gliding movement
 - Shape: Not fixed
 - Cytoplasm ectoplasm, & endoplasm
 - Nucleus: Central karyosome surrounded by delicate nu memb & space is traversed by fine thread of linin network having spoke like radial arrangement
- *Entamoeba histolytica* – Trophozoite stage



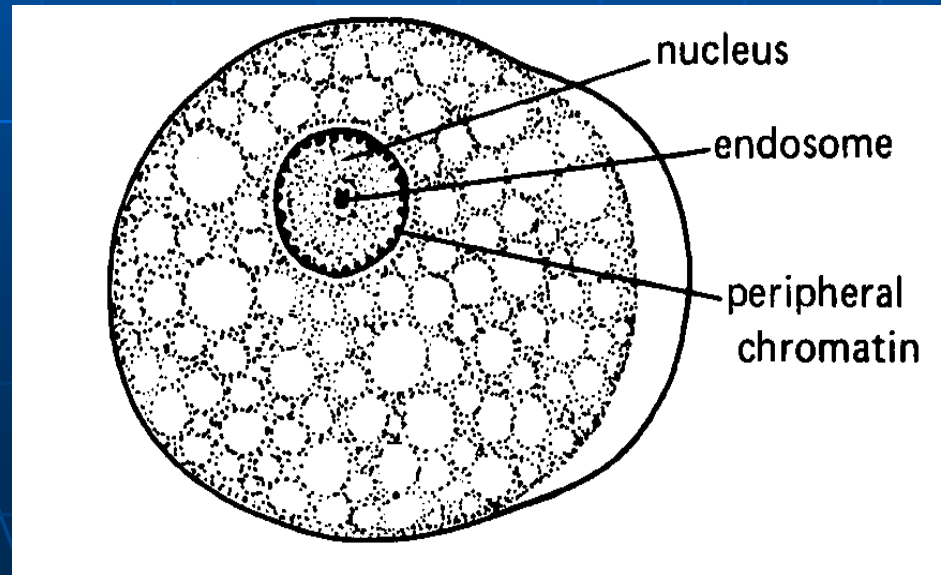


Entamoeba histolytica trophozoites



Precystic stage

- 10 – 20 μm
- Same like trophozoite
- Round or oval with blunt pseudopodia
- No RBCs / Food particles

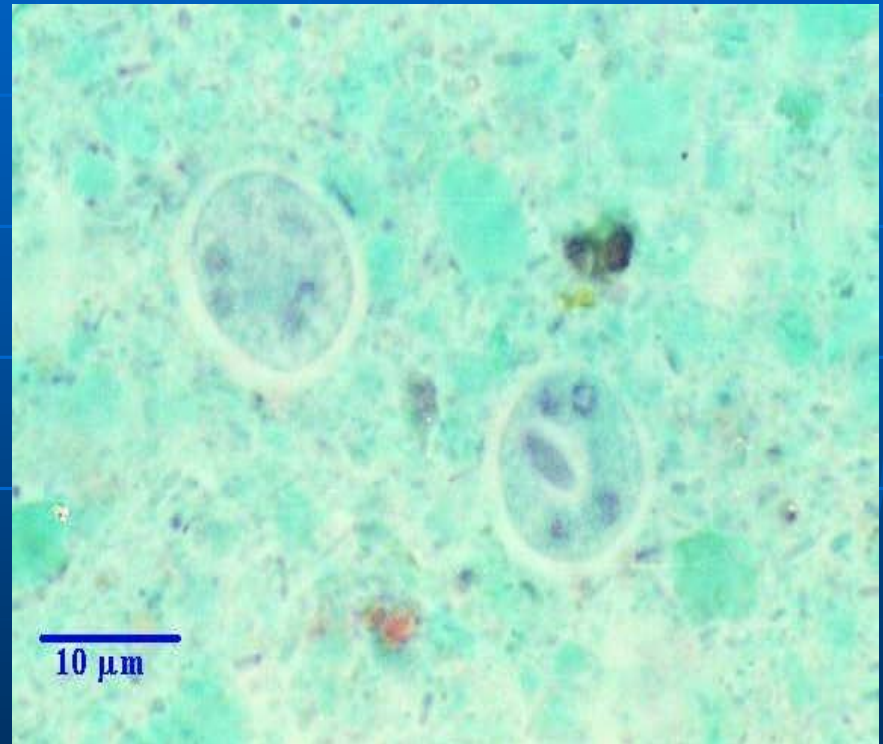


Cystic stage

- 12 – 15 μm
- Round
- Cyst wall – highly refractile
- Nucleus: 1 / 2 / 4
- Cytoplasm – shows
 - Chromatoid body
 - Glycogen mass



Cyst of *E. histolytica*



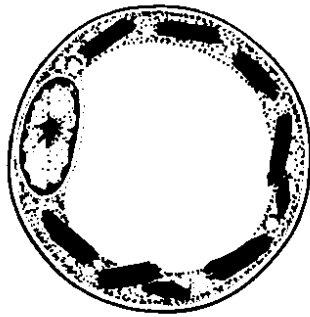
Entamoeba histolytica cysts

Cyst **nuclei** possess even peripheral chromatin and a central karyosome

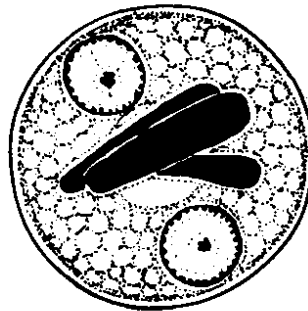
- **Cytoplasm** contains rod-shaped **chromatoid bars** - cigar-shaped - and **vacuoles**

- Chromatoidal bars and glycocogen vacuoles are most common in young cysts (uninucleate & binucleate).

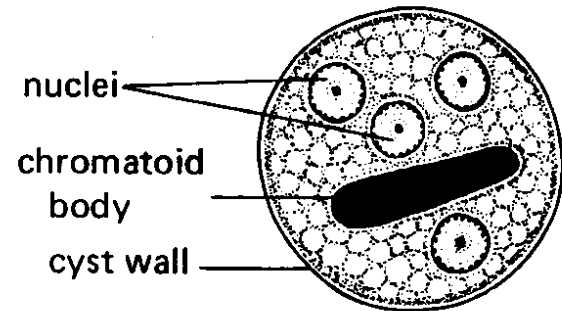
-In mature cysts, glycogen mass is absent



A. Uninucleate



B. Binucleate



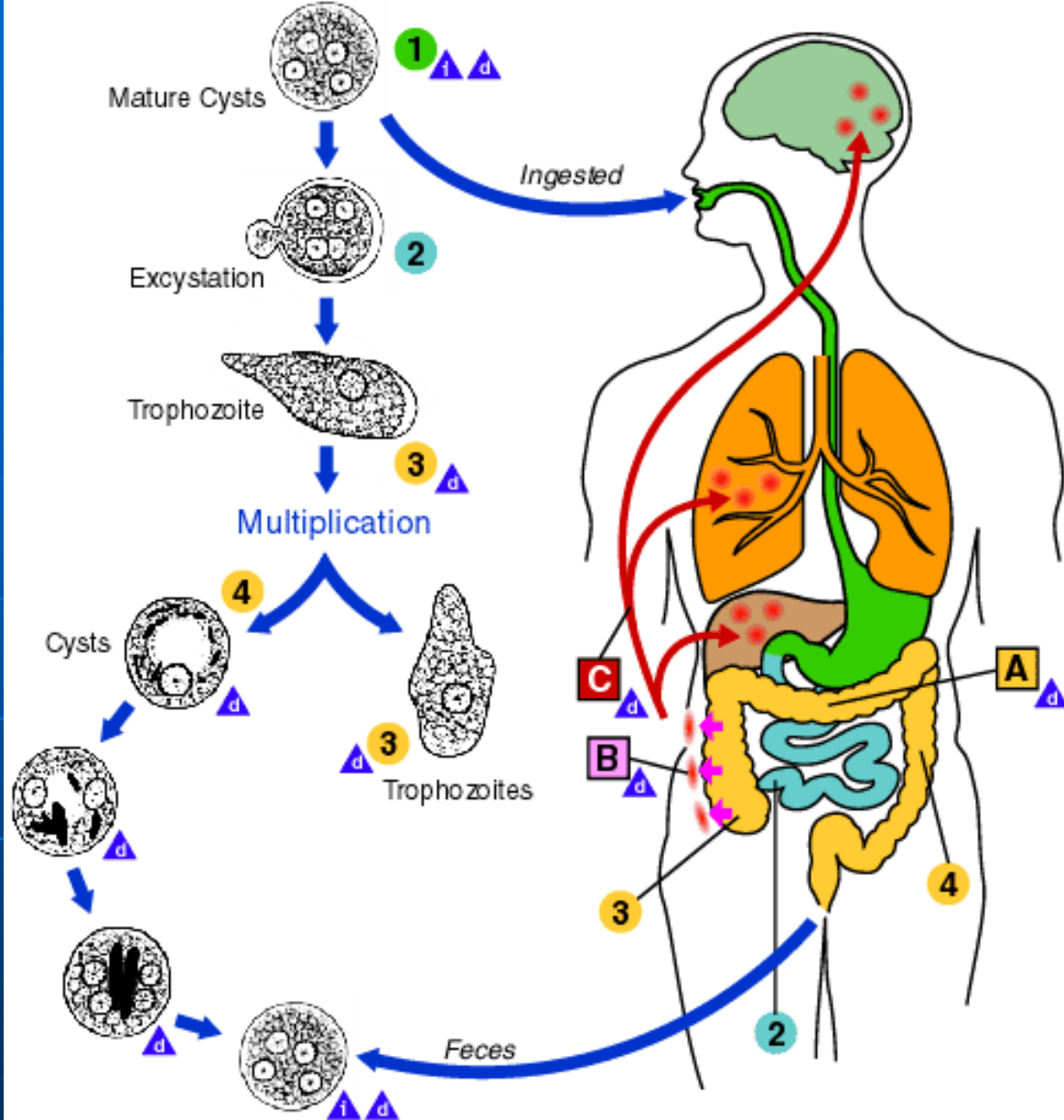
C. Quadrinucleate

Life cycle

Entamoeba histolytica life cycle

Common source of infection is from the use of Manure containing infected faeces- used to fertilize vegetables





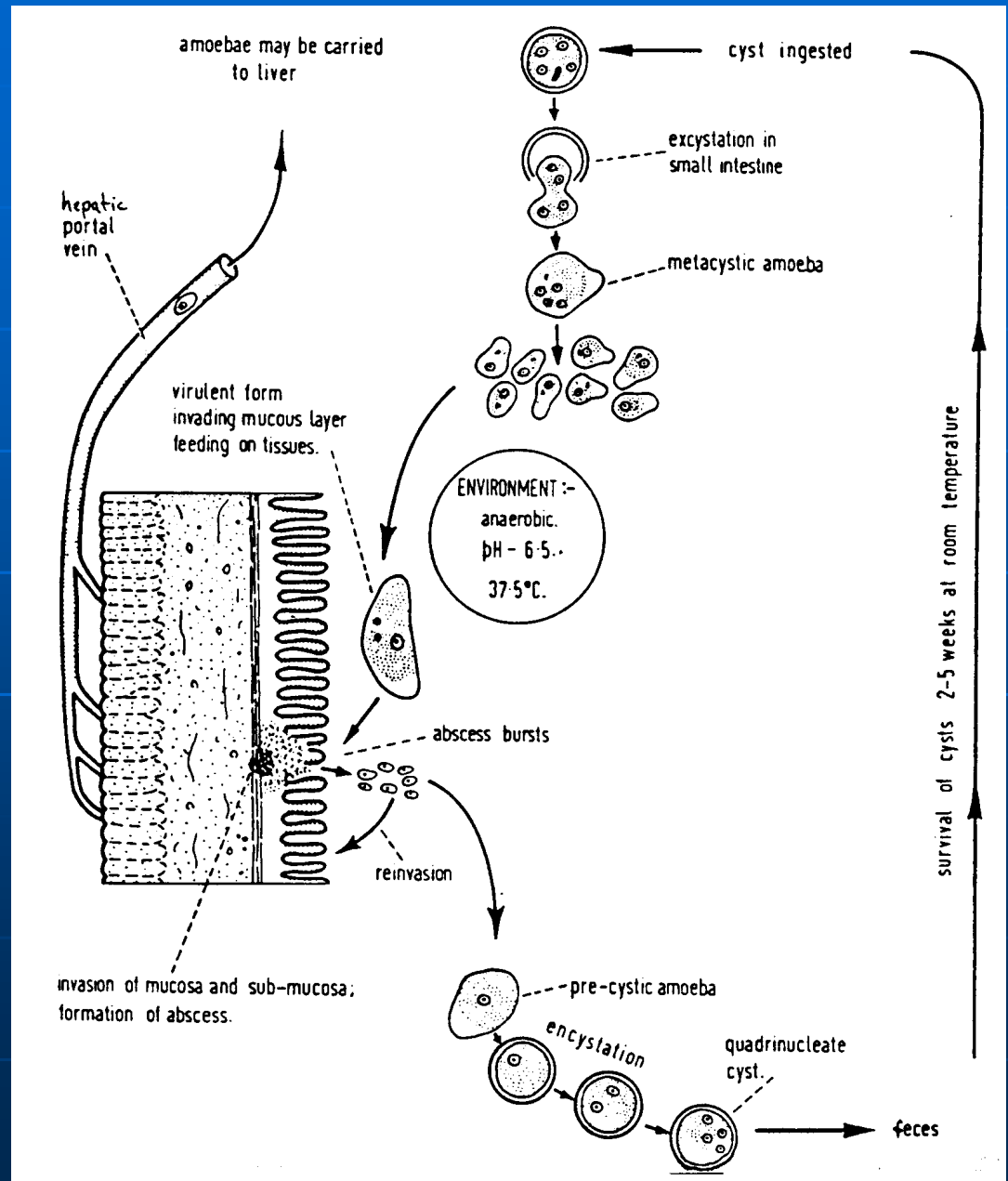
i = Infective Stage
d = Diagnostic Stage

A = Non Invasive Colonization
B = Intestinal Disease
C = Extra-Intestinal Disease

Entamoeba histolytica life cycle

Infection occurs when infective cysts are ingested in food or water that has been contaminated with human feces.

Thus, this parasite is transmitted from human to human via fecal contamination



Symptoms/Pathology

- Infections of *E. histolytica* vary in intensity from asymptomatic to severe or fatal invasions
- Asymptomatic infections are responsible for the spread of the parasite with numerous cysts being passed in normal stools
 - 90 % - carriers
 - 10 % - symptomatic infection
 - 1 % - complication

Symptoms & Pathology

- Invasive forms of the disease :
 - **Intestinal :**
 - Dysentery
 - Intestinal ulceration
 - **Extra-intestinal : Abscess**
 - Liver
 - Lung
 - Brain

Entamoeba histolytica pathogenesis

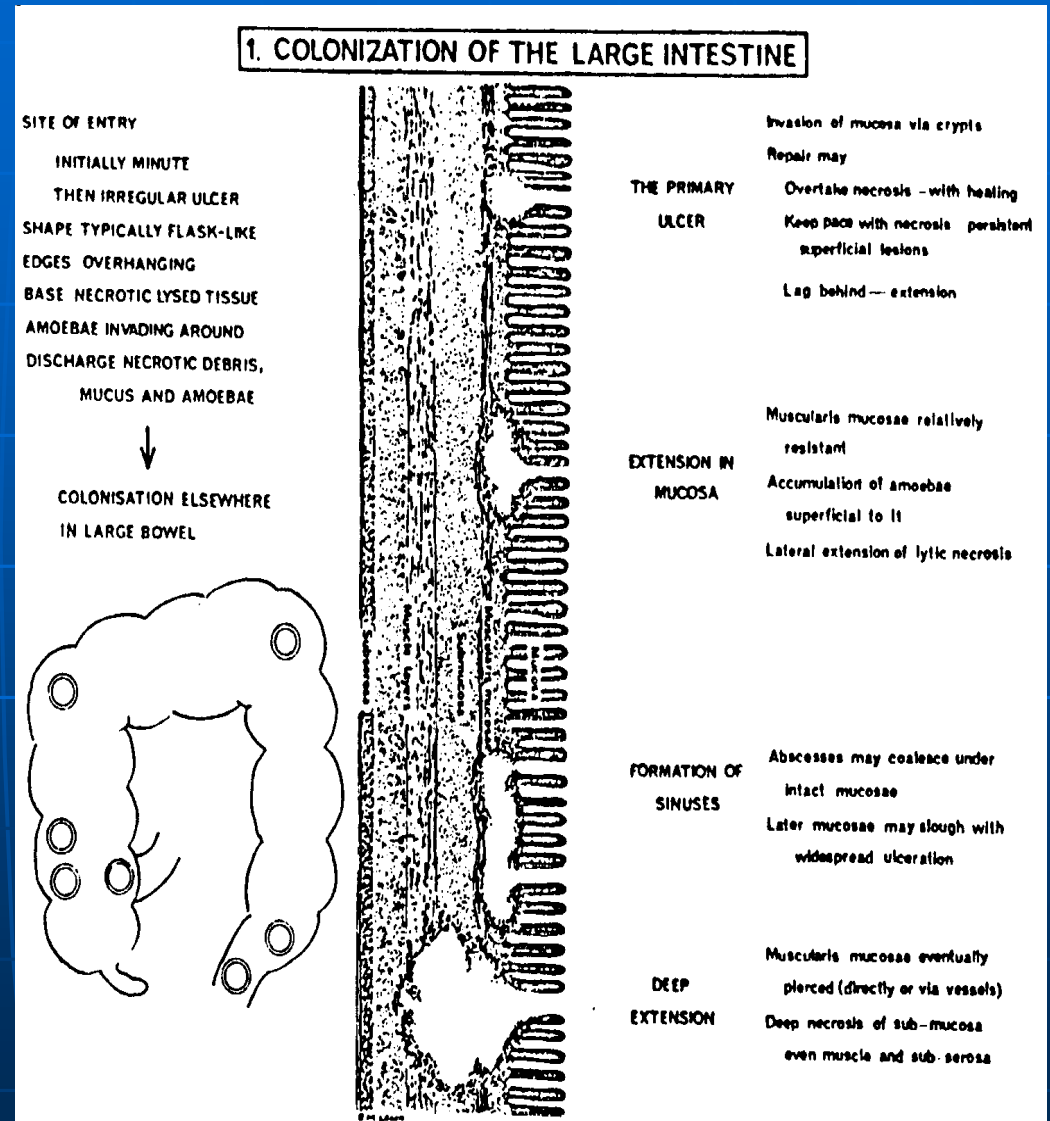
1. COLONIZATION OF THE LARGE INTESTINE

flask-shaped lesions:

proteolytic enzymes :

Symptoms:

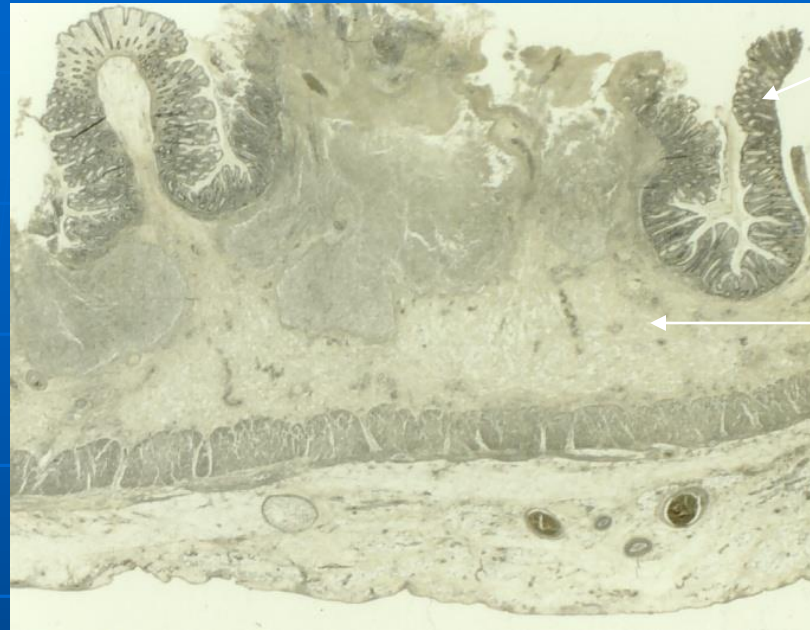
Ulcers may form sinuses and extend into the submucosa



Entamoeba histolytica pathology

1. COLONIZATION OF THE LARGE INTESTINE

primary ulcer:



Mucosa

submucosa



COMPLICATIONS IN LARGE INTESTINE

2. COMPLICATIONS

PERFORATION
HAEMORRHAGE (RARE)

With peritonitis
haemorrhage

SECONDARY INFECTION

With surrounding inflammatory reaction and fibroblastic proliferation

INVASION OF BLOOD VESSELS
DIRECT EXTENSION OUTSIDE BOWEL



Entamoeba histolytica pathology

3. EXTRA-INTESTINAL LESIONS occur in 3 ECTOPIC SITES

A. HEPATIC AMEBIASIS

B. PULMONARY AMEBIASIS

C. CEREBRAL AMEBIASIS

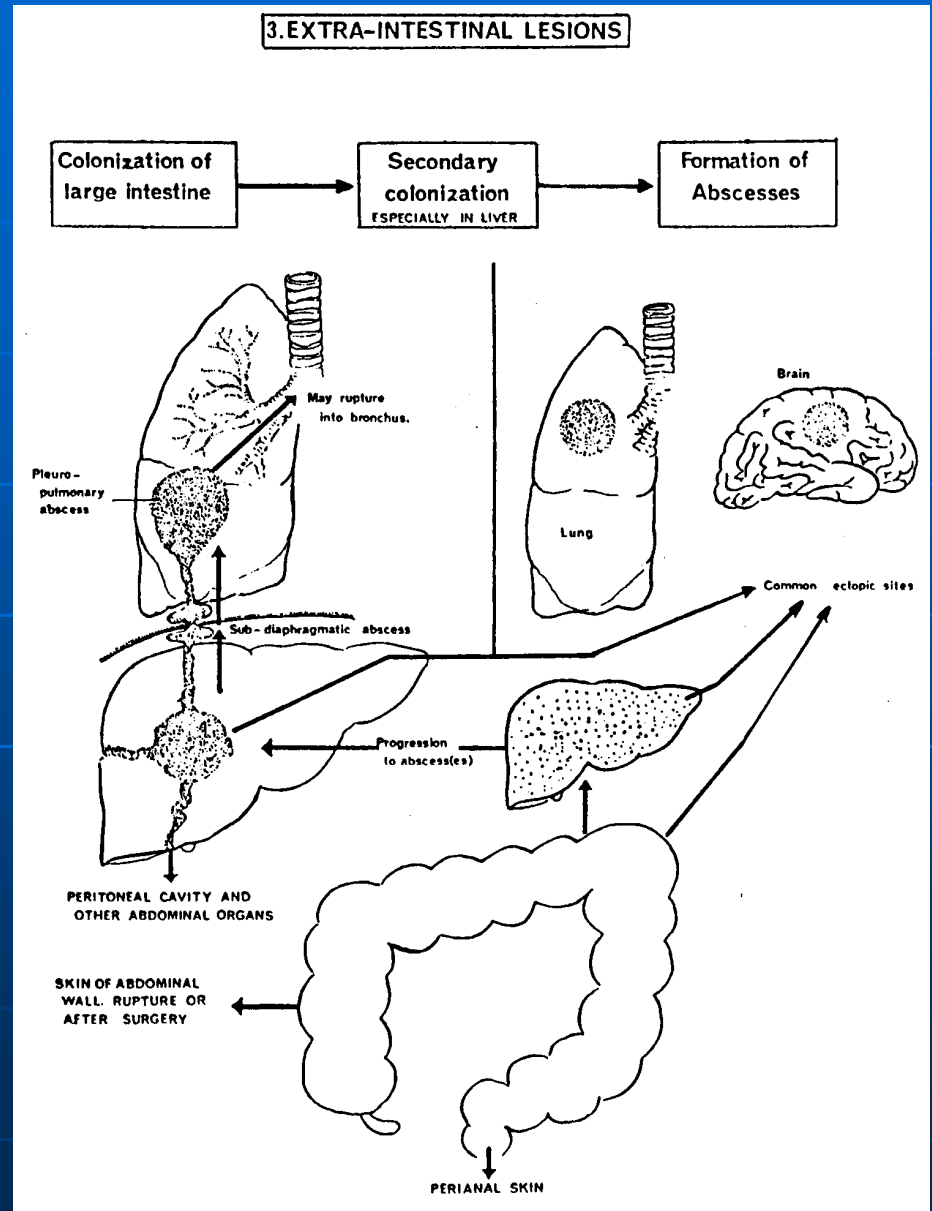
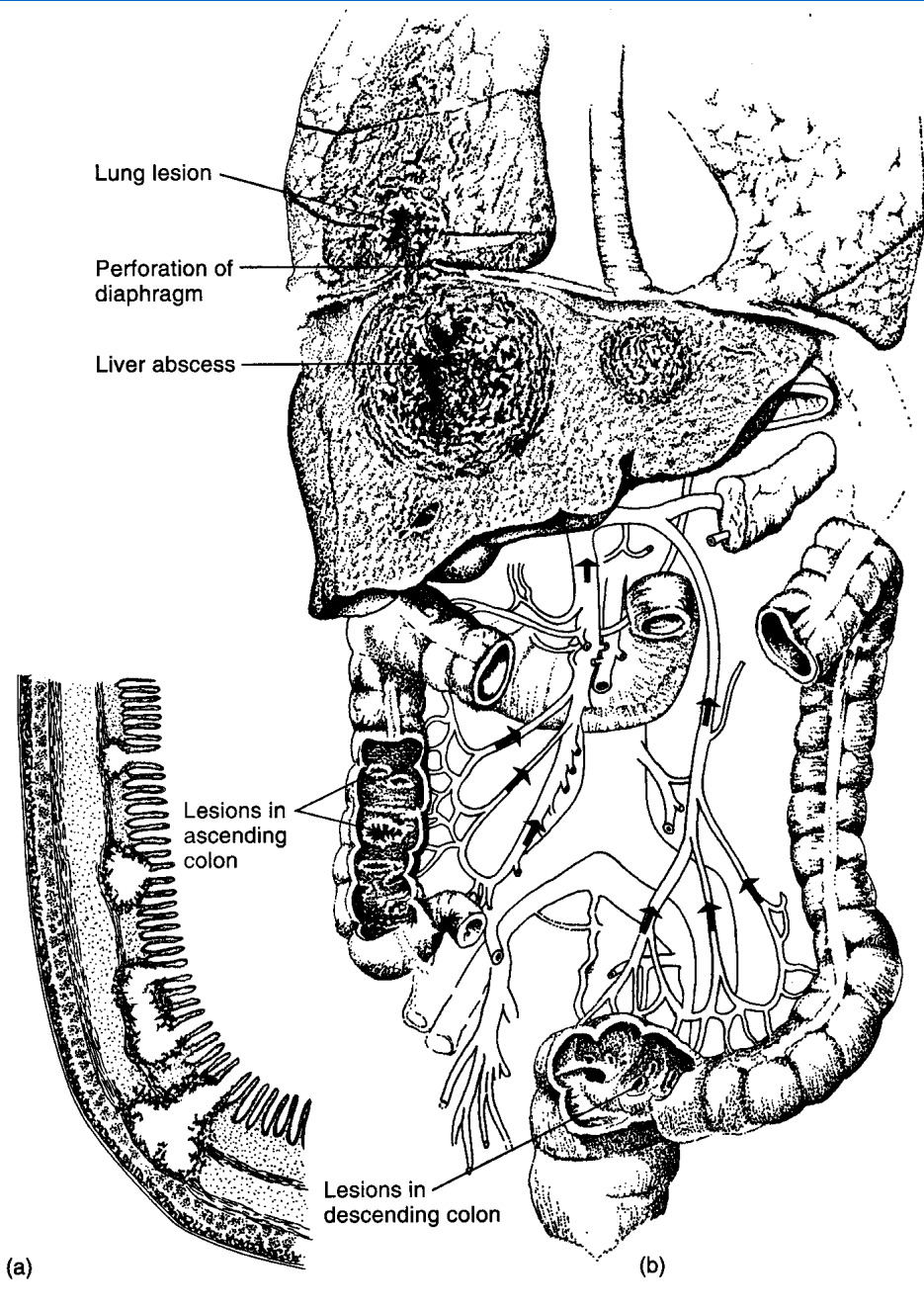


Diagram of pathology

Shows movement of trophozoites from large intestine to lungs via hepatic portal vein

Liver abscesses



Amoebic liver abscess

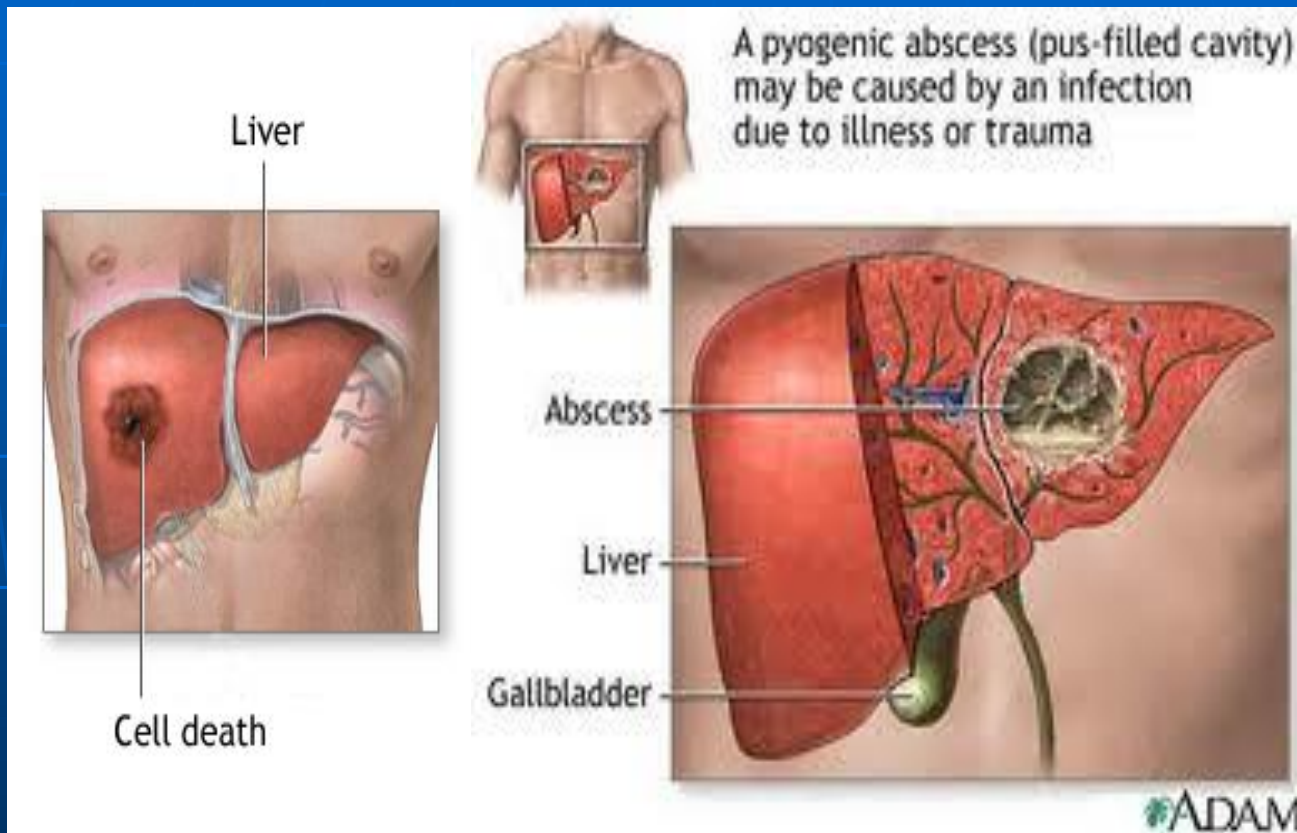
- Incidence: Only 5-10% persons with intestinal amoebiasis
- The parasite multiply rapidly in the liver & cause obstruction to circulation resulting in ischaemic necrosis of the surrounding liver cells forming small abscesses.

Amoebic liver abscess

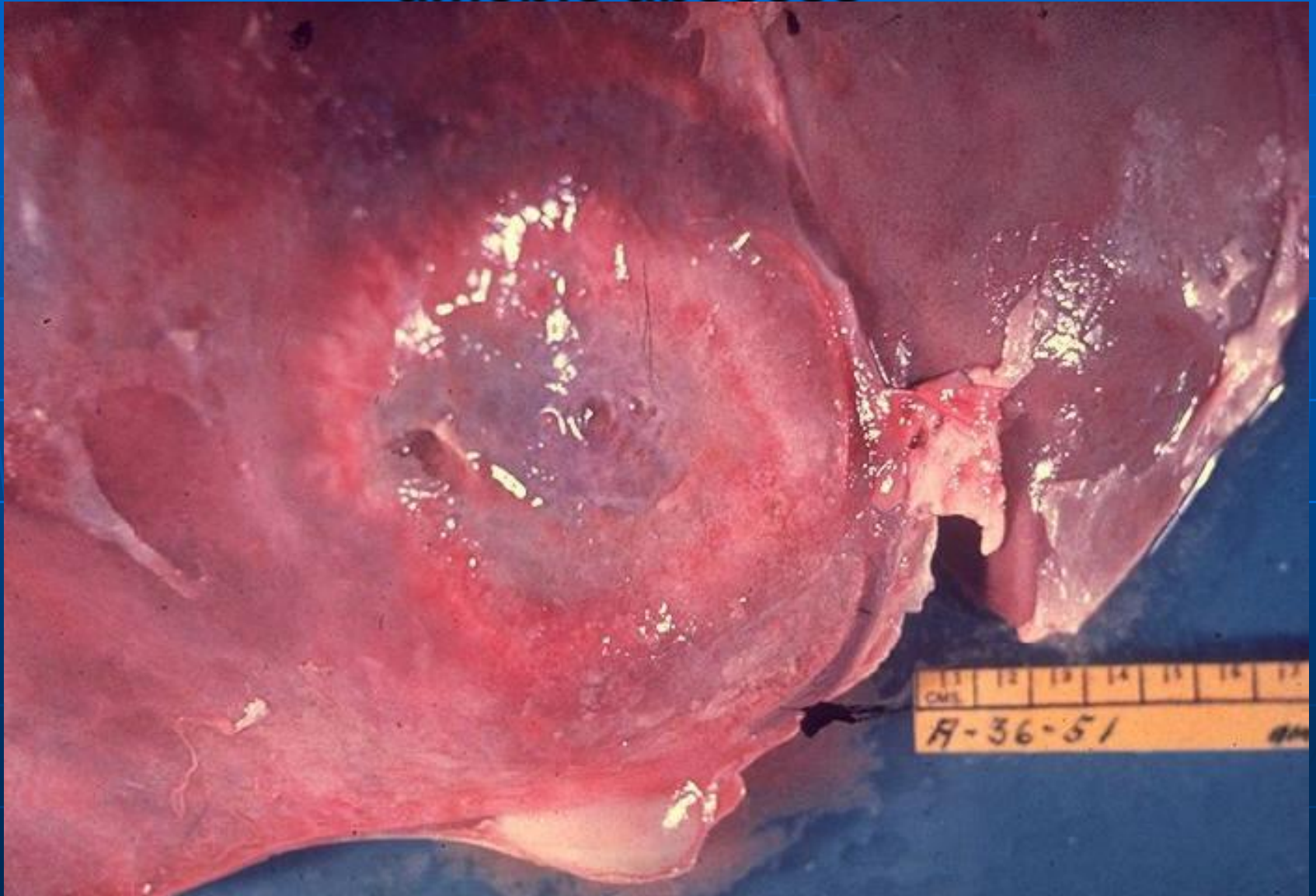
- Abscess area: Reddish brown with semifluid consistency.
- Cytolysed liver tissue: Completely destroyed
- Contains pus like mix.- sloughed liver tissue & blood
- Anchovy sauce pus
- Bacteriologically: sterile



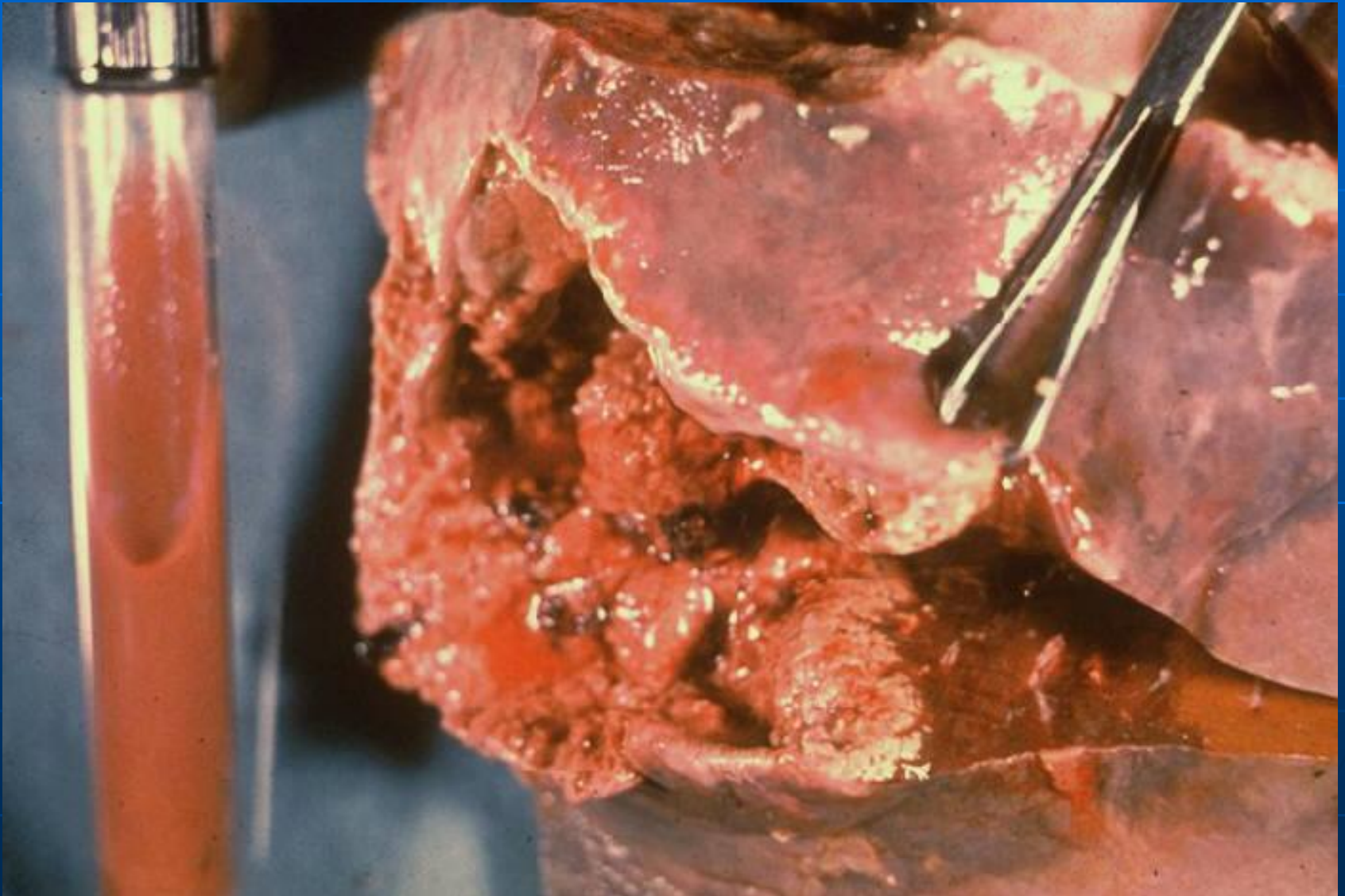
Localisation of abscess



Gross pathology of liver containing amebic abscess



Gross pathology of amebic abscess of liver. Tube of "chocolate" pus from abscess.



Anchovy sauce pus



Figure 1. Aspirate from an amoebic liver abscess—classical 'anchovy paste'



Laboratory Diagnosis - Dysentery

- Stool Examination: Gross
Microscopic
- Serological test

Stool Examination - Gross

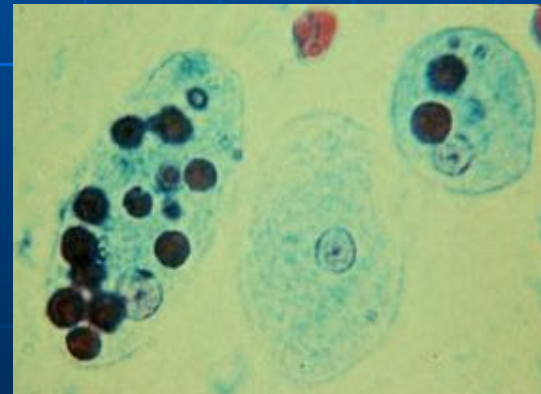
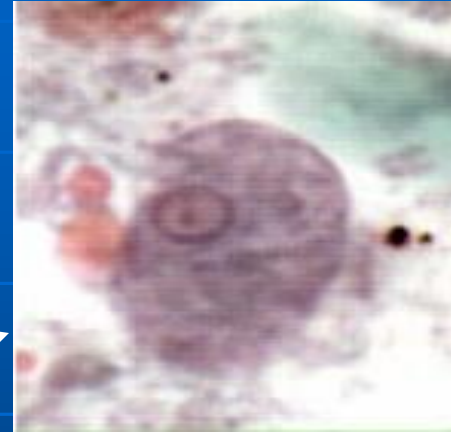
- With Mucus , blood & / Pus
- Foul smelling
- pH: Acidic
- Dark Red

Microscopic Examination

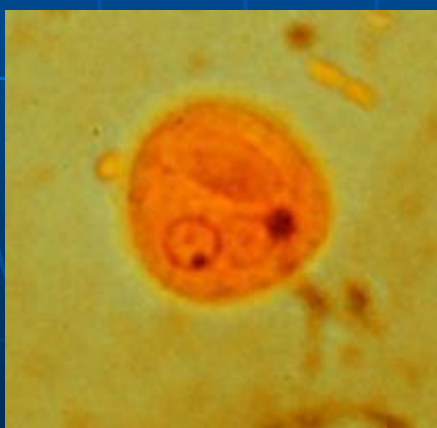
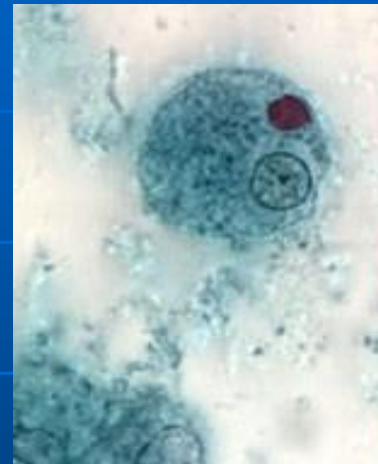
- Pus cells
- RBCs
- Bacteria
- Parasites
- C. L. Crystals

Microscopic Examination

- Wet mount – saline
- Wet mount – Iodine
- Iron Haematoxyline stain
- Trophozoites

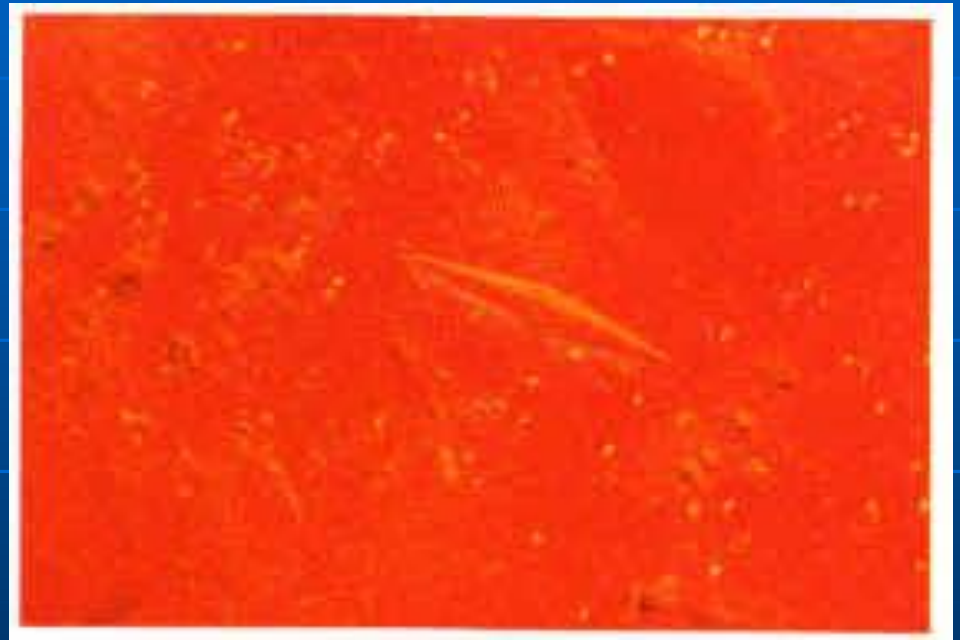


Microscopic Examination: Cysts



Charcot Leyden Crystal

- Diamond shaped crystals are often seen in amoebic dysentery faeces and may also be present in other parasitic infections. They are absent in bacillary dysentery.



Dysentery	Amoebic	Bacillary
Onset	Gradual	Acute
Clinically	No symptoms	Fever, vomiting
Odour	Offensive	Odourless
Nature	Blood & Mucus	Often watery & Bloody
Reaction	Acidic/Dark red	Alkaline/Bright red
Numbers	6 to 8 motions/day	> 10 motions/day
Amount	Copious	Small

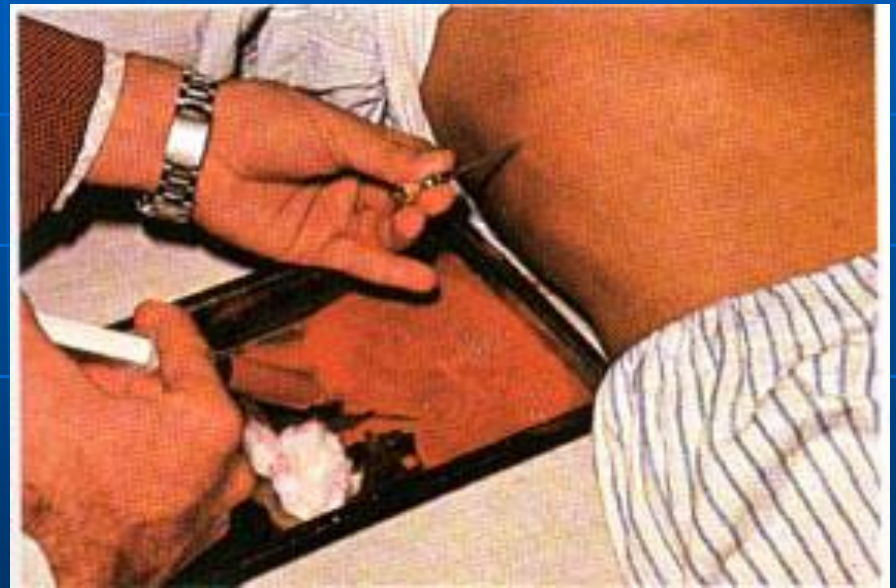
Dysentery	Amoebic	Bacillary
RBC	Clumps	Discrete
Pus cells	Scanty	Numerous
Macrophage	Nil/very few	Large numbers
Trophozoite	E.histolytica	Nil
Charcot-Leyden crystals	Present	Nil
Eosinphils	Present	Absent
Pyknotic body	Common	Nil

Liver abscess – Lab. Diagnosis

- Pus – gross – Chocolate color
 - Microscopy – Trophozoites rare
 - C. L. crystals
 - Necrotic debris, pus cells, RBCs
- Serological test: - Detection of antibody – Precipitation / ELISA / Immunochromatography

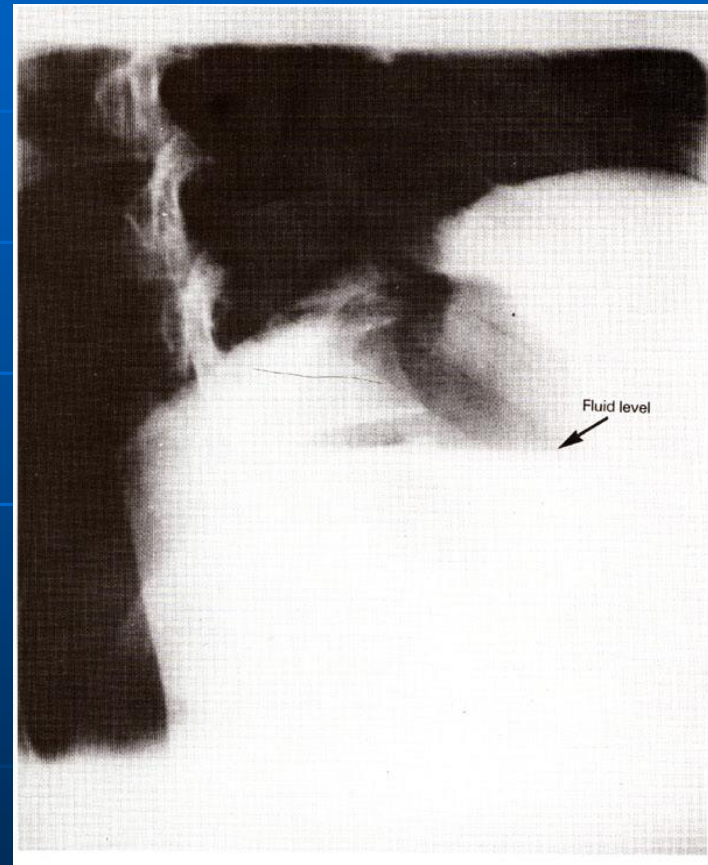
An Amoebic Liver Abscess Being Aspirated.

- Note the reddish brown color of the pus ('anchovy-sauce'). This color is due to the breakdown of liver cells.



X-ray of a Large Amoebic Liver Abscess.

- A fluid level has formed after aspiration due to entry of air

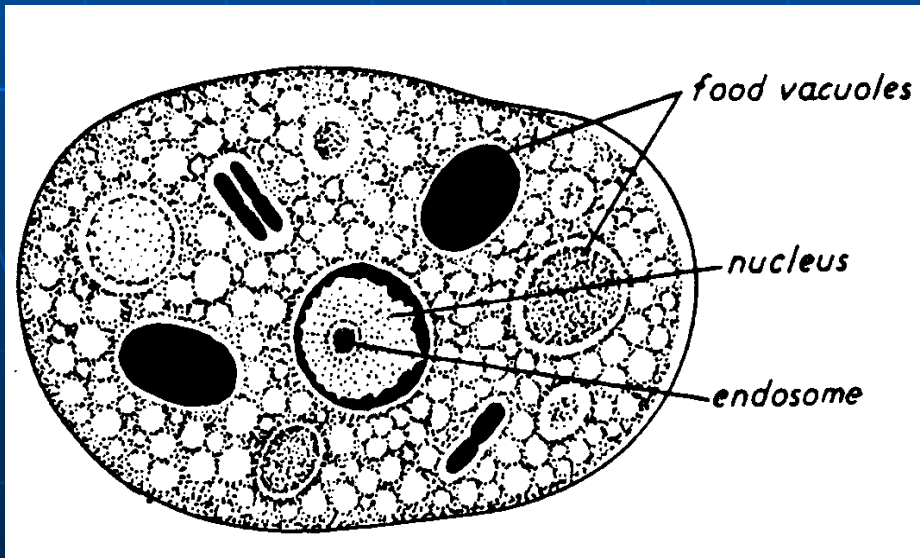


Entamoeba coli

Entamoeba coli life cycle stages

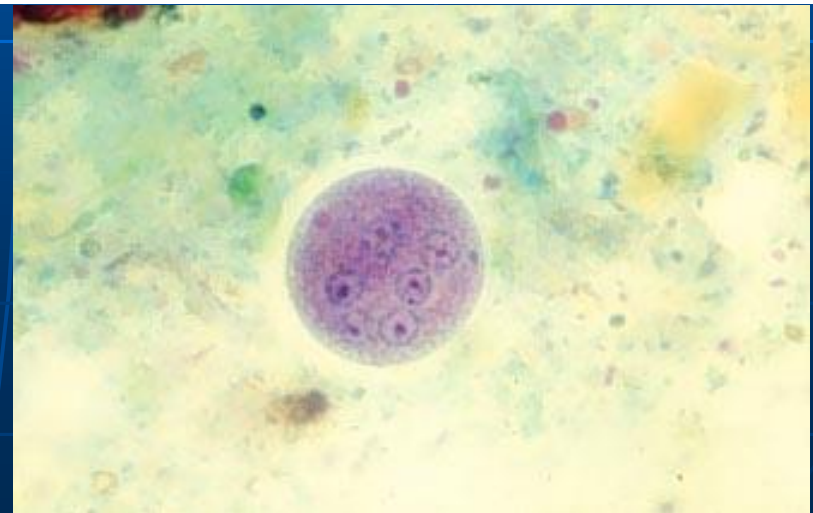
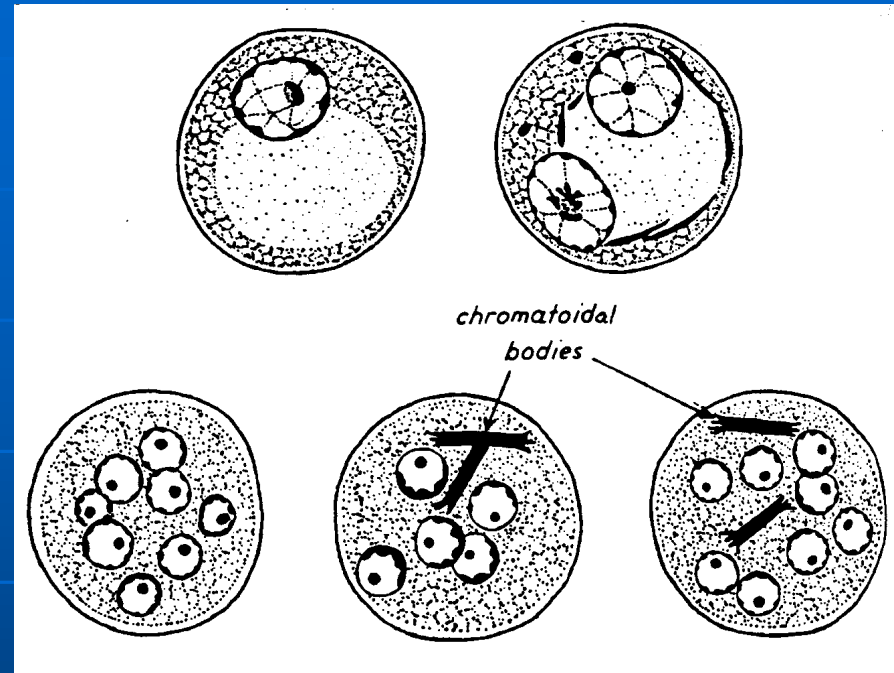
1. TROPHOZOITE - 30 to 40 μm in diameter

- granular endoplasm is coarser than *E. histolytica*
- structure of nucleus: karyosome eccentric, nuclear membrane lined by coarse chromatin granules
- lives in **large intestine** and feeds on bacteria and any other cells available to it; does not invade tissue

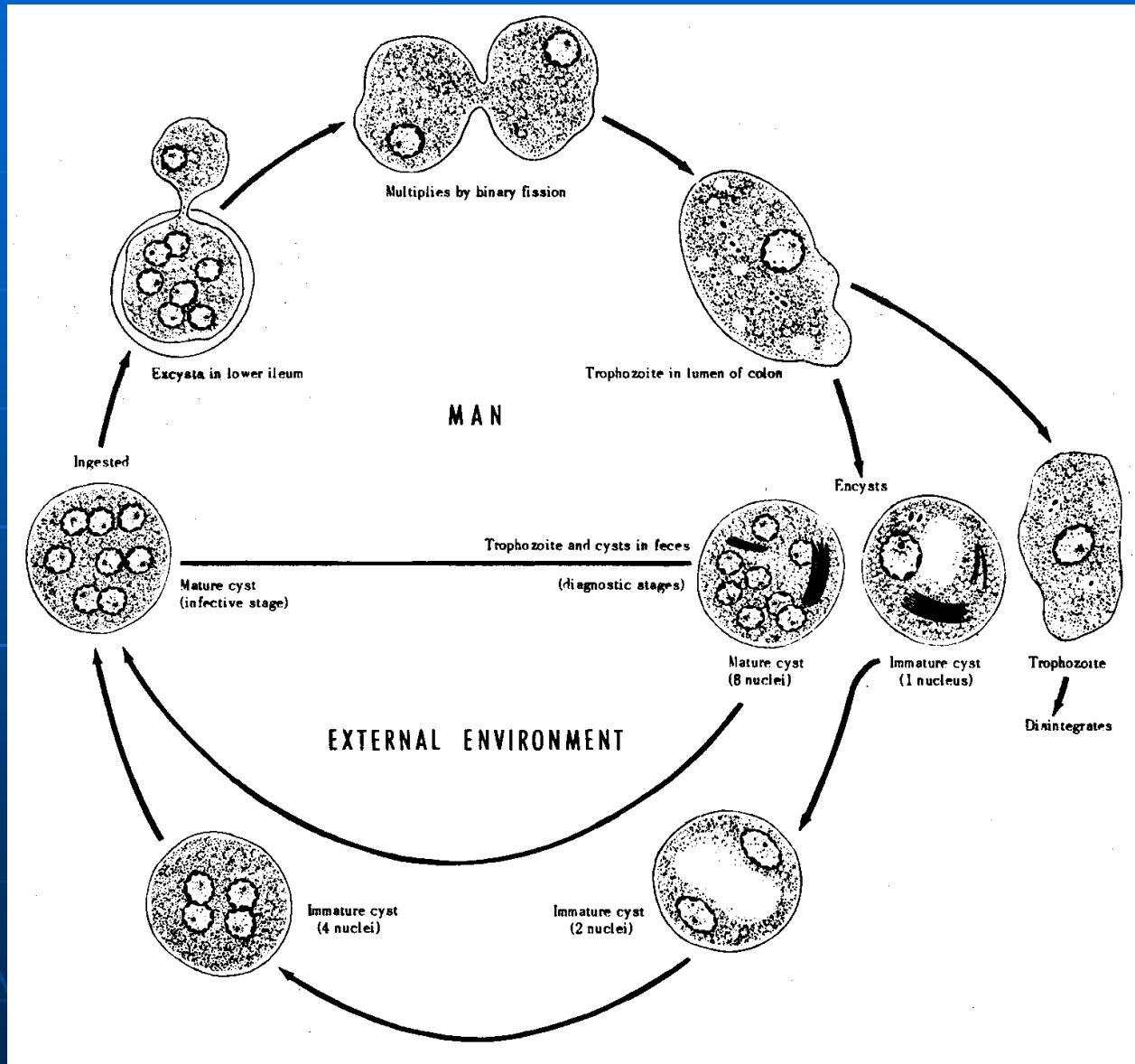


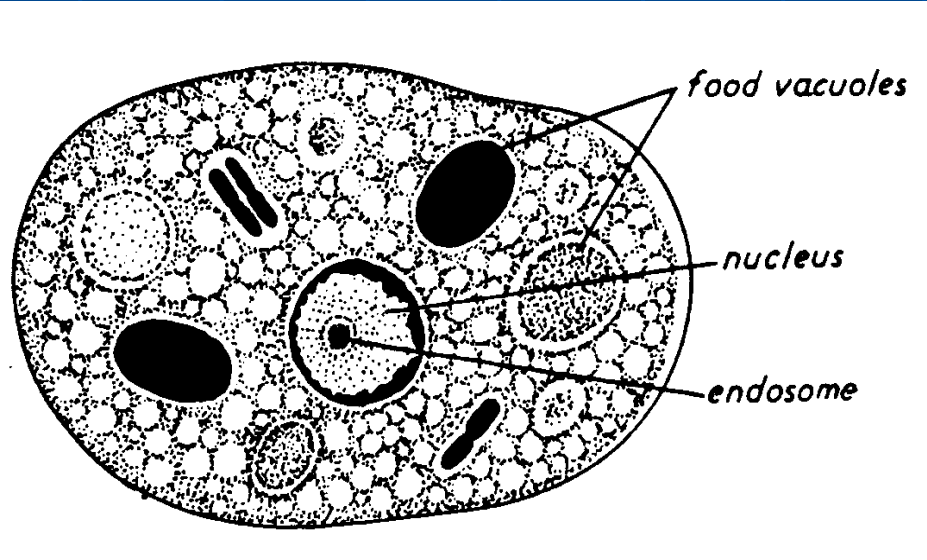
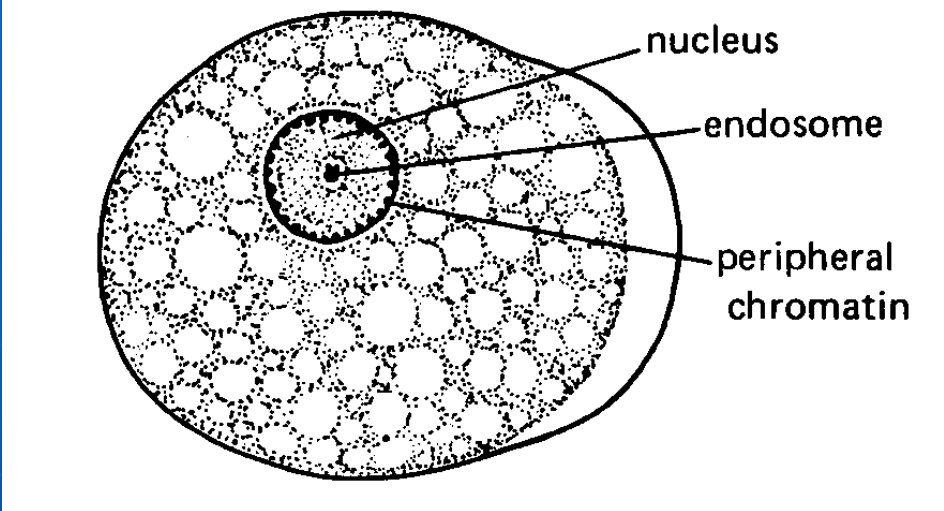
Entamoeba coli life cycle stages

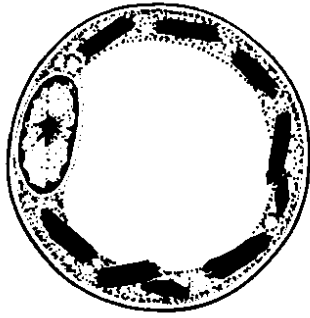
2. CYST - encystment is similar to that of *E. histolytica*
 - immature cysts are rare in fecal smears
 - mature cyst is large, 15 to 20 μm , has **8 nuclei**
 - chromatoidal bodies, if present, have splinter-like ends (disappear in most cysts)
 - cyst is released in the feces into the external environment
 - importance of human infection?



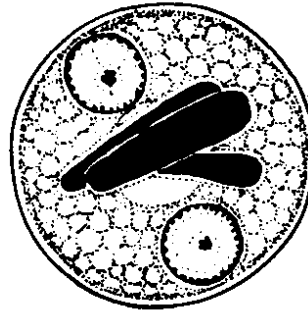
Entamoeba coli life cycle



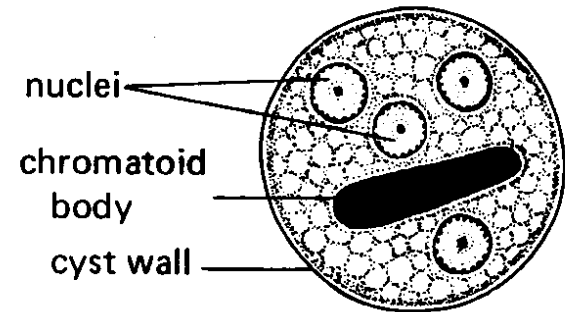




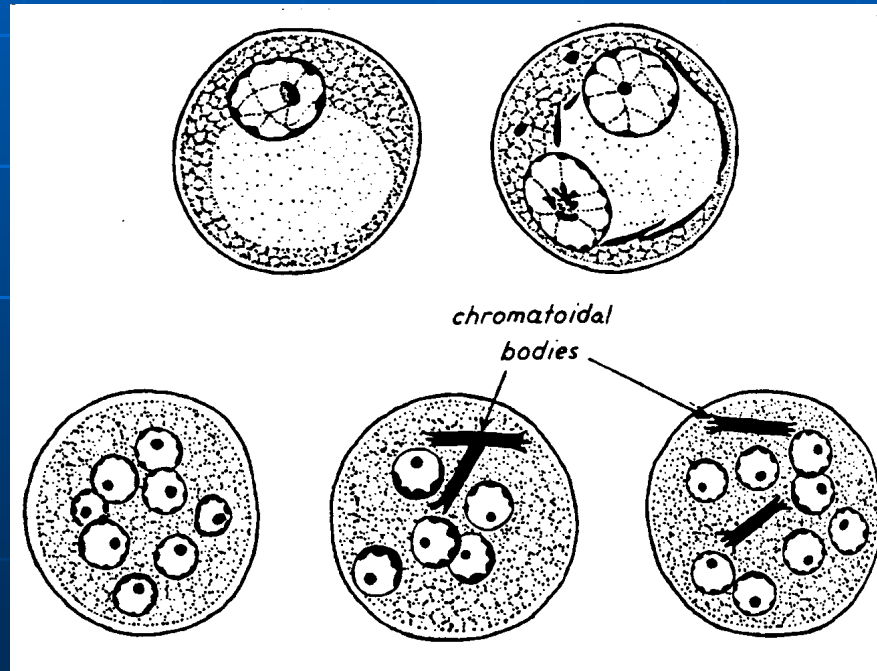
A. Uninucleate



B. Binucleate



C. Quadrinucleate



Free living amoeba

- *Naegleria fowleri*
- *Acanthamoeba* spp.

THANK U