

INTRODUCTION TO MEDICAL PARASITOLOGY



Objectives

- *Define medical parasitology.**
- *Define habitat and classify parasites according to their habitats.**
- *Explain modes of parasitic invasions to the host.**
- *Explain types of parasites according to the nature of the host-parasite interactions and the environmental factors.**
- *Understand types of hosts.**
- *Recognize types of symbiotic relationships**

INTRODUCTION TO MEDICAL PARASITOLOGY

Medical Parasitology is the branch of medical sciences dealing with organisms called (parasites), which live temporarily or permanently, on **or within the human body (host).**

Human parasites (according to their structure) could be either unicellular (protozoa), or multicellular (helminths).

Most parasites of humans (according to their existence) live inside the host (endoparasites) , and some of them live on the host surface (ectoparasites).

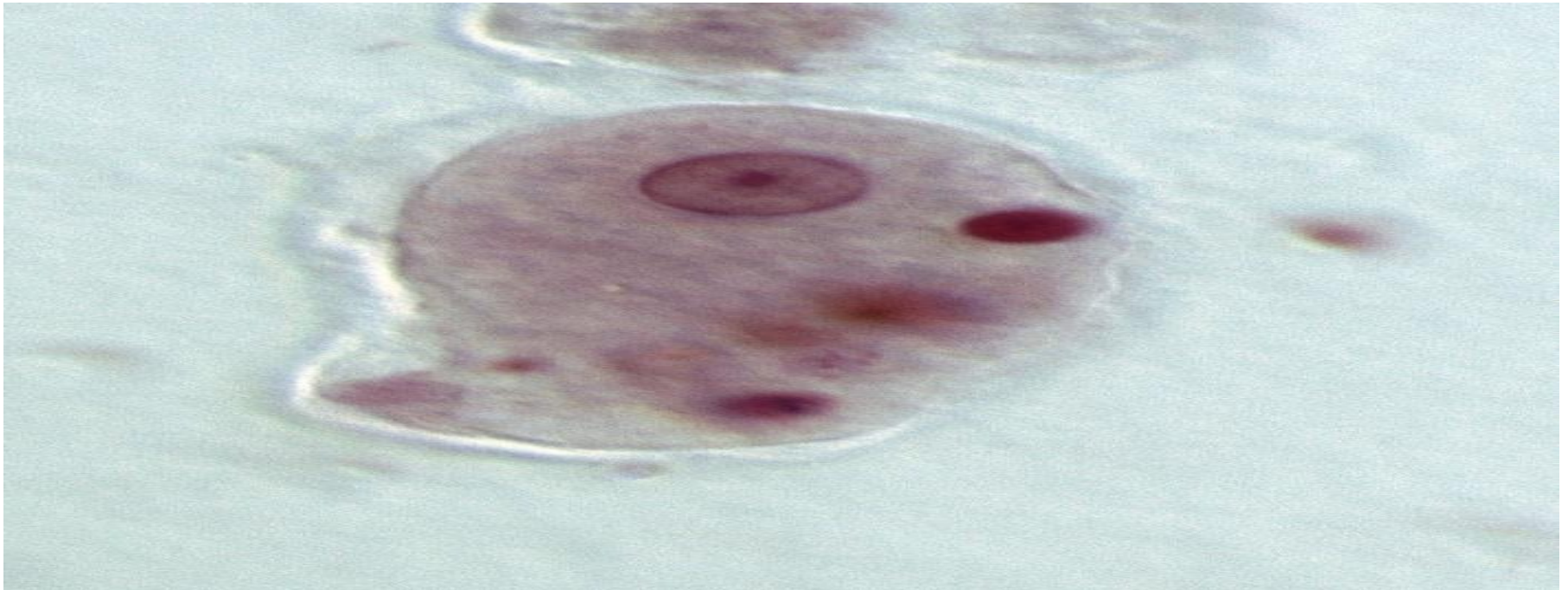
Endoparasites, are (helminths , or protozoa), it can infect different tissues and organs of the human body.

While ectoparasites are arthropods (invertebrate animals with a segmented body, and paired jointed appendages), attached to the skin for feeding.

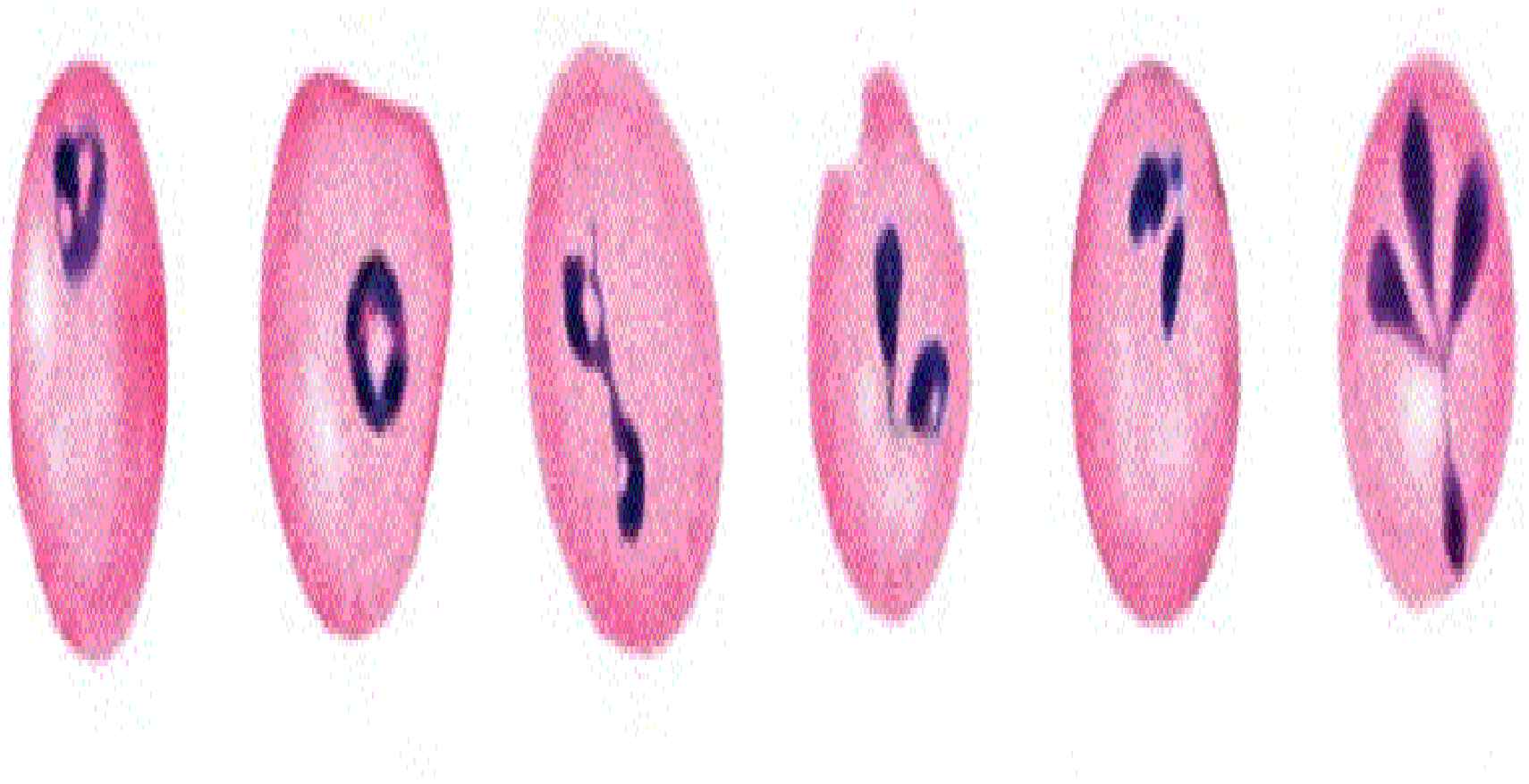
Habitat of the parasites

Habitat is the particular part of the host, in which parasite is adapted to live.

1-A great number of endoparasites live in the intestine , or at least pass through the intestine , having been swallowed with food or water. Ex: (*Entamoeba histolytica*).

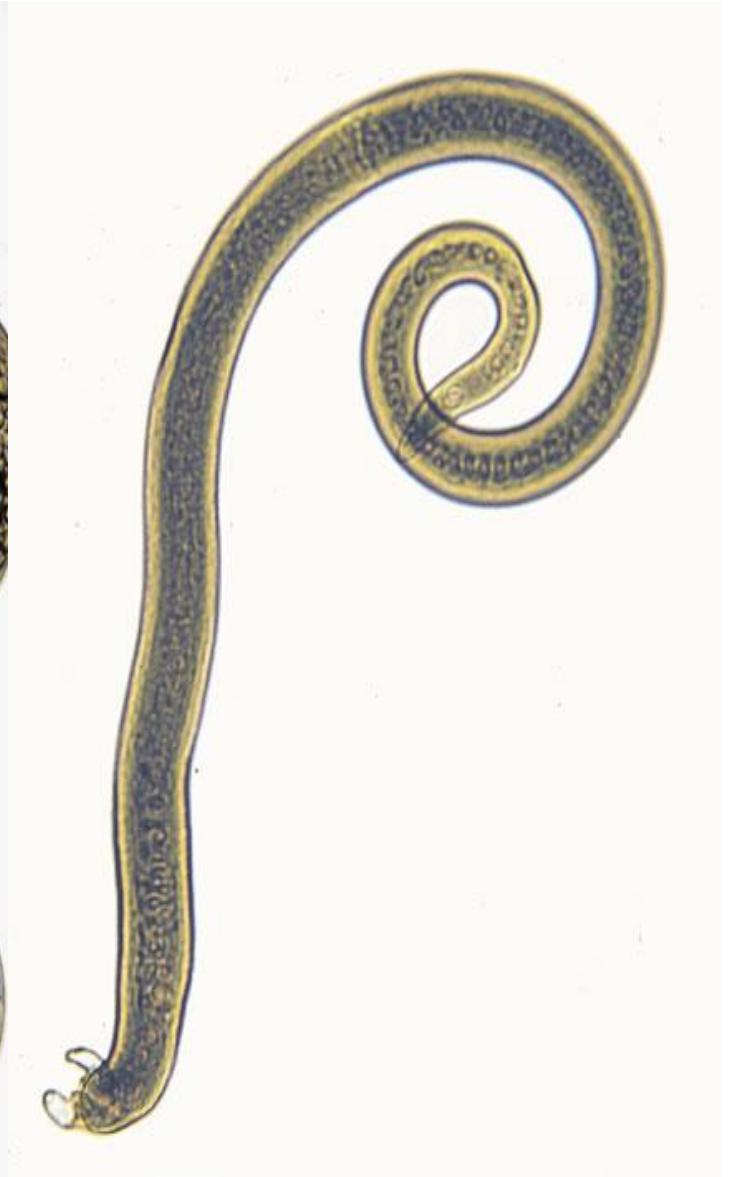
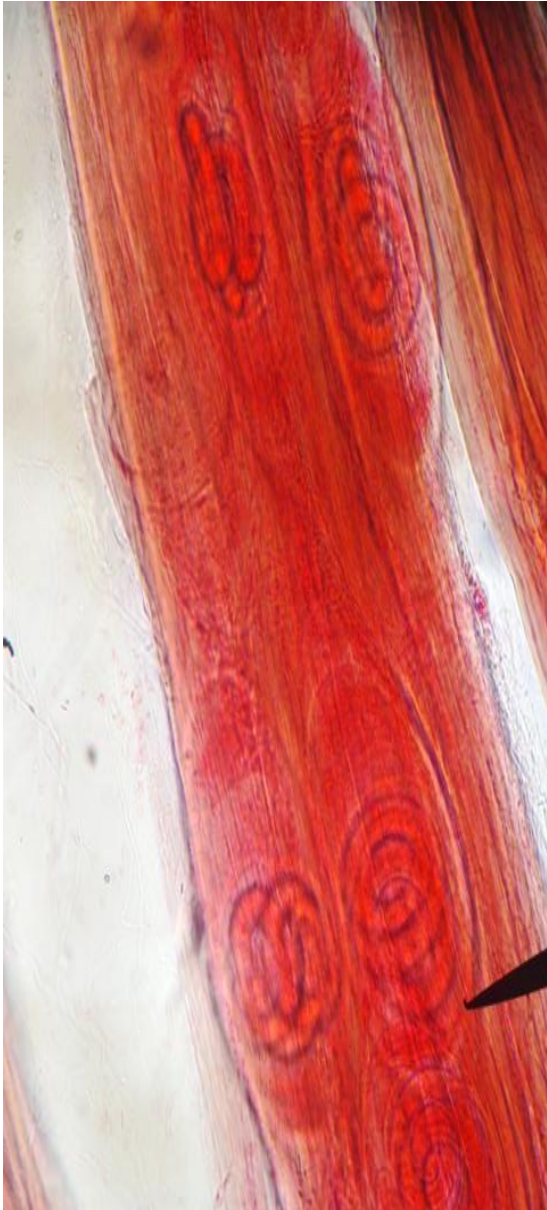


**2- Other protozoan parasites target the blood .
ex: (*Plasmodium*).**



3-Some parasites target the muscles.

ex: larva of *Trichinella spiralis*

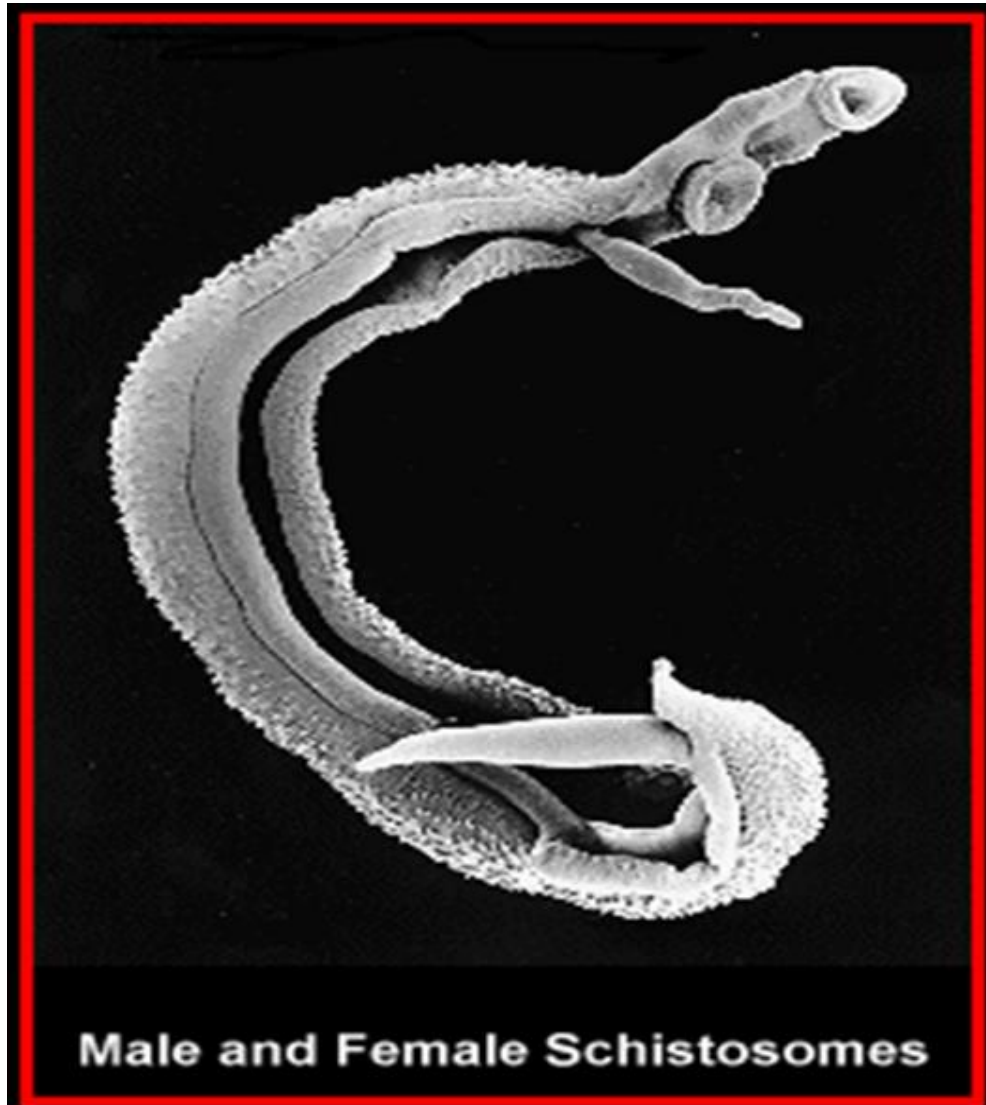


4- Some parasites occupy the liver. ex: larva of *Echinococcus* .

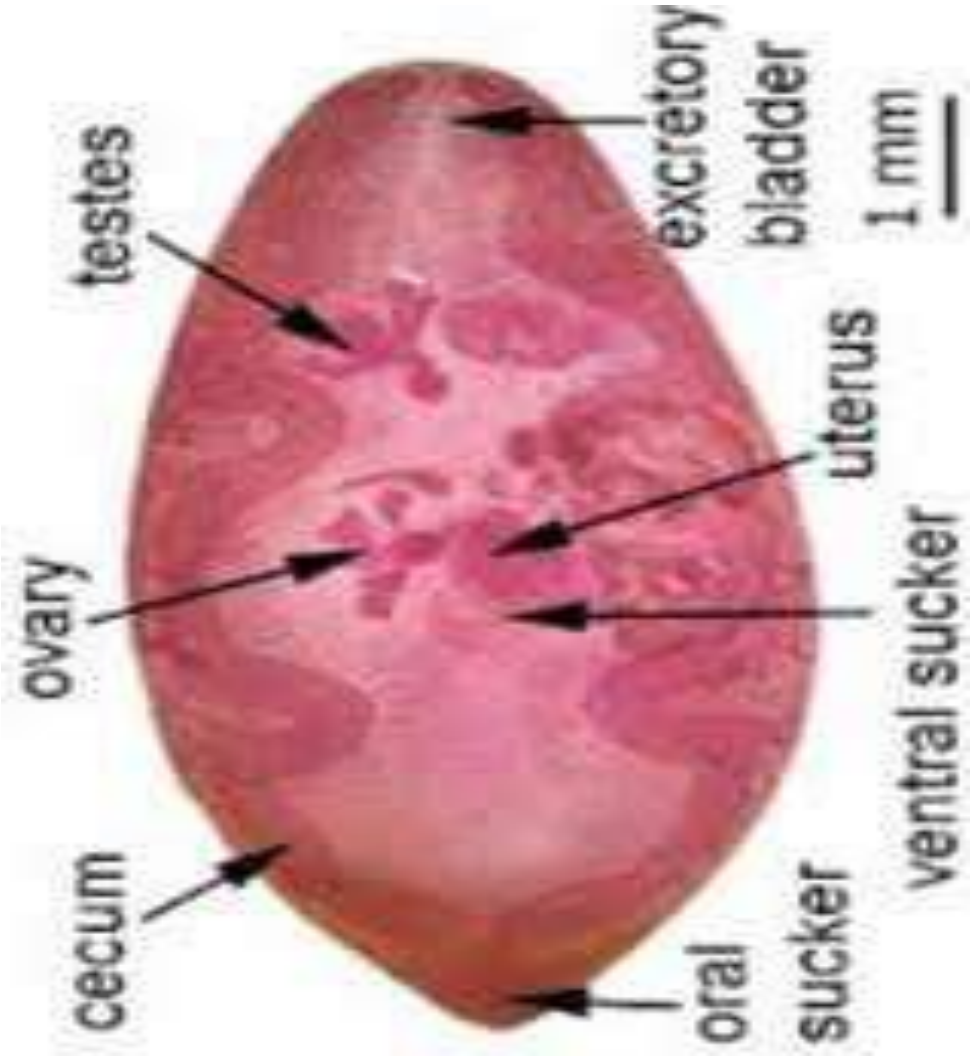
Echinococcus granulosus (large) and *Echinococcus multilocularis*



**5-Some parasites target the urinary bladder.
ex:(*Schistosoma haematobium*).**



6-Some parasites target the lung. ex: *Paragonimus westermani*



7-Some parasites live in the eye. ex: *Loa loa*

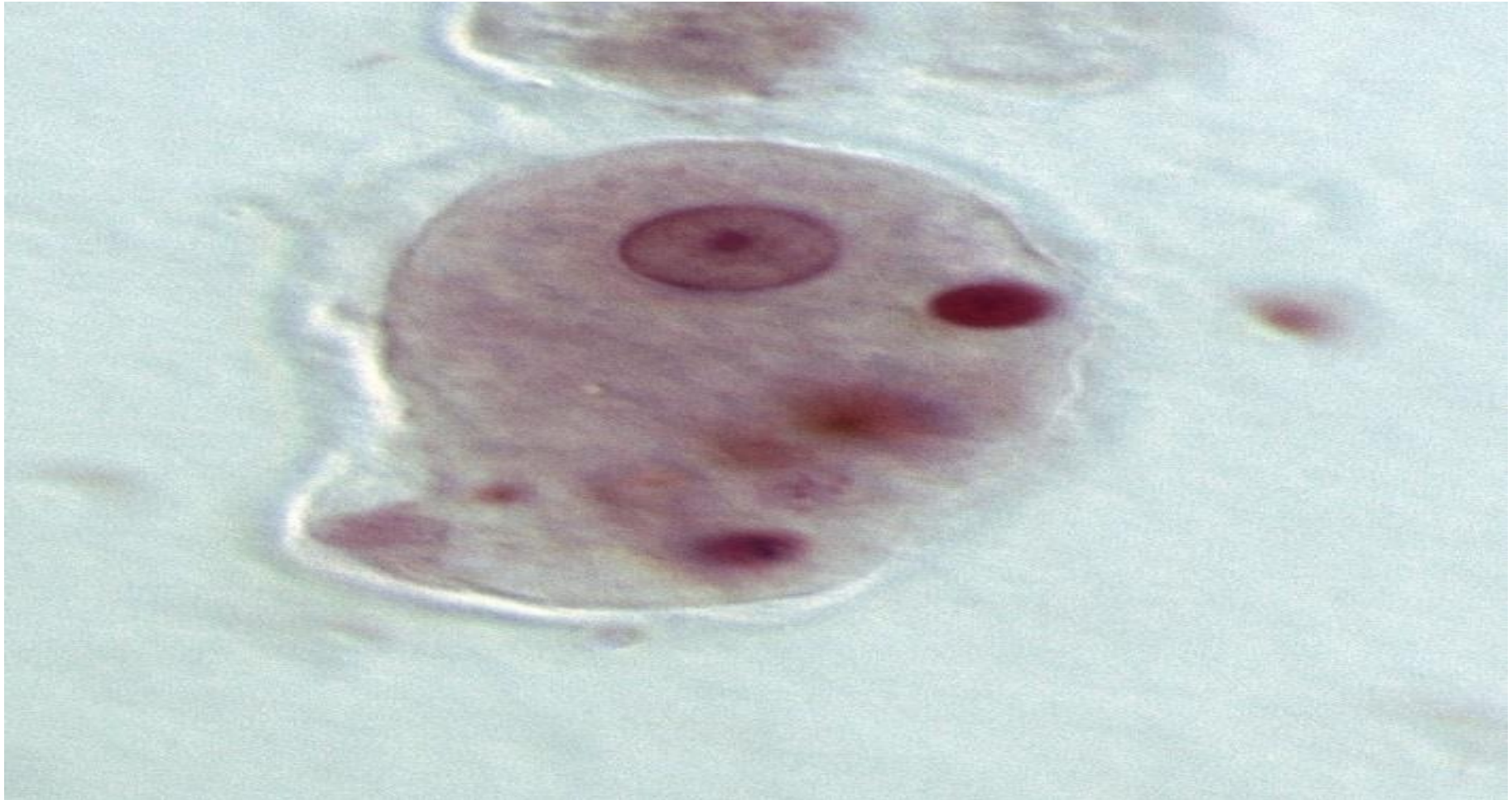


8-Some parasites target reproductive system
ex:(*Trichomonas vaginalis*)



Modes of Parasitic invasions to the human body

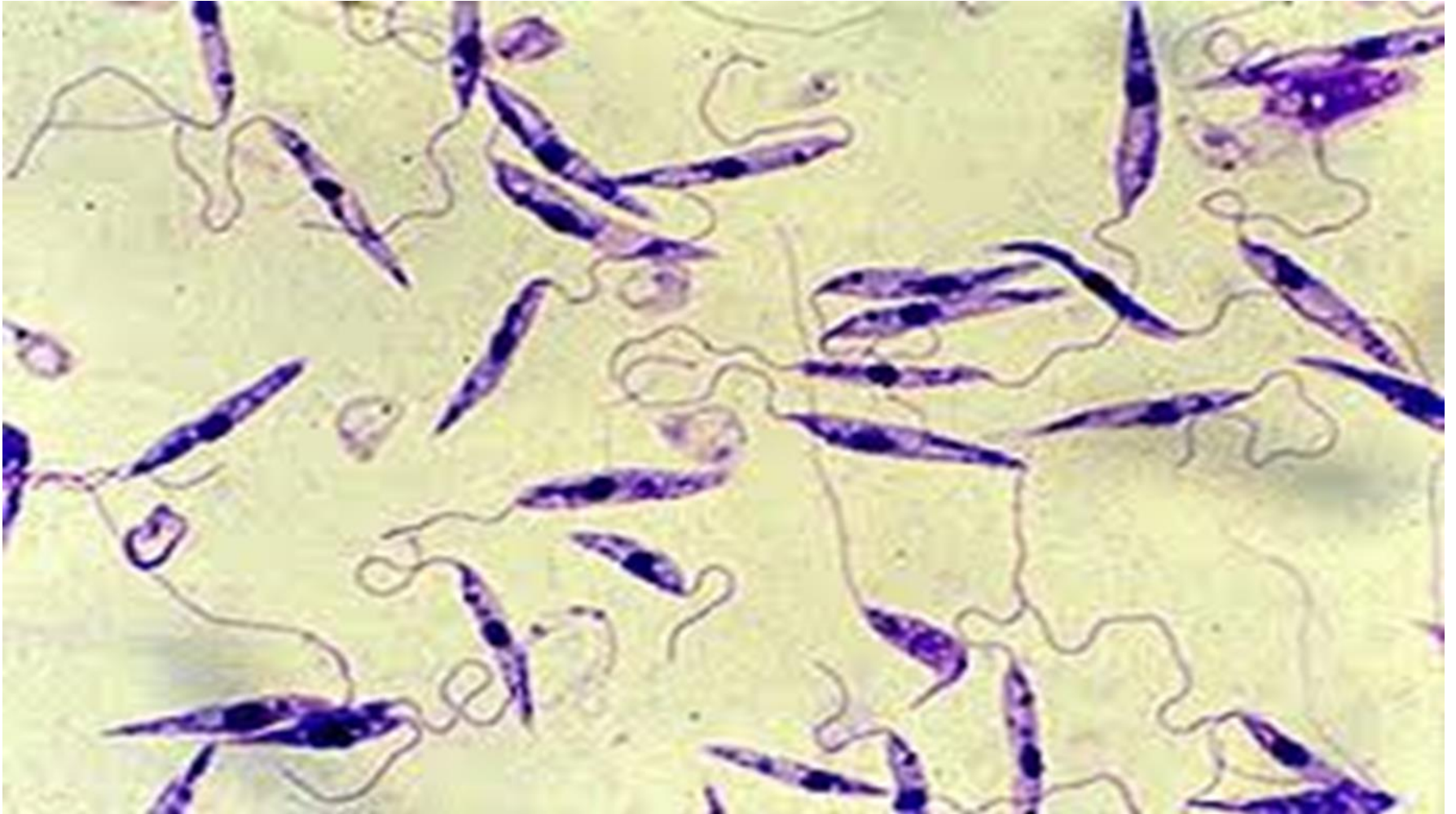
1-Through oral route (*Entamoeba histolytica*).



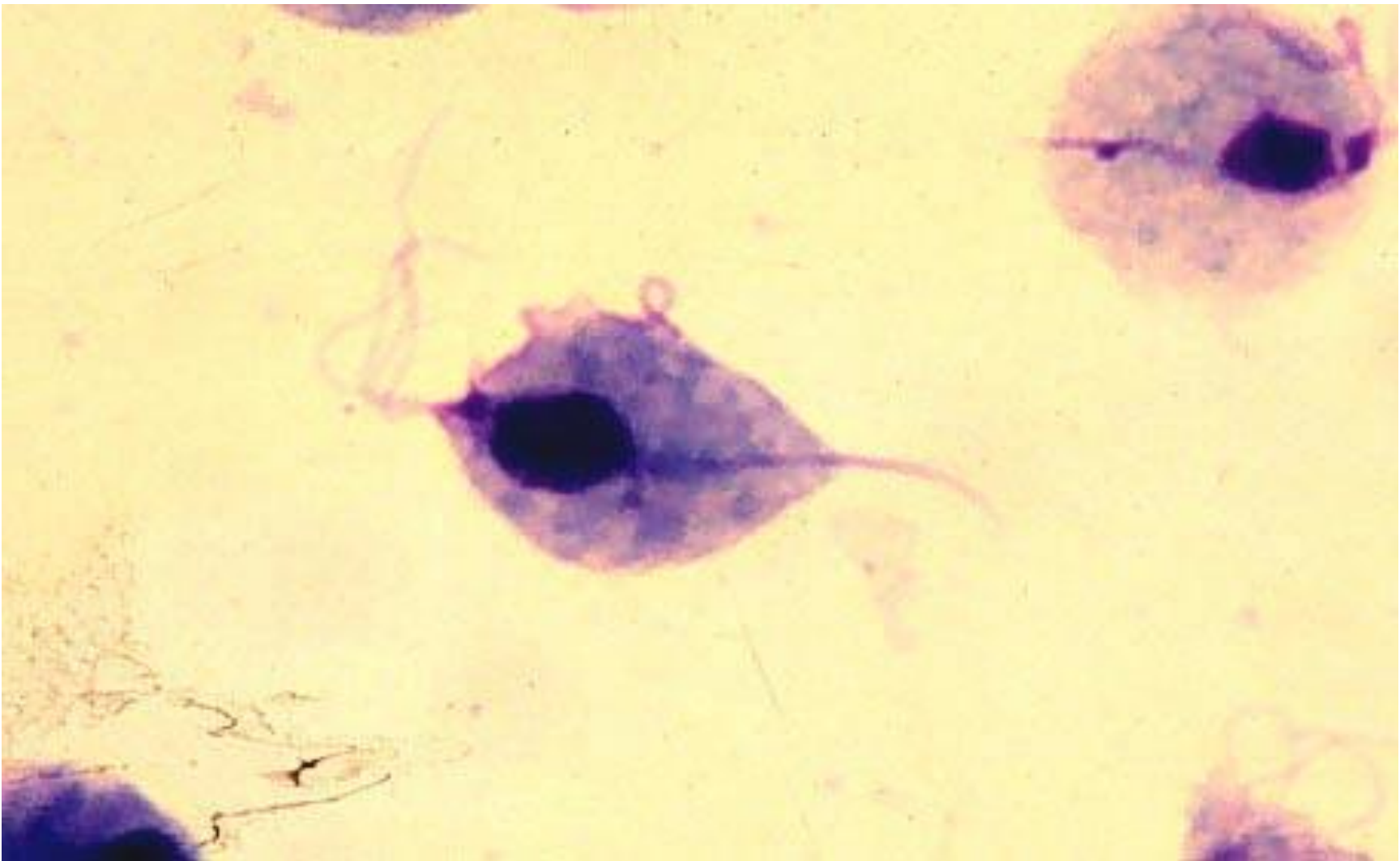
2-Skin penetration (*Schistosoma haematobium*)



3- Through Vectors (*Leishmania tropica*)



4-Sexual contact (*Trichomonas vaginalis*)



Types of parasites according to the nature of the host-parasite interactions and the environmental factors :

1- Obligatory parasite: Which is completely dependent on its host and can't survive without it
ex: *Entamoeba histolytica* .

2- Facultative parasite: That can change its life style between free-living in the environment and parasitic living according to the surrounding conditions (*Strongyloides stercoralis*).

3- Accidental parasite: Can affect unusual host
(*Toxocara canis*) a dog parasite in man.

4- Temporary parasite: that need the host only for feeding and then leave it ,(Bed bug) takes blood meal from human.

5- Opportunistic parasite: Which is able of producing disease in an immune deficient host (like AIDS patients and cancer patients).

In the immune competent host, it is found in a latent form (*Entamoeba gingivalis*).

6- Zoonotic parasite: that primarily infects animals and is transmittable to humans (*Fasciola hepatica*).

Types of Hosts :

Hosts are classified according to their role in the life cycle of the parasite into:

1- Definitive host (DH) or primary host: where the parasite attains sexual maturity (female of *Anopheles* mosquito is DH for *Plasmodium* parasites).

2- Intermediate host (IH) or secondary host: That contain larval stages of the parasite or in whom asexual reproduction occurs (man is IH of *Plasmodium* parasites).

3- Reservoir host (RH): where the infectious agent multiplies and/or develops, the host essential for keeping parasite when active transmission is not occur . (Animals such as pigs, dogs can harbor *Paragonimus westermani*, man is DH for this parasite)

4- Paratenic or transport host: that serve until the appropriate definitive host is reach ,the parasite can not undergo any development but remains alive and infective to the final host. Ex: house flies are common transport hosts for *Cryptosporidium* to the locations where parasites are more likely to infect animals.

Host-Parasite Symbiotic Relationships:

Symbiosis defined as "life together", (the two different organisms live in relation with one another).

There are at least three types of relationships based on whether the symbiont has beneficial, harmful, or no effects on the other.

1- Mutualism:

Is a relationship in which both different organisms of two different species benefit. Mutualism is usually obligatory, that one mutual cannot survive without the other.

Termites cannot digest cellulose in the wood, papers, cotton, and overcome that by harboring symbiotic flagellate protozoa, which live anaerobically in the termite hindgut and secrete enzymes cellulase that break down cellulose into a simple sugar (glucose)

2- Commensalism:

A symbiotic relationship between two organisms of different species in which one derives benefit without harming the other. Commensalism may be facultative, the commensal may not be required to participate in the relationship to survive.

Humans harbor several species of commensal protozoans, that colonize in the intestinal tract such as *Entamoeba dispar*, *Entamoeba hartmanni*, *Endolimax nana*, *Iodamoeba butschlii*.

3- Parasitism:

A relationship between two organisms of different species, in which parasite benefit from the relationship, and harm the host.

The pathogenic mechanism of parasitic infection varies according to species and quantity of parasites as well host response .

The damage caused by parasites can be either confined within the habitat of the parasite, or extend to other parts of the host.

The damages are commonly caused by :

- *mechanical injury.
- *capturing nutrition.
- *toxins secretion.
- *host anaphylaxis .
- *passage for other pathogens , which can invade the host.

Parasite differ from Parasitoid, which is organism whose larval development occurs within another organism's body, cause the death of the host, thus, the interaction between the parasitoid and the host is fundamentally different from true parasites and their host.