

Unit 3B

Human Form & Function

Body systems

The skeleton

Study Guide



Read:

- **Our Human Species (3rd edtn)**
Chapter 4, sections 1-8, 13-14

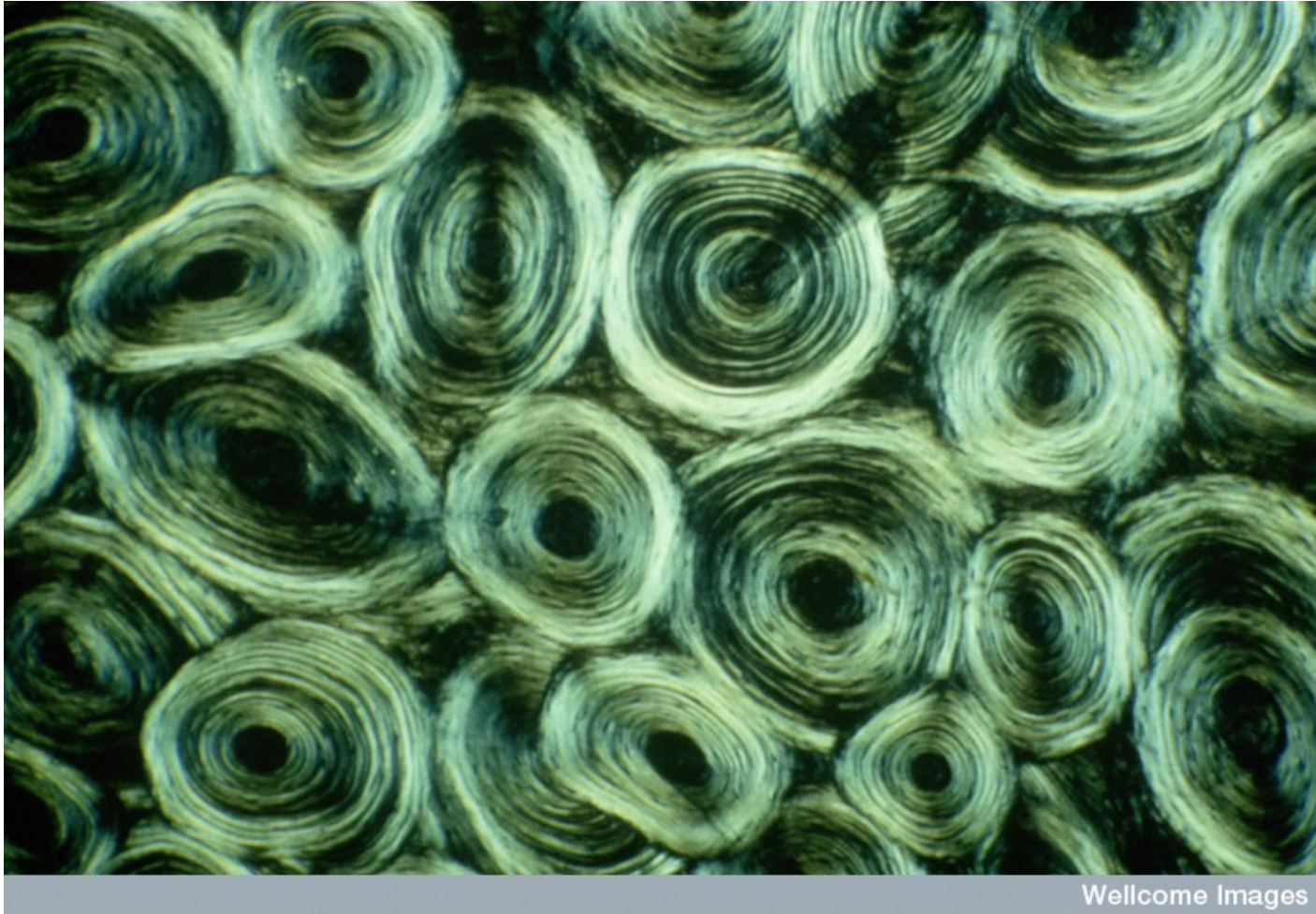
Complete:

- **Human Biological Science Workbook**
Topic 13 – The Skeleton

Skeletal system

- The skeletal system consists of the bones, joints, ligaments and cartilages in the body.
- The functions of the skeletal system are to:
 - protect and support the internal organs,
 - provide anchor points for the muscles to allow movement,
 - produce blood cells.

The microscopic structure of bone

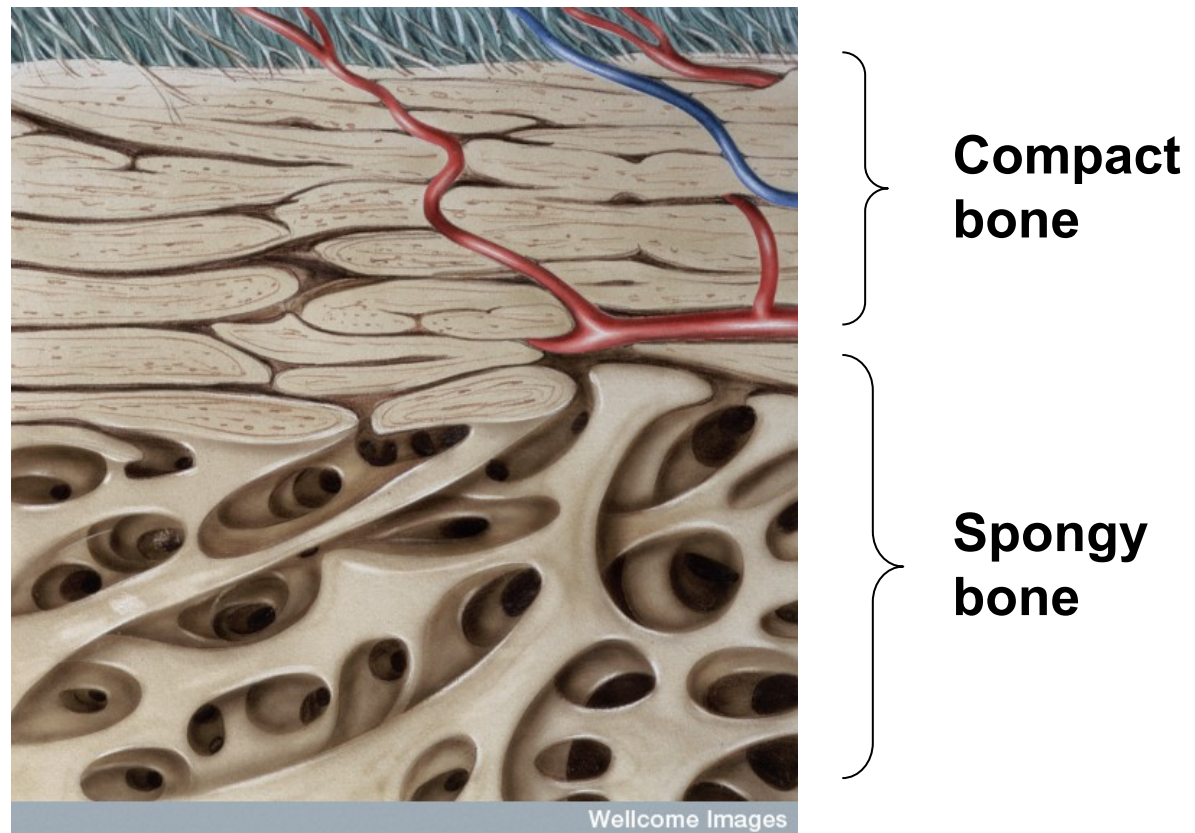


Wellcome Images

Bone

- Bone is classified as a connective tissue.
- It has a brittle, calcified matrix with many collagen fibres, giving bones a degree of pliability.
- Several types of cells occur in bone. These include **osteoblasts**, which are young, bone-forming cells, and **osteocytes**, which are mature cells contained in cavities (**lacunae**).
- Bone has a rich blood supply.

There are two types of bone – **compact bone**, which is very hard and dense, and **spongy bone**, which is porous, consisting of a network of small bony plates.

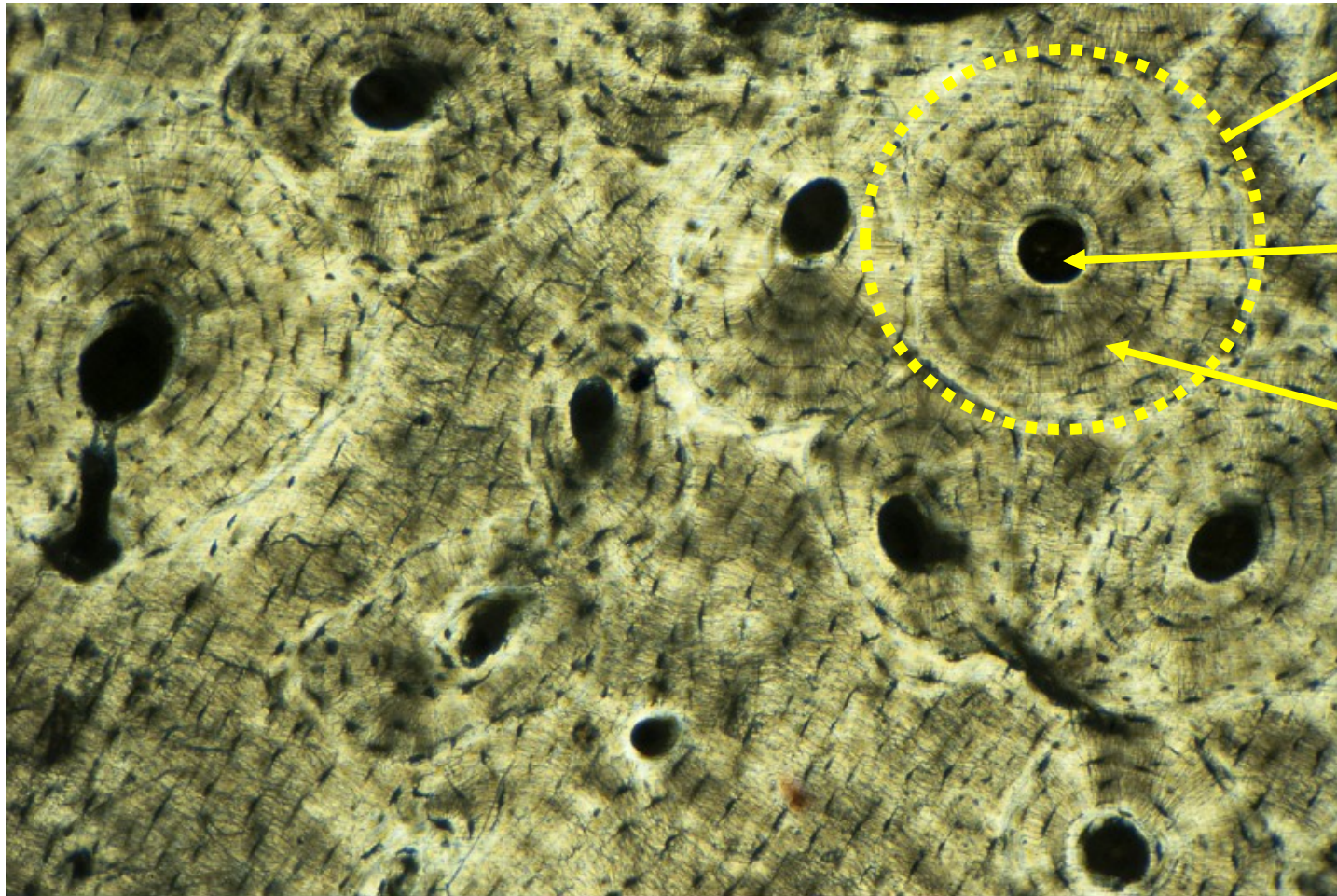


Compact bone

- Compact bone consists of **Haversian systems**.

A Haversian system comprises circular layers of bone (**lamellae**) surrounding a central **Haversian canal**, which carries blood and lymph vessels.

Haversian systems



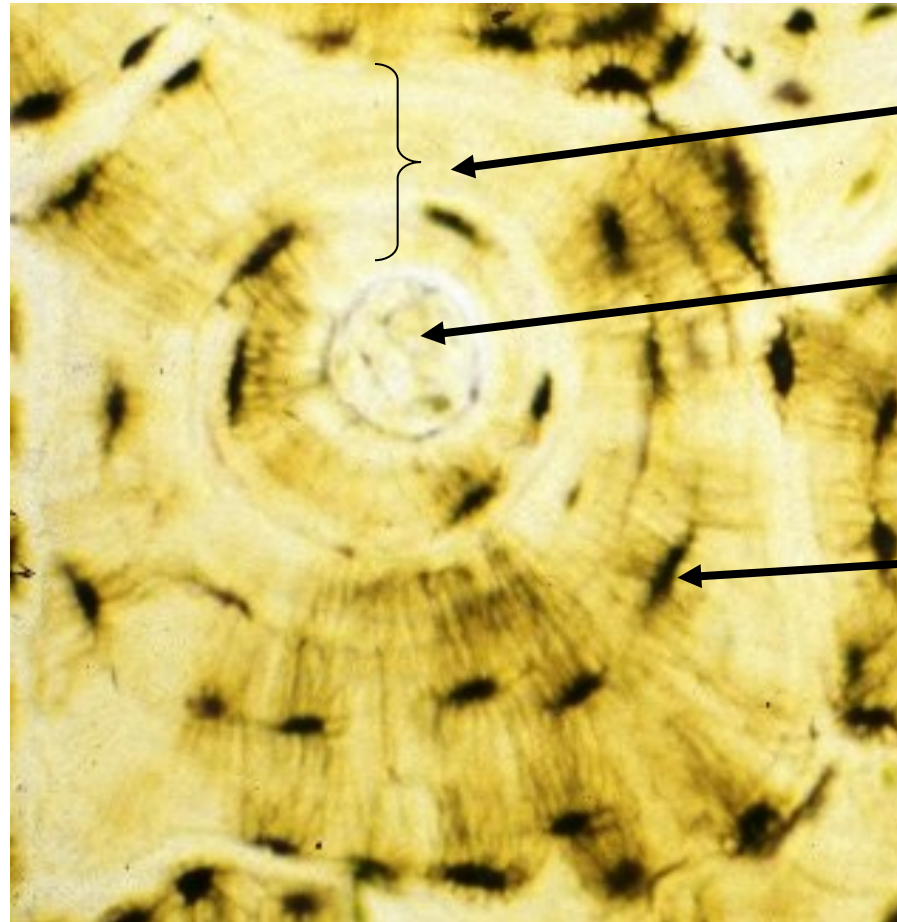
Wellcome Images

Haversian
system

Haversian
canal

Concentric
lamellae

Haversian systems

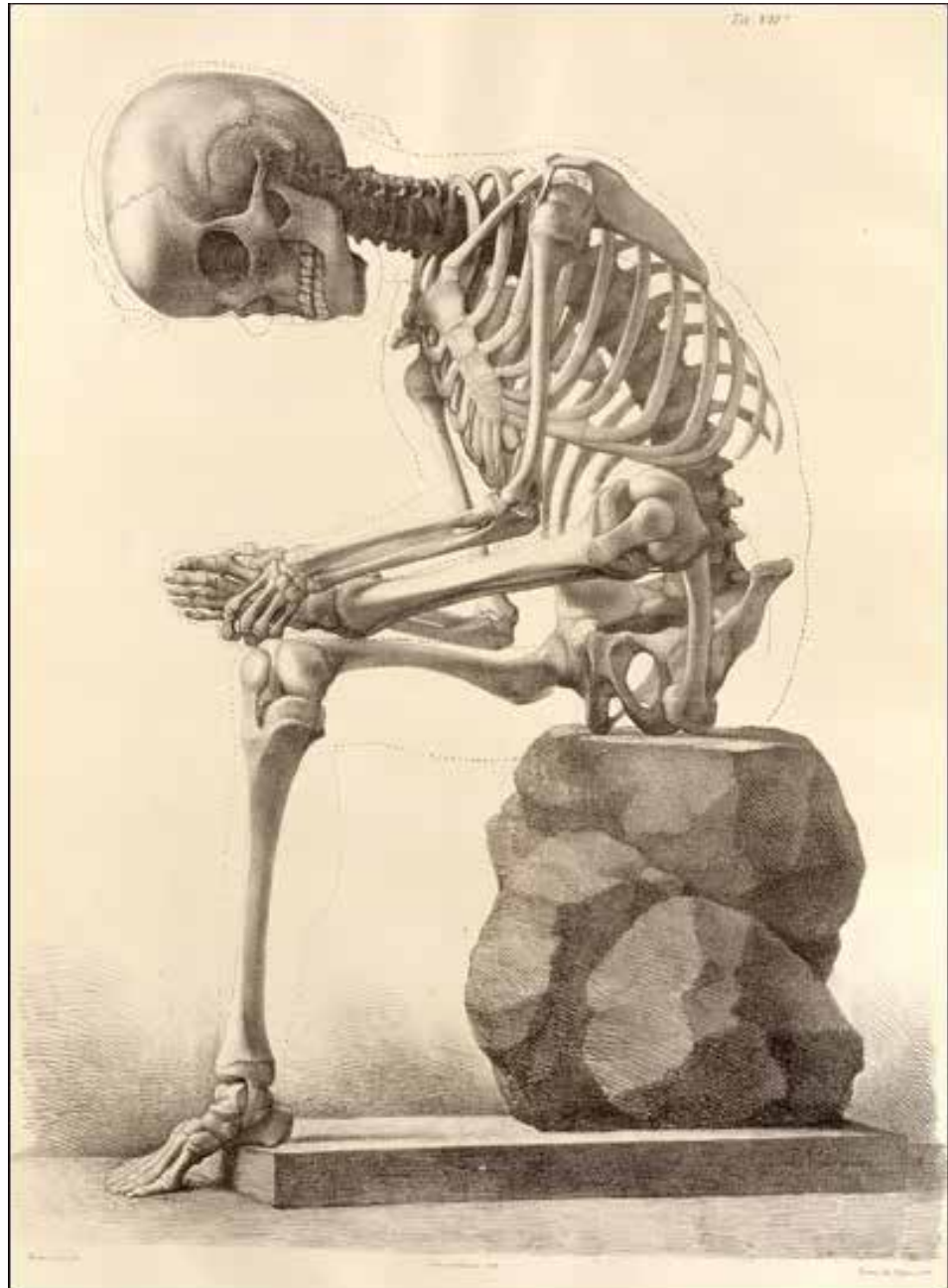


Concentric lamellae

Central canal

**Lacunae housing
mature
osteocytes**

The skeleton



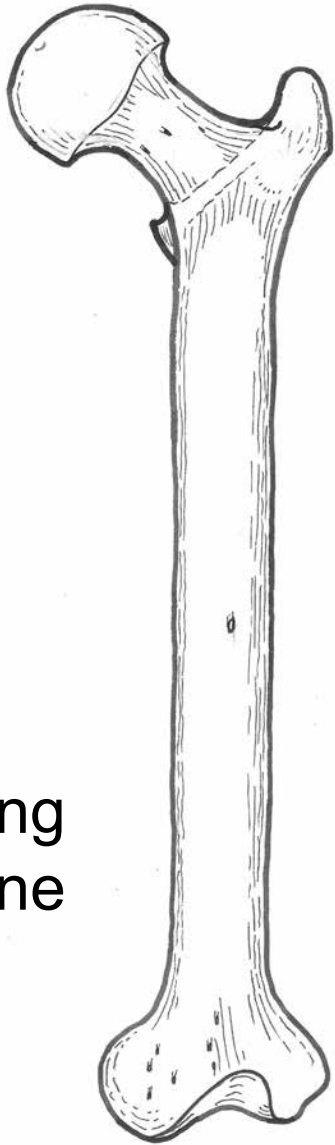
Bone classification

Bones can be classified according to their shape and their structure.

Classification by shape

- **Long bone** – e.g. Thigh bone (femur)
- **Short bone** – e.g. wrist bones (carpals)
- **Flat bone** – e.g. shoulder blade (scapula)
- **Irregular bone** – e.g. vertebrae
- **Sesamoid bones** develop in tendons – e.g. kneecap (patella)

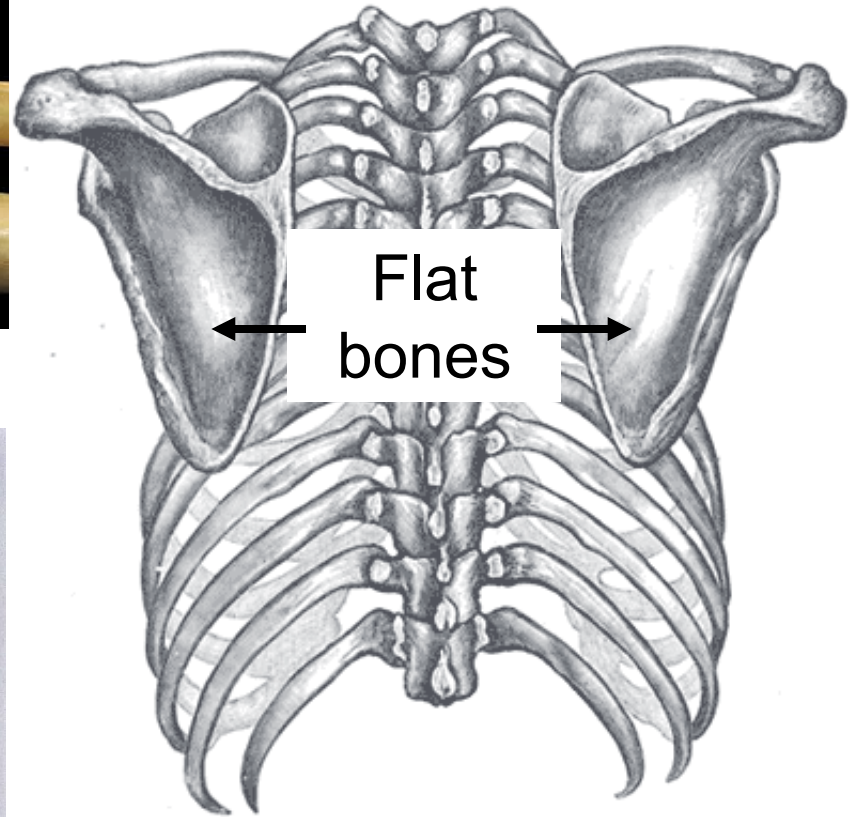
Long
bone



Short
bones

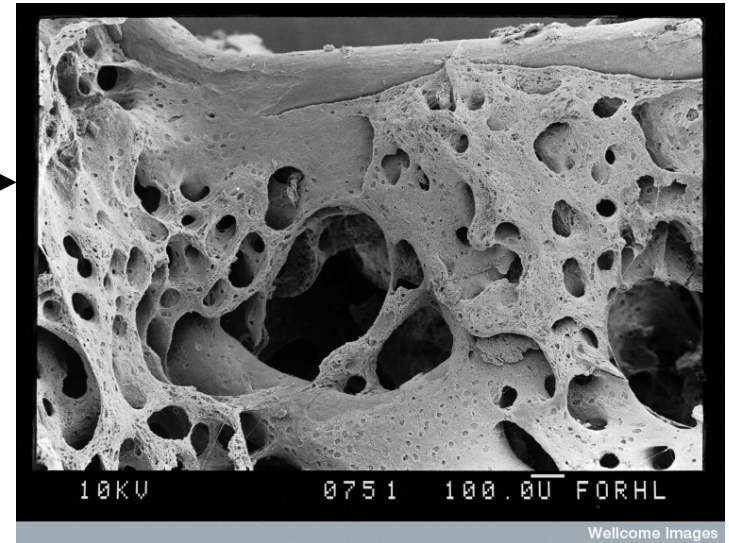
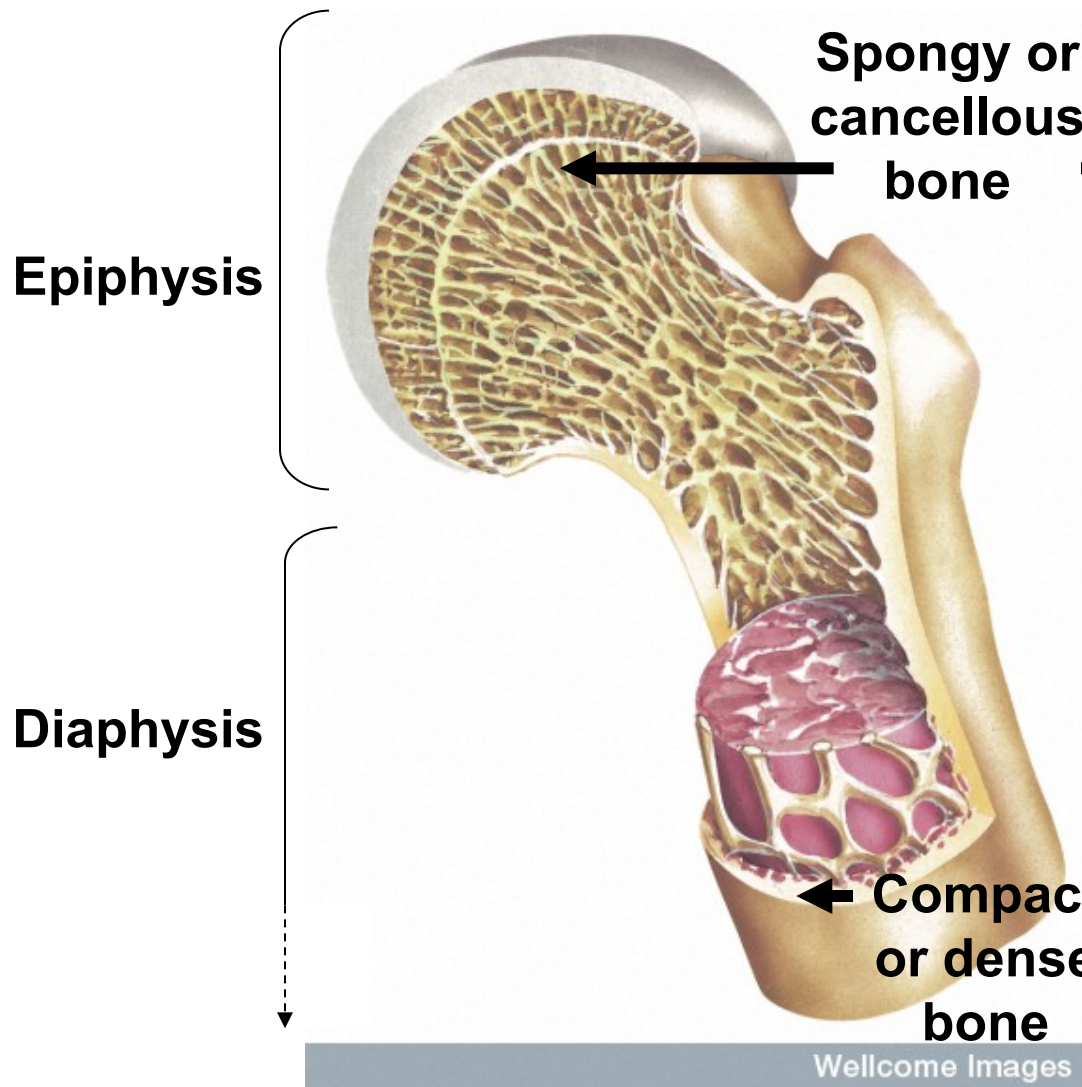


Wellcome Images

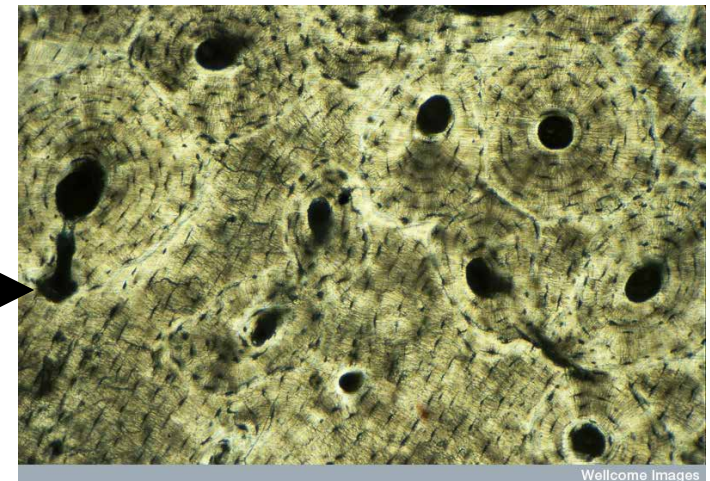


Irregular
bone

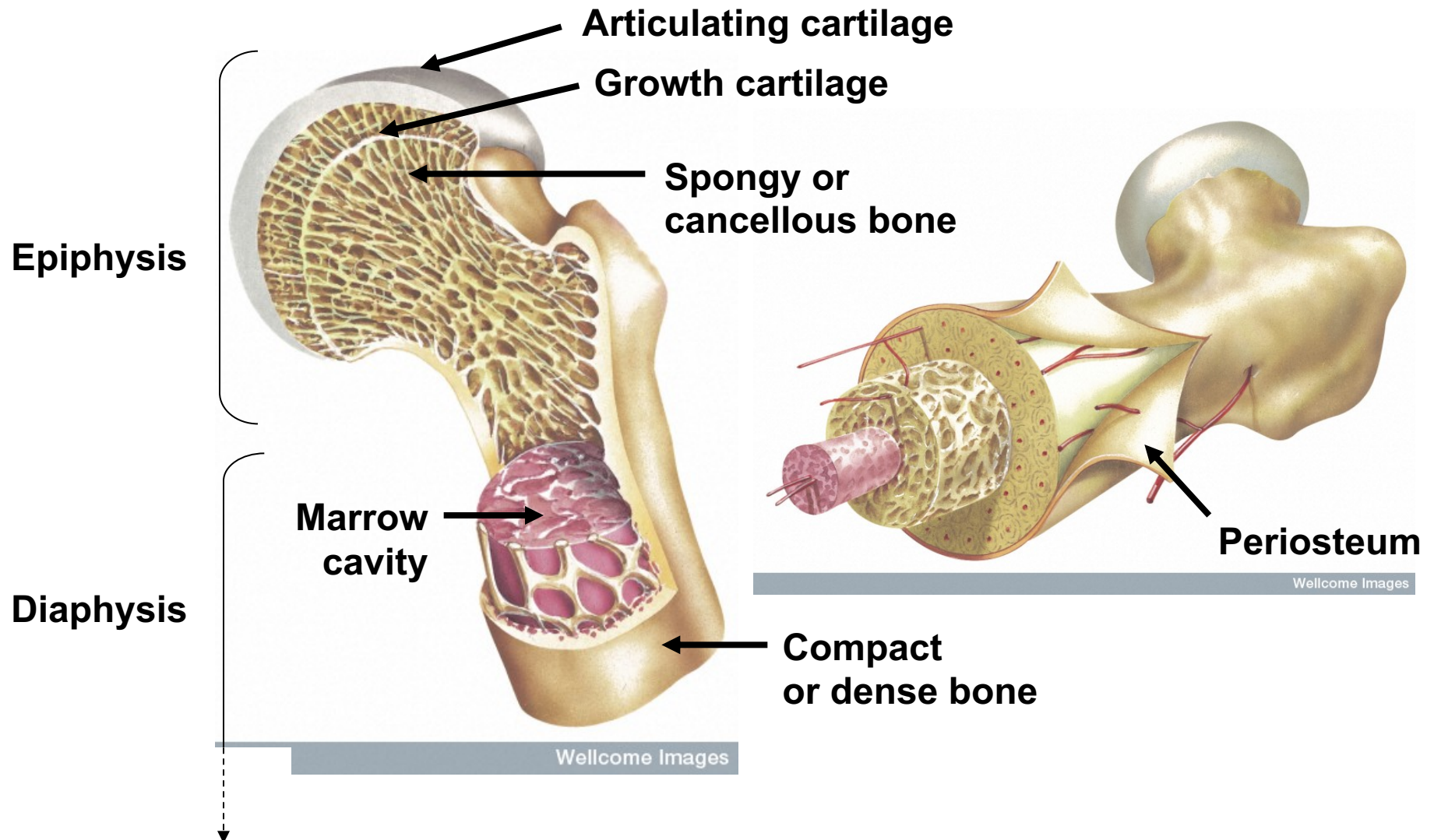
Bones classified by structure



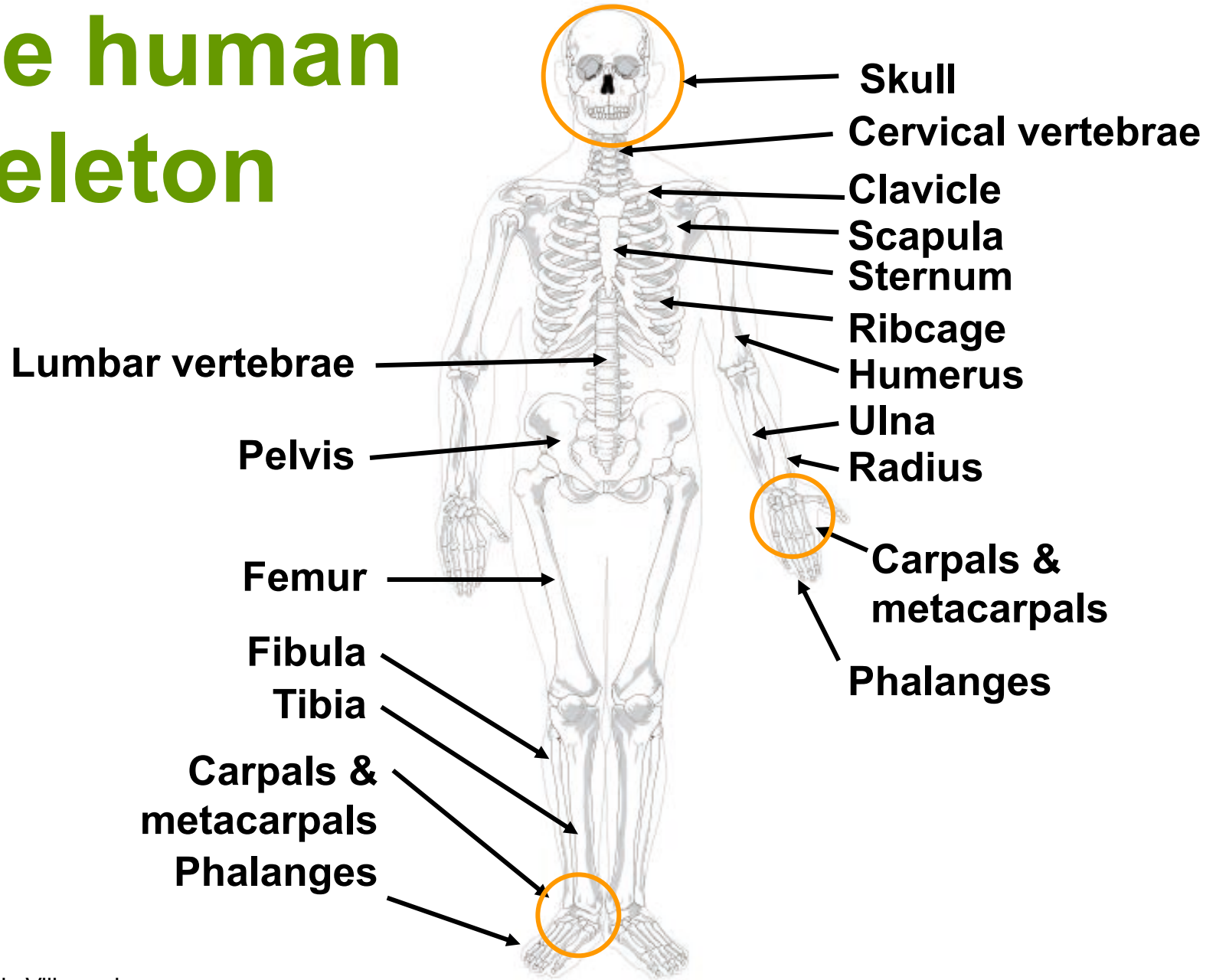
D Gregory & D Marsgall, Wellcome Images



Structure of a long bone



The human skeleton



Axial & appendicular skeleton

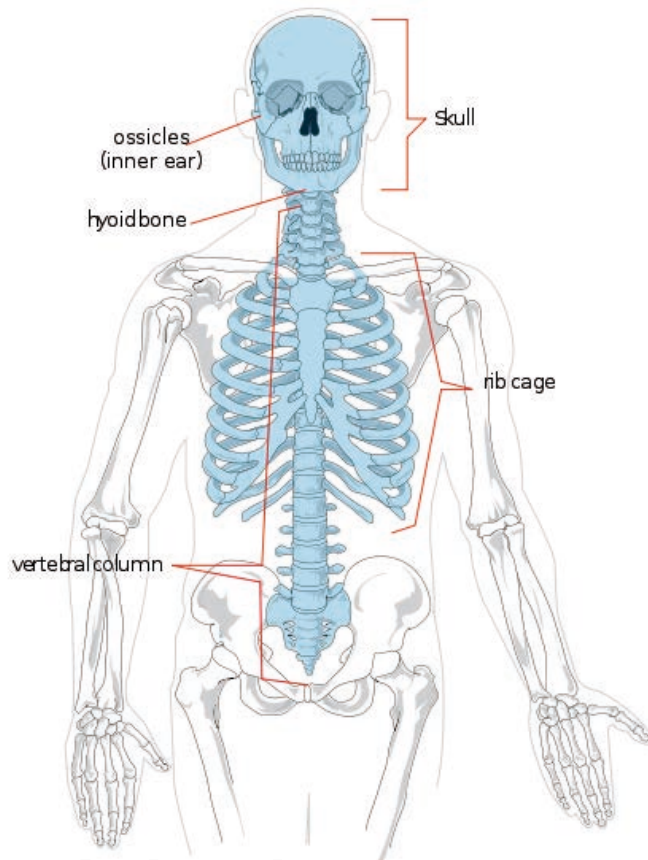
Axial skeleton

- Skull
- Vertebral column
(backbone)
- Ribcage

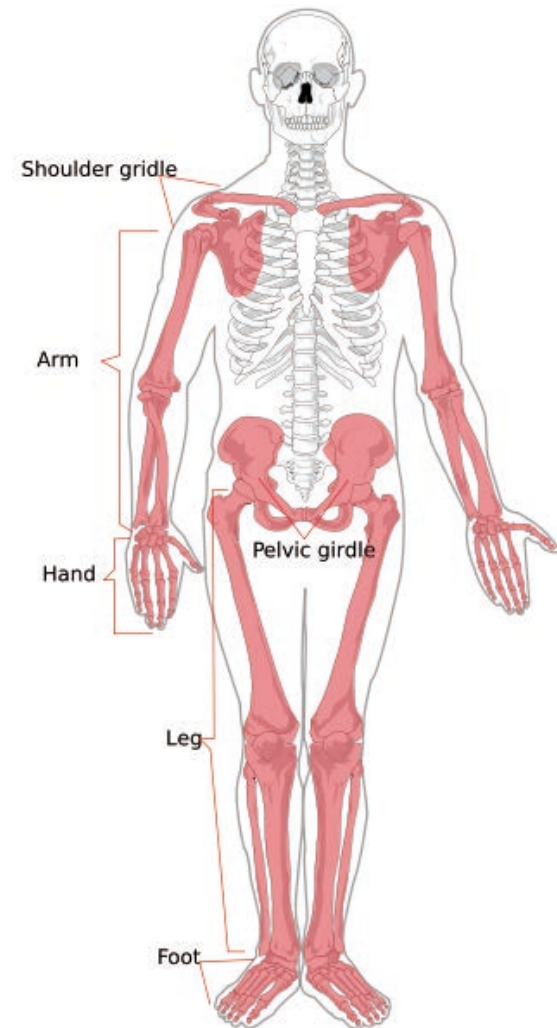
Appendicular skeleton

- Pectoral girdle
- Upper limbs
- Pelvic girdle
- Lower limbs

Axial & appendicular skeleton

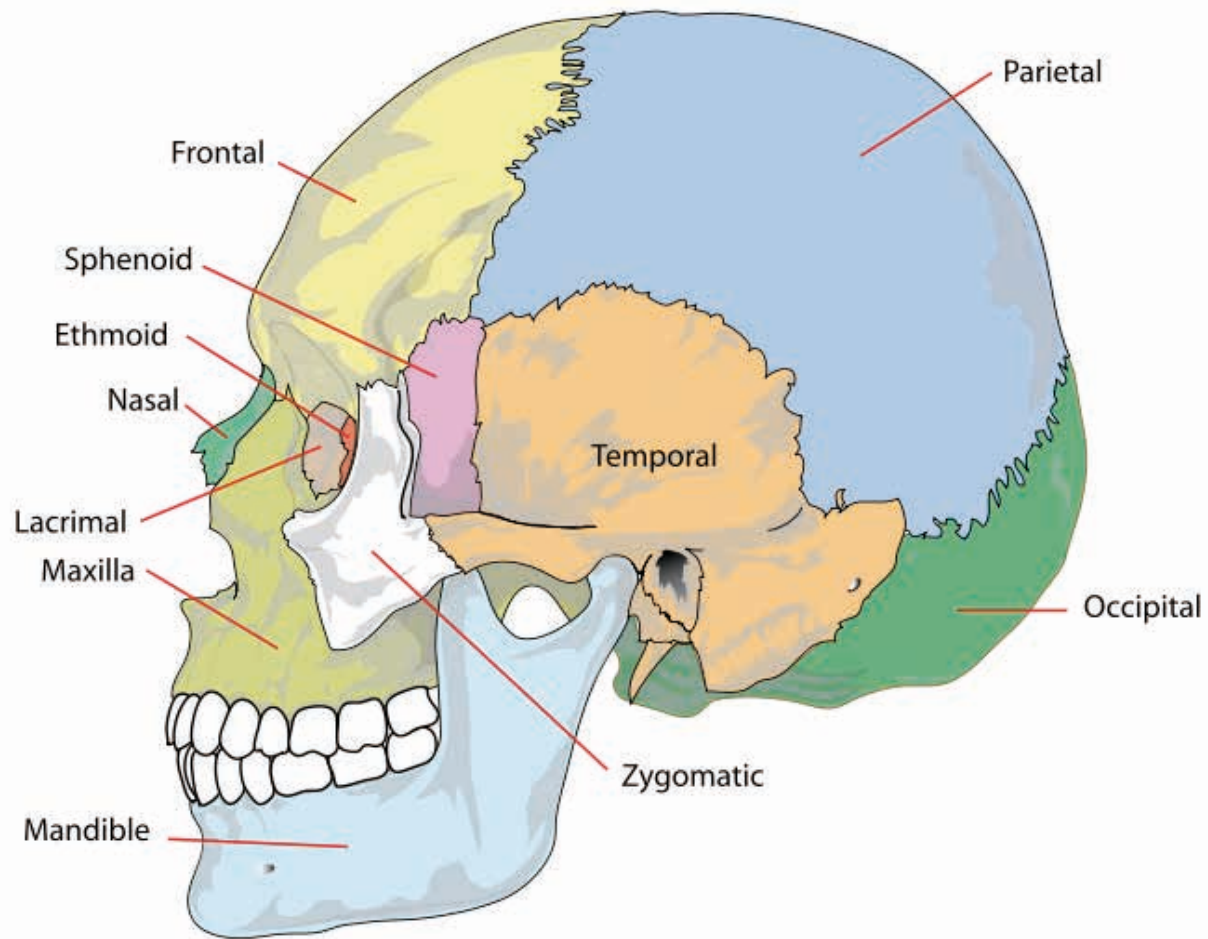


Axial skeleton

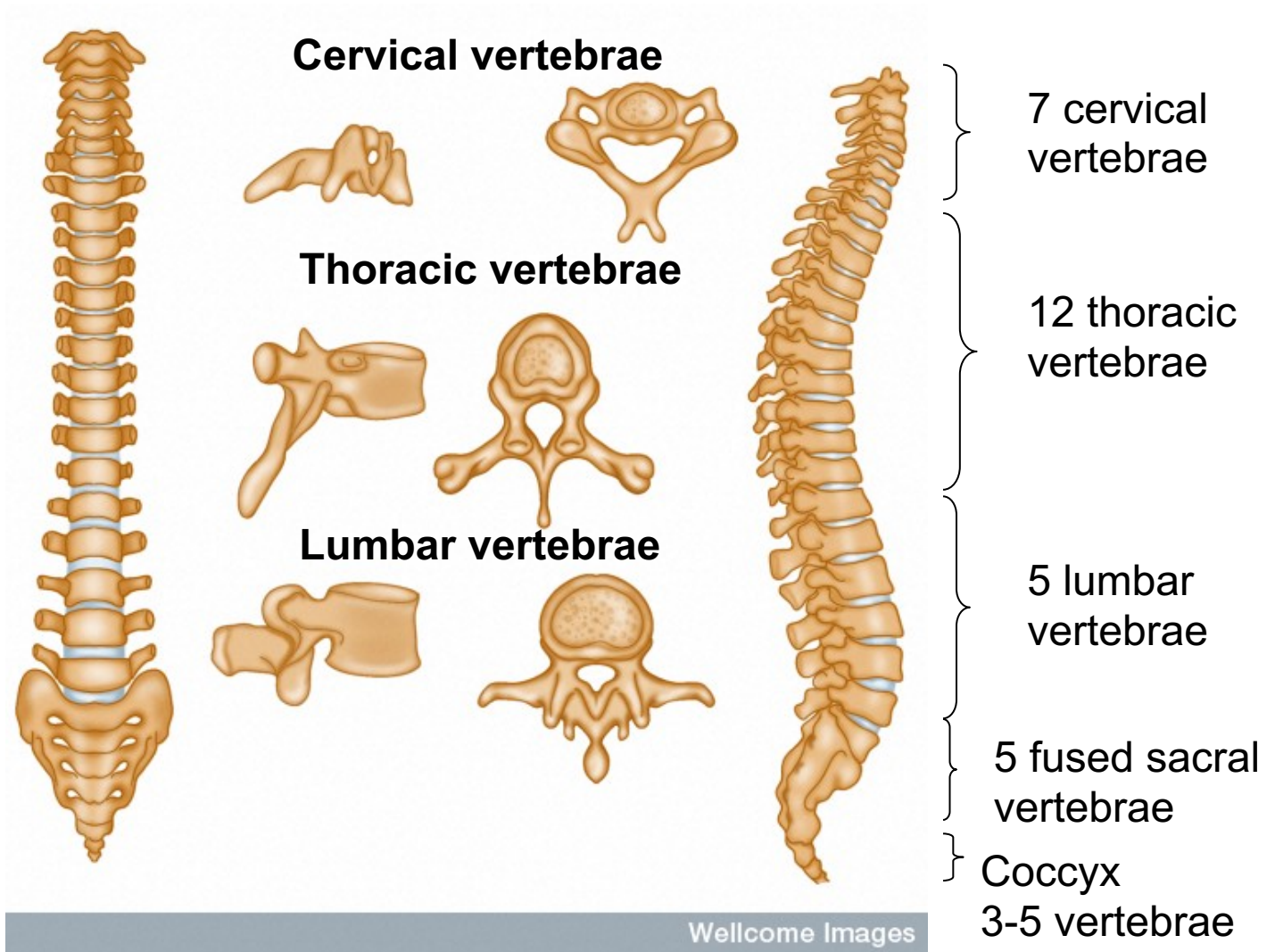


Appendicular skeleton

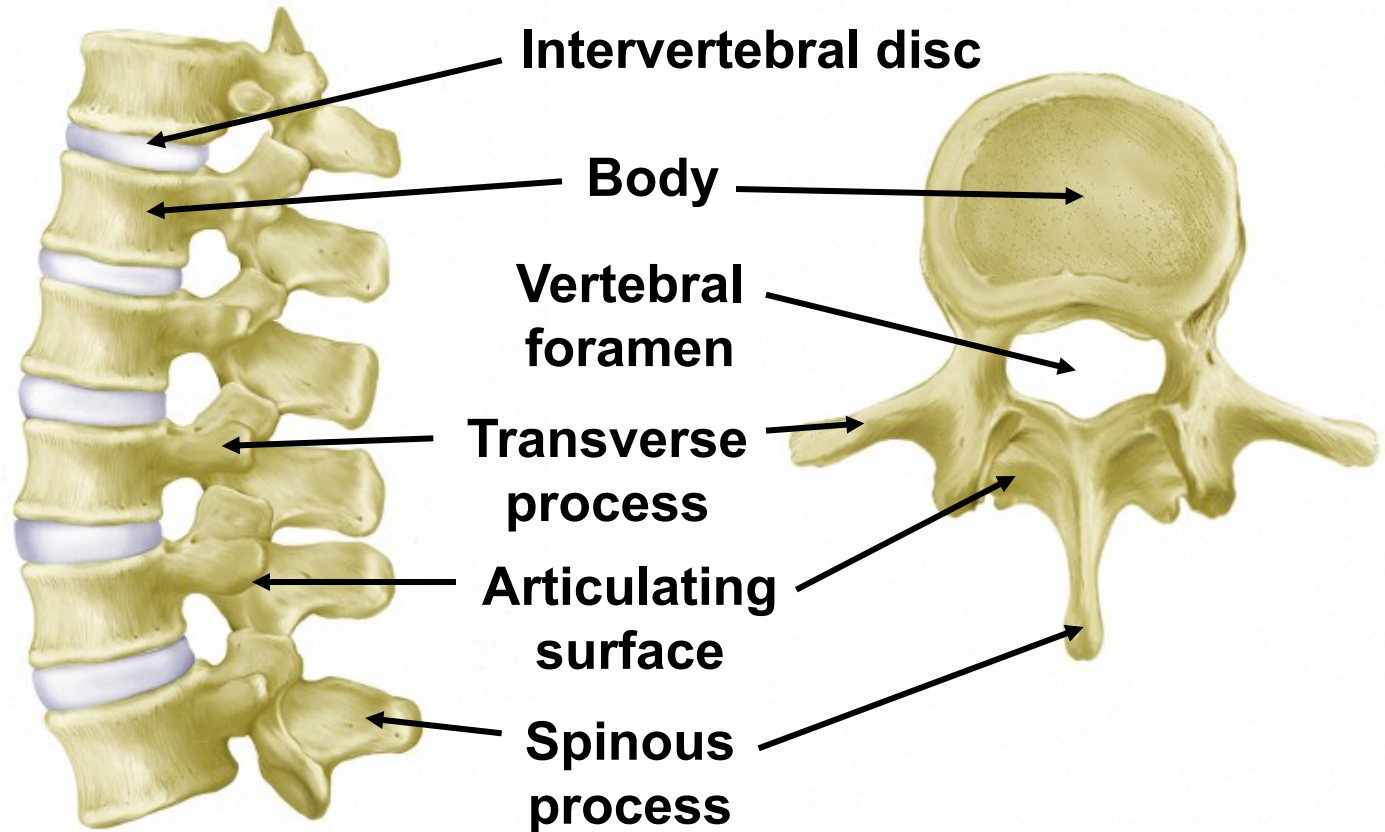
Skull



Vertebral column



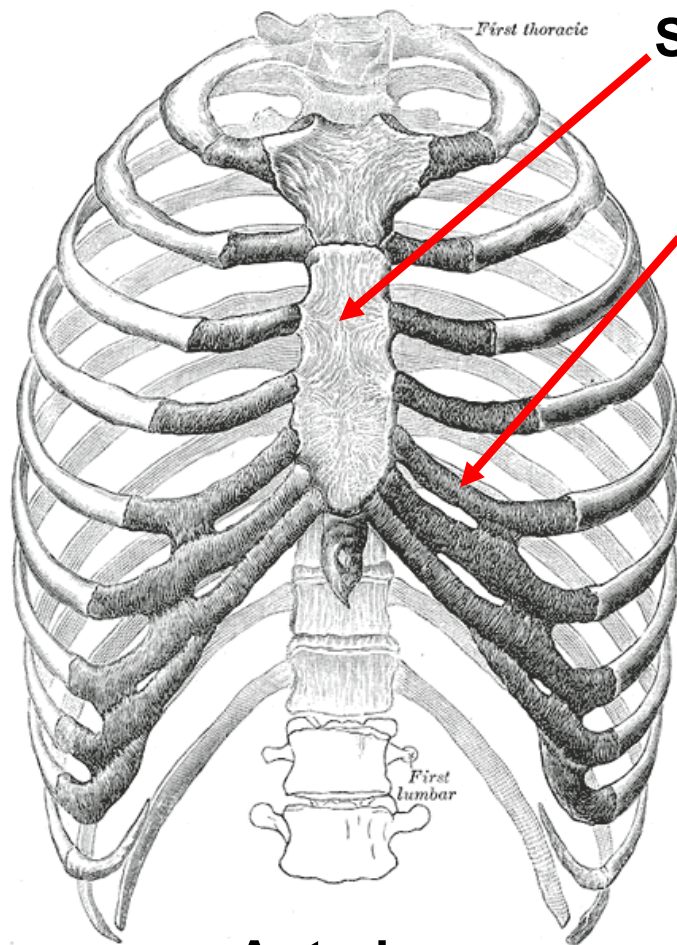
Structure of a vertebra



Wellcome Images

Wellcome Images

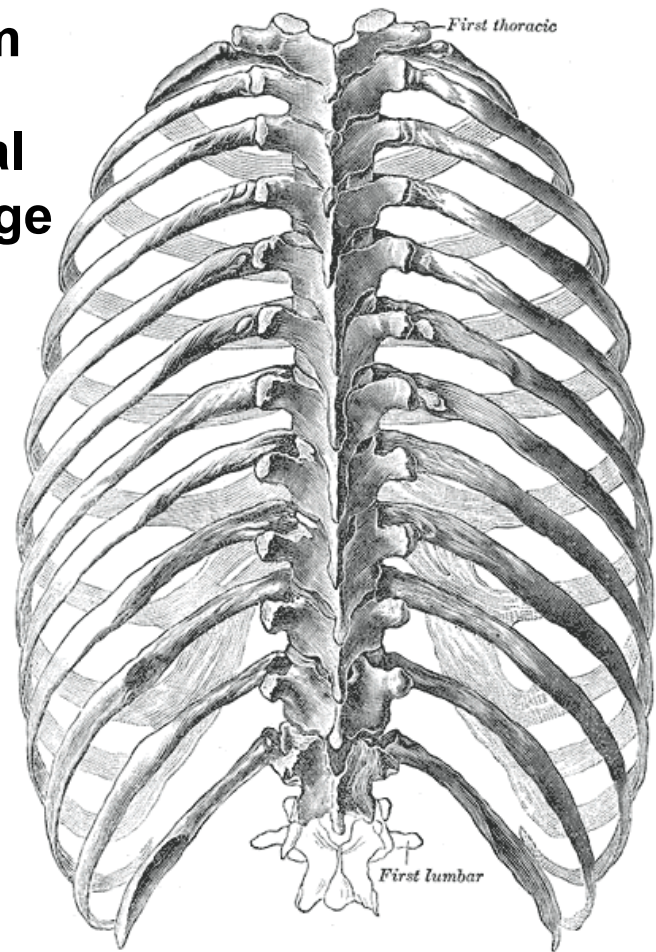
Ribcage



Anterior

Sternum

**Costal
cartilage**

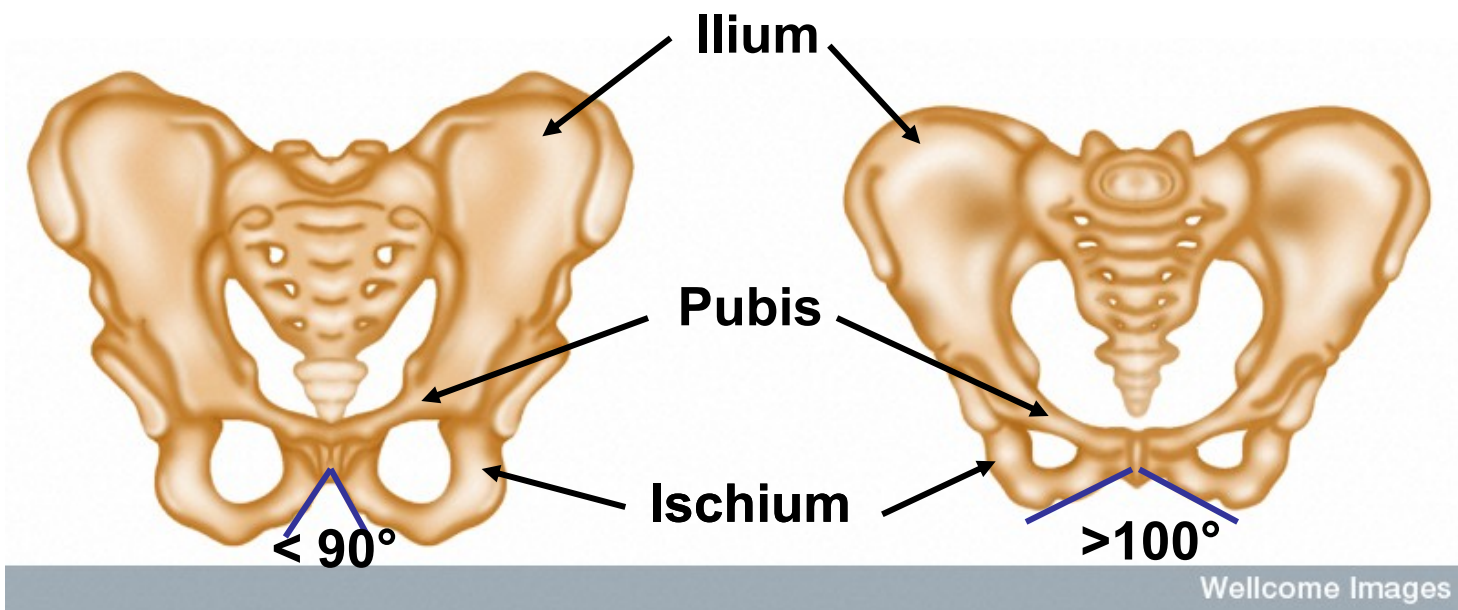


Posterior

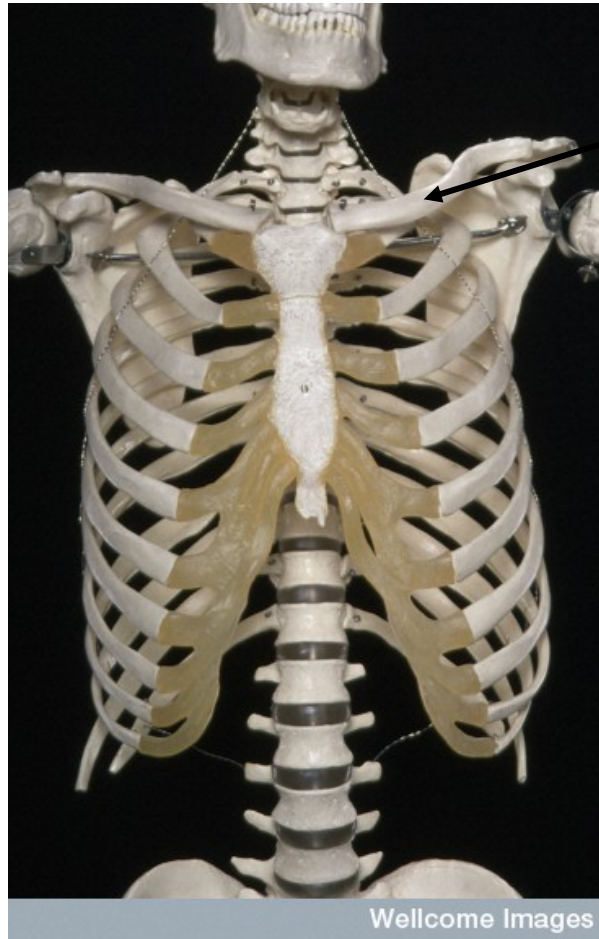
Pelvic girdle

Male

Female

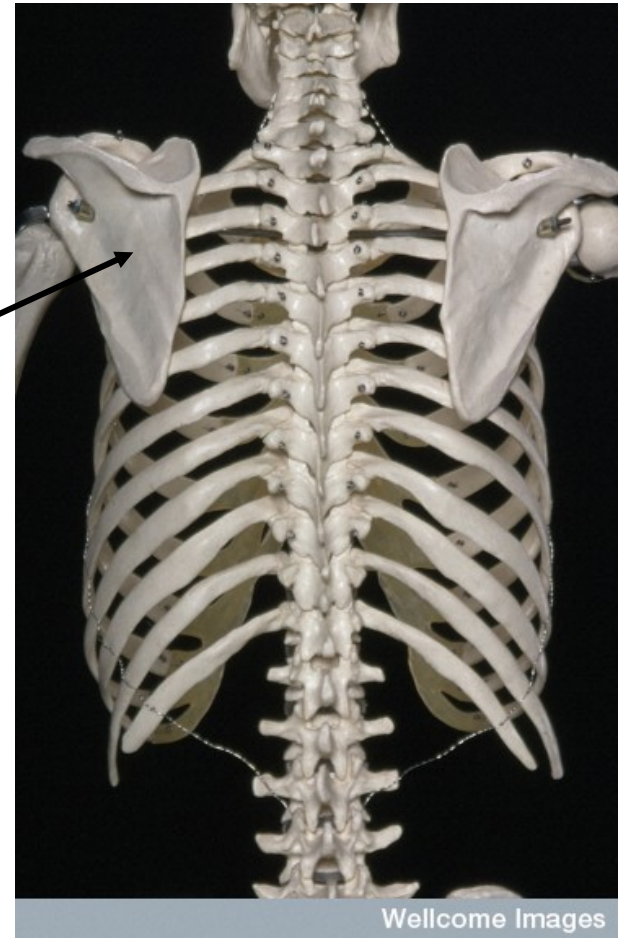


Pectoral girdle

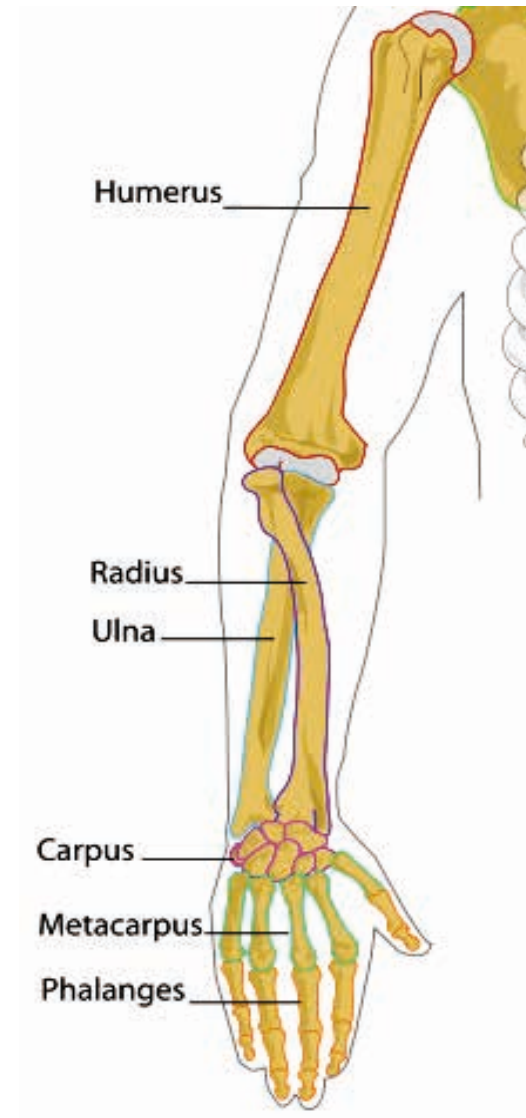
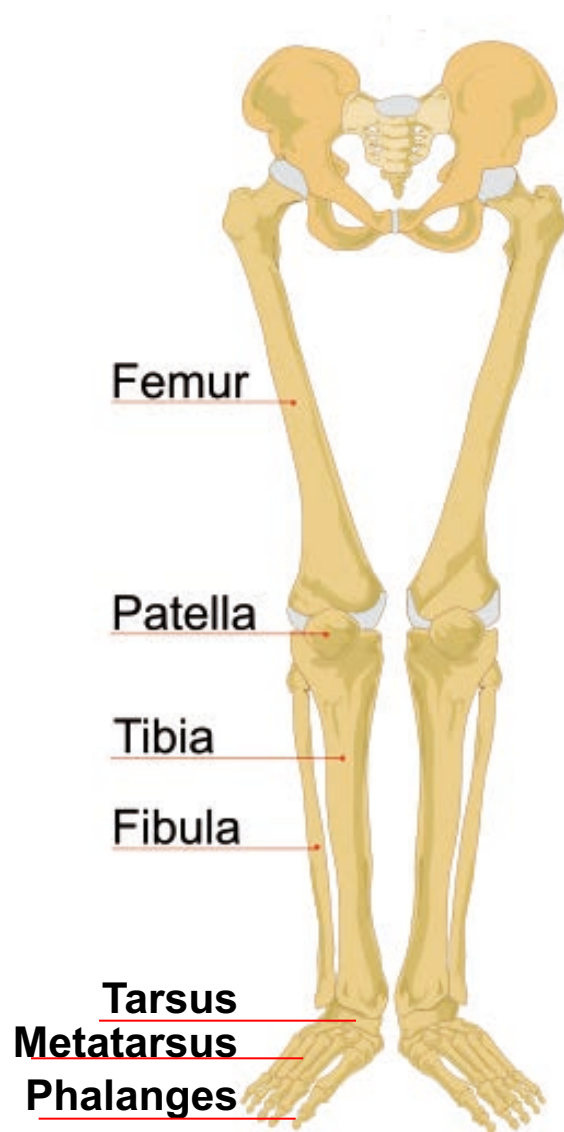


Clavicle

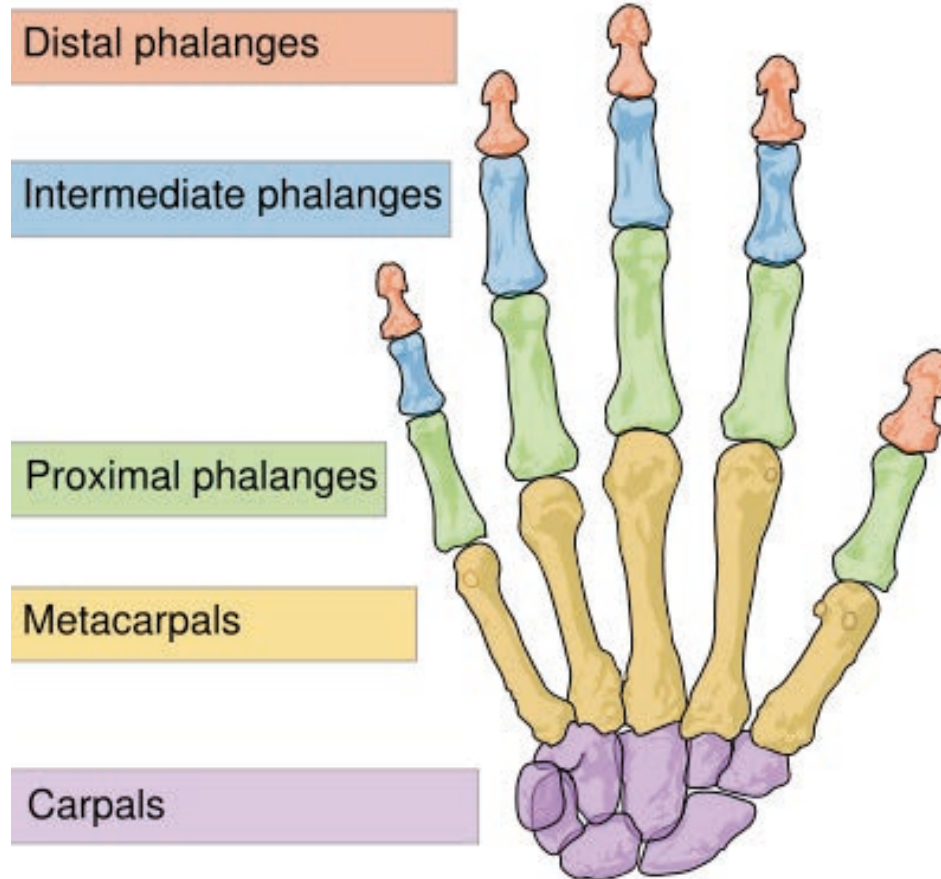
Scapula



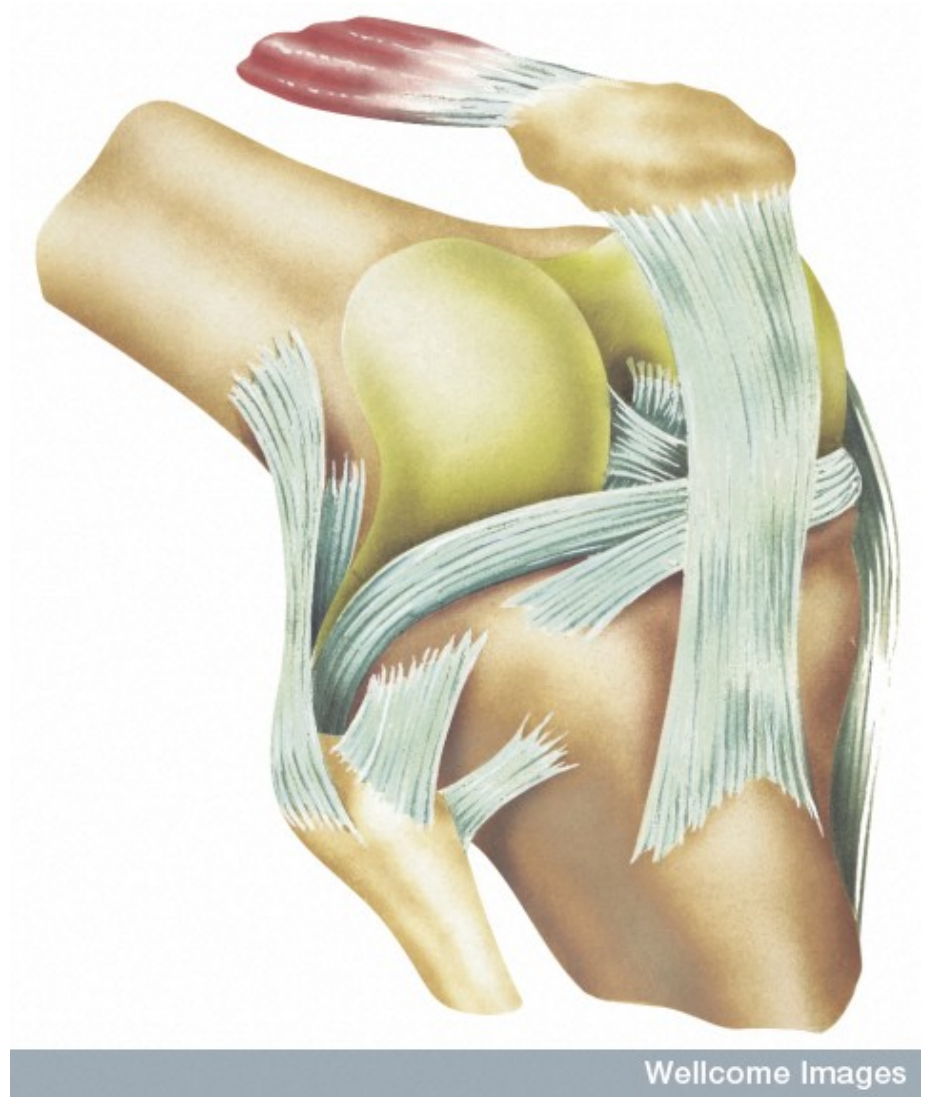
The upper and lower limbs



The hand



Joints



Wellcome Images

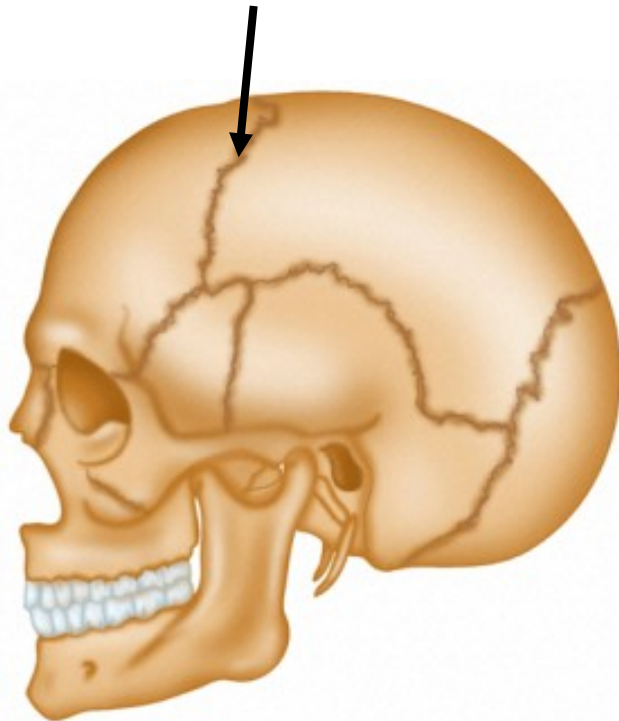
Joint classification

- Joints can be classified by their structure and the amount of movement they allow.

Structure	Joint cavity	Movement
Fibrous	None	None
Cartilaginous	None	None or slight
Synovial	Present	Freely movable

Types of joints

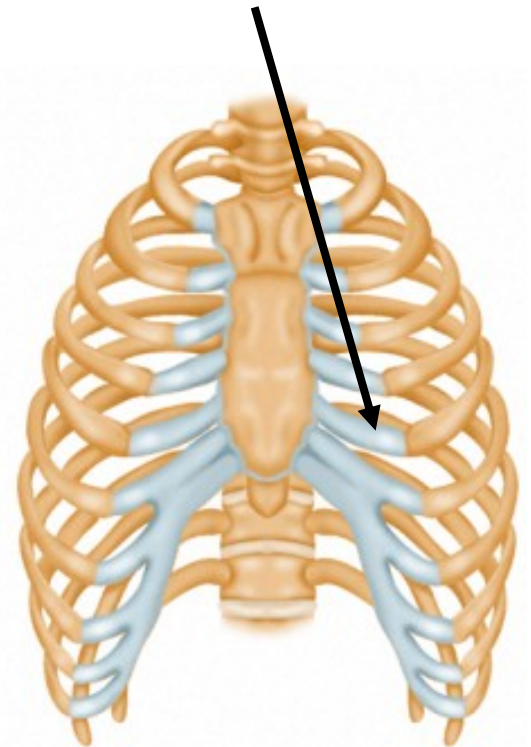
Immovable
fibrous joint



Movable
synovial joint

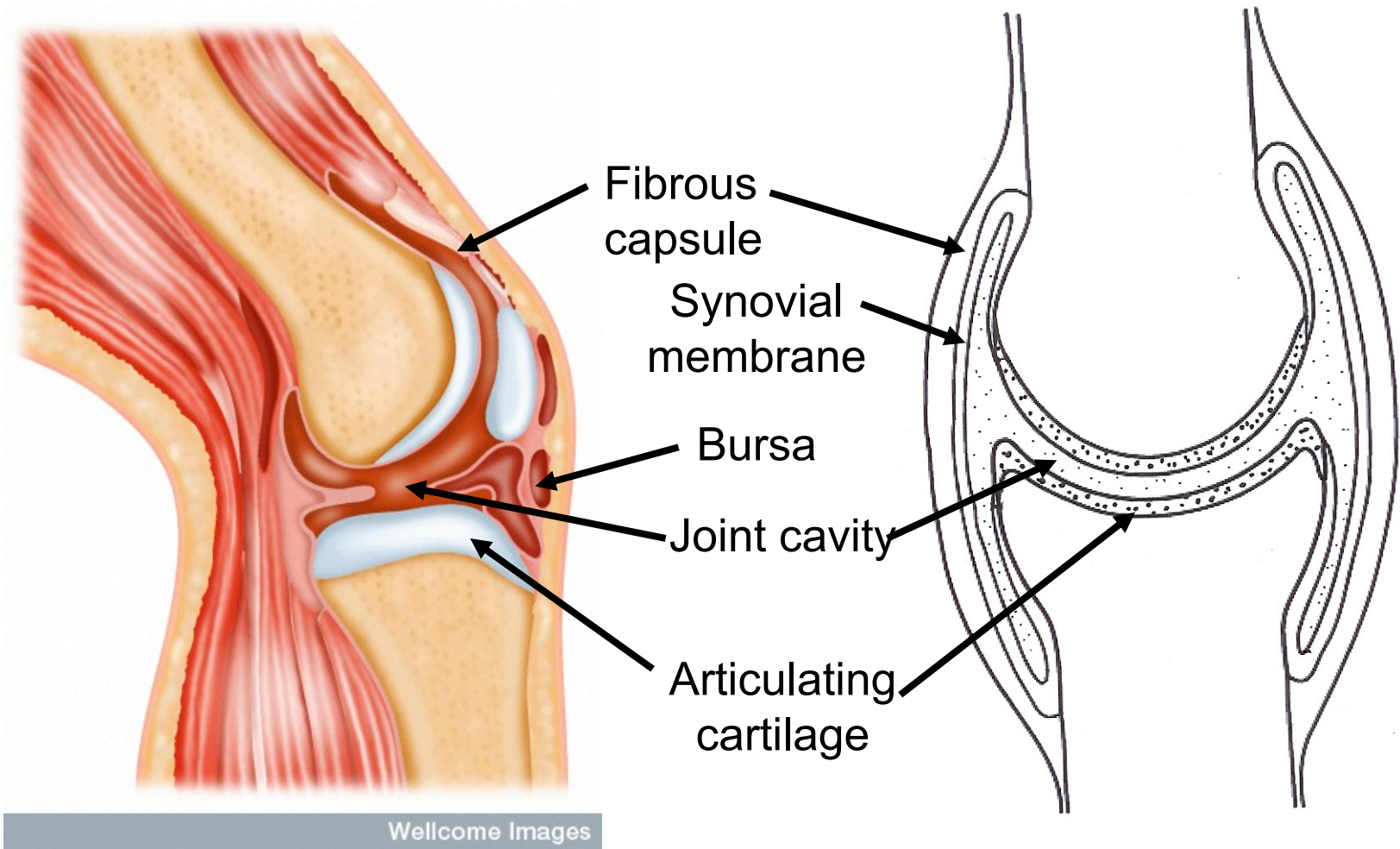


Slightly movable
cartilaginous joint

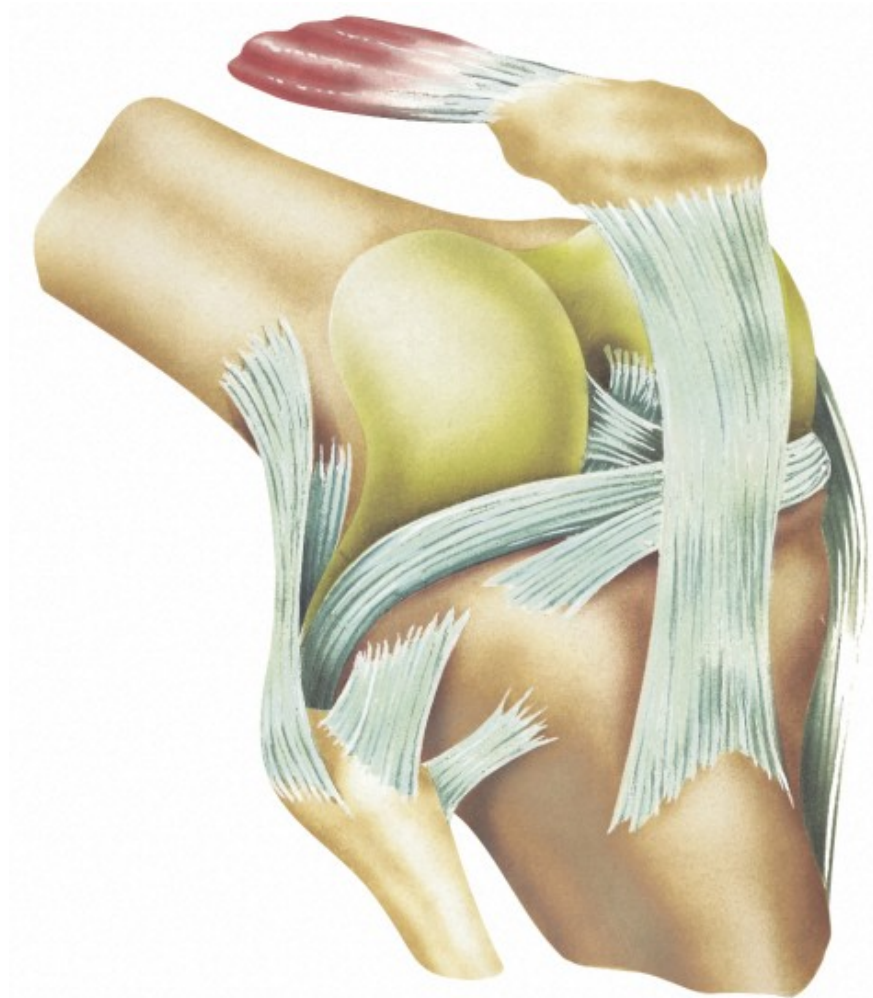


Wellcome Images

The structure of a synovial joint



Can you name these ligaments of the knee joint?

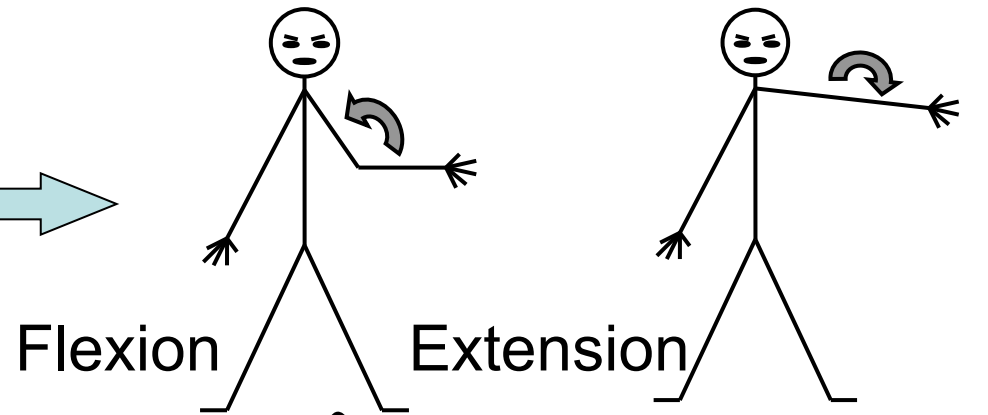


Wellcome Images

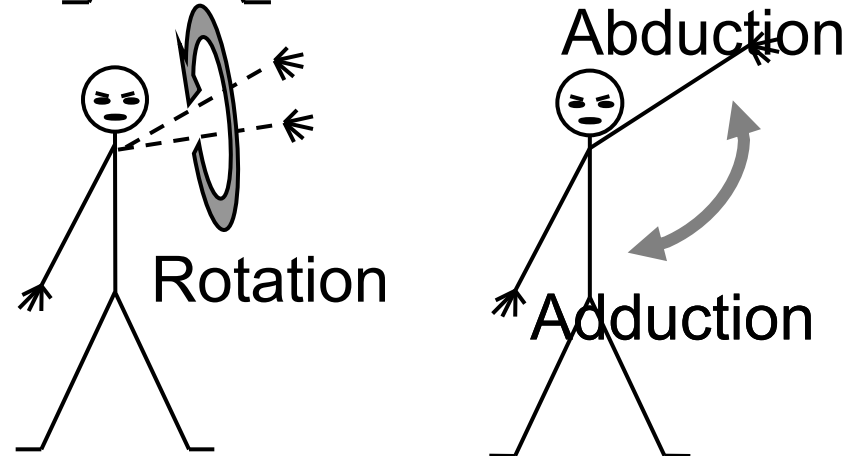
Synovial joints

Synovial joints have a joint cavity and are classified according to the type of movement they allow.

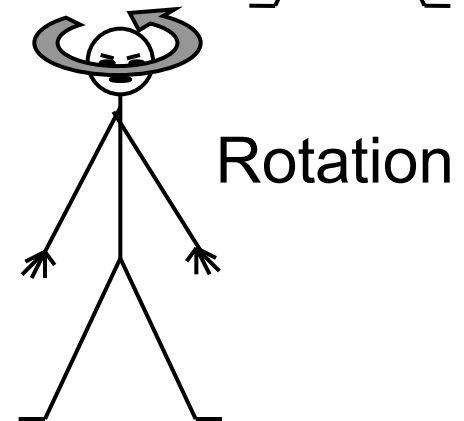
Hinge joint



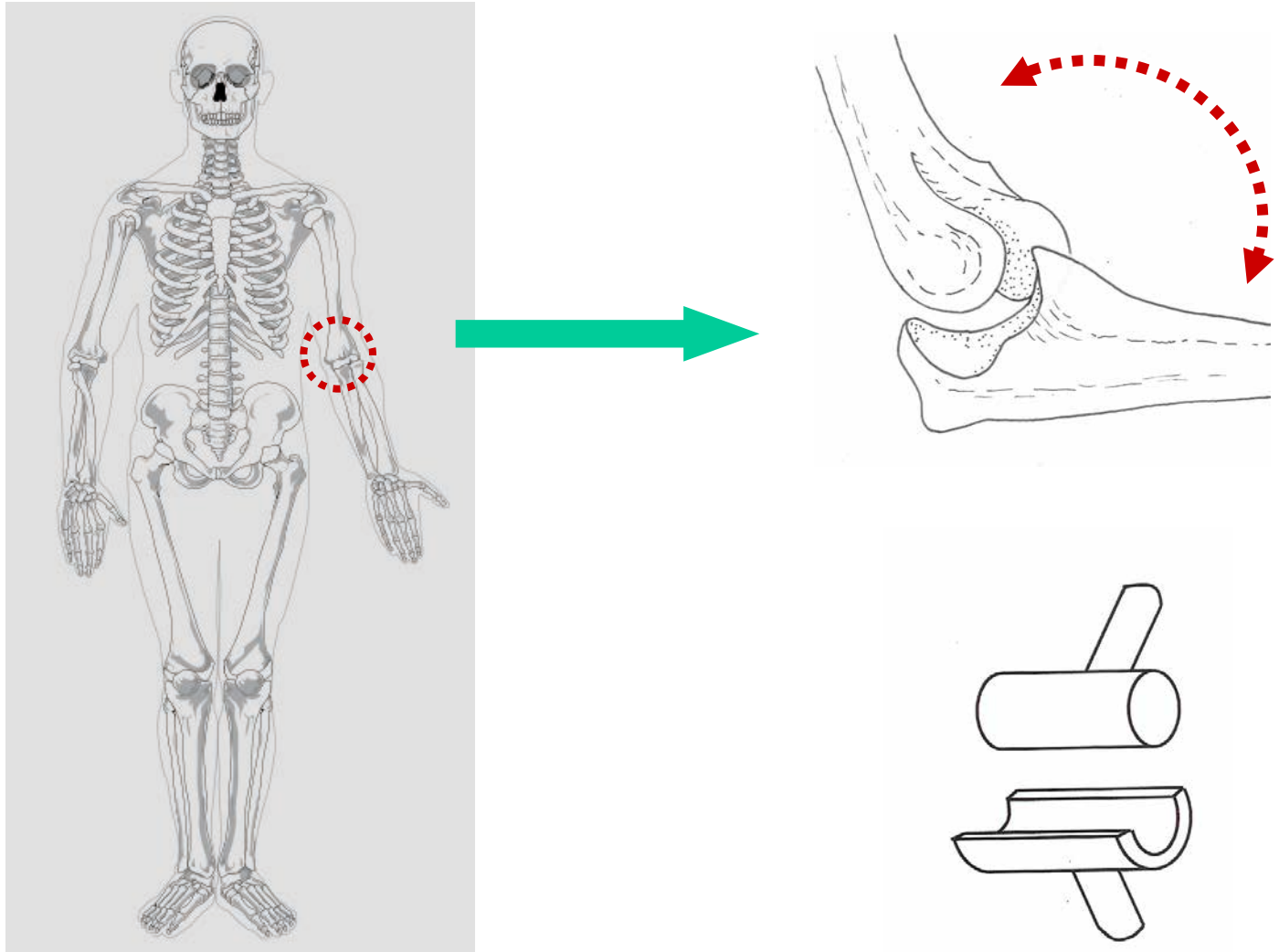
Ball & socket joint



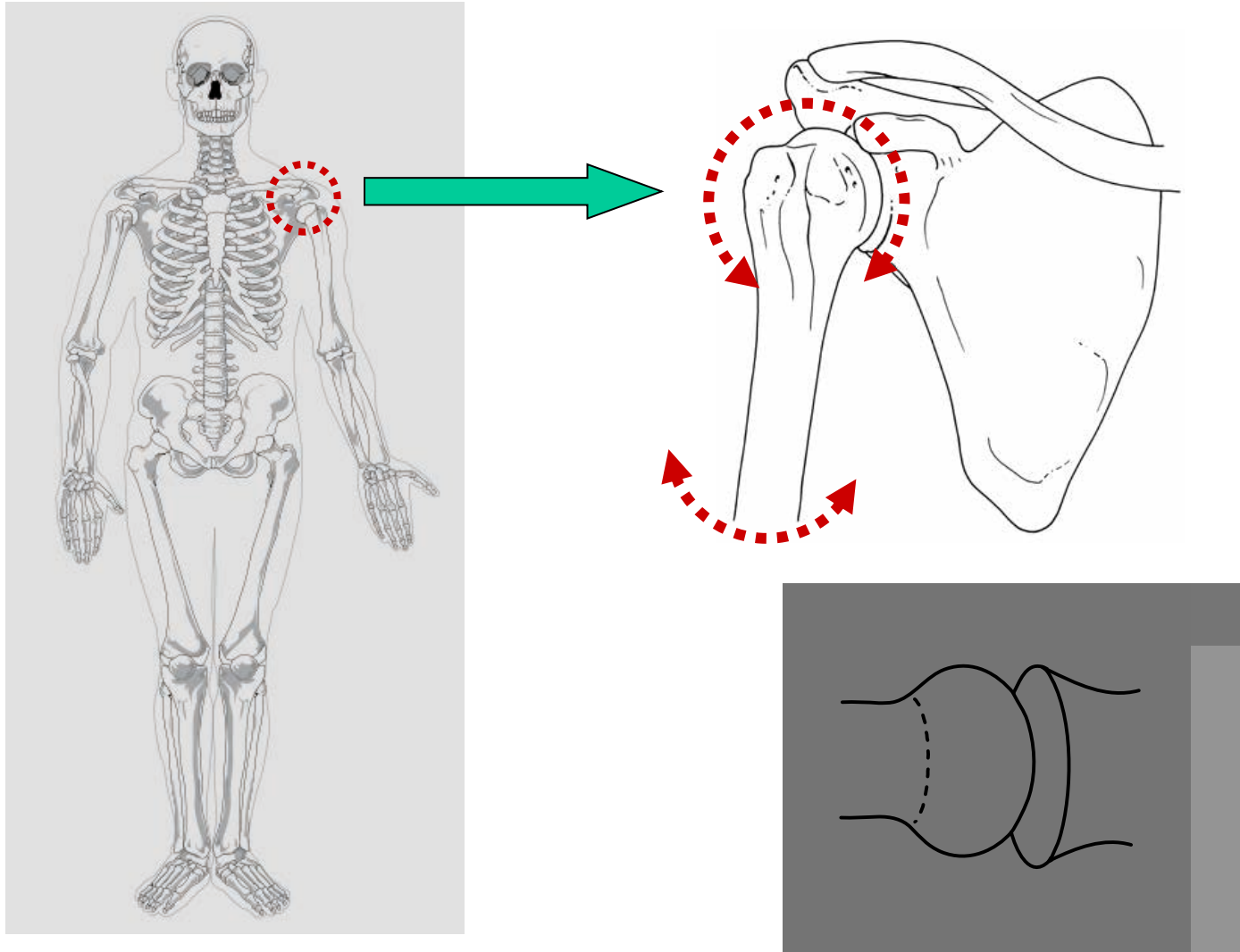
Pivot joint



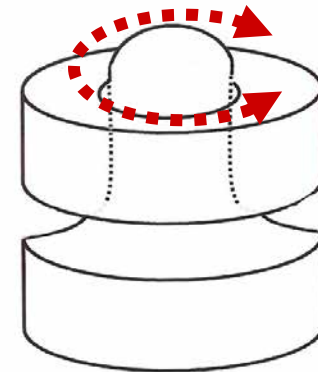
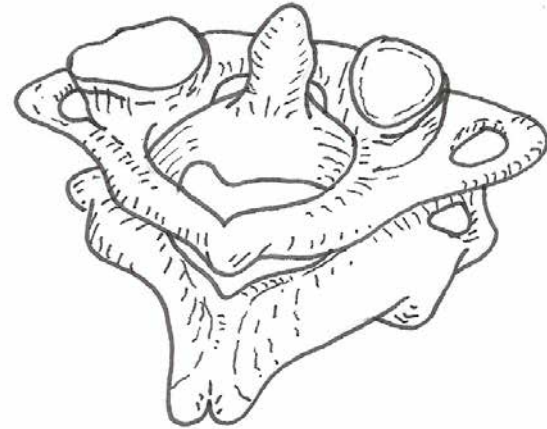
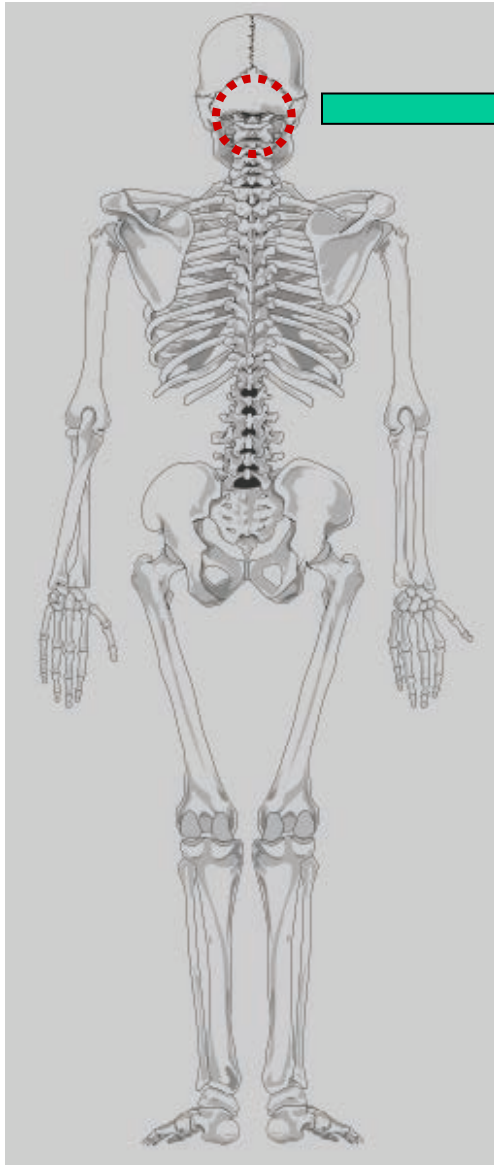
Hinge joint



Ball and socket joint



Pivot joint



Saddle joint

