

THE MUSCLES

STRUCTURE OF MUSCLE	<p>The fleshy central portion of a skeletal or voluntary muscle consists of contractile muscle fibers and is termed the belly. It is usually attached at both ends by connective tissue fibers which form either a tendon or a flat sheet termed an aponeurosis. In some cases muscle fibers attach directly to the periosteum without the intervention of a tendon. The more stable of the two attachments is termed the origin; the more mobile attachment is termed the insertion. The origin is usually nearer the sagittal plane than the insertion. In some cases (the intercostal muscles, for instance) both attachments are equally mobile and neither is nearer the sagittal plane. In such instances the terms <i>origin</i> and <i>insertion</i> may be assigned arbitrarily even though they do not have their usual functional significance.</p>
ATTACHMENT	<p>Most muscles are attached to bones, cartilages, or ligaments. Muscles may also attach to the fascia covering another muscle, to the mucous membrane (tongue muscles), to the skin (facial muscles), or they may form circular bands (sphincters).</p>
ACTIONS	<p>Muscles act only by contraction and almost always occur in antagonistic groups. Examples of such groups are: extensors, which straighten joints, and flexors, which bend them; adductors, which move appendages toward the median sagittal plane, and abductors, which move them away; pronators, which turn the dorsal surface of a limb anteriorly, and supinators, which turn the ventral surface of a limb anteriorly; levators, which raise structures, and depressors, which lower them; sphincters, which close openings, and dilators, which open them.</p> <p>For descriptive purposes we usually speak of a muscle as having a primary action, determined by the origin and insertion, and a number of secondary actions, determined by the activities of other muscles. Only the primary action of the muscle is listed in the descriptions which follow, and in many cases the accounts of the origins and insertions are simplified. Most of the muscles you will study in the cat have homologs of the same name in the human. When this is not the case, or when the human homolog is significantly different, it will be noted in the description of the muscle. Refer to the skeleton of the cat and to drawings or models of the human muscles during your dissection.</p>

DISSECTING TECHNIQUE

Before beginning the dissection of a given area, read through the dissecting instructions and study the illustrations in order to familiarize yourself with the structures you will encounter. Then study and identify the individual muscles as they are listed in the text, freeing each one from the surrounding muscles and confirming its origin and insertion as you do so. In order to define the limits of a muscle, use small scissors and forceps to trim away the overlying fat and fascia until you can see the direction of the muscle fibers. Look for a change in the direction of the fibers near the place where the edge of the muscle should be, and attempt to slip the flat edge of your scalpel handle between two separate layers of muscle at this point. If one layer separates easily from another you have your scalpel between two different muscles. Do not try to cut or force the separation of the muscles. If you are looking in the right place the separation will be natural. When it is necessary to cut a muscle in order to expose underlying structures, make your cut at right angles to the direction of the fibers and about half way between the origin and the insertion. Then pull back the two halves of the muscle and dissect them away from the underlying structures. After verifying the points of attachment you may wish to remove the muscle completely in order to make a neat dissection. In some cases it is desirable to leave the cut portions of the superficial muscles intact so that they can be replaced to re-establish their natural relationships with the underlying structures. It is often helpful to confirm an observation made on the left side of the specimen by dissecting on the right. If you do this, leave intact the origins and insertions of any muscles you cut on the right and do not destroy any of the nerves or vessels, which will be studied later.

SKINNING

Place the cat on its back. Make a midventral cut through the skin and extend it from the jaw to the anus. If your cat is a female, cut around the nipples and dissect the skin away from the mammary glands, which lie between the skin and the superficial muscles of the abdomen.

Separate the skin from the underlying muscles by blunt dissection. Make additional cuts as necessary to remove the skin from the torso and legs, leaving it intact around the mouth, eyes, ears, and feet.

FASCIA

As you pull the skin away from the body you will observe that it is connected to the underlying structures by a white, fibrous membrane consisting of elastic fibers and fat. This layer of connective tissue, termed the superficial fascia, is distinguished from the deep fascia, the tough fibrous membrane which invests the individual muscles.

CUTANEOUS MAXIMUS

In the lateral thoracic area you will observe muscle fibers lying within the superficial fascia and attached directly to the skin. These fibers are part of the cutaneous maximus, which originates from the muscles of the axilla and from the ventral side of the abdomen and thorax, and inserts on the skin. It serves to twitch the skin, as in avoiding irritants. Cut through the cutaneous maximus and remove it with the skin.

PLATYSMA

Another muscle which moves the skin will be found in the area of the neck and face. This is the platysma, which inserts on the skin around the ears, eyes, and lips. Remove it with the skin. In skinning the head and neck, refer

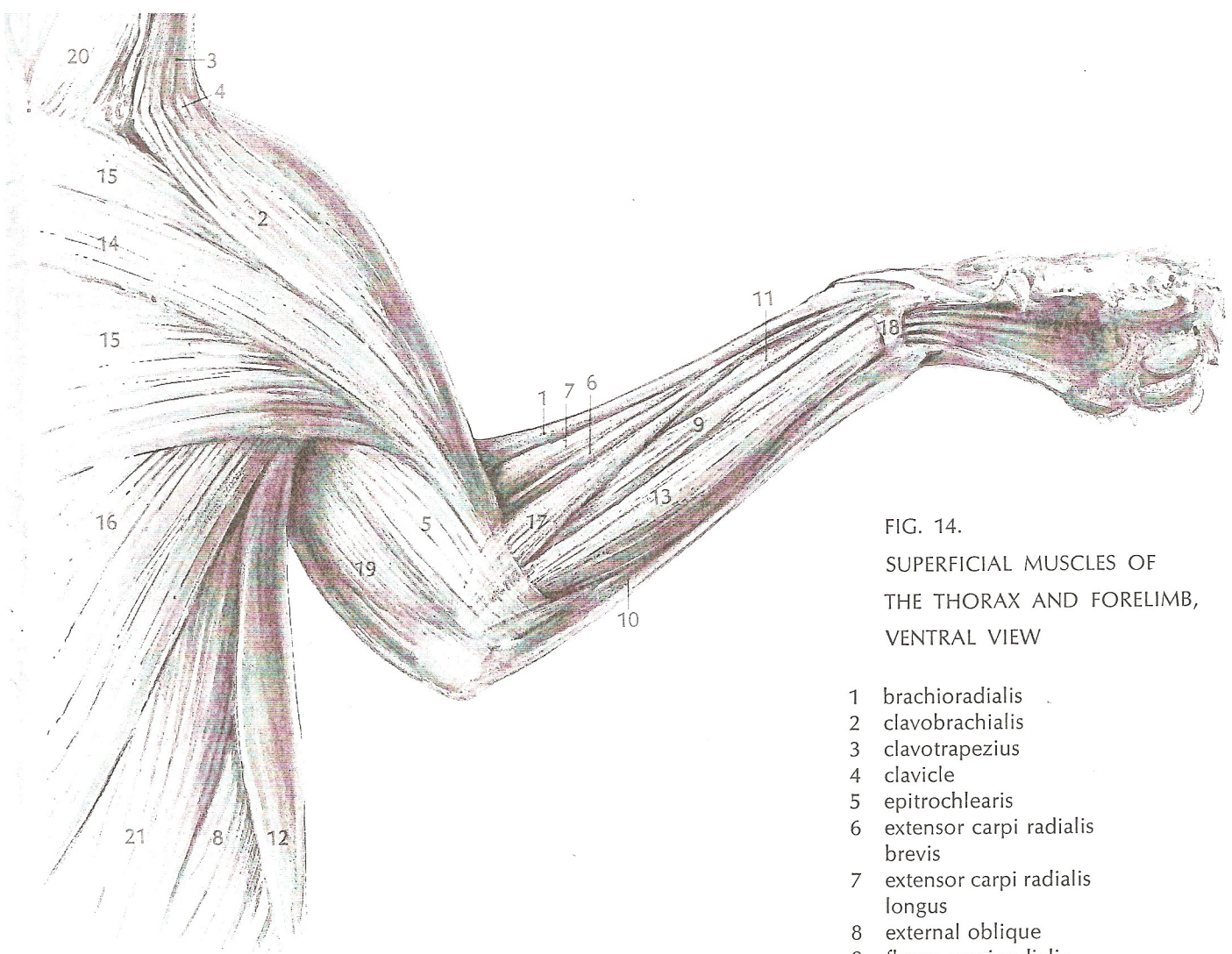
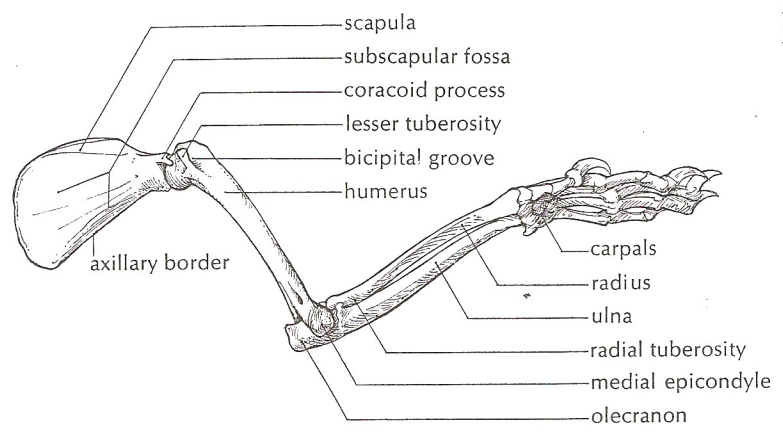


FIG. 14.
SUPERFICIAL MUSCLES OF
THE THORAX AND FORELIMB,
VENTRAL VIEW

- 1 brachioradialis
- 2 clavobrachialis
- 3 clavotrapezius
- 4 clavicle
- 5 epitrochlearis
- 6 extensor carpi radialis
brevis
- 7 extensor carpi radialis
longus
- 8 external oblique
- 9 flexor carpi radialis
- 10 flexor carpi ulnaris
- 11 flexor digitorum profundus
- 12 latissimus dorsi
- 13 palmaris longus
- 14 pectoantebrachialis
- 15 pectoralis major
- 16 pectoralis minor
- 17 pronator teres
- 18 transverse carpal ligament
- 19 triceps brachii
- 20 sternomastoid
- 21 xiphohumeralis



to Figures 15 and 16 and be careful not to damage the superficial veins and glands. As you skin the dorsal side of the thorax and abdomen observe the segmentally arranged cutaneous vessels and nerves passing from the dorsal body wall to the skin.

Examine the ventral aspect of the thorax and forelimb, and identify the muscles illustrated in Figure 14.

The pectoantebrachialis is the most superficial of the chest muscles. Separate it from the underlying pectoralis major, observing that it originates from the manubrium and inserts on the fascia of the forelimb near the elbow. It has no homolog in man. Cut the pectoantebrachialis in the middle and pull back both ends. Dissect the clavobrachialis and the clavotrapezius away from the humerus to expose the insertion of the pectoralis major.

The pectoralis major and minor are somewhat variable in form. If the pectoralis major is not readily distinguishable from the pectoralis minor, examine their insertions on the humerus. The fibers of the pectoralis major pass from the sternum, almost at right angles to the midline of the body, and insert on the proximal two thirds of the humerus between the biceps and the brachialis. The pectoralis minor crosses obliquely, deep to the pectoralis major, and inserts on the proximal half of the humerus. In the human the pectoralis major is much larger than the pectoralis minor. This is not the case in the cat.

The xiphohumeralis originates from the sternum, passes obliquely deep to the pectoralis minor, and inserts by a narrow tendon near the proximal end of the humerus. The xiphohumeralis has no homolog in man. The pectoantebrachialis, pectoralis major, pectoralis minor, and xiphohumeralis act together to rotate the forelimb and to draw the forelimb toward the chest.

The epitrochlearis is a thin, superficial muscle which appears to be an extension of the latissimus dorsi. It originates from the lateral surface of the ventral border of the latissimus dorsi and inserts by a thin aponeurosis which is continuous with the fascia of the lower forelimb. It acts in common with the triceps as an extensor of the elbow. It has no homolog in man.

The pronator teres originates from the medial epicondyle of the humerus and inserts about the middle of the radius. It rotates the radius to the prone position.

The palmaris longus arises from the medial epicondyle of the humerus and passes under the transverse carpal ligament. Trace its tendons, which insert on the pads of the forefoot and on the proximal phalanges of the digits. It is a flexor of the wrist and digits. The palmaris longus of the human is a slender muscle which inserts on the fascia of the palm. It is absent in about 10 per cent of humans.

The flexor carpi radialis originates from the medial epicondyle of the humerus and inserts on the second and third metacarpals. It flexes the wrist.

The flexor carpi ulnaris arises as two heads. One originates from the medial epicondyle of the humerus; the other originates from the olecranon. About the middle of the ulna the two heads join and pass along the ulnar border of the lower forelimb to insert on the ulnar side of the carpals. This muscle acts as a flexor of the wrist.

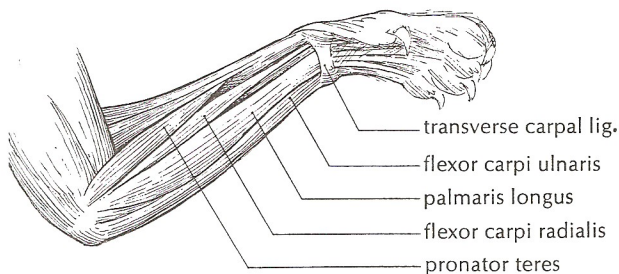
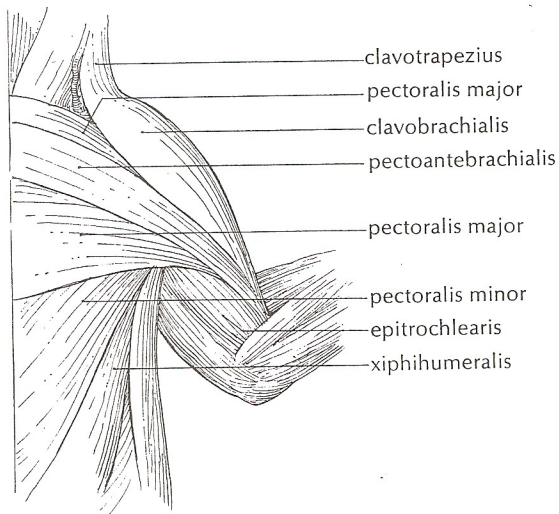
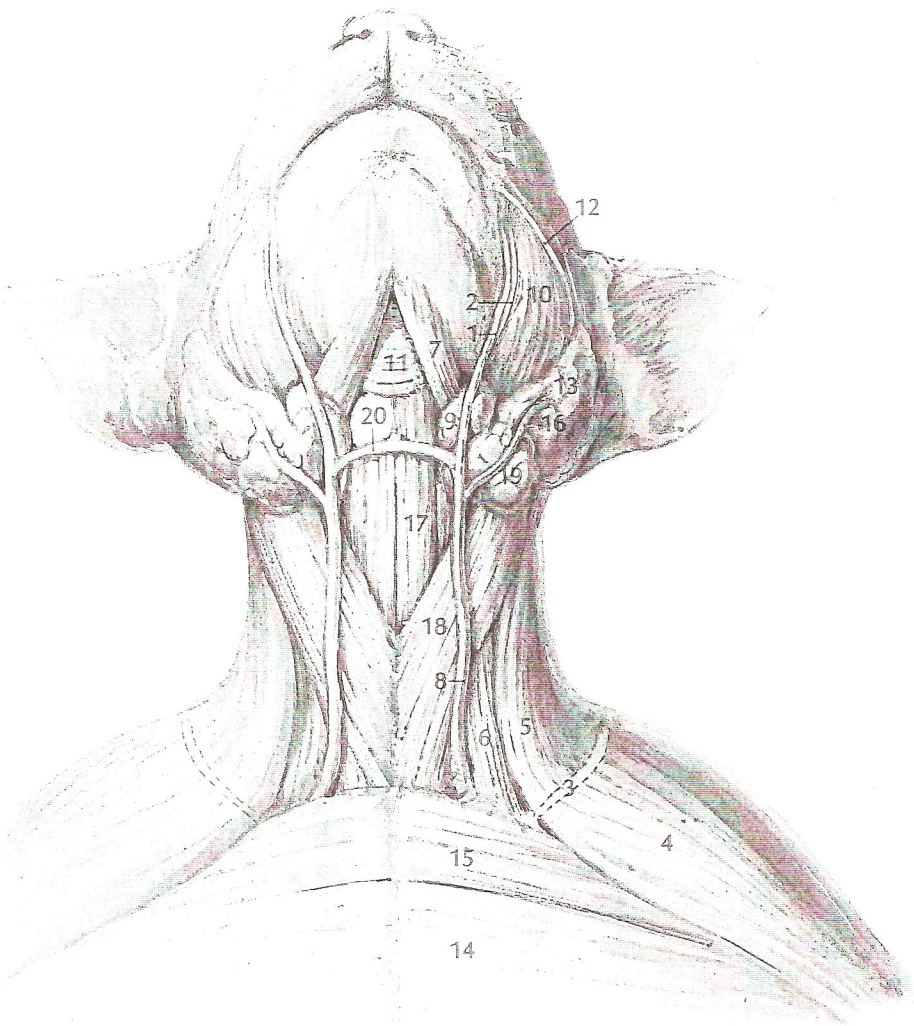


FIG. 15.
SUPERFICIAL MUSCLES OF
THE NECK, VENTRAL VIEW



- 1 anterior facial vein
- 2 branch of facial nerve
- 3 clavicle
- 4 clavobrachialis
- 5 clavotrapezius
- 6 cleidomastoid
- 7 digastric
- 8 external jugular vein
- 9 lymph nodes
- 10 masseter
- 11 mylohyoid
- 12 parotid duct
- 13 parotid gland
- 14 pectoantebrachialis
- 15 pectoralis major
- 16 posterior facial vein
- 17 sternohyoid
- 18 sternomastoid
- 19 submaxillary gland
- 20 transverse jugular vein

NECK AND SHOULDER

Examine the ventral aspect of the neck and identify the muscles illustrated in Figure 15.

The mylohyoid originates from the medial surface of the two dentary bones and inserts on a median raphe which extends from the hyoid bone to the mandibular symphysis. It raises the floor of the mouth and draws the hyoid bone anteriorly.

The digastric originates from the jugular and mastoid processes and inserts on the inferior border of the dentary bone. It is a depressor of the mandible.

The masseter originates from the zygomatic arch and inserts on the posterior half of the lateral surface of the dentary bone. It elevates the mandible.

Examine the lateral aspect of the neck and shoulder, and identify the muscles illustrated in Figure 16.

The temporal muscle originates from the lateral surface of the skull posterior to the orbit, and inserts on the coronoid process of the dentary bone. It acts with the masseter to elevate the mandible.

The sternomastoid originates from the manubrium of the sternum and from the midventral line anterior to the manubrium. It passes obliquely around the neck to insert on the superior nuchal line and on the mastoid process. Singly it turns the head; both muscles

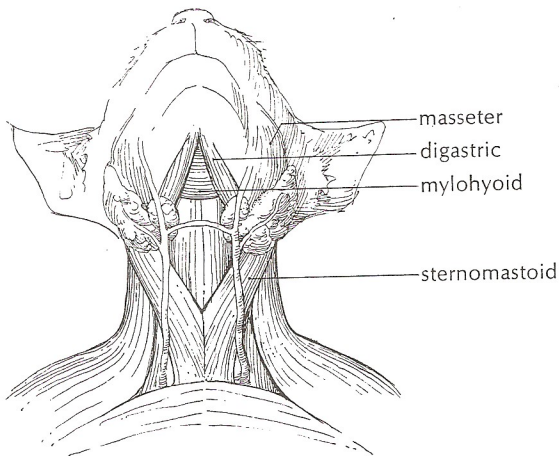
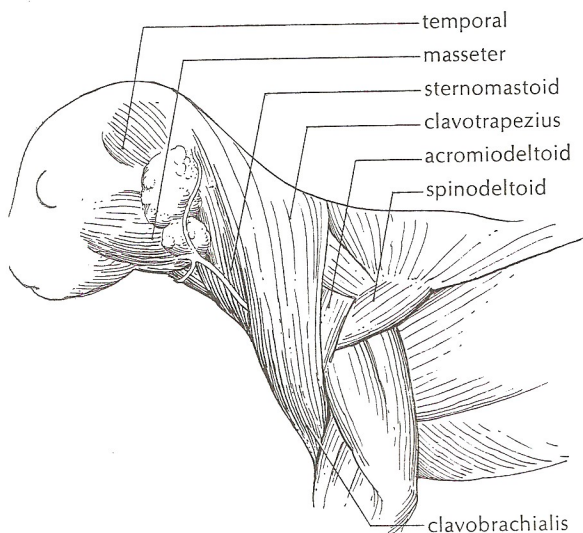
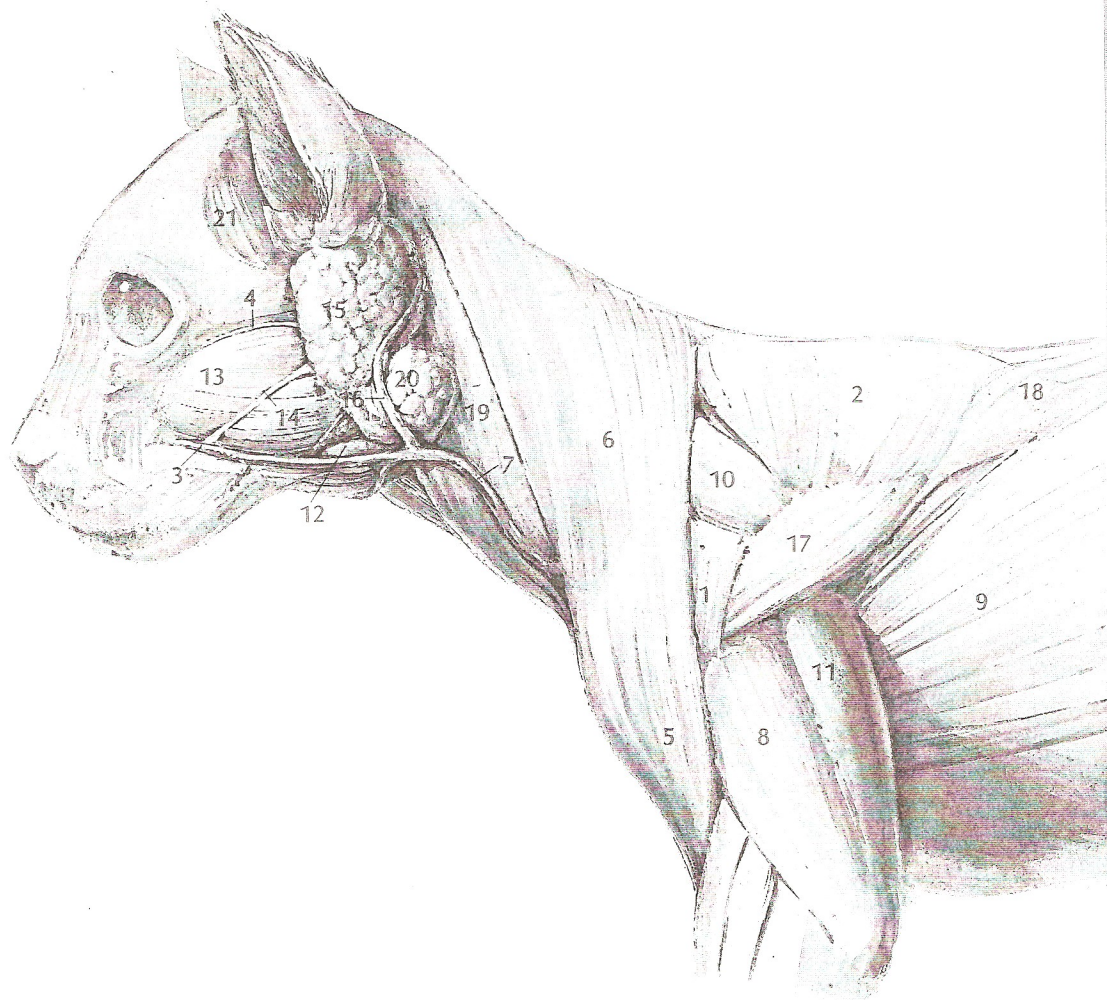


FIG. 16.
SUPERFICIAL MUSCLES OF
THE NECK AND SHOULDER,
LATERAL VIEW

- 1 acromiodeltoid
- 2 acromiotrapezius
- 3 anterior facial vein
- 4 branch of facial nerve
- 5 clavobrachialis
- 6 clavotrapezius
- 7 external jugular vein
- 8 lateral head of triceps
- 9 latissimus dorsi
- 10 levator scapulae ventralis
- 11 long head of triceps
- 12 lymph nodes
- 13 masseter
- 14 parotid duct
- 15 parotid gland
- 16 posterior facial vein
- 17 spinodeltoid
- 18 spinotrapezius
- 19 sternomastoid
- 20 submaxillary gland
- 21 temporal



acting together depress the head and neck.

The fibers of the clavotrapezius and the clavobrachialis are continuous, but their innervation is separate. Find the position of the clavicle by palpation at the point where the fibers of the clavobrachialis meet those of the clavotrapezius. The clavotrapezius originates from the superior nuchal line of the skull and from the median dorsal line of the neck. It inserts on the clavicle. The clavobrachialis originates from the clavicle and inserts on the proximal end of the ulna. The clavotrapezius and clavobrachialis work together in the forward extension of the humerus, as in running; they also assist in turning the head and in flexing the elbow. The clavotrapezius is homologous with that portion of the trapezius which inserts on the clavicle in man; the clavobrachialis is homologous with that portion of the deltoid which originates from the clavicle in man.

The acromiodeltoid originates from the acromion. The spinodeltoid originates from the spine of the scapula. Both muscles insert on the proximal end of the humerus and work together to raise and rotate the humerus. The acromiodeltoid, spinodeltoid, and clavobrachialis are homologous with the single deltoid muscle of man.

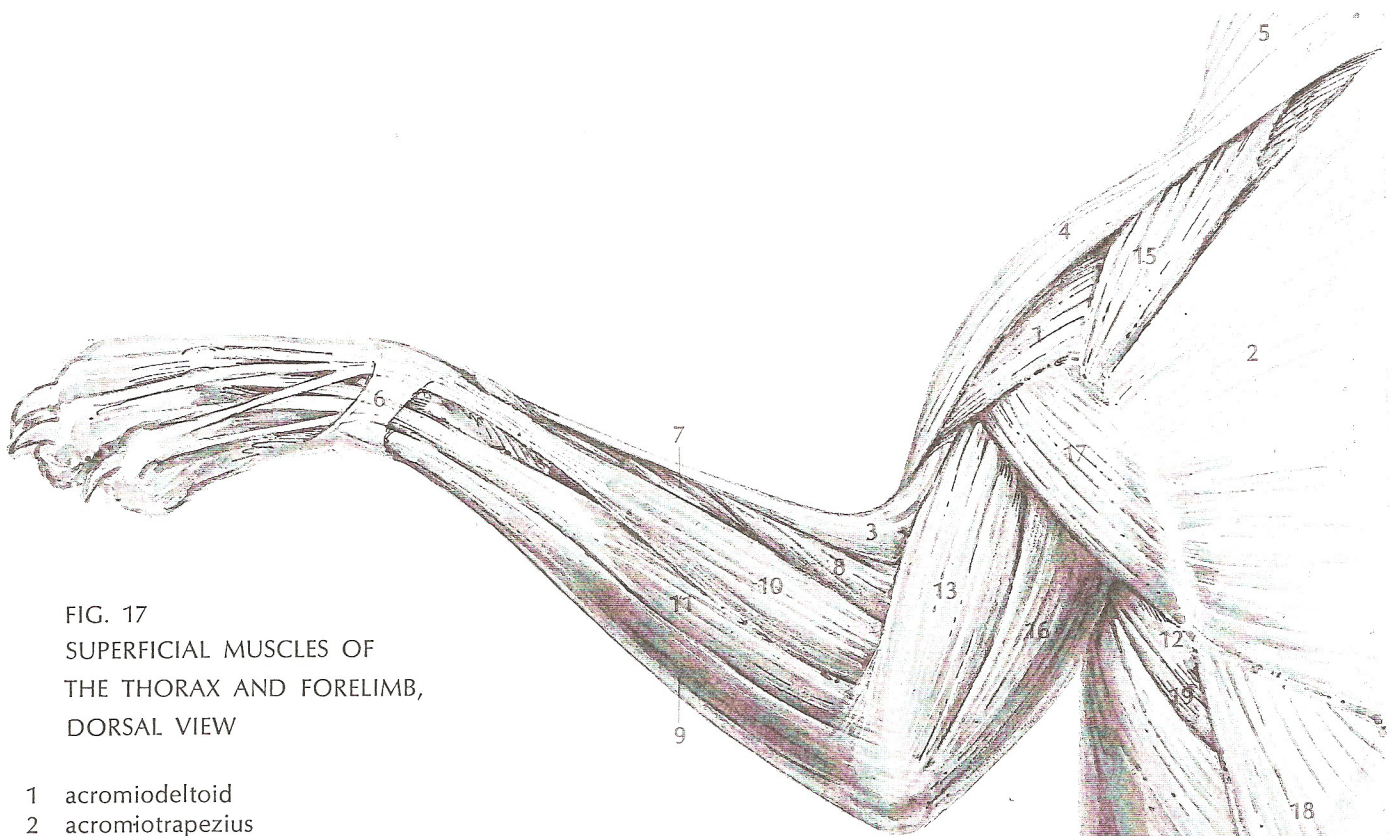
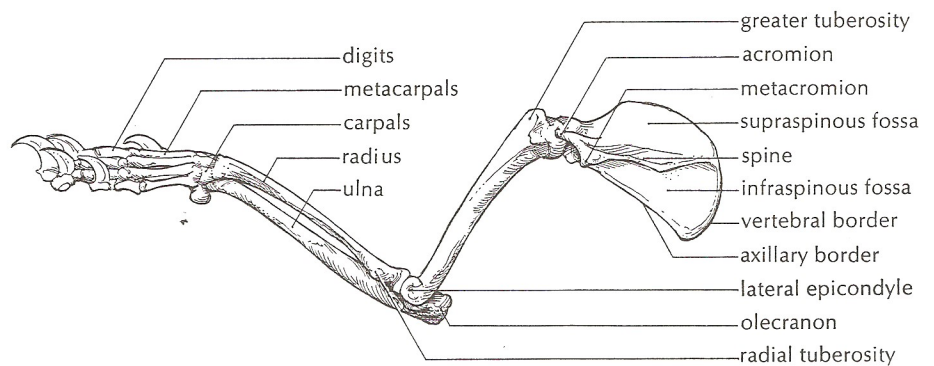
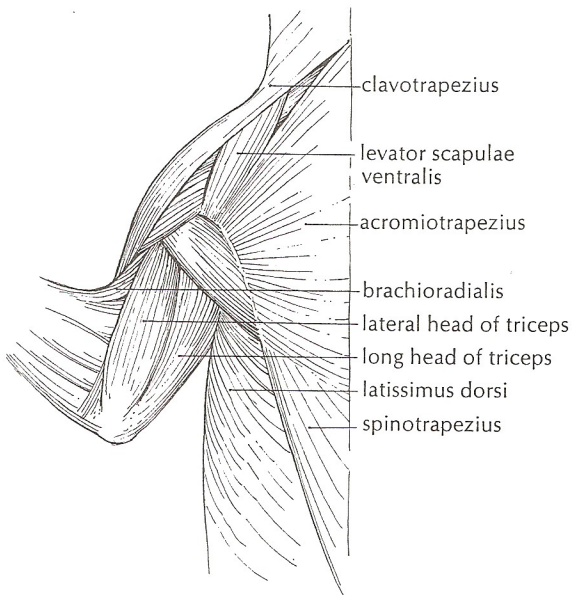


FIG. 17
SUPERFICIAL MUSCLES OF
THE THORAX AND FORELIMB,
DORSAL VIEW

- 1 acromiodeltoid
- 2 acromiotrapezius
- 3 brachioradialis
- 4 clavobrachialis
- 5 clavotrapezius
- 6 dorsal carpal ligament
- 7 extensor carpi radialis
brevis
- 8 extensor carpi radialis
longus
- 9 extensor carpi ulnaris
- 10 extensor digitorum
communis
- 11 extensor digitorum
lateralis
- 12 infraspinatus
- 13 lateral head of triceps
- 14 latissimus dorsi
- 15 levator scapulae ventralis
- 16 long head of triceps
- 17 spinodeltoid
- 18 spinotrapezius
- 19 teres major





Examine the dorsal aspect of the shoulder and forelimb, and identify the muscles illustrated in Figure 17.

The acromiotrapezius originates by a thin aponeurosis from the spinous processes of the cervical and anterior thoracic vertebrae. It inserts on the spine of the scapula.

The spinotrapezius originates from the spinous processes of the posterior thoracic vertebrae. It inserts on the spine of the scapula and the surrounding fascia. Together the spinotrapezius and the acromiotrapezius act to hold the two scapulae together. The spinotrapezius also draws the scapula posteriorly. The clavotrapezius, acromiotrapezius, and spinotrapezius of the cat are homologous with the single trapezius muscle of the human.

The latissimus dorsi originates from the spinous processes of the posterior thoracic vertebrae and the lumbar vertebrae. It inserts on the medial aspect of the humerus and acts to pull the forelimb dorsally and posteriorly.

Remove the clavotrapezius and the clavobrachialis to expose the levator scapulae ventralis, which originates from the occipital bone and the transverse process of the atlas. It inserts on the metacromion and nearby fascia. It acts to draw the scapula anteriorly. This muscle has no homolog in man.

The triceps brachii has three divisions. The long head originates from the axillary border of the scapula just below the glenoid fossa. The medial and lateral heads originate from the humerus. In the cat the medial head is divisible into three smaller slips which need not be individually identified. All three heads of the triceps insert on the olecranon. Cut the lateral head and pull it back to see the medial head from the dorsal view. Also see the triceps as illustrated in Figure 20, page 25, and Figure 21, page 27. The triceps acts to extend the elbow.

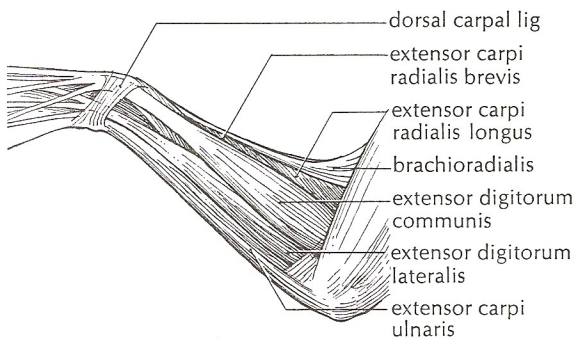
The brachioradialis originates about the middle of the humerus and inserts on the distal end of the radius. It rotates the radius and supinates the foot.

The extensor carpi radialis longus and the extensor carpi radialis brevis lie deep to the brachioradialis. They originate from the lateral surface of the humerus above the lateral epicondyle and insert on the bases of the second and third metacarpals, respectively. They extend the carpal joint (see Fig. 20, p. 25).

The extensor digitorum communis originates from the lateral surface of the humerus above the lateral epicondyle. It divides into four tendons which pass under the dorsal carpal ligament and insert on the bases of the second phalanges of digits 2-5. It extends the digits.

The extensor digitorum lateralis originates from the lateral surface of the humerus above the lateral epicondyle. Its three tendons insert, in common with the tendons of the extensor digitorum communis, on digits 3-5. In some specimens it will also be found to give a tendon to the second digit. It acts with the extensor digitorum communis to extend the digits. The homolog of the extensor digitorum lateralis in man is a much smaller muscle, the extensor digiti quinti proprius, which inserts only on the little finger.

The extensor carpi ulnaris originates from the lateral epicondyle of the humerus and inserts on the proximal end of the fifth metacarpal. It extends the carpal joint.



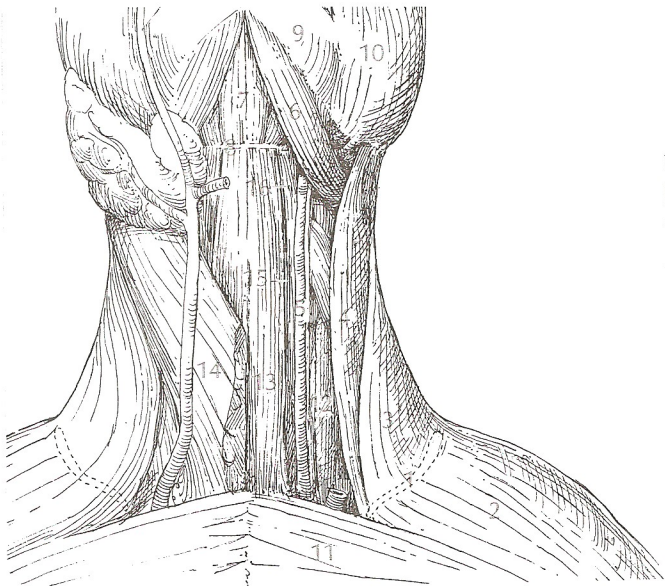


FIG. 18
DEEP MUSCLES OF THE
NECK, VENTRAL VIEW

- 1 clavicle
- 2 clavobrachialis
- 3 clavotrapezius
- 4 cleidomastoid
- 5 common carotid artery
and vagus nerve
- 6 digastric
- 7 geniohyoid
- 8 hyoid bone
- 9 mandible
- 10 masseter
- 11 pectoralis major
- 12 scalenes
- 13 sternohyoid
- 14 sternomastoid
- 15 sternothyroid
- 16 thyrohyoid

Refer to Figure 18. Remove the external jugular vein and the salivary glands and lymph nodes from the left side of the neck. Remove the sternomastoid and mylohyoid muscles, and identify the cleidomastoid, which lies deep to the sternomastoid and the clavotrapezius.

The cleidomastoid originates from the clavicle and inserts on the mastoid process. It acts together with the sternomastoid and the clavotrapezius in effecting movements of the head and forelimb. In man the homologs of the sternomastoid and the cleidomastoid are united to form a single muscle, the sternocleidomastoid.

The sternohyoid is a slender muscle in the midline of the throat. It originates from the first costal cartilage, inserts on the hyoid bone, and acts to draw the hyoid bone posteriorly. Determine the position of the hyoid bone by palpation.

The sternothyroid lies deep to the sternohyoid. It originates from the first costal cartilage, and inserts on the thyroid cartilage of the larynx. It draws the larynx posteriorly.

Cut the pectoralis major, the pectoralis minor, and the xiphohumeralis, examining their origins and insertions as you do so. Deep to the pectoralis minor you will find considerable fat and connective tissue surrounding the vessels and nerves which supply the forelimb. Remove the vessels, nerves, and fat to expose the muscles as illustrated in Figure 19.

The serratus ventralis originates by a series of individual slips from the first nine or ten ribs and from the transverse process of the last five cervical vertebrae. It inserts on the vertebral border of the scapula. The serratus ventralis is the largest of the muscles which attach the forelimb to the thorax. It serves to suspend the thorax, and is homologous with the serratus anterior and the levator scapulae of the human. In the cat that portion of the serratus ventralis which arises from the cervical vertebrae is sometimes termed the levator scapulae, although it is not a separate muscle as it is in man.

FIG. 19.
DEEP MUSCLES OF THE THORAX, VENTRAL VIEW

- 1 biceps brachii
- 2 brachialis
- 3 coracobrachialis
- 4 cut insertions of pectoralis
major and pectoante-
brachialis
- 5 epitrochlearis
- 6 external oblique
- 7 latissimus dorsi
- 8 levator scapulae ventralis
- 9 pectoralis minor
- 10 rectus abdominis
- 11 scalenus medius
- 12 serratus ventralis
- 13 sternohyoid
- 14 subscapularis
- 15 teres major
- 16 transversus costarum
- 17 triceps brachii
- 18 xiphohumeralis



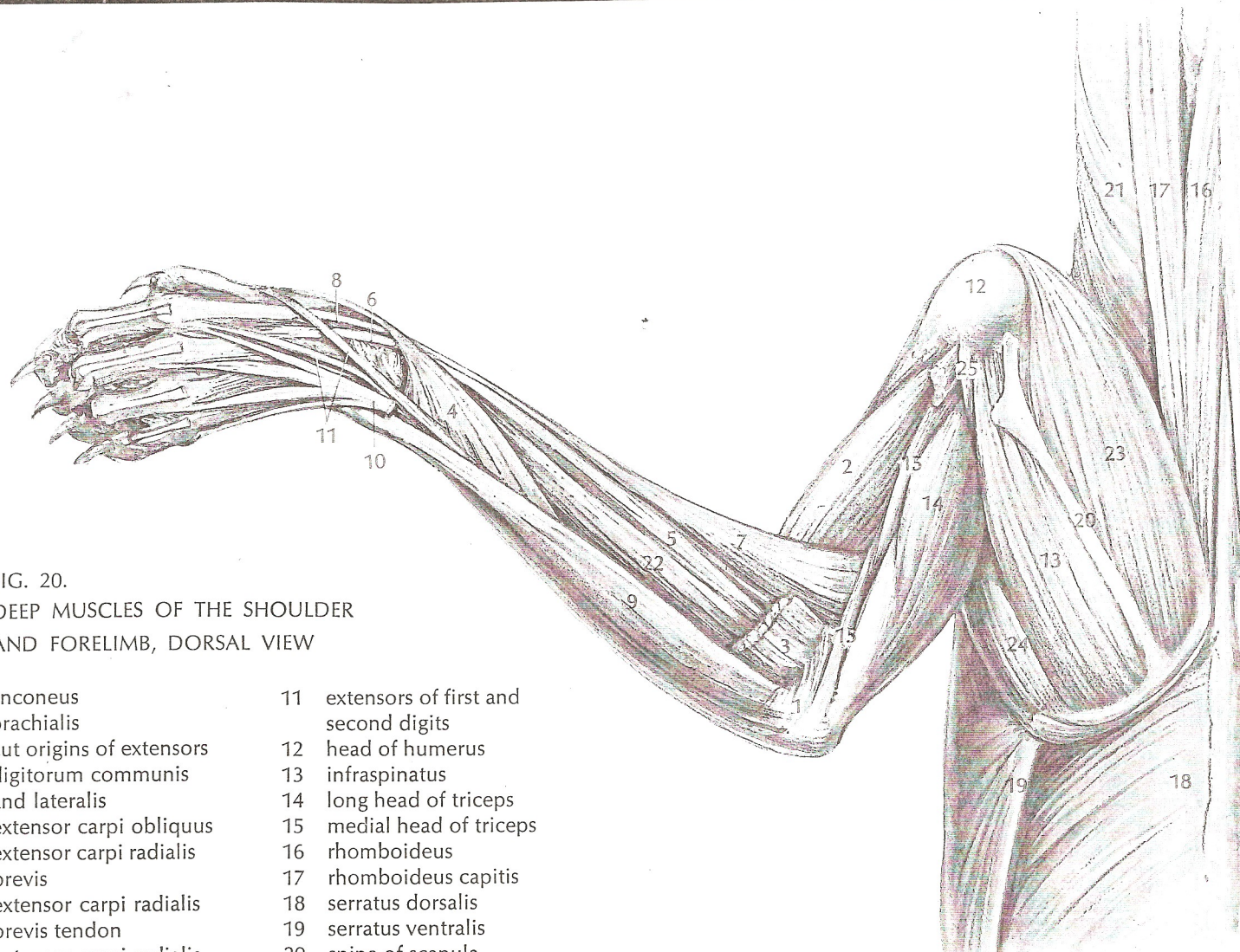
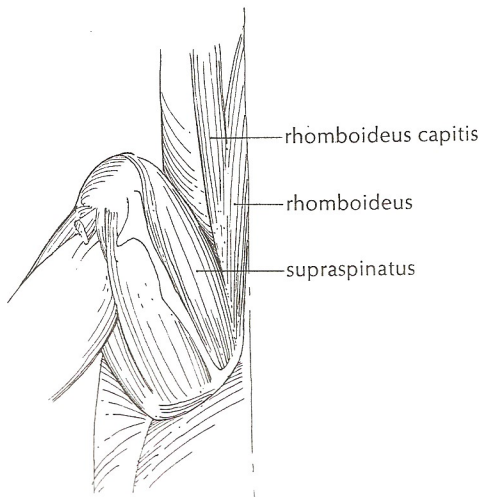


FIG. 20.
DEEP MUSCLES OF THE SHOULDER
AND FORELIMB, DORSAL VIEW

- | | |
|---|---|
| 1 anconeus | 11 extensors of first and second digits |
| 2 brachialis | 12 head of humerus |
| 3 cut origins of extensors digitorum communis and lateralis | 13 infraspinatus |
| 4 extensor carpi obliquus | 14 long head of triceps |
| 5 extensor carpi radialis brevis | 15 medial head of triceps |
| 6 extensor carpi radialis brevis tendon | 16 rhomboideus |
| 7 extensor carpi radialis longus | 17 rhomboideus capitis |
| 8 extensor carpi radialis longus tendon | 18 serratus dorsalis |
| 9 extensor carpi ulnaris | 19 serratus ventralis |
| 10 extensor digitorum lateralis tendon | 20 spine of scapula |
| | 21 splenius |
| | 22 supinator |
| | 23 supraspinatus |
| | 24 teres major |
| | 25 teres minor |

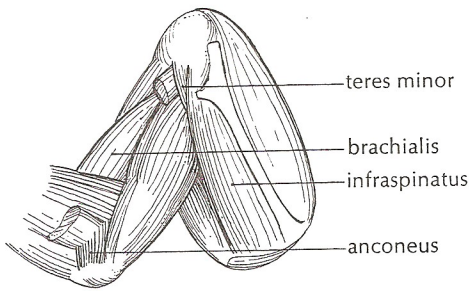
DISSECTION OF LATERAL FORELIMB MUSCLES



Referring to Figures 17 and 20, remove the following muscles: spinotrapezius, acromiotrapezius, levator scapulae ventralis, acromiodeltoid, spinodeltoid, lateral head of the triceps, brachioradialis, extensor digitorum communis, and extensor digitorum lateralis. Your dissection should now resemble Figure 20.

The rhomboideus originates from the spinous processes and ligaments of the posterior cervical and anterior thoracic vertebrae, and inserts on the vertebral border of the scapula. A separate portion of the rhomboideus, termed the rhomboideus capitis, originates from the superior nuchal line. The rhomboideus draws the scapula forward and toward the mid-dorsal line; the rhomboideus capitis assists in the rotation of the scapula. The rhomboideus is homologous with the rhomboideus major and minor in man, but the rhomboideus capitis has no homolog in man.

The supraspinatus originates from the supraspinous fossa of the scapula and inserts on the greater tuberosity of the humerus. It draws the humerus anteriorly.



The infraspinatus originates from the infraspinous fossa of the scapula and inserts on the lateral aspect of the greater tuberosity of the humerus. It is a lateral rotator of the humerus.

The teres minor originates from the axillary border of the scapula and inserts on the greater tuberosity of the humerus. It assists the infraspinatus.

The brachialis originates from the lateral surface of the humerus and inserts on the ulna, acting with the biceps to flex the elbow.

The anconeus consists of short superficial muscle fibers which originate near the lateral epicondyle of the humerus and insert near the olecranon. It assists in the extension of the elbow and acts on the capsule of the joint.

The extensor carpi obliquus originates from the ulna and passes around the wrist to insert on the base of the first metacarpal. It abducts the first digit and extends the wrist. It is homologous with the abductor pollicis longus of man.

The extensors of the first and second digits are small slips which originate from the lateral surface of the ulna and insert on the first and second digits. The extensor of the first digit is sometimes absent. These muscles are homologous with the extensor pollicis longus and extensor indicis proprius of man.

The supinator originates from the ligaments of the elbow and may appear continuous with the extensor carpi obliquus. It inserts on the proximal end of the radius and acts as a lateral rotator of the radius to produce supination of the forefoot.

Cut the rhomboids and the serratus ventralis at the vertebral border of the scapula, and free the forelimb from the thorax. Trim away any remaining portions of the trapezius, latissimus dorsi, and serratus ventralis to expose the underlying muscles. Referring to Figures 14 and 21, cut and remove the palmaris longus, flexor carpi radialis, and flexor carpi ulnaris. Cut the carpal ligament which holds the flexor tendons against the bones of the wrist. Your dissection should now resemble Figure 21.

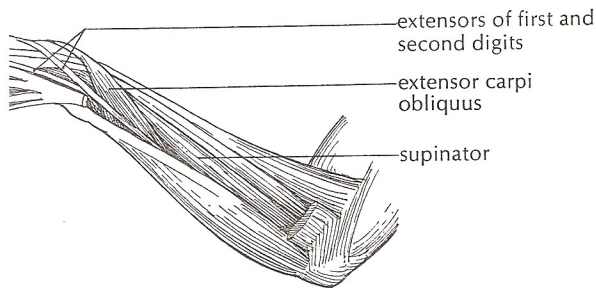
The subscapularis originates from the subscapular fossa and inserts on the lesser tuberosity of the humerus. It is an adductor of the humerus.

The teres major originates from the axillary border of the scapula; it inserts in common with the latissimus dorsi on the proximal end of the humerus. It rotates the humerus and draws it posteriorly.

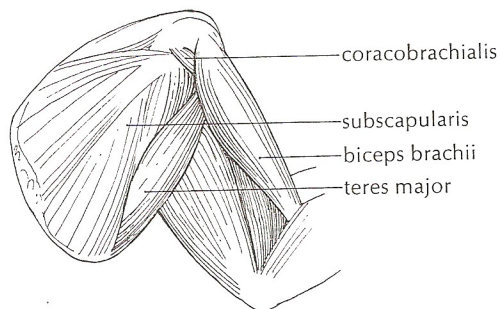
The coracobrachialis originates from the coracoid process and inserts on the proximal end of the humerus. It is an adductor of the humerus.

The biceps brachii originates just above the glenoid fossa of the scapula. Cut away the capsular ligament of the shoulder around the proximal end of the biceps tendon to see its origin. Observe that the tendon lies in the bicipital groove of the humerus, thus serving to stabilize the shoulder joint. The biceps inserts on the radial tuberosity near the proximal end of the radius, and acts as a flexor of the elbow. In man the biceps has two heads of origin: one above the glenoid fossa, as in the cat, and one from the coracoid process.

The flexor digitorum sublimis is a prominent muscle in man, but in the cat it is represented by a few slender strips which originate from the surface of the palmaris longus and flexor digitorum



DISSECTION OF MEDIAL FORELIMB MUSCLES



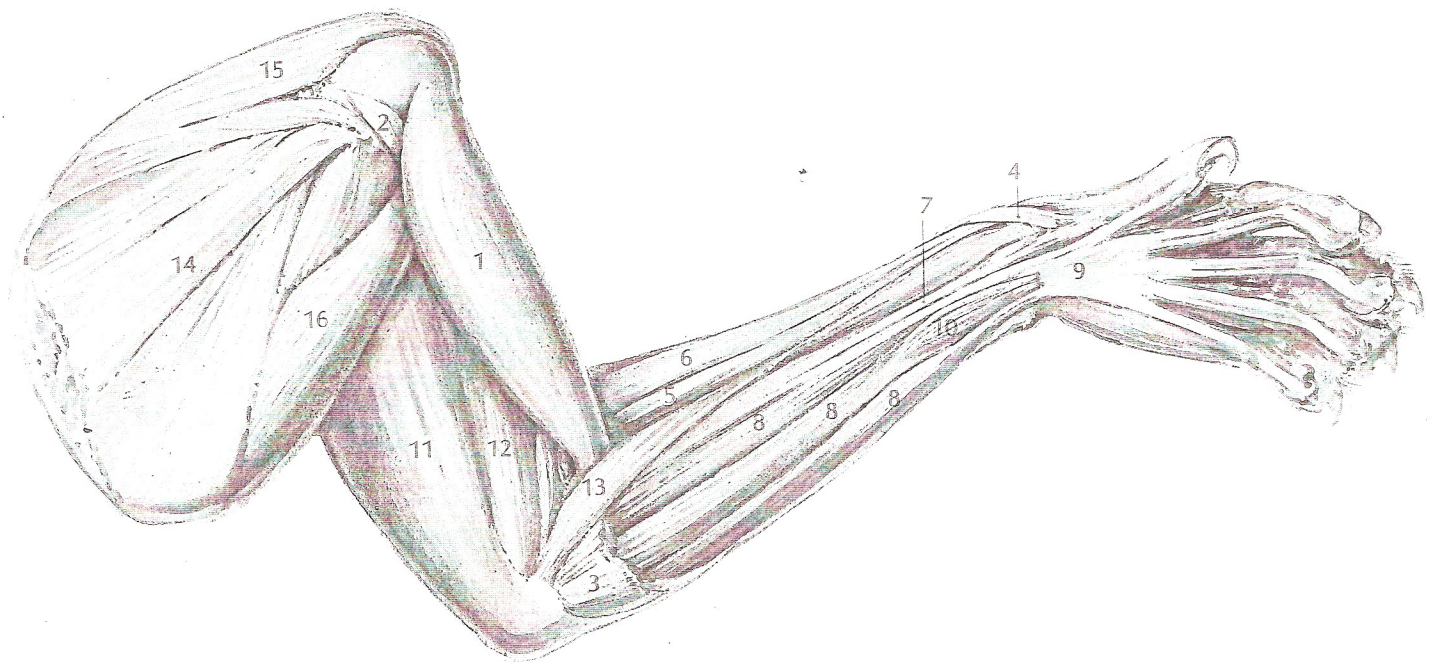
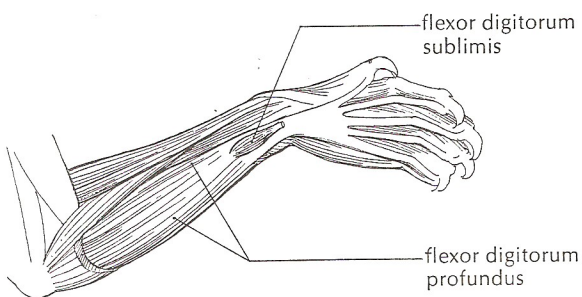


FIG. 21.
DEEP MUSCLES OF THE SHOULDER AND FORELIMB, VENTRAL VIEW

- | | | | |
|---|---|----|--------------------------------------|
| 1 | biceps brachii | 7 | flexor carpi radialis tendon |
| 2 | coracobrachialis | 8 | flexor digitorum profundus |
| 3 | cut origins of palmaris
longus and flexor
carpi ulnaris | 9 | flexor digitorum profundus
tendon |
| 4 | extensor carpi obliquus
tendon | 10 | flexor digitorum sublimis |
| 5 | extensor carpi radialis
brevis | 11 | long head of triceps |
| 6 | extensor carpi radialis
longus | 12 | medial head of triceps |
| | | 13 | pronator teres |
| | | 14 | subscapularis |
| | | 15 | supraspinatus |
| | | 16 | teres major |



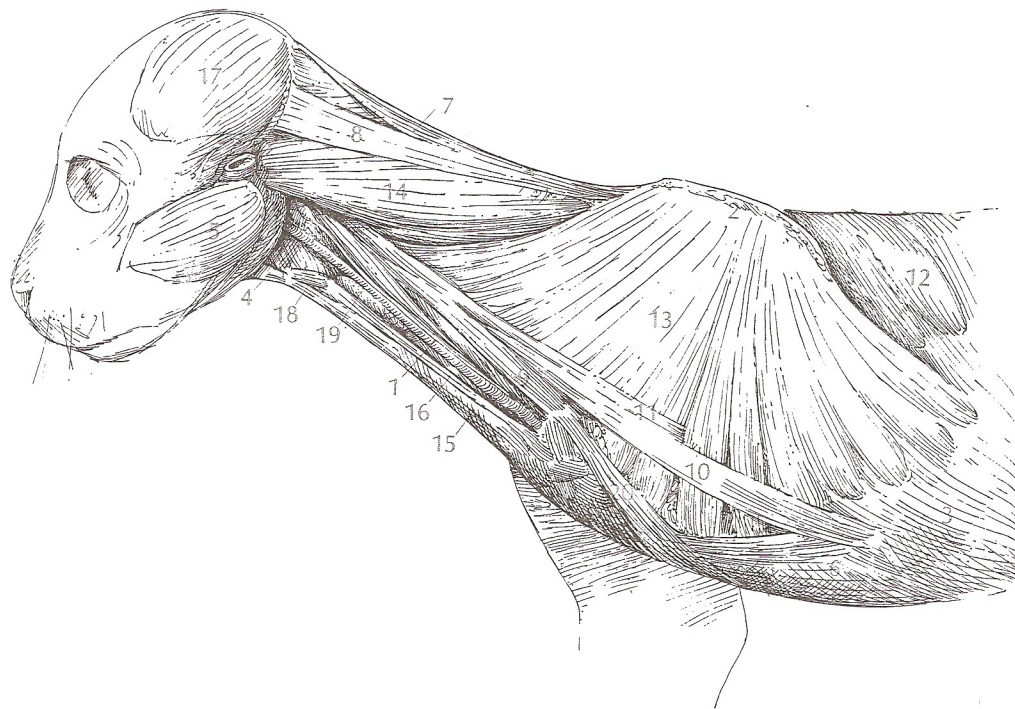
profundus near the carpal joint. They insert on the digits.

The flexor digitorum profundus originates as five separate heads from the radius, the medial epicondyle of the humerus, and the ulna. It inserts by strong tendons on the distal phalanges of the digits and acts as a flexor of the digits.

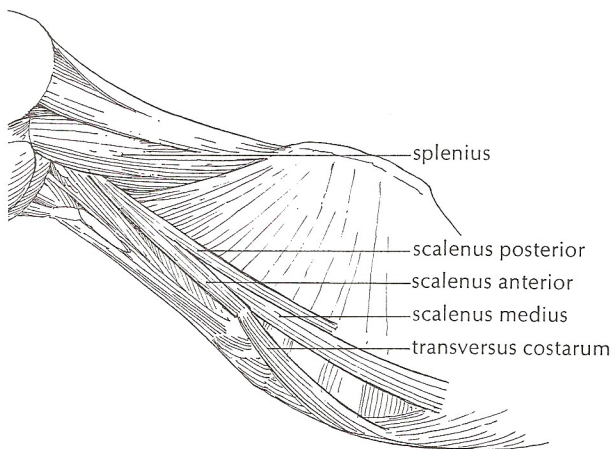
The pronator quadratus (not illustrated) lies beneath the tendon of the flexor digitorum profundus, just proximal to the carpal joint. It originates from the ulna and consists of short muscle fibers which pass obliquely to the radius. It acts with the pronator teres in the medial rotation of the radius.

FIG. 22.
MUSCLES OF THE THORAX, LATERAL VIEW

- 1 common carotid artery and sympathetic trunk
- 2 cut insertion of serratus ventralis
- 3 external oblique
- 4 geniohyoid
- 5 masseter
- 6 rectus abdominis
- 7 rhomboideus
- 8 rhomboideus capitis
- 9 scalenus anterior
- 10 scalenus medius
- 11 scalenus posterior
- 12 serratus dorsalis cranialis
- 13 serratus ventralis
- 14 splenius
- 15 sternohyoid
- 16 sternothyroid
- 17 temporal
- 18 thyrohyoid
- 19 thyroid gland
- 20 transversus costarum



SUPERFICIAL DISSECTION OF
LATERAL THORACIC MUSCLES



DEEP DISSECTION OF
LATERAL THORACIC MUSCLES

Examine the left lateral aspect of the head, neck, and thorax. The scapula and forelimb are removed, but the rhomboids and the serratus ventralis are still in their normal positions as seen in Figure 22. Remove any remaining superficial fascia and fat to make a dissection resembling the illustration.

The splenius originates from the nuchal ligament, in the mid-dorsal line of the neck, and inserts on the superior nuchal line of the skull. It turns or raises the head.

The scalenes are three muscles which originate on the ribs and insert on the transverse processes of the cervical vertebrae. The most prominent is the middle portion, the scalenus medius, which originates from ribs 6-9. The most ventrally located is the scalenus anterior. It originates from the second and third ribs, and may appear to be continuous with the transversus costarum. The scalenus posterior, which originates from the third rib, is the most dorsally placed of the three scalenes. The scalenes bend the neck and draw the ribs anteriorly.

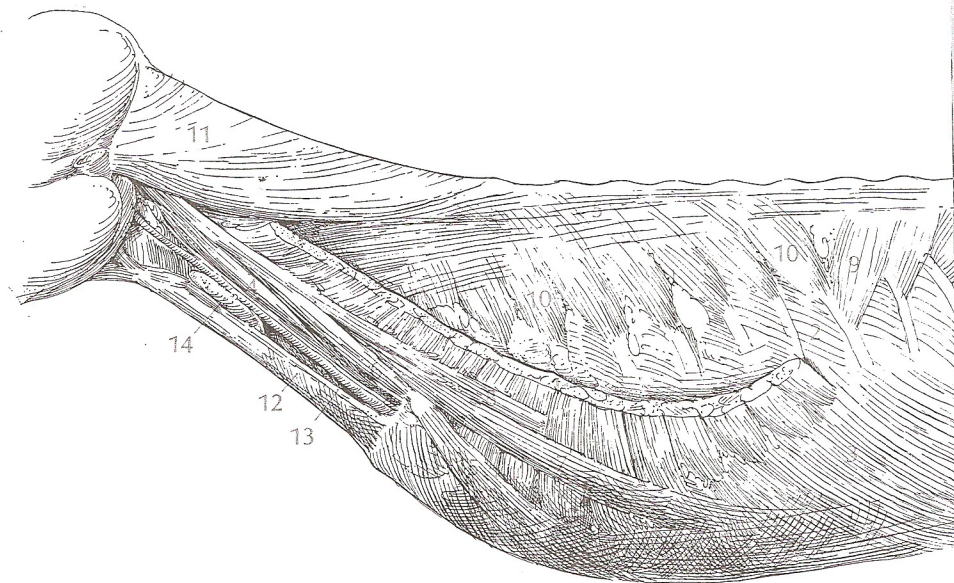
The transversus costarum originates from the sternum and inserts on the first rib and costal cartilage. It acts together with the scalenes.

Remove the rhomboids and cut the serratus ventralis near its insertion to make a dissection similar to Figure 23.

The serratus dorsalis cranialis originates as a thin aponeurosis overlying the anterior divisions of the sacrospinalis and inserts on ribs 1-9 by a series of thin muscular strips. The serratus dorsalis caudalis lies posterior to the serratus dorsalis cranialis and may

FIG. 23.
DEEP MUSCLES OF THE THORAX, LATERAL VIEW

- 1 cut edge of serratus ventralis
- 2 external intercostal
- 3 external oblique
- 4 longus capitis
- 5 lumbodorsal fascia
- 6 scalenus anterior
- 7 scalenus medius
- 8 scalenus posterior
- 9 serratus dorsalis caudalis
- 10 serratus dorsalis cranialis
- 11 splenius
- 12 sternohyoid
- 13 sternothyroid
- 14 thyroid gland
- 15 transversus costarum



be distinguished by the anterior direction of its fibers. It consists of four or five separate slips which insert on the posterior ribs. The serratus dorsalis cranialis draws the ribs forward and outward, increasing the volume of the thorax during inspiration. The serratus dorsalis caudalis draws the ribs posteriorly, decreasing the volume of the thorax during expiration.

Remove the serratus dorsalis, scalenes, transversus costarum, splenius, and the remaining portion of the serratus ventralis.

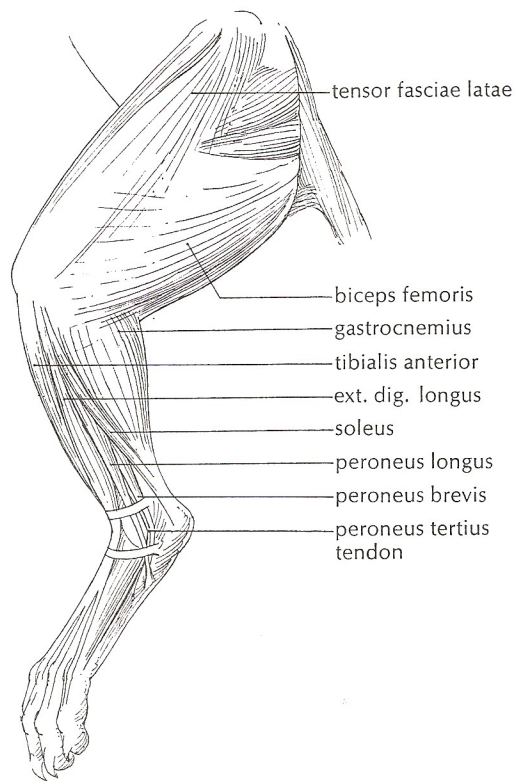
INTERCOSTALS

The external and internal intercostals extend between adjacent ribs and serve to draw the ribs together during respiration. Cut away the external intercostal muscle between two adjacent ribs. Observe that the fibers of the internal intercostals run in the opposite direction from the external intercostals, and that the internal intercostals extend all the way from the dorsal end of the costal interspace to the sternum, whereas the external intercostals cover the dorsal, but not the ventral part of the interspace.

SACROSPINALIS

The sacrospinalis (not illustrated) is the muscle which lies dorsal to the spinal column, extending from the pelvis to the head. It is invested by the lumbodorsal fascia, and originates from the dorsal aspect of the pelvis and spinal column. In the thoracic region it is divisible into several elements which insert on the ribs, the transverse process of the vertebrae, and the head. The actions of its subdivisions are complex and will not be described in detail, but in general it may be said that the sacrospinalis acts to extend the spinal column, draw the ribs posteriorly, and bend the neck and spinal column to one side.

HINDLIMB, LATERAL VIEW



Clear the superficial fat and fascia away from the hip and thigh, being careful not to damage the spermatic cord if your specimen is a male. Examine the lateral aspect of the thigh and identify the muscles illustrated in Figure 24. Do not cut the fascia lata, which is the tough white aponeurosis on the anterior and lateral aspect of the thigh. The fascia lata is continuous proximally with the fascia of the gluteal muscles; distally it is attached to the ligaments of the patella and is continuous with the fascia of the lower limb.

The tensor fasciae latae is a thick triangular muscle which is continuous with the proximal portion of the fascia lata. It originates from the crest of the ilium and neighboring fascia and inserts on the fascia lata. It acts to tighten the fascia lata and to draw the thigh anteriorly.

The biceps femoris is the large muscle covering the lateral portion of the thigh. It originates from the tuberosity of the ischium and inserts on the patella, tibia, and fascia of the lower limb. It abducts the thigh and assists in flexing the knee.

The gastrocnemius is the large muscle on the posterior aspect of the lower hindlimb. It originates as lateral and medial heads from the distal end of the femur and from the fascia of the knee. It inserts on the calcaneus, and acts as an extensor of the foot.

The soleus lies deep to the gastrocnemius on the lateral side. It originates from the fibula and inserts on the calcaneus. Both the soleus and the gastrocnemius extend the foot.

The peroneus longus originates from the proximal portion of the fibula and inserts by a tendon which passes through a groove on the lateral malleolus and then turns medially to attach to the bases of the metacarpals. It extends the foot.

The peroneus brevis originates from the distal portion of the fibula and inserts on the base of the fifth metatarsal. It is an extensor of the foot.

The peroneus tertius is a slender muscle which lies between the peroneus longus and brevis. It originates from the lateral side of the fibula and inserts on the extensor tendon of the fifth digit. It assists in extending the fifth digit and in flexing the foot.

The extensor digitorum longus originates from the lateral epicondyle of the femur. It inserts on the bases of the middle and distal phalanges by means of four tendons which spread over the dorsum of the foot. It extends the digits.

The tibialis anterior originates from the proximal ends of the tibia and fibula and inserts on the first metatarsal. It flexes the foot.

Examine the medial aspect of the thigh and identify the muscles illustrated in Figure 25.

The sartorius covers the anterior half of the medial aspect of the thigh. It originates from the crest and ventral border of the ilium and inserts on the tibia, patella, and fascia of the knee. It adducts and rotates the thigh and extends the knee.

The gracilis covers the posterior portion of the medial aspect of the thigh. It originates from the ischium and the pubic symphysis and inserts by a broad aponeurosis on the medial surface of the tibia. It adducts the leg and draws it posteriorly.

The iliopsoas (homolog of the psoas major and iliacus of man) arises from the lumbar vertebrae and from the ilium. It inserts

HINDLIMB, MEDIAL VIEW

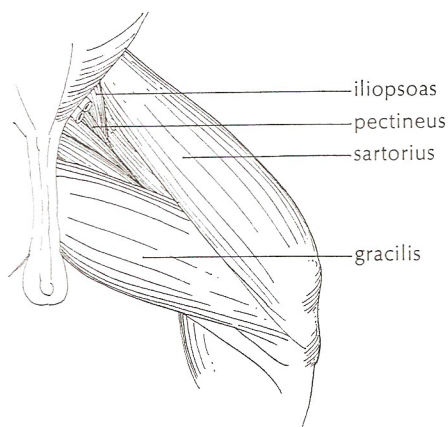
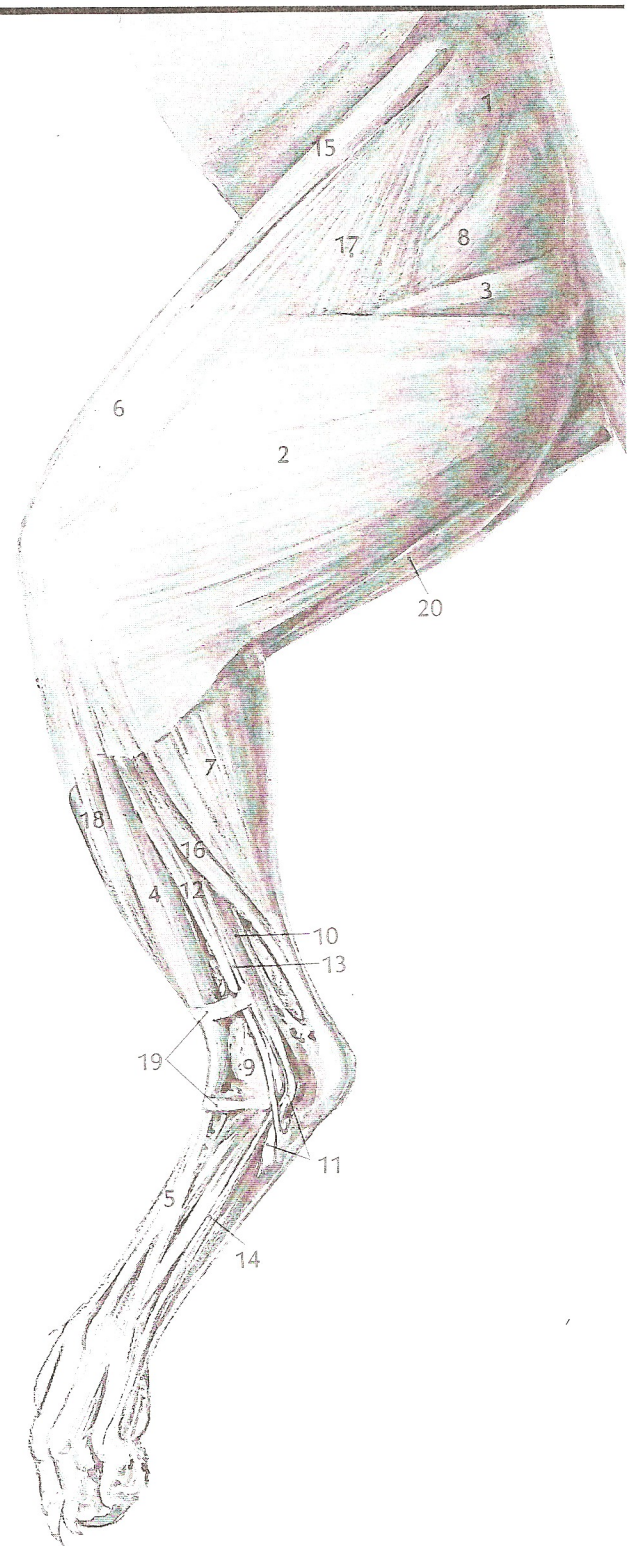
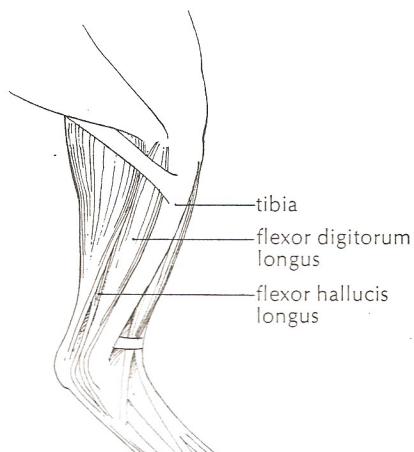
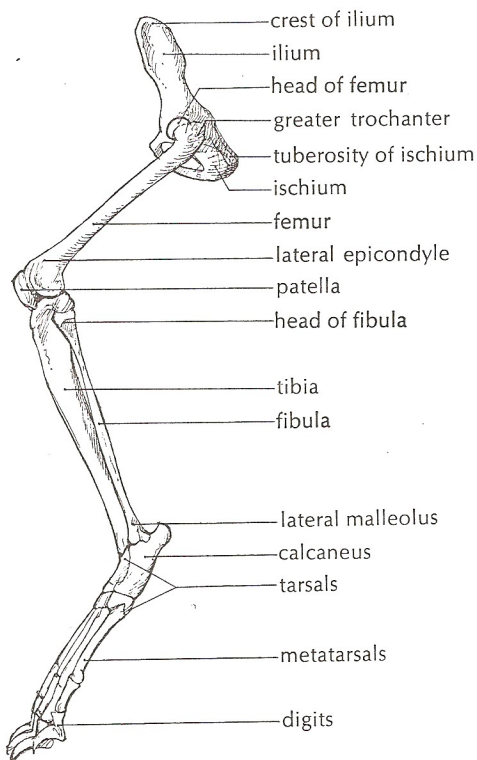


FIG. 24.
SUPERFICIAL MUSCLES OF THE HINDLIMB, LATERAL VIEW

- | | | | |
|---|-------------------------------------|----|-------------------------|
| 1 | aponeurosis of tensor fasciae latae | 10 | peroneus brevis |
| 2 | biceps femoris | 11 | peroneus brevis tendon |
| 3 | caudofemoralis | 12 | peroneus longus |
| 4 | extensor digitorum longus | 13 | peroneus tertius |
| 5 | extensor digitorum longus tendons | 14 | peroneus tertius tendon |
| 6 | fascia lata | 15 | sartorius |
| 7 | gastrocnemius | 16 | soleus |
| 8 | gluteus maximus | 17 | tensor fasciae latae |
| 9 | lateral malleolus | 18 | tibialis anterior |
| | | 19 | transverse ligaments |
| | | 20 | semitendinosus |



on the lesser trochanter of the femur, acting to draw the thigh forward and rotate it outward.

The pectineus originates from the anterior border of the pubis and inserts on the proximal end of the femur. It adducts the thigh.

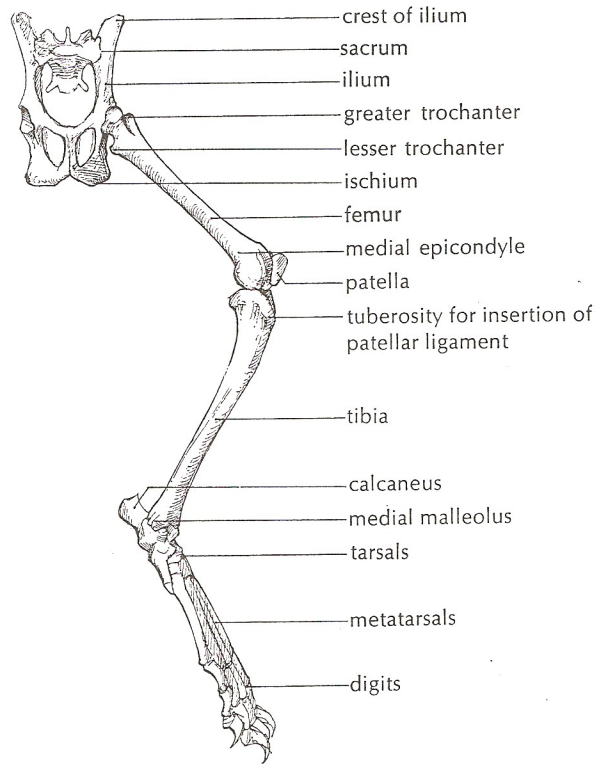
The flexor digitorum longus lies on the medial aspect of the lower limb, next to the tibia. It arises from the proximal portion of the tibia, fibula, and adjacent fascia. It inserts by four tendons on the bases of the terminal phalanges and acts as a flexor of the digits.

The flexor hallucis longus originates lateral to the flexor digitorum longus. It inserts, in common with the flexor digitorum longus tendons, on the digits, and assists in flexing them.

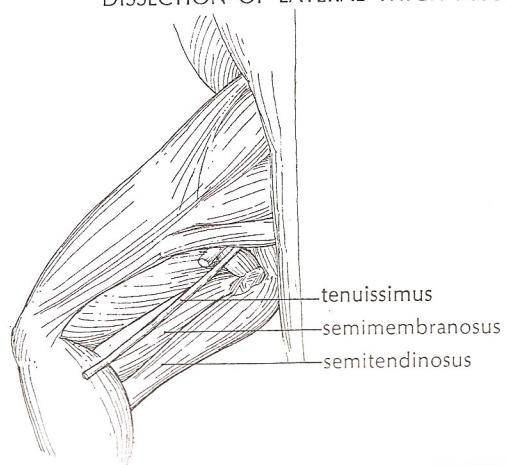


FIG. 25.
SUPERFICIAL MUSCLES OF THE HINDLIMB, MEDIAL VIEW

- | | |
|-----------------------------|------------------------------|
| 1 adductor femoris | 11 pectineus |
| 2 adductor longus | 12 rectus abdominis |
| 3 extensor digitorum longus | 13 sartorius |
| tendons | 14 semitendinosus |
| 4 external oblique | 15 spermatic cord |
| 5 flexor digitorum longus | 16 tibia |
| 6 flexor hallucis longus | 17 tibialis anterior |
| 7 gastrocnemius | 18 tibialis anterior tendon |
| 8 gracilis | 19 tibialis posterior tendon |
| 9 iliopsoas | 20 vastus medialis |
| 10 medial malleolus | |



DISSECTION OF LATERAL THIGH MUSCLES



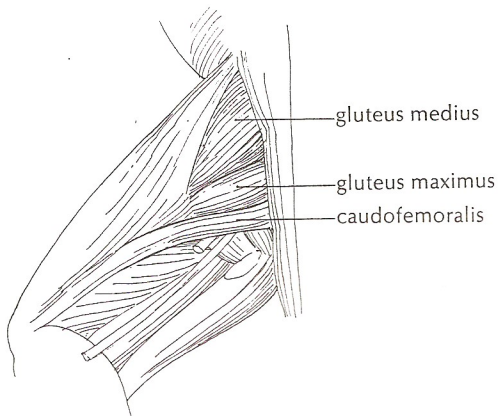
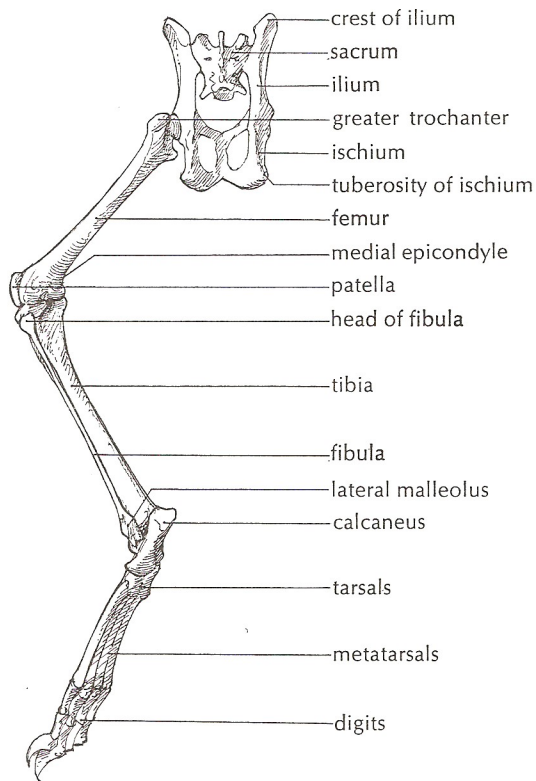
Referring to Figures 24 and 26, remove the biceps femoris and expose the deep muscles on the lateral aspect of the thigh. Your dissection should resemble Figure 26. Deep to the biceps femoris you will find a large nerve, the sciatic (Fig. 71, p. 98), and near it a slender muscle, the tenuissimus. The tenuissimus originates from the second caudal vertebra and inserts in common with the biceps femoris. It has no homolog in man.

The semimembranosus originates from the ischium and inserts on the medial epicondyle of the femur and on the proximal end of the tibia. It draws the thigh posteriorly.

The semitendinosus lies on the posterior aspect of the thigh. It originates from the tuberosity of the ischium and inserts by a

FIG. 26.
DEEP MUSCLES OF THE HINDLIMB, DORSAL VIEW

- | | |
|-----------------------------|----------------------------|
| 1 adductor femoris | 10 peroneus brevis |
| 2 caudofemoralis | 11 peroneus brevis tendon |
| 3 cut origin of biceps | 12 peroneus longus |
| 4 extensor digitorum longus | 13 peroneus tertius tendon |
| 5 fascia lata over vastus | 14 sciatic nerve |
| 6 lateralis | 15 semimembranosus |
| 7 gastrocnemius | 16 semitendinosus |
| 8 gluteus maximus | 17 soleus |
| 9 lumbodorsal fascia | 18 tensor fasciae latae |
| | 19 tenuissimus |



thin tendon on the medial side of the tibia. It flexes the knee.

The gluteus medius originates from the ilium and the transverse processes of the last sacral and first caudal vertebrae. It inserts on the greater trochanter of the femur and acts as an abductor of the thigh.

The caudofemoralis originates from the transverse processes of the second and third caudal vertebrae and inserts on the patella and the surrounding fascia by a thin tendinous band. It abducts the thigh and helps to extend the knee. It has no homolog in man.

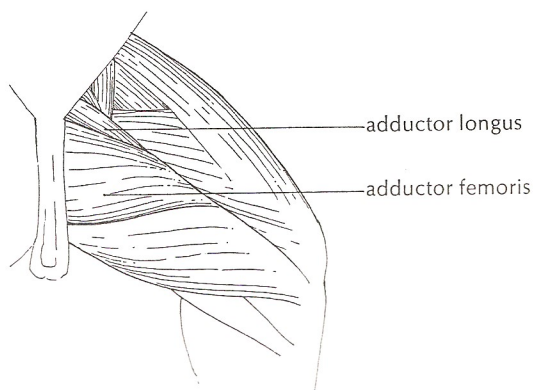
The gluteus maximus lies between the gluteus medius and the caudofemoralis. It originates from the transverse processes of the last sacral and first caudal vertebrae and inserts on the greater trochanter. It abducts the thigh.



FIG. 27.
DEEP MUSCLES OF THE HINDLIMB, MEDIAL VIEW

- 1 adductor femoris
- 2 adductor longus
- 3 extensor digitorum longus tendons
- 4 fascia lata
- 5 flexor digitorum longus
- 6 flexor hallucis longus
- 7 gastrocnemius
- 8 iliopsoas
- 9 medial malleolus
- 10 pectineus
- 11 plantaris
- 12 rectus femoris
- 13 semimembranosus
- 14 semitendinosus
- 15 soleus
- 16 tensor fasciae latae
- 17 tibia
- 18 tibialis anterior
- 19 tibialis anterior tendon
- 20 tibialis posterior tendon
- 21 vastus medialis

DISSECTION OF MEDIAL THIGH MUSCLES



Referring to Figures 25 and 27, remove the sartorius and the gracilis. Then, referring to Figures 27 and 28, remove the tensor fasciae latae. Identify the muscles illustrated in Figures 27 and 28.

The adductor longus and adductor femoris originate from the pubis and insert on the femur. They adduct the thigh.

The quadriceps femoris is the large muscle which covers the anterior surface of the thigh. It consists of four separate heads which are united distally by the patellar ligament. This ligament contains the patella and inserts on the proximal end of the tibia. The four heads of the quadriceps femoris are: the vastus lateralis, which originates from the lateral surface of the femur; the

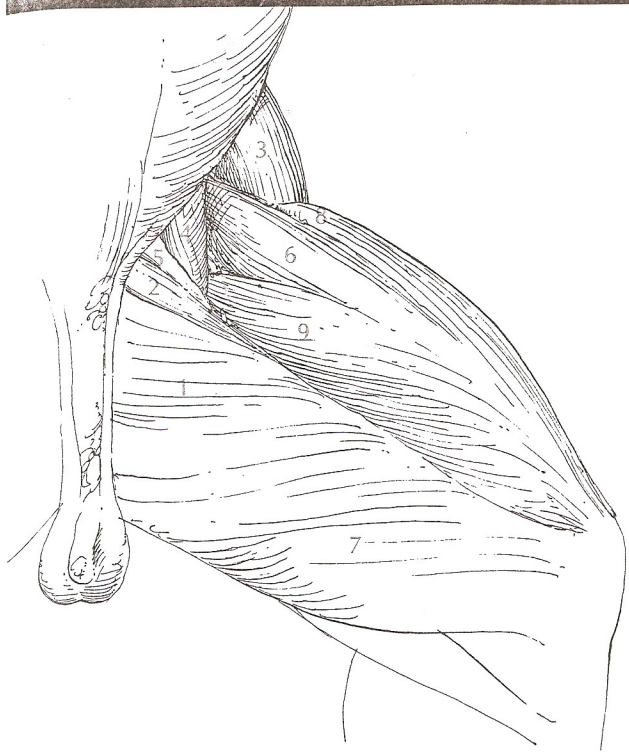
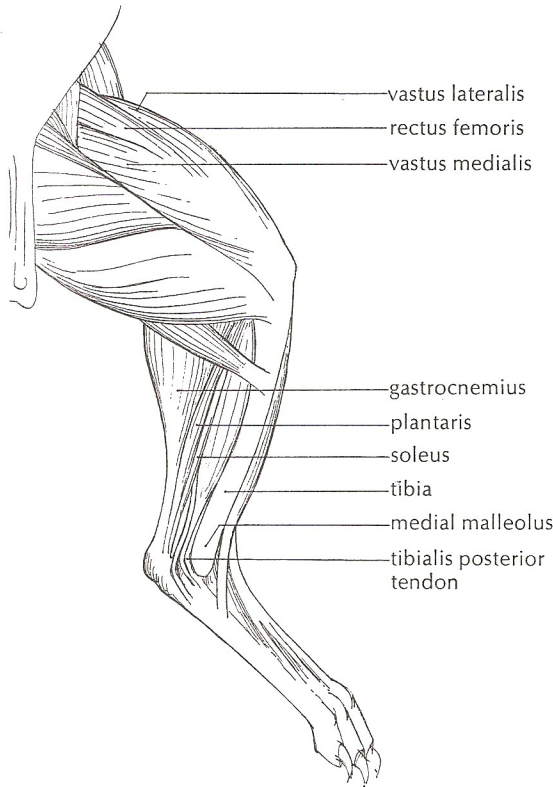


FIG. 28.
DEEP MUSCLES OF THE THIGH, MEDIAL VIEW

- 1 adductor femoris
- 2 adductor longus
- 3 gluteus medius
- 4 iliopsoas
- 5 pectineus
- 6 rectus femoris
- 7 semimembranosus
- 8 vastus lateralis
- 9 vastus medialis



EXTERNAL OBLIQUE

rectus femoris, which originates from the ilium anterior to the acetabulum; the vastus medialis, which originates from the medial side of the femur; and the vastus intermedius (not illustrated), which originates from the anterior surface of the femur. The vastus intermedius is the deep muscle next to the femur. It can be seen by separating the rectus femoris from the vastus lateralis. The four heads of the quadriceps femoris act together to extend the knee.

Separate the gastrocnemius from the soleus and identify the plantaris, which lies between the gastrocnemius and the soleus. The plantaris originates from the lateral side of the femur and the patella. It is fused with the lateral head of the gastrocnemius but is easily separated from the medial head. Its tendon passes around the calcaneus, lying within a sheath formed by the tendons of the soleus and gastrocnemius, and divides into four slips which insert on the bases of the second phalanges. The plantaris flexes the digits and acts together with the soleus and the gastrocnemius to extend the foot. In man the plantaris is a very slender muscle which inserts on the calcaneus.

The tibialis posterior originates from the proximal end of the tibia and fibula, and inserts on the medial side of the tarsals. It extends the foot.

Examine the abdominal muscles. The external oblique has already been observed in connection with the dissection of the chest and shoulder muscles. The most superficial of the muscles of the lateral abdominal wall, it originates from the lumbodorsal fascia and from the last nine or ten ribs by slips which interdigitate with the serratus ventralis and the serratus dorsalis. It inserts by a broad aponeurosis on the linea alba, or tendinous ventral midline of the abdominal wall.

Cut through the middle of the external oblique, making your cut at right angles to the direction of the fibers. Separate the external oblique from the internal oblique, which lies deep to it.

- INTERNAL OBLIQUE The internal oblique originates from the pelvis and the lumbodorsal fascia and inserts by a broad aponeurosis on the linea alba. Observe that the fibers of the internal oblique pass ventrally and anteriorly, whereas the fibers of the external oblique pass ventrally and posteriorly.
- TRANSVERSUS The transversus constitutes the third and deepest layer of the abdominal wall. It originates from the posterior ribs, lumbar vertebrae, and ilium, and inserts on the linea alba. The transversus is thin and may be difficult to distinguish from the internal oblique. The external oblique, internal oblique, and transversus act together to compress the abdominal viscera, as in defecation and in forced expiration, and to arch the back.
- RECTUS ABDOMINIS The rectus abdominis lies on the ventral aspect of the abdomen. It is enclosed in a tough sheath formed by the aponeuroses of the external oblique, internal oblique, and transversus. The rectus abdominis originates from the pubic symphysis and inserts on the sternum and costal cartilages. It acts with the other muscles of the abdominal wall to flex the trunk and to compress the abdominal viscera.