

# Parasitology

## General Introduction

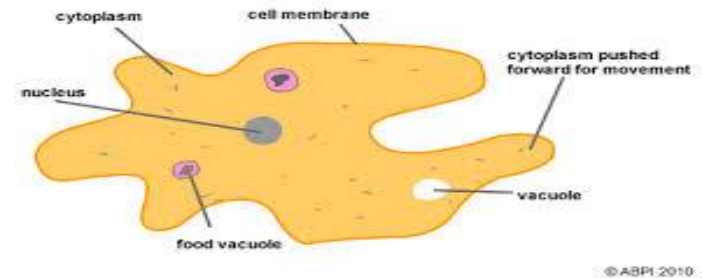
# Definition of a Parasite

- A parasite is a living organism which depends on a living host for its survival, shelter and nutrition.



# Classification of parasitology

- **Protozoa**: unicellular, single cell performs all vital functions, sexes and not separate, they show asexual reproduction.



- **Helminths**: Multicellular, Different systems to perform vital functions, Sexes may or may not be separate.



- **Vectors**: Mechanical/ Biological vectors



# General scheme of classification

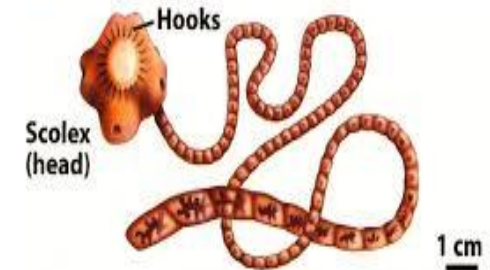
- Kingdom --- Phylum --- Class --- Order ---  
Family --- Genus --- Species.

# Types of Parasites

- **Ectoparasites:** (Infestation)  
Parasite lives on external surface.  
Eg: *Sarcoptes scabiei* which causes scabies.
- **Endoparasites:** (Infection) Parasite lives within the body of the host.  
Eg: All protozoans and Helminths.
- **Obligate Parasites:** Cannot exist without their host. Eg:  
*Plasmodium* sp causing Malaria

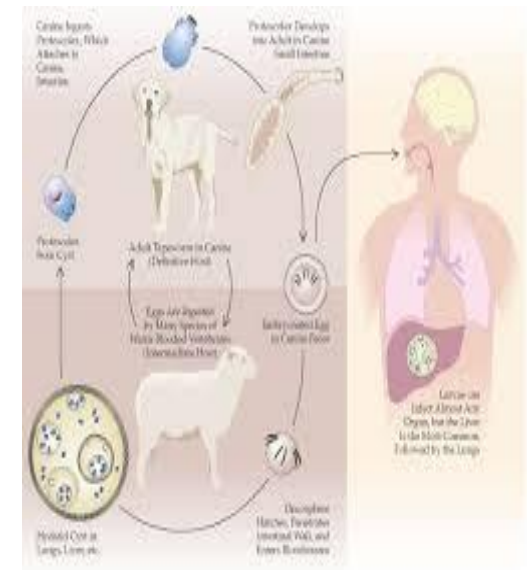


Tapeworms (Platyhelminthes) are endoparasites.



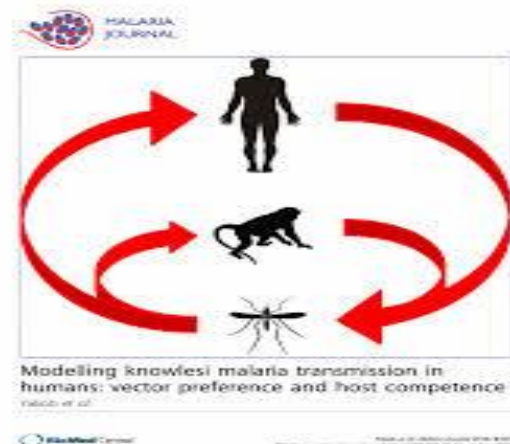
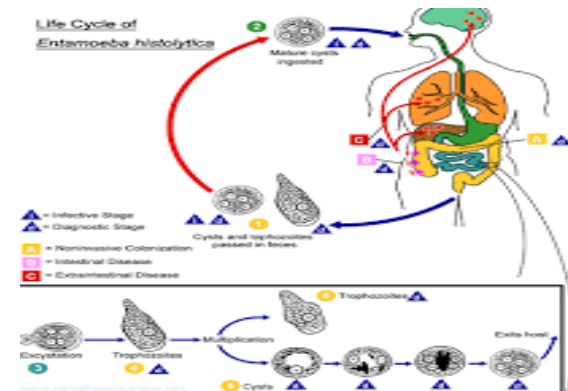
# Types of Parasites

- **Facultative parasites:** May live parasitic life in favourable host but free existence is also possible. Eg: *N.fowleri* can live freely in soil and water.
- **Accidental Parasites:** May infect an unusual host by accident. Eg: *E.granulosus*.
- **Aberrant Parasites:** Infect a host where it cannot survive. Eg: *Toxocara canis* infecting humans.



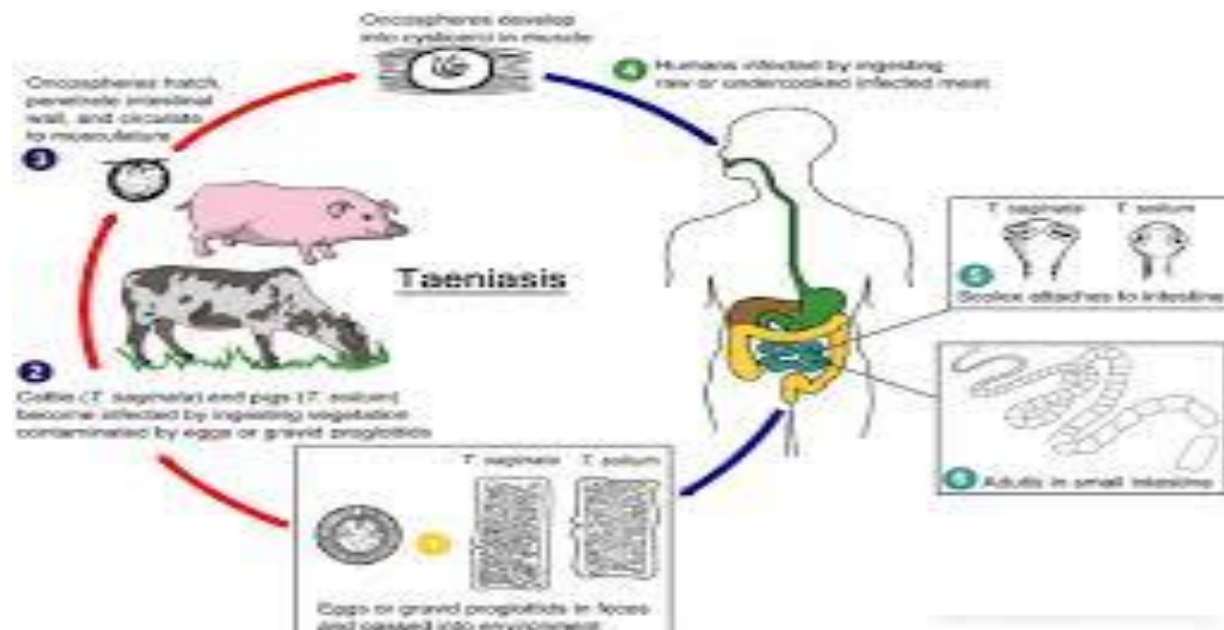
# Life cycle of a parasite

- **Direct life cycle:** only one species of host is required to complete its development.  
Eg: *E.histolytica*, *G.lamblia*
- **Indirect Life Cycle:** requires two or more species of host to complete its development.  
Eg: *W.bancrofti*, *Plasmodium* sp.



# Host

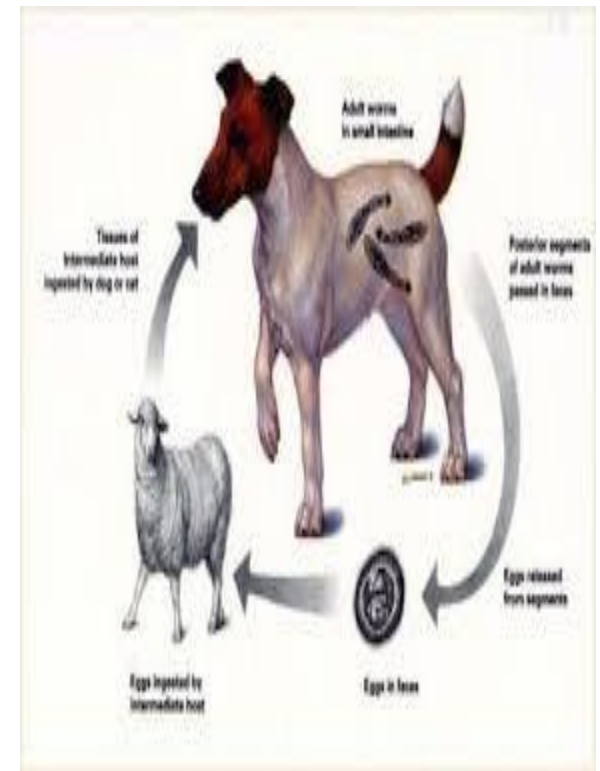
**Definition:** An organism that harbours the parasite and provides shelter and nourishment to it.





# HOST

- **Definitive Host:** which harbours adult forms of the parasite and in whom sexual reproduction takes place. Eg: Dogs in *E.granulosus* (Dogworm).
- **Intermediate Host:** which harbours larval forms of the parasite and in whom the parasites multiplies asexually. Eg: Sheep in *E.granulosus* (Dogworm)
- **Paratenic Host:** in which parasite only remains viable but does not undergo any development or multiplication. Eg: Housefly in amoebiasis.

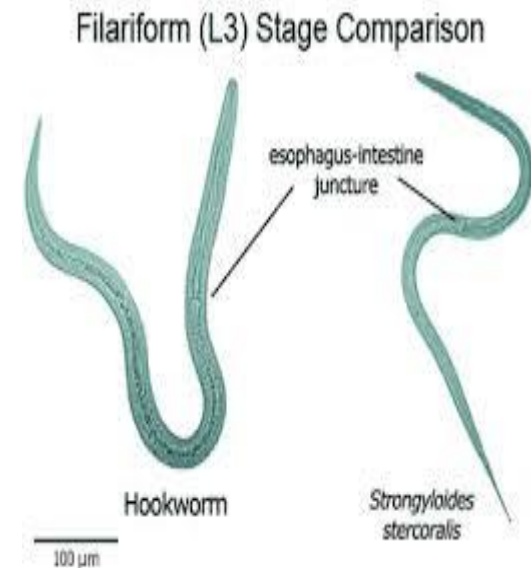


# Host- Parasite Relationship

- **Symbiosis:** Both the parasite and host help each other. None of them suffer any harm. Eg: Lactobacilli in human gut.
- **Commensalism:** Only parasite derives benefit without causing harm to the host. A commensal is capable of living independently. Eg: S.pneumoniae in human throat.
- **Parasitism:** Parasite derives benefit and the host suffers some injury. A parasite cannot live an independent life.

# Routes of Infection

- Ingestion
- Skin transmission- Direct
  1. Direct: Eg: Hookworm through soil
  2. Inoculation: Mosquito bite
- Congenital



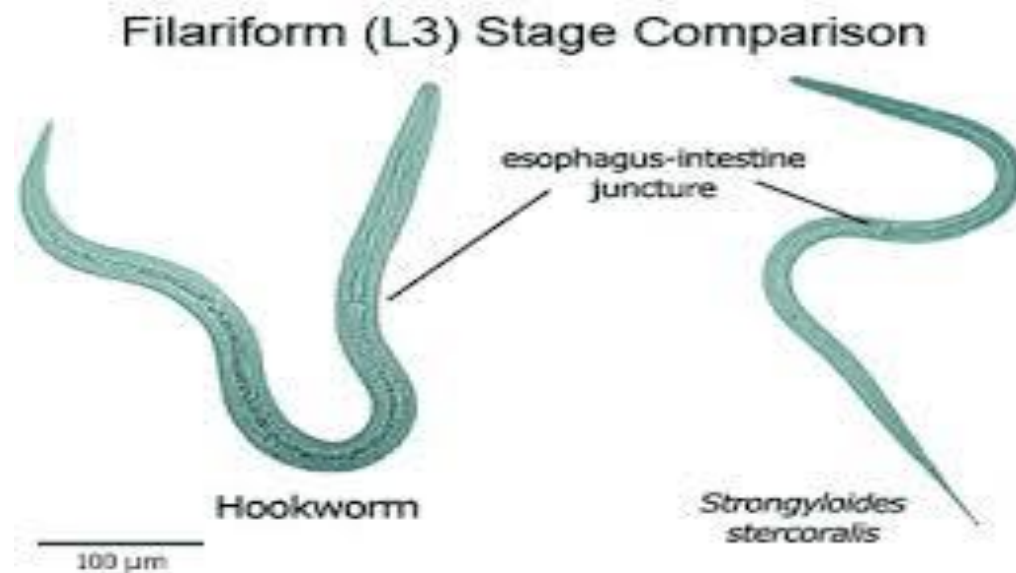
# Sources of Infection

- **Water and Food.** Egs: *E.histolytica*, *T.trichura*
- **Undercooked Meat.** Eg: pork containing *Cysticercus cellulosae*, beef containing *Cysticercus bovis*.
- **Crab:** Containing metacercarial forms of *P.westermani*.
- **Cyclops:** Larval forms of *D.medinensis*



# Skin transmission

- **Soil:** *A. duodenale*, *S. stercoralis* through soil containing filariform larva



## BY INSECTS:

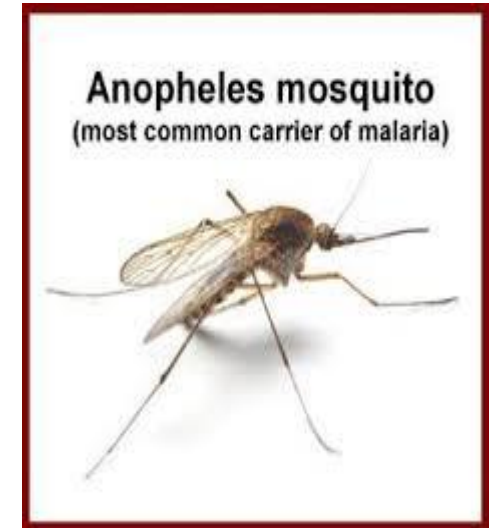
Plasmodium by mosquitoes and  
Leishmania by sandfly.

## Sexual contact:

Sexual Contact for T.vaginalis.

## CONGENITAL:

Toxoplasma gondii transmitted from  
mother to foetus.



# Pathogenicity

- **Trauma**: Eg: *A. duodenale* attaches to int wall. or *A. lumbricoides* causing intestinal obstruction
- **Lytic Necrosis**: *E. histolytica* produces histolysin which causing necrosis and sloughing of intestinal cells.
- **Allergic**: Hydatid fluid has anaphylactic properties. Secretions from dead filarial worms can also cause anaphylaxis.
- **Inflammatory reaction**: All parasites
- **Neoplasia**: *S. hematobium* can cause vesical carcinoma.



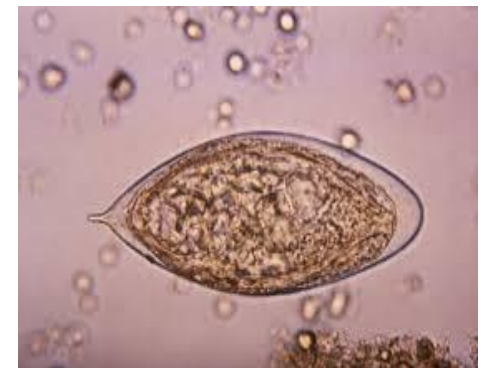
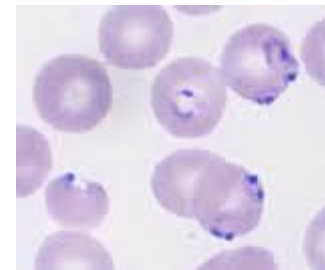
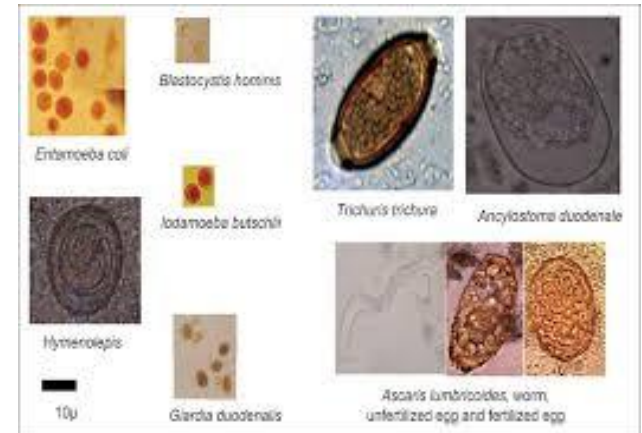
# Lab Diagnosis

- Direct demonstration of parasite.
- Culture
- Animal Inoculation
- Serological tests
- Skin tests
- Molecular methods



# Direct Examination

- **Stool examination:** Ova, cysts and trophozoite forms of *E.histolytica*, *A.lumbricoides*, *H.nana*, *A.duodenale*, *Cryptosporidium*, *Isosporidium* etc
- **Blood examination:** Thick and thin blood examination for malarial parasites, leishmania, trypanosoma, *Microfilaria* etc.
- **Urine examination:** *S.hematobium*, *W.bancrofti* in chylous urine.



# Direct Examination

- **Genital Specimens:** trophozoites of *T.vaginalis*
- **CSF:** *Acanthameba*, *Naegleria*
- **Sputum examination:** for *P.westermani*
- **Tissues:** Hydatid cysts due to *E.granulosus*



## CULTURE:

Parasites which can be cultured are *E.histolytica*,  
Leishmania, Giardia

## ANIMAL INOCULATION:

For *T.gondii* and *Babesia* sp

## SEROLOGICAL TESTS:

ELISA, CFT, IHA, IFA, RMA

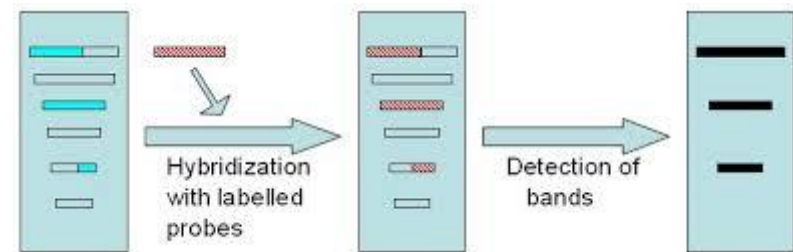
## SKIN TESTS:

Casoni test for hydatid cyst



## MOLECULAR TESTS:

DNA probes and PCR.



# Important questions:

## SAQs

1. Classification of parasites
2. Types of parasites
3. Types of Hosts
4. Sources of infection
5. Lab Diagnosis of parasites.