

Plasmodium falciparum

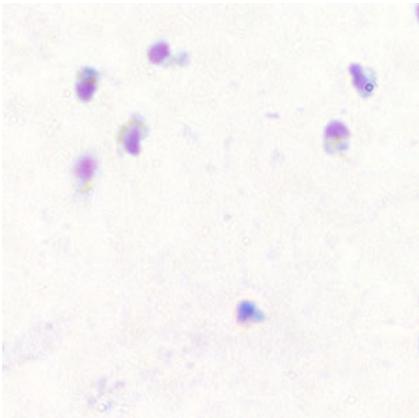
Basic guidelines

- A. Capillary blood should be obtained by fingerstick, or venous blood should be obtained by venipuncture.
- B. Blood smears, at least two thick and two thin, should be prepared as soon as possible after collection. **Delay in preparation of the smears can result in changes in parasite morphology and staining characteristics.**
- C. Schüffner's dots can be demonstrated in Giemsa stain, which is preferred to Wright or Wright-Giemsa stains.

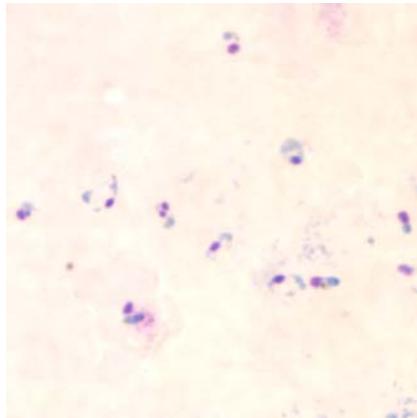
In *P. falciparum* infections, red blood cells (rbc) are normal in size. Typically only rings and gametocytes are seen unless the blood sat before the smears were prepared.

1. Rings

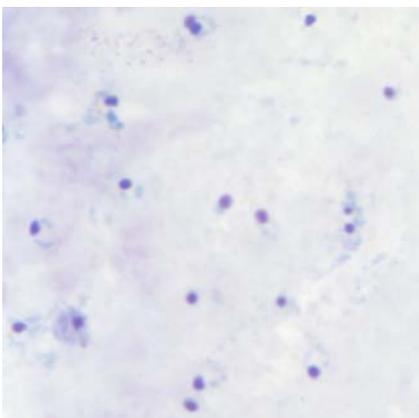
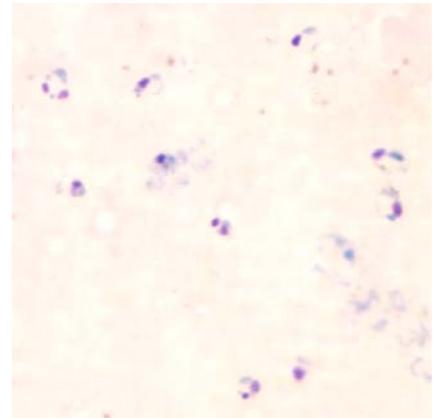
P. falciparum rings have delicate cytoplasm and one or two small chromatin dots. Rbcs that are infected are not enlarged; multiple infection of rbc is more common in *P. falciparum* than in other species. Occasional appliqué forms (rings appearing on the periphery of the rbc) can be present.



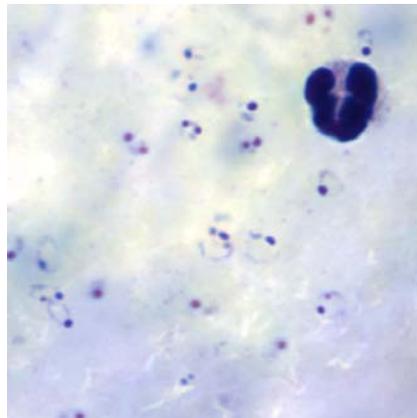
Rings in a thick blood smear.



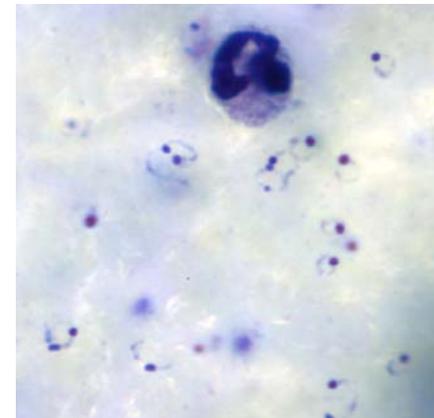
Images from a thick blood smear showing more rings.



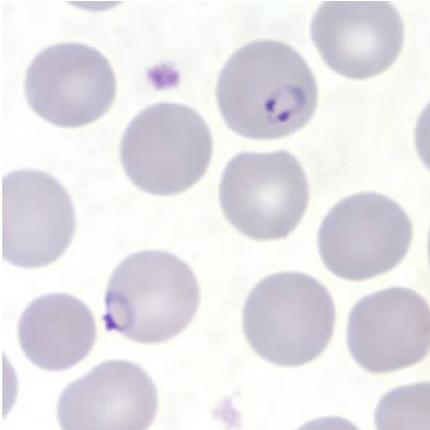
Rings in a thick blood smear.



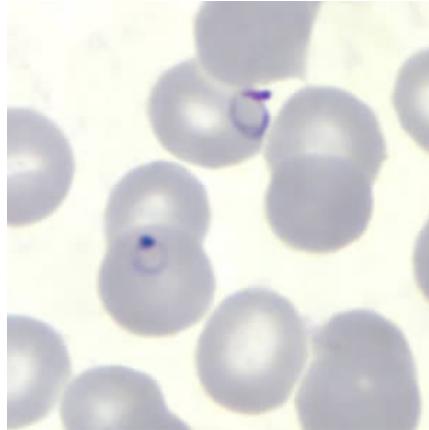
Images from a thick blood smear showing more rings. Note the classic "headphones" appearance of many of the rings.



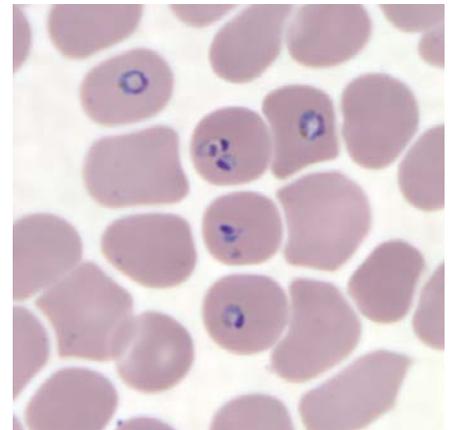
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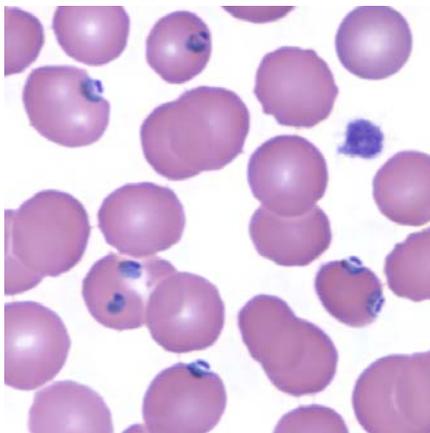
Thin, delicate rings in a thin blood smear. Note the double chromatin dot in the infected rbc at top, and the appliqué form in the infected rbc at bottom.



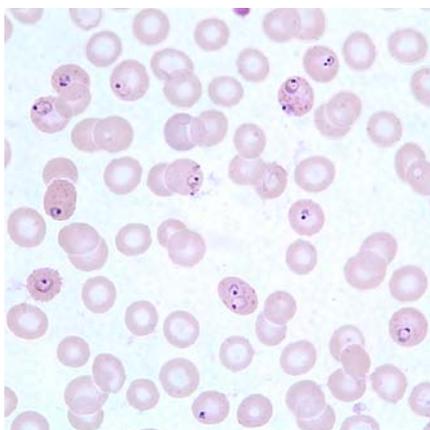
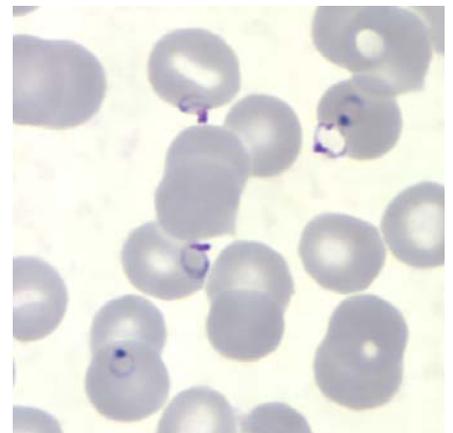
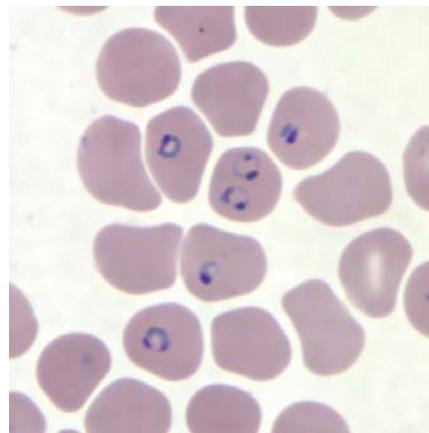
Thin, delicate rings in a thin blood smear.



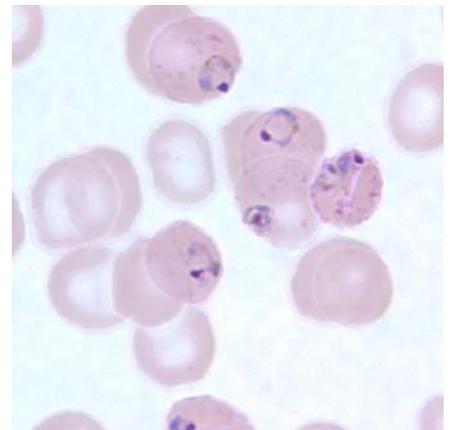
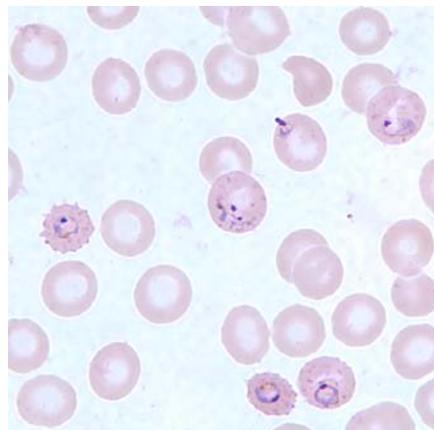
Rings in a blood smear. Note the multiply-infected rbcs



Rings in thin blood smears. Note the multiply-infected rbcs, some appliqué forms and some classic "head phone" form of several of the infected red blood cells.



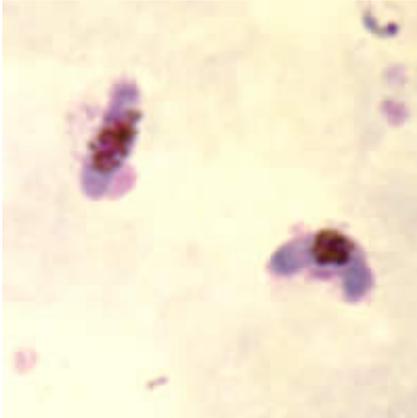
Rings and some developing trophozoites seen in thin smears, Note also the presence of Maurer's clefts, which are often seen in older ring forms. Maurer's clefts stain best with an alkaline pH of 7.2—7.6.



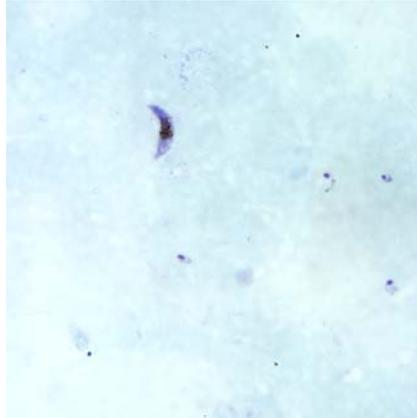
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2. Gametocytes

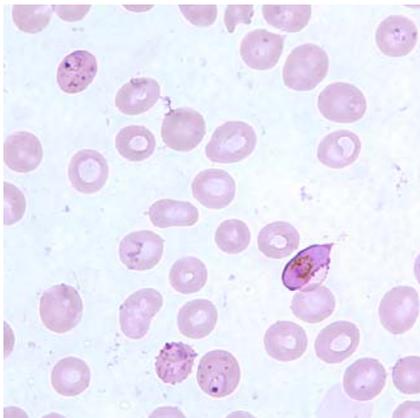
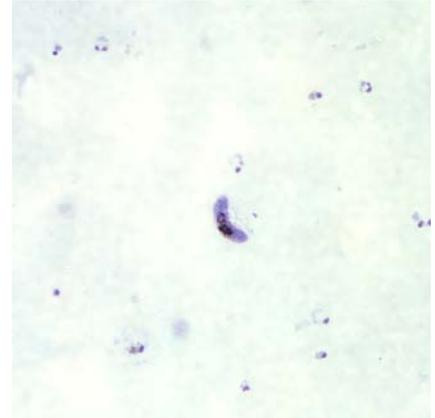
P. falciparum gametocytes are crescent or sausage shaped. The chromatin is in a single mass (macrogamete) or diffuse (microgamete).



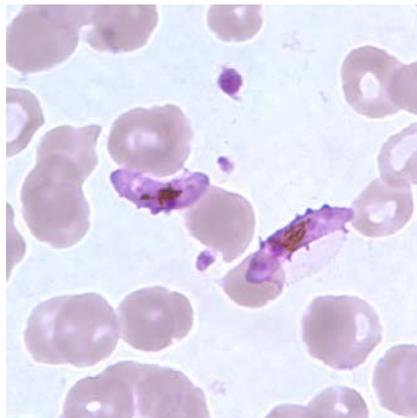
Gametocytes in a thick blood smear.



Gametocytes in a thick smear. Note also the presence of several rings.



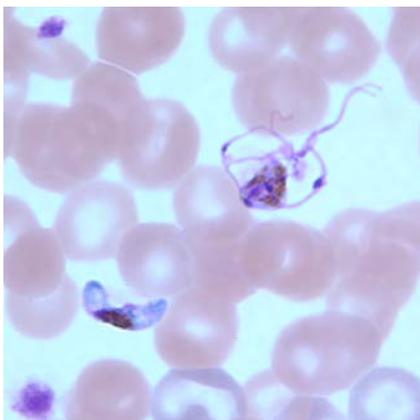
Gametocyte in a thin smear with rings and Maurer's clefts.



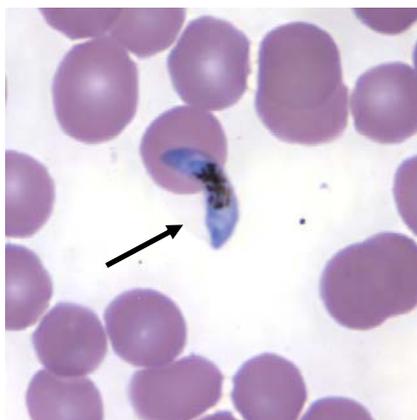
Two gametocytes in a thin smear.



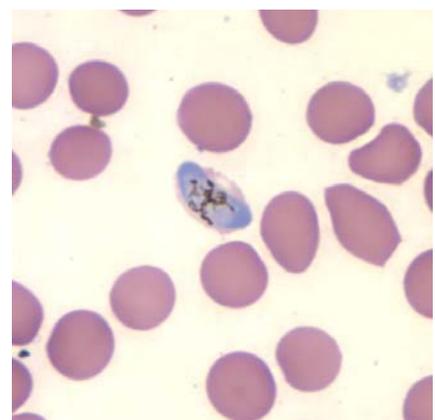
Gametocyte in a thin smear showing the membrane of the rbc.



Gametocytes; the one on the right is undergoing exflagellation



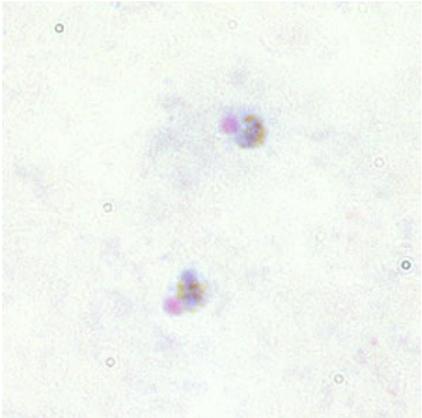
Gametocytes in thin blood smears. Note the presence of "Laveran's bib" (black arrow), which is not always visible.



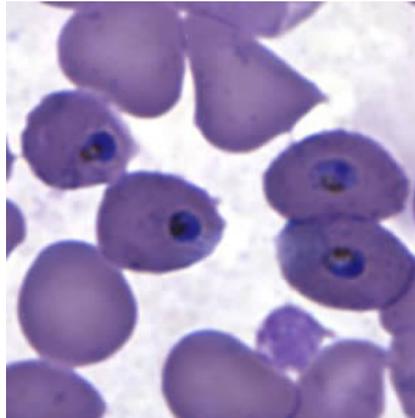
Laboratory diagnosis of malaria

3. Trophozoites

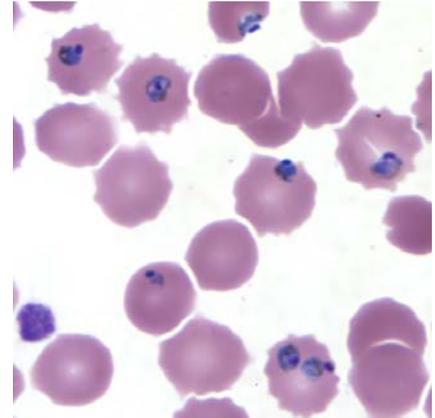
P. falciparum trophozoites are rarely seen in peripheral blood smears. Older, ring stage parasites are referred to as trophozoites. The cytoplasm of mature trophozoites tends to be more dense than in younger rings. As *P. falciparum* trophozoites grow and mature, they tend to retain their ring-like shape and sometimes trace amounts of yellow pigment can be seen within the cytoplasm. Growing trophozoites in *P. falciparum* can appear slightly amoeboid in shape.



Trophozoites in a thick blood smear.



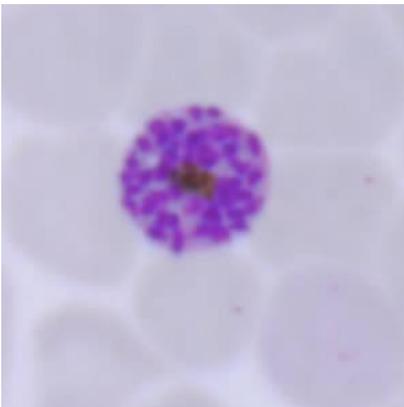
Mature, compact trophozoites in a thin blood smear.



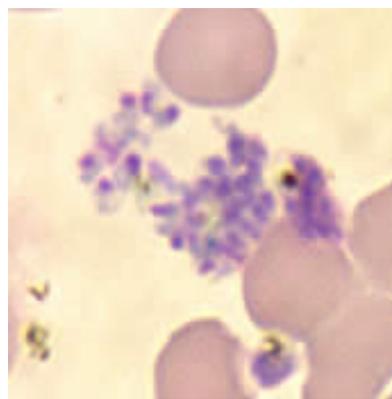
Compact trophozoites in a thin blood smear.

4. Schizonts

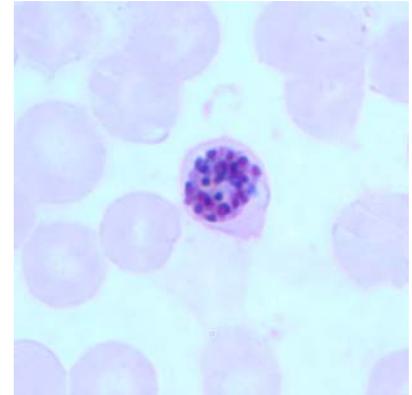
P. falciparum schizonts are seldom seen in peripheral blood. Mature schizonts have 8 to 24 small merozoites; dark pigment, clumped in one mass.



Mature schizont in a thin blood smear.



Ruptured schizont in a thin blood smear.



Another schizont in a thin blood smear.



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