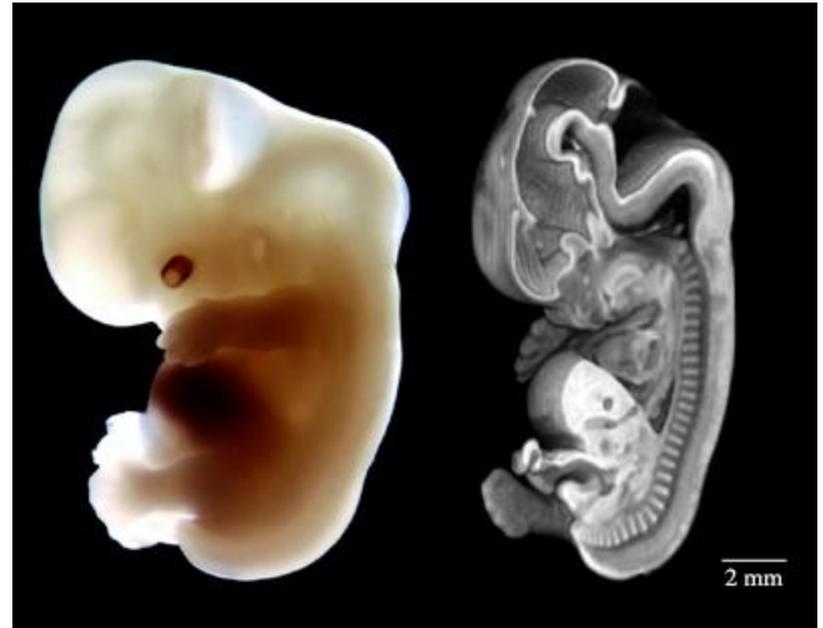


HISTOLOGY OF CARTILAGE & BONE

Dr AMAL ALBTOOSH

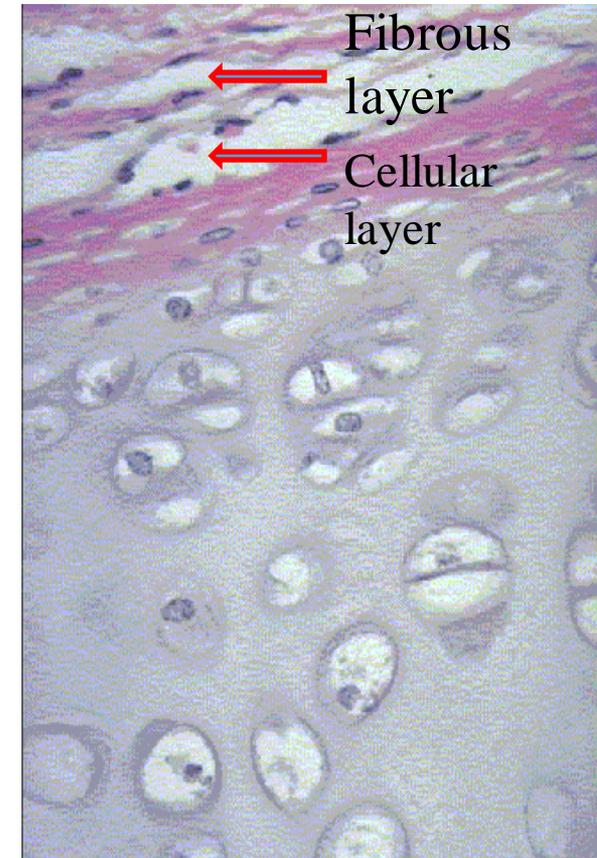
CARTILAGE

- Modified connective tissue
- Forms skeletal basis of some parts of body
- Matrix is firm giving it the characteristic consistency
- Resists compression
- Avascular (nutrients diffuse through matrix)
- Perichondrium is rich in blood vessels



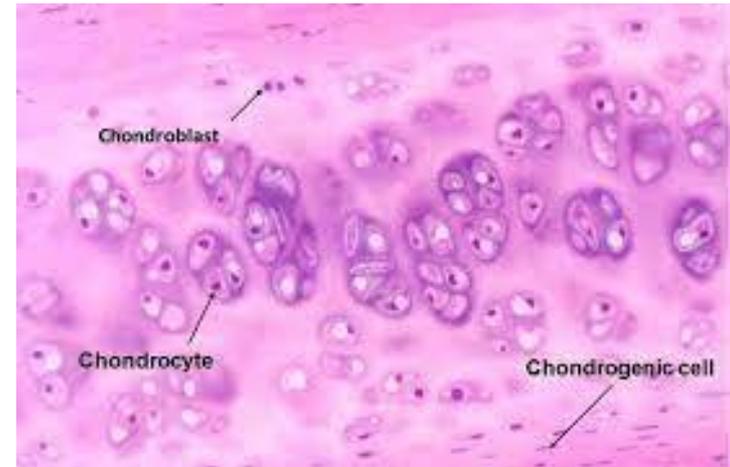
PERICHONDRIUM

- Dense irregularly arranged fibrous tissue
- Ensheathes the cartilage
- Composed of cells & matrix
- Matrix consists of fibres & ground substance
- Houses the blood vessels that nourish chondrocytes
- Present in most of the hyaline & elastic cartilage
- Absent in fibrocartilage



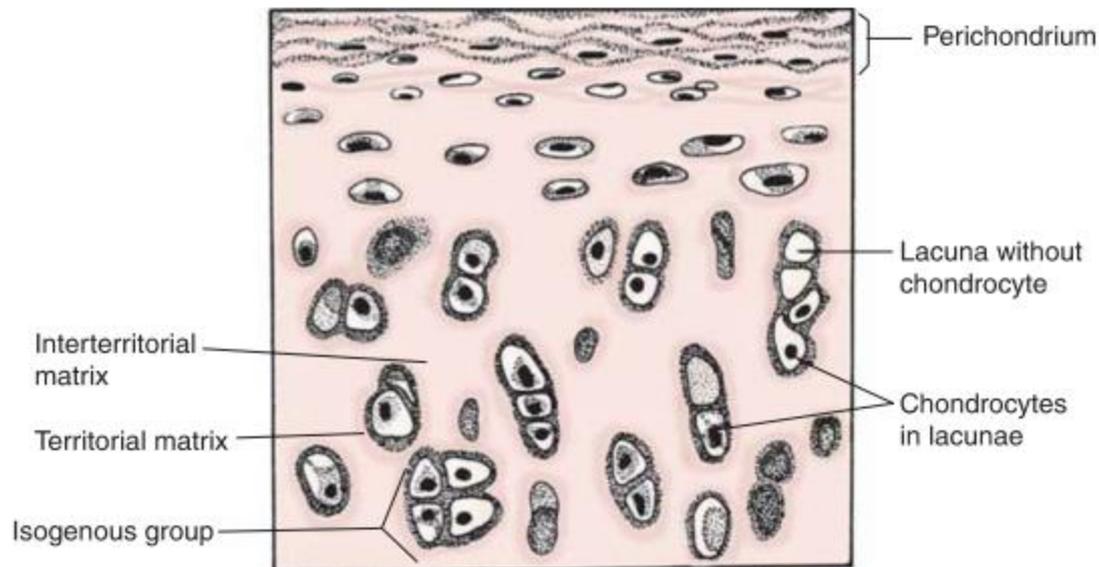
CHONDROBLAST

- Mesenchymal (embryologically)
- Progenitor of chondrocytes
- Lines border between perichondrium and matrix
- Produce the intercellular matrix and collagen fibres
- Cells which become imprisoned within this matrix become chondrocytes.



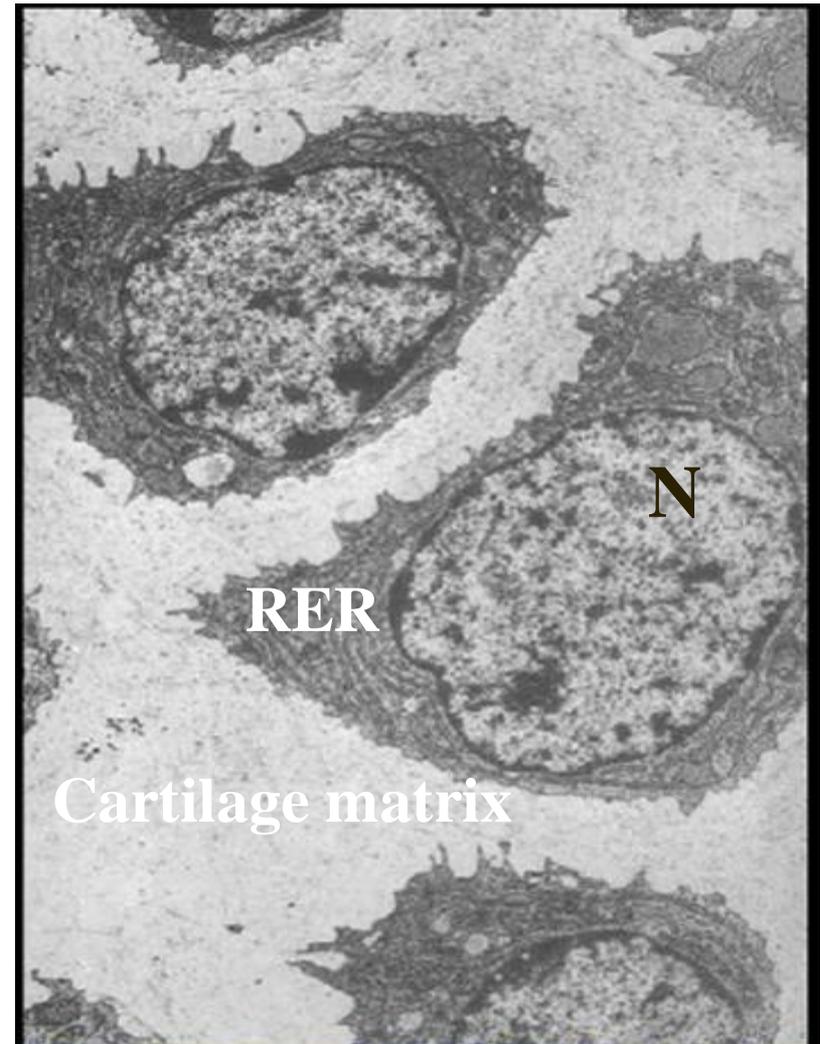
CHONDROCYTE

- Mature cartilage cell
- Reside in a space called the **lacuna**
- Isogenous cell group
- Basophilic
- Clear areas = Golgi and lipid droplets



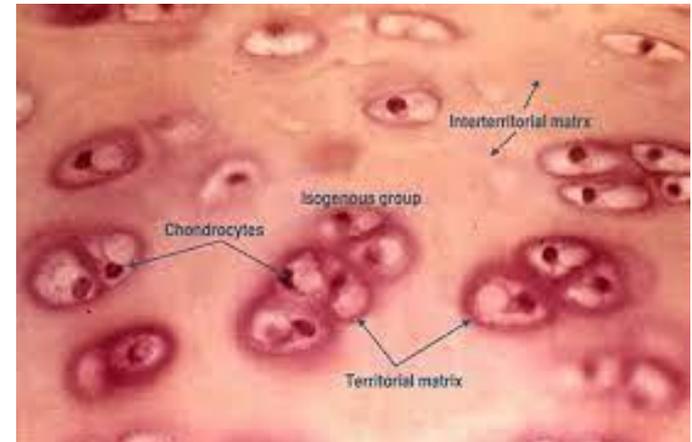
CHONDROCYTE

- Chondrocytes completely fill their lacunae
- RER and euchromatic nuclei
- Synthetically active, secrete matrix
- Synthesize type II collagen, proteoglycans and chondronectin.



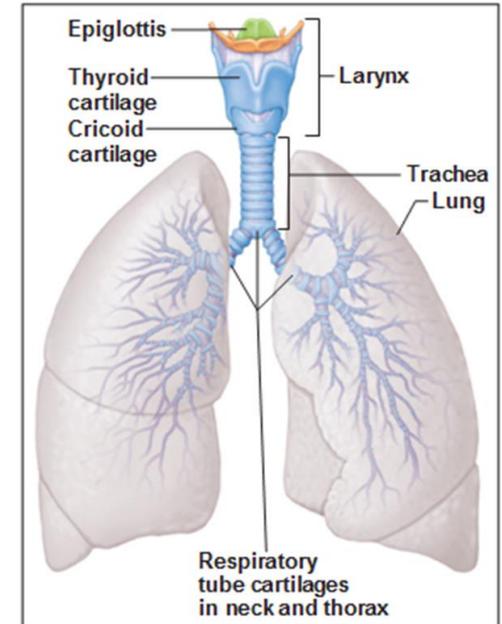
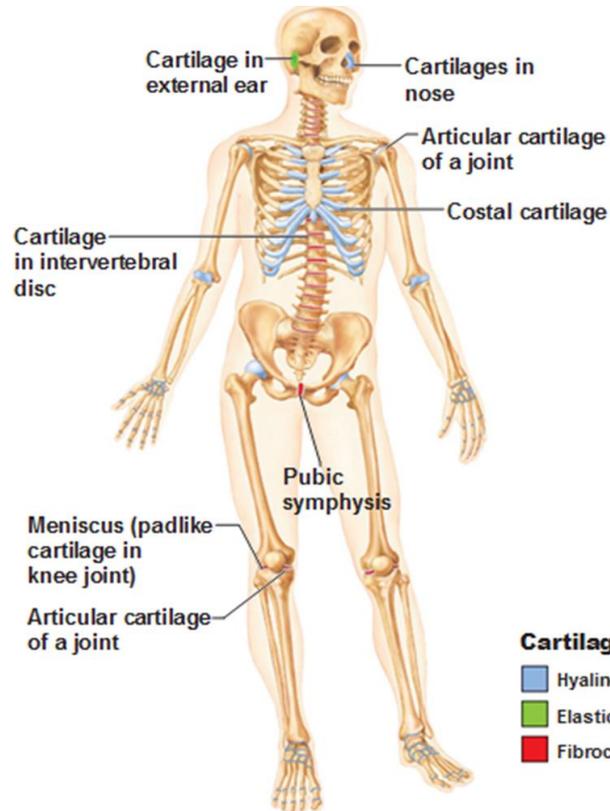
MATRIX

- Provides the rigidity, elasticity, & resilience
- **FIBERS**
 - Collagenous and elastic
- **GROUND SUBSTANCE**
 - Glycosaminoglycans (chondroitin sulfates & keratan sulfate)
 - Proteoglycans
 - Water
- Basophilic
- Territorial matrix
- Interterritorial matrix



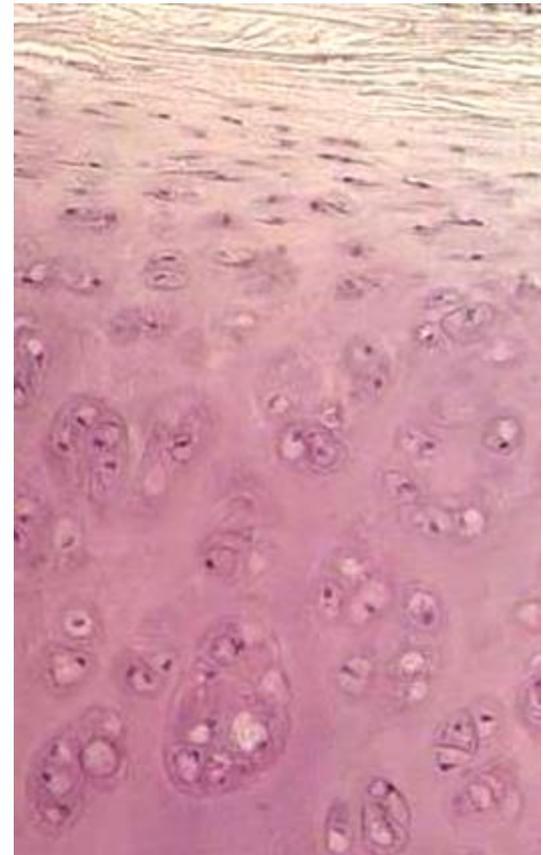
TYPES OF CARTILAGE

- **HYALINE**
- **ELASTIC**
- **FIBROUS**



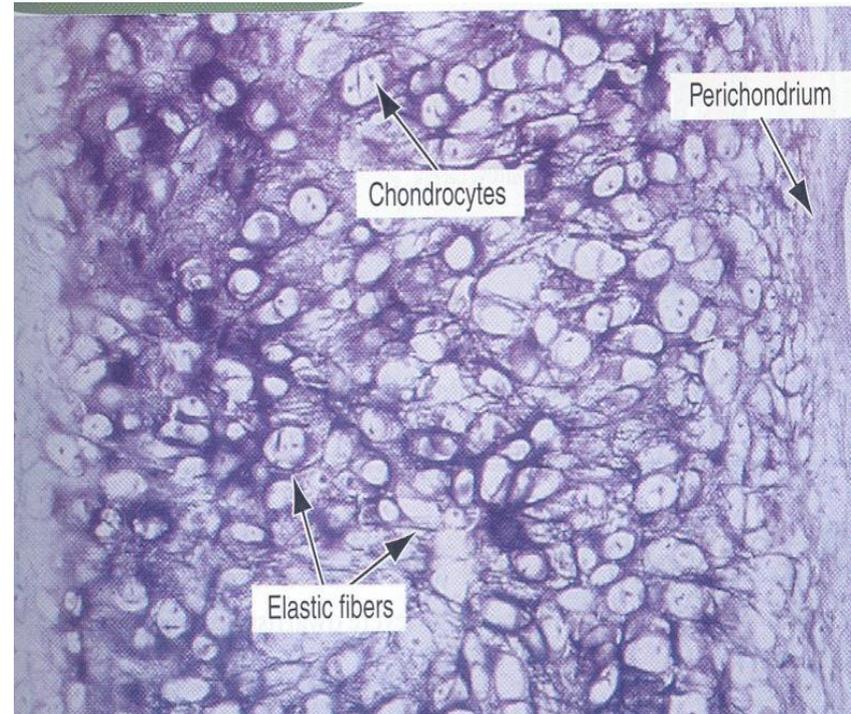
HYALINE CARTILAGE

- **Sites:** Tracheal rings, nasal septum, larynx, costal cartilage & articular surfaces of joints
- **Cartilage cells:** Present singly or in groups of 2 or 4 cells inside lacunae
- **Cartilage Matrix:** Collagen type II
- **Ground substance:** Homogenous, clearly basophilic
- **Functions:** supportive



ELASTIC CARTILAGE

- **Sites:** Auricle, ext. auditory meatus, auditory tube, epiglottis, apices of arytenoid cartilage
- **Cartilage cells:** larger, more numerous, packed more closely
- **Cartilage Matrix:** elastic fibres, collagen type II
- **Ground substance:** Rich in elastic fibres
- **Functions:** supportive with resilience
- Elastic fibers stain with orcein.



FIBROCARILAGE

- **Sites:** intervertebral discs, arytenoid cartilage (except apices), pubic symphysis, manubriosternal joint, articular disc of TM joint.
- **Cartilage cells:** fewer, smaller, scattered singly or in rows
- **Cartilage Matrix:** collagen type I & II
- **Ground substance:** acidophilic
- **Functions:** supportive with tensile strength



Intervertebral disc

BONE

- Modified connective tissue
- Highly vascular mineralized connective tissue consisting of cells and dense intercellular organic matrix impregnated with inorganic salts.
- Provide support & protection to the vital organs
- Forms skeletal framework

COMPOSITION

- **Cells:**

- a. Osteogenic cells

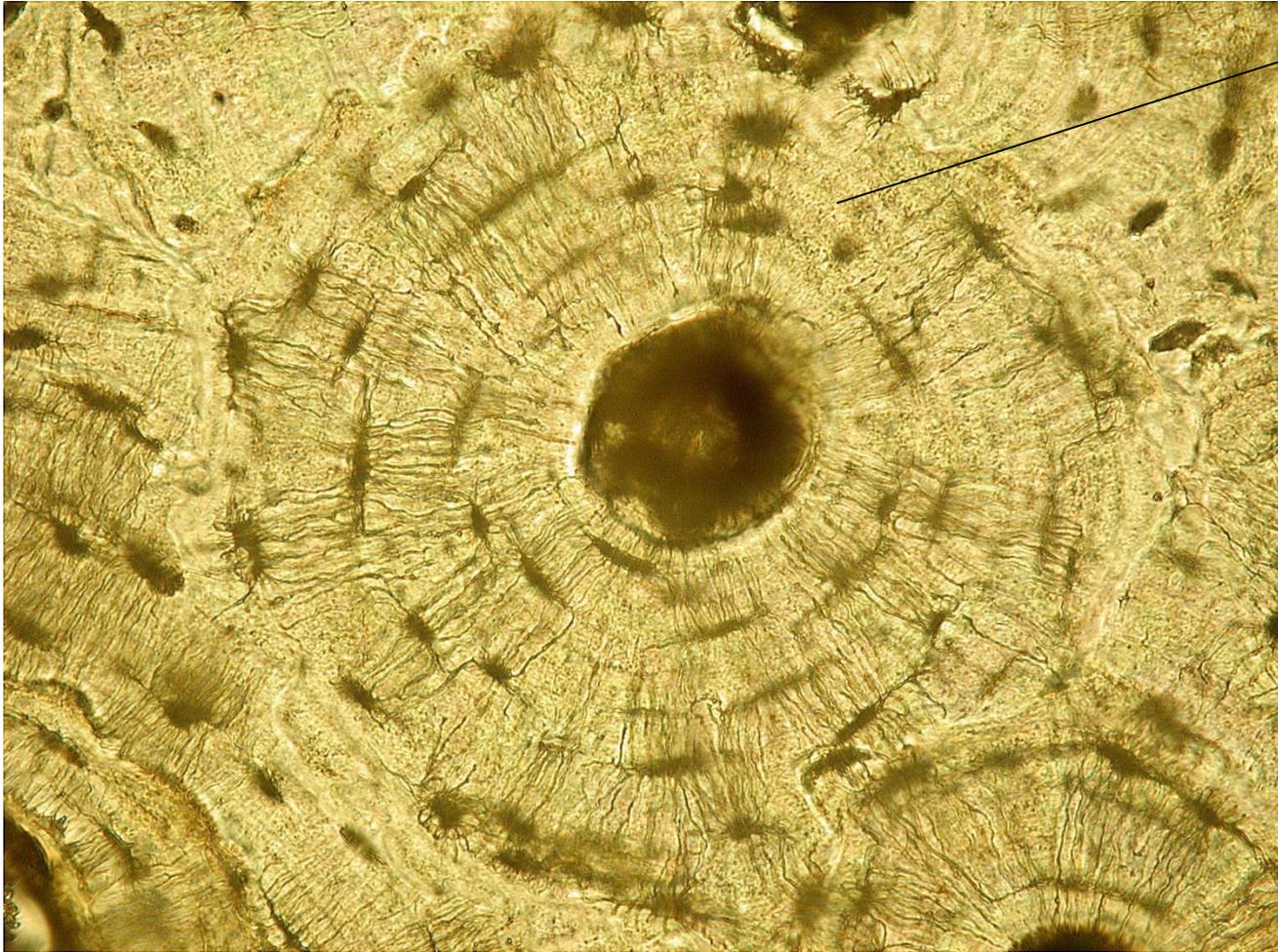
- b. Osteoblasts

- c. Osteocytes

- d. Osteoclasts

- **Fibers:** collagen type I

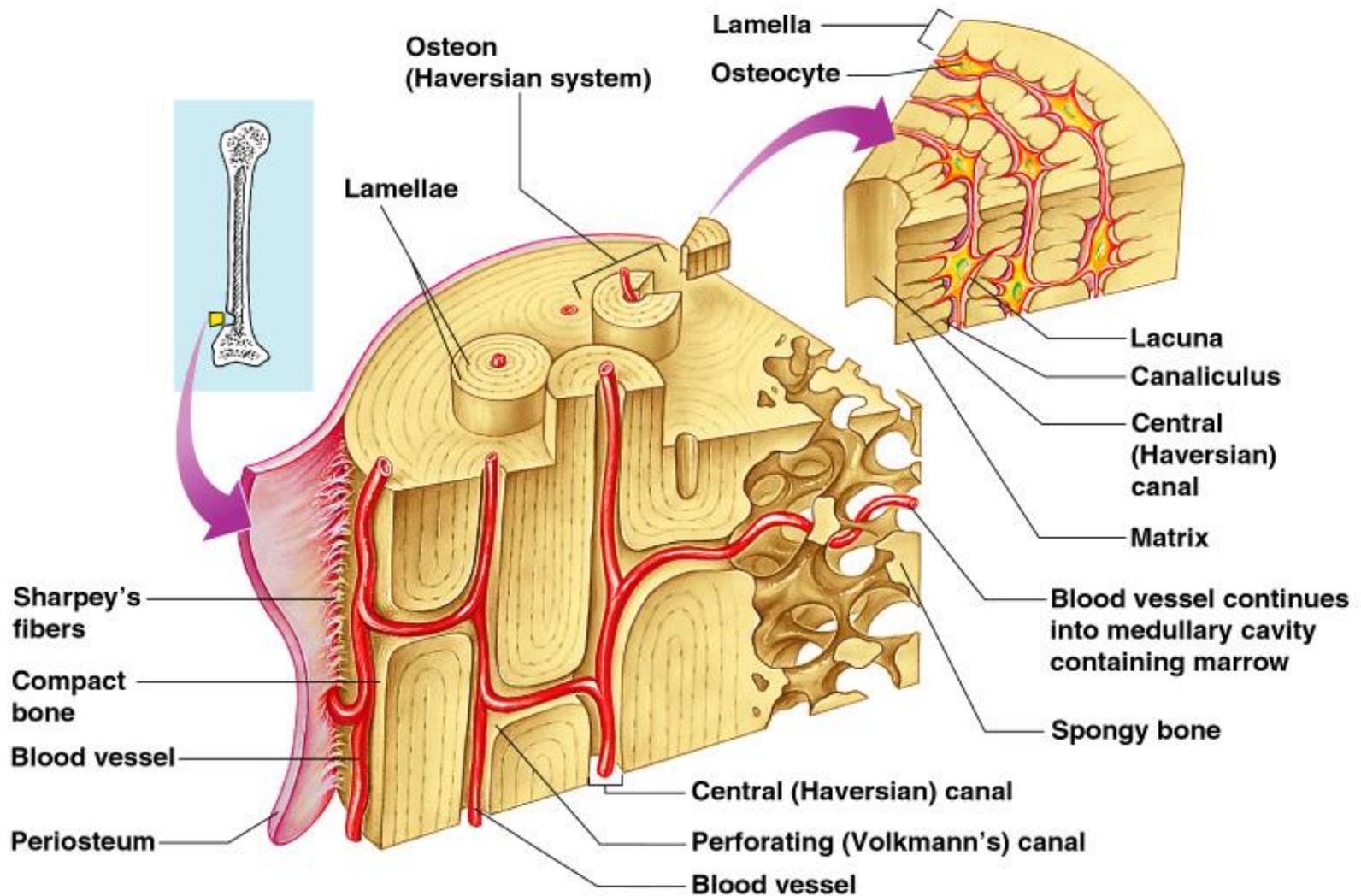
- **Ground Substance:** Proteoglycans & glycoproteins



The matrix of bone is a mixture of organic (collagen) and inorganic (calcium phosphate)

90% of bone is matrix, with the remaining 10% made of osteocytes.

MICROSCOPIC ANATOMY OF BONE



LAMELLAR ARRANGEMENT

- Lamellae
 - Rings around the central canal
 - Sites of lacunae
- Lacunae
 - Cavities containing bone cells (osteocytes)
 - Arranged in concentric rings

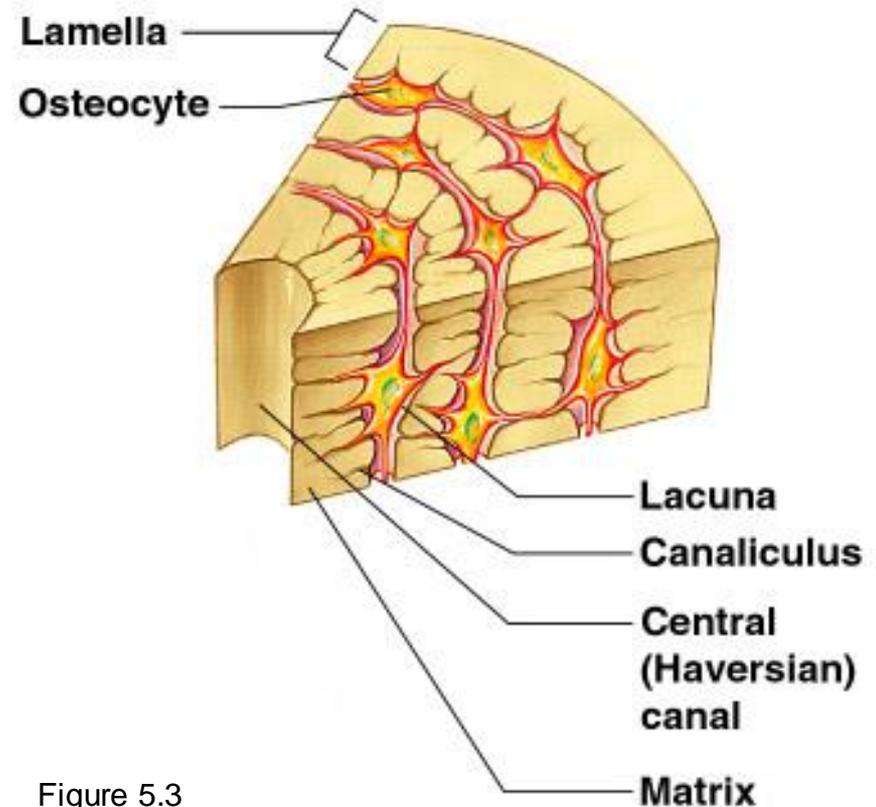
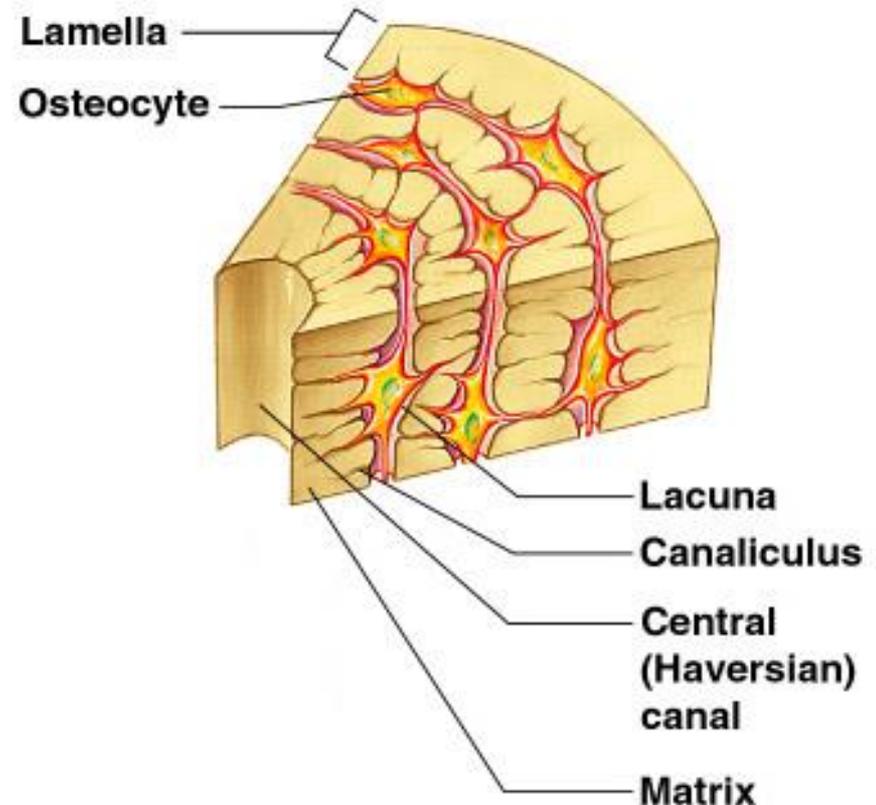


Figure 5.3

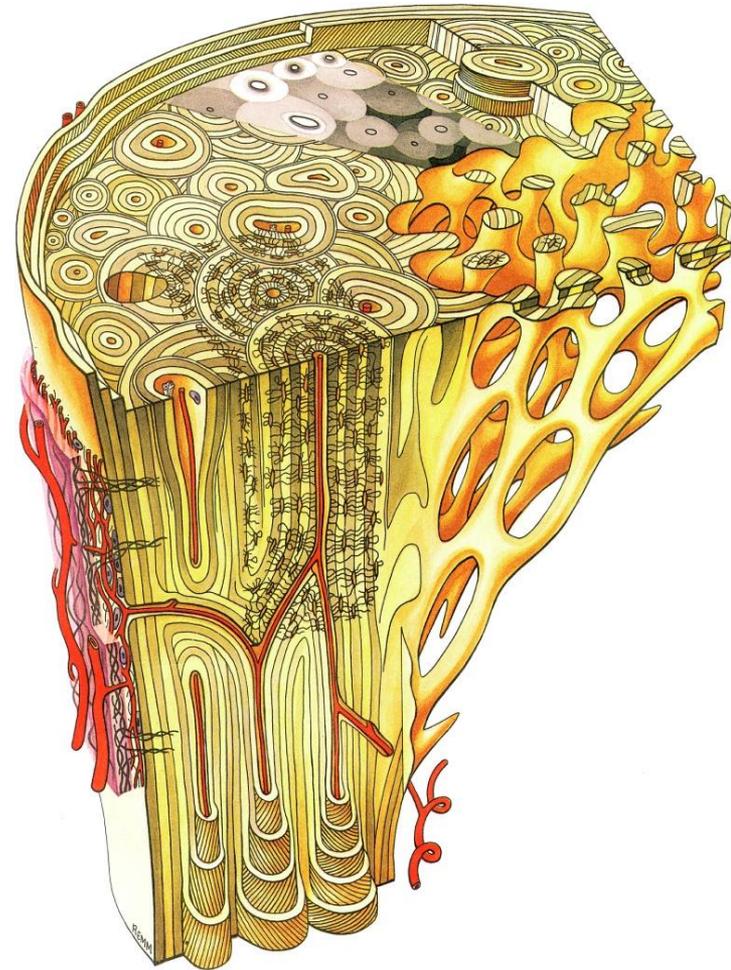
LAMELLAR ARRANGEMENT

- **Canaliculi**
 - Tiny canals
 - Radiate from the central canal to lacunae
 - Form a transport system



COMPACT BONE

- The morphofunctional unit of the bone is **osteon**, or **Haversian system**.
- Lamellar pattern of compact bone:
 - i. Haversian system
 - ii. Interstitial lamellae
 - iii. Circumferential lamellae



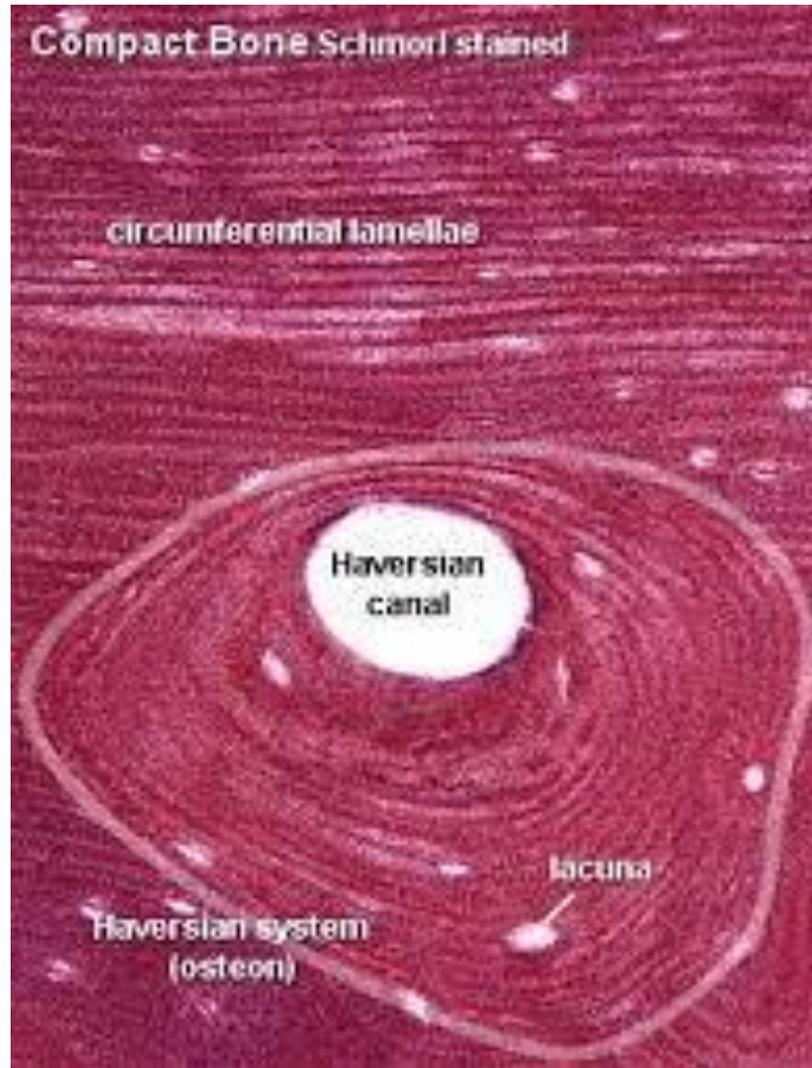
Compact Bone Schmorl stained

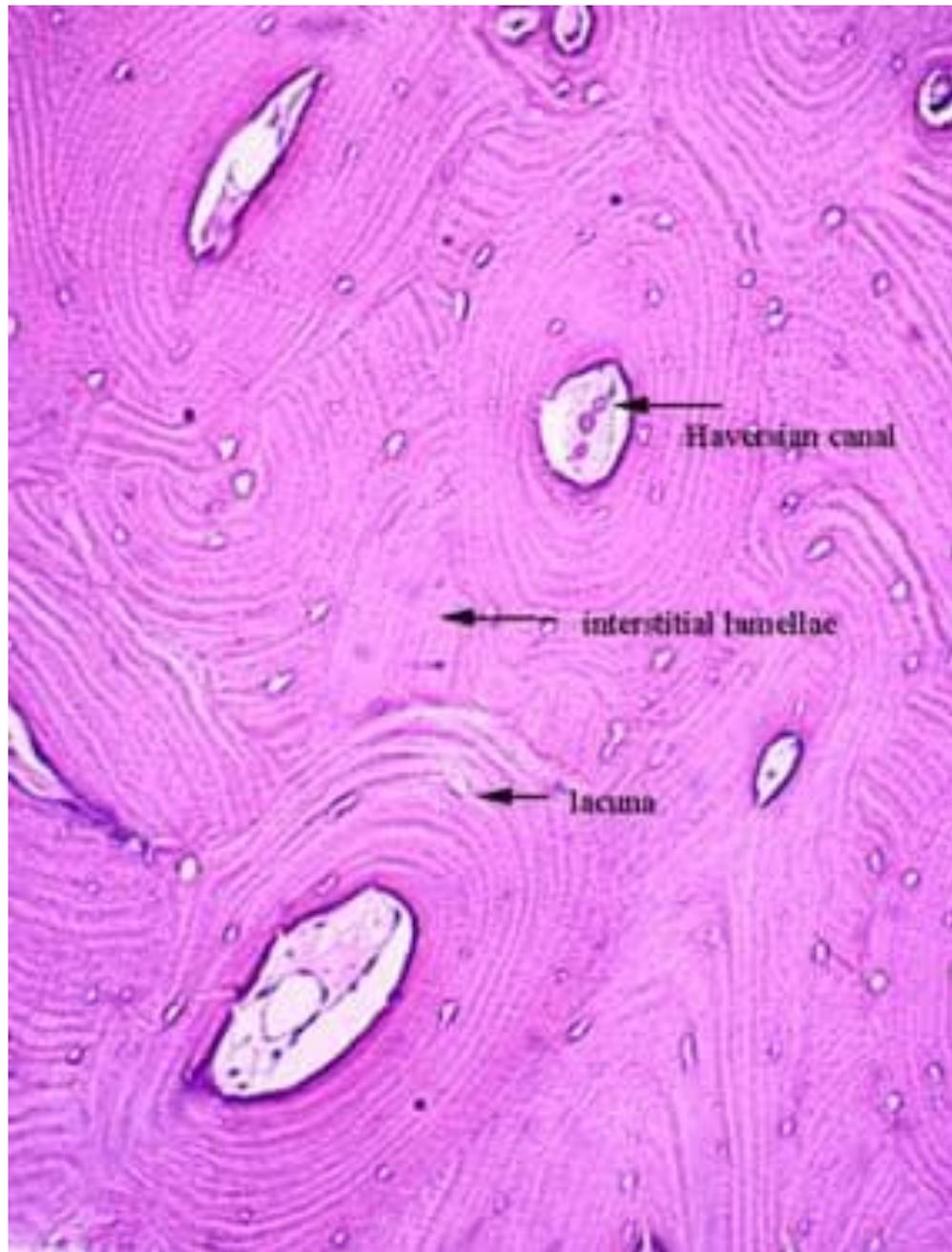
circumferential lamellae

Haversian canal

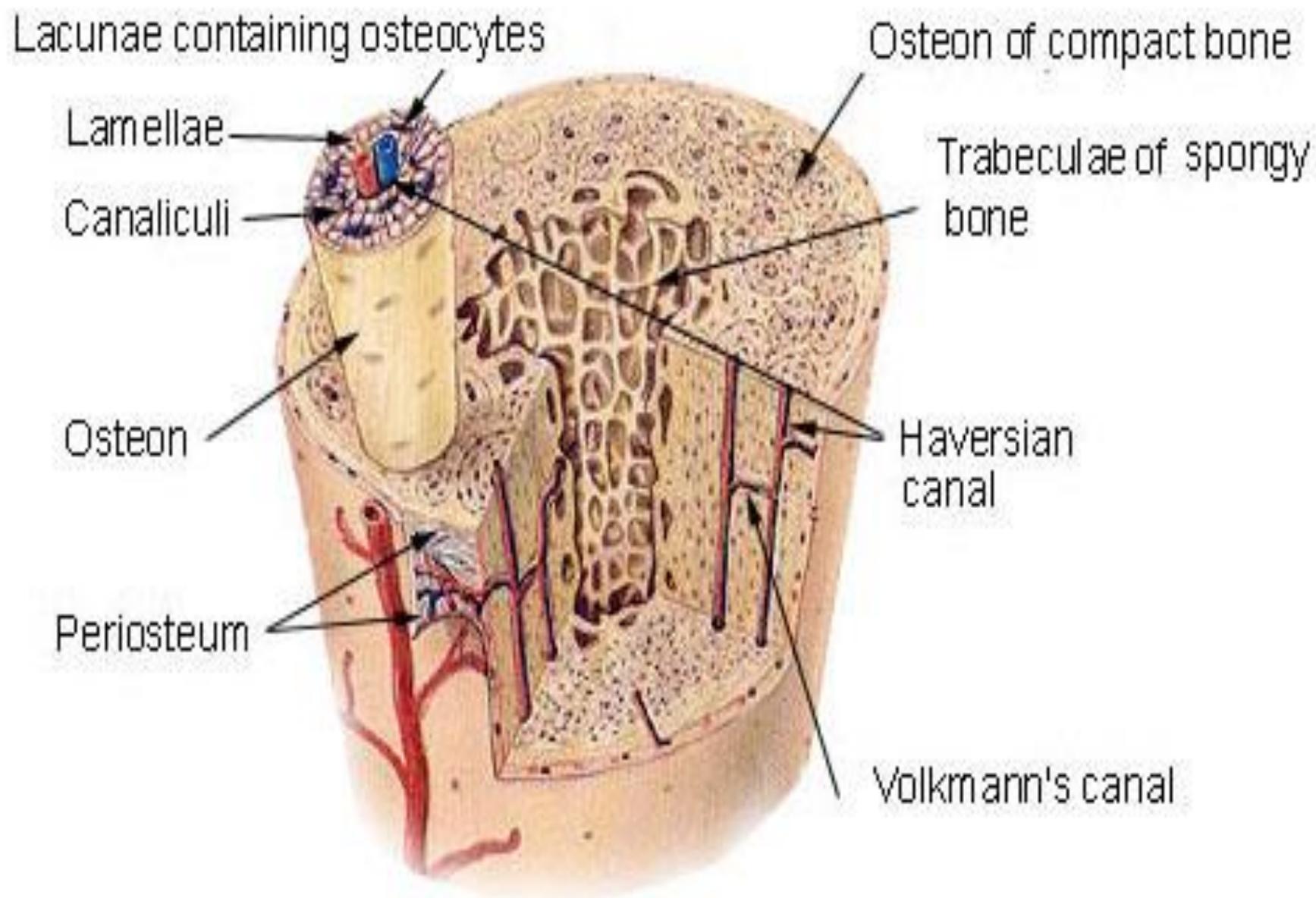
lacuna

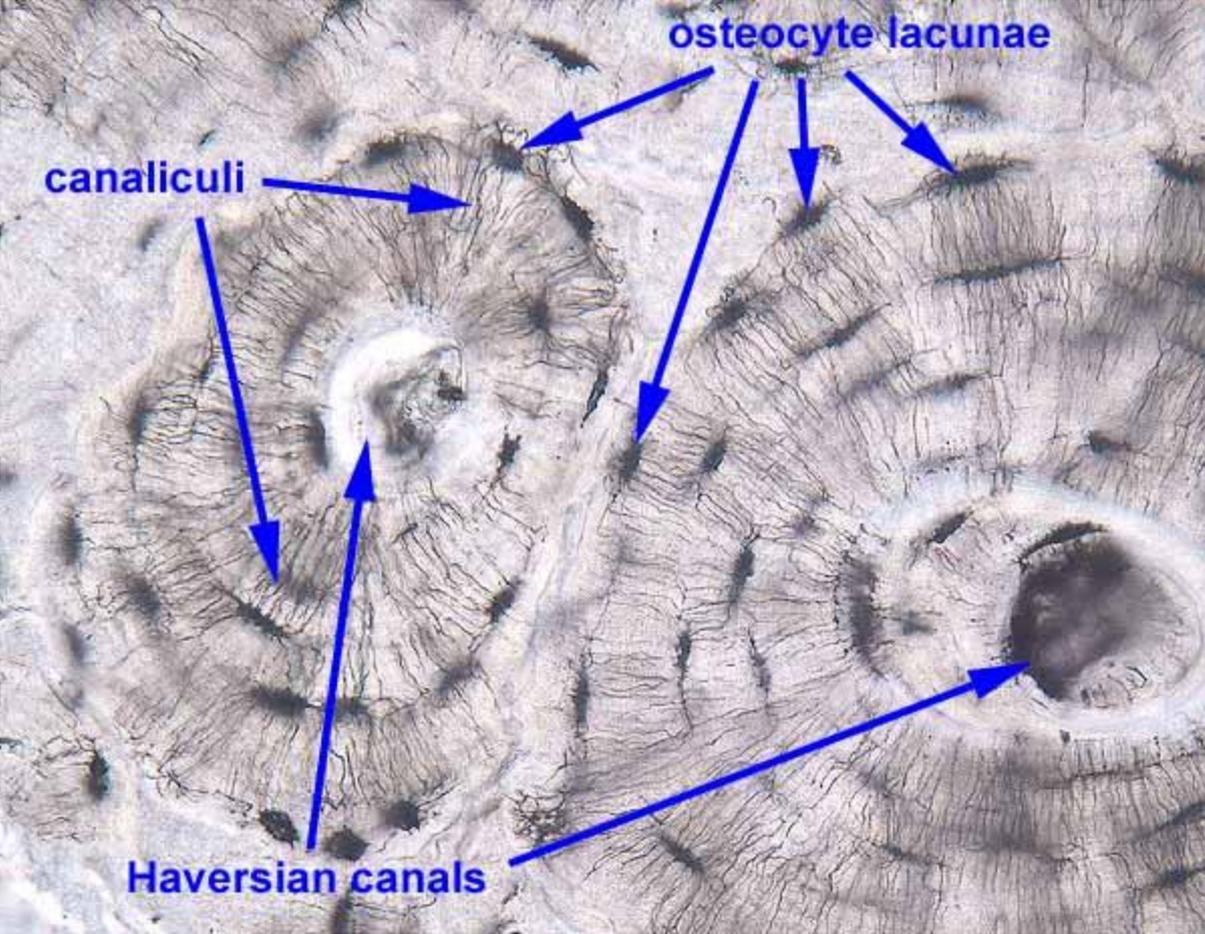
Haversian system
(osteon)



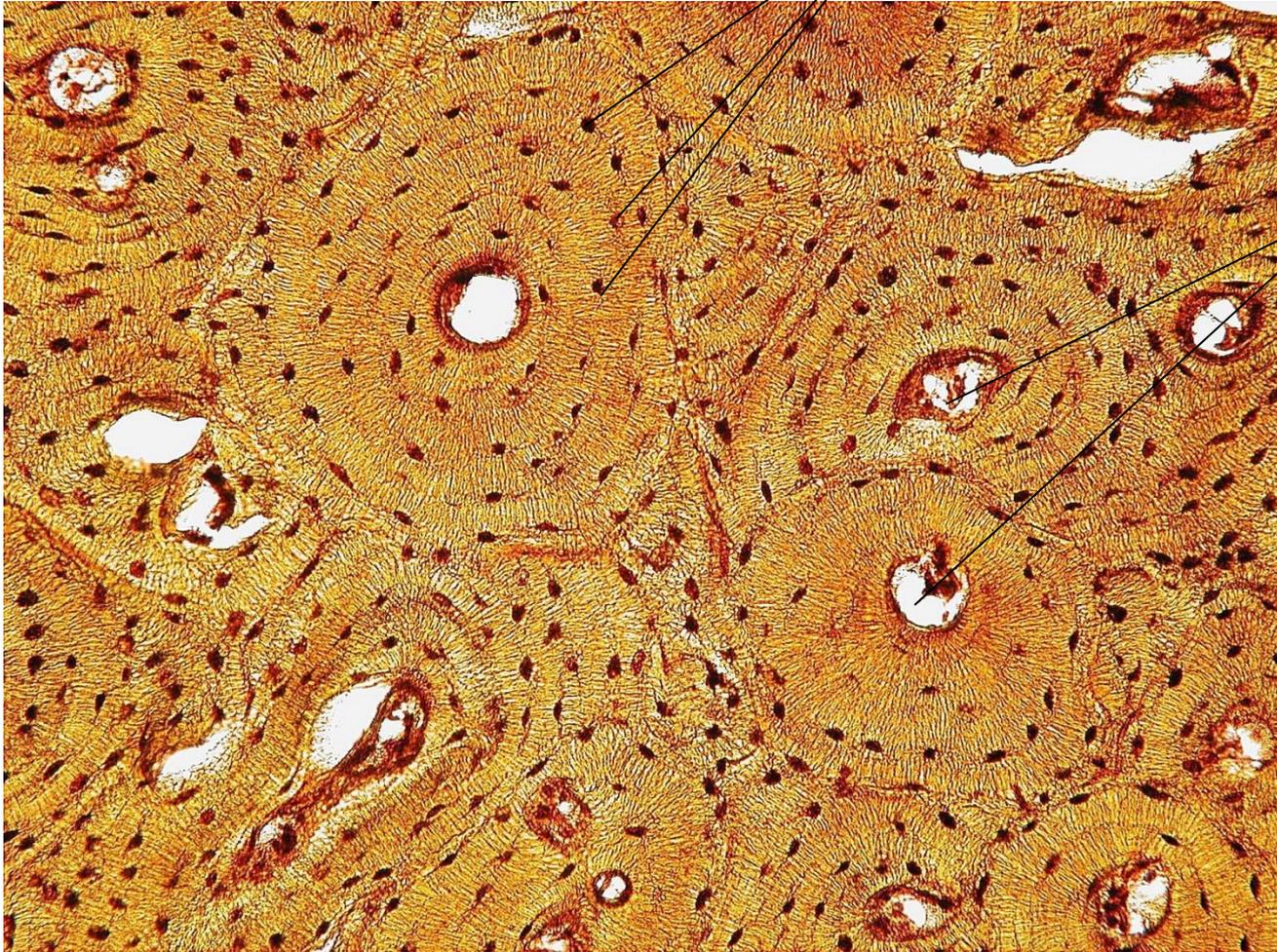


Compact Bone & Spongy (Cancellous Bone)





Dark spots are called 'lacunae' and would contain osteocytes in living bone



Central canal
containing an
artery, vein,
lymph vessel
and nerves