

## BONES OF THE THORACIC AND PELVIC LIMB IN THE GROUND SQUIRREL BONES OF THE THORACIC AND PELVIC LIMB IN THE GROUND SQUIRREL (*Citellus citellus*)

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The bones of the thoracic and pelvic limb in the laboratory animal, ground squirrel, are presented in this paper. While examine the bone structure of limbs in the ground squirrel, a comparative study was made with other laboratory animals, particular the rat. The spine of the scapula is very long and distally continues on as the hamatus process which bears an articular surface for articulation with the clavicle. Arising from the lateral epicondyle on the humerus is a well developed lateral epicondyloid crest. The radius and ulna are of equal width, while the latter is longer due to the size of its olecranon. The thoracic limb has five digits. The os coxae bears a caudal ventral iliac spine. The ischial arch is rectilinear. The major and minor trochanter are at the same level. The tibia is slightly convex. The fibula extends to the distal and of the tibia. There are five digits on the pelvic limb.

**Key words:** *scapula, humerus, ossa antebrachii, pelvis, femur, ssacruris, digits, ground squirrel.*

### INTRODUCTION

In the literature there are information of bones of rat (Hebel and Stromberg, 1976; Hagemann and Schmidt, 1960) and rabbit (Schwarce and Hoffman, 1954.; Barone et al., 1973).

As a sequence in the study of organs and organ systems in the ground squirrel, the purpose of this paper is a morphological presentation of the bones of the thoracic and pelvic limb in this animal is of particular importance in comparative studies of bones in laboratory animals.

### MATERIAL AND METHODS

In our study, 40 bones of ground squirrel were subject to investigation. They were prepared by cooking and maceration, while those to be photographed were bleached in 6% hydrogen peroxide.

## RESULTS AND DISCUSSION

### Bones of the thoracic limb

**SCAPULA** (Fig. 1A). The caudal (Fig. 1A<sub>c</sub>) and dorsal (Fig. 1A<sub>d</sub>) borders of the scapula form a sharp angle while the dorsal and cranial borders meet to form a blunt angle. The spine (Fig. 1A<sub>1</sub>) runs round along the central lateral surface of the scapula and bends caudally, particularly its distal segment which continues on as the hamatus process (Fig. 1A<sub>2</sub>), similarly to rats (Hebel and Stromberg, 1976). An articular surface lies on the apex of the hamatus process which serves to articulate with the clavicle. The distal part of the scapula bears a well developed coracoid process (Fig. 1A<sub>3</sub>).

**Humerus** (Fig. 1B). As in all mammals (Barone et al., 1973; Hagemann and Schmidt, 1960) the proximal end of the humerus in ground squirrel bears a head as well as a greater (Fig. 1B<sub>2</sub>) and lesser tubercle which do not extend proximal to the level of the head (Fig. 1B<sub>1</sub>). Both the deltoid tuberosity (Fig. 1B<sub>4</sub>) and crest (Fig. 1B<sub>3</sub>) are well developed. Very distinct condyles are located on the distal end of the humerus. A well defined lateral epicondylar crest arises from the lateral epicondyle.

**OSSA ANTEBRACHII** (Fig. 1C). The radius (Fig. 1C<sub>1</sub>) and ulna (Fig. 1C<sub>2</sub>) are almost of equal width. The ulna extends distally as far as the radius, while its greater length is attributed to the olecranon. The radius has a slight cranial curve.

**OSSA CARPI**. The carpus is comprised of two rows of bones. There are two bones in the proximal row and four in the distal row. In the rat there are three bones in the proximal and 1-4 in the distal row (Hebel and Stromberg, 1976). An inserted bone lies between the proximal and distal row at the level of the third and fourth bones.

**OSSA METACARPI AND PHALANGES**. The ground squirrel has five metacarpal bones of various length, similarly to the rat (Hebel and Stromberg, 1976, Barone et al., 1973). The first metacarpal bone is the shortest while the third bone is the longest. This laboratory animal also has five digits. The first digit has two phalanges and the others have three. The first phalanges of the third, fourth and fifth digits are the most well developed.

### The bones of the pelvic limb

**OSSA COXAE** (Fig. 2) As in all mammals, it is comprised of the ilium, pubis and ischium (Fig. 2<sub>1,3,4</sub>). The wings of the ilium (Fig. 2<sub>2</sub>) are set at an angle. The acetabulum (Fig. 2<sub>5</sub>) is cut into by a deep notch which leads into a deep acetabular fossa. Located on the ilium cranial to the acetabulum is a very distinct ventral caudal iliac spine as is found in the rabbit (Barone et al., 1973). The obturator foramen (Fig. 2<sub>6</sub>) is a very large and the ischial arch (Fig. 2<sub>8</sub>) is rectilinear. There is one ischiadic tuber (Fig. 2<sub>9</sub>).

**OSSA FEMORIS** (Fig. 3A). The greater trochanter (Fig. 3A<sub>1</sub>) and head (Fig. 3A<sub>2</sub>) are at the same level. The head is separated from the body by a very distinct neck (Fig. 3A<sub>3</sub>). The lesser trochanter (Fig. 3A<sub>4</sub>) and trochanter tertius (Fig. 3A<sub>5</sub>) are the most distinct while a crest extends from the latter distally towards the central shaft area. Two small sesamoid bones (Fig. 3A<sub>6</sub>) are located on the dorsal surface of the lateral and medial condyles (Fig. 3A<sub>6</sub>).

**PATELLA** is very small and square shaped.

**OSSA CRURIS** (Fig. 3B). The tibia is slightly convex (Fig. 3B<sub>1</sub>). The fibulae (Fig. 3B<sub>2</sub>) is a very slender and long and extends to the distal end of the tibia. The fibula articulates proximally with the tibia.

**OSSA TARSII**. Two bones, talus and calcaneus, are located in the proximal row of

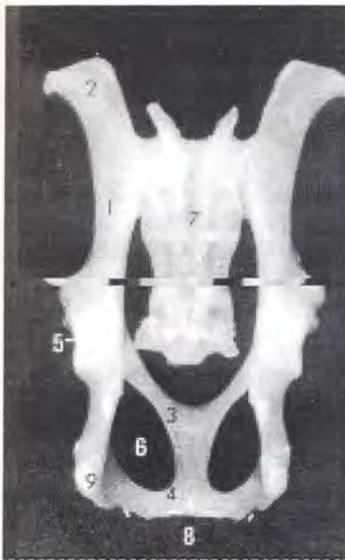
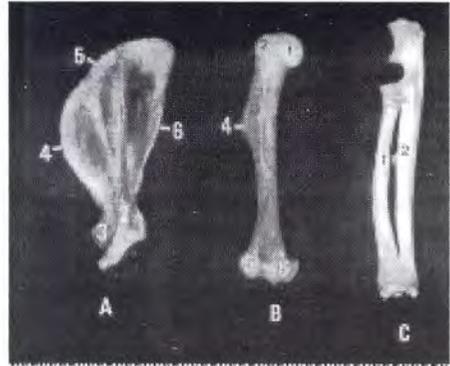
tarsal bones, similarly to the rabbit (Barone et al., 1973). In the distal row, there are four bones, while a central bone is inserted between the both rows.

**OSSA METATARSI AND PHALANGES.** There are five metatarsal bones various of lengths. The first bone is the shortest, while the third bone is the longest. Five digits exists on the pelvic limb. The first digit has two phalanges, while the others have three per digit.

**FIGURES:**

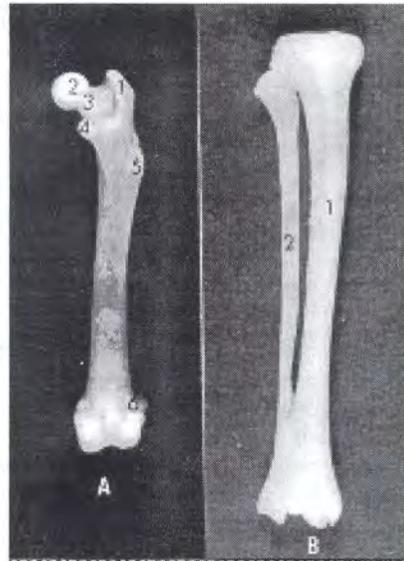
**Figure 1.** Bones of the thoracic limb in the ground squirrel

A- Scapula, B-Humerus, C-Ossa antebrachii  
 A<sub>1</sub>- Spina scapulae; A<sub>2</sub>- Processus hamatus; A<sub>3</sub>- Processus coracoideus; A<sub>4</sub>- Margo cranialis; A<sub>5</sub>- Margo dorsalis; A<sub>6</sub>- Margo caudalis; B<sub>1</sub>- Caput humeri; B<sub>2</sub>- Tuberculum majus; B<sub>3</sub>- Crista humeri; B<sub>4</sub>- Tuberositas deltoidea; B<sub>5</sub>- Codylus lateralis; B<sub>6</sub>- Codylus medialis; C<sub>1</sub>- Radius; C<sub>2</sub>- Ulna.



**Figure 2.** The pelvis in the ground squirrel

1- Os ilium; 2- Ala ossis ilii; 3- Os pubis; 4- Os ischii; 5- Acetabulum; 6- Foramen obturatum; 7- Sacrum; 8- Arcus ischiadicus; 9- Tuber ischiadicum.



**Figure 3.** Bones of the pelvic limb in the ground squirrel

A- Os femoris, B- Ossa cruris.  
 A<sub>1</sub>- Trochanter major; A<sub>2</sub>- caput femoris; A<sub>3</sub>- Collum femoris; A<sub>4</sub>- Trochanter minor; A<sub>5</sub>- Trochanter tertius; A<sub>6</sub>- Ossa sesamoides Vesalii; B<sub>1</sub>- Tibia; B<sub>2</sub>- Fibula.

## CONCLUSION

As a sequence in the study of organs and organ systems in the ground squirrel, the purpose of this paper is a morphological presentation of the bones of the thoracic and pelvic limb in this animal is of particular importance in comparative studies of bones in laboratory animals.

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## КОСКИ НА ПРЕДНИОТ И ЗАДНИОТ ЕКСТРЕМИТЕТ НА ПЕШТЕРСКАТА ВЕРВЕРИЦА (*Citellus citellus*)

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Коските на предниот и задниот екстремитет на лабораториското животно, пештерската верверица, се претставени во овој труд. Додека се испитуваше структурата на коските на верверицата, беше направено компаративно истражување со други лабораториски животни, особено со стаорци. Гребенот на лопатката е многу долг и продолжува дистално како изданок на хаматусот што е носач на зглобна површина за зглобување со клавикулата. Од страничниот епикондил на хумерусот произлегува добро развиениот страничен епикондилоиден гребен. Радиусот и улната се со еднаква широчина, додека улната е подолга заради големината на својот олекранон. Предниот екстремитет има пет прсти. Ос сохае е носач на каудалниот вентрално иличен гребен. Исихјалниот лак е праволиниски. Големиот и малиот трохантер се на исто ниво. Тибијата е малку конвексна. Фибулата се протега до дисталниот крај на тибијата. Има пет прста на задниот екстремитет.

**Клучни зборови:** скапула, хумерус, *ossa antebrachii*, ѓелвис, фемур, *ossa cruris*, прсти, верверица.