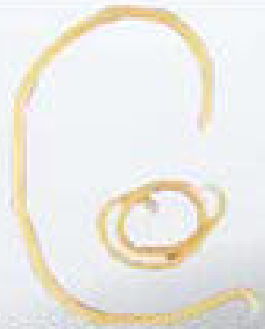


Parasite



ROUNDWORM



HOOKWORM



FLUKE



TAPEWORM



NEMATODE



PROTOZOA

Topics to be covered today:

- Introduction of parasite, some definitions
- Parasite's hosts
- Classifications of parasite
- mode of transmission
- The clinically important protozoa with their life cycle

Introduction

- **Parasitology:** study of parasite.
- **Parasitism:** is a relationship between two organisms living together, one is benefited “parasite” at the expense of the other “host”
- **Parasite:** is an organism live on or in other living organism “host” and get its food and shelter from or at the expense of its host (temporarily or permanent)
- There are many types of parasites: human parasites, plant parasites, and animal parasites

Types of parasites according to their habitat

1. Ectoparasites:

2. Endoparasites:



Parasites can be:

1-Facultative parasite:

Parasites able to live both free living and parasite living, e.g. Amebae.

2-Obligate parasite:

Parasite living permanently in a host and cannot live without a host, e.g. Trichomonos species, most human parasites.

3-Coprozoic (spurious) parasites:

Foreign organisms which have been swallowed, merely pass along alimentary canal of man (without establishment) to be recovered in faeces (without affect).

Host

- Host is an organism harboring the parasite species (may be affected or not).

Classification of Hosts:

1. **Definitive host:**
2. **Intermediate host :**

Eg: Taenia>> Adult stage in man (definitive host)

Larval stage in cattle (intermediate host)

3. Reservoir host (carrier): host that well adapted to the parasite and tolerates the infection (no symptoms), help to maintain the life cycle of parasite and act as a source of infection to the other organisms.

4. Vector: an arthropod which carries the parasite from one host to another.

Remember !!

Taxonomic Classification of parasite:

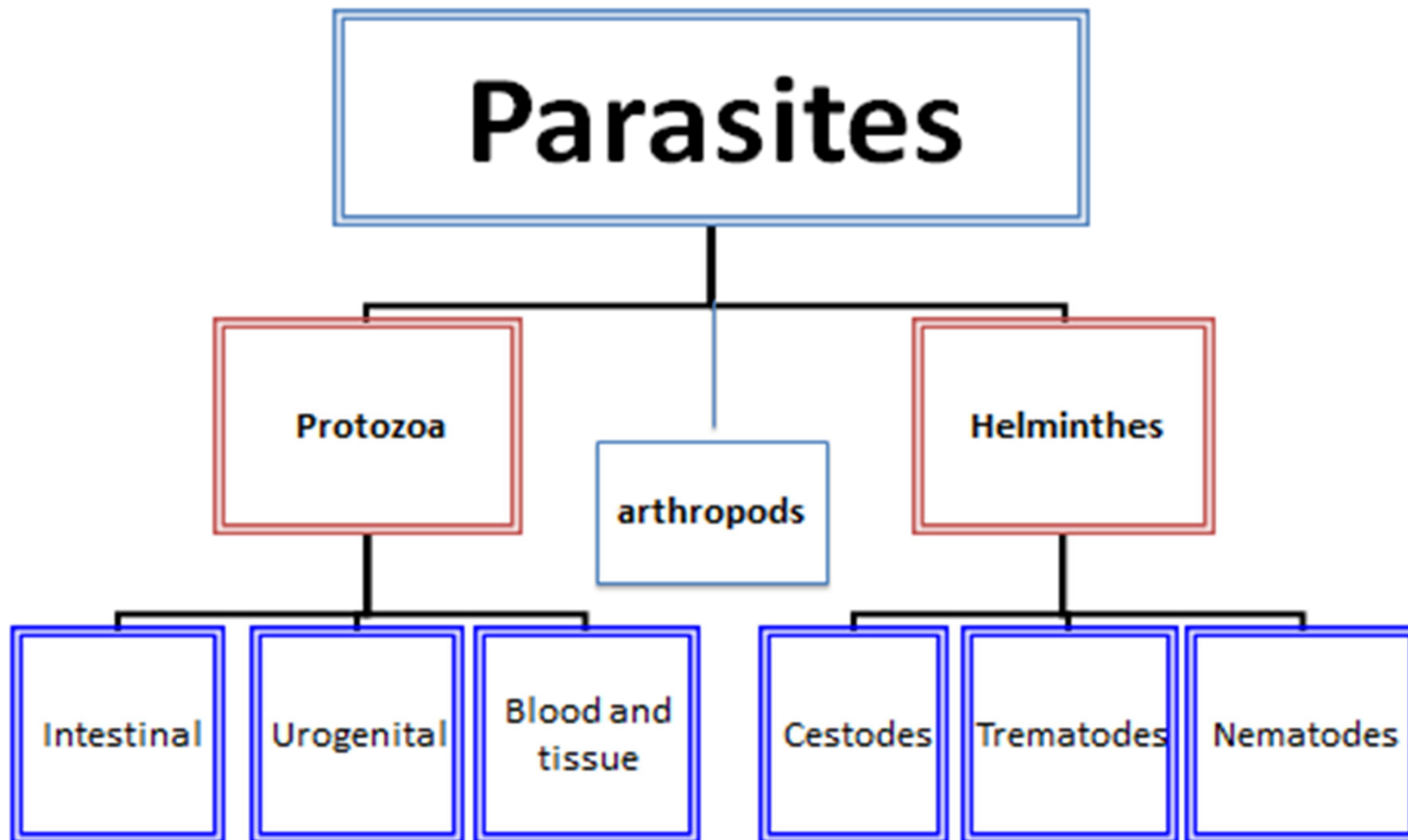
- Each parasite belong to: Kingdom>> Phylum>> Class>> Order>> Family>> Genus>> species
- Some have further divisions to: Sub – order, super family, sub – species
- Scientific parasitic name is of 2 parts: Genus and species

Ex: *Plasmodium falciperum*

Mode of Parasitic Infection Transmission

- 1) Congenital from mother to fetus.
- 2) Sexually transmission
- 3) Ingestion of contaminated food and water or undercooked meat in which the infective stage has developed.
- 4) Penetration of the skin due to contact with infected soil or water stream.
- 5) Inhalation of dust carrying the infective stage of parasite.
- 6) Vectors: through the bite or faeces of infected vector or by swallowing the vector.

Classification of parasites

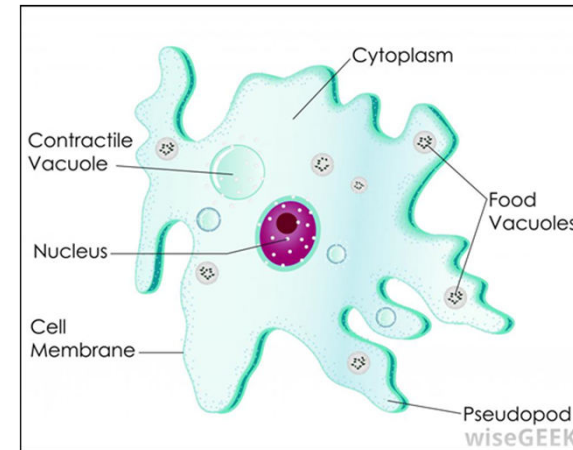


Protozoa (sing., Protozoan)

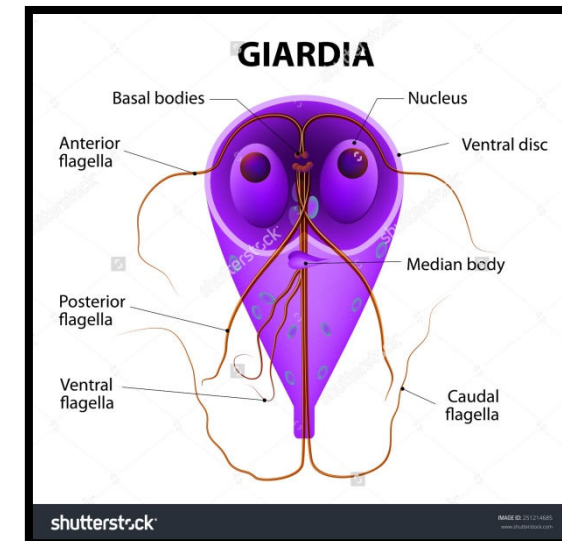
- Eukaryotic organism
- Classified in the second Kingdom (protista)
- Most of protozoa are unicellular, but some are multicellular
- Most of protozoa are free living organisms found in soil and water
- Some protozoa are parasites

Classification of Protozoa according to their method of locomotion

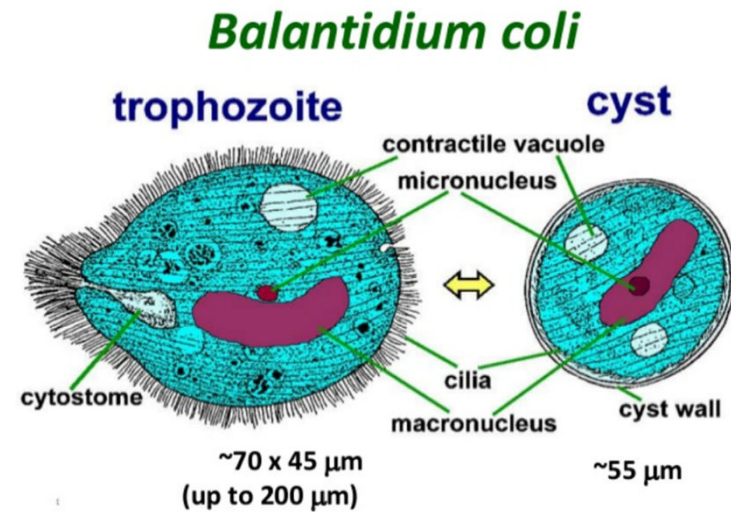
1. Amebas:



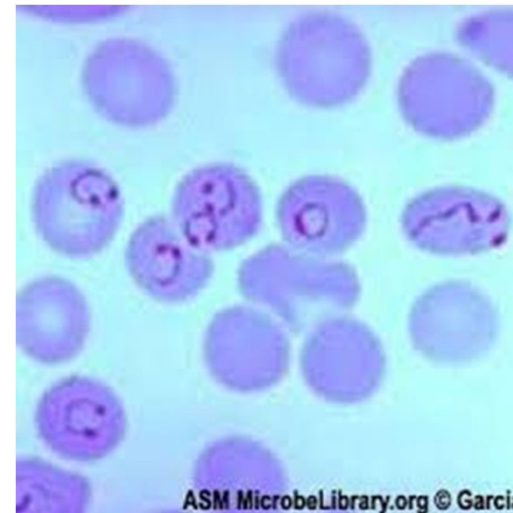
2. Flagellates:



3. Ciliates:

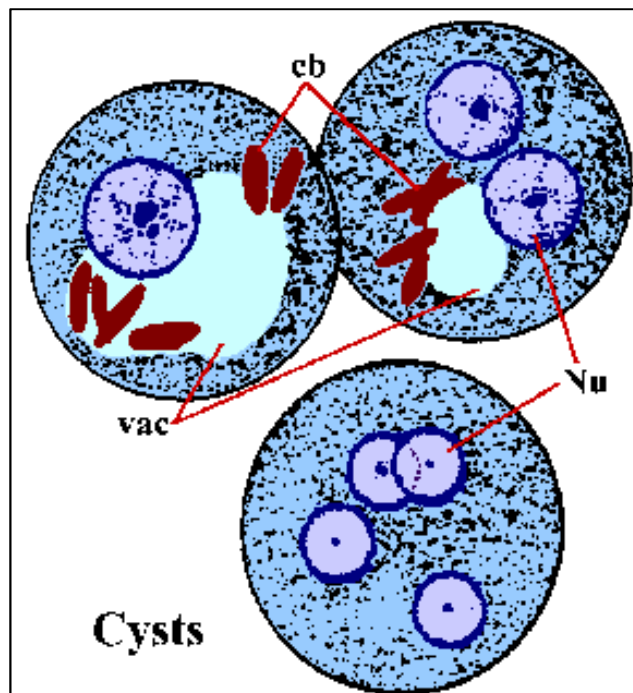


4. Sporozoa:

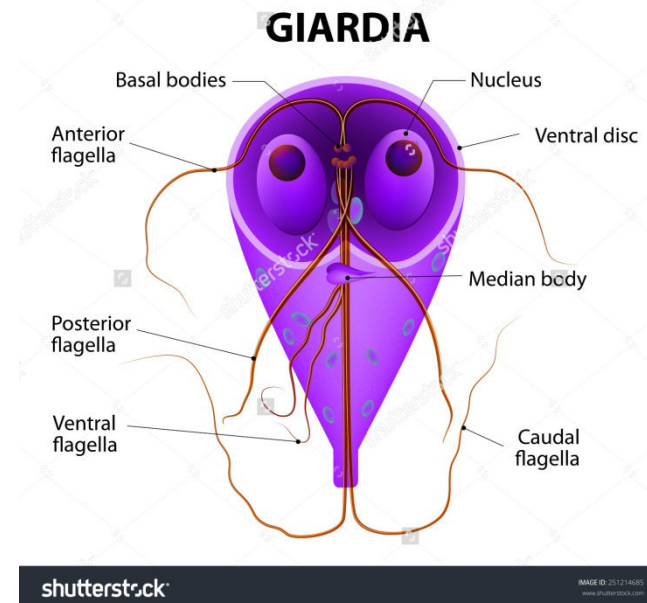


Protozoan life cycle consist of two stages:

➤ **Cyst stage:** non motile, dormant, survival stage, infective stage



➤ **Trophozoite stage:** vegetative stage (feeding, dividing), can be motile



Protozoa infection

```
graph TD; A[Protozoa infection] --> B[Intestinal]; A --> C[Blood and tissue]; A --> D[Urogenital tract]; B --> B1[Entamoeba histolytica]; B --> B2[Giardia lamblia]; B --> B3[Cryptosporidium]; C --> C1[Plasmodium spp.]; C --> C2[Toxoplasma]; C --> C3[Trypanosoma]; C --> C4[Leishmania]; D --> D1[Trichomonas Vaginalis];
```

Intestinal

Entamoeba histolytica
Giardia lamblia
Cryptosporidium

Blood and tissue

Plasmodium spp.
Toxoplasma
Trypanosoma
Leishmania

Urogenital tract

Trichomonas Vaginalis

Amebiasis (Amebic Dysentery)

- It is gastrointestinal infection caused by *Entamoeba histolytica*

- **Geographical distribution:**

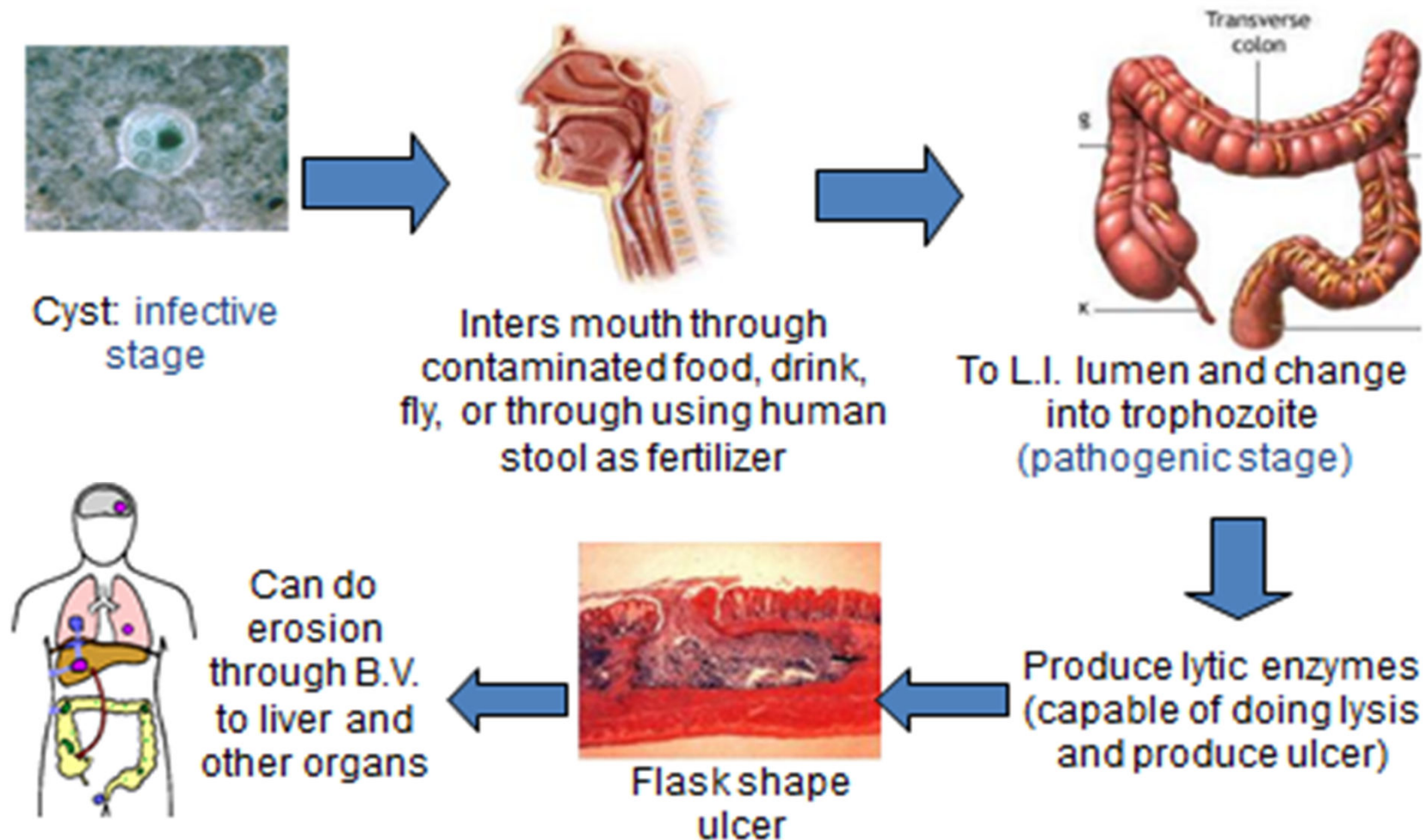
World wide, but more common in tropical and subtropical countries and in countries with poor sanitation

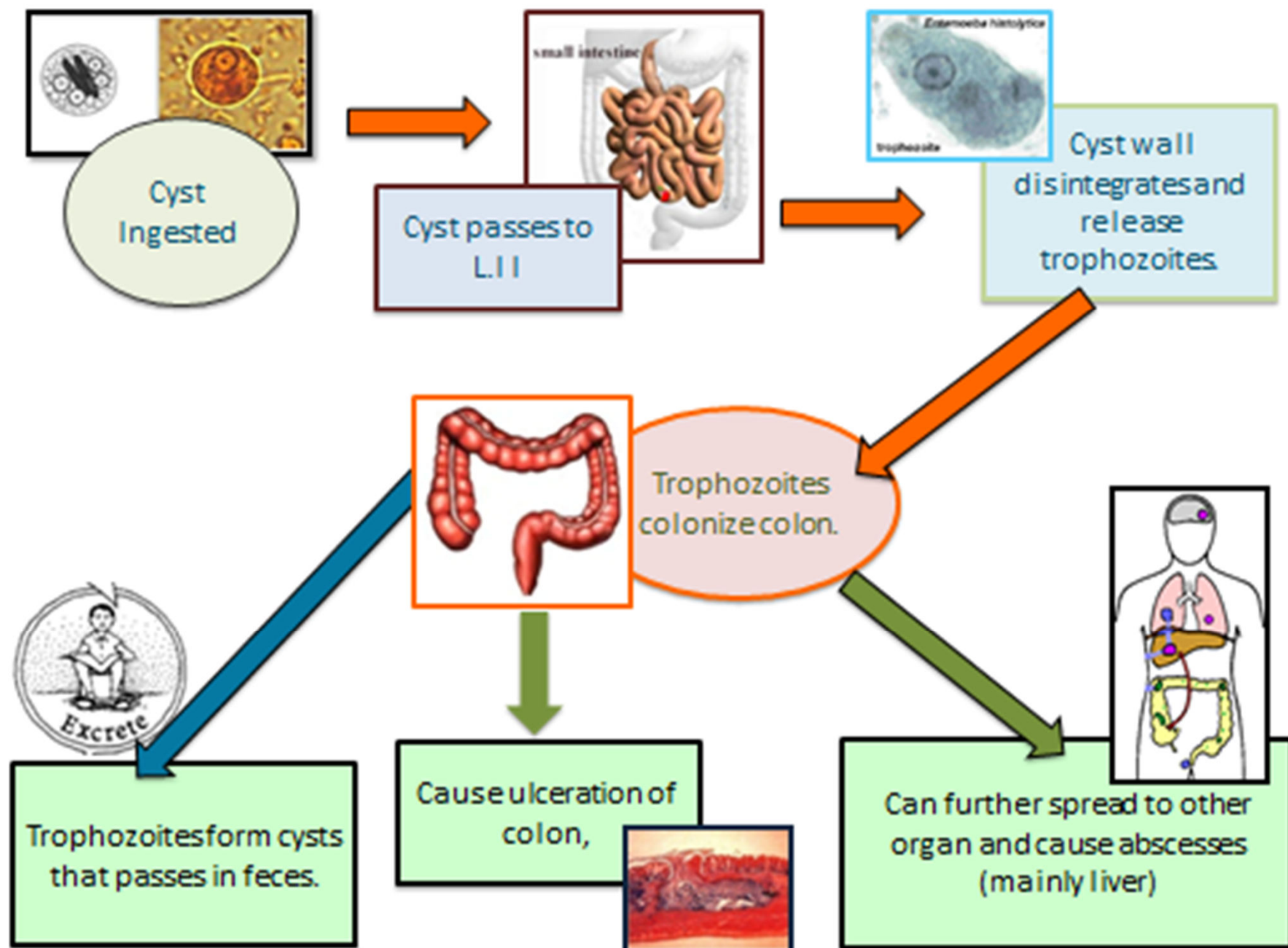
***E. histolytica* has two stages:**

1. **Cyst stage**>> infective stage, dormant, around 10-20 μm in diameter, contains four nuclei, resistant to desiccation and stomach acid, and can survive long enough in the environment to be spread to other humans.

2. **Trophozoite stage**>> pathogenic stage, around 10-60 μm in diameter, motile (move by pseudopodia), active, reproducing stage

E. histolytica Life Cycle





Amebiasis (Amebic Dysentery)

- **Habitat of *E. histolytica*:**

The lumen of the large intestine.

- **Reservoir:** humans

- **Mode of transmission:** Infection is associated with poor hygiene:

Amebiasis (Amebic Dysentery)

Clinical picture:

- May be asymptomatic, mild, or severe
- **Dysentery:** blood + mucous diarrhea (as a result of flask shape ulcer wall invasion)
- Severe abdominal pain
- **Tenesmus:** sense of incomplete evacuation
(the patient at this point should be seeking medical advice)

Amebiasis (Amebic Dysentery)

Complication:

A. intestinal:

peritonitis, appendicitis, Hemorrhage

B. Extraintestinal:

- Most commonly: liver >> hepatitis (sever right abdominal pain)
Fever
amoebic liver abscess
shoulder pain and Toxemic manifestations
- Also in lung, skin, and brain

Malaria

- It is a systemic infection caused by *Plasmodium spp.*

Clinical picture:

- malaise, fever, chills, sweating, headache, and nausea.
- The frequency with which the cycle of chills, fever and sweating is repeated is referred to as **periodicity** and depends on the particular species of plasmodium

Malaria

- Approximately 300 million people worldwide are affected by malaria and between 1 and 1.5 million people die from it every year

Geographical distribution:

- Previously extremely widespread, the malaria is now mainly confined to Africa, Asia and Latin America
- The problems of controlling malaria in these countries are aggravated by inadequate health structures and poor socioeconomic conditions. The situation has become even more complex over the last few years with the increase in resistance to the drugs normally used to combat the parasite that causes the disease.

Malaria

Four species of Plasmodium are known to infect human:

1. *Plasmodium falciparum*

(the most deadly and dangerous species)

2. *Plasmodium vivax*

(the most common species)

3. *Plasmodium ovale*

4. *Plasmodium malaria*

- *Plasmodium* spp. are intraerythrocyte sporozoan parasites

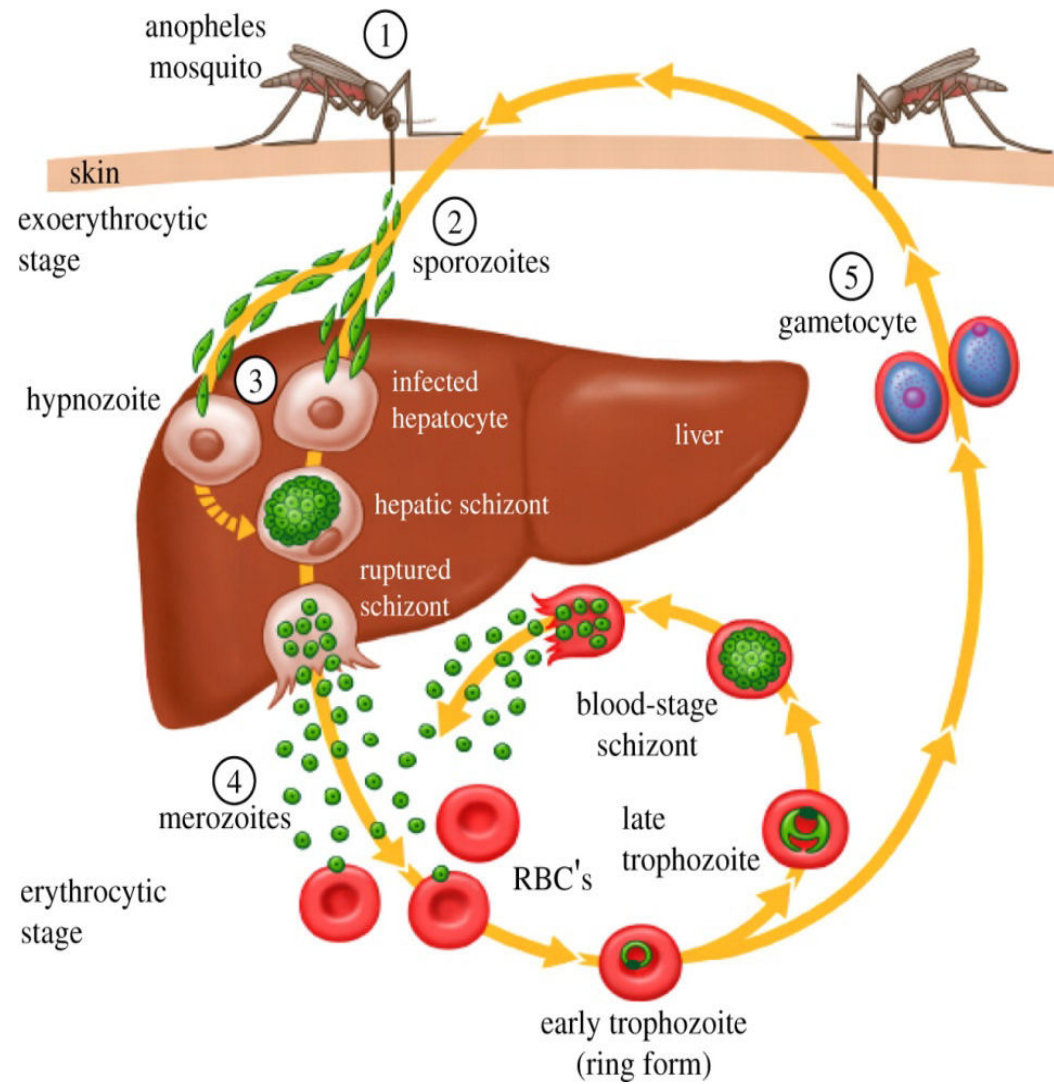
Plasmodium spp.

Mode of transmission:

- See page 366 , chapter 21 , table 21-4



Plasmodium Life Cycle (chapter 21, page 367, figure 21-7)



Pathology of Malaria:

- When merozoites invade the RBCs, using hemoglobin as a nutrient, eventually, the infected red cells rupture, releasing merozoites that can invade other erythrocytes. If a large numbers of red cells rupture at roughly the same time, a **paroxysm** (sudden onset) of fever can result from the massive release of toxic substance.
- *P. falciparum* is the most dangerous species, *P. malriae*, *P. vivax*, and *P. ovale* cause milder form of the disease **(why??)**

probably because they invade either young or old red cells, but not both. This is in contrast to *P. falciparum*, which invades cells of all ages.

- *P. falciparum* is characterized by persistent high fever and orthostatic hypertension. Infection can lead to capillary obstruction and death if treatment is not introduced
- **Habitat of *Plasmodium spp.*:** Erythrocytes
- **Reservoirs:** infected humans and infected mosquitoes