



AVIAN PHYSIOLOGY



Part I

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- ❖ The avian CBC is a **most important component of a diagnostic panel and the best indicator of a bird's general health**. It is the microscopic examination and evaluation of red and white blood cells that make up the cellular component of blood, and the results are an indicator of immune system activity.

THE CBC PROVIDES:

- ❖ The volume, number, and character of the **red blood cells** per liter of blood.
- ❖ The numbers, percentages and characteristics of the white blood cells.
- ❖ A report of the relative numbers of specific types of **white blood cells** (*leukocytes*) in the sample.
- ❖ The concentration of solids in the *plasma*.
- ❖ The relative number of **thrombocytes**, and
- ❖ The presence or absence of blood-borne **parasites**

THE CBC PROVIDES:

IMPORTANT POINTS:

- ❖ The CBC is used to diagnose various blood dyscrasias (diseases or disorders), infections, and other abnormal body conditions.
- ❖ The average blood volume of most birds is about 10% of the body weight.
- ❖ When blood is used for testing, 10% of this volume (1% of the bird's body weight) may be safely removed.
- ❖ New blood cells are generated every 4-6 weeks; if there is major blood loss, it can be replaced in a reasonable amount of time.
- ❖ In birds, mammalian neutrophils are replaced with heterophils, and platelets are replaced with thrombocytes.
- ❖ Total cells counts differ among members of a given species

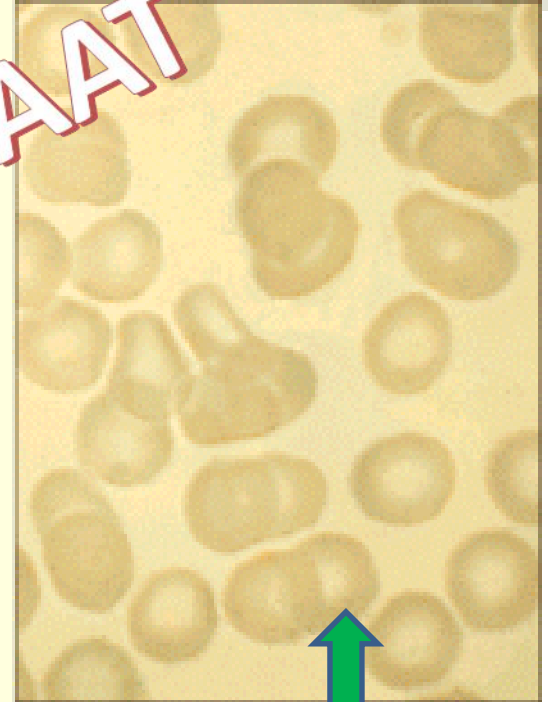
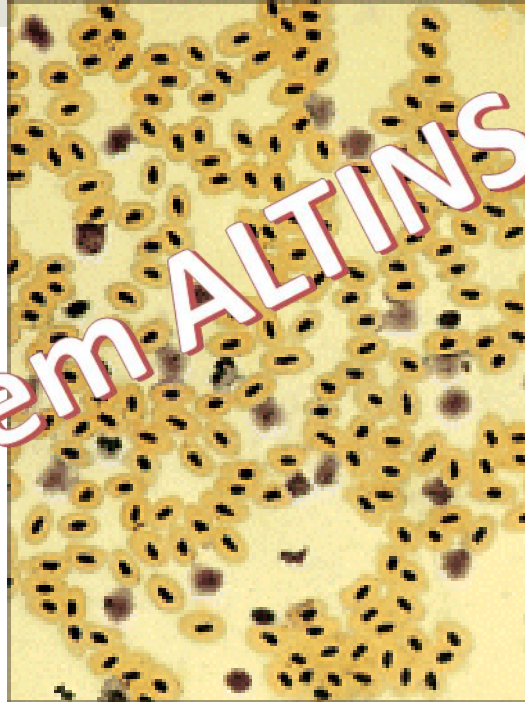
CBC COMPONENTS.

THREE TYPES OF CELLS ARE EVALUATED:

- **Erythrocytes:** Red Blood Cells
- **Leukocytes:** White Blood Cells
- **Thrombocytes:** blood clotting cells, similar to mammalian platelets

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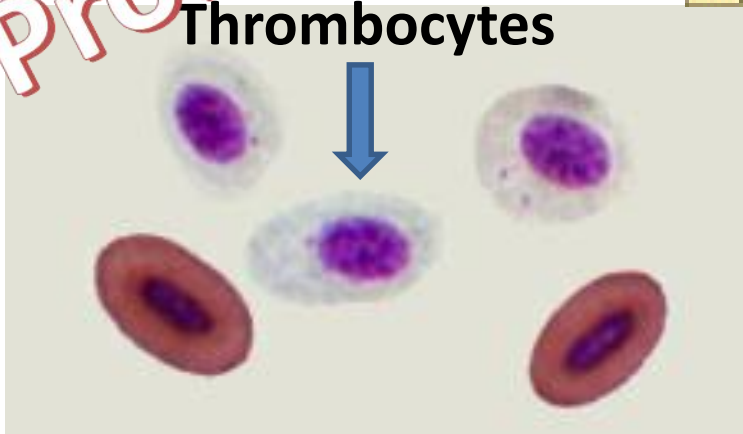
Avian RBC's are oval in shape.



No nuclei in mammalian mature RBC

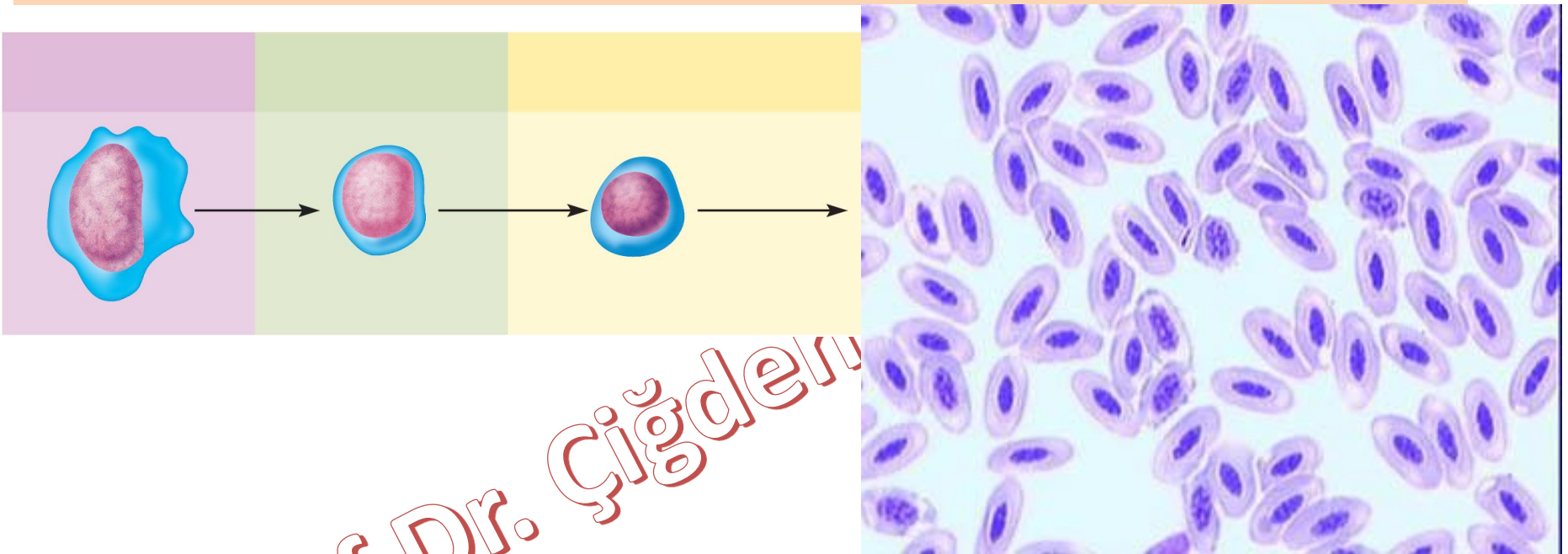


Thrombocytes



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ERYTHROCYTE



- ❖ **RBC's** are produced in the bone marrow
- ❖ Are oval in shape.
- ❖ Can be produced in liver and spleen (ectopic production)
- ❖ Lifespan is 28-45 days (Shorter than mammals)

ERYTHROCYTES: RED BLOOD CELLS

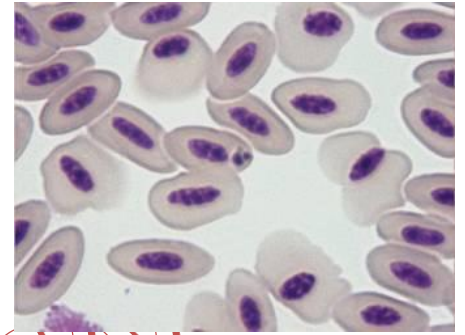
- The **normal RBC count** is from 2.5-4.5 millions of cells/cu mm (cubic millimeter)
- If the bird is ***anemic*** (decrease in the normal number of RBC's) and shows slight to no ***polychromasia*** (abnormal color of red blood cells)
- or ***anisocytosis*** (unequal shape and size of the red blood cells) over several weeks, decreased levels indicate that the bone marrow is depressed and not producing new erythrocytes. This is a serious condition.


ERYTHROCYTES: RED BLOOD CELLS

- **Polychromasia** is a disorder in which the abnormal color of the red blood cells is a result of being prematurely released from the bone marrow during blood formation.
 - The **test for polychromasia** measures the color variation among erythrocytes, indicating the hemoglobin content of the erythrocytes. This is usually slight.

- **Anisocytosis** is a disorder in which the variations in size and shape of the erythrocytes indicate anemia or other blood conditions.
 - The test measures these variations, which are usually slight.
- A high **Packed Cell Volume (PCV) level** indicates dehydration or **polycythemia** (abnormally high number of erythrocytes.)
 - Polycythemia is an indication of bone marrow dysplasia and anemia-related disease
 - Most erythrocytes are mature in the sample; a small percentage are immature. This verifies the normal replenishment from bone marrow.

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- ✓ The total blood volume in clinically normal birds is in the range of 6 to 11 ml per 100 g of body weight
- ✓  A bird weighing 250 g would have approximately 15 to 27.5 ml of blood, of which, in a clinically normal individual, up to 10% (1.5-2.7 ml) can be safely withdrawn without having any detrimental effect on the patient.
- ✓ However, 0.2 to 0.3 ml of blood is generally sufficient to carry out a comprehensive hematology examination in a bird.