

# Comparison of the *Plasmodium* Species Which Cause Human Malaria

<i>Plasmodium</i> species	Stages found in blood	Appearance of Erythrocyte (RBC)	Appearance of Parasite
<b>P. falciparum</b>	Ring	normal; multiple infection of RBC more common than in other species	delicate cytoplasm; 1-2 small chromatin dots; occasional appliqué (accollé) forms
	Trophozoite	normal; rarely, Maurer's clefts (under certain staining conditions)	seldom seen in peripheral blood; compact cytoplasm; dark pigment
	Schizont	normal; rarely, Maurer's clefts (under certain staining conditions)	seldom seen in peripheral blood; mature = 8-24 small merozoites; dark pigment, clumped in one mass
	Gametocyte	distorted by parasite	crenate or sausage shape; chromatin in a single mass (macrogametocyte) or diffuse (microgametocyte); dark pigment mass
<b>P. vivax</b>	Ring	normal to 1-1/4 X, round; occasionally fine Schüffner's dots; multiple infection of RBC not uncommon	large cytoplasm with occasional pseudopods; large chromatin dot
	Trophozoite	enlarged 1-1/2-2 X; may be distorted; fine Schüffner's dots	large ameboid cytoplasm; large chromatin; fine, yellowish-brown pigment
	Schizont	enlarged 1-1/2-2 X; may be distorted; fine Schüffner's dots	large, may almost fill RBC; mature = 12-24 merozoites; yellowish-brown, coalesced pigment
	Gametocyte	enlarged 1-1/2-2 X; may be distorted; fine Schüffner's dots	round to oval; compact; may almost fill RBC; chromatin compact, eccentric (macrogametocyte) or diffuse (microgametocyte); scattered brown pigment
<b>P. ovale</b>	Ring	normal to 1-1/4 X, round to oval; occasionally Schüffner's dots; occasionally fimbriated; multiple infection of RBC not uncommon	sturdy cytoplasm; large chromatin
	Trophozoite	normal to 1-1/4 X; round to oval; some fimbriated; Schüffner's dots	compact with large chromatin; dark-brown pigment
	Schizont	normal to 1-1/4 X; round to oval; some fimbriated; Schüffner's dots	mature = 6-14 merozoites with large nuclei, clustered around mass of dark-brown pigment
	Gametocyte	normal to 1-1/4 X; round to oval; some fimbriated; Schüffner's dots	round to oval; compact; may almost fill RBC; chromatin compact, eccentric (macrogametocyte) or more diffuse (microgametocyte); scattered brown pigment
<b>P. malariae</b>	Ring	normal to 3/4 X	sturdy cytoplasm; large chromatin
	Trophozoite	normal to 3/4 X; rarely, Ziemann's stippling (under certain staining conditions)	compact cytoplasm; large chromatin; occasional band forms; coarse, dark-brown pigment
	Schizont	normal to 3/4 X; rarely, Ziemann's stippling (under certain staining conditions)	mature = 6-12 merozoites with large nuclei, clustered around mass of coarse, dark-brown pigment; occasional rosettes
	Gametocyte	normal to 3/4 X; rarely, Ziemann's stippling (under certain staining conditions)	round to oval; compact; may almost fill RBC; chromatin compact, eccentric (macrogametocyte) or more diffuse (microgametocyte); scattered brown pigment

# Keypoints for *Plasmodium* Species Which Cause Human Malaria

## Infected RBCs

Size	Shape	Schüffner's Dots
<p>&lt;N, N: <b>PM</b></p> <p>N: <b>PF</b></p> <p>&gt;N: <b>PO</b></p> <p>&gt; &gt;N: <b>PV</b></p>	<p>Crescent: <b>PF</b> (gametocytes)</p> <p>Ameboid: <b>PV</b></p> <p>Fimbriation: <b>PO</b></p> <p>Elongated: <b>PO</b></p>	<p><b>PV, PO</b></p>

## Parasites Found In Circulating Blood

Rings	Trophozoites	Schizonts (mature)	Gametocytes
<p>Rings only (±gametocytes): <b>PF</b></p> <p>Numerous: <b>PF</b></p> <p>Multiply infected RBCs: <b>PF</b></p> <p>Accessory chromatin dots: <b>PF</b></p> <p>Delicate: <b>PF</b></p>	<p>Ameboid: <b>PV</b></p> <p>Compact: <b>PO</b> <b>PM</b> <b>PF</b> (rarely seen)</p> <p>Band form: <b>PM</b></p>	<p>6-12 nuclei: <b>PM</b></p> <p>6-14 nuclei: <b>PO</b></p> <p>12-24: <b>PV</b></p> <p>8-24: <b>PF</b> (rarely seen)</p> <p>Rosettes: <b>PM</b></p>	<p>Crescent: <b>PF</b></p> <p>Round: <b>PV</b> <b>PO</b> <b>PM</b></p>

Certain morphologic key characteristics of the infected erythrocytes and parasites can be used to orient the diagnosis towards one of the four *Plasmodium* species that infect humans, as shown above. These characteristics are by no means absolute, however. The final diagnosis should be based on the combined findings for the various characteristics: what is the most probable species, based on the available findings.

### Legend

**PF:** *P. falciparum*  
**PV:** *P. vivax*  
**PO:** *P. ovale*  
**PM:** *P. malariae*