

IDENTIFICATION OF AXIAL BONES

Background: ^[1]

Hard external and internal structure of our body constitute the skeleton. The skeleton which is external is known as exoskeleton. For example nails, hair etc. The endoskeleton consists of those hard parts which are present inside the body of animal.

Functions Of Skeleton: The main functions of endoskeleton are as follows-

- 1) Support: One of the main functions of skeleton is to give support to the softer body parts.
- 2) Protection: The endoskeleton protects the delicate body parts.
- 3) Muscle attachment: The endoskeleton parts provide attachment for large muscles.
- 4) Movement: Due to contraction of muscles, the bones or parts of the bones are able to change their position. Thus, the bones help in bringing about movement also.
- 5) Body form: It forms a typical body shape and form of an individual animal.
- 6) Blood cell formation: The red blood corpuscles and white blood corpuscles and platelets are produced by bone marrow.
- 7) Mineral reservation: The bones maintain the phosphorus and calcium level of the blood.
- 8) Helps in breathing and hearing: The cartilage of the larynx, trachea, sternum and ribs are helpful in breathing while ear bones of middle ear transmit sound vibration from tympanic membrane to the internal ear.

On the basis of position of skeletal structure of the body, the endoskeleton is divisible into two parts:

- i. Axial Skeleton
- ii. Appendicular skeleton

The aim of the experiment is to study the human axial skeletal system.

REQUIREMENT: Skeletal system model.

Defination of axial skeleton: It is present on the median longitudinal axis of body. It consists of skull, vertebral column, sternum and ribs. It includes 80 bones which are as follows-

1. SKULL ^[1,2]

Skeleton of head is called skull. It rests upon upper end of vertebral column. Its bony structure consists of the following parts:

- a) Bones Of Cranium: The cranium is formed by 8 bones. The bones which form the cranium are- **1 frontal bone, 2 parietal bones, 2 temporal bones, 1 occipital bone, 1 sphenoid bone and 1 ethmoid bone.** The frontal bone is the bone of the forehead. This is involved in the formation of orbital cavities and

the prominent ridges above the eye. The parietal bones are two in number which forms the sides as well as the skull. The temporal bones lie on each side of the head. The occipital bone forms the back of the head. The sphenoid bone is a bat shaped bone with its wings out stretched and it occupies the middle portion of the base of the skull. The ethmoid bone occupies the anterior part of the base of the skull.

- b) Ear Ossicles: There are present 6 ear ossicles in the skull- **2 malleus (Hammer shaped), 2 incus (Anvil shaped) and 2 stapes (Stirrup shaped).**
- c) Hyoid Bone: 1 in number. This is an isolated horse shoe shaped bone. It provides support and protection to the throat.
- d) Bones Of The Face: There are 14 bones which form the skeleton of the face- **2 zygomatic bones, 2 maxilla, 2 nasal bones, 2 lacrimal bones, 1 vomer, 2 palatine bones, 2 inferior nasal conchae, 1 mandible.** Zygomatic bone forms the cheek . Maxilla forms the upper jaw. Nasal bones form the lateral and superior surfaces of the bridge of the nose. Lacrimal bones lies in the posterior and lateral position to the nasal bones. Vomer is a thin flat bone that extends upward from the middle of the hard palate and separate the two nasal cavities.

Palatine bones are “L” shaped bone which form the posterior part of hard palate. The two nasal conchae forms the lateral part of nasal cavity. Mandible is one of the strongest bones of the body and is the only movable bone of the skull.

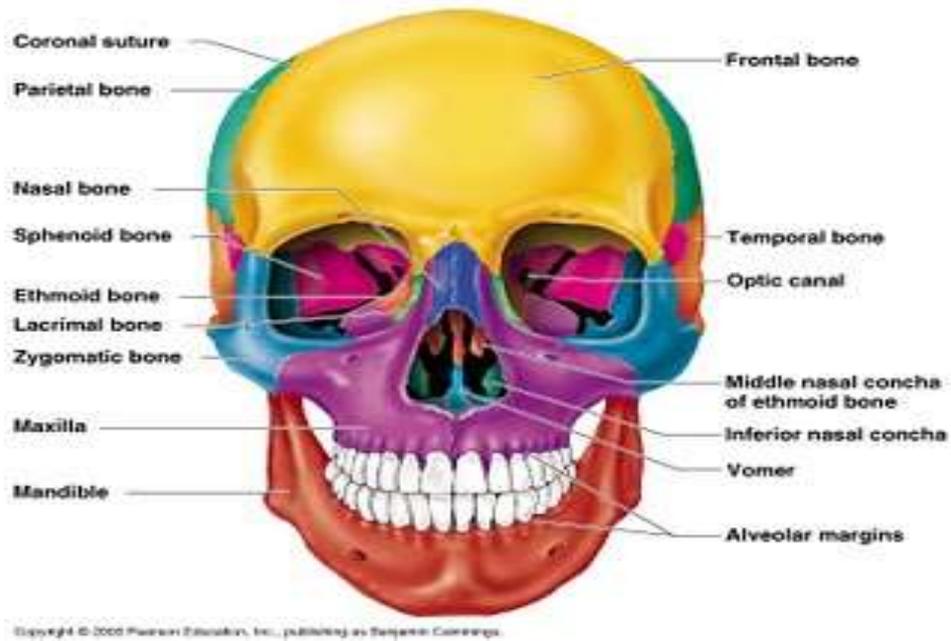


FIGURE: Showing Bones Of Skull

2. VERTEBRAL COLUMN (Back Bone) ^[1,2]

The vertebral column is about 71 cm long. It lies in the mid dorsal line of the neck and trunk. It is made up of 33 vertebrae. The vertebrae are grouped into 5 groups-

- a) **Cervical Vertebrae:** 7 in number, present in neck. First cervical vertebra is called atlas. Second cervical vertebra is called axis.
- b) **Thoracic Vertebrae:** 12 in number, present in chest. They are larger and stronger than the cervical vertebrae.
- c) **Lumbar Vertebrae:** 5 in number, present in abdomen. They are the largest and strongest in vertebral column.
- d) **Sacrum:** 5 sacral vertebrae are fused in the adult forming one structure called the sacrum.
- e) **Coccyx:** The four coccygeal vertebrae are fused to form a curved triangular bone called coccyx. It is considered as vestigial tail.

The vertebral formula of human is **C₇T₁₂L₅S₍₅₎C₍₄₎** .

A typical vertebra shows the following structure:

1. **A body:** A body is present anteriorly in each vertebra. It is smaller in the cervical region and larger towards the lumbar end.
2. **A neural arch:** This arch encloses a large foramen called as vertebral foramen. There is presence of transverse processes. The spinous process projects backwards.

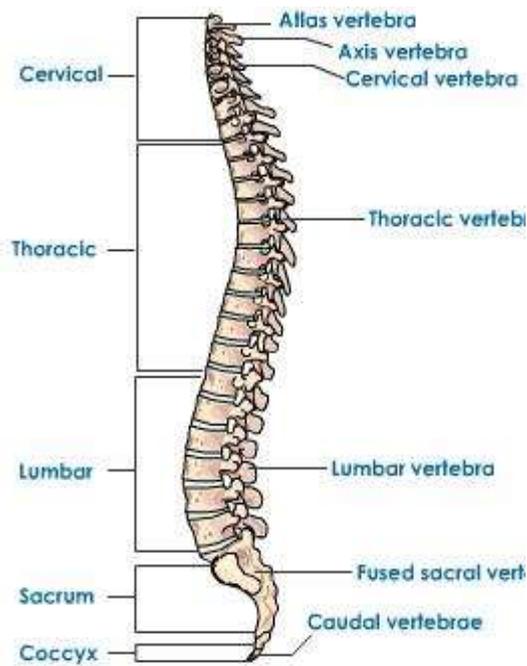


FIGURE: Showing Vertebral Column

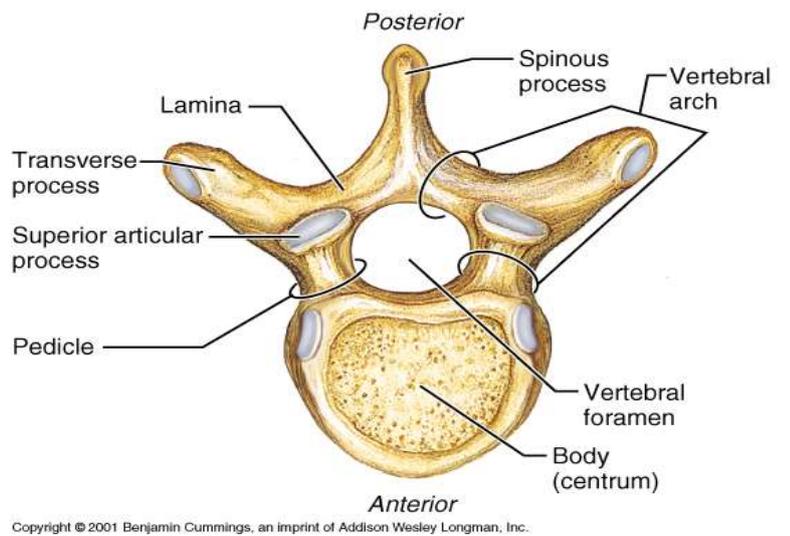


FIGURE: A Typical Vertebra

3. STERNUM (Breast Bone) ^[1,2]

It is a flat bone which is present in the chest. It is about 15cm long. It consists of three parts. The **manubrium** is the uppermost part which has articular facets laterally for articulation with the clavicle to form the sternoclavicular joint. **The body** is the middle portion which shows presence of facets for articulation with ribs and **xiphoid process** is the tip of the bone.

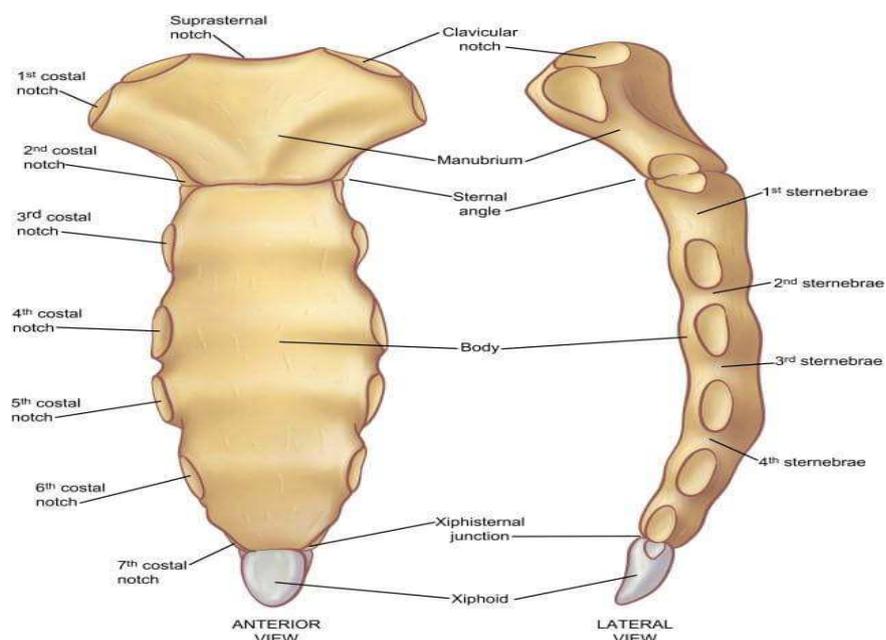


FIGURE: Showing the Sternum

4. RIBS^[1,2]

There are 12 pairs of ribs which form the bony lateral walls of the thoracic cage.

- a) The first seven pairs are called true ribs. Because their anterior ends are attached directly to the sternum by means of small pieces of cartilage.
- b) The eighth, ninth and tenth pairs of ribs are called false ribs. They articulate by cartilage with costal cartilage of seventh rib and thus are attached indirectly to the sternum.
- c) The last two pairs of ribs are called floating ribs because their anterior ends are not attached to either the sternum or the cartilage of another rib.

Rib is a flat bone and presents **head** (articulate with body of vertebra), **neck** (constricted part between head and tubercle), **Tubercle** (articulates with thoracic vertebra), **Angle** (point at which the bone ends).

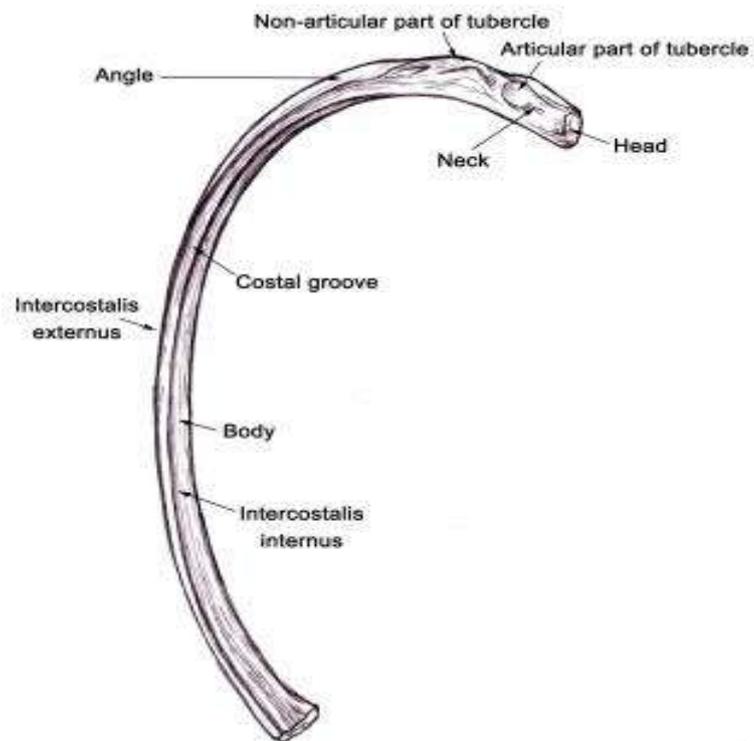


FIGURE: Showing A Rib

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2. Haematology, Practical Human Anatomy And Physiology, S.R. Kale et al., Nirali Prakashan, Eight Edition, 2002, pp. 5-9