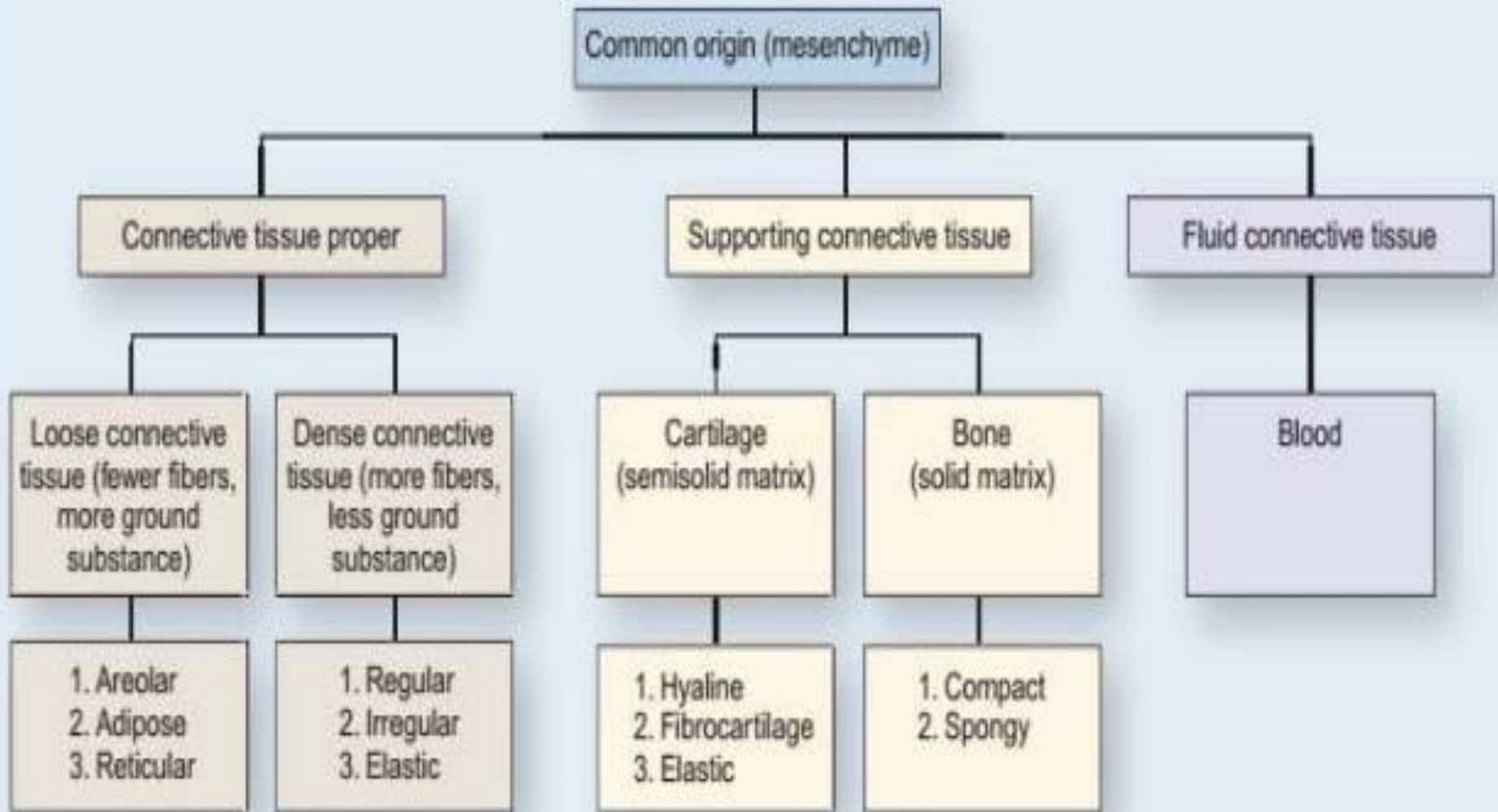


## Connective Tissue Classification



# *Specialized connective tissues*

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## **Specialized Connective Tissues**

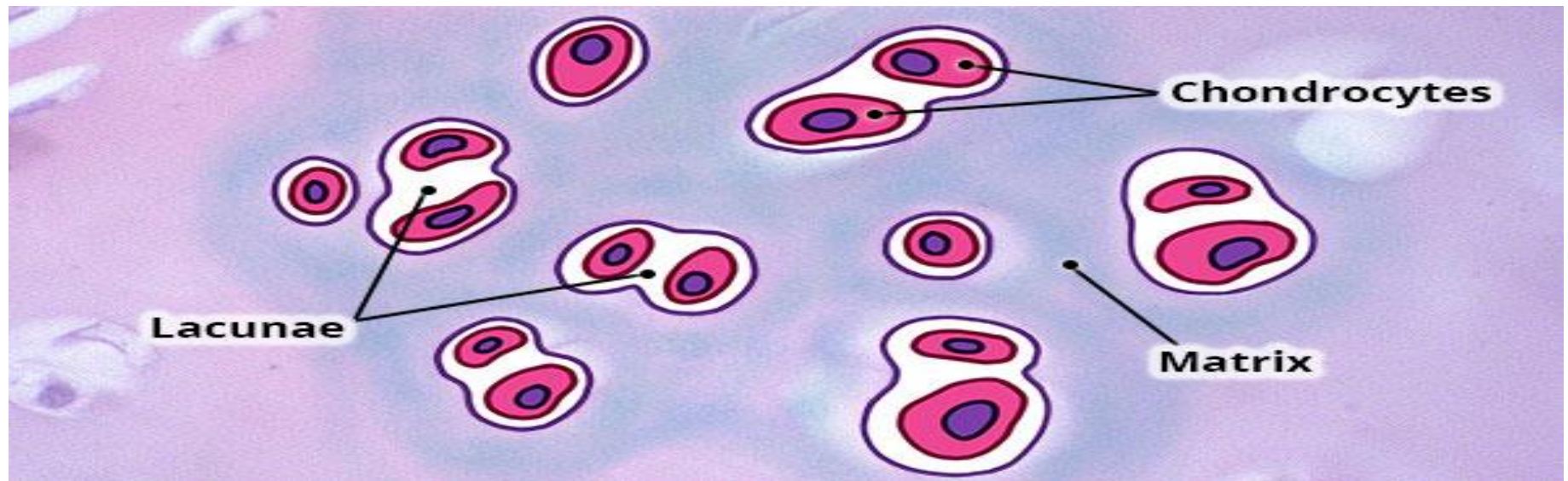
**This group includes cartilages, bone , and blood.**

**Cartilage and bone form the skeletal framework of the body while blood is the vascular (transport) tissue.**

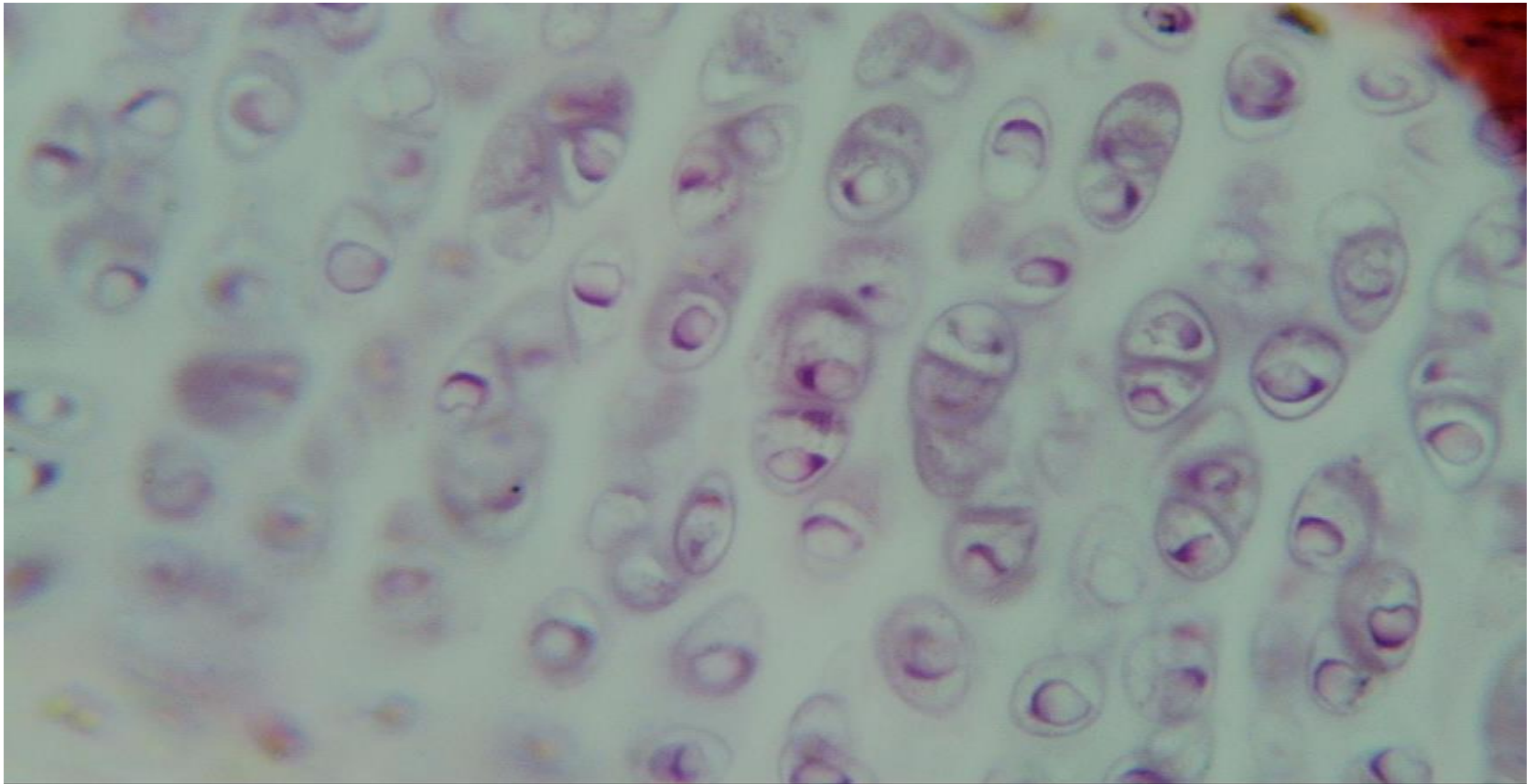
**Cartilage does not have any blood vessels occur at all if the damage is extensive enough. Nonvascular, get nutrient via diffusion through ground substance**

# Cartilage

- **Cartilage is a special form of C.T. that consists mainly of cells called **chondrocytes** and **chondroblasts****
- **Providing a firm structural support for soft tissue, which allows flexibility without distortion and is resilient to compression.**



**Cartilage is classified into these three main types (Hyaline, Elastic and Fibrocartilage), which founds in the body, according to the amount and types of fibers present in its extracellular matrix**



**Cells and Matrix of mature Hyaline cartilage [ Chondrocytes in side Lacunae]**

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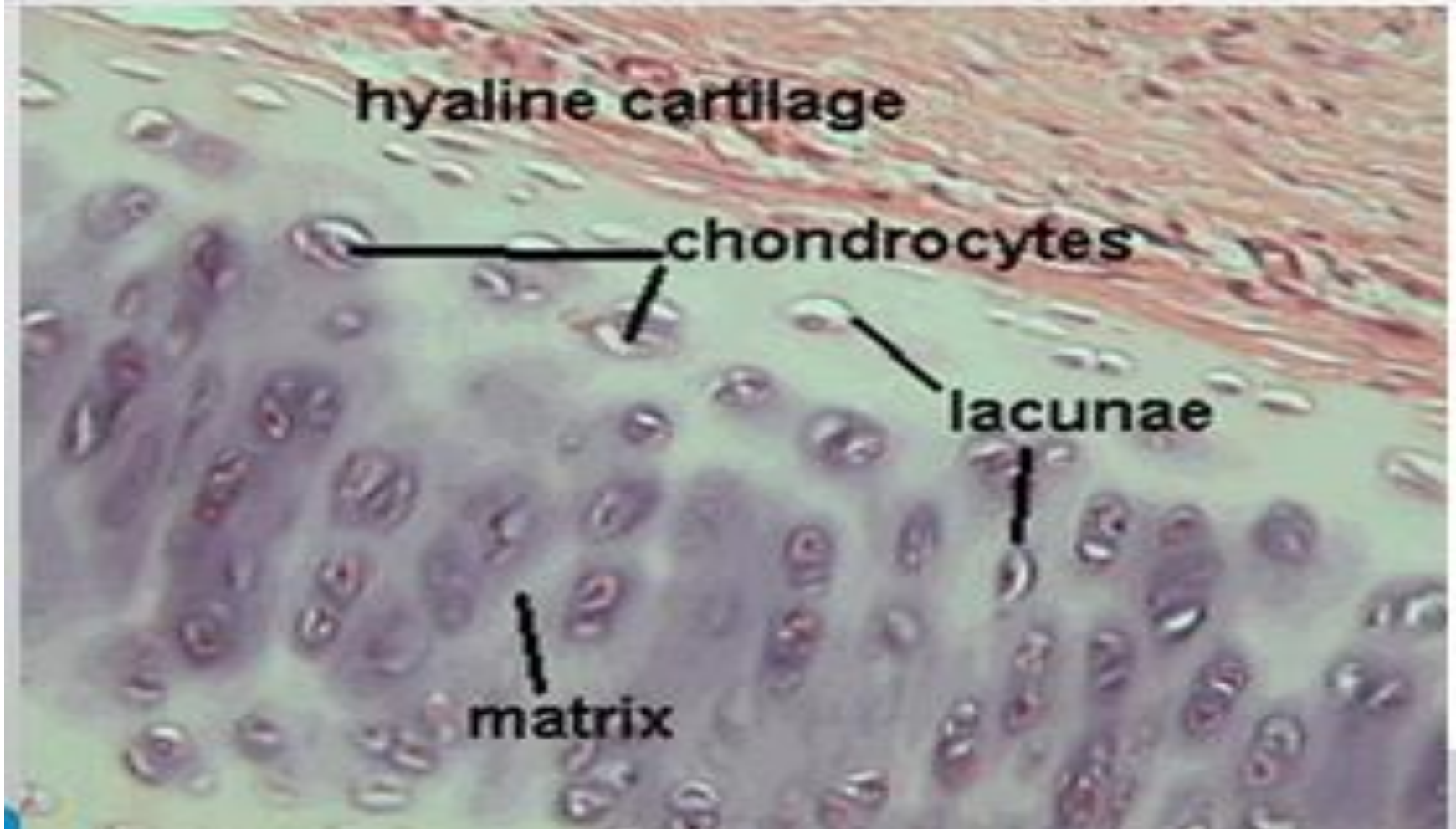
# A-Hyaline Cartilage

**-Very rubbery, soft cartilage**

**-Hyaline cartilage is covered externally by a fibrous membrane, called the perichondrium. This membrane contains vessels that provide the cartilage with nutrition. It consists of cells (chondrocytes) .**

**-The cells are contained in cavities in the matrix called cartilage lacunae.**

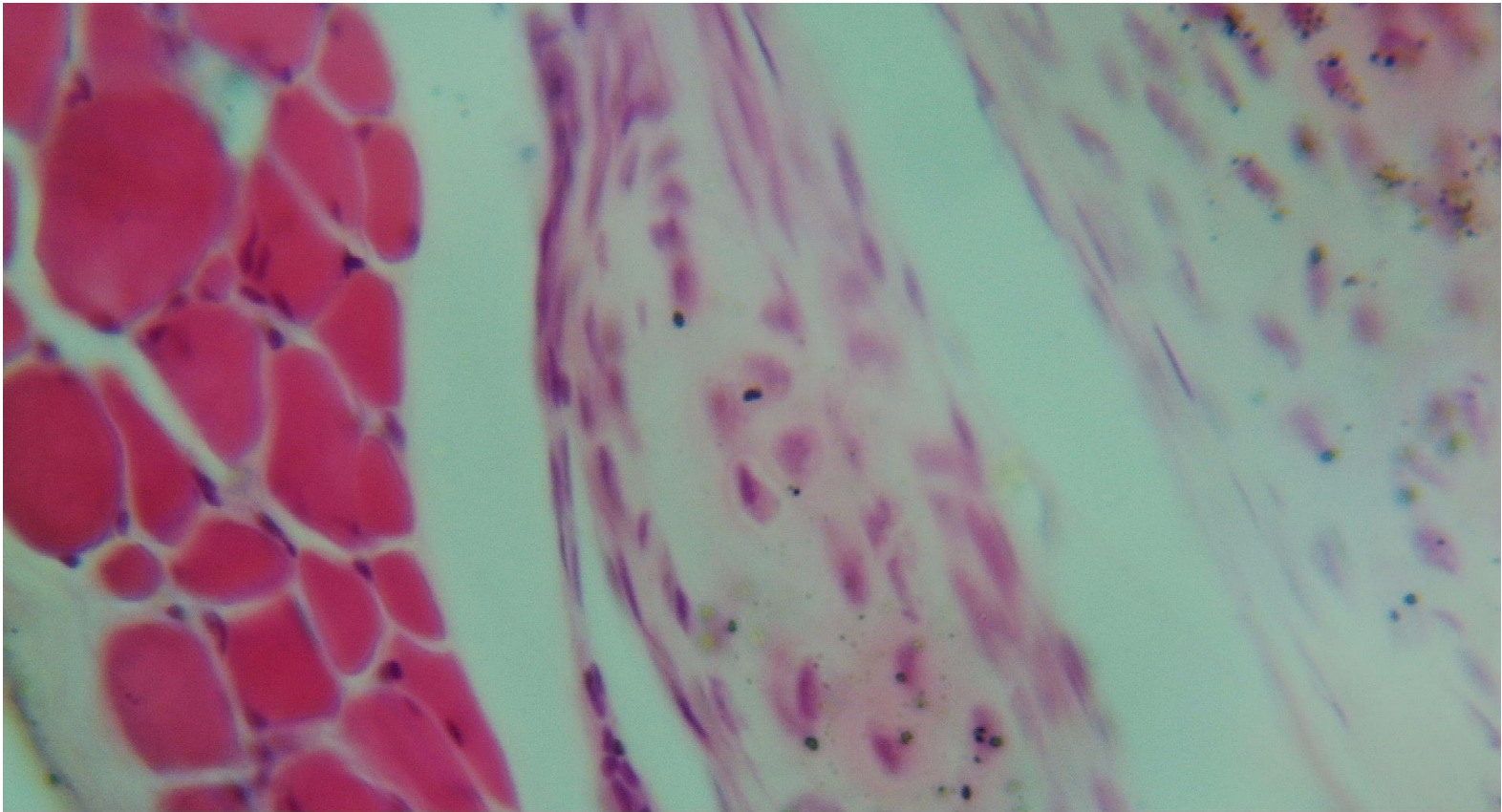
# Hyaline cartilage







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**Hyaline cartilage and developing bone [Perichondrium, Chondrocyte, Chondroblast]**

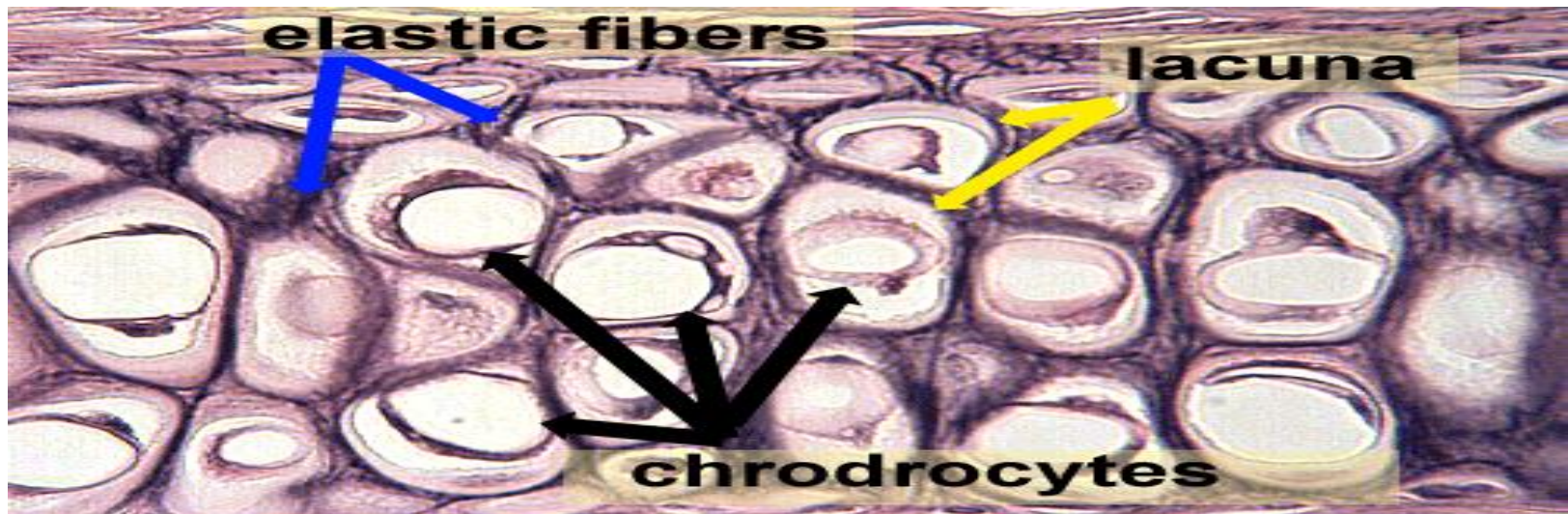
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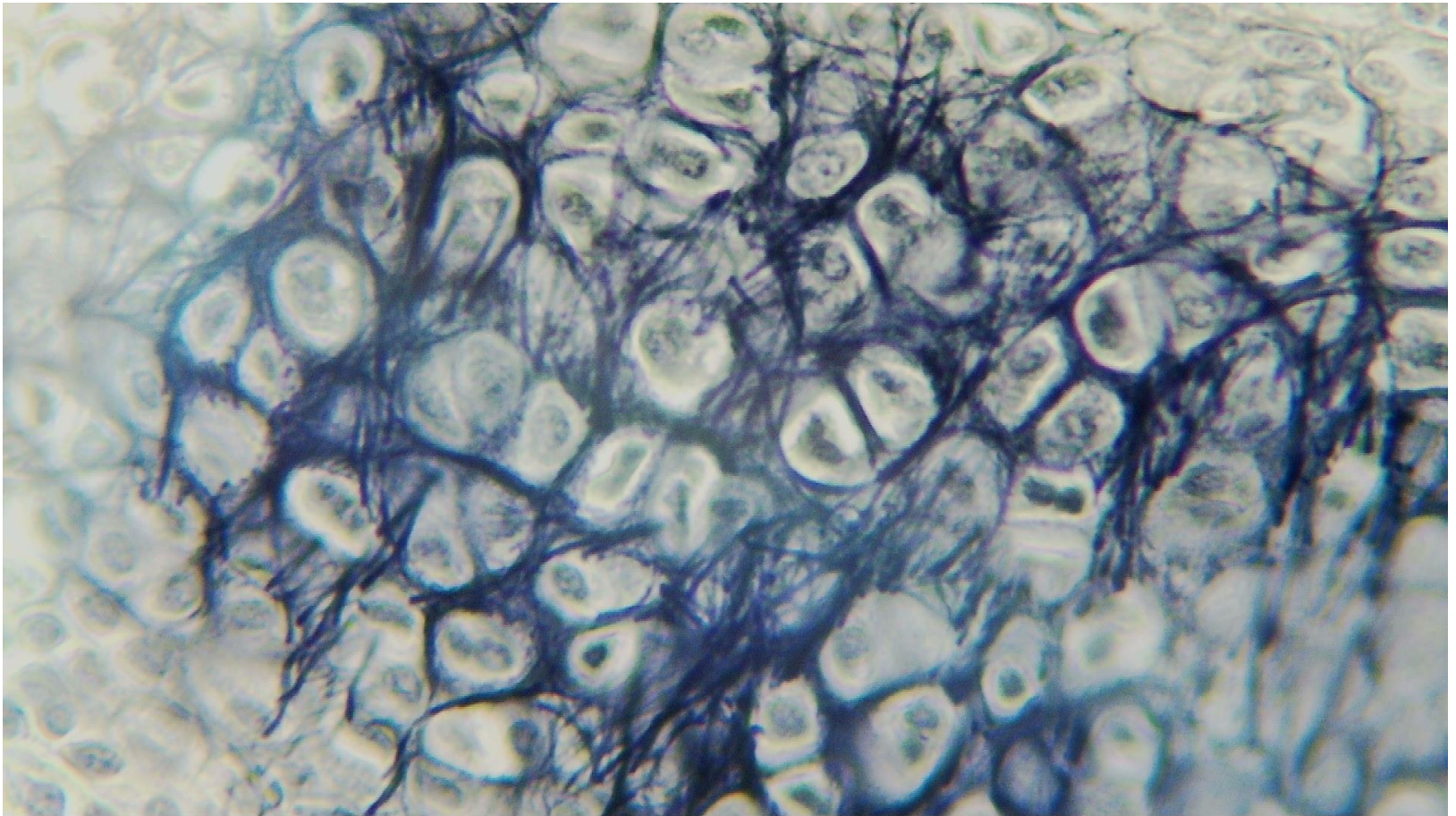


## **B- Elastic cartilage**

**Elastic cartilage is histologically similar to hyaline cartilage but contains many **yellow elastic fibers lying in a solid matrix.****

**This type of cartilage allows for flexibility and makes structures elastic. It is much more flexible than hyaline cartilage because it contains elastic fibers embedded in its matrix e.g. cartilage of pinna and epiglottis**



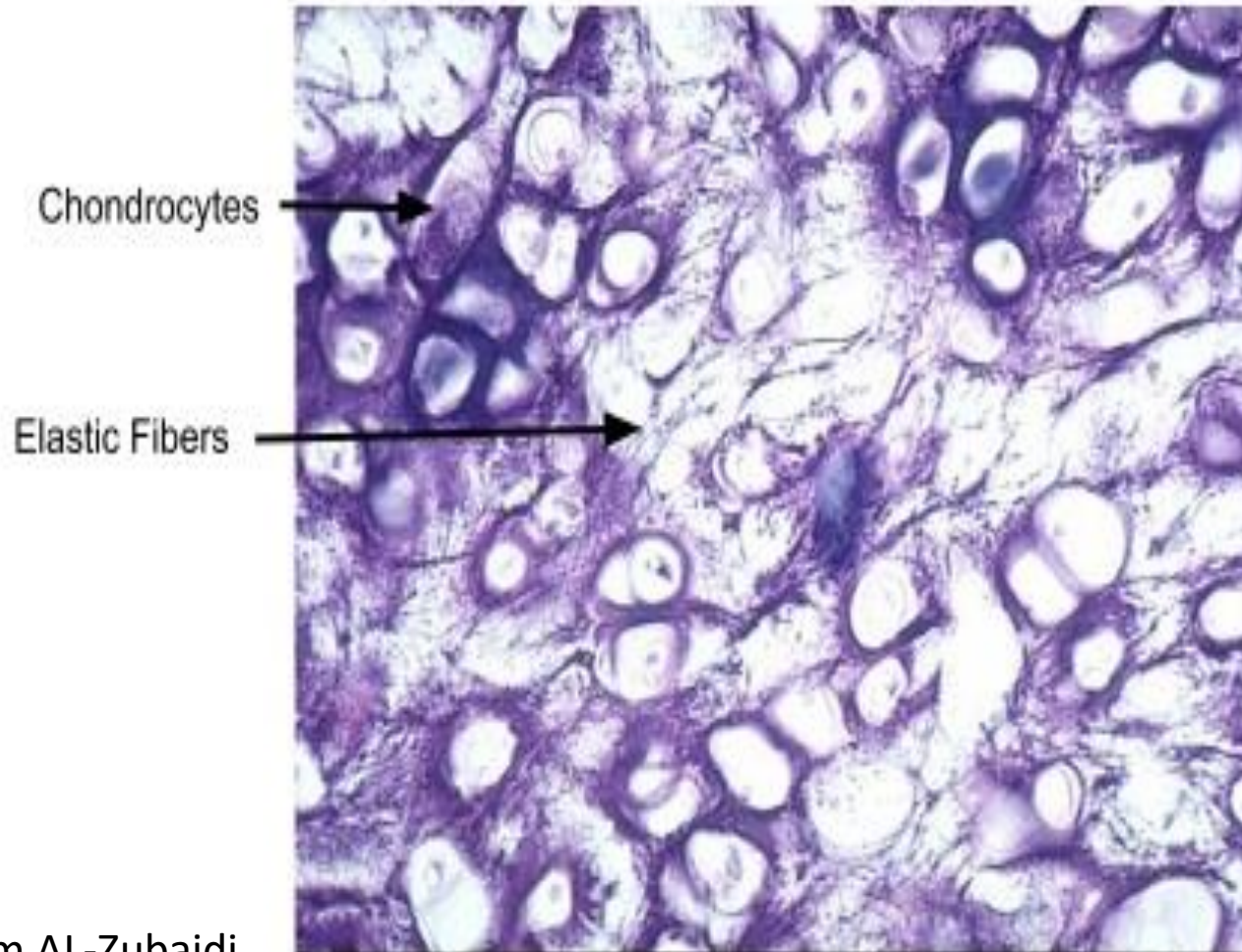


## **Elastic Cartilage [Elastic Fiber, Chondrocytes]**

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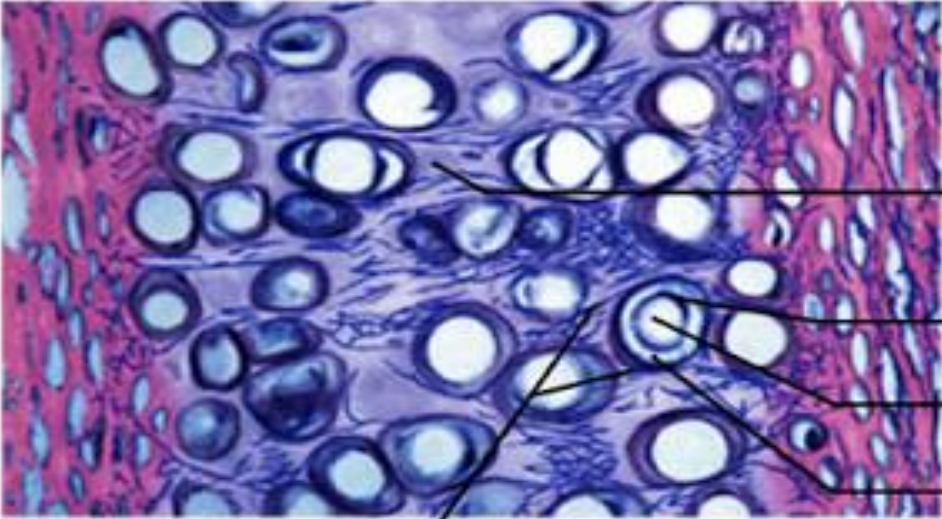


## Elastic Cartilage



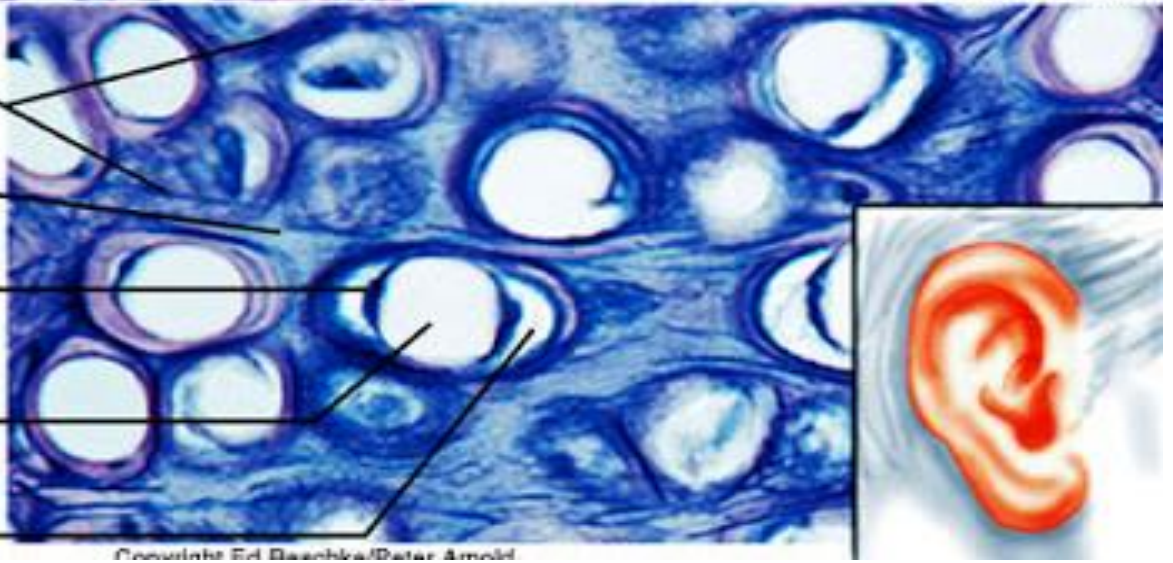


# Elastic Cartilage



- Intercellular material
- Nucleus
- Chondrocyte
- Lacuna

- Elastic fibers
- Intercellular material
- Nucleus
- Chondrocyte
- Lacuna



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# C- Fibro cartilage

- It is a tough flexible tissue which contain dense collagenous fibers imbedded in matrix
- It is very useful for resisting compressive forces and physical shock
- Found in three places: intervertebral disks and the pubic symphysis.



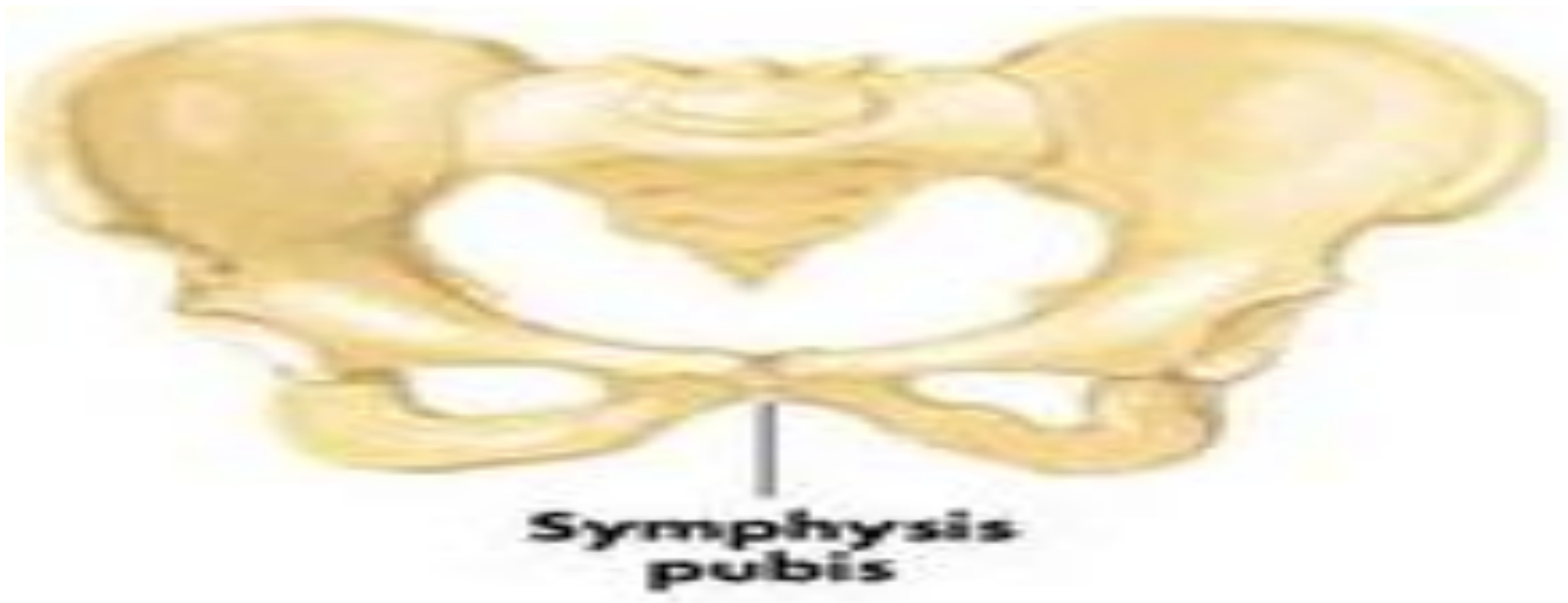
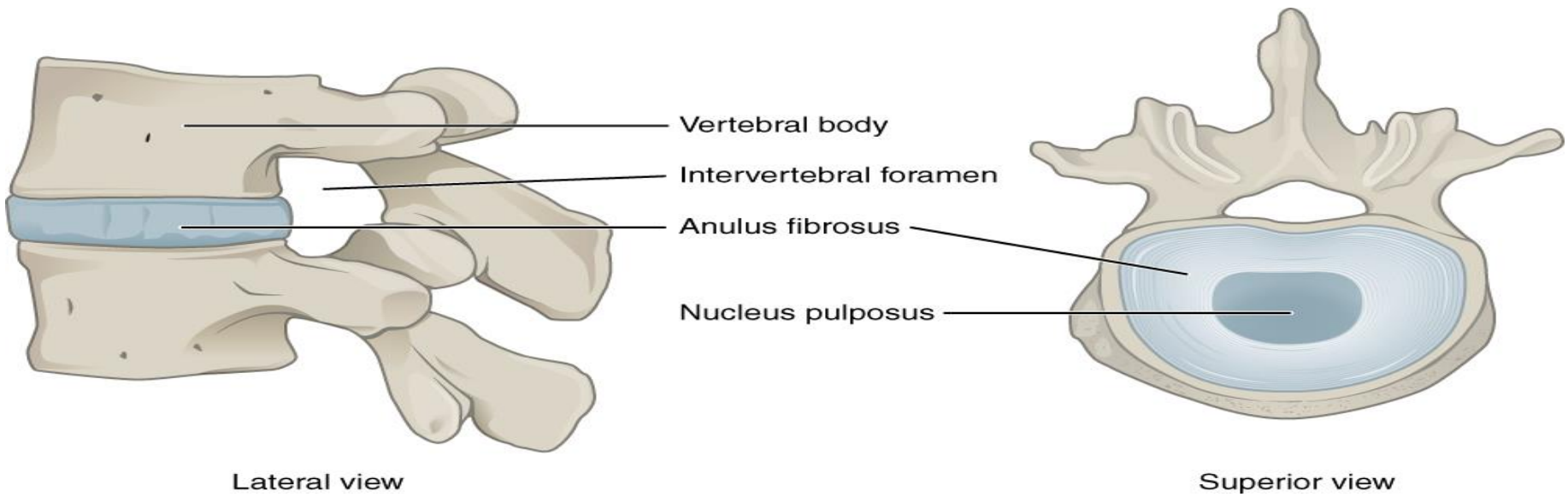
**Fibrous Cartilage H&E**  
**articular disc**

**fibrous matrix**



**chondrocytes**





# FEATURES OF IDENTIFICATION

<b>HYALINE CARTILAGE</b>	<b>ELASTIC CARTILAGE</b>	<b>FIBRO CARTILAGE</b>
<b>1. PERICHONDRIMUM PRESENT</b>	<b>1. PERICHONDRIMUM PRESENT</b>	<b>1. PERICHONDRIMUM ABSENT</b>
<b>2. GROUND SUBSTANCE HIGHLY BASOPHILIC AND HOMOGENEOUS</b>	<b>2. NUMEROUS ELASTIC FIBRES</b>	<b>2. BUNDLES OF COLLAGEN FIBRES</b>
<b>3. CHONDROCYTES IN LACUNAE AND IN GROUPS</b>	<b>3. SINGLE CHONDROCYTES IN LACUNA</b>	<b>FEW CHONDROCYTES SEEN</b>



# Bone

- **Bone is also a special of C.T. It is tough and more brittle tissue than cartilage. Bones become calcified due to mineral deposition ( the salts of calcium phosphate and calcium carbonate) in the matrix.**
- **As a result they can bear more weight than cartilage, sever as a rigid skeleton for the body and provide attachment sites for muscle and organs, protects the vital organs, supports mechanical movement, hosts hematopoietic cell, and maintains iron homeostasis.**
- **There are three key cells of bone tissue. Osteoblasts, Osteocytes and Osteoclasts They each have unique functions and are derived from two different cell lines.**

# There are two types of bone:

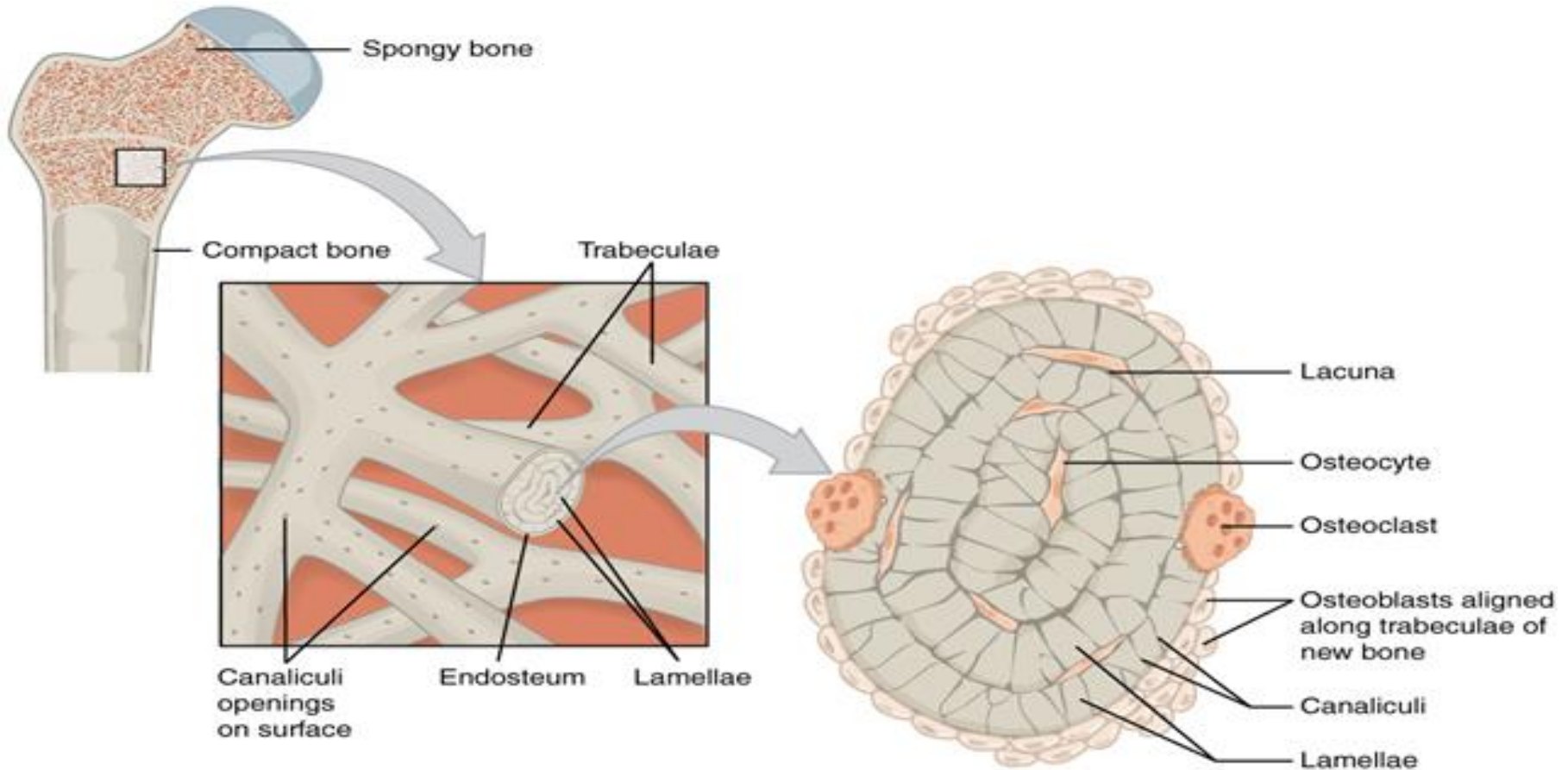
## **A- SPONGE BONE**

- Spongy bone(trabecular bone, cancellous bone)
- Basically bone tissue with many spaces/ struts and is covered by compact bone, it has no haversian system.
- This is where you find red bone marrow.
- Spongy bone is found on the ends of long bones

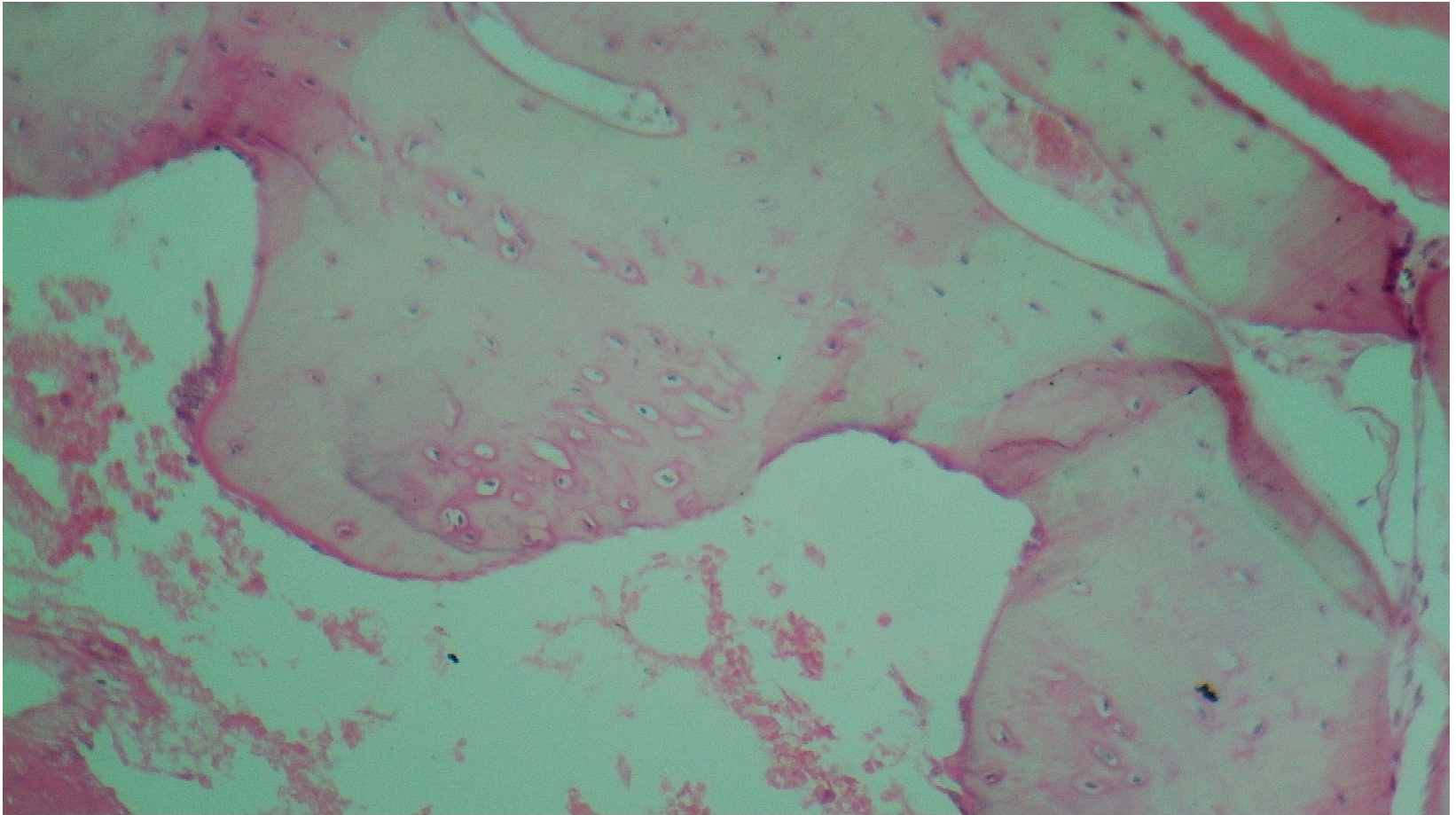
## **B- DENSE OR COMPACT BONE**

Compact bone is formed of haversian system (osteons) and is located in the outer surface of bone ; e.g. shaft of long bones.

# Spongy bone



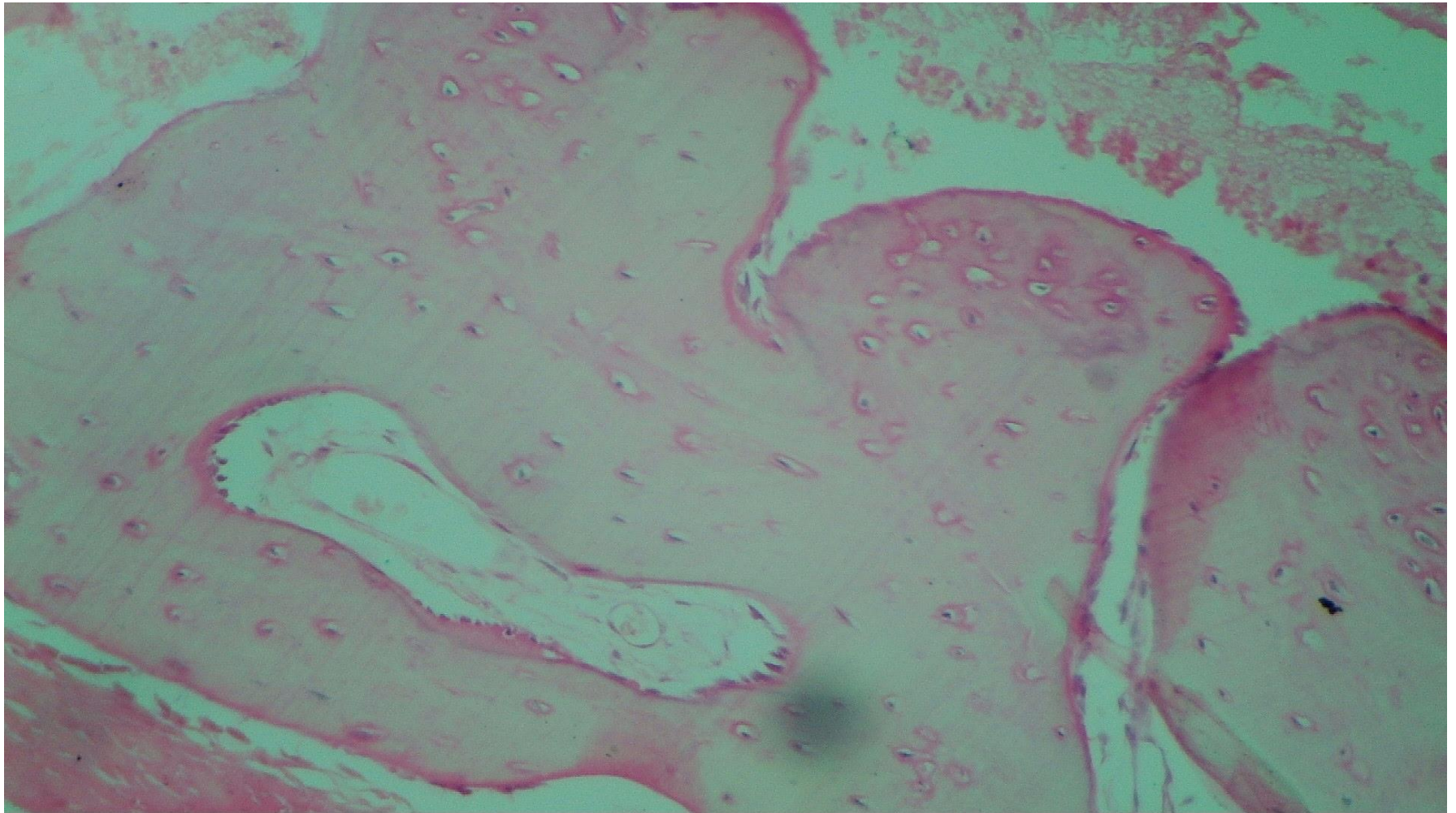
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**Cancellous Bone with trabeculae and bone marrow cavities  
{Osteocytes in lacunae}**

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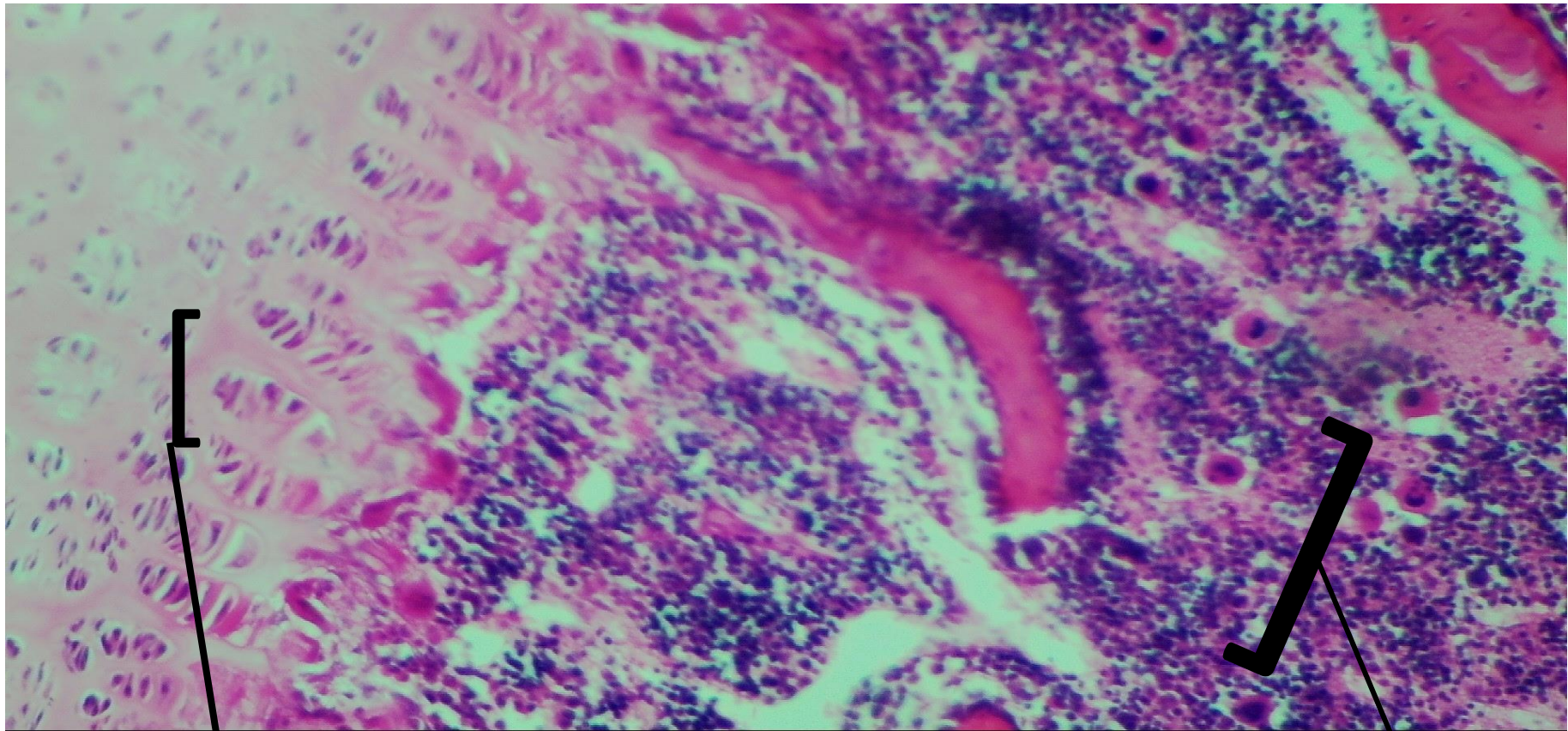




**Cancellous Bone with trabeculae and bone marrow cavities  
{Osteocytes in lacunae}**

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**Chondrocytes**

**Osteoblasts**

## **The transformation of Hyaline Cartilage into Bone**

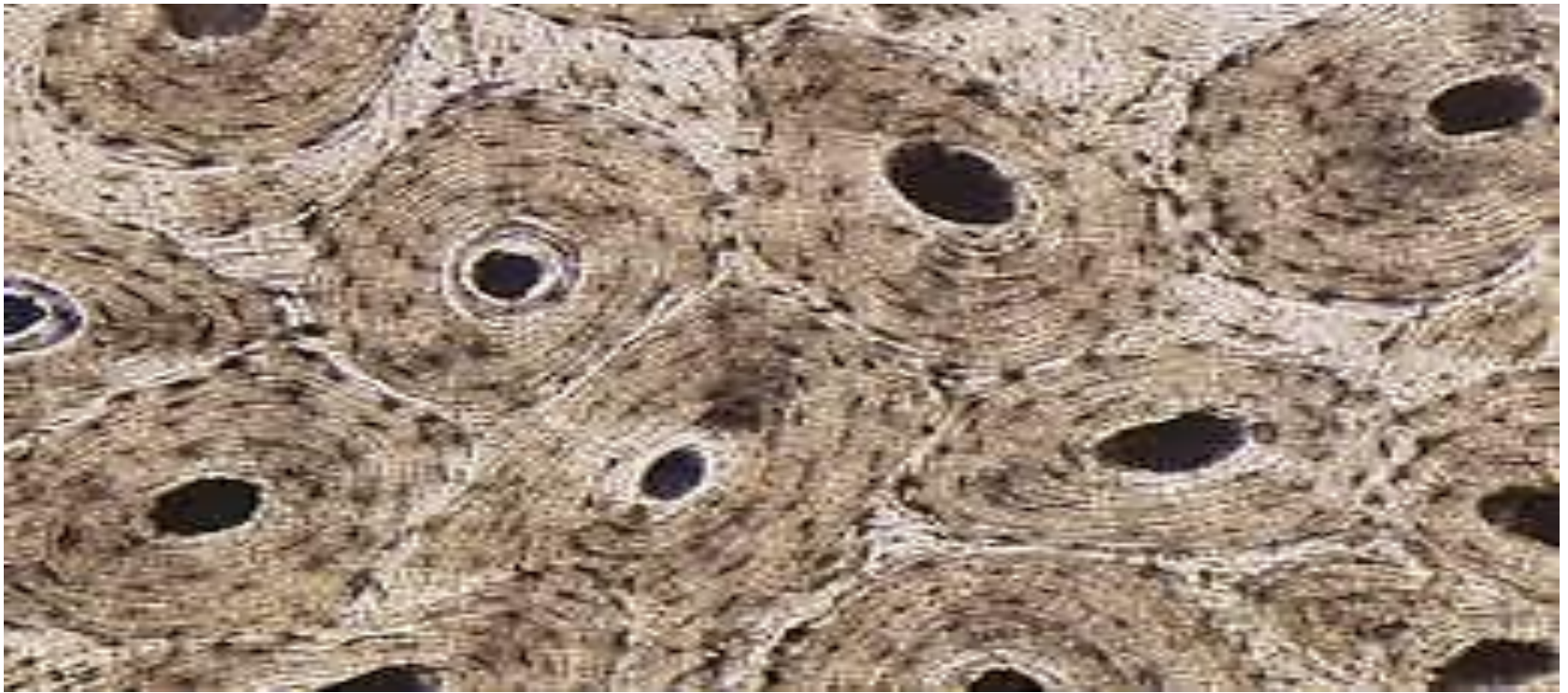
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**Compact Bone, Dried: An Osteon (transverse section).** High magnification.





**Compact bone {Osteon (Haversian system), central Haversian canal, lamellae, lacunae and canaliculi}**

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# Blood

-Blood is a highly specialized tissue composed of many different kinds of components.

-Blood is a constantly circulating fluid providing the body with nutrition, oxygen and waste removal. Blood is a liquid, with numerous cells and proteins suspended in it. The most important ones are red cells, white cells, platelets.

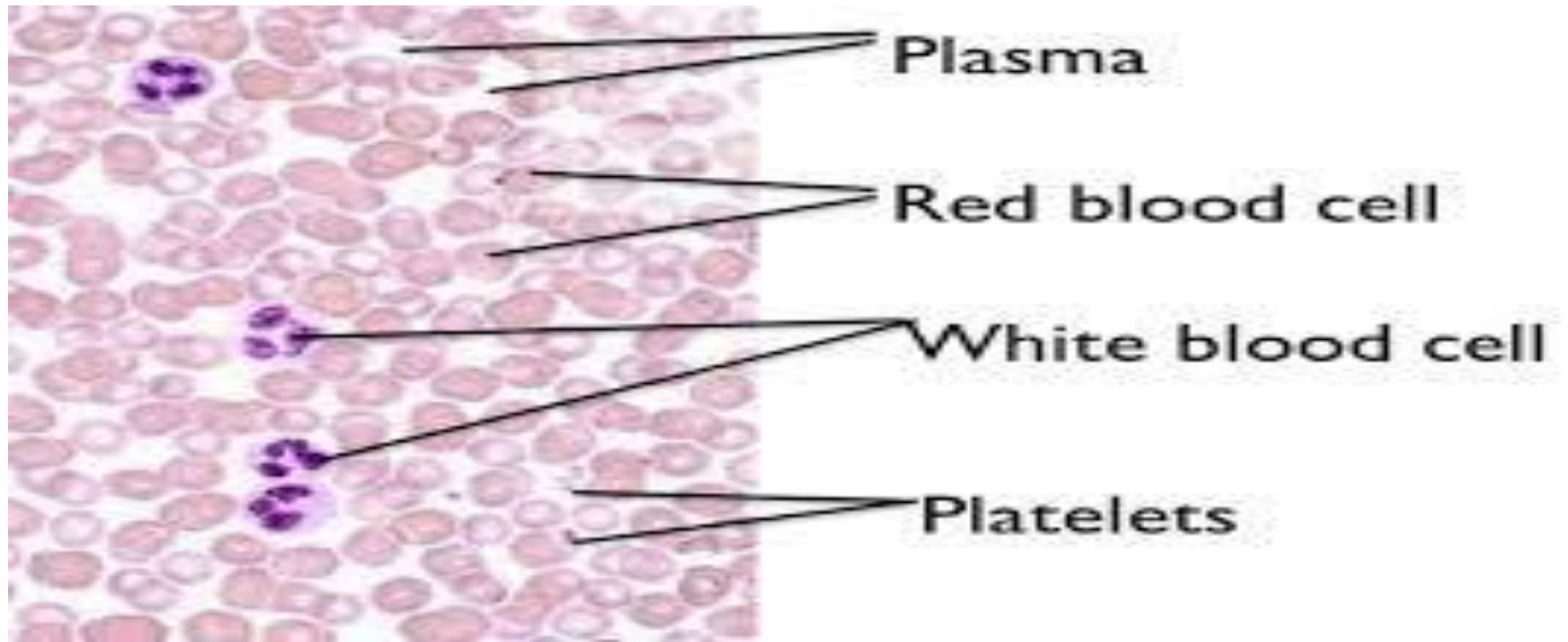
# 1- ERYTHROCYTES

- Erythrocytes which also called red blood corpuscles(RBCs) are shaped like a biconcave disc and when observed on a flat have a circular outline,RBCs are much more numerous than any of the other formed elements of the blood. The content of RBCs is composed of a lipid and protein colloidal complex basically hemoglobin which is responsible for the color of the RBCs.



**White cells or leukocytes:** All white blood cells have nuclei, which distinguishes them from the other blood cells. Types of white blood cells can be classified in standard ways. Two pairs of broadest categories classify them either by structure (granulocytes or agranulocytes). These broadest categories can be further divided into the five main types: neutrophils, eosinophils, basophils, lymphocytes, and monocytes.

**Platelets:** have no cell nucleus, they are fragments derived from the megakaryocytes of the bone marrow, and then enter the circulation.



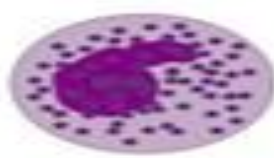
## White blood cells



neutrophil



eosinophil



basophil



monocyte



lymphocyte

# Plasma

- Plasma constitutes 55% of blood, it is a homogenous slightly alkaline fluid which contains nutritive substance derived from the digestive system, the waste substance produced in the tissue, hormones, dissolved gases, inorganic salts, protein , carbohydrates , lipids and other certain organic substances.

# Lymph

- It is the fluid that is collected from the tissue and returned to the blood stream. There are no cellular elements within the lymph of the smallest lymph vessels.



# BLOOD FUNCTIONS:

Blood play important role in :

1-Respiration of body

2-Nutrition

3-Waste elimination

4-Thermoregulation

5-Immune defence

6-Acid- base balance

7-Water balance

8-Internal communication