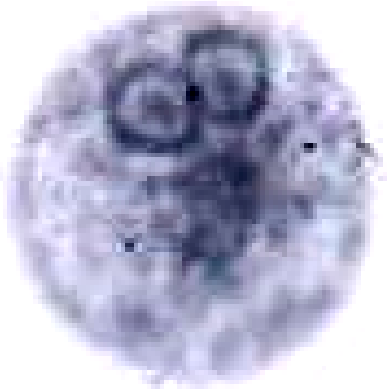
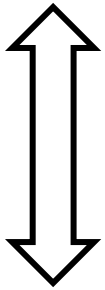
Entamoeba Histolytica

- Well recognized as pathogenic ameba, associated with **intestinal** and **extra intestinal** infections.
- The other species are important because they may be confused with ***E. histolytica*** in diagnostic investigations.
- **typical fecal-oral life cycle**
- **inhabits large intestine**
- It occurs in 3 various stages: **Trophozoite, precyst and cyst**.



Cyst



Trophozoite

Trophozoite stage:

- The active, feeding and vegetative form.
- It inhabits the large intestine (cecum, appendix and upper colon).
- It has no fixed shape because of constantly changing position.
- The cytoplasm containing ingested RBCs.
- feed on bacteria and debris
- Replicate by binary fission

Cyst

No stain

Trophozoite

Cyst stage:

- Found in the lumen of the large intestine and never found in tissues
- It starts as: uninucleated, binucleated and quadrinucleated

Uninucleated cyst

Binucleated Cyst

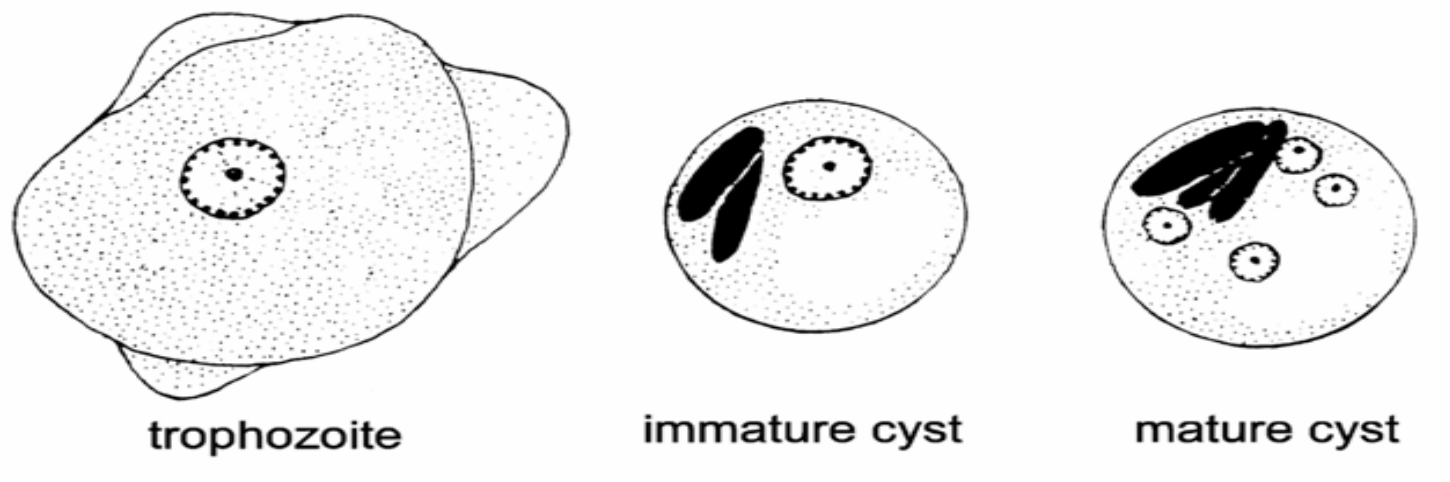
Quadra nucleated cyst (infective stage)

Cyst stage:

- Quadrinucleated cyst is the infective stage.
- Multiply by binary fission.
- The structure of the nucleus is like that of trophozoite.
- Two types of cyst: small cyst race (5-10 µm) and large cyst race (10-20 µm).

Encystation

- ❖trophozoite rounds up
- ❖secretion of cyst wall
- ❖aggregation of ribosomes (= chromatoid bodies- cigar shape)
- ❖2 rounds of nuclear division (1→4 nuclei)



Viability:

❖Trophozoite may live for 1 hr at 5 C^0,

❖ Cyst stage viable in stool for 10 days at 22 C^0.

❖The cyst does not destroyed by chlorinate of water.

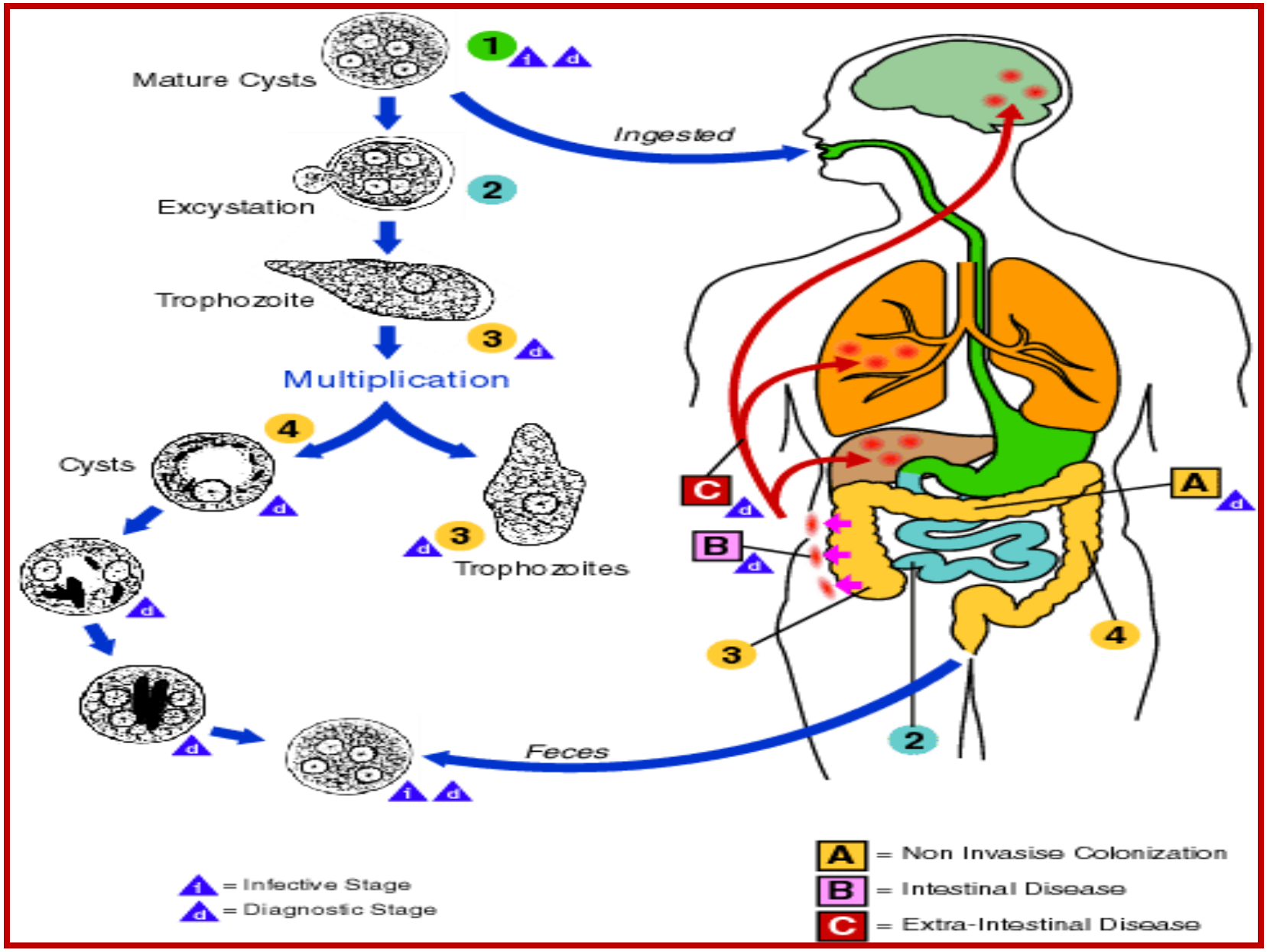
❖The trophozoite absorbs food from surrounding tissue including RBCs, fecal materials and bacteria dissolve it by cytolytic enzymes.

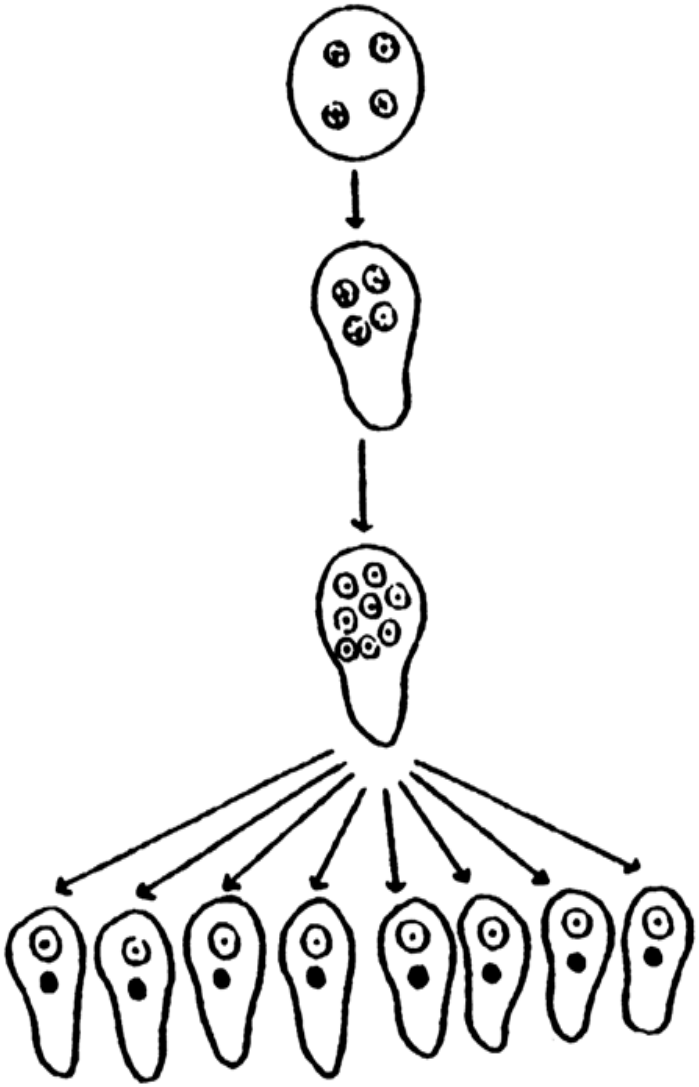
❖*E. histolytica* live in poor O_2 atmosphere, under complete or partial anaerobic conditions. It lacks the mitochondria

Epidemiology:

•The infection is due to transmission of mature cysts with contaminated foods (fruit, vegetables), drinking water or fecally contaminated hands of infected persons or carriers.

- Flies and cockroaches can function as mechanical transmitters by carrying cysts from the feces to foods


Mature Cysts
1
i
d
Ingested
Excystation
2
Trophozoite
3
d
Multiplication
4
Cysts
d
3
d
Trophozoites
d
d
d
i
d
Feces
C
d
A
d
B
d
3
4
2
i = Infective Stage
d = Diagnostic Stage
A = Non Invasise Colonization
B = Intestinal Disease
C = Extra-Intestinal Disease



Excystation

- occurs in small intestine
- cyst wall disruption
- ameba emerges
- nuclear division (4→8)
- cytoplasmic divisions (8 amebala)
- trophozoites migrate to large intestine

Pathogenesis

- *E. histolytica* is a facultative pathogen.

  Normally *E. histolytica* lives in the human large intestine and feeds on the bacterial

- Approximately 85-90% of people infected with *E. histolytica* are asymptomatic carriers.

- Among the symptomatic patients only 10% will develop severe dysentery or invasive disease.

Pathogenesis

Infection with *E. histolytica* implies colonization. The speed of which depend on many factors:

- ✓**General condition of the host.**
- ✓**Bacterial flora.**
- ✓**Diet.**
- ✓**Cytotoxic power of trophozoites upon the leukocytes.**
- ✓**The protolytic enzyme found in trophozoites.**
- ✓**Pathogenic activity of the strain (invasive or non invasive ameba).**

Pathogenesis

Intestinal amoebiasis

A. Symptomatic intestinal amoebiasis (invasive intestinal amoebiasis). By *E. histolytica*.

B. Asymptomatic intestinal amebiasis (non invasive intestinal amoebiasis). By *E. dispar& E. histolytica*.

Extraintestinal amoebiasis

A. Liver amoebiasis

B. Pulmonary amoebiasis:

C. Cerebral amoebiasis

caused by *E. histolytica*.

Intestinal amoebiasis

- **NON-INVASIVE (asymptomatic intestinal amoebiasis):**
- **(*E. dispar* & *E. histolytica*)**
  - **ameba colony on intestinal mucosa**
  - **asymptomatic cyst passer**
  - **non-dysenteric diarrhea, abdominal cramps, other GI symptoms.**

- **INVASIVE (symptomatic intestinal amoebiasis): (*E. histolytica*)**
  - **necrosis of mucosa → ulcers, dysentery**
  - **ulcer enlargement → severe dysentery, colitis, peritonitis**
  - **metastasis → extraintestinal amoebiasis**

Symptomatic intestinal amoebiasis (invasive intestinal) Cause by virulent strain of *E. histolytica.*

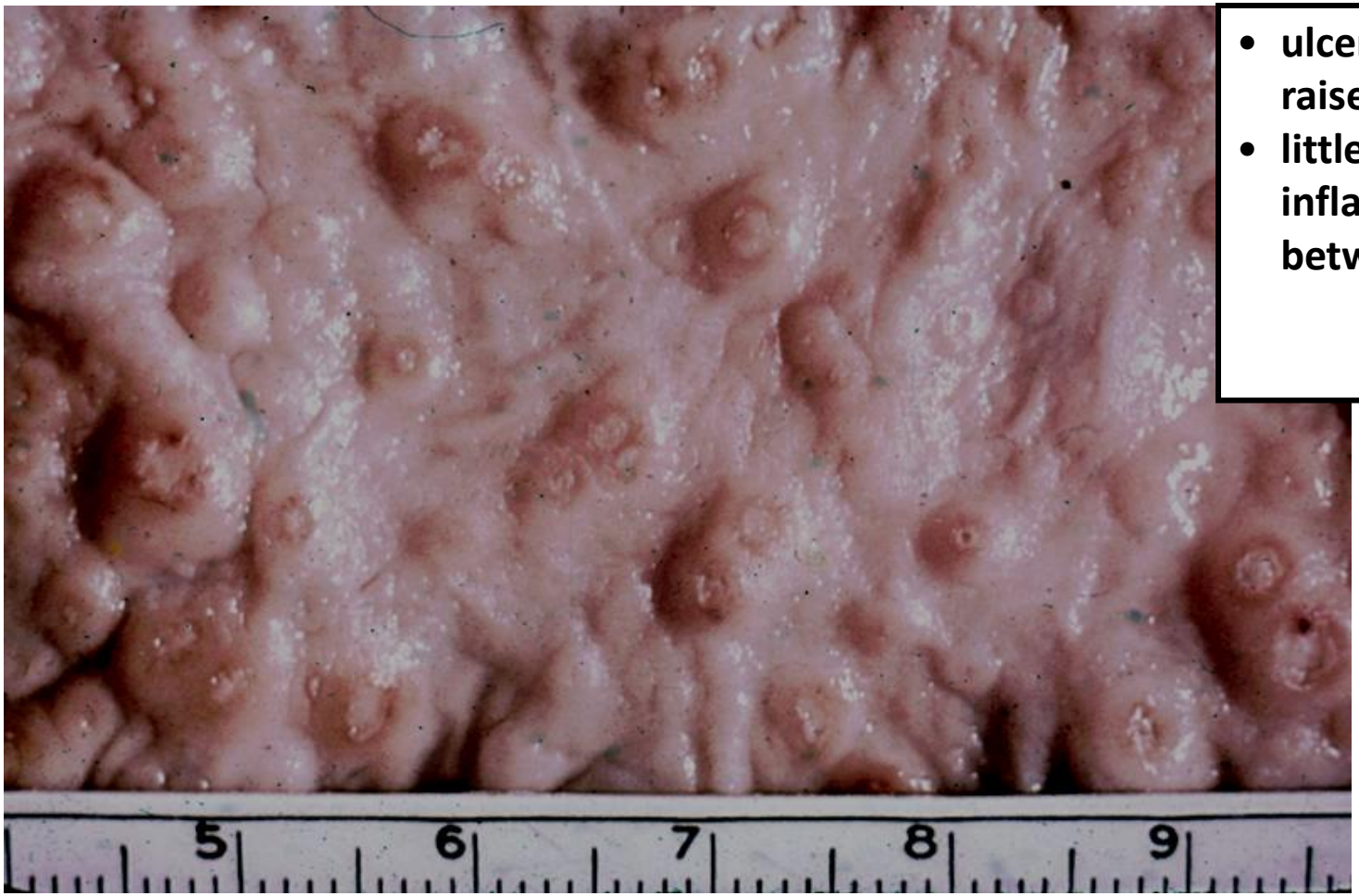
I. Acute intestinal amoebiasis (acute amebic dysentery) :

- The trophozoites colonize the large intestine mucosa or lumen (colon, cecum, rectum,sometimes terminal ileum). Initially at the coecal level

- The characteristic lesion is a superfacial minute cavity resulting from necrosis of mucosal epithelium.

- The lesion enlarged somewhat as the ameba reach the muscular mucosa, then gradually it erode a passage through the muscularis mucosa to submucosa and serosa where they spread to the surrounding tissues.

- The lesions of varying intensity, ranging from edematous swelling and reddening to pinhead-sized foci with central necrosis or larger and typical bottle-shaped ulcers= flask shape ulcers.



- **ulcers with raised borders**
- **little inflammation between lesions**

The luminal side of the colon from fulminating amebiasis case showing several ulcers. Note raised edges (arrow).

- ‘flasked-shaped ulcer’
- trophozoites at boundary of necrotic and healthy tissue
- trophozoites ingesting host cells
- dysentery (blood and mucus in feces)
- Deep ulcer which is limited to submucosa or extend deeper to muscular layer and serosa causing peritonitis, pericecal abscess and gangrene of intestine.