

*Biology 223*

*Human Anatomy and Physiology*

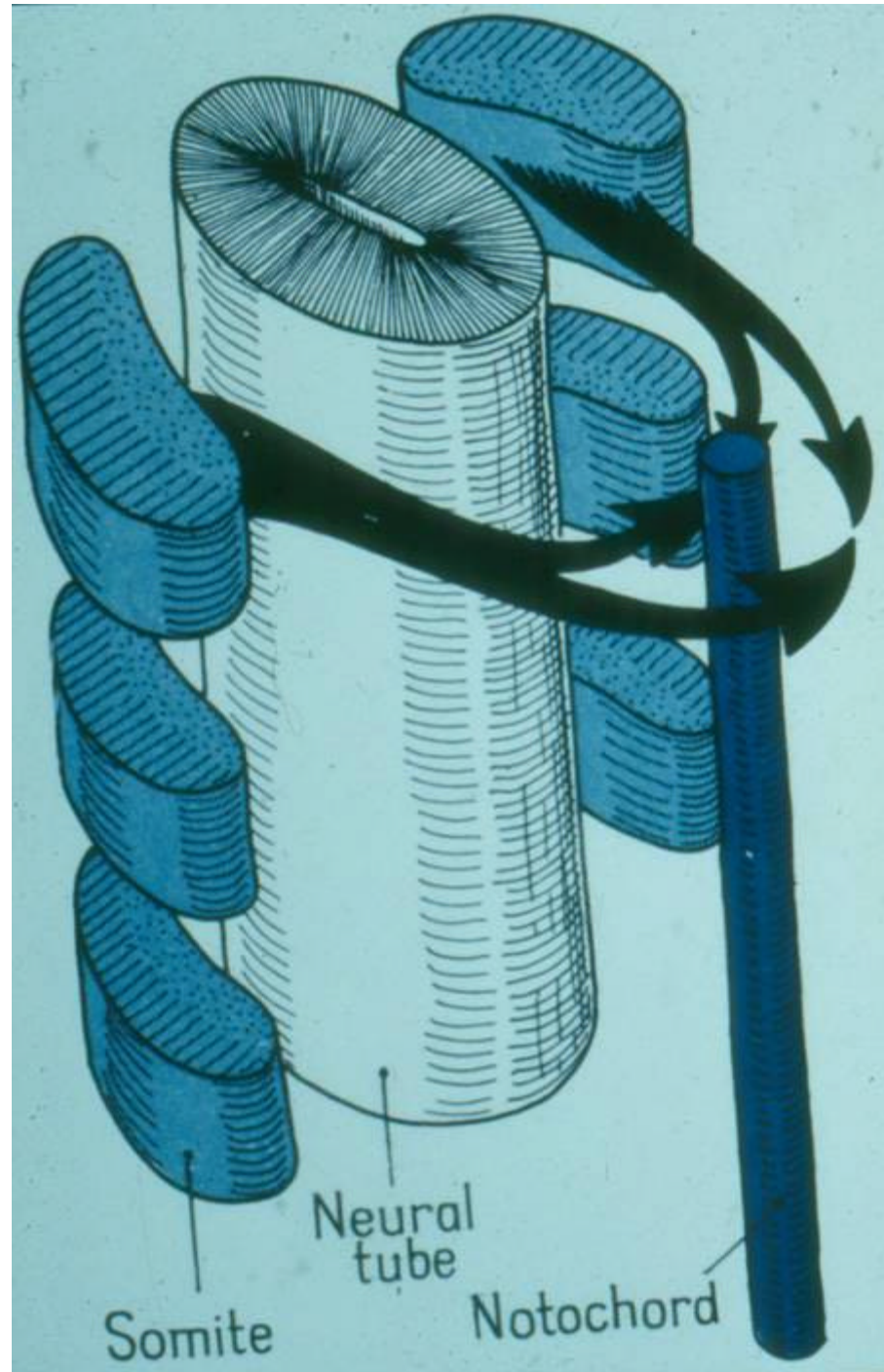
*Week 3; Lecture 1; Wednesday*

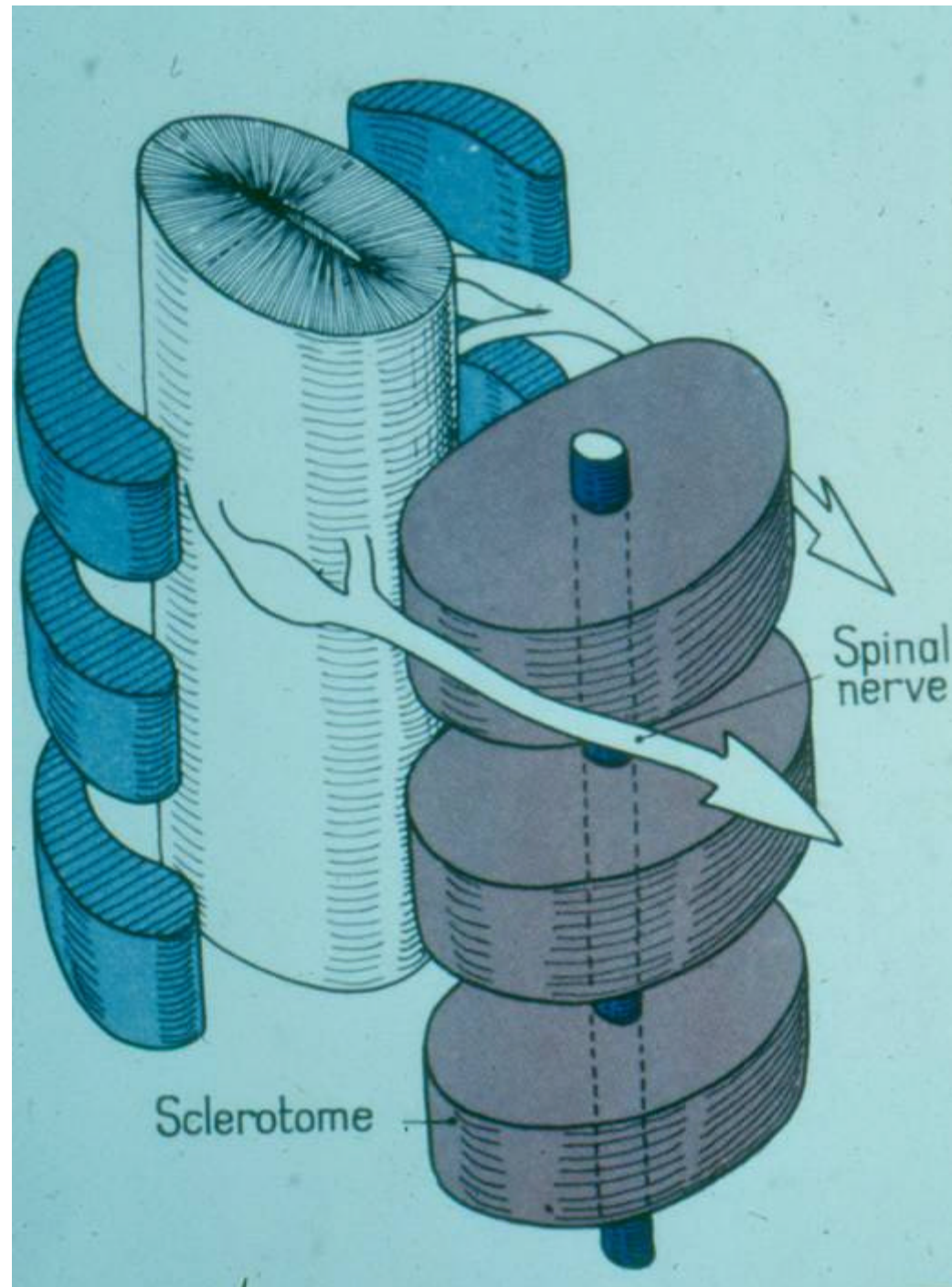
*Dr. Stuart S. Sumida*

# **The Axial Skeleton**

# Axial Skeleton

Development of the skeleton

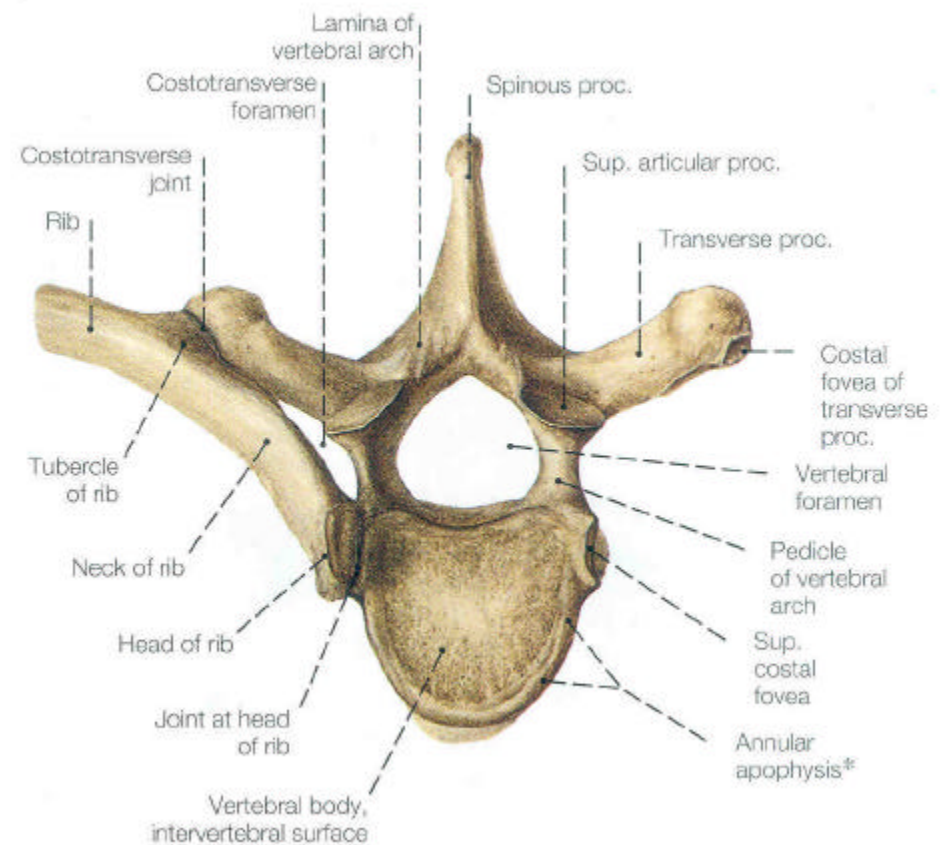
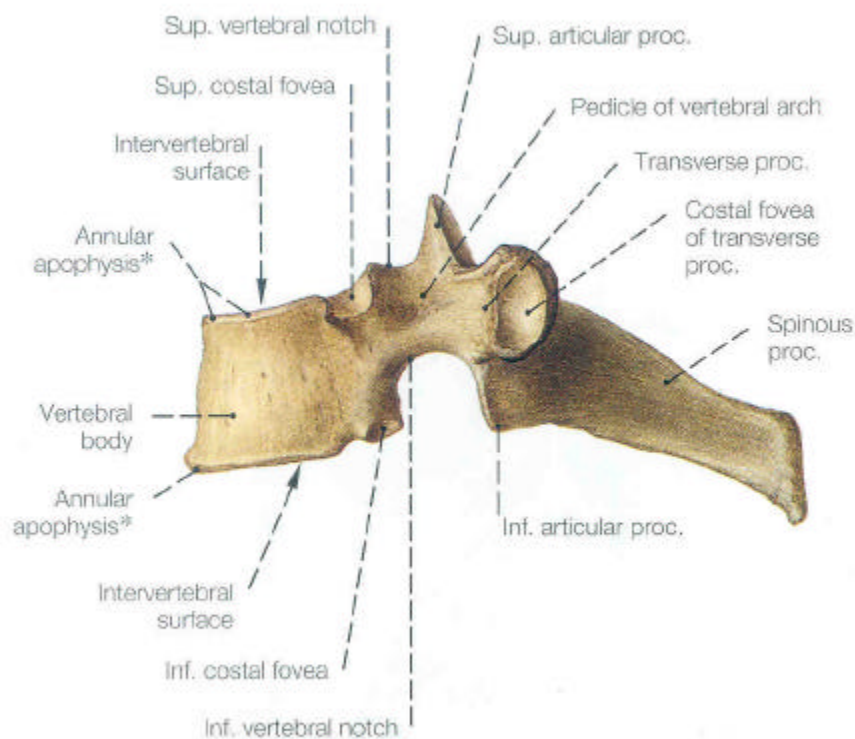




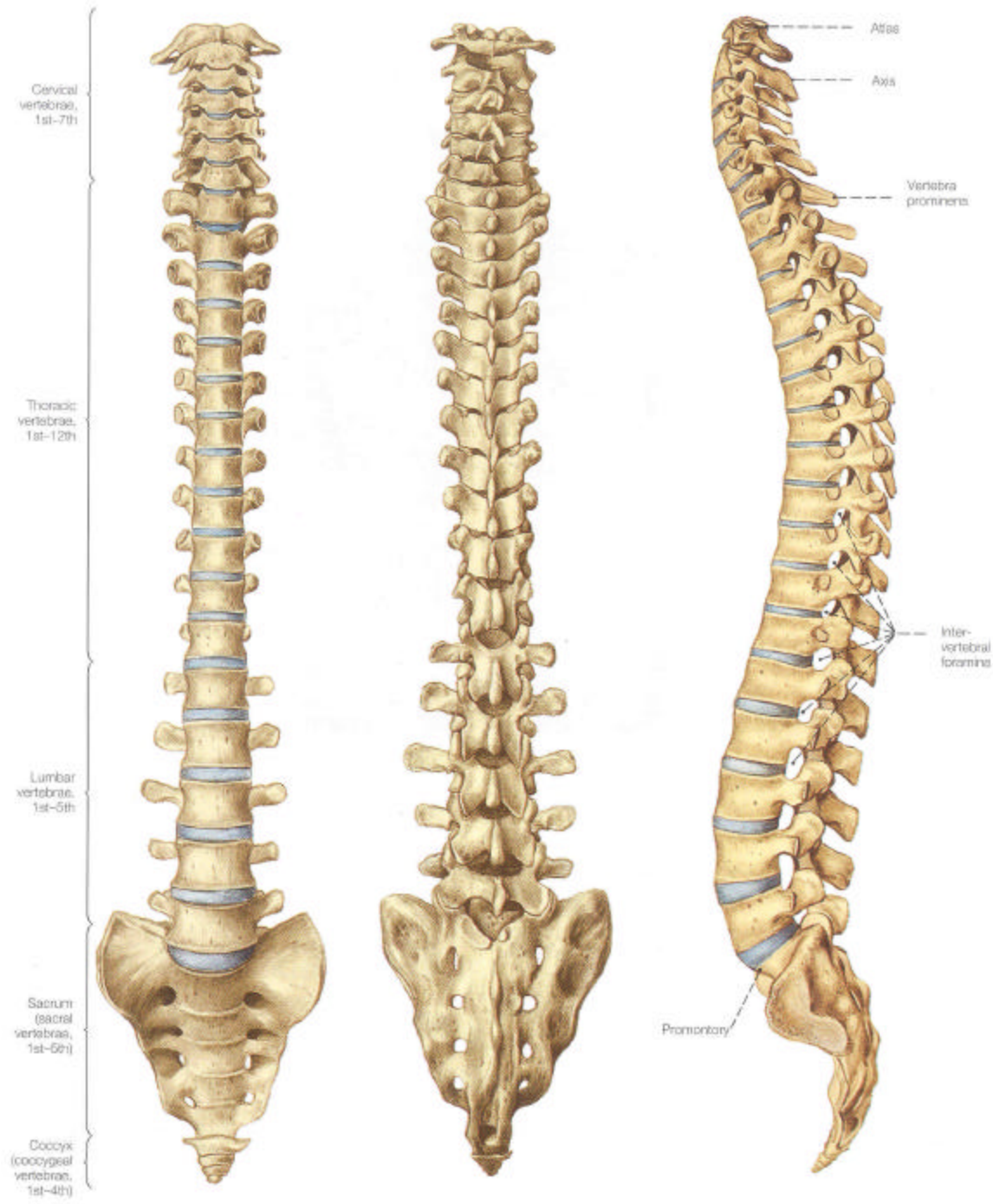


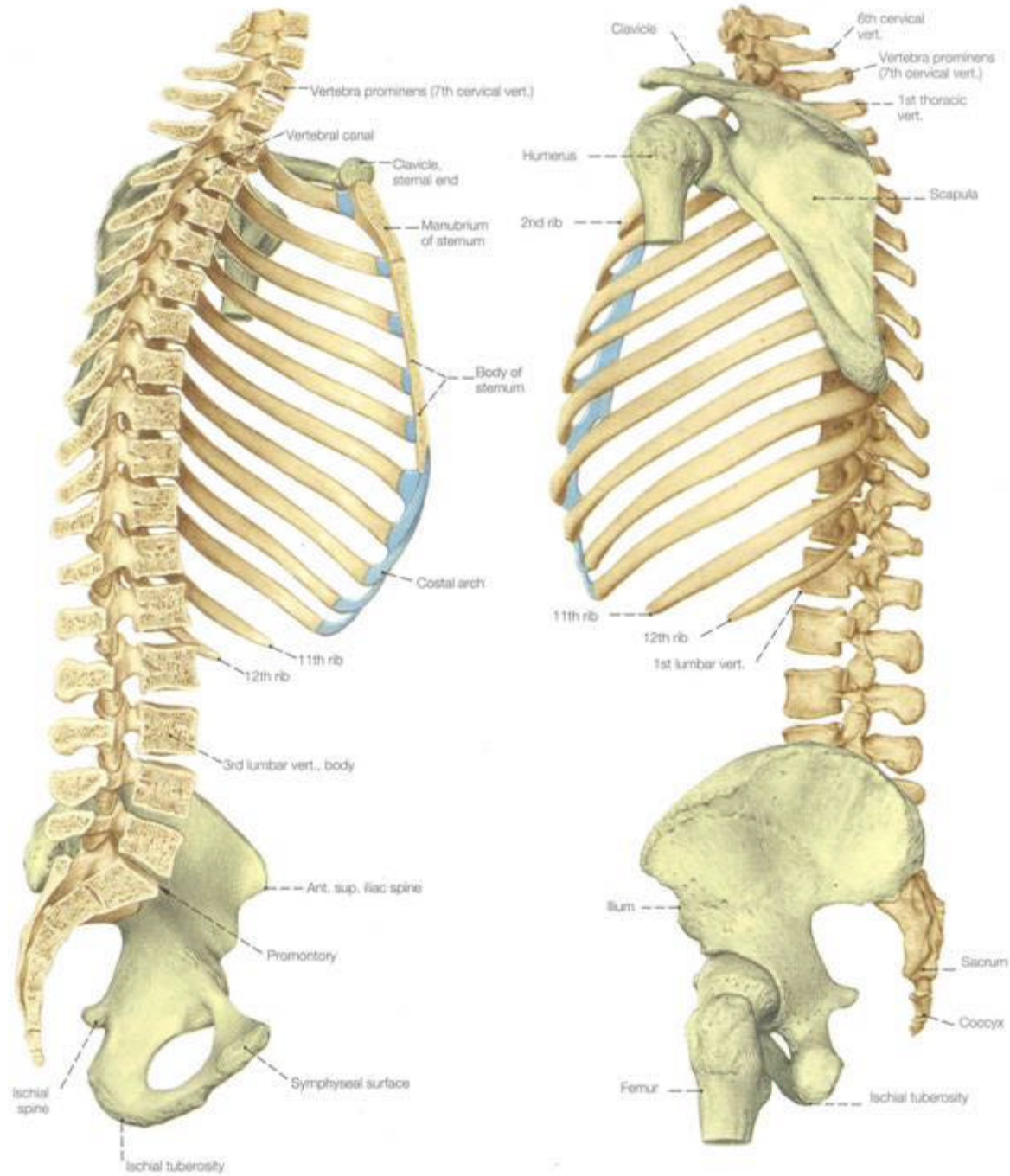
## Structural features of the vertebrae:

- Centrum
- Neural arch
- Transverse processes
- Spinous process
- Zygapophyses











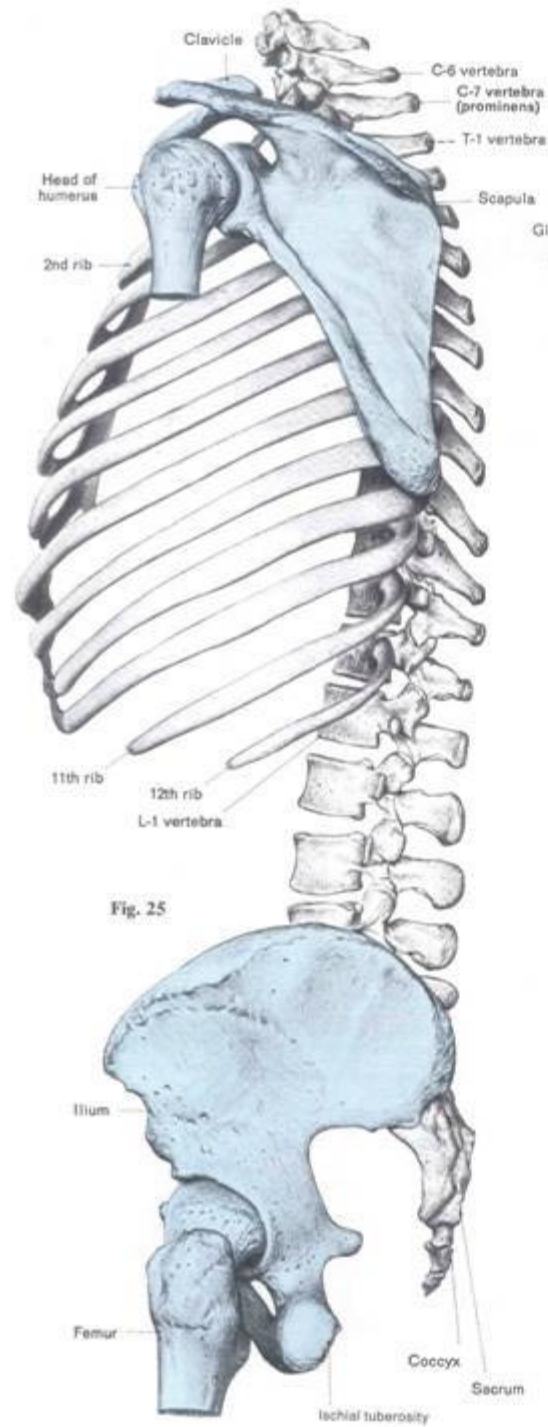


Fig. 25

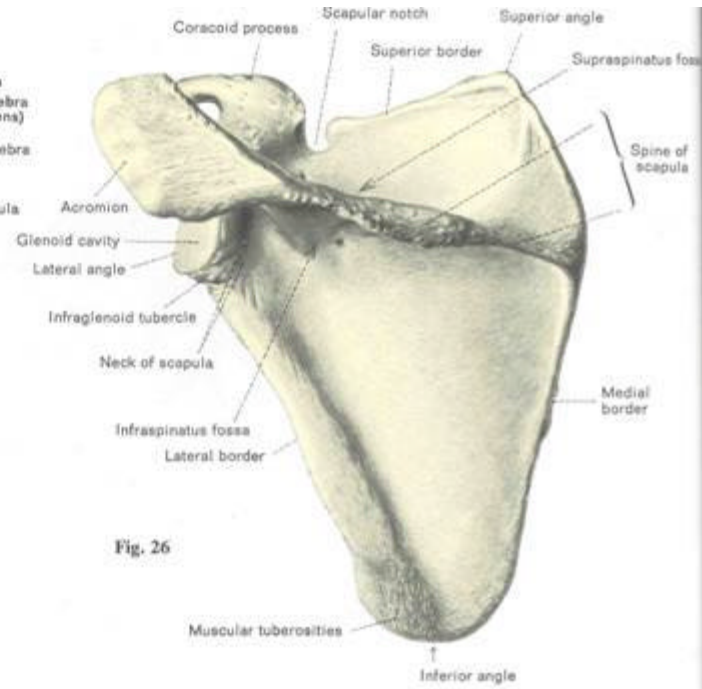


Fig. 26

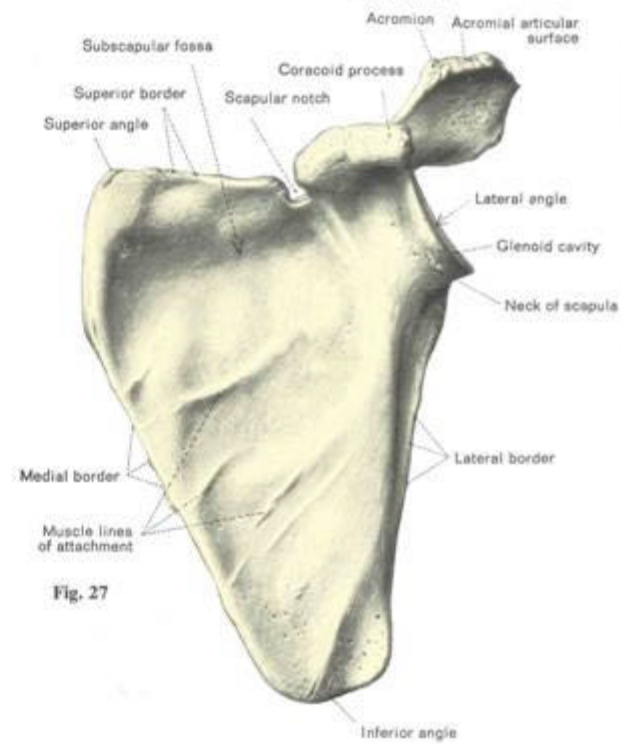
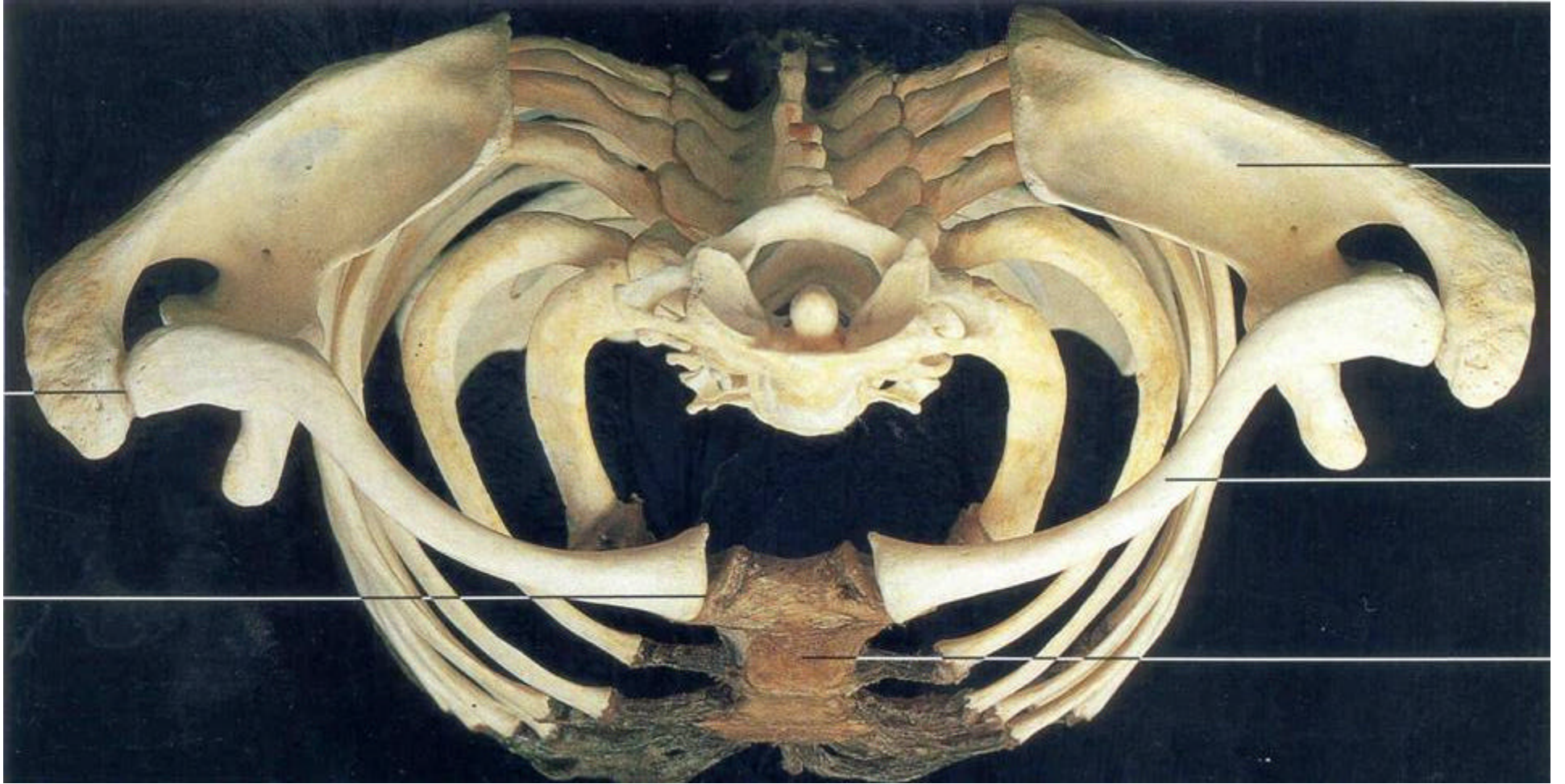
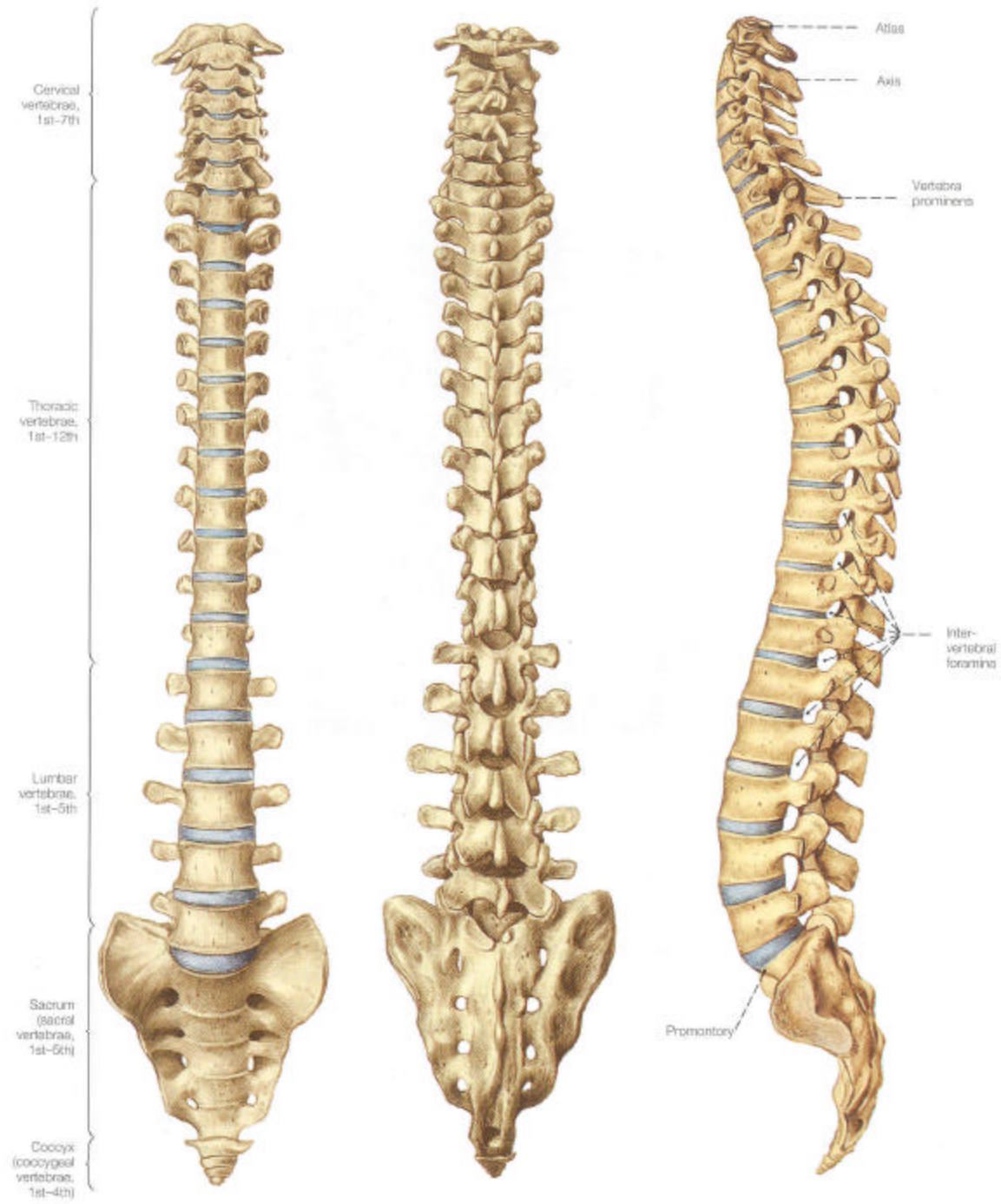


Fig. 27







02-FEB-01

09:41:34AM

4C1 7Hz

H4.0 MHz 100mm

OB

SOFT

60dB -/+1/3/1

GAIN= 0dB  $\Delta=1$

18:0 100%



02-FEB-01

09:42:09AM

4C1 - 8

H4.0 MHz 100mm

OB

SOFT

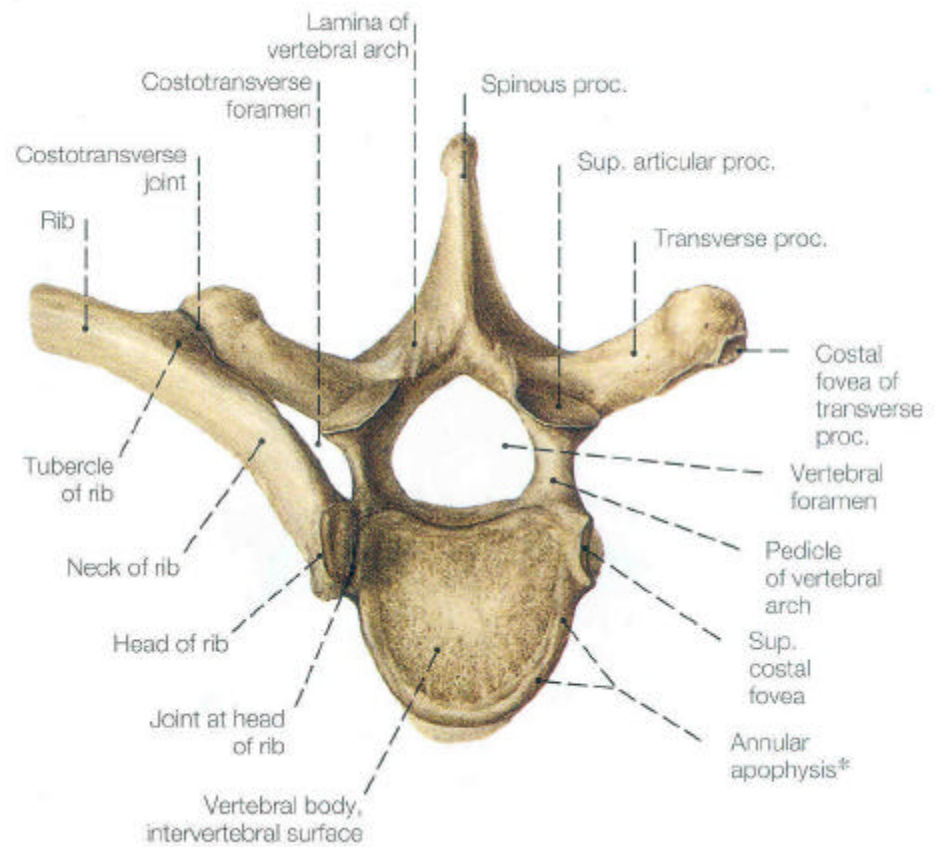
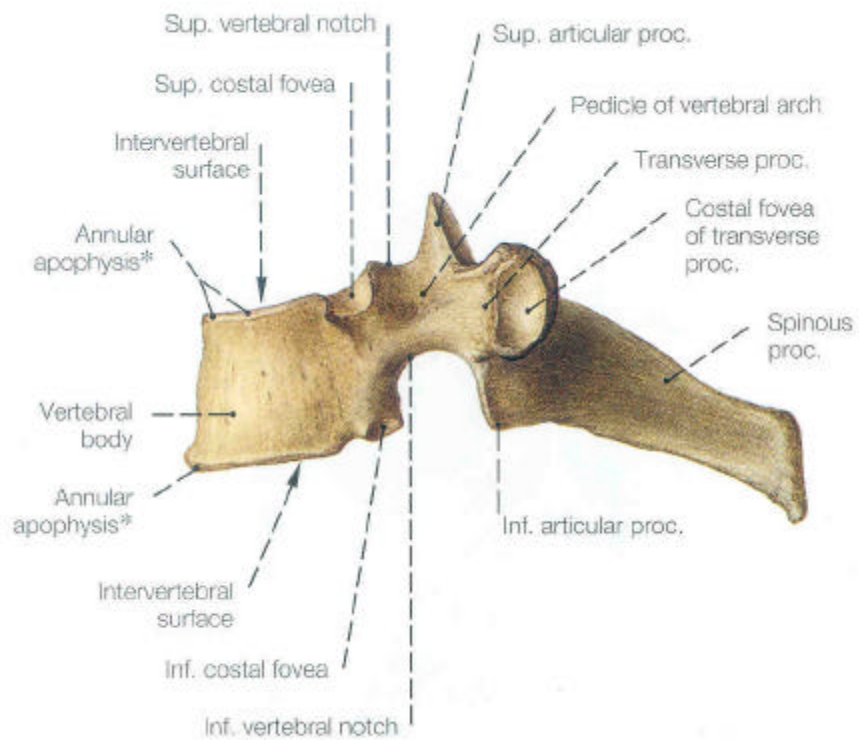
60dB -/+1/3/1

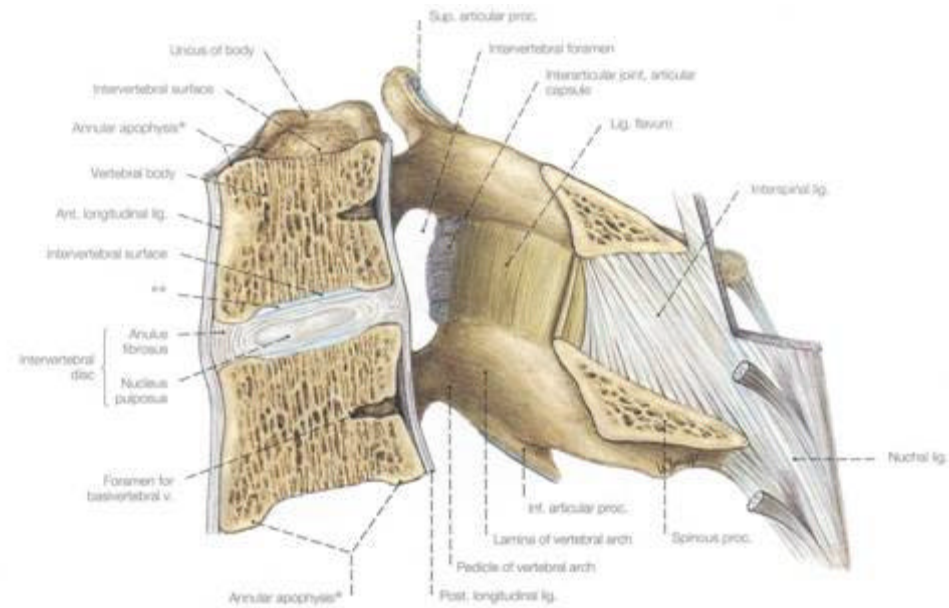
GAIN= 0dB  $\Delta=1$

18:0 100%



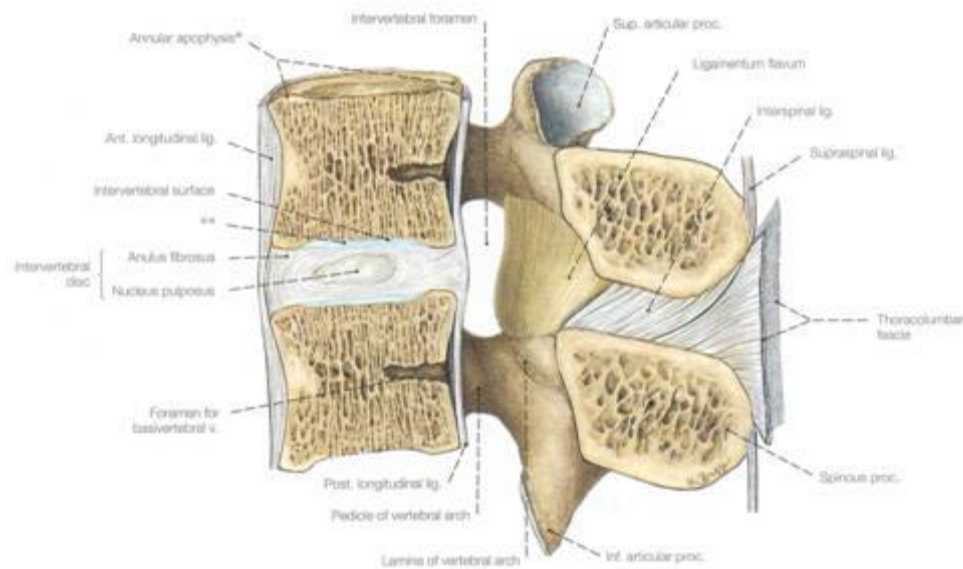






Cervical intervertebral joints,  
schematic of a median section (180%).

- \* Rim of vertebral body
- ++ Hyaline cartilaginous covering of the end plate,  
a nonossified portion of the epiphysis of the  
vertebral body

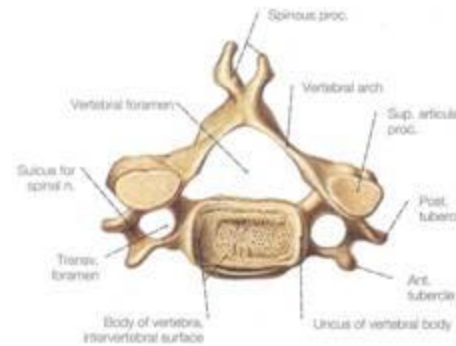


Lumbar intervertebral joints,  
schematic of a median section (100%).

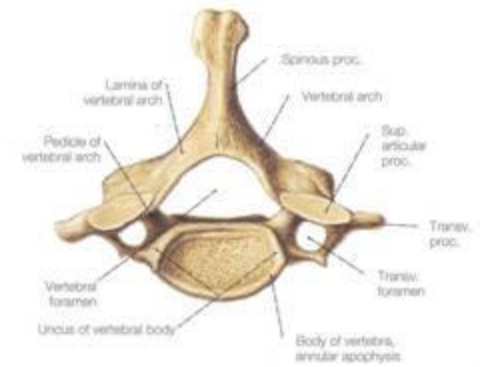
- \* Rim of vertebral body
- ++ Hyaline cartilaginous covering of the endplate,  
a nonossified portion of the epiphysis of the  
vertebral body

# Cervical vertebrae:

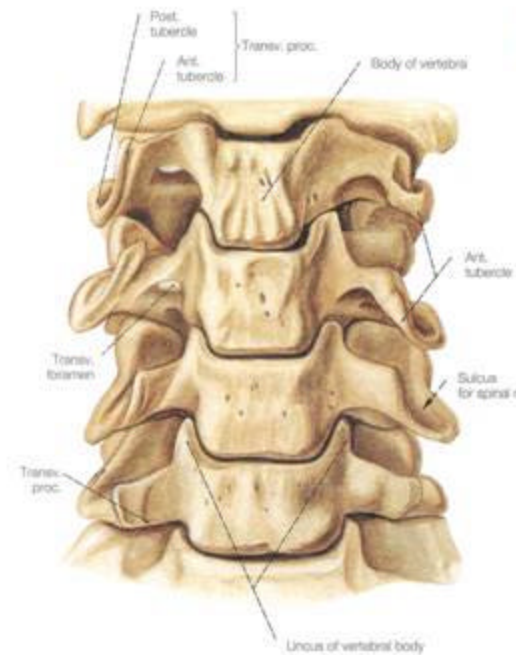
- Transverse foramen
- Vertebral artery



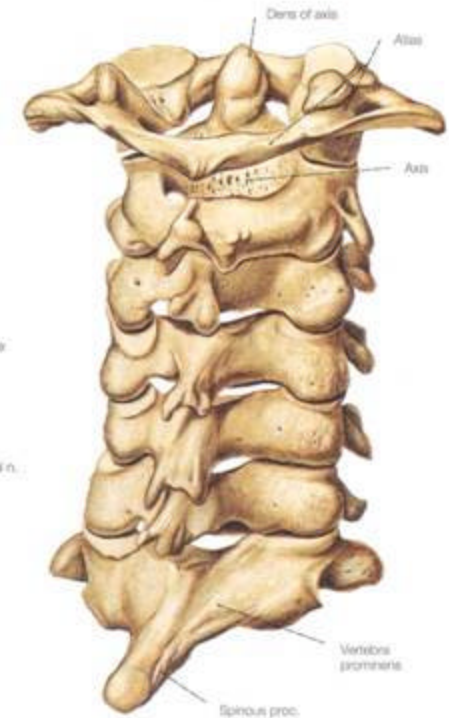
Fifth cervical vertebra, viewed from above (100%).  
The spinous processes of the second to sixth cervical vertebrae are generally split (i.e., bifid).



Seventh cervical vertebra, viewed from above (100%).  
The seventh cervical vertebra is generally distinguished on the basis of its protruding spinous process and is known as the vertebra prominens. Actually, the spinous process of the first thoracic vertebra protrudes even further.



The second to seventh cervical vertebrae, ventral view (120%).

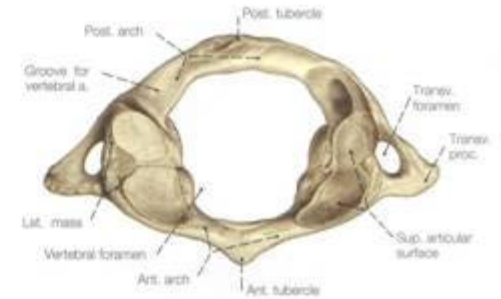


The first to seventh cervical vertebrae, laterodorsal view (110%).

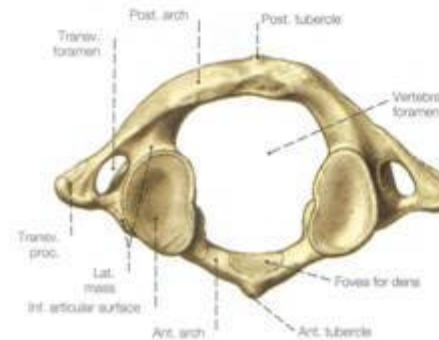
# Atlas and Axis Vertebrae



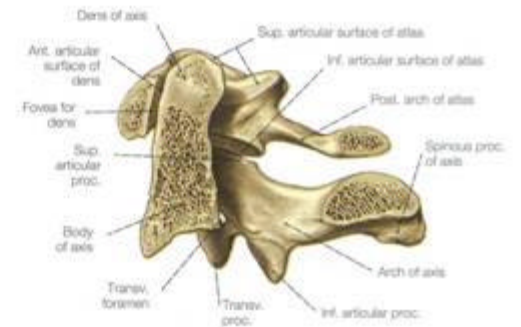
The occipital bone. Segment showing the foramen magnum and the articular surfaces of the atlanto-occipital joint.



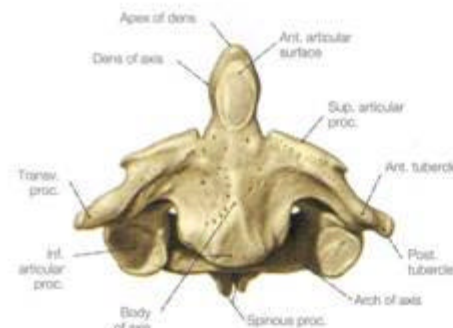
First cervical vertebra, atlas, viewed from above (85%). The arterial vertebral canal shown on the left side is a variant. The superior articular surfaces of the atlas are frequently divided.



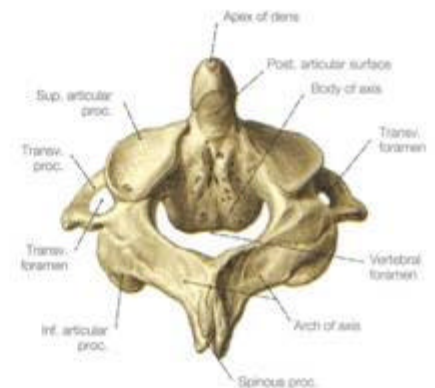
First cervical vertebra, atlas, viewed from below (85%).



First and second cervical vertebrae, atlas and axis, median view of a median sagittal section (90%).



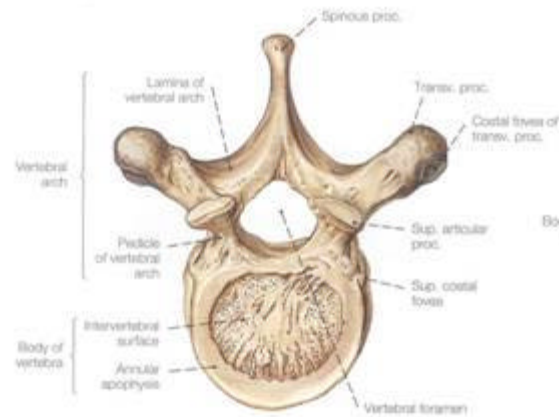
Second cervical vertebra, axis, ventral view (90%).



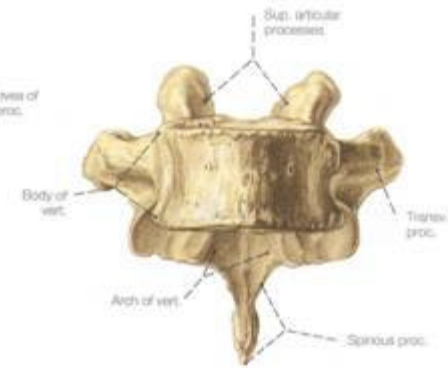
Second cervical vertebra, axis, dorsal view from above (90%).



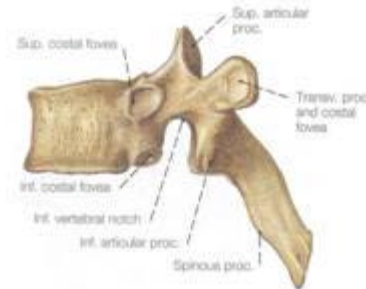
# Thoracic vertebrae



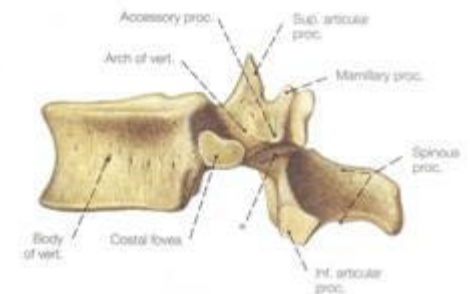
Tenth thoracic vertebra, viewed from above (90%).



Tenth thoracic vertebra, ventral view (90%).

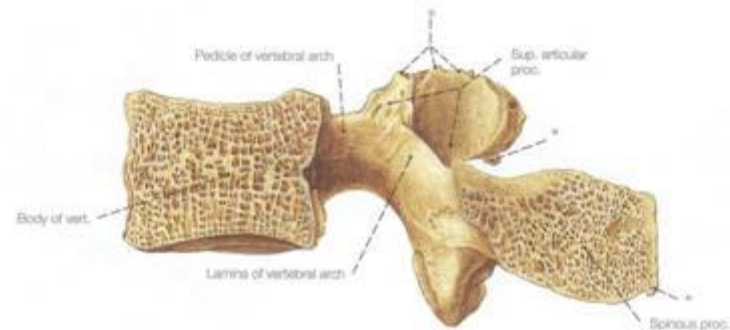


Sixth thoracic vertebra, viewed laterally from the left (90%).



Twelfth thoracic vertebra, viewed laterally from the left (80%).

\* Region of the vertebral arch between the superior and inferior articular processes ("isthmus" = interarticular portion)

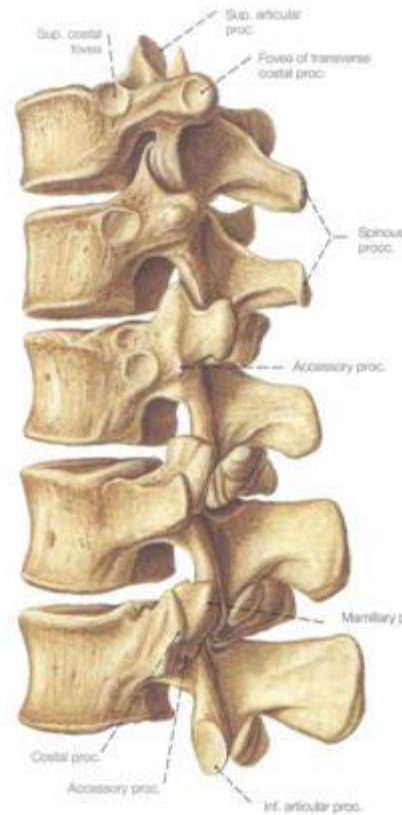


Third lumbar vertebra, medial view of a median sagittal section (110%). Specimen from an elderly person.

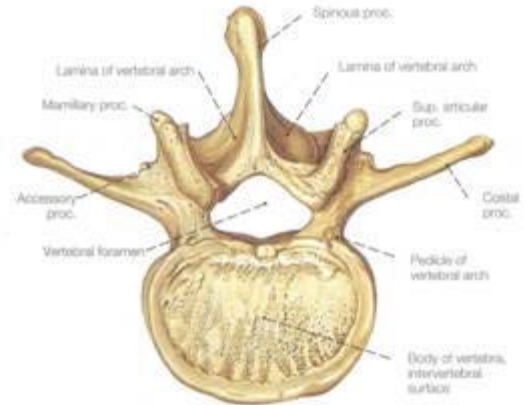
\* Ossification of the ligamentous insertions



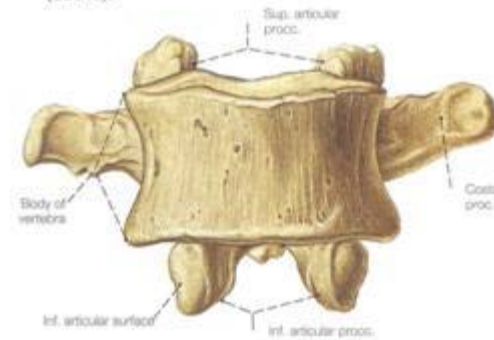
# Lumbar vertebrae



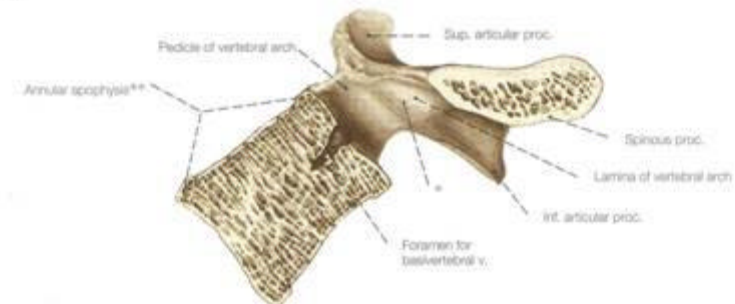
The tenth to twelfth thoracic vertebrae and the first and second lumbar vertebrae, laterodorsal view (70%).



Fourth lumbar vertebra, viewed from above (100%).



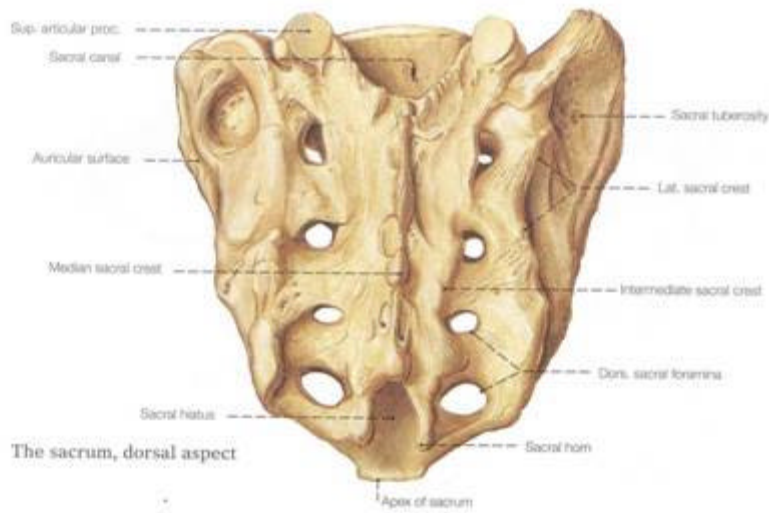
Fourth lumbar vertebra, ventral view (100%).



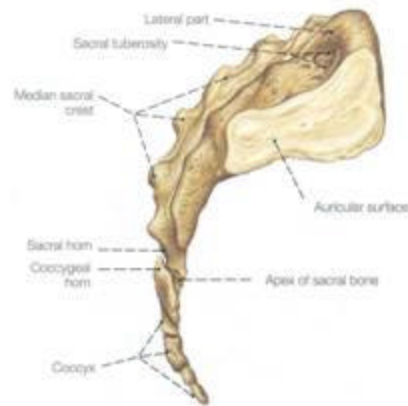
Fifth lumbar vertebra, medial view of median sagittal section (100%). Note the characteristic wedge-shape of the body of the 5th lumbar vertebra.

\* The region of the vertebral arch between the superior and inferior articular processes where, possibly due to excessive local flexion loads, a cleft bridged by connective tissue (spondylolysis) can form at the fifth (more seldom at the fourth) lumbar vertebra with subsequent slippage of the body of one vertebra on the vertebra below it (spondylolisthesis).

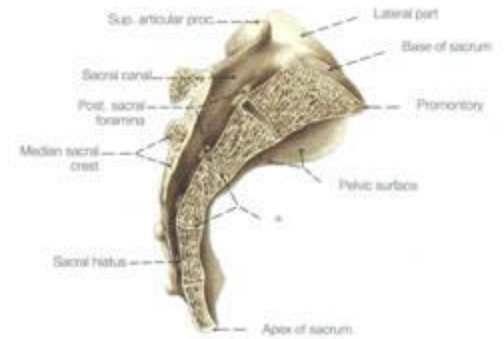
\*\* In this specimen, the anterior border is pathologically oblique.



The sacrum, dorsal aspect (60%).

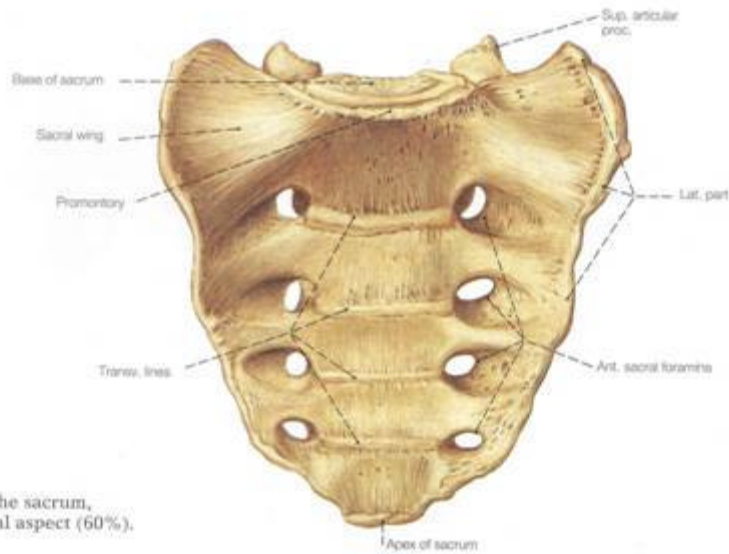


The sacrum, viewed laterally from the right (45%).

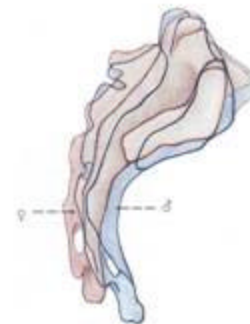


The sacrum, medial view of a median sagittal section (45%).

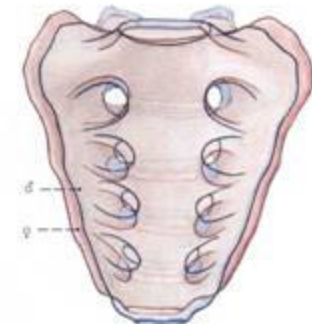
\* Remnants of intervertebral disc tissue persist in adults.



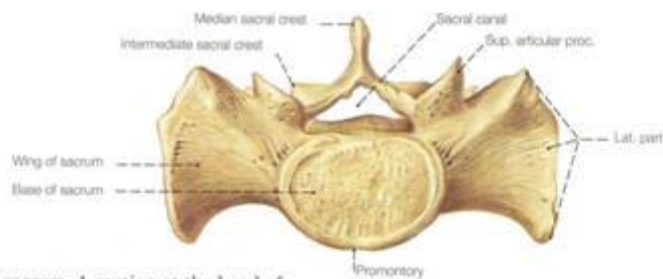
The sacrum, ventrocaudal aspect (60%).



The sacrum, lateral aspect. Gender differences.



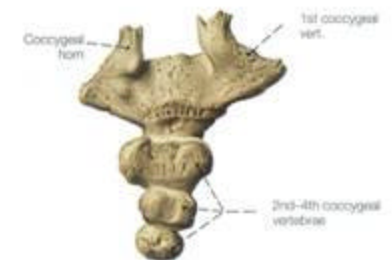
The sacrum, ventral aspect. Gender differences.



The sacrum. A section at the level of the second sacral vertebra, viewed from above (55%).

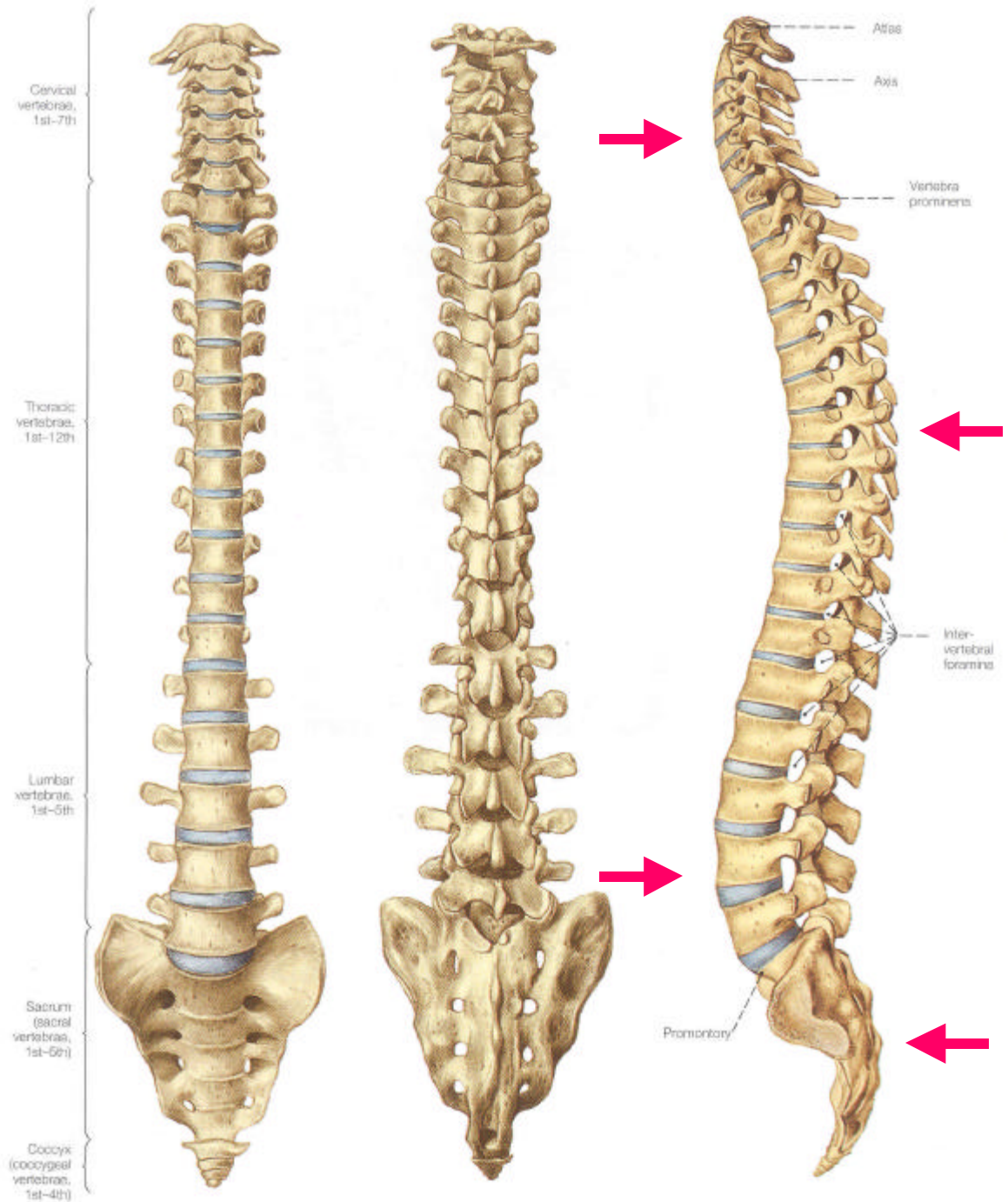


The coccyx, ventral view from above (105%). Despite variations in the formation of the intervertebral discs, all postsacral vertebral elements are jointly termed the coccyx.



The coccyx, dorsocaudal aspect (105%).

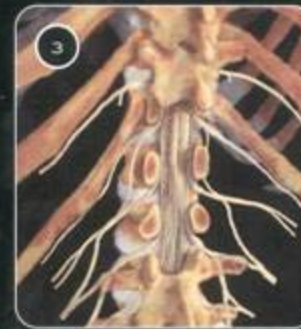
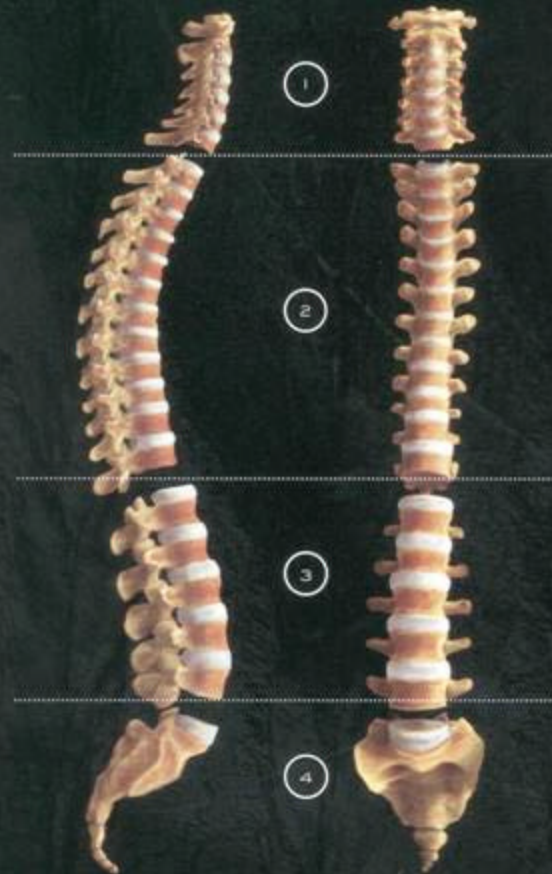
# 4 Distinct Curvatures of the Vertebral Column



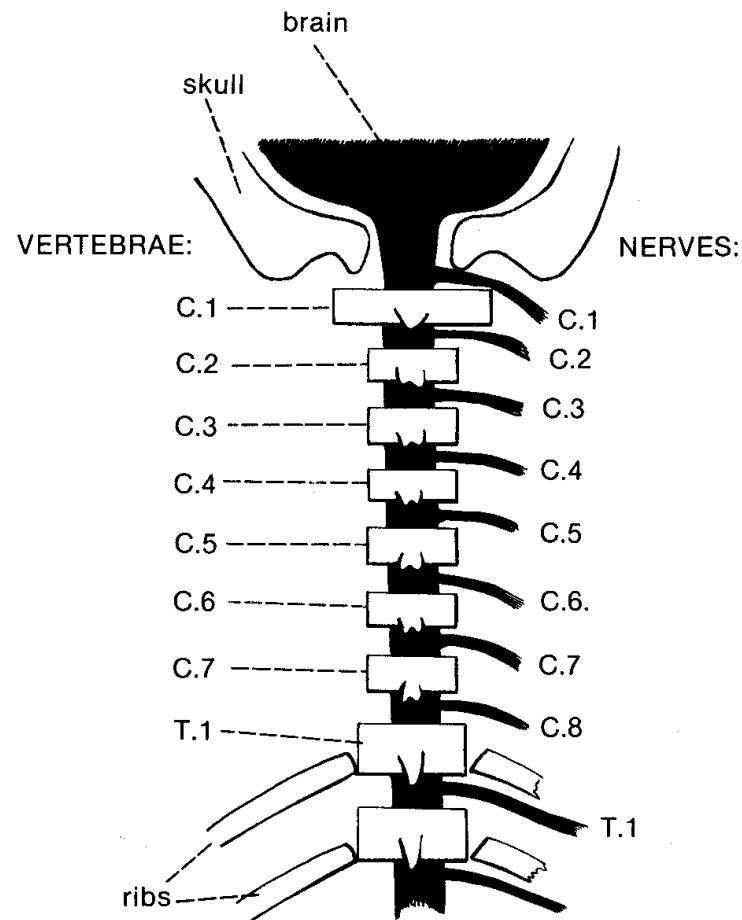


## DIFFERENT REGIONS. DIFFERENT SHAPES

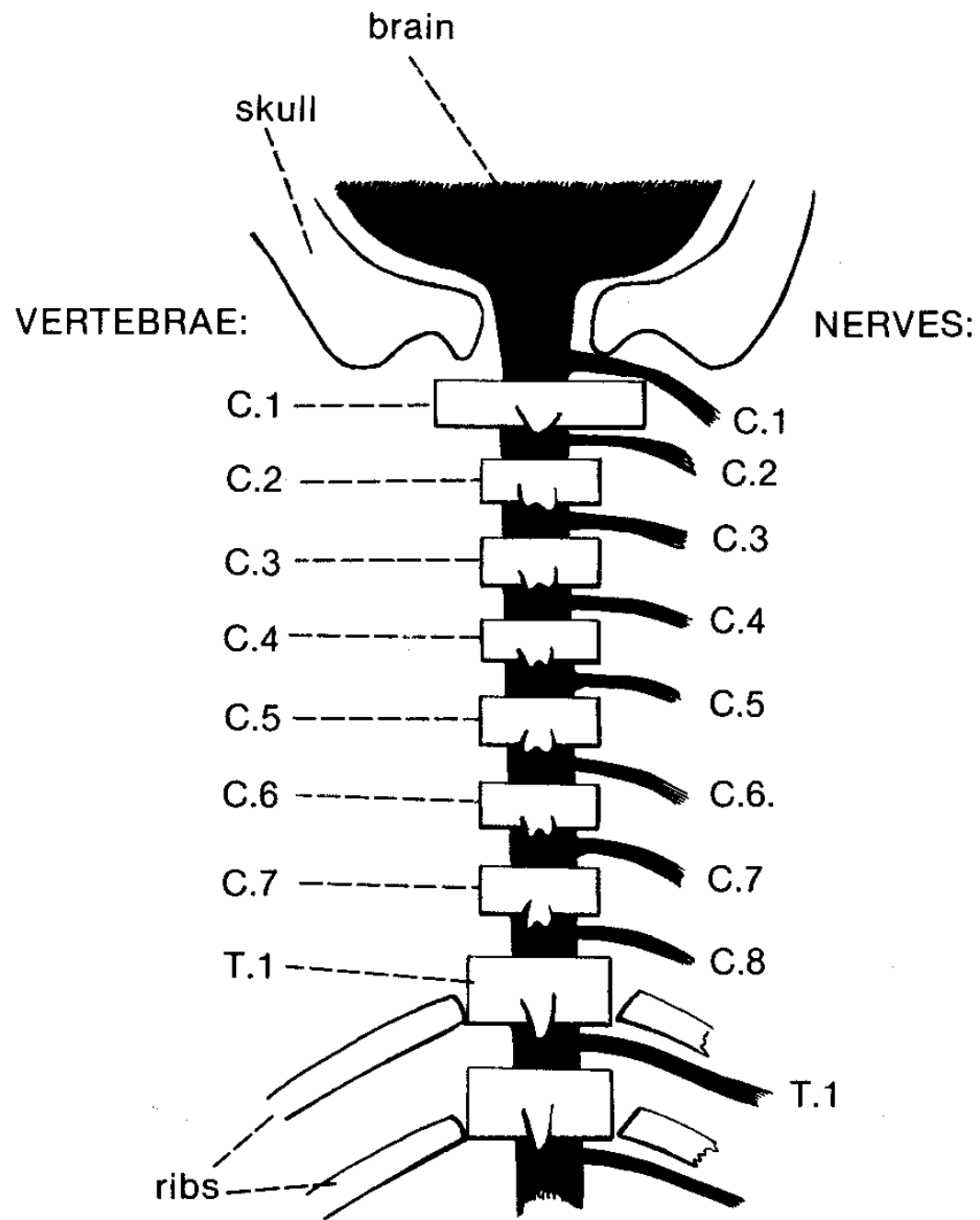
Each section of the spine is designed for a specific purpose. The flattened vertebrae on top support the head and neck; those behind the chest anchor the rib cage; and those at the base are thick, wide, and strong, to bear weight and provide stability.

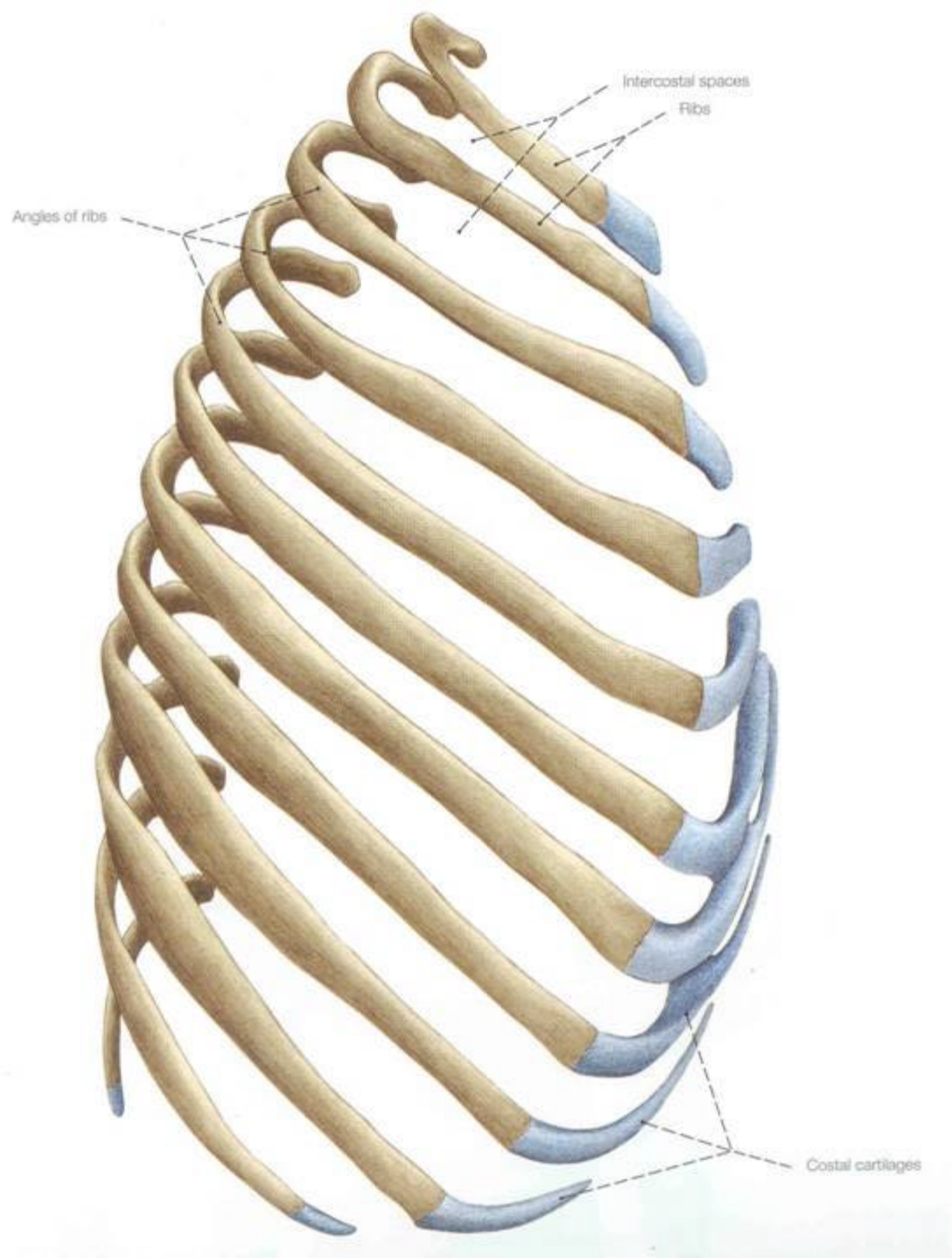


- Characteristic number of vertebrae in each region
- Segmental spinal nerves
- Number system for the spinal nerves
- (See pages 68-69 of your lab manual.)



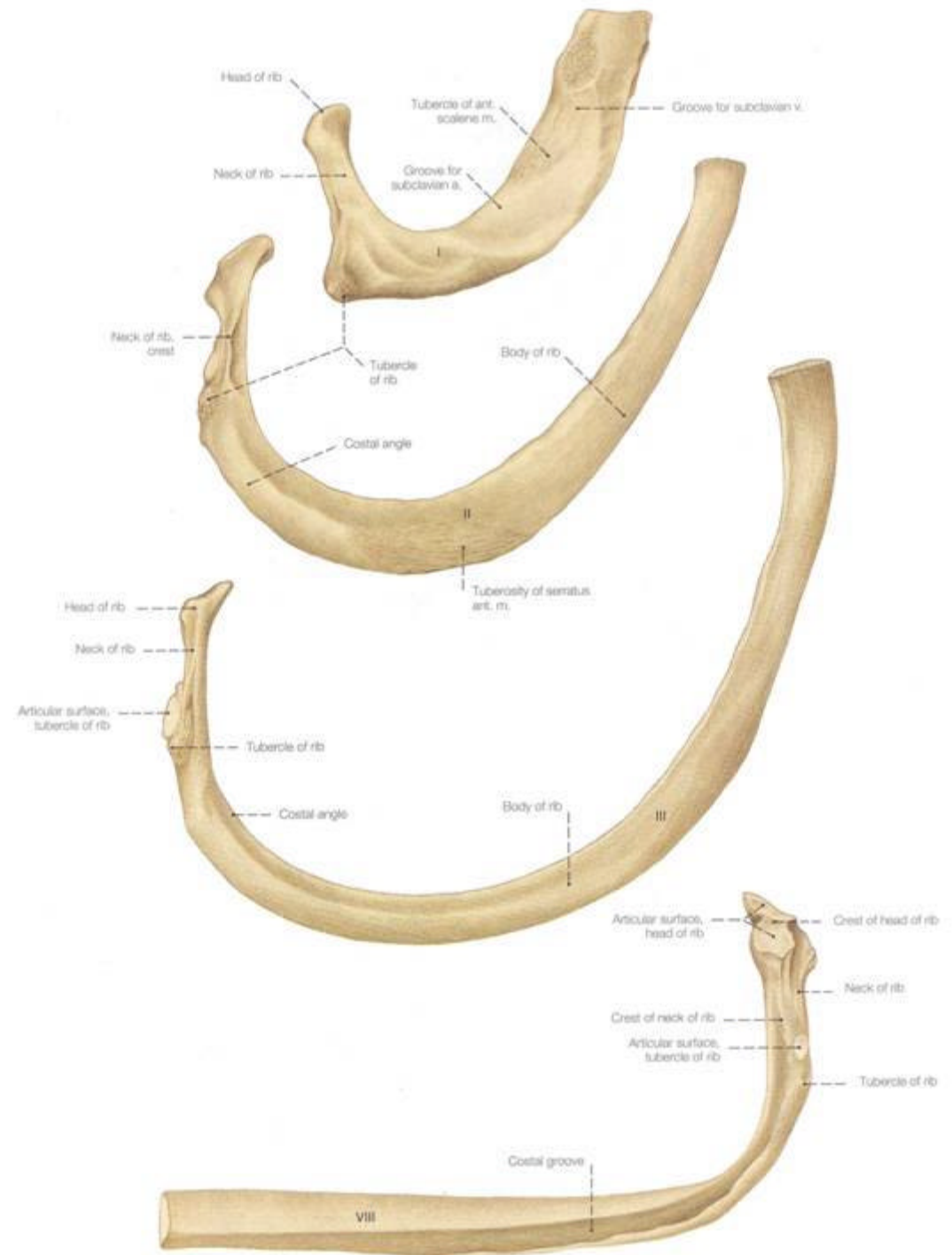


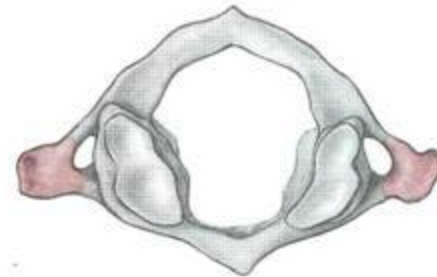
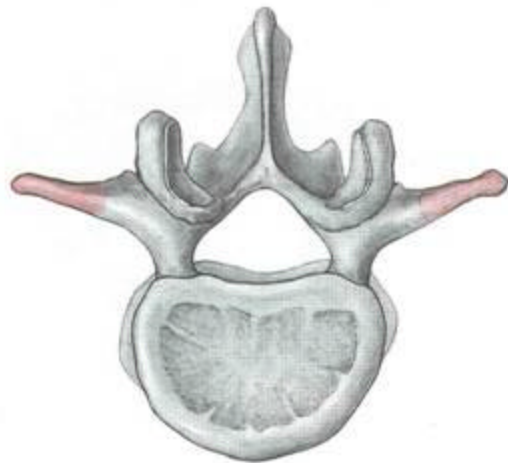
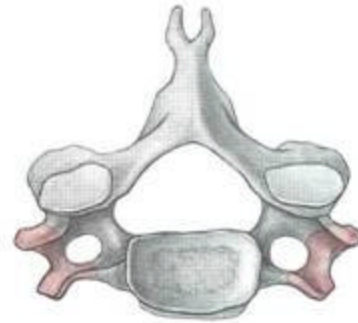
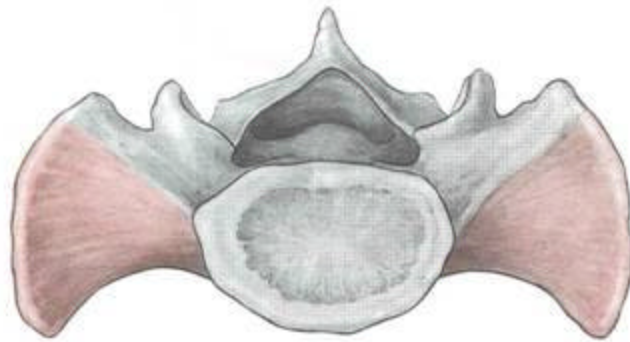
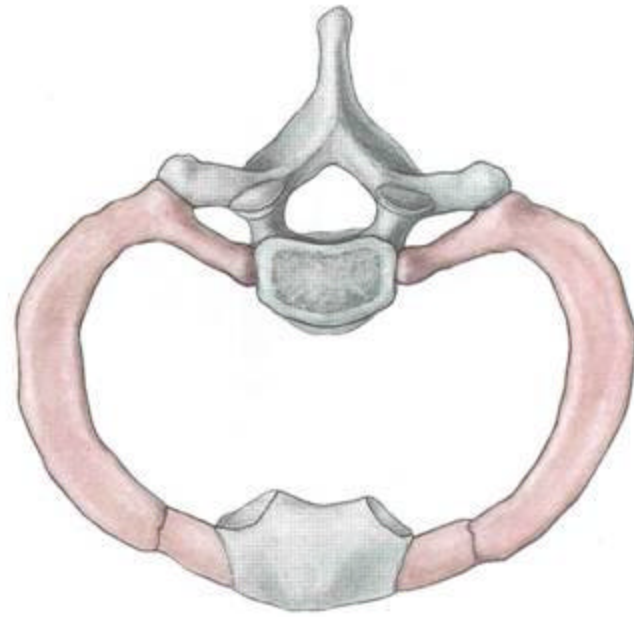


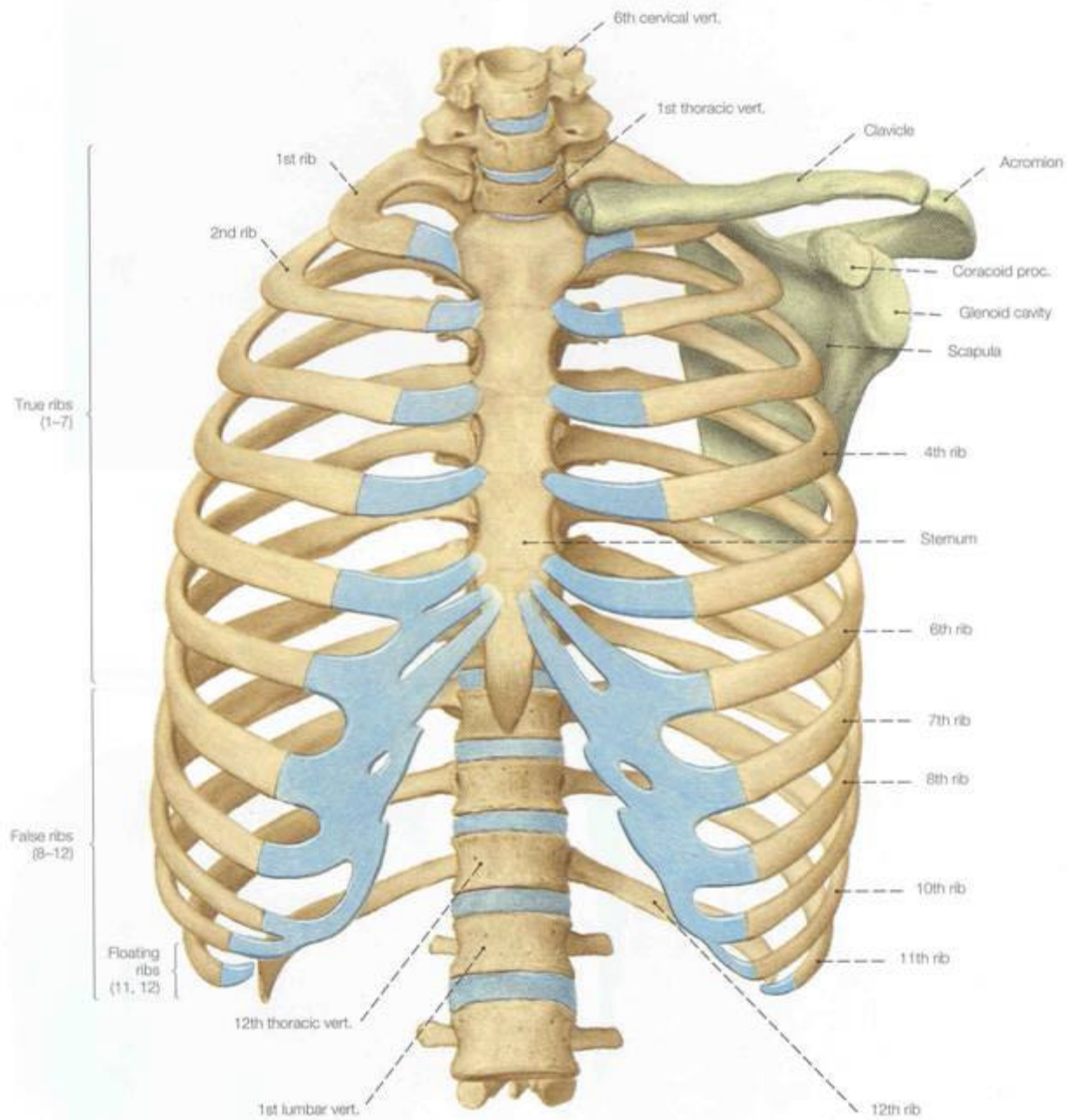


# Ribs – Know:

- Difference between "true ribs," "false ribs," and "floating ribs."
- Body or shaft
- Head of the rib
- Tubercle



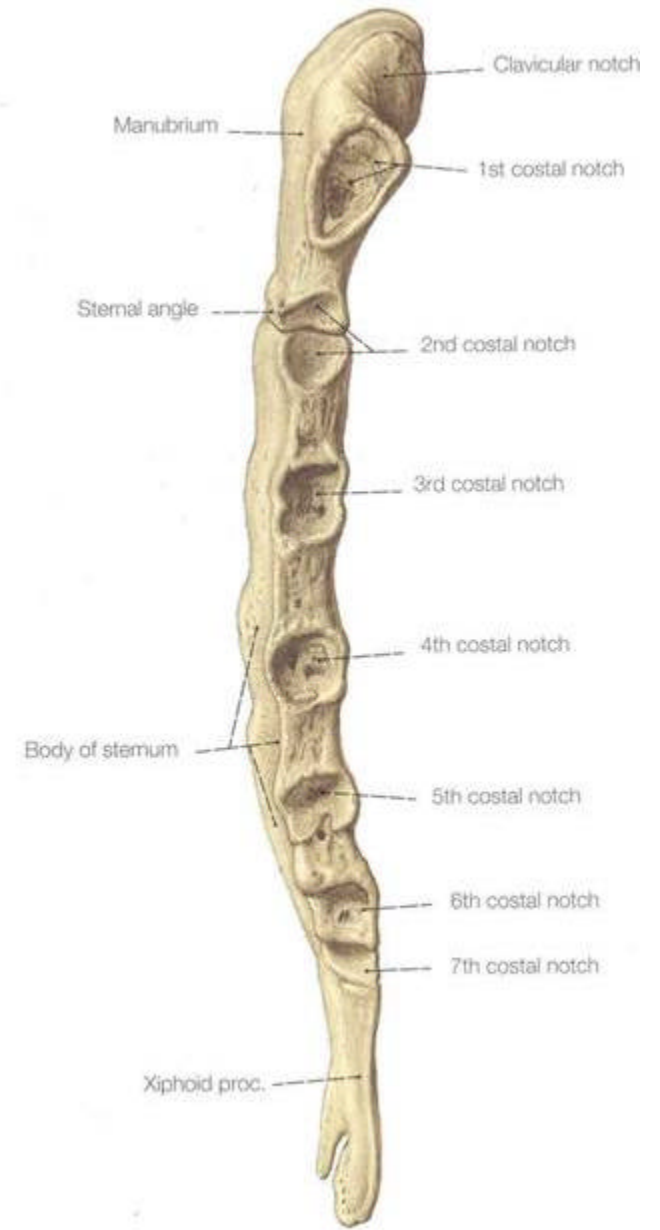
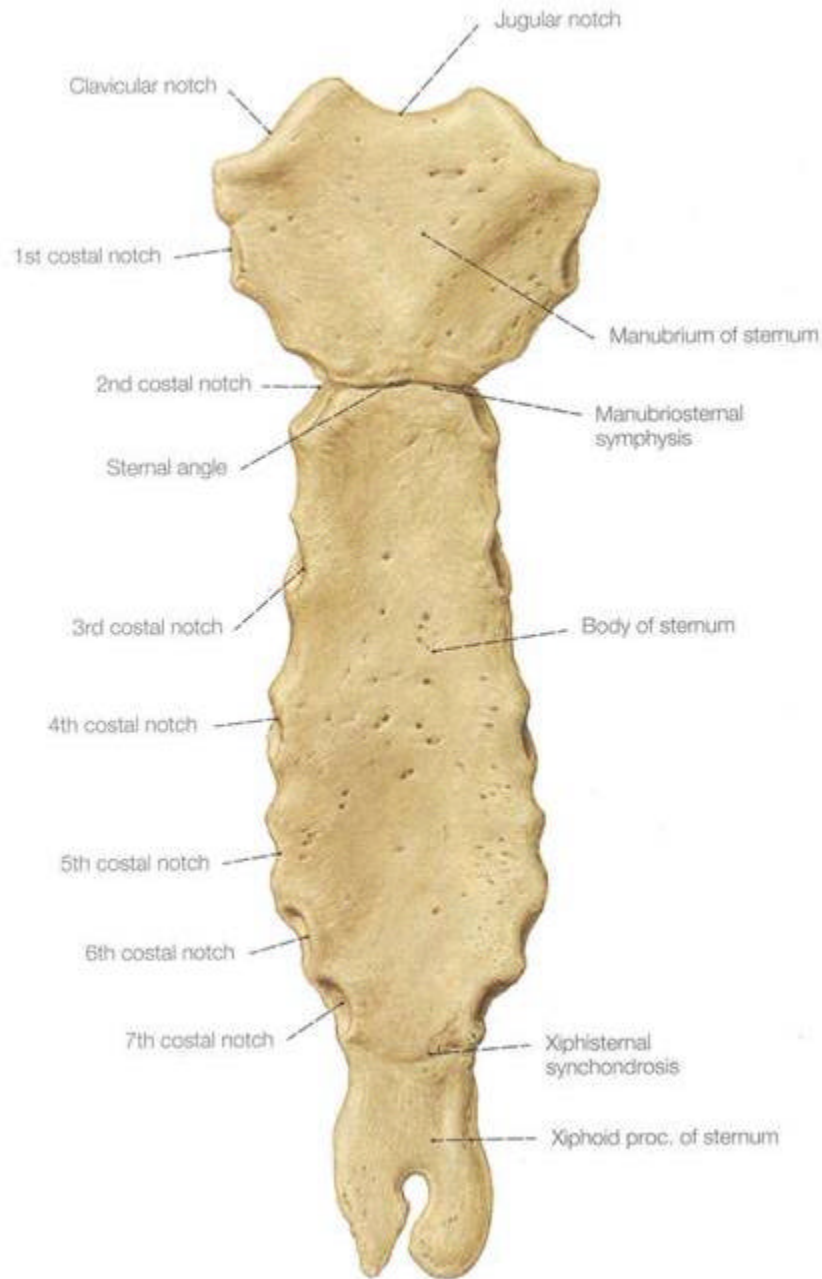


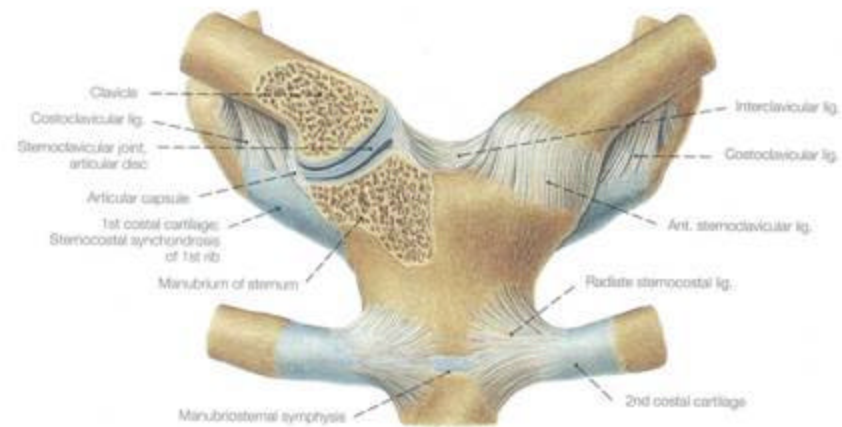
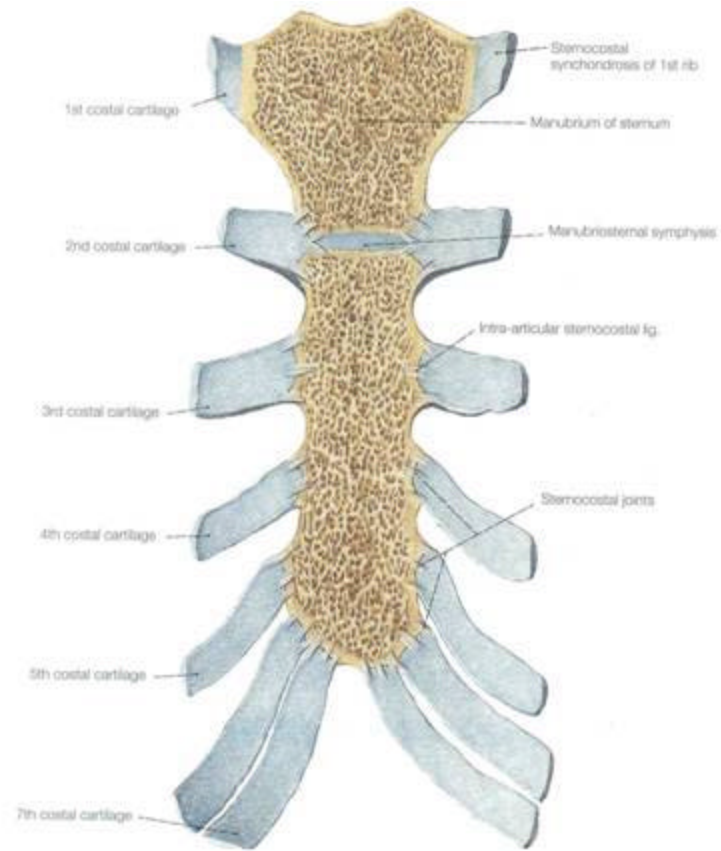




# Sternum

- Body
- Manubrium
- Xiphoid process





# Functions of the Axial Skeleton

- Support
- Protection
- Respiration

