



كلية الرشيد الجامعة

قسم تقنيات المختبرات الطبية

الطفيليات الطبية

Plasmodium

المرحلة الثانية – النظري

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Plasmodium

There are four species of plasmodium:

- 1. *Plasmodium vivax* : caused tertian malaria.**
- 2. *Plasmodium ovale* : caused tertian malaria.**
- 3. *Plasmodium malaria* : causes benign quartan malaria.**
- 4. *Plasmodium falciparum* : causes malignant tertian malaria**

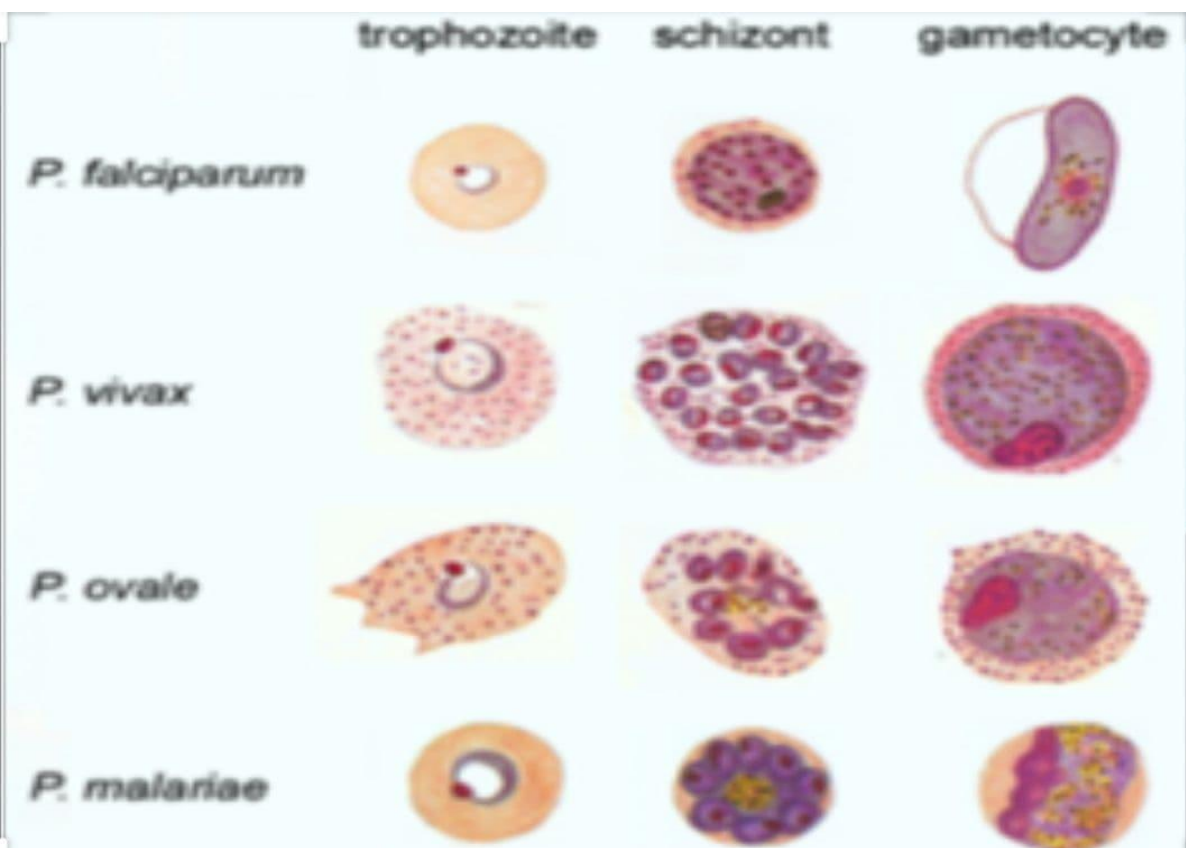
morphology

1- Trophozoites (ring form): are small and may range between 1.25 and 1.5µm in size. They also have a thin cytoplasm and may have a signet ring shape In addition, they are contain a single nucleus.

2- Schizonts : They measure 4.5-5 µm in diameter and occupy about 2/3rd of the infected RBC. Each schizont contains two or four merozoites .

3- **Gametocytes:** are the sexual forms of the parasite and are characterized by a crescent shape (banana-shape). Being the sexual forms, there are both male and female forms of the parasite, microgametocytes (male gametocyte) and macrogametocytes (female gametocyte).

4- **Sporozoites:** are infective to humans and are characterized by a thick pellicle, a mitochondrion, a single nucleus as well as a sickle-shape. They measure between 10 and 15 μm in length and are capable of locomotion.



Life Cycle

They complete their life cycle in two hosts. This cycle consists of both sexual and asexual cycles that occur in the anopheles mosquito and vertebrate respectively.

When the infected mosquito starts feeding, using its proboscis to suck blood from a person, the sporozoites are injected into the skin thus causing an infection.

According to research studies, mosquitoes that are infected with the parasite feed at a higher rate compared to uninfected ones. Moreover, they have been shown to have a higher survival rate.

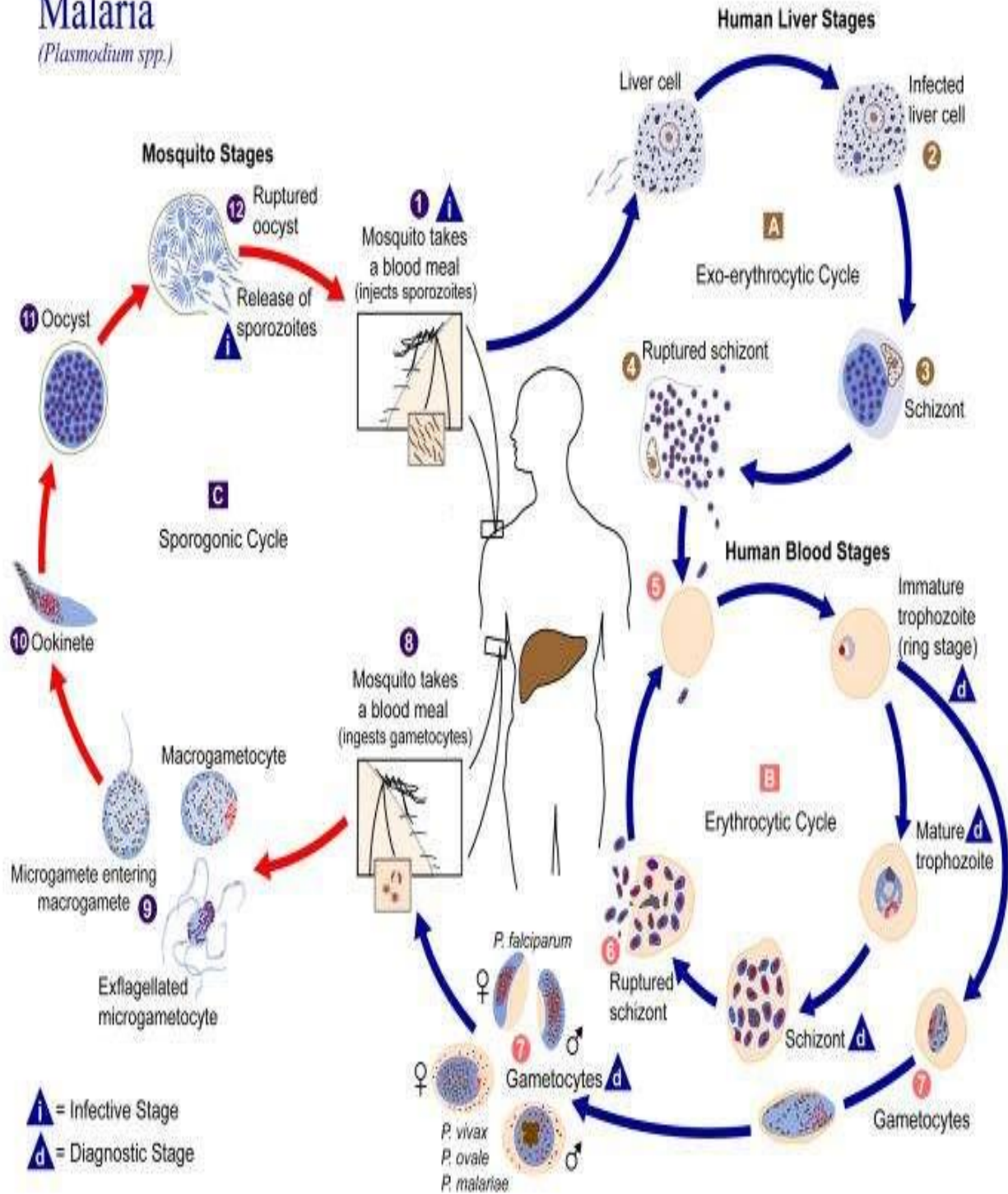
Following a mosquito bite, between 10 and several hundreds of sporozoites are injected into the blood stream (through the skin) of the Intermediate host (man).

For the sporozoites that enter the bloodstream, this allows them to be transported to the liver. In some animals, they may first invade the spleen, macrophages or endothelial cells. In the liver,

they invade the cells (hepatocytes) and proliferate to produce merozoites. From the hepatocytes, merozoites are transported to the lungs (in the lung capillaries) from where they are released into the bloodstream. Using receptor-ligand interactions, merozoites released from the liver attach and invade red cells. This invasion has been shown to take less than a minute, which helps prevent the parasite from being exposed to immune cells. Once the parasite is attached to a red cell, the cell membrane of the red cell is deformed to form a junction that allows the parasite to penetrate into the cell using a number of specialized protein structures. In the cell, the parasite, which starts taking a ring-like shape, The parasite continues dividing within the cell and goes through several stages that produce the trophozoites and ultimately the schizonts. As they increase in numbers, this causes the cell to burst thus.

Malaria

(*Plasmodium spp.*)



Pathogenesis (symptoms)

Flu like symptoms the Pathogenesis of malaria divided to three stages :

1. Cold stage : shivering , sense of coldness, with rise of temperature to 41c .this stage lasts 1-2 hours.
2. Hot or fever stage : after 3hours from the first stage , patient becomes flushed , hot , headache.
3. Sweating stage : 2-4 hours profuse Sweating, fever drops , headache disappears .

Diagnosis

- 1.Thick blood film :Identifies the infection of *Plasmodium*.
- 2.Thin blood film : Identifies the species of *Plasmodium*.
- 3.Immunological test.