Cat muscular anatomy

The muscle labs will be divided into the study of two general regions: the abdomen and hindlimbs (lab 1), and the chest and forelimbs (lab 2). The manner of dissection for these labs will be the same.

Dissection of muscles requires care and only infrequent use of a scalpel or scissors. Make sure you know what you are cutting and how deep before you do it.

Before we start looking at the muscles, you need to first spend some time at the beginning of both labs in the removal of fat from the surface of the regions you are going to look at that day (abdomen/hindlimb or chest/forelimb). Both lab partners need to participate. You remove fat by using tweezers, pulling with fingers, or lightly scraping with a scalpel. For large sections of fat, you can use tweezers to lift the fat and then cut it away with a scalpel. Be careful that you do not remove muscle when using the scalpel. Once the fat and fascia has been cleared from muscle, you should see the pinkish-reddish color of muscles. Note you will not see a pinkish color in the midline of the abdomen (where the linea alba is located), in the middle of the lumbar region along the back (where the lumbodorsal fascia is located), or along the anterior edge of the thigh, lateral side, (where the fascia lata is located). These regions will instead be white.

Once fat has been cleared from muscles, then you will separate the superficial muscles from each other. Try to keep the muscles as “natural” as possible. You do this by mainly using a blunt probe or fingers to separate muscles. You only use a scalpel when you need to cut through superficial muscles to get at deeper muscles.

When you cut muscles remember to cut through the belly (middle) of the muscle, and not at its origin or insertion (where they attach to bone). This process is called “reflection” of muscles. When you properly reflect a muscle, you can put the muscle back to the way it originally was by closing the two halves of muscle back together. You must separate a muscle from other muscles before cutting through it – you need to poke your finger completely under it. Then you know how deep to cut. In muscle lab 1 you will reflect the sartorius, gracilis, and fascia lata only.

Important:
** When removing your cat from its bag, be careful to let the preservative remain in the bag!
There should be enough preservative so your cat stays moist...but not too much so that your cat is soaked. You will return your cat to the bag when finished. Label your bag with a large permanent marker or use a tag.
Muscle Lab 1
The study of cat musculature starts on p.309 of the lab manual. First sex your cat. Read over the section “Preparing the cat for muscle dissection” on p. 310. Since the pictures in your manual tend to be only close-ups, I have provided some diagrams that show the location of all the muscles so you know where they are generally located on the body.

Abdomen:
Derivations of hypaxial muscles: The muscles of the abdomen are laid out in thin layers and are outlined on p.312. The linea alba is a white line in the middle of the abdomen (under thin tendon sheets of fascia) where many abdominal muscles insert. The rectus abdominis is also underneath fascia of the abdominal midline. Lateral to the rectus abdominis (more to the side) is the external oblique. Notice the direction of fibers of the external oblique. Along the cat’s back use tweezers to lift up the external oblique and use a scalpel to make a very slight incision until you get to the next thin muscle layer underneath (about a mm thick). Just under the external obliques are the internal obliques, and just under those lies the transversus abdominis. If you perform incisions on the ventral side of your cat, the transversus is too thin to see very well, so do these cuts more dorsally. Notice the differences in direction of fibers of these three thin muscle layers. Use page 312

<table>
<thead>
<tr>
<th>Linea alba</th>
<th>External oblique</th>
<th>Transversus abdominis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rectus abdominis</td>
<td>Internal oblique</td>
<td>Lumbodorsal fascia</td>
</tr>
</tbody>
</table>

Hindlimb:
The thigh muscles are outlined starting on the bottom of p. 331. Observe the superficial muscles and then cut through the belly of large superficial muscles (fascia lata, sartorius, gracilis) to see the deeper muscles. You don’t need to cut the biceps femoris (contrary to the book). Follow the descriptions in your text (pp. 331-339) and figures to examine the following muscles:

<table>
<thead>
<tr>
<th>Sartorius</th>
<th>Tensor fascia lata</th>
<th>Peroneus longus</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gracilis</td>
<td>Vastus medialis</td>
<td>Extensor digitorum longus**</td>
</tr>
<tr>
<td>Biceps femoris</td>
<td>Vastus lateralis</td>
<td>Gastrocnemius</td>
</tr>
<tr>
<td>Semitendinosus</td>
<td>Rectus femoris</td>
<td>Gluteus medius</td>
</tr>
<tr>
<td>Semimembranosus</td>
<td>Vastus intermedius</td>
<td>Gluteus maximus</td>
</tr>
<tr>
<td>Adductor femoris</td>
<td>Tibialis anterior (cranialis)</td>
<td></td>
</tr>
</tbody>
</table>

*Rectus femoris, vastus medialis, vastus lateralis, vastus intermedius make up the "quadriceps". Semimembranosus, semitendinosus and biceps femoris make up the “hamstrings”.

**When looking at the extensor digitorum longus, pull the skin farther off the foot to take a look at the four tendons that pass along the top of the foot and insert on the digits. You distinguish the tibialis anterior and extensor digitorum longus by looking at their different insertions (extensor vs. flexor).
Muscle lab 2

Before looking at muscles, you need to again remove fat and fascia from the upper half of the cat. Be careful of damaging the xiphihumeralis and the latissimus dorsi.

Chest:
These muscles are outlined starting on p. 310. You do not need to cut all of these muscles (contrary to the book). The only cuts you need to make are: 1) around under the armpit (through some pectoralis major and minor) in order to see the serratus ventralis, teres major, infraspinatus; and 2) a location where the ribs are (you can cut through external obliques near the edge of the xiphihumeralis) in order to observe the intercostals; and 3) cut through medial edge of acromiotrapezius to expose. Use pp. 310-311, 315-316

Xiphihumeralis
Pectoralis minor
Pectoralis major
Pectoantebrachialis
Intercostalis internus* (internal intercostal)
Intercostalis externus* (external intercostal)

*Intercostals are outlined on p.315

Forelimb and Back:
Superficial back muscles outlined starting on p.313

Superficial muscles
Clavotrapezius p.313
Spinotrapezius p.314
Acromiotrapezius
Latissimus dorsi
Lumbrodorsal fascia
Deeper muscles
Infraspinatus p.324
Supraspinatus
Teres major
Rhomboideus (cervicis and thoracis) p.320*
Serratus ventralis (a deeper muscle) p.315

*Don’t pull out the scapula (as in p.321-322) to see the rhomboideus muscles it isn’t necessary.

"Arm" muscles:
These muscles are outlined starting on p.324
Spinodeltoid p.324
Acromiodeltoid
Lateral head of triceps brachii p.326
Long head of triceps brachii
Medial head of triceps brachii
Biceps brachii p.326
Extensor digitorum communis p.329
Flexor digitorum superficialis p.329

The extensor digitorum communis is one of two muscles that have tendons that split into four thin tendons that insert on digits (similar to the extensor digitorum longus of the foot). The flexor digitorum superficialis is a fairly wide, flat and shiny muscle. Supraspinatus and infraspinatus="rotator cuff"
Know insertions and origins of the following muscles:

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Origin</th>
<th>Insertion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gastrocnemius</td>
<td>Patella, femur</td>
<td>Calcaneus</td>
</tr>
<tr>
<td>Vastus medialis</td>
<td>Femur</td>
<td>Patella</td>
</tr>
<tr>
<td>Sartorius</td>
<td>Illium</td>
<td>Tibia</td>
</tr>
<tr>
<td>Semimembranosus</td>
<td>Ischium</td>
<td>Tibia</td>
</tr>
<tr>
<td>External oblique</td>
<td>Lumbodorsal fascia, ribs</td>
<td>Linea alba</td>
</tr>
<tr>
<td>Pectoralis major</td>
<td>Sternum</td>
<td>Humerus</td>
</tr>
<tr>
<td>Latissimus dorsi</td>
<td>Thoracic, lumbar vertebrae</td>
<td>Humerus</td>
</tr>
<tr>
<td>Triceps brachii (lateral head)</td>
<td>Humerus</td>
<td>Olecranon process of ulna</td>
</tr>
<tr>
<td>Rhomboideus</td>
<td>Neural spines of vertebrae</td>
<td>Scapula</td>
</tr>
</tbody>
</table>

The insertions and origins are provided in the lab manual when each muscle is described. Regarding insertions and origins: if there are two or more origins for a muscle I will accept any one on a practical. Insertions and origins can also be less specific than given in the book - example: insertion of latissimus dorsi is listed as “medial surface of humerus at the proximal end” - I would accept “humerus” on a practical. The origin of the biceps femoris is “ischial tuberosity” – I would accept “ischium”. So just name the bone. Exception: triceps brachii insertion is olecranon process and not ulna. Obviously, you can’t be too general and write, “arm” or “leg”.
FIGURE 3-1
Muscular system (dorsal view).
FIGURE 3-2
Muscular system (ventral view).
FIGURE 3-11
Superficial muscles of the thigh (ventral view).

FIGURE 3-12
Deep muscles of the thigh (ventral view).
FIGURE 3-13
Superficial muscles of the thigh (lateral view).

FIGURE 3-14
Deep muscles of the thigh (lateral view).
FIGURE 3-17
Ventral leg muscles (left side).

FIGURE 3-18
Muscles and tendons of the dorsum of foot (left side).

FIGURE 3-19
Muscles of the sole (left side).

tendon from tibialis
ant. turns medially
and goes to underside
of foot

Peroneus brevis

Tibialis anterior

Extensor digitorum longus

Calcaneal tendon

Tibialis posterior tendon

Peroneus longus tendon

Flexor hallucis longus tendon

Flexor digitorum brevis

Metatarsal pad

Flexor digitorum longus (tendon)
FIGURE 3-7
Superficial dorsal muscles of the forearm (left side).

- Brachioradialis
- Extensor carpi radialis longus
- Extensor digitorum communis
- Extensor carpi radialis longus
- Extensor carpi ulnaris
- Dorsal carpal ligament
- Triceps brachii-long head
- Triceps brachii-lateral head

FIGURE 3-8
Deep dorsal muscles of the forearm (left side).

- Supinator
- Extensor pollicis brevis
- Extensor indicis proprius