

Parasitology

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Trichostrongylus axei



Trichostrongylus axei



Giardia lamblia



Entamoeba histolytica



Important Terms Used in Parasitology

Parasite: An organism entirely dependent on another larger organism (Host) in order to have shelter and /or nutrition.

Parasitology: A science that deals with parasite.

Medical Parasitology: The study of parasites of medical importance that is capable of causing disease in man.

Host Parasite Relationship

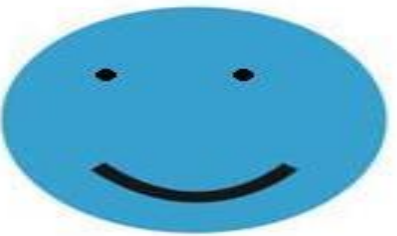
Symbiosis: a close and prolonged association between two organisms of different species. It may be one of three relationships:



commensalistic



parasitic



mutualistic

Parasite

Permanent
parasite
(e.g. head louse)

Temporary
parasite
(e.g. bed bugs)



Parasite

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graph TD; Parasite --> Ectoparasite; Parasite --> Endoparasite;
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Ectoparasite

(e.g. head louse)

Endoparasite

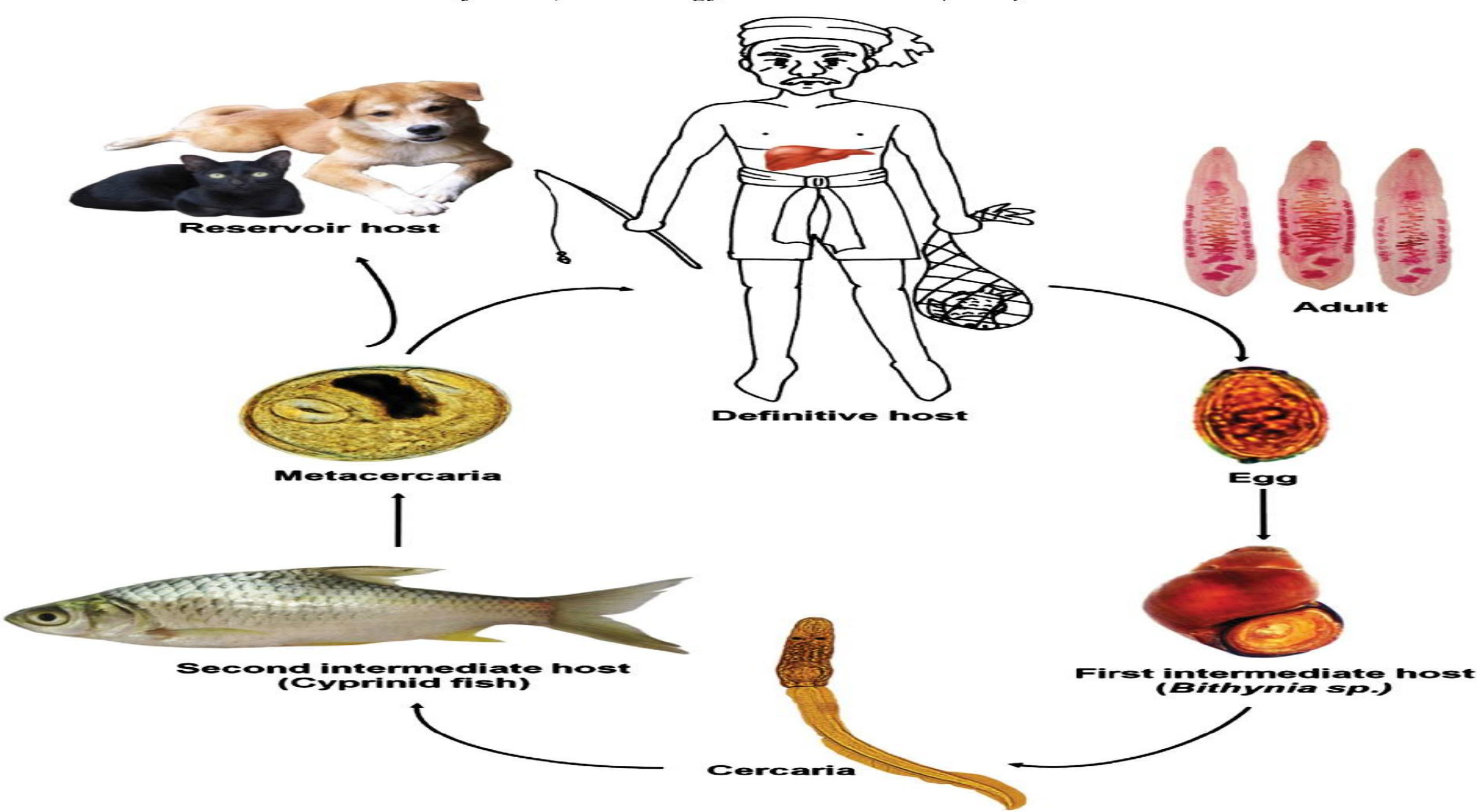
(e.g. *Entamoeba histolytica*)

Life cycle

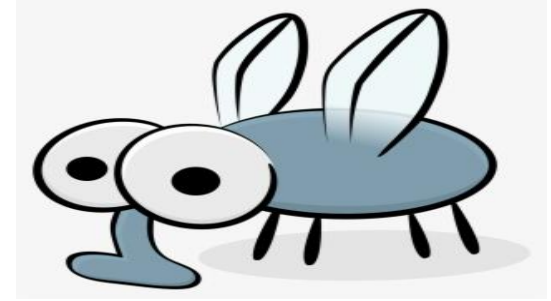
Host: That harbours the parasite.

- **Definitive host:** a host which harbours the adult stage, the most highly developed form of the parasite or sexually mature stage of a parasite.
- **Intermediate host:** a host which harbours sexually immature or larval stage of a parasite.
- **Reservoir host:** The animal that holds the same species of parasites as man, and constitutes a source of infection to man and ensures continuity of parasite life cycle.

- **Habitat:** The tissue or organ in which the adult stage of parasite exists in the definitive host.
- **Infective Stage:** The stage of parasite that capable of causing infection (entering the host and continue development within it).
- **Diagnostic Stage:** it is the stage of a parasite that can be detected in stool, blood, urine, sputum, CSF,... and used in diagnosis.



Vector



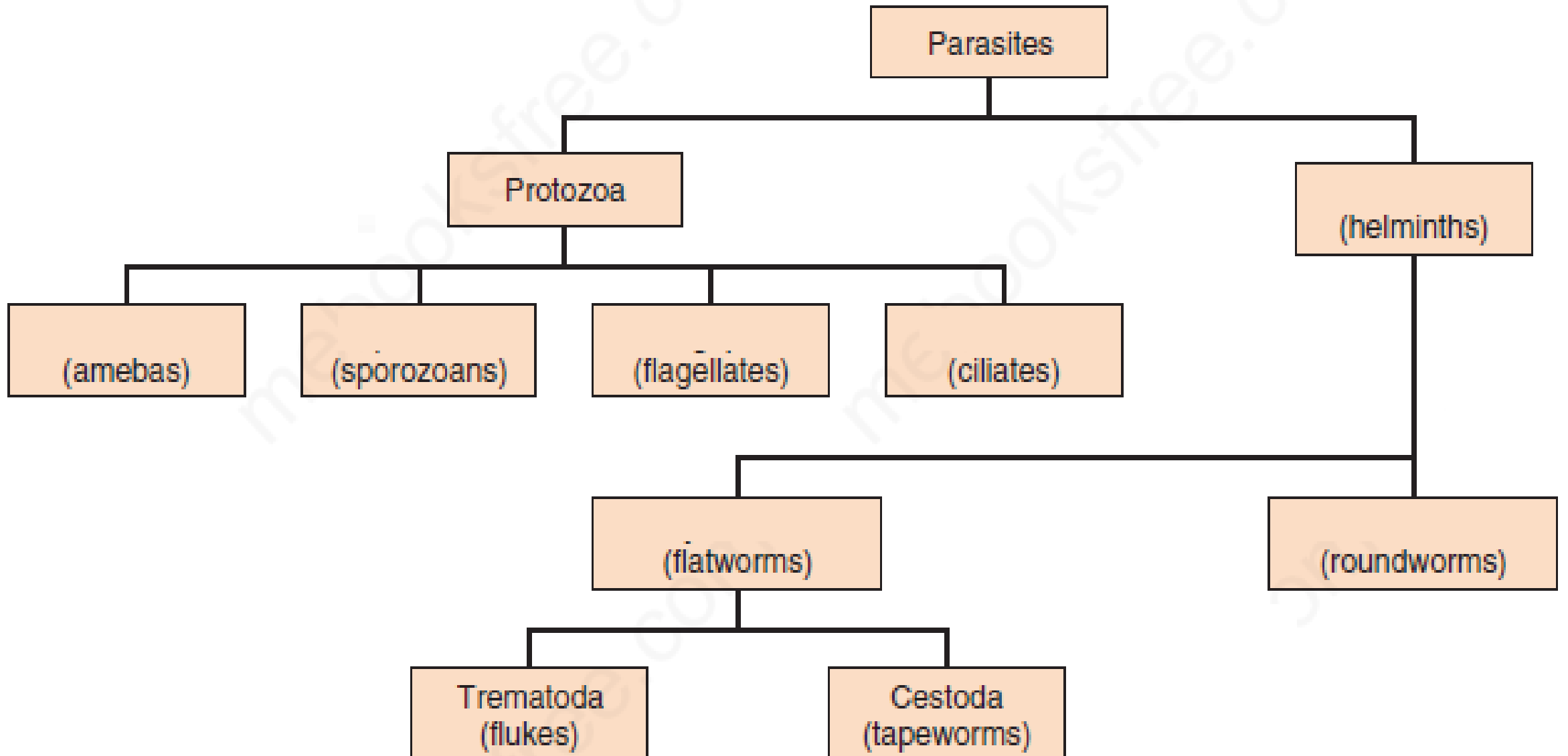
Any arthropod which transports a parasite from an infected to non-infected host.

Biological vectors: Vectors that are necessary to complete the life cycle of a parasite.

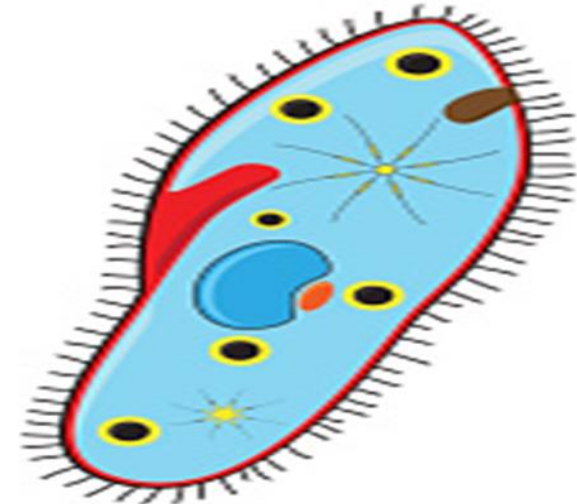
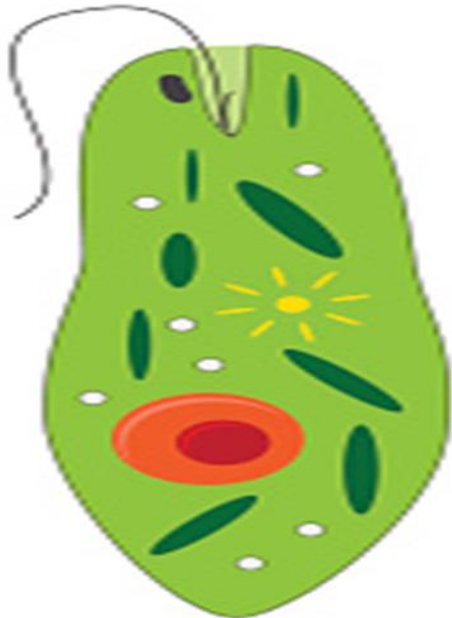
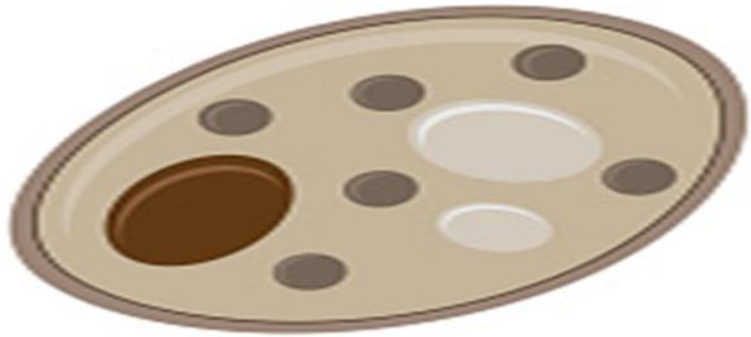
Mechanical Vectors: It is a passive carrier of parasites, not essential in the life cycle.

- **Infection:** Invasion of the body by any pathogenic organism
“except” arthropods.
- **Infestation:** The establishment of arthropods upon or within a host.
- **Autoinfection:** A situation where the infected individual acts as a source of infection to himself.
- **Zoonosis:** Diseases of animals that are transmittable to man.

Classification of the medically important parasites



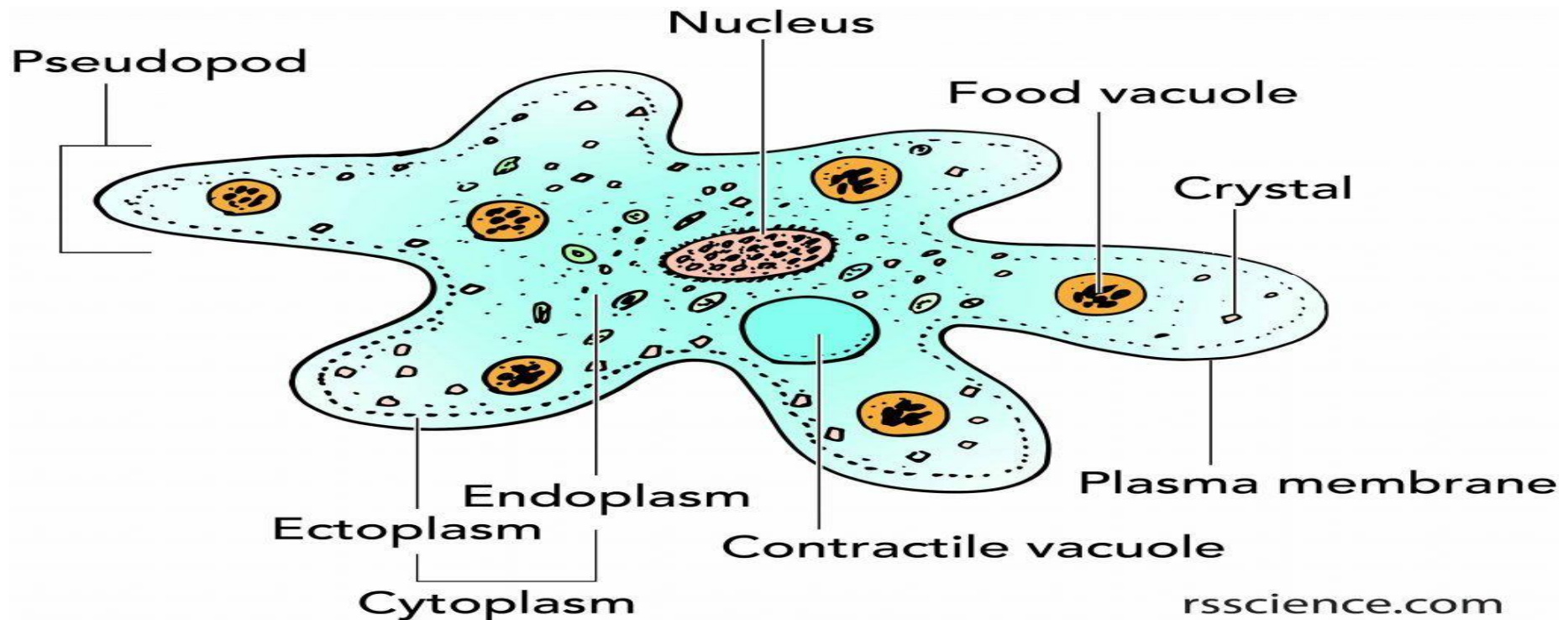
Protozoa



➤ Unicellular organism.

➤ Eukaryotic cell: - Has true nucleus surrounded with nuclear membrane.

- Has specialized membranous organelles (e.g. golgi apparatus, endoplasmic reticulum, ...).



They are categorized according to their method of movements:

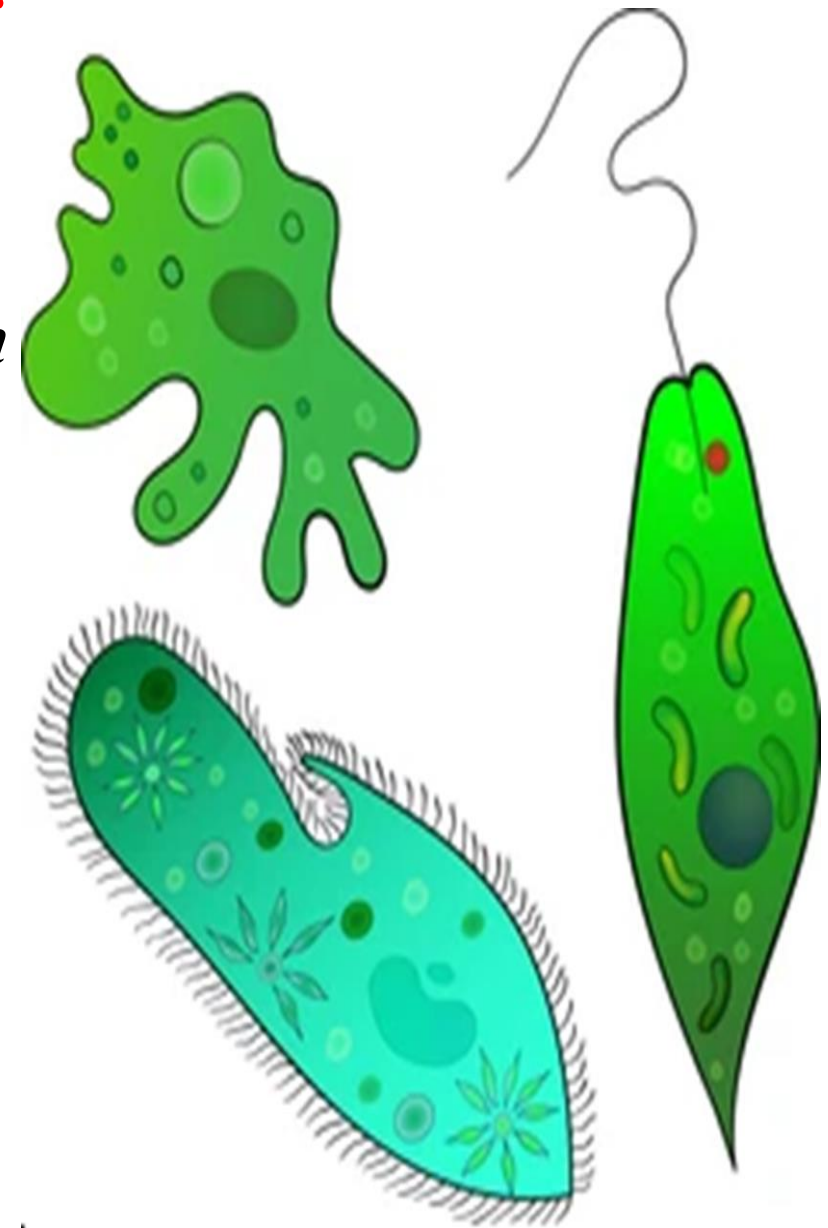
1- **Amoeba:** move by pseudopods e.g. *Entamoeba histolytica*.

2- **Flagellates:** move by flagella e.g. *Giardia lamblia*.

3- **Ciliates:** move by cilia e.g. *Balantidium coli*.

4- **Sporozoa:** no organ of locomotion

(gliding motility). e.g. Plasmodium, Toxoplasma.



Medically important protozoa

<p>Amoeba: Entamoeba histolytica Free living amoeba: Acanthamoeba, Naeglaria</p>	<p>Gastrointestinal tract Nervous system</p>
<p>Flagellates: Giardia lamblia Trichomonas vaginalis Hemoflagellates: Leishmania Trypanosoma</p>	<p>Gastrointestinal tract Urogenital tract Blood, Skin Blood, Nervous system</p>
<p>Ciliates: Balantidium coli</p>	<p>Gastrointestinal tract</p>
<p>Sporozoa: Cryptosporidium Cyclospora Isospora Toxoplasma Plasmodium</p>	<p>Gastrointestinal tract Gastrointestinal tract Gastrointestinal tract Nervous system, tissue Blood</p>

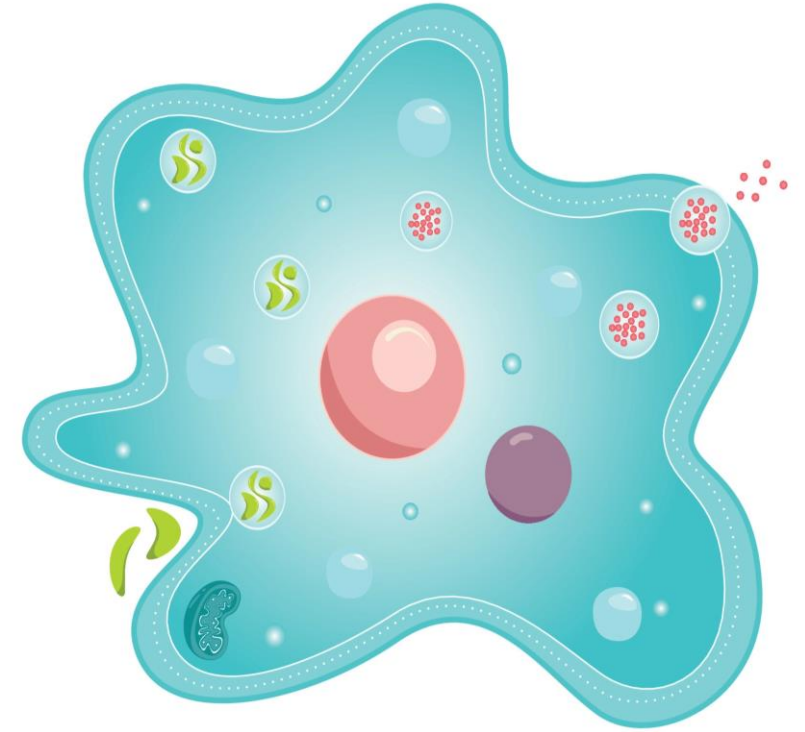
A) Intestinal amoeba: **Amoeba**

- **Pathogenic:** *Entamoeba histolytica*.
- **Commensals:** *Entamoeba dispar*.

B) Free living amoeba:

- **Acanthamoeba, Naeglaria:**

They are opportunistic pathogens causing fatal meningo-encephalitis in immuno-compromised individuals.



Entamoeba histolytica

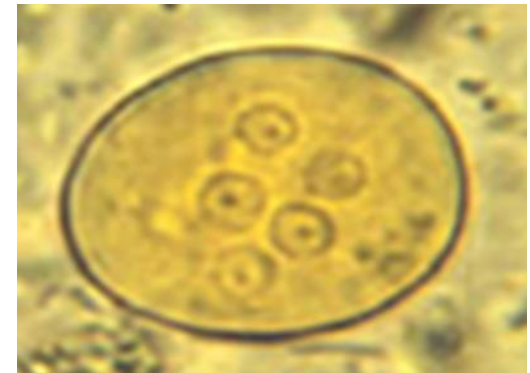
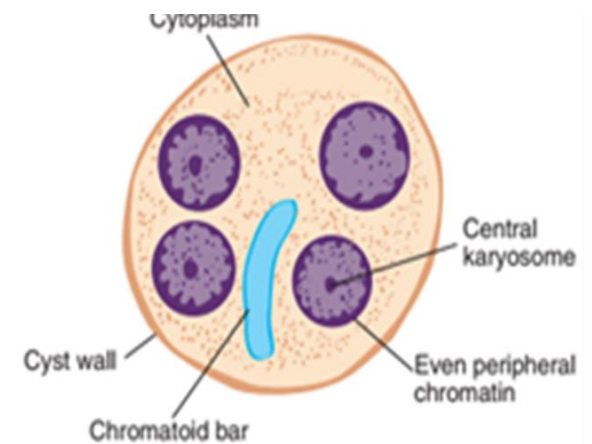
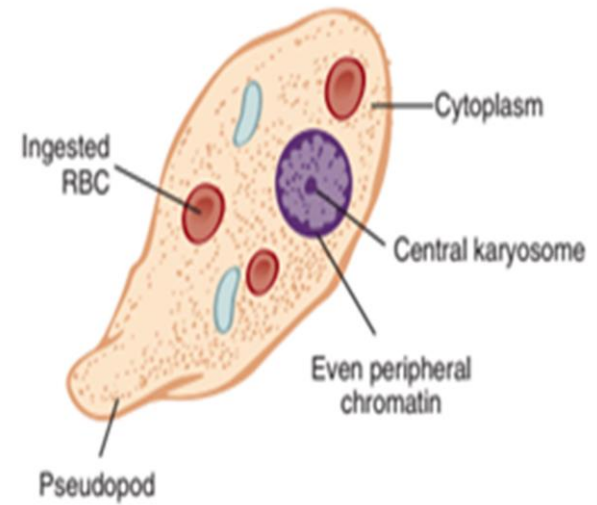
Morphology

1) Trophozoite:

- It is the active motile feeding reproducing pathogenic stage.
- Contains: Nucleus and food vacuoles.

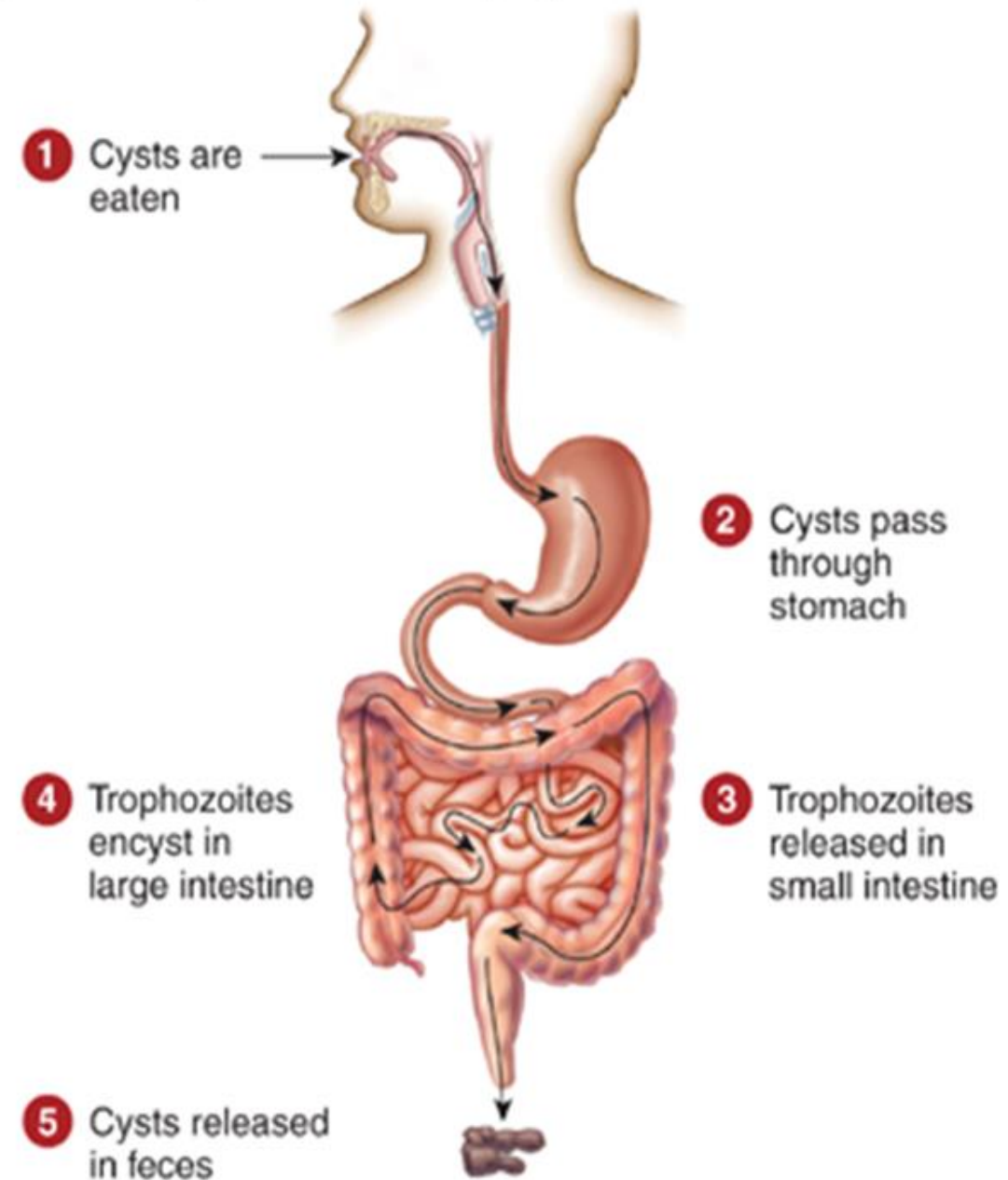
2) The cyst form:

- Trophozoites usually encyst before leaving the gut.
- Mature cyst is spherical, 4 nucleated cyst (**quadrinucleate**).



Life cycle

- **Definitive host:** Man.
 - **Habitat:** Large intestine.
- But may invade other tissues, reaching the circulation leading to extra-intestinal lesions.
- **Infective stage:** Four nucleated cyst.
 - **Mode of infection:** Ingestion of food or drink contaminated with infective stage.
 - **Diagnostic stage:** Four nucleated cyst.



Amoebiasis

Trophozoites invade colonic mucosa, producing extensive ulceration. They may also invade the portal circulation and carried to the liver or, more rarely, to the lung, brain, or spleen.

1) Intestinal amoebiasis:

a) Asymptomatic (cyst passers about 75%).

b) Acute amoebiasis (Amoebic dysentery): Fever, colic, tenesmus, bloody diarrhea.

c) Chronic amoebiasis: There is diarrhea, abdominal cramps, flatulence, anorexia. The diarrhea is alternating with normality or constipation.

2) Extraintestinal: Amoebic hepatic, pulmonary, cerebral and renal abscesses.

Amoebic liver abscess: right-upper-quadrant pain, fever, and a tender, enlarged liver.

Flagellates

- **Intestinal Flagellates:** *Giardia lamblia*.
- **Urogenital Flagellates:** *Trichomonas vaginalis*.

- **Hemoflagellates:**

- Leishmania.

- Trypanosoma.



Giardia
intestinalis



Trichomonas
vaginalis



Trypanosoma
gambiense



Leishmania sp.

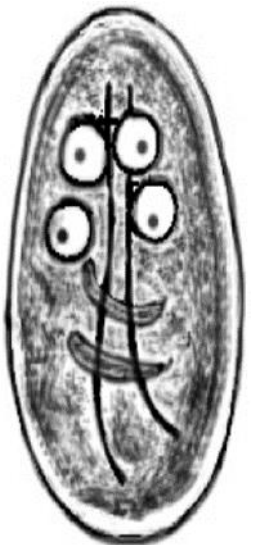
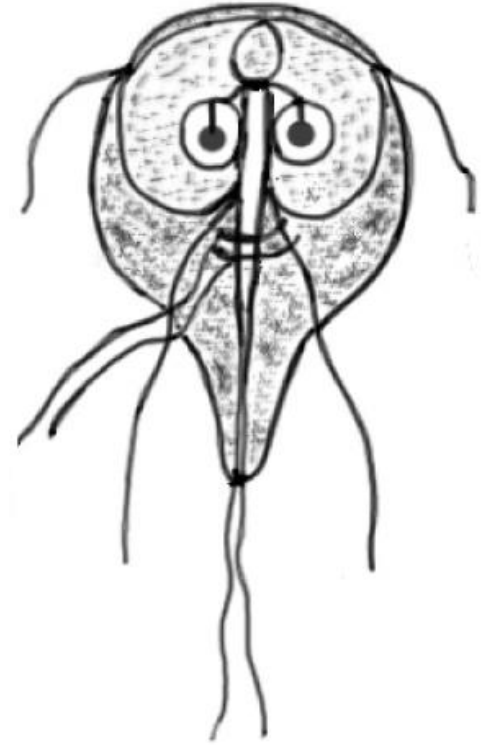
Giardia lamblia

Morphology

1) Trophozoite:

Pear shaped, has two nuclei and central parabasal bodies and four pairs of flagellae giving it the appearance of a face with two eyes, a mouth, hair and chin.

2) Cyst: Oval, 4 nucleated, develop in the colon.



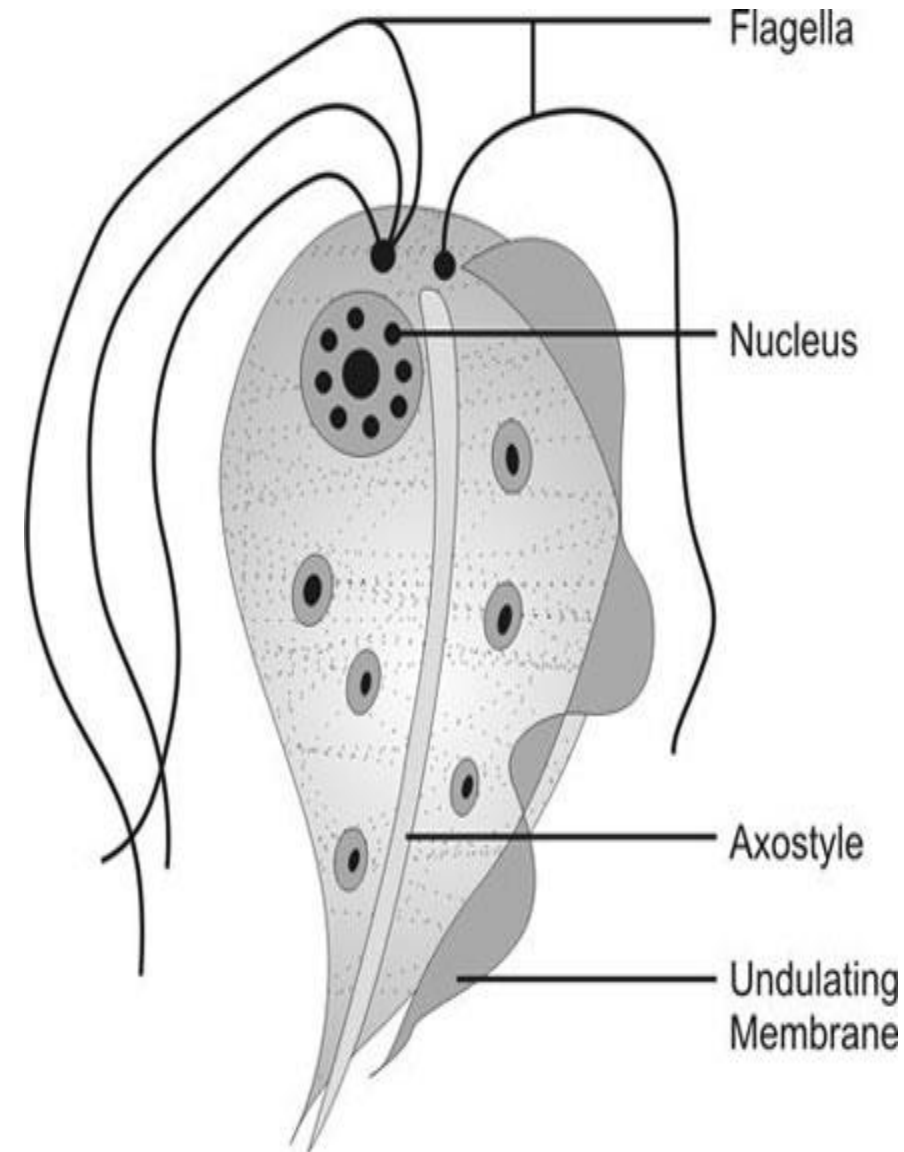
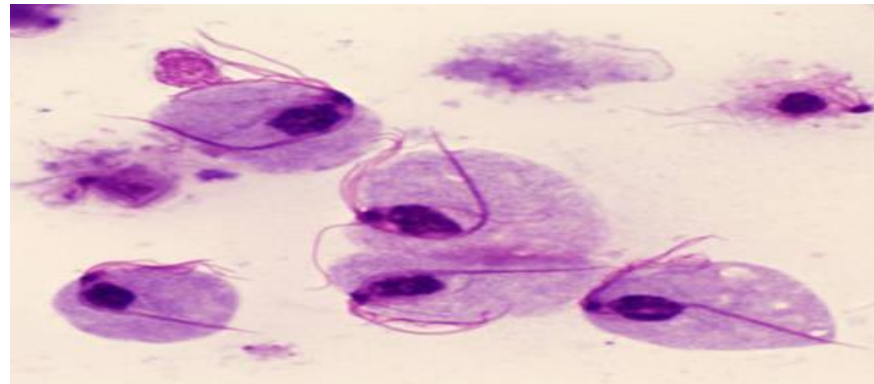
Giardiasis

- Trophozoite attaches to the gut wall (not invade the mucosa /bloodstream)
 - > inflammation of the duodenal mucosa —> malabsorption of protein and fat.
- Most cases are asymptomatic.
- Symptoms range from mild diarrhea, flatulence, cramp-like abdominal pains to **steatorrhea (fatty diarrhea)**.
- The stool is foul smelling, greasy in appearance and devoid of blood.

Trichomonas vaginalis

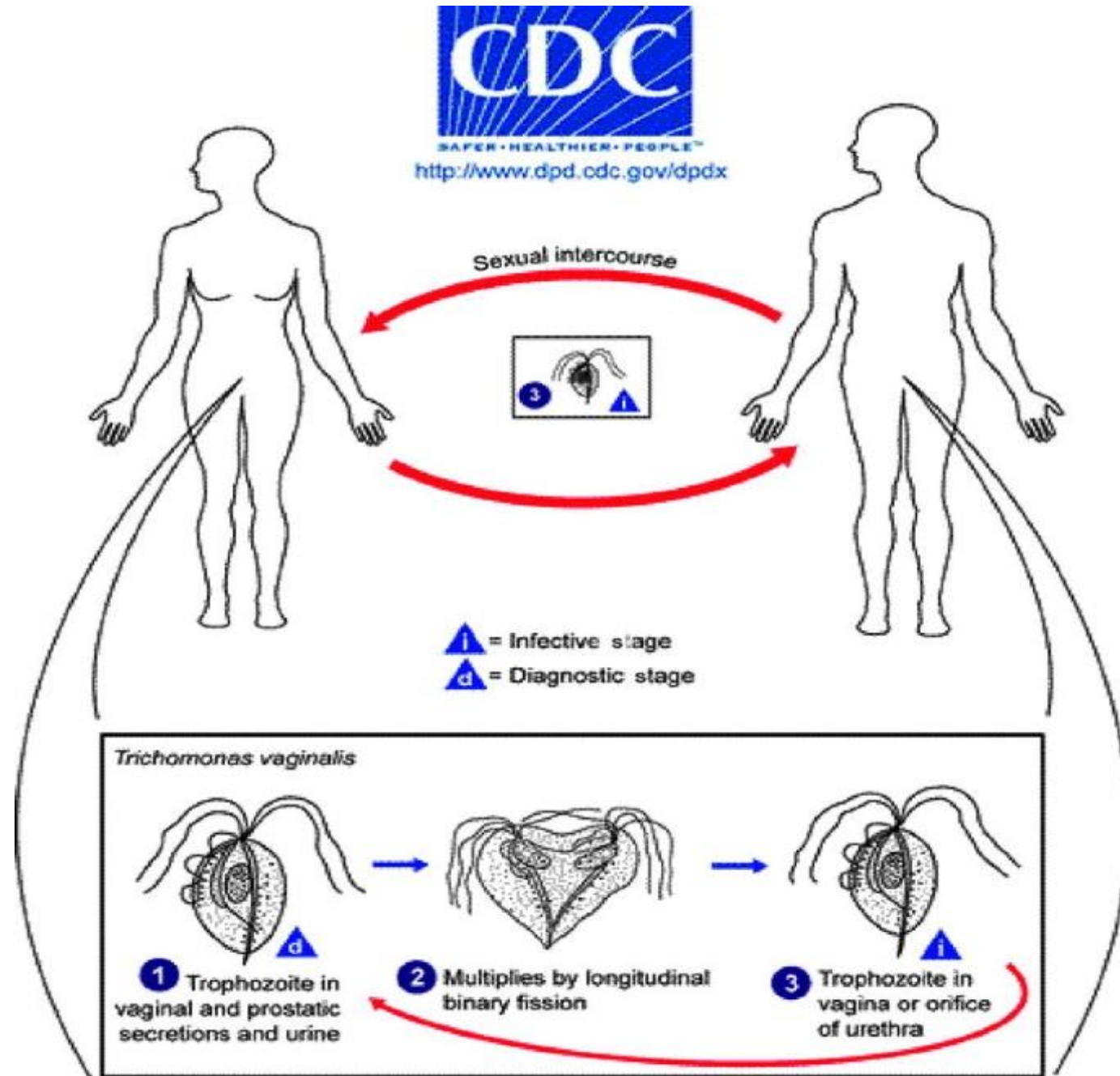
Morphology

- 1) **Trophozoites** are pear shaped, and have single nucleus, 3-5 anterior flagella, and undulating membrane bordered by flagellum.
- 2) **No cyst stage**, so infection occurs by trophozoites.



Life cycle

- Definitive host:** Man.
- Habitat:** Urogenital tract of both women and men.
- Infective stage:** Trophozoite.
- Mode of infection:**
Sexual intercourse
less common through contaminated toilet seats or towel.
- Diagnostic stage:** Trophozoite.



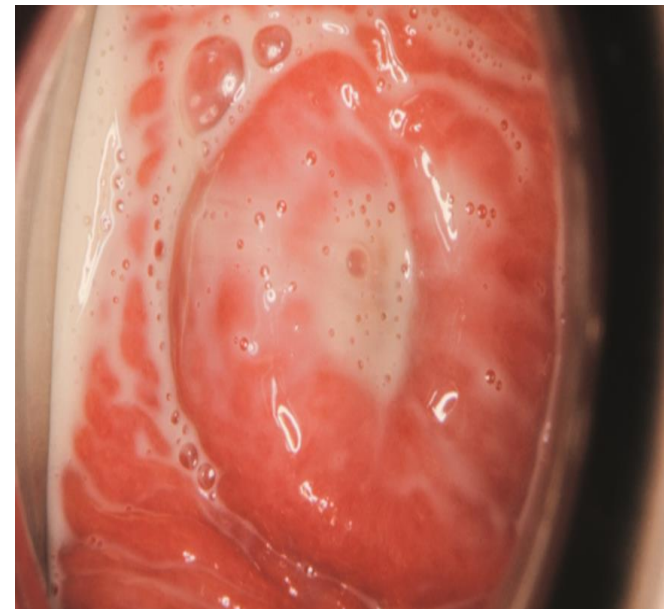
Trichomoniasis

In women:

- Vaginitis in 70 % of infected women.
- Reddish vaginal mucosa & strawberry cervix.
- White or yellowish frothy discharge with a fishy smell.
- Vulvar pruritis.
- Dysuria and frequency.

In man:

- Mostly asymptomatic.
- Sometime it causes urethritis (frequency and dysuria).





Regarding amoebiasis, which of the following statements is TRUE?

- A) The lesion is confined only to the intestine.
- B) The normal habitat of the parasite is the small intestine.
- C) The infection occurs by ingestion of food or drink contaminated with four nucleated cyst.
- D) The infection occurs by penetration of the skin by trophozoite.
- E) Trophozoites is the infective stage.

A 7-year-old child presented with diarrhea, flatulence and cramp-like abdominal pain. The child's stool appears fatty, greasy and foul smelling. An examination of his stool revealed pear-shaped, motile organisms. Of the following, which one is the most likely cause of this infection?

A) *Cryptosporidium hominis*

B) *Entamoeba histolytica*.

C) *Giardia lamblia*.

D) *Trichomonas vaginalis*.

E) *Balantidium coli*.

Which of the following statements concerning *Trichomonas vaginalis* is CORRECT?

- a) It is transmitted sexually.
- b) It can be diagnosed by visualizing the cyst stage in vaginal discharge.
- c) It causes bloody diarrhea.
- d) It causes vaginal thrush.
- e) It is symptomatic in 70% of males.

Thank
you

