

Comparative Anatomy of the Korean Native Goat

1. Muscles of the thoracic limb

Suk Bong Yoon, D.V.M., M.S., Ph.D.

Department of Veterinary Medicine, College of Agriculture, Seoul National University

Hi Cheol Mun, D.V.M.

Department of Animal Science, Daejeon Vocational Junior College

Chang Key Kim, D.V.M., M.S.

Department of Animal Science, Chungbuk National College

Introduction

A detailed knowledge of the anatomy of the goat is necessary for the understanding of many problems in the fields of physiology, pathology and surgery, including those related to many experimental works on this animal. There were however, few reports on the anatomy of the goat with special reference to its musculature. In the text-books of veterinary anatomy available at present, the goat has been left out of consideration or simply compared with cattle and sheep without detailed description. But direct carry-over of the information from cattle or sheep to the goat might be impossible for studies requiring specific anatomical knowledge.

In recent years, the Korean native goat has been used frequently as a subject for many experimental studies, but its anatomy has not yet been completely elucidated. As a basis for clinical and other experimental works, it was keenly felt necessary to describe in detail the anatomy and to compare with that of other animals.

Our endeavour in the present paper was limited to describe and to illustrate the gross anatomy of the thoracic limb of the Korean

native goat.

The nomenclature employed in this paper was chosen, taking into consideration that used by other authors.

Materials and Methods

Eleven Korean native goats of both sexes (5 males and 6 females) with black hair and ranging in body weight from 15 to 25 kg were grossly dissected. After sacrifice, they were infused with and stored in embalming fluid (50% isopropyl alcohol, 10% glycerine, 5% formalin, 5% phenol, 30% water). All illustrations were made while directly viewing the dissected specimens.

Results

Extrinsic Muscles

M. trapezius (Fig. 1, 3)

Origin: The funicular part of the ligamentum nuchae and the supraspinous ligament between the second and the 9th thoracic vertebra.

Insertion: The middle portion of the scapular spine; the supra and infraspinous fascia by a broad aponeurosis.

This muscle was undivided and was not separated from *M. brachiocephalicus* and *M. omotransversarius* along its cranial border. In the region of the 9th thoracic vertebra, it blended with the dorsal fascia by means of an aponeurosis.

M. rhomboideus (Fig. 2, 3, 5) This muscle was divided into two portions.

Cervicis

Origin: The funicular part of the ligamentum nuchae from the second to the 7th cervical vertebra.

Insertion: The medial surface of the scapular cartilage close to the cranial angle of the scapula.

Thoracis

Origin: The spinous processes of the first eight thoracic vertebrae.

Insertion: The medial surface of the scapular cartilage just caudal to the insertion of the cervical part.

These two parts were clearly separated from each other and were completely covered by *M. trapezius*. The cervical part was covered by the thoracic part in its caudal border and its fibers were directed for the most part longitudinally. The thoracic part was quadrilateral in shape and its fibers were nearly vertical.

M. brachiocephalicus (Fig. 1, 2, 3, 5) This consisted of two muscles.

Origin: 1) Cleidooccipitalis—the mastoid process, the nuchal crest and the cranial part of the ligamentum nuchae by a broad aponeurosis. 2) Cleidomastoideus—the ventral surface of the skull at the basilar occipital tubercle, fusing with *M. longus capitis* and *M. sternomastoideus* under the atlas wing; partly the cleidooccipitalis.

Insertion: United in the middle part of the neck, they have a common insertion to the crest of the humerus and to the medial epicondyle of the humerus with that of *M. pectoralis superficialis cranialis* by means of an aponeurosis and to the deltoid tuberosity in part.

M. cleidooccipitalis was a wide and large muscle, about 7 cm wide in adult goats, covering the lateral surface of the neck. It ran downward and backward to pass in the medial side of the arm and its cranioventral border was continued to the fascia covering the mandible. Along its caudal border, it fused with *M. trapezius* for a considerable distance and with *M. omotransversarius* for a short distance. *M. cleidomastoideus* originated partly from the ventral surface of skull and partly from the *M. cleidooccipitalis*; those two original parts joined caudal to the atlas wing. This was a small muscle, being 1 cm broad in adult goats, which passed backward to fuse with *M. cleidooccipitalis* in the middle portion of the neck.

M. subclavius (Fig. 4, 6)

Origin: The lateral surface of the first sternal segment at the level of the first rib.

Insertion: The medial surface of the *M. brachiocephalicus*.

It was a thin, ribbon-like muscle which extended from the first sternal segment to *M. brachiocephalicus*. In adult goats, this muscle was about 1 cm broad and 0.5 cm thick.

M. omotransversarius (Fig. 3)

Origin: The atlas wing.

Insertion: The suprascapular fascia and partly *M. brachiocephalicus*.

It was covered by and was closely adherent to the medial side of *M. brachiocephalicus* with the exception of the terminal part united partly with the latter.

M. lastissimus dorsi (Fig. 2, 3, 4, 5)

Origin: The 11th to the 12th rib muscularly; as a wide and aponeurotic tendon the lumbodorsal fascia and the deep fascia of the thoracic wall.

Insertion: Forming a broad aponeurotic tendon on the medial surface of the long head of *M. triceps brachii*, it partly ended on the fascia of *M. triceps brachii* and partly blended with *M.*

teres major to be inserted into the teres tuberosity and partly as a long tendon goes to the coracoid process of the scapula with that of *M. pectoralis profundus caudalis*.

This muscle covered in part *M. serratus ventralis thoracis*. The cranial border of the muscle lies under *M. trapezius*, where it covered the caudal angle of the scapula.

M. pectoralis superficialis (Fig. 3, 4, 5, 6) This muscle was easily separated into two portions, having each other different fiber-direction.

Cranialis

Origin: The ventral surface of the sternum from the first two sternbrae, as far as the third costal cartilage.

Insertion: The medial epicondyle of the humerus with *M. brachiocephalicus* and the fascia over *M. biceps brachii*.

Caudalis

Origin: The ventral surface of the sternum from the second to the six sternbra.

Insertion: The fascia of the cranial and medial aspects of the forearm by a broad aponeurosis, where it was connected with *M. cutaneus trunci*.

The cranial part covered *M. pectoralis profundus cranialis* in the original part. Its fibers run caudodorsally to pass under the caudal part. The caudal part was a thin and wide muscle covering partly *M. pectoralis profundus caudalis* and its fibers were directed nearly vertically to cross over the cranial part.

M. pectoralis profundus (Fig. 2, 3, 4, 5, 6) This muscle is divided into two parts, as in *M. pectoralis superficialis*.

Cranialis

Origin: The ventral surface of the first two sternbrae.

Insertion: The fascia over *M. biceps brachii* and the crest of the humerus by means of an aponeurotic tendon.

Caudalis

Origin: The ventral surface of the last three sternbrae and the elastic abdominal tunic to the xiphoid process.

Insertion: The medial surface of *M. triceps brachii* by an aponeurosis, where it met with that of *M. latissimus dorsi*; the coracoid process of the scapula by means of a tendon, in common with that of *M. latissimus dorsi*; partly muscularly and partly tendinously, on the medial tuberosity of the humerus and the tendon of insertion of *M. supraspinatus*.

The cranial part was covered by *M. pectoralis cranialis* and its fibers were nearly vertical. The caudal part was a long and wide muscle and its fibers run cranially and laterally toward the arm to pass medially to the cranial part.

M. serratus ventralis (Fig. 3, 4, 5) This muscle is divided into cervical and thoracic portions.

Cervicalis

Origin: The transverse processes of the last five cervical vertebrae and the first five ribs by digitations.

Insertion: The cranial triangular area on the costal surface of the scapula.

Thoracis

Origin: The first nine ribs by digitations.

Insertion: The medial surface of the scapula by a flat tendon.

These two parts was not clearly separated in the original part but separated completely in the terminal part. The thoracic part was composed of many dividable muscular bundles and covered by a white tendinous sheet from the middle to the insertion.

Intrinsic Muscles

M. deltoideus (Fig. 1, 3, 4) This muscle consisted of two portions, the acromial and the scapular parts.

Origin: 1) The acromial part the acromion

and the fascia over *M. infraspinatus* by an aponeurotic tendon. 2) The scapular part the caudal border of the aponeurosis over *M. infraspinatus*.

Insertion: These two parts had a common insertion to the deltoid tuberosity.

Over half of this muscle consisted of an aponeurotic sheet, which fused with that covering *M. infraspinatus*. It covered the terminal tendons of *M. infraspinatus* and *M. teres minor*.

M. infraspinatus (Fig. 1, 4)

Origin: The infraspinous fossa and scapular spine.

Insertion: The lateral surface of the greater tuberosity of the humerus as a strong tendon.

This muscle was covered by a strong aponeurosis. The medial surface had a strong tendon which was continued to a strong terminal tendon. At the shoulder joint the fleshy muscle was not easily separated from *M. supraspinatus*.

M. supraspinatus (Fig. 1, 4)

Origin: The supraspinous fossa, including the scapular spine; the cranial border of the scapula.

Insertion: The free edge of the greater tuberosity of the humerus.

This muscle was covered by *M. trapezius* and *M. omotransversarius*. The strong muscular belly appeared to the medial surface of the shoulder over the cranial border of the scapula so that it met with *M. subscapularis*.

M. subscapularis (Fig. 2, 5)

Origin: The subscapular fossa, the caudal border of scapula and the medial surface of *M. teres major*.

Insertion: The medial part of the lesser tuberosity of the humerus by means of a short and strong tendon.

This muscle was divided into three parts: cranial, middle and caudal. The cranial part originated from the cranial portion of subscapular fossa and its fibers run caudoventrally to end partly on the fascia of the middle part. The

largest middle part was covered by a glistening tendinous sheet and become narrower toward the insertion. The caudal part originated from the caudal surface of the subscapular fossa and partly from the medial surface of *M. teres major*, and overlapped part. These three parts were united on the head of the humerus to form a strong, common terminal tendon on which the original tendon of *M. coracobrachialis* was crossed.

M. teres major (Fig. 2, 4, 5)

Origin: The caudal angle and the proximal half of the caudal border of the scapula.

Insertion: The three tuberosity by a short and flat tendon, in common with *M. latissimus dorsi*.

It was a fleshy, slender muscle lying caudal to *M. subscapularis* and medial to the long head of *M. triceps brachii*. The insertion was by a flat tendon which fused with that of *M. latissimus dorsi* on the medial surface of the long head of *M. triceps brachii*.

M. teres minor (Fig. 1, 8)

Origin: The distal half of the caudal half of the caudal border of the scapula as far as the infraarticular tuberosity.

Insertion: The *teres minor* tuberosity just above the deltoid tuberosity as a short and strong tendon.

It was a flat and triangular muscle lying on the long head of *M. triceps brachii* and under both *M. deltoideus* and *M. infraspinatus*. This muscle originated by means of a fascicular aponeurosis, which blended with *M. infraspinatus* and the long head of *M. triceps brachii*.

M. tensor fascia antebrachii (Fig. 3)

Origin: Over *M. infraspinatus* and the caudal border of the scapula by means of a thin and broad aponeurosis: the fascia of *M. latissimus dorsi*.

Insertion: On the olecranon, in common with *M. triceps brachii*: the deep fascia of the forearm.

It lay on the caudal edge of the long head of

M. triceps brachii. This muscle originated by a very thin aponeurosis but its muscular portion became thicker and narrower toward the insertion.

M. triceps brachii (Fig. 1, 2, 3, 4, 5, 7) This muscle consists of three heads: *Caput longum*, *laterale* and *mediale*.

Caput longum

Origin: The distal two-thirds of the caudal border of the scapula.

Insertion: The medial part and summit of the olecranon.

The medial surface of this muscle was covered by a glistening and strong tendinous sheet from the origin to the origin to the middle portion, from which a shiny and aponeurotic tendon(E) originated to be inserted into the *teres* tuberosity. A tendinous strand was found in the lateral surface.

Caput laterale

Origin: The lateral surface of the deltoid tuberosity to the neck: the strong fascial band which extended from the deltoid tuberosity to *M. extensor carpi radialis*.

Insertion: The lateral part of the olecranon.

Its fibers were directed obliquely downward and the terminal part blended with the long head of *M. triceps brachii* and partly with the *antebrachial* fascia.

Caput mediale.

Origin: The medial surface of the proximal half of the humeral shaft.

Insertion: The medial part of the olecranon just below the the insertion of the long head. The smallest medial head lay under *M. coracobrachialis* proximally and the long head distally.

M. anconeus. (Fig. 1, 8)

Origin: The distal half of the caudal surface of the humerus.

Insertion: The lateral part of the olecranon.

It was a small muscle lying between the lateral

and medial head of *M. triceps brachii*. It met with the medial head of *M. triceps brachii* on the caudal surface of the humerus along the median line and covered the dorsal surface of the elbow joint with the latter.

M. biceps brachii (Fig. 1, 2, 5, 7)

Origin: The supraglenoid tuberosity of the scapula by means of a long and round tendon.

Insertion: 1) The radial tuberosity; 2) the ulnar tuberosity; 3) the fascia covering *M. extensor carpi radialis*.

It was a fusiform muscle located on the cranial surface of the humerus. A tendinous intersection run through the muscular belly. In the region of the elbow joint this muscle divided into two portions, a long and a short tendon. The long tendon (*Lacertus fibrous*; *bicipital fascia*) passed obliquely downward and medialward and was continuous with the deep fascia covering *M. extensor carpi radialis*. The short, strong tendon splits again into two portions; the one inserted on the radial tuberosity and the other on the ulnar tuberosity.

M. brachialis (Fig. 1, 2, 8, 11)

Origin: The proximal third of the caudal surface of the humerus muscularly.

Insertion: The ulnar tuberosity and the interosseous ligament between the radius and the ulna just below the insertion of *M. biceps brachii*.

It wended obliquely from the caudolateral into the cranial surface of the humerus and finally reaches the medial side of the forearm by passing between *M. biceps brachii* and *M. extensor carpi radialis*. Its terminal tendon went side by side with that of *M. biceps brachii* to the ulnar tuberosity through between the *M. pronator teres* and radius.

M. Coracobrachialis (Fig. 2, 7, 10)

Origin: The coracoid process by a round and strong tendon.

Insertion: 1) The deep part - a small area

above the teres tuberosity of the humerus; 2) the superficial part – the distal two-thirds of the cranial surface of the humerus as far as the medial epicondyle crest of the humerus distally.

This muscle was divided into two parts, which origin by a common tendon surrounded by a synovial sheath once passing over the terminal part of *M. subscapularis*. The smaller, deep part spreaded out under the superficial part to be inserted into a small area above the teres tuberosity. The larger, superficial part passed over the deep part and went under *M. biceps brachii* to be inserted into the cranial surface of the humerus from the insertion of the deep part to the medial epicondyle crest of the humerus. For three goats, this muscle was composed of three parts by an additional part appearing over the superficial part; this additional part originated from a common tendon with the other parts to be inserted into the medial epicondyle of the humerus. In these goats, the median and ulnar nerves passed between the superficial and additional parts.

M. extensor carpi radialis (Fig. 1, 7, 11, 12)

Origin: The lateral condyloid crest and the coronoid fossa of the humerus.

Insertion: The metacarpal tuberosity.

At its origin, it blended with *M. extensor digiti tertii proprius* for a short distance by an intermuscular septum and was closely adherent to the joint capsule of the elbow joint. a fascial band originating from the deltoid tuberosity ran distally along the cranial surface of the muscular belly to be united with the tendon of insertion of this muscle at the middle of the forearm. The terminal tendon was supplemented in a proxiaml direction by a fascial sheet, which covered the forearm and was united with the long tendon of *M. triceps brachii*, to from a strong tendon at the carpal joint.

M. extensor digiti tertii proprius (Fig. 1, 11)

Origin: The lateral epicondyle of the humerus

and partly the coronoid fossa of the humerus.

Insertion: The dorsal surface of the second phalange of the medial digit.

It lay laterally on the radius between the preceding muscle and *M. extensor digitorum communis*. At its origin, it was fused with the preceding muscle by an intermuscular septum and with *M. extensor digitorum deeply communis* by a common aponeurosis. The tendon received a reinforcing slip from the suspensory ligament and was adherent to the joint capsule at the fetlock joint.

M. extensor digitorum communis (Fig. 1, 11)

This muscle was composed of 2 heads, with each origin to the humerus and ulna.

Origin: 1) Caput humerale – the lateral epicondyle of the humerus; 2) Caput ulnare – the cornoid process of the lateral surface of the proximal third of the ulnar shaft.

Insertion: The third phalanges of the digits III and IV. The ulnar head lay under *M. extensor digiti quartii proprius* and *M. extensor carpi ulnaris* proximally and fused with the humeral head in the middle of the forearm to form a common tendon passing down over the metacarpus with the preceding muscle. The common tendon gradually inclined forward and at the fetlock joint bifurcates, each of which was inserted into the extensor process of the corresponding third phalanx.

M. extensor digiti quartii proprius (Fig. 1, 11)

Origin: The lateral epicondyle of the humerus with the humeral head of the preceding muscle; the lateral ligament of the elbow joint; the lateral tuberosity of the distal half of the ulnar shaft.

Insertion: The second phalange of the digit IV.

This muscle fused deeply with the humeral head of the preceding muscle at its origin and lay between the preceding muscle and *M. extensor carpi ulnaris*. The tendon was adherent at the fetlock joint to the joint capsule, and it become flatter and larger at the fetlock where it received

band from the suspensory ligament.

M. extensor carpi ulnaris (Fig. 1, 11)

Origin: The lateral epicondyle of the humerus by a strong tendon.

Insertion: Divided into 2 tendons, the lateral side of the accessory carpal bone and the lateral surface of the proximal end of the large metacarpus.

It was a flat muscle lying on the caudolateral side of the forearm behind the extensor group and had action to flex the carpus and to extend the elbow joint.

M. abductor pollicis longus (Fig. 1, 2, 11, 12)

Origin: The distal half of the lateral surface of the ulna and the interosseous space between the ulna and radius.

Insertion: The head of the medial metacarpal bone.

It was a small and flat muscle. Its fibers were directed obliquely medially and distally and its terminal tendon crossed over the tendon of *M. extensor carpi radialis*. In too goats, their muscle was absent.

M. flexor carpi ulnaris (Fig. 2, 12) This muscle was composed of 2 heads.

Origin: 1) *Caput humerale* - the medial epicondyle of the humerus just behind the origin of *M. flexor carpi radialis*; 2) *Caput ulnare* - the caudal border and the fascia over the surface of the olecranon.

Insertion: The accessory carpal bone.

This muscle lay caudolaterally on the forearm and consists of 2 heads. The ulnar head originated by a thin tendon which was covered by the terminal tendon of *M. triceps brachii* and covered the ulnar head of *M. flexor digitorum profundus*. At its insertion, it became a strong tendon to be inserted into the accessory carpal bone, where this tendon blended with that of *M. extensor carpi ulnaris* ending to the lateral half of the accessory carpal bone.

M. flexor carpi radialis (Fig. 2, 12)

Origin: The medial epicondyle of the humerus, behind the origin of *M. pronator teres*.

Insertion: The caudal surface of the proximal end of the metacarpus.

It was a fusiform muscle lying between the preceding muscle and *M. pronator teres*, covering *M. flexor digitorum profundus*.

M. pronator teres (Fig. 2, 12)

Origin: The proximal half of the medial surface of the radius.

This muscle was only composed of a strong tendinous band, and under this muscle passed the tendons of insertions of *M. biceps brachii* and *M. brachialis*.

M. flexor digitorum superficialis (Fig. 1, 2, 12, 13)

Origin: The medial epicondyle of the humerus.

Insertion: The proximal end of the second phalanges of the digits III and IV.

This muscle was divided into 2 bellies, a superficial and a deep one. This superficial belly crossed over the volar annular ligament and perforates the metacarpal fascia, and joins with the deep belly at the distal third of the metacarpus. The deep belly arose tendon in common with the superficial belly, and united with *M. flexor digitorum profundus* in the distal third of the forearm, from where the muscle fibers were connected to the deep flexor tendon as far as its union with the superficial belly. The conjoined tendon bifurcated in the distal end of the metacarpus where each branch was joined by a band from the suspensory ligament. Near the fetlock joint, each branch of the tendon formed a ring for the corresponding one of the deep flexor tendon. The ring divided into 2 tendons at the middle of the first phalanx and passed under the proximal digital annular ligament on both sides of the deep flexor tendon to be inserted into the second phalanges of the digits III and IV.

M. flexor digitorum profundus (Fig. 1, 2, 12, 13) This muscle consisted of 3 heads.

Origin: 1) Caput humerale—the medial epicondyle of the humerus; 2) Caput ulnare—the medial surface of the olecranon; 3) Caput radiale—the middle of the volar surface of the radius and a small adjacent area of the ulna and *M. pronator teres*.

Insertion: The volar surface of third phalanges.

The humeral head was composed of 2 bellies arising by a common short tendon and covered by that of *M. flexor digitorum superficialis*. The ulnar head lay on the medial surface of the ulna arose on the medial surface of the olecranon muscularly and became a thin and long tendon which ran along the medial side of the medial side of the humeral head. This tendon was united with that of the humeral head to form a common tendon. The radial head lay on the caudomedial surface of the radius and its terminal tendon in the carpal canal was connected with the deep belly of *M. flexor digitorum superficialis*. This tendon bifurcated near the distal end of the metacarpus and passed in the ring formed by the superficial flexor tendon to be inserted into the third phalanges.

M. interosseus medius (Fig. 1, 2, 9) It was a muscle occupying the groove on the volar surface of the metacarpus medial to the deep flexor tendon. It arose from the proximal extremity of the metacarpus muscularly, and at the distal fourth of the metacarpus, it was divided into 4 bands; 2 axial and 2 abaxial ones. Each abaxial band was attached to the abaxial sesamoid bone partly and passed obliquely downward and forward over the proximal end of the first phalanx to join the extensor tendon at the middle of the middle of the first phalanx. Each axial band passed between first the phalanges of the digits III and IV to join the extensor tendon at the middle of the first phalanx.

Discussion

The discussion here will be primarily limited to compare our observations with those of cattle and sheep in that many of the anatomical features of the goat are different from those of other animals except for the ruminants. Also lack of literatures on the goats makes the comparative observations difficult.

In the division of several muscles, our findings differed from accounts of other authors in cattle and sheep. In the Korean native goat *M. trapezius* was undivided into two parts, as in the two parts, as in the ox¹⁰⁾, while this muscle was divided into two parts in the sheep.⁶⁾ Also whereas *M. rhomboideus* was divided into three parts in the sheep,⁶⁾ it was able to separate it into two parts in case of the Korean native goat. The superficial and deep pectoral muscles were clearly separable into two parts, cranial and caudal, respectively, as in the sheep; their fibers differed each other in the direction, and in the deep pectoral muscle there was also a space, 3 cm long in adult goats, between two parts (Fig. 6). According to Sisson,¹⁰⁾ in the ox, *M. pectoralis superficialis* was not so clearly separable into two parts and *M. pectoralis profundus* is undivided. Ellenberger³⁾ also did not divide *M. pectoralis profundus*, though he did *M. pectoralis superficialis*. It was considered, therefore, that the pectoral muscles of the Korean native goats differed from those of the ox in the division.

M. brachiocephalicus consisted of two muscles, *M. cleidooccipitalis* and *M. cleidomastoideus*. The former was a wide and large muscle covering the lateral surface of the neck, while the latter was so small that it could be considered as a branch of the former (Fig. 3).

We observed *M. subclavius* in all cases and Ellenberger³⁾ also described that this muscle was.

always in the goat, but according to Chauveau¹⁷ it was found on some occasions in the sheep. Whereas May⁶⁾ regarded this muscle as a part of *M. pectoralis profundus cranialis* in case of sheep, Ellenberger³⁾ commended that it probably corresponds to *M. subclavius hom.* and Sisson¹⁰⁾ also stated that it seemed quite plausible that this was the homologue of the subclavius muscle of man. Although the Korean native goat had, not the clavicle, it might probably be right that this muscle could be called *M. subclavius* because it resembled closely to that of man.⁵⁾

M. serratus ventralis originated from a considerable wide surface of the thoracic wall. Such a development of the origin might be related to the poor development of *M. serratus dorsalis cranialis*, which was absent in ten of eleven goats.

May⁶⁾ in the sheep, separated the middle and caudal parts of *M. subscapularis* by the insertion of *M. serratus ventralis thoracis*, describing that *M. subscapularis* was divided into three parts and *M. serratus ventralis thoracis* was inserted between the middle and caudal parts of the former muscle. But in the Korean native goat, if did so, this muscle should be divided into four parts. Although *M. subscapularis* was separated for a short distance by the insertion of *M. serratus ventralis thoracis*, it was difficult to divide into the middle and caudal parts at the this point.

In the Korean native goat, it was observed that a tendinous band suspended the long head of *M. triceps brachii* to the humerus, extending from the muscle to the *teres tuberosity*.

Generally, in the ruminants^{3,10)} as well as in horse^{3,10)} *M. coracobrachialis* differed markedly from those of the dog,⁷⁾ rabbit²⁾ and cat⁹⁾ in its development, division and attachment. In the sheep⁶⁾ and ox,¹⁰⁾ the superficial part of this muscle ended on the middle third of the humerus, but in the Korean native goat it ended on the distal two-thirds of the humerus as far as the medial epico-

nyloid crest by developing more richly than those of the ox and sheep. In three goats it was consisted of three parts, one of them ended on the medial epicondyle of the humerus. In such goats this muscle covered nearly the whole of the medial surface of the humerus.

Mm. lumbriculis was absent as a definite structure in the Korean native goat, but it might be represented by muscular bundles, lying between the tendons of the deep and superficial flexor muscles at the volar surface of the metacarpus.

M. extensor pollicis, a small muscle lying along *M. extensor carpi radialis*, was not observed in the Korean native goat, According to Sisson¹⁰⁾ it could be observed sometimes in the ox, and Ellenberger³⁾ reported that it was rarely found in the cattle but frequently in the case of sheep.

M. abductor pollicis longus was poorly developed, and in two goats it failed to develop, whereas *M. teres minor* and *M. anconeus* are richly developed.

Conclusion

The muscles of the Korean native goats were described, illustrated and compared those of cattle and sheep.

The superficial and deep pectoral muscles were clearly separated cleared into two parts, as in the sheep, respectively. *M. subclavius* was observed in all cases and its term was discussed. Whereas *M. coracobrachialis*, *M. anconeus* and *M. teres minor* were well developed, *M. abductor pollicis longus* was done poorly. Especially *M. coracobrachialis*, as compared with that of other animals, was developed very well, In three goats this muscle was composed of three parts, extending the medial epicondyle of the humerus and covering nearly the whole of the medial surface of the humerus. *M. extensor pollicis* was not observed in the Korean native goats.

Explanations for Plates

- Fig. 1 and 2.** Lateral (1) and medial (2) views of skeleton of the thoracic limb, showing muscle attachments.
- Fig. 3.** Lateral view of superficial muscles of the shoulder and arm. The cutaneous muscle was removed.
- Fig. 4.** Lateral view of deep muscles of the shoulder.
- Fig. 5.** Medial view of muscles of the shoulder and arm. The extrinsic muscles attaching to the medial side of the shoulder and arm were cut.
- Fig. 6.** Ventral view of the thoracic muscles.
- Fig. 7.** Medial view of muscles of the arm. A tendinous band(E), originating from the medial surface of 17A, suspends *M. triceps brachii* to the humerus.
- Fig. 8.** Lateral view of deep muscles of the shoulder and arm.
- Fig. 9.** Volar view of the manus, showing the arrangement of *M. interosseus medius*.
- Fig. 10.** Medial view of the arm. *M. coracobrachialis* consists of three parts, one of them (21C) extends to the medial epicondyle of the humerus.
- Fig. 11.** Lateral view of muscles of the antebrachium and manus.
- Fig. 12.** Medial view of muscles of the antebrachium and manus.
- Fig. 13.** Medial view of deep muscles of the antebrachium after removal of the superficial muscles (28 and 29).

Abbreviations

1: *M. trapezius*, 2: *M. rhomboideus*(2A: Cervicalis), 3: *M. brachiocephalicus*(3A: cleidooccipitalis, 3B: Cleidomastoideus), 4: *M. subciavius*, 5: *M. omotransversarius*, 6: *M. latissimus, dorsi*, 7, *M. pectoralis superficialis*(7A: Cranialis, 7B: Caudalis), 8: *M. pectoralis profundus*(8A: Cranialis, 8B: Caudalis), 9: *M. serratus venralis*(9A: Cervicalis, 9B: Thoracis), 10: *M. deltoideus*(10A: acromial part, 10B: scapular part), 11: *M. infraspinatus*, 12: *M. supraspinatus*, 13: *M. subscapularis*, 14: *M. teres major*, 15: *M. teres minor*, 16: *M. tensor fascia antebrachii*, 17: *M. triceps brachii*(17A Caput longum, 17B: Caput laterale, 17C: Caput mediale), 18: *M. anconeus*, 19: *M. biceps brachii*, 20: *M. brachialis*, 21: *M. coracobrachialis*(21A: superficial part, 21B: deep part), 22: *M. extensor carpi radialis*, 23: *M. extensor digiti tertii proprii proprius*, 24: *M. extensor digitorum communis*(24A: Caput humerale, 24B: Caput ulnare), 25: *M. extensor digiti quartii proprius*, 26: *M. extensor carpi ulnaris*, 27: *M. abductor pollicis longus*, 28: *M. flexor carpi ulnaris*(28A: Caput humerale, 28B: Caput ulnare), 29: *M. flexor carpi radialis*, 30: *M. pronator teres*, 31: *M. flexor digitorum superficial belly*, 31B: deep belly), 32: *M. flexor digitorum profundus* (32A: Caput humerale, 32B: Caput ulnare, 32C: Caput radiale), 33: *M. interosseus medius*, E: tendinous band extending from the medial surface of 17A to the teres tuberosity, F: fascial band extending from the deltoid tuberosity to *M. extensor carpi radialis* along the cranial border of *M. brachialis*.

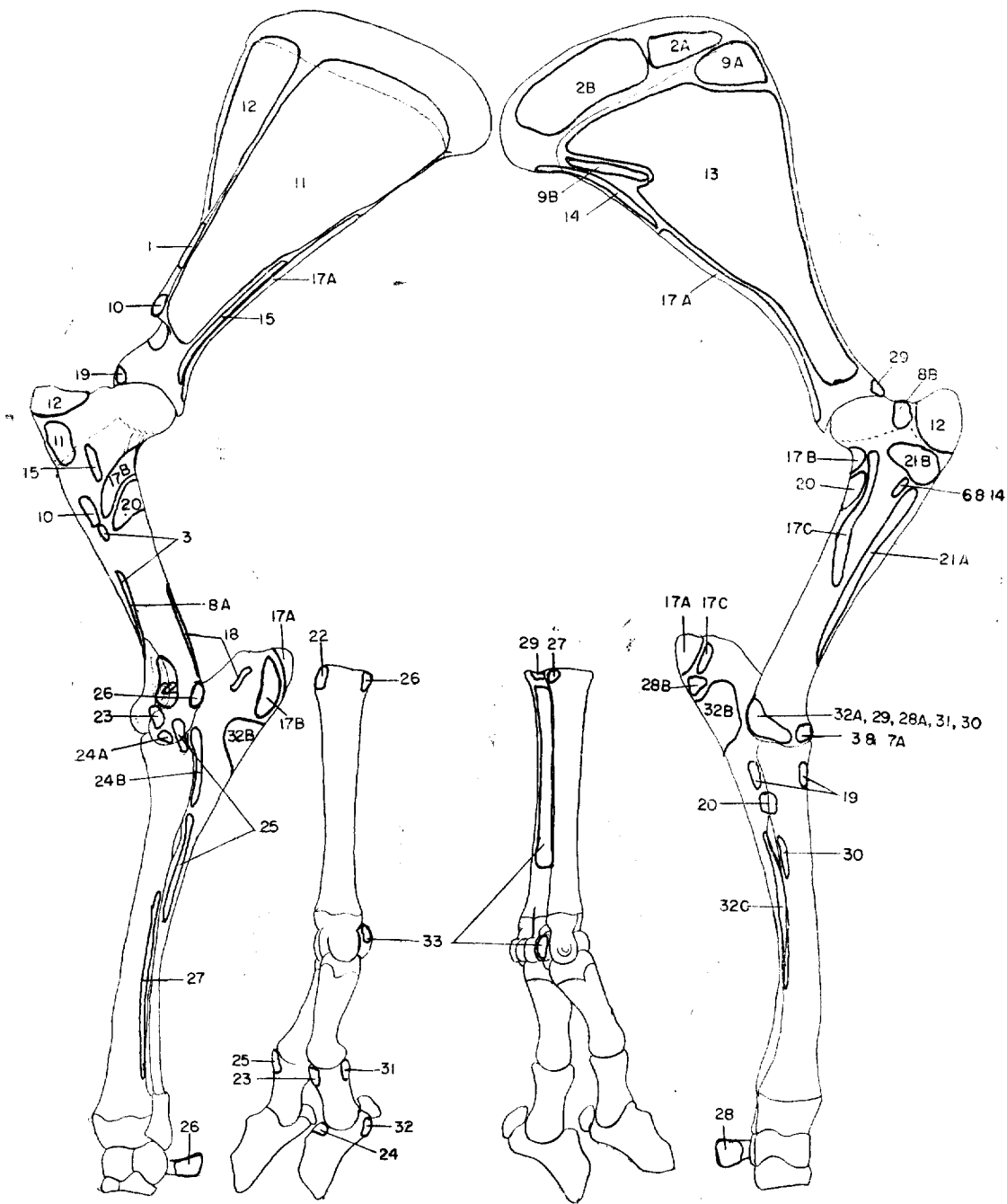


Fig. 1.

Fig. 2.

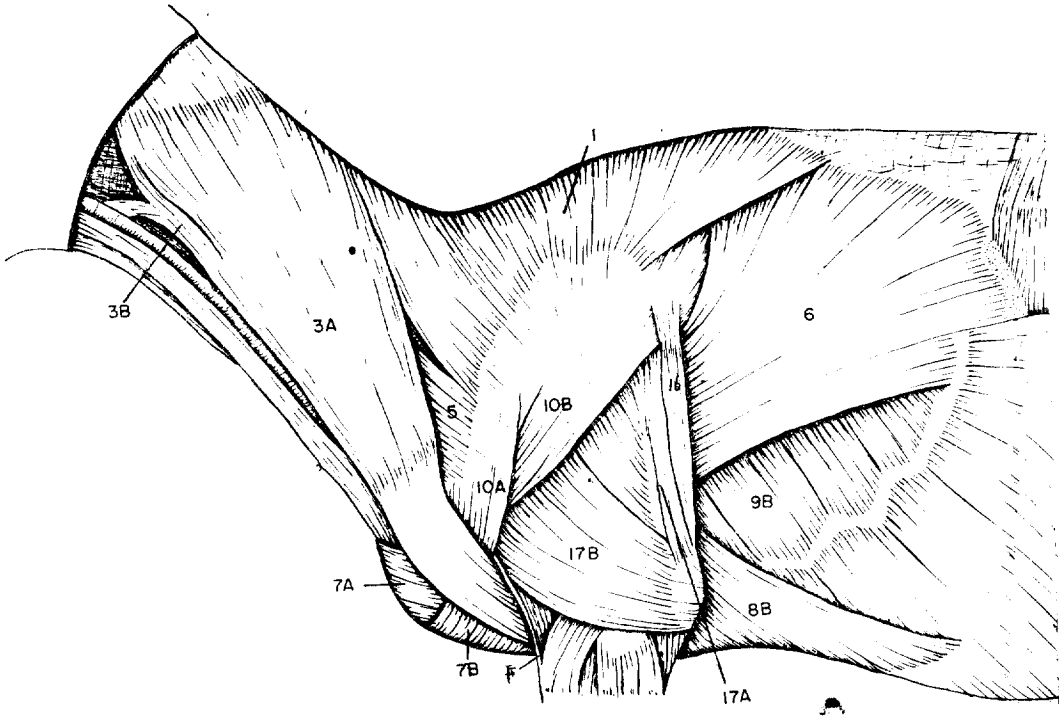


Fig. 3.

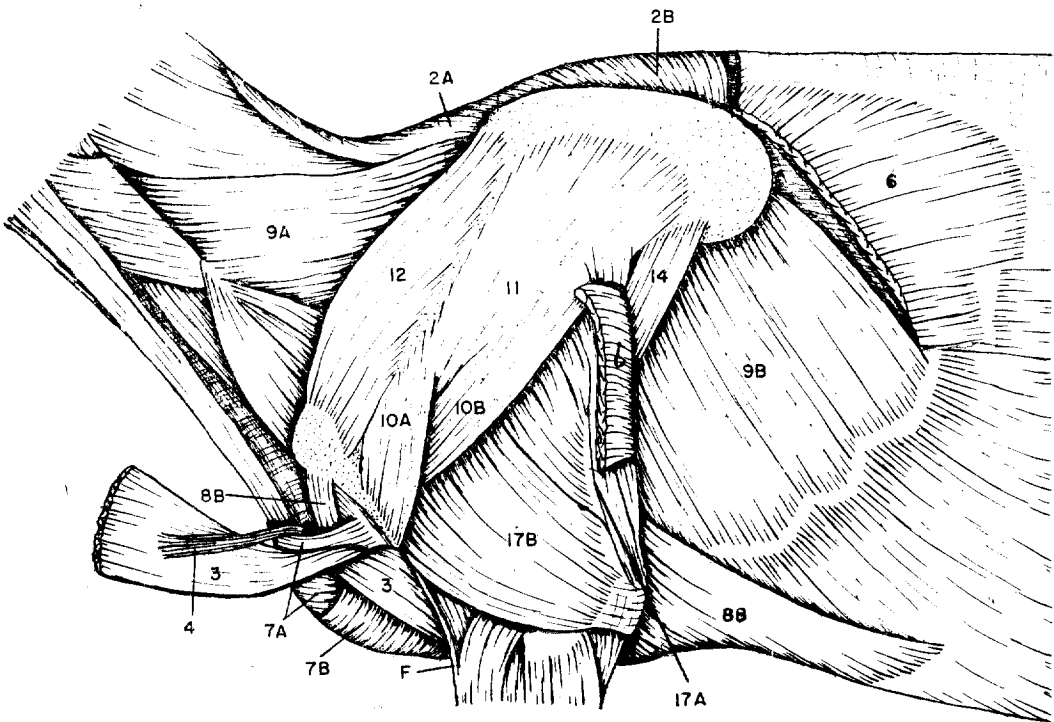


Fig. 4.

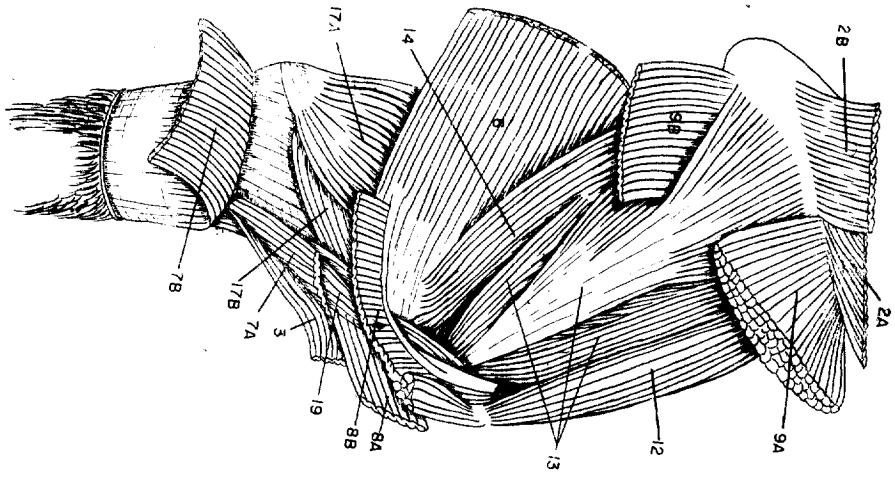


Fig. 5.

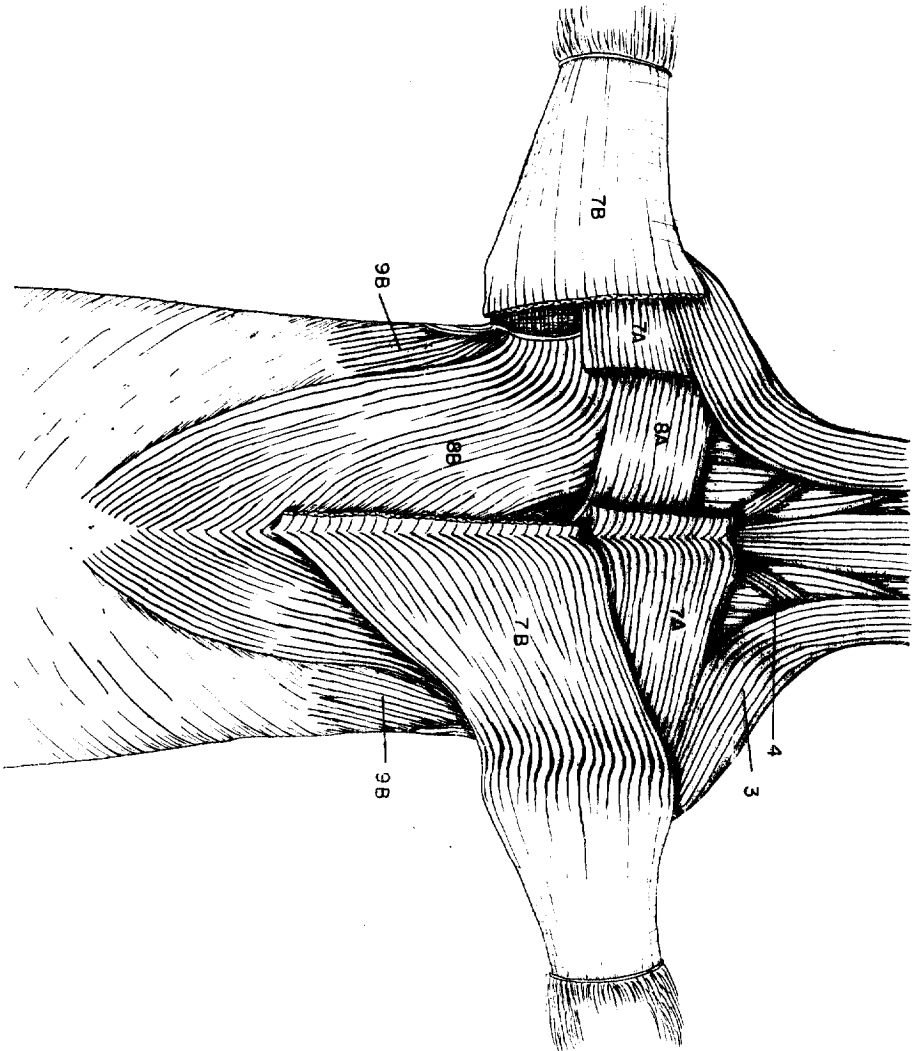


Fig. 6.

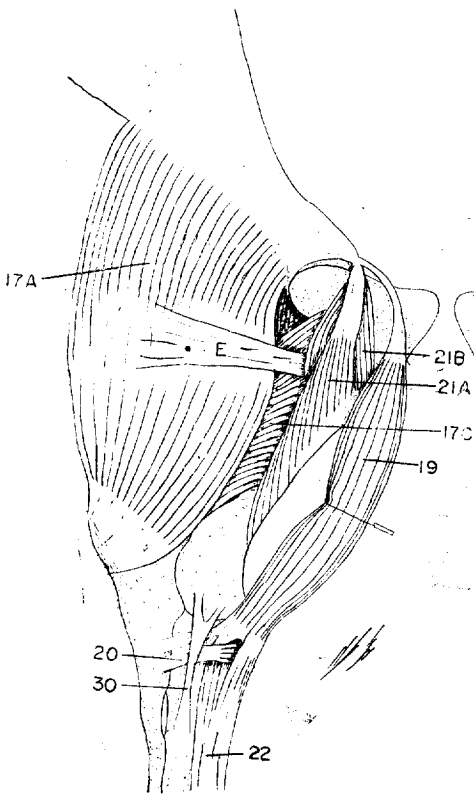


Fig. 7.

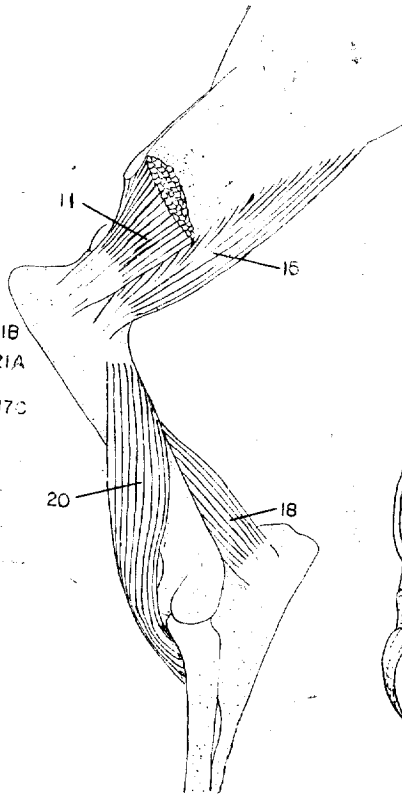


Fig. 8.

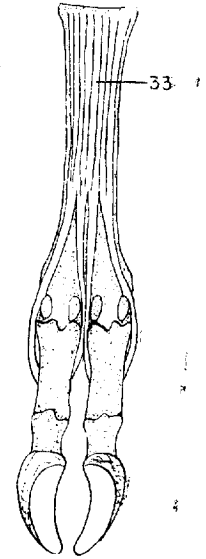


Fig. 9.

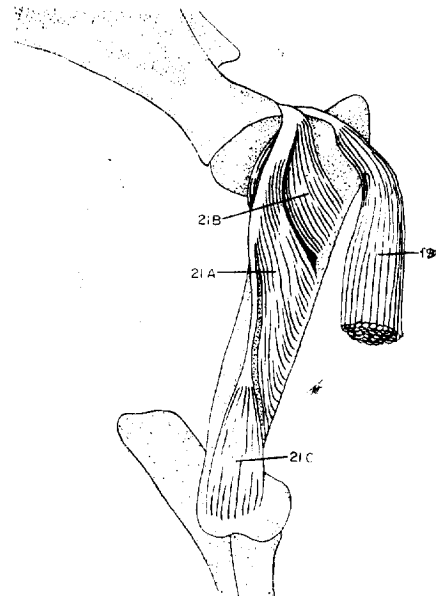


Fig. 10.

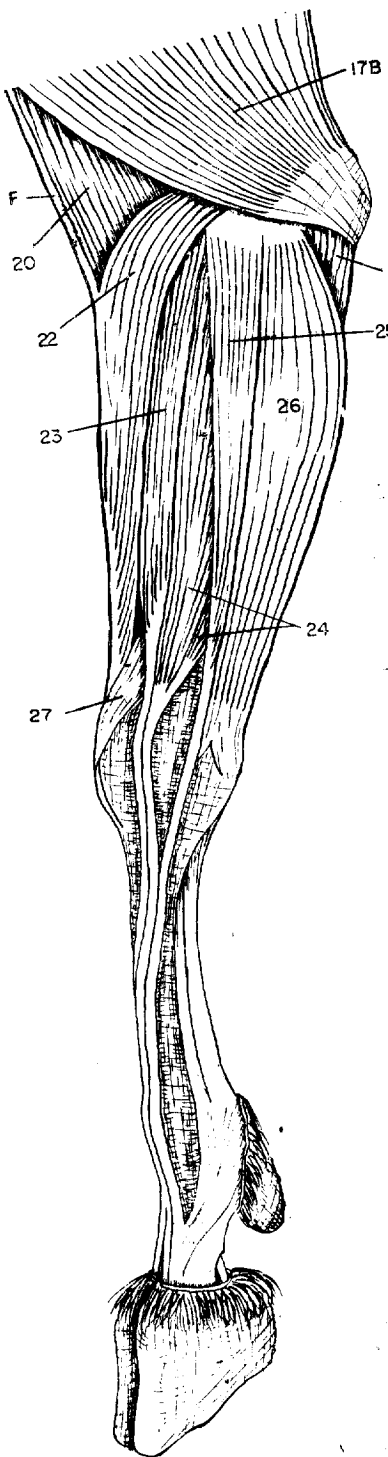


Fig. 11.

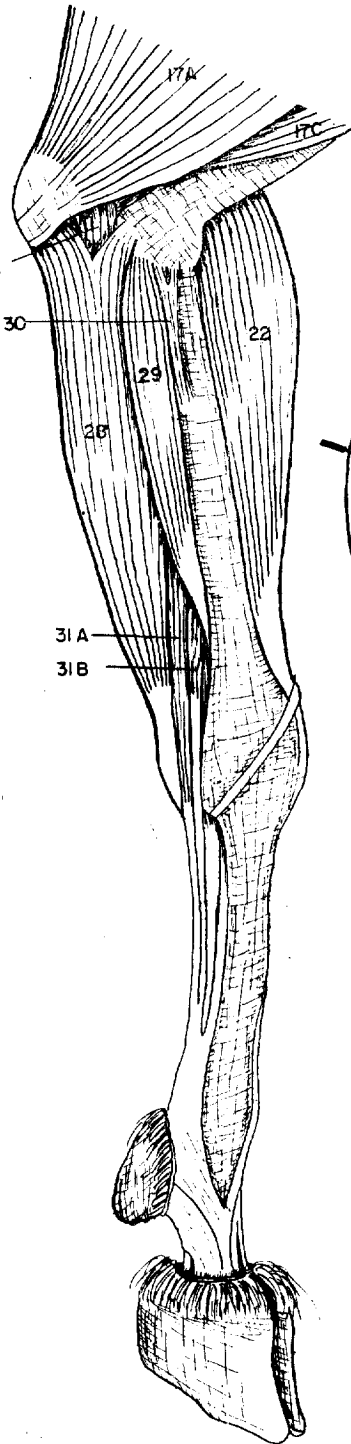


Fig. 12.

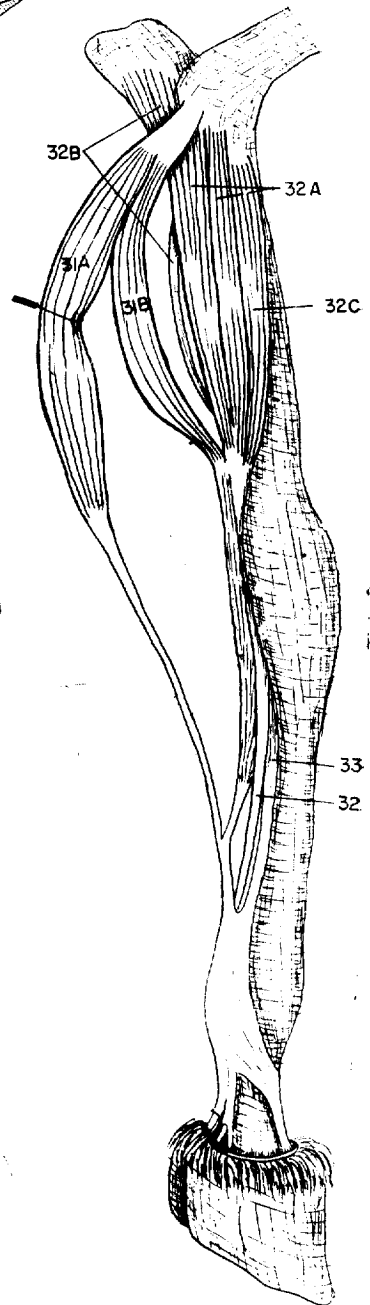


Fig. 13.

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韓國在來山羊의 比較解剖學的研究

1. 前肢筋에 관하여

尹 錫 鳳 文 熙 哲 金 昌 基
 서울大學校 農科大學 獸醫學科 大田實業專門學校 畜産科 忠北大學 畜産學科

국 문 초 목

韓國在來山羊 11마리의 前肢筋을 절개하여 관찰하였던 바 다음과 같은 結論을 얻었다.

1. 韓國在來山羊의 前肢에서는 다음과 같은 筋들을 관찰할 수 있었다. 僧帽筋 M. trapezus, 菱形筋 M. rhomboideus, 腕頭筋 M. brachiocephalicus, 鎖骨下筋 M. subclavius, 肩甲橫突筋 M. omotransversarius, 闊背筋 M. latissimus dorsi, 淺胸筋 M. pectoralis superficialis, 探胸筋 M. pectoralis profundus, 腹鋸筋 M. serratus ventralis, 三角筋 M. deltoideus, 棘下筋 M. infraspinatus, 棘上筋 M. supraspinatus, 肩甲下筋 M. subscapularis, 大圓筋 M. teres major, 小圓筋 M. teres minor, 前腕筋 張筋 M. tensor fascia antebrachii, 三頭腕筋 M. triceps brachii, 肘筋 M. anconeus, 二頭腕筋 M. biceps brachii, 上腕筋 M. brachialis, 鳥喙腕筋 M. coracobrachialis, 橈腕伸筋 M. extensor carpi radialis, 固有第三指伸筋 M. extensor digiti tertii proprius, 總指伸筋 M. extensor digitorum communis 固有第四指伸筋 M. extensor digiti quartii proprius, 尺腕伸筋 M. extensor carpi ulnaris, 長母指外轉筋 M. abductor pollicis longus, 尺腕屈筋 M. flexor carpi ulnaris, 橈腕屈筋 M. flexor carpi radialis, 圓回內筋 M. pronator teres, 淺指屈筋 M. flexor digitorum superficialis, 探指屈筋 M. flexor digitorum profundus, 骨間筋 M. interosseus medius.
2. 淺胸筋과 深胸筋은 각각 前部와 後部로 명확히 分離되어있으며 특히 深胸筋의 前部와 後部는 서로 떨어져서 起始를 하고있어 그 사이에는 胸骨이 노출되어 있었다.
3. 鎖骨下筋은 全例에서 관찰할 수 있었다.
4. 鳥喙胸筋은 소나 양에 비하여 매우 발달하였으며 특히 3例에서는 더욱 발달하여 3개의 部分으로 되어있어 상완골 내측면 거의 전체를 덮고 있었다.
5. 肘筋, 小圓筋 등 小動物에서는 작은 筋들이 매우 발달하였으나 長母指外轉筋은 옅고 작았다.
6. 反芻類에서 가끔 볼 수 있는 M. extensor pollicis는 관찰할 수 없었다.