🔬 Parasites in Blood and Bone Marrow: A Morphological Guide for Pathologists

Recognizing parasites on peripheral blood smears and bone marrow aspirates requires a keen eye for morphology and attention to subtle diagnostic clues.

From the delicate ring forms of Plasmodium falciparum to the sheathed microfilariae of Wuchereria bancrofti and the characteristic nucleus–kinetoplast combination of Leishmania donovani, every morphological detail matters.

🔍 **Key learning points:**

- Differentiate Plasmodium species based on their characteristic morphology.
- Identify filarial microfilariae by their sheath, nuclear arrangement, and tail-tip features.
- Recognize Leishmania amastigotes in bone marrow aspirates.
- Be aware of important mimics, including Histoplasma capsulatum.
- Correlate morphological findings with clinical details and confirmatory investigations.

This quick-reference poster below is designed to help pathology residents and reporting pathologists revise these important diagnostic features during routine laboratory practice.

Because sometimes, one microscopic finding can make all the difference! 🔍

#Pathology #Hematopathology #Parasitology #PeripheralBloodSmear #BoneMarrow #MedicalEducation #PathologyResidents #LaboratoryMedicine

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PARASITES IN BLOOD AND BONE MARROW

Key Morphological Features for Pathology Residents & Reporting Pathologists

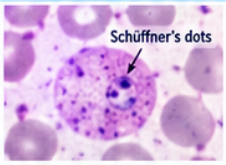
1. PARASITES IN PERIPHERAL BLOOD

Plasmodium falciparum



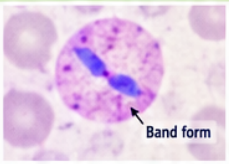
- Delicate ring forms
- Multiple rings in one RBC
- Appliqué forms
- Crescent-shaped gametocytes
- **Severe malaria**

Plasmodium vivax



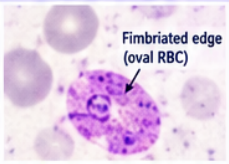
- Enlarged RBCs
- Amoeboid trophozoites
- Schüffner's dots
- Malaria with relapses

Plasmodium malariae



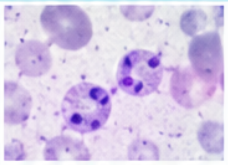
- Band-form trophozoites
- Rosette schizonts
- Quartan malaria

Plasmodium ovale



- Enlarged, often oval RBCs
- Fimbriated edges
- Stippling
- Malaria with relapses

Plasmodium knowlesi



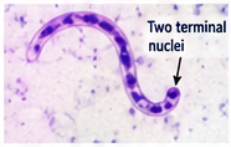
- Early rings like *P. falciparum*
- Later forms like *P. malariae*
- Potentially severe malaria

Wuchereria bancrofti



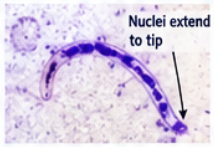
- Sheathed microfilaria
- Smooth, gently curved
- No nuclei at tail tip
- Lymphatic filariasis

Brugia malayi



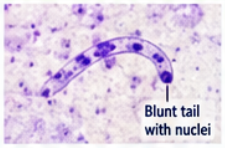
- Sheathed microfilaria
- More angular/kinked
- Two distinct terminal nuclei
- Lymphatic filariasis

Loa loa



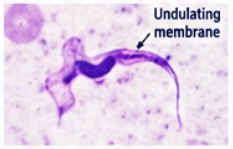
- Sheathed microfilaria
- Nuclei extend to tail tip
- Loa loa filariasis

Mansonella perstans



- Unsheathed microfilaria
- Nuclei to tail tip
- Blunt tail
- Mainly in Africa

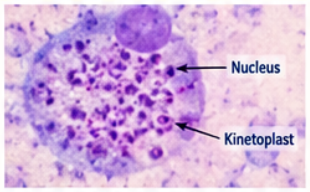
Trypanosoma spp.



- Extracellular flagellate
- Undulating membrane
- Kinetoplast
- Trypanosomiasis (rare in India)

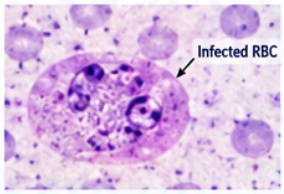
2. PARASITES IN BONE MARROW ASPIRATE

Leishmania donovani



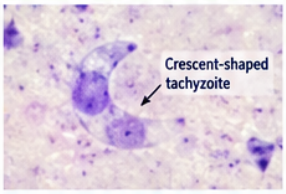
- **Intracellular/extracellular amastigotes**
- **Nucleus + rod-shaped kinetoplast**
- Macrophages
- Visceral leishmaniasis (kala-azar)

Plasmodium spp.



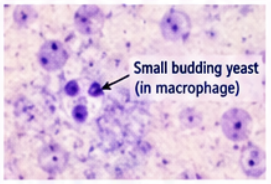
- Intraerythrocytic stages
- Ring, trophozoite, schizont
- Malaria

Toxoplasma gondii



- Crescent-shaped tachyzoites (may be accasional in marrow)
- Disseminated toxoplasmosis (immunocompromised)

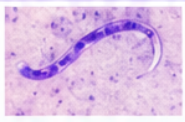
Histoplasma capsulatum



- Small intracellular yeasts
- Narrow-based budding
- Clear halo (may mimic capsule)
- Disseminated histoplasmosis (fungus – not a true parasite)

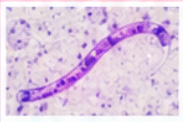
3. FILARIAL MICROFILARAE – MORPHOLOGICAL IDENTIFICATION

Wuchereria bancrofti



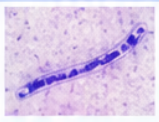
- Sheath present
- Smooth, gently curved
- Short cephalic space
- No nuclei at tail tip

Brugia malayi



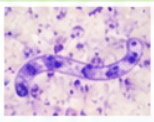
- Sheath present
- More angular/kinked
- Longer cephalic space
- Two terminal nuclei

Loa loa



- Sheath present
- Nuclei extend to tip
- Slender

Mansonella perstans



- No sheath
- Blunt tail
- Nuclei to tip
- Stouter

Key Features at a Glance

Feature	W. bancrofti	B. malayi	Loa loa	M. perstans
Sheath	Present	Present	Present	Absent
Body	Smooth	Angular/ kinked	Slender	Stouter
Cephalic space	Short	Longer	Short	–
Tail nuclei	Absent	Two terminal	Present to tip	Present to tip
Tail tip	Free of nuclei	Two nuclei	Nuclei to tip	Blunt

QUICK REFERENCE – WHAT TO LOOK FOR?

Finding	Most likely organism
Multiple rings in one RBC	*P. falciparum*
Band-form trophozoite	*P. malariae*
Enlarged RBC with Schüffner's dots	*P. vivax*
Sheathed microfilaria (no tail nuclei)	*W. bancrofti*
Sheathed microfilaria (two terminal nuclei)	*B. malayi*
Intracellular amastigotes (nucleus + kinetoplast)	*Leishmania donovani*
Intraerythrocytic tetrad / Maltese-cross	*Babesia species*
Small intracellular budding yeasts	*Histoplasma capsulatum*

IMPORTANT POINTS

- Malaria parasites are best detected on thick and thin smears.
- Microfilariae may be periodic (depends on species).
- A negative smear does not exclude malaria or filariasis.
- Bone marrow is not a routine specimen for filarial parasites.
- Always correlate with clinical findings and use confirmatory tests (serology/PCR) when needed.

KEY TAKEAWAY

Look closely, recognize the morphology, correlate with clinical context and confirm when needed.

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