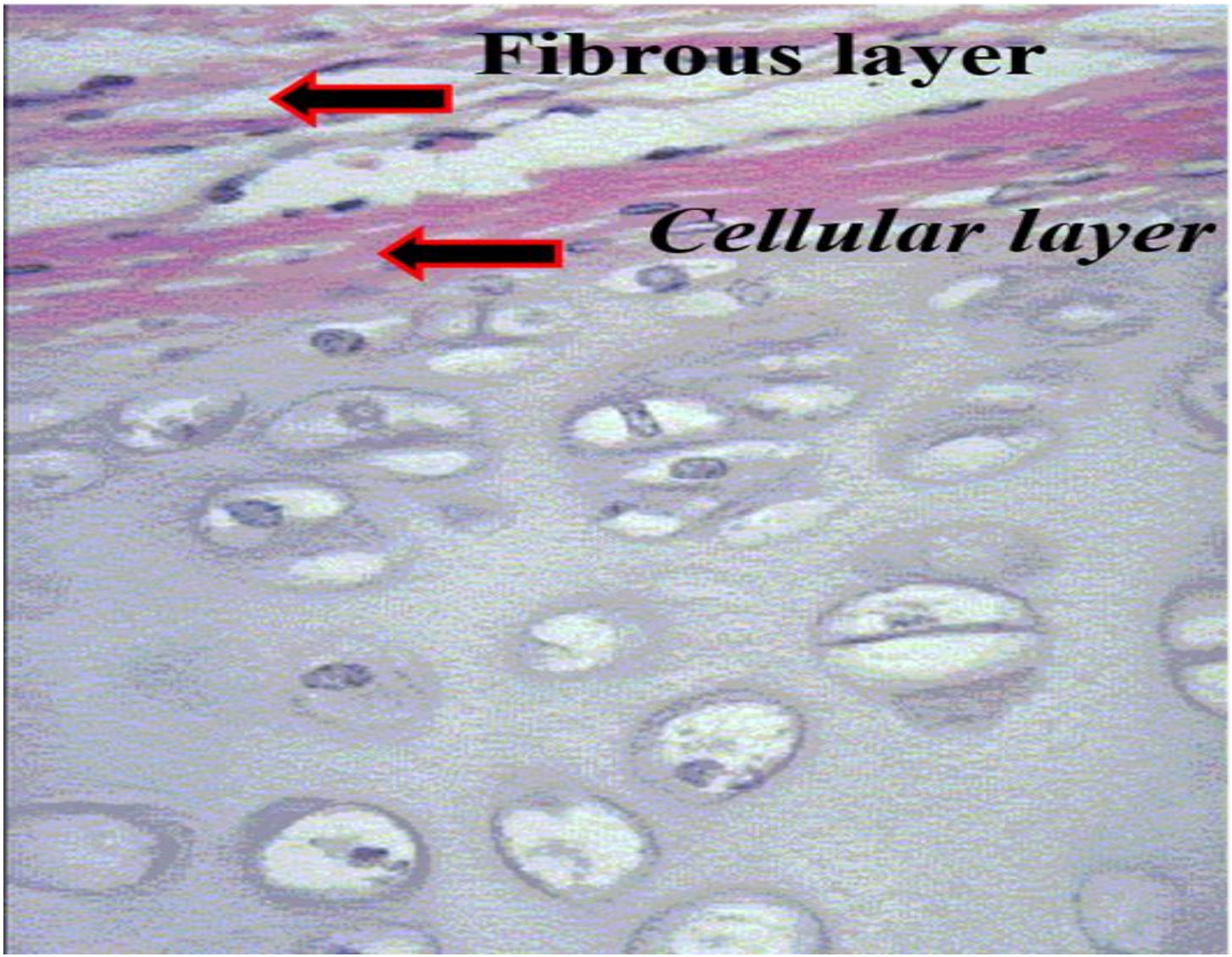
Supporting connective tissue

- Cartilage and bone are modified CT in which ground substance is hardened to provide support for soft tissue
- Cartilage and bone form the skeleton of the body

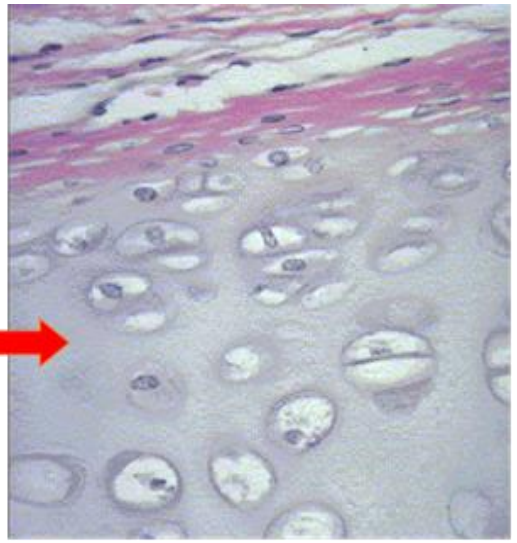
PERICHONDRIUM



Extracellular MATRIX

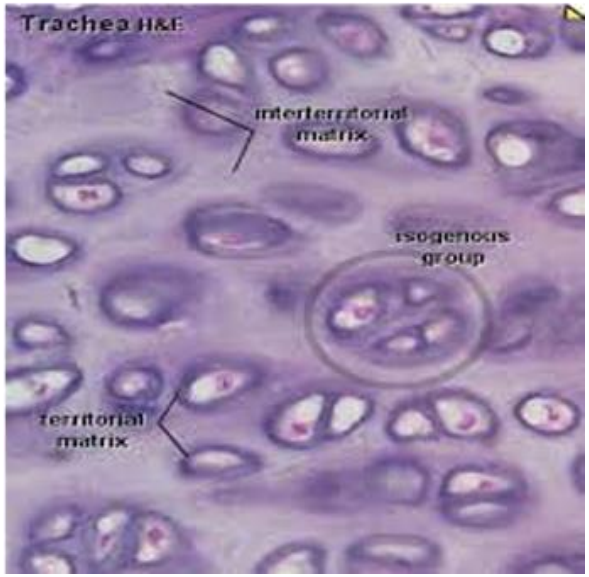
➢ **Interterritorial matrix**

Between the lacunae

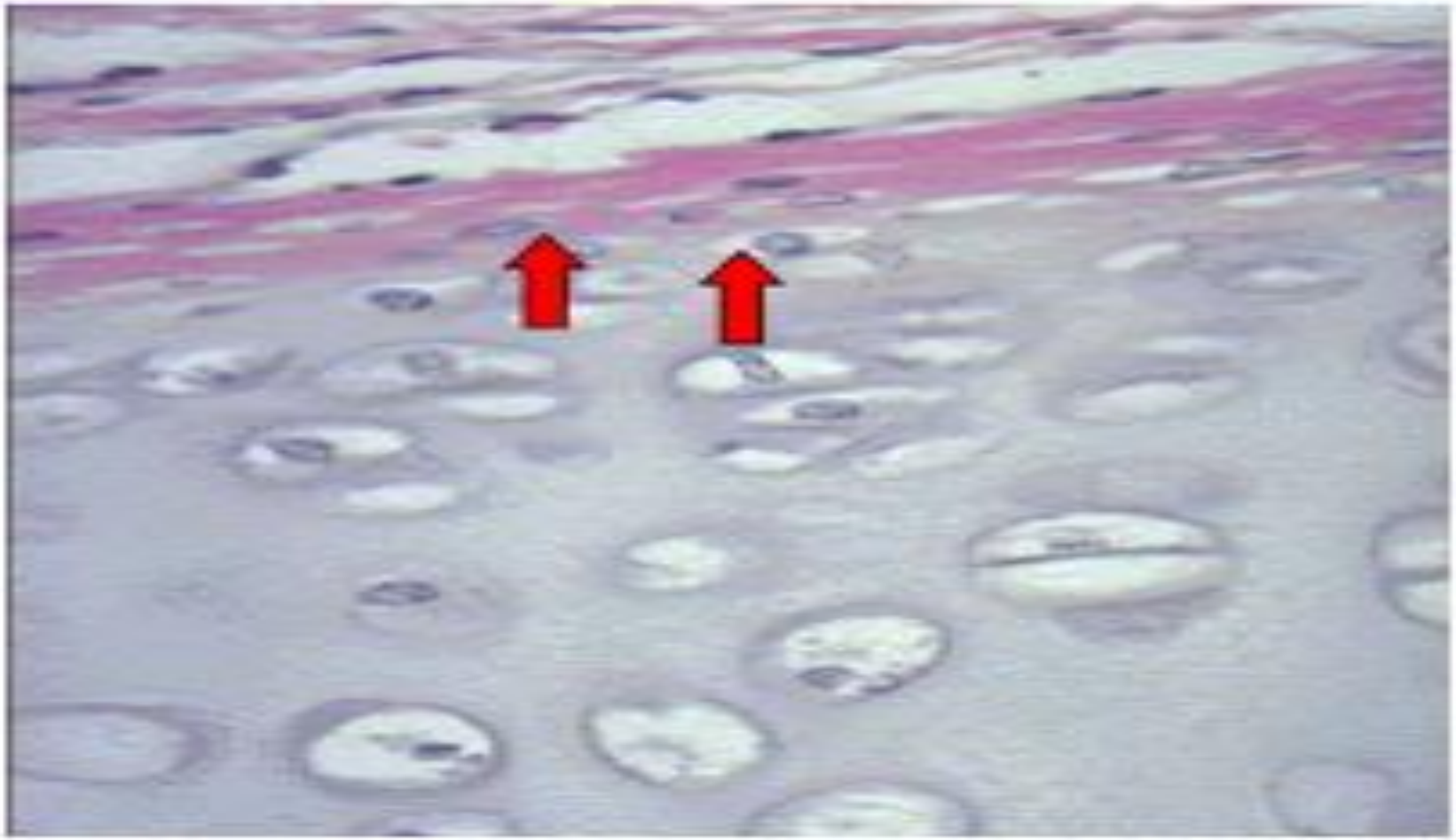


➢ **Territorial matrix**

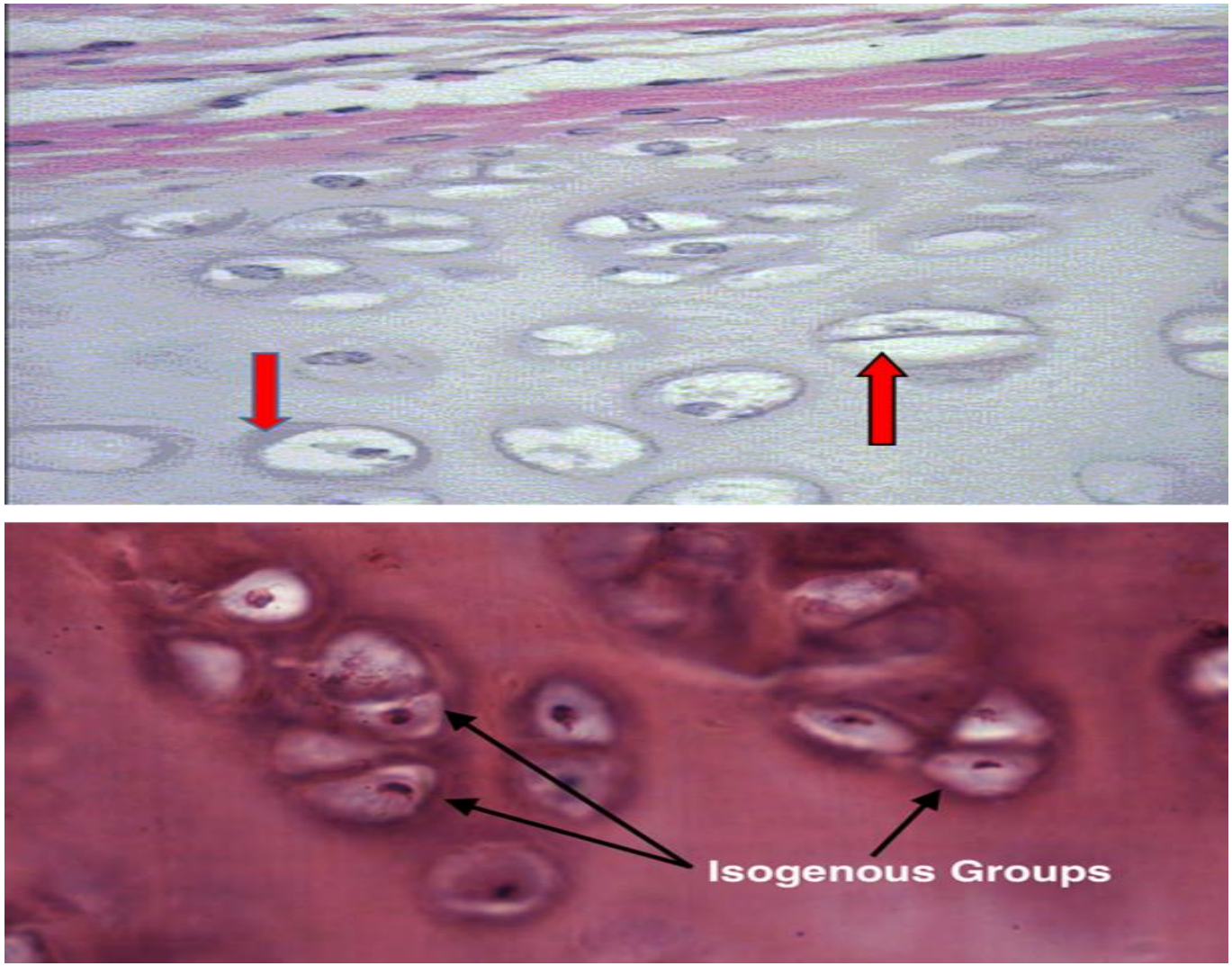
surrounds lacuna (space in which chondrocyte present)



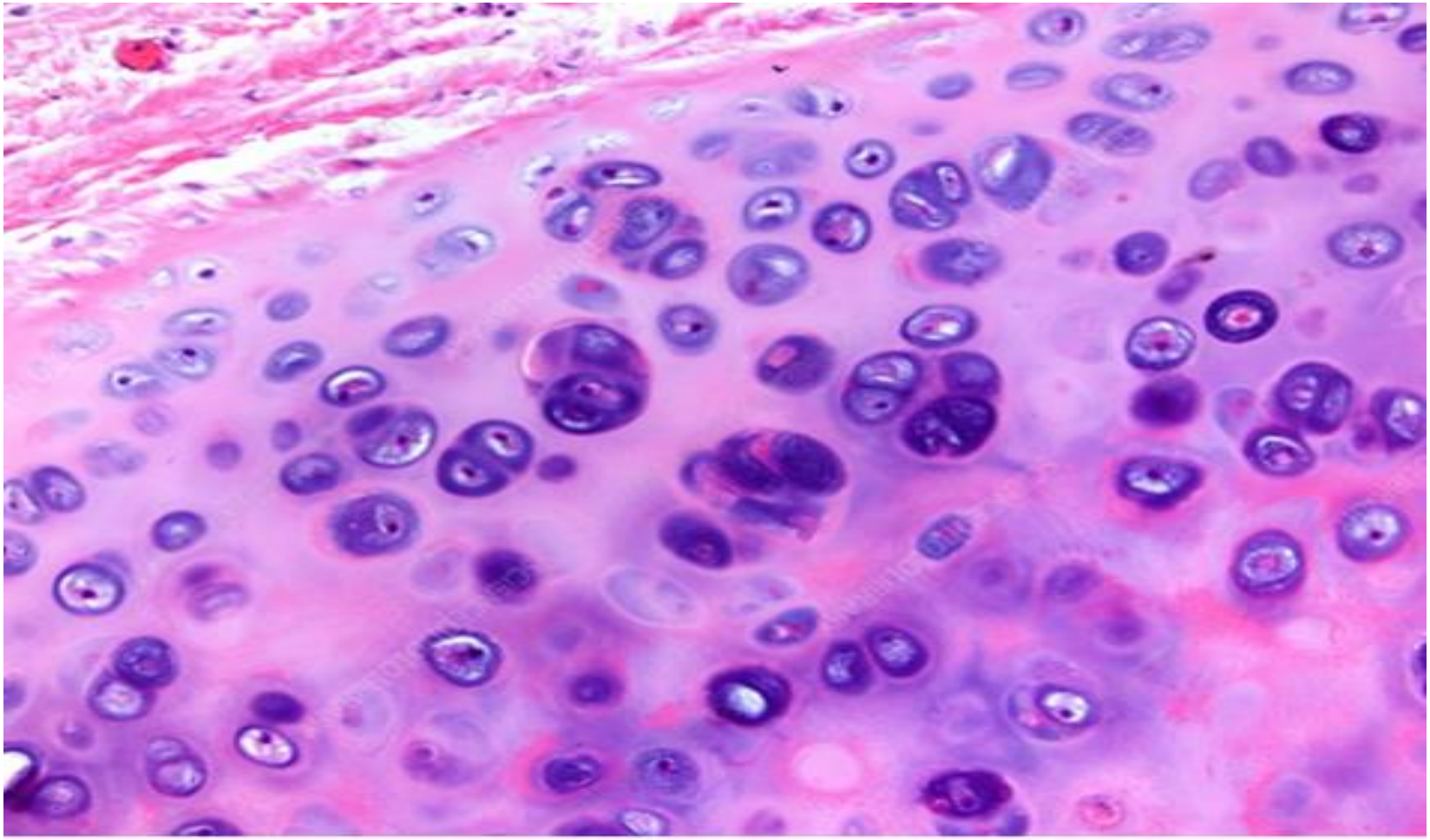
Chondroblast

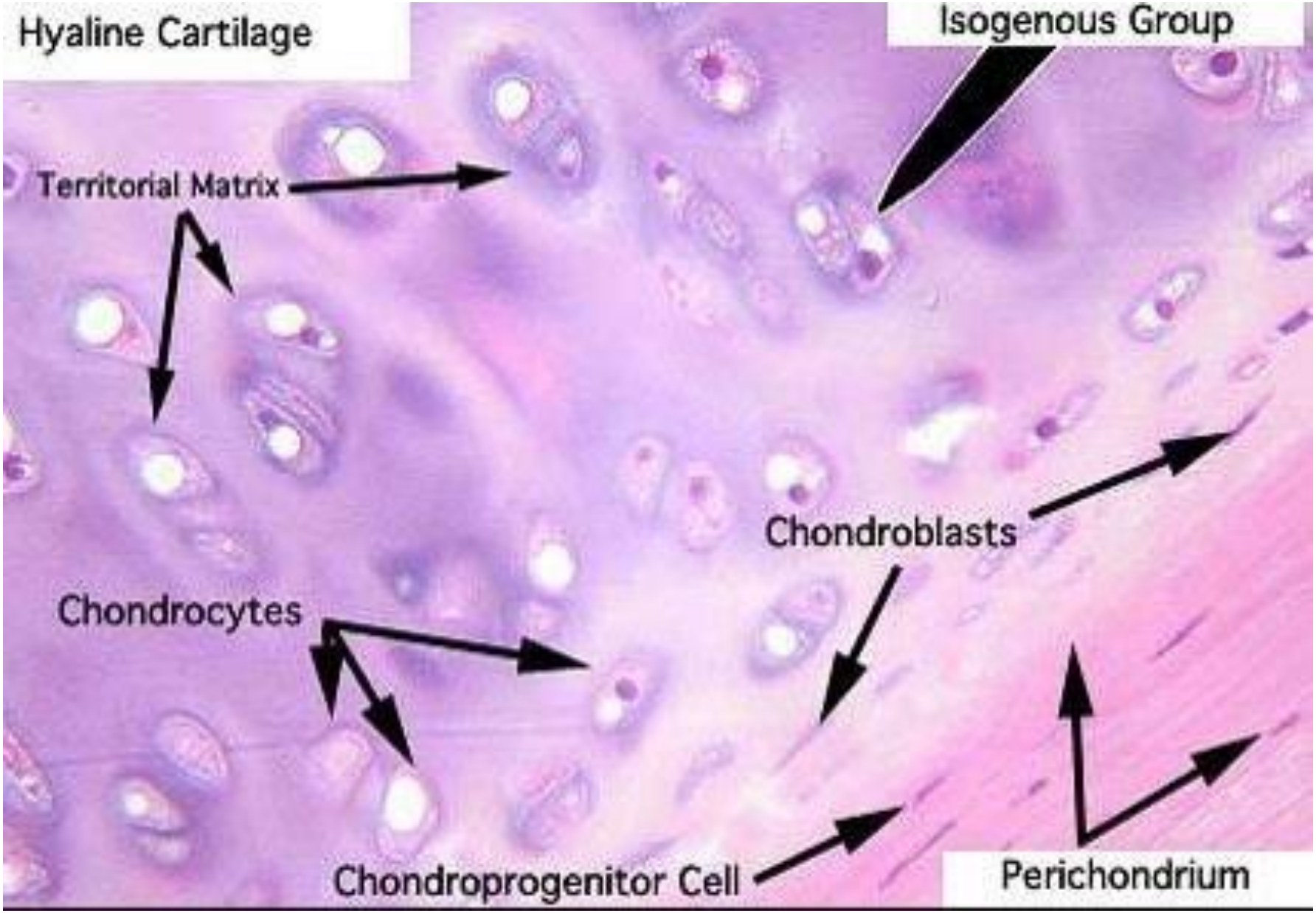


Chondrocytes

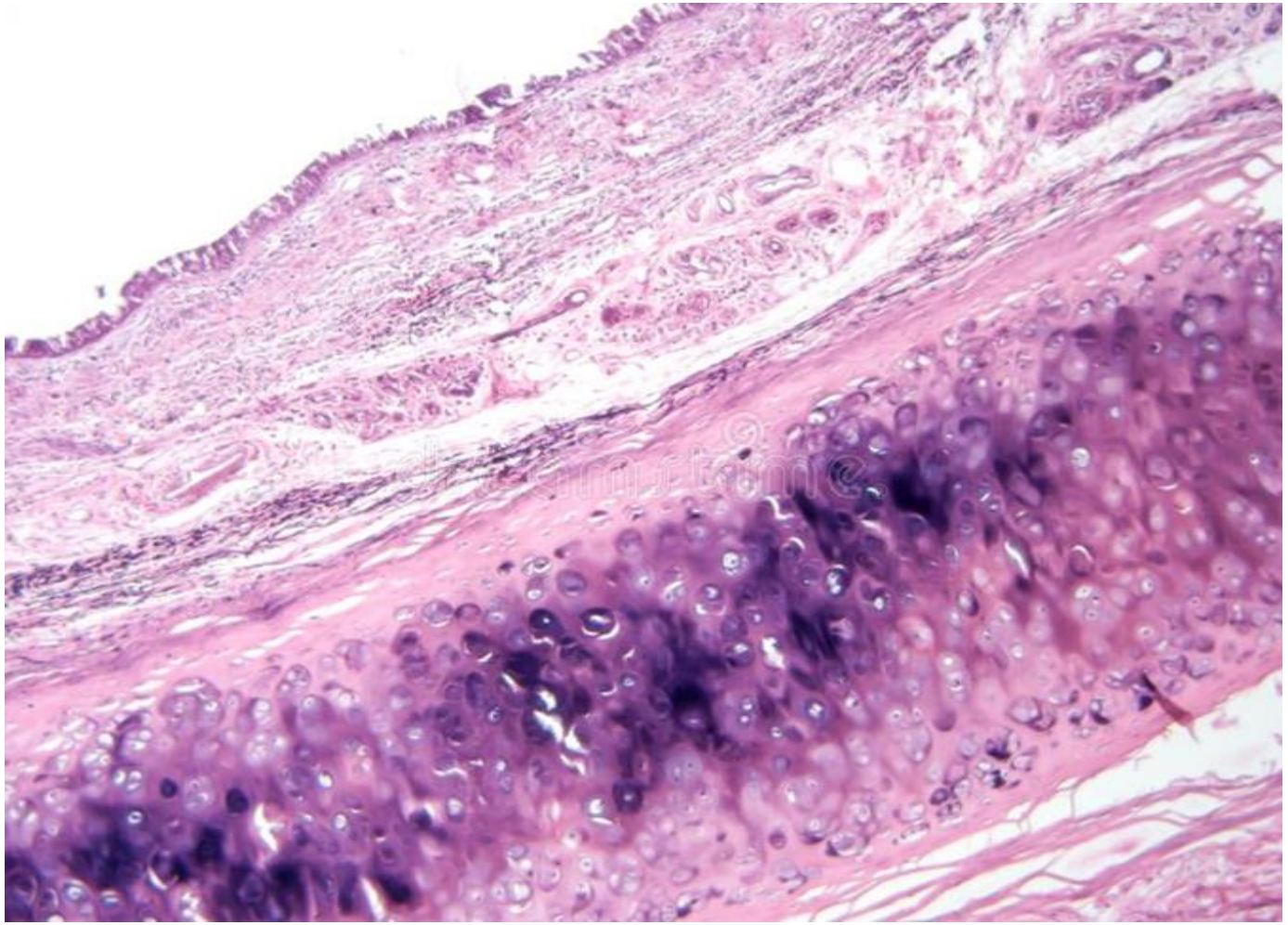


HYALINE CARTILAGE

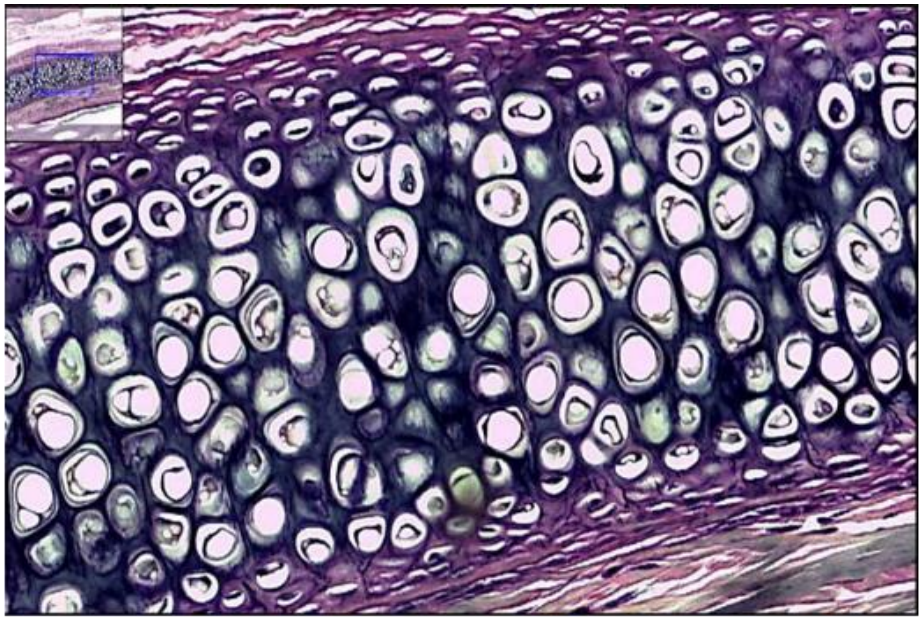


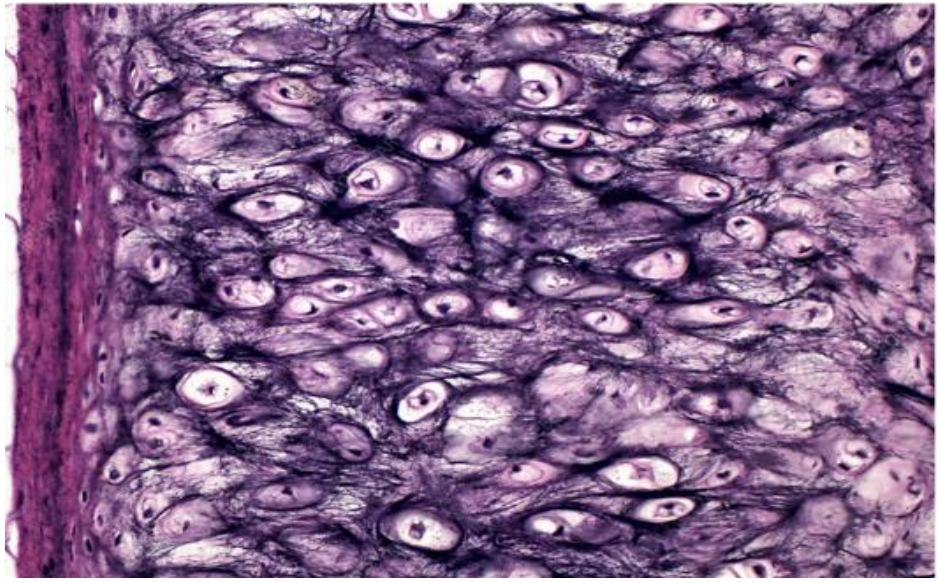

Hyaline Cartilage
Isogenous Group
Territorial Matrix
Chondroblasts
Chondrocytes
Chondroprogenitor Cell
Perichondrium

ELASTIC CARTILAGE

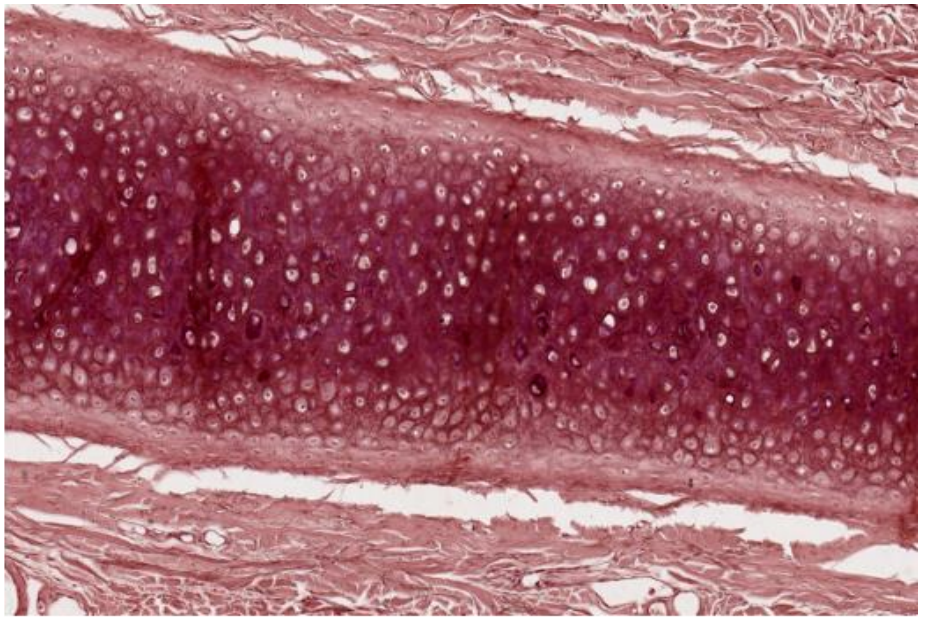


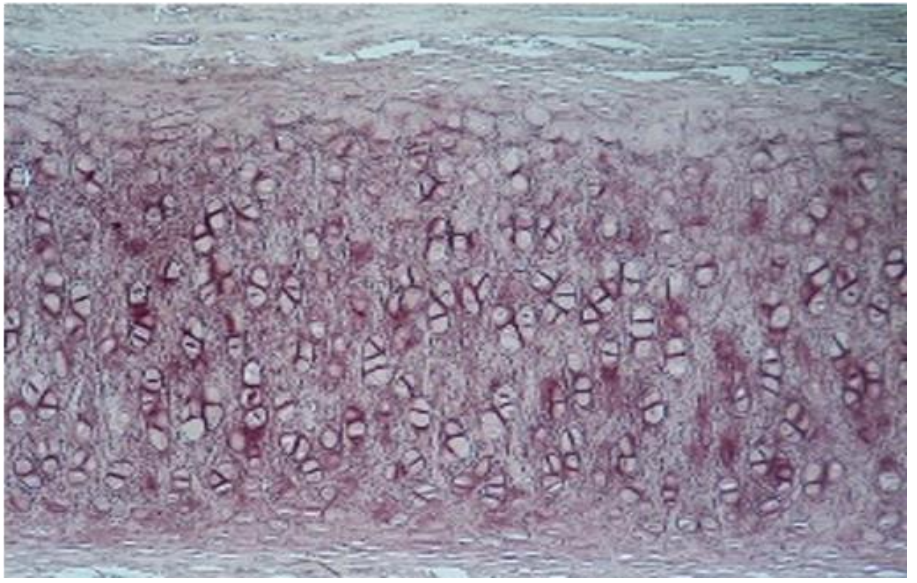
VVG stain



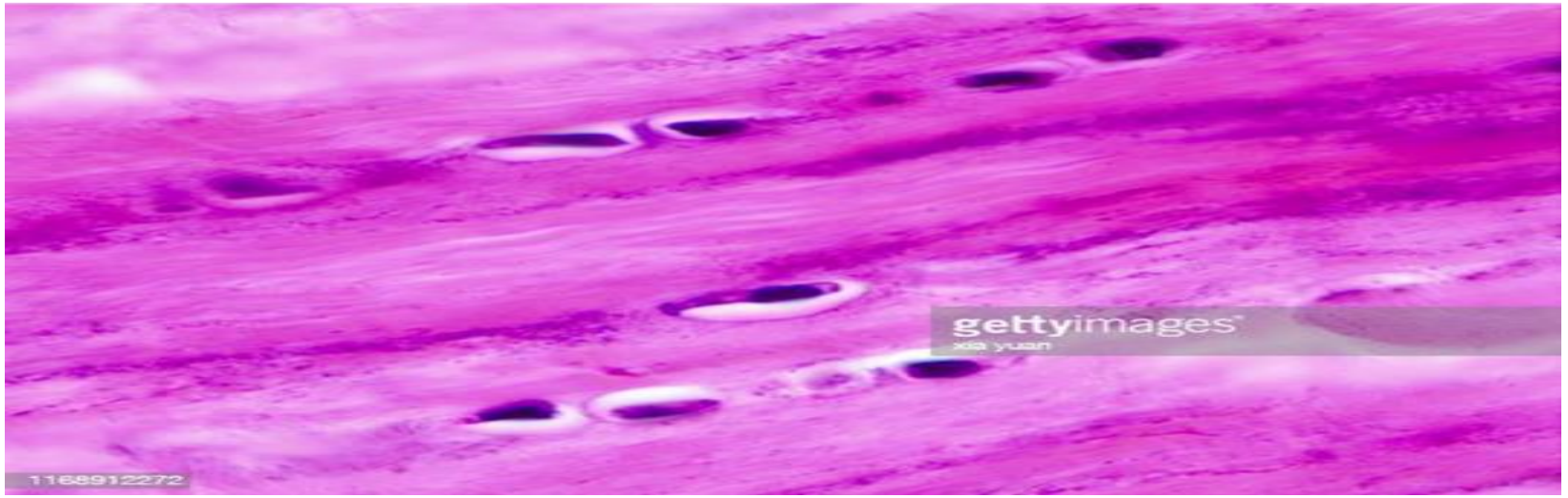


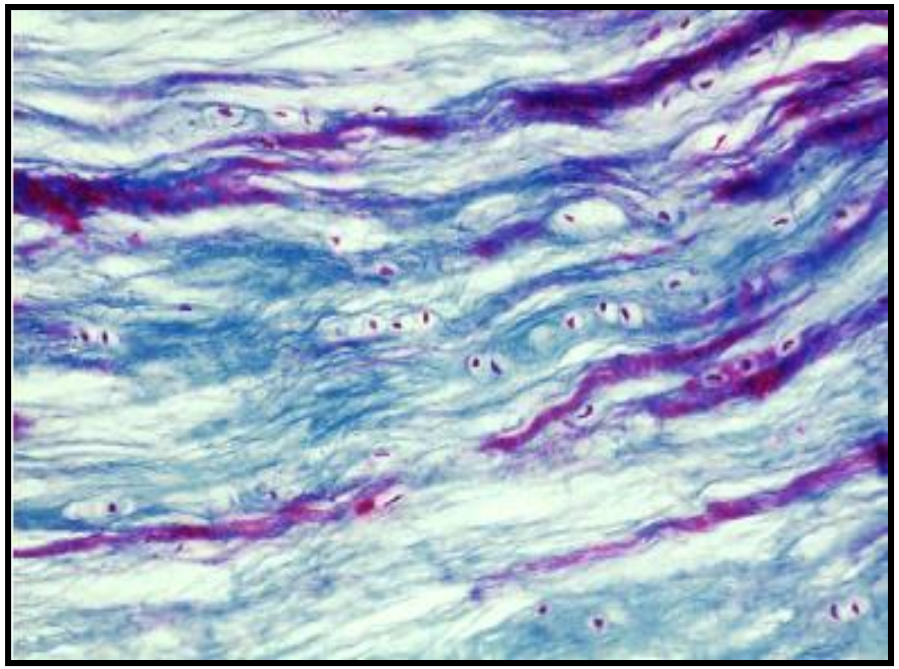
Orcein stain

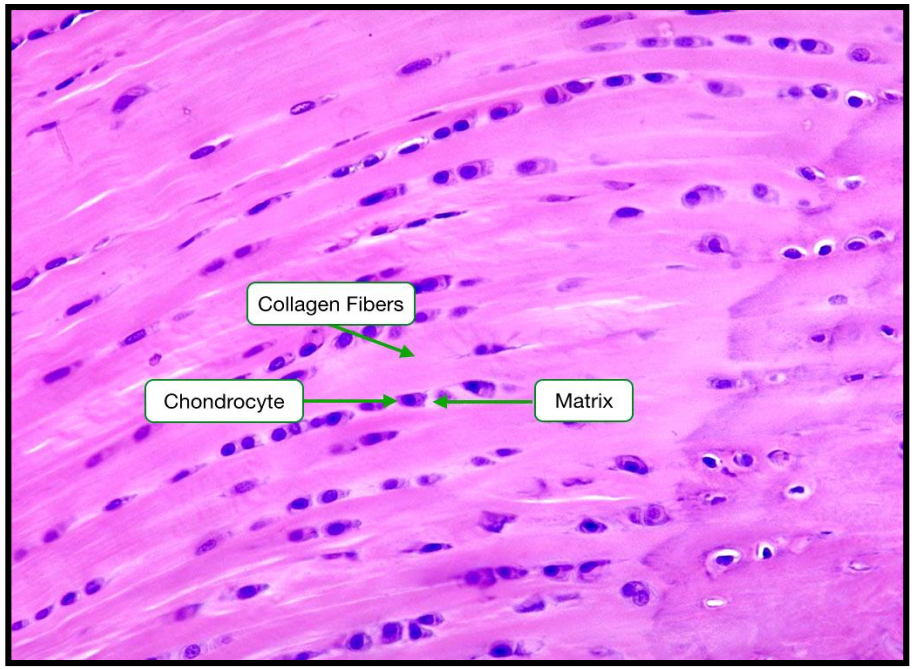


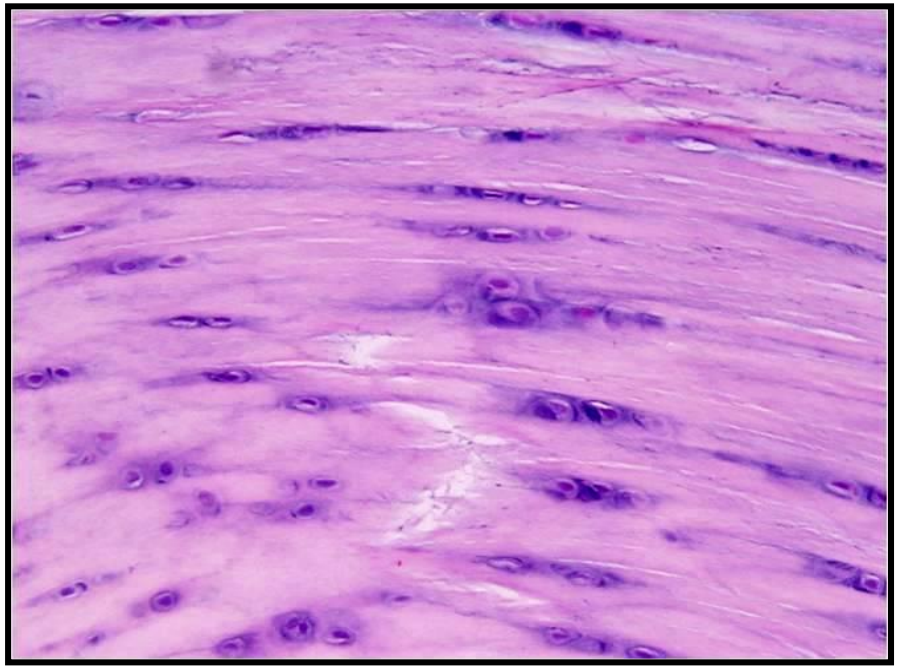


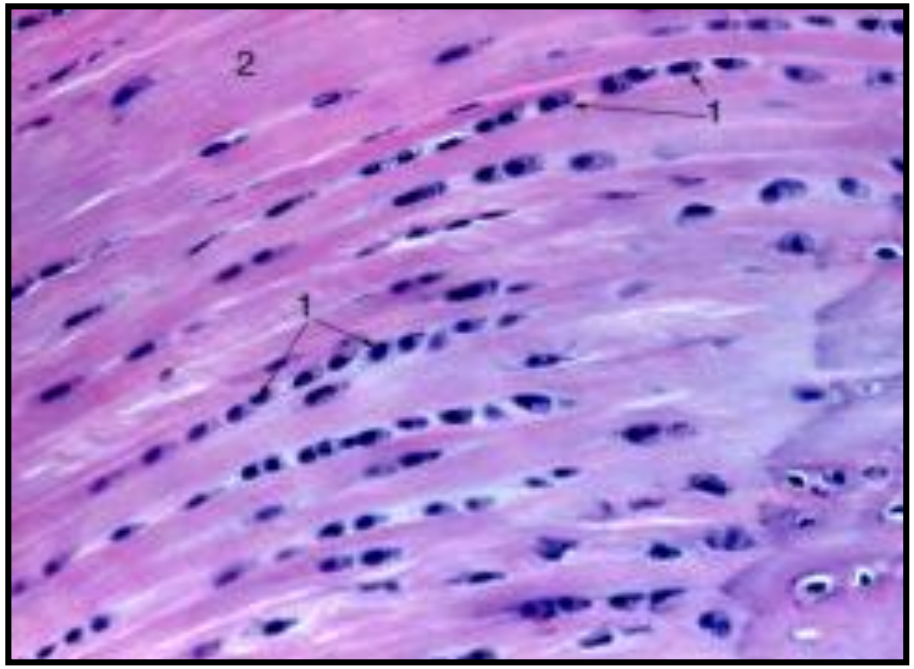
White FIBROCARTILAGE






Collagen Fibers
Chondrocyte
Matrix

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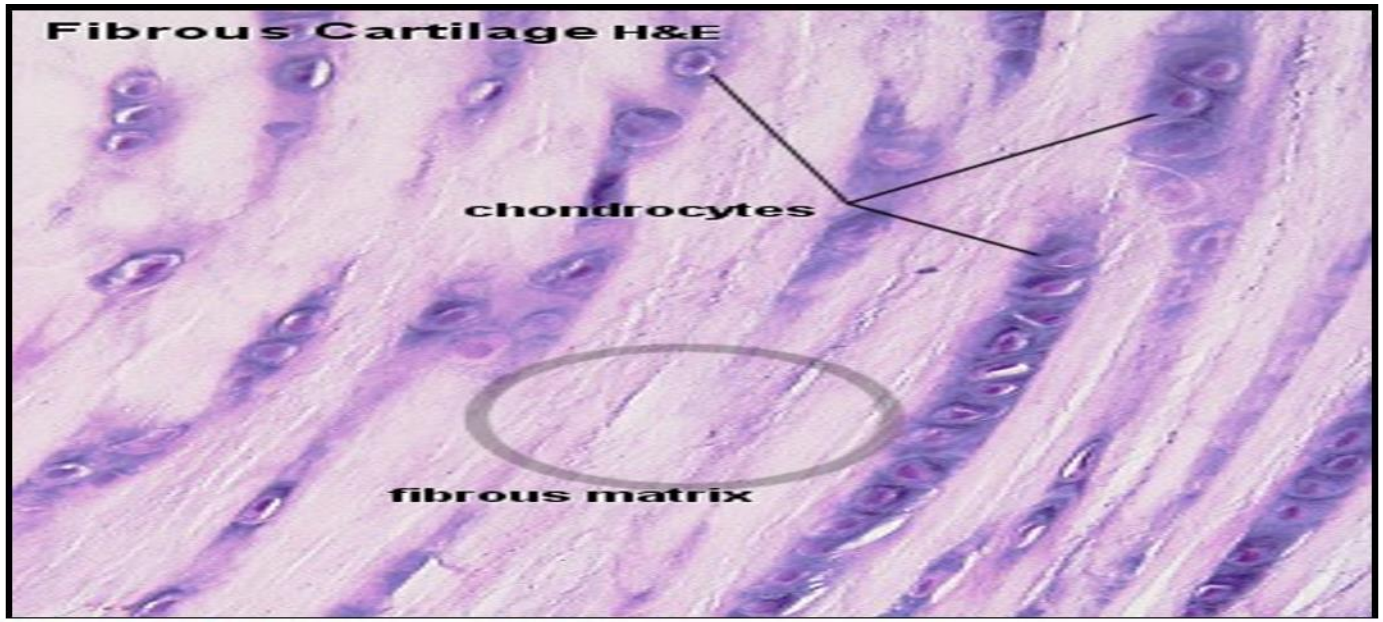
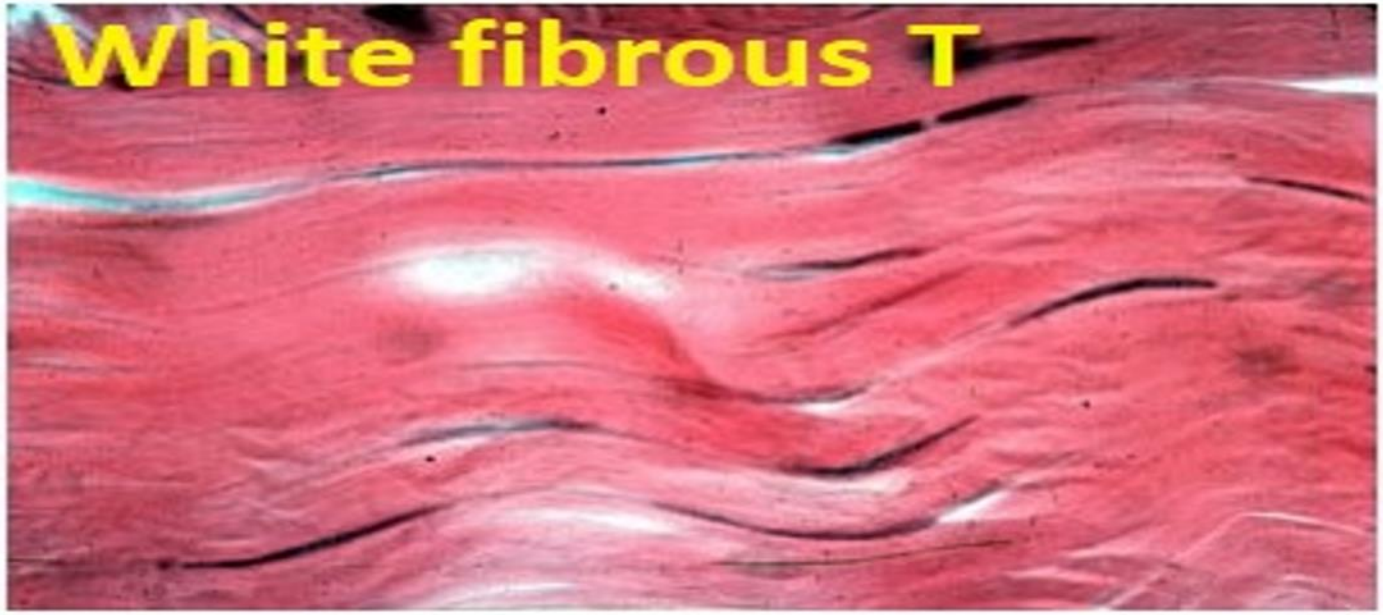
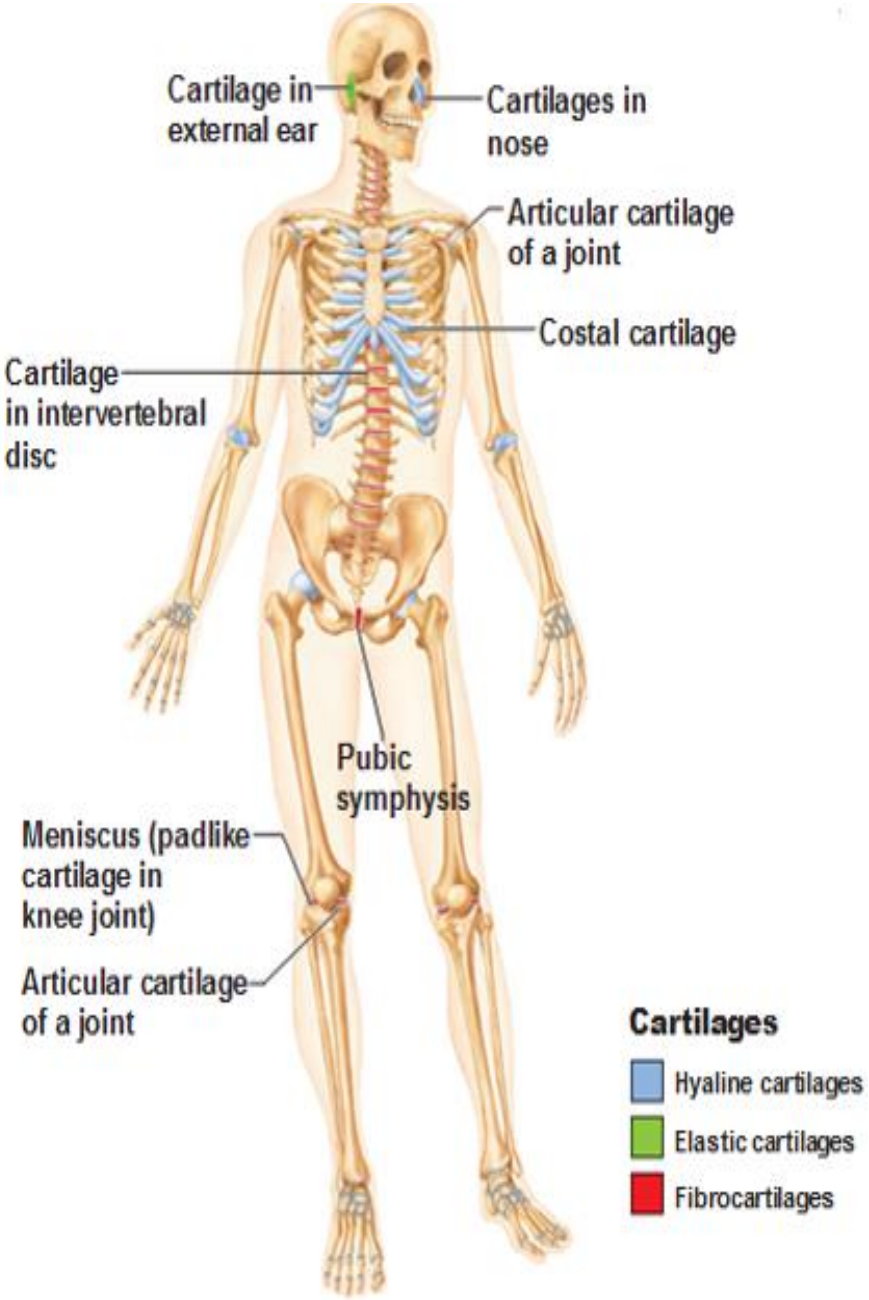
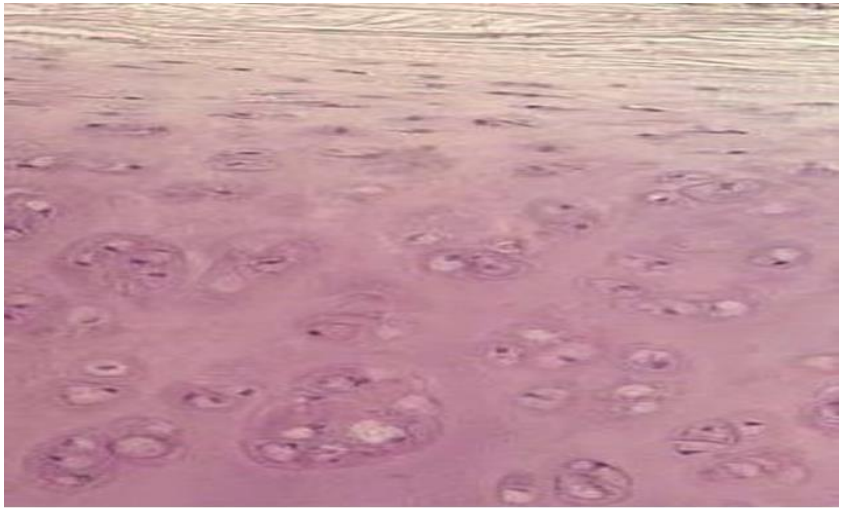
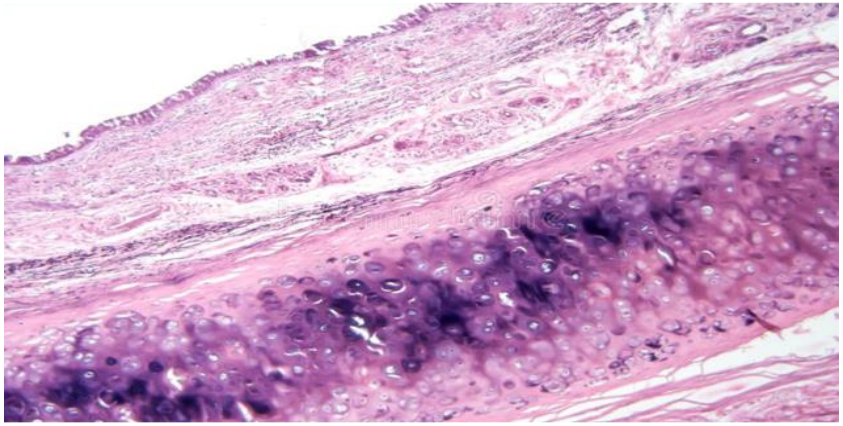
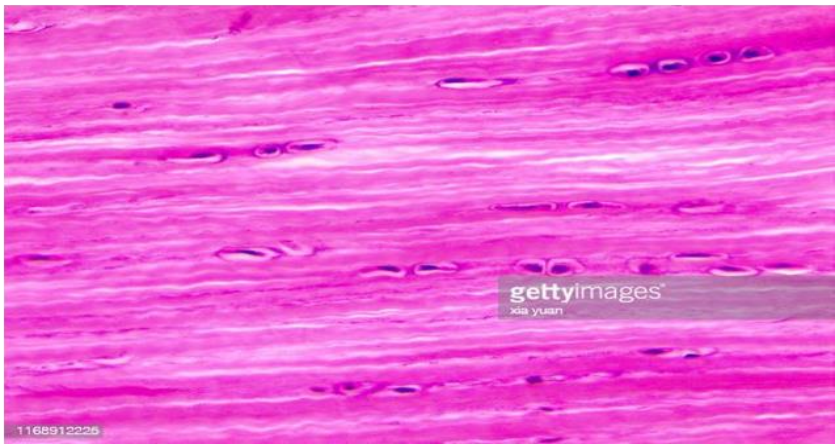

Fibrous Cartilage H&E
chondrocytes
fibrous matrix


White fibrous T


Cartilage in external ear
Cartilages in nose
Articular cartilage of a joint
Costal cartilage
Cartilage in intervertebral disc
Pubic symphysis
Meniscus (padlike cartilage in knee joint)
Articular cartilage of a joint
Cartilages
Hyaline cartilages
Elastic cartilages
Fibrocartilages






gettyimages
xia yuan
1168912225

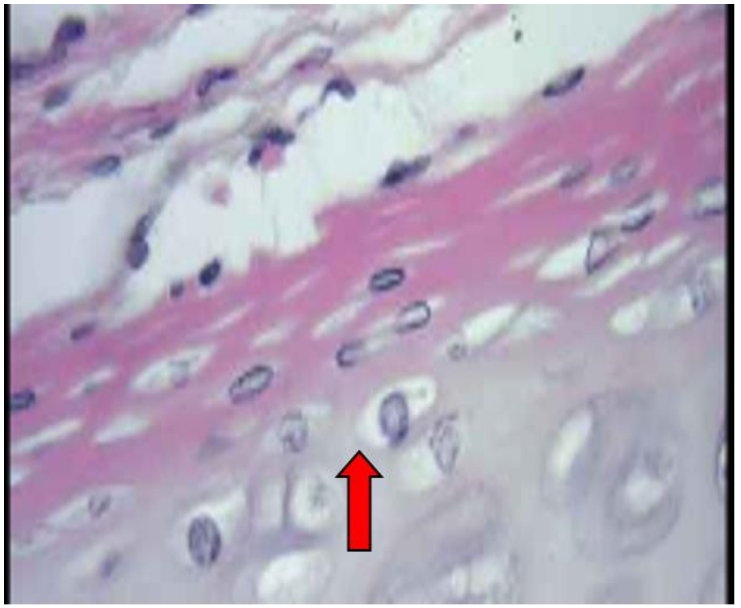
CARTILAGE GROWTH

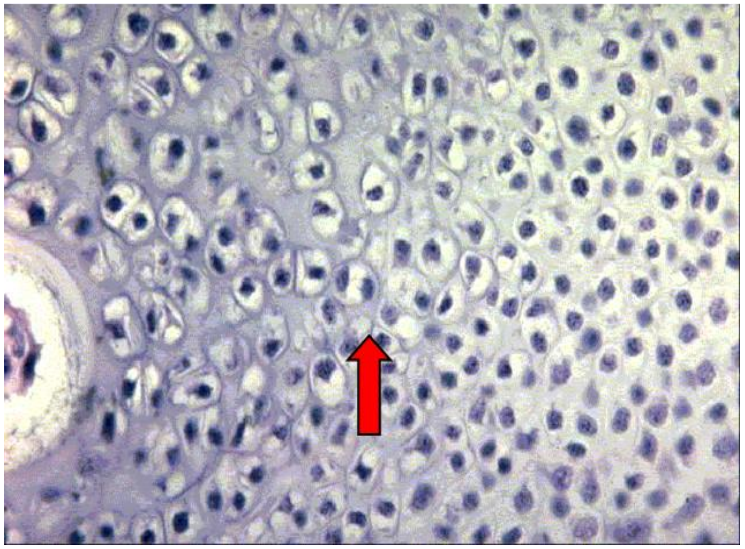
❑Appositional

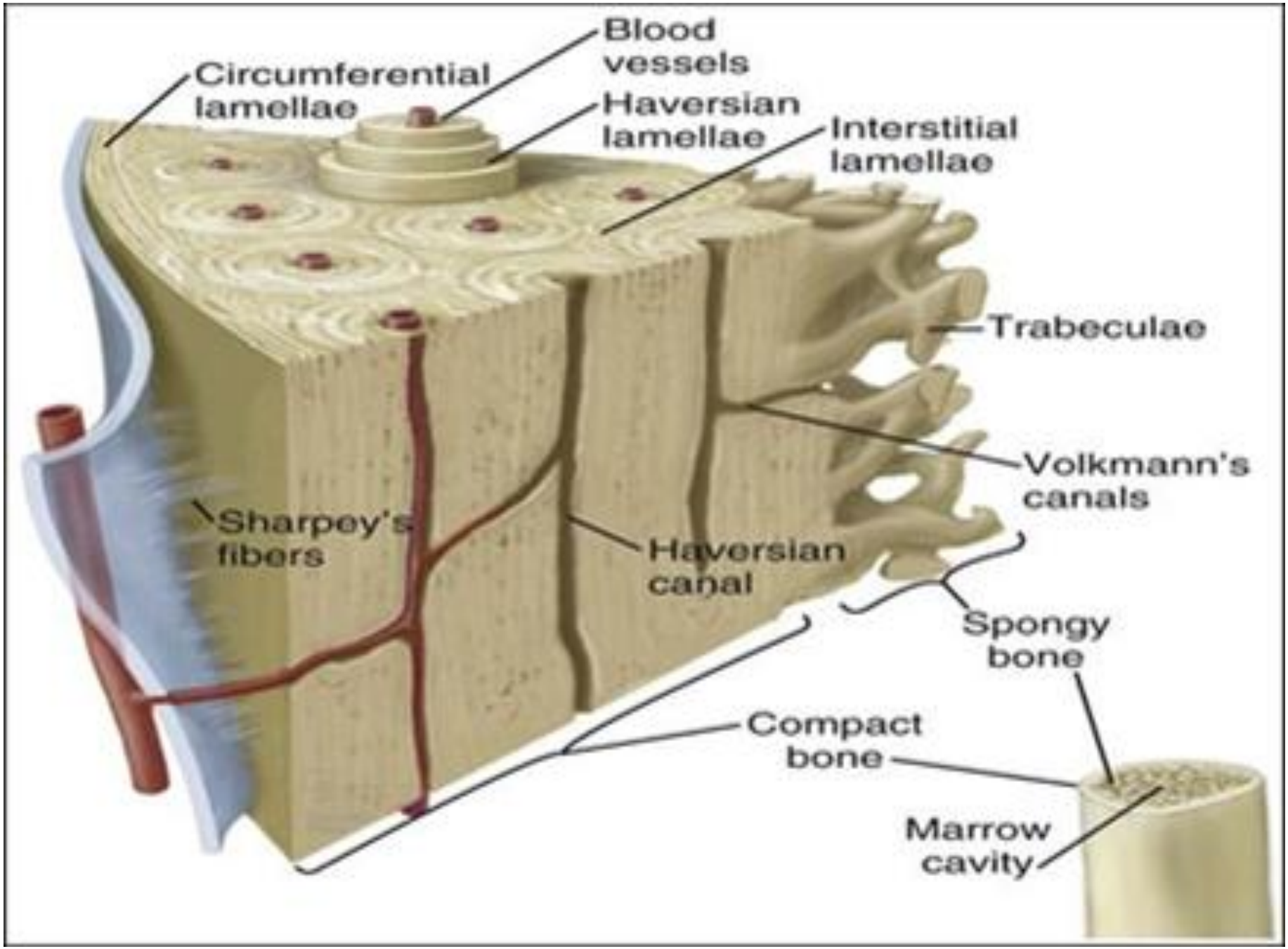
Addition of new cartilage over the surface of existing cartilage.

❑Interstitial

Newly formed cartilage grows by multiplication of cells throughout its substance.






Blood vessels
Circumferential lamellae
Haversian lamellae
Interstitial lamellae
Trabeculae
Volkmann's canals
Sharpey's fibers
Haversian canal
Spongy bone
Compact bone
Marrow cavity

❑ Bone cells (4)

1. Osteoprogenitor cells (mother cells of bone)

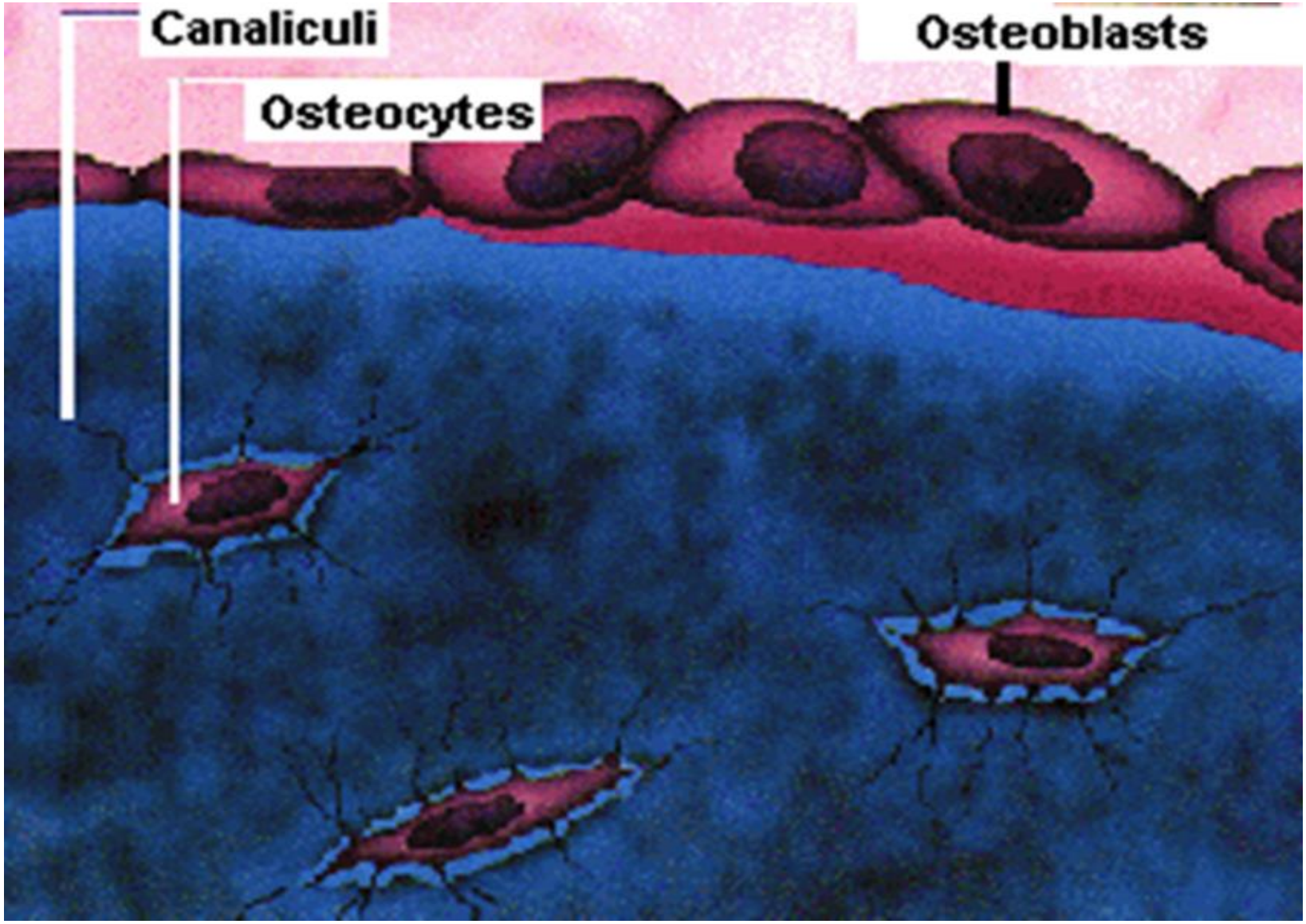
arise from UMCs in the connective tissue present where bone formation is initiated

- present in cellular layer of periosteum
- Endosteum
- Lining Haversian canals

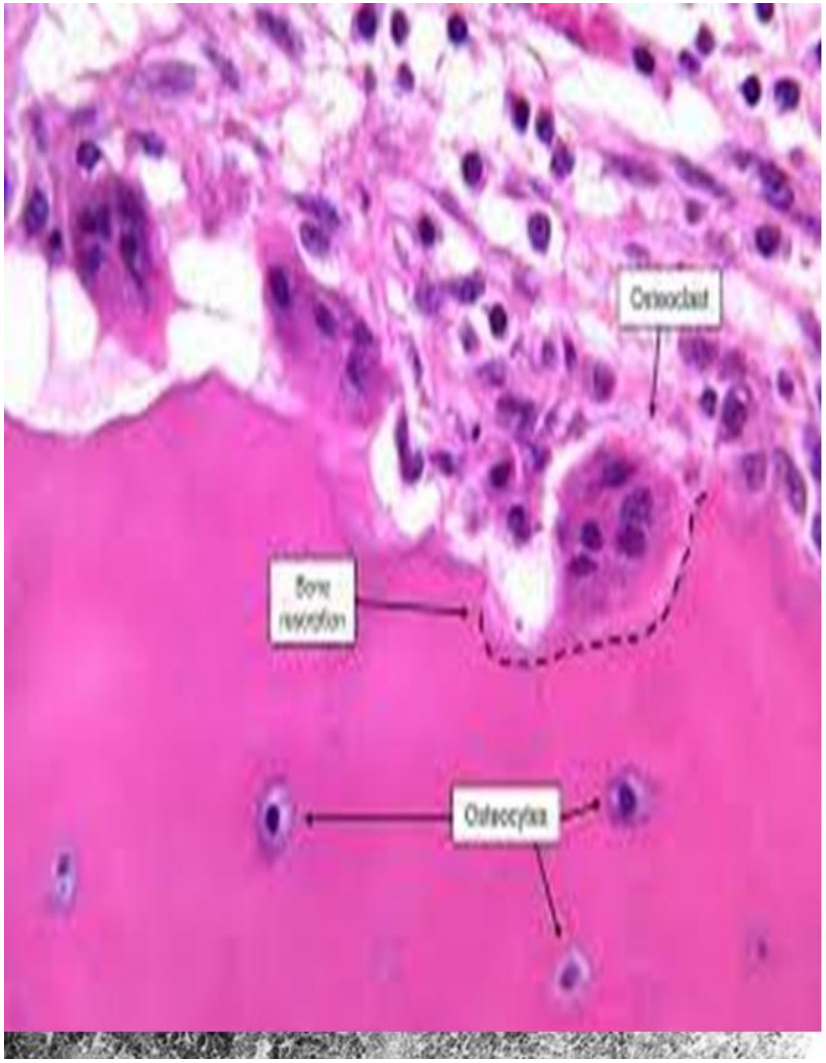
Function

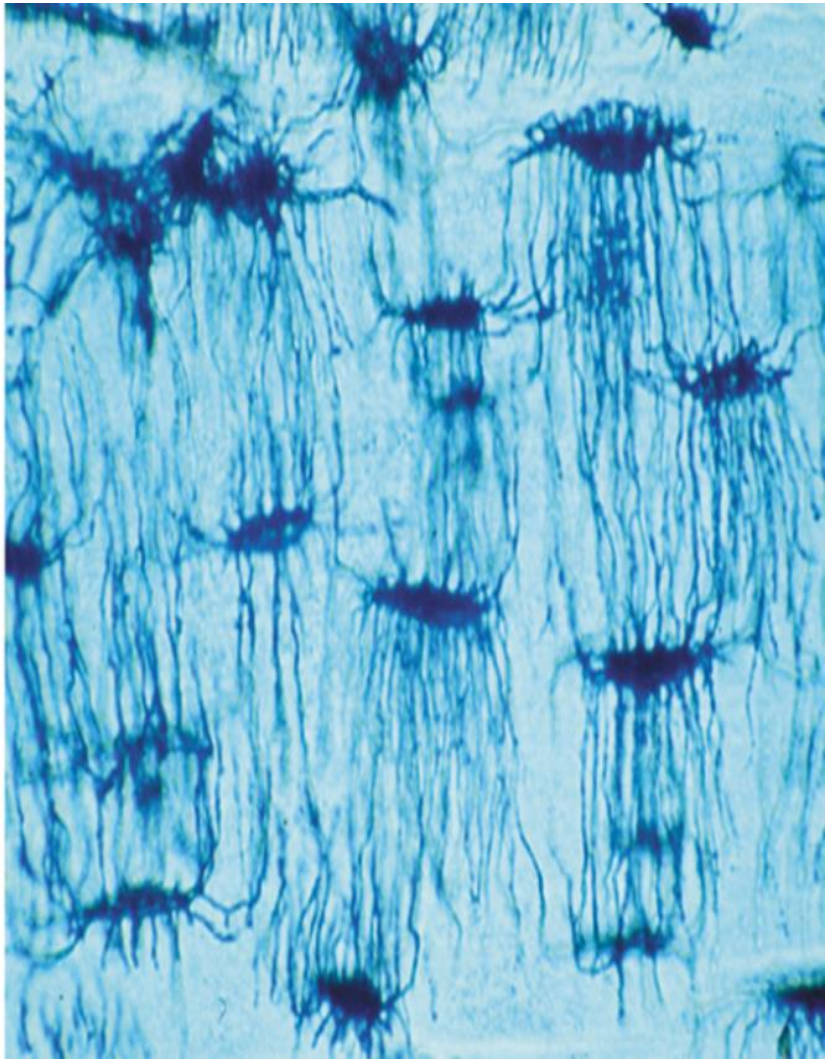
Proliferate and differentiate to osteoblasts

2.Osteoblasts are bone-forming cells

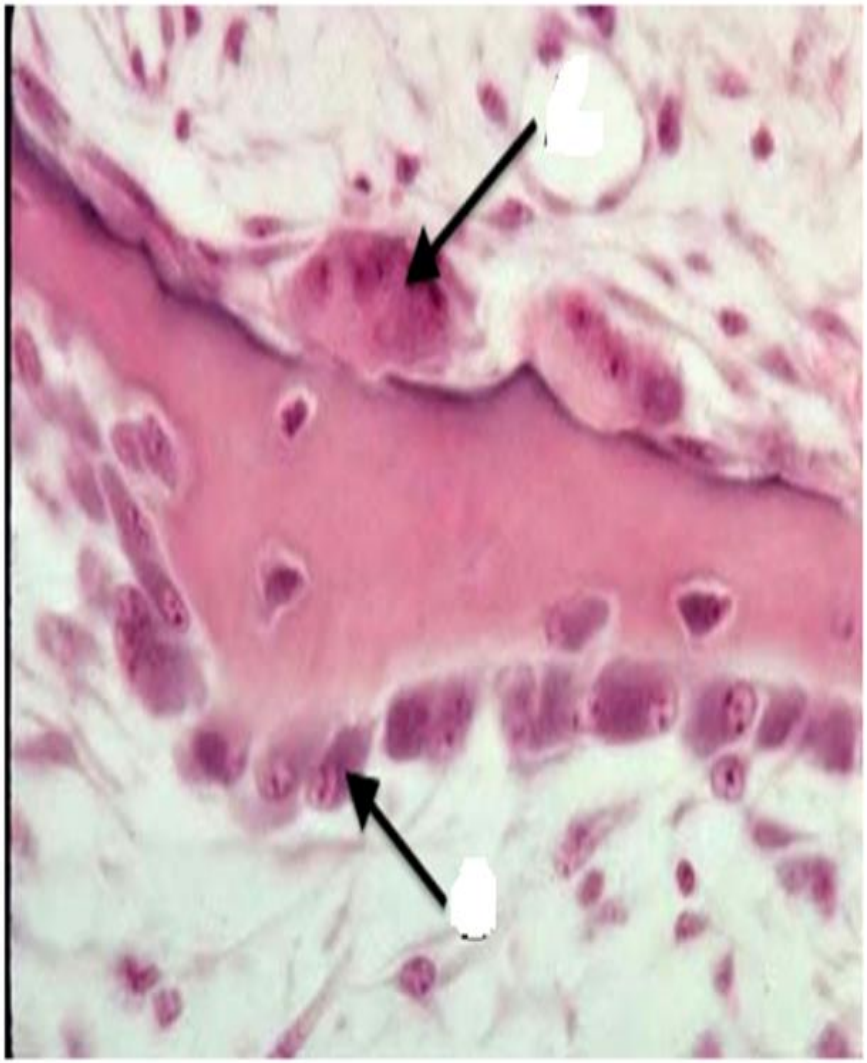


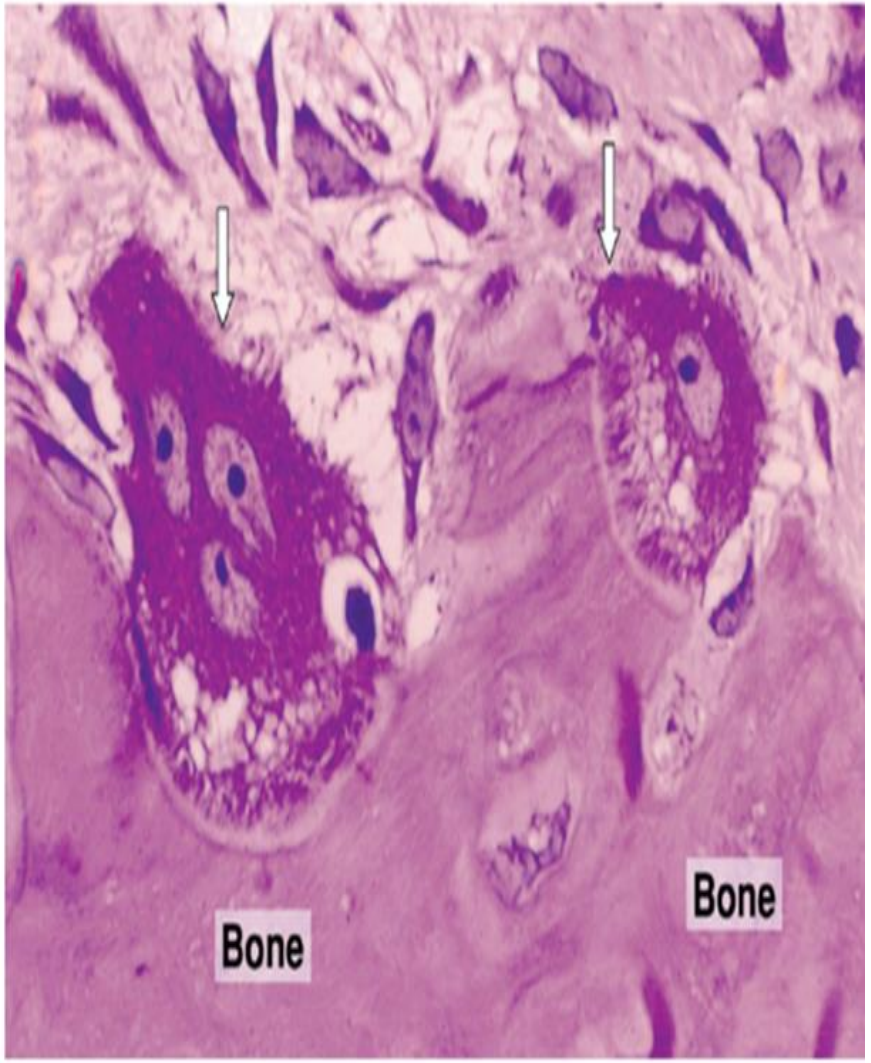
3.Osteocytes = called unit bone cells



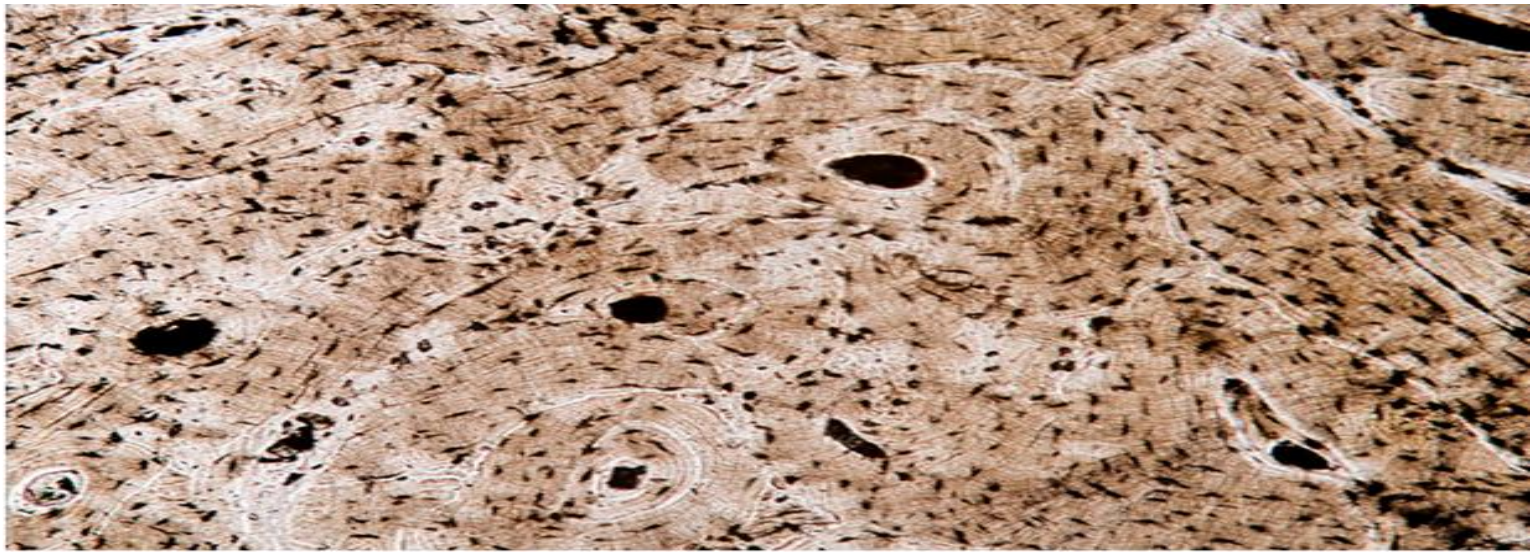


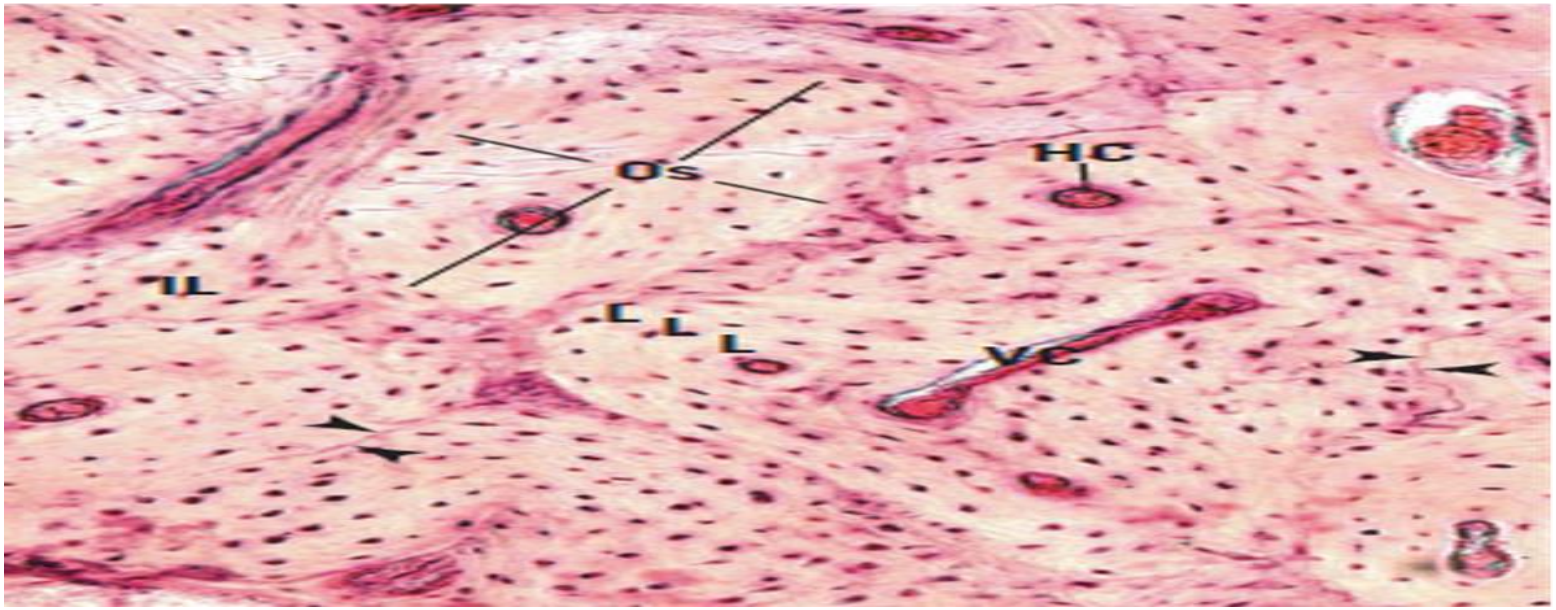
4.Osteoclasts = bone macrophages are bone-eating cells



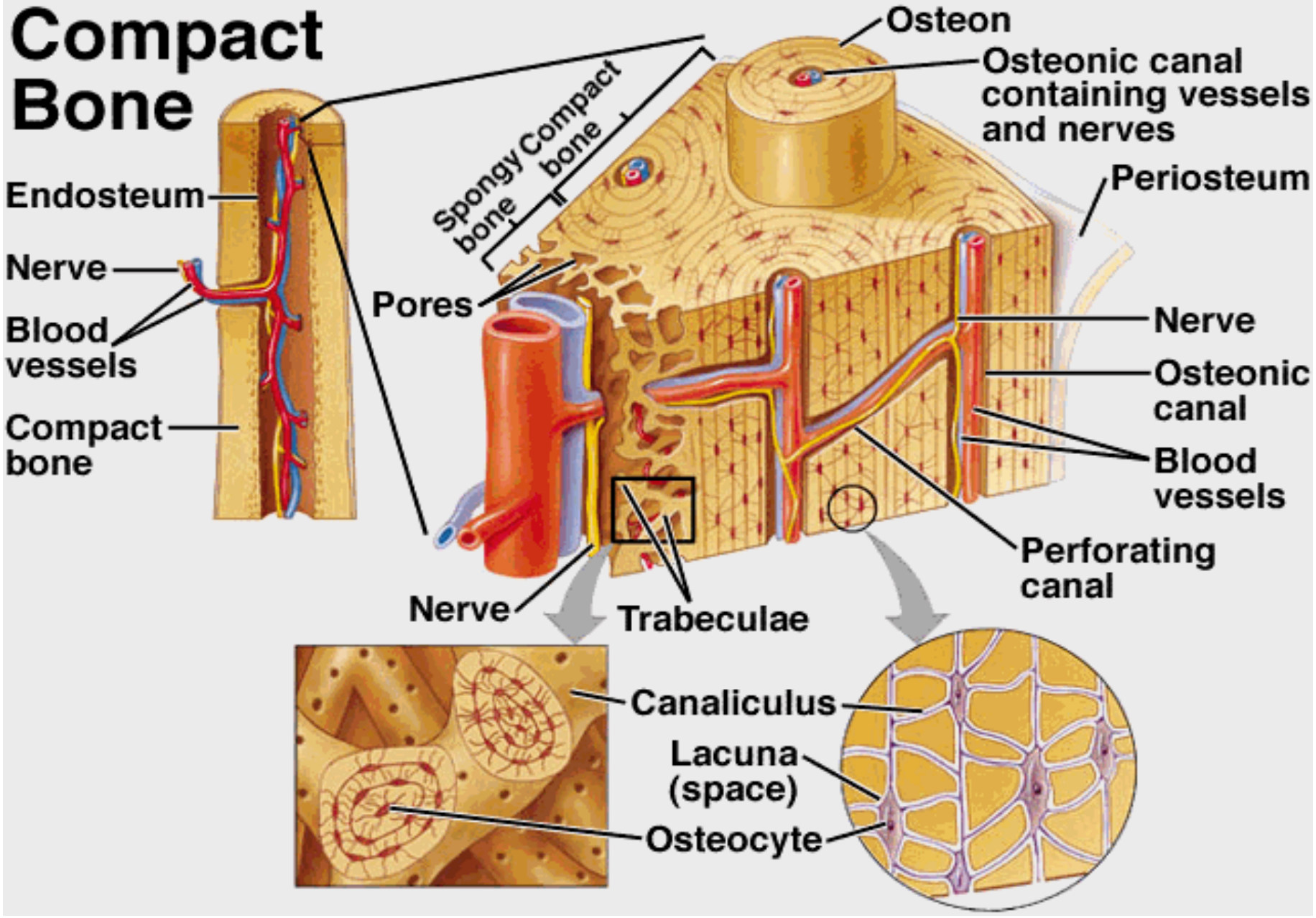


Methods of histological study of bone

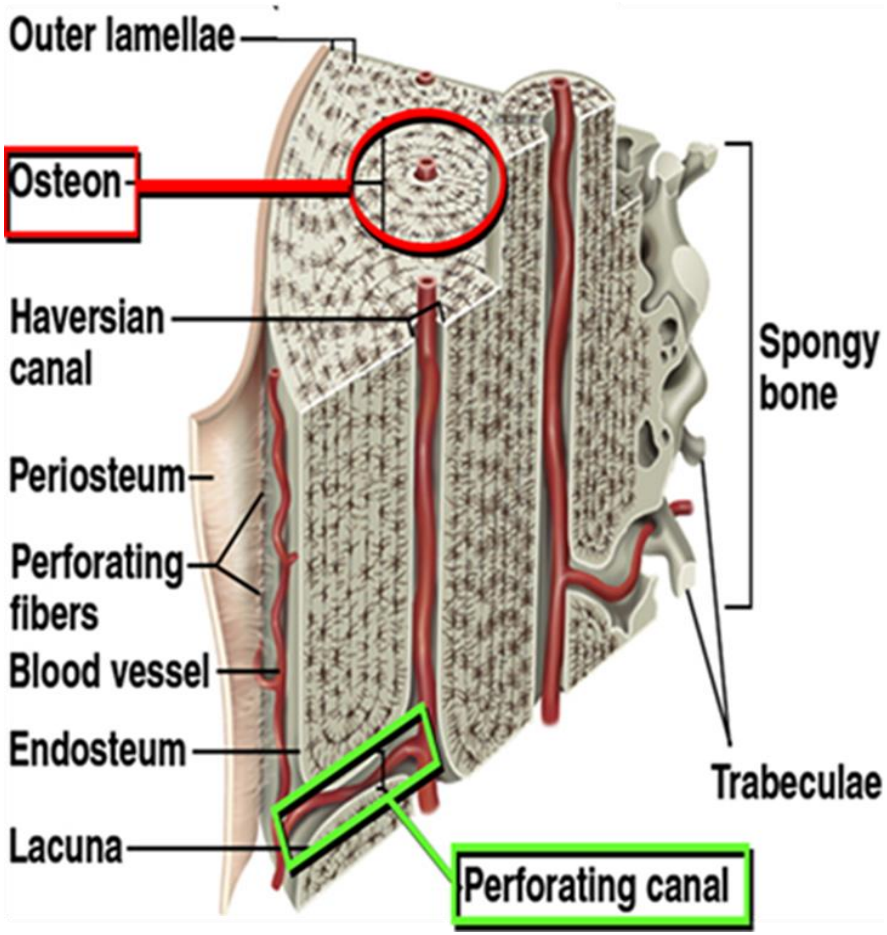


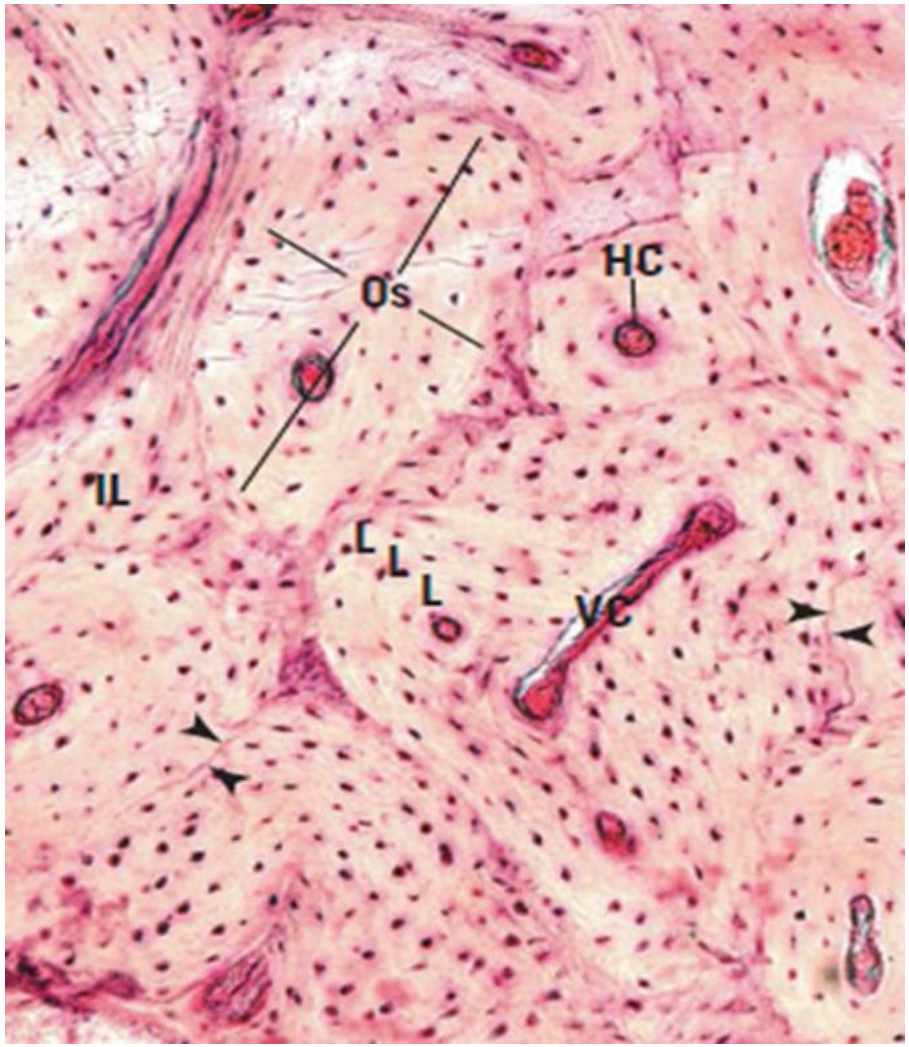


Compact Bone

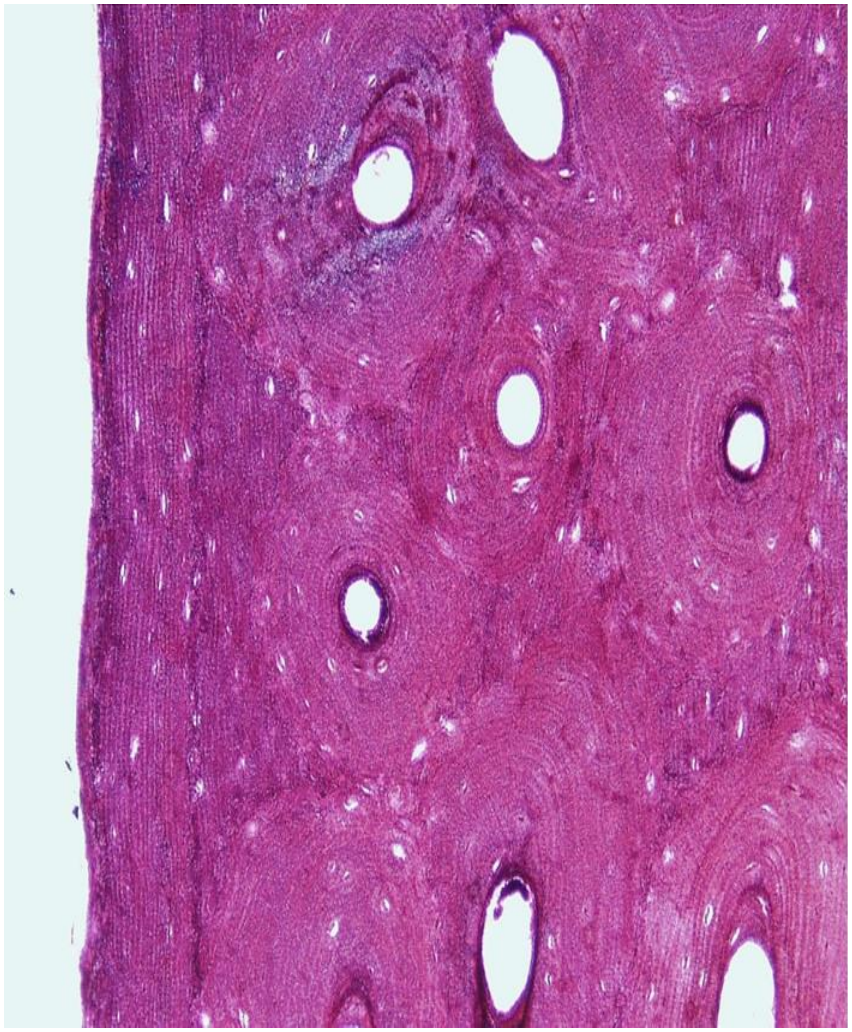


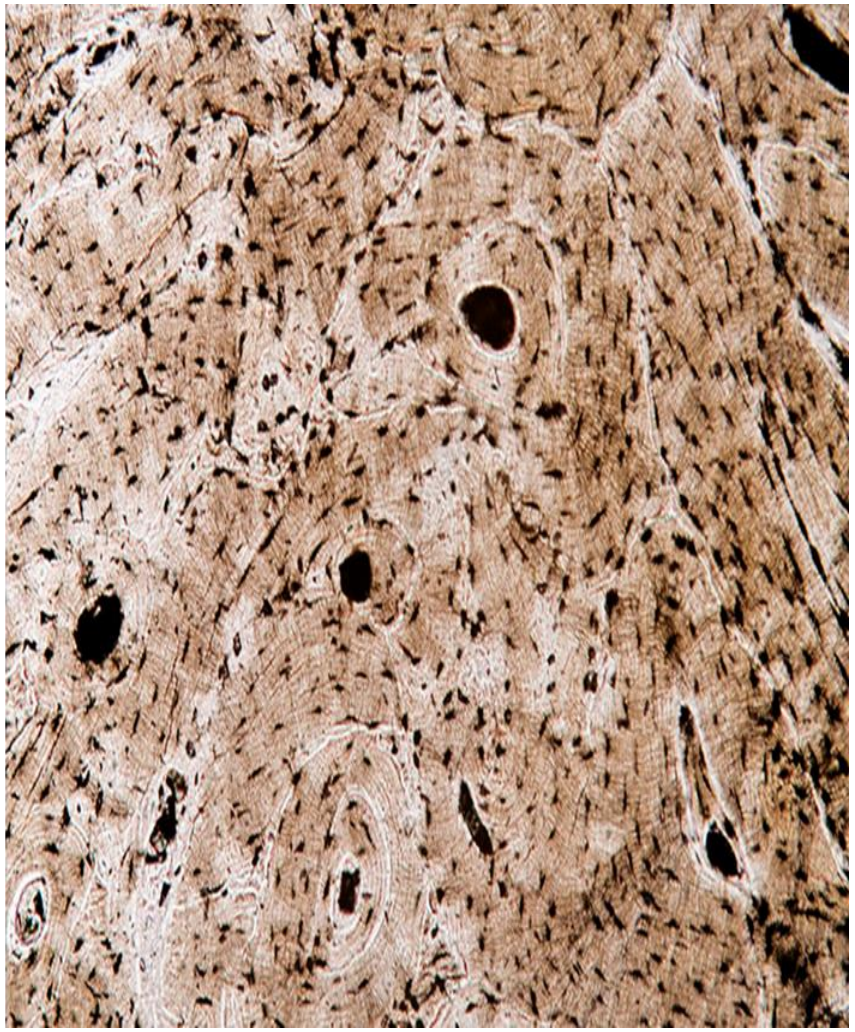
OSTEONS
=Haversian system



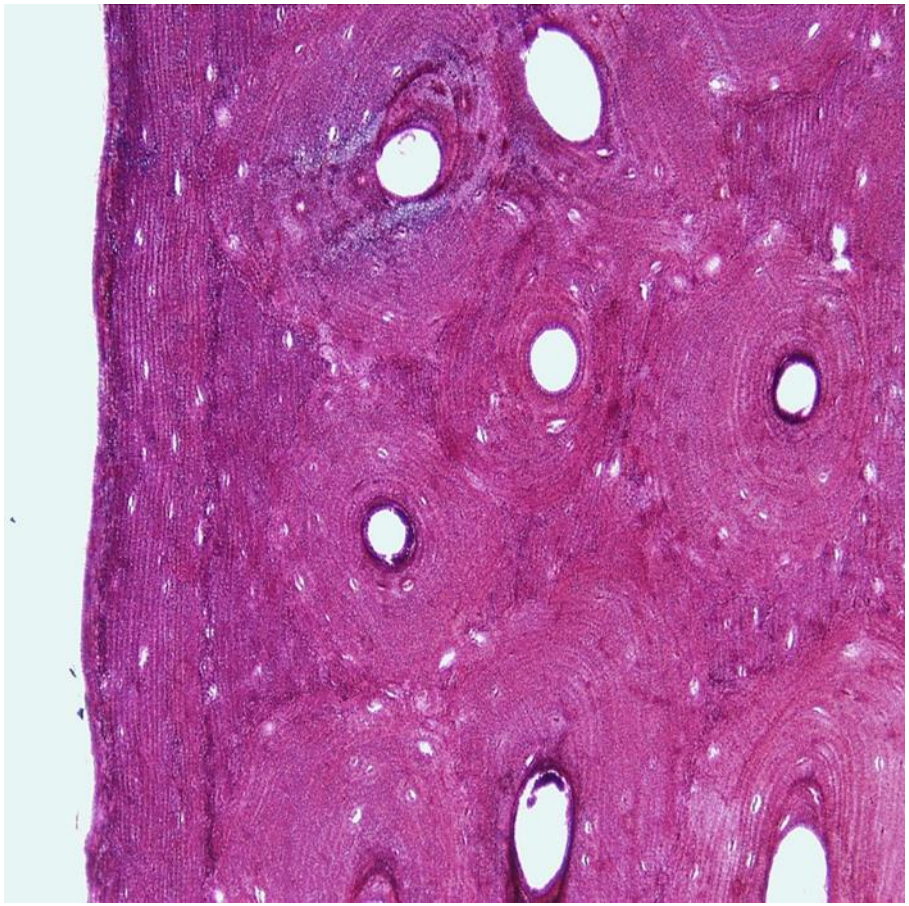


OSTEONS

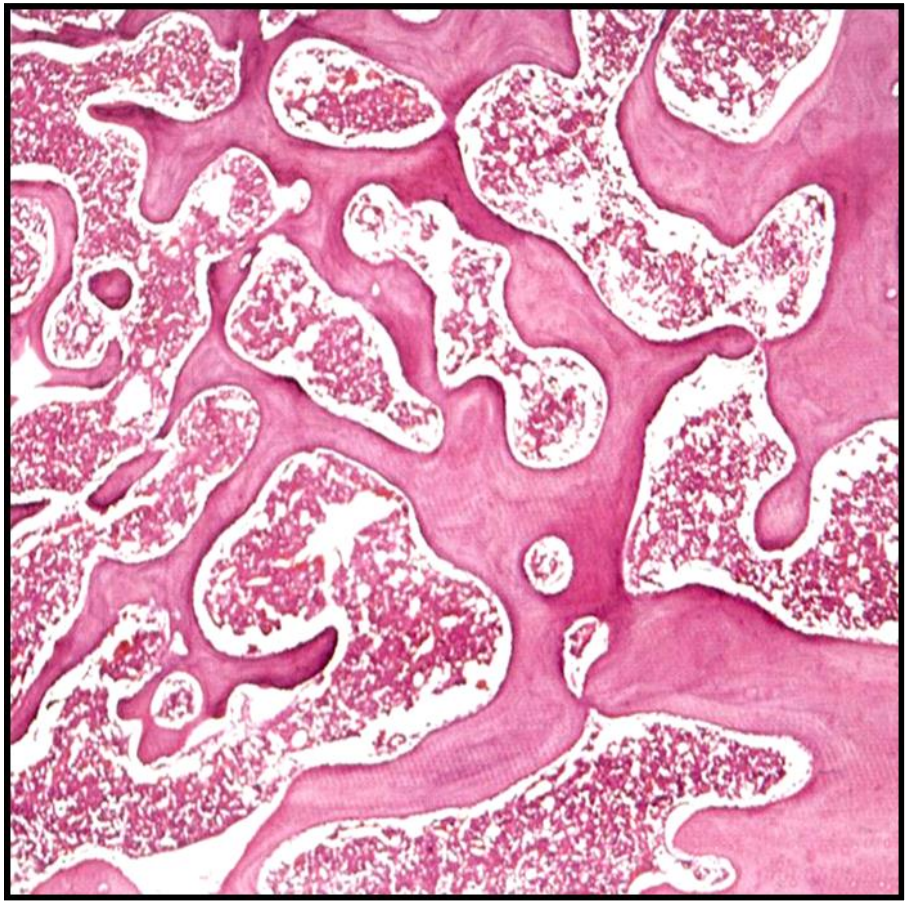




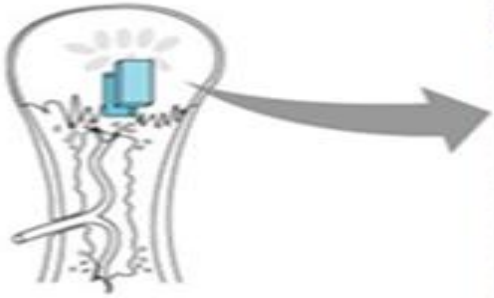
Compact bone

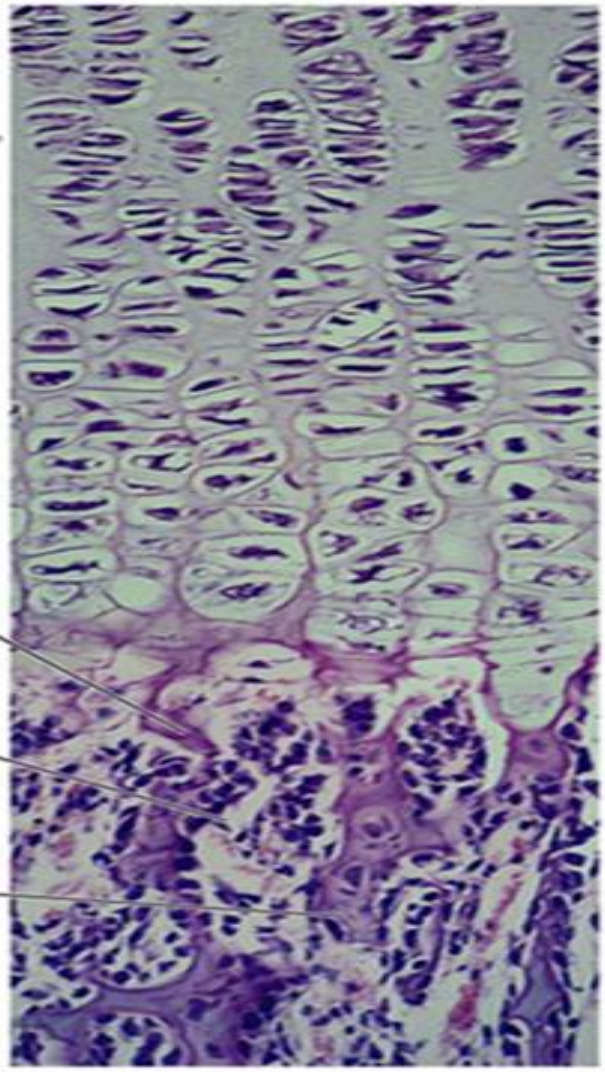


Cancellous bone



GROWTH IN LENGTH
GROWTH OF CARTILAGE ON THE EPIPHYSEAL PLATE





Resting (quiescent) zone

Growth (proliferation) zone
Cartilage cells undergo mitosis

Hypertrophic zone
Older cartilage cells enlarge

Calcification zone
Matrix becomes calcified; cartilage cells die; matrix begins deteriorating

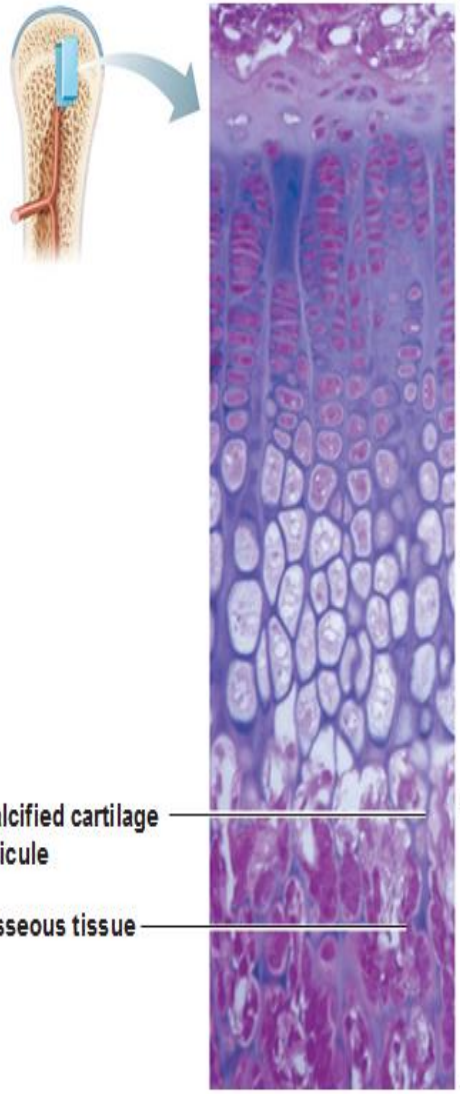
Ossification (osteogenic) zone
New bone formation is occurring

Calcified cartilage spicule

Osteoblast depositing bone matrix

Osseous tissue (bone) covering cartilage spicules

Organization of Cartilage within Epiphyseal Plate of Growing Long Bone



Resting zone – small, inactive cartilage cells

① **Proliferation zone**
Chondroblasts quickly divide and push the epiphysis away from the diaphysis, lengthening the bone.

② **Hypertrophic zone**
Older chondrocytes enlarge and signal the surrounding matrix to calcify.

③ **Calcification zone**
Matrix becomes calcified; chondrocytes die, leaving behind trabeculae-shaped calcified cartilage. THIS IS NOT YET BONE!
.

Calcified cartilage spicule

Osseous tissue

④ **Ossification zone**
Osteoclasts digest the calcified cartilage, and *osteoblasts* replace it with actual bone tissue in the shape of the calcified cartilage – resulting in bone trabeculae.