

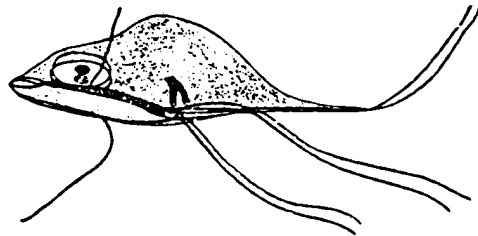
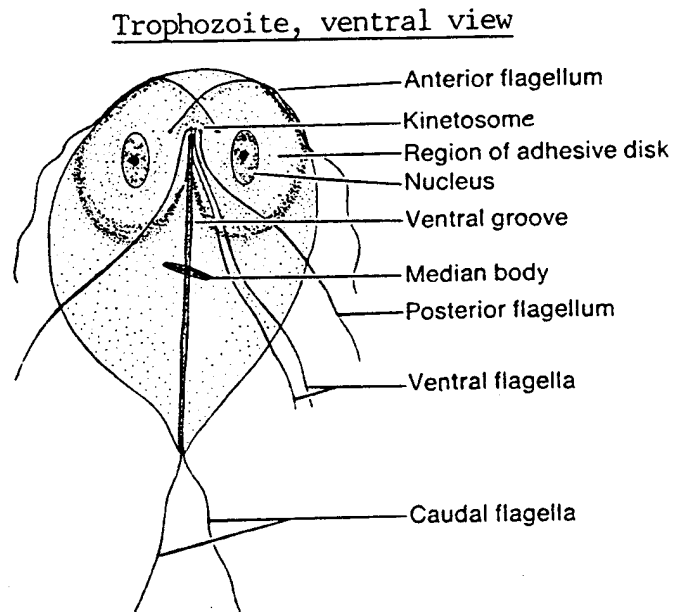
# Giardiasis

*(Giardia lamblia/intestinalis)*

# Giardiasis

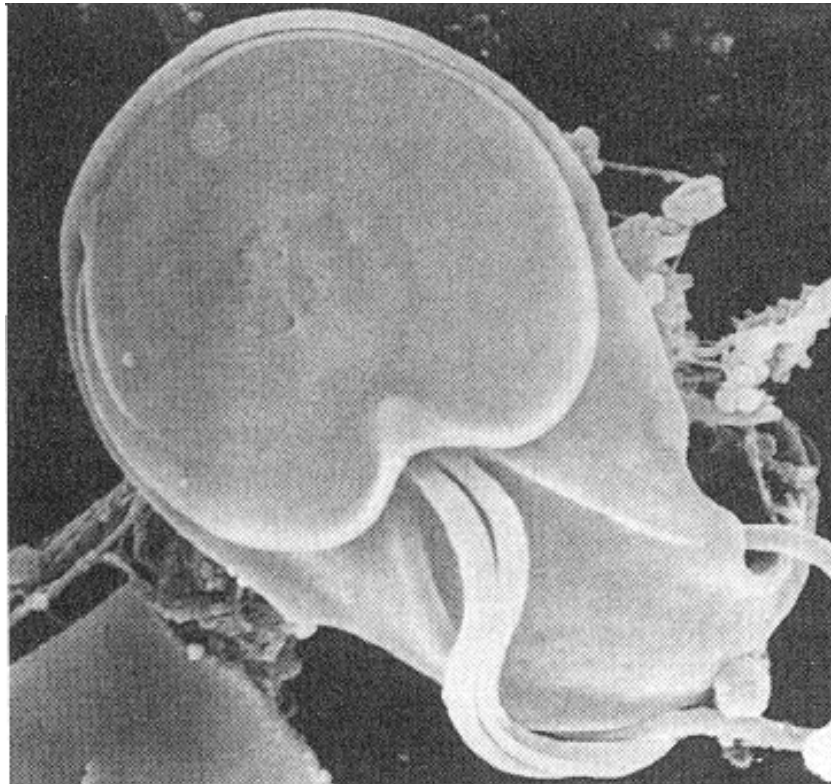
- Most common causative agent of epidemic & endemic **diarrhoea** throughout the world
- Prevalence - 2-5% in industrialised countries  
20-30% in developing countries
- Reported from through out India
- Caused by *Giardia intestinalis*/*Giardia lamblia*
- Man is the main reservoir
- Inhabit duodenum, jejunum & upper ileum
- *G. intestinalis* exists in 2 stages – **trophozoite & cyst**

# Morphology of *Giardia lamblia* trophozoite

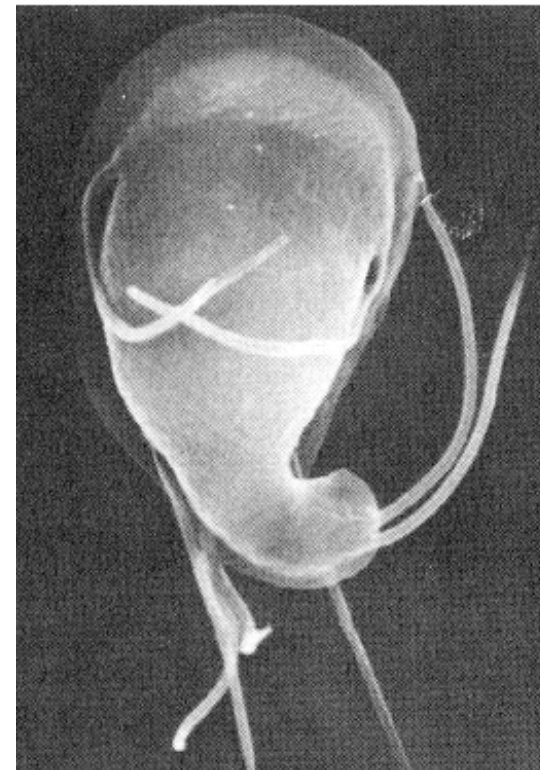


- Pear shaped, rounded anterior end, posterior end pointed (looks like monkey face)
- Size: 12 to 15  $\mu\text{m}$  long x 5 to 9  $\mu\text{m}$  wide
- Dorsal surface convex, ventral surface concave
- Ventral surface bears **sucking disk** to adhere to surface of intestinal cell
- Bilaterally symmetrical: 2 **nuclei**, 2 **axostyles**, 4 pairs of **flagella** (2 anterior, 2 posterior, 2 ventral, and 2 caudal)
- Actively moving and feeding stage
  - Habitat: small intestine
  - May invade the common bile duct.

# Morphology of *Giardia lamblia* trophozoite



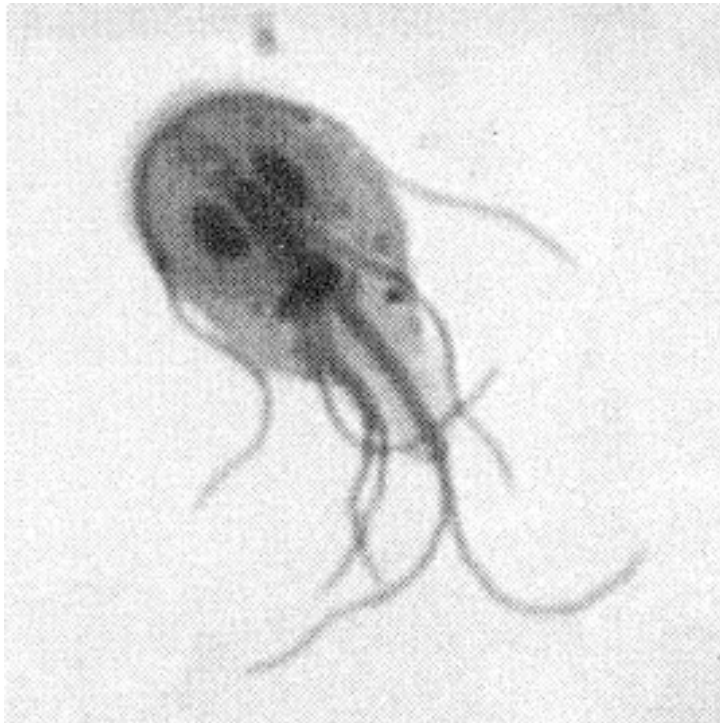
ventral



dorsal

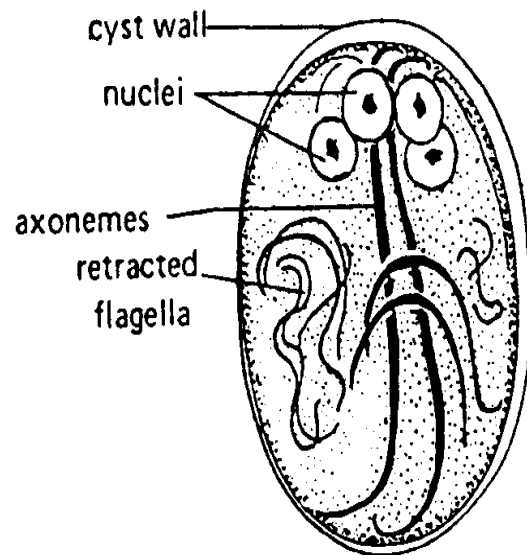
Scanning EM view of trophozoite surface showing the adhesive disk  
(text photo on p. 92)

# Morphology of *Giardia lamblia* trophozoite



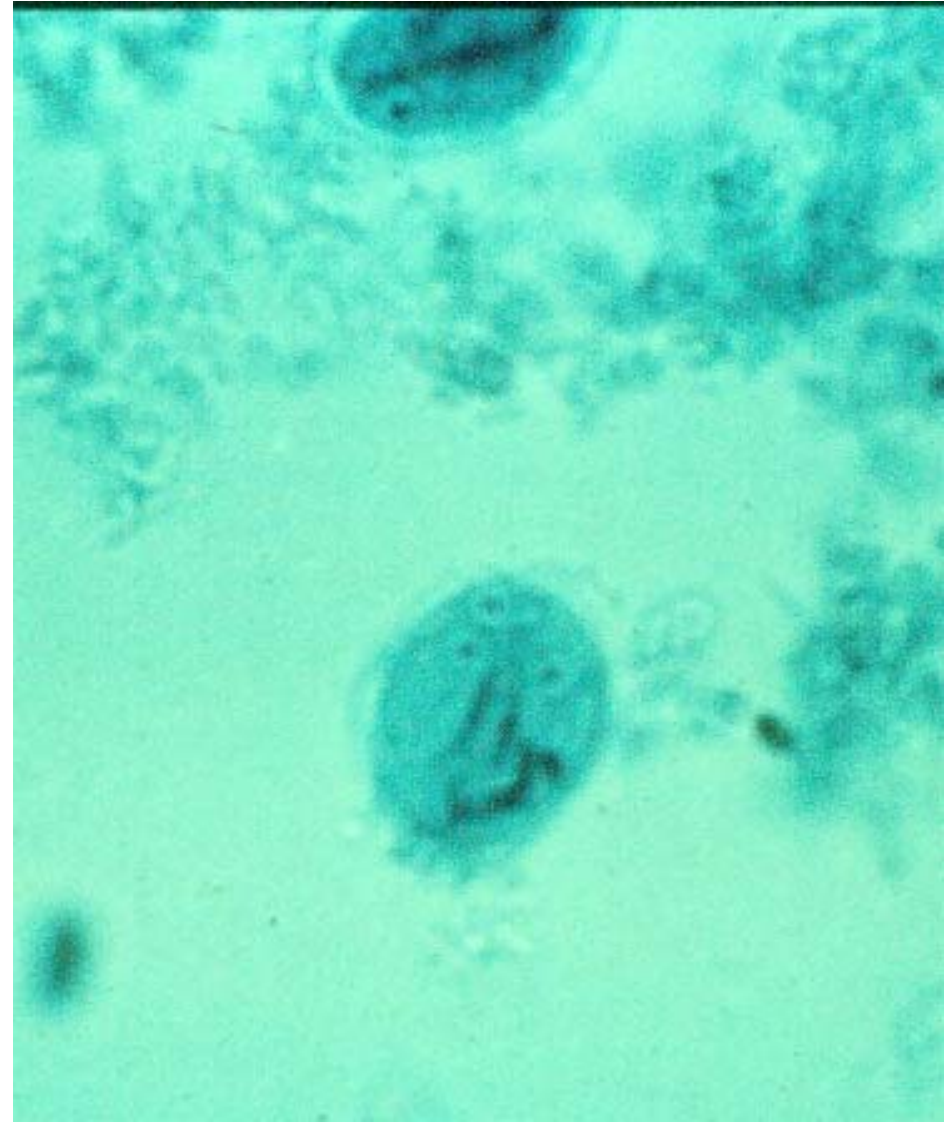
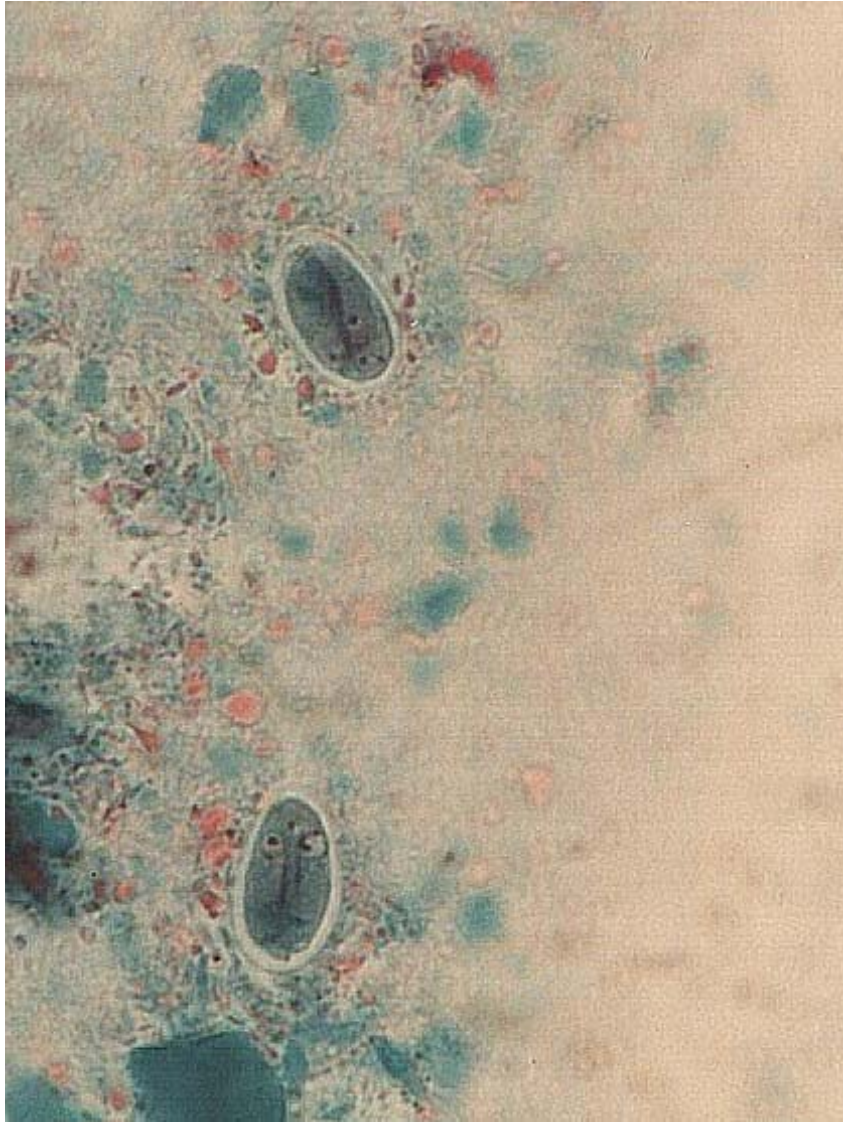
Light microscope photos of trophozoites

# Morphology of *Giardia lamblia* cyst



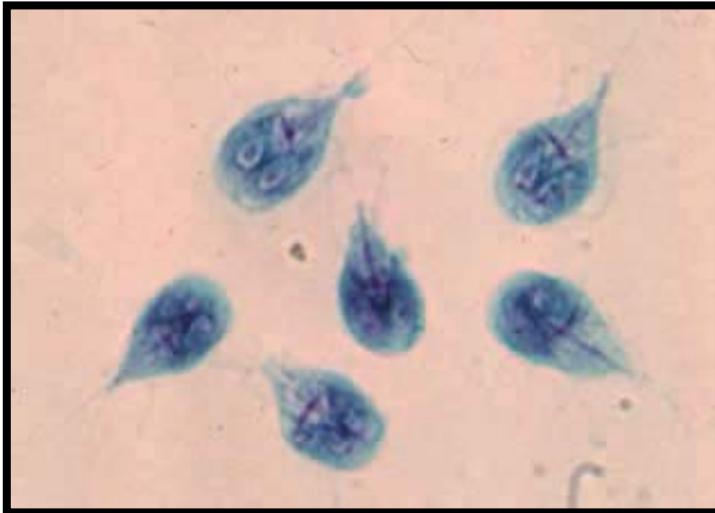
- ovoid in shape
- 8-12  $\mu\text{m}$  long x 7-10  $\mu\text{m}$  wide
- thick cyst wall
- 4 **nuclei** present, either clustered at one end or present in pairs at opposite ends
- **Axostyle** runs diagonally through the cyst
- **flagella** shorten and are retracted within cyst
  - provide internal support
- The cyst forms as trophozoites become dehydrated when they pass through the large intestine
- Cyst may remain viable in the external environment (usually water) for many months.

# *Giardia lamblia* cyst

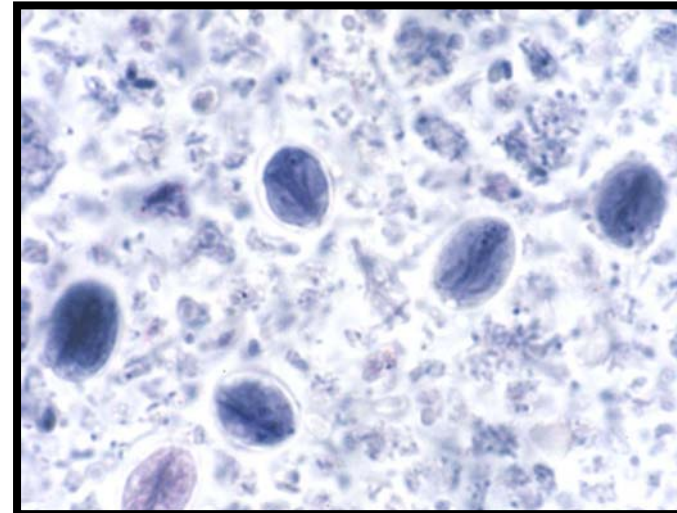


# Giardiasis

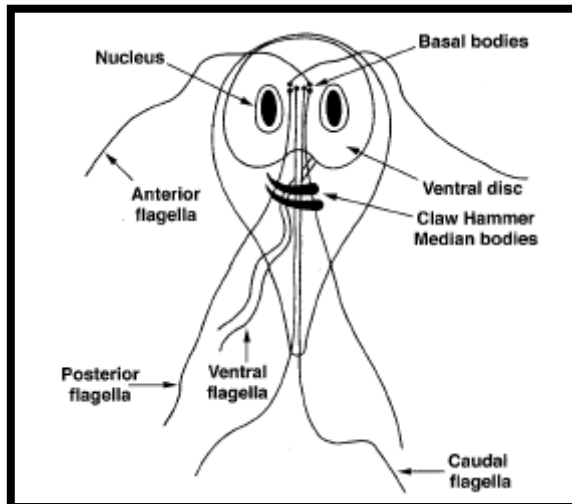
(*Giardia intestinalis/lamblia*)



Trophozoites



Cysts





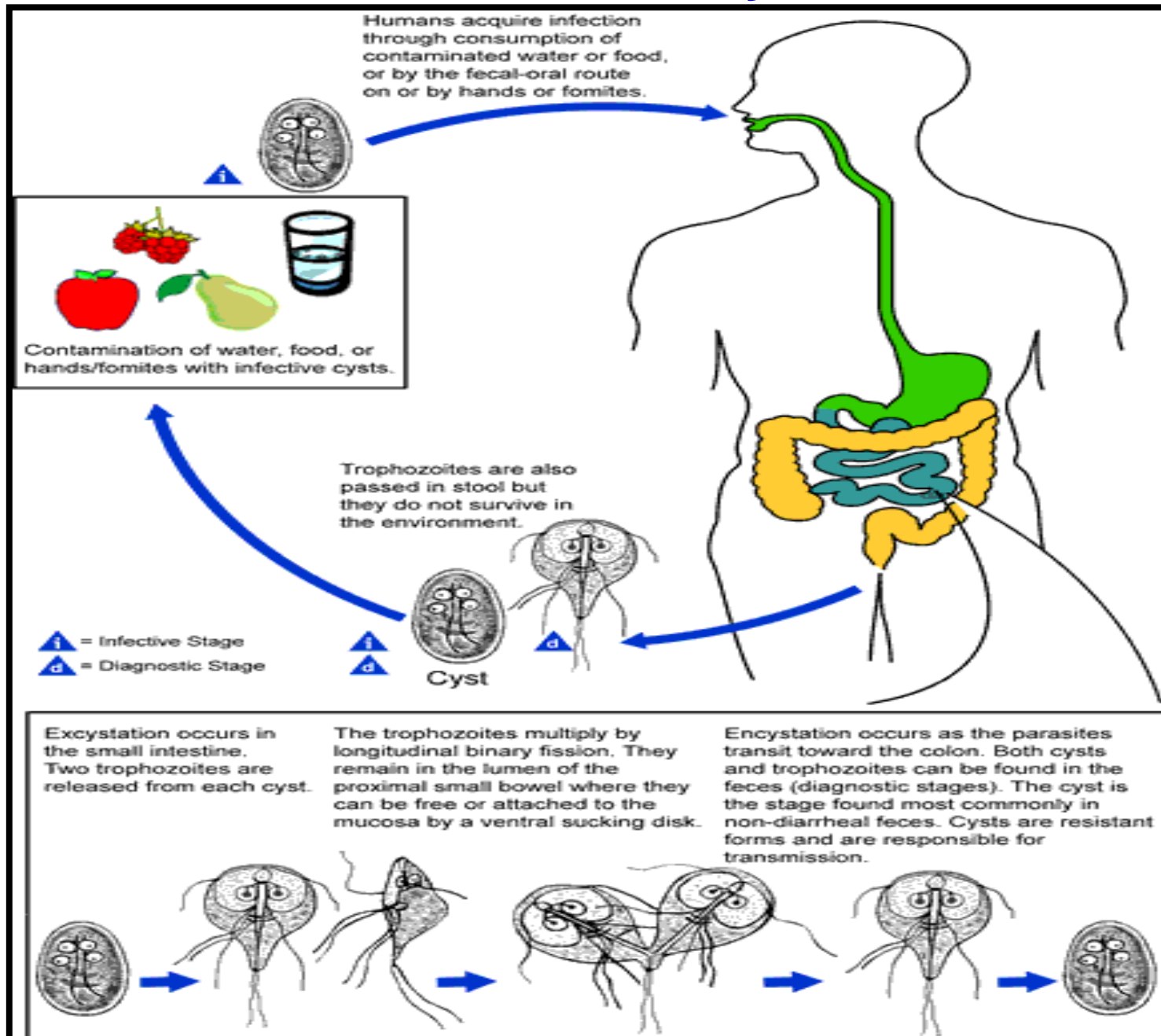
# Giardiasis – Infective Form

- Infective form – **mature cyst** passed in feces of man
- Routes of transmission
  - Feco-oral
    - ingestion of contaminated water – most important
    - Ingestion of contaminated food
  - Person to person – day care, nursing homes, mental asylums (poor hygiene)
  - Sexual – sexually active homosexual males

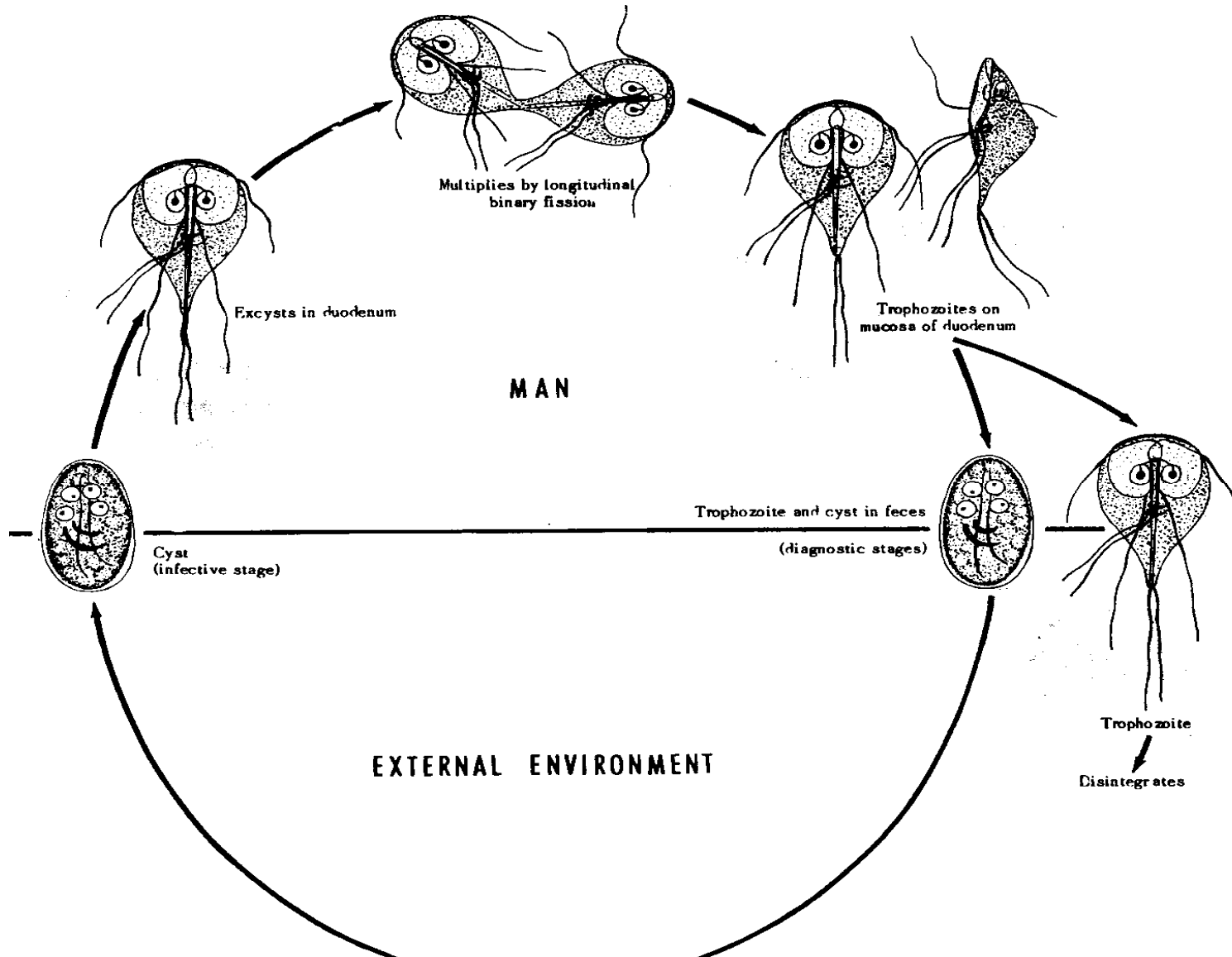
# Life Cycle

- Acquire infection – ingestion of mature cysts
- **Excystation** occurs in stomach & duodenum within 30 minutes
- **2 trophozoites** hatch from one cyst
- Trophozoites multiply by binary fission & colonize in duodenum & upper jejunum
- Trophozoites adhere to enterocytes by ventral suckers
- **Encystation** occurs in transit down the colon
- Axonemes retract, cytoplasm condense & thin tough hyaline wall is secreted
- Encysted trophozoite undergo nuclear division – mature **quadrinucleate cyst**

# Giardia – Life cycle



# Giardia lamblia life cycle



# Pathology

- Do not invade tissues
- Feed on mucous secretions
- May localise in **biliary tract** to avoid the acidity of duodenum
- Cause inflammation of duodenum & jejunum
- Cause **malabsorption** as the parasite coats the mucosa & damage epithelial brush border
- Stool contains large amounts of mucous & fat but no blood

# Giardiasis: The Disease

- Asymptomatic : largest group
- Acute : self-limiting infection, acute watery **diarrhoea**, abdominal cramps, bloating, flatulence
  - Stool is profuse & watery in earlier disease
  - Voluminous, foul smelling & greasy (**steatorrhoea**) later
- Chronic : chronic diarrhoea with **malabsorption** syndrome, steatorrhoea

# Laboratory Diagnosis

## Samples

- Stool
- Duodenal contents
  - Duodenal fluid (Entero test )
  - Duodenal/ jejunal biopsy

**Entero test** – gelatin capsule containing a nylon string with a weight is swallowed by the patient. Free end of the string is fixed to the mouth. Capsule dissolves & the string is released in the duodenum. After overnight string is removed & bile stained mucus collected.

# Microscopy

## Microscopy

### Direct Wet Mount

- Trophozoite with **falling leaf motility** in saline mount
- Cyst in iodine mount

### Stained stool smears

- Trichrome
- Iron haematoxylin



# Laboratory Diagnosis

## Antigen detection (Coproantigen )

- ELISA
- Sensitivity & specificity high

## Culture

- Not done routinely
- Diamond's medium

# Laboratory Diagnosis

## **Serodiagnosis**

- ELISA
- Epidemiological purpose

## **Molecular diagnosis**

- DNA probes & PCR for research purpose

# Prevention

- Avoid food & water that might be contaminated
  - filtration of water (be sure filter is fine enough to trap the cysts)
  - boiling water
  - addition of a tincture of iodine are effective in killing cysts (chlorination of water does not effect the cysts)
- Practice good hygiene
  - Wash hands thoroughly with soap and water
    - after using the toilet
    - before handling or eating food

# Treatment

- Nitroimidazole derivatives
  - Metronidazole
  - Tinidazoledrugs of choice
- Acridine dye
  - Quinacrine
- Nitrofurans
  - Furazolidone