

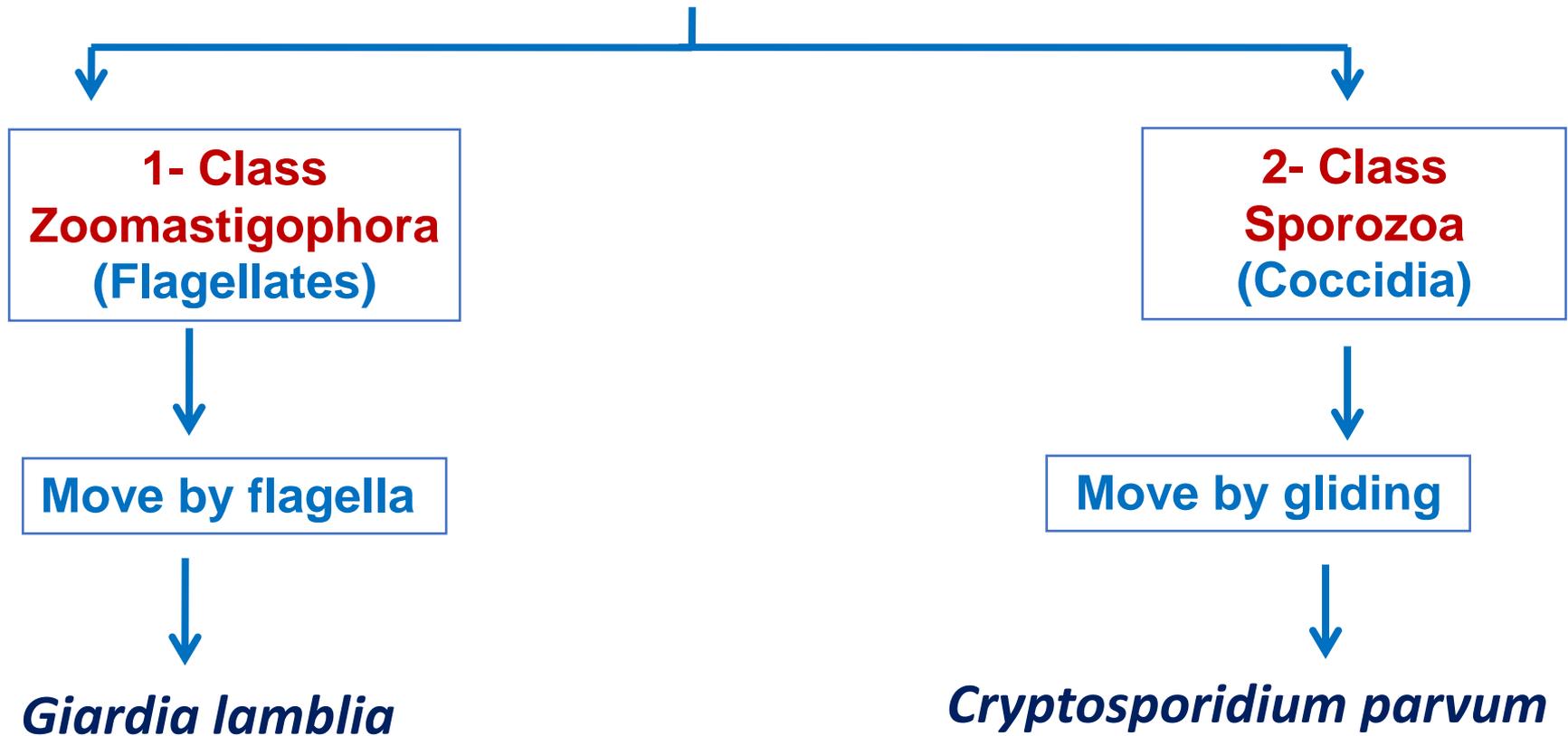
# Intestinal Protozoa

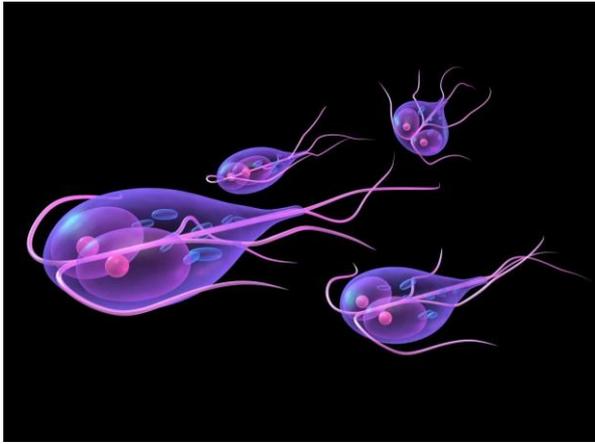
Presented by

**Professor Dina Abou Rayia**



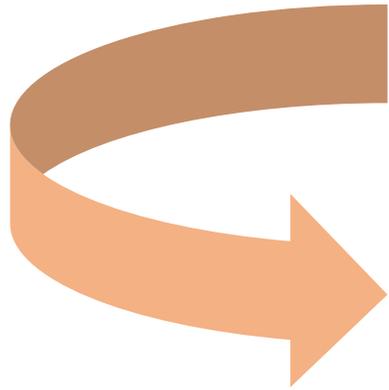
# Intestinal Protozoa



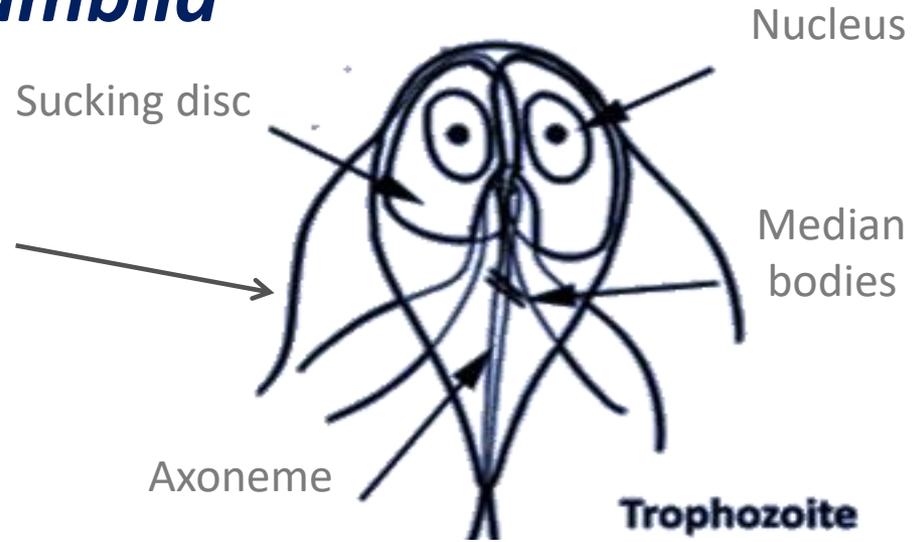


# *Giardia lamblia*

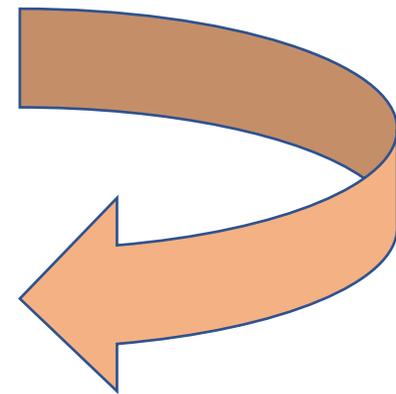
# *Giardia lamblia*



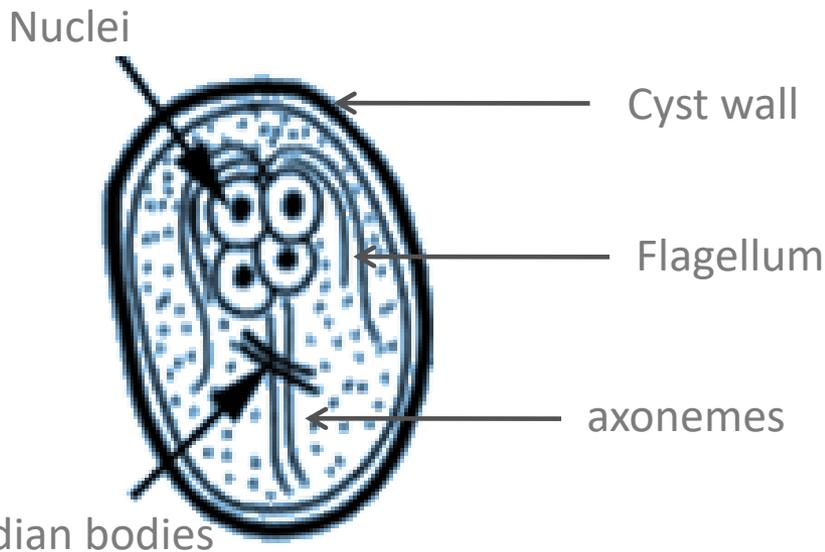
**Trophozoite**



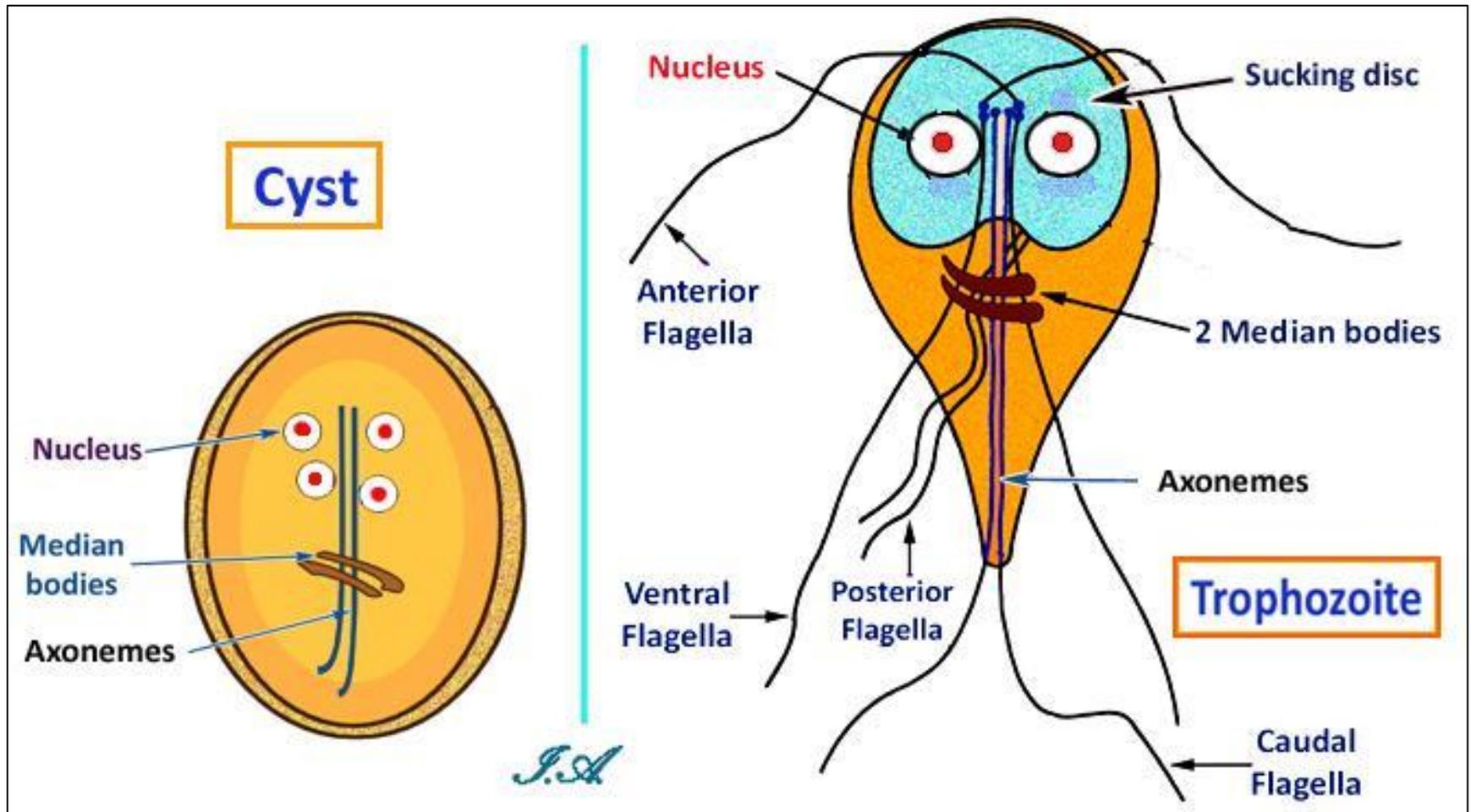
Size: 15 x 8  $\mu$

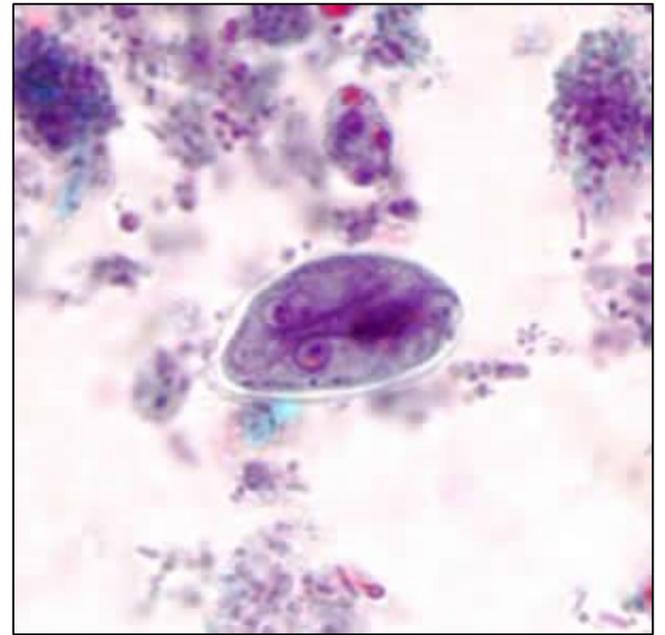


**Cyst**



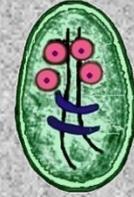
Size: 12 x 8  $\mu$





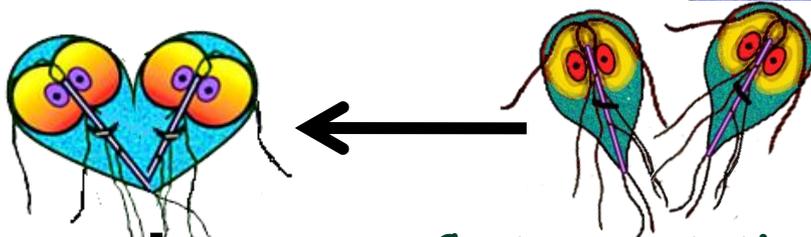
# Small Intestine

Ingestion of food or water contaminated with cysts



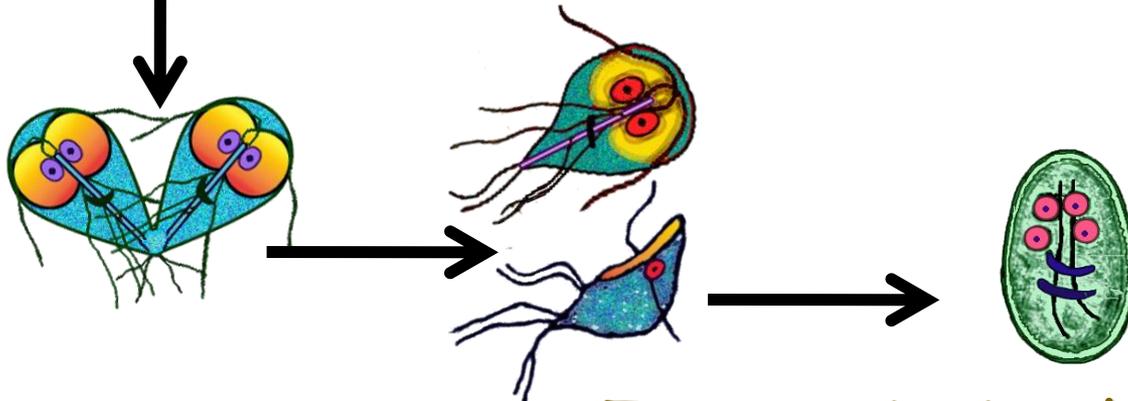
Infective Stage Cyst

External Environment



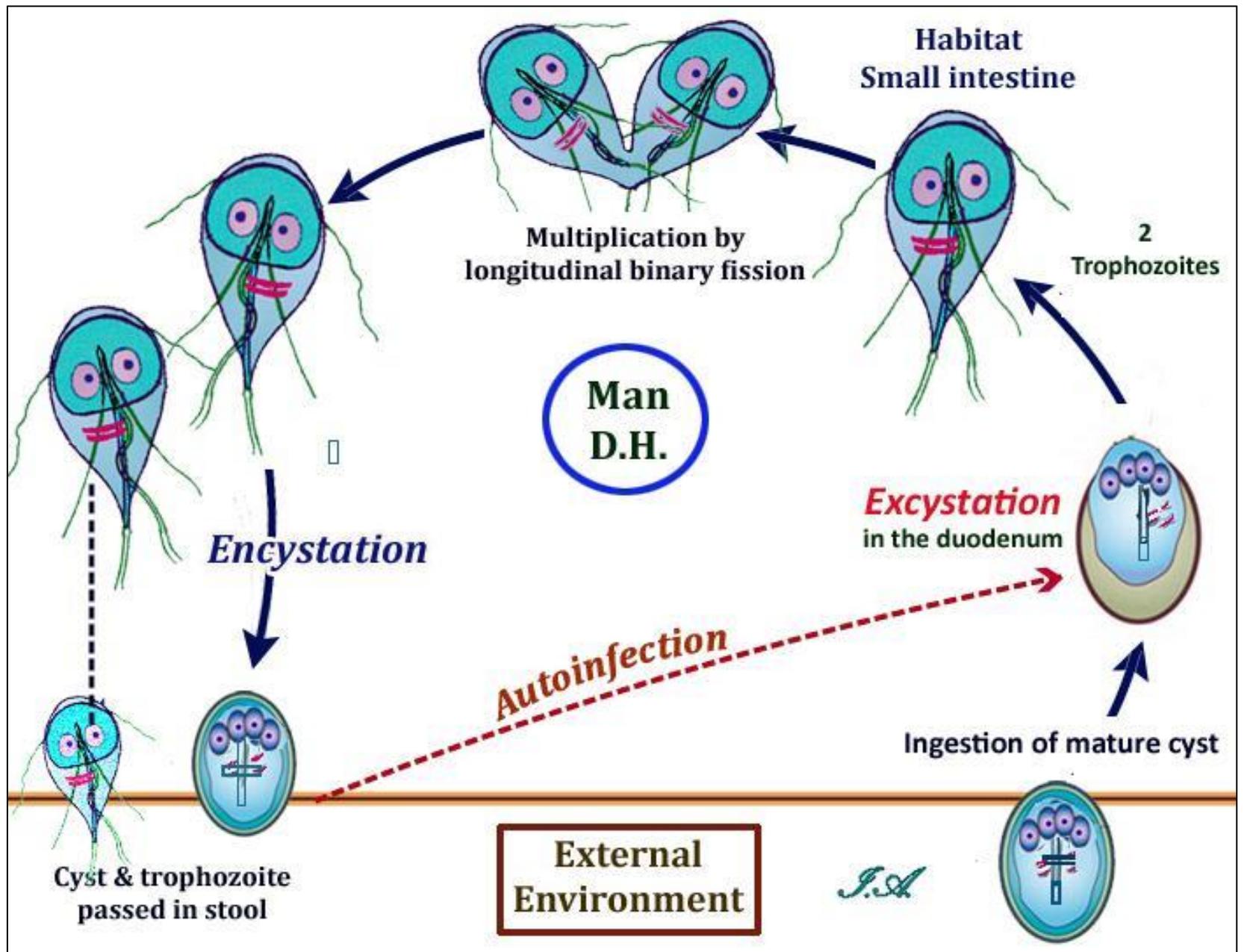
T multiply by LBF  
Cyst excystation in the duodenum → 2 trophozoites

T. pass with stool & disintegrate



T encystation in colon

Cyst excreted in stool





- **Habitat:** Small intestine (especially duodenum and upper jejunum), possibly bile duct and gall bladder.
- **Hosts:**
  - ❖ **Definitive host:** Man.
  - ❖ **Reservoir host:** Dogs, rodents, cattle, sheep and pigs.
- **Diagnostic stage:** \*Mature cyst (in formed stool).  
\*Trophozoite (in diarrheic stool).
- **Infective stage:** Mature cyst.
- **Mode of infection:** Ingestion of cysts.
  - \* Contaminated food and drink.
  - \* Feco-oral (autoinfection-person to person).

# The pathogenesis of *G.lamblia* infection depends on the following factors:

## a) Mucosal factors

Direct attachment of the trophozoites to the duodenal mucosa leads to:

- Atrophy of duodenal microvilli and hyperplasia of the crypts ⇒ **malabsorption syndrome for:**

• **Lactose** ⇒ lactose intolerance.

• **Glucose and amino acids.**

• **Fat** ⇒ steatorrhea (light coloured fatty stool ).

• **Fat soluble vitamins (A,D,E,K) and vitamin B12.**

## b) Luminal factors

Infection with *Giardia lamblia* infection leadsto:

1- **Decrease luminal bile salts:** Due to the uptake of bile salts by *Giardia lamblia* trophozoite during its growth ⇒ impaired absorption of fat and fat soluble vitamins and also vitamin B12 leading to steatorrhea

3- **Inhibition of digestive enzymes** such as lipase and trypsin ⇒ maldigestion

# Clinical pictures

## 1-Asymptomatic infection

Most common. The trophozoites remain in the intestinal lumen feeding on surrounding nutrients and mucus without causing manifestations (Asymptomatic patient known as a healthy carrier).

## 2-Symptomatic infection

### Acute giardiasis

### Chronic giardiasis

### Complications

- Common in children and travelers to endemic areas.
- Fever, abdominal colic, epigastric pain, anorexia, flatulence, vomiting, watery diarrhoea with excess mucus (no blood) but later steatorrhoea occurs ⇒ dehydration and loss of weight. Trophozoites are found in the stool in this case.
- Invasion to gall bladder ⇒ cholecystitis, jaundice and biliary colics.
- In immunocompetent patient, giardiasis is self limiting.
- In immunodeficient patient, IgA secretion in the gut is decreased ⇒ severe infection with persistent diarrhea, steatorrhea, malabsorption syndrome and weight loss.

## 2-Symptomatic infection

Acute giardiasis

Chronic giardiasis

Complications

- Common in adults.  
-The patient suffers from anorexia, epigastric pain, dyspepsia, nausea, vomiting & diarrhoea alternating with constipation. Only cysts are found in stool.

1- Retardation of growth & development in infant and young children.  
2- Malnutrition and malabsorption syndrome.  
3- Biliary tract disease.

# Laboratory diagnosis

## Direct methods

### Macroscopic

Stool is bulky, offensive, loose and greasy mixed with mucus and usually float on the water surface in toilet (lentil soup appearance).

### Microscopic

- 1) **Stool examination:** Reveals either trophozoites (in loose stool) or cysts (in formed stool) by: direct smear or concentration methods.
- 2) **Examination of duodenal content** (enterotest or string test).
- 3) **Endoscopic biopsy** from duodenum for trophozoites & pathological changes in mucosa.

## Indirect methods

- Faecal antigen ELISA:** Immunologic test for detection of *G. lamblia* antigen in the stool (coproantigen)
- PCR:** For detection of DNA of *G. lamblia*

# Treatment

**1- Metronidazole (Flagyl).**

**2-Nitazoxanide**

# *Cryptosporidium species*

## General characters

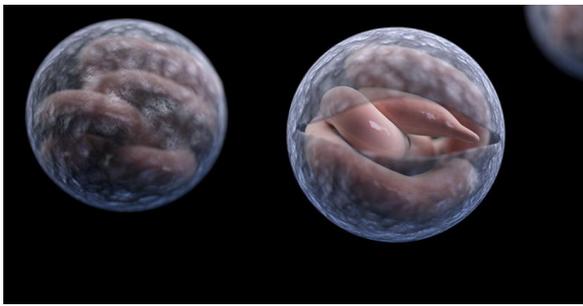
- 1- Single-celled **obligate intracellular parasites**.
- 2- Multiply by **alternation of sexual and asexual cycle**.
- 3- They are **opportunistic parasites** that **common affected immunosuppressed persons**.

❖ *Cryptosporidium species* are:

1- *C. parvum*.

2- *C. muris*.

3- *C. bovis*

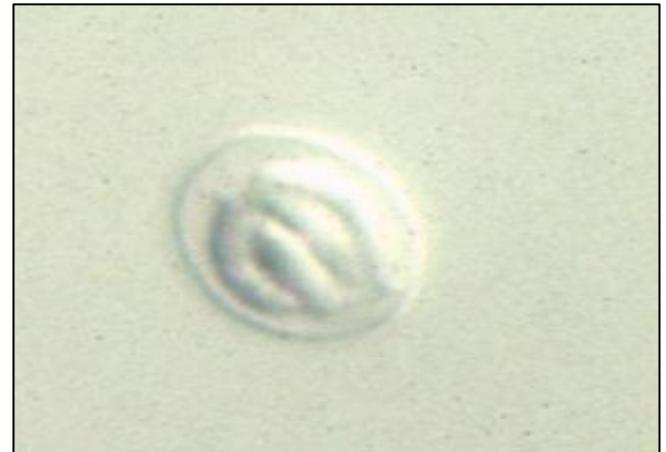
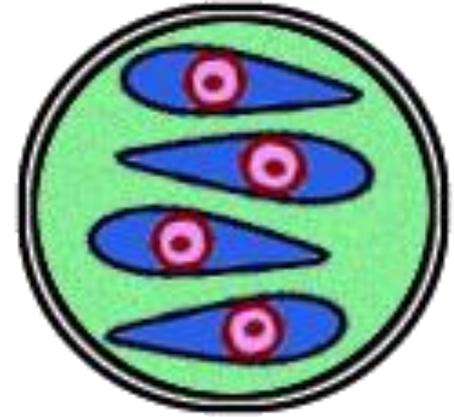


# *Cryptosporidium* spp.

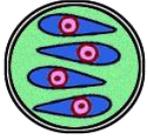
# *Cryptosporidium parvum*

## Mature oocyst:

- 5  $\mu\text{m}$ .
- 4 naked fusiform sporozoites



Oocyst Stage



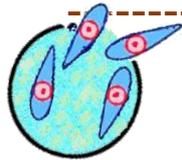
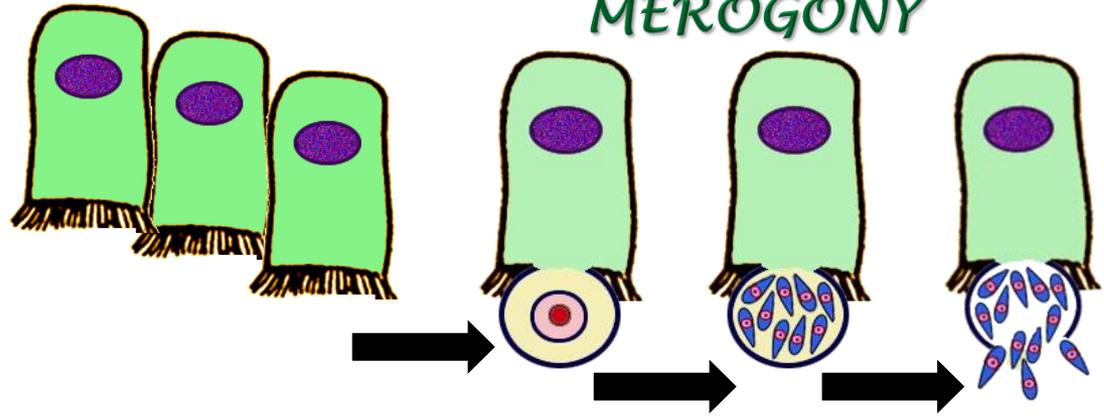
Autoexoinfection

External Environment



MEROGONY

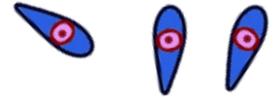
Ingestion



Small Intestine

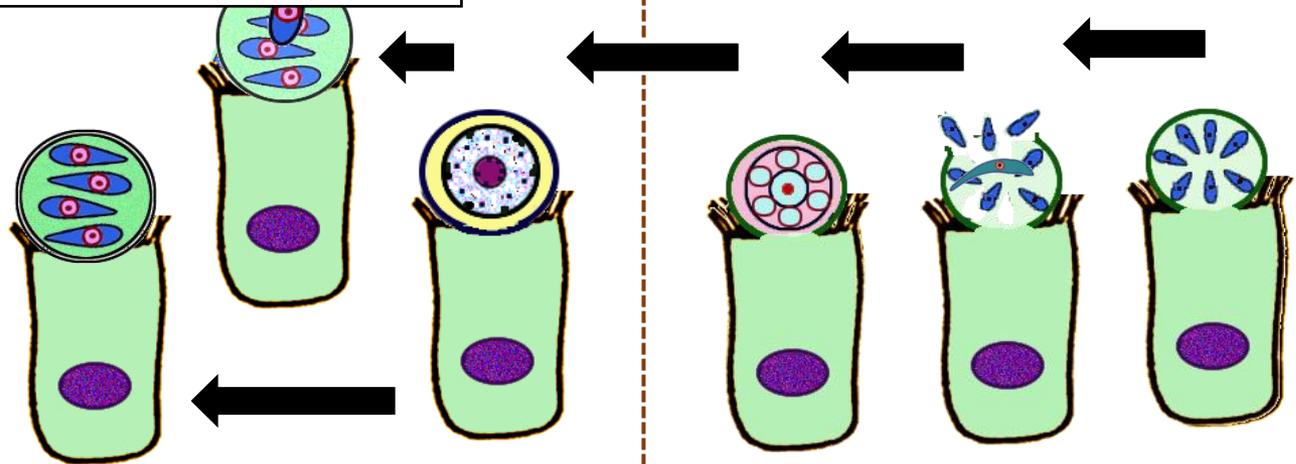
Autoendoinfection

Excystation and release of sporozoites in the lumen of a thick-walled oocyst



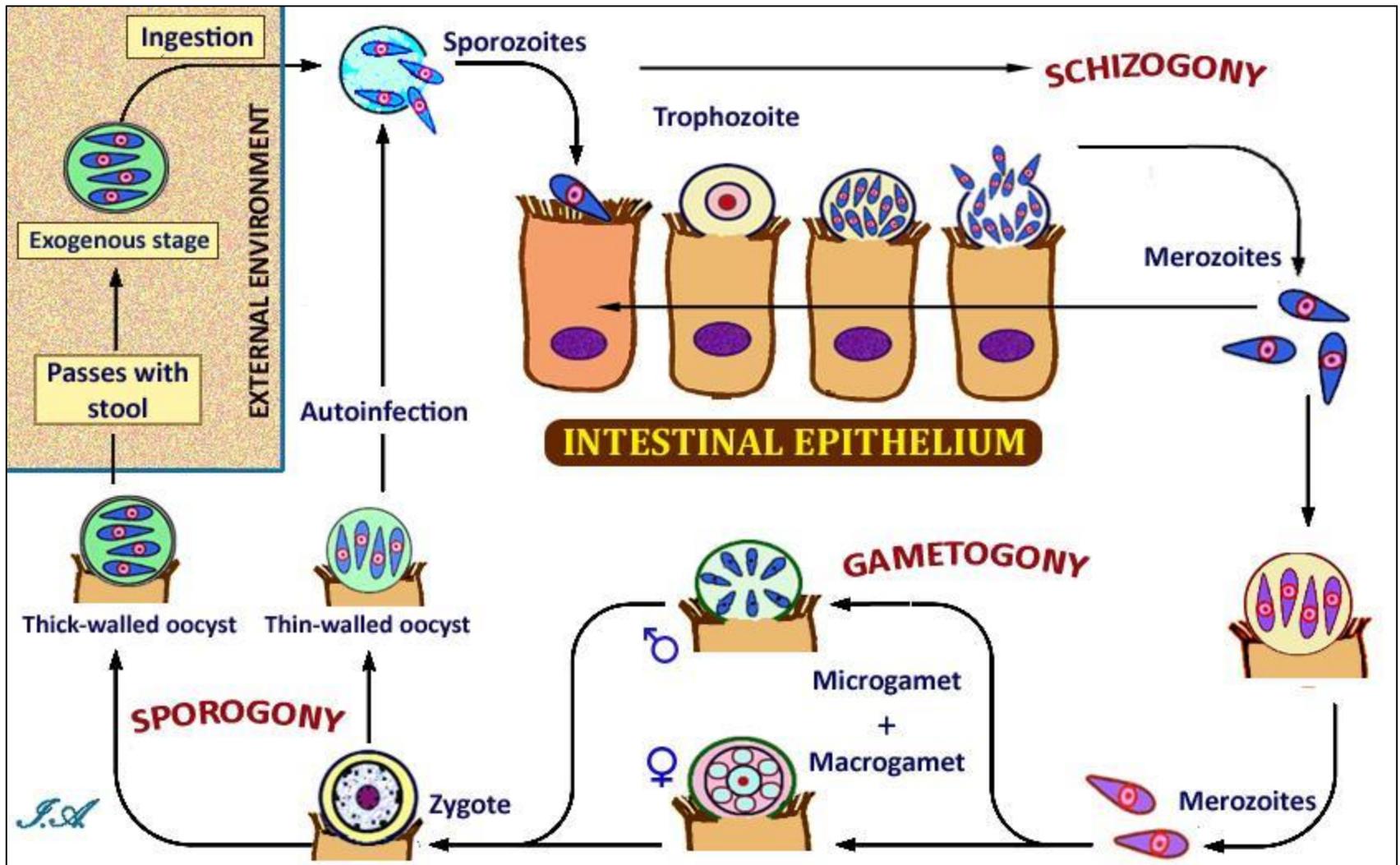
Thick-walled oocyst released in stool

Fecal-oral transmission



SPOROLOGY

GAMETOLOGY



- **Habitat:** Brush border of the small intestine and in immunosuppressed may invade the surface epithelium of respiratory and biliary tract
- **Host:**
  - **D.H:** Man
  - **R.H:** wide range of animals, birds, rodents and farm animals
- **Diagnostic stage:** Mature oocyst
- **Infective stage:** Mature oocyst
- **Modes of infection:** ingestion, autoinfection and inhalation

# Pathogenesis and symptomatology

## Disease: Cryptosporidiosis

The parasite is located **in the brush border** of the epithelial cells of the small intestine (**intracellular but extracytoplasmic**) → damage to the microvilli where it attaches.

**In immunocompetent patient**

**Acute self limited watery diarrhoea** that can last for a few weeks with abdominal cramps, low fever, nausea, vomiting, malabsorption and dehydration.

**In immunocompromised patient**

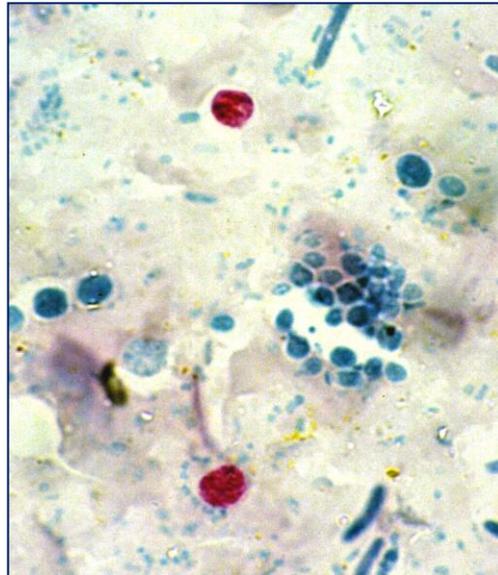
The disease is more severe with **cholera like diarrhea** → severe malabsorption and weight loss. The diarrhea is chronic and last for 2 months or more (cholera-like watery diarrhea).

**Respiratory tract infection**  
**Jaundice and biliary colic** especially in **AIDS patients**

# Laboratory diagnosis

## Direct

- **Stool examination** for detection of oocysts by:
  - Direct smear.
  - Concentration floatation methods.
  - Smear stained with modified Ziehl-Neelsen stain or acid fast stain.
- **Intestinal biopsy** stained with hematoxylin and eosin for detection of oocysts attached to the brush border.



## Indirect

- **Antigen detection in the stool by using:** DFAT, ELIZA, IFAT.
- **PCR.**
- **For biliary cryptosporidiosis:** Ultrasonography and endoscopy.

# Treatment

- **Supported treatment:** Fluid + antidiarrhoeal treatment ➔ ends with spontaneous recovery.
- **Drugs:** Nitazoxanide and Spiramycin



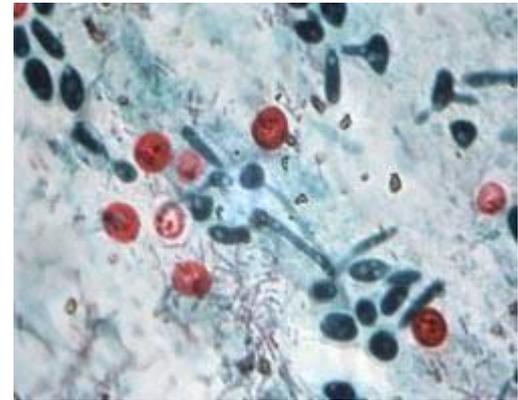
# *Giardia lamblia* keywords

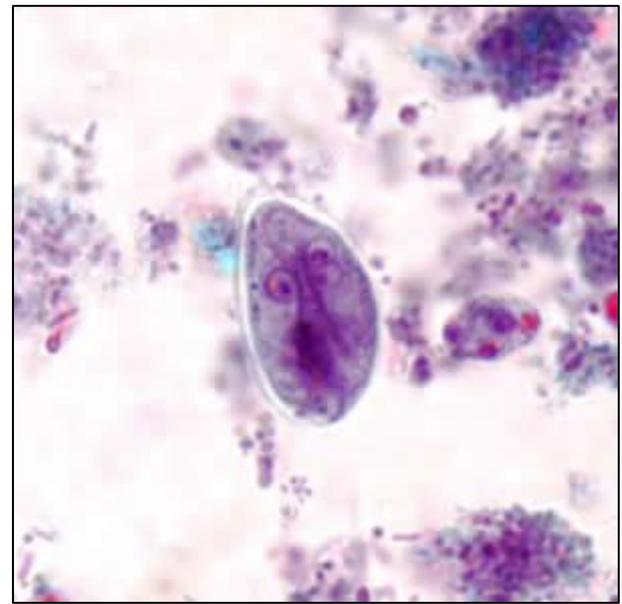
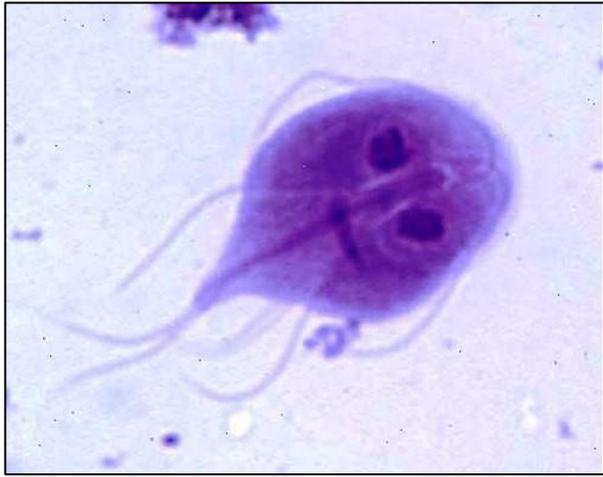
- Small intestine, bile duct and gall bladder.
- Destruction of the mucus membrane
- Bile salts consumption
- Decrease bile secretion
- Severe maldigestion and absorption
- Steatorrhea
- Zoonotic
- Opportunistic



# *Cryptosporidium parvum* keywords

- Small intestine brush border, respiratory and bile duct epithelium.
- Sever cholera-like diarrhea
- Malabsorption
- Zoonotic
- Opportunistic
- Special stains (Zeil-Neelsen or acid fast)





**Identify  
???????**

