PLASMODIUM VIVAX

Phylum Protozoa

Subphylum Apicomplexa

Class Telosporea

- Plasmodium is a pathogenic sporozoan that cause malaria fever in Man.
- In 1880, a French military doctor Charles Laveran discovered the Plasmodium in the blood of malarial patient.
- Golgi observed that Plasmodium always occur in the RBC of a person suffering from malaria.
- In 1897 Sir Ronald Ross a French scientist while working in Secunderabad has identified Plasmodium cysts in the stomach wall of female Anopheles mosquito. He described the life cycle of Plasmodium in mosquito.Malaria day - August 20.
- Grassi described the complete life cycle of Plasmodium vivax in the female anophelus mosquito. Garnham published detailed monograph on P.vivax.
- Anopheles mosquito is the primary host and man is the secondary host.
- When the cause of malaria was not discovered, it was supposed to be caused by bad air.
- The mode of infection is inoculation and the infective stage of Plasmodium to Man is sporozoite.
- Plasmodium reproduces asexually in Man and sexually in mosquito. Pre-erythrocytic and Exo-erythrocytic cycles of Plasmodium occur in liver cells.
- The sporozoite is a sickle or spindle shaped. The body is covered by an clastic pellicle. The parasite is always haploid but becomes diploid during fertilisation.
- The sporozoite has a pair of secretory organelle opening into the apical cup. These organelle secrete cytolytic enzyme, which is useful for the penetration of sporozoite into liver cells
- Sexual phase of life cycle is completed in the mosquito. It's a primary host. Mosquito is called as vector as it transmits the parasite from person to the other.
- SEXUAL PART OF THE CYCLE IS CALLED CYCLE OF ROSS NAMED AFTER RONALD ROSS.
- Asexual phase of the cycle is completed in man. Man is secondary host or intermediate host.
- Asexual part of the life cycle is called cycle of Golgi named after Camillo Golgi.
- Monkey is considered as the Reservoir host.
- In man P.vivax reproduces by asexual multiple fission called schizogony. It is completed in the liver cells and RBC.
- The spindle shaped sporozoite changes to oval or spherical trophozoite in liver cells.
- Cryptozoites are formed in liver cells during preerythrocytic cycle.
- Macro-meta and micrometa cryptozoites are formed in Exoerythrocytic cycle.
- The time interval between the initial entry of sporozoite and the first appearance of the parasite in the blood of man is called **pre patent period.** It is 8 day in P. Vivax.
- Erythrocytic shizogony begins with the entry of cryptozoites of the pre erythrocytic cycle or with the micromctacyrptozoitcs of the exoerythrocytic cycle.

- The active feeding stage of Plasmodium is trophozoite. The food of Plasmodium is globin, a protein part of haemoglobin.

•Signet ring and Amoeboid stages arc various stages of growing trophozoites in R.B.C.

- Vacuole develop in the trophozoite and pushes nucleus and cytoplasm lo the periphery. This is called **signet ring stage**
- The parasite develops pseudopodia in amoeboid stage. The erythorcytes increase double to their size - hypertrophy.
- In P.vivax schuffners dots appear in the cytoplasm of" RBC.
- Trophozoite fills the entire RBC and become the schizont.
- Alter division of nucleus, each bit of nucleus is surrounded by a bit of cytoplasm to form merozoitcs.
- The ingested haemoglobin is broken down into globin and haematin.
- Incubation period in P. Vivax is 10-14 days.
- The liberation of hacmozoin granules and mcrozoites causes the symptoms of malaria in Man.
- Gametocytes are produced in human R.B.C and they exhibit dimorphism.
- Gametocytes are the infective stages to mosquito.
- Micro-gametocyte or male gamctocyte is small in size but has large nucleus. Macro gamctocyte is large in size but has small nucleus.
- Sexual phase in the life history of Plasmodium occurs in the gut of mosquito.
- All the stages of erythrocytic cycle except the gamctocytes arc digested in the gut of mosquito.
- The pH of the digestive fluid and the body temparature of the mosquito seems to be the favourable factors for the survival of the gamctocytcs.
- Each microgamctocyte produces 6 to 8 microgametes by Exflagellation and each macrogamelocylc produces only one ovum.
- The fertilisation in Plasmodium is described as anisogamy because the fusing gametes arc dissimilar.
- The moving zygote of Plasmodium is known as ookinete or vermicule.
- It pierces through the wall of gut and lives in the outer epithelium becomes round and form a cyst called oocyst.
- Oocyst enlarge and begins sporogony. Oocyst undergoes reduction division and later many mitotic divisions produce number of nuclei.(this was found by the scientist BANO)
- Now cytoplasm develops large Vacuoles dividing the cytoplasm into bits. Bit of cytoplasm surrounds bit of nucleus.
- This cytoplasmic masses are called sporoblasts. Cyst with sporoblasts are called sporocyst. Sporoblasts transform into spindle shaped sporozoites.
- Each sporocyst produces thousands of sporozoites by sporogony. Oocysts were first observed by Sir Ronald Ross.
- When the sporocyst burst out and more than 10000 sprorozoites are liberated into the haemocoel of mosquito.
- In mosquito the sporozoites are stored in salivary glands.
- When the infected mosquito bites a person sporozoites are injected into the host and continue the life cycle.
- In the life cycle of Plasmodium, asexual phase alternates with sexual phase and this phenemenon is described by metagenesis / alternation of generations.

- P. vivax causes Benign tertian malaria and fever occurs after every 48 hours.
- Clinical stages 1)febrile paroxysm(cold stage, hot stage) 2) Anaemia 3) splenomegaly
- The symptoms are high fever, increased breathing rate, pulse rate, profused sweating.
- Gambusia is the insectivorous fishe that feeds on Mosquito larvae, pupae and thereby control malaria.
- Spraying of kerosin oil / pyrethnum oil on drainage ponds affecs the respiration of the larvae and the larvae die of suffocation
- The stages of plasmodium that survive for a long period in liver as dormant stages called hypnozoites.
- Reactivation of hypnozoites leads to initiation of fresh erythrocytic cycles and new attacks of malaria which is referred to as relapse of malaria.