

Plasmodium falciparum

Trophozoites

Red blood cells in *Plasmodium falciparum* infections are not enlarged and they may have a spikey outline which is common in cells which have dried slowly. The typical arrangement of cytoplasm in young trophozoites is the well known ring formation which thickens and invariably contains several vacuoles as the trophozoite develops. Chromatin is characteristically found as a single bead, but double beads and small curved rod forms frequently occur.

Maurer's clefts are slow to appear and are first seen as minute purplish dots, 6 or less in number. The points become spots, still few in number and are now characteristic enough to be recognised. Maurer describes them as fine ringlets, loops or streaks. They are seldom absent from the red cells containing large rings but the staining of the spots is very sensitive to pH and are seldom seen if the pH falls below 6.8.

Trophozoites of *P. falciparum* can be found on the edge of the red blood cells. These are known as **accolé** forms and are found as three distinct types:

1. Common

The single chromatin bead lies on the edge of the cell with most of the cytoplasm extended along the edge on both sides of the bead.

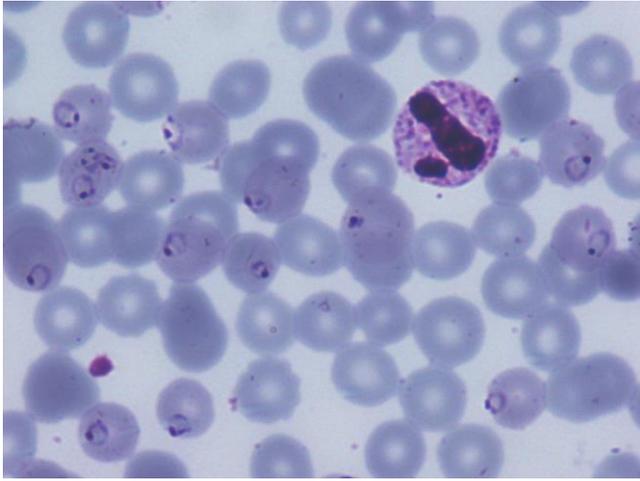
2. Rim

The complete parasite lies in a thickened line along the edge of the cell with no evidence of ring formation.

3. Displaced

The parasites are displaced beyond the edge of the host cell. All degrees of displacement may occur, from partial to marked displacement with most of the parasite lying beyond the cell margin.

Pigment is not a characteristic finding in the early stages of *P. falciparum* infections.



Trophozoites of *Plasmodium falciparum* exhibiting Maurer's clefts, acrole forms multiply infected red blood cells and double chromatin dots

Gametocytes

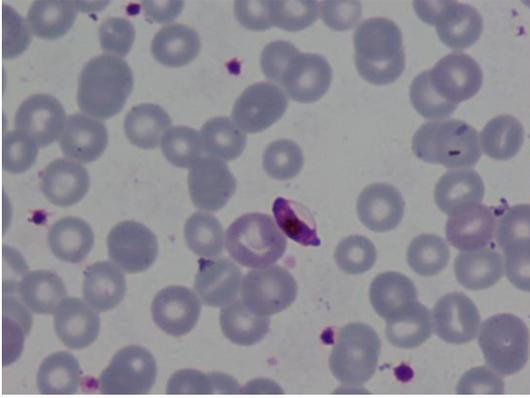
Gametocytes are the sexual stage of the malaria parasite. When the mature **trophozoite** starts to divide in the red cell, separate merozoites are formed resulting in a **schizont**. When fully developed, the **schizont** ruptures the red cell containing it, liberating the **merozoites** into the circulation. These **merozoites** will then infect new red cells and the process of asexual reproduction in the blood tends to proceed. Some of the **merozoites** entering red cells do not form trophozoites then schizonts but develop into **gametocytes** and this process takes place in deep tissue capillaries.

In infections with *Plasmodium falciparum* usually only young **trophozoites** and **gametocytes** are seen in peripheral blood smears, the **schizonts** are usually found in capillaries sinuses of internal organs and in the bone marrow.

Plasmodium falciparum **gametocytes** appear in the peripheral circulation after 8 - 11 days of patent parasitaemia and by then, they have assumed their typical crescentic shapes. They soon reach their peak density, and then decline in numbers, disappearing in about 3 months as a rule.

The female form, or **macrogametocyte**, is usually more slender and somewhat longer than the male, and the cytoplasm takes up a deeper blue colour with Giemsa stain. The nucleus is small and compact, staining dark red, while the pigment granules are closely aggregated around it. The male form, or **microgametocyte**, is broader than the female and is more inclined to be sausage shaped. The cytoplasm is either pale blue or tinted with pink, and the nucleus, which stains dark pink, is large and less compact than in the female, while the pigment granules are scattered in the cytoplasm around it.

In humans, **gametocytes** do not multiply, nor cause symptoms but they are the forms which are infective to the mosquito. When a female Anopheline mosquito takes a blood meal, the male and female **gametocytes** continue their sexual development.



Schizonts

Schizonts are rarely seen in the peripheral blood and their presence may indicate a potentially serious parasitaemia. Schizonts are have 8 - 36 merozoites and a large mass of golden brown pigment (haemozoin) is seen in the preshizont and schizont stage.

