

Lab 8: Appendicular Muscular System

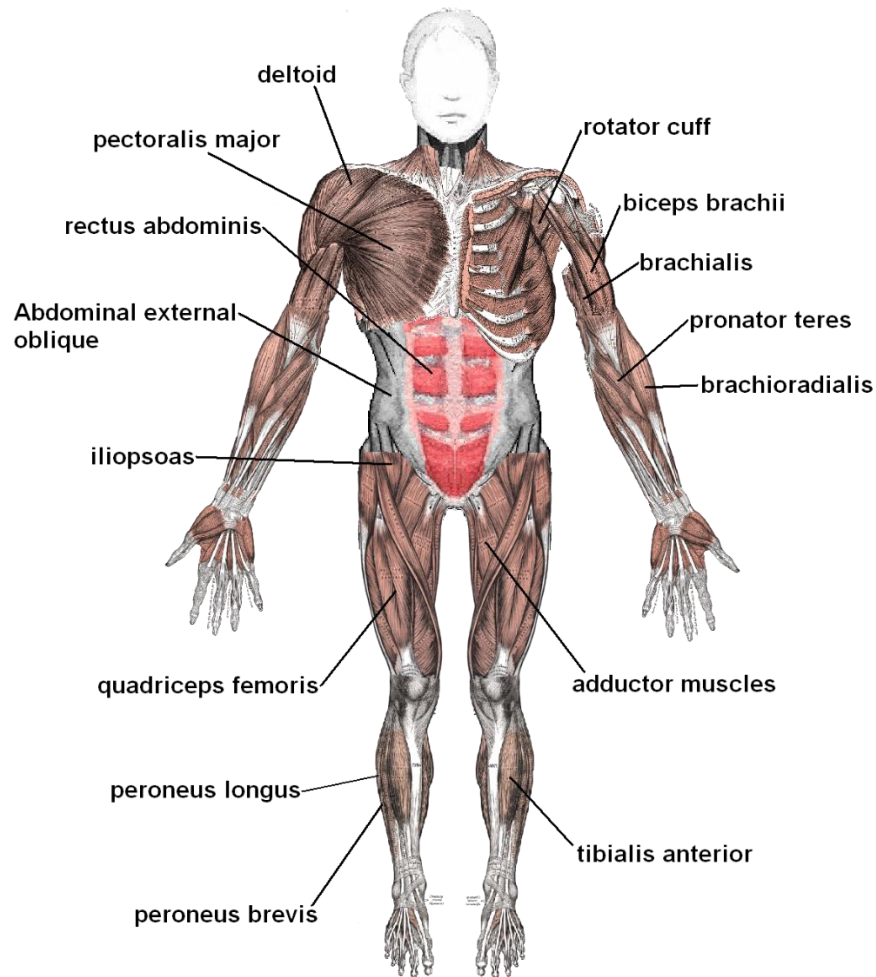


Figure 8.1 Appendicular muscles

(https://upload.wikimedia.org/wikipedia/commons/e/e5/Muscles_anterior_labeled.png)

Exercise 8 Learning Goals

After completing this lab you should be able to:

Define the terms prime mover/agonist, antagonist, synergists and fixators in reference to muscle groups contributing to movement

➤ Describe the origin, insertion and action of select muscles that:

- Position and stabilize the pectoral girdle
- Move the humerus
- Move the forearm
- Move the wrist, hand and fingers
- Move the thigh
- Move the lower leg
- Move the feet

Pre-Lab Activity 8.1: Muscle Name & O.I.A. Flashcards

At the end of this chapter there are flash card templates for each muscle group. Before lab starts please make sure you research and write down the **origins** and **insertions** for each muscle listed on the flash cards. You do not have to fill out the **action** section yet (**although this is not strictly prohibited**).

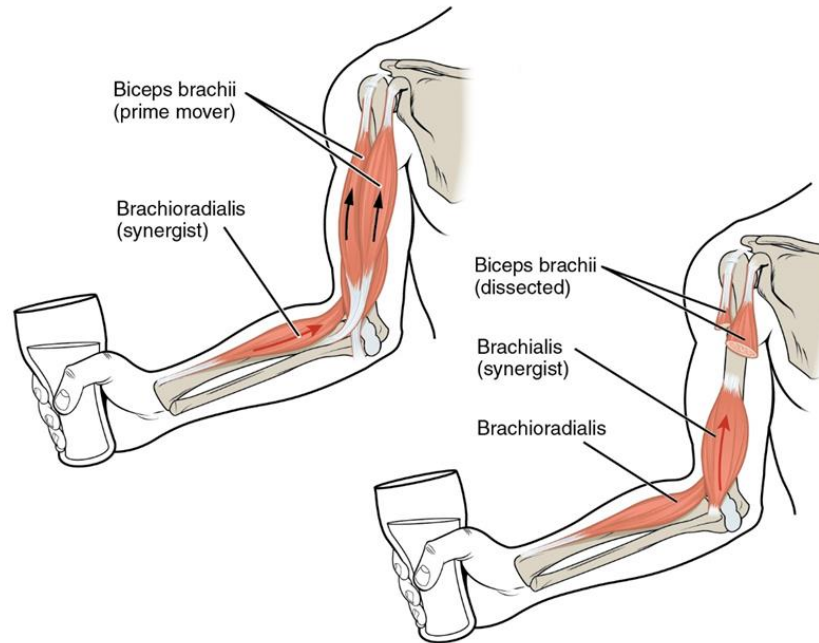


Figure 8.2. Relationship between prime mover and synergist at the elbow joint (<http://cnx.org/contents/994d37cf-24cc-45b5-9683-851444fab8f3@5>)

Key Definitions

PRIME MOVER/AGONIST: THE MAIN MUSCLE INVOLVED IN A PARTICULAR MOVEMENT E.G. BICEPS BRACHII IS THE MAIN MUSCLE THAT FLEXES THE ELBOW

ANTAGONIST: A MUSCLE THAT OPPOSES THE MOVEMENT OF A PRIME MOVER E.G. TRICEPS BRACHII OPPOSES THE BICEPS BRACHII MUSCLE DURING FLEXION OF THE ELBOW

SYNERGISTS: MUSCLES THAT ASSIST A PRIME MOVER E.G. BRACHIALIS AND BRACHIORADIALIS ASSIST THE BICEP TO FLEX THE ELBOW (SEE FIGURE 2)

FIXATORS: MUSCLES THAT ARE CLOSE TO A PRIME MOVER'S ORIGIN (NORMALLY AT THE PROXIMAL END) THAT HELP TO STABILIZE THE

As all muscles can only shorten, they work in groups in order to create the dynamic movements of the skeleton, especially movements at the shoulder, elbow, hip and knee joints. Muscles are classified into 4 main functional groups depending on their movement: **prime mover/agonist, antagonist, synergist** (Figure 8.2) and **fixator**.

Pre-Lab Activity 8.2 Prime movers, antagonists, synergists and fixators

Name the prime mover, antagonist, synergist and fixators of movements listed in the table below.

Movement	Prime mover	Antagonist	Synergists	Fixators
Elbow flexion	Biceps Brachii	Triceps Brachii	Brachialis & Brachioradialis	Trapezius & Rhomboid
Elbow extension				
Knee flexion				
Knee extension				
Shoulder lateral rotation				
Shoulder medial rotation				

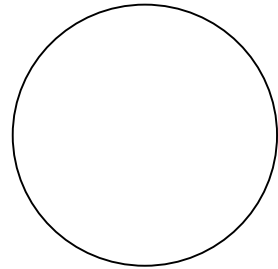
Anatomy in Clay® Instructions

To demonstrate your understanding of origins, insertions and fascicle arrangement of the muscles, you will use an oil-based clay to form select muscles on the Maniken®. Please follow the instructions below. If you are unsure of what to do, ask your instructor.

- Keep your space clean and organized.
- Keep track of your tools and supplies.
- Feel free to stand or sit when working on your model.
- Move your model around so it is easy to build on but be careful!
- Use dry paper towels to remove clay from hands and tools (DO NOT USE SOAP OR WATER).
- Use red/tera cotta clay to build muscles.
- Keep the clay on the green mats at all times.
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Clean Up at the end of lab period

1. Take all clay off of the model!
2. Roll into balls **NO BIGGER** than image shown and organize into bags.
3. Use dry paper towels to wipe off as much clay as possible from the model and tools used.
4. Return your model to its original place.



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Muscles of the Upper Limb

Muscles of the shoulder and upper limb can be divided into four groups: **muscles that stabilize and position the pectoral girdle**, **muscles that move the arm**, **muscles that move the forearm**, and **muscles that move the wrists, hands, and fingers**.

Activity 8.1: Muscles that position the Pectoral Girdle

For each of the following groups of muscles, use the anatomical models in the lab and the figures in this chapter to exam the individual muscle's origins, insertions and fascicle arrangement. Fill out the table after completing your examination of the anatomical models and figures.

The **pectoral girdle**, or shoulder girdle, consists of the lateral ends of the clavicle and scapula, along with the proximal end of the humerus, and the muscles covering these three bones to stabilize the shoulder joint. The girdle creates a base from which the head of the humerus, in its ball-and-socket joint with the glenoid fossa of the scapula, can move the arm in multiple directions.

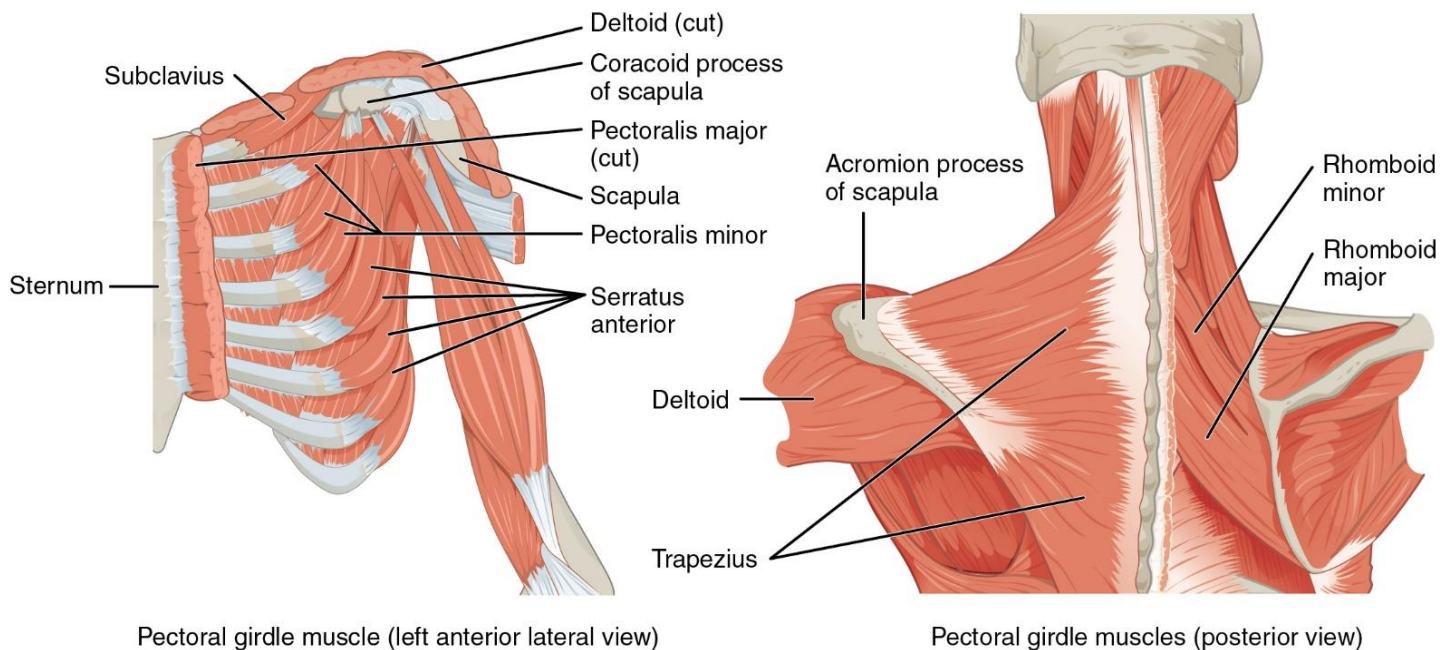


Figure 8.3. Muscles that position the pectoral girdle (<http://cnx.org/contents/14fb4ad7-39a1-4eee-ab6e-3ef2482e3e22@15.1>)

Complete the table for muscles that position the pectoral girdle

Muscle Name	Origin	Insertion	Action
Pectoralis minor			
Serratus anterior			
Trapezius			
Rhomboid major			

Anatomy in Clay®- Muscles that Position the Pectoral Girdle

On your model, place the muscles **pectoralis minor** and **rhomboid major** and include fascicle orientation.

Activity 8.2: Muscles of the shoulder

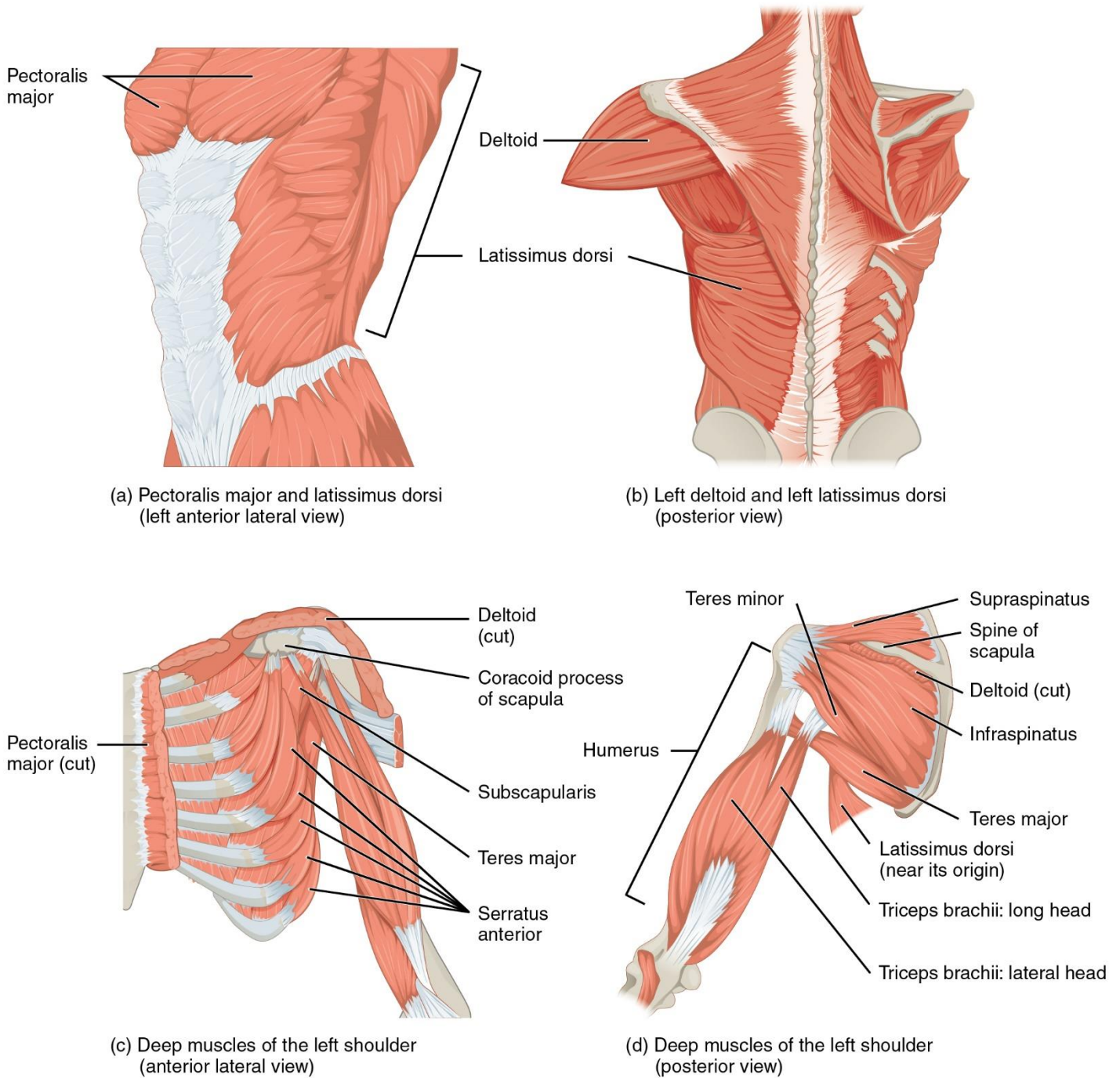


Figure 8.4 Muscles of the shoulder (<http://cnx.org/contents/14fb4ad7-39a1-4eee-ab6e-3ef2482e3e22@15.1>)

Muscle Name	Origin	Insertion	Action
Pectoralis major			
Latissimus dorsi			
Deltoid			
Teres major			
Rotator Cuff Muscles (SITS)	Origin	Insertion	Action
Supraspinatus			
Infraspinatus			
Teres minor			
Subscapularis			

Anatomy in Clay® - Muscles of the shoulder

On your model, place the muscles **pectoralis major**, **latissimus dorsi** and **deltoid** and include fascicle orientation.

Activity 8.3: Muscles of the Forearm/Elbow

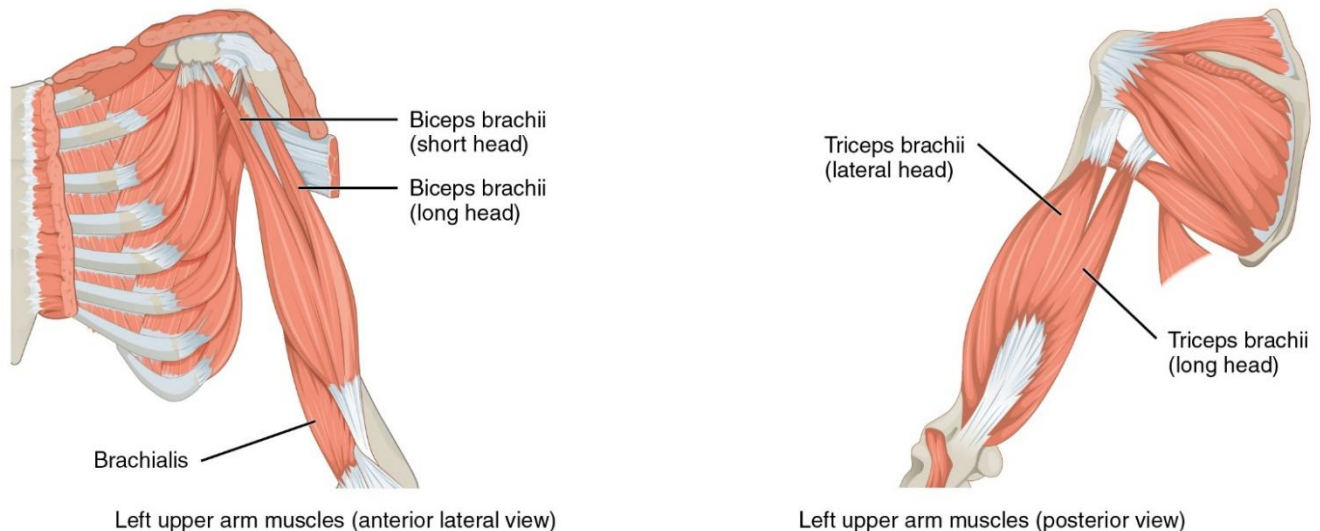


Figure 8.5 Muscles of the forearm/elbow (<http://cnx.org/contents/14fb4ad7-39a1-4eee-ab6e-3ef2482e3e22@15.1>)

Muscle Name	Origin	Insertion	Action
Biceps brachii			
Brachialis			
Triceps brachii			

Anatomy in Clay® - Muscles of the forearm/elbow

On your model, place the **brachialis** and **triceps brachii** muscles and include the fascicle orientation.

Activity 8.4: Muscles that move the wrist, hand and fingers

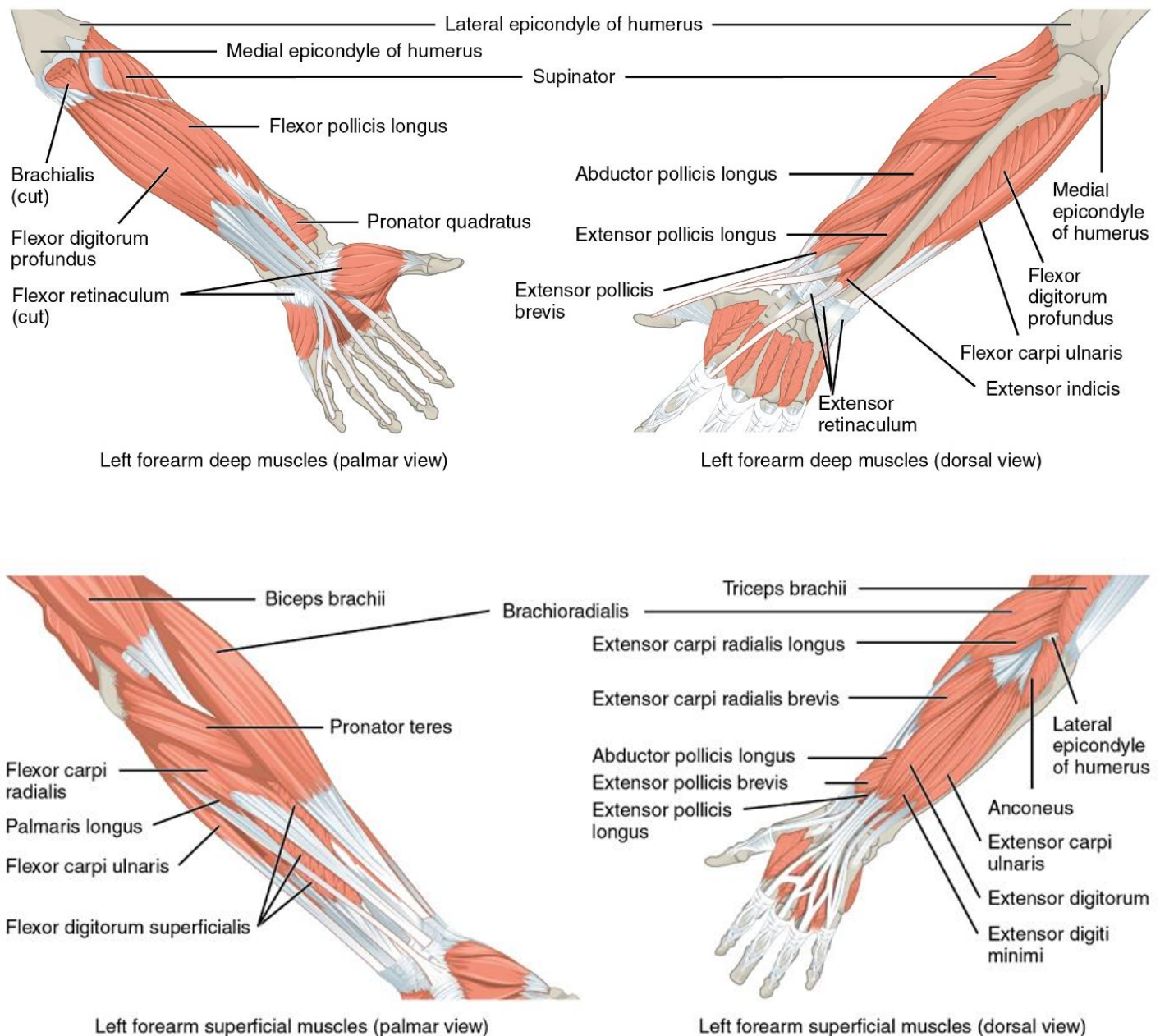


Figure 8.6 Muscles that move the wrist, hand and fingers (<http://cnx.org/contents/14fb4ad7-39a1-4eee-ab6e-3ef2482e3e22@15.1>)

Muscle Name	Origin	Insertion	Action
Flexor digitorum superficialis			
Extensor digitorum			
Palmaris longus			
Abductor pollicis longus			

Anatomy in Clay® - Muscles that move the wrist, hand and fingers

On your model, place the **extensor digitorum** and **abductor pollicis longus** muscles and include the fascicle orientation.

Muscles of the Lower Limb

The appendicular muscles of the lower body position and stabilize the **pelvic girdle**, which serves as a foundation for the lower limbs. Comparatively, there is much more movement at the pectoral girdle than at the pelvic girdle. There is very little movement of the pelvic girdle because of its connection with the sacrum at the base of the axial skeleton. The pelvic girdle is less range of motion because it was designed to stabilize and support the body.

Activity 8.5: Muscles of the hip/thigh

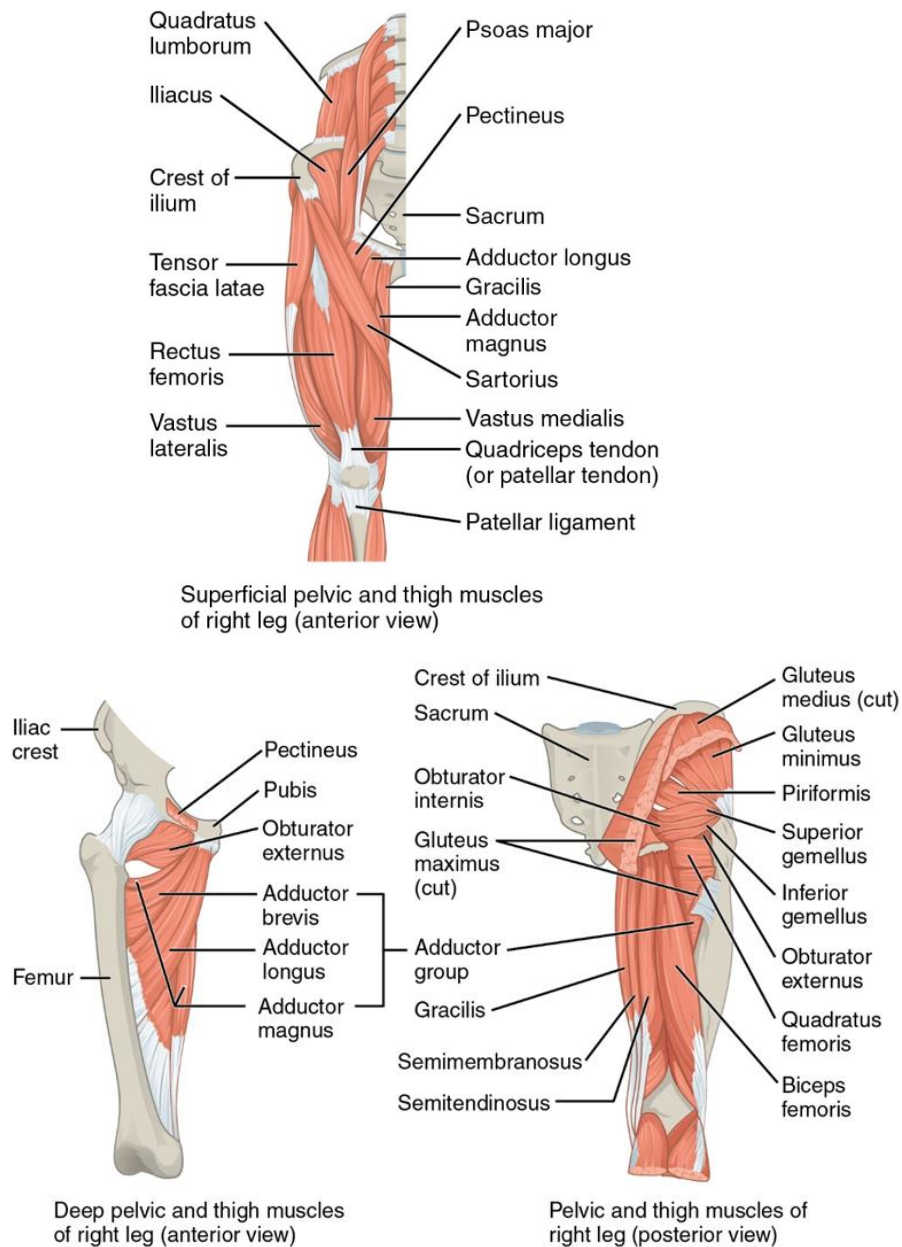


Figure 8.7 Muscles of the hip/thigh (<http://cnx.org/contents/14fb4ad7-39a1-4eee-ab6e-3ef2482e3e22@15.1>)

Muscle Name	Origin	Insertion	Action
Psoas major (Iliopsoas)			
Gluteus maximus			
Gluteus medius			
Tensor faciae latae			
Sartorius			
Gracilis			

Anatomy in Clay® - Muscles that move the thigh

On your model, place the **gluteus maximus** and **sartorius** muscles and include the fascicle orientation.

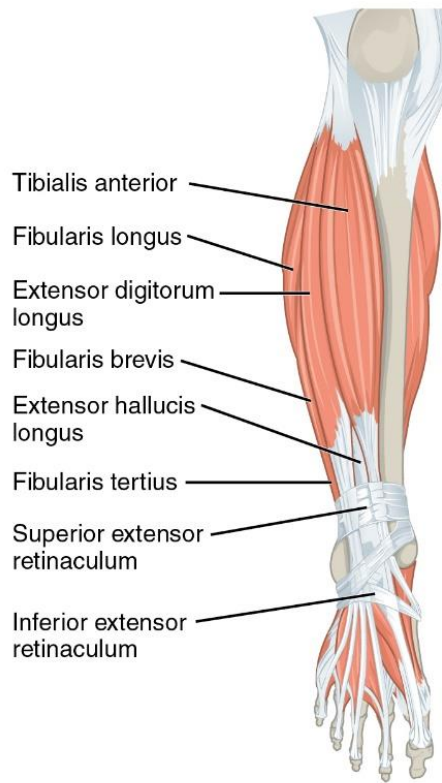
Activity 8.6: Anterior Thigh – Quadriceps Femoris & Posterior Thigh- Hamstrings

Muscle Name (Quadriceps)	Origin	Insertion	Action
Rectus femoris			
Vastus lateralis			
Vastus medialis			
Vastus intermedius			
Muscle Name (Hamstrings)	Origin	Insertion	Action
Biceps femoris			
Semitendinosus			
Semimembranosus			

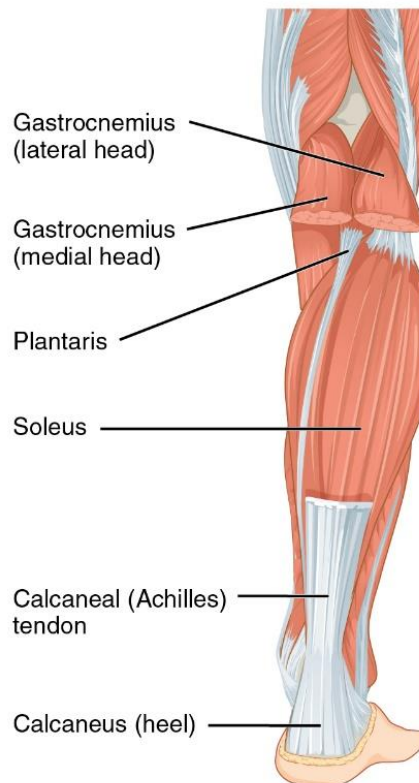
Anatomy in Clay® - Muscles that move the lower leg

On your model, place the **rectus femoris** and **biceps femoris** muscles and include the fascicle orientation.

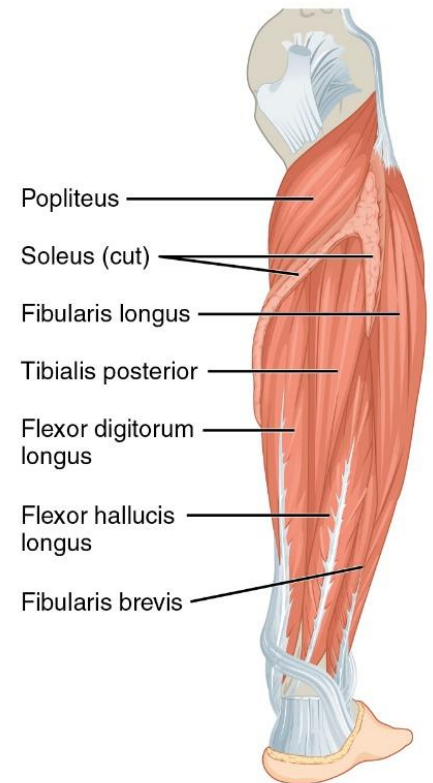
Activity 8.7: Muscles of the lower leg/ankle



Superficial muscles of the right lower leg (anterior view)



Superficial muscles of the right lower leg (posterior view)



Deep muscles of the right lower leg (posterior view)

Figure 8 Muscles of the lower leg & ankle (<http://cnx.org/contents/14fb4ad7-39a1-4eee-ab6e-3ef2482e3e22@15.1>)

Muscle Name	Origin	Insertion	Action
Gastrocnemius			
Soleus			

Tibialis anterior			
Flexor hallucis longus			

Anatomy in Clay® - Muscles that move the feet

On your model, place the **gastrocnemius** and **tibialis anterior** muscles and include the fascicle orientation.