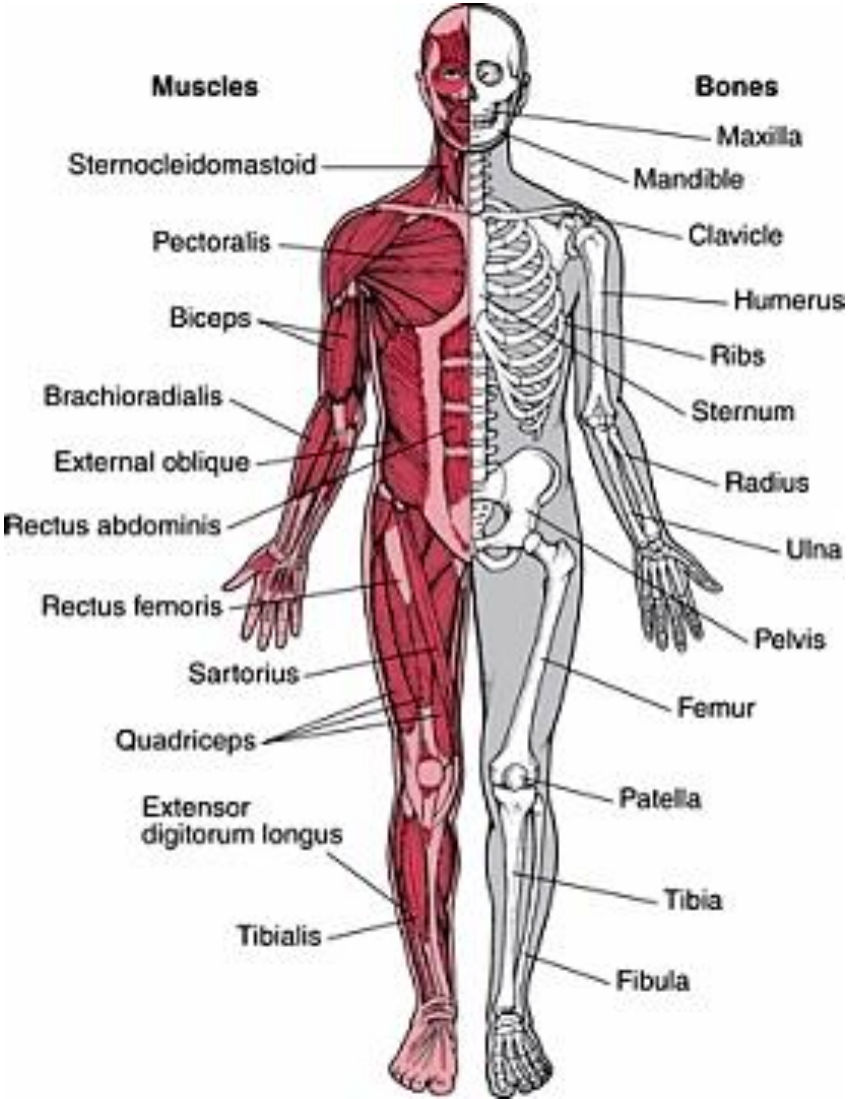
Human skeletal system

- **Locomotion system** – тірек-қимыл жүйесі, опорно-двигательная система
- **Support** – тірек, поддержка
- **Cartilage** – шеміршек, хрящ
- **Compact bone** – компактные кости, тығыз сүйек
- **Spongy bone –** жұмсақ сүйек, губчатые кости
- **Intracellular space** – жасушааралық қуыс, межклеточное пространство
- **Resorption** – жұту, поглощение
- **Sternum** – төс сүйек, грудная кость
- **Patella of knee** – тізе тостағы, чаша колени
- **Ribs** – қабырға, ребра

Locomotion system

- The movement of body is provided by skeletal and muscular systems
- They together form ***LOCOMOTION*** system



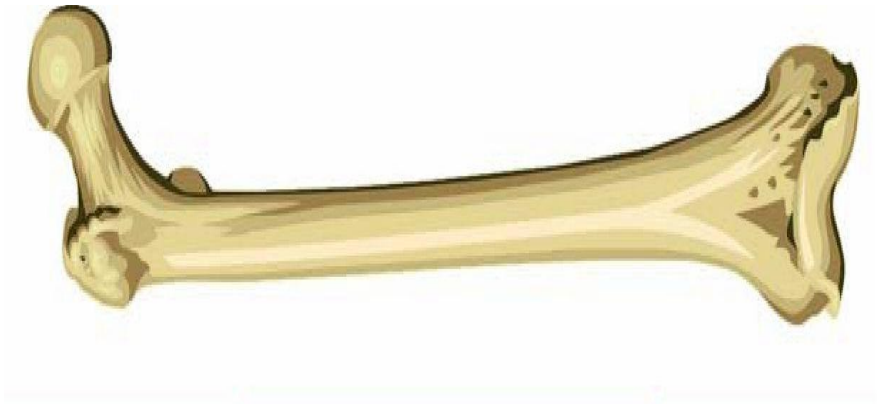
Properties of skeletal system

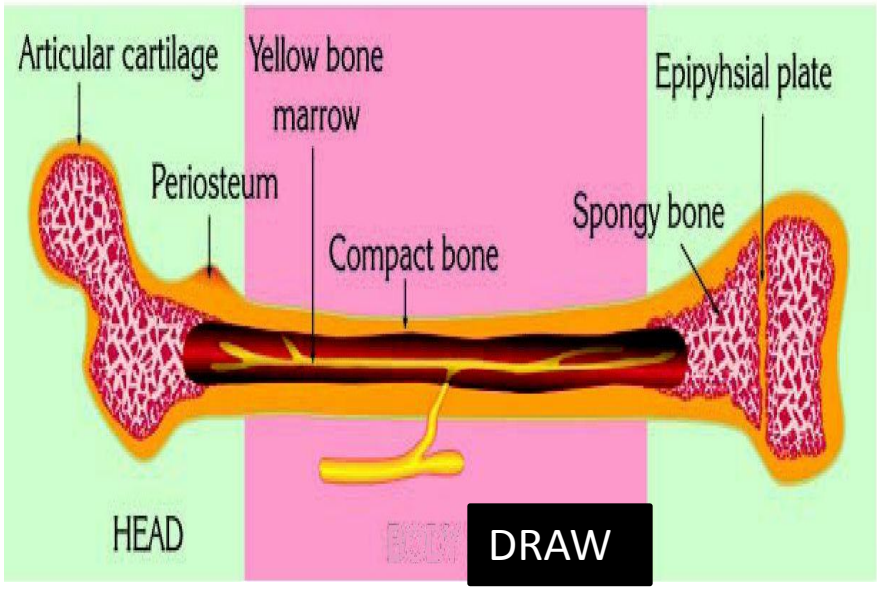
- Movement
- Support and giving shape
- Protection of the internal organs
- Production of blood cells
- It stores minerals such as P and Ca

HUMAN SKELETAL SYSTEM

- *206 bones*
- *Skeleton* is composed of cartilage and bone developed from ***connective tissue***
- Bone cells are called osteocytes

Bone tissue

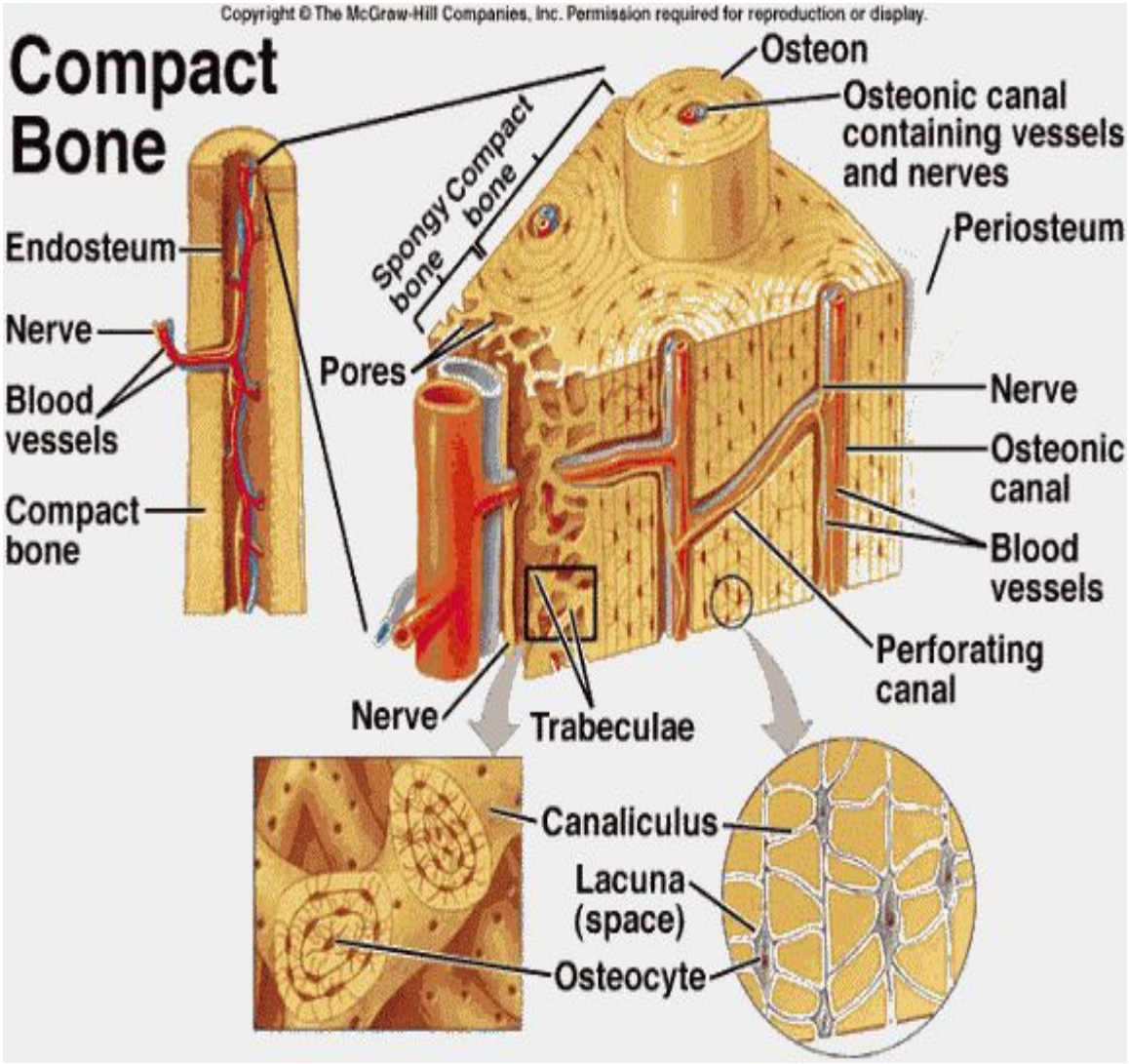




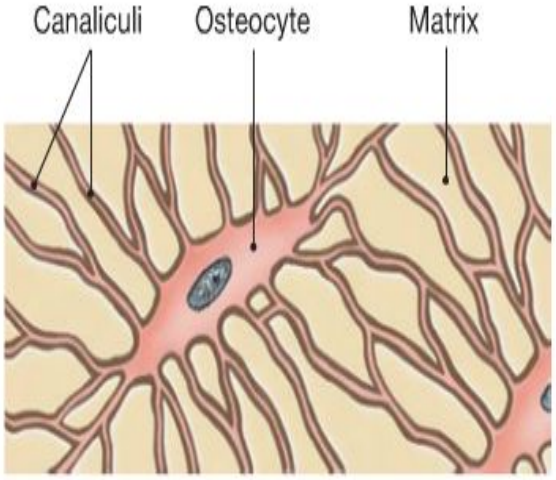
- COMPACT BONE that is very dense and strong
- SPONGY BONE that is porous and soft
- The spaces in spongy bones are filled with a soft tissue called ***marrow***
- red marrow – produces red blood cells
- yellow marrow – stores fat and energy

Structure of a bone

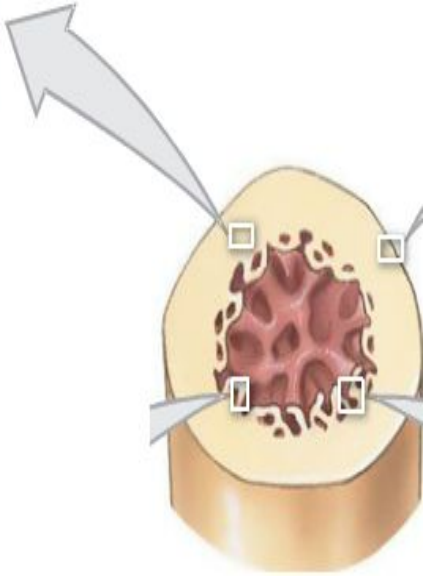
- Osteocytes are connected by ***cytoplasmic bridges***
- Osteonic canal (Haversian canal) contains blood vessels and nerves
- Periosteum (outer membrane) that provide production of new bone for growth and repair



Chemistry of a bone



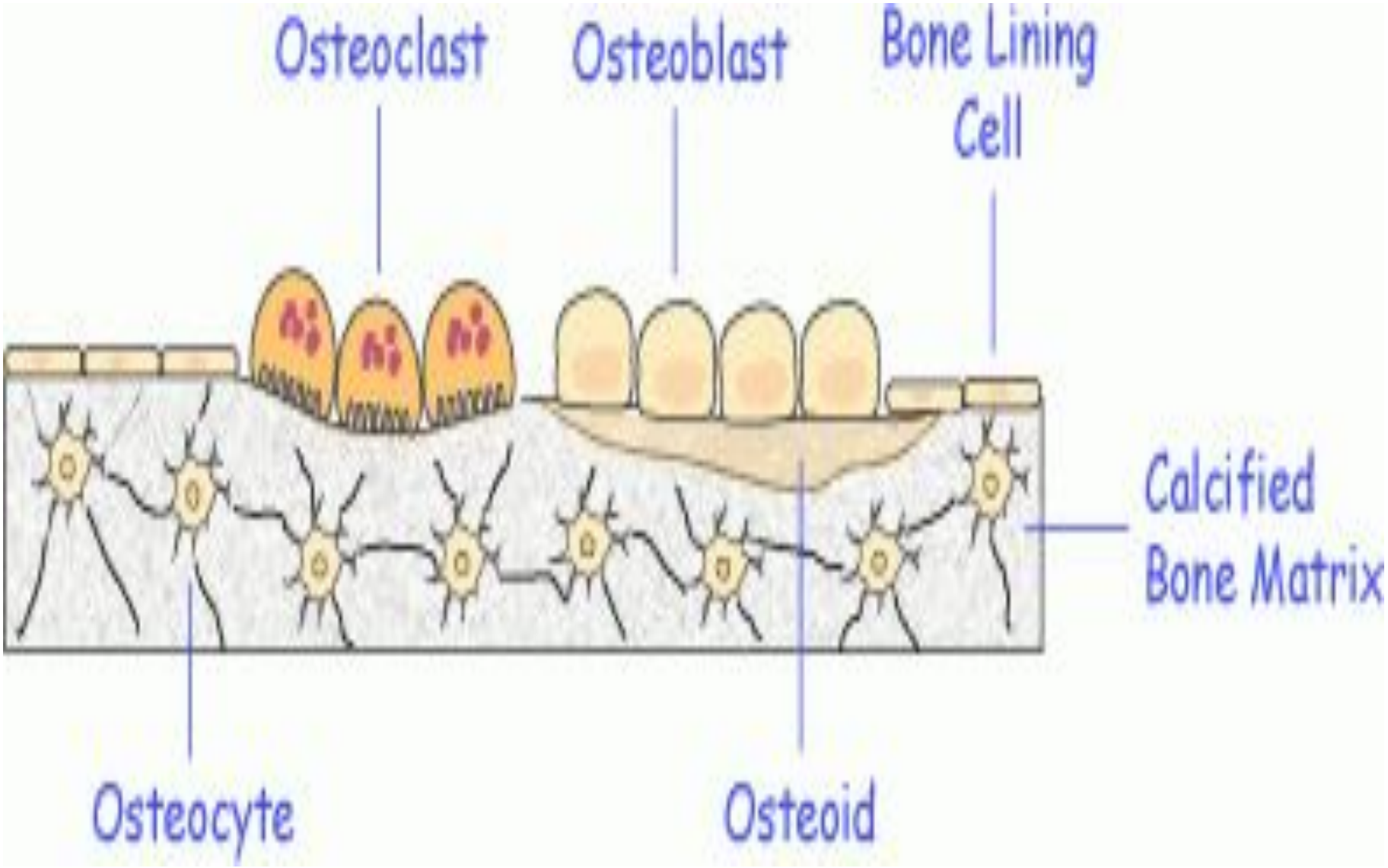
Osteocyte: Mature bone cell that maintains the bone matrix

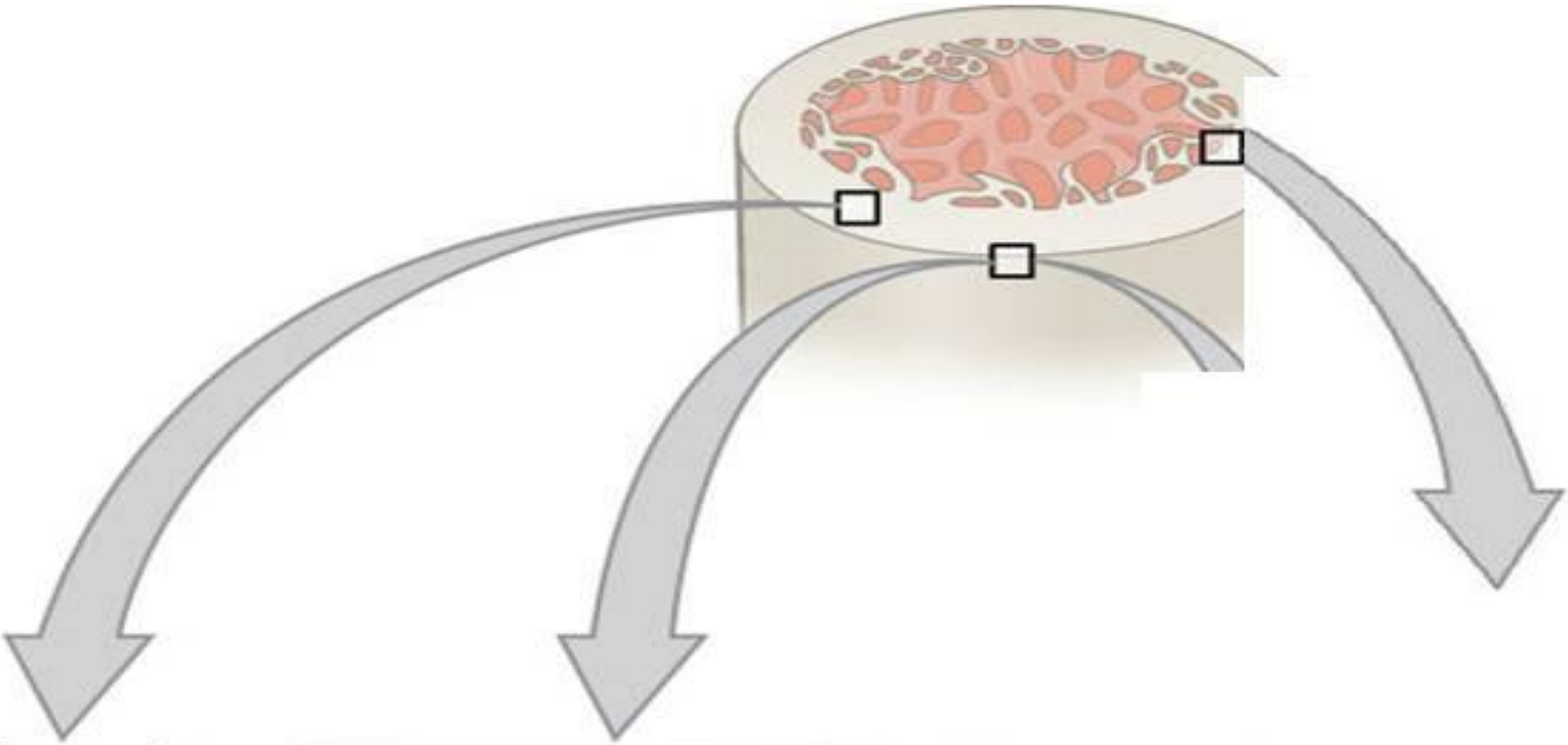


- **Bone**
  - **Bone matrix** (intercellular space)
    - Organic compound (mainly ***collagen***)
    - Inorganic compound (***Ca***, ***P***, ***CaCO3,*** ***etc.***)
  - **Osteocytes** (Bone cells)

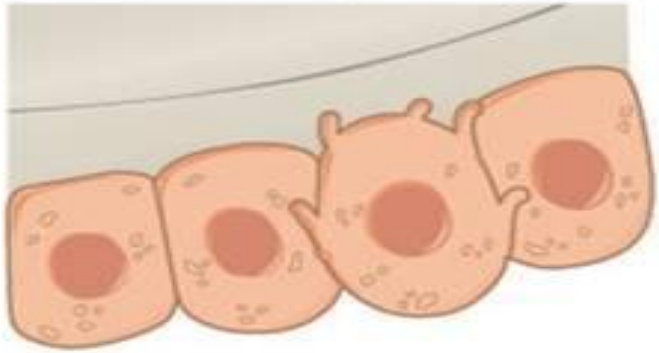
Formation of a bone

- Bone is formed by ***osteoblasts*** and cartilage
- Carilage catch calcium from blood and are converted to ***osteocytes***
- In the formation of bone, vitamins A, C, D and Ca and P minerals play important role
- ***Osteoclasts*** are the cells responsible for bone resorption (поглощение), thus they break down bone

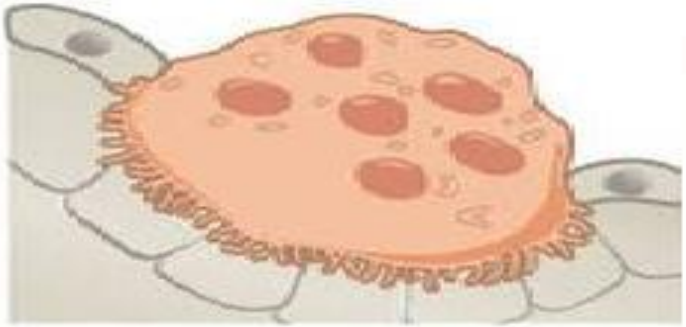

Osteoclast
Osteoblast
Bone Lining Cell
Calcified Bone Matrix
Osteocyte
Osteoid



Osteocyte
(maintains
bone tissue)

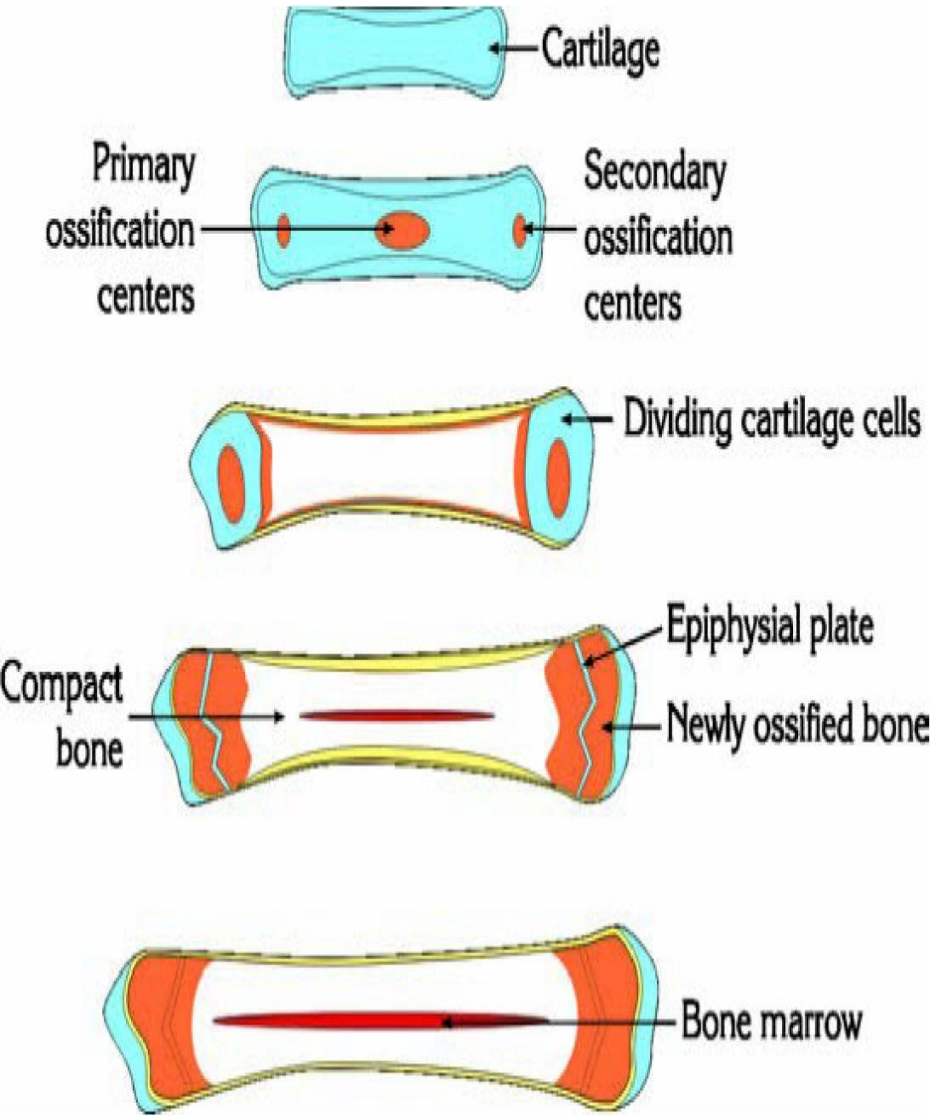


Osteoblast
(forms bone matrix)

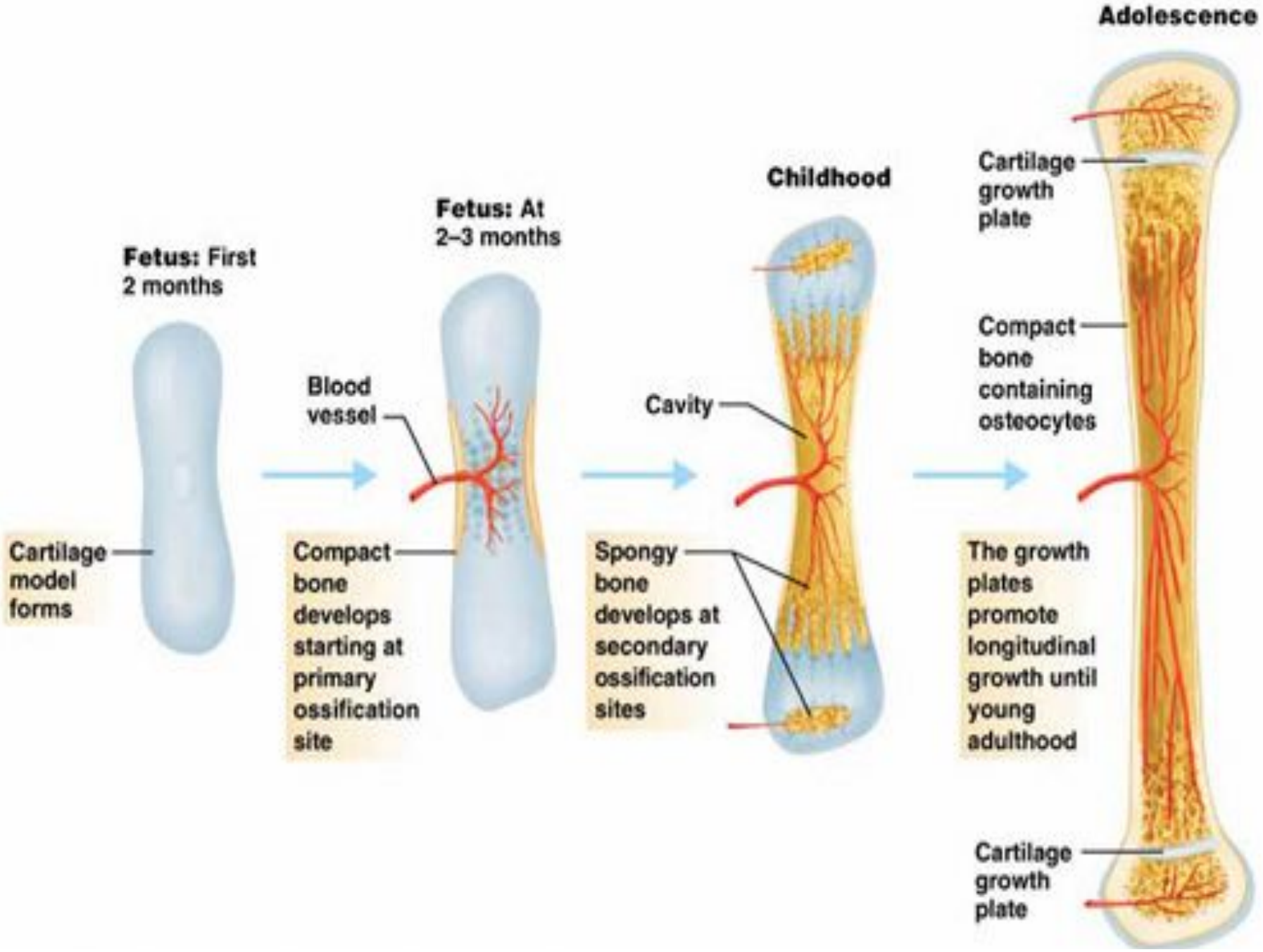


Osteoclast
(resorbs bone)

Growth of bones longitudinally

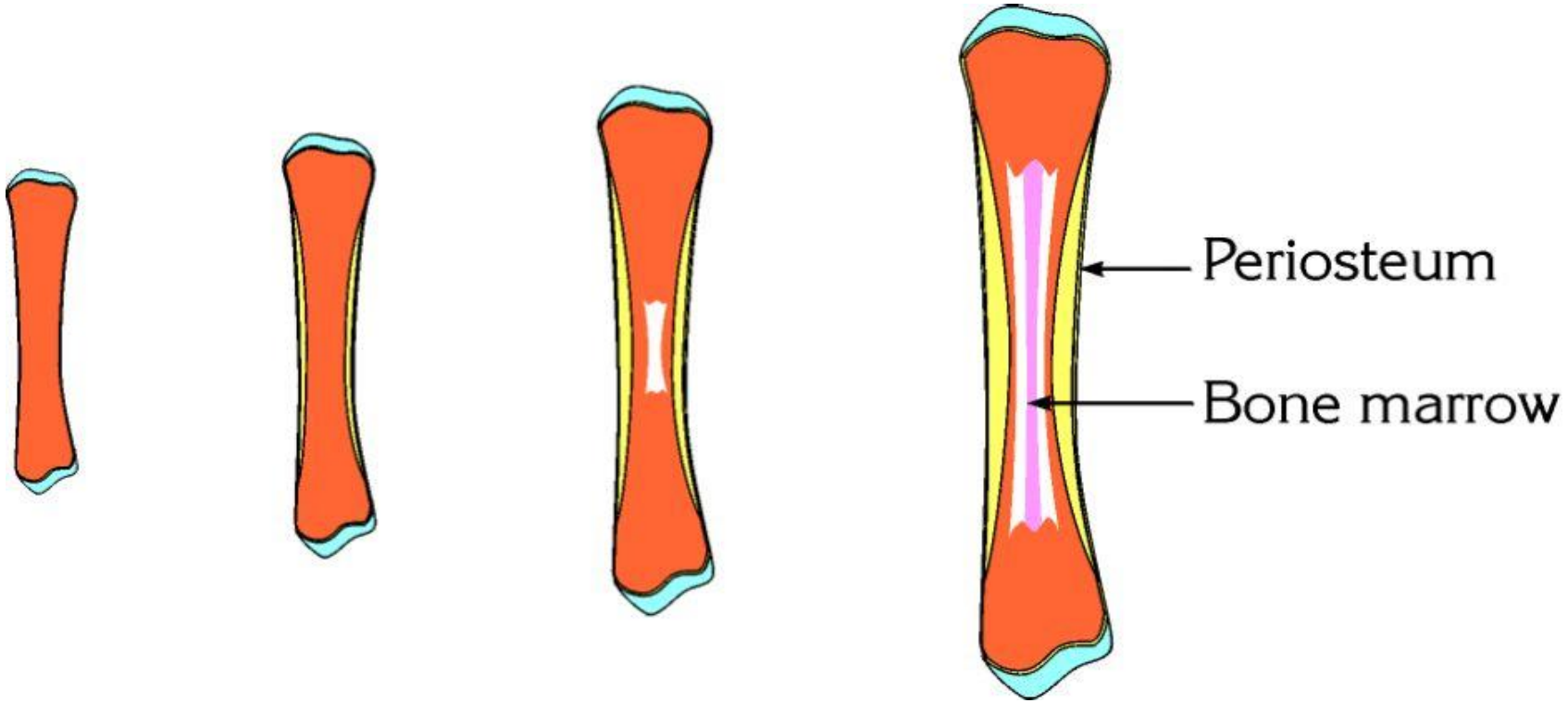


- Bone is formed from cartilage
- Cartilage changes into bone, this process is called ossification
- Cartilage cells (chondrocytes) found in epiphysial plate are responsible for increasing of bone in length


Fetus: First 2 months
Cartilage model forms
Fetus: At 2–3 months
Blood vessel
Compact bone develops starting at primary ossification site
Childhood
Cavity
Spongy bone develops at secondary ossification sites
Adolescence
Cartilage growth plate
Compact bone containing osteocytes
The growth plates promote longitudinal growth until young adulthood
Cartilage growth plate

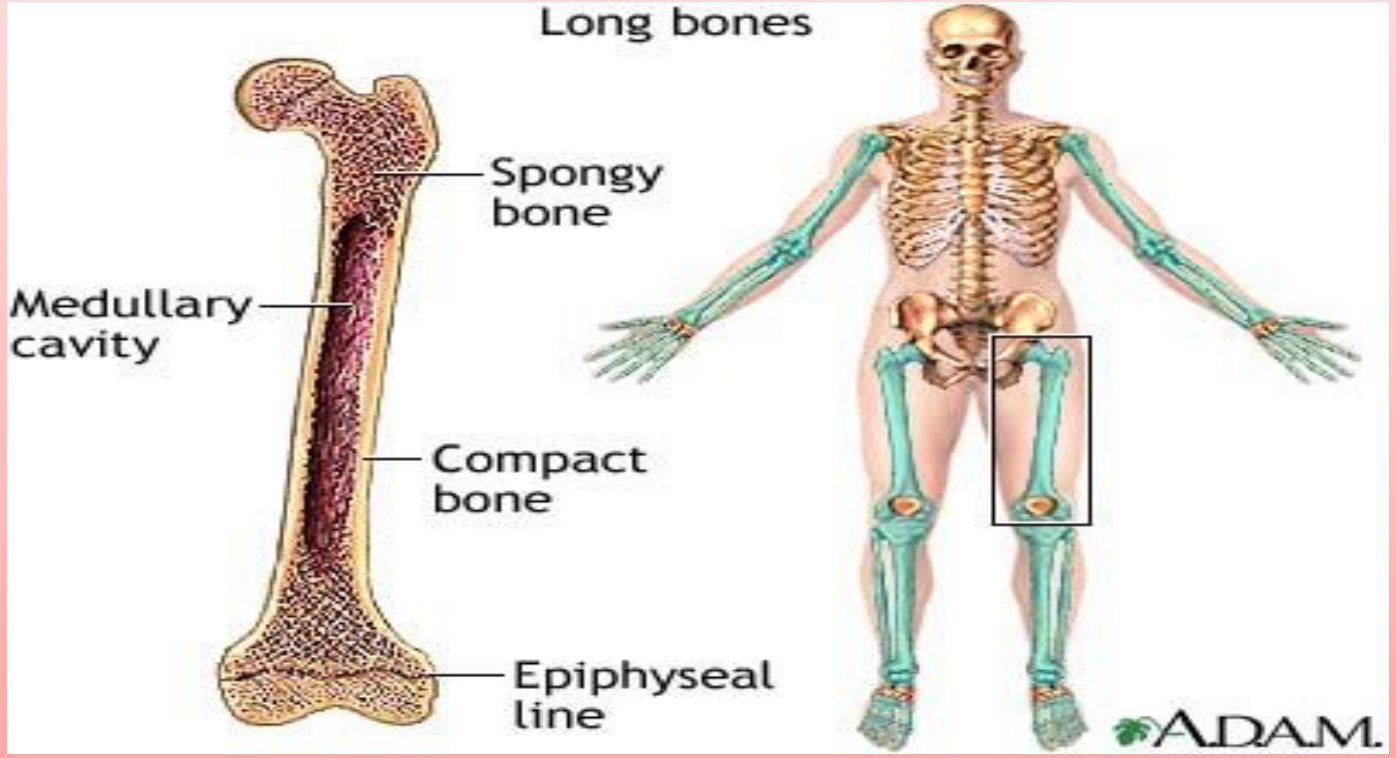
Growth of bones in diameter

- Increasing in diameter is provided by periosteum



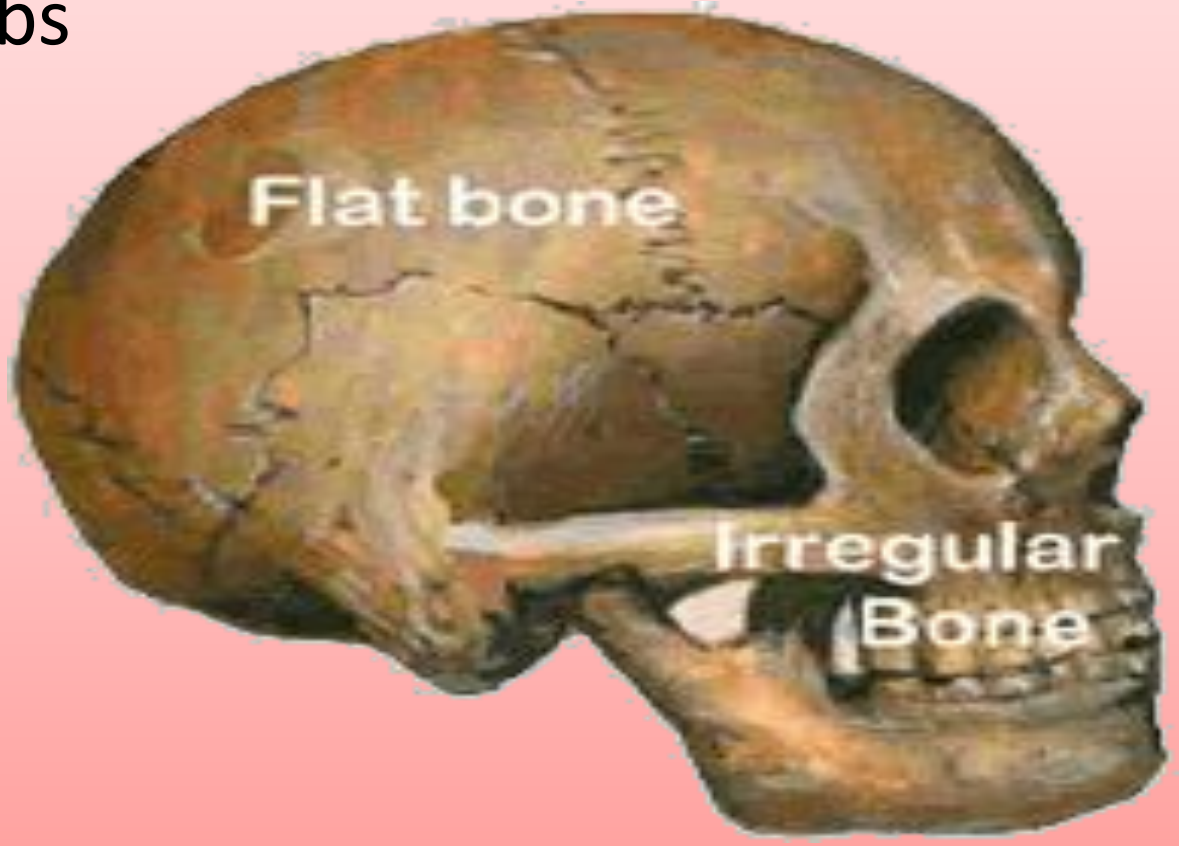
Types of bones

Long Bones: are found in leg and arms



Types of bones

Flat Bones: skull, sternum, patella of knee and ribs



Types of bones

Short Bones: Vertebrae, bones of the hand and foot, fingers