

Dissection of the Muscles: Cat

PROCEDURAL INQUIRIES

Preparation

1. What terminology should one be familiar with before beginning muscle dissection?
2. Which dissecting instruments should be used in working with cat muscles?
3. What is fascia and how should it be worked with?
4. What guidelines should be used for identification of individual muscles?

Dissection

5. What are the major deep and superficial muscles of the ventral thorax and abdomen?

6. What are the major deep and superficial muscles of the head and neck?
7. What are the major deep and superficial muscles of the dorsal area?
8. What are the major deep and superficial muscles of the forelimb?
9. What are the major deep and superficial muscles of the hind limb?

Additional Inquiries

10. How is the cat musculature analogous to the human musculature?
11. When and how should a muscle be transected?

HUMAN CORRELATION: Cadaver Atlas in Applications Manual.

Key Terms

Deep Fascia	Head and Neck
Epimysium	Hind Limb
Grain	Ventral Thorax and Abdomen
Insertion	Origin
Linea Alba	Superficial Fascia
Muscles of the Dorsal Area	Transecting
Forelimb	

Materials Needed

Preserved Cat
Dissecting Kit
Dissecting Pan
Gloves
Disinfectant
Optional: Human Torsos or Limb Models for Comparative Purposes
Other Equipment as Indicated by Your Instructor

Muscle systems are basically analogous throughout the mammalian world. This means the muscles of the cat are structurally and functionally similar to our own. Therefore, learning the muscles of one mammal by handling, separating, and identifying them means you have almost learned the muscles for all mammals (including the human).

Muscle variations do exist. Muscle fusion is the variation you should be most aware of. Many of the non-human animals have more individual muscles than we do. For instance, the cat has eight superficial shoulder muscles, and we have only three. The proportionate muscle mass is approximately the same, but developmentally our muscles fuse whereas the cat's do not. Nevertheless, we can readily correlate most feline muscles with human muscles. In working through the muscle dissection, you should concentrate on this correlation. Look for the similarities.

This laboratory exercise is designed to help you develop a conceptual understanding of the human

muscle system by dissecting the muscles of the cat. Your goal is to separate and identify the individual cat muscles. You are encouraged to work in pairs, to say the muscle names out loud, to study the diagrams, to quiz your partner extensively on the names and locations of the muscles, and to correlate the cat musculature with your previous knowledge of the human musculature.

In this exercise we are using the regional approach and will thus examine the muscles of the ventral abdomen and thorax, the head and neck, the dorsal area, the forelimbs, and the hind limbs. With each section we will look at both the superficial and the deep muscles. We will dissect all major and readily identifiable muscles, except for those of the head and upper face. In all cases, identifying data such as the **origin** and **insertion** are given to help you locate the muscle.

□ Preparation

I. Getting Ready

A. Terminology

- 1 → Be certain you have a good grasp of skeletal terminology before you begin dissecting the muscles of the cat. (Refer back to Unit III if necessary.) You should also be familiar with the material in Exercise 21. You are encouraged to correlate the feline and human musculatures. Most of the information in Exercise 21 is applicable to the cat as well as to the human. Use the classroom models often as you make your comparisons.

B. Tools

Beginning students are often afraid to attack the deep fascia. Be assured that the deep fascia is tough, and the older your animal, the tougher the fascia. To separate many of the muscles, it will be necessary for you to break through the deep fascia.

- 1 → Use your blunt nose probe as your primary muscle-dissecting instrument. You can rip the deep fascia with this probe without worrying about tearing the muscle fibers.

As you separate muscles, always work with the direction or **grain** of the fibers. You can usually distinguish separate muscles by a change in the grain. Individual muscles also separate naturally from one another in all directions. You will be able to run your probe beneath or along a given muscle without any difficulty (after you have penetrated the deep fascia).

- 2 → Do not use your scissors or scalpel for muscle dissection unless you are deliberately

transecting (cutting) a muscle. You may occasionally use your sharp nose probe, but you must be careful that you do not tear a delicate blood vessel or nerve fiber. Your forceps can be used to grip fascia or muscle tissue or to pull out adipose tissue.

- 3 → Work with a partner unless you are directed otherwise. Both of you should use your blunt nose probes to feel the individual muscles. Both of you should say the names of the muscles out loud and study the diagrams carefully. Quiz each other often.
- 4 → Transect (cut) certain muscles according to directions. This is necessary in order to study the deeper muscles. Before you transect anything, be certain you are transecting in the right place. Reconstructive surgery on preserved cats is not highly successful.

C. Incision

- 1 → Refer back to Exercise 24 or follow your instructor's directions if you have not already opened your cat.
- 2 → Your instructor will advise you about how much of the skin should be removed at any given time. If you will be working on your muscle dissection for several weeks, we recommend skinning on an "as needed" basis. This prevents excess drying of your specimen. If your muscle dissection will be completed in a relatively short time, skinning the entire cat at once may be appropriate. We also recommend that you wrap the removed skin around your cat before placing the cat back in its storage bag. (Directions for skinning are given in Exercise 24.)
- 3 → Recall from Exercise 20 that a bundle of skeletal muscle fiber is surrounded by a layer of coarse connective tissue called the **epimysium**. Covering the entire muscle (exterior to the epimysium) is a tough fibrous membrane, the **deep fascia**, the fibers of which intermesh with the fibers of the **superficial fascia**. (The superficial fascia helps anchor the skin to the body.) The deep fascia is also continuous with the tendons, ligaments, and periosteum.

□ Dissection

II. Muscles of the Ventral Thorax and Abdomen

Open the cat and lay back (or remove) the skin on the ventral thorax and abdomen. Probe your way

through the fascia. Remove any adipose tissue that may be in your way.

A. Separating the Superficial Muscles

- 1 → Observe the ventral surface of the animal. Follow Figures 25a-1● to 25a-3● and use the right side of your animal to locate the superficial muscles. Separate the muscles with your probe.

Pectoantebrachialis A strip of muscle running from the manubrium to the superficial fascia of the forearm. Humans do not have a pectoantebrachialis.

Pectoralis major From the sternum to the humerus. Note how the pectoralis major forms a sheet deep to the pectoantebrachialis. Verify that despite the pectoantebrachialis, the pectoralis major is only one muscle. The pectoantebrachialis seems to form a superficial strip over the pectoralis major. Note the grain of the two muscles.

Pectoralis minor From the sternum to the humerus. Note how the pectoralis minor seems to glide up under the pectoralis major. The pectoralis minor is also a heftier muscle than the pectoralis major. In humans the pectoralis major is the larger muscle.

Xiphohumeralis From the xiphoid process to the humerus. This muscle, which is not found in humans, fuses with the pectoralis minor.

External oblique Large sheet of muscle with diagonal fibers covering most of the abdomen.

The white abdominal midline is the **linea alba**.

B. Separating the Deep Muscles

- 1 → Use the left side of your animal. Immediately to the left of the linea alba, carefully transect and reflect the 5 muscles just mentioned. (To reflect means to fold back.) Identify these deep muscles. Follow Figures 25a-2● and 25a-3●.

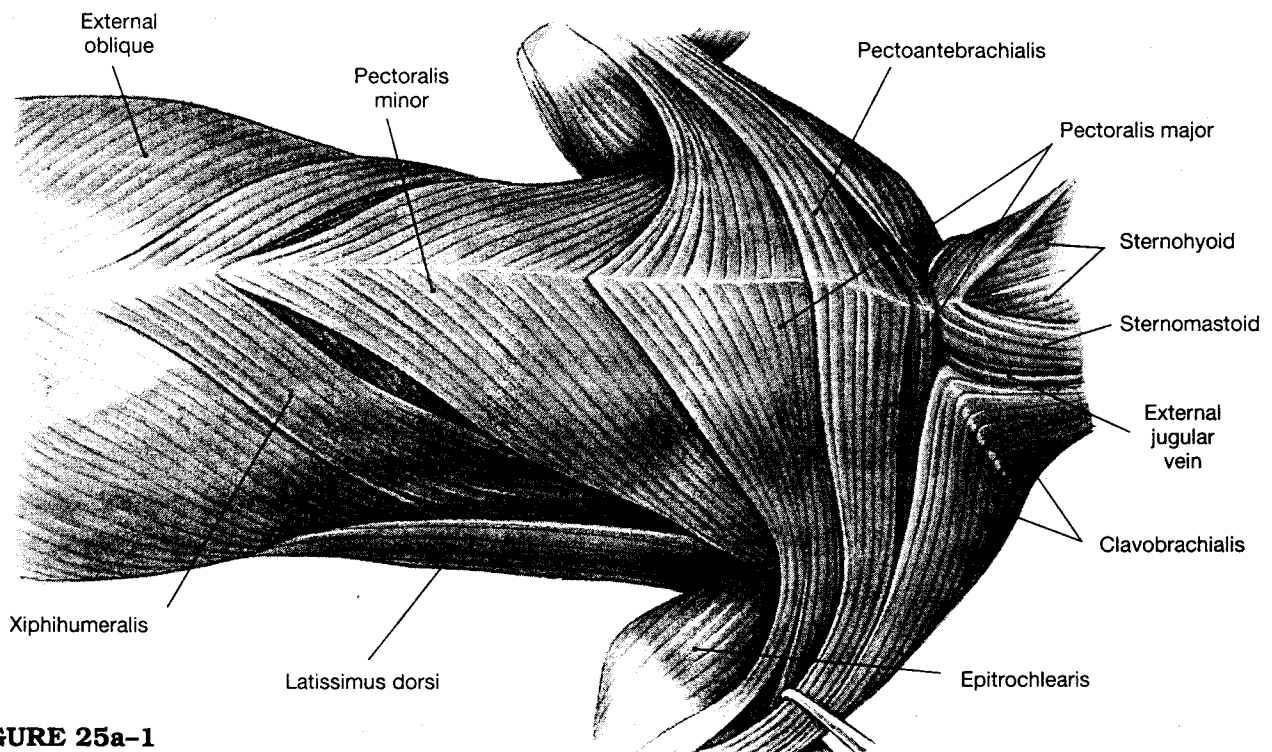
Rectus abdominis Longitudinal muscle extending from the pubis to the sternum and costal cartilages.

Internal oblique Immediately deep to the external oblique. The fibers of the external and internal obliques form a 90° angle.

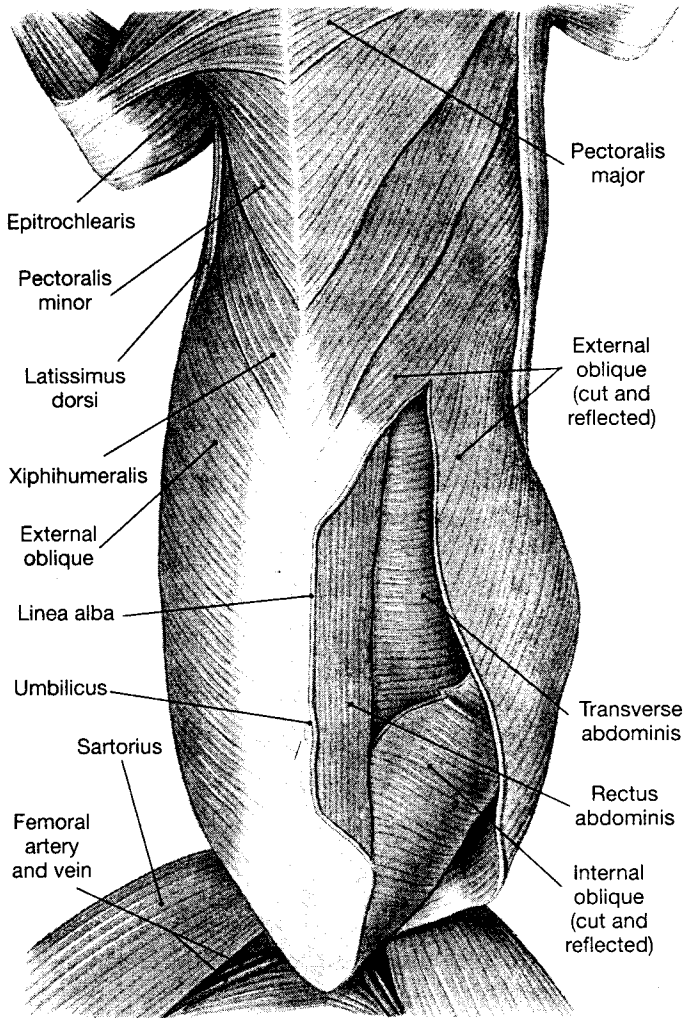
Transversus abdominis Transverse fibers immediately deep to the internal oblique. (The external oblique, internal oblique, and transversus abdominis muscles are paper-thin layers and may be difficult to separate.)

Serratus ventralis Large fan-like muscle arising from the ribs and inserting on the vertebral border of the scapula.

Transversus costarum Arising from the sternum and inserting on the first rib. (Not identified on the dissection figures.)



● **FIGURE 25a-1**
Superficial Muscles of the Chest.



● **FIGURE 25a-2**
Superficial Muscles of Abdomen — Ventral View.

External intercostals Series of muscles between the ribs, immediately deep to the transversus costarum. The external intercostals are superficial to the internal intercostals, another series of muscles also found between the ribs.

Scalenus Two-part muscle lateral to the transversus costarum.

Levator scapulae Lateral muscle used to raise the scapula (not identified on the dissection figures).

Subscapularis On the “back wall” as you look on the inside of the deep muscles. Actually this muscle extends from the subscapular fossa to the lesser tubercle of the humerus. (Not identified on the dissection figures.)

III. Muscles of the Head and Neck

A. Separating the Superficial Muscles

1 → Study Figures 25a-4● and 25a-5●. We will describe a few of these muscles. Because of the injection sites on many cats, it may not

be possible for you to find all of the muscles in the diagram. Before beginning this dissection, palpate the hyoid bone and the thyroid cartilage. These landmarks will orient you to the muscles described here. These superficial muscles include:

Clavotrapezius The flat, shoulder-covering muscle originating on the crest of the skull and inserting in the region of the clavicle. (In most cats the clavicle is either absent or present only as a vestigial bone. This muscle is mentioned again as a muscle of the dorsal region.)

Sternomastoid Diagonal muscle medial to the clavotrapezius.

Sternohyoid Longitudinal medial muscle just deep to the sternomastoid.

Stylohyoid Thin transverse muscle strip following the hyoid bone.

Mylohyoid Flat transverse muscle superior to the stylohyoid.

Digastric Diagonal muscle superficial to the mylohyoid.

Masseter Large cheek muscle.

B. Separating the Deep Muscles

1 → Return to Figure 25a-5●. Find as many of the following deep muscles as you can. Not all of these muscles are shown on the diagrams: **geniohyoid** (deep to the mylohyoid), **genioglossus** (deep to the geniohyoid), **styloglossus** (deep to the lateral mylohyoid), **hyoglossus** (lateral to the geniohyoid), **cleidomastoid**, **thyrohyoid** (deep to the sternohyoid), **cricothyroid** (medial to the sternothyroid), **sternothyroid**.

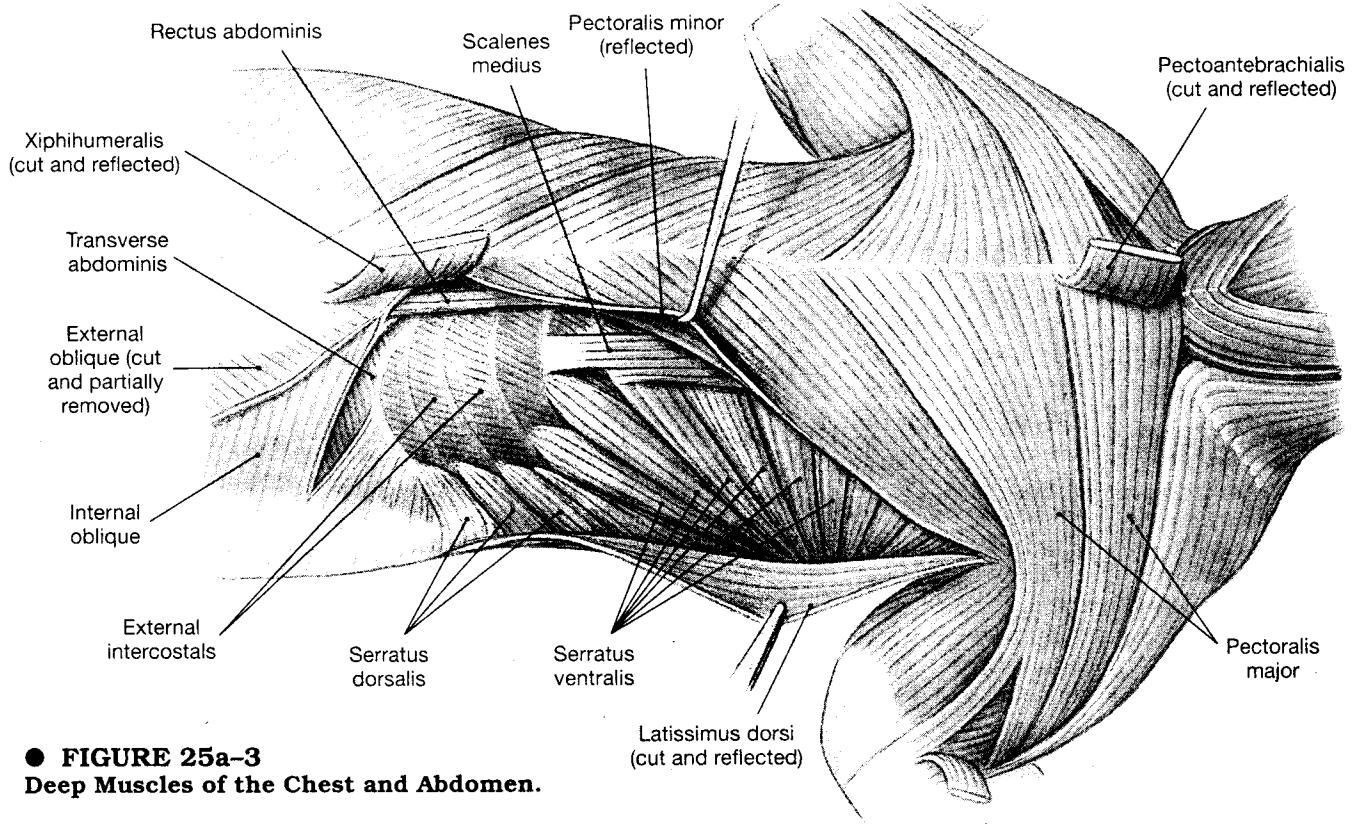
IV. Muscles of the Dorsal Region

A. Separating the Superficial Muscles

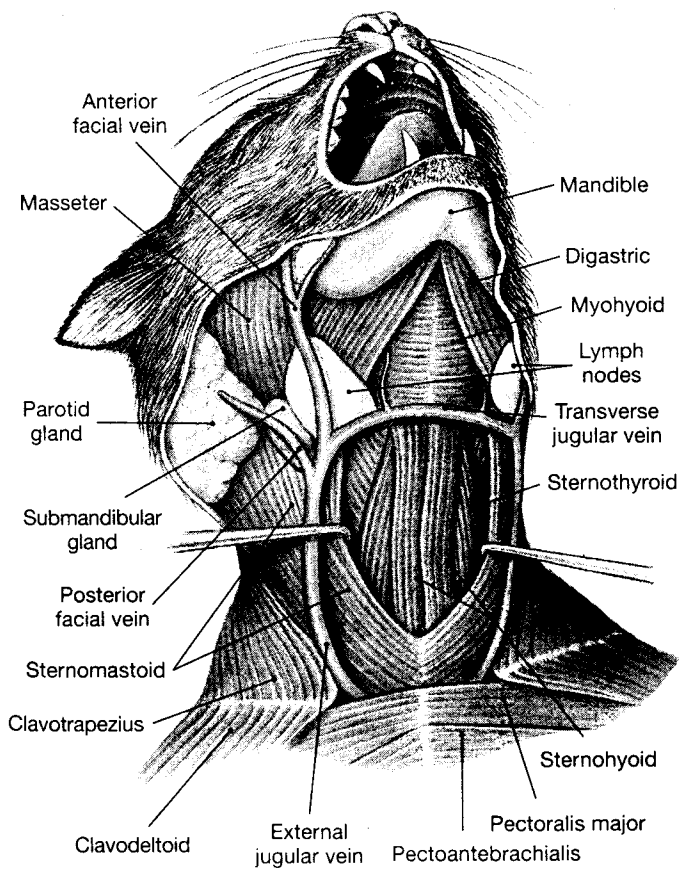
1 → Use Figure 25a-6● to help you locate these superficial muscles of the dorsal region. As you work through these muscles, notice that the cat has three separate trapezius muscles, whereas we have only one. (Although three separate trapezius muscles can be identified, most veterinarians today consider these three trapezius muscles as a single trapezius muscle analogous to our own.)



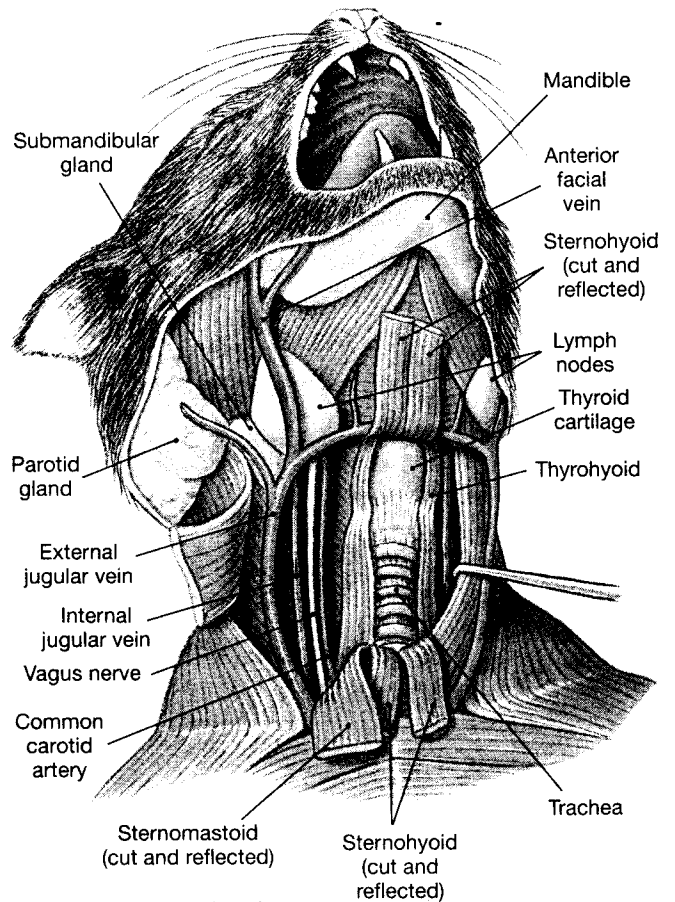
1. The cat also has three separate deltoid muscles, as compared to our one. Note these three delts below. What types of movements does the cat have that make this arrangement advantageous to the animal?



● **FIGURE 25a-3**
Deep Muscles of the Chest and Abdomen.



● **FIGURE 25a-4**
Superficial Muscles of the Neck — Ventral View.



● **FIGURE 25a-5**
Deep Muscles and Vessels of the Neck.

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2 → Identify the superficial muscles on the right side of your cat and the deep muscles on the left side.

Clavotrapezius Extending from the midline of the back to the clavicle region.

Clavodeltoid Extending from the clavicle to the ulna. This muscle almost seems to be an extension of the clavotrapezius.

Acromiodeltoid Just inferior to the clavodeltoid, extending from the scapula to the spinodeltoid muscle.

Acromiotrapezius Flat muscle just caudal to the clavotrapezius, originating from the cervical and thoracic vertebrae and inserting on the scapular spine.

Spinotrapezius Flat muscle just caudal to the acromiotrapezius, originating at the spines of the thoracic vertebrae and inserting on the fascia of the scapular muscles.

Spinodeltoid Muscle seeming to be a continuation of the spinotrapezius, extending up under the acromiodeltoid, from the scapula to the humerus.

Latissimus dorsi Large flat muscle with diagonal fibers extending from the lumbar dorsal fascia, around the lateral part of the body, and onto the humerus.

B. Separating the Deep Muscles

1 → Transect and reflect the left-side muscles. You should have no difficulty identifying the following muscles.

Rhomboideus Muscle extending from midback to the medial border of the scapula. Humans and cats both have two rhomboideus muscles, the major and the minor.

Rhomboideus capitis Longitudinal muscle lateral to the rhomboideus and inserting on the angle of the scapula.

Splenius Flat muscle lateral to the rhomboideus.

Levator scapulae Extending from mid-scapula to the occipital bone.

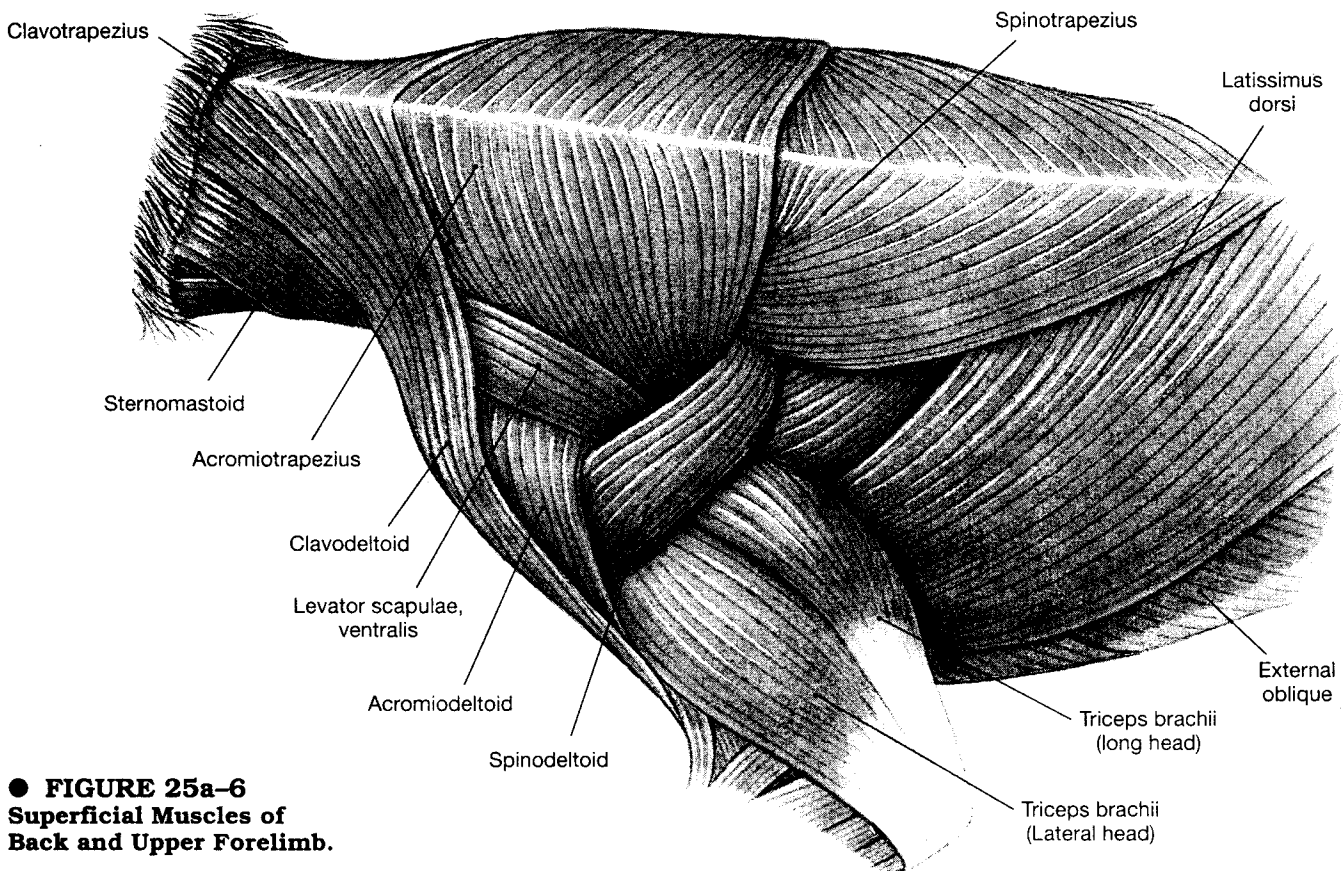
Supraspinatus Superior of two muscles covering the scapula.

Infraspinatus Inferior of two muscles covering the scapula.

Teres major Running from the medial border of the scapula to the humerus.

Teres minor Deeper muscle extending from the lateral border of the scapula to the greater tubercle of the humerus. (Not Shown).

Serratus dorsalis Two sets of muscles, **superior** and **inferior**, fanning out from the ribs.



● FIGURE 25a-6
Superficial Muscles of
Back and Upper Forelimb.

Sacrospinalis Collective term for several longitudinal muscle masses, **spinalis dorsi**, **longissimus dorsi** and **iliocostalis** (not identified).

V. Muscles of the Forelimb

A. Separating the Major Muscles

1 → Choose either the right or the left forelimb. Use Figures 25a-6● through 25a-9●. Begin with the medial side of the brachium.

Epitrochlearis Sheet-like muscle on the medial side of the brachium (not found in humans).

Biceps brachii Crosses the brachium from the scapula to the radial tuberosity.

Coracobrachialis Small muscle connecting the coracoid process with the proximal humerus.

Triceps brachii Crosses the brachium from the scapula and humerus to the olecranon process of the ulna.

Anconeus Small muscle between the distal humerus and the olecranon process of the ulna (not identified on the dissection pictures).

Brachialis From the lateral surface of the humerus to the proximal end of the ulna.

B. Identifying Additional Muscles

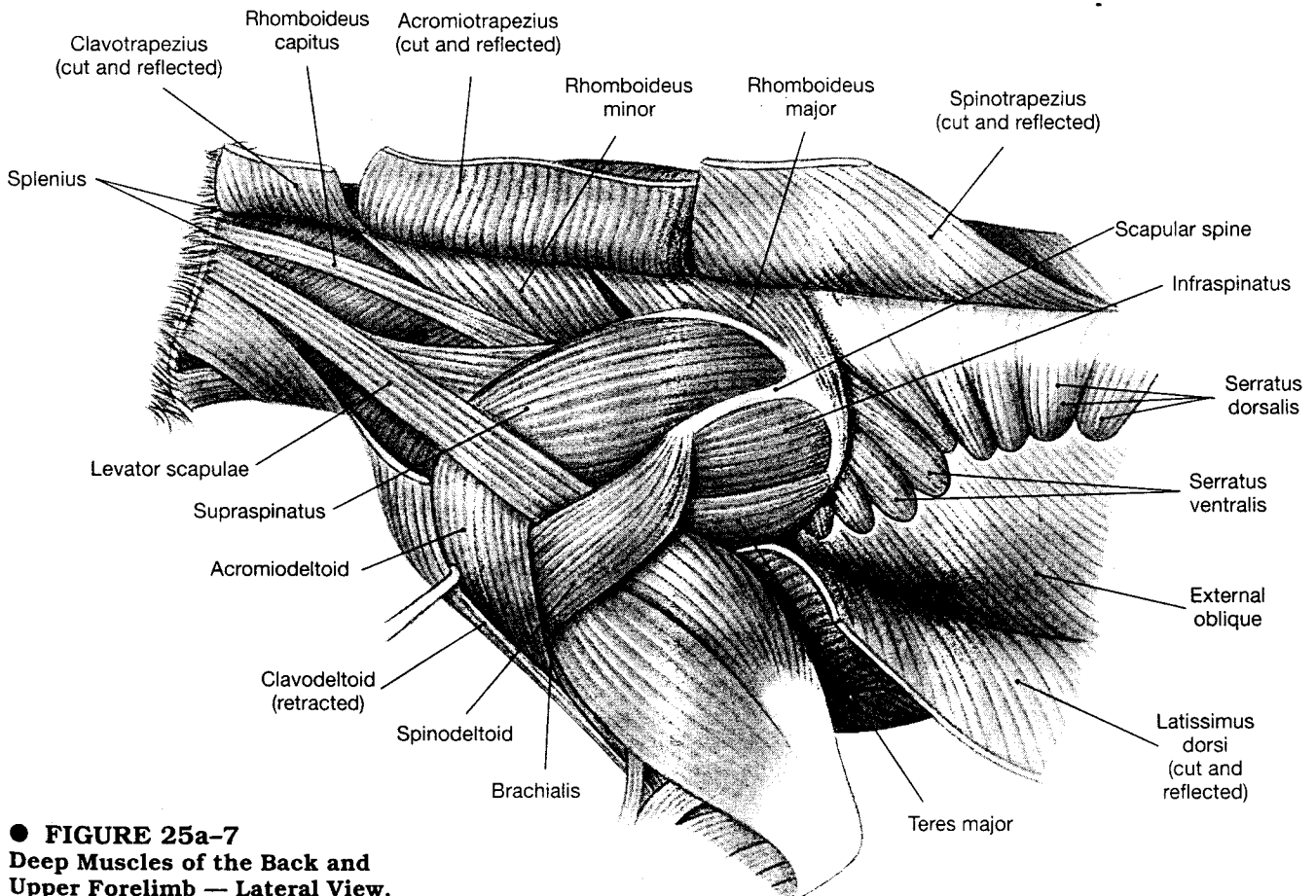
1 → Many of the muscles of the forelimb are often difficult to identify in classroom cat specimens. Based on your instructor's directions, use Figures 25a-9● and 25a-10● to locate the following: **brachioradialis**, **extensor carpi radialis longus**, **extensor carpi radialis brevis**, **extensor digitorum communis**, **extensor digitorum lateralis**, **extensor carpi ulnaris**, **pronator teres**, **flexor carpi radialis**, **palmaris longus**, **flexor carpi ulnaris**.

VI. Muscles of the Hind Limb

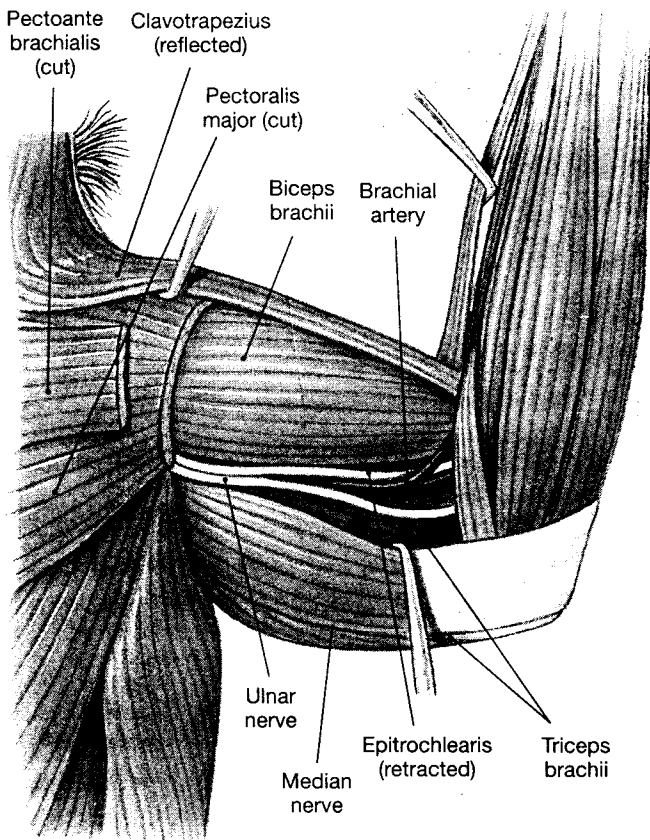
A. Separating the Superficial Muscles

1. Observe that the cat's hind limb is proportionately far less "round" than the human leg. What functional advantage do you see for the cat having this svelte leg?

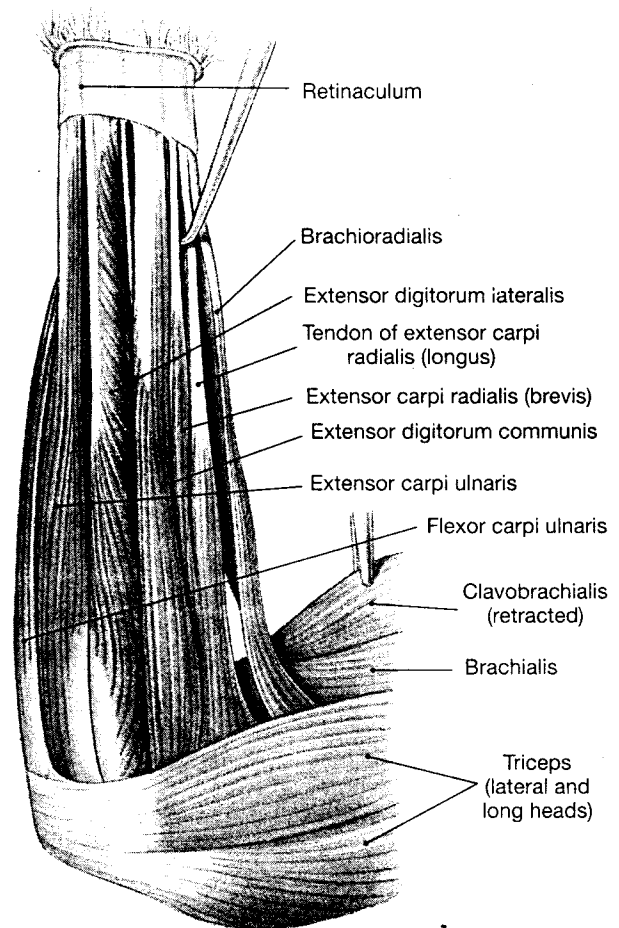
Choose either the right or the left hind limb. Use Figures 25a-11● through 25a-13● to help you isolate and identify these thigh muscles.



● **FIGURE 25a-7**
Deep Muscles of the Back and Upper Forelimb — Lateral View.



● FIGURE 25a-8
Muscles of Upper Forelimb — Medial View.



● FIGURE 25a-9
Muscles of Left Forelimb — Lateral View.

Sartorius Large plate-like muscle extending from the ilium to the tibia.

Tensor fasciae latae Lateral to the sartorius. The wide muscular portion of the tensor fasciae latae originates on the iliac crest. This muscle narrows to a tough band of fascia that inserts on the proximal tibia.

Biceps femoris Large lateral muscle.

Gracilis Inner thigh muscle extending from the ischium and symphysis pubis to the tibia.

B. Separating the Muscles of the Upper Thigh

1 → Transect and reflect the sartorius, the tensor fasciae latae, the biceps femoris, and the gracilis. Now identify these muscles:

Gluteus medius Lateral to the tensor fasciae latae and extending up into the hip.

Gluteus maximus Lateral to the gluteus medius. As in humans, the gluteus maximus is the buttock muscle. However, in cats the maximus is smaller than the medius. (Cats do have a gluteus minimus and several other small muscles deep to the medius. We will not identify those muscles here.)

Caudofemoralis Long, somewhat triangular muscle lateral to the gluteus maximus and extending down to the patella. Humans do not have a caudofemoralis muscle.

Tenuissimus Long, very thin muscle extending from the second caudal vertebra to the fascia of the biceps femoris. This is one of the hamstrings.

C. Separating the Muscles on the Anterior Surface of the Hind Limb

1 → Locate the following muscles:

Vastus lateralis Large muscle running from the proximal femur to the patella, deep to the tensor fasciae latae.

Rectus femoris Large muscle originating on the ilium and extending to the patella. You can find it on the proximal end of the femur between the vastus lateralis and the vastus medialis.

Vastus medialis Large muscle just medial to the rectus femoris.

