

The Bones of The Thoracic Limb

It consist of four chief segments

- 1- **The Pectoral or shoulder girdle** 2- **The arm**
- 2- **The forearm** 3- **The manus**

- 1- The pectoral or shoulder girdle comprises **The Scapula, the coracoid , the collar bone and shoulder blade and joins** the forelimb to the trunk.

In domestic mammals, the coracoid is reduced to cylindrical process fused to the medial side of the scapula.

The clavicle or collar is either absent or a small rudiment embedded in the brachiocephalic muscle, In contrast to the well-developed functional bone of man.

Shoulder blade (Scapula)

The scapula is triangular in outline and lies flat against the cranial part of the lateral thoracic wall in a cranioventral direction. It is linked to the trunk by muscle without forming a true articulation.

The dorsal border points towards the vertebral column and extend into the crescent shaped scapular cartilage.

The lateral surface of the scapula carries prominent bony structures, whereas the medial / or costal surface is a shallow fossa for muscular attachment. The lateral surface is divided by the prominent spine of the scapula into the smaller cranial **supraspinous fossa**, and the larger **infraspinous fossa** caudally, the scapular spine extends from the dorsal border to the ventral angle, increasing in height dorsoventrally.

The spine ends with a well-defined prominence (**acromion**) close to the ventral angle, in carnivores and ruminant , but in the horse and pig it subsides distally.

The tuberosity of the spine of the scapula is present dorsal to its middle in all domestic mammals with the exception of the carnivores.

The costal surface of scapula is hollowed by the shallow subscapular fossa. On the proximal border a roughened area (**Facies serrate**).

The outline of the scapula can be defined by different features;

- 1- Cranial angle
- 2- Cranial border
- 3- Ventral angle
- 4- Caudal border
- 5- Caudal angle
- 6- Dorsal border

Arm (brachium)

The skeleton of the proximal part of the free appendage of the forelimb is formed by a single bone, the humerus. The humerus has a central function in the movement of the thoracic limb, in humerus appeared specific modifications the humerus can be divided into three basic segments;-

- 1- Proximal extremity carrying the head and the tubercles
- 2- Shaft of humerus
- 3- Distal extremity bearing the humeral condyle

The caudal part of the proximal extremity carries the head of the humerus, the humeral head is separated from the shaft of the humerus by a well-defined neck.

The greater tubercle is placed on the craniolateral side of the humeral head and the lesser tubercle craniomedially. They are separated by bicipital groove. The bicipital groove is subdivided by a flat protuberance in ruminants and a prominent ridge (intermediate tubercle in horse).

The deltoid tuberosity is located on the lateral aspect of the humeral shaft. The distal extremity bears the humeral condyle. To both side of the condyle are thick protuberances, the epicondyles, which give origin to the musculature of the distal part of forelimb.

The epicondyles are separated by a deep groove the **olecranon fossa**.

The radial fossa is situated on the cranial aspect of the condyle. In dog, olecranon fossa and radial fossa communicate the supratrochlear foramen. In cat the medial aspect of the distal extremity of the humerus is perforated by the supracondylar foramen.

Forearm (antebrachii)

Consist of two bones, the **Radius and the Ulna**.

The ulna is placed Caudal / caudolateral to the radius in the proximal part and lateral in distal part.

The Radius can be divided into three main segments :-

- 1- Proximal extremity carrying the head
- 2- Shaft of the radius
- 3- Distal extremity bearing the radial trochlea

The Ulna consist of three main segments

- 1- Proximal extremity carrying the olecranon
- 2- Shaft of the ulna
- 3- Distal extremity

The olecranon and its tuber, at the base of the olecranon lies trochlear notch, overhanging the trochlear notch cranially is the beak-shaped called **anconeal process**. Distal extremity in horse fused to the radius to form the lateral **styloid process**.

The radius is placed in front and supports the weight. The ulna is well developed only in its proximal part which forms a lever for the extensor muscles of elbow.

The Manus

The homologue of the hand in man, consists of three subdivisions, the carpus, metacarpus and digit or digits.

The Carpus : are eight bones and are arranged in two transverse rows;

A proximal and distal

The bones of proximal are from radius to ulna ; **Radial, intermediate, Ulnar and accessory** carpal bones.

The bones of distal row: **First, Second, Third and Fourth** carpal bones.

***** Number of carpal bones :-**

- Human and pig = 8
- Horse = 7
- Carnivoras (R & I) fused =7
- Ruminant =6

The metacarpus; contains **five (5)** metacarpal bones : In the **dog** they are five in number, in the **horse** the first and **fifth** are somewhat reduced, the **third** is the large supporting metacarpal bone and carry the single digit. While the **2nd** and **4th** are much reduced.

The digits : Are homologous with the fingers of man, and are typically **five** in number, The full number in **dog** .

In the ox the **3rd** and **4th** are well developed and support the weight , while the **second** and **fifth** are reduced .

In the horse has a single digit the **3rd** .

The digit consists of 3 phalanges and certain **sesamoid** bones.

The 1st phalanx articulates with the corresponding metacarpal bone above and with the second phalanx below. The 3rd phalanx is in closed in the hoof or Claus . The sesamoid bones are develop a long the course of tendons or in the joint capsule at points where , there is increased pressure. Two proximal sesamoid bones and one distal sesamoid bone.

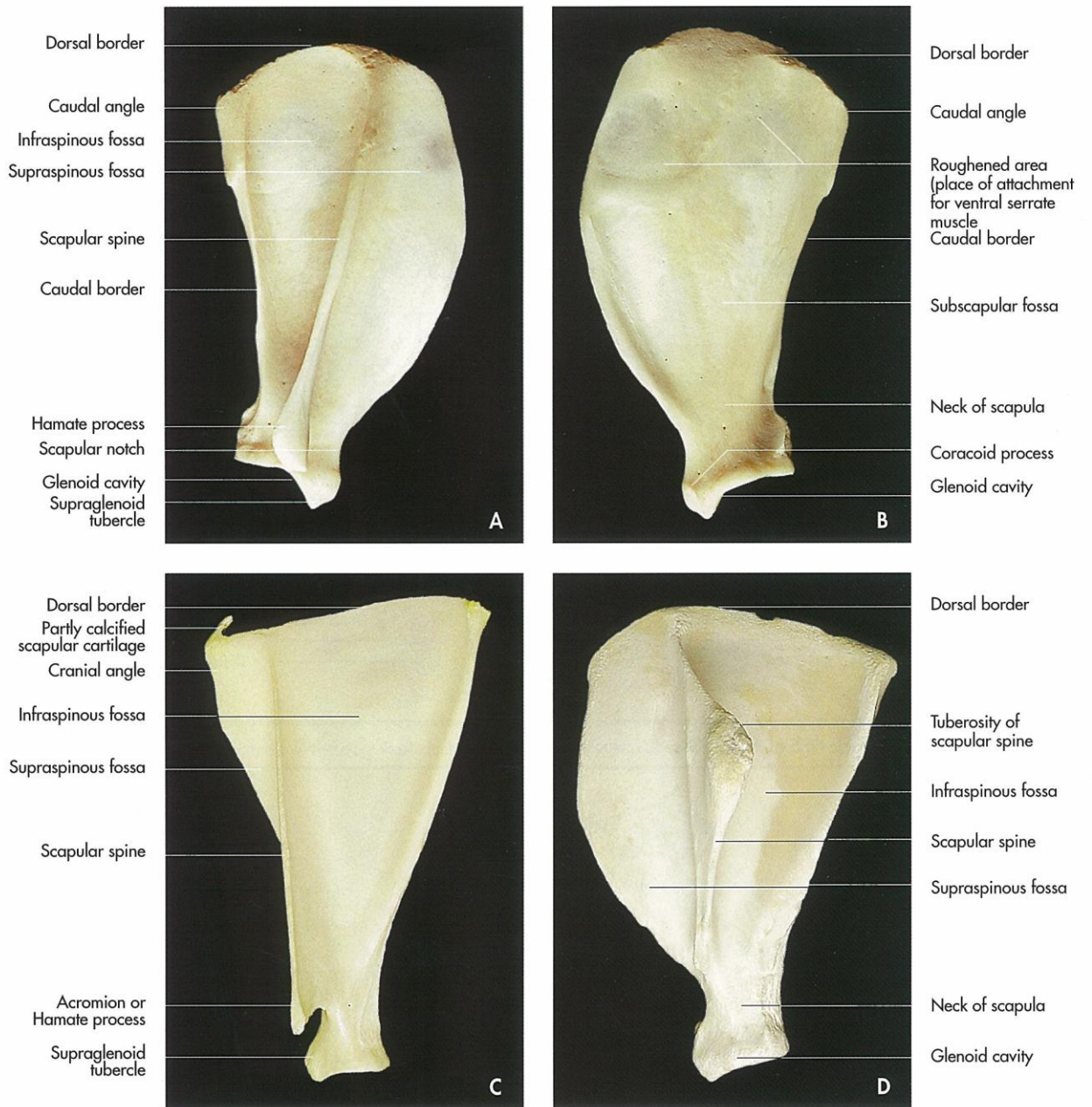


Fig. 3-6. Comparison of the scapula of a dog (A lateral and B medial aspects), of a small ruminant (C lateral aspect) and a pig (D lateral aspect).

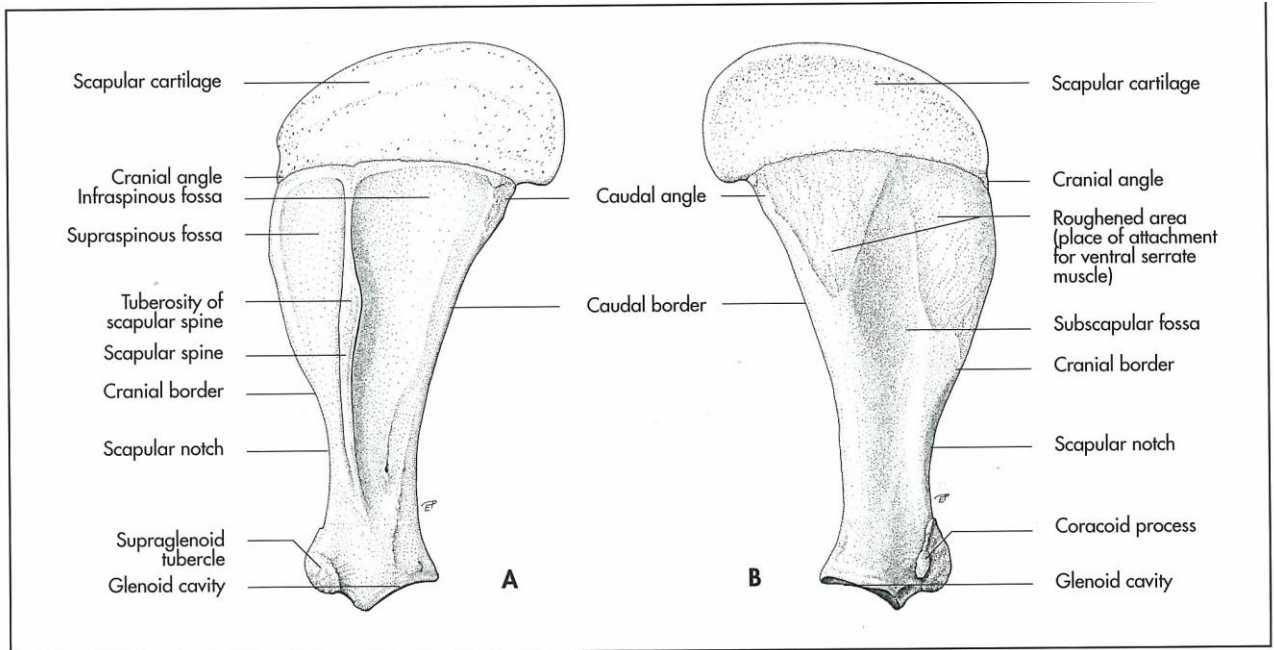


Fig. 3-7. Left scapula of the horse (schematic, lateral (A) and medial (B) aspect).

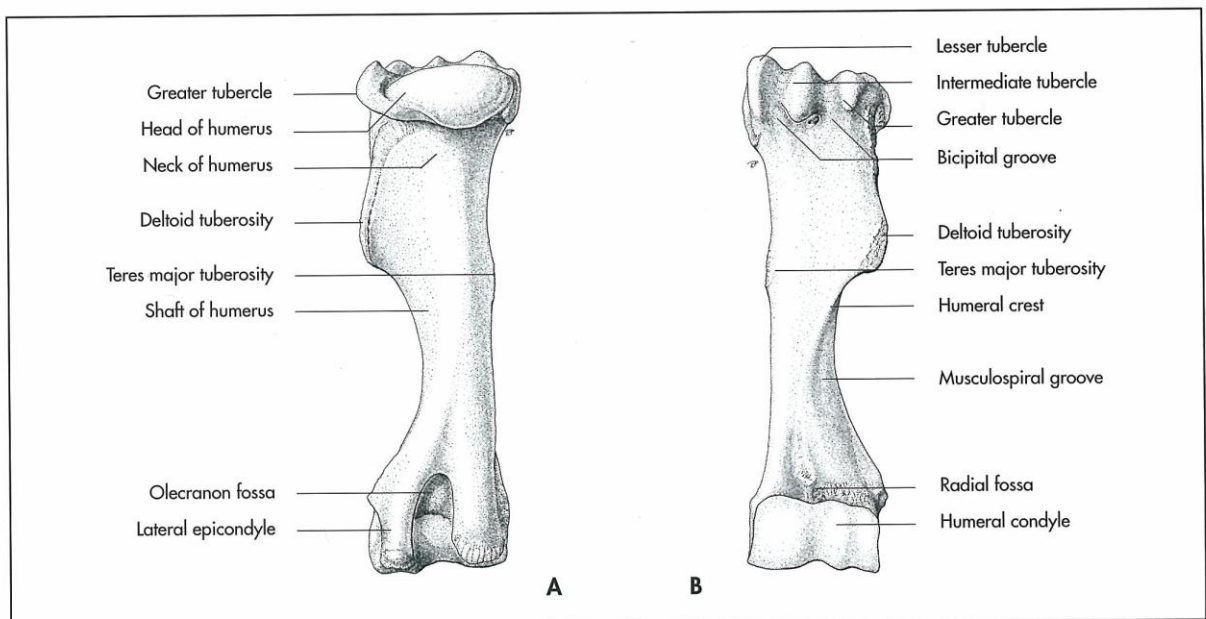


Fig. 3-9. Left humerus of the horse (schematic, caudal (A) and cranial (B) aspect).

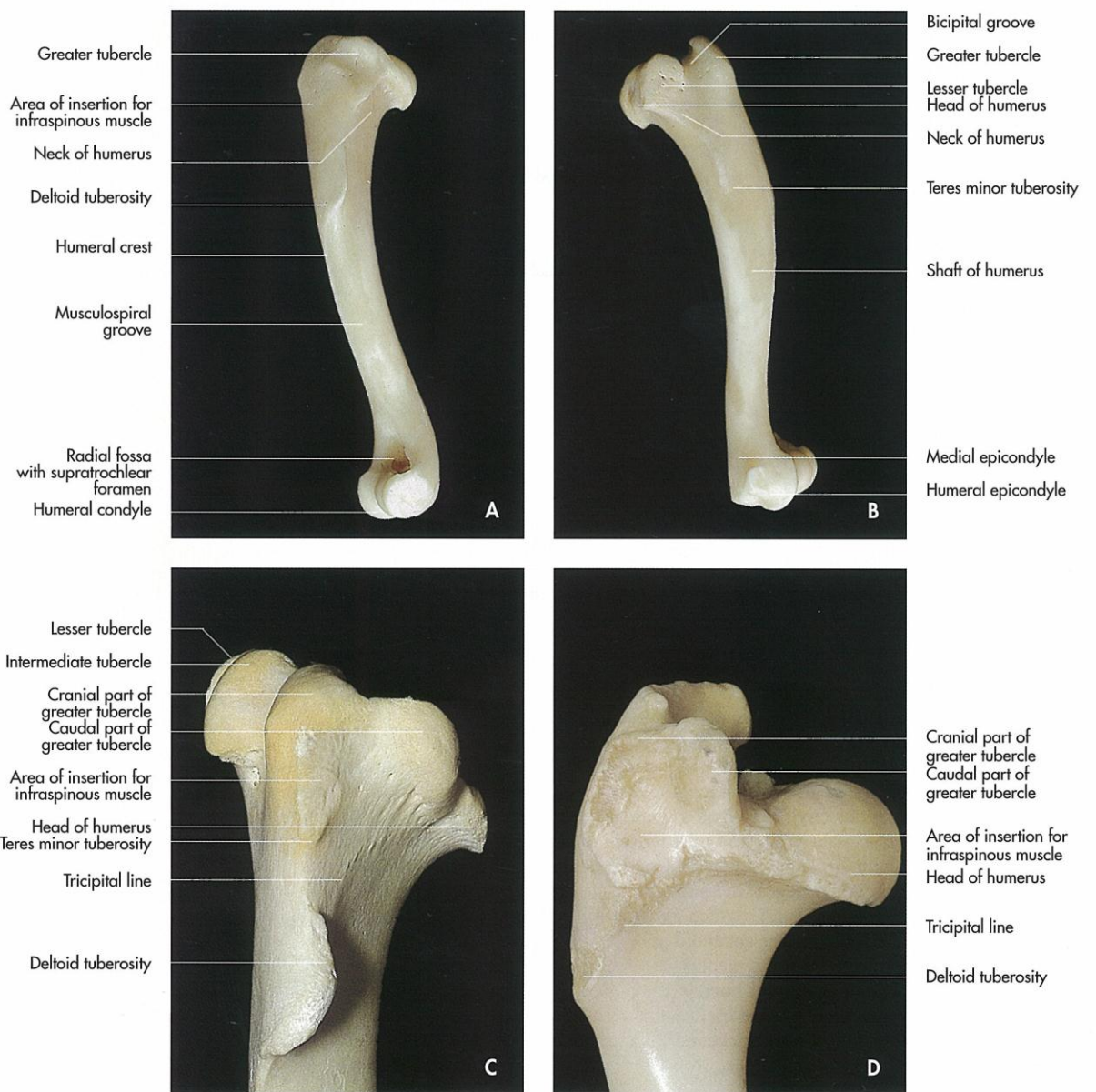


Fig. 3-8. Left humerus of a dog (**A** lateral, **B** medial aspect) and proximal extremity of the left humerus of a horse (**C** lateral aspect) and a pig (**D** lateral aspect).

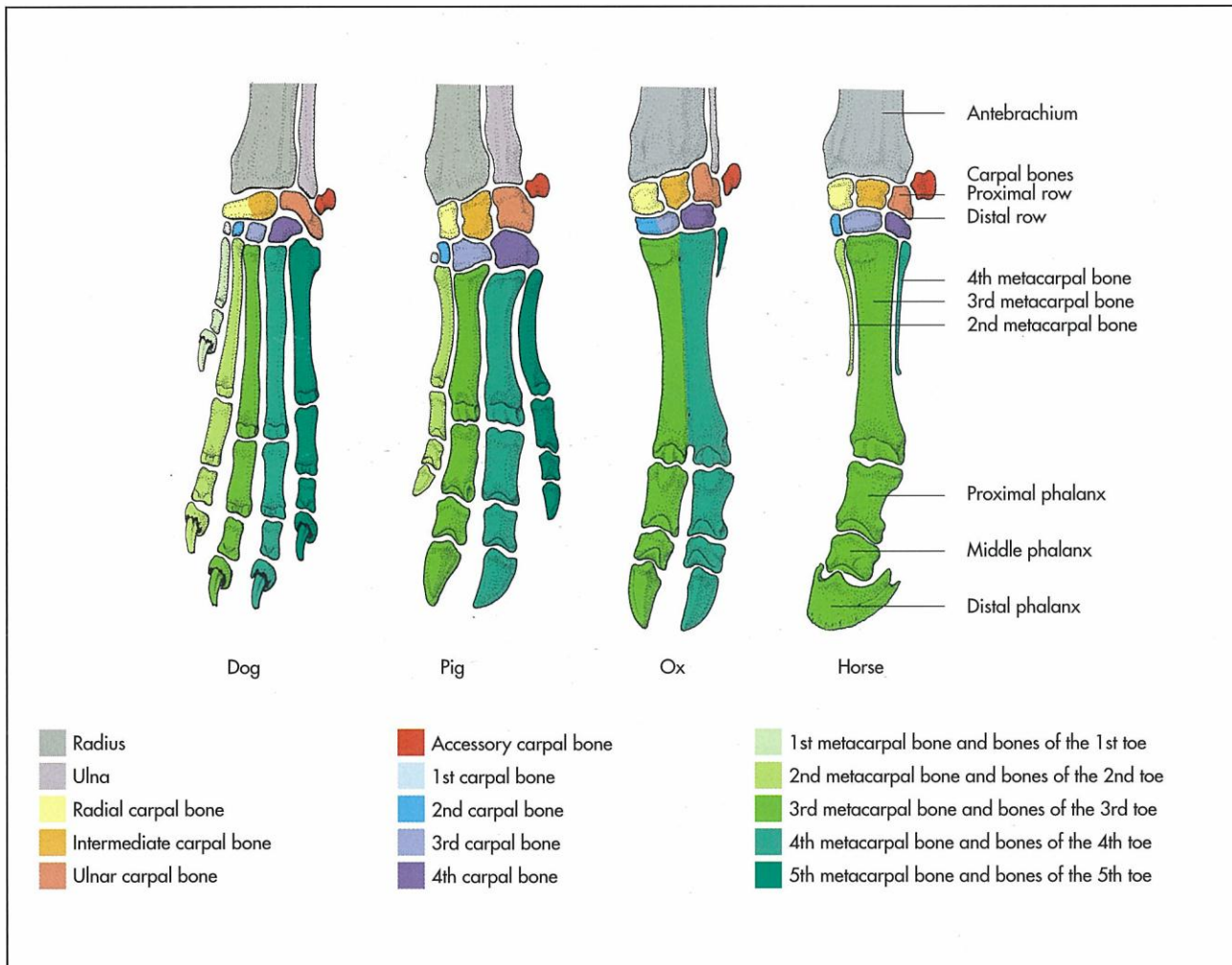


Fig. 3-14. Skeleton of the manus in the domestic mammals (schematic) (Ellenberger and Baum, 1943).