The Muscular System

▶ Procedure: Skinning the Rat

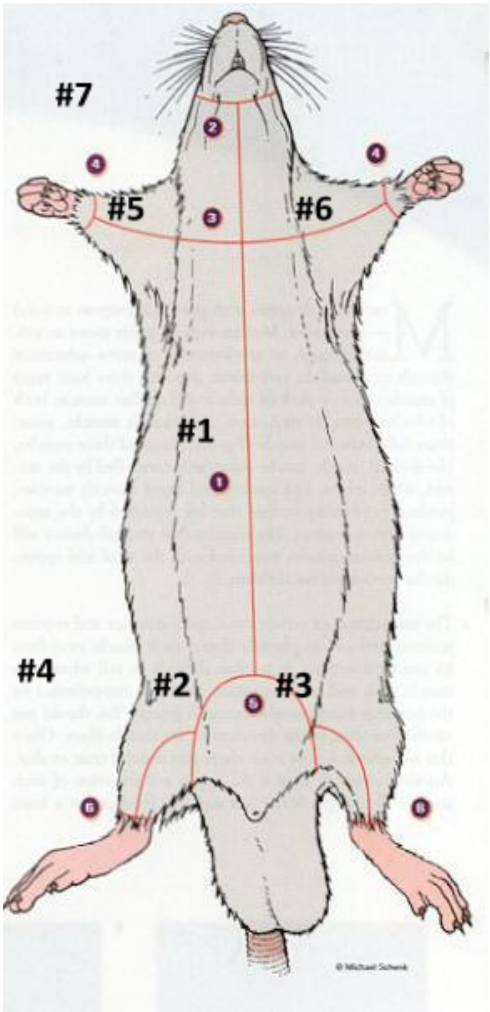
Exercise caution and patience when cutting through tissues. Dissection is not merely "cutting up" an animal, but rather a careful process of separating parts from each other. Therefore, it is important to cut only when instructed to and to thoroughly read about the area you are about to cut into.

Below is a list of common dissection tools and a brief description of their proper uses:

-Blunt probe: a rigid 5-inch steel instrument with a blunt, bent tip. This is useful for gentle manipulation of muscles and internal organs.
-**Scissors**: usually 4-6 inches long with pointed tips. Scissors should be used to cut through skin, muscles, and other large structures
-**Scalpel**: a rustproof metal handle with replaceable blades. The scalpel should be used to make small incisions. Notify your teacher if your blade breaks and they will replace it for you.
-Needle Probe: a 3-inch needle attached to a wooden or plastic handle. This may be used as a pointer or to attach the specimen to the dissecting tray.
-**Forceps**: about 5-inches long, the two pointed ends should contain ridges and should meet together evenly when closed. They are used to grasp small objects.

You will carefully remove the skin of the rat to expose the muscles below. This task is best accomplished with scissors, scalpel, probe, and forceps where the skin is gently lifted and snipped away from the muscles.

1. Place your rat on its back in the dissecting tray. Your rat is a preserved, injected specimen so there will be an opening on the midventral surface of the neck. At this opening, insert the point of your scissors between the skin and the underlying muscle and make a midventral incision through the skin extending to the tail (cut #1). **Do not cut too deep!!! You do not want to cut the muscle and expose the organs yet.** Gently peel the skin from the muscles, using scissors and a probe or scalpel to tease away muscles that stick to the skin.
2. From the caudal end of your first cut (near the genitals) , make additional incisions through the skin around the genitals and base of the tail, down the lateral surface of each hindlimb, and around each ankle (cuts #2, #3). Make a cut from ankle to ankle on the dorsal side near the base of the tail (cut #4).
3. From the midventral incision at the cranial end make a cut to and around each wrist (cuts #5 and #6). Make a cut from wrist to wrist on the dorsal side near the base of the neck (cut #7).



4. Carefully separate the skin from the underlying muscles. Do this by pulling the skin gently but firmly away from the body with one hand and tearing through the white connective tissue with the scalpel or blunt probe in the other hand. In the chest region you will notice that the skin is attached to a thin, brownish sheet of muscle which is continuous with muscles extending into the armpit. This muscle must be removed with the skin.

Keep the skin and wrap it around your specimen when it is stored. This will help prevent the body from drying out and will prolong its use.

Muscular System

Muscle is an important type of tissue that is found throughout the body of all vertebrates. There are three basic types of muscle tissue: **smooth** or **visceral muscle**, which forms part of the walls of visceral organs or blood vessels. Visceral muscle is also called smooth muscle because it doesn't have cross striations. Visceral muscle contracts slower than skeletal muscle, but the contraction can be sustained over a longer period of time; **cardiac muscle**, which forms the bulk of the heart; and **skeletal** or **somatic muscle**, which lies immediately deep to the skin and is attached to bones. Smooth and cardiac muscle are **not** considered to be components of the muscular system but are instead part of the organ and organ systems that they help form.

Muscles are attached to bones by connective tissue called **tendons** that adhere to spines, knobs, and ridges on bones. You will need to refer to the rat skeleton to determine where the muscles are attached to bones. During contraction of a muscle, one end remains mostly stationary and the opposite end moves the bone to which it is attached as the muscle shortens. The end attached to the bone that does not move during contraction is called the **origin**. The end of the muscle that attaches to the bone that does move is called the **insertion**. The movement caused by the contraction of the muscle is called the **action**. Muscles can be easily identified from one another by their shape and overlap.

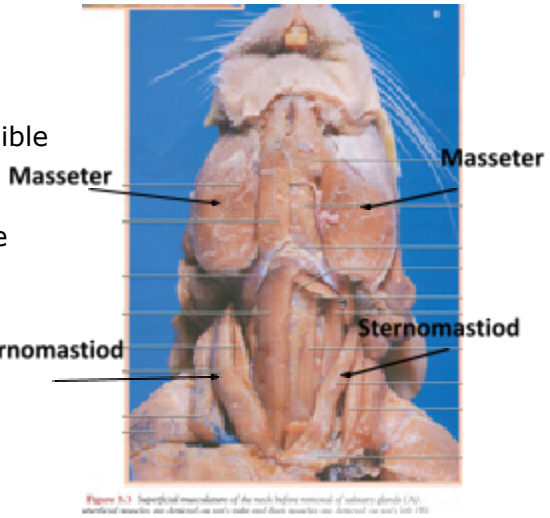
Muscle Dissection

Muscle dissection involves the careful separation of muscles from each other. Locate the cleavage lines that separate adjacent muscles while comparing your specimen with the diagrams. If the lines are not visible, they can be emphasized by pulling the muscles apart with your fingers until they appear. To separate individual muscles, use a blunt probe to break the surrounding connective tissue at the cleavage lines by inserting the probe between adjacent muscles and working the instrument forward.

Identify the following muscles of the head and neck:

1. **Masseter** – a large, round muscle located in the cheek region. Action: (movement it causes): closing of the mandible (jaw)

2. **Sternomastoid** – a long muscle located in the front of the neck. Action: turn the head side to side



Identify the following ventral muscle of the pectoral girdle:

3. **Pectoralis superficialis** - a broad triangular portion of the pectoralis muscle located in the chest region. Action: draws the arm forward and across the chest, and rotates it inwards. (ex: important in climbing and rowing)

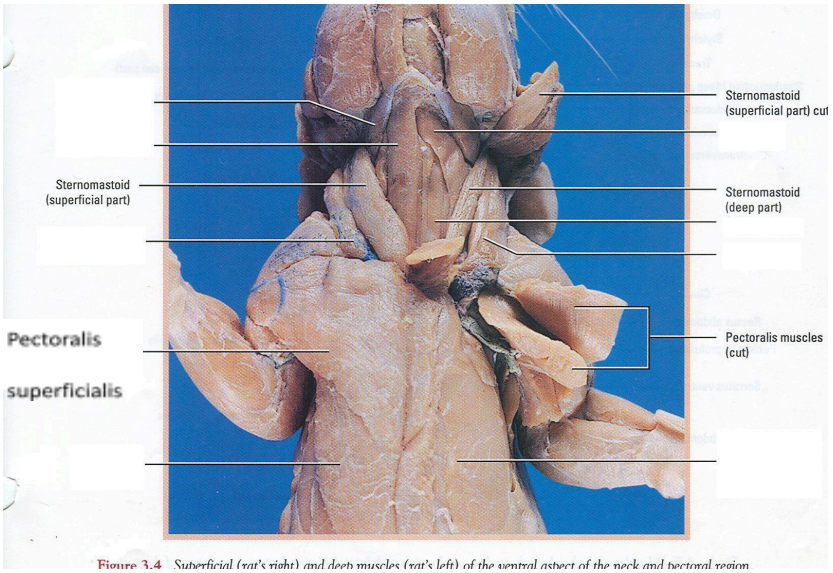
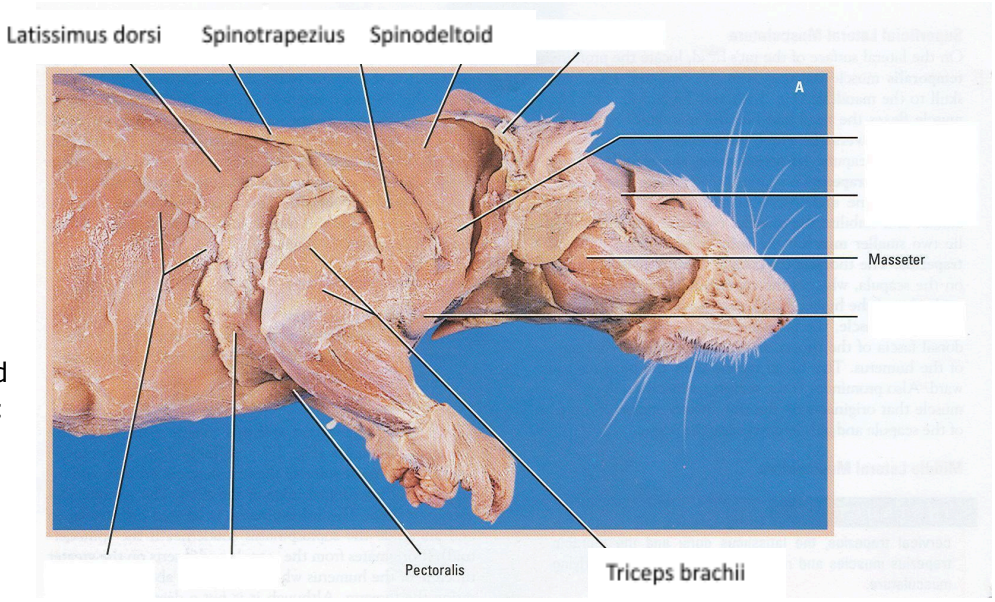


Figure 3.4 Superficial (rat's right) and deep muscles (rat's left) of the ventral aspect of the neck and pectoral region

Identify the following dorsal muscles of the neck and pectoral girdle:

4. **Latissimus dorsi** - located posterior (and partially covered) by the spinotrapezius. Action: draws the humerus downward and backward and rotates it inward (ex: the down stroke in freestyle swimming)

5. **Spinotrapezius** - located across the dorsal thoracic region of the rat. Action: moves scapula up and backward (ex: shrugging up or lifting the shoulders)



Identify the following muscles of the shoulder & cranial appendages:

6. **Spinodeltoid** - arises from the scapula spine and inserts on the proximal portion of the humerus. Action: flexes and rotates the humerus laterally (ex: pulling back while rowing)

7. **Triceps brachii** - located on the sides and back of the upper arm. Action: extends lower arm (ex: extending of the elbow joint / straightening of the arm)

8. **Biceps brachii** - located on the anterior surface of the humerus. Action: flexes lower arm (ex: performing a curl lift) *Not shown in diagrams but it is located opposite the triceps brachii.

Identify the following muscles of the trunk:

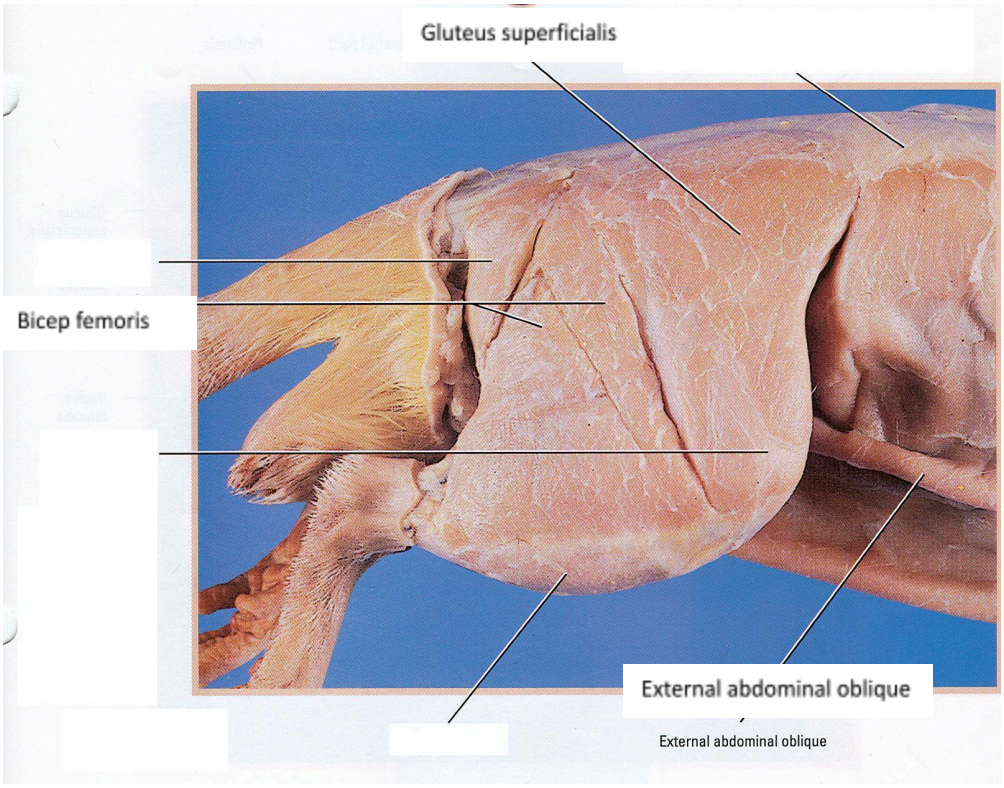
9. **Intercostals -** muscles that form the outermost layer of the thoracic wall between the ribs. Action: breathing. *Not shown in diagrams

10. **Diaphragm** - circular sheet of muscle that divides the thoracic and abdominal cavities internally. Action: pushes downward, which expands the thoracic cavity, causing air to be drawn into the lungs while breathing in. *You will see this muscle when we look at the thoracic and abdominal cavities.

11. **External abdominal oblique** – located on the sides of the abdomen. Action: constricts the abdomen and thorax (ex: doing a twisting sit up)

Identify the following muscle of the pelvic girdle and hip:

12. **Gluteus superficialis** – the large muscle located on the lower back and rear. Action: to regain an erect position from a squatting position



Identify the muscles of the caudal appendages:

13. **Biceps femoris** - located on the side of the thigh, in two bundles; flexes knee and rotates leg laterally (ex: downward motion of kicking a soccer ball) Action: flexes the lower leg

14. **Gastrocnemius** - located on lower leg, bulk of the calf muscle. Attaches to heel by the **Achilles Tendon**. Action: extends the foot. *Not shown but it is located behind the biceps femoris.