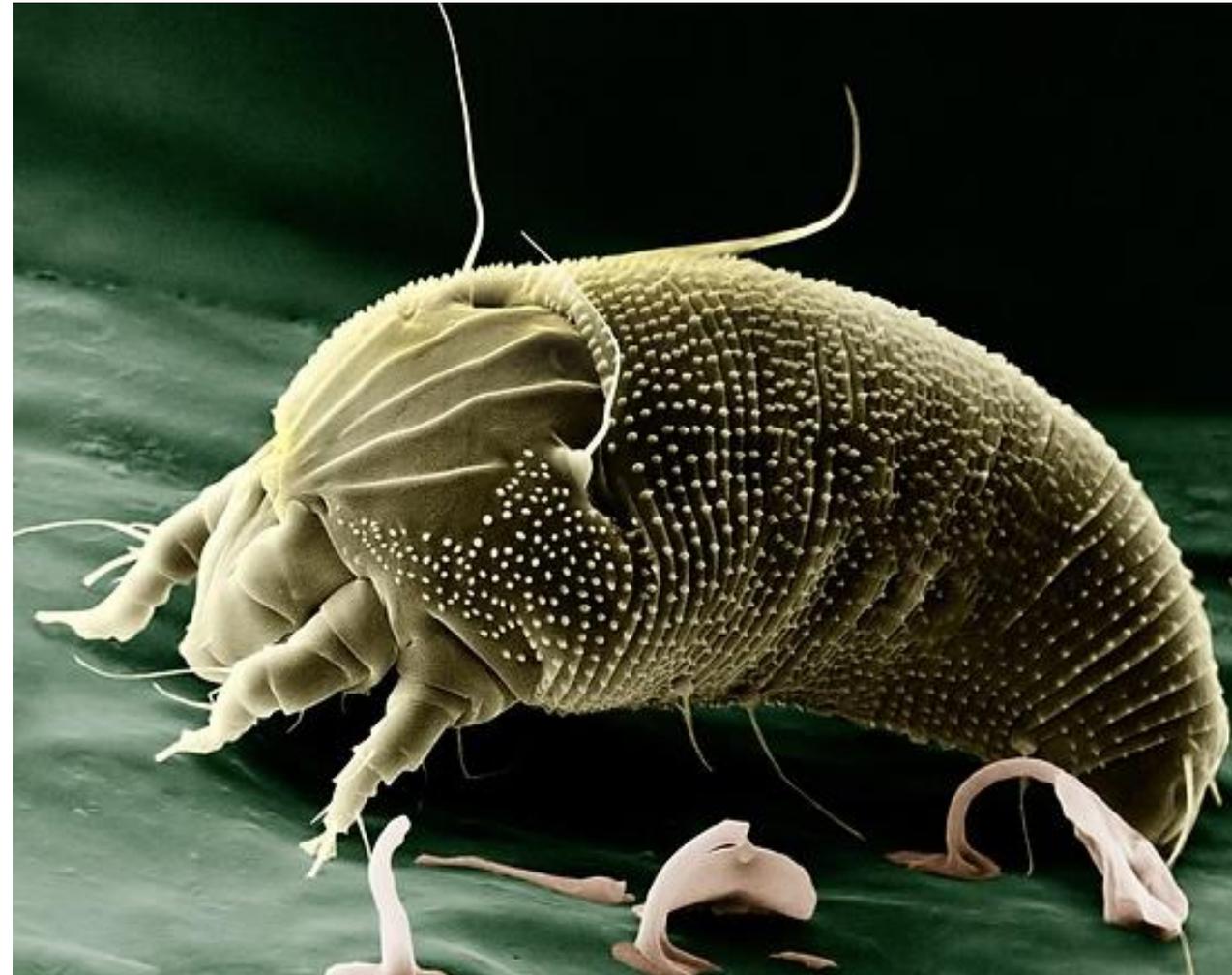


Advanced Parasitology

(ZOO 510)



Course

- Course title: **Advanced Parasitology**
- Credit hours: **3 (2+1)**
- Teacher name: **Dr Rewaida Abdel-Hakim**
- Office: 105 (3rd floor)
- E-mail : rewaida@sci.cu.edu.eg

**25% absence from both lectures and labs (approximately 10 hrs.),
student will be deprived from the course.**

Evaluation and Assessment

	Activities	%
1	First midterm exam	15%
2	Second midterm exam	15%
3	Practical	30%
4	Final Examination	40%
	Total	100%



First mid- term exam : Thursday **10/10/2018**
(29-1-1440 H)

Second mid-term exam : Thursday **7/11/2018**
(27-2-1440H)

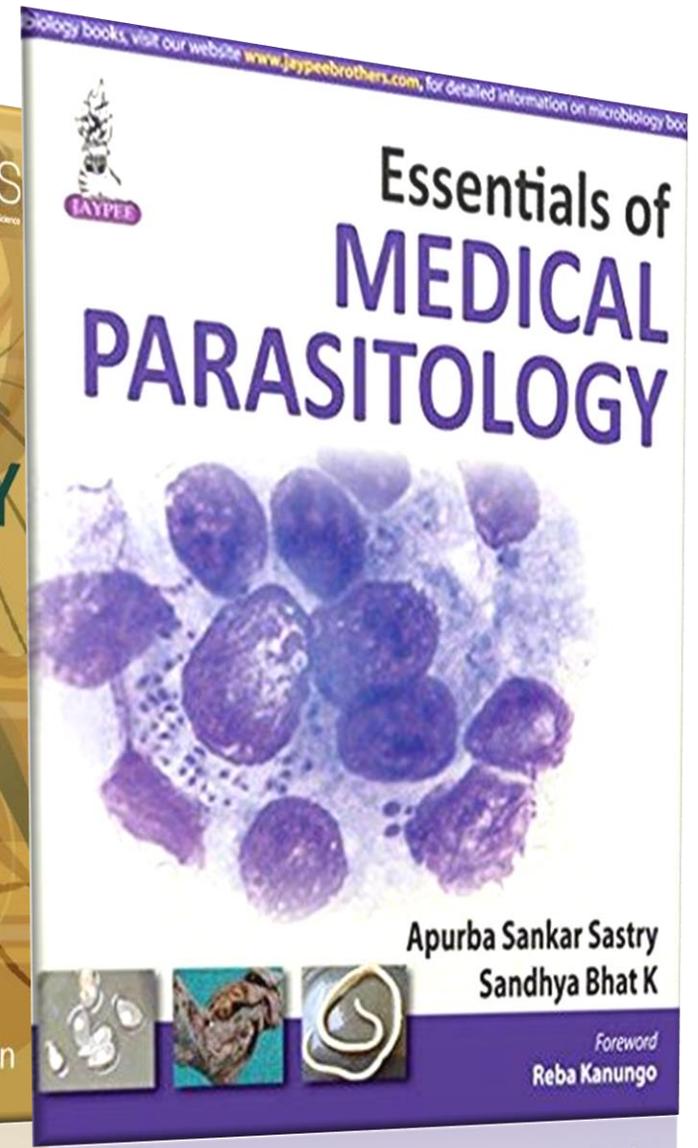
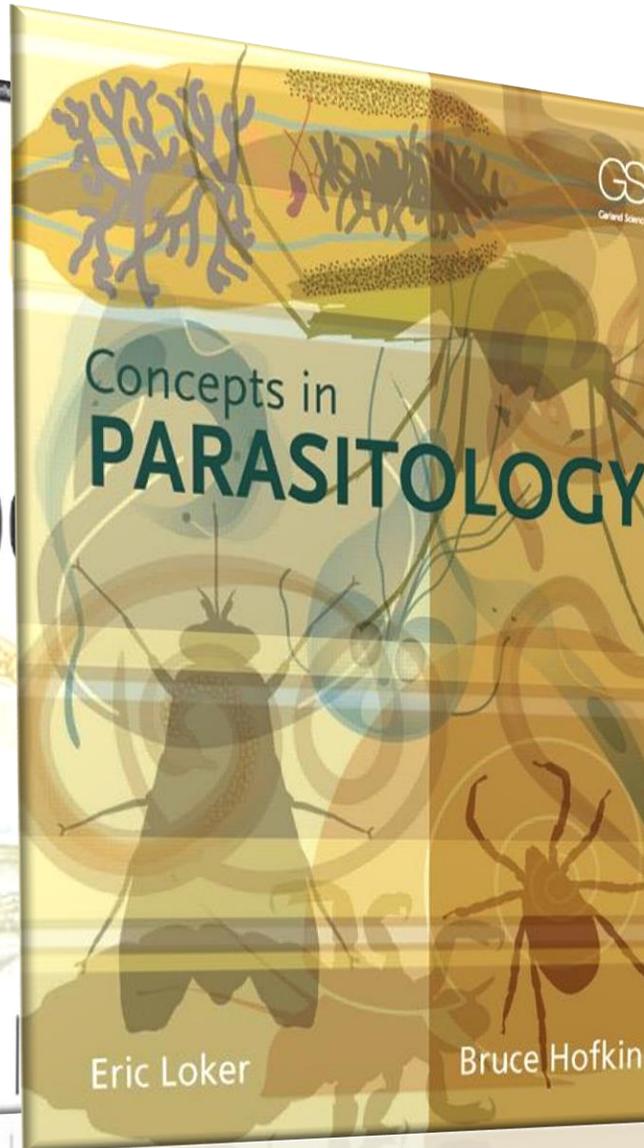
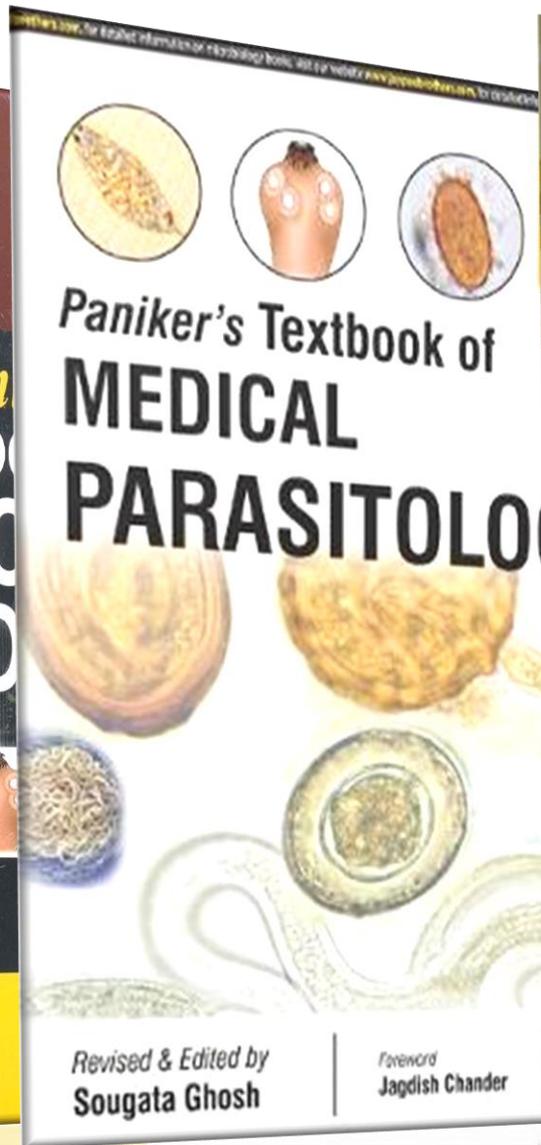
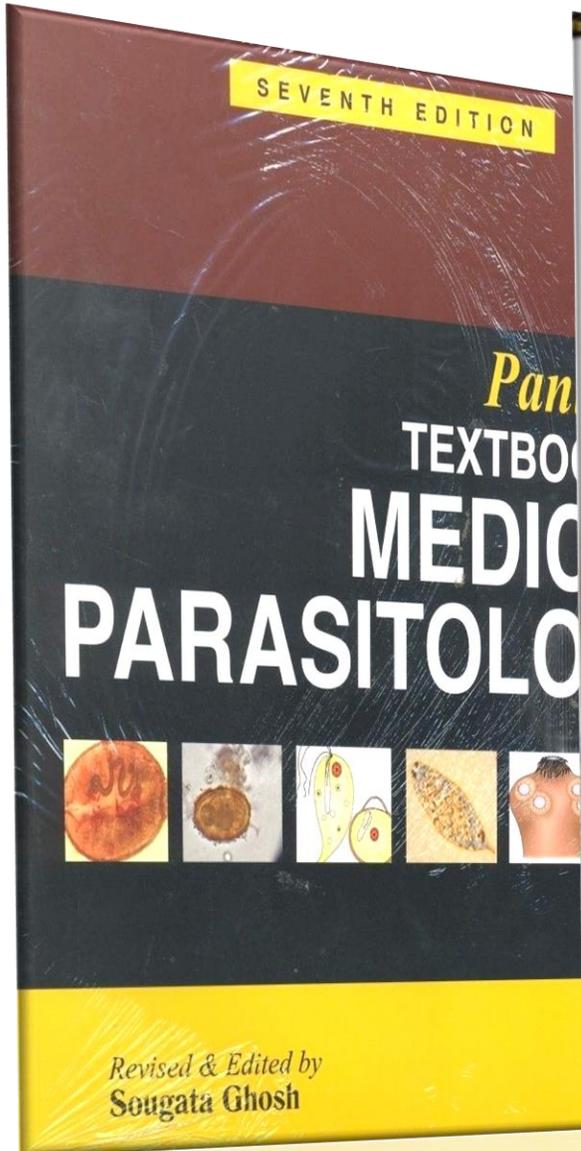
Time : (8 – 9)



This course is based on providing details about:

the concept of parasitism; comparison of the origin of parasitism, predation, and other related animal associations; economic and social importance of parasites to be highlighted through the studies of specific examples of parasitic protozoa, helminthes and arthropods; methods of treatment of parasitic infections; and control of parasitic infections.

REFERENCES





LECTURE (1)

Introduction of Parasitology



Lecture contents

1 **Symbiosis**

2 **Types of symbiosis**

3 **Major differences from Parasitism**

4 **Types of Parasites and hosts**

5 **Vector transmission**

6 **Life Cycles**

7 **Sources of Parasitic Infections**

SYMBIOSIS

It is a relationship between two or more organisms living closely **TOGETHER** with some form of feeding relationship involved.

There are various types of symbiosis:

A- Phoresis (“traveling together” or “to carry”):

A smaller organism, termed the **PHORONT**, is carried mechanically by the other, termed the **HOST**. For instance, bacteria, fungus, cysts, or eggs on insect legs or even passively within an arthropod gut.

B- Commensalism:

When one symbiont, the **COMMENSAL**, benefits and the other animal is neither helped nor harmed. For instance, *Entamoeba gingivalis* in mouth to some degree.

C- Mutualism:

Each member, a **MUTUALIST**, depends upon the other, obligatory or facultative. For instance, flagellates produce cellulase in gut of termites; ciliates in ruminants.

D- Predation:

Where one member, **PREDATOR**, benefits and a smaller organism, **PREY**, is harmed; usually eaten). For instance, cats and mice.

E- Parasitism:

Where one member, **PARASITE**, lives in or on another organism, **HOST**, at the expense of that organism.

DIFFERENCES BETWEEN PARASITISM AND PREDATION

Parasitism	Predation
Parasite host relationship is VERY SPECIFIC (host specificity) is more stringent. Each parasite is often associated with a definite host species	No specific prey predator relationship or predator may feed on many prey species WITHOUT SPECIFICITY
Parasitism is an intimate involving METABOLIC DEPENDENCY of the parasite on the host	NO METABOLIC DEPENDENCY in prey predator relationship
Parasite is generally SMALLER than the host	Predator is generally LARGER than the prey
Parasites progression inside the hosts is SLOW AND STEADY	Predator is VERY ACTIVE and often intense PHYSICAL EFFORT is needed to catch the prey
Usually parasite DO NOT KILL the host	Prey is IMMEDIATELY KILLED and eaten by the predator
OFTEN parasite COMPLETES its life cycle inside the host or hosts	Predator DOES NOT REQUIRE prey for completion of its life cycle
<p style="text-align: center;">Examples:</p> <p style="text-align: center;">Lice on humans (ectoparasites) Tapeworms in intestines of cows (endoparasite)</p>	<p style="text-align: center;">Examples:</p> <p style="text-align: center;">Lion and Zebra Bear and Fish</p>

MAJOR DIFFERENCES FROM PARASITISM

Parasitoidism

Parasitoids are organisms whose larval development occurs in or out of another organism's body resulting in the death of the host. The interaction between parasitoid and the host is fundamentally different from true parasites and their hosts and shares some characteristics with predation.



MAJOR DIFFERENCES FROM PARASITISM

Hyperparasitism

When an organism which parasitizes another parasite are known Hyperparasite and this phenomenon are termed Hyperparasitism



TYPES OF PARASITES

They are categorized on the following basis:

- 1) On the basis of **Generation**
- 2) On the basis of **Pathogenicity**
- 3) On the basis of **Localization**
- 4) On the basis of **Dependency**
- 5) On the basis of **Amount of time spent**

TYPES OF PARASITES

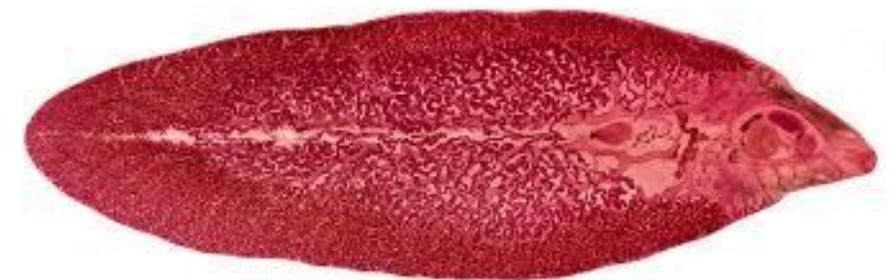
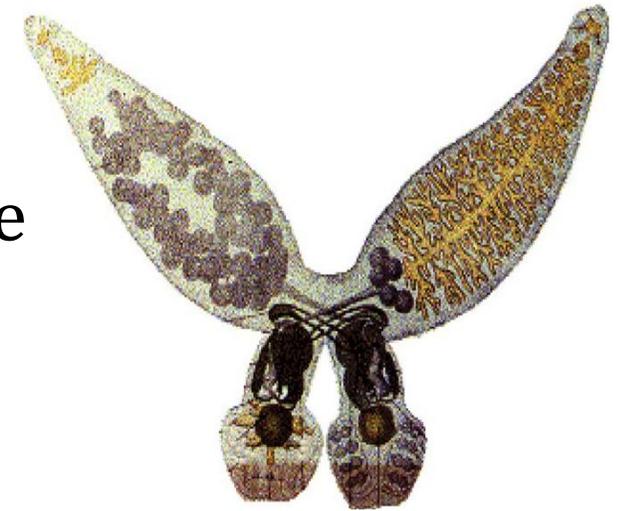
1- Generation

1) Monogenetic Parasite- These require hosts of only one species to complete their life spon.

e.g.-*Ancylostoma duodenale*, *Diplozoon paradoxum*

1) Digenetic Parasite- These require hosts of two different species to complete their life spon.

e.g.-*Leishmania donovani*, *Fasciola hepatica*



TYPES OF PARASITES

2- Pathogenicity

- 1) Pathogenic Parasite-** Those parasite which are caused disease and act as a pathogen called pathogenic parasite.
e.g.-*Taenia solium* (caused taeniasis in Man)
- 1) Nonpathogenic Parasite-** They are not cause any disease in the host.
e.g.-*Taenia hominis* (without causing disease in Man)
- 2) Intermittent Parasite-** They are not constantly associated with the host. They obtain nourishment from host at time to time.
e.g.-*Bed bugs* (Suck blood meal from Man)

TYPES OF PARASITES

3- Localization



Endoparasite

Parasites that live within the body of their host (intestinal tract, liver, etc.) including all protozoans, parasitic worms (Tapeworms, flukes).

Ectoparasite

Parasites that are attached to (or lives outside) the outer surfaces of their hosts including (Mosquitoes, leeches, ticks, fleas).

Intercellular parasites

inhabiting spaces in the host's body
Ex. *Trypanosoma*

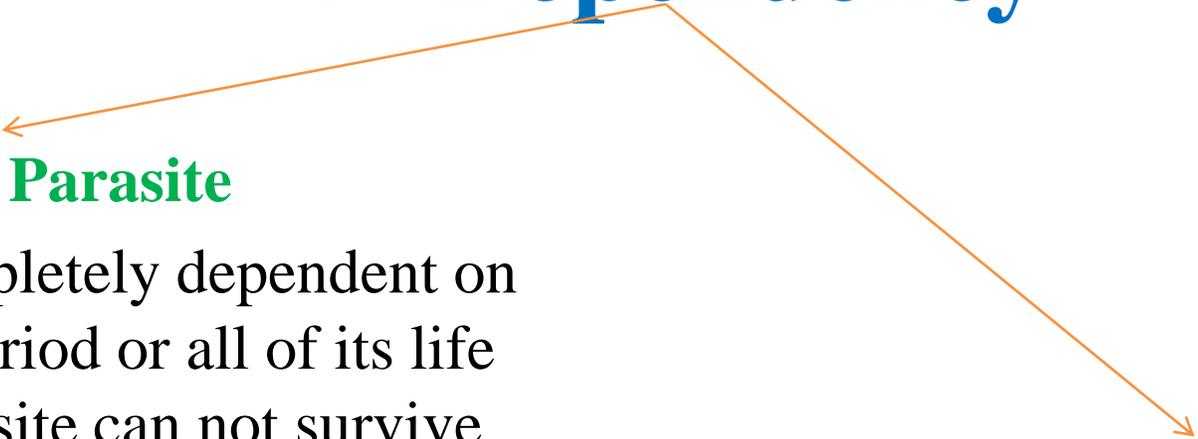
Intracellular parasites

inhabiting cells in the host's body
Ex. *Plasmodium*



TYPES OF PARASITES

4- Dependency



Obligate Parasite

An organism is completely dependent on the host during a period or all of its life cycle, i.e: the parasite can not survive without a host to complete its life cycle.

Facultative Parasite

An organism that does not absolutely depend on the parasitic way of life, but is capable of adapting to it if placed in such a relationship

TYPES OF PARASITES

5- Amount of time spent

❑ Permanent Parasite

- Remains on or in the body of the host for its entire life.
- Usually endoparasites.

❑ Temporary Parasite

- Spends only a short time on a host (visit the host only at interval).
- Usually ectoparasites.

ABNORMAL PARASITES FROM ABNORMAL HOSTS

Aberrant Parasites

Sometime the parasite happen to reach a place which is not its usual site of localization. Such parasite which fails to reach its normal destination is termed as aberrant or wandering parasite. For instance, *Ascaris*.

Incidental Parasites

Parasites of lower form of animal and may eventually be transferred to humans due to peculiar habit of humans. For instance, *Diphyllobothrium caninum* from dogs.

TYPES OF HOSTS

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graph TD; A[TYPES OF HOSTS] --> B[Definitive host (primary host)]; A --> C[Intermediate host (secondary host)]; A --> D[Paratenic or transport hosts]; A --> E[Accidental hosts]; A --> F[Vector];
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Definitive host (primary host):

It is the host in which the parasite become sexually mature (with adult stage or sexually reproducing forms of parasite).

Intermediate host (secondary host):

Is a temporary environment for the parasite, but is necessary for the parasite to complete its life cycle

Paratenic or transport hosts:

a potential or substitute intermediate host that serves until appropriate definitive host is reached, and no development occurs

Accidental hosts:

A host in which parasite is not commonly found, nevertheless it is one suitable for parasite's development.

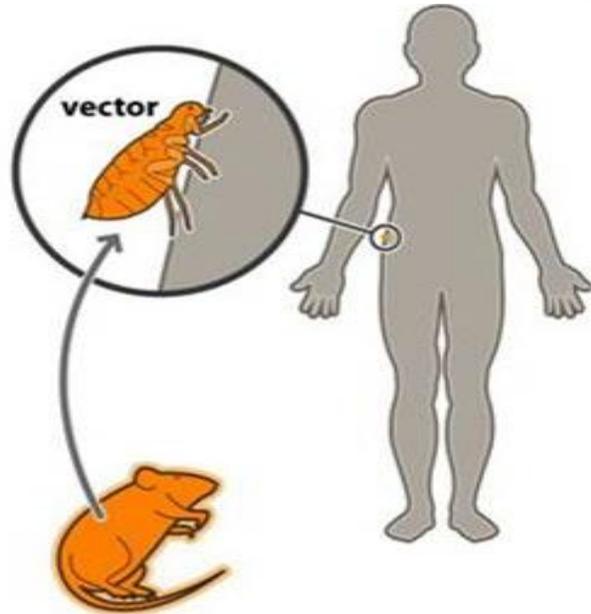
Vector :

Any organisms (typically arthropods) that serve as intermediate hosts as well as carriers for protozoans and other small parasites

VECTOR TRANSMISSION

Biological transmission

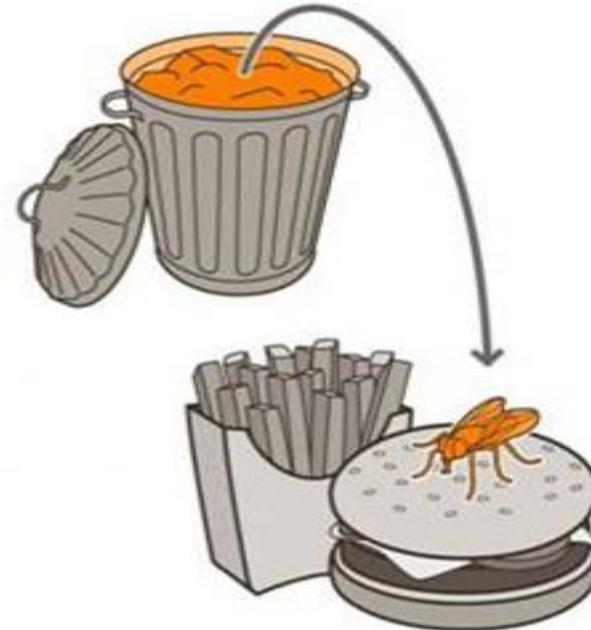
Pathogens are within the vector and transmission to the host is through a bite



plague (flea), malaria (mosquito),
yellow fever (mosquito)
Rocky Mountain spotted fever (tick),
Lyme disease (tick)

Mechanical transmission

Pathogens are on vector's body parts and are passively brushed off and onto host



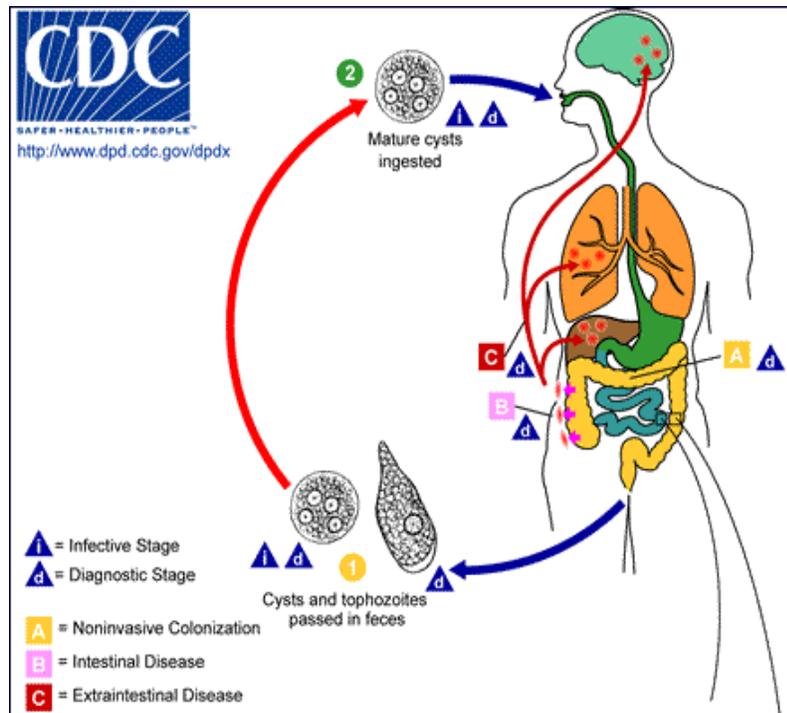
E. coli diarrhea,
salmonellosis

TYPES OF LIFE CYCLES

Direct life cycle

Involves only one host species to complete the life cycle.

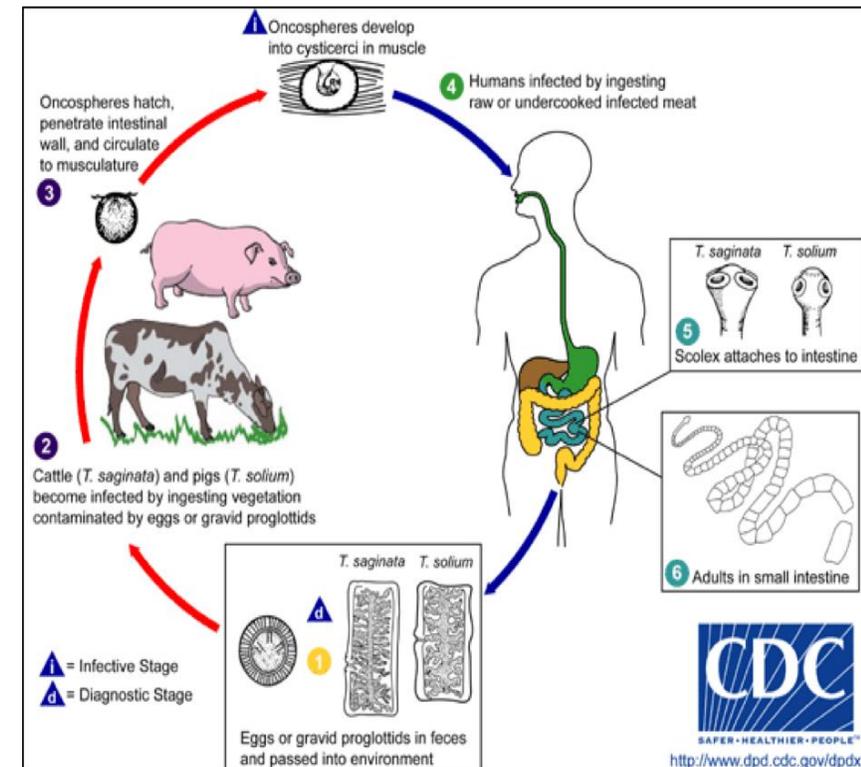
Transmitted from one host to another through the air, or in contaminated food or water.



Indirect life cycle

Involves more than one different host species mainly two to complete the life cycle.

An invertebrate (intermediate host) that transmits a parasite from one host to another.



SOURCE OF PARASITIC INFECTION

Parasitic infections originate from following sources:

1- Contaminated soil and water

Soil polluted with human excreta acts as a source of infection with:

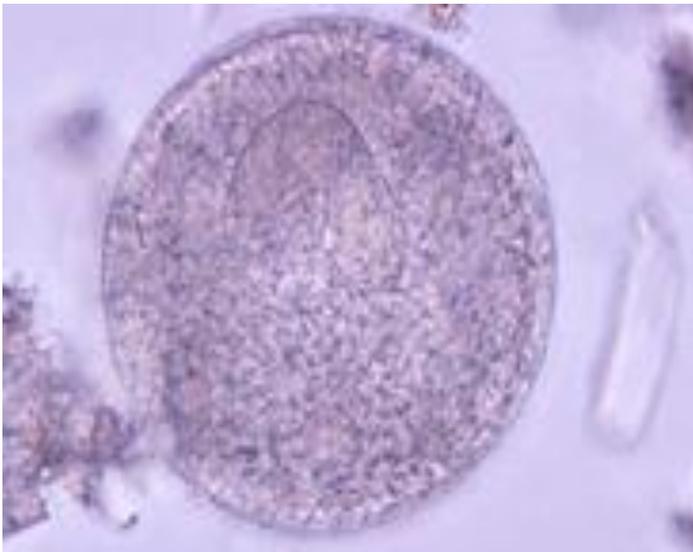
- *Ascaris lumbricoides*
- *Trichuris trichiura*
- *Ancylostoma duodenale*
- *Nector americanus*
- *Strongyloides stercoralis*

Before acquiring infectivity for man, eggs of these parasites undergo certain development in the soil.

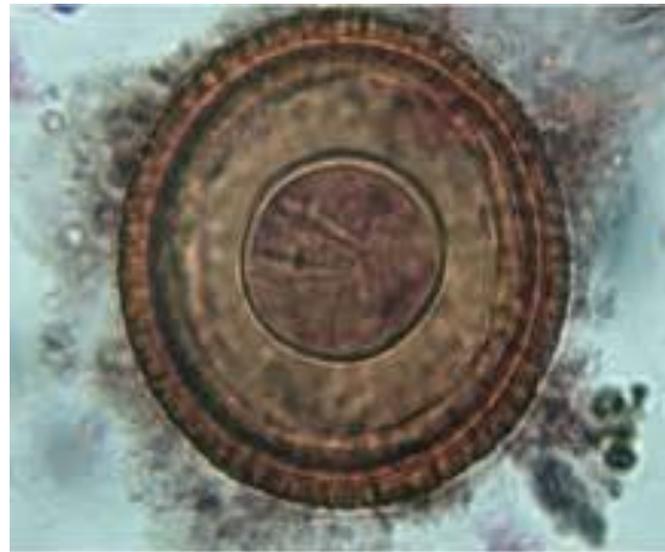
These are known as soil transmitted helminths

Water polluted with human excreta may contain

Viable cysts of
Entamoeba histolytica
Giardia lamblia
Balantidium coli



Eggs of
Taenia solium
Hymenolepis nana



Infective cercarial stage of
Schistosoma haematobium
Schistosoma mansoni
Schistosoma japonicum



2- Freshwater fishes

Constitute the source of *Diphyllobothrium latum* and *Clonorchis sinensis*.

3- Crab and crayfishes: Are the sources of *Paragonimus westermani*.

4- Raw or undercooked pork

Is the source of *Trichinella spiralis*, *Taenia solium*, *Fasciola hepatica*, *Taenia saginata*, and *Sarcocystis suihominis*.

5- Raw or undercooked beef: Is the source of *Taenia saginata*, *Toxoplasma gondii*, and *Sarcocystis hominis*.

6- Watercress: Is the source of *Fasciola hepatica*.

7- Blood-sucking insects

Transmit *Plasmodium* spp., *Wuchereria bancrofti*, *Brugia malayi*, *Onchocerca volvulus*, *Trypanosome brucei*, *Trypanosome cruzi*, *Leishmania* spp. and *Babesia* spp.

8- Housefly (mechanical carrier): Is the source of *Entamoeba histolytica*

9- Dog

Is the source of *Echinococcus granulosus* and *Toxocara canis* (Visceral larva migrans)

10- Cat: Is the source of *Toxoplasma gondii*

11- Man: Is the source of *Entamoeba histolytica*, *Enterobius vermicularis*, and *Hymenolepis nana*

12- Autoinfection

May occur with *Entamoeba vermicularis* and *Strongyloides stercoralis*, leading to hyperinfection.

7- Sexual intercourse: Is the source of *Trichomonas vaginalis*.

8- Inhalation of dust: Carrying the infective stage of parasite (*Enterobius ova*).

10- Congenital from mother to fetus.

Thank you