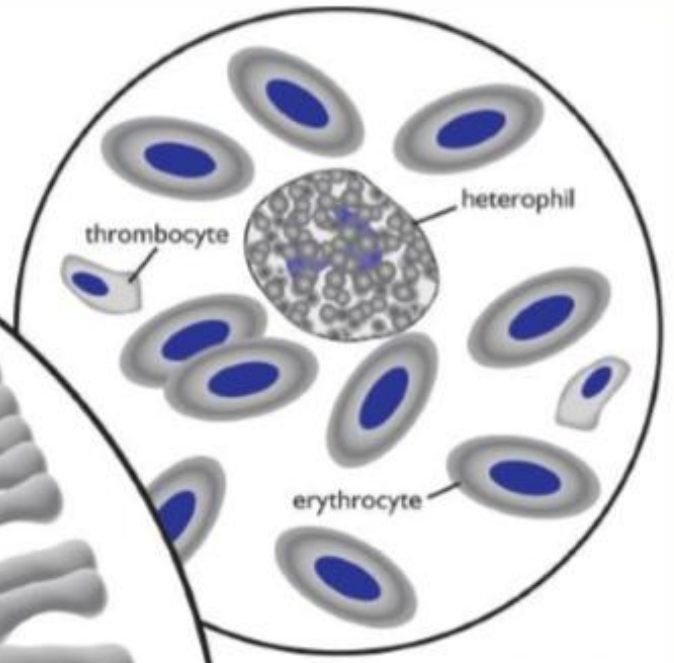
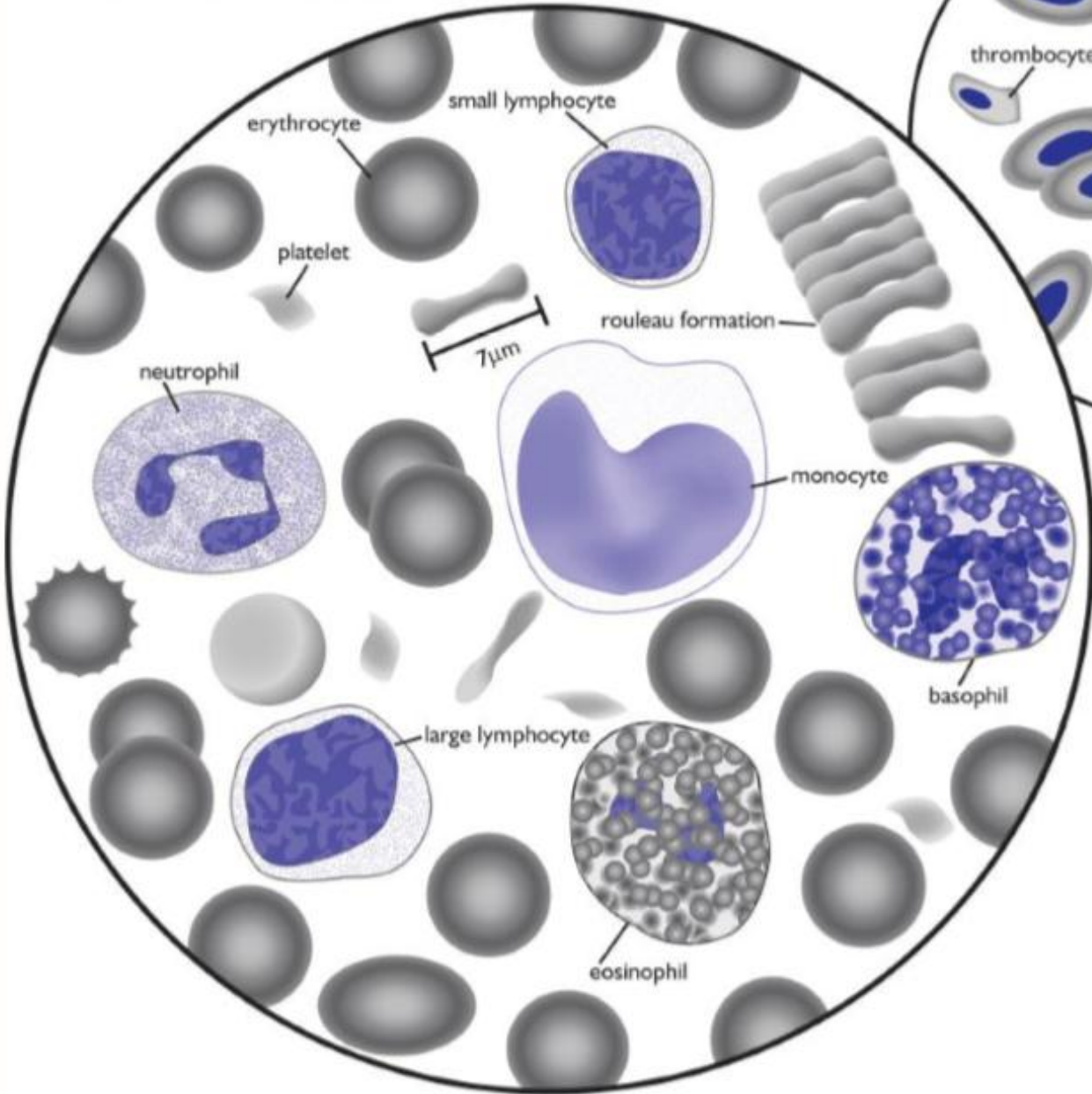


Blood

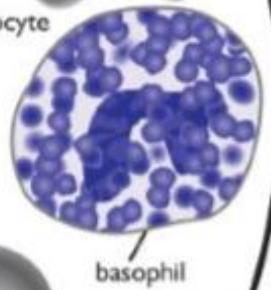
- Mammalian blood is composed of plasma, cells and platelets.
- Blood cells and platelets are produced in the bone marrow.
- Plasma is the fluid component of blood.
- **Erythrocytes:**
- The erythrocyte, or red blood cell (RBC), is the most numerous cell in blood.
- The mammalian cell is a biconcave disk which is devoid of a nucleus and organelles and measures 4-7 micrometres in diameter.
- In contrast, erythrocytes from avian and many lower species are ovoid and contain numerous organelles including a nucleus.
- The cytoplasm of erythrocytes contains haemoglobin and various enzymes.
- Haemoglobin is a large protein bound to heme, which contains iron.
- The protein portion of haemoglobin releases carbon dioxide while the iron portion binds oxygen in the lung.


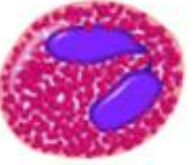
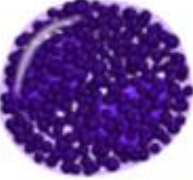

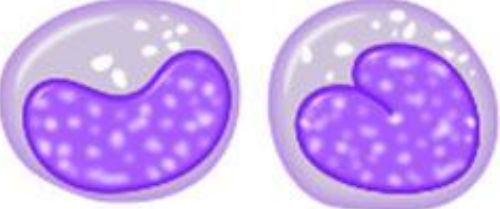
Blood

MAMMALIAN BLOOD



AVIAN BLOOD



Leukocytes	Subtype	Nucleus	Function	Example
Granulocytes	Neutrophil	Multi-Lobed	Bacterial or fungal infection. These are the most common first responders to microbial infection.	
	Eosinophil	Bi-Lobed	Parasitic infections and allergic reactions (inflammatory).	
	Basophil	Bi/Tri-Lobed	Allergic and antigen response (releases histamine causing vasodilation).	
Agranulocytes	Lymphocyte	Deep Staining, Eccentric	Include B cells, CD4+ helper T cells, and CD8+ cytotoxic T cells. Operate primarily in the lymphatic system.	
	Monocyte	Kidney Shaped	Phagocytosis of pathogens. Presentation of antigens to T cells. Eventually, they become tissue macrophages, which remove dead cell debris and attack microorganisms.	

Platelets and Thrombocytes

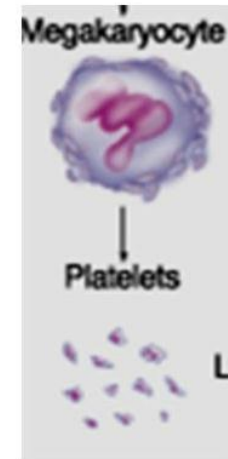
➤ Platelets

- They are small fragments of megakaryocytes.
- The platelet lacks a nucleus.
- Platelets play a role in the formation of blood clots



➤ Thrombocytes

- They are found in the blood of avian and lower vertebrates.
- The thrombocyte is nucleated and has a clear cytoplasm with small red granules.
- Thrombocytes function in blood clotting, are phagocytic, and develop from erythrocytic precursors instead of forming from the megakaryocyte.



➤ Megakaryocytes

- Are large cells with a single polyploid nucleus.
- Release membrane-bounded fragments of their cytoplasm into circulating blood as platelets.
- Megakaryocytes are absent in avian and lower vertebrates

Plasma

- The fluid component of blood is plasma which is composed of water with a small percentage of proteins, inorganic salts and other organic compounds including amino acids, hormones and lipoproteins
- Plasma proteins include albumin, alpha-, beta- and gamma-globulins, and fibrinogen. If plasma is allowed to clot and the clot is removed, the residual fluid is serum

Blood Cell Formation

- Blood cell development occurs at different sites in the body. Prenatally and during certain diseases, blood cells are formed outside the bone marrow (extramedullary hemocytopoiesis) in the yolk sac, liver, and spleen.
- Medullary hemocytopoiesis is the formation of blood cells within the bone marrow. Colony-forming units (CFU).
- The committed stem cells continue to develop into specific cell lines and include the erythrocytic, leukocytic, and lymphocytic stem cells.
- CFU-GM are the stem cells for precursor cells of monocytes, neutrophils, eosinophils, and basophils.
- CFUMK are the stem cells for megakaryocytes and CFU-E are the stem cells for erythrocytes.
- The lymphoid stem cell divides to form B and T progenitor cells.
- The B cell goes through initial differentiation in the cloacal bursa in avian or a bursa-equivalent area, the bone marrow, in mammals, while the T cell begins differentiation in the thymus.
- Release of New Blood Cells into Circulation Mature
- blood cells leave the hemocytopoietic compartment by crossing the sparse basement membrane of the sinusoidal endothelium and exiting the bone marrow through transient