

Plasmodium Spp.

- **Definition**

- Malaria is a mosquito-borne infectious disease of humans and other animals caused by the genus Plasmodium, transmitted by the bite of female anopheles mosquito. Malaria is the most important parasitic disease being widespread in tropical and subtropical regions in a broad band around the equator, including much of Sub-Saharan Africa, Asia, and the Americas.
- The disease results from the multiplication of malaria parasites within [red blood cells](#), causing symptoms that typically include [fever](#) and [headache](#), in severe cases progressing to [coma](#), and death.
- Name is derived from Italian **Mal' aria or bad air**

Why it is important in Medicine

- **Malaria remains the world's most devastating human parasitic infection. Malaria affects over 40% of the world's population. WHO, estimates that there are 350 - 500 million cases of malaria worldwide, of which 270 - 400 million are Falciparum malaria, the most severe form of the disease.**

Etiology

- ❖ **Causative organism: Plasmodia**
 - **P. Vivax: tertian malaria**
 - **P. Malariae: quartan malaria**
 - **P. Falciparum: malignant malaria**
 - **P. Ovale: tertian malaria**

Mode of transmission

- Malaria is transmitted by the bite of an infective female Anopheles mosquito. Rarely, transmission can be congenital (via the placenta) or can occur through transfusions or the use of contaminated needles.
- ***Malaria Kills more people than AIDS***
- Malaria kills in one year what AIDS kills in 15 years. For every death due to HIV/AIDS there are about 50 deaths due to malaria. To add to the problem is the increasing drug resistance to the established drug.

Life Cycle

A- *Human cycle-Shizogony*

Included Four stages

1 - *Pre or (Exo) erythrocytic schizogony*

2 - *Erythrocytic Schizogony*

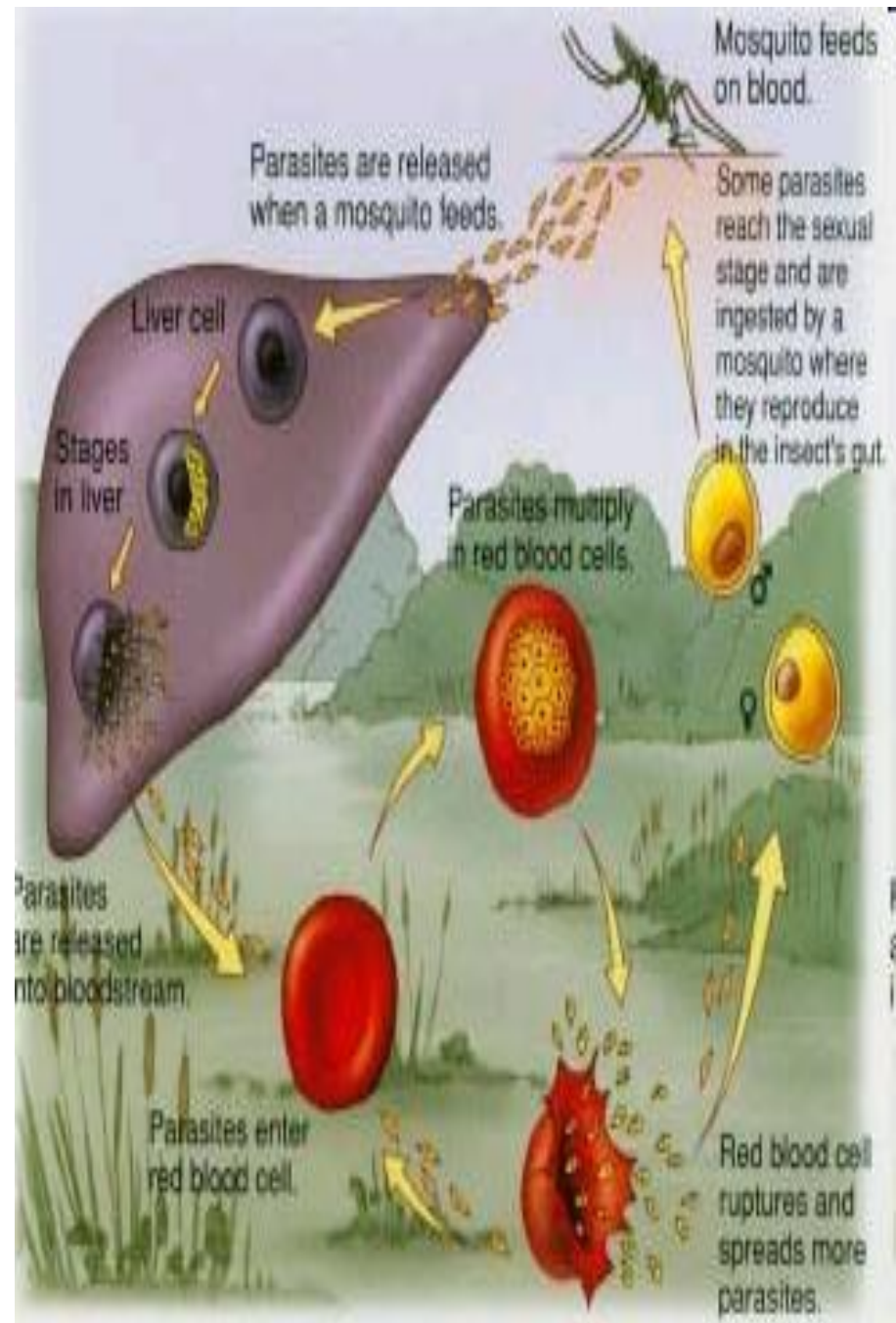
3 - *Gametogony*

4 – *Latent Stage*

- **Man – Intermediate host.**
- **Mosquito – Definitive host**
- Sporozoites are infective forms Present in the salivary gland of female anopheles mosquito
- After bite of infected mosquito sporozoites are introduced into blood circulation.

1 - PRE-ERYTHROCYTIC SHIZOGONY

- Developmental phase inside the tissue (liver) of man, Site-parenchyma cells (hepatocyte) of liver, Sprozoites are elongated and spindle shaped become rounded inside the liver parenchyma, Multiple nuclear divisions develop to Schizonts, Consists of single generation of pre erythrocytic
- schizont which liberates merozoites
- Duration -- P.V.-8 days, P.O.-9 days
P.F.-6 days, P.M.-15days
- Cryptozoites—liberated merozoites-
 - i) merozoites – enter circulation
 - ii) merozoites—re-enter liver cells
- No clinical manifestations or pathological damage



• Exo-erythrocytic Schizogony

Salivary glands (mosquitoes) → Sporozoites (spindle shaped) → human circulation → parenchymal liver cells (30 mins)

↓
rounded and mature
to schizonts

↓
Nuclear division to
exo-erythrocytic mero.

← Cell rupture EEM released

← Macro-merozoites
merozoites
(re-enter liver cells)

↑ Micro-merozoites
(circulation)

- Erythrocytic merozoites do not reinvade the liver cells. So malaria transmitted by blood transfusion reproduces only erythrocytic cycle
- In case of *P. falciparum* and *P. malariae*, all merozoites invade RBC's without re-invading liver cells. However, but *P. vivax* and *P. ovale*, some merozoites invade RBC's and some re-invade
- liver cells initiating Exo-erythrocytic schizogony, which is responsible for relapses. Some of the merozoites remain dormant (hypnozoites) becoming active later on.