

Endoskeleton of Guinea Pig (*Cavia porcellus*)



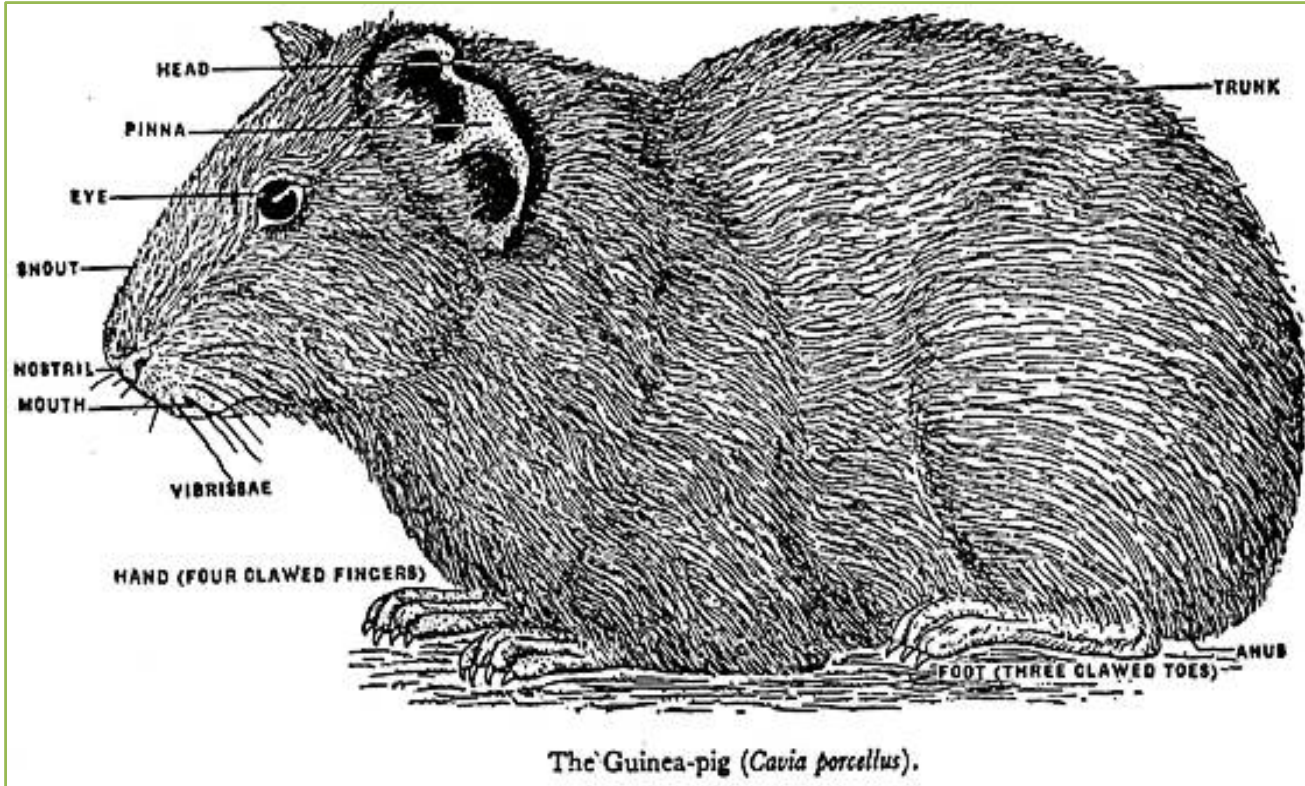
The guinea pig or domestic guinea pig, also known as cavy (wild & domestic), is a species of rodent belonging to the family Caviidae and the genus *Cavia*. Despite their common name, guinea pigs are not native to Guinea, nor are they biologically related to pigs, and the origin of the name is still unclear.



<u>Kingdom:</u>	Animalia
<u>Phylum:</u>	Chordata
<u>Class:</u>	Mammalia
<u>Order:</u>	Rodentia
<u>Family:</u>	Caviidae
<u>Genus:</u>	<i>Cavia</i>
<u>Scientific Name:</u>	<i>Cavia porcellus L.</i>
<u>Common Name:</u>	Guinea Pig
<u>Other Name(s):</u>	Cavy, Little Pig

Biological experimentation on domestic guinea pigs has been carried out since the 17th century. The animals were so frequently used as model organisms in the 19th and 20th centuries that the epithet *guinea pig* came into use to describe a human test subject. Since that time, they have been largely replaced by other rodents such as mice and rats. However, they are still used in research, primarily as models for human medical conditions such as juvenile diabetes, tuberculosis, scurvy (like humans, they must get vitamin C), and pregnancy complications.

ANATOMY: EXTERNAL & INTERNAL



Lifespan: 4 – 8 years
Scientific name:
Cavia porcellus
Gestation period:
59 – 72 days (Adult)
Mass: 0.7 – 1.2 kg (Adult)
Family: *Caviidae*
Species: *C. porcellus*
Order: *Rodentia*
Kingdom: *Animalia*
Class: *Mammalia*

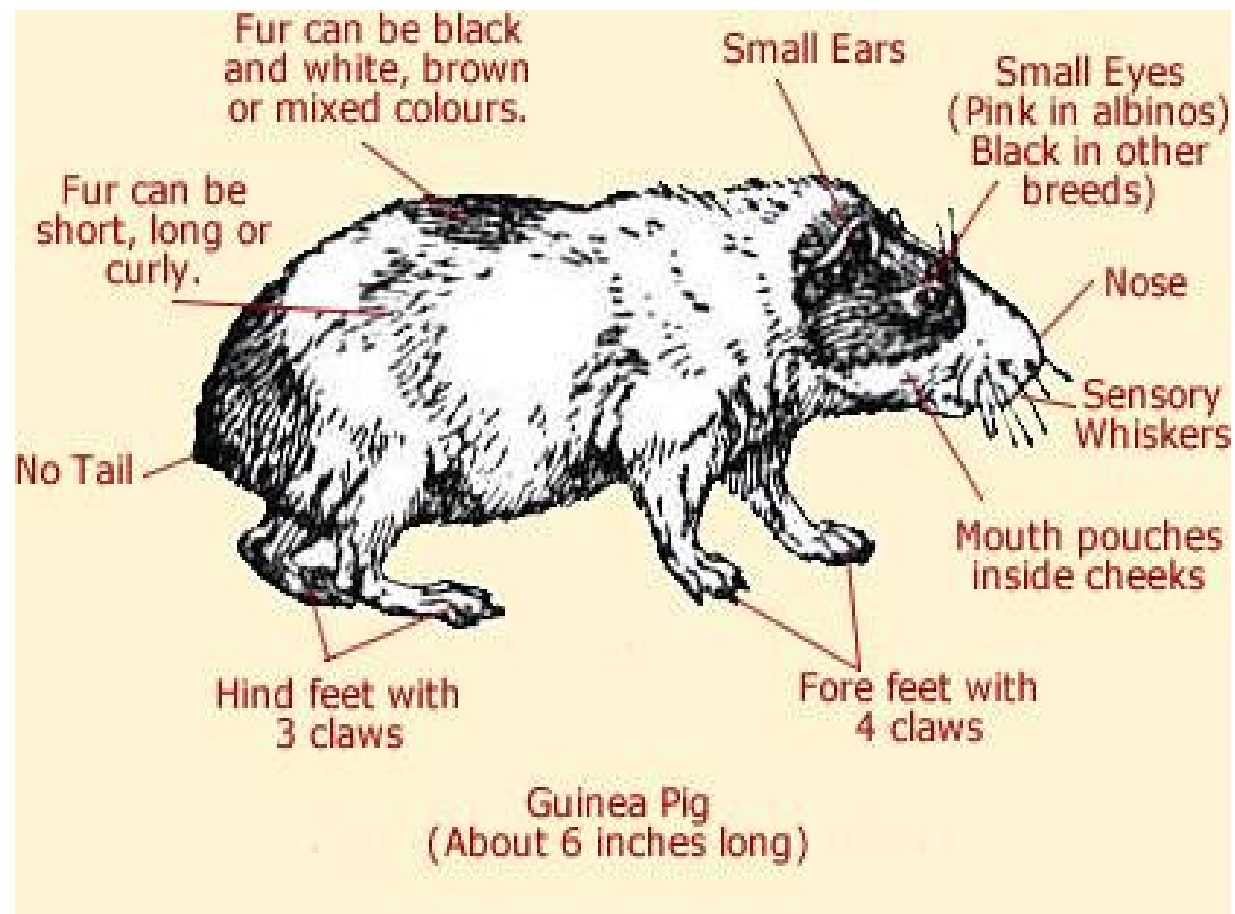
A Guinea Pig is a small, burrowing rodent that has a compact body. Guinea pigs have small ears and eyes, a small snout with sensory whiskers each side and no tail. Like most rodents, they have two gnawing teeth at the front which continue to grow throughout their life. Because these teeth are continuously growing, it is very important that Guinea Pigs have something to gnaw on to help keep the teeth trim.

Guinea Pigs have short legs and little feet with claws on. Their front feet have four toes/claws, however, their back feet have only three. Guinea Pig claws do need a regular trim as these too continuously grow.

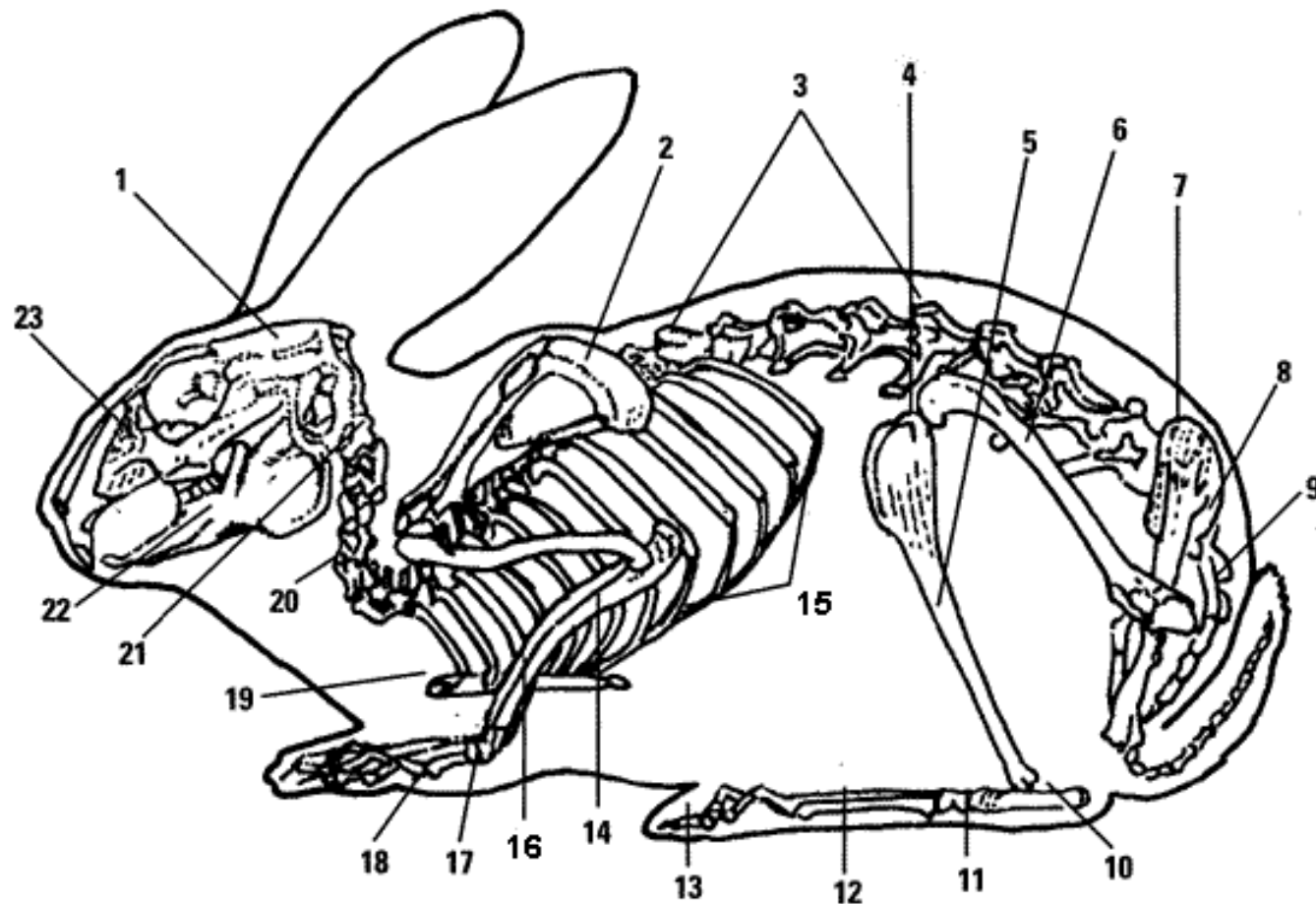
Habitat of Guinea-Pig:

The guinea-pig, *Cavia porcellus*, is a well-known household pet. The name seems to be a misnomer, because the animal is neither a pig nor does it come from Guinea. It is a herbivorous rodent belonging to the same order as the common rat and the rabbit.

It is timid and inoffensive in the domesticated state. In the wild state, guinea-pig is gregarious and lives in underground burrows or in bushes hiding inside thick vegetation. It feeds chiefly at dusk and makes a hasty retreat on slightest provocation.



Whole Skeleton of Guinea pig



1. Cranium (Skull)
2. Scapula
3. Spine
4. Fibula
5. Tibia

6. Femur
7. Ilium
8. Sacrum
9. Caudal Vertebrae
10. Calcaneus

11. Tarsus
12. Metatarsus
13. Phalanges
14. Ulna
15. Ribs

16. Radius
17. Carpus
18. Metacarpus
19. Sternum
20. Cervical Vertebrae

21. Atlas
22. Mandible
23. Maxilla

Skeletal System of Guinea-Pig:

The skeleton of guinea-pig is almost entirely osseous with strips of cartilage persisting at the ends of some bones. Cartilage is also present in a few places such as in the external ears and nose.

The skeleton is divided into axial and appendicular portions. The axial skeleton is composed of the skull, vertebral column, ribs, and sternum. The appendicular skeleton consists of the limbs and limb girdles.

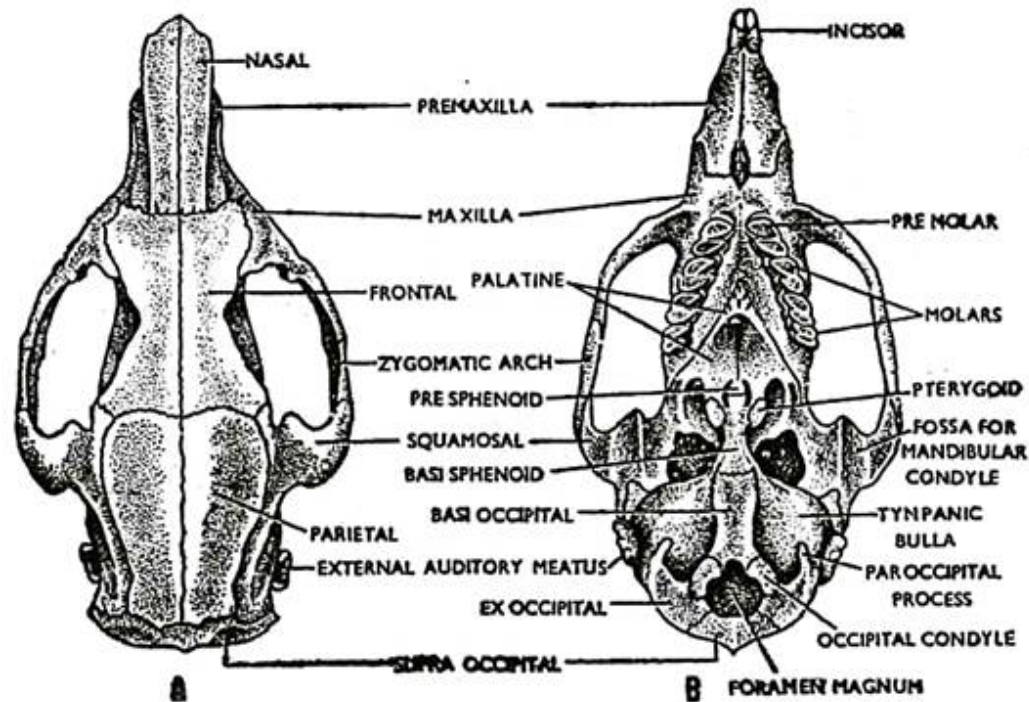
Skull:

The skull consists of three main parts:

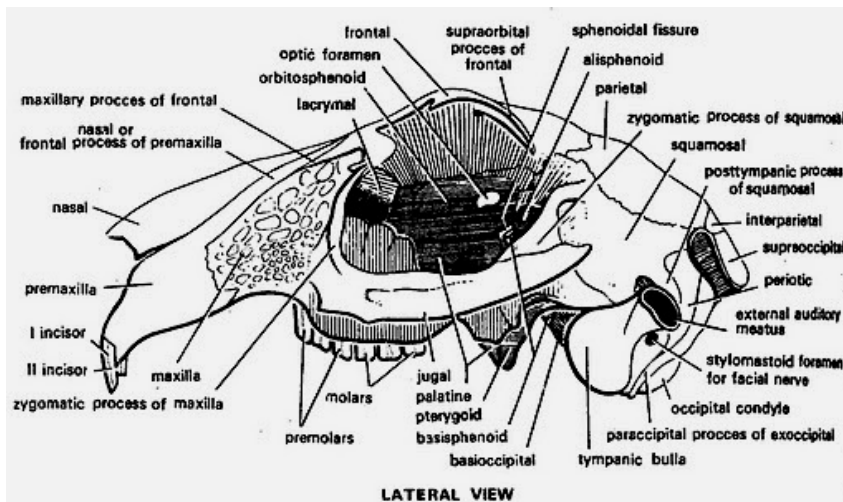
- (1) the cranium, which surrounds the brain;
- (2) the sense capsules—olfactory, optic, and otic—which enclose the organs of special sense; and
- (3) the visceral skeleton formed by the jaws, hyoid apparatus and part of the larynx. Cranium, sensory capsules and the upper jaw are firmly united.

The cranium or brain-box is composed of a number of bones rigidly articulated with one another by well-marked sutures. At the posterior part of the cranium, there are two occipital condyles for articulating with the vertebral column, one on either side of the foramen magnum. Surrounding this foramen there are four bones—a supraoccipital above, a basioccipital below, and two exoccipitals, one on each side. Each exoccipital is produced ventrally into a pointed and curved paroccipital process which serves for the attachment of muscles. The roof of the cranium consists, from behind forwards, of the single supraoccipital, paired parietals and paired frontals. The floor is composed of the basioccipital, basisphenoid, and presphenoid. Each lateral wall of the cranium is made up of squamosal, alisphenoid and orbitosphenoid. Arterial wall of the cranium is formed by a cribriform plate pierced by a number of holes. This plate separates the cranium from the olfactory capsule.

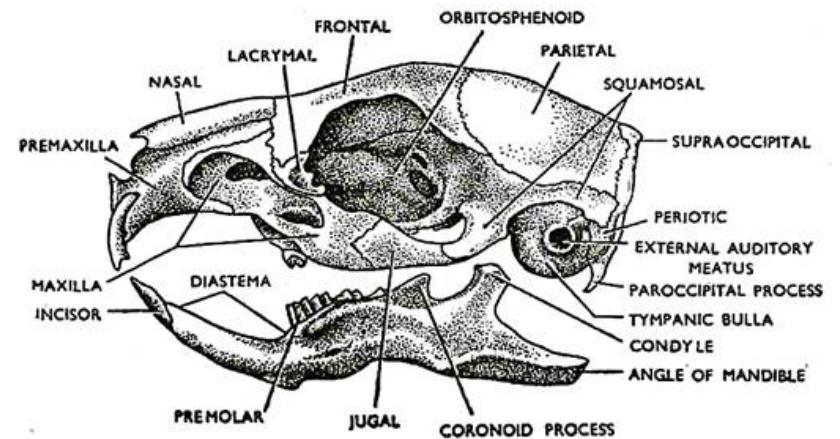
SKULL of GUINEA PIG



Skull of Guinea-pig; A—Dorsal view, B—Ventral view.



LATERAL VIEW



Skull and lower jaw of Guinea-pig (side views).

The upper jaw, on each side, is composed chiefly of a pre-maxilla, a maxilla, and a jugal which runs backwards to meet a process of the squamosal, thus forming the zygomatic arch. The premaxilla bears a cutting or incisor tooth, whereas the maxilla bears four grinding teeth, of which the anterior one is the premolar and the remaining three are molars.

A long space, the diastema, separates the incisor from the premolar. The anterior part of the floor of the skull is known as the hard palate. This is formed by inward expansions of the premaxillae, maxillae, and by two palatines. Just behind each palatine is a small pterygoid. The quadrate is absent.

The lower jaw or mandible consists of two halves united in front by a weak symphysis. Each half is composed of a single bone, the dentary, which bears teeth similar to those on the upper jaw, and there is a diastema between the incisor and the premolar. Each dentary has an ascending ramus which forms the condyle for articulating with the undersurface of the squamosal at the posterior end of the zygomatic arch. In front of the condyle is a small curved process called coronoid process. The posterior end of each dentary is produced behind into an angular process which forms the angle of the mandible.

The olfactory capsule, housing the nose, is roofed over by two nasals, whilst its floor and side walls are formed by the inward expansions of the premaxillae anteriorly, maxillae posteriorly, and the vomer in the midventral line. Posteriorly, the vomer articulates with the presphenoid. There is a porous cribriform plate at the posterior part of the olfactory capsule which shuts out the nose from the cranium.

The olfactory nerves enter the nose through the holes on this plate. A vertical plate of cartilage, the mesethmoid, separates the two nasal chambers, and a few insignificant spongy bones called turbinals are found inside each nose to support the nasal epithelium.

The optic capsule, housing the eye, is represented on each side by a large orbit. At the anterior part of each orbit is a small lacrimal bone interposed between the frontal above and the maxilla below; this bone is perforated by a minute lacrimal foramen.

The orbit is bounded dorsally by the frontal, ventrally by the zygomatic arch, and posteriorly by the squamosal. The inner wall of the orbit is the interorbital septum. It is formed by the orbitosphenoids above, and the presphenoid below.

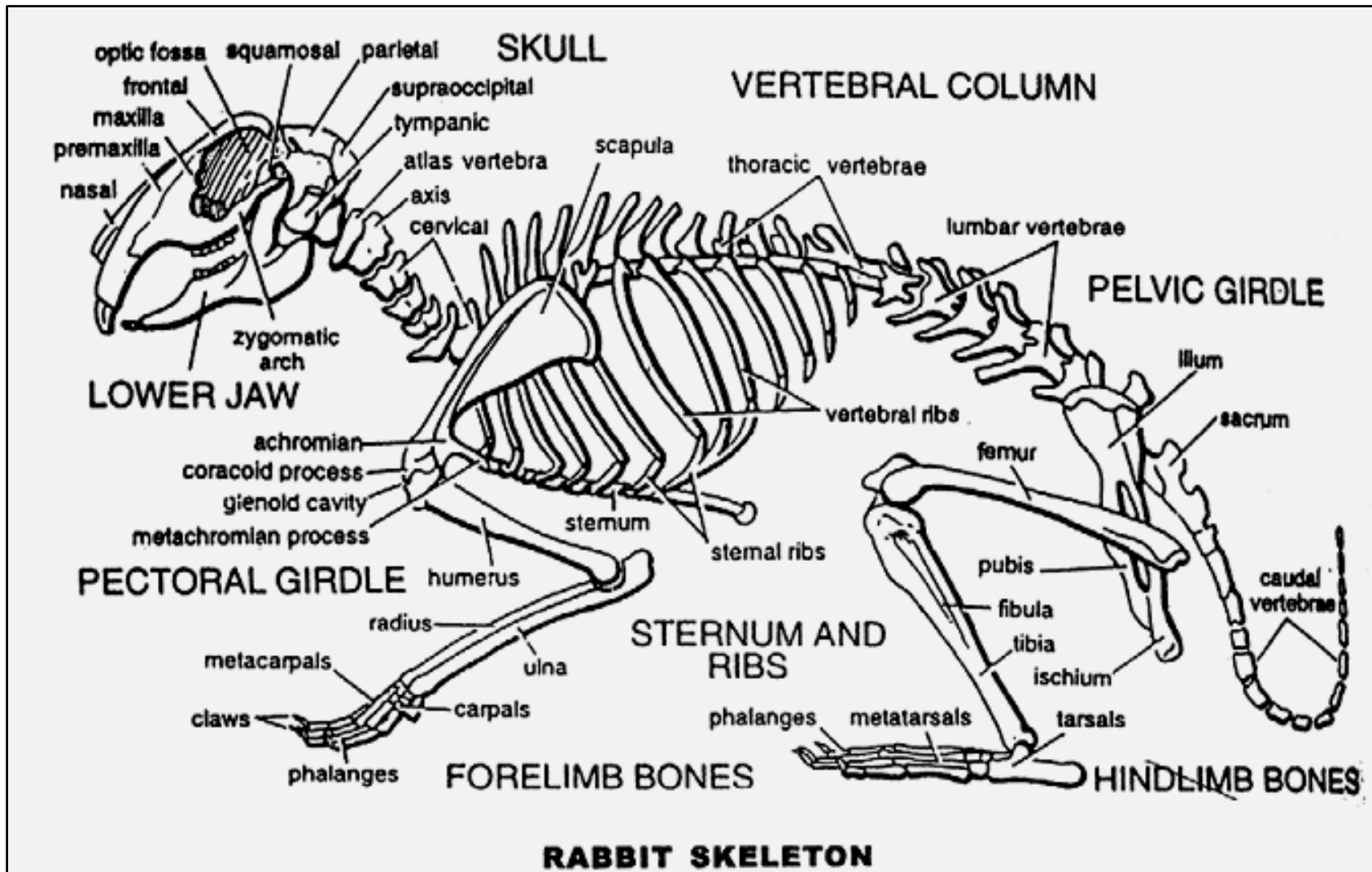
The otic or auditory capsule, housing the internal ear, is placed between the squamosal and the exoccipital on either side of the cranium. Each capsule is principally composed of a periotic bone, a tympanic bone, and the auditory ossicles. The periotic bone is formed by the fusion of three small bones; it is irregular in shape and encloses the membranous labyrinth.

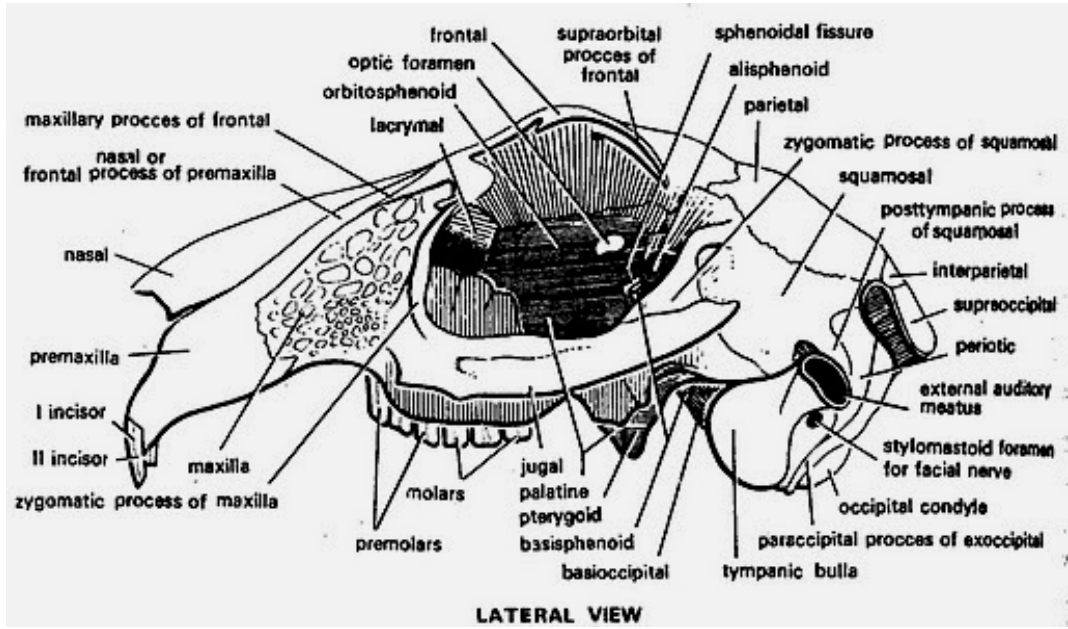
The tympanic bone is firmly applied to the outer surface of the periotic; it is flask-shaped—the opening of the flask is the external auditory meatus, and the swollen base of the flask is the tympanic bulla which encloses the tympanic cavity along with the auditory ossicles.

The pinna is attached to the rim of the external auditory meatus. The auditory ossicles constitute a chain of three small bones, the malleus, the incus and the stapes; they connect the eardrum with the internal ear and are themselves enclosed by the tympanic bulla.

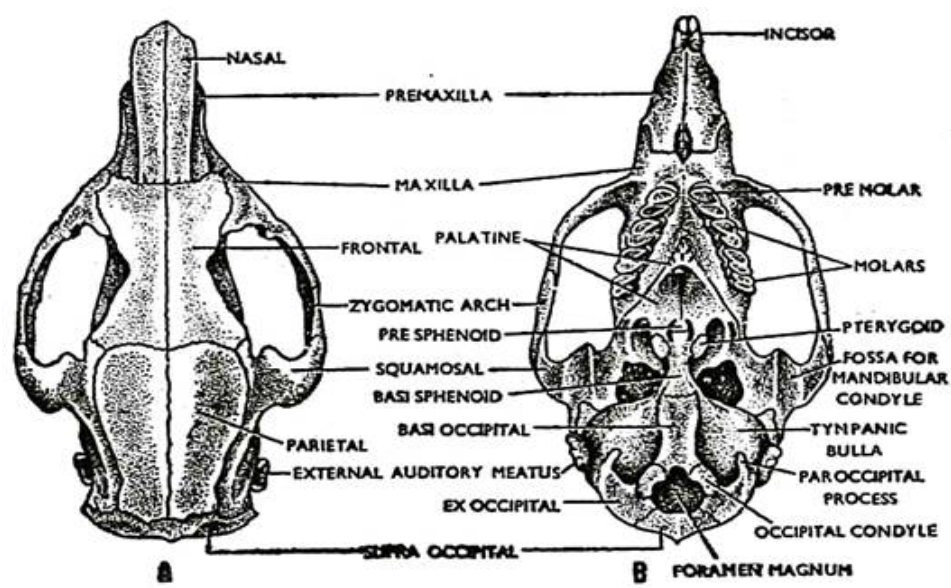
The hyoid is a small bone lying at the root of the tongue on the floor of the buccal cavity. It consists of a stout median part, the body and two pairs of slender horns or cornua. The anterior cornua connect the hyoid with the periotics; the posterior cornua are similarly connected with the larynx.

WHOLE SKELETON

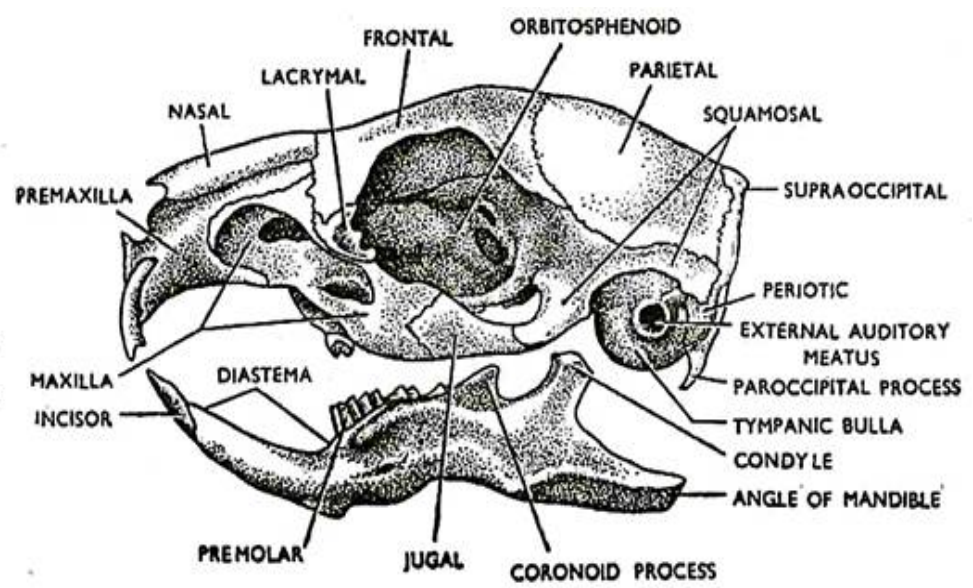




LATERAL VIEW



Skull of Guinea-pig; A—Dorsal view, B—Ventral view.



Skull and lower jaw of Guinea-pig (side views).

Vertebral Column:

The vertebral column is composed of about thirty-seven vertebrae, which are separated from one another by pads of cartilage, called intervertebral discs.

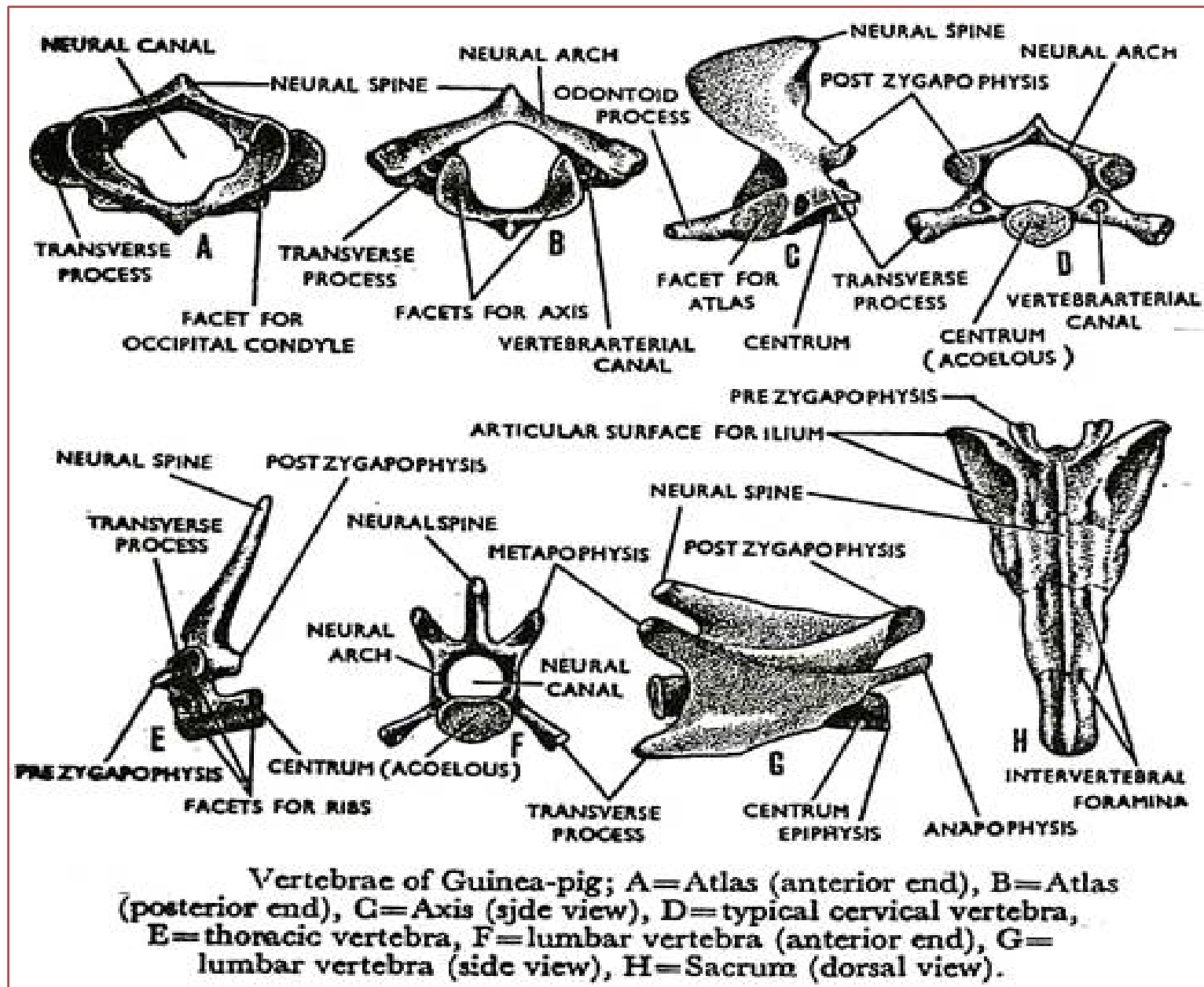
It is divisible into five regions:

- (1) The cervical regions consisting of seven vertebrae,
- (2) The thoracic region of twelve vertebrae,
- (3) The lumbar region of seven vertebrae,
- (4) the sacral region of four vertebrae, and
- (5) the caudal region of about seven vertebrae. In each of these five regions the vertebrae possess certain common distinguishing features.

A typical vertebra, from the middle of the series, consists of the following parts:

- (1) a vertebral body or centrum with a flat surface at the anterior and posterior ends; the centrum is there-fore acoelous;
- (2) a neural arch, placed above the centrum, enclosing the neural canal and thereby protecting the spinal cord; the part of the neural arch which joins with the centrum is known as the pedicle, and the remaining part forming the roof of the neural canal is the lamina; the margins of the pedicle are notched in such a way that openings, called intervertebral foramina, are formed between successive vertebrae serving as outlets for the spinal nerves;
- (3) a spinous process or neural spine, arises dorsally from the summit of the neural arch;
- (4) two transverse processes, one on each side, arising from the junction of the centrum with the neural arch; they are directed outwards and downwards;
- (5) a pair of upward-feeing anterior articulating processes or prezygapophyses, borne upon the inner side of a pair of large forwardly directed processes, called metapophyses;
- (6) a pair of posterior articulating processes or postzygapophyses facing downwards and outwards from the posterior end of the neural arch; at the base of each postzygapophysis is a backwardly directed small process, called anapophysis.

VERTEBRAE of Guinea pig



A typical rib such as the sixth is a curved rod divisible into two portions:

- (1) a vertebral portion which is bony and articulates with the vertebral column, and
- (2) a shorter sternal portion which is cartilaginous and therefore known as the costal cartilage; the costal cartilage joins the vertebral portion to the sternum. The first seven are complete or true ribs, because they extend from the vertebral column to the sternum. The following five are false ribs, because they do not extend up to the sternum.

The costal cartilages of the eighth and the ninth ribs are attached in front to the costal cartilage of the seventh rib and are thus indirectly connected to the sternum. The last three ribs remain free at their ventral ends, and are, therefore, called floating ribs. There are thus seven true ribs and five false ribs, of which the last three are floating.

Pectoral Girdle:

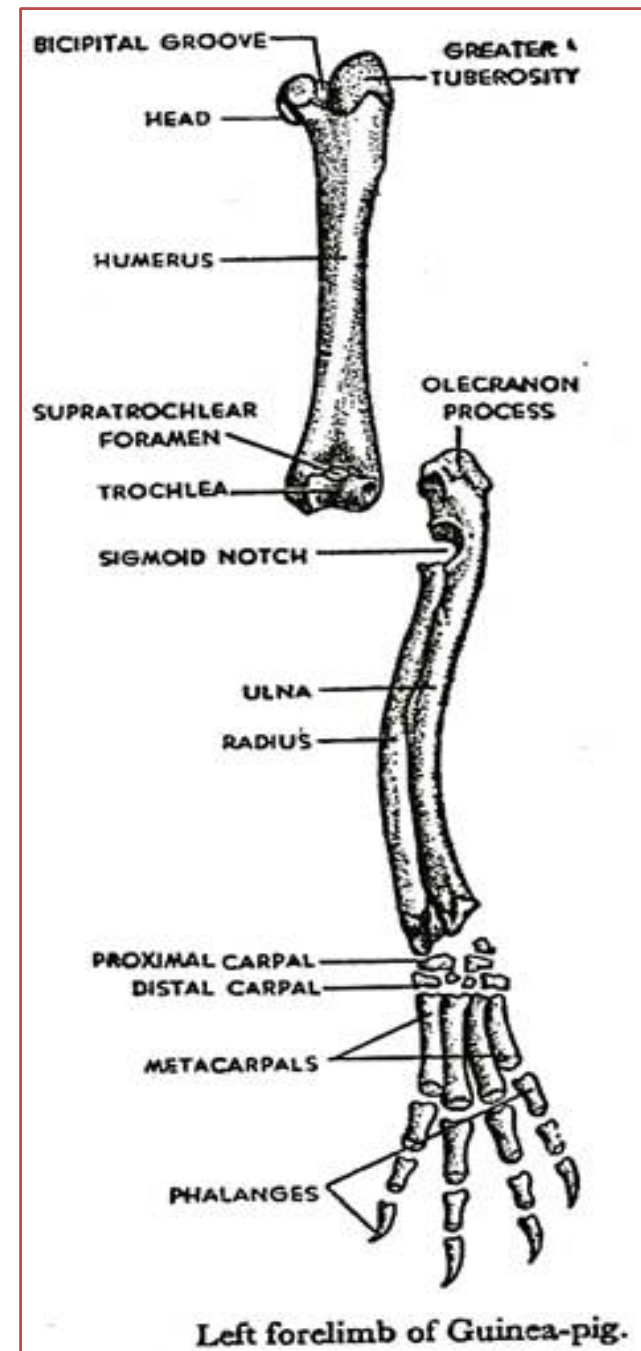
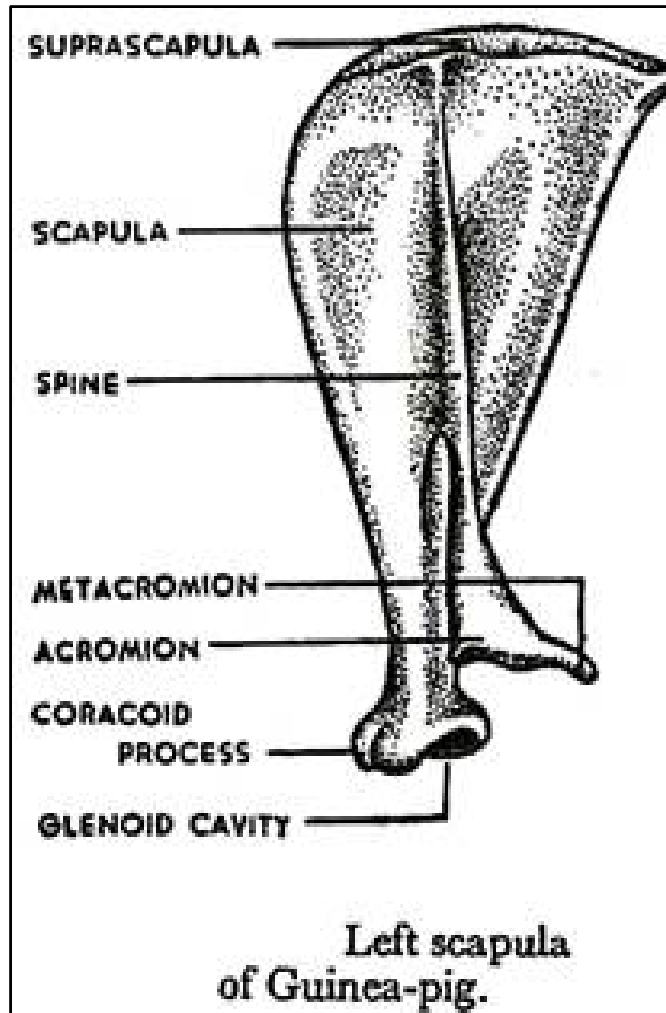
The pectoral girdle of the guinea-pig consists of two bones on each side:

- (1) a large flat scapula, and
- (2) a small rod-like clavicle.

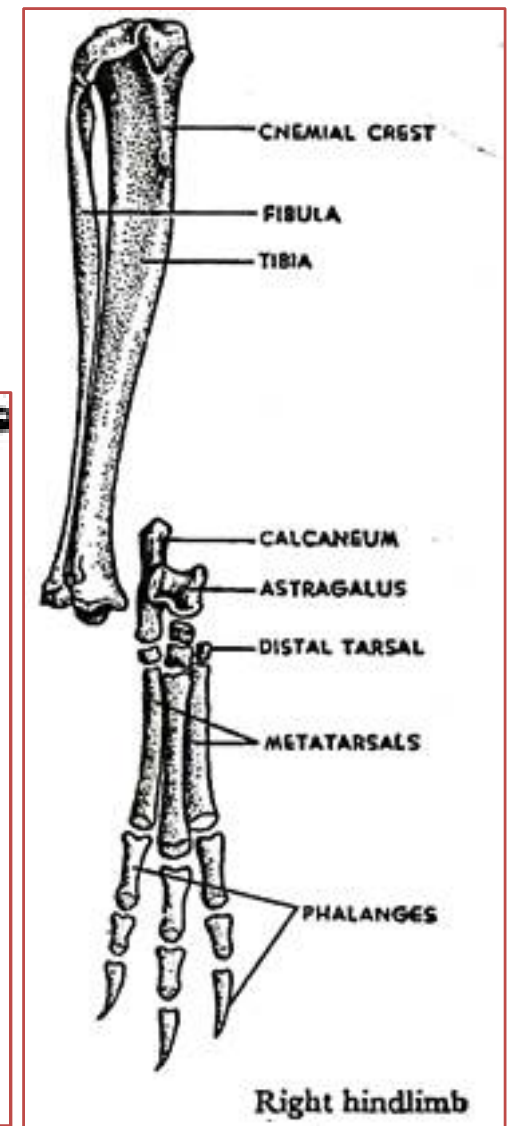
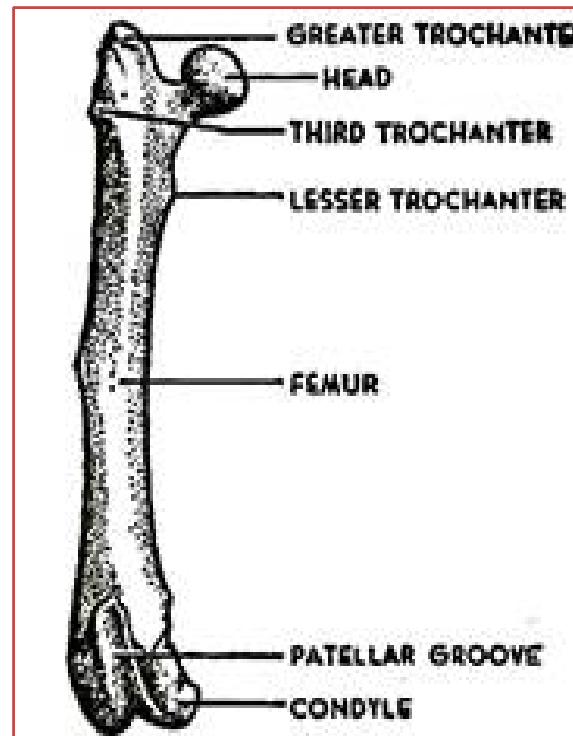
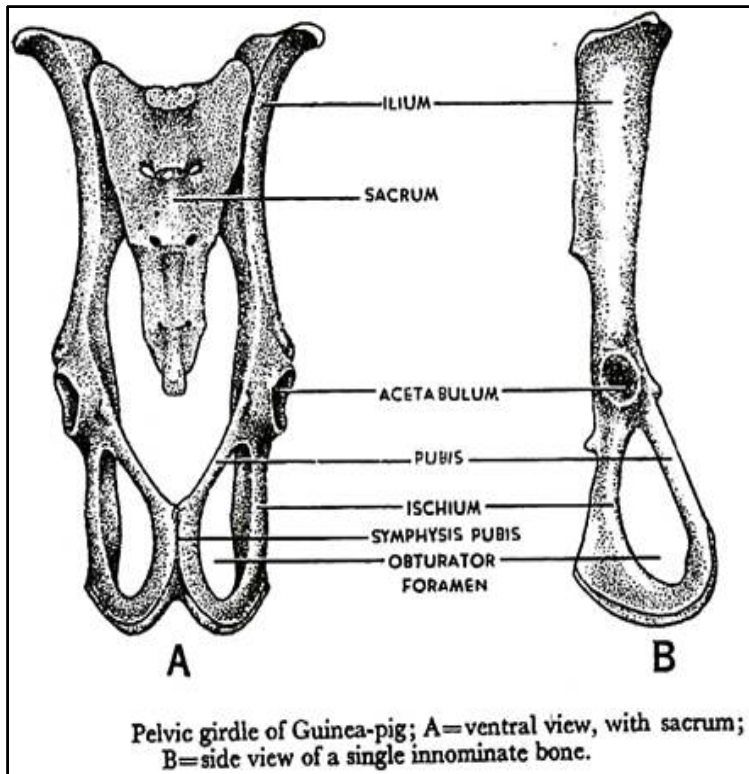
The scapula is triangular in shape, with its base turned upwards and the apex pointing forwards and downwards; its flat portion overlies the ribs to which it is attached by muscles. The apex of the scapula is expanded and bears the glenoid cavity into which fits the head of the humerus. Overhanging the glenoid cavity is a hook-like coracoid process.

Posteriorly, the broad base of the scapula bears a narrow strip of cartilage, the suprascapula. On the outer surface of the scapula is a prominent bony keel known as the spine. The spine ends in a pointed acromion near the apex of the scapula and a long metacromion projects downwards from the acromion. The clavicle is a short slender bone which is imperfectly developed.

SEGMENTS OF FORE LIMBS



SEGMENTS OF HIND LMBS



Pelvic Girdle:

The pelvic girdle of the guinea-pig consists of two halves, the innominate bones, which are united with one another in the midventral line by a strip of cartilage. Each innominate bone is composed of three parts—the ilium, the ischium, and the pubis, which are completely fused into one. It bears on its outer side a cup-shaped cavity, the acetabulum, in which fits the head of the thigh bone of the same side.

The acetabulum marks the point of union of ilium, ischium, and pubis. The ilium is a blade-like bone which lies anterior to the acetabulum; it is joined to the sacrum by a rough articular surface on its inner side.

The ischium forms the posterior third of the acetabulum, and is continued backwards along the line of the ilium; it is then continued to meet the pubis of the same side. The pubis, the smallest of the three bones, lies ventral to the acetabulum; it joins the ilium anteriorly and the ischium posteriorly.

A large obturator foramen is enclosed between the pubis and the ischium. The pubes of the two sides meet in the midventral line to form the symphysis pubis.

Forelimb:

The arm is supported by a stout humerus. The humerus has a rounded head at its proximal end, articulating with the glenoid cavity of the scapula. Close to the head is a greater tuberosity on the outer side, and a lesser tuberosity on the inner side; between the two tuberosities is the bicipital groove for lodging the tendon of the biceps muscle. Anteriorly, the shaft of the humerus bears a deltoid ridge.

Distally, the humerus has a pulley-like surface, the trochlea, for articulation with radius and ulna of the forearm. Above the trochlea are two deep depressions, one in front and the other behind.

The front one is the coronoid fossa, into which fits the radius and the back one is the olecranon fossa, into which fits the olecranon process of the ulna. The two fossae are joined by a small hole through the bone, the supratrochlear foramen.

The forearm is composed of two separate bones, the radius and the ulna, which are immovably articulated to each other. The radius is the shorter of the two bones and lies towards the inner side of the forearm. As the two bones are fixed in a prone position with the thumb pointing inwards, the guinea-pig cannot rotate its palm like a man.

The ulna is longer than the radius; it bears a sigmoid notch at the proximal end for fitting into the trochlea of the humerus. The proximal end of ulna is continued backwards as the olecranon process which forms the point of the elbow and acts as a level for the arm. The ulna and the radius form a hinge-joint with the trochlea of the humerus. Distally, both the bones bear articular surfaces for the carpals.

The wrist or carpus is composed of seven carpal bones which are arranged in two rows. The proximal row includes the radius, the intermedium and the ulnare. The distal row consists of four small bones. In addition to these, a very small sesamoid bone, the pisiform, is found on the underside of the wrist.

The palm includes four metacarpal bones. There are four fingers, each of which is composed of three phalanges. The terminal phalanx ends in a claw.

Hindlimb:

The thigh is supported by a long bone, the femur, which bears medially a rounded head for articulation with the acetabulum, thereby forming a ball and socket hip-joint.

Close to the head are three rough elevations:

- (1) a greater trochanter externally,
- (2) a lesser trochanter internally, and
- (3) a third trochanter externally just below the greater trochanter.

Distally, the femur has two rounded condyles for articulation with the tibia. The condyles are separated by an intercondylar groove which is continued upwards for a short distance for accommodating the patella or knee-cap. The patella is a small sesamoid bone which develops in the tendon of a muscle in front of the knee-joint.

The leg is composed of two bones, the tibia and the fibula. The tibia is a stout bone bearing, in front, a sharp ridge called cnemial crest. The fibula is a thin splint-like bone lying on the outer side of the tibia. Proximally, the tibia and fibula articulate with the condyles of the femur; distally, they form articular surfaces for the tarsals.

The ankle or tarsus includes six bones arranged in two rows: a proximal row of two bones called astragalus and calcaneum, a centrally placed bone called navicular, and a distal row of three small tarsals.

The foot is composed of three metatarsals. There are three toes, each consisting of three phalanges. The terminal phalanx is clawed.



THANKS

Date: 10-04-2019