

Bone

Highly specialized connective tissue in which ground substance is impregnated with calcium salts to make the tissue rigid

Function-

- 1.Forms internal frame work of the body
- 2.Acts as lever for the movements
- 3.Provide protection to the organs
- 4.Forms the calcium depots of the body
- 5.Contains bone marrow

- Components-

1. **Ground substance-**

Organic

Inorganic

2. **Cells-**

Osteogenic cells

Osteoblasts

Osteocytes

Osteoclasts

- **Intercellular substance-**

1. **Organic-** formed of dense bundle of collagen fibers embedded in an amorphous ground substance composed of hyaluronic acid & protein polysaccharide.

Both derived from osteoblasts.

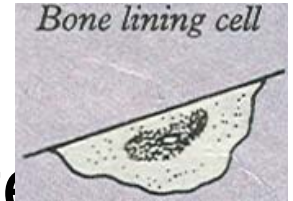
2. **Inorganic-** constitutes about 2/3 rd of the wt of bone.

Consists of CaPO_4 , CaCO_3 , CaFl_2 & MgCl_2

Cells-

- **Osteogenic cells-** Precursor of other tree variety of cells

Present in the osteogenic layer of periosteum



- **Osteoblasts-** Present where active bone formation is going on.

Large cells with heavily basophilic cytoplasm

Nucleus is round and eccentric

Cell possesses cytoplasmic processes

- **Osteocytes**- are present in full formed bone tissue

Cells lie imprisoned in the intercellular substance in a space called lacunae

The processes of osteocyte extend into the canaliculi



Microscopic appearance is similar to osteoblast but being quiescent cytoplasm is less basophilic

when occasion demands, they become active again & lay down the organic intercellular substance



- **Osteoclasts-**

Are a form of **giant** cells.

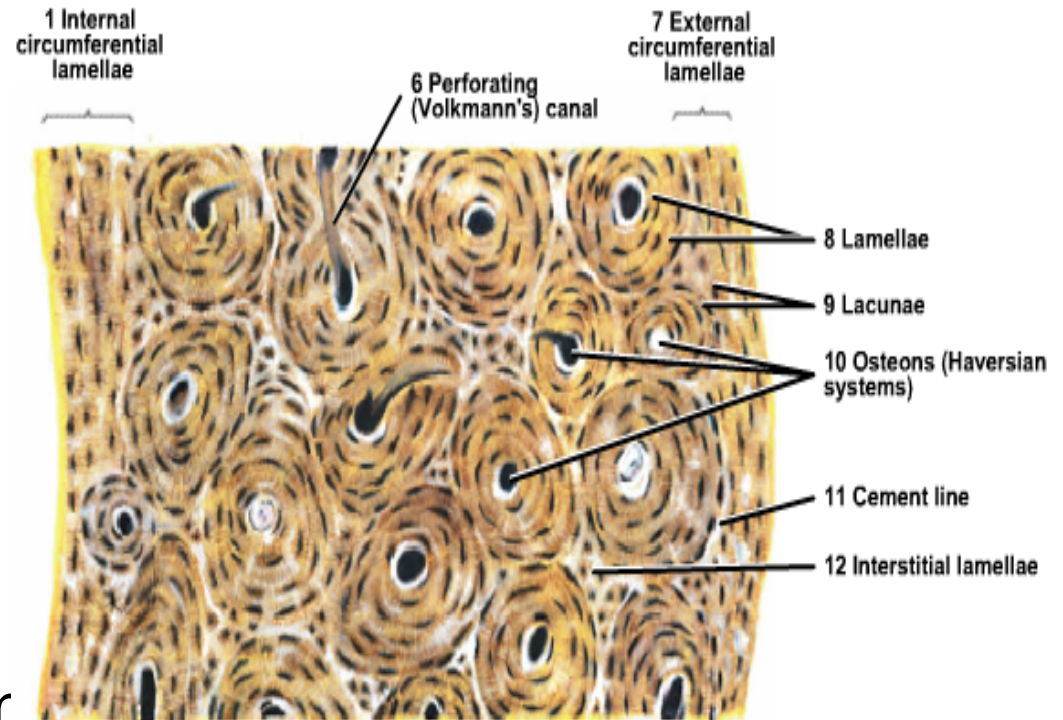
Present at sites where bone **resorption** takes place. Multinucleate cells , number of nuclei ranging from **6-20**. Cytoplasm is **eosinophilic** & may be **vacuolated**

Types of bone-

- 1.Dense or compact-** found in shaft of long bones
- 2.Spongy or cancellous-** Found at the end of long bones

Compact bone

- Outer covering of bone is called periosteum
- Periosteum is made up of outer fibrous layer & inner osteogenic layer
- A number of osteon or **haversian system** are seen.
- Besides concentric lamellae interstitial & circumferential lamellae are also present. Haversian canals are interconnected by **Volkman's canal**

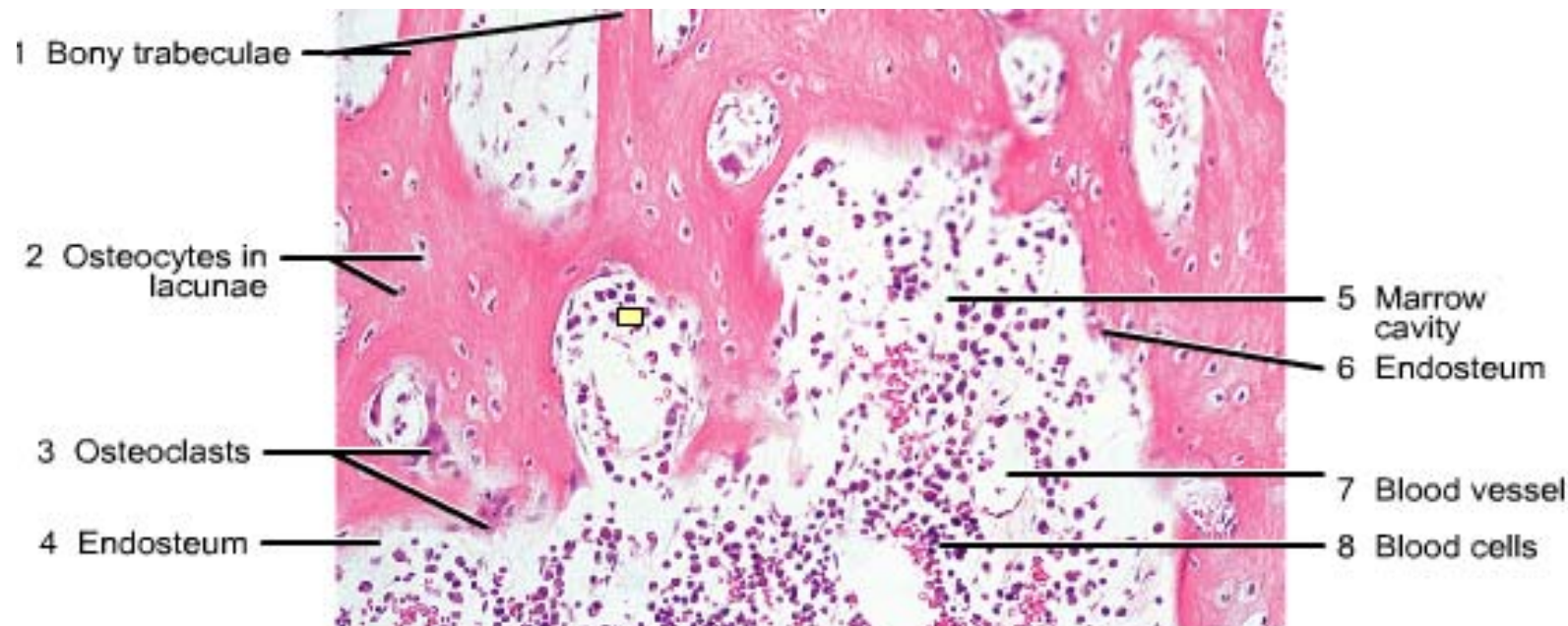


- **Osteon or Haversian system** consists of- centrally situated canal called haversian canal which is occupied by vessels nerves & lymphatics
- H. canals are surrounded by 8-15 concentric lamellae
- between the lamellae there are oval spaces known as lacunae which are occupied by osteocytes
- Fine channels radiate from each lacuna . These are called canaliculi. These are occupied by processes of osteocytes

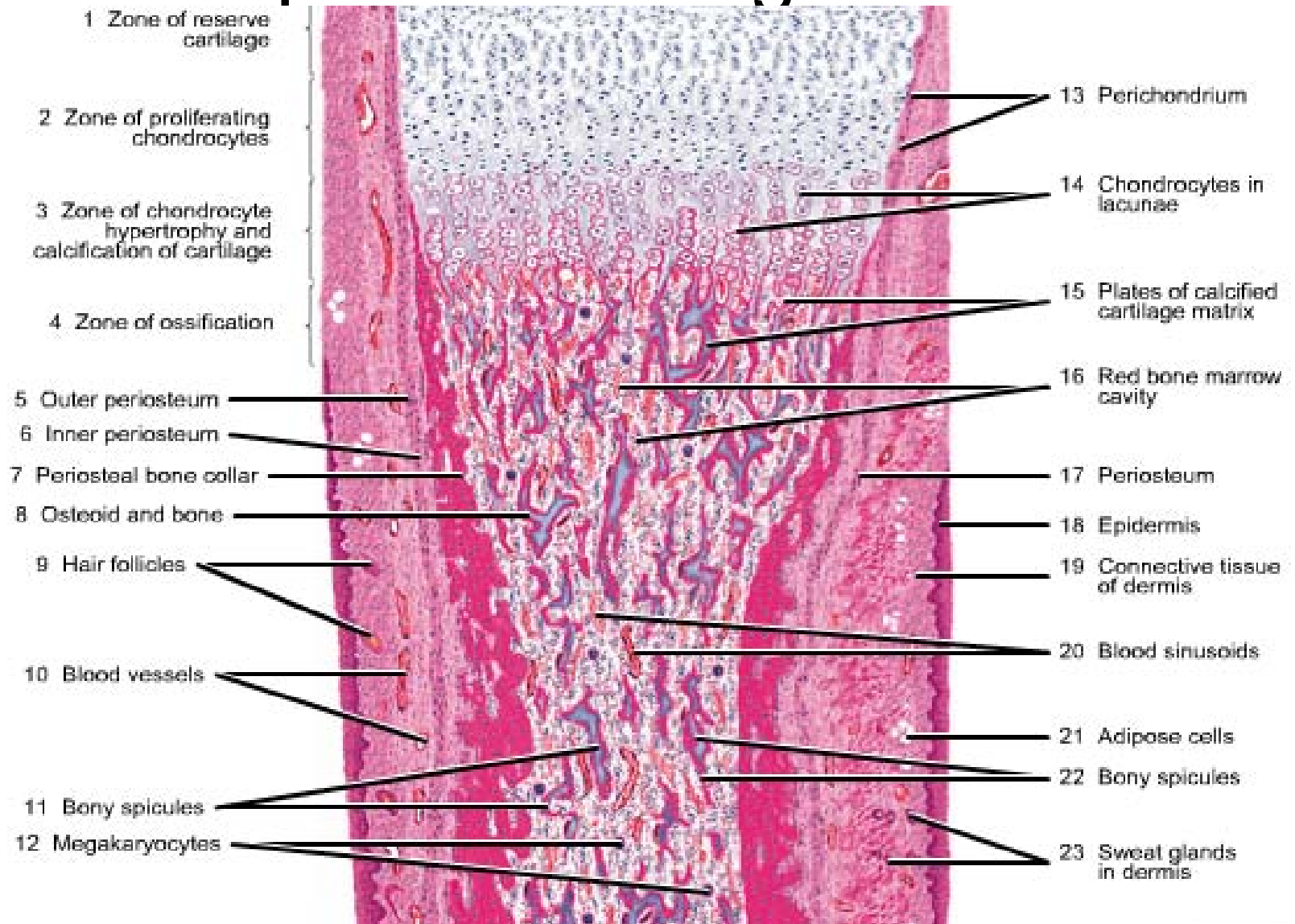


Cancellous bone

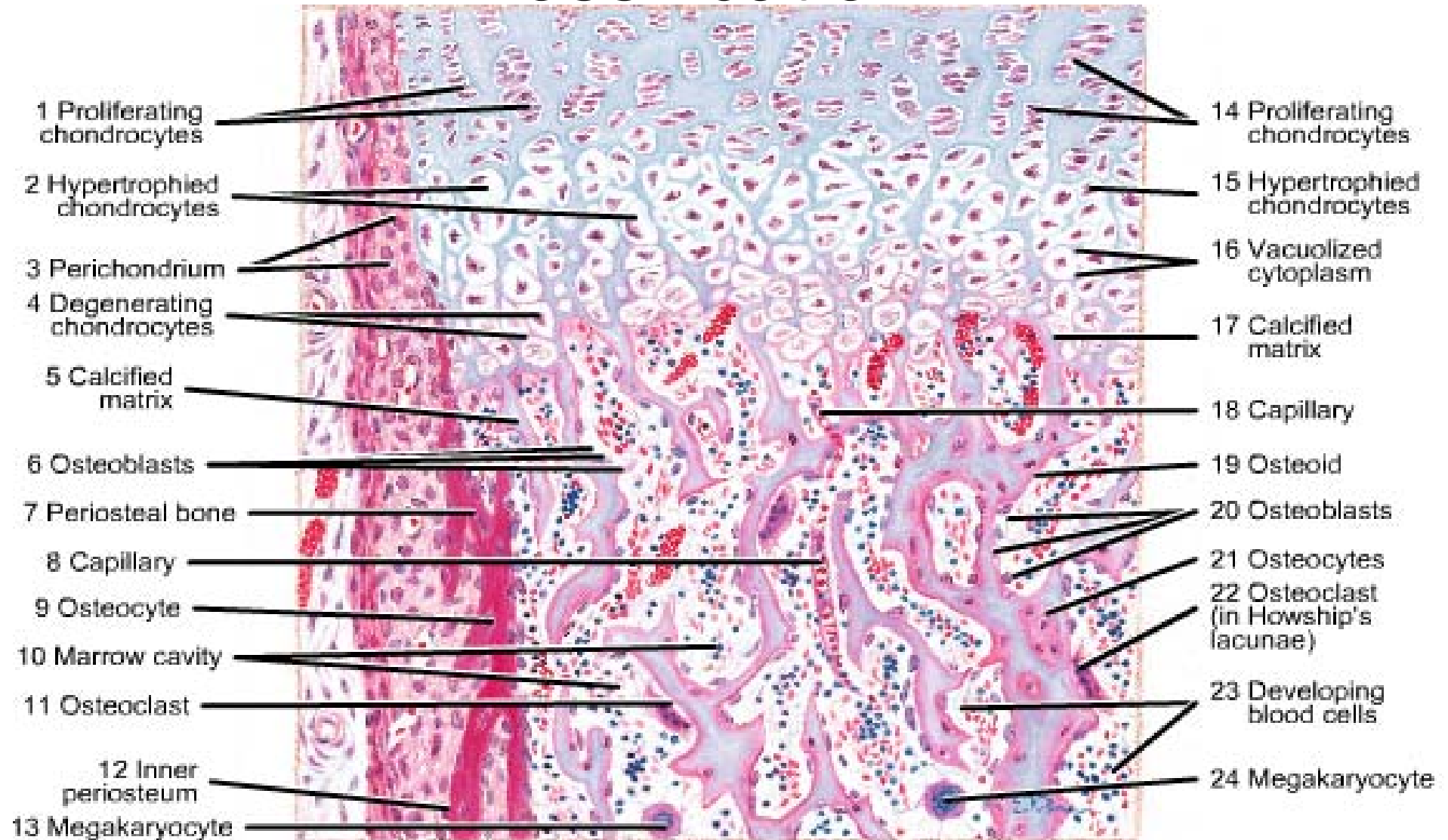
- Lamellae are irregularly arranged
- Haversian system is absent
- bone tissue is arranged as thin plates known as **trabeculae**
- spaces between the trabeculae are occupied by bone marrow



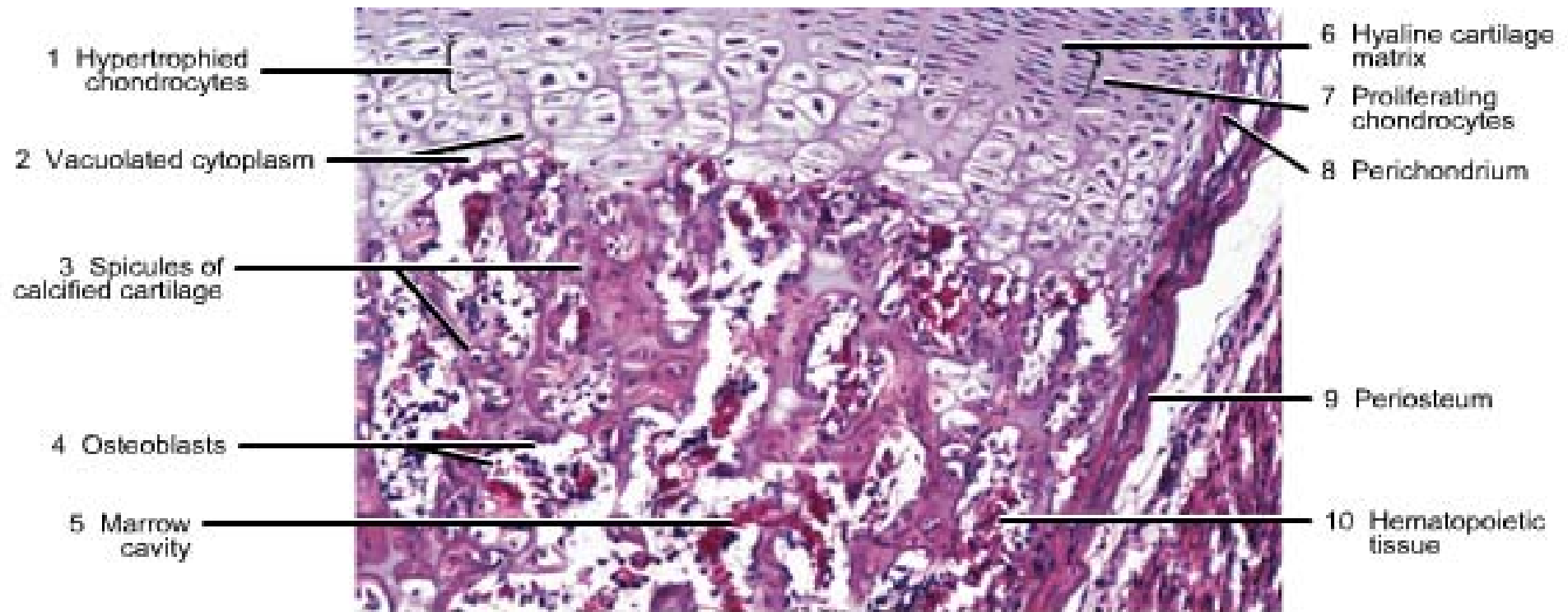
Endochondral ossification; development of long bone



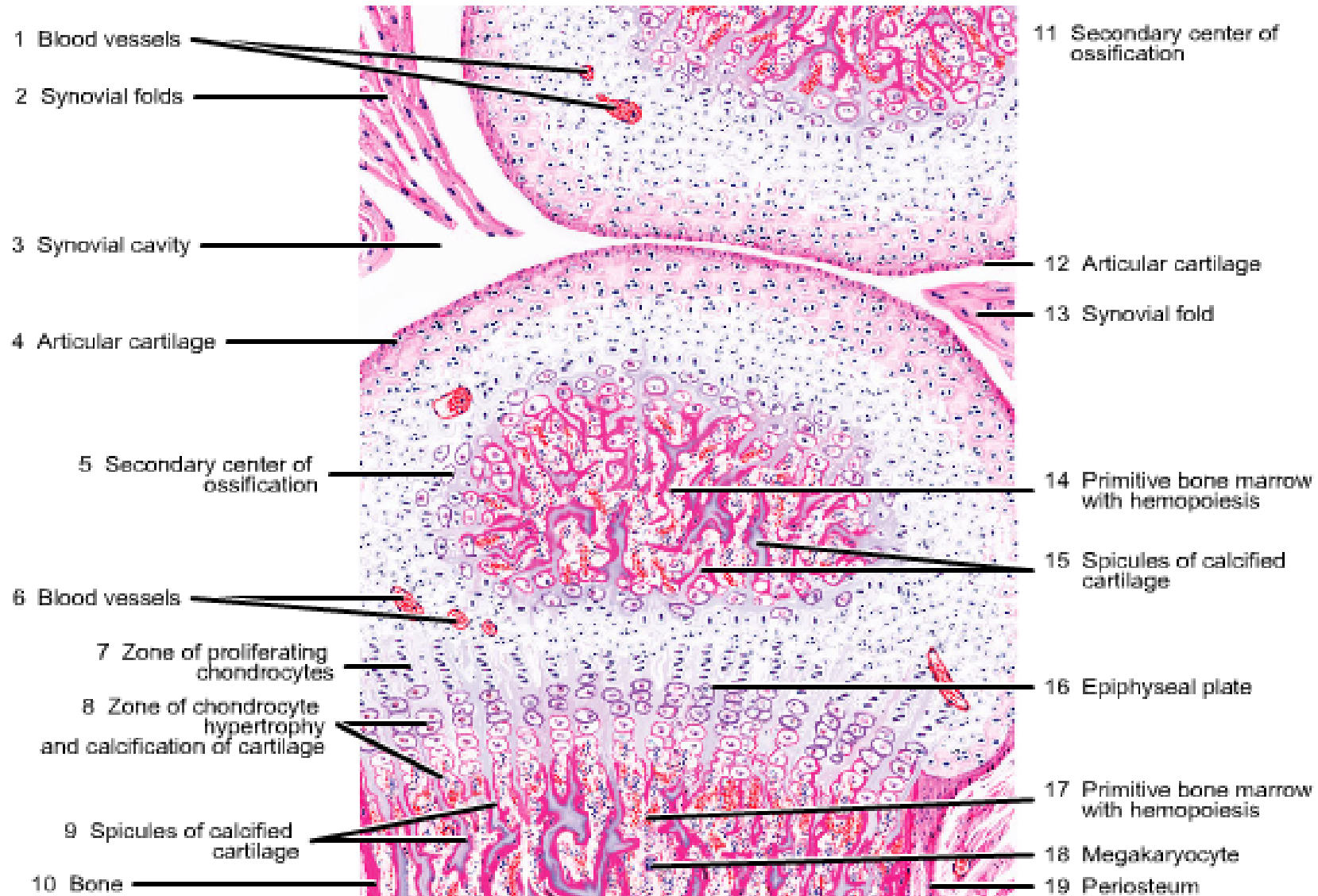
Endochondral ossification: zone of ossification



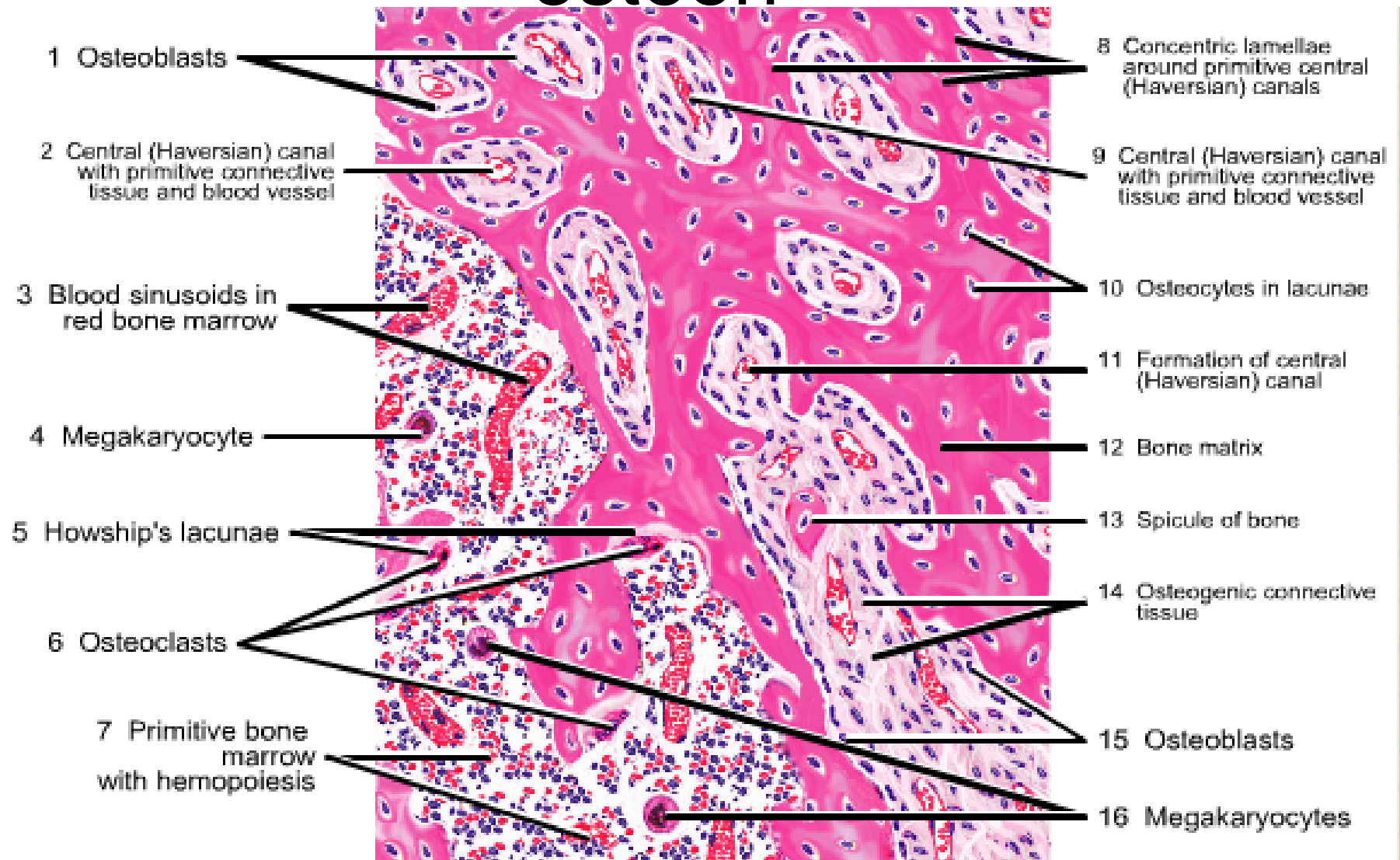
Endochondral bone : zone of osification



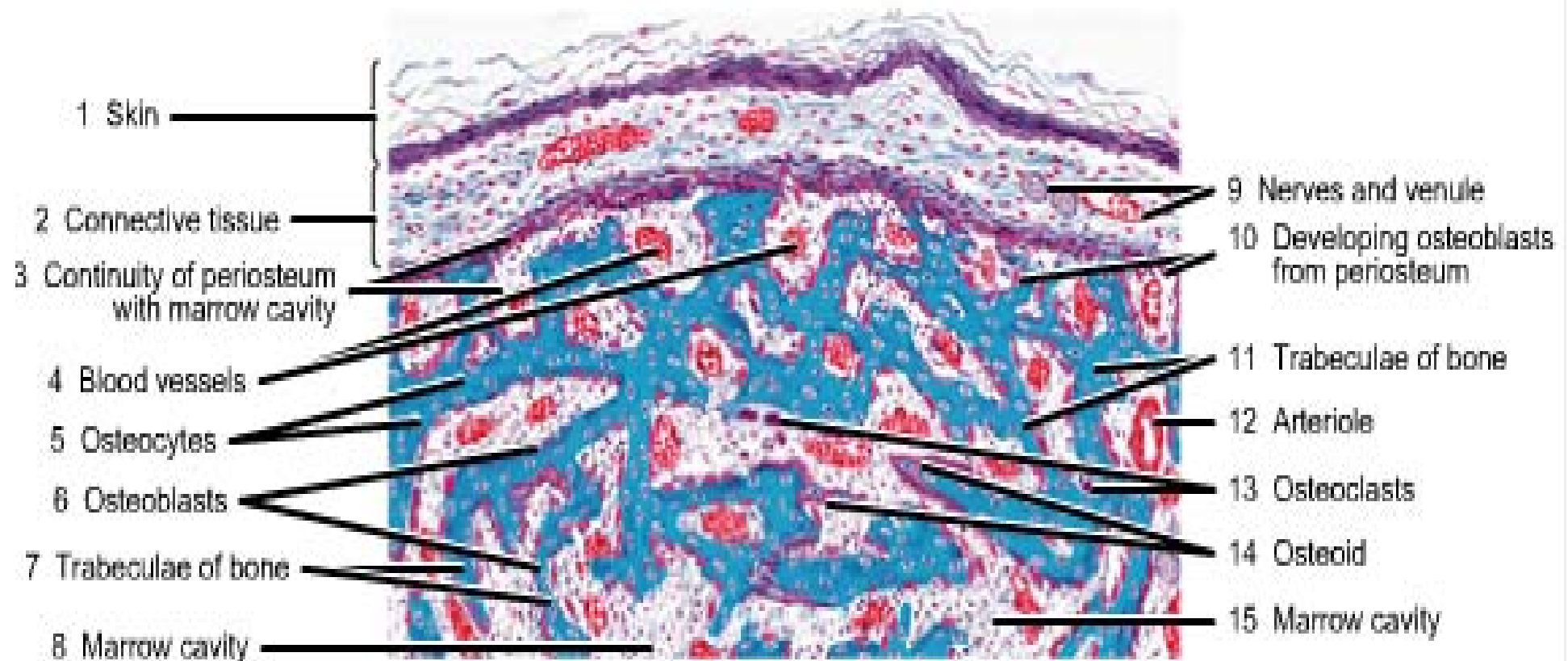
Endochondral ossification: development of secondary center



Bone formation development of osteon



Intramembranous ossification



Intramembranous ossification

