



Lecture title: Introduction to anatomy and osteology

Lecturer Affiliation: *Ali Ahmed Hasan, BVMS, MSc, (Assistant Lecturer)*
Department of Anatomy, College of Veterinary Medicine, University of Mosul,
Mosul, Iraq <https://orcid.org/0000-0002-7767-7840>
<https://www.researchgate.net/profile/Ali-Hasan-119>

Anatomy:

History of Veterinary Anatomy:

The morphology, as the scientific study of the form and structure of organisms, was founded by Aristotle.

- He defined morphology as the search for a common construction plan for all structures.
- He referred to the relation between form and function for classification.
- Aristotle performed anatomical research through dissections.

Key Historical Figures and Milestones:

- Fabrizio Acquapendente was the first worker in comparative embryology (around the year 1600).
- Marcello Malpighi studied the development of the chick embryo (year 1687).
- Andreas Vesalius published his seminal work on human anatomy (1543).
- Johann Conrad Peyer studied the anatomy of ruminants (1685).

However, for over 1500 years, Galen's teachings confined animal dissection. He published the first book of veterinary medicine.



Anatomy:

Definition:

Anatomy is the branch of morphology that deals with the form, structure, topography, and functional interaction of the tissues and organs that comprise the body.

The dissection of dead animals remains the most important and efficient method for studying and comprehending anatomy.

Classification of Anatomy:

1. Histology:

Includes microscopic anatomy.

2. Embryology:

Studies the development of the body's organs from fertilization of the ovum in the uterus until birth.

3. Systemic Anatomy:

Deals with the systems of the body, for example: the respiratory system and nervous system.

4. Comparative Anatomy:

Limited to the study of domestic animals and poultry.

5. Topographic Anatomy:

Describes the relative position and functional interaction of organs and structures in the various regions of the body.

Both systemic and topographic anatomy constitute the foundation of clinical practice.

Radiological Anatomy

Modern technology applied in veterinary medicine deals with X-ray, Ultrasound, Computed Tomography, or Magnetic Resonance Imaging, which helps with clinical knowledge.



Directional Terms and Planes of the Animal Body:

The body of an animal has major divisions which are clearly distinguishable externally:

- 1.The Head (Caput)
- 2.The Neck (Collum)
- 3.The Trunk (Truncus)
- 4.The Tail (Cauda)
- 5.The Limbs (Membra)

Each one of these sections is, in turn, divided into regions.

Division of the Animal Body into Organs and Organ Systems:

Cells and tissues similar in structure and function are joined together to form distinct organs and organ systems. These systems work together to fulfill specific physiological functions.

An individual organ is composed of different types of tissue:

1.Parenchyma

2.Interstitial Tissue

- The parenchyma is formed by the specific functional cells of the organ, such as liver cells (hepatocytes) or renal cells (nephrons).
- The interstitial tissue (stroma) builds the connective tissue framework and forms the lobules within the organ.
- Connective tissue also supports the other tissues. For example, it encloses structures such as blood and lymph vessels.



Veterinary Anatomy deals mainly with the study of domestic mammals.
These are **classified as**:

Classification	Common Examples
Canine	Dogs
Feline	Cats
Ovine	Sheep
Caprine	Goats
Bovine	Cattle, Cows
Equine	Horses
Avian (Poultry)	Hens, Chickens
Swine	Pigs

Organ Systems:

1. Integumentary System
2. Skeletal System
3. Muscular System
4. Digestive System
5. Respiratory System
6. Urogenital System
7. Circulatory System
8. Nervous System
9. Sensory Organs
10. Endocrine System
11. Immune System

Table 1.2 Organ systems.

Name	Primary function
Outer skin	Protective covering of the animal body
Skeleton and joints	Supporting framework of the body
Musculature of the skeleton	Locomotion
Digestive system	Food intake, mastication, chemical digestion, excretion and absorption
Respiratory system	Oxygen supply, elimination of carbon dioxide and production of sound
Urogenital system	Excretion and reproduction
Circulatory system	Transport and exchange of substances
Nervous system	Regulation, transmission, reaction in response to external stimuli
Organs of sense	Reception of external stimuli
Endocrine glands	Regulation of cell functions by hormones
Immune system	Response to infection



Directional Terms and Planes of the Animal Body

Common Directional Terms:

Term	Definition
1. Cranial	Toward the head
2. Rostral	Toward the tip of the nose (used only on the head)
3. Caudal	Toward the tail
4. Dorsal	Toward the back (upper side)
5. Ventral	Toward the belly (underside)
6. Medial	Toward the midline (center) of the body
7. Lateral	Away from the midline; toward the side
8. Median	On the midline of the body
9. Proximal	Closer to the body trunk (used for limbs)
10. Distal	Farther away from the body trunk (used for limbs)
11. Palmar	The "caudal" surface of the forelimb below the wrist (toward the palm)
12. Plantar	The "caudal" surface of the hindlimb below the hock (toward the sole)
13. Axial	Toward the central axis of a limb or digit
14. Abaxial	Away from the central axis of a limb or digit
15. External	Located on or toward the outside
16. Internal	Located on or toward the inside
17. Superficial	Located near the body surface
18. Deep	Located further away from the body surface; internal
19. Temporal	Located toward the temporal region (bone) of the skull
20. Nasal	Located toward the nose
21. Superior	Above (more commonly used in human anatomy)
22. Inferior	Below (more commonly used in human anatomy)
23. Apical	Toward the tip or apex of a structure
24. Oral	Toward the mouth



Planes of the Animal Body:

1. Median plane: Divides the body into equal right and left halves.
2. Paramedian plane: Any plane parallel and close to the median plane.
3. Sagittal plane: Any plane parallel to the median plane but located further lateral.
4. Dorsal plane: Any plane parallel to the dorsal surface (also called the Frontal plane, which divides the body into dorsal and ventral parts).
5. Transverse plane: A plane that divides the body into cranial (head-end) and caudal (tail-end) parts.



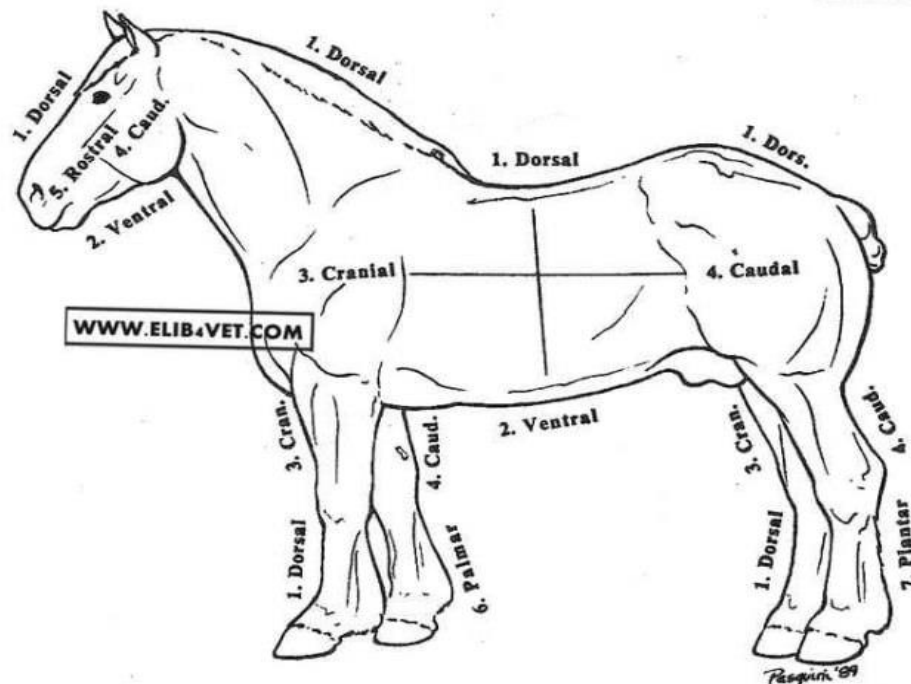
Table 1.1 Directional terms and virtual planes of the animal body.

Term	Meaning	Usage
Cranial	Towards the head, trunk and tail	Trunk and tail, limbs proximal to the carpus and tarsus
Rostral	Towards the tip of the nose	Head
Caudal	Towards the tail	Head and trunk, limbs proximal to the carpus and tarsus
Dorsal	Towards the back	Trunk, head and the front of the limbs distal of carpus and tarsus
Ventral	Towards the belly	Underside of the trunk, head
Medial	Towards the centre	Head, trunk and limbs
Lateral	Towards the side	Head, trunk and limbs
Median	In the middle	Trunk, head and limbs
Proximal	Towards the trunk	Limbs and other body parts located close to the trunk or projecting away from the trunk
Distal	Away from the trunk	Limbs and other body parts located at a distance from the trunk or projecting away from the trunk
Palmar	Towards the palm of the hand	Forelimbs distal of the carpal joint
Plantar	Towards the sole of the foot	Hindlimbs distal of the tarsal joint
Axial	Towards the axis of the digits	Digits
Abaxial	Away from the axis of the digits	Digits
External	Located outside	Body parts and organs
Internal	Located inside	Body parts and organs
Superficial	Located near the surface	Body parts and organs
Deep	Located in the depth	Body parts and organs
Temporal	Towards the temporal bone	Eye
Nasal	Towards the nose	Eye
Superior	Above	Eyelid
Inferior	Below	Eyelid
Apical	Towards the tip	Nose, digits and tail
Oral	Towards the mouth	Head
Virtual planes of the animal body		
Median plane	Plane dividing the body in two equal parts	
Paramedian plane	Any plane parallel and close to the median plane	
Sagittal plane	Any plane parallel to the median plane but located further lateral	
Dorsal plane	Any plane parallel to the dorsal surface	
Transverse plane	Any plane perpendicular to the long axis	



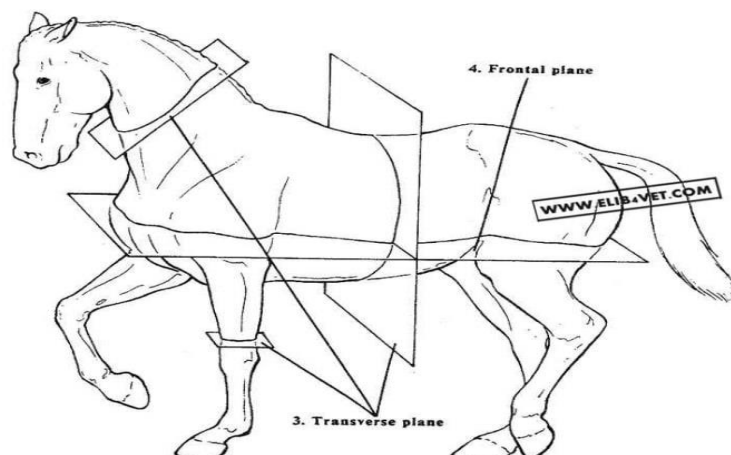
DESCRIPTIVE TERMS - PLANES - SECTIONS

General-17



PLANES - SECTIONS

General-22





PLANES - SECTIONS

General-19

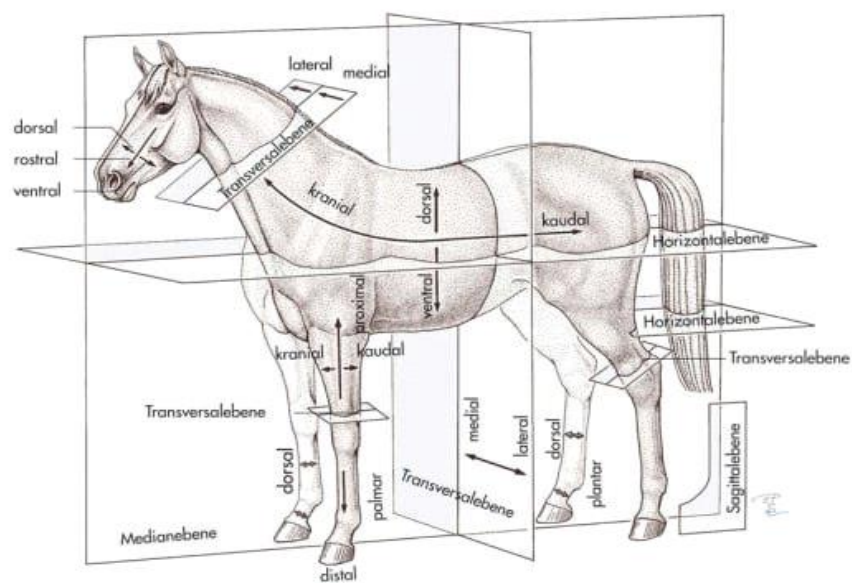
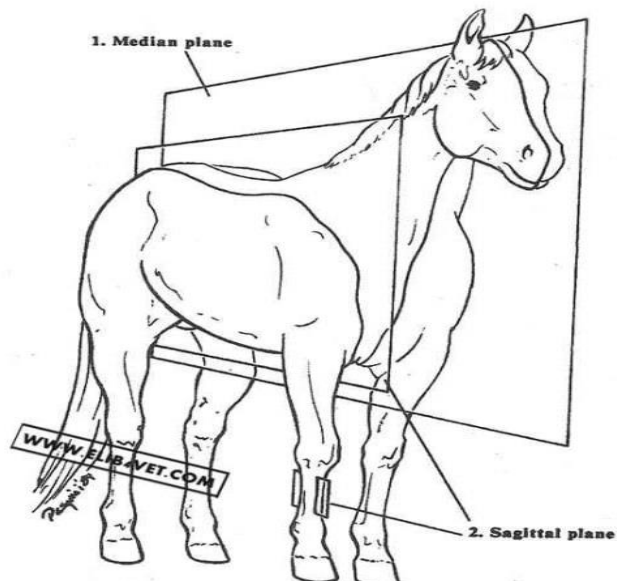


Fig. 1.10 Directional terms and planes of the animal body (schematic); fig. based on data from Dyce, Sack and Wensing, 2002.

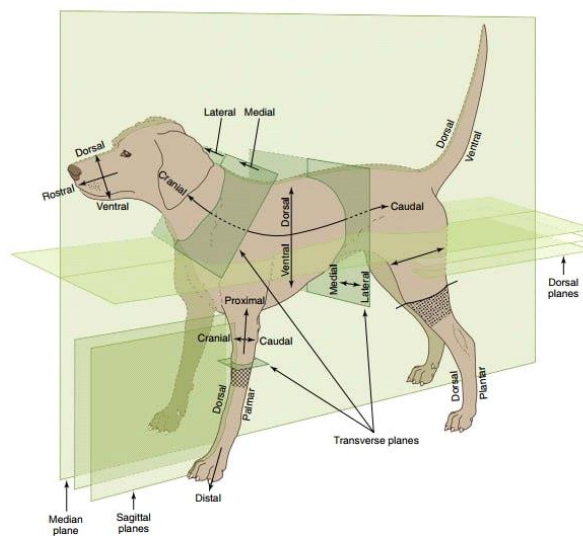
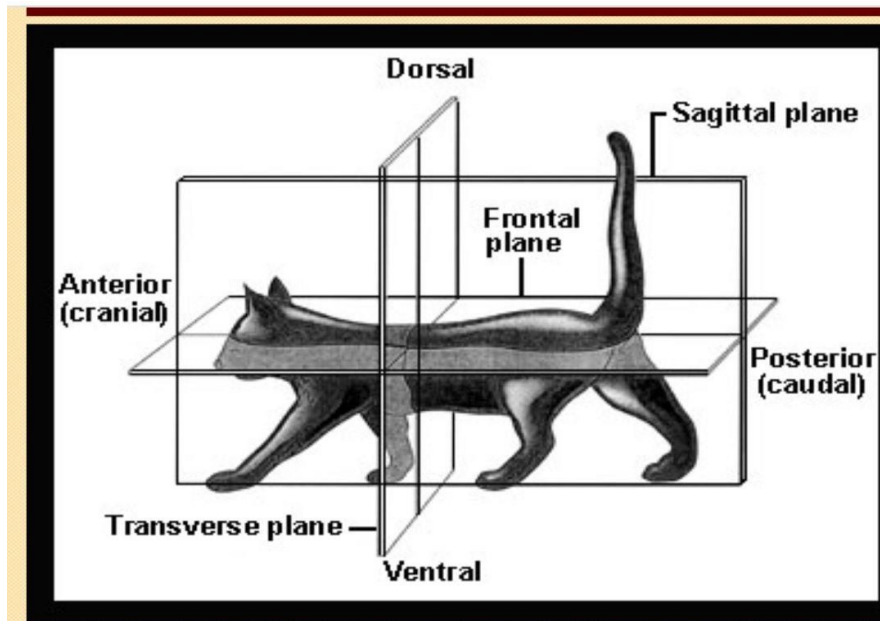


Figure 1-1 Directional terms and planes of the animal body. The stippled areas represent the carpus and tarsus on forelimbs and hindlimbs, respectively.