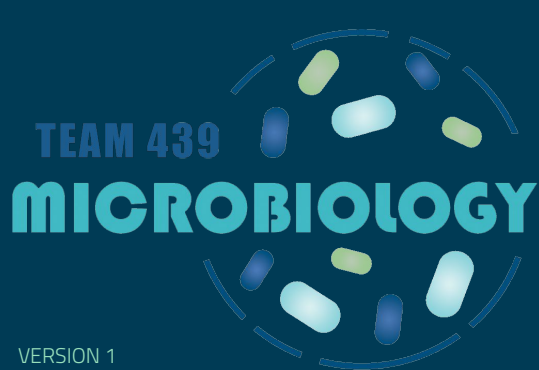


Classification of Parasites & Protozoa



Objectives

- ❖ Define common terms describing host-parasite relationship.
- ❖ Outline the broad classification of parasites.
- ❖ Name examples of protozoan parasites.
- ❖ Describe the life-cycle of *Giardia lamblia* as an example of intestinal protozoa.
- ❖ Describe the main stages of the life-cycle of *Plasmodium* as an example of blood and tissue protozoa.

Colour index:

- **Red: Important.**
- Grey: Extra info & explanation.
- **Purple: Only in girl's slides.**
- **Green: Only in boy's slides.**
-

Any future corrections
will be in the editing
file, so please check it
frequently.

Scan the code
Or click [here](#)



Definitions

- ❖ **Infection:** The entry, development and multiplication of an infectious agent in humans or animals. Which may results:
 - In apparent (asymptomatic) infection
 - Manifest (symptomatic) infection (there are symptoms)
- ❖ **Host:** human or animal which harbors (keeps and shelter) an infectious agent under natural conditions.
- ❖ **Definitive host (Primary host) :** a host in which the parasite passes its **sexual stage**.
- ❖ **Intermediate host (Secondary host) :** a host in which the parasite passes its larval or **asexual stages**.
- ❖ **Carrier:** a person or animal that harbors a specific infectious agent in the absence of symptoms and signs of a disease and serves as a potential source of infection.

What is the difference between carrier and asymptomatic? An asymptomatic is a person or other organism that has become infected with a pathogen, but that displays no signs or symptoms. Although unaffected by the pathogen, carriers can **transmit** it to others or develop symptoms in later stages of the disease.
- asymptomatic = short time. Carrier = long time.



Definitions, contd..

- ❖ **Pathogenesis** : Production and development of disease .
- ❖ **Pathogenicity**: Capability of an infectious agent to cause disease in a susceptible host .
- ❖ **Parasitism**: Relationship in which an organism (infectious agent, the parasite) **benefits**, and the other organism (host) is **harmed** in some way. الباراسايت ينتفع والهوست يتضرر
- ❖ **Commensalism**: Relationship whereas one organism (the commensal) is benefited & the host is not harmed nor is it helped by the association. الباراسايت ينتفع لكن الهوست لا يتضرر ولا يستفيد
- ❖ **Ectoparasite**: parasite that lives on the outer surface of its host.
- ❖ **Endoparasite**: Parasite that lives inside its host .
- ❖ **Zoonosis**: Disease of animals that is transmissible to humans.

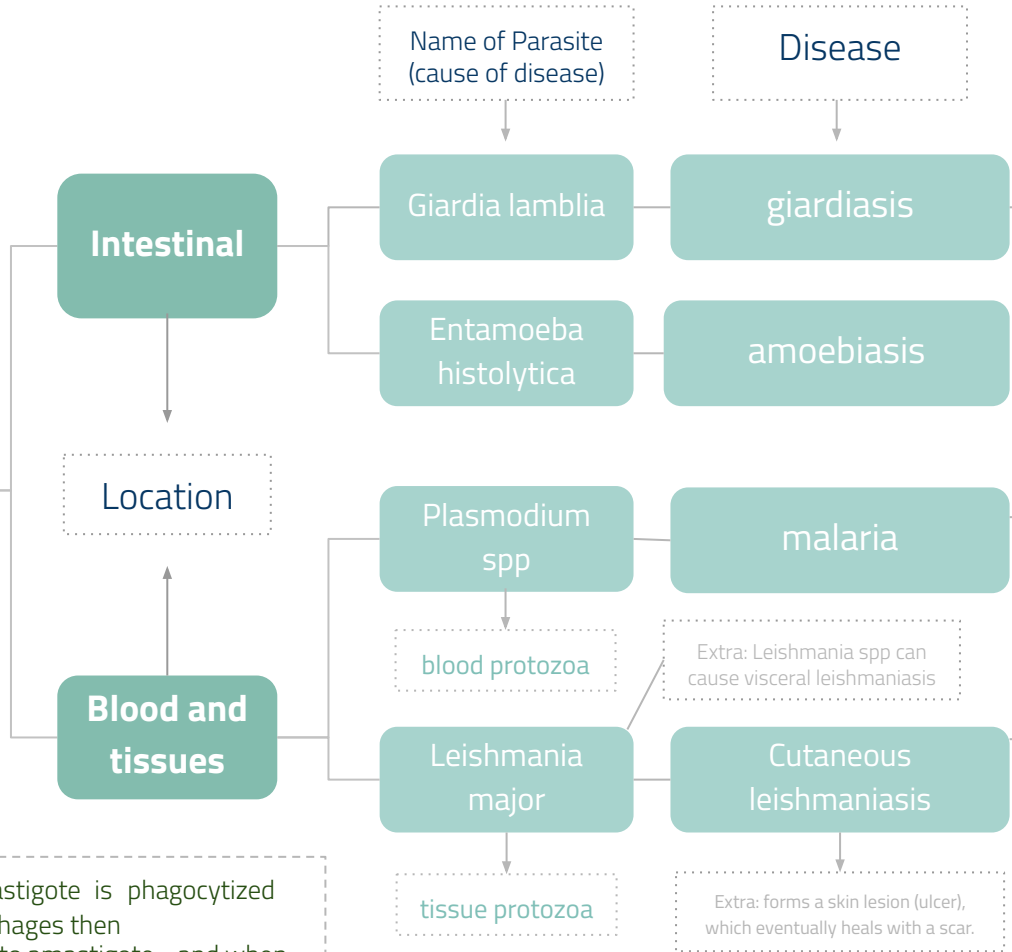


Classifications of Parasites*

PROTOZOA	HELMINTHS
Unicellular	Multicellular
Single cell of all functions	Specialized cells
According of the movement: 1- Amoebae: move by pseudopodia (أقدام كاذبة) 2- Flagellates: move by flagella 3- ciliates: move by cilia 4- apicomplexa (sporozoa): tissue parasite. (move with the flow of blood or it's surrounding fluid)	1-Roundworms (Nematodes): -Elongated -Cylindrical -Unsegmented 2- Flatworms: - Trematodes : leaf-like, unsegmented - Cestodes : tape-like, segmented



Parasitic Protozoa



- Infective stage: Cyte.
- Pathogenic stage: Trophozoite .
- Cyte and Trophozoite are both **diagnostic stages**.
- Ingested fecal-orally

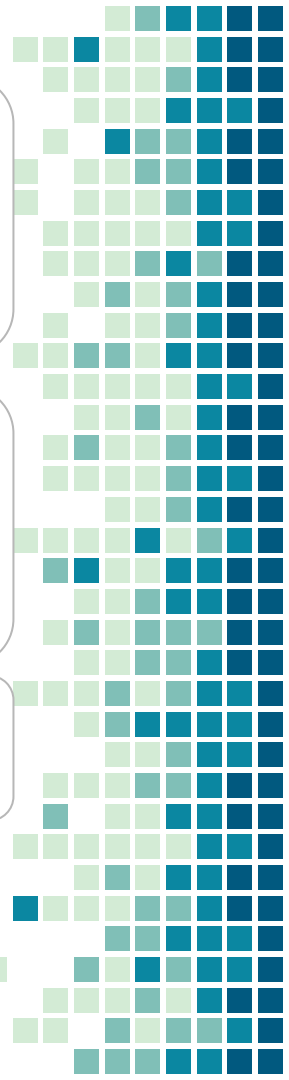
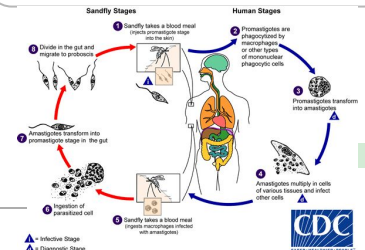
- The vector of malaria: Female **Anopheles**.
- Infective stage of human: **sporozoites**.
- Infective stage of Anopheles: **gametocyte**.

- The vector of Cutaneous leishmaniasis: **Sandfly**.
- Infective stage: promastigotes
- Diagnostic stage: Amastigotes.

the promastigote is phagocytized by macrophages then transforms to amastigote - and when **sandflies bite the infected human they ingest the macrophages**

Extra: Leishmania spp can cause visceral leishmaniasis

Extra: forms a skin lesion (ulcer), which eventually heals with a scar.



Giardia lamblia (a.k.a Giardia intestinalis)

Life cycle of Giardia lamblia

1

cysts are the infective stage of *G. intestinalis*. As few as 10 cysts can cause infection, These cysts are ingested by consuming contaminated food or water, or **fecal-orally** (e.g when sewage contaminates drinking water).

2

When cysts are ingested, the low pH of the stomach, the acidity, causes excystation. (Excystation means the releases of **trophozoites**)

3

Within the small intestine, the trophozoites reproduce asexually (longitudinal binary fission) and either float free or are attached to the mucosa of the lumen.

4

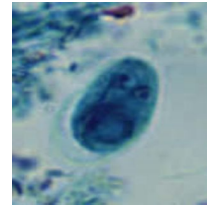
Some trophozoites then encyst in the small intestine, **Both** cysts and trophozoites are then passed in the feces.

5

ONLY the cyst is infectious, Person-to-person transmission is possible, Animals can also be infected with Giardia.

- Giardia infect the cells of the duodenum and jejunum.

- Giardia lamblia can cause diarrhea with poor absorption of the nutrient, loss of appetite, stomach cramp, vomiting.



Giardia cyst
(infective stage)



Giardia
trophozoite

- can survive outside the body for months.
- relatively resistant to chlorination, UV exposure and freezing.

can't survive inside the stomach because it isn't resistant to the acidity of the stomach.



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Plasmodium spp

Four main species of malaria:

Plasmodium falciparum

Plasmodium vivax

Plasmodium ovale

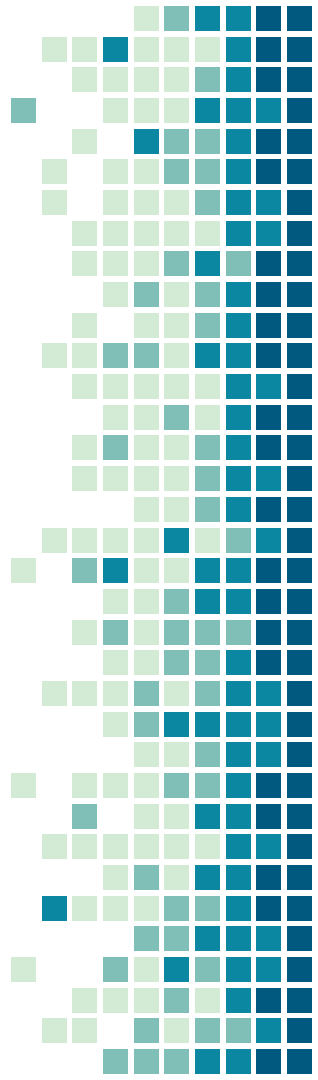
Plasmodium malariae

EXTRA: Plasmodium knowlesi has been recently recognized as a cause of malaria

All the above species cause malaria but its severity differs

Notes:

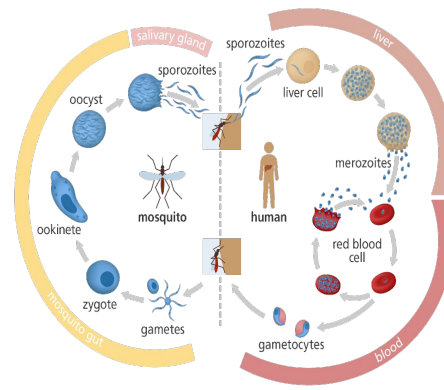
- ❖ The main pathology of malaria is due to invasion of RBCs (i.e the symptoms of malaria are due to RBC infection and lysis)
- ❖ The **mosquito** is the **primary** (definitive) host (because it supports **sexual** reproduction of the plasmodium)
- ❖ The **human** is the **secondary** (intermediate) host (because it supports **asexual** reproduction of the plasmodium)



Life Cycle of Malaria

Note: The **Hepatic cycle** includes the pre & exo erythrocytic cycle

1 In Liver	Pre-erythrocytic cycle: Infected mosquito stings a person so sporozoites (enter through the mosquito salivary gland) moves to the liver via the blood
2	Exo-erythrocytic cycle: Sporozoites multiply (asexually) inside the liver cells forming merozoites , which eventually cause the liver cell to burst releasing the merozoites into the blood
3 In Blood	Erythrocytic cycle: The merozoites then enter RBCs where they continue to proliferate and cause cell lysis (releasing more merozoites into the blood)
4	Some transform to male and female gametocytes inside RBCs, they stay in RBCs until they are picked up by another anopheles mosquito
5 In Mosquito	They sexually replicate inside the mosquito (making the mosquito infected and able to infect other humans)



436: This could cause severe anemia



Scan or Click

Some spp of plasmodium produce **hypnozoites** (dormant form), which can grow years later resulting in a relapse of the disease (i.e disease comes back)

MCQs

1- Refers to the Capability of an infectious agent to cause disease in a susceptible host.

- A- Parasitism.
- B- Infection.
- C- Pathogenicity.
- D- Pathogenesis.

2-What is true about helminths?

- A- Unicellular.
- B- Multicellular.
- C- Specialized cells.
- D- B & C.

3- The type of relationship whereas the host is unharmed.

- A- Parasitism.
- B- Commensalism.
- C- Amensalism.
- D- Antagonism.

4- An example of malaria specie.

- A- Plasmodium vivax.
- B- Giardia lamblia.
- C- Plasmodium falciparum.
- D- A & C.

5- The vector of cutaneous leishmaniasis is

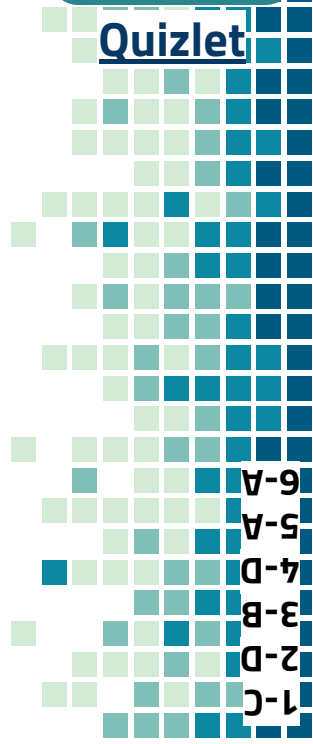
- A- Sandflies.
- B- Mosquitos.
- C- Bugs.
- D- Barry B. Benson

6- Trophozoites reproduce asexually in:

- A- Small intestines
- B- Stomach
- C- Liver
- D- Soil



Quizlet



1-C
2-D
3-B
4-D
5-A
6-A

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