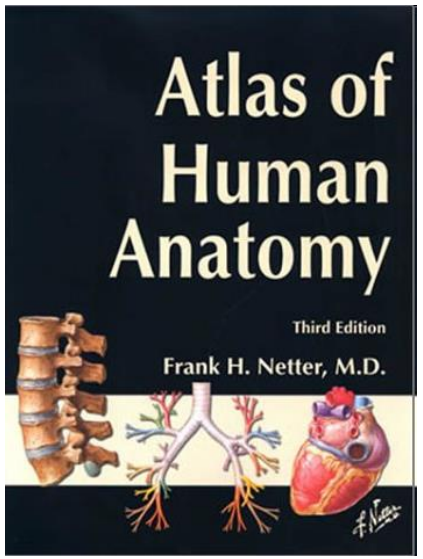
ANATOMY OF THE HUMAN BODY

RECOMMENDED LITERATURE

- **Páč, L., Horáčková, L., Nechutová, H.:** ***Anatomy of human locomotor system.*** Brno 2010

Atlases for example:

- **Netter, F. H.:** ***Atlas of Human Anatomy***
- **Sobotta:** ***Atlas of Human Anatomy***



Anatomical nomenclature

The **first word is name of described formation,**
next adjectives specificate it
and in the end there is a name of formation where the described formation is located.

Examples:

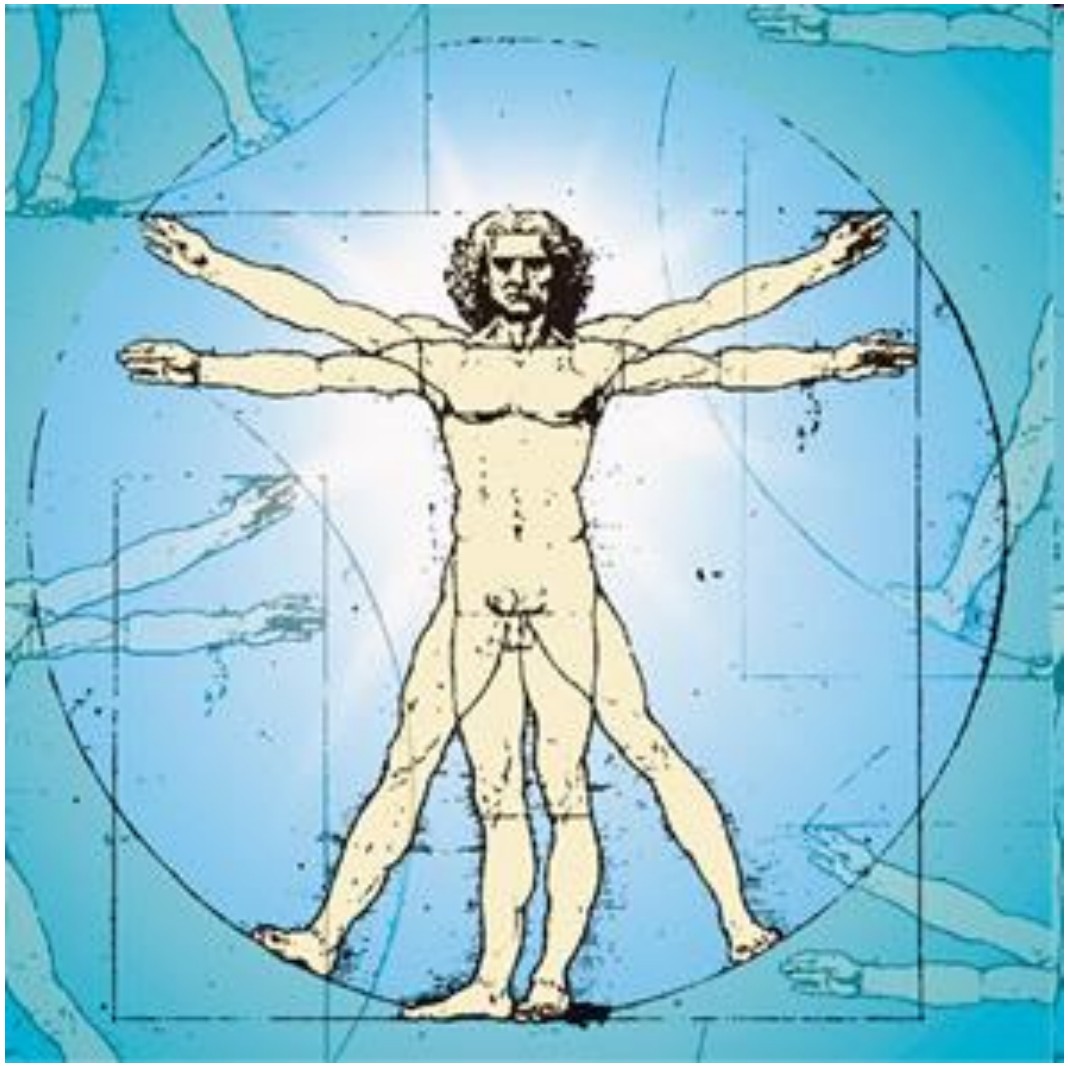
Collum (neck) **radii** (of radius)

Collum (a neck) **anatomicum** (anatomical) **humeri** (of humerus)
Collum (a neck) **chirurgicum** (surgical) **humeri** (of humerus)
Tuberculum (a tubercle, a bulge) **majus** (big) **humeri** (of humerus)
Spina (a thorn) **iliaca** (iliac) **anterior** (fore) **superior** (upper) **ossis coxae** (of coxal bone)
Epicondylus medialis humeri
Epicondylus medialis femoris

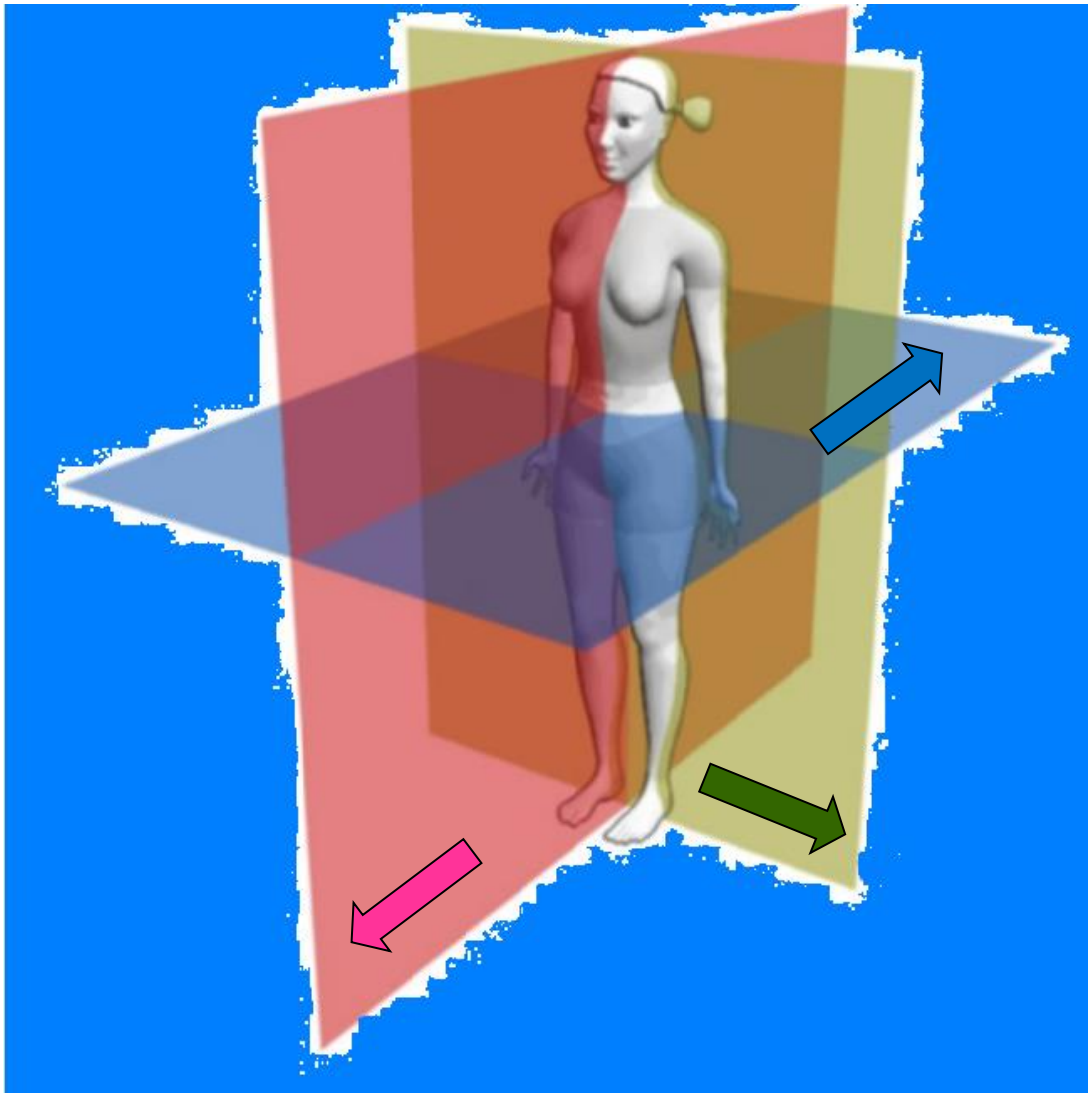
Anatomical position
standard erect position

Not
a military
position

Orientation on the body



PLANES – 3 anatomical planes or sections

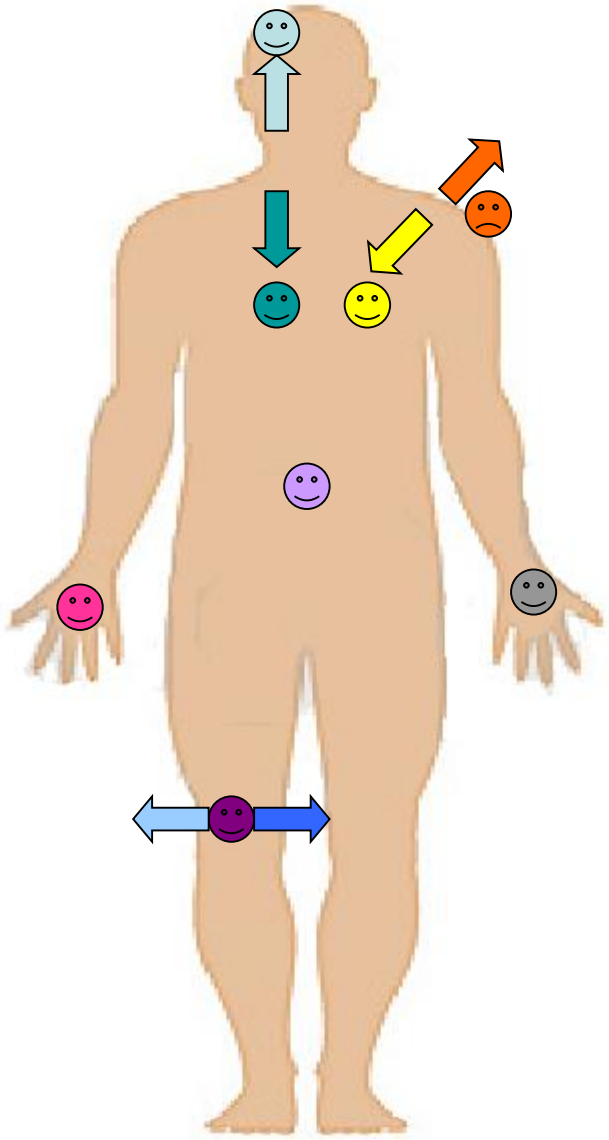


Sagittal plane
Right and left

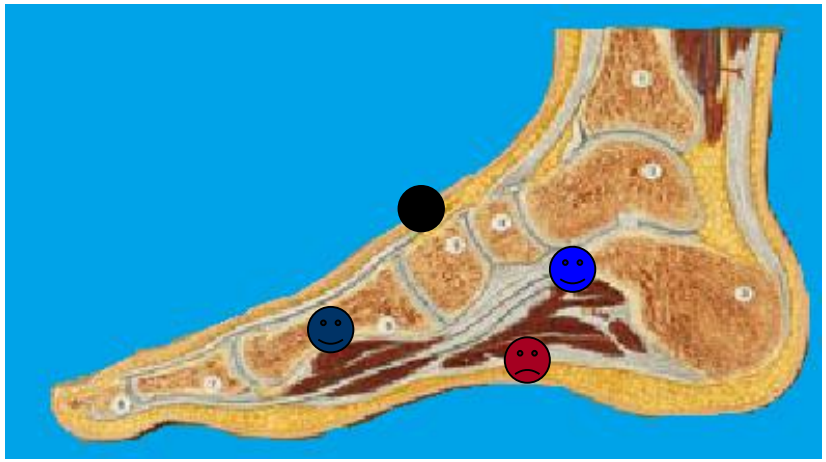
Transversal plane (horizontal)
Superior and inferior

Frontal plane (coronal)
Anterior and posterior

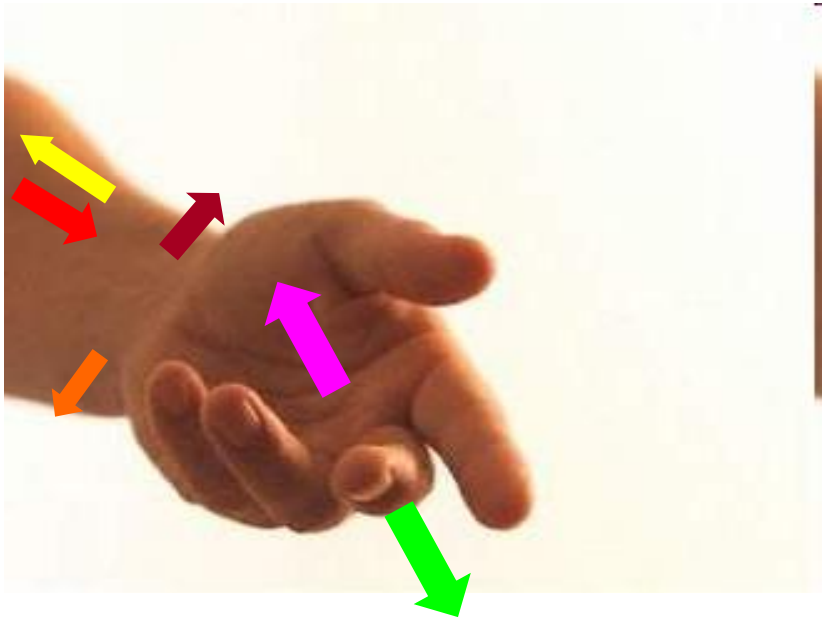
Directions on the body



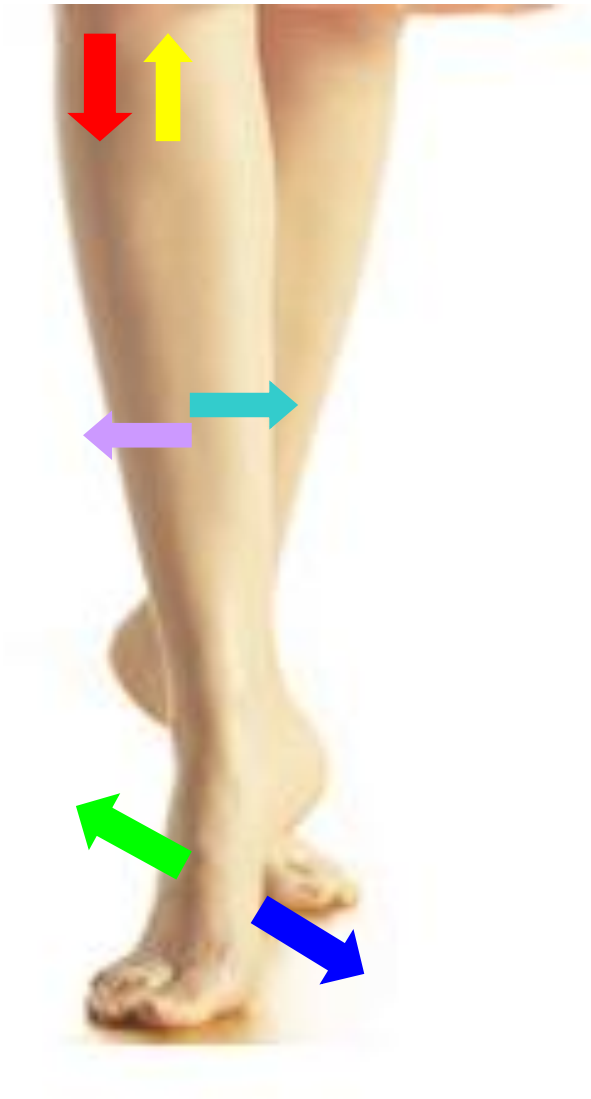
- cranialis
- caudalis
- superior
- inferior
- ventralis
- dorsalis
- anterior
- posterior
- medialis
- lateralis
- medianus
- medius (intermedius)
- dexter
- sinister
- superficilais
- profundus
- internus
- externus



Directions at the limbs



proximalis
distalis
radialis
ulnaris
tibialis
fibularis
palmaris
plantaris
dorsalis



PARTS OF HUMAN BODY

head **– caput**

neck **– collum (cervix)**

trunk **– truncus**

- chest **– thorax**
- belly **– abdomen**

pelvis **– pelvis**

back **– dorsum**

Upper limb**– membrum superius**

- arm **– brachium**
- forearm **– antebrachium**
- hand **– manus**

Lower extremity**– membrum inferius**

- thigh **– femur**
- leg **– crus**
- foot**- pes**

Positive and negative relief

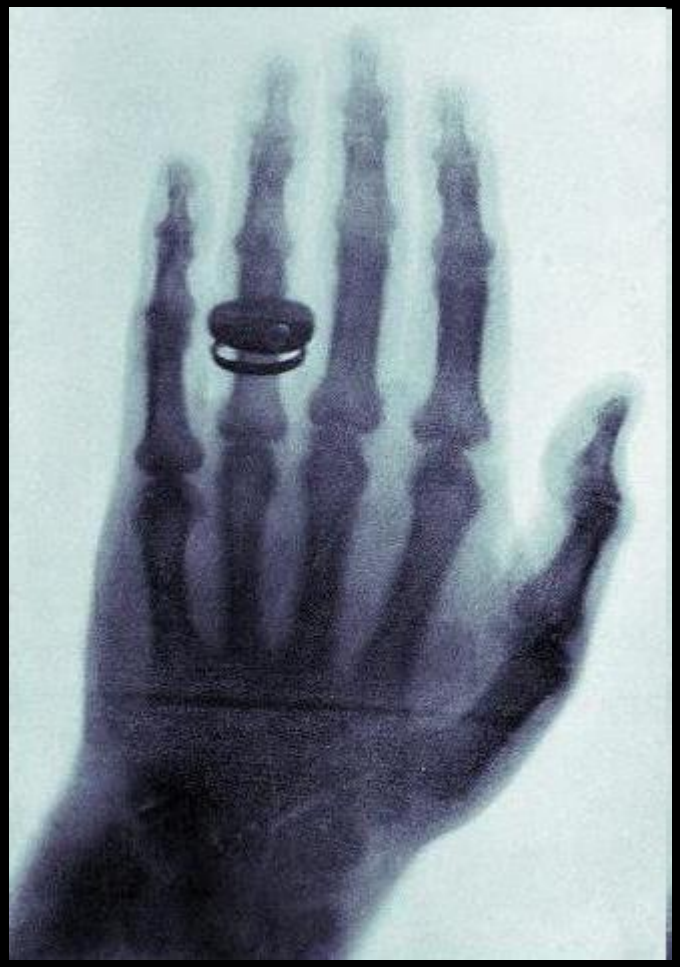
- **Sulcus – a groove**
- **Incisura – a notch**
- **Canalis – a canal**
- **Fossa – a pit, hollow**
- **Fovea – a pit, hollow**
- **Processus – a projection, prominence**
- **Spina – a thorn**
- **Tuberculum – a tubercle**
- **Tuber – a torus**
- **Tuberositas – a tuberosity**
- **Foramen – an opening, orifice, gap**
- **Facies – a facet, surface**
- **Articulatio – a joint**
- **Os, ossis, ossa – a bone, bones**

Caput – a head
Capitulum – a small head
Collum, cervix – a neck

X-ray´s anatomy

Anatomy is essential for understanding radiology.

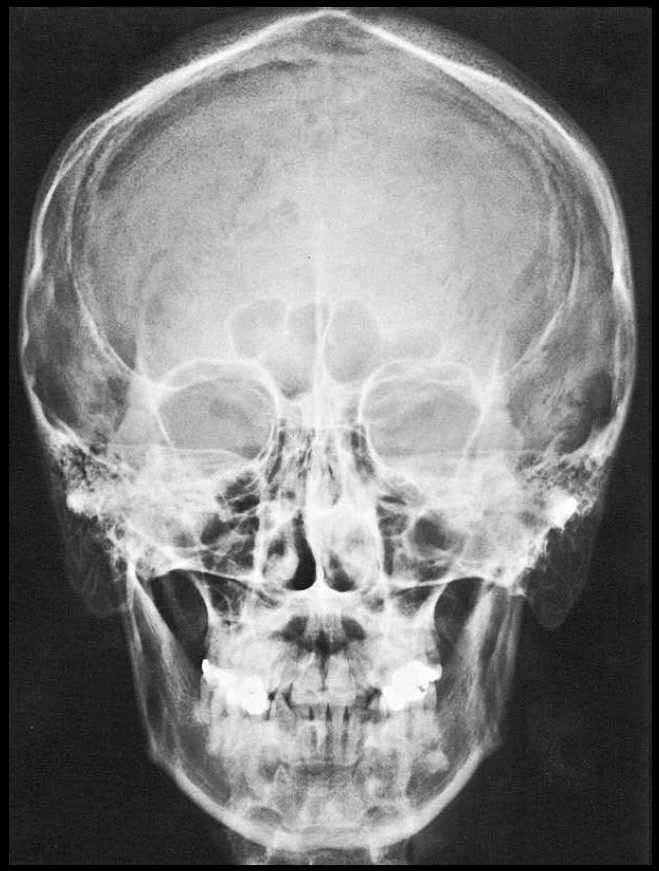
Wilhelm Conrad Röntgen 1845-1923
1895 – discovery of x-ray
1901- awarded by Nobel price in physics



X-rays principle

- **A highly penetrating beam of x-rays „transluminates“ the patient, showing tissues of differing densities on x-ray film.**
- **A tissue or organ that is relatively dense absorbs (stops) more x-rays than a less dense tissue.**
- **Like a negative**
- **Light structures –shadows**
- **Dark structures -brightening**

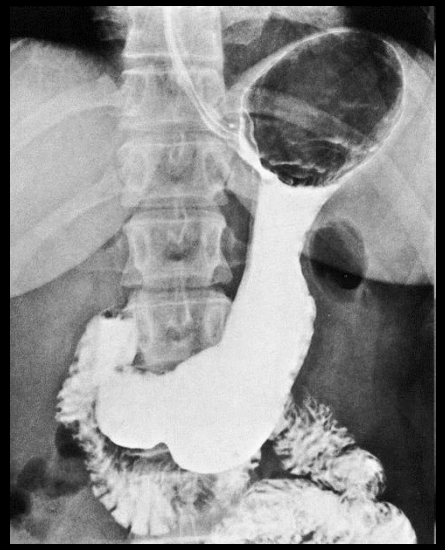
NATIVE x-ray
without using of contrast agent



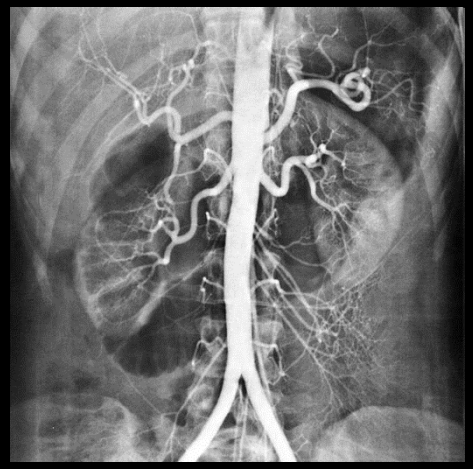
X-rays with <u>contrast</u> material (Contrast examination)

Negative
Gass, air

Positive
Barium sulfate



Iodine-based molecules

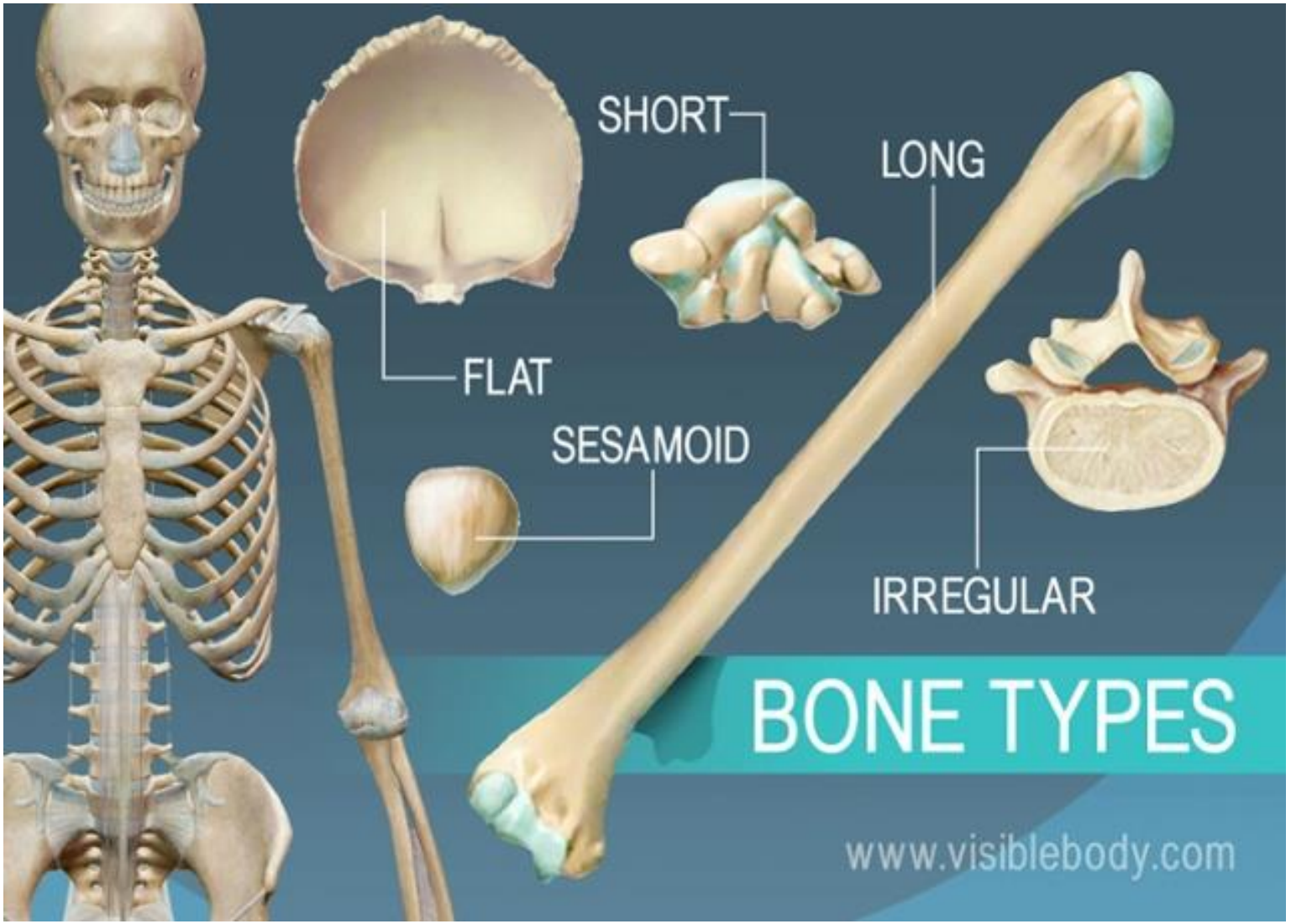


INTRODUCTION TO OSTEOLOGY

GENERAL OSTEOLOGY

- skeleton – firm support of the body, protection for organs
- deposit of minerals
- haematogenesis

BONE TYPES


SHORT
LONG
FLAT
SESAMOID
IRREGULAR
BONE TYPES
www.visiblebody.com

Long bones

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dis

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-cav

-sub

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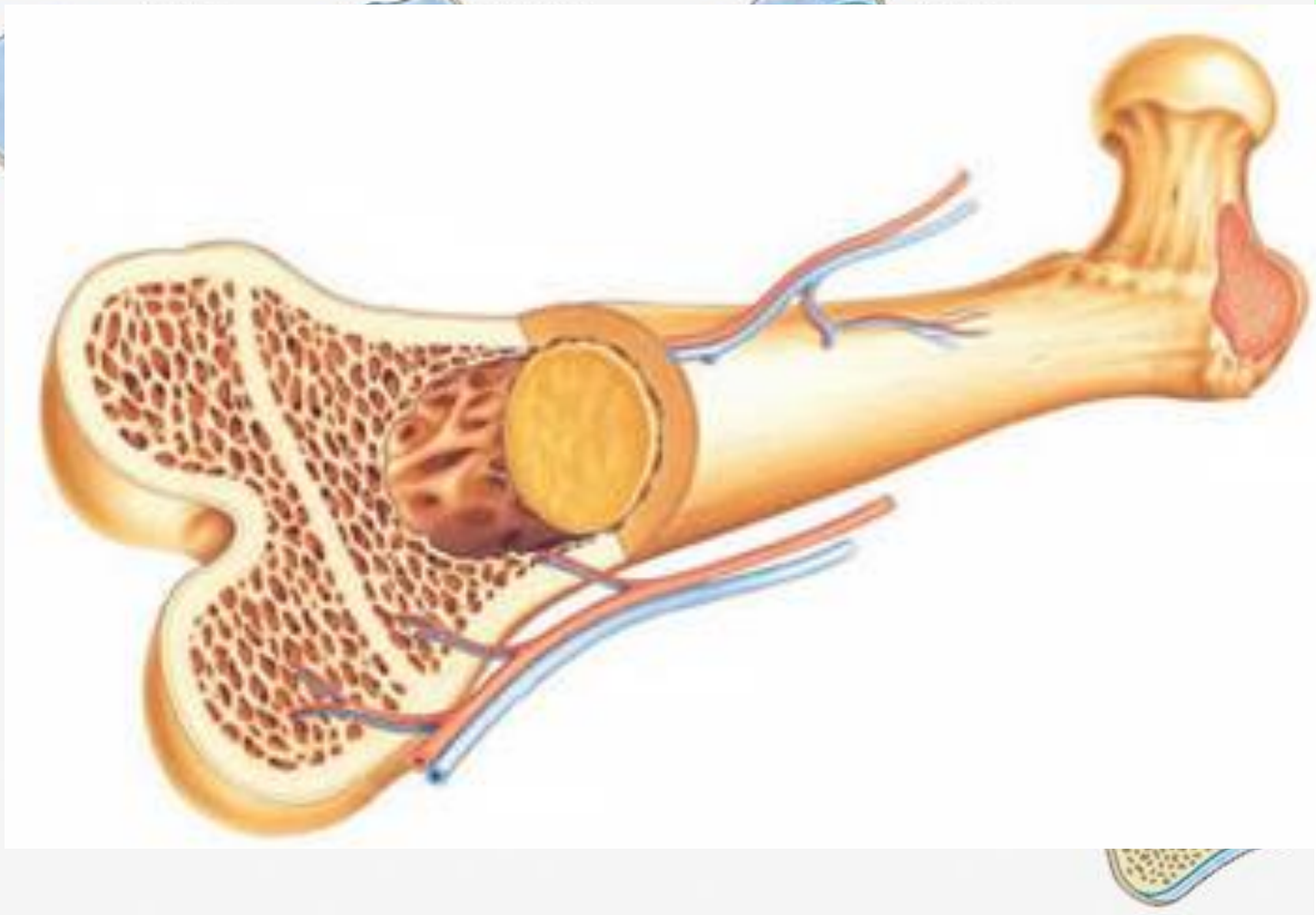
-sub



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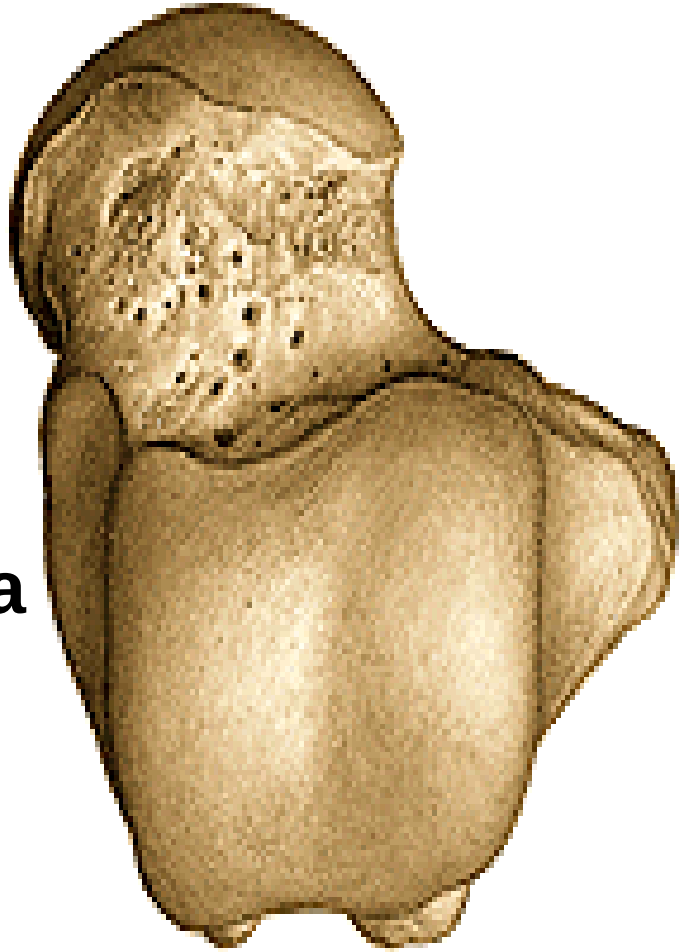
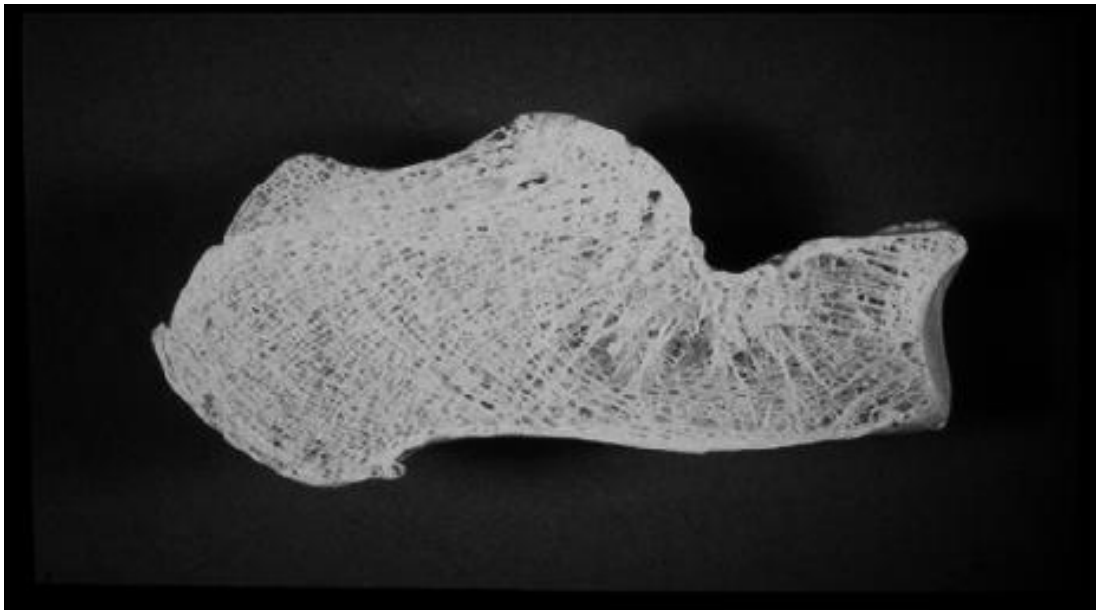
Short bones

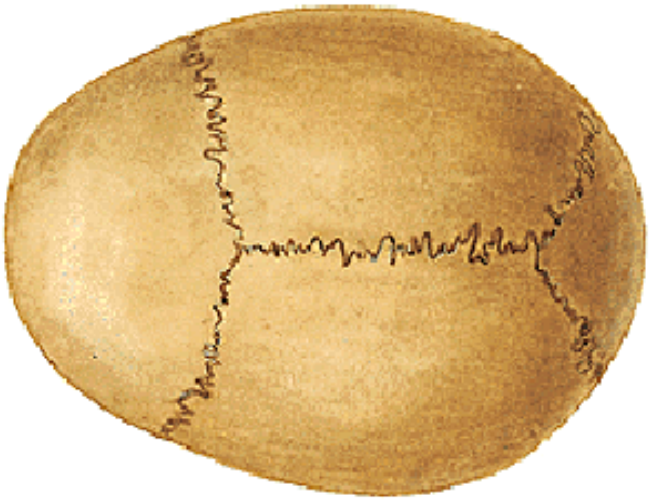
(various shapes)

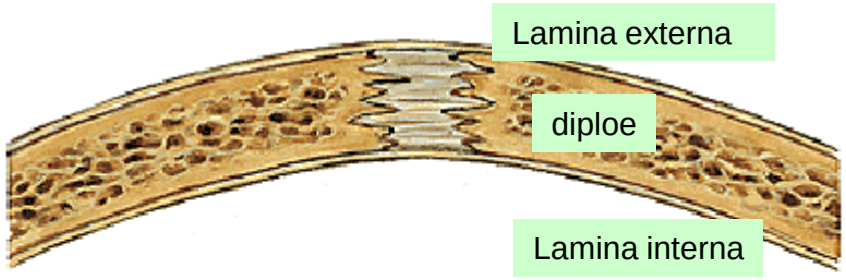


1) On the surface - **corticalis**
2) Inside - **substantia spongiosa**



Flat bones

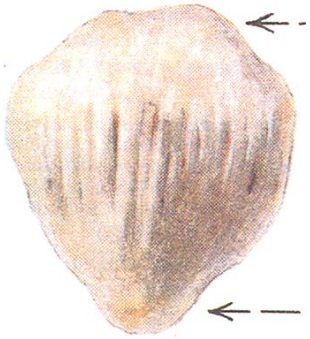


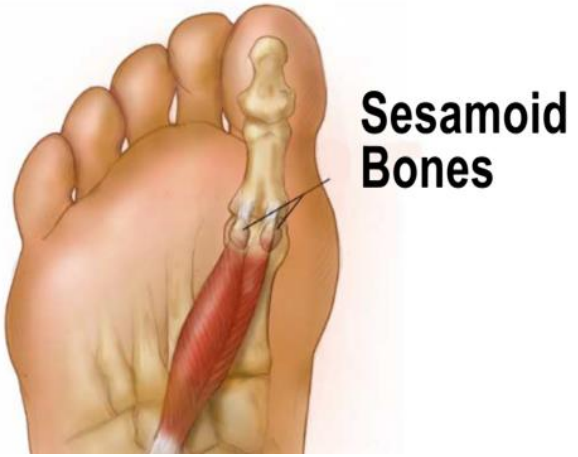


1) **Compact bone** has two layers:
lamina externa and interna and between them, there is **spongy bone – diploe**

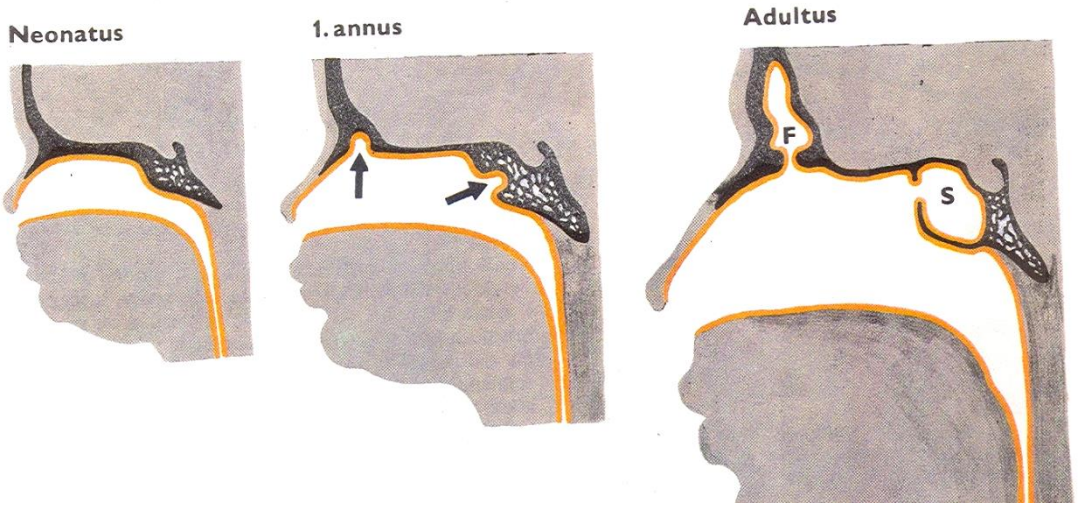
Sesamoidal bones

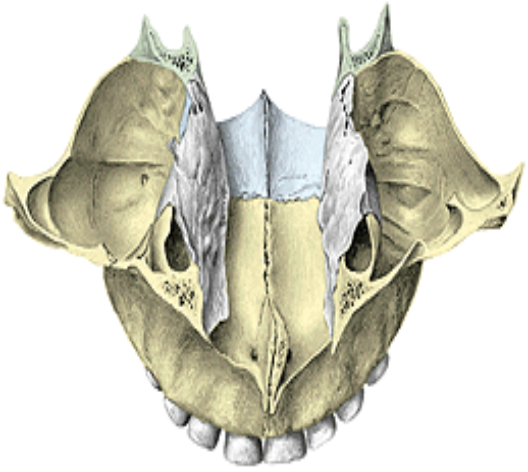
In some muscle tendons



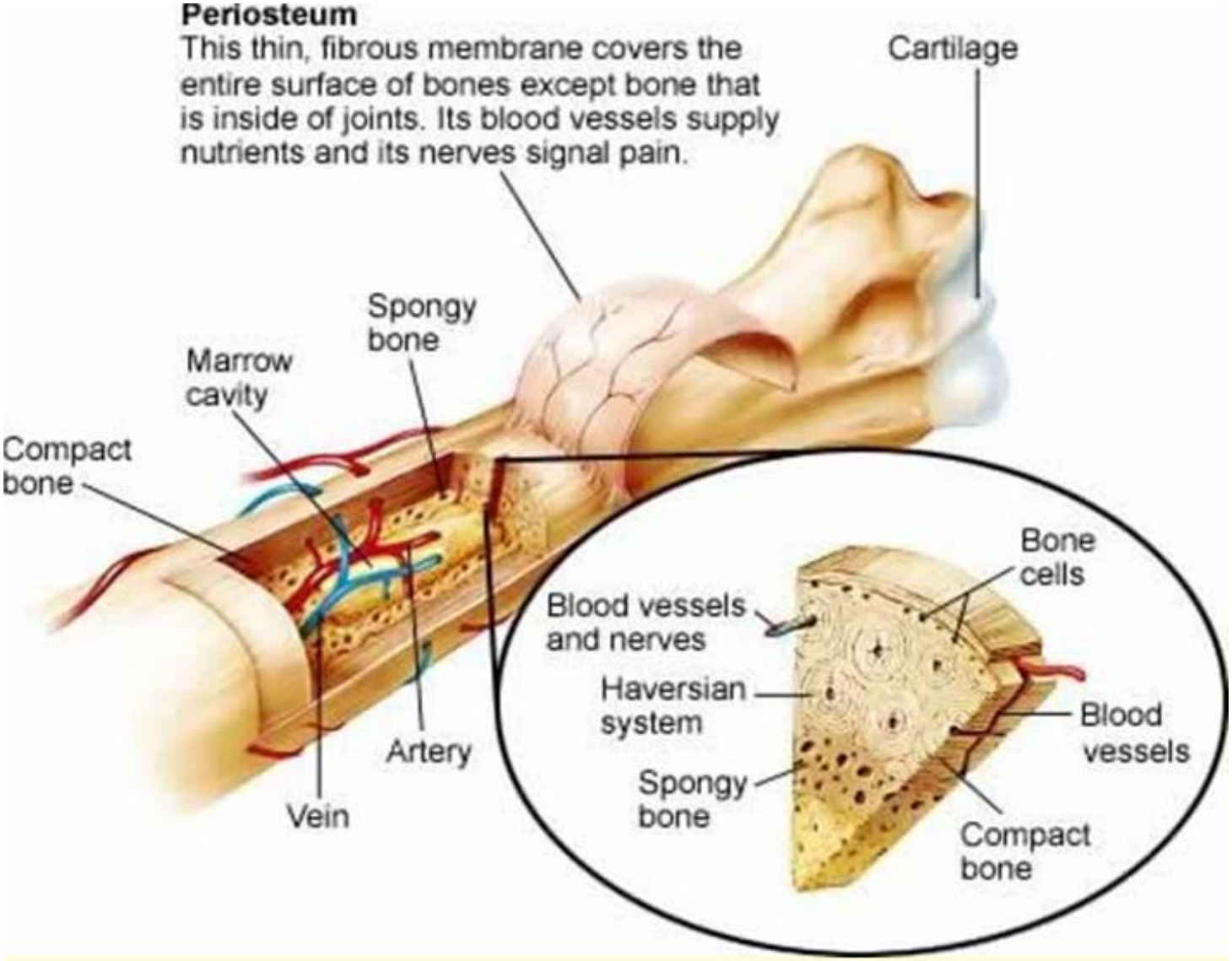


Pneumatized bones





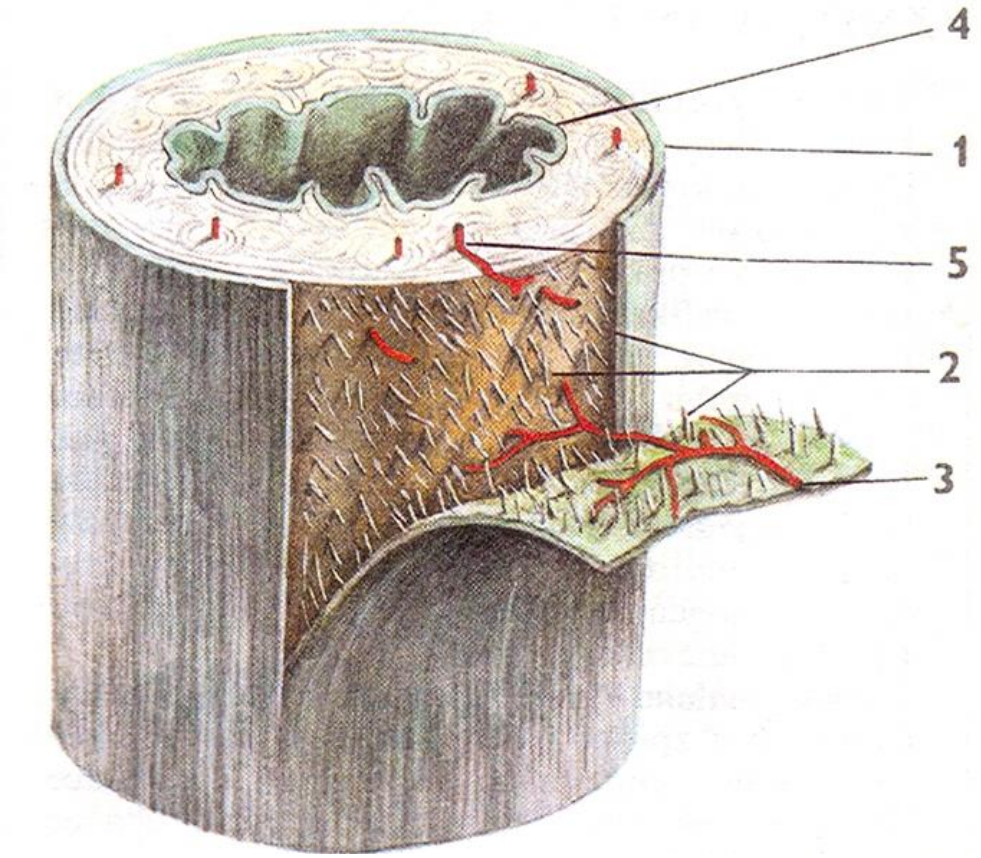
STRUCTURE OF BONES



PERIOSTEUM

a) Fibrous layer (external)

b) Cambious layer (internal) – rich sensory innervation

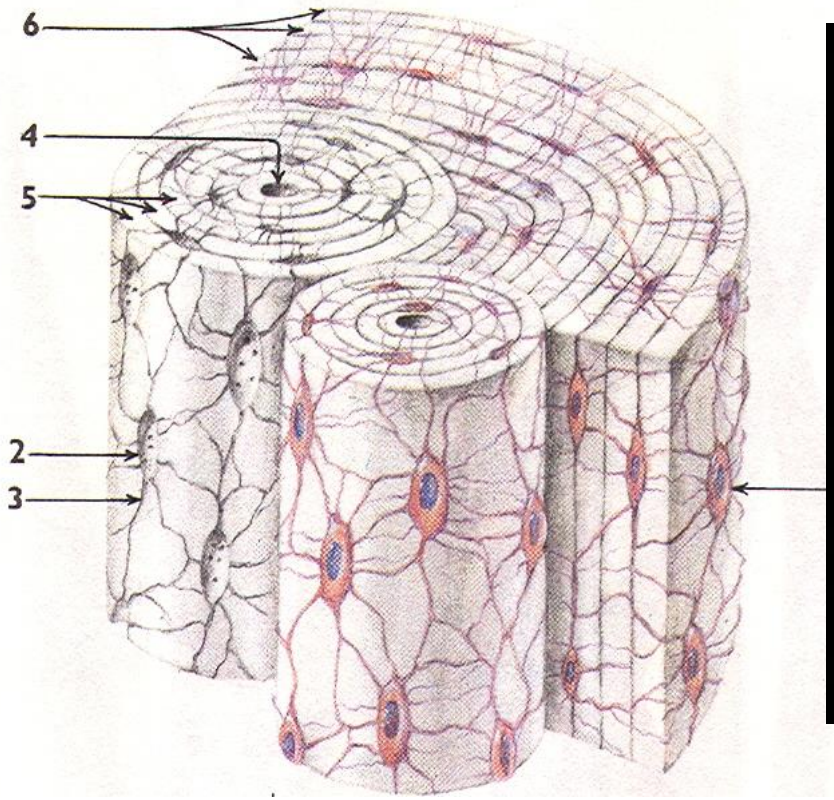


1 – periosteum
2 – Sharpey fibres
3 – vessels
4 – endosteum

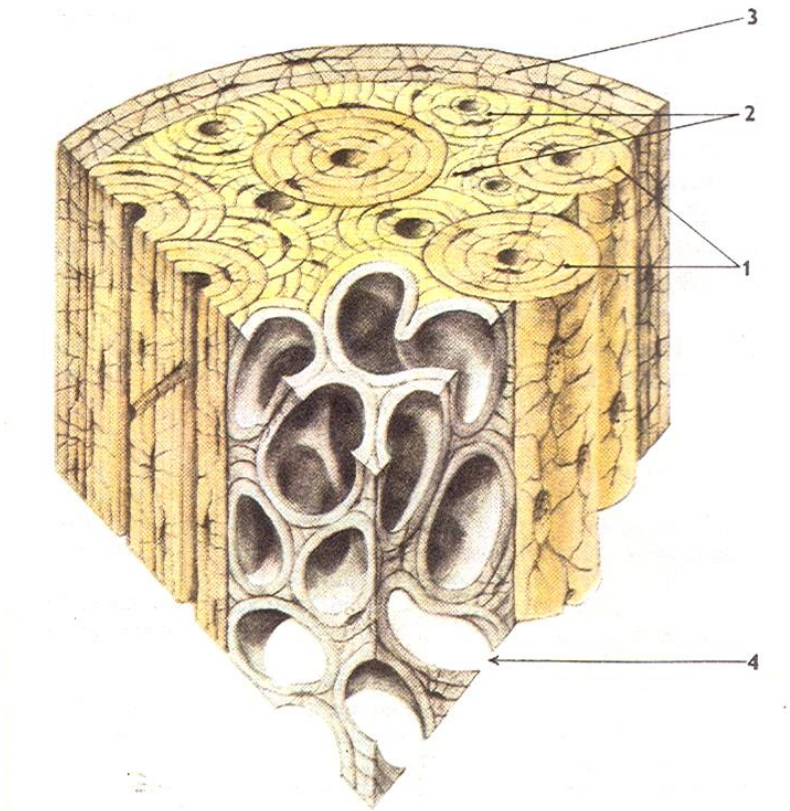
We know two forms of bone tissue

a) Compact bone (**substantia compacta**)

b) Spongy bone (**substantia spongiosa**)



Compact bone



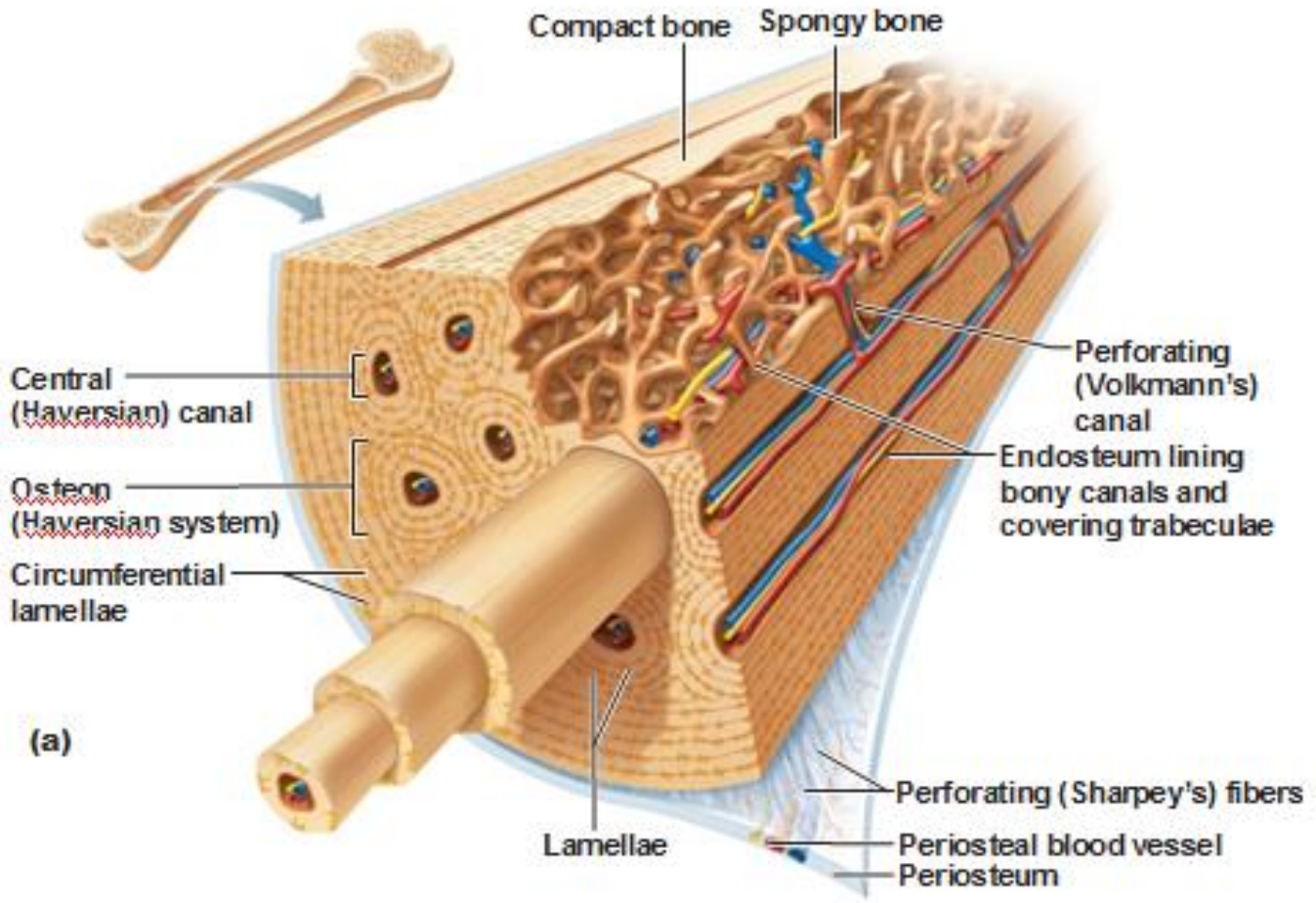
1 – Haversian lamellas

2 – intersected lamellas

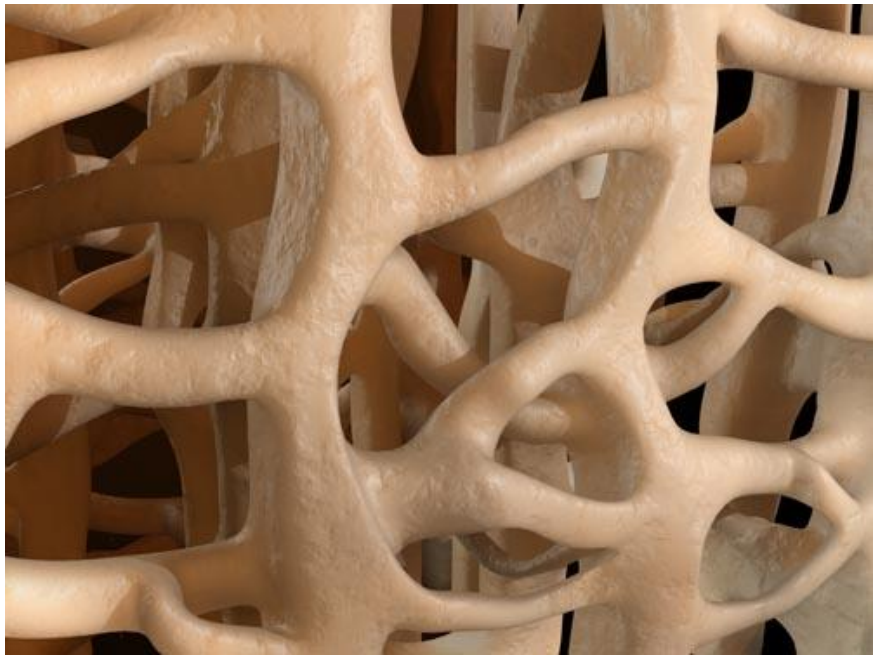
3 – superficial lamellas

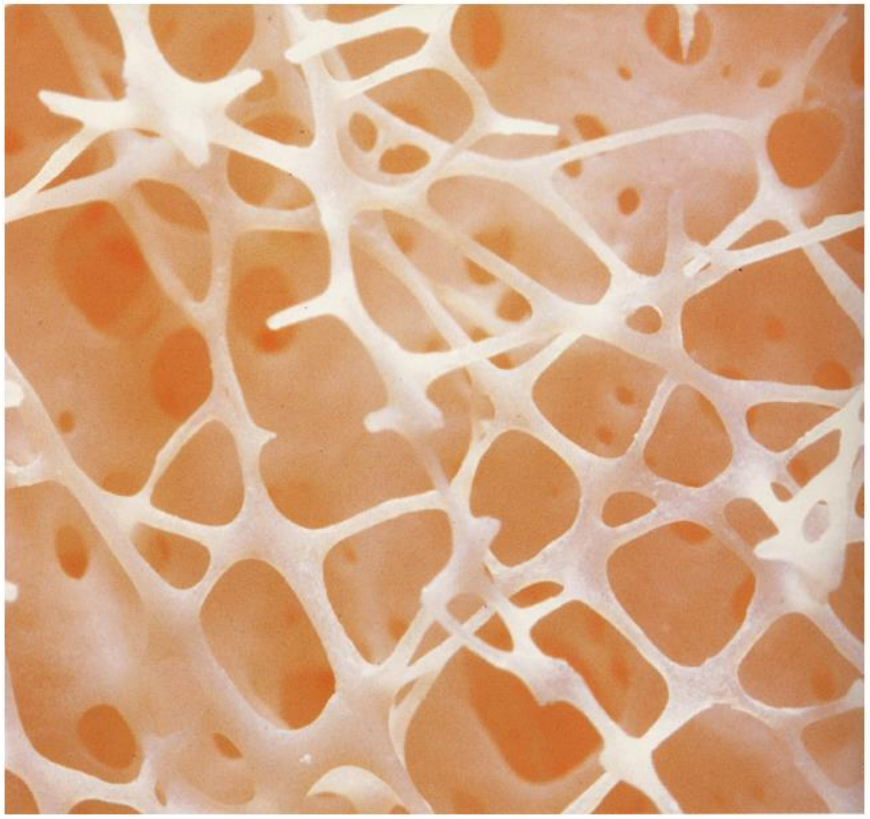
4 – spongy bone

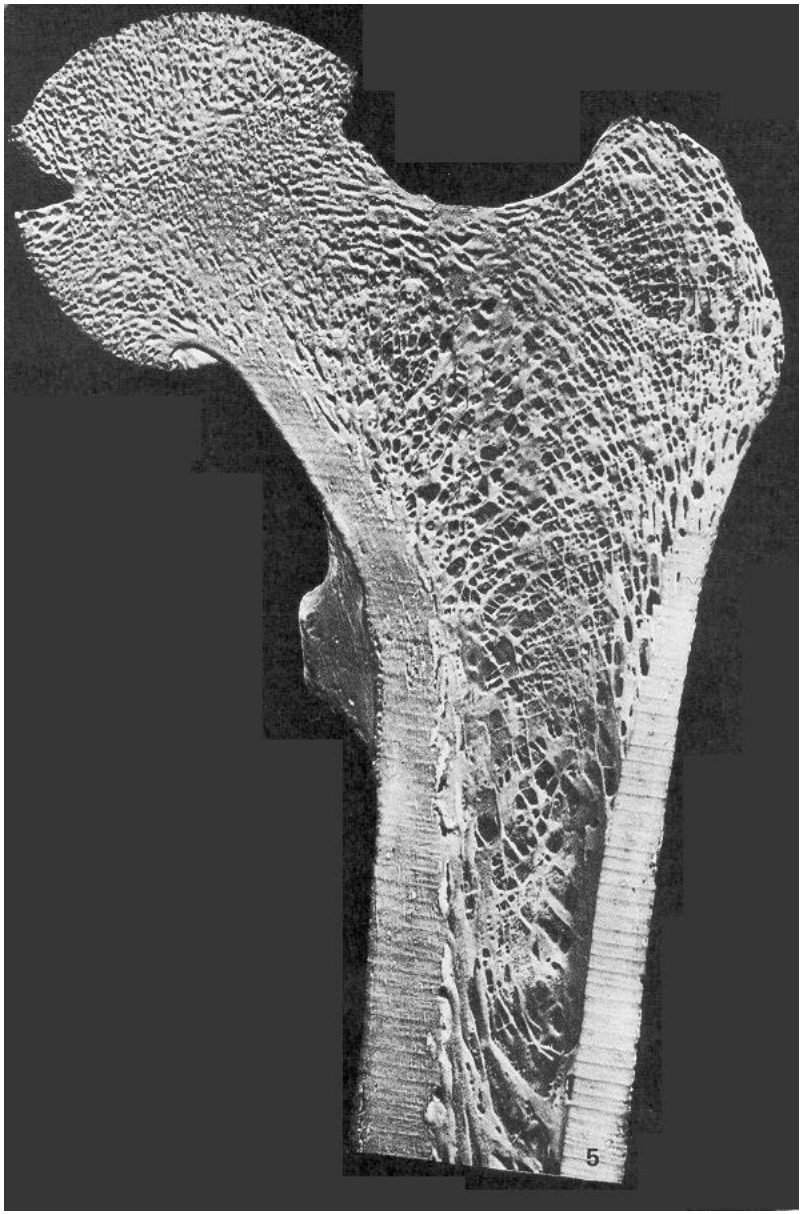
Microscopic Structure of Compact Bone



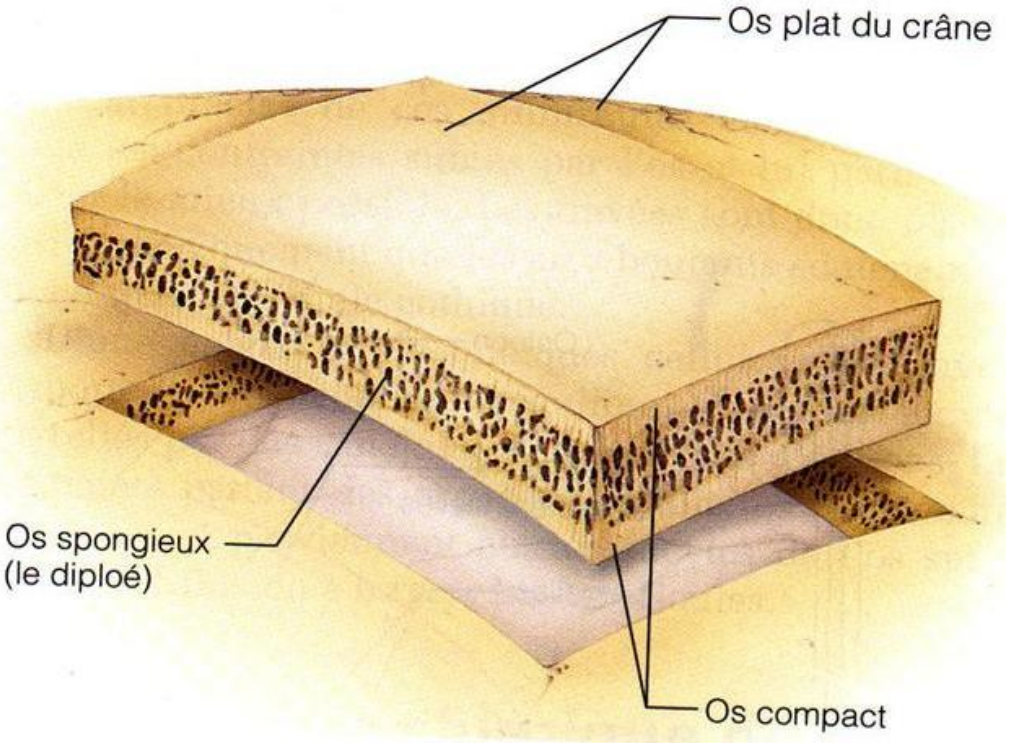
The spongy bone





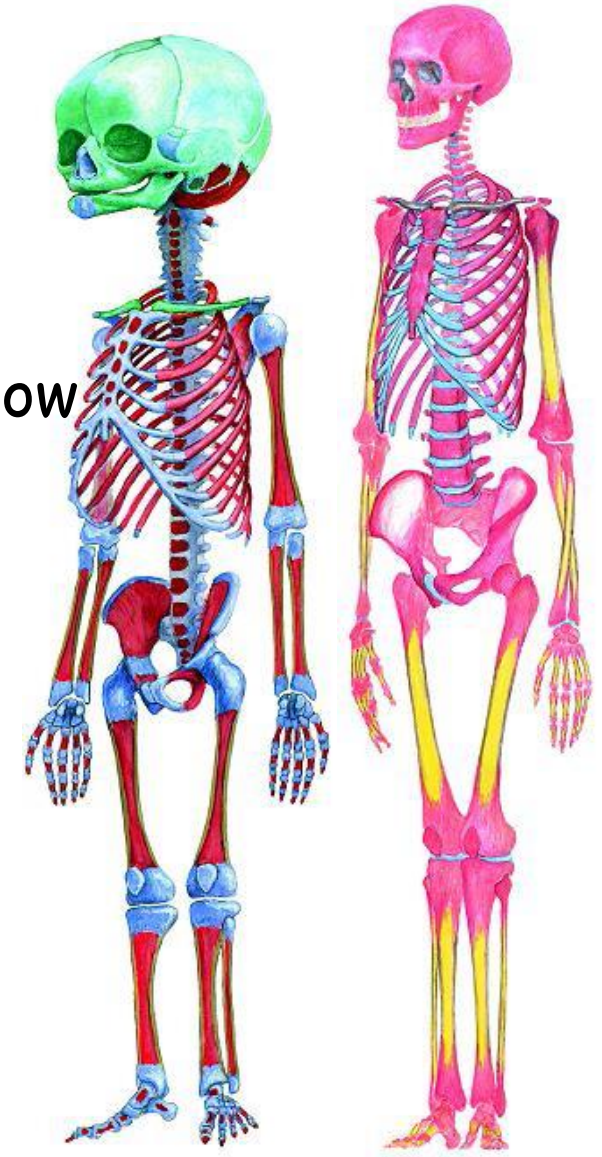


- Substantia spongiosa
- Substantia compacta
- Skull - diploe



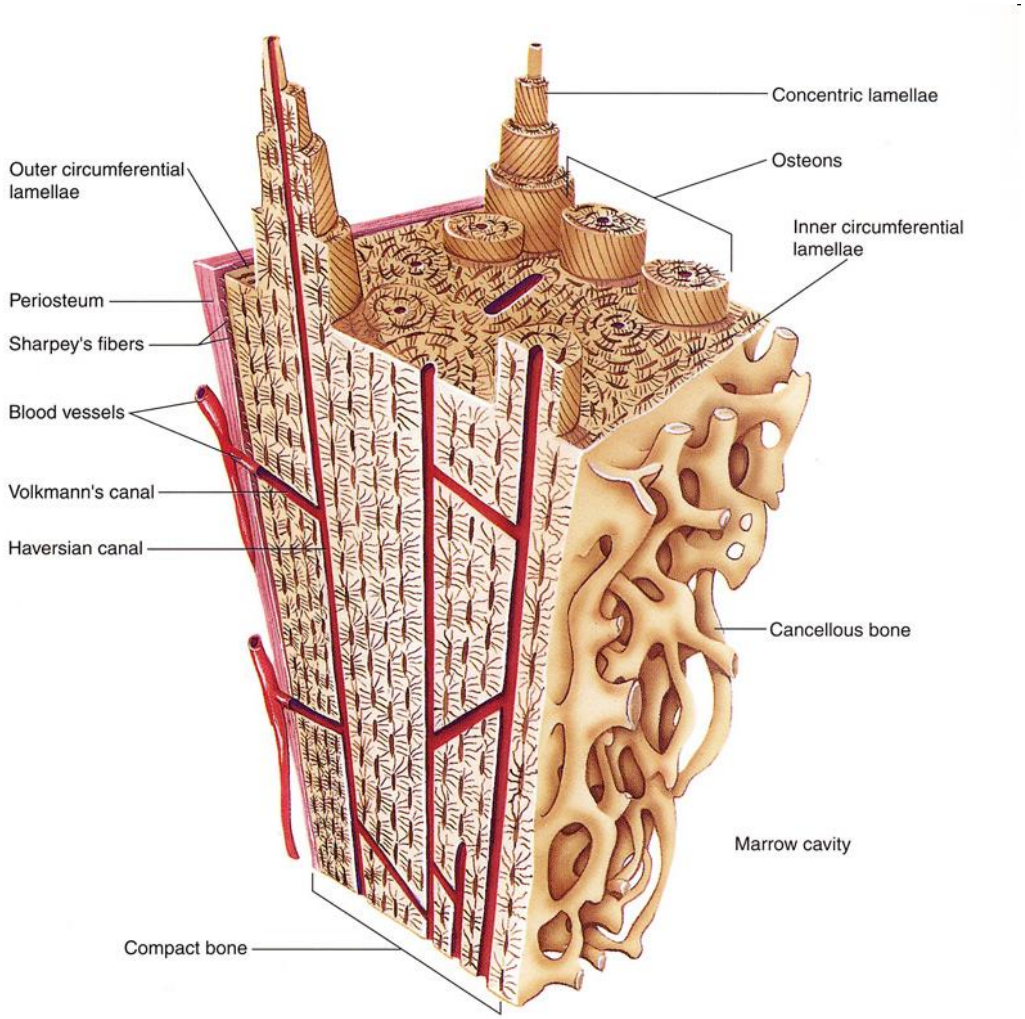
BONE MARROW

Medulla ossium rubra – red bone marrow (active hematopoetic tissue)
Medulla ossium flava – yellow bone marrow (source of energy for organism)
Medulla ossium gelatinosa – grey bone marrow

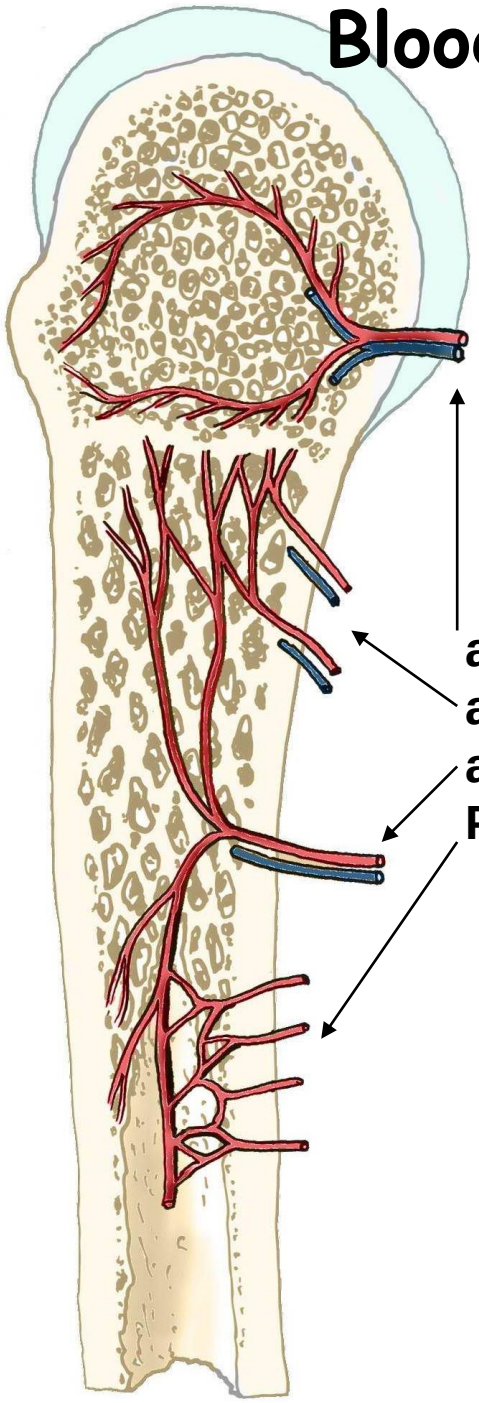


BONE VESSELS

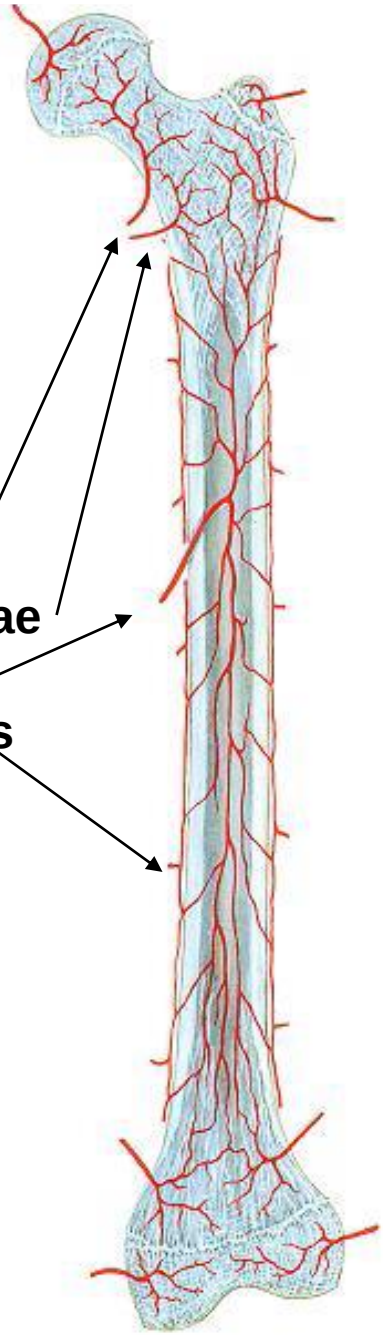
- The most important bone vessels come through periosteum via **Volkmann´s channels**

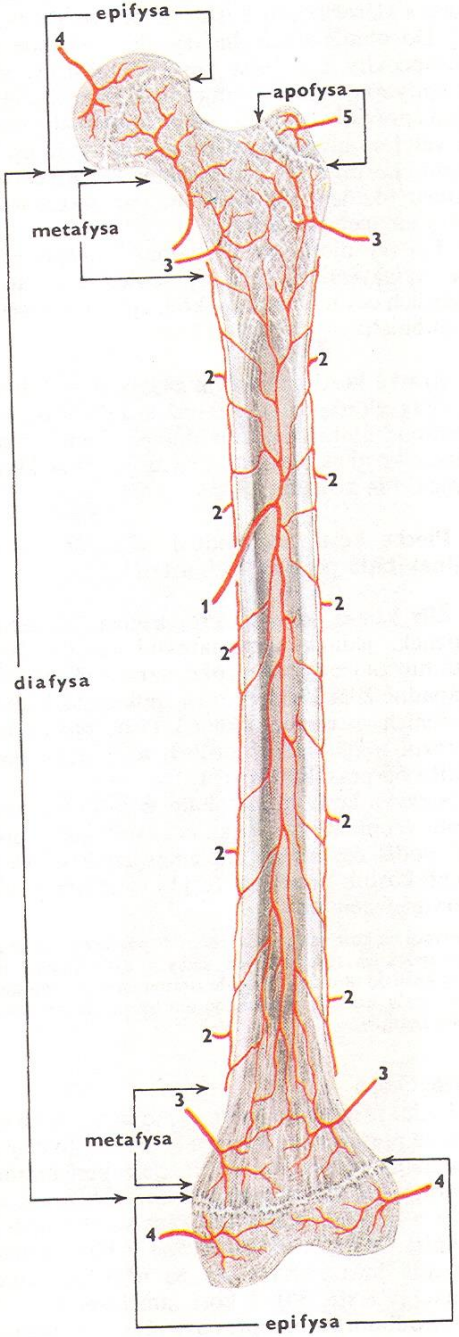


Blood supply of the long bone



aa. epiphysariae
aa. metaphysariae
a. nutricia
Periostal vessels





X-RAY PICTURES

4,5 years

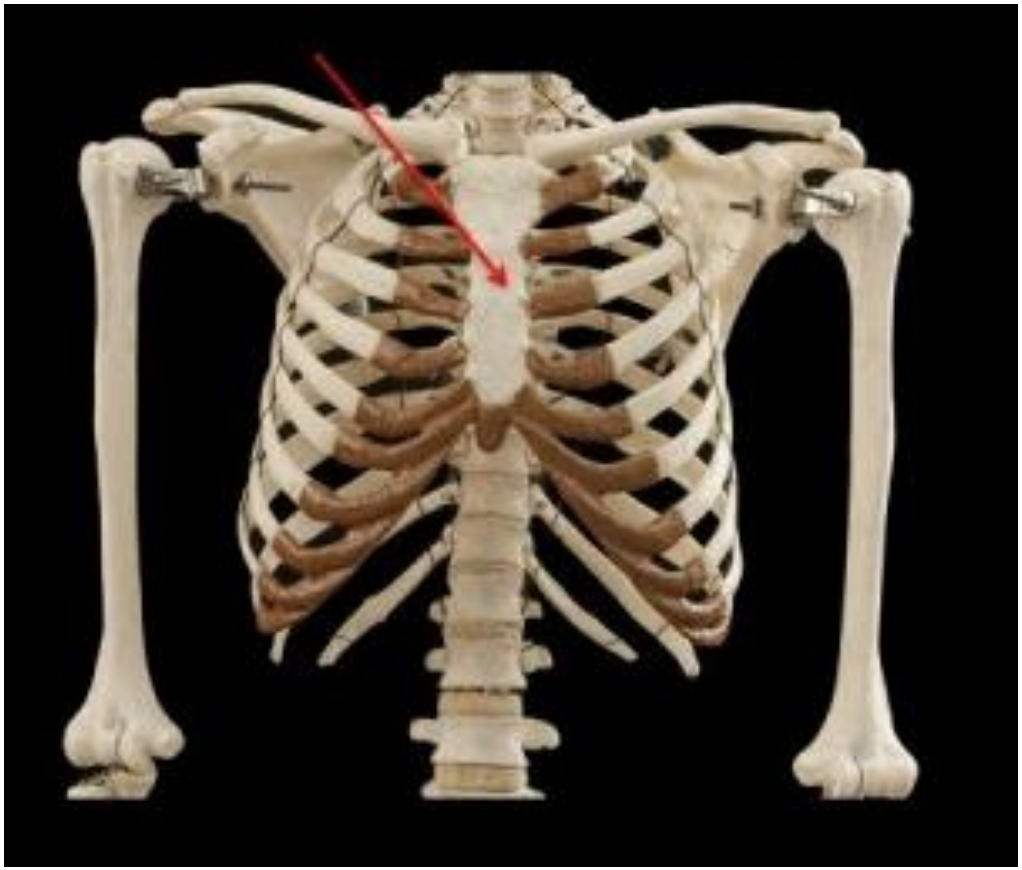
7 years

11 years

14 years

SPECIAL OSTEOLOGY

SKELETON OF THORAX



COLUMNA VERTEBRALIS - SPINE

- During development: **33-34 vertebrae**
- After fusion: **24 vertebrae**

Vertebrae

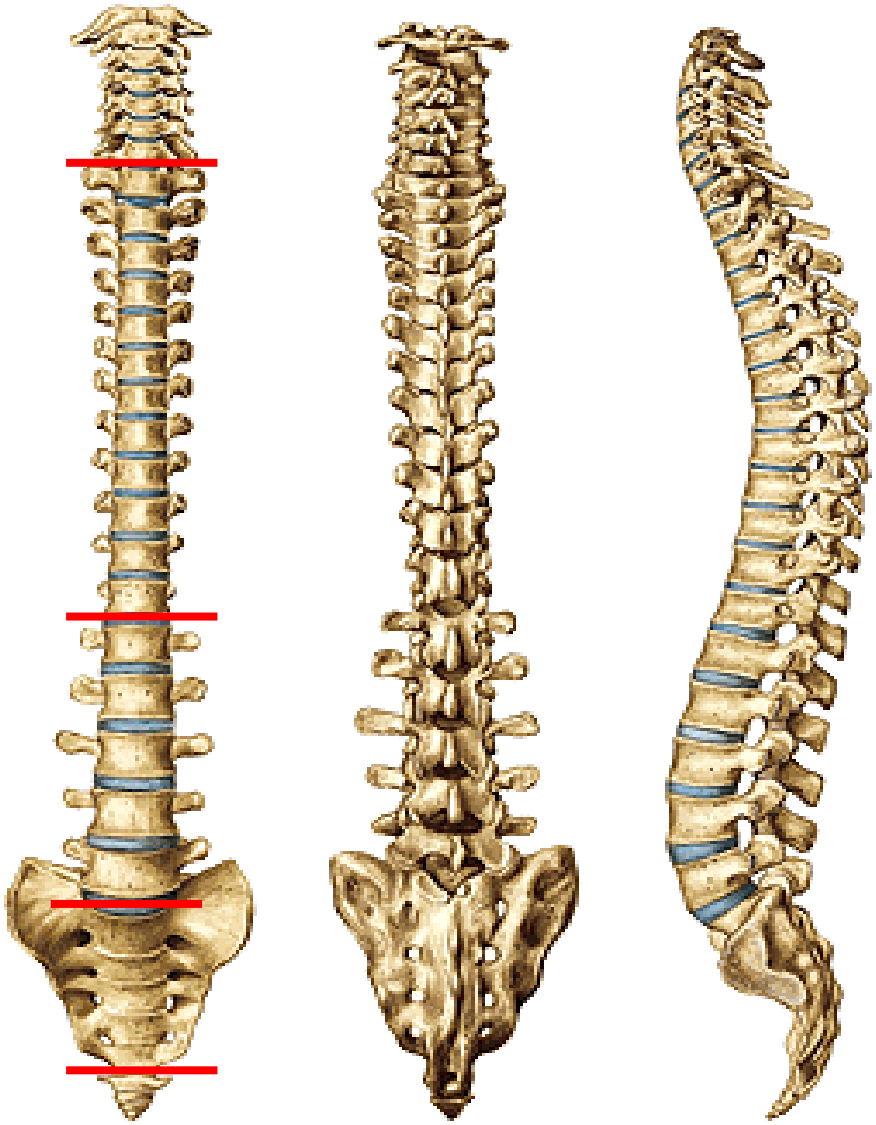
7 cervical

12 thoracic

5 lumbar

4-5 sacral- **os sacrum**

4-5 coccygeal- **os coccygis**



VERTEBRA

corpus vertebrae

facies terminalis superior et inferior

arcus vertebrae

pediculus arcus vertebrae

lamina arcus vertebrae

foramen vertebrale

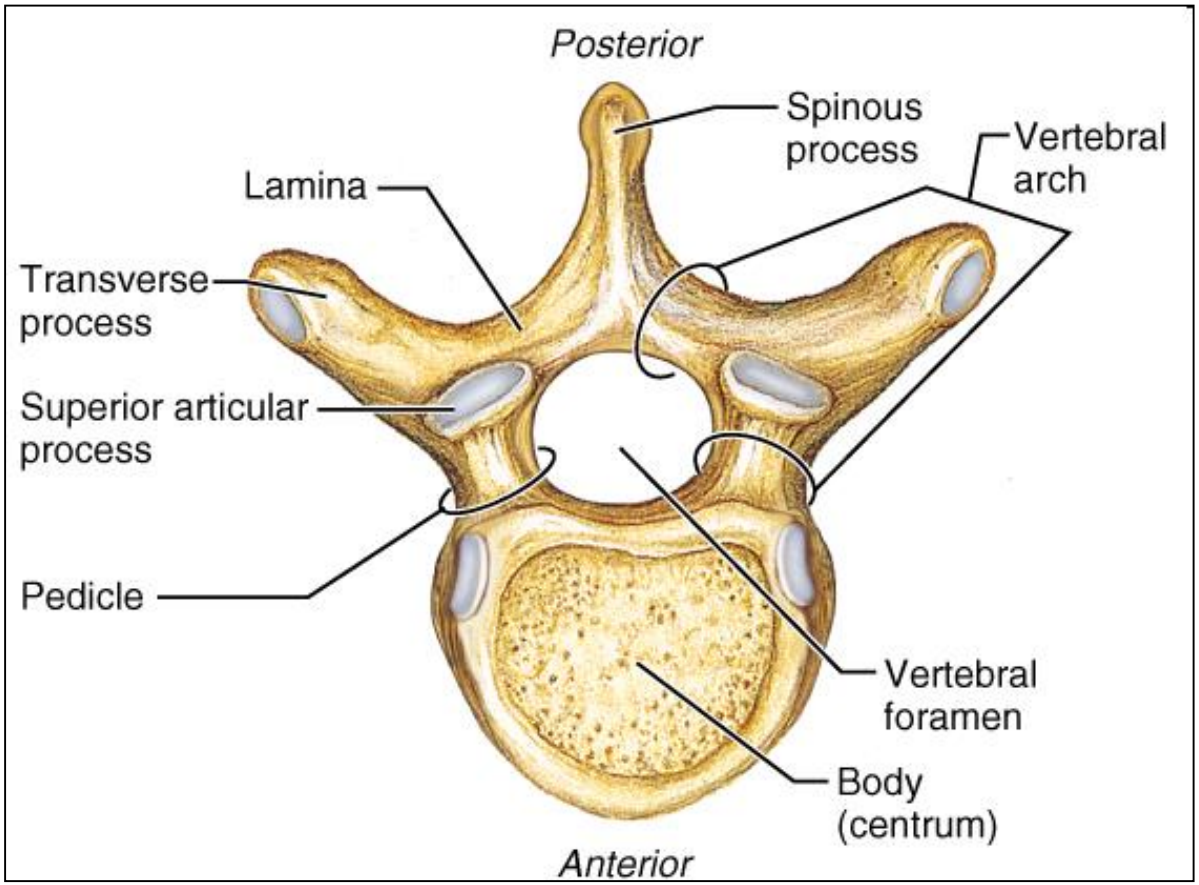
incisura vertebralis

processus

processus articulares

processus transversi

processus spinosus



DEVELOPMENT OF THE VERTEBRAE

Corpus vertebrae

Arcus vertebrae

Processus articulares

Processus transversus

Processus spinosus

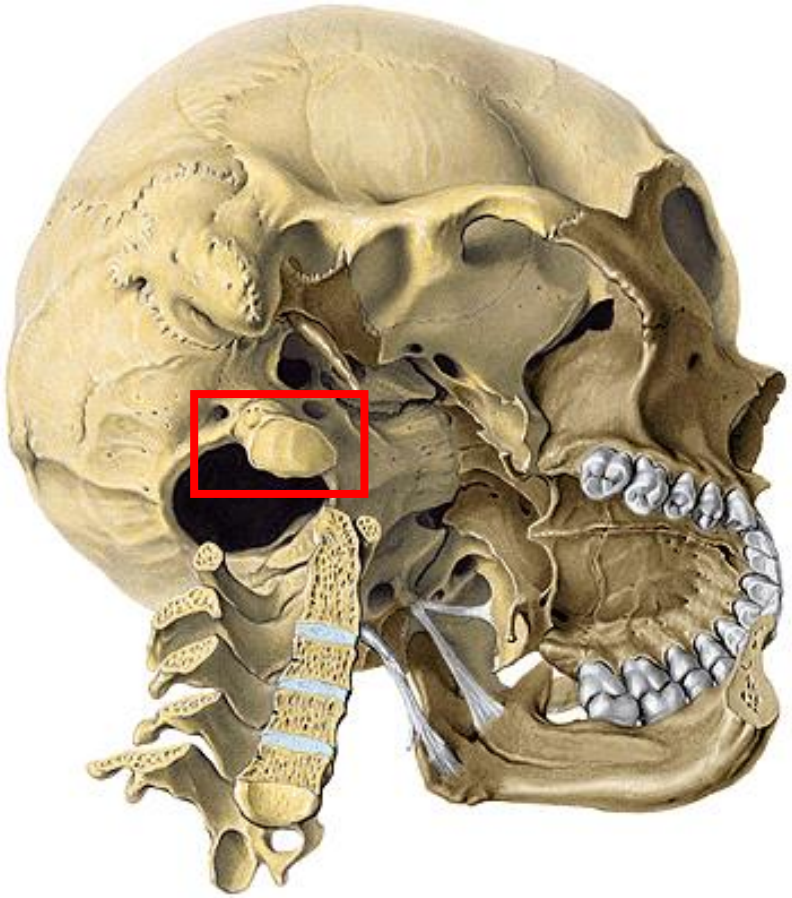
Costa

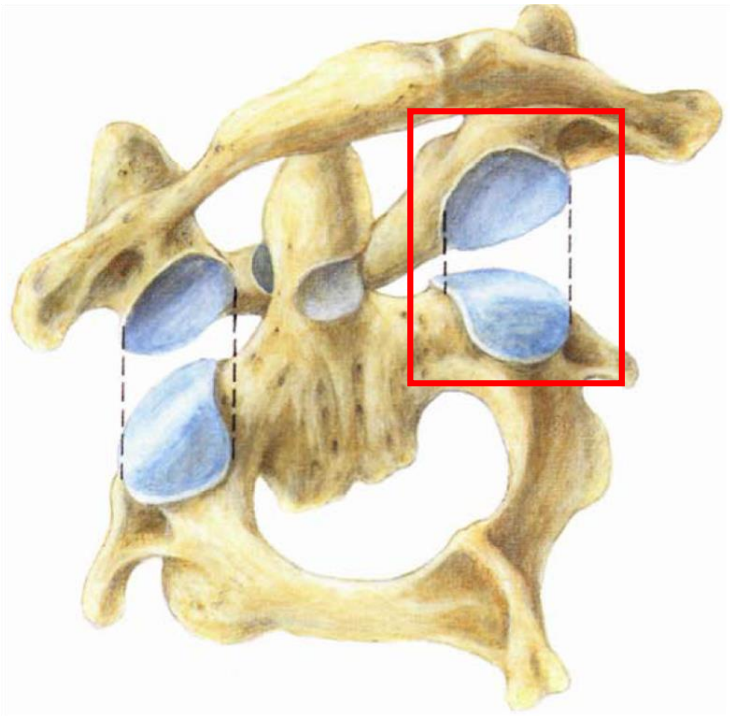
CERVICAL VERTEBRAE

- **uncus corporis vertebrae**
- **processus transversus – tubercula anteriora et posteriora, foramina processus transversi**
- oval body
- Triangular **foramen vertebrale**
- cleft **processus spinosus**
- **processus articulares** – in oblique plane

ATLAS - C1

- **arcus anterior**
  tuberculum anterius
  fovea dentis
- **arcus posterior**
  tuberculum posterius
  sulcus a. vertebralis
- **massae laterales**
  processus transversi
  foramina pr. transversi

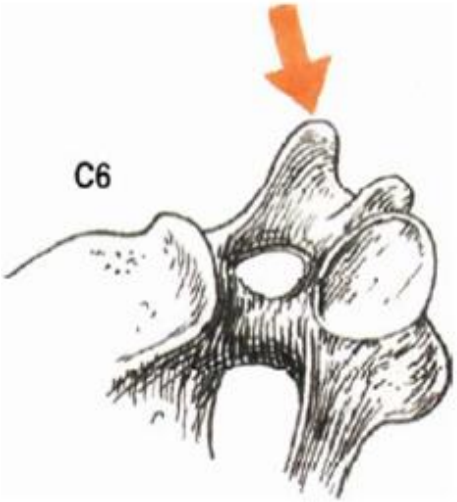




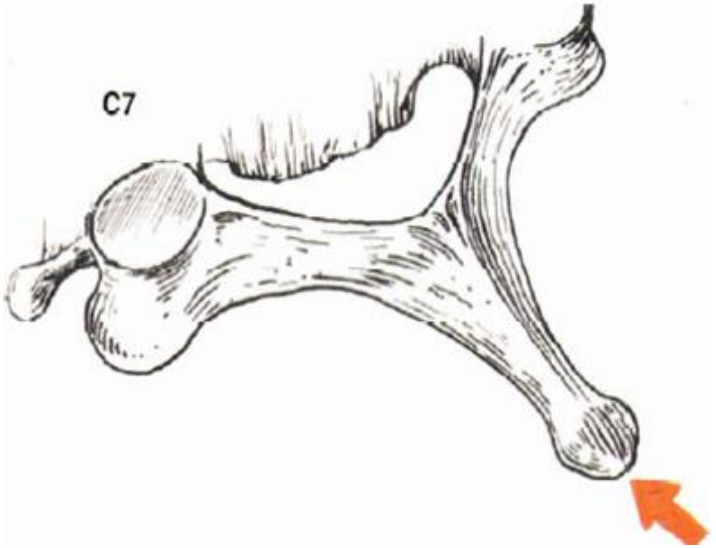
AXIS - C2

- **dens axis (original body of atlas)-** apex dentis
- facies articularis anterior et posterior

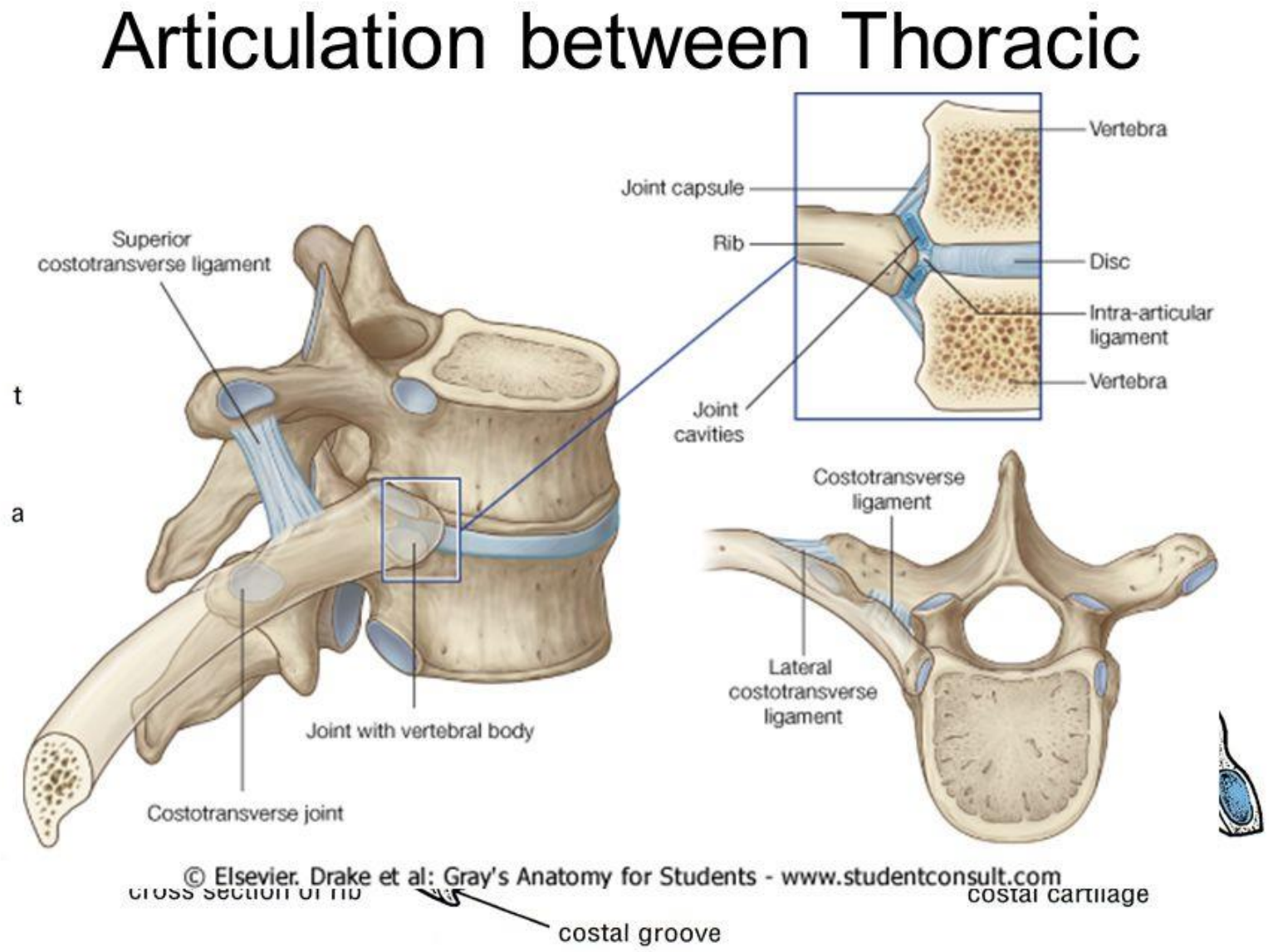
C6- TUBERCULUM CAROTICUM



VERTEBRA PROMINENS- C7



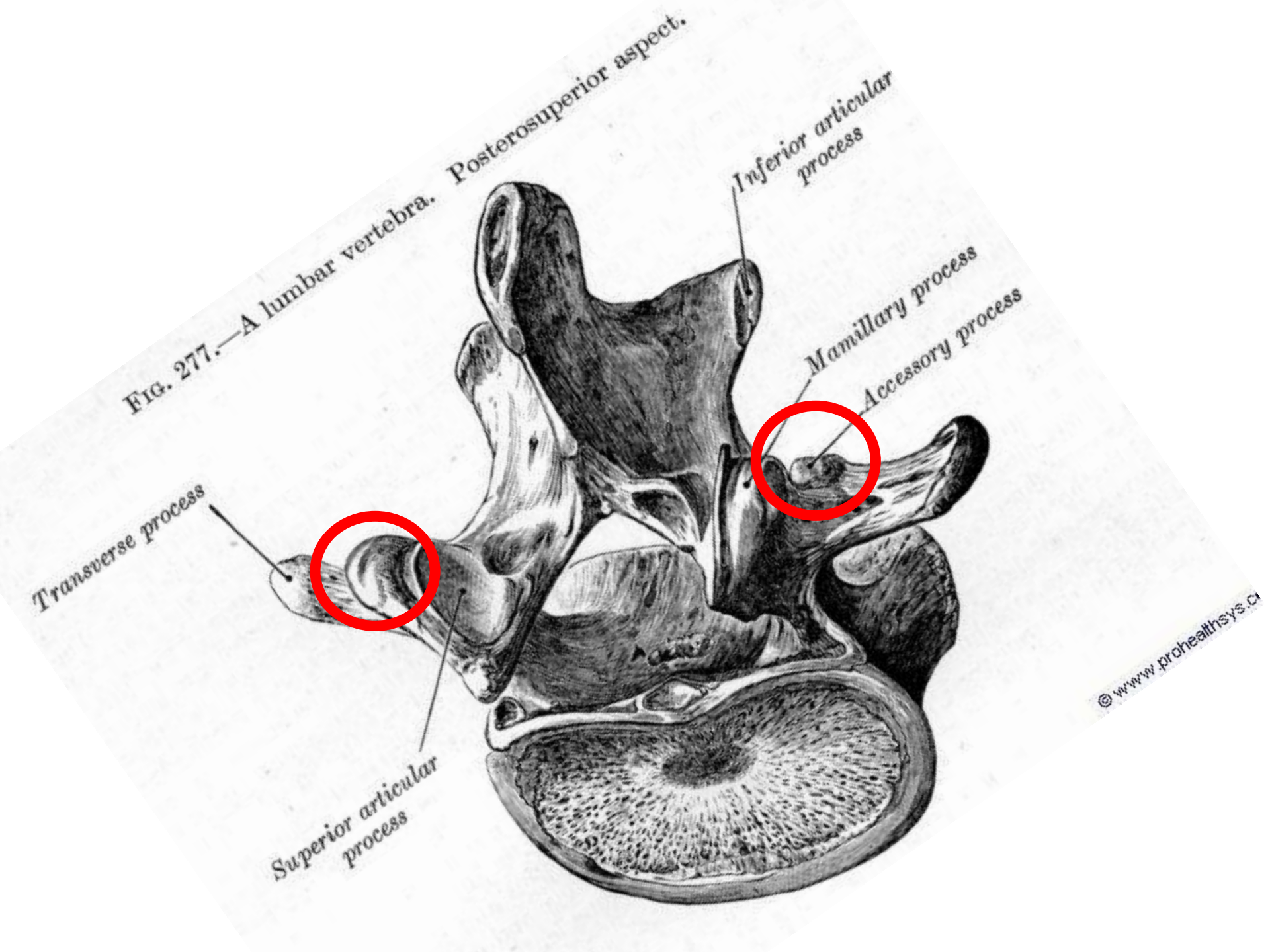
VERTEBRAE THORACICAE



VERTEBRAE LUMBALES

- **processus costarii**
- **processus accesorius-** more caudally
- **processus mamillaris-** more cranially
- **processus articulares-** in sagital plane
- **processus spinosi-** flat plate

FIG. 277.—A lumbar vertebra. Posterosuperior aspect.



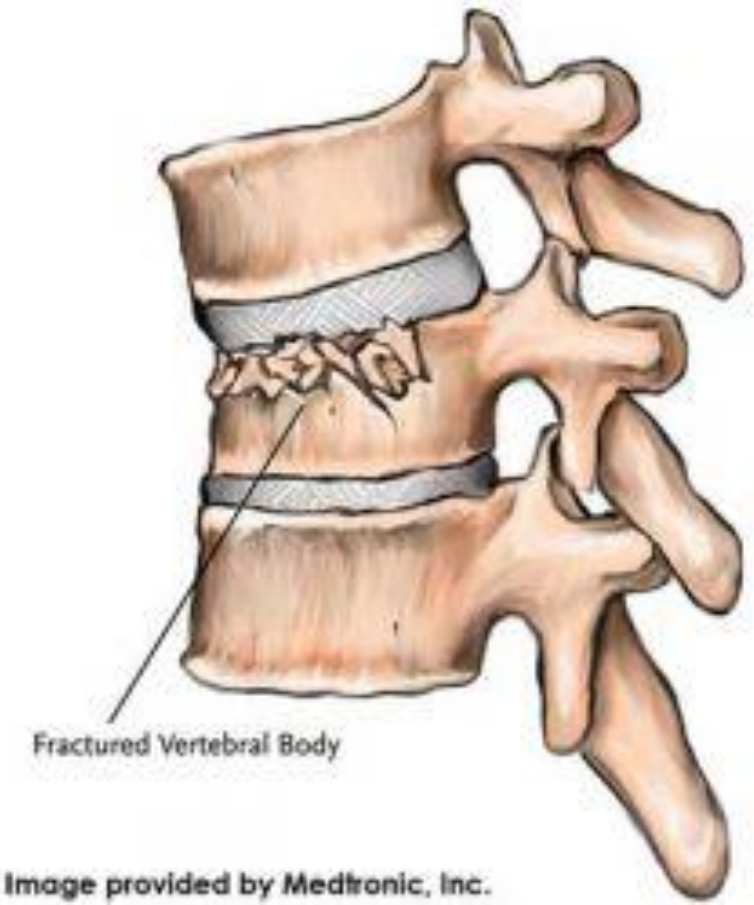
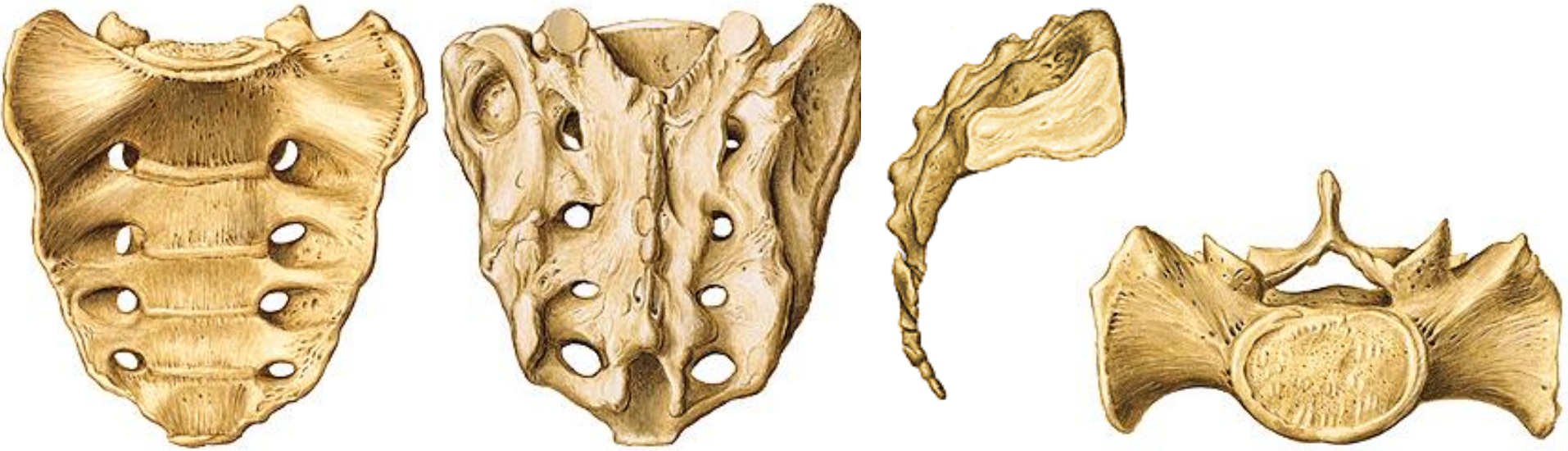


Image provided by Medtronic, Inc.

OS SACRUM



- **facies dorsalis-** crista- mediana, medialis, lateralis
- **facies auricularis-** partes laterales ossis sacri
- **facies pelvina-** lineae transversae
- **foramina sacralia-** dorsalia, pelvina
- **canalis sacralis-** hiatus sacralis- cornua sacralia
- **basis ossis sacri**
- **apex ossis sacri**

OS COCCYGIS

- **cornua ossis coccygis=** processus transversi Co1
- **apex coccygis**

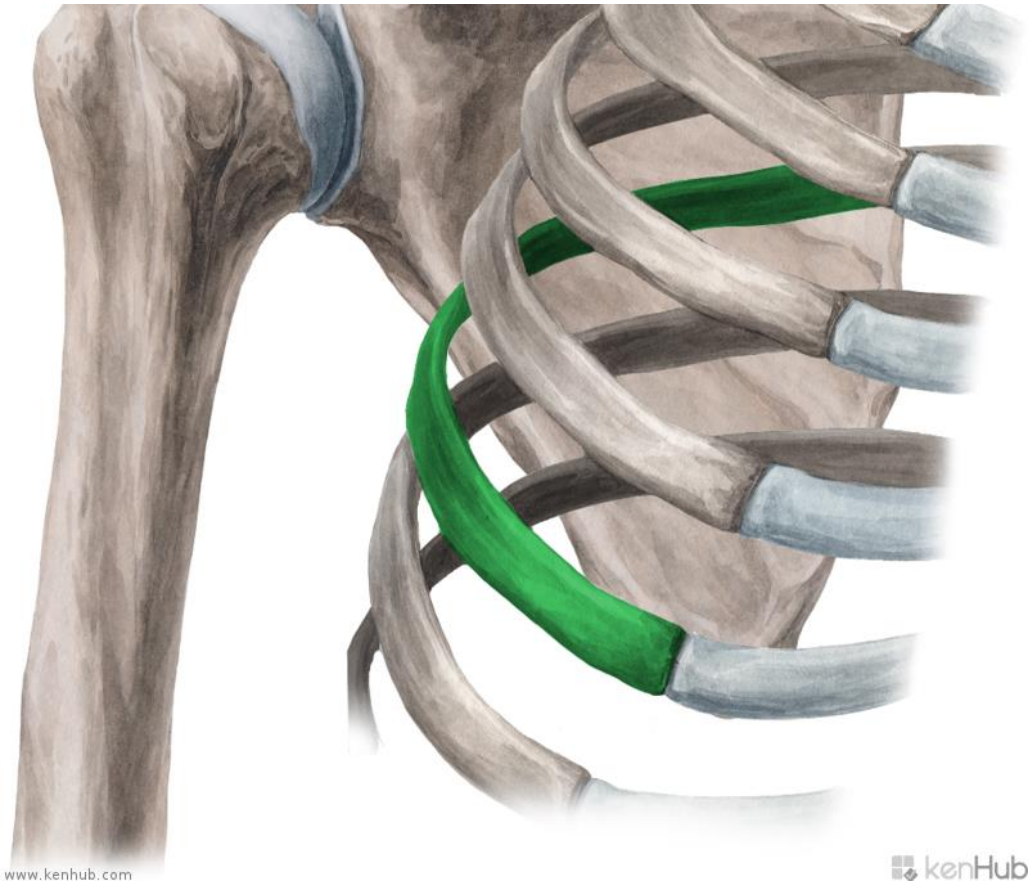
COSTAE - RIBS

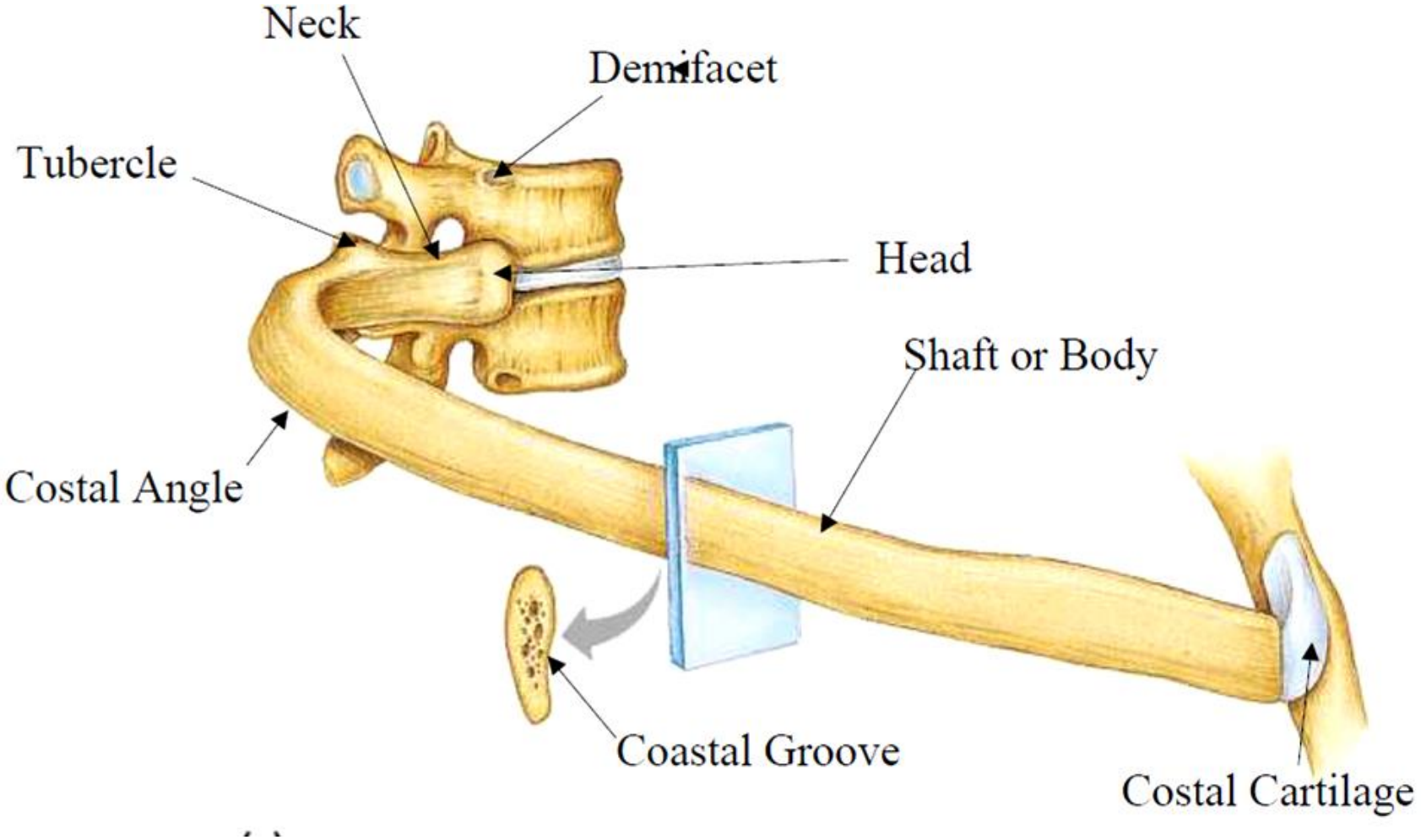
- 12 pairs of ribs:
- **costae verae**: 7 pairs, true ribs
- **costae spuriae:** 8th-10th pair, false ribs
- **costae fluctuantes (liberae) :** 11th and 12th pair- free ribs
- length- from 1st to 8th increases, the smallest: 1st and 12th, the largest 6th – 9th

RIB

os costae + cartilago:

- caput costae, crista
- collum costae
- tuberculum costae
- corpus costae
- crista costae
- sulcus costae
- angulus costae

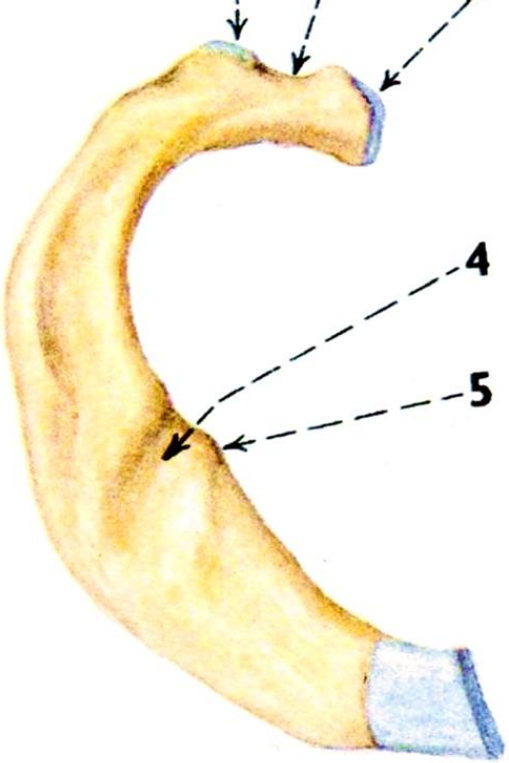


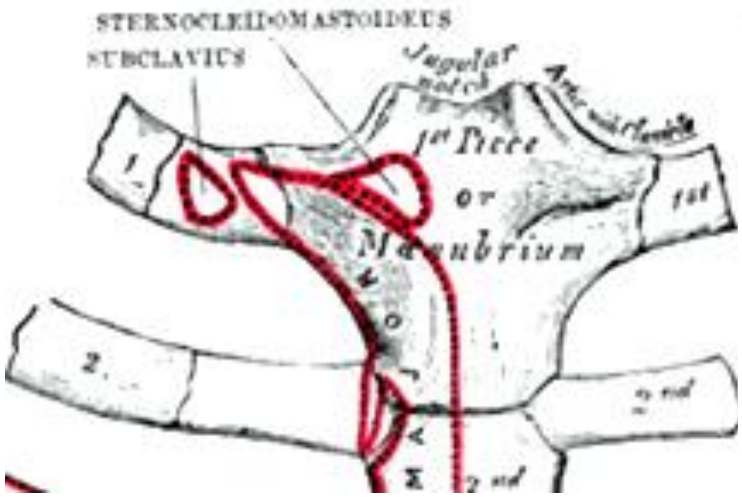

Neck
Demifacet
Tubercle
Head
Shaft or Body
Costal Angle
Coastal Groove
Costal Cartilage

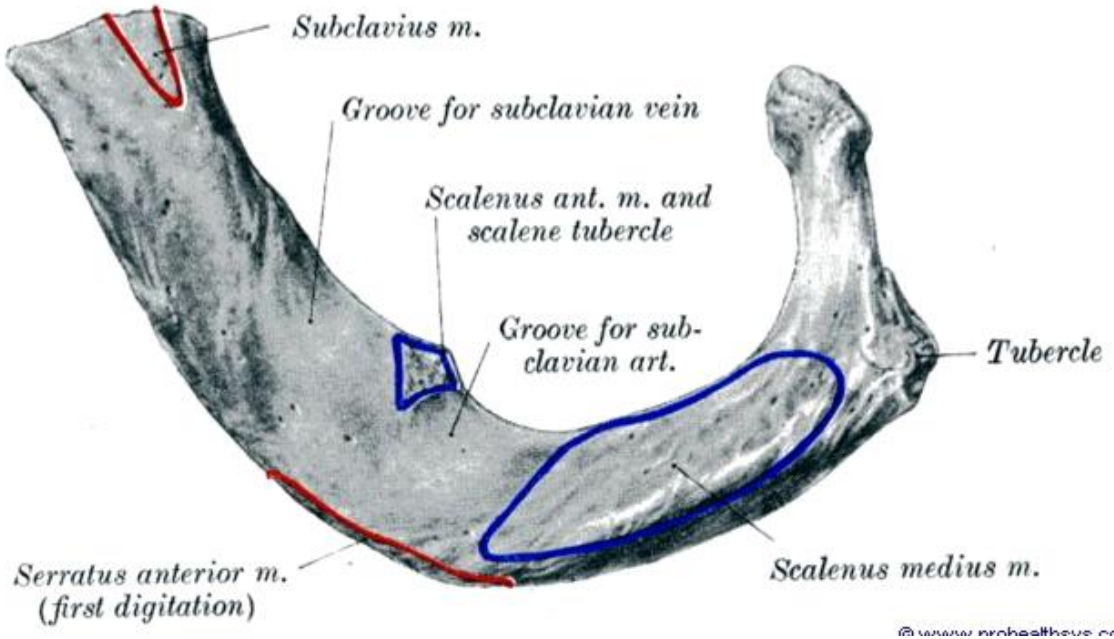
Facies articularis capitis costae
Facies articularis tuberculi costae

COSTA PRIMA/the first rib

- sulcus arterie subclaviae
- (sulcus venae subclaviae)
- tuberculum m. scaleni anterioris
- insertion of m. scalenus medius
- begining of m. subclavius

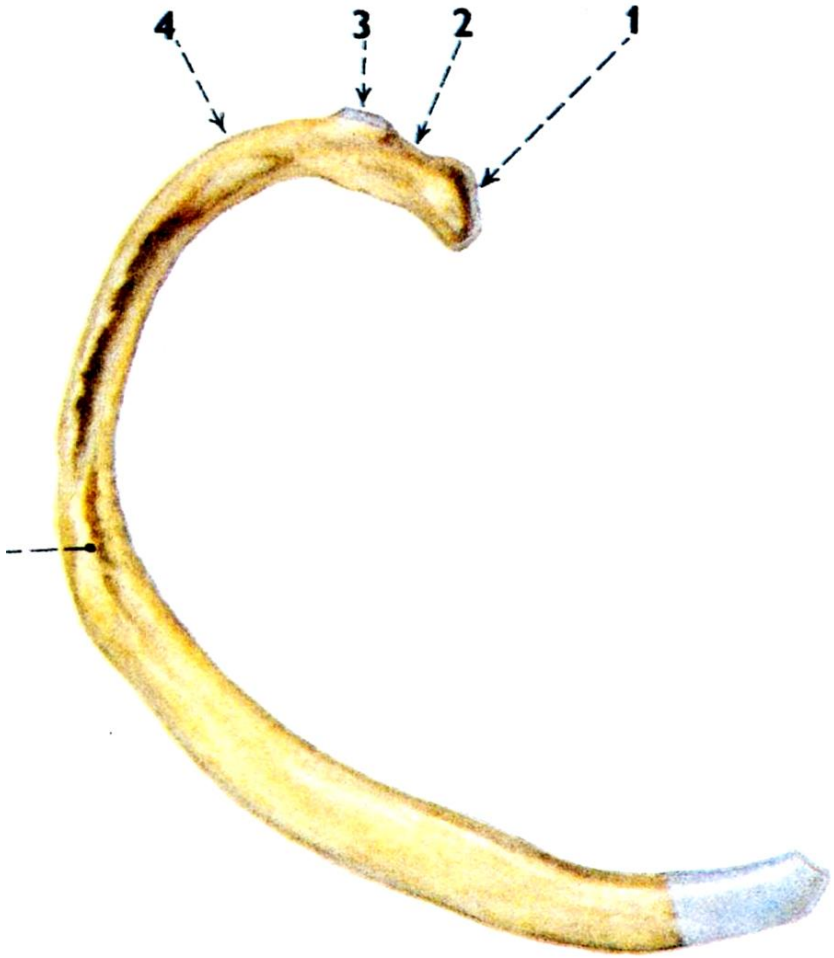


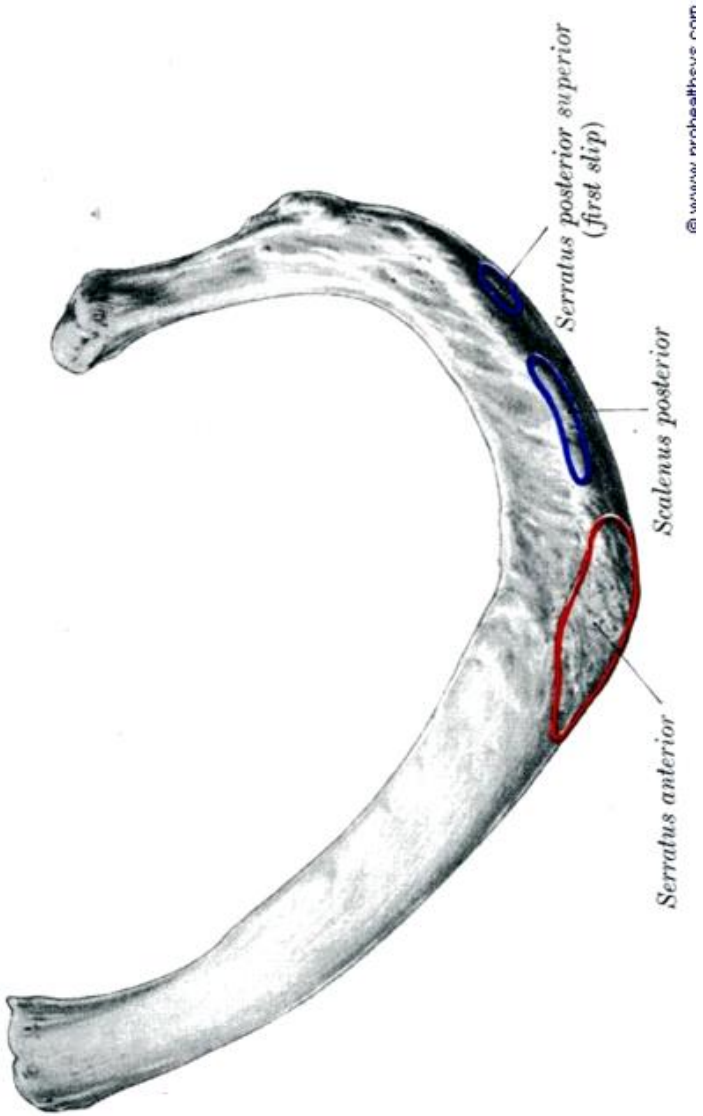


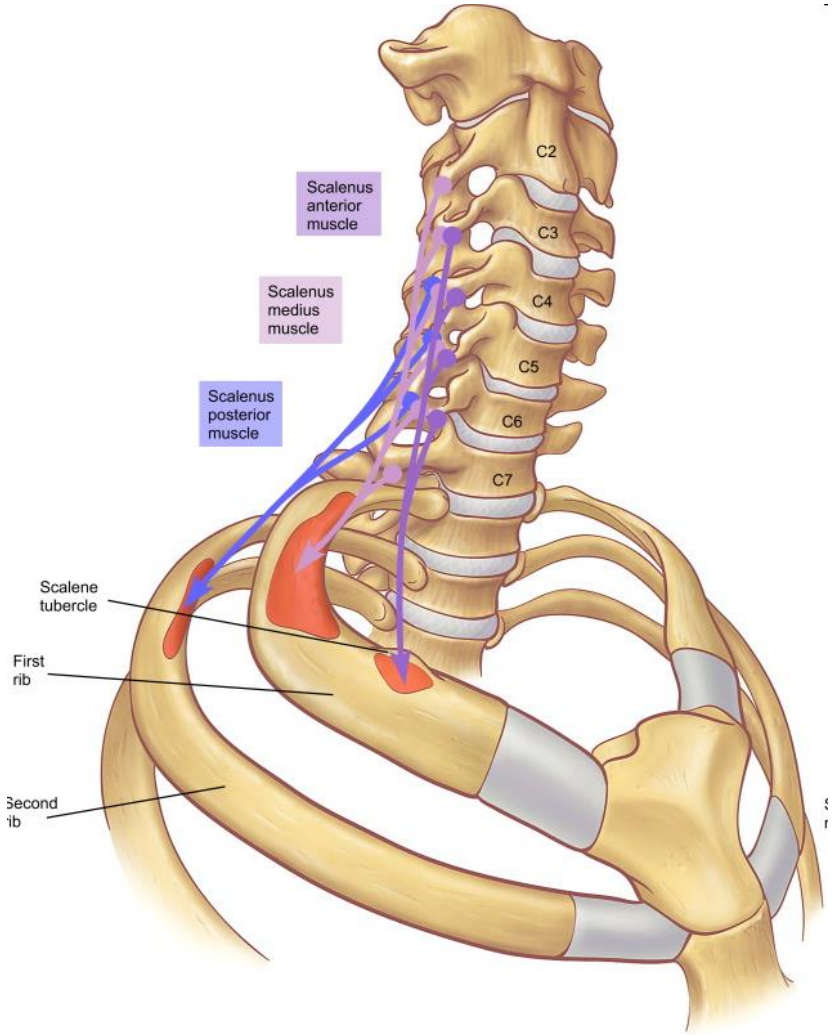


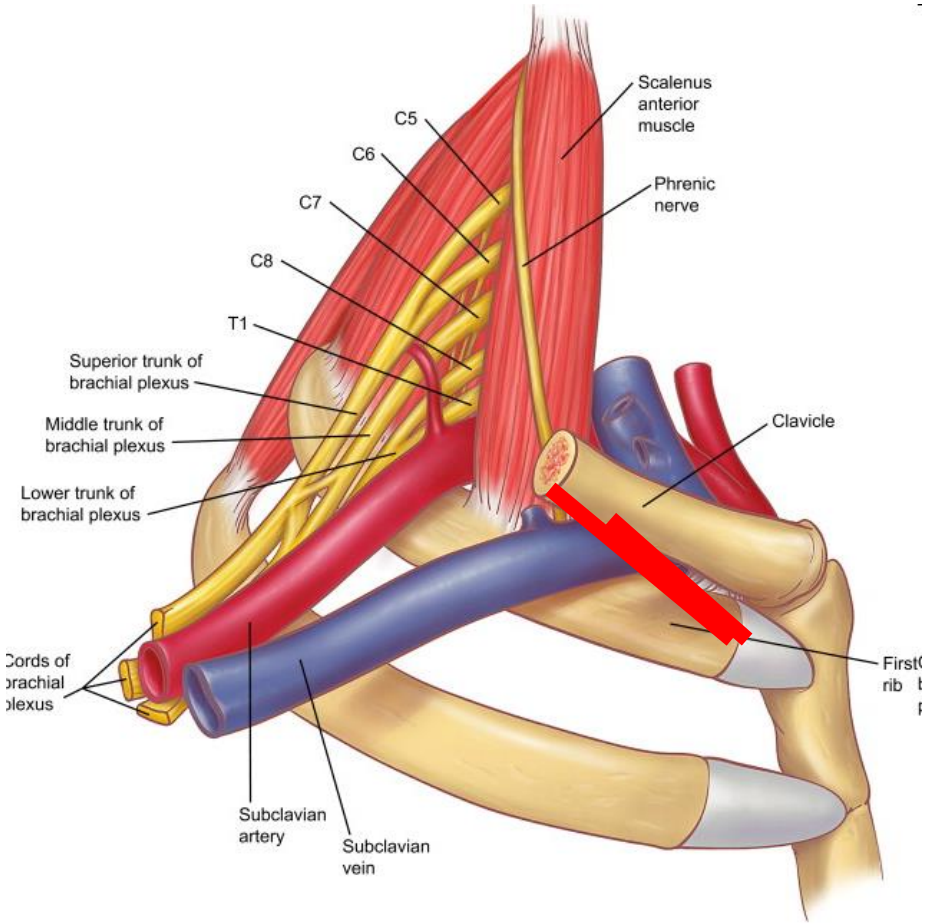
COSTA SECUNDA/the second rib

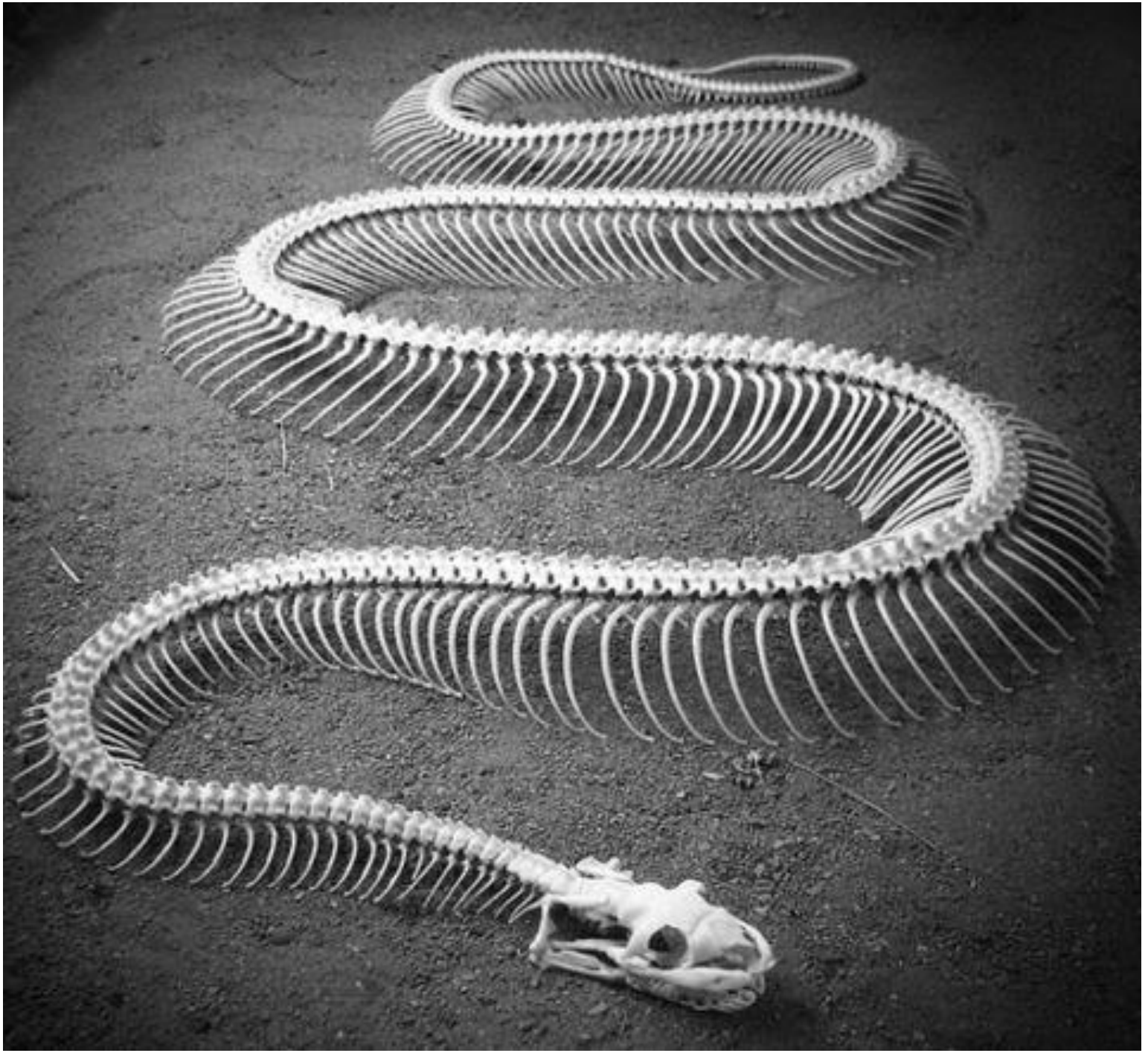
- tuberculum m. scaleni posterioris
- tuberositas m. serrati anterioris



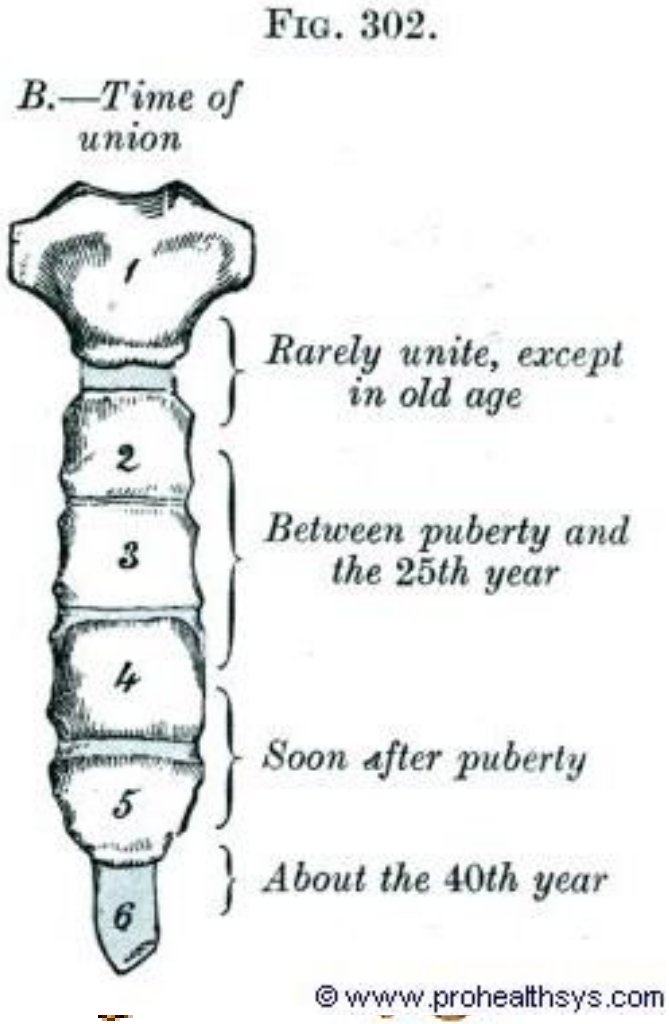



C2
C3
C4
C5
C6
C7
Scalenus anterior muscle
Scalenus medius muscle
Scalenus posterior muscle
Scalene tubercle
First rib
Second rib


C5
C6
C7
C8
T1
Scalenus anterior muscle
Phrenic nerve
Superior trunk of brachial plexus
Middle trunk of brachial plexus
Lower trunk of brachial plexus
Clavicle
Cords of brachial plexus
First rib
Subclavian artery
Subclavian vein



STERNUM

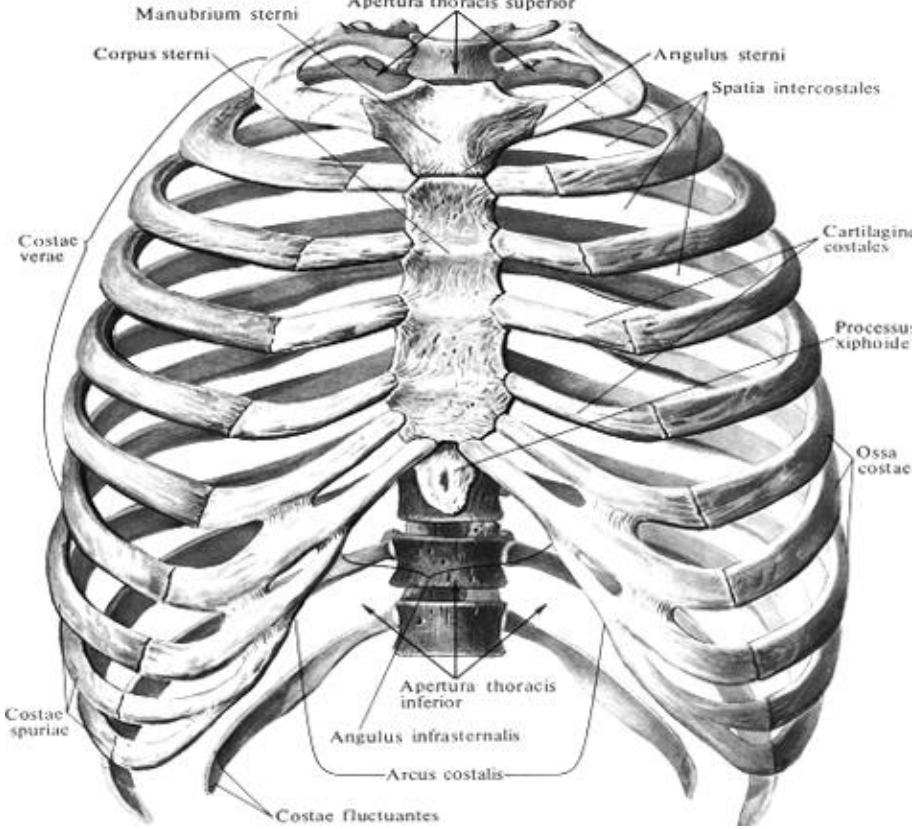


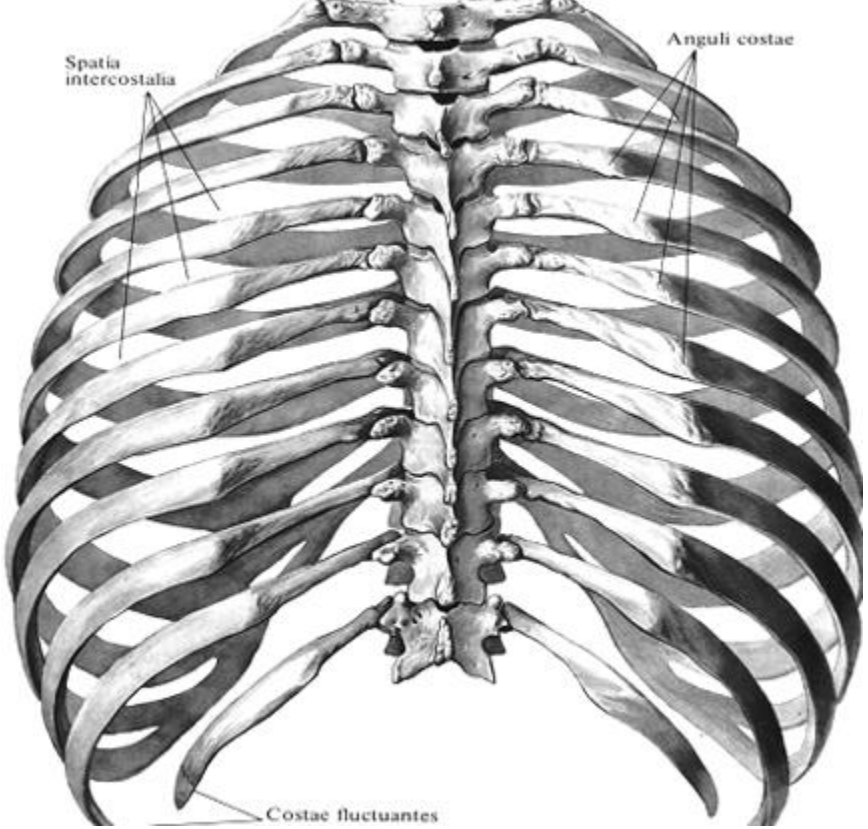
manubrium sterni- incisura-jugularis, clavicularis and places for connection with cartilages of the first pair of ribs

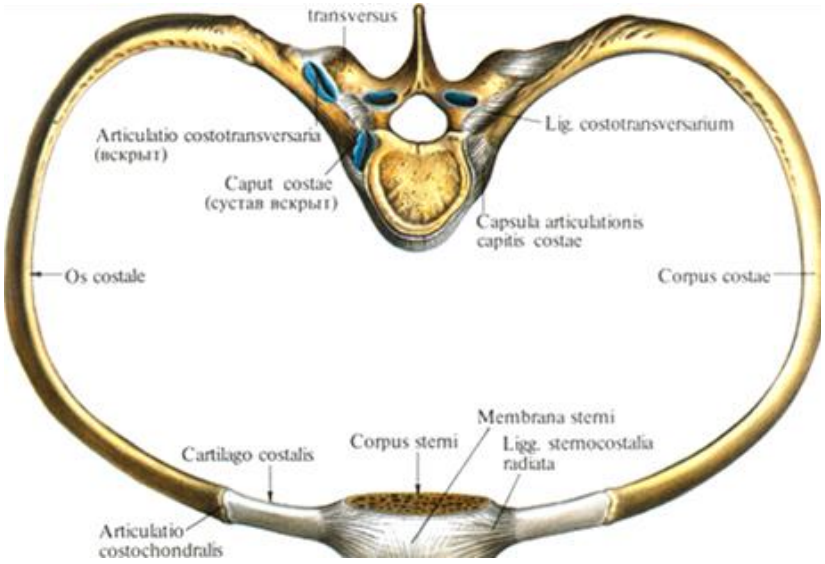
angulus sterni

corpus- incisurae costales

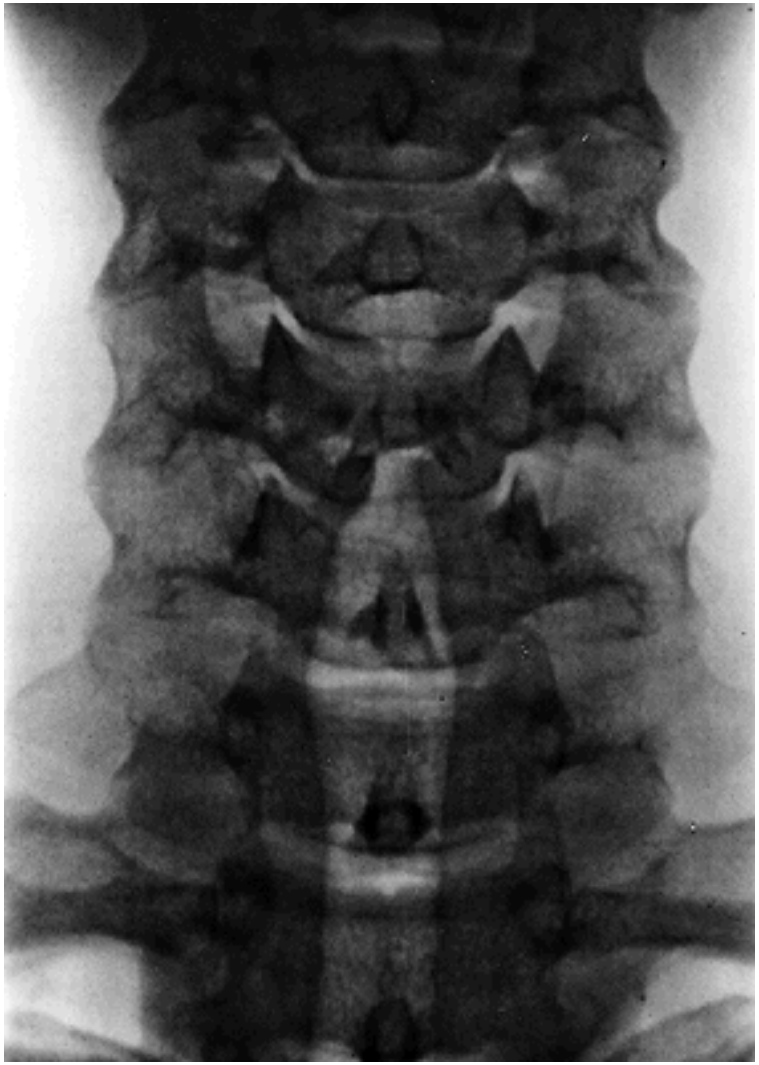
processus xiphoideus


Manubrium sterni
Apertura thoracis superior
Corpus sterni
Angulus sterni
Spatia intercostales
Costae
veae
Cartilagin
costales
Processu
xiphoide
Ossa
costae
Costae
spuriae
Apertura thoracis
inferior
Angulus infrasternalis
Arcus costalis
Costae fluctuantes


Spatia
intercostalia
Anguli costae
Costae fluctuantes


transversus
Articulatio costotransversaria
(вскрыт)
Lig. costotransversarium
Caput costae
(сустав вскрыт)
Capsula articularis
capitis costae
Os costale
Corpus costae
Membrana sterni
Cartilago costalis
Corpus sterni
Ligg. sternocostalia
radiata
Articulatio
costochondralis

X-RAY of cervical spine



X-RAY of thoracic spine

X-RAY of lumbar spine

Thank you for your attention!

Pictures:
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Netter: Interactive Atlas of Human Anatomy.
Naňka, Elišková: Přehled anatomie. Galén, Praha 2009.
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Drake et al: Gray´s Anatomy for Students. 2010