

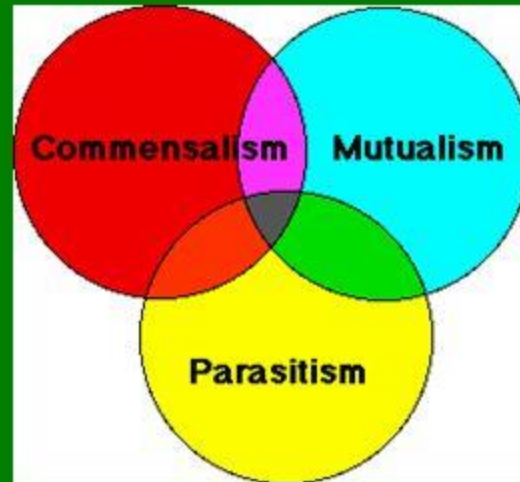
Introduction to Parasitology

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Symbiosis



A relationship where two organisms (of different species) live together.

Symbiotic relationship may be

- **Commensalism:** Where an organism (^{لِستفيد} commensal) is dependent on another (^{لايتفرد} host) but does not harm it.
- **Mutualism:** Where shared benefits are present but both organisms can live apart.
- **Parasitism:** Where one benefits (parasite) while the other is harmed (host).

INTERACTION	TYPE OF SYMBIOSIS
 <p data-bbox="266 521 479 556">Benefits</p> <p data-bbox="730 521 942 556">Benefits</p>	<p data-bbox="1304 335 1613 371">Mutualism</p> <p data-bbox="1232 392 1680 428">Species A benefits</p> <p data-bbox="1232 435 1680 471">Species B benefits</p>
 <p data-bbox="266 849 479 885">Benefits</p> <p data-bbox="695 849 975 885">Unaffected</p>	<p data-bbox="1226 671 1680 706">Commensalism</p> <p data-bbox="1232 728 1671 763">Species A benefits</p> <p data-bbox="1197 771 1709 806">Species B unaffected</p>
 <p data-bbox="266 1178 479 1213">Benefits</p> <p data-bbox="734 1178 937 1213">Harmed</p>	<p data-bbox="1294 999 1613 1035">Parasitism</p> <p data-bbox="1232 1056 1671 1092">Species A benefits</p> <p data-bbox="1232 1099 1671 1135">Species B harmed</p>

Medical Parasitology is the science
studying the parasites that infect
the humans.

Terms used in Parasitology

❖ Parasite:

- Is an organism, which is dependent on another organism (**host**) for its survival and causes harm to it.

❖ Host:

- Is a living organism that harbours the parasite.

Types of the parasites according to their **location** in the host

- **Ectoparasite:** A parasite that lives on the surface of the host (infestation).
- **Endoparasite:** A parasite that lives inside the body of its host (infection) either intracellular or extracellular. → as in the blood.

Types of the parasites according to their relationship with the host

- **Obligatory parasite:** A parasite that is completely dependent upon a host.
- **Facultative parasite:** A parasite that is capable of living both freely and as a parasite.
- **Accidental (Incidental) parasite:** A parasite found in other host different from its normal host.

* usually live in host but can infect other its normal host → accidental host
and we call the parasite → accidental parasite.

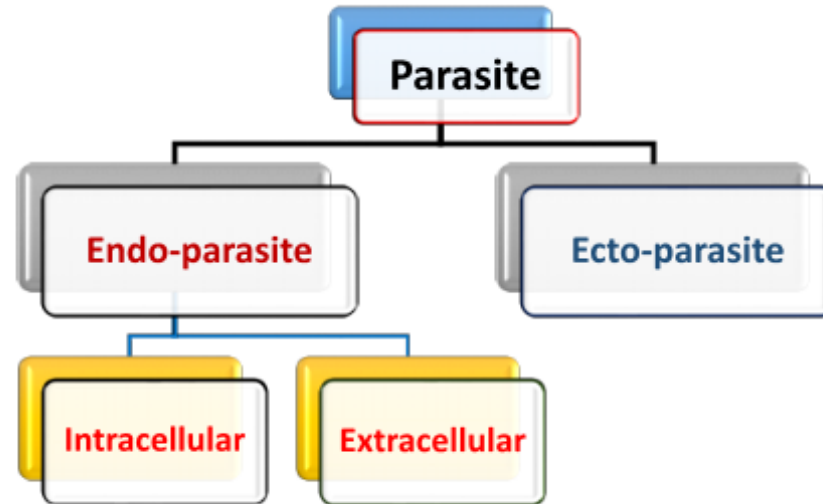
Types of the parasites according to their **relationship** with the host

- **Permanent parasite:** A parasite that spends its life cycle on or in the body of its host.
- **Temporary or Intermittent parasite:** A parasite that visits its host only for a short period of time for its meal.

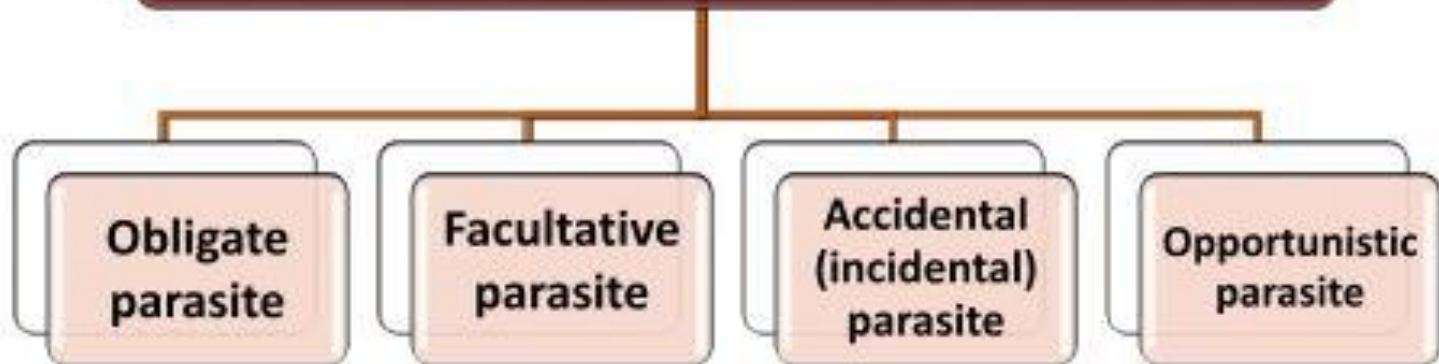
Types of the parasites according to their **relationship** with the host

- **Opportunistic parasite:** A parasite that causes disease only in immunodeficient patients (AIDS, cancer patients), while in immunocompetent individuals, the parasite may exist in a latent form producing no or mild symptoms.

PARASITES are classified according to their **LOCATION** in the host into:



PARASITES are classified according to their **RELATIONSHIP** to the host into:



Types of the hosts

- **Definitive host (D.H):** It is the host which harbours the **mature (adult) stage** of the parasite or in which sexual reproduction of the parasite takes place.

- **Reservoir host (R.H):** It is an animal that harbours the **mature (adult) stage of the parasite** as in human. It acts also as a source of infection to man and maintains the **parasite in nature.**

* when adult stage parasite live in man and some types of animal we call man → definitive host and the animal → reservoir host

* إنسان في حالة adult parasite للإنسان، والحيوان ← animal ← definitive host للإنسان، والحيوان → reservoir host. إنسان في حالة adult parasite للإنسان، والحيوان ← animal ← definitive host للإنسان، والحيوان → reservoir host.

Types of the hosts

- **Intermediate host (I.H):** It is the host which harbours the **immature (larval) stage** of the parasite or in which **non-sexual** reproduction of the parasite takes place
- **Complete host:** which acts as both definitive and intermediate host. *host live in it immature & adult stage of parasite.*
- **Vector:** An arthropod that carry the parasite to the host

Kinds of hosts



Main Kinds

Definitive Host

Intermediate Host



Other Hosts

Reservoir Host

Accidental Hosts

Complete Host

Vector



❖ **Infective stage (I.S):** The stage by which the infection takes place.

❖ **Diagnostic stage (D.S):** The stage by which we can diagnose the parasitic infection (disease).

❖ **Habitat:** The natural site or location where the parasite lives.

* تحديد مواقع parasite داخل host تحديد " مثلًا في skin , liver ...

شخص حامل للمرض.

❖ **Carrier:** A host in a state of equilibrium with parasite without or with minimal symptoms of the disease, but he is infective to others.

* asymptomatic patient but can transfer

the disease to another human.

So we should give him treatment.

❖ **Zoonosis:** Transmission of an infection from animal to man either directly or indirectly via intermediate host.

↳ From animal to man.

zoonosis ↓

* if the animal has a role in the life cycle of parasite → we call it zoonotic

Classification of Medical Parasitology

Medical Parasitology is classified into

Medical helminthology

↳ multicellular

Deals with parasitic worms

1-Phylum :
Platyhelminthes
(flat worms)

↓ مسطحة مثل شكل الورقة
No lumen/No body cavity

➤ Class: Trematoda
↳ consist of one segment
➤ Class: Cestoidea
↳ multiple segment

2-Phylum :
Nemathelminthes
(round worms)

↓ مثل الـ شوازية
has body cavity & lumen.

➤ Class: Nematoda

Medical protozoology

Deals with unicellular parasites

↓ classified according to
origin of locomotion

مستطوية العرجة

1-Class: Rhizopoda:

(move by pseudopodia)

2- Class: Ciliata

(move by cilia)

3-Class: Zoomastigophora

(move by flagellae)

4-Class: Sporozoa

(move by gliding movement)

مثل الزحف



Trematoda

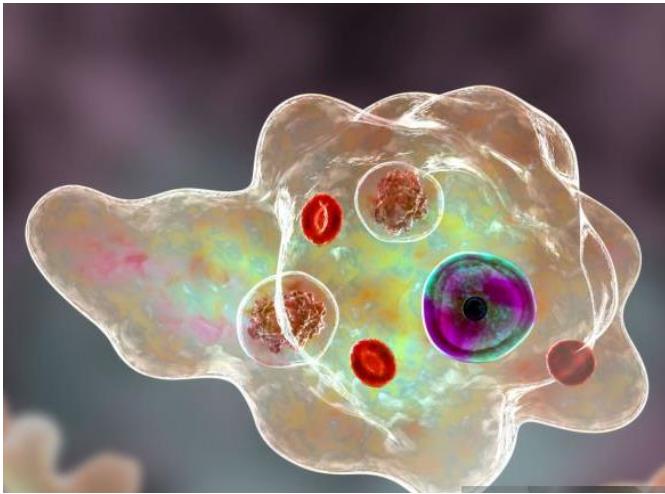


Cestoda

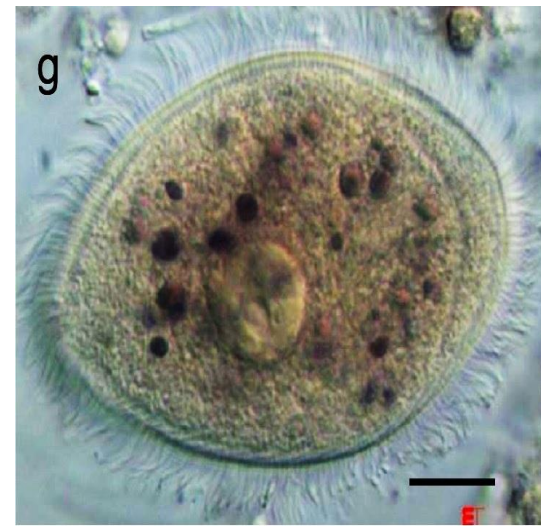


Nematoda

**Helminthology
worms**



Rhizopoda



Ciliata



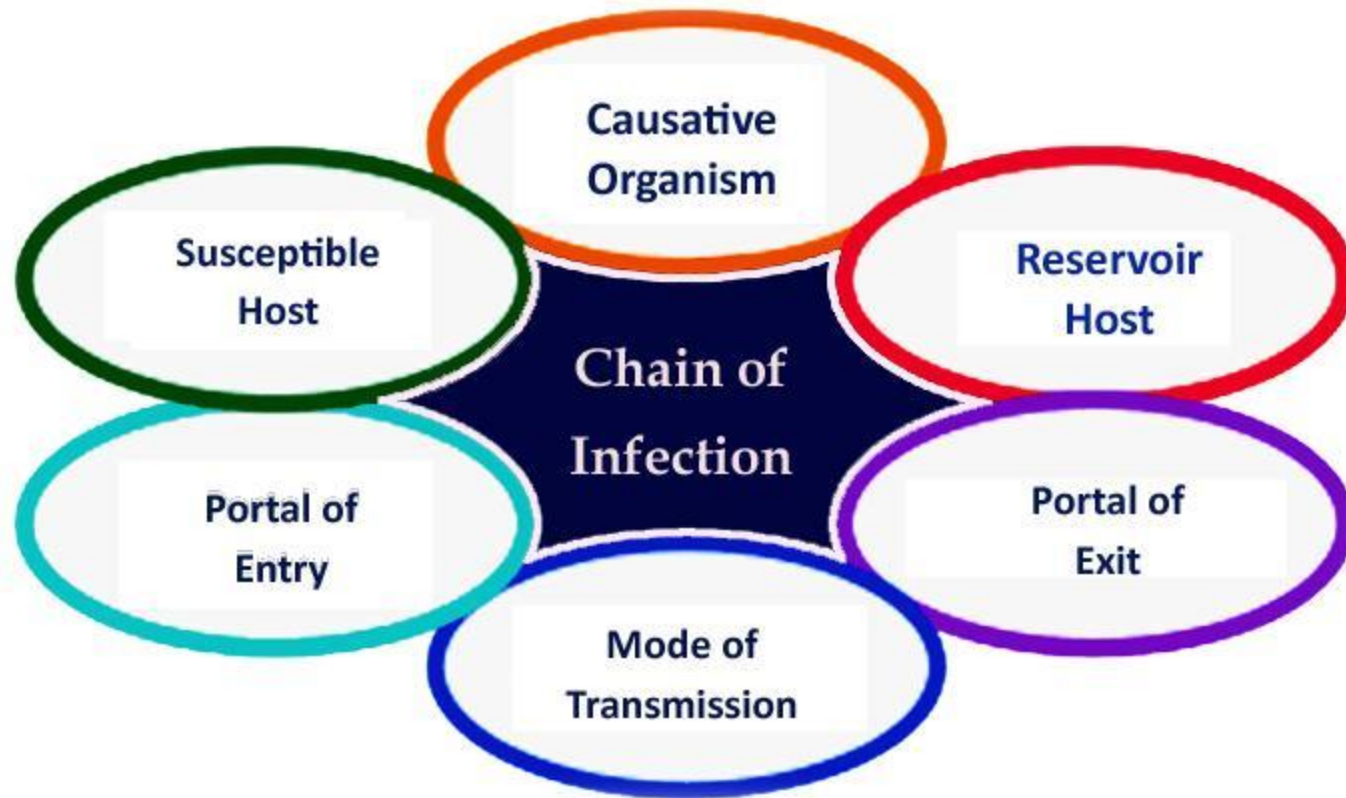
Zoomastigophora

Protozoology
Unicellular organisms

The chain of infection

The sequence of parasitic disease transmission is called "the chain of infection".

Transmission occurs when the causative organism leaves its "reservoir host" through a "portal of exit" then transmitted by some "mode of infection" then enters through an appropriate "portal of entry" to infect a "susceptible host".



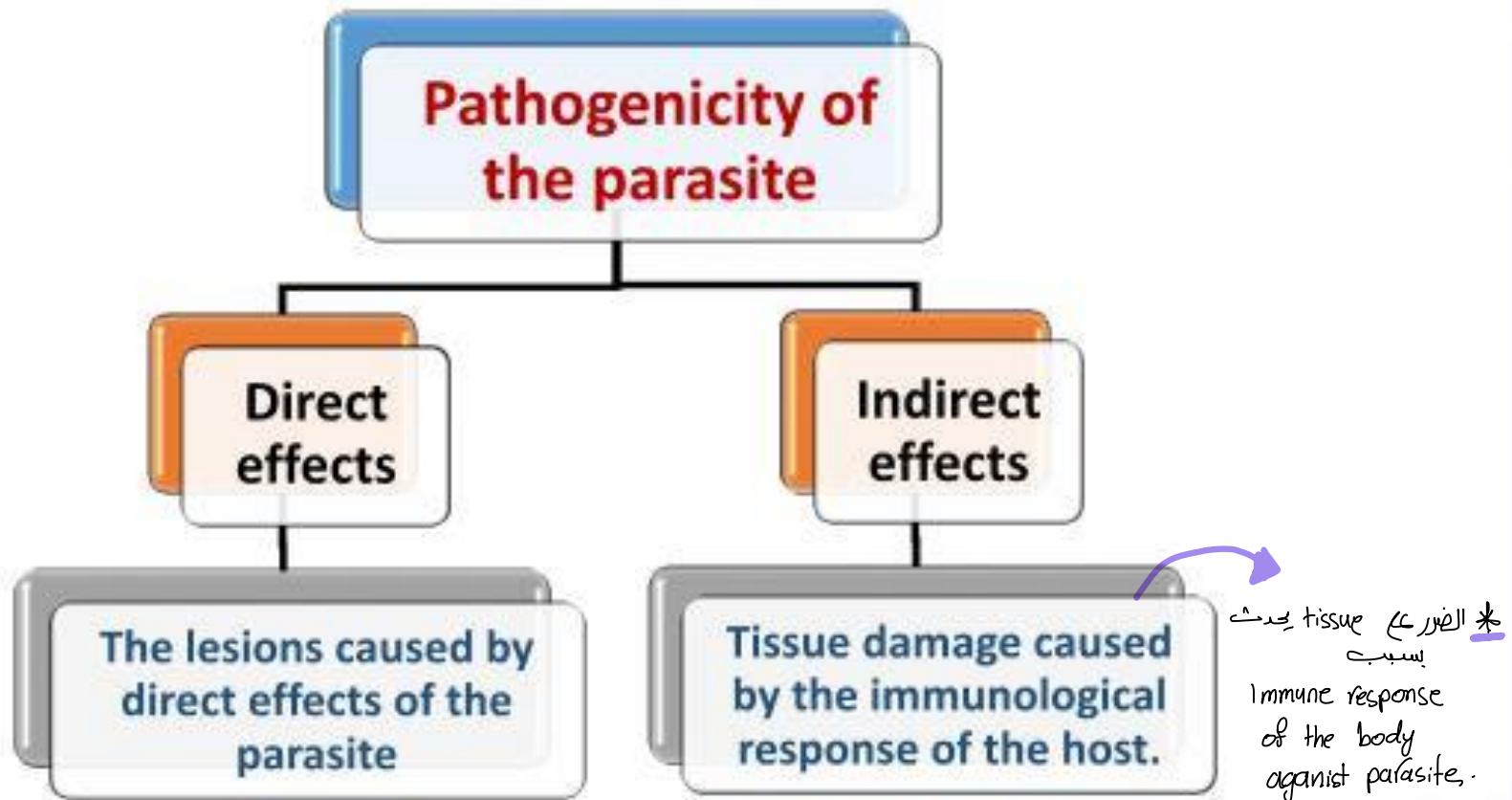
Knowledge of the chain of infection provides a basis for determining appropriate control measures.

Effect of the parasite on the host (pathogenicity)

- The effect depends on the number, size and morphology of the parasite, its activity (movement and migration), site (habitat), specific toxin and host reaction

Pathogenicity

Q: What are the mechanisms of host tissue damage caused by the parasite?



Q; What are the direct effects of the parasite on the host?



- 1) Impairing nourishment.
- 2) Tissue damage.
- 3) Toxic effect.
- 4) Secondary bacterial infection.

because of decreasing immunity by parasite

or

parasite make portal of entry to the bacteria.

J.S.A

Q: Define the host Tissue damage caused by immune response to infection? by mediators

Generalized

Fever, malaise and weakness.

Anaemia, eosinophilia, leucocytosis, leucopenia.

Allergic reactions.



Localized

According to the tissue or organ affected, e.g.:

Gastrointestinal (colic, dyspepsia, diarrhoea ...)

Neurological(headache,convulsion,paralysis)

Respiratory(cough,dyspnea,wheezes)

Cutaneous(itching,rashes,ulceration)



J.A

Geographical distribution of parasites



- ♋ Parasites have more or less **cosmopolitan distribution**.
- ♋ Parasites survive mostly in **tropical and subtropical regions**.
- ♋ Parasites distribution depends upon both **host factors** and **environmental conditions**

Host factors

- 👤 **Host specificity**, as some parasites require man as a host where others require dogs or cats.
- 👤 **Host habits**, e.g. consumption of raw or undercooked meat or fish and raw vegetables.
- 👤 **Host occupation**, e.g. farmer, fisherman or
- 👤 The presence of an appropriate **vector or I.H.**
- 👤 The presence of an appropriate **reservoir host**.



Environmental conditions favoring survival outside the body of the host, as;

- ⚙️ The presence of water,
- ⚙️ Temperature,
- ⚙️ Humidity etc..



Class Trematoda (flukes) are classified according to their habitat into

1- Liver fluke

Fasciola

2- Intestinal flukes

1- Heterophyes heterophyes
2- Fasciolopsis busci

4- Lung fluke

Paragonimus westermani

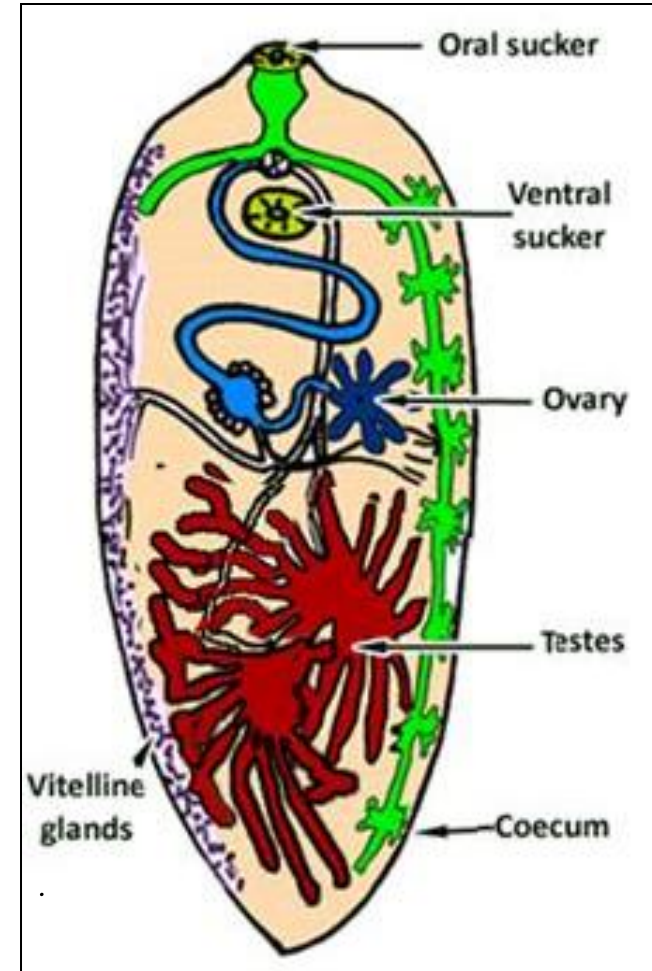
3- Blood flukes

1- Schistosoma mansoni
2- S. haematobium
3- S. japonicum

Class : Trematoda (Flukes)

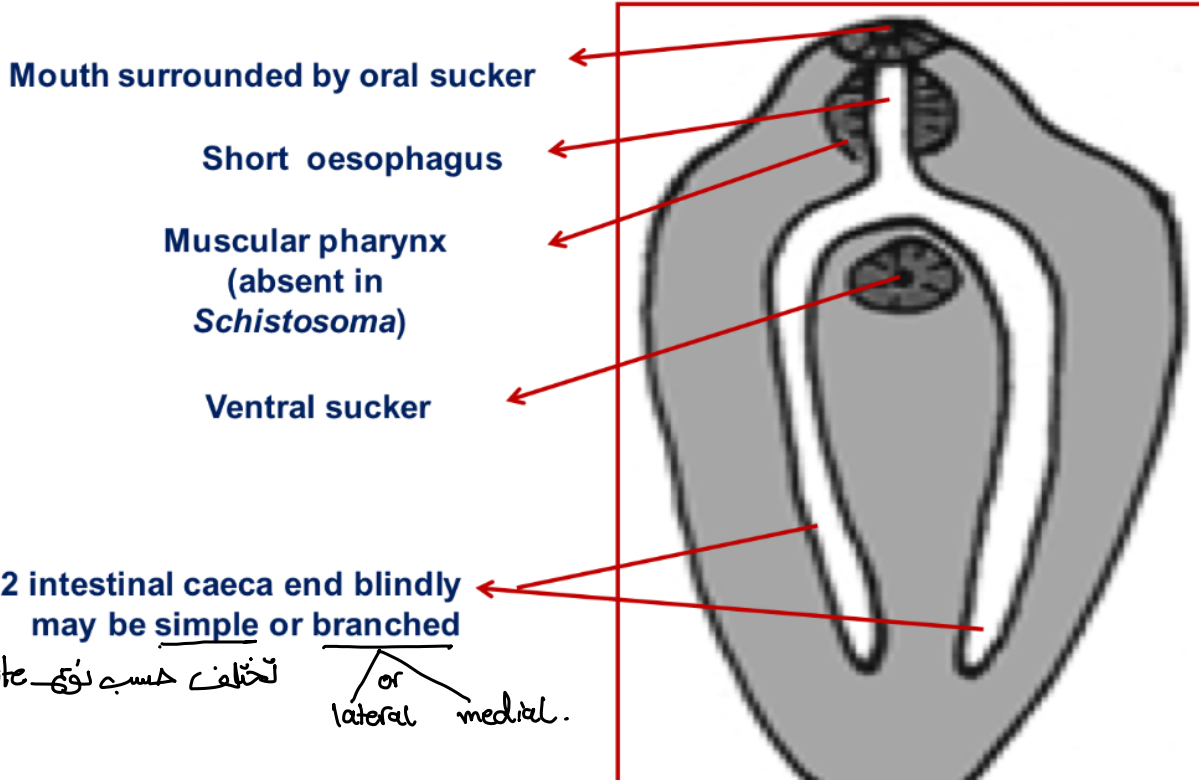
❖ General characters:

- Flattened, leaf-like **except** female of *Schistosoma*.
- Bilaterally symmetrical.
- Has no body cavity.
- Variable in size. Large (*Fasciola*), very small (*Heterophyes*).
- Covered with cuticle(smooth, é spine or tubercle).
- **Organs of fixation:**
 - Oral sucker ⇨ anterior.
 - Ventral sucker ⇨ on the ventral surface.
 - Genital sucker (**present in some species**).



Digestive system

ملاحظة :- الصور من كتاب المايكر ريم رقم (٧)
بس الدكتور شرحتهم في المحاضرة .



⇒ Digestive system of Trematoda is a tube open at the mouth and closes at the Intestinal caeca.

So solid waste exist from the mouth by vomiting (in reverse peristalsis).

⇒ There are 2 sucker in trematoda :-
1) oral sucker 2) ventral sucker.

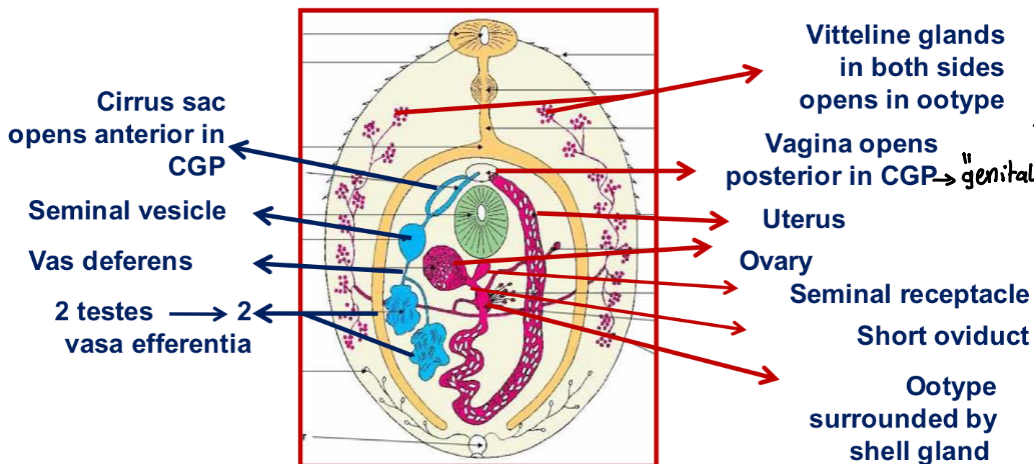
⇒ The function of sucker → is for attachment

Genital system

All trematods are hermaphrodite except *Schistosoma*

Male G.System

Female G.System



⇒ Hermaphrodite → that mean the parasite has both male and female sex organs.

⇒ vitelline glands → make secretion nutritive to embryo

⇒ number of ovaries and testes differ according to the type of parasite.

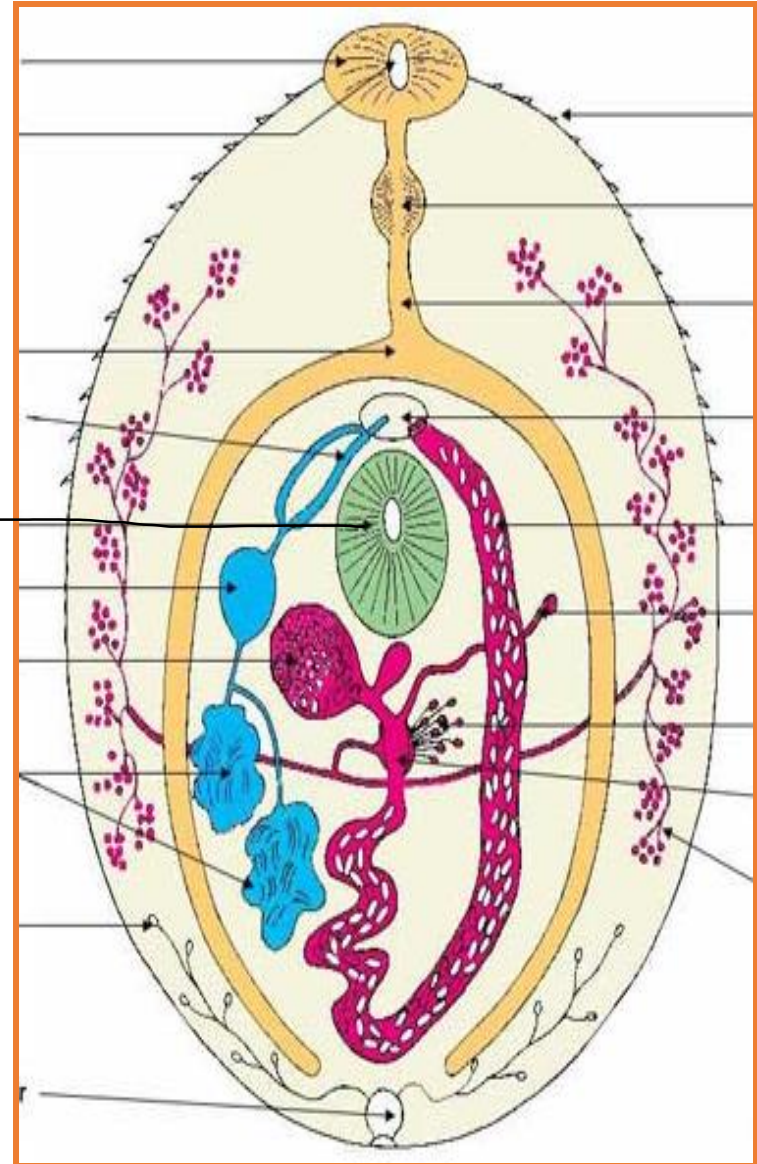
- Digestive system
- Excretory system
- Nervous system
- Reproductive system
- No body cavity, No respiratory or circulatory systems.

Ventral sucker.



* How the fertilization occur in trematode?

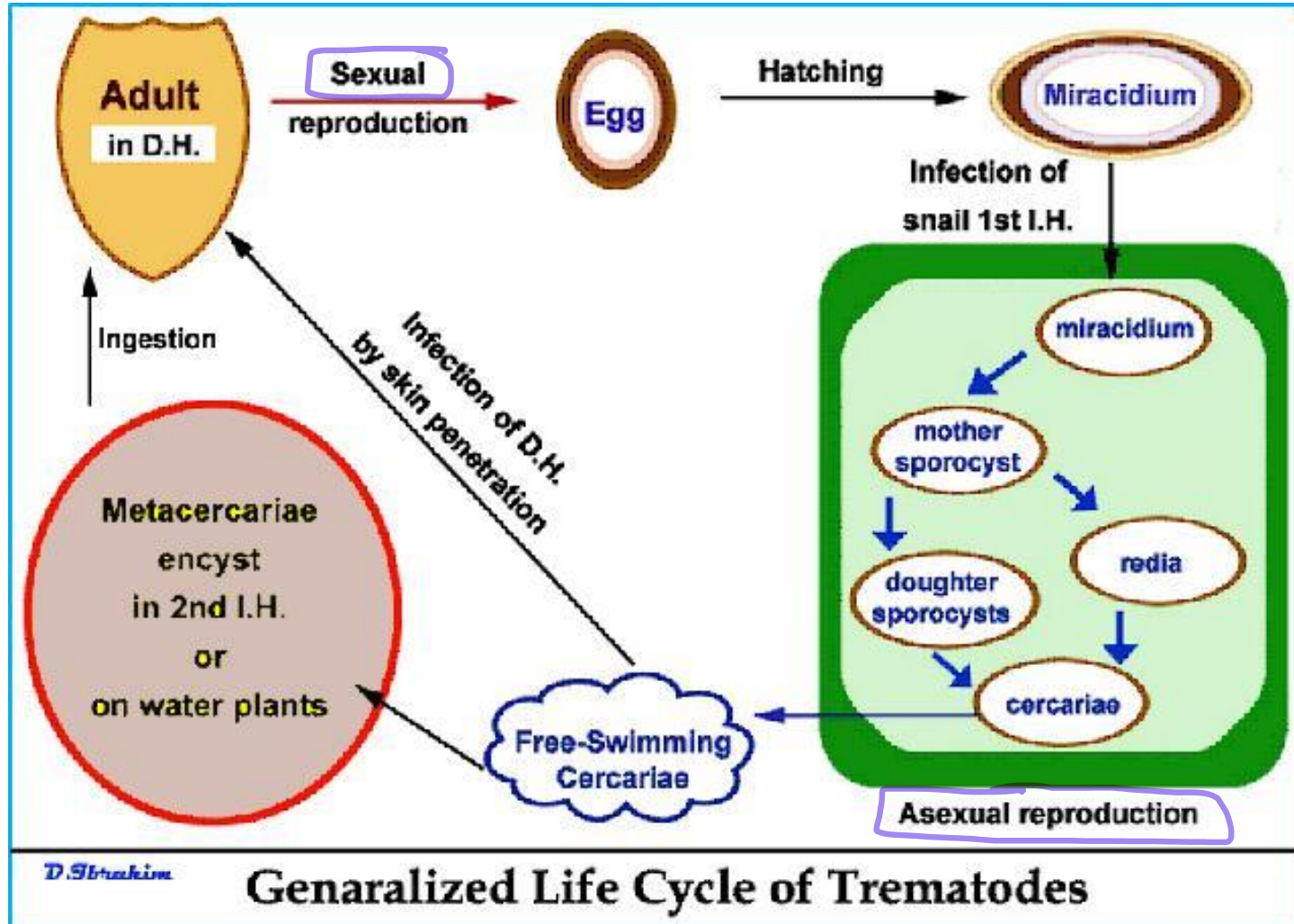
- 1) sperms exit from male genital system by genital pores.
- 2) sperms enter to female G-system → enter to ootype.
- 3) so sperms make fertilized egg then exit by uterus by genital pores

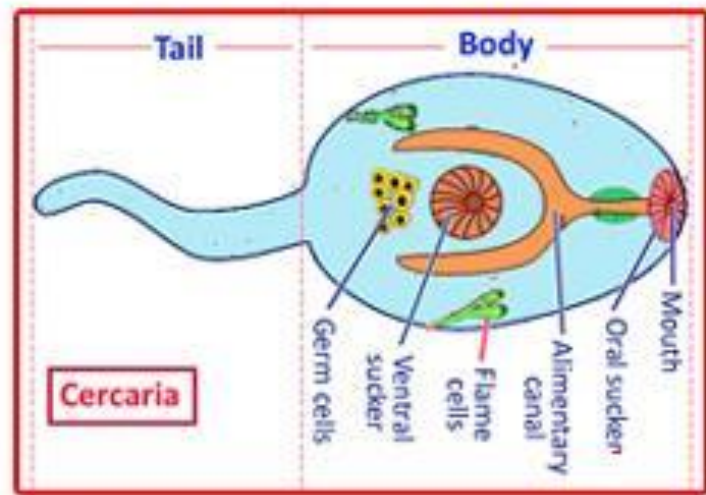
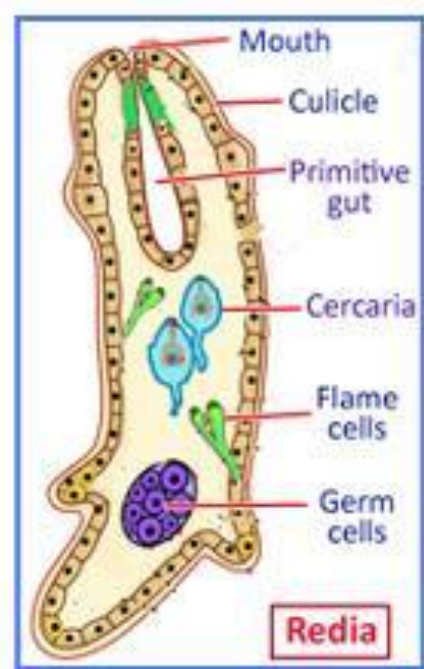
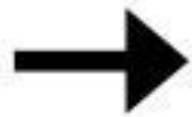
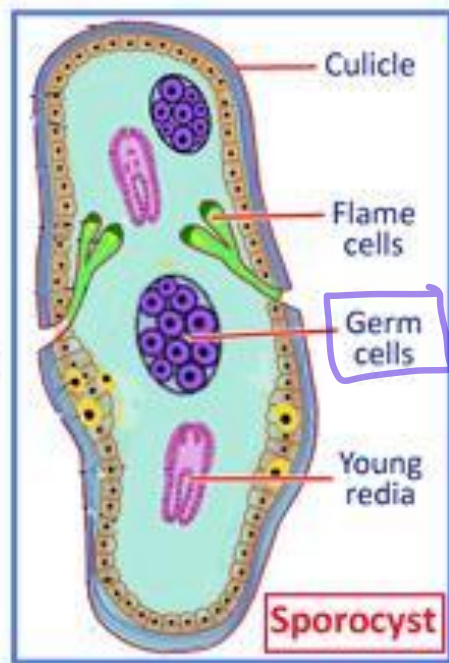
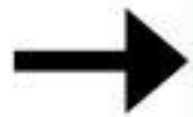
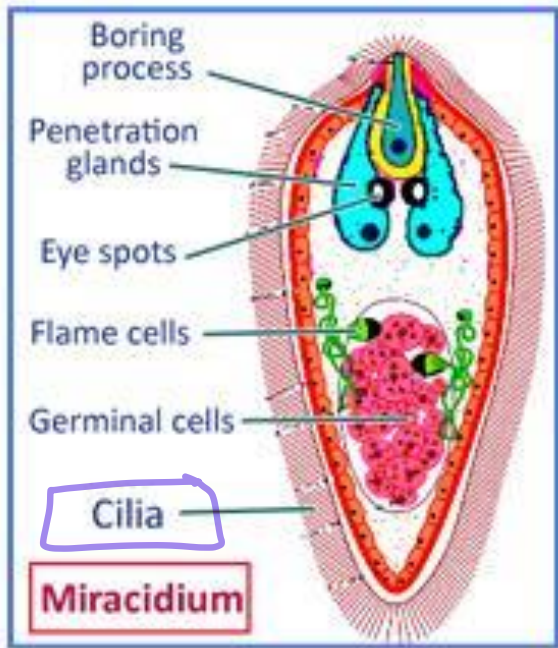


❖ **Excretory system:**

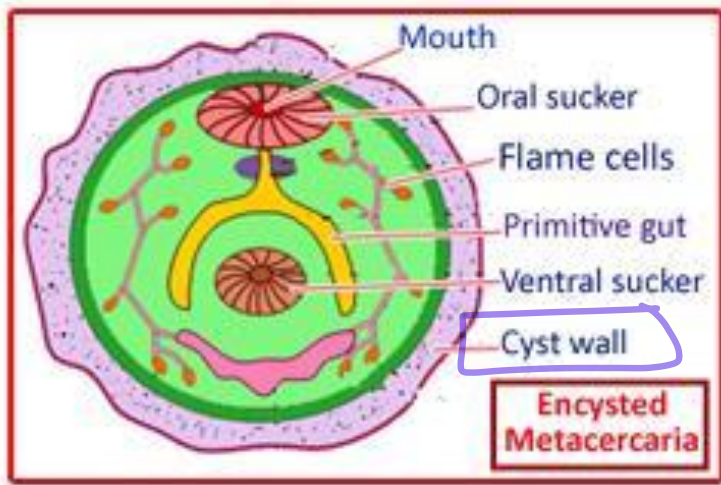
Bilaterally symmetrical
 flame cells → collecting tubules
 which collect fluid → bladder
 → excretory pore posteriorly.

❖ Life cycle:





J.S.A

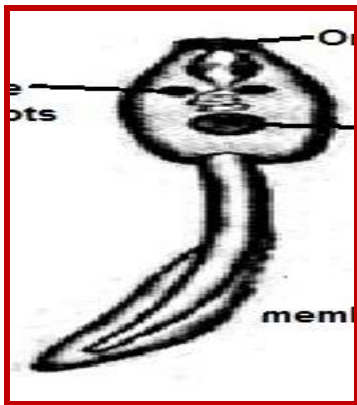


❖ Life cycle:

1- Sexual development (adult stage): inside the D.H.

2- Asexual development (larval stage): inside the snail (I.H).

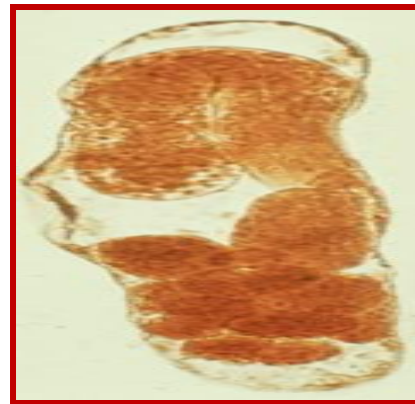
- Inside the snail, miracidium develops asexually → sporocyst → redia → cercaria, except schistosomes (no redia stage).



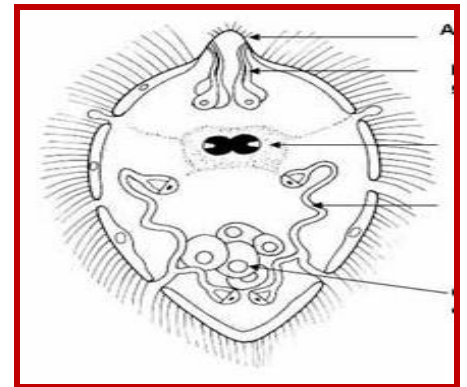
cercaria



redia



sporocyst



miracidium



Test Knowledge

Match each Type of parasite (I) with its most probable Definition (II)

(I)	Type of parasite	(II)	Definition
1	Opportunistic:	A	A parasite that lives on the surface of the host's body. <i>Ectoparasite.</i>
2	Accidental:	B	A parasite which is capable of living both freely and as a parasite. <i>facultative</i>
3	Ectoparasites:	C	A parasite which is completely dependent on the host. <i>obligatory</i>
4	Endoparasites:	D	A parasite occurs in patients with impaired defense mechanisms. <i>opportunistic</i>
5	Obligatory:	E	A parasite found in a host other than its normal one. <i>Accidental</i>
6	Facultative:	F	A parasite that lives within the body of the host. <i>Endoparasite.</i>

THANK

YOU

