



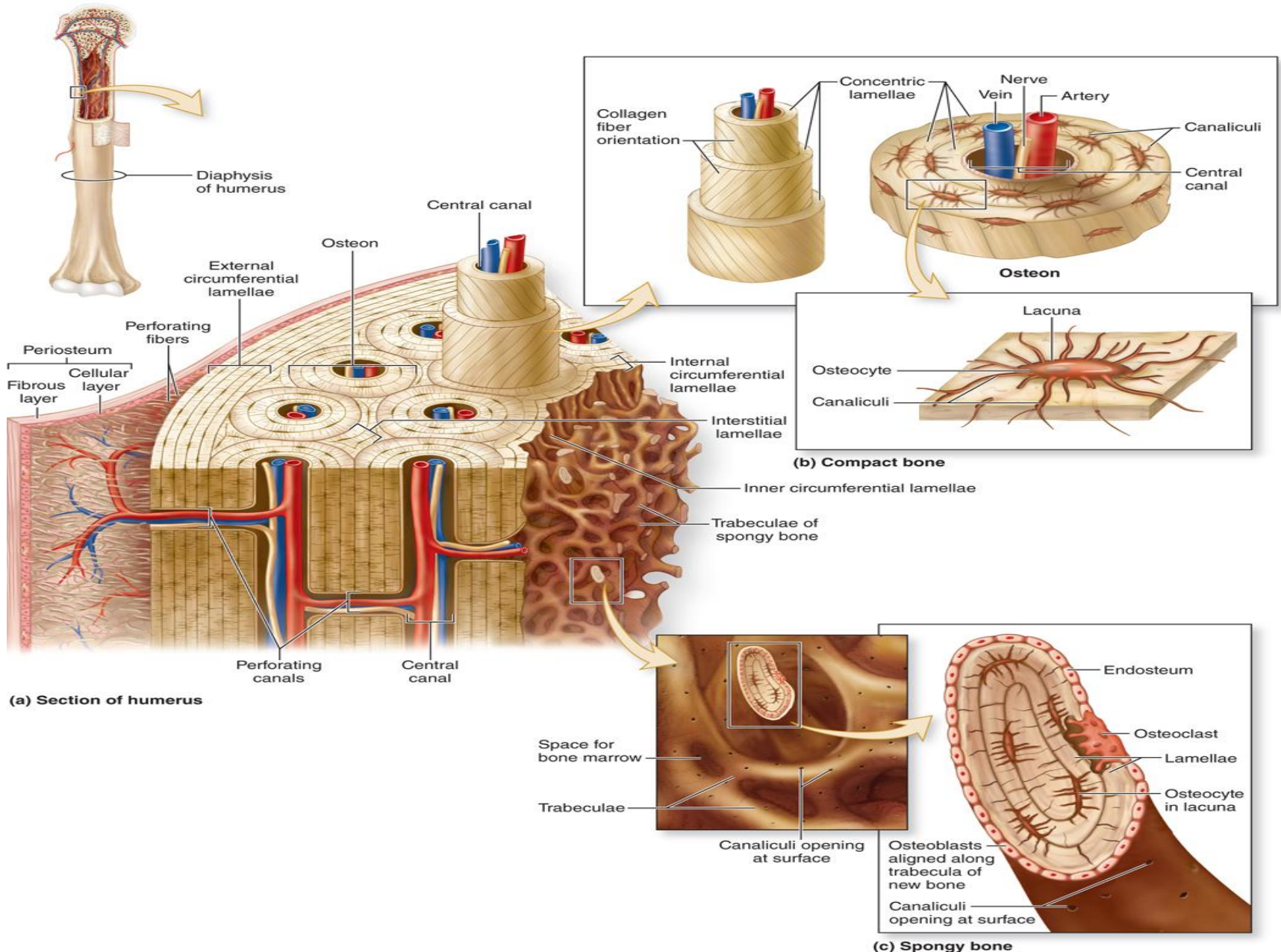
Bone tissue and Ossification

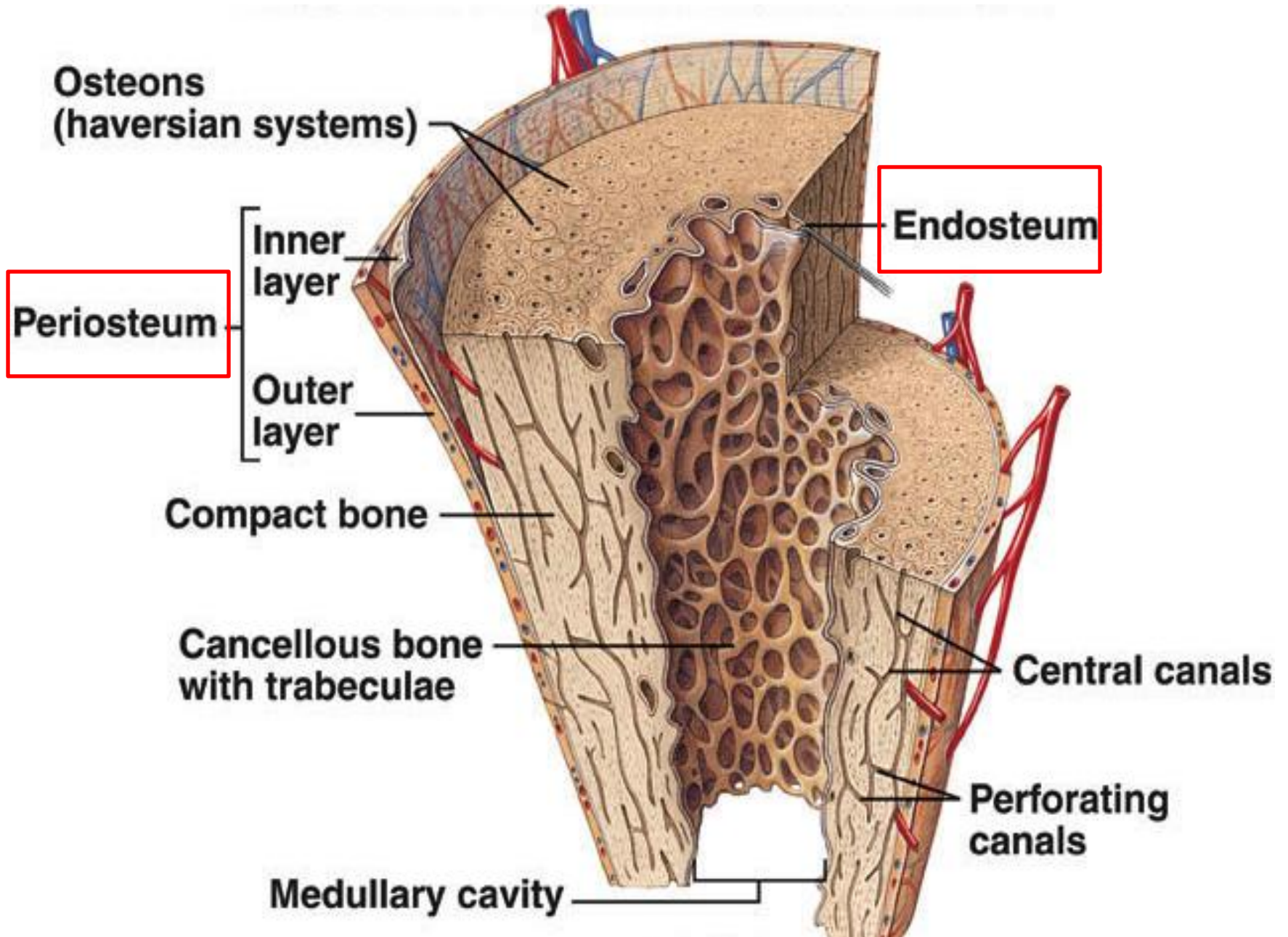
Practical part

Dr. Heba Kalbounieh

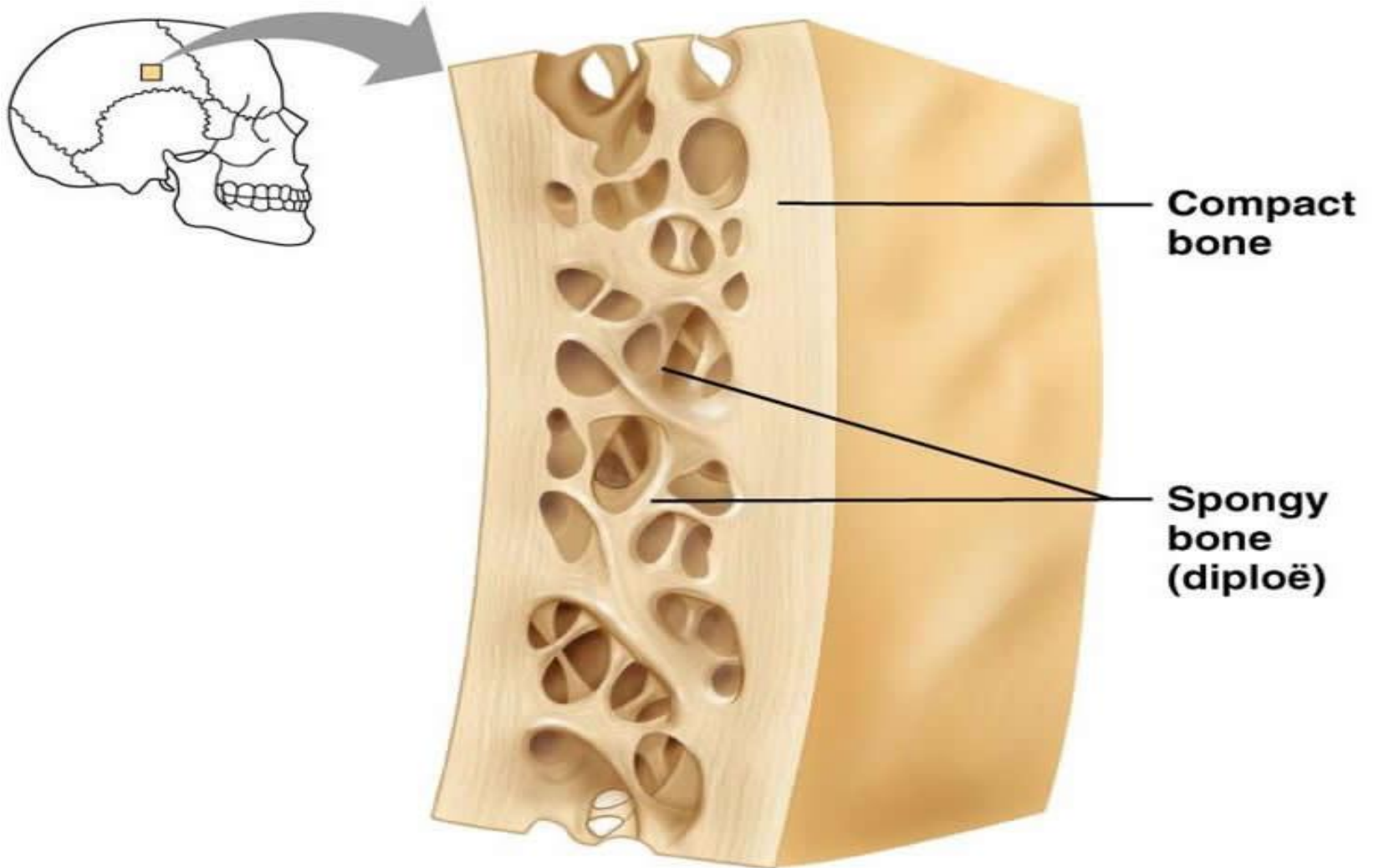
Associate Professor of Anatomy and Histology

Long bone





Flat bone



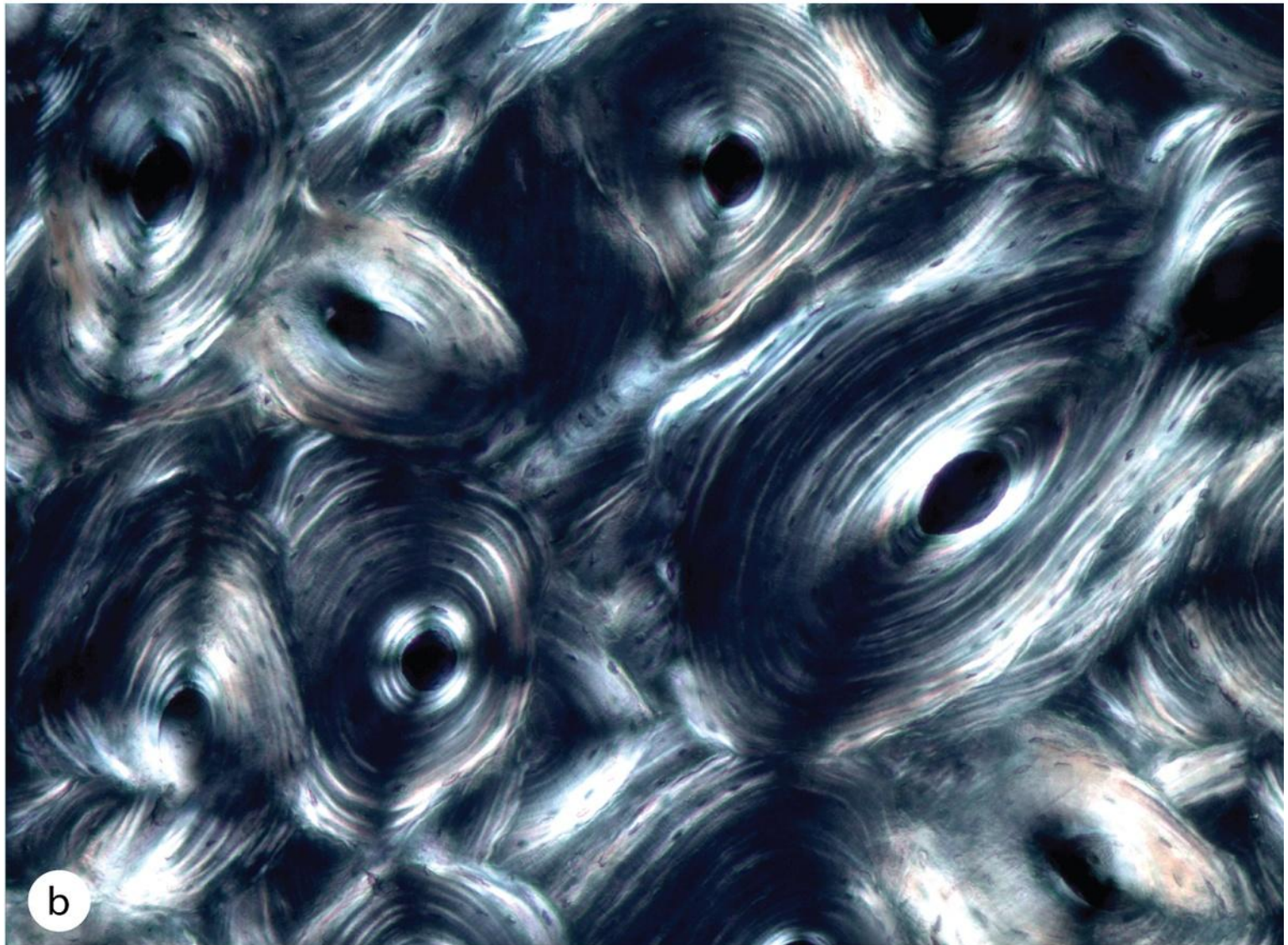


Ground bone



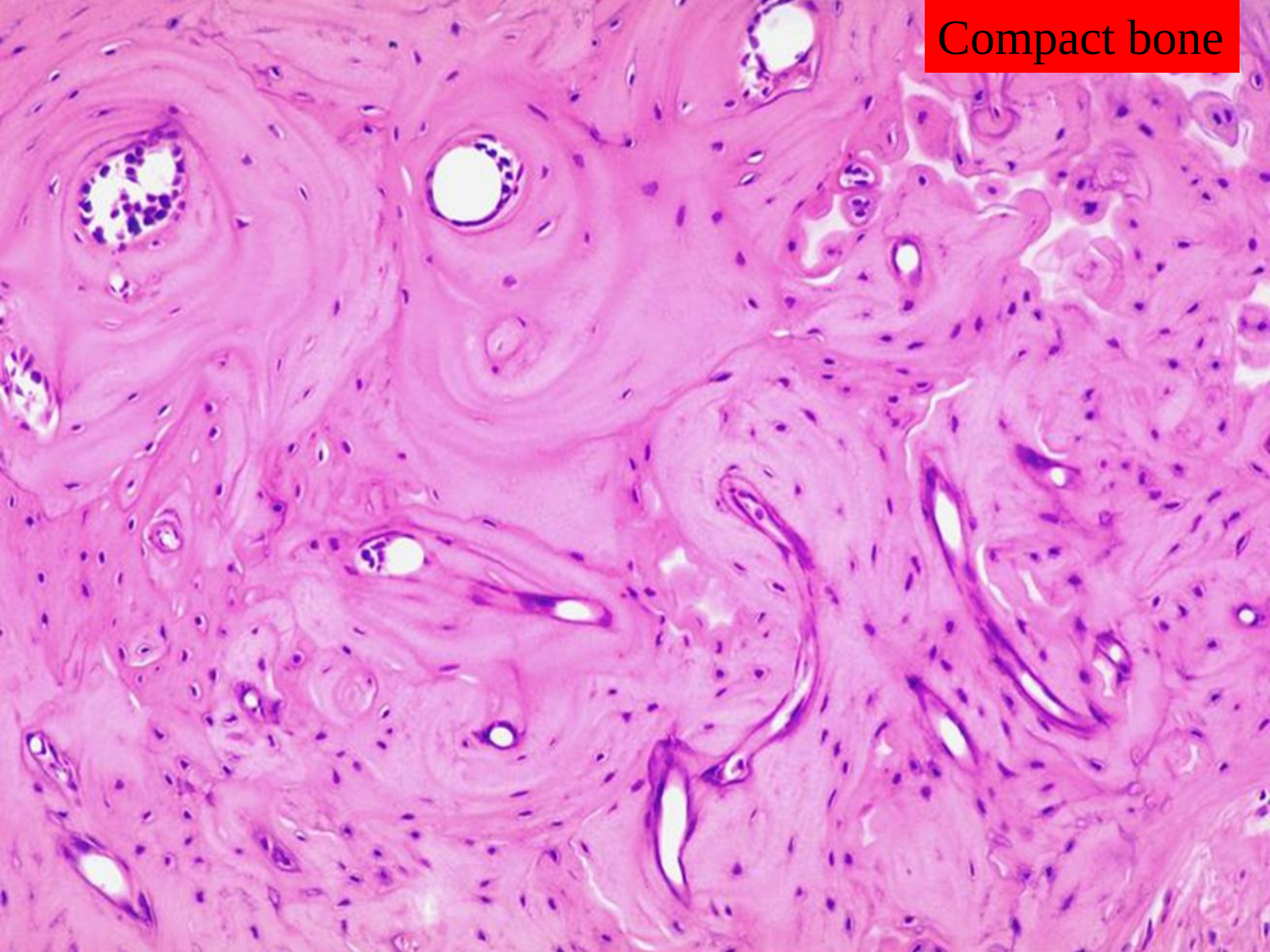
Decalcified bone

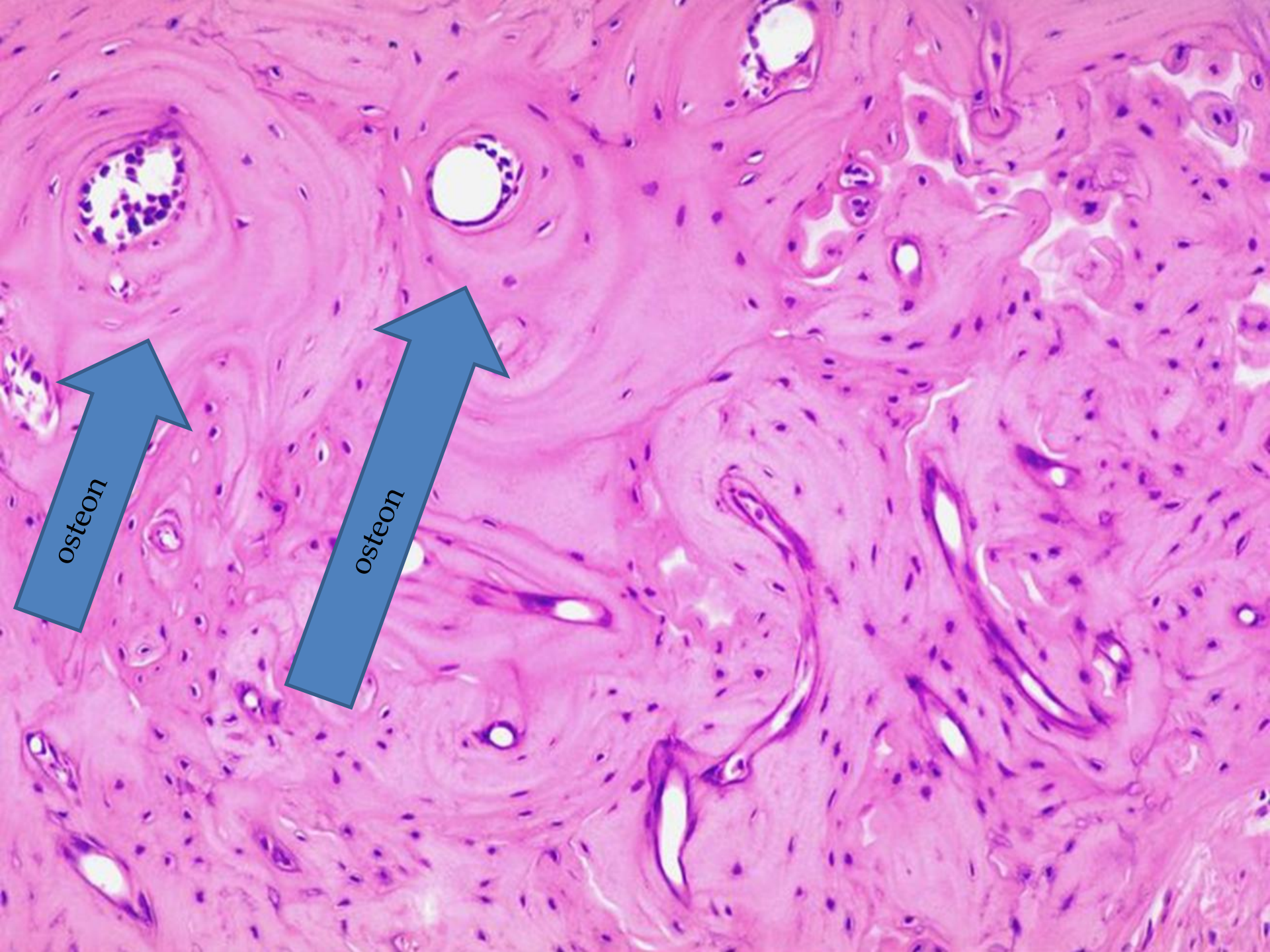
Compact bone
(Dense or cortical bone)



Alternating bright and dark bands indicate that collagen fibers in successive lamellae have different orientations.

Compact bone

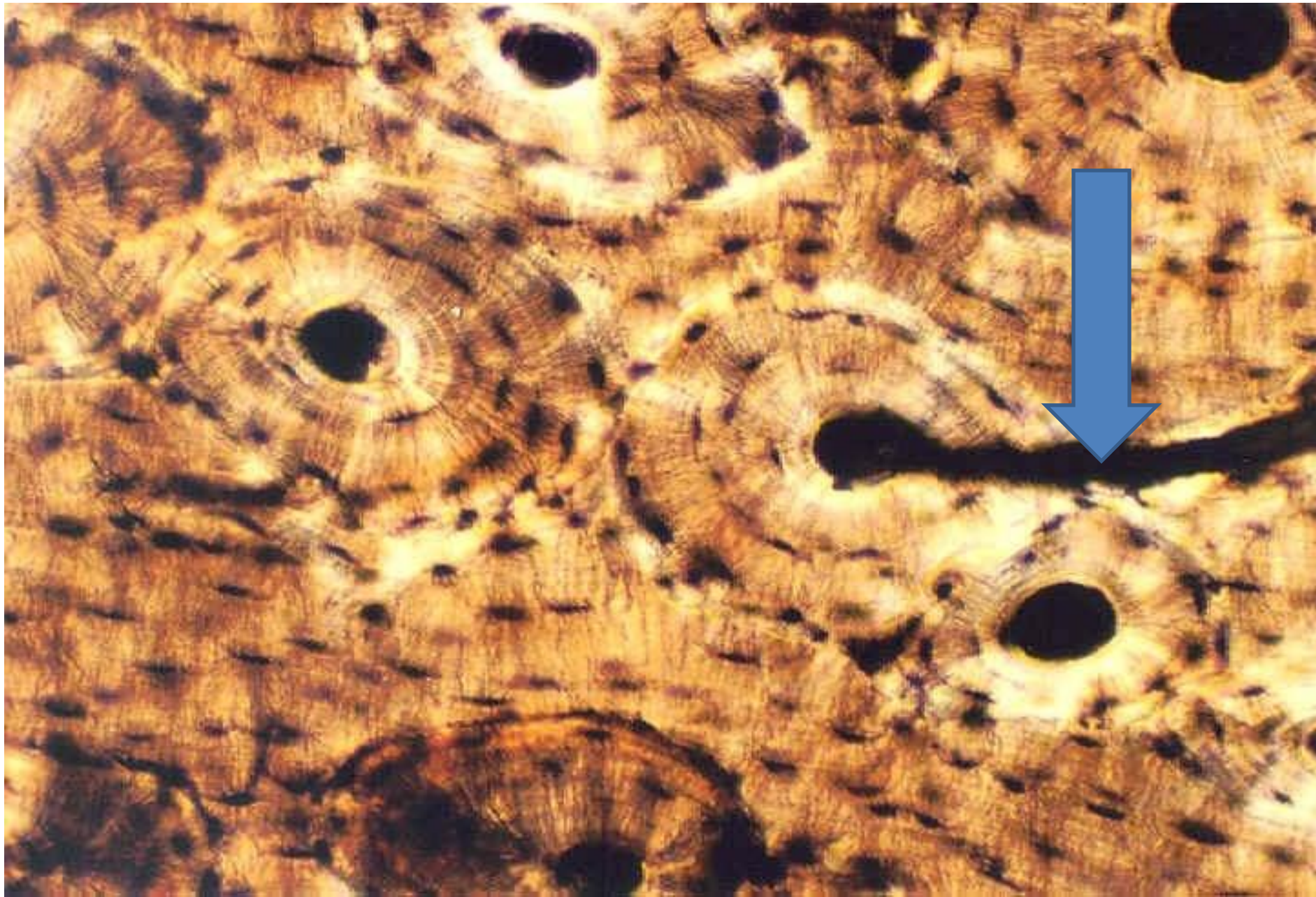




osteon

osteon

VOLKMANN'S CANAL



Cancellous
(trabecular or spongy) bone



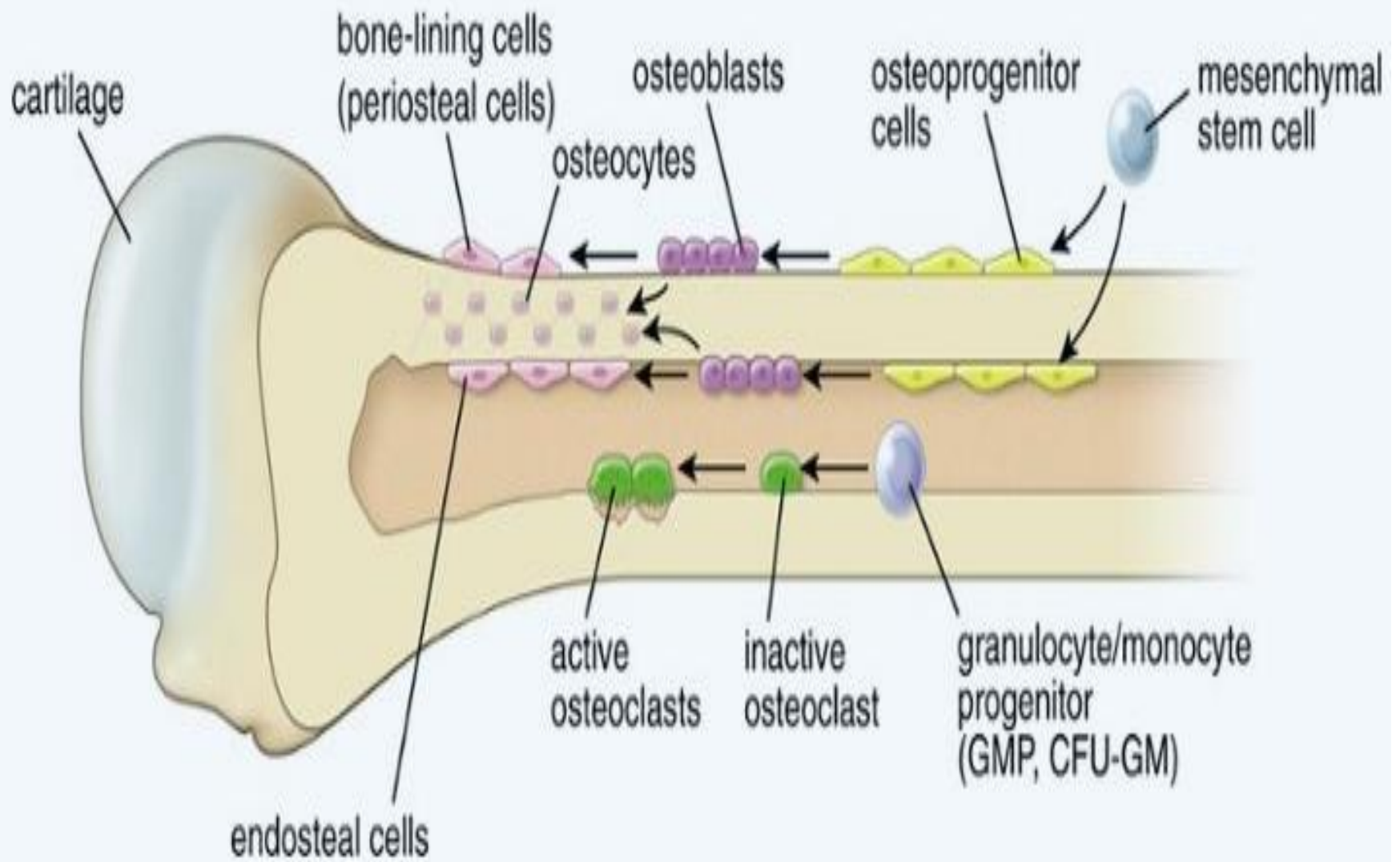
Trabecular Bone H&E

**yellow bone marrow
(adipose tissue)**

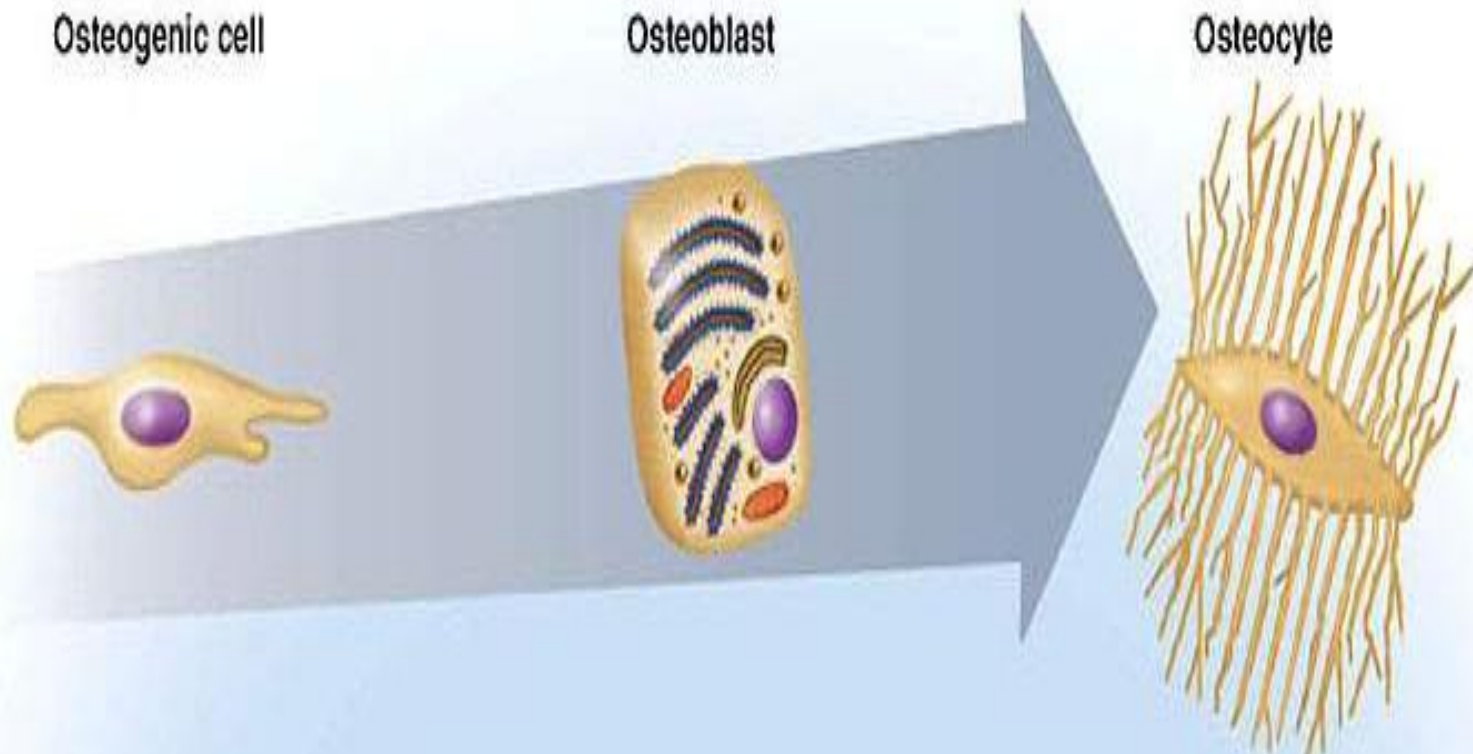
bone trabeculae

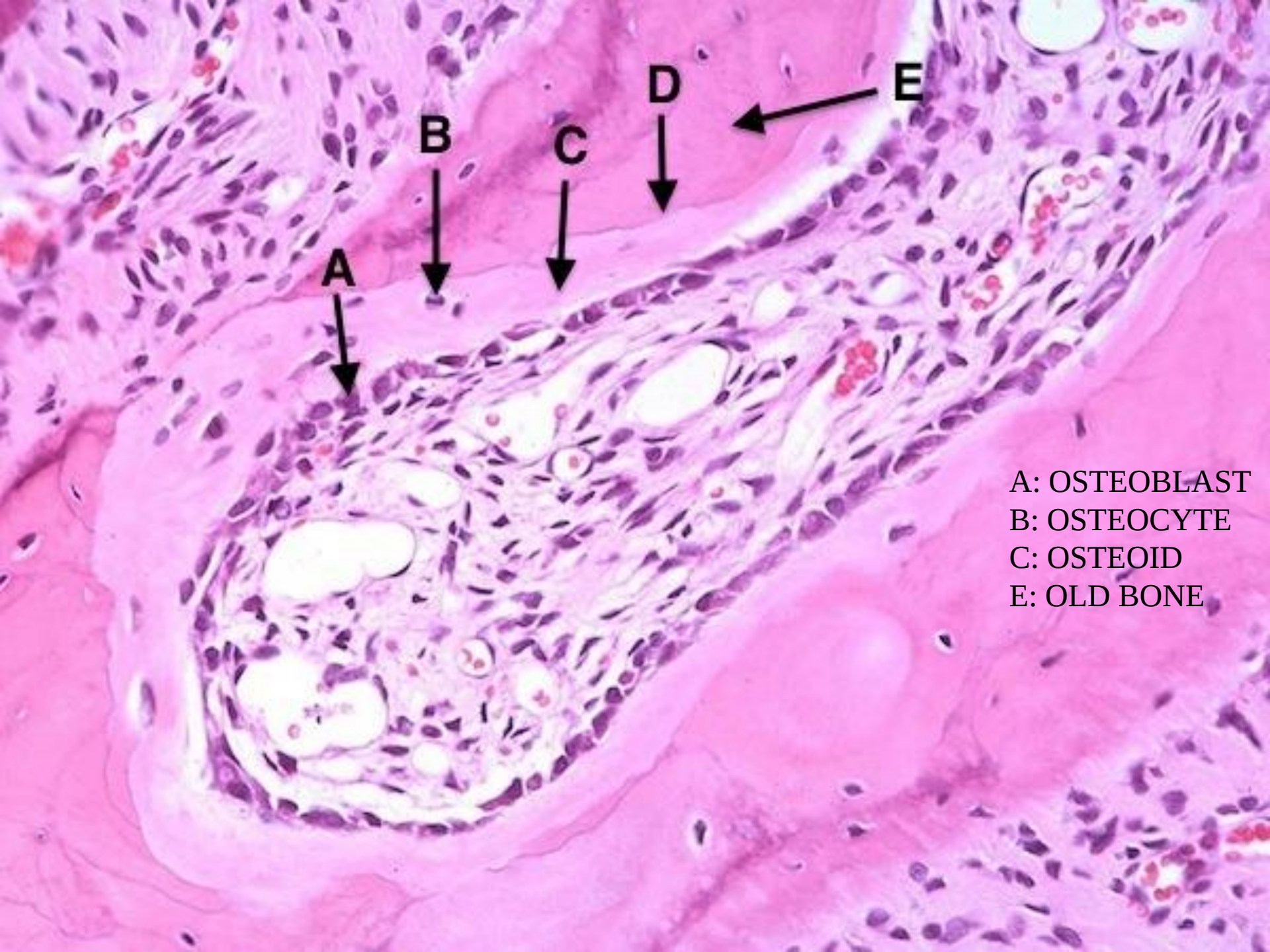


Bone cells



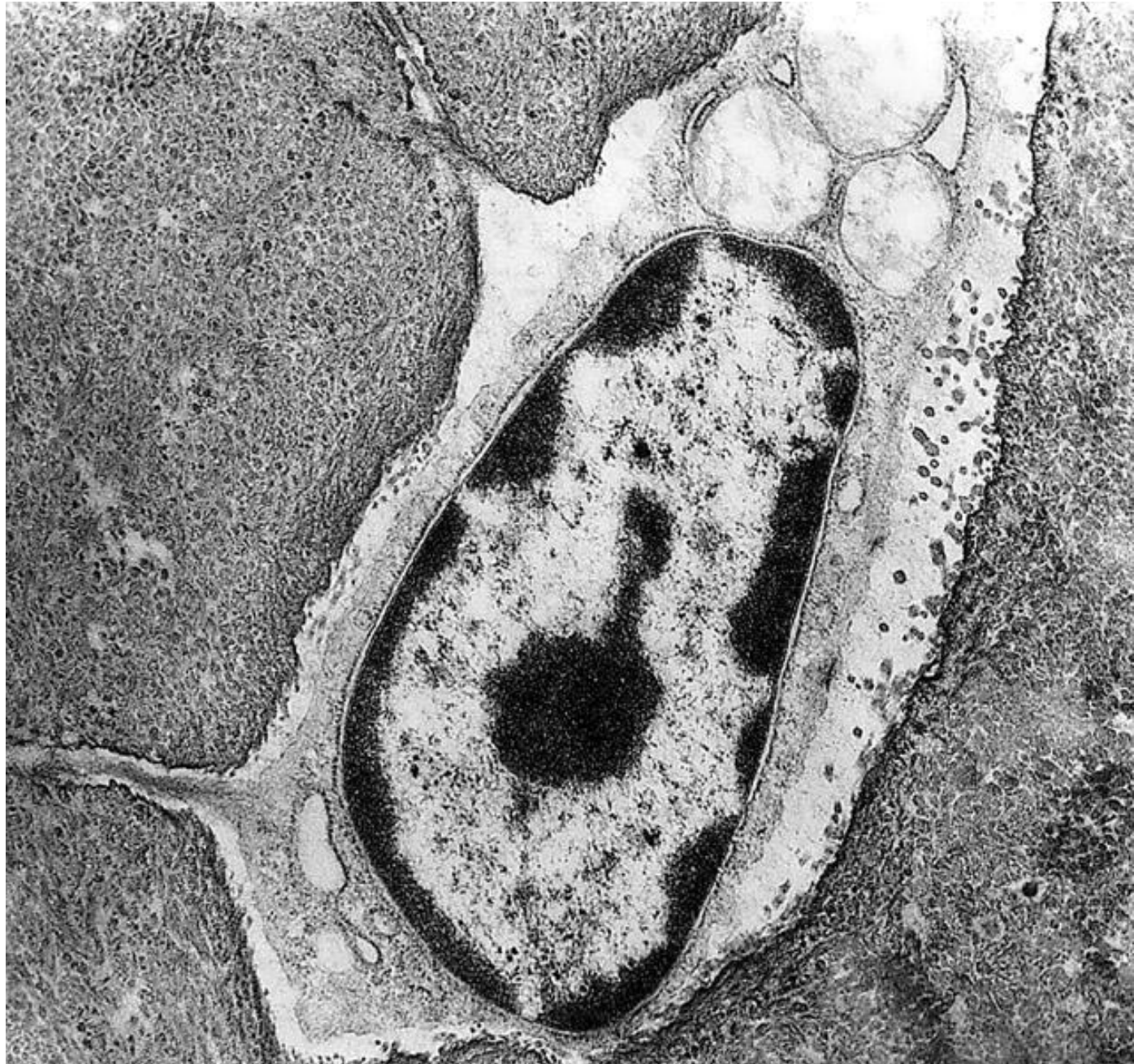
- Osteoblast $\Rightarrow$ Osteocyte



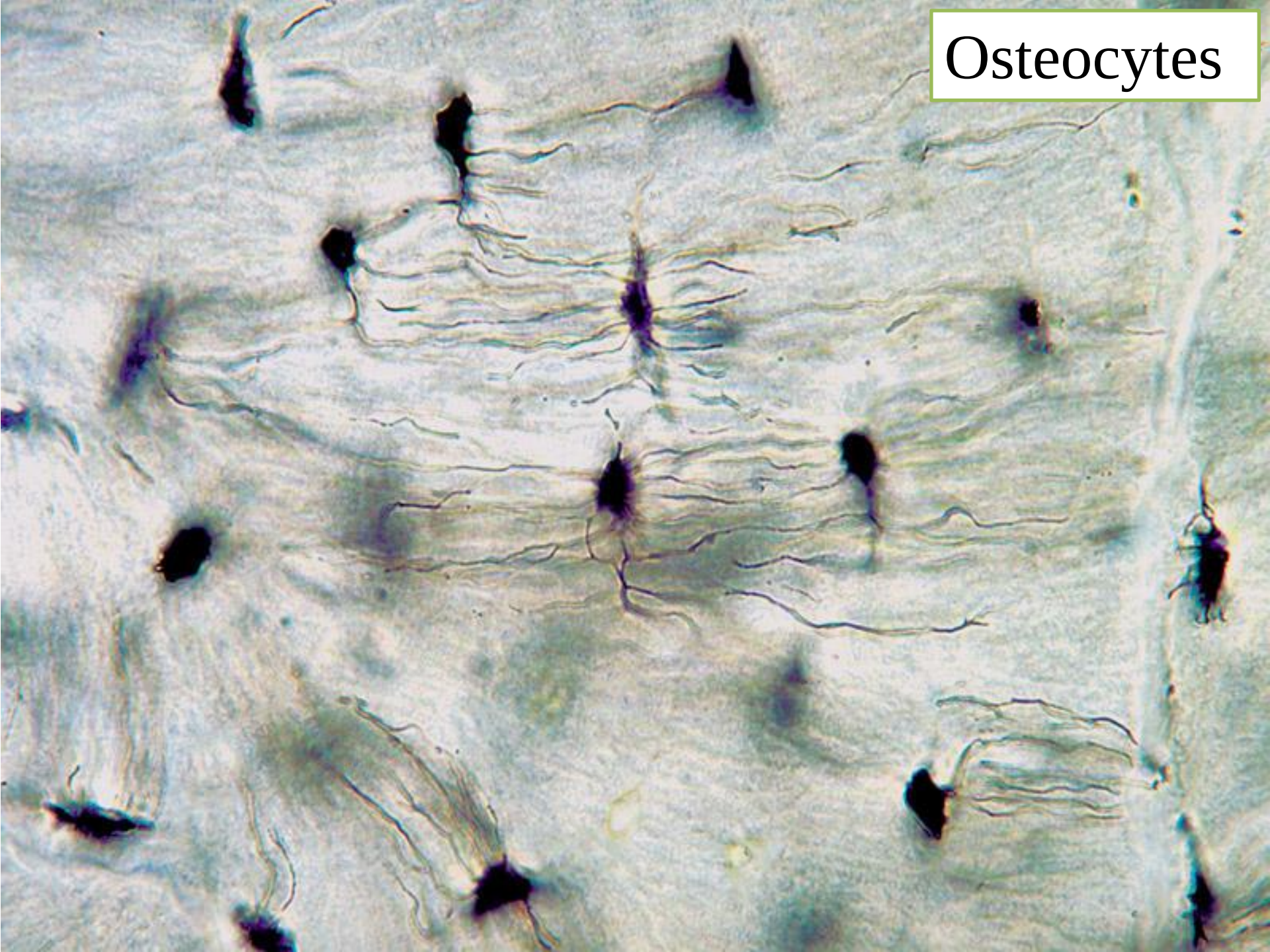


A: OSTEOLAST
B: OSTEOCYTE
C: OSTEOD
E: OLD BONE

Osteocyte

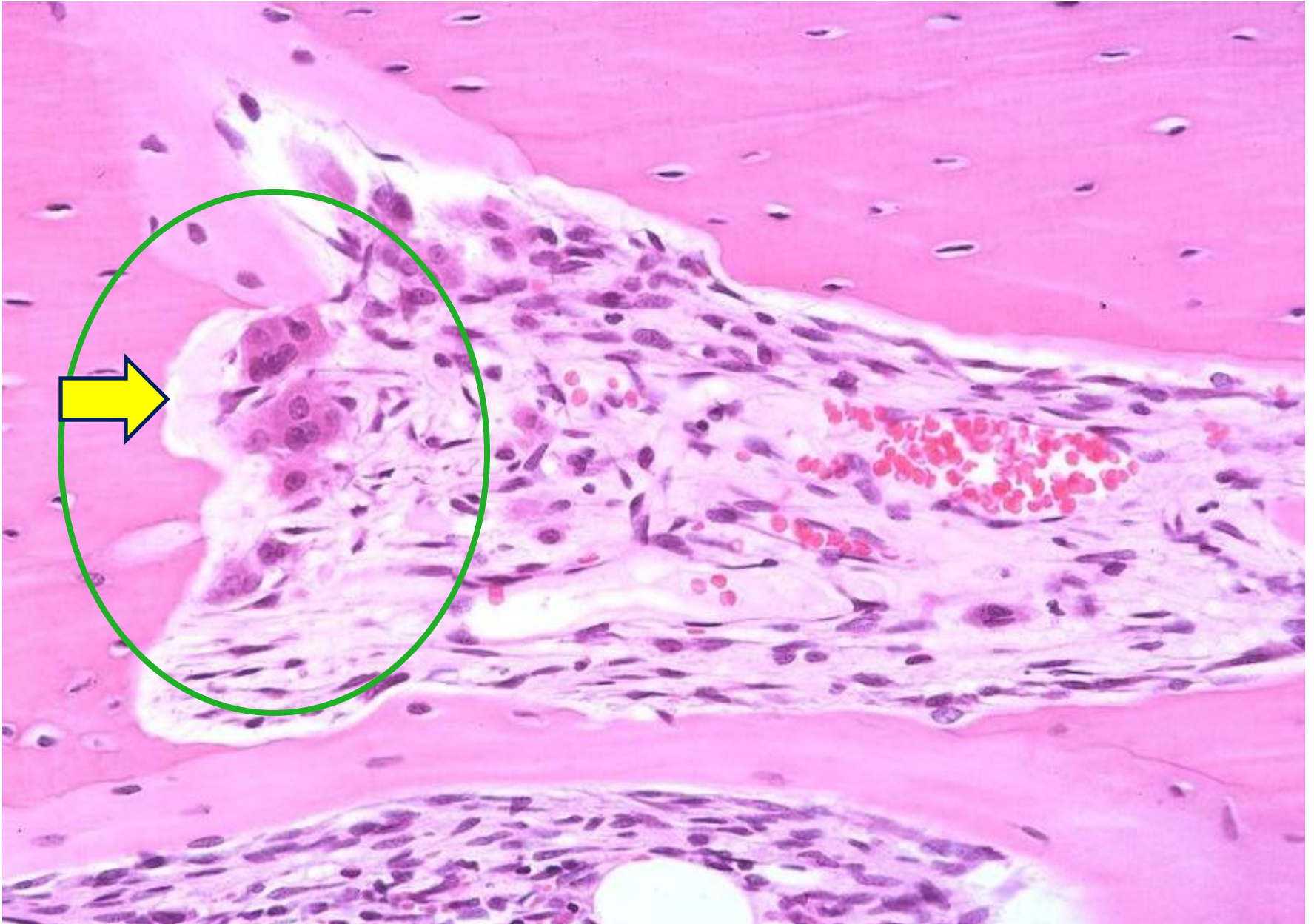


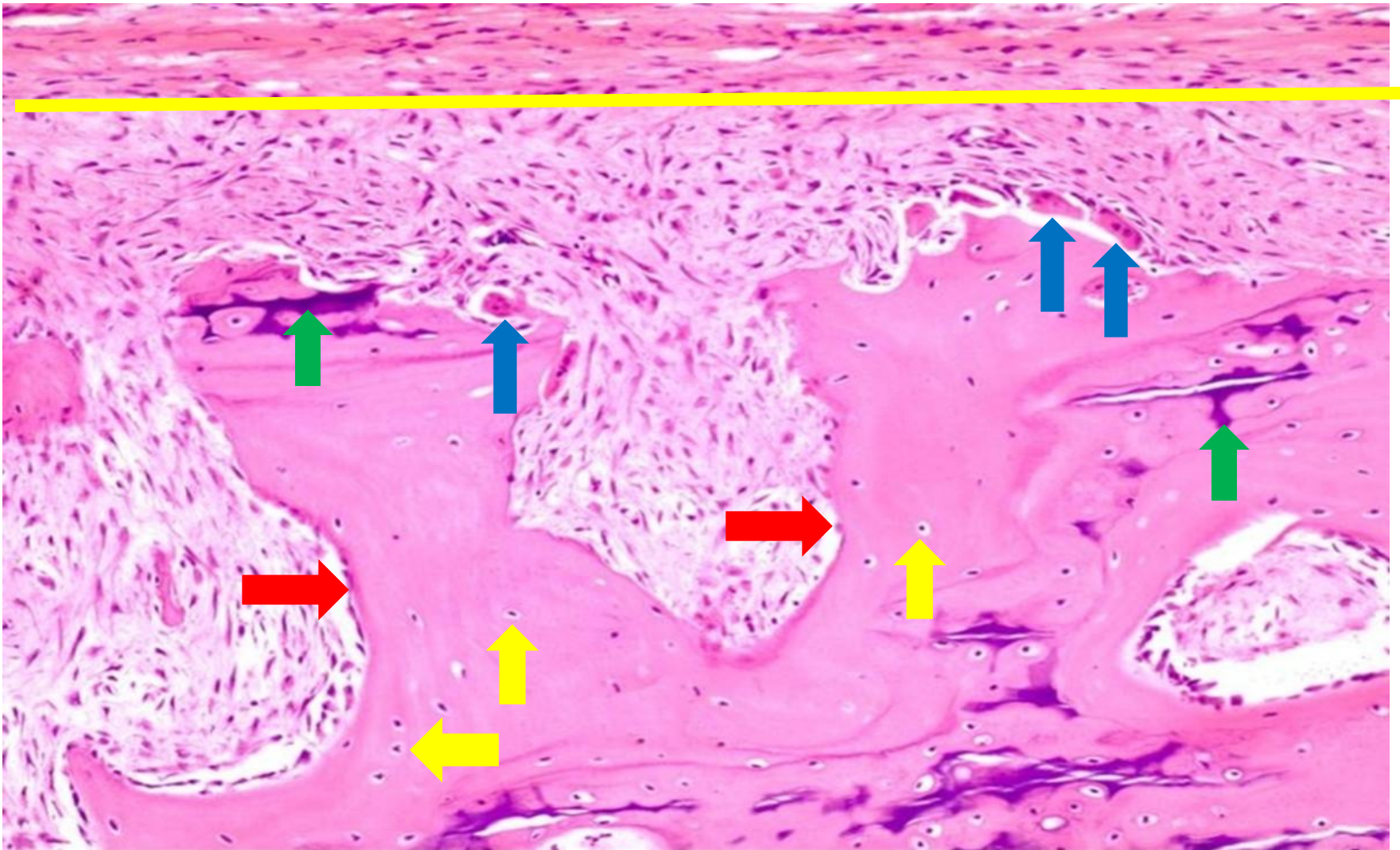
Osteocytes



Howship's lacuna

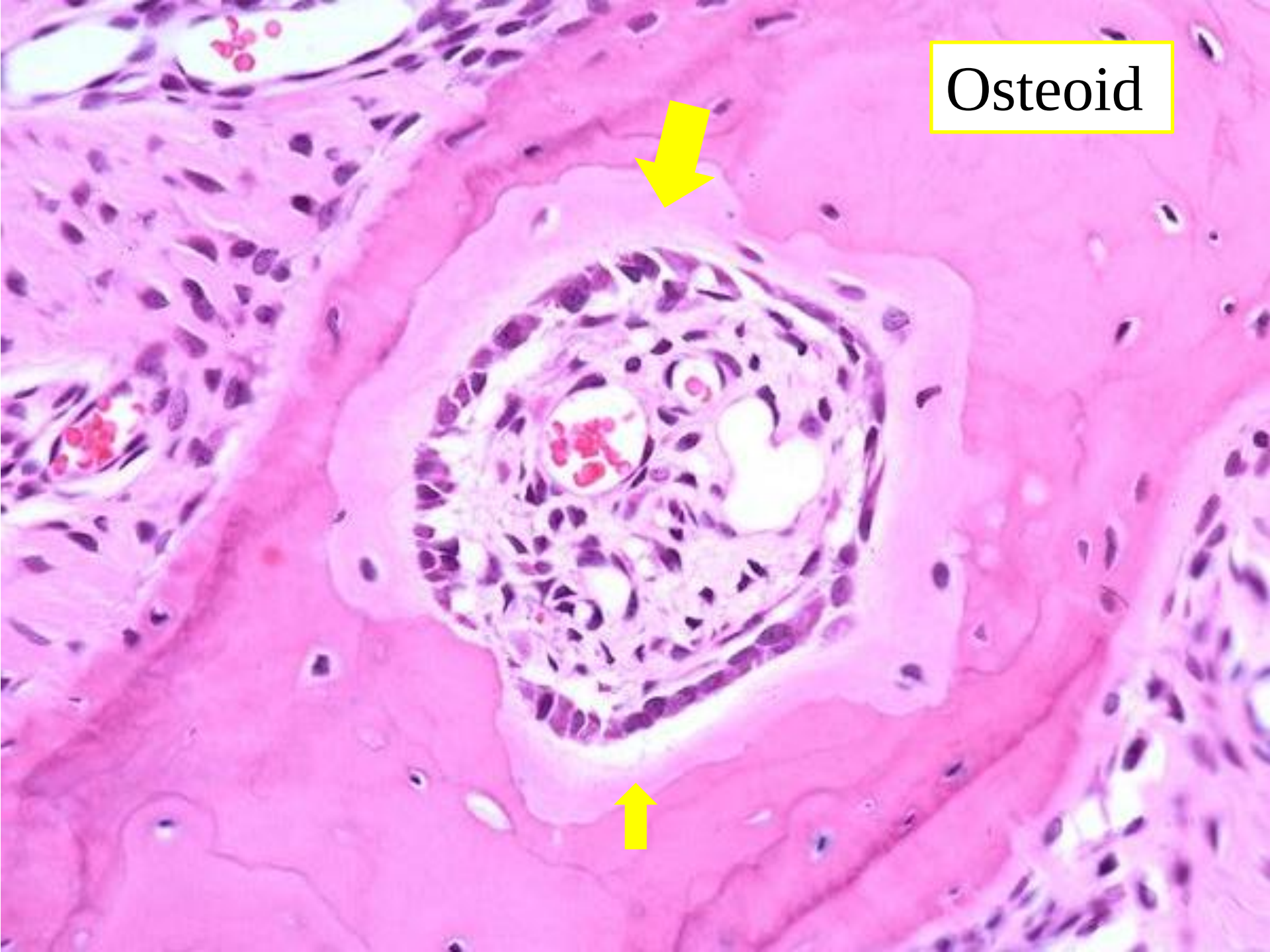
Osteoclasts

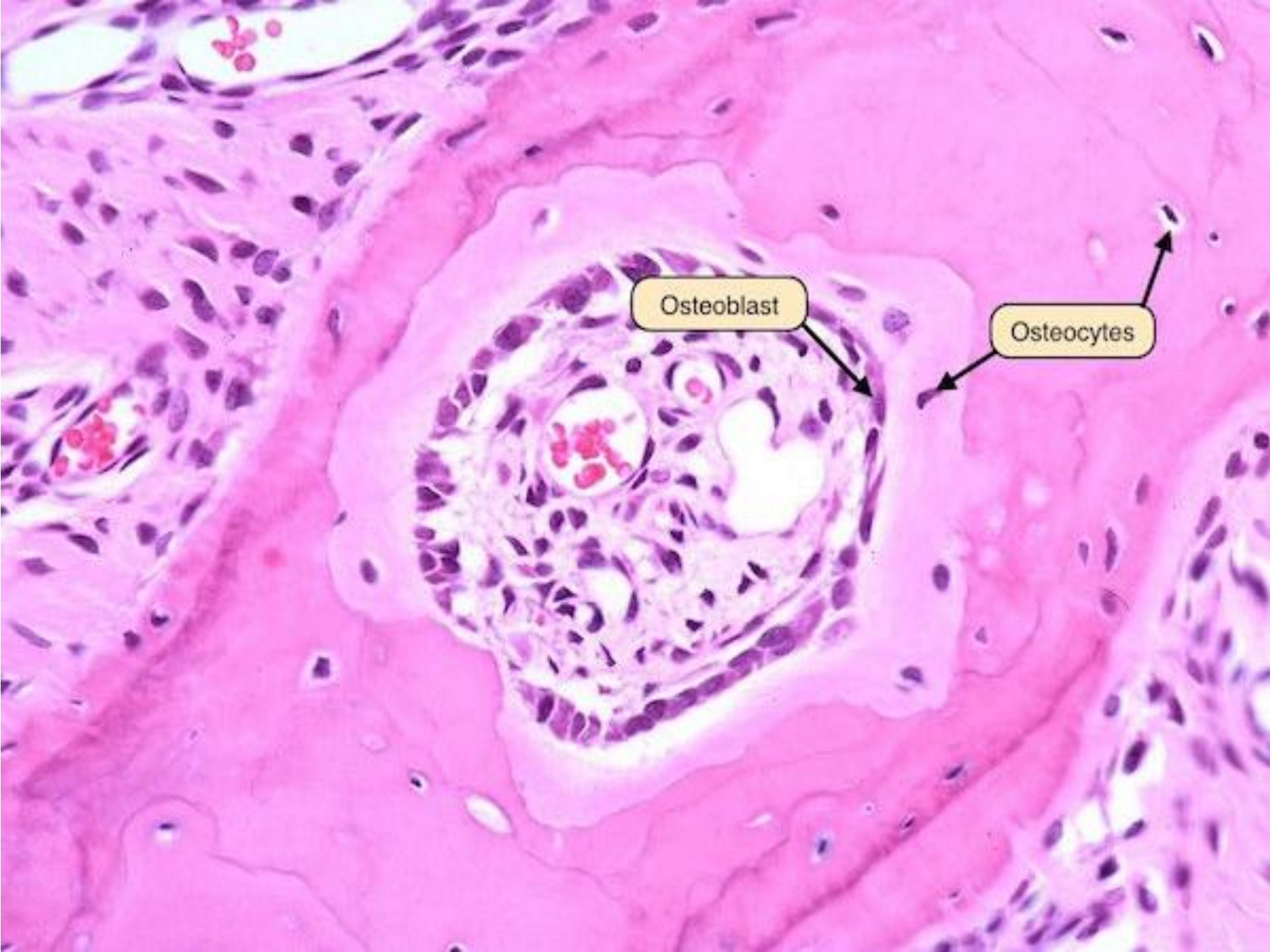




- ▣ **Periosteum**: an outer fibrous above the yellow line and inner cellular below the yellow line.
- ▣ **Blue arrow**: osteoclast.
- ▣ **Green arrow**: calcified cartilage.
- Red arrow**: osteoblast
- Yellow arrow**: Osteocyte

Osteoid

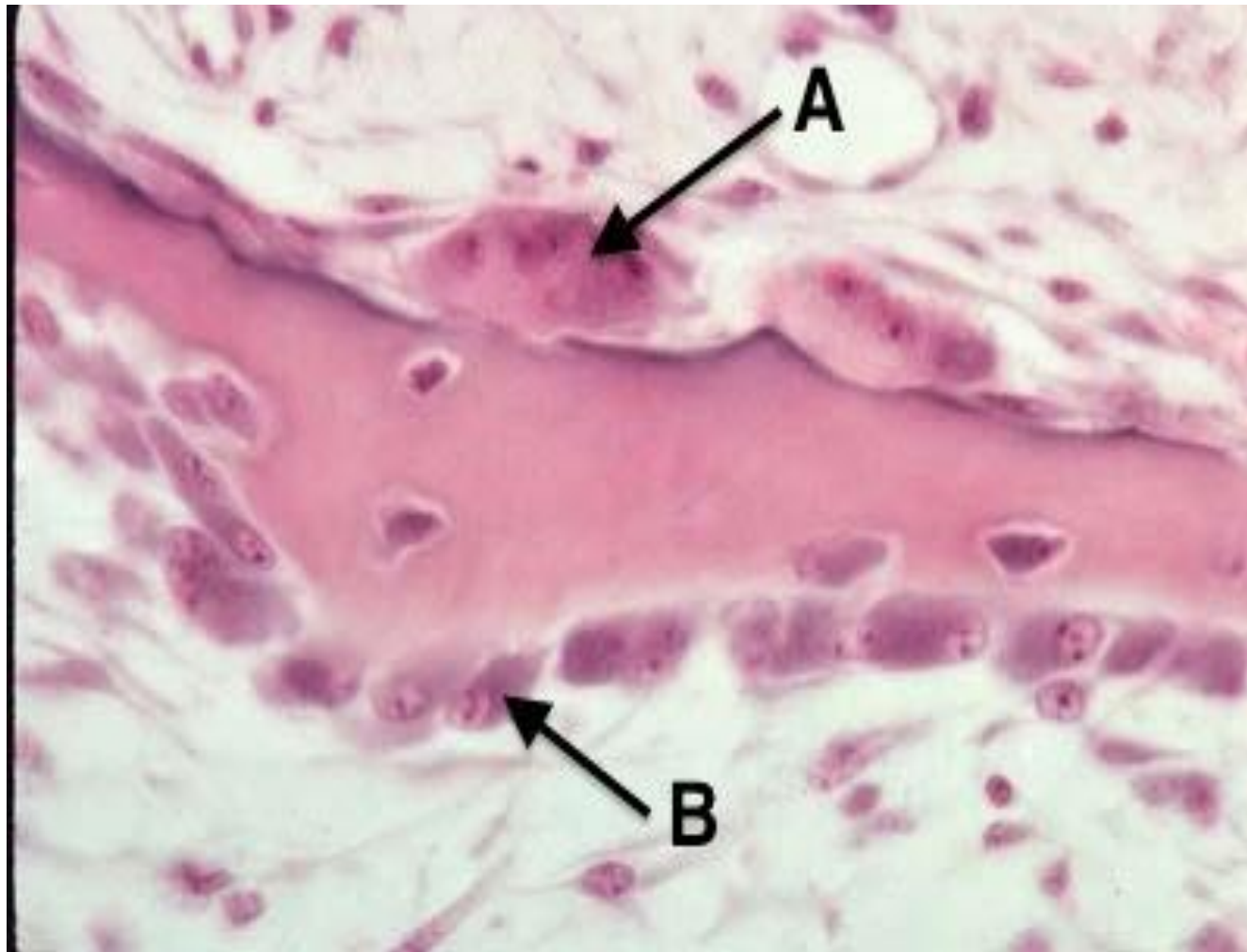




Osteoblast

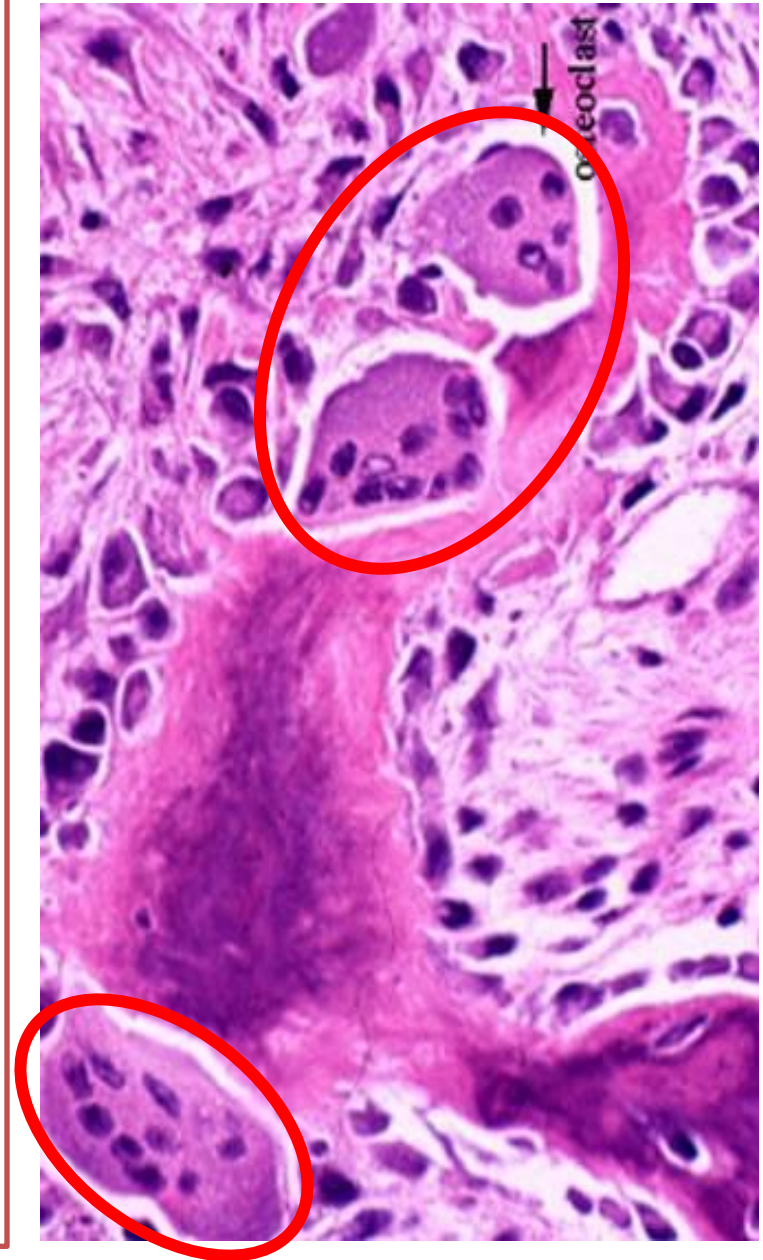
Osteocytes

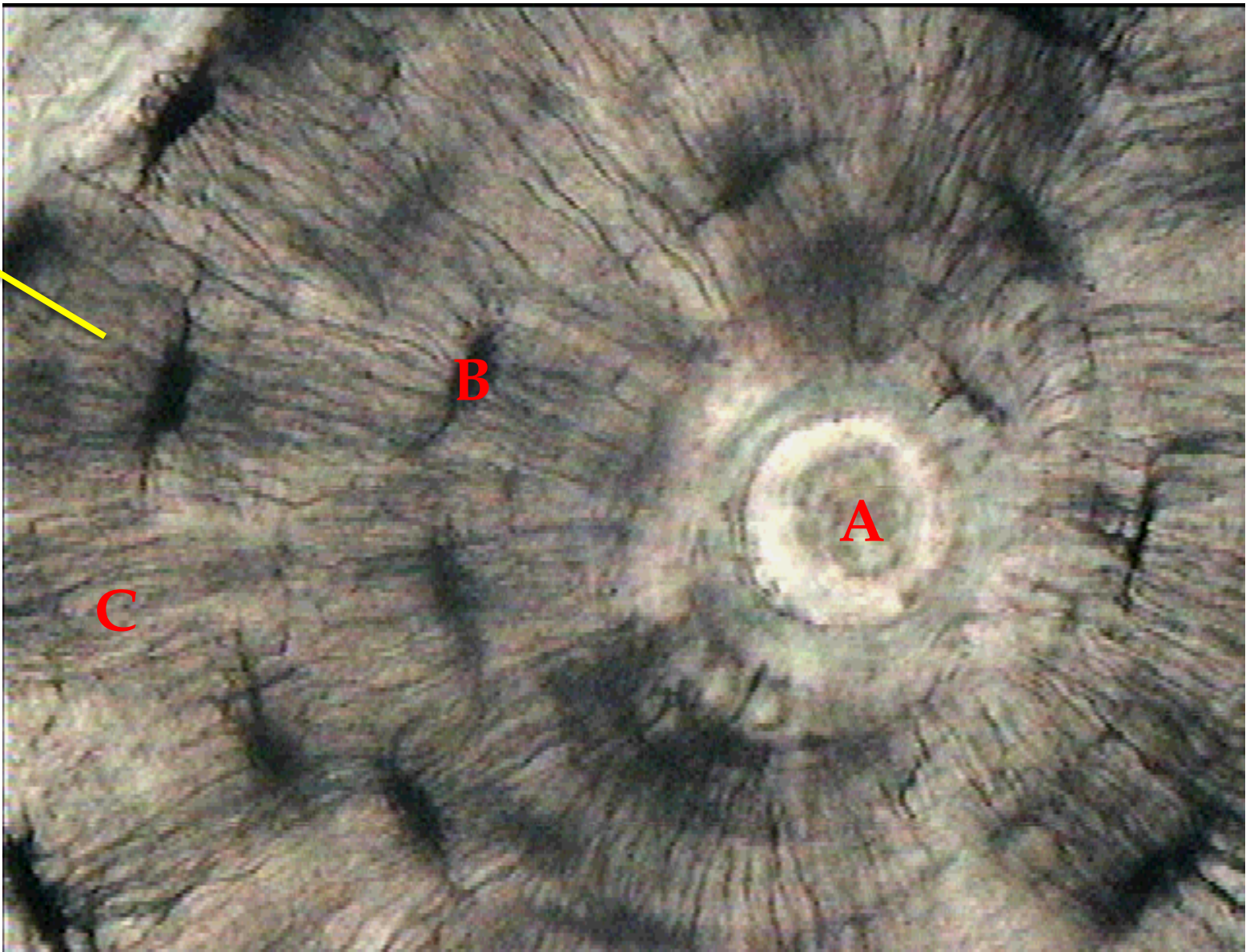
A: OSTEOCLAST
B: OSTEOBLAST



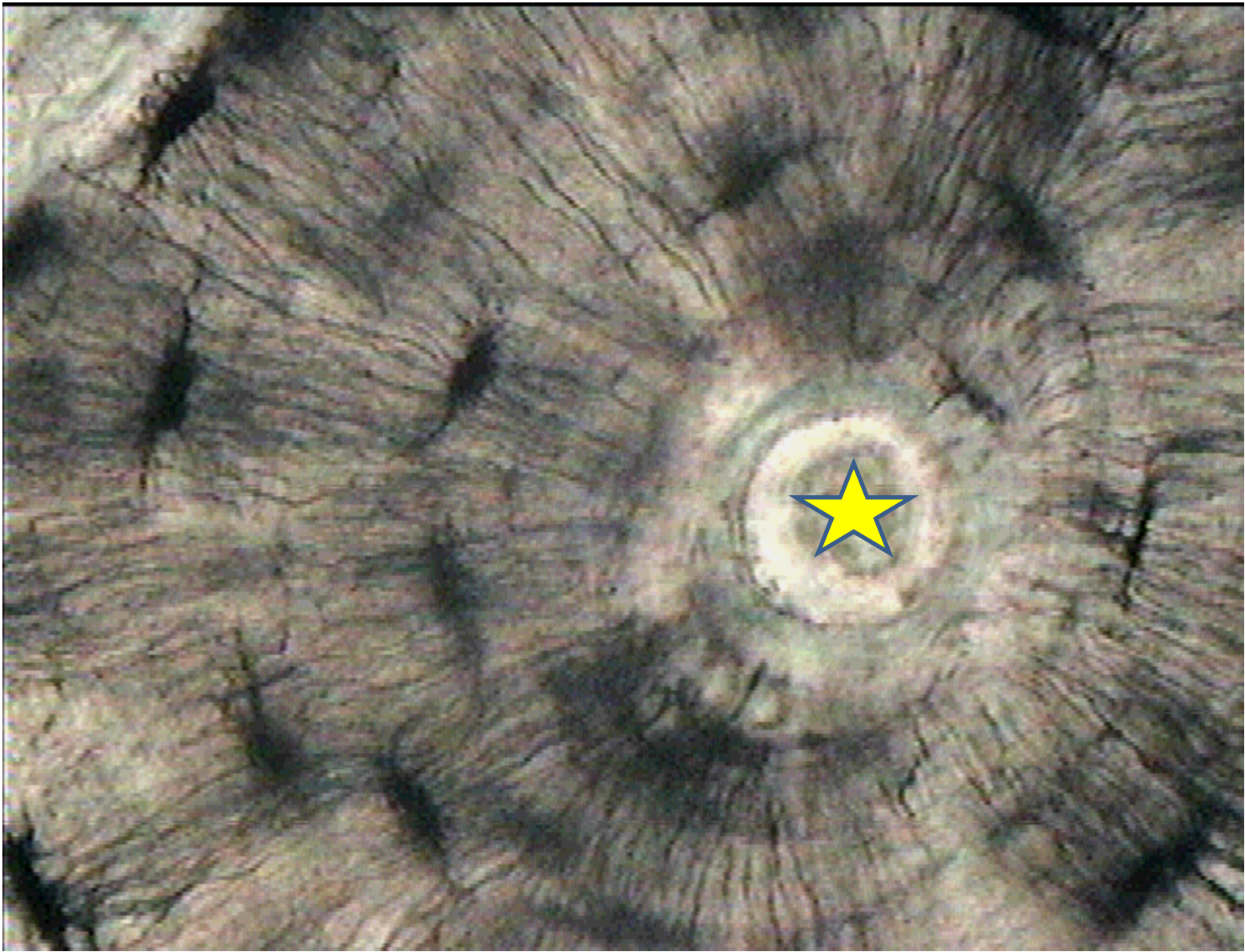
Osteoclasts:

1. Are housed in Howship's lacunae. **T/F**
2. Give rise to osteoblasts. **T/F**
3. Are located at the site of a bone resorption. **T/F**
4. Are derived from osteoprogenitor cells. **T/F**
5. Are large multinucleated cells. **T/F**





- What tissue type is this? Name the structures indicated by the letters.
- Name the ring of matrix at the pointer.
- How was this slide prepared?



What does this space contain?

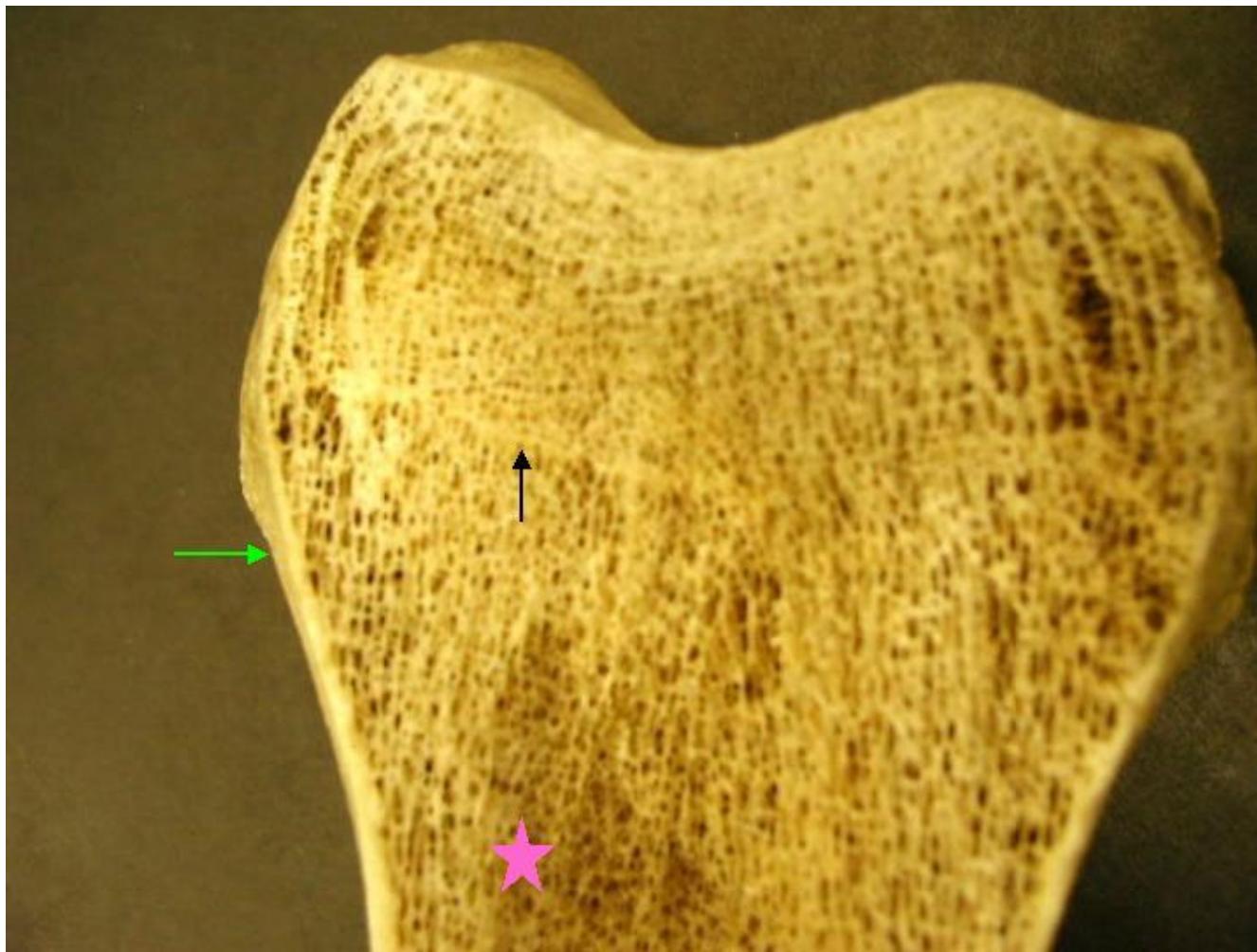
Are Haversian Canals connected to each other? If so, by what?



- Identify the large black space indicated by the yellow arrow
- Identify the small black space indicated by the red arrow
- In living tissue, what would occupy this space?
- Identify the structure indicated by the yellow circle



- Identify the structure indicated by the pink arrow
- Identify the structure indicated by the green arrow
- Identify the diagonal black line indicated by the blue arrow
- In living tissue, what would occupy this space



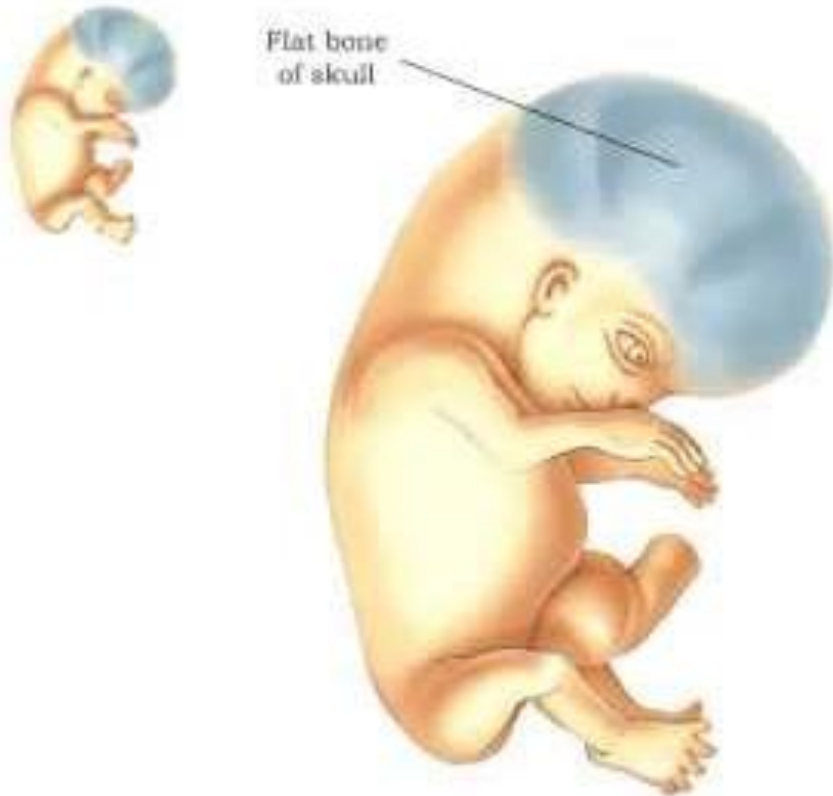
- What type of bone is indicated by the pink star?
- How many osteons would you expect to find in this particular type of bone?
- What type of bone is indicated by the green arrow?
- Identify the structure indicated by the black arrow
- What previously occurred here?

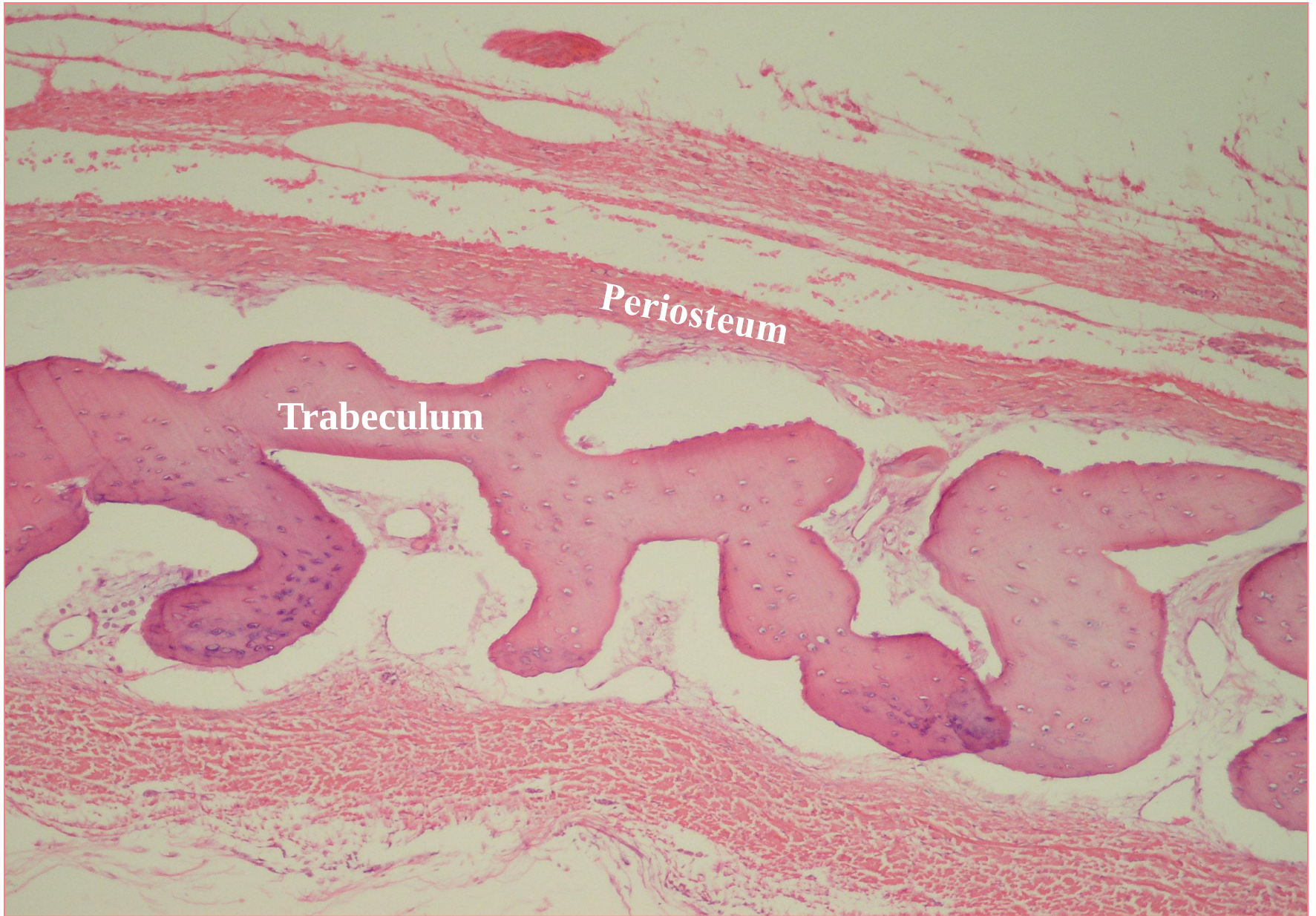
Bone Ossification

Practical part

Intramembranous Ossification

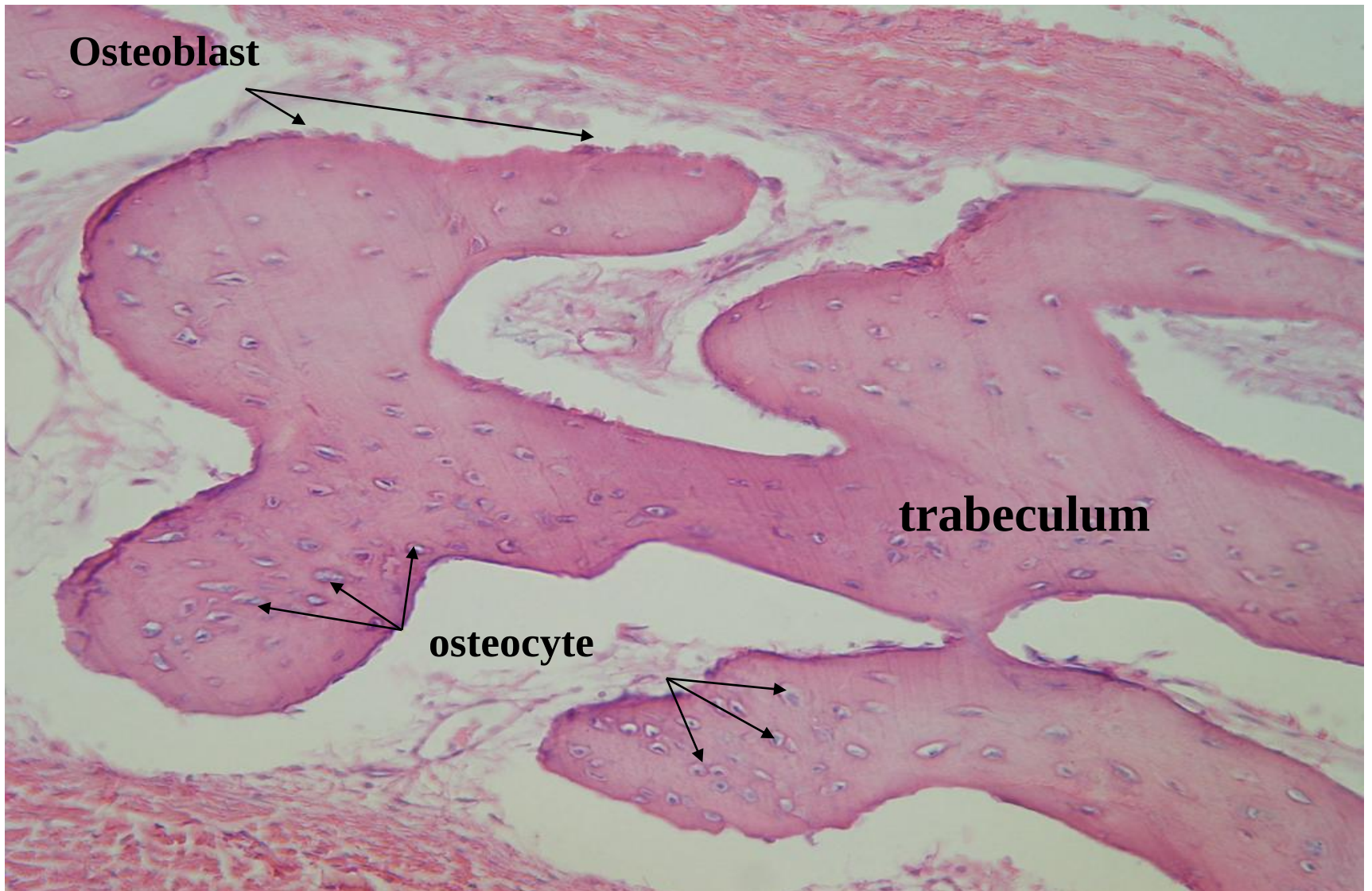
(prenatal)



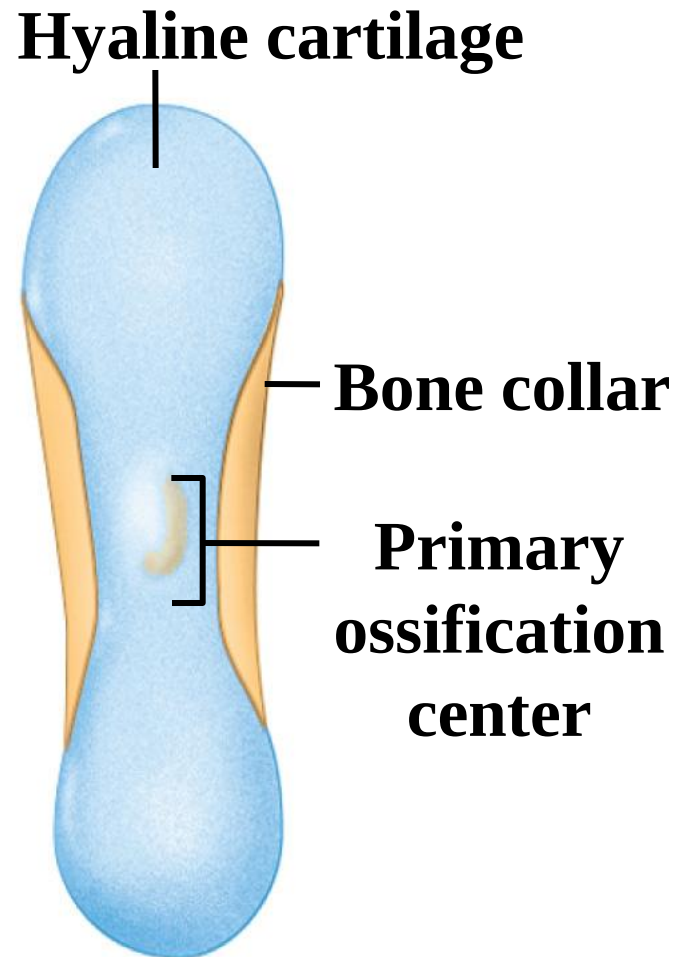


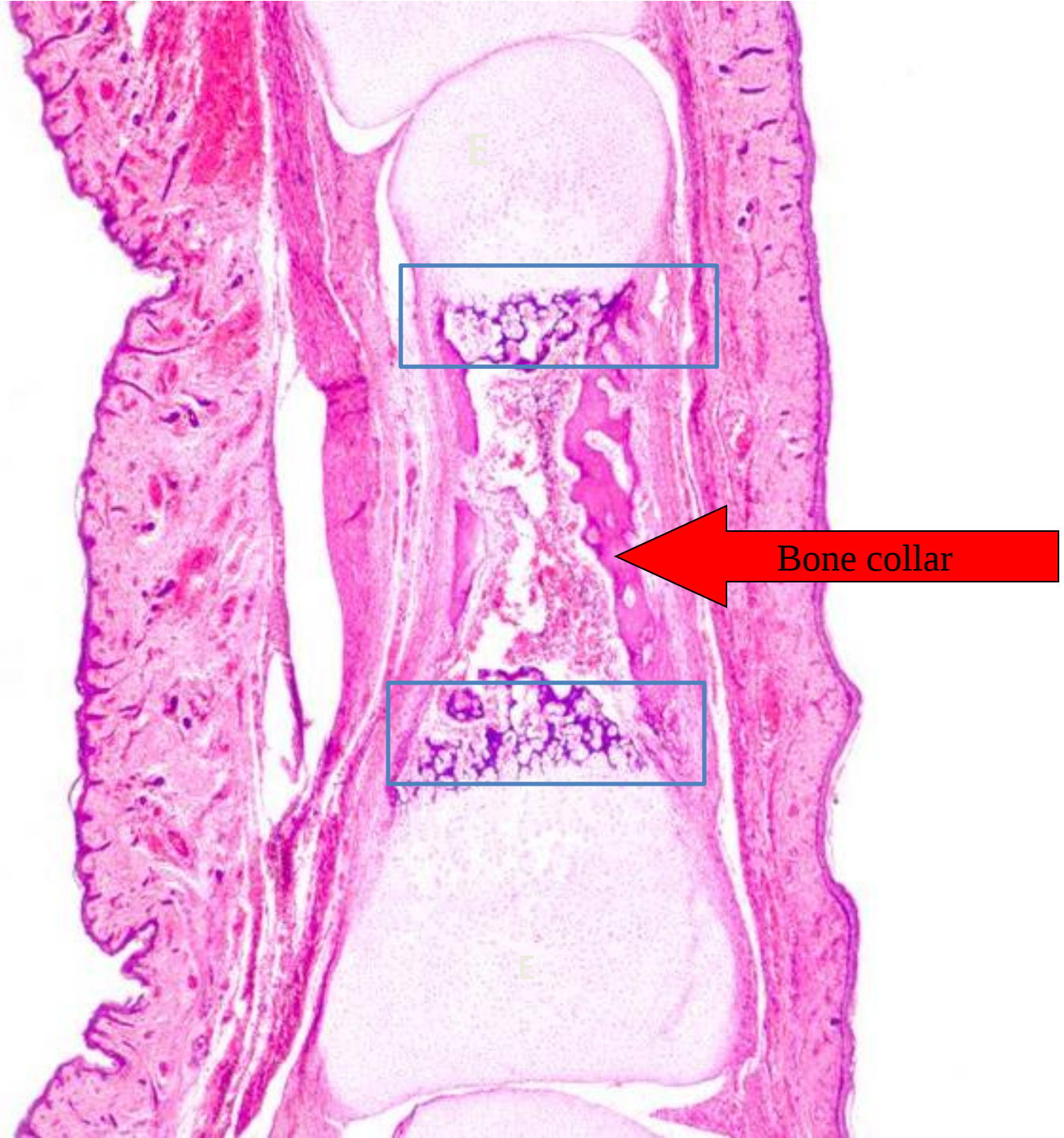
Periosteum

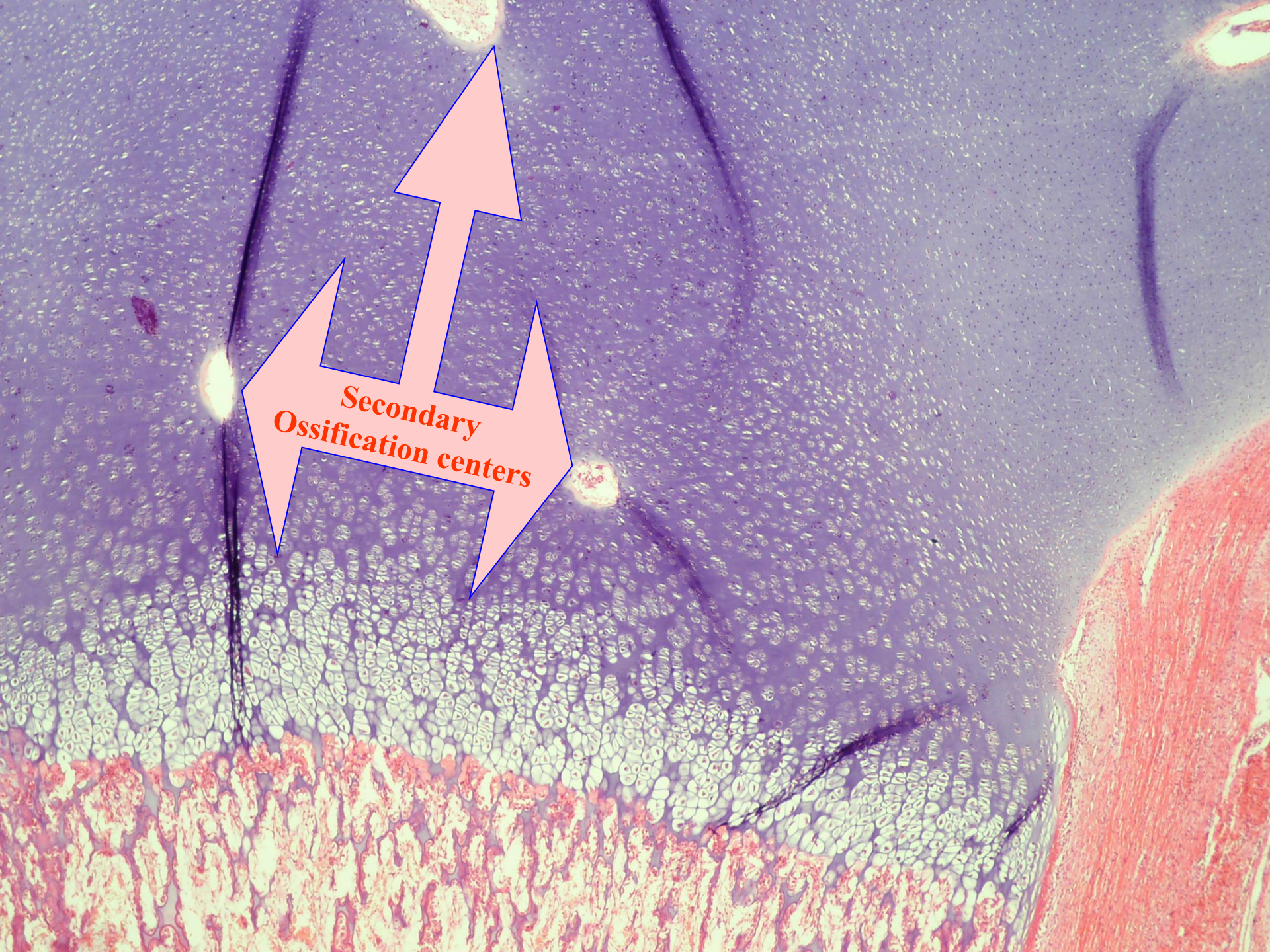
Trabeculum



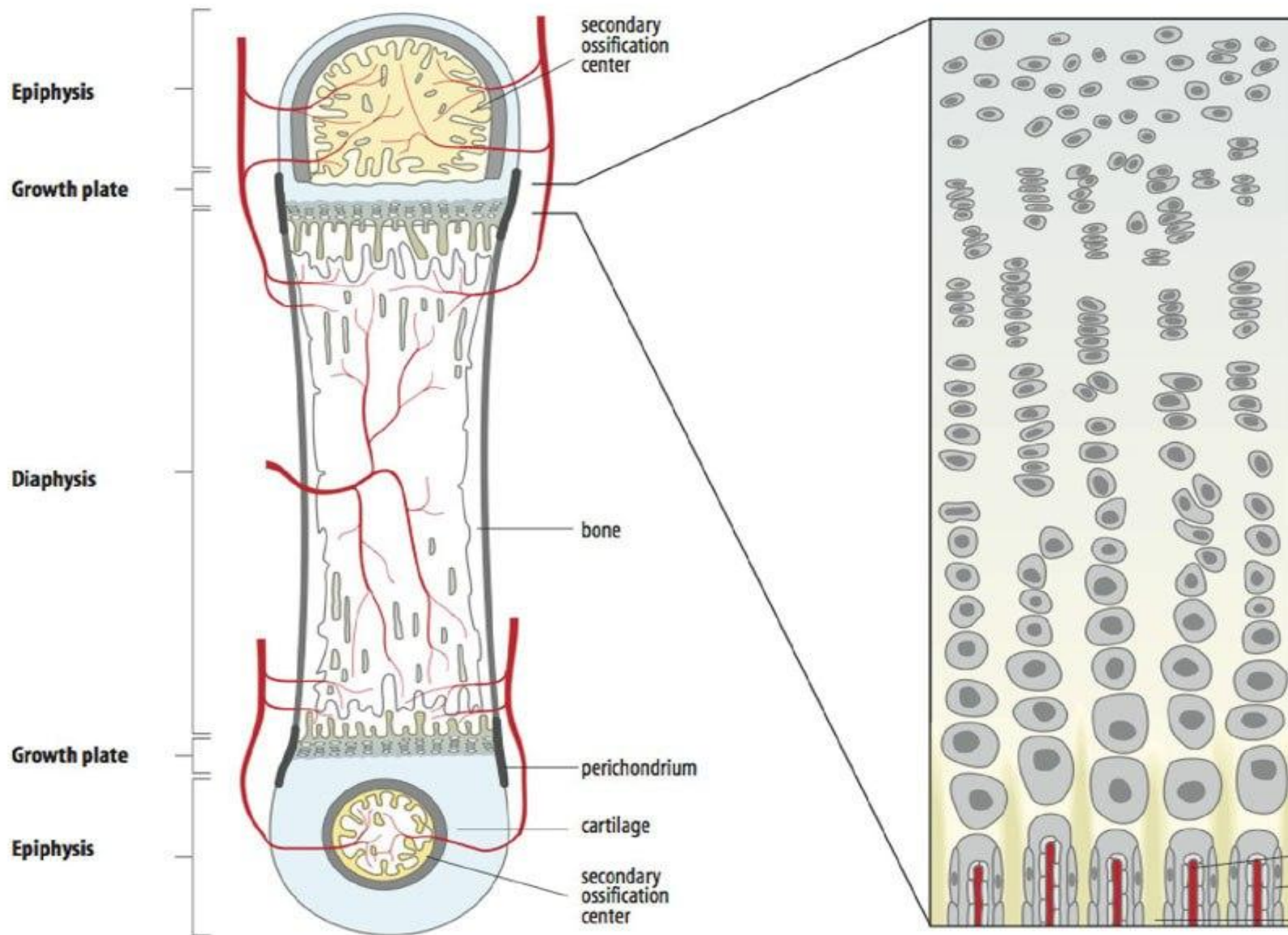
Endochondral Ossification







**Secondary
Ossification centers**



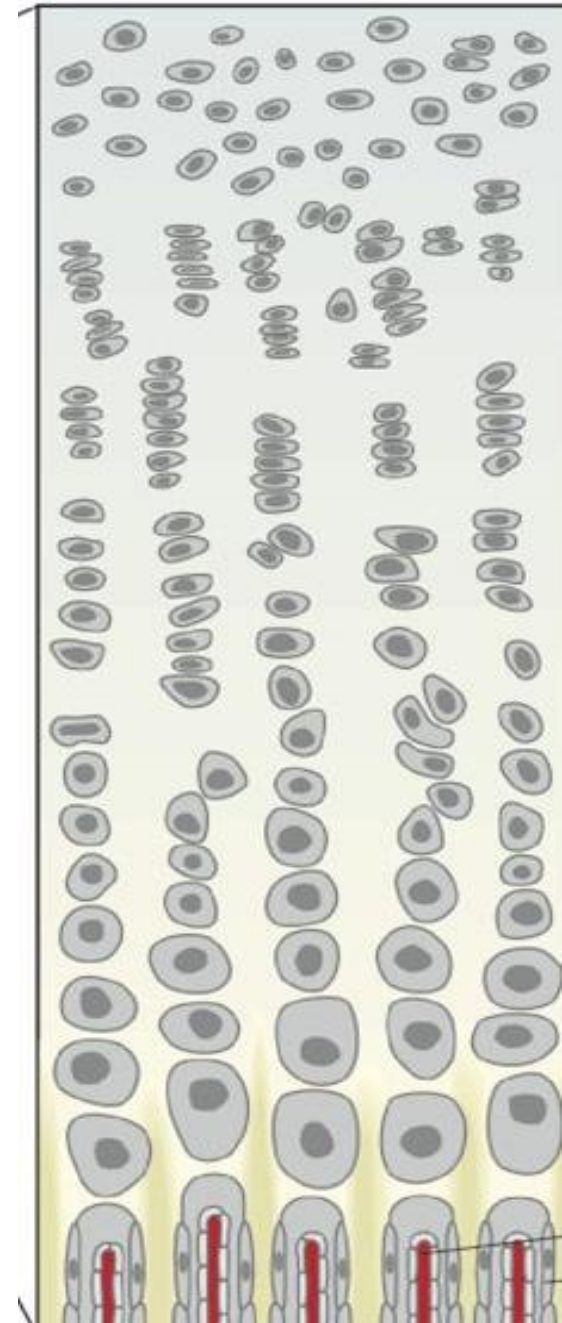
Epiphyseal plate
From proximal to Distal

**Zone of reserve cartilage
(resting cartilage)**

**Zone of growth
(proliferation)**

**Zone of hypertrophy and
calcification**

Zone of ossification



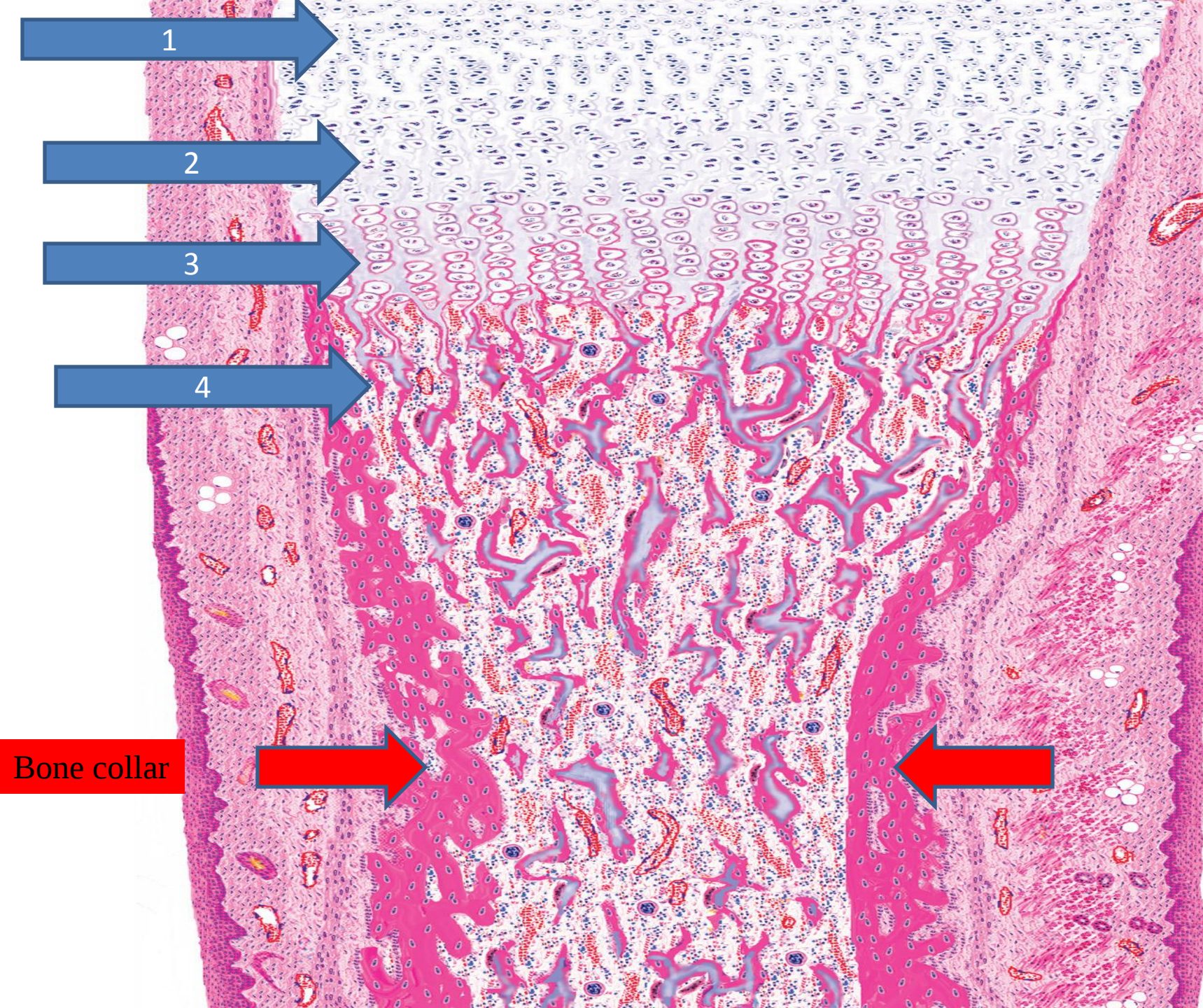
1

2

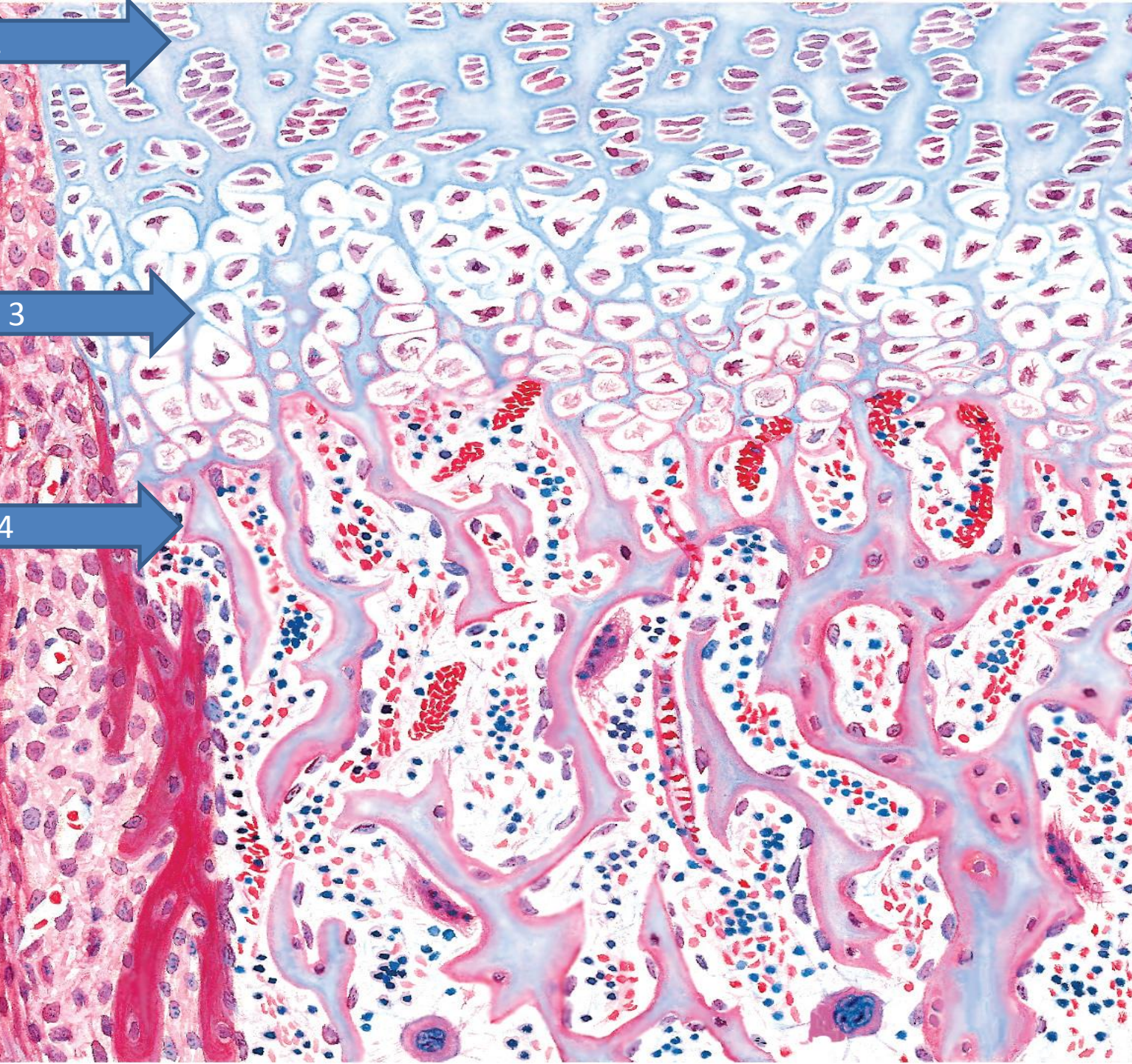
3

4

Bone collar

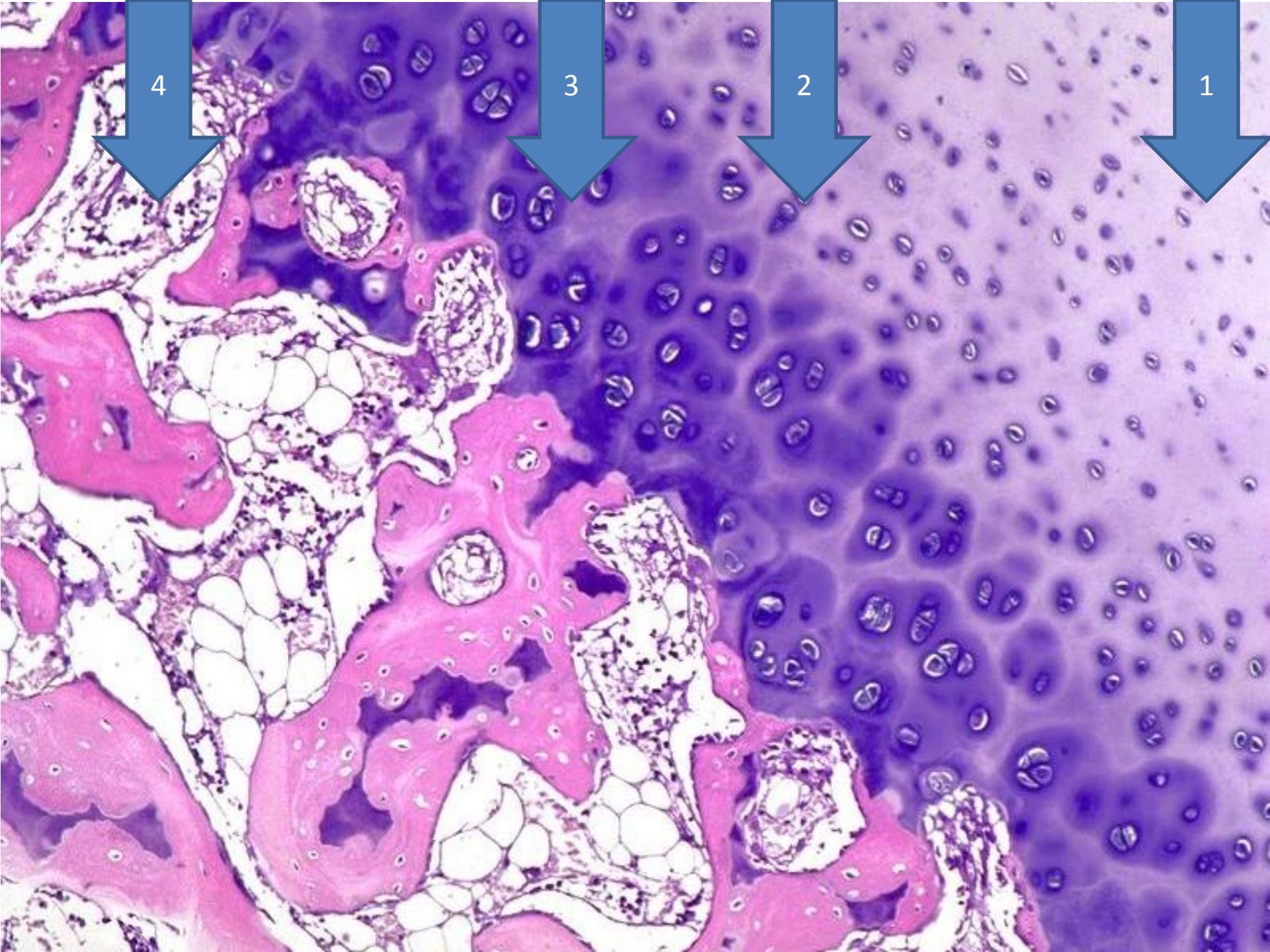


2

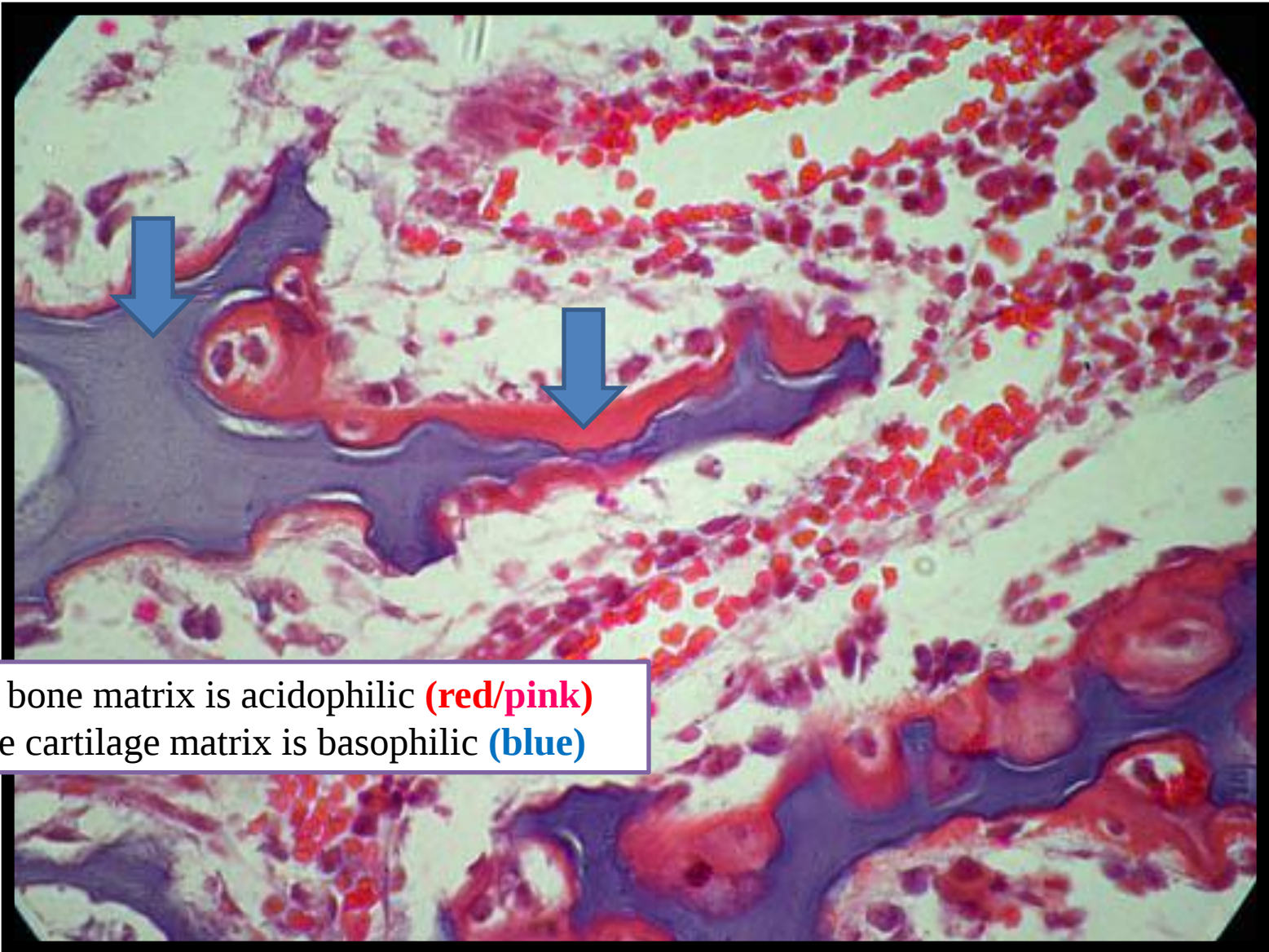


3

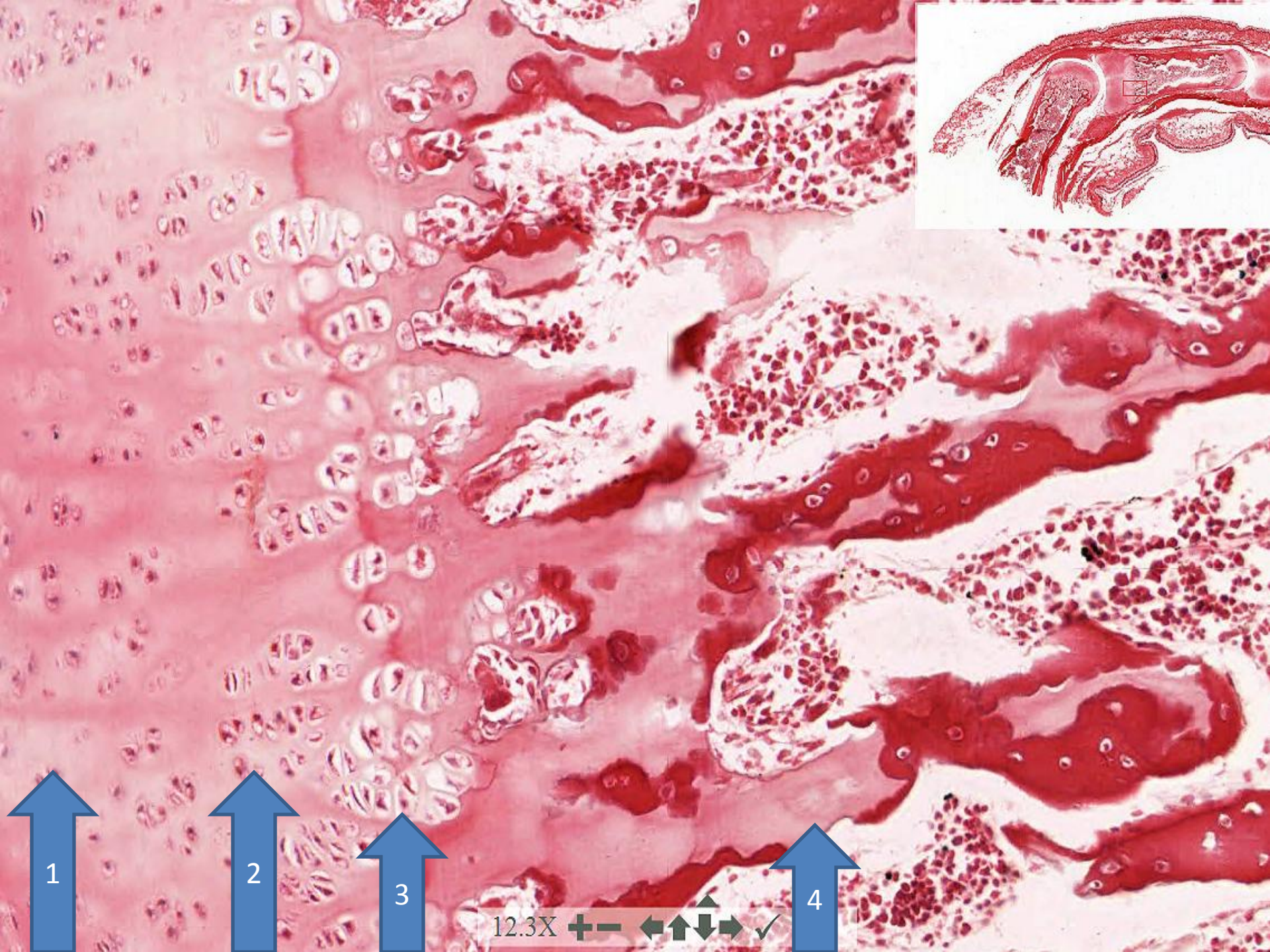
4



Ossification zone

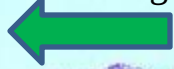


Note bone matrix is acidophilic (red/pink)
while cartilage matrix is basophilic (blue)



12.3X + - < > < > < > < > ✓

Direction of growth (due to cartilage proliferation)



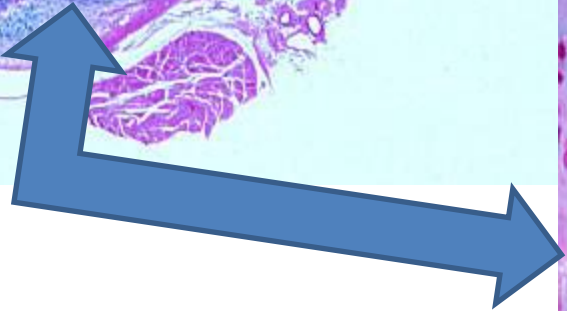
Shaft (diaphysis) becomes **compact bone**



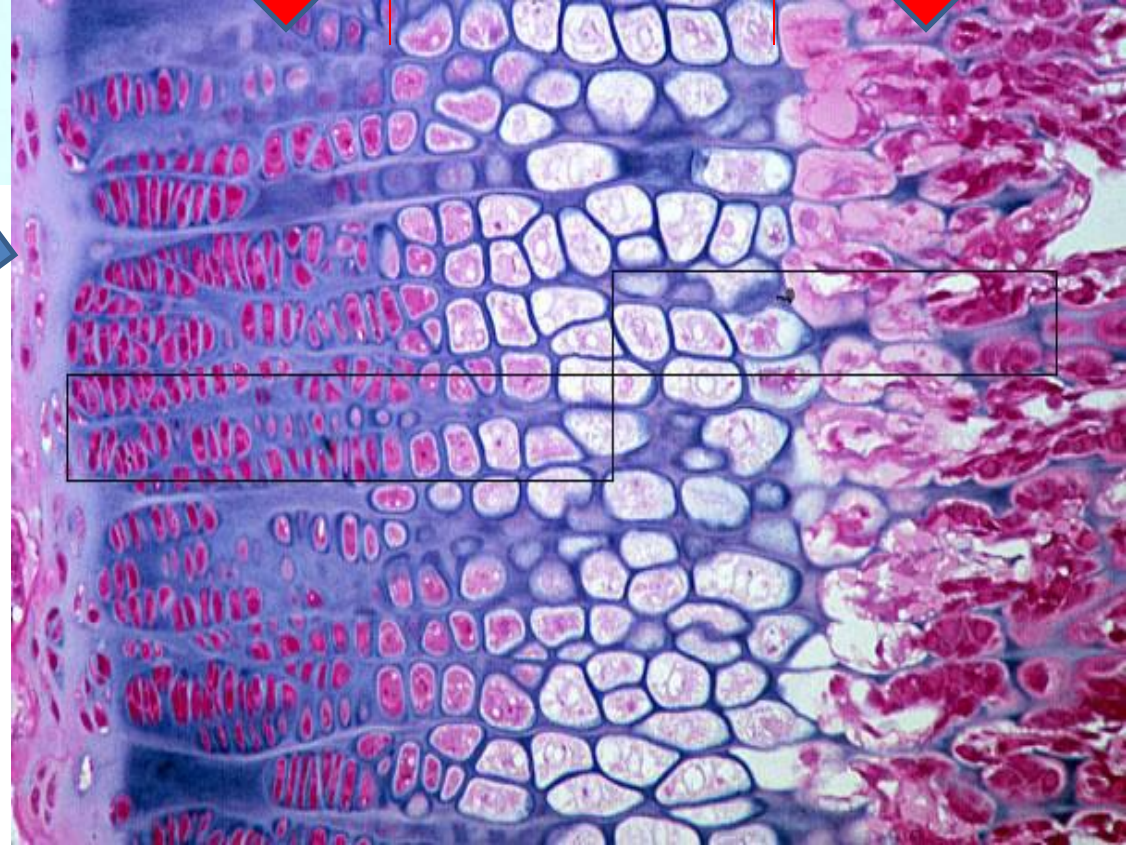
2

3

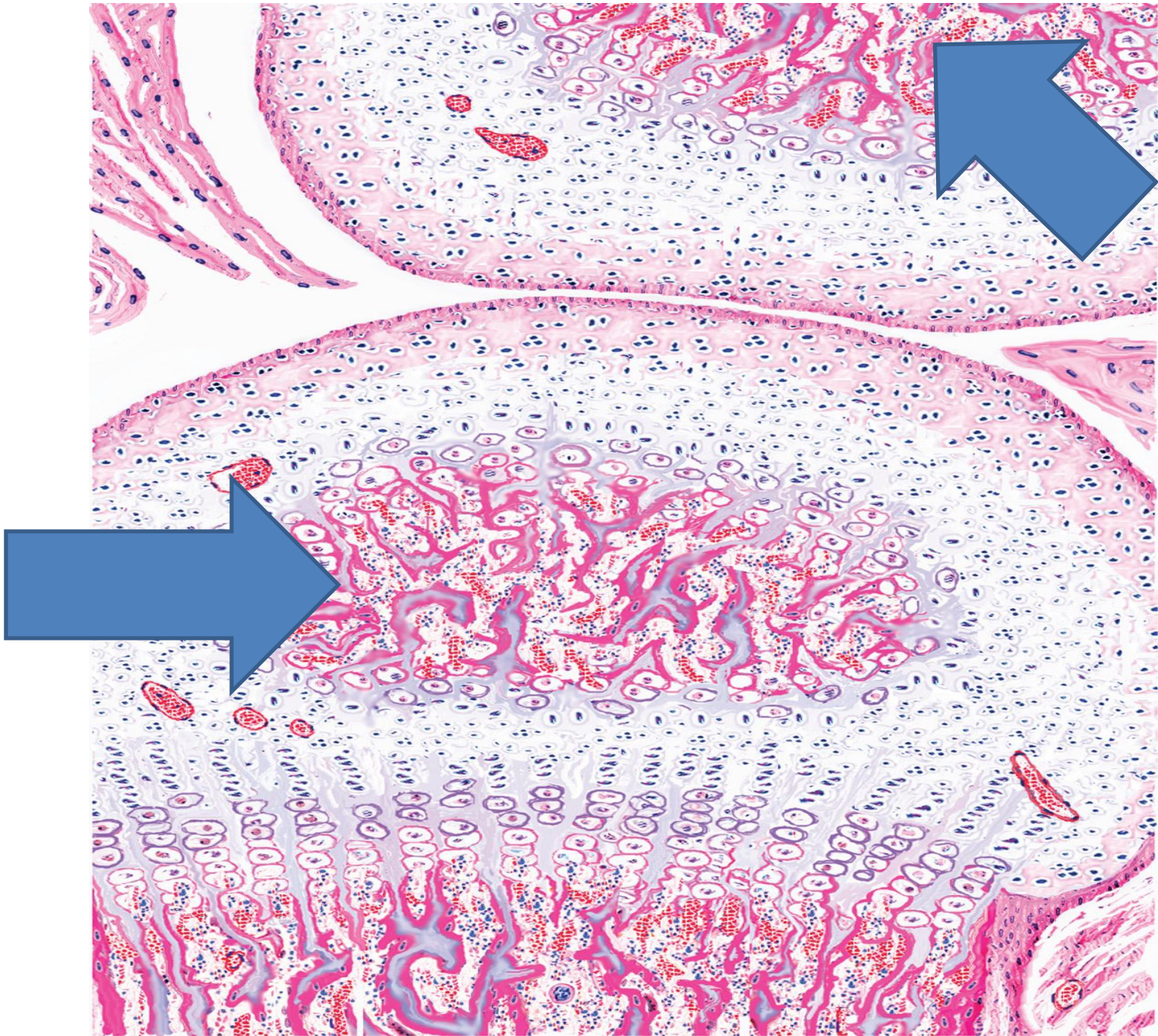
4

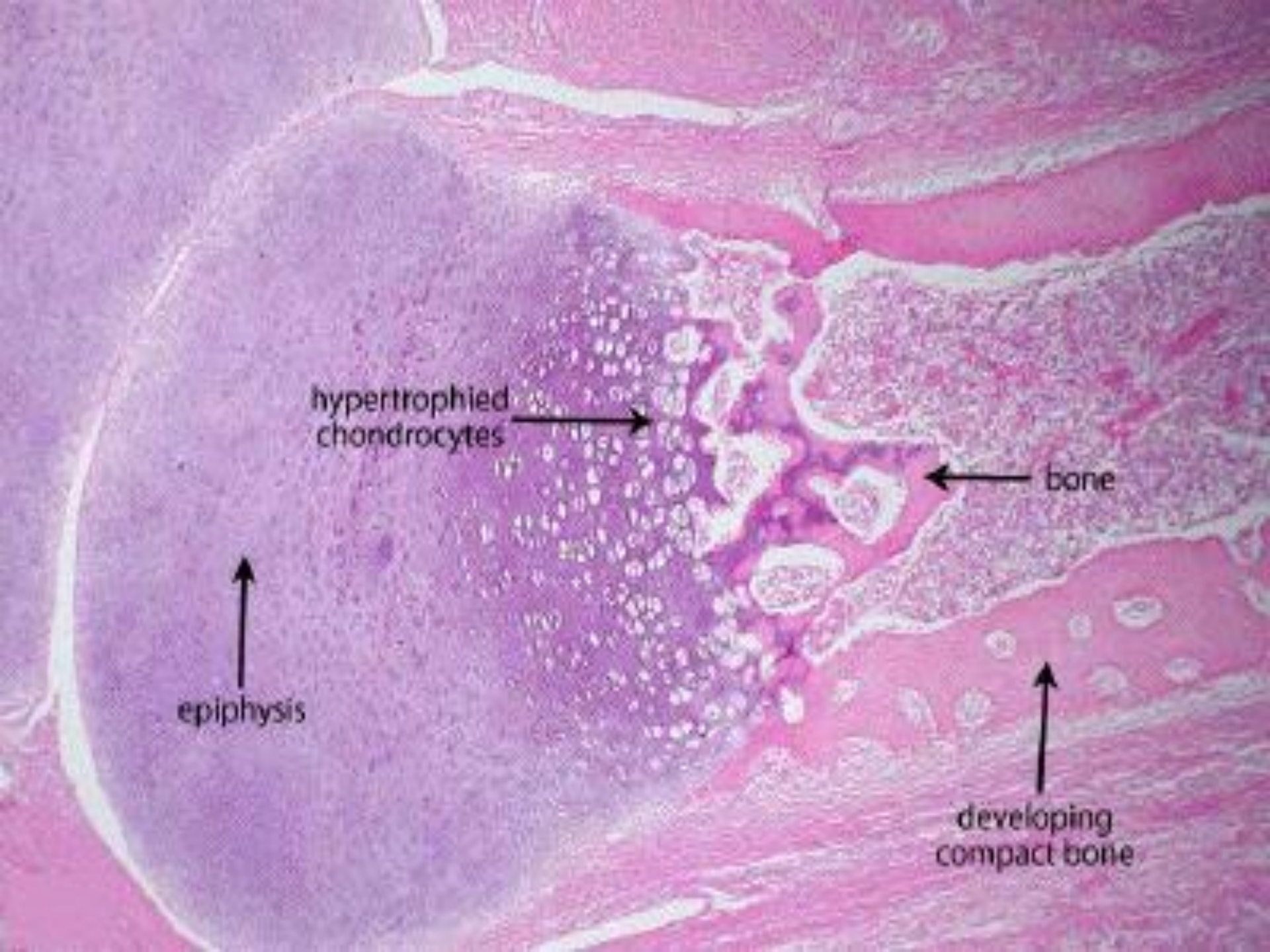


Cartilage at the head of the bone remains – this is the **articular cartilage (no perichondrium!)**



Secondary
center of
ossification





hypertrophied
chondrocytes

bone

epiphysis

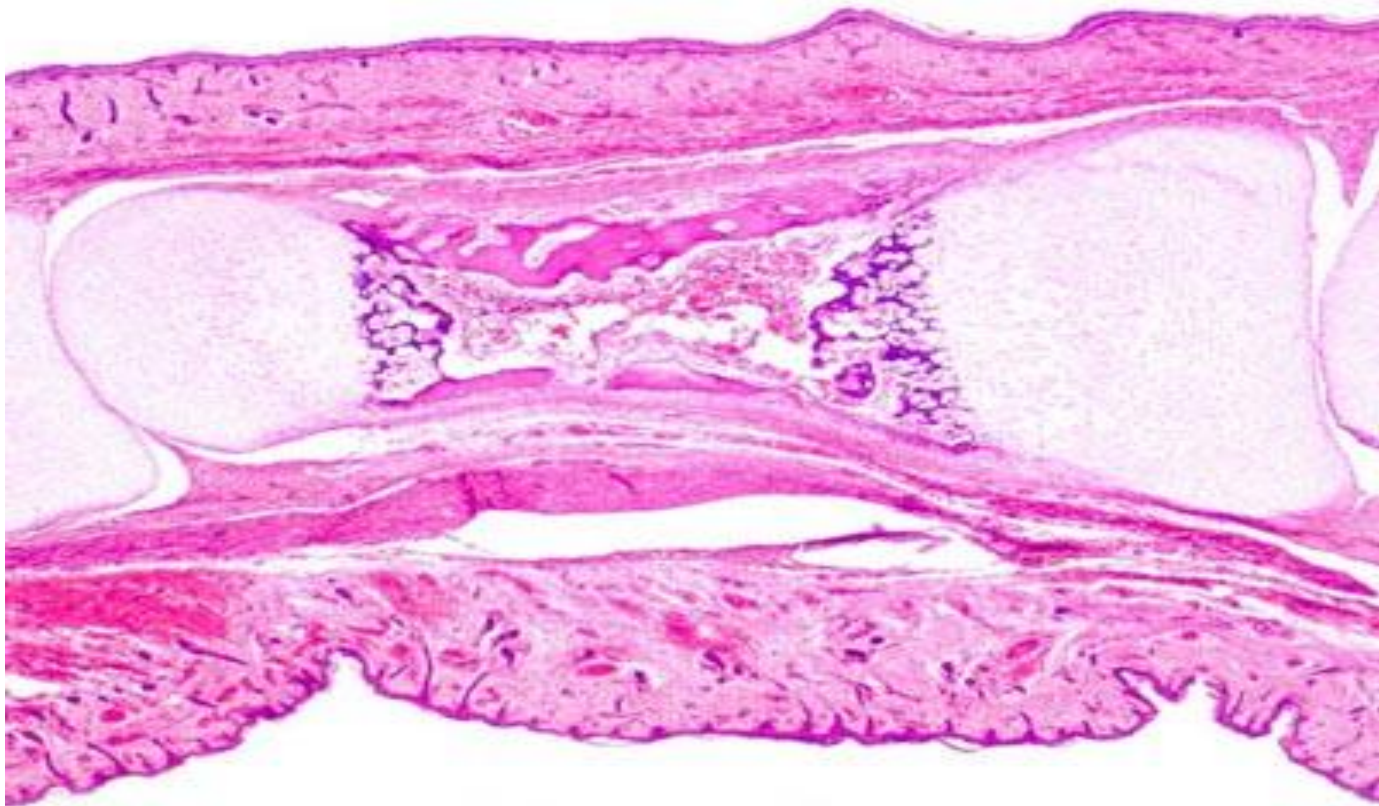
developing
compact bone

Growth in the Epiphyseal Plate

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What type of bone formation is taking place?



What type of bone formation is taking place?

