Unit 3 Pictures

BIOL 212 Online Lab PowerPoint

<u>Hint:</u> Slides with colored backgrounds help to divide content into different days.

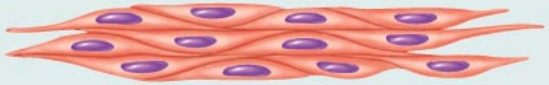
Use the following pictures to help you identify terms from the lab term handout.

Another good resource is the Olexik website: http://faculty.montgomerycollege.edu/wolexik/204_histology_page.htm

Muscle Histology

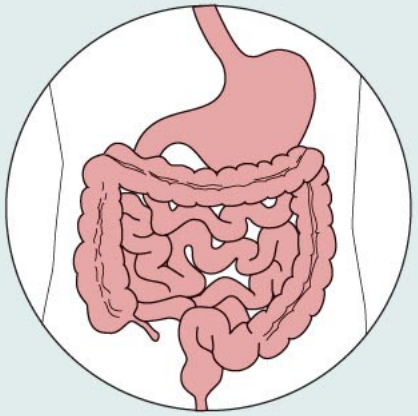
(c) Smooth muscle

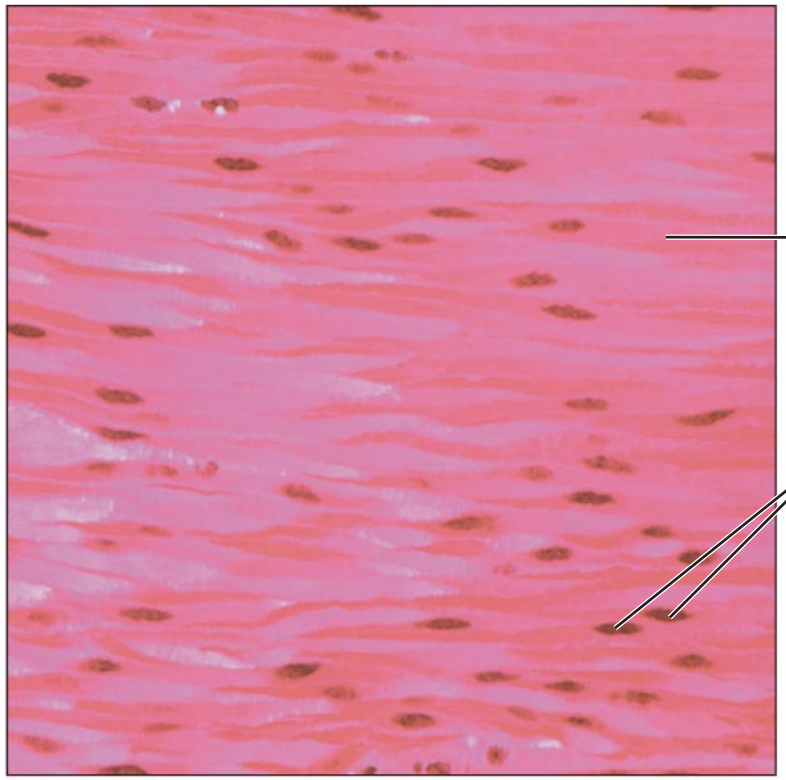
Description: **Spindle-shaped cells with central nuclei; no striations; cells arranged closely to form sheets.**



Function: **Propels substances or objects (foodstuffs, urine, a baby) along internal passage-ways; involuntary control.**

Location: **Mostly in the walls of hollow organs.**

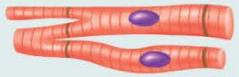




Photomicrograph: **Sheet of smooth muscle (200x).**

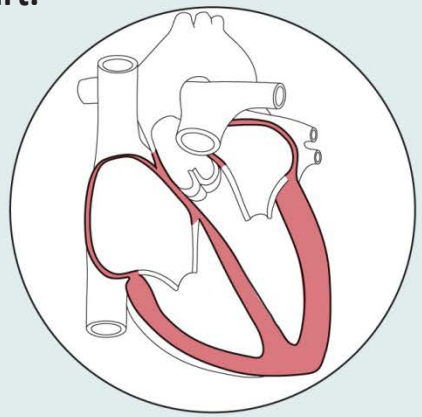
(b) Cardiac muscle

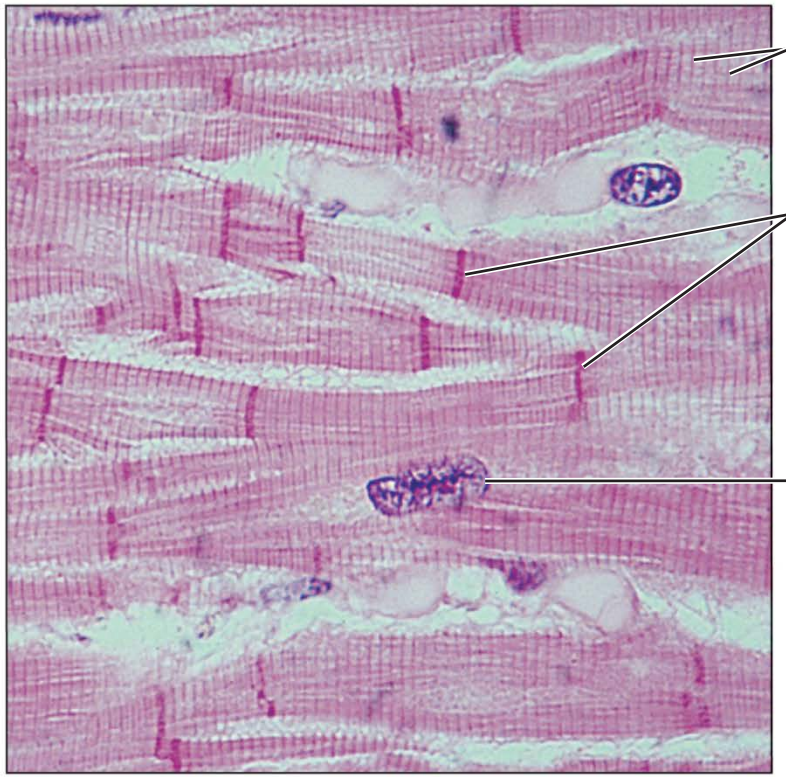
Description: **Branching, striated, generally uninucleate cells that interdigitate at specialized junctions (intercalated discs).**



Function: **As it contracts, it propels blood into the circulation; involuntary control.**

Location: **The walls of the heart.**





Photomicrograph: **Cardiac muscle (500X); notice the striations, branching of cells, and the intercalated discs.**

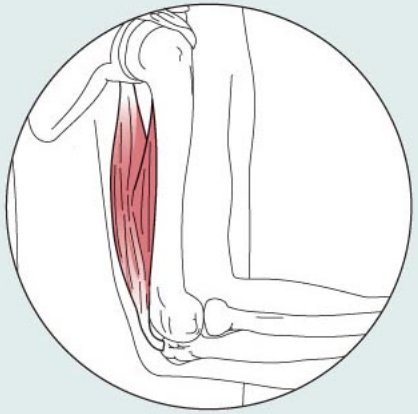
Longitudinal Section

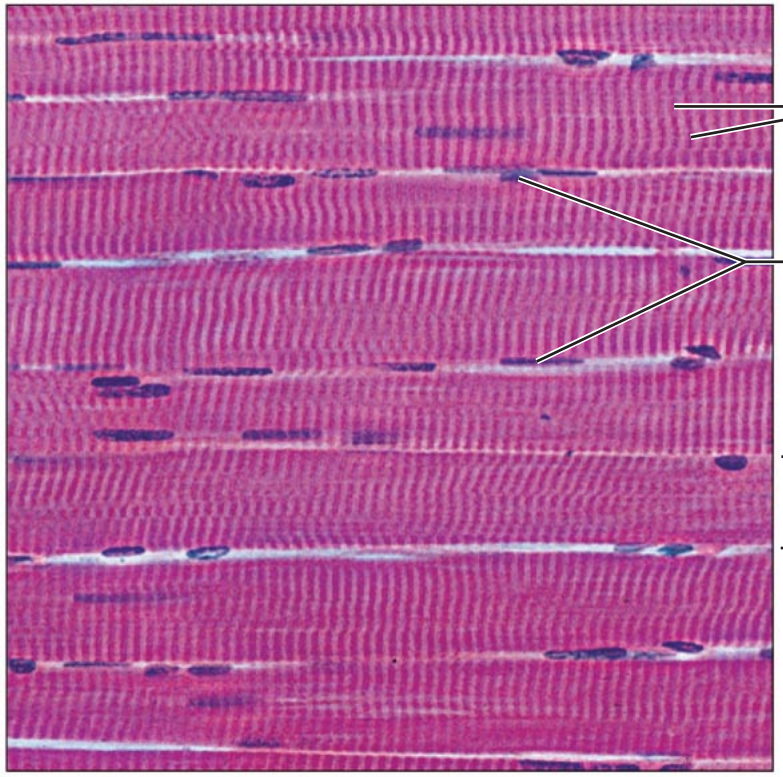
(a) Skeletal muscle

Description: **Long, cylindrical, multinucleate cells; obvious striations.**

Function: **Voluntary movement; locomotion; manipulation of the environment; facial expression; voluntary control.**

Location: **In skeletal muscles attached to bones or occasionally to skin.**





Photomicrograph: **Skeletal muscle (approx. 460x). Notice the obvious banding pattern and the fact that these large cells are multinucleate.**

Longitudinal Section

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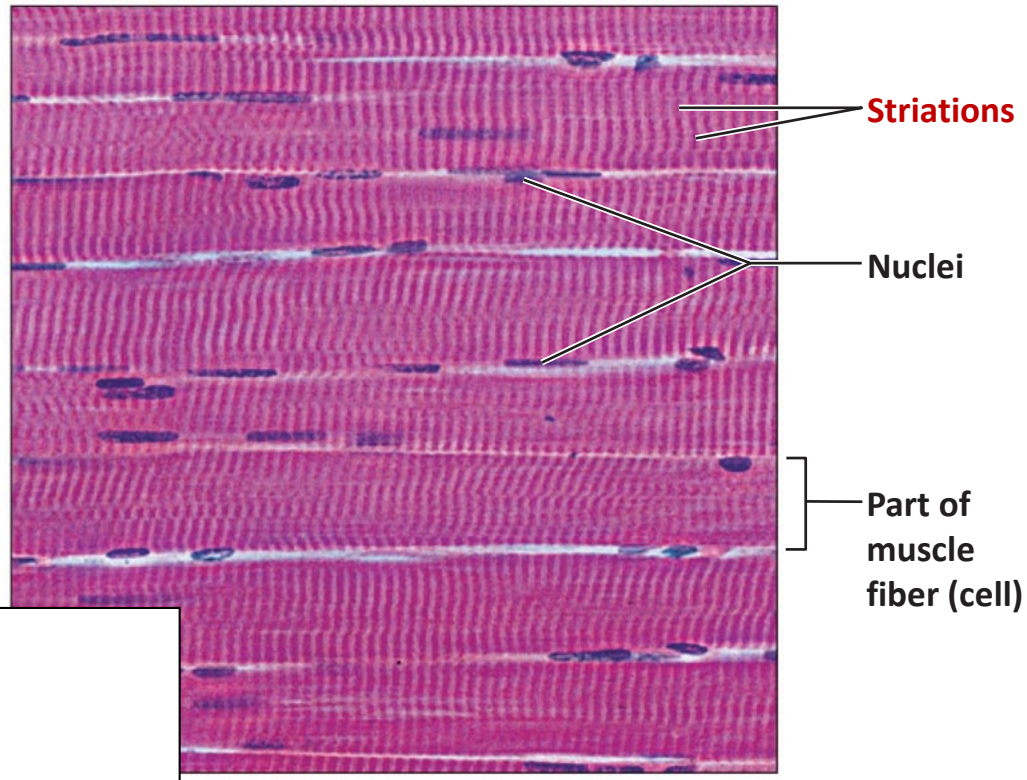
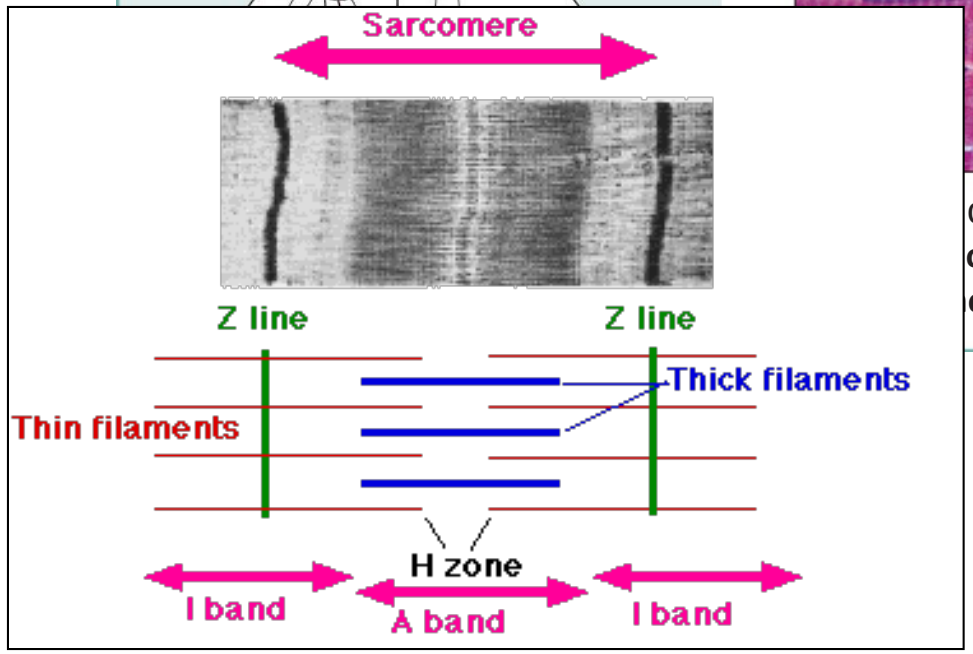


crograph: **Skeletal muscle (approx. 460x). obvious banding pattern and the ese large cells are multinucleate.**



Marieb

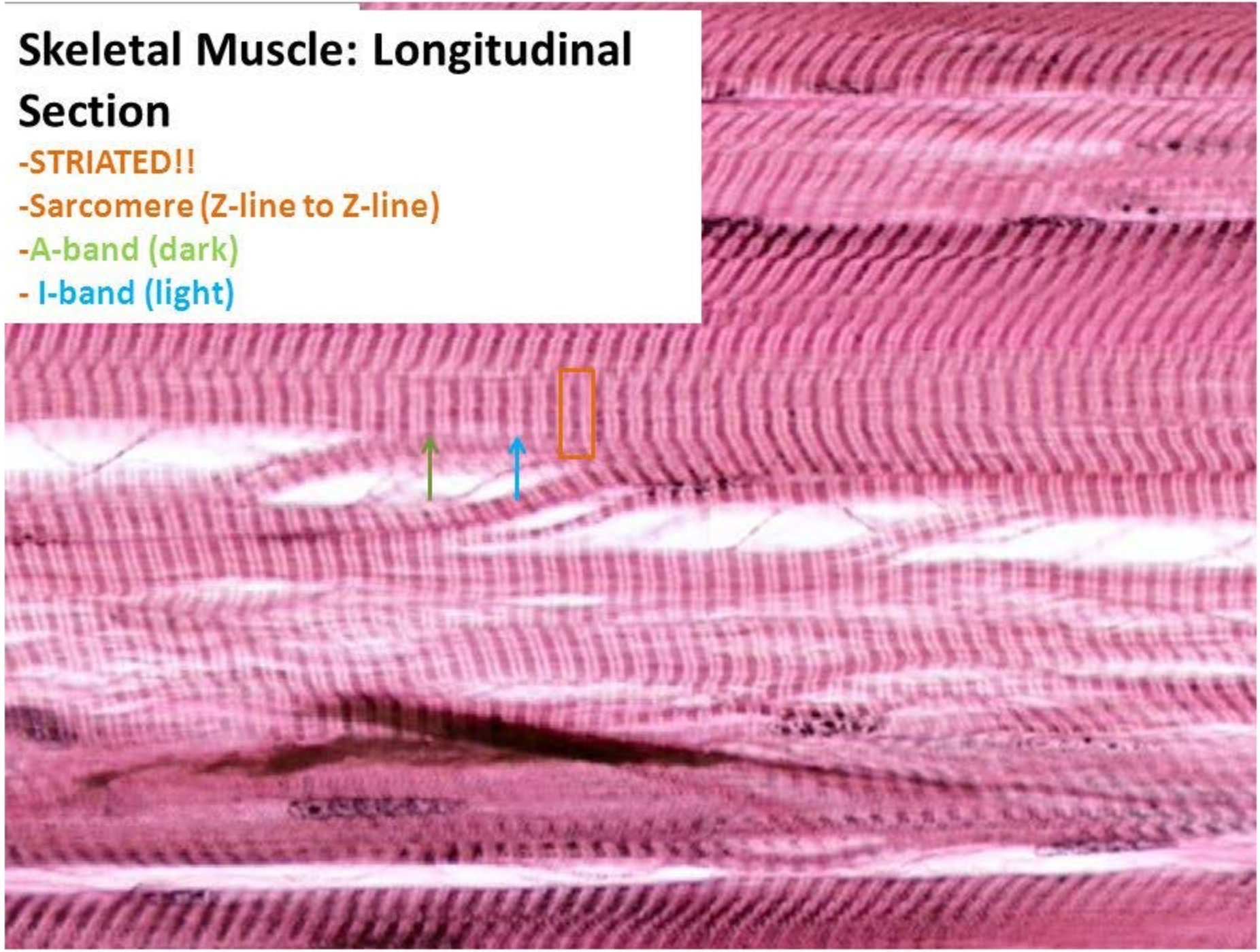
Skeletal Muscle: Longitudinal Section

-STRIATED!!

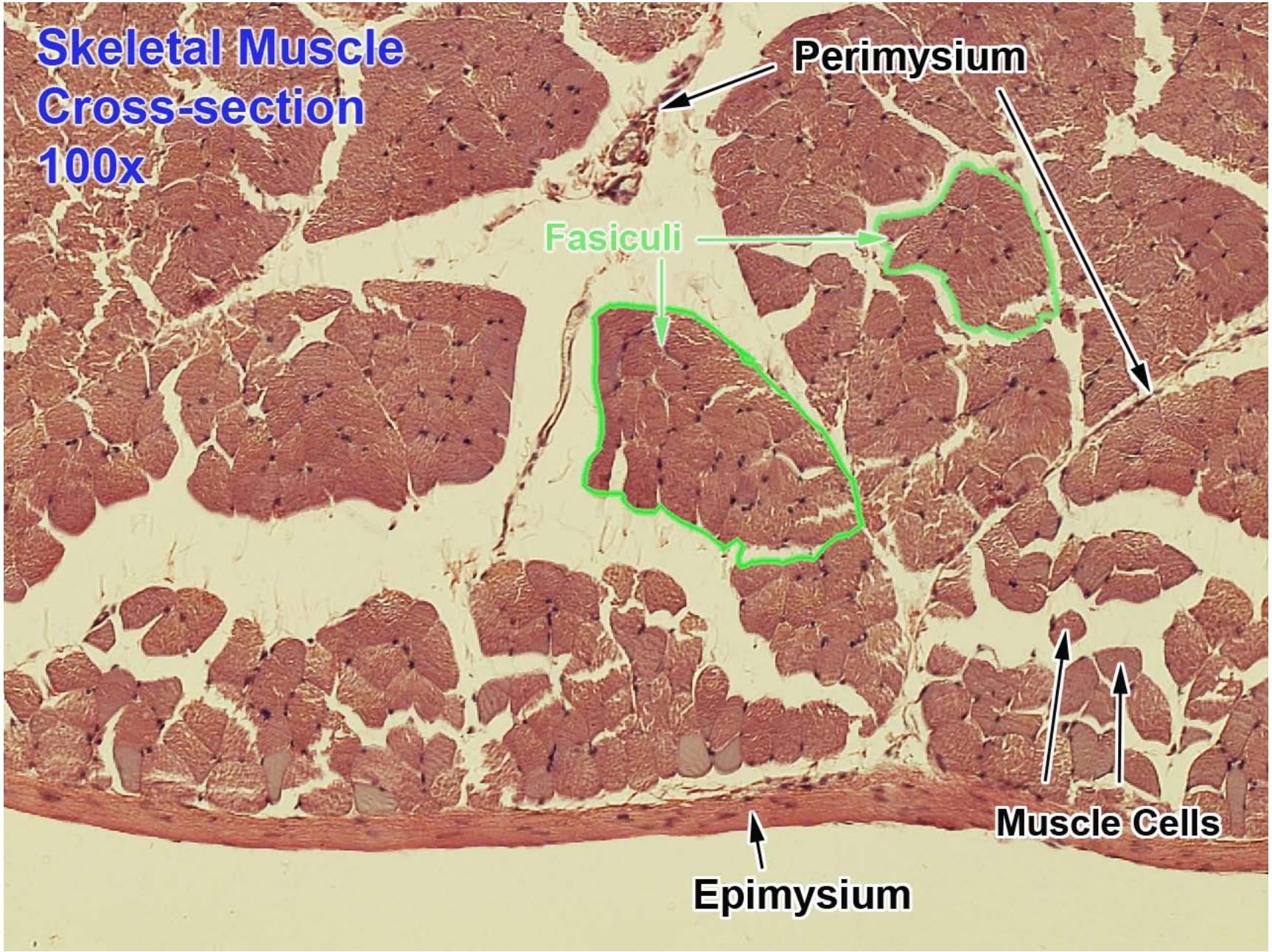
-Sarcomere (Z-line to Z-line)

-A-band (dark)

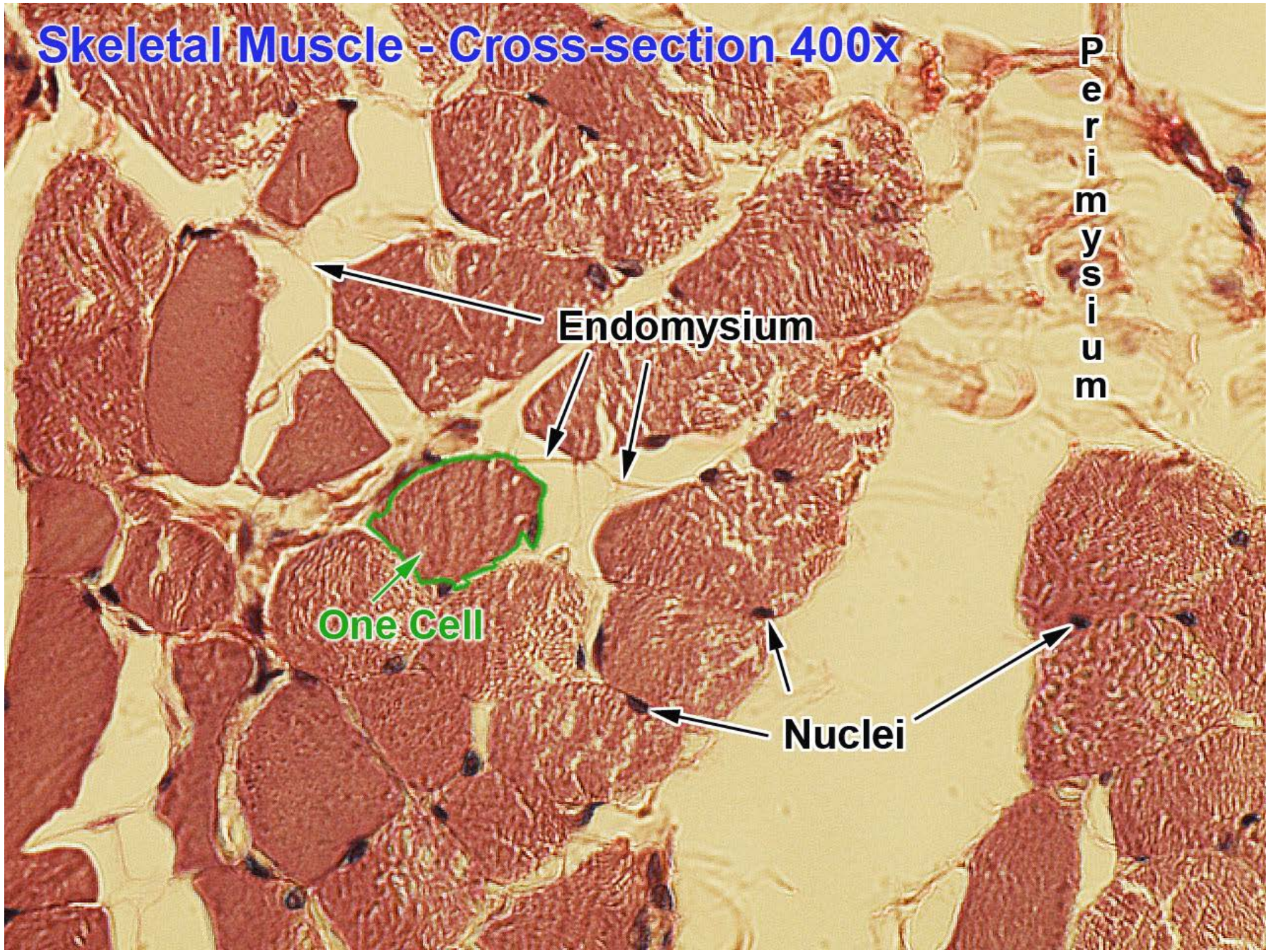
- I-band (light)



Olexik website

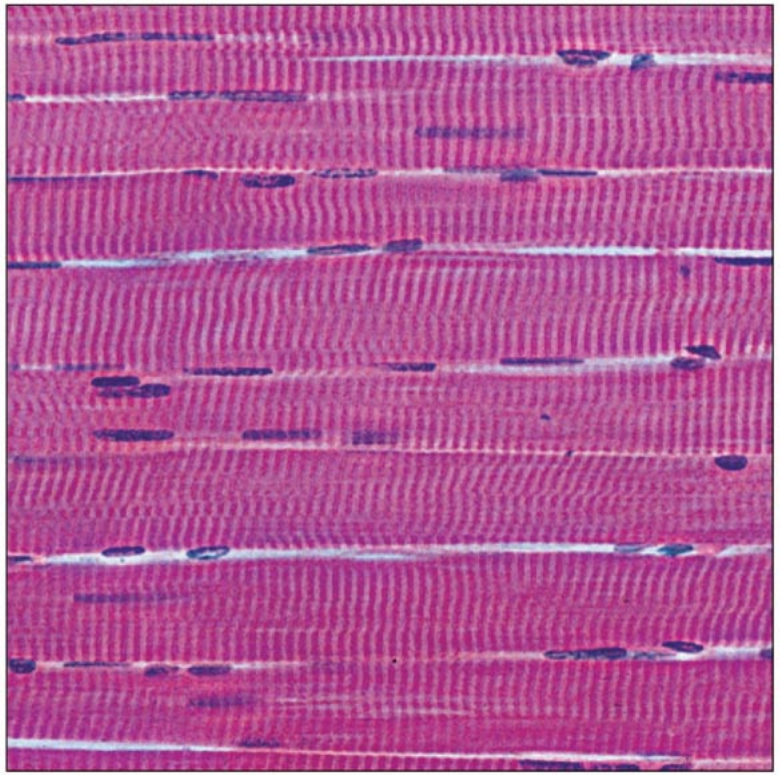


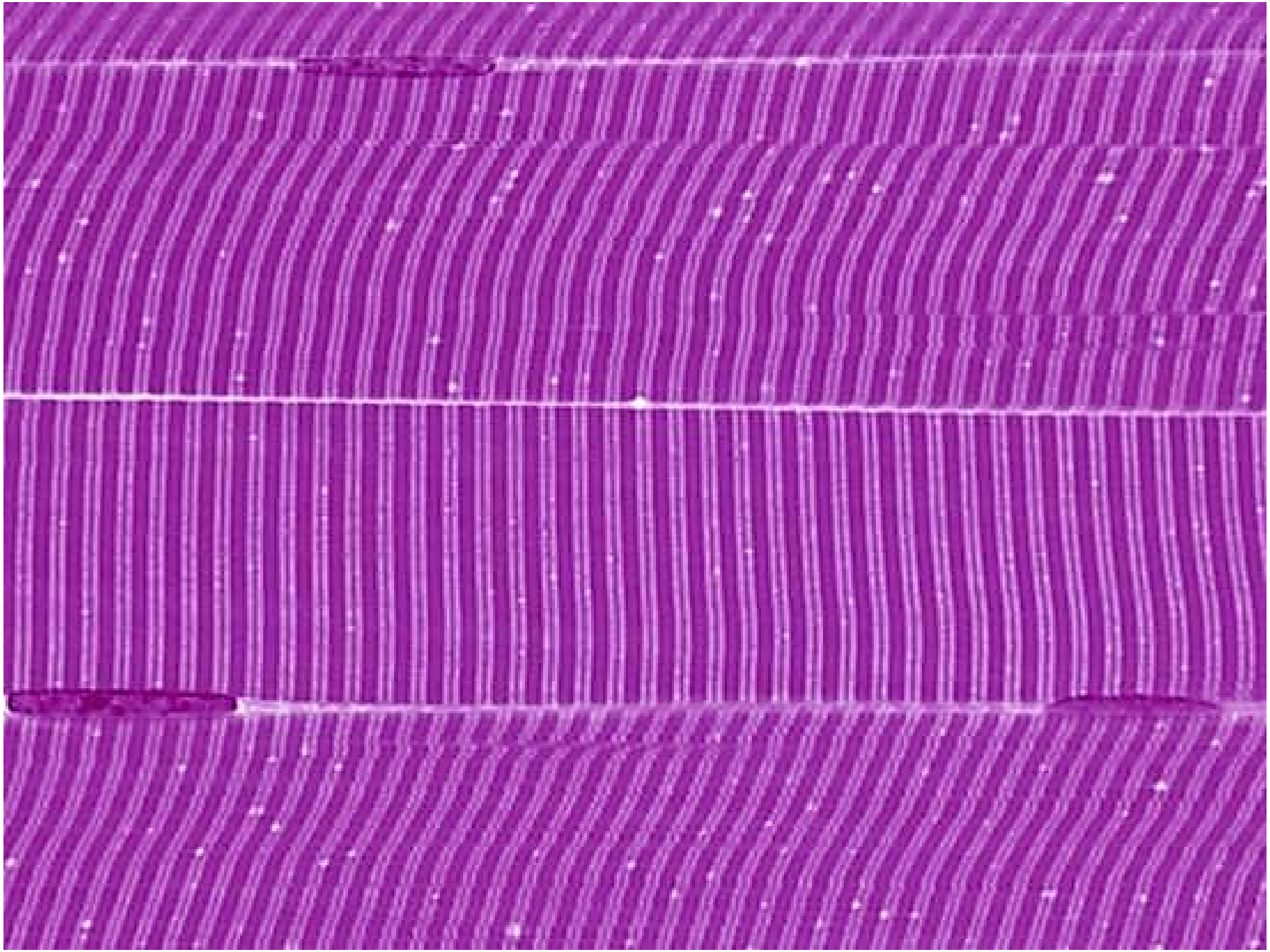
Olexik website

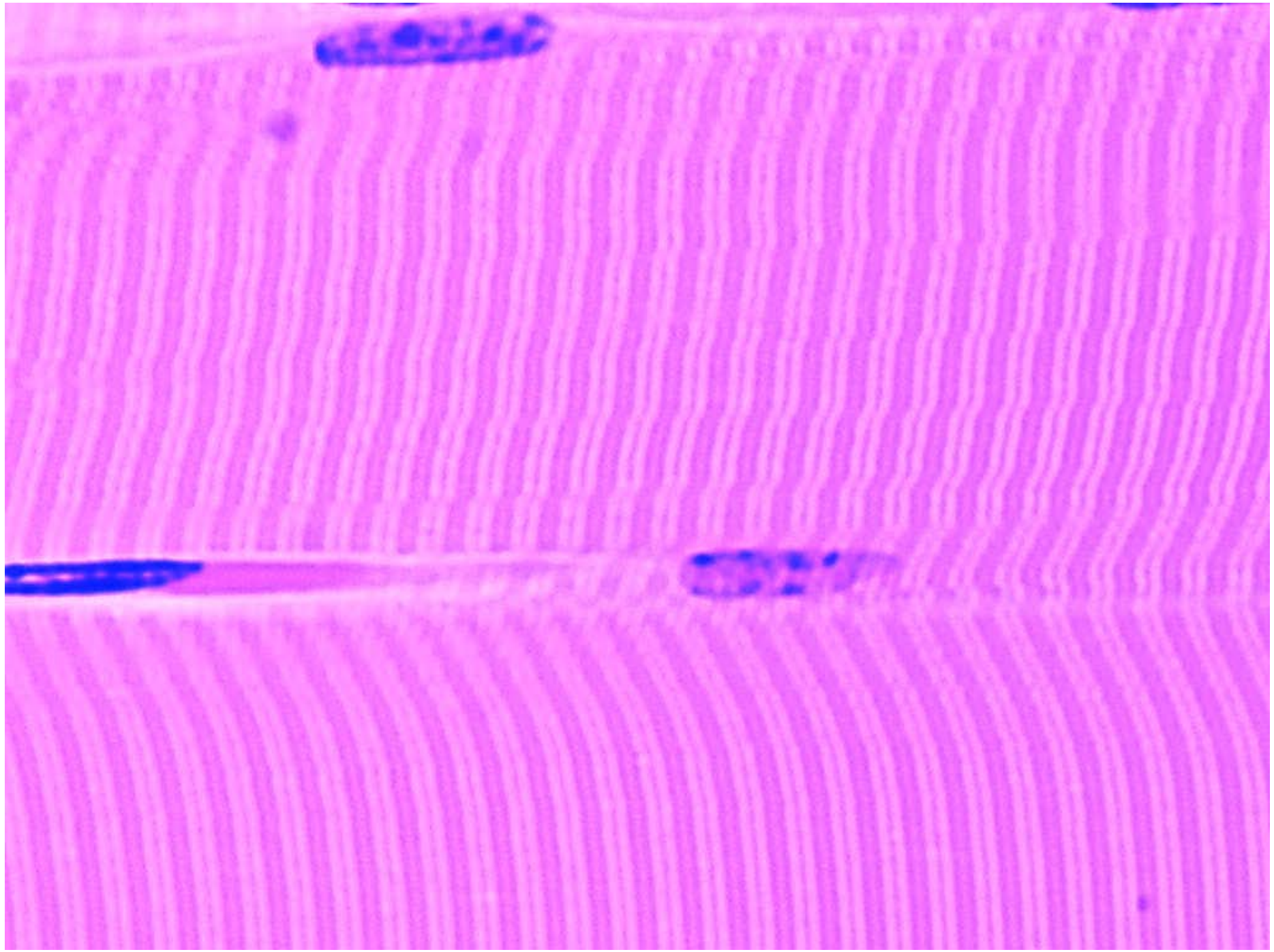


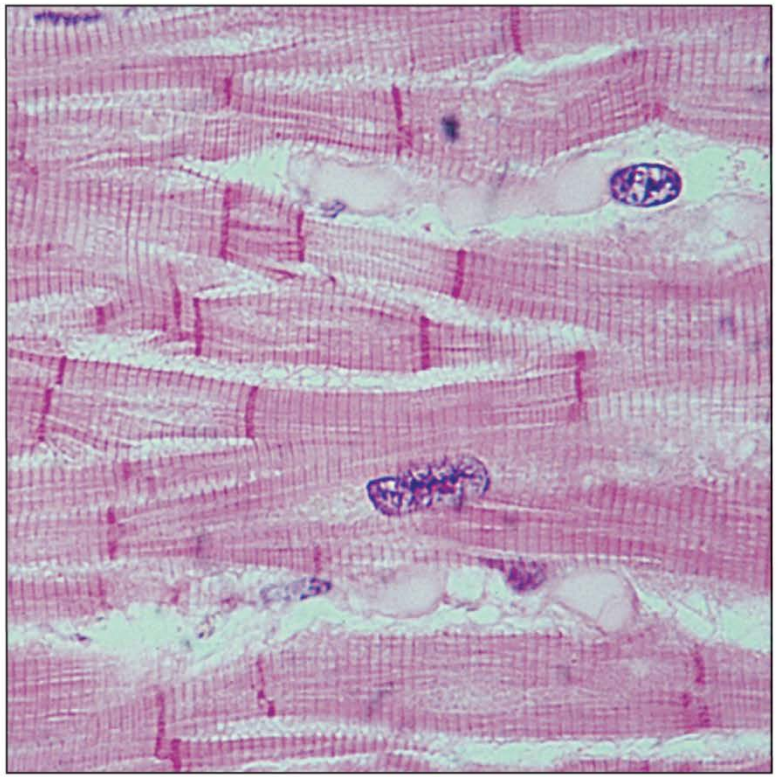
Use the following pictures to help you practice finding the terms from the lab term handout on unlabeled images.

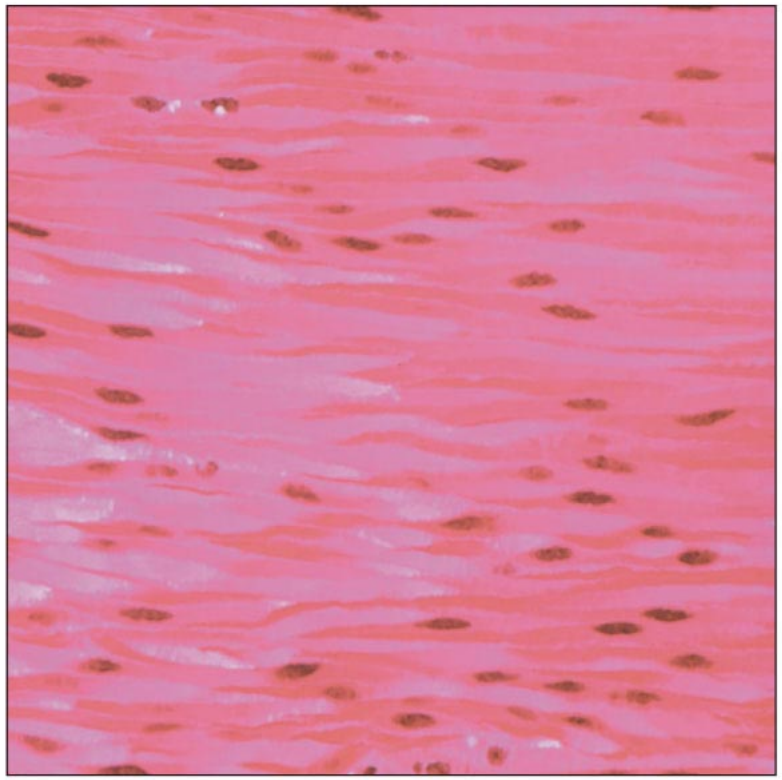
- Remember, you won't learn them if you don't take plenty of time to practice!
- Also, be sure to mix up the order once you get comfortable with the unlabeled slides.
- Over the weekend, once you are feeling confident with the pictures here, do the muscle histology quizzes in PAL (from the Pearson website) to get practice with new pictures that you haven't seen.

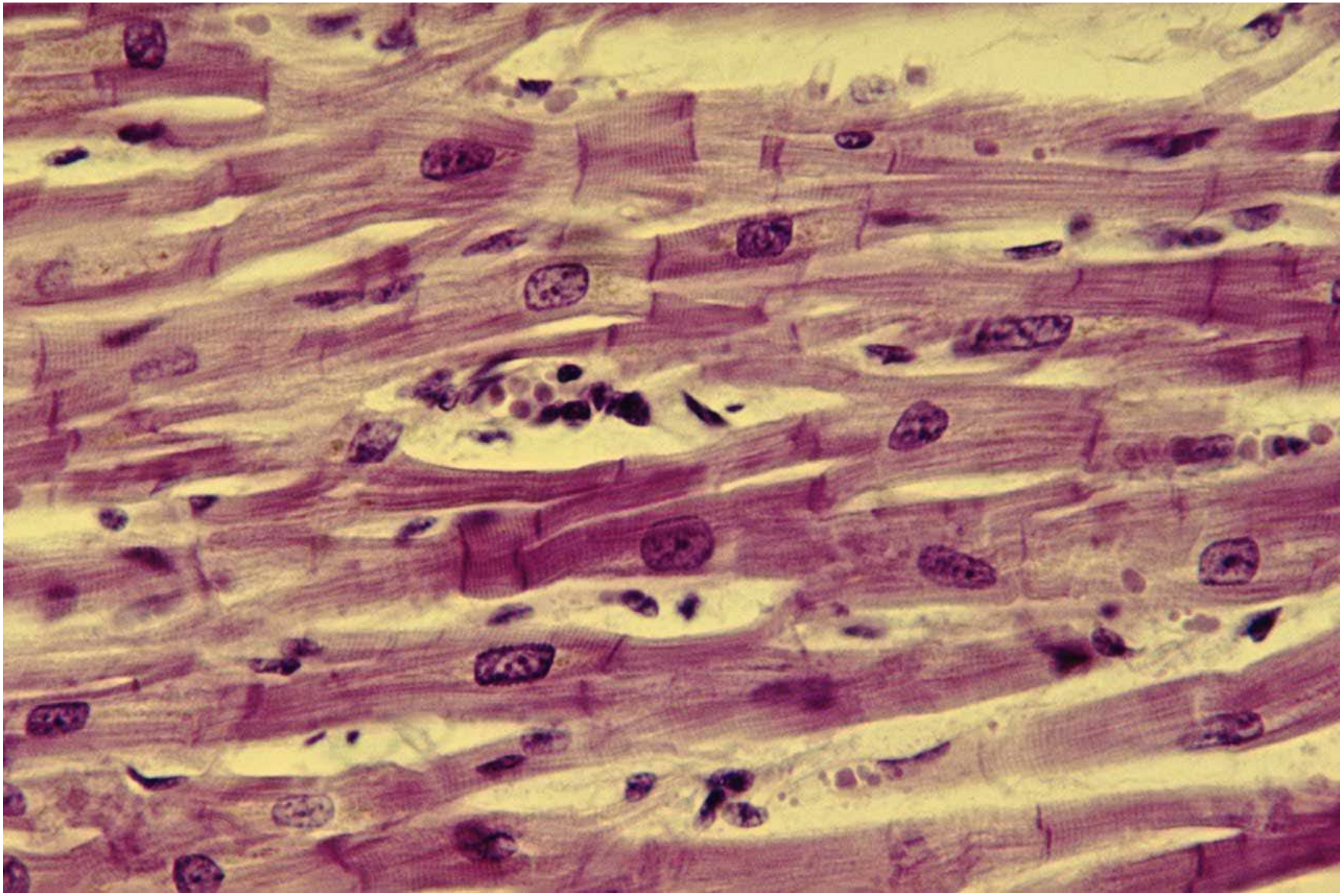


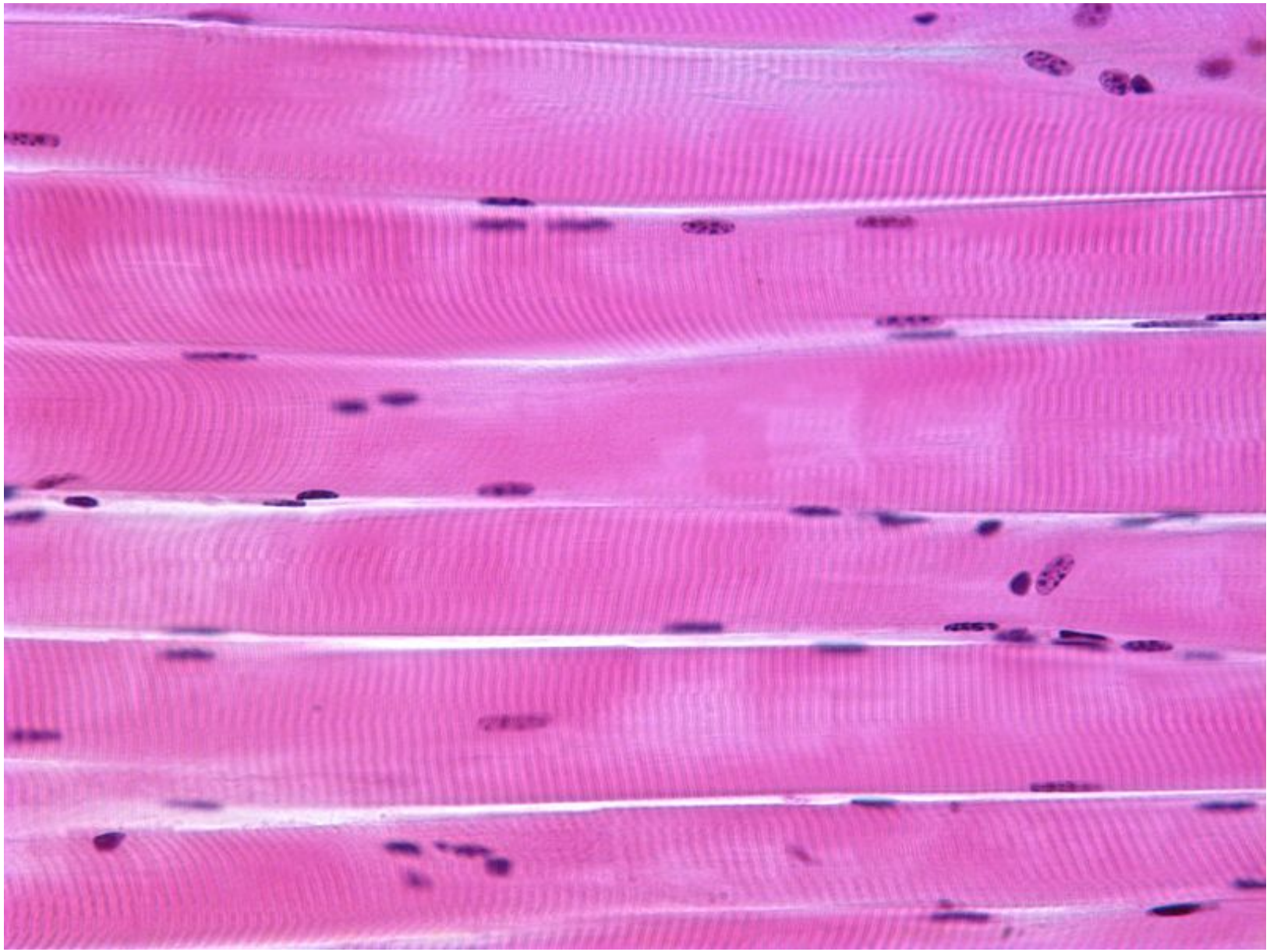


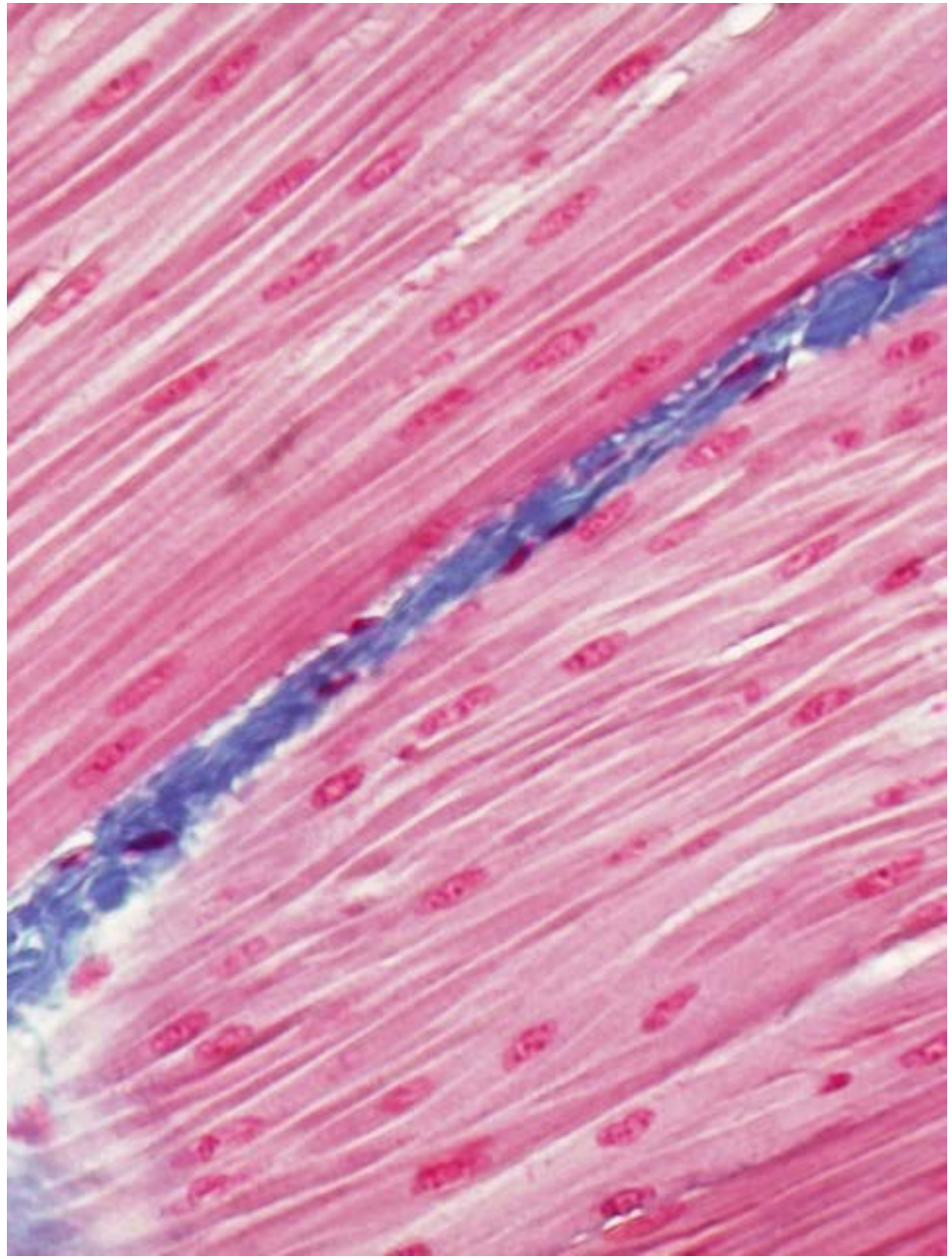


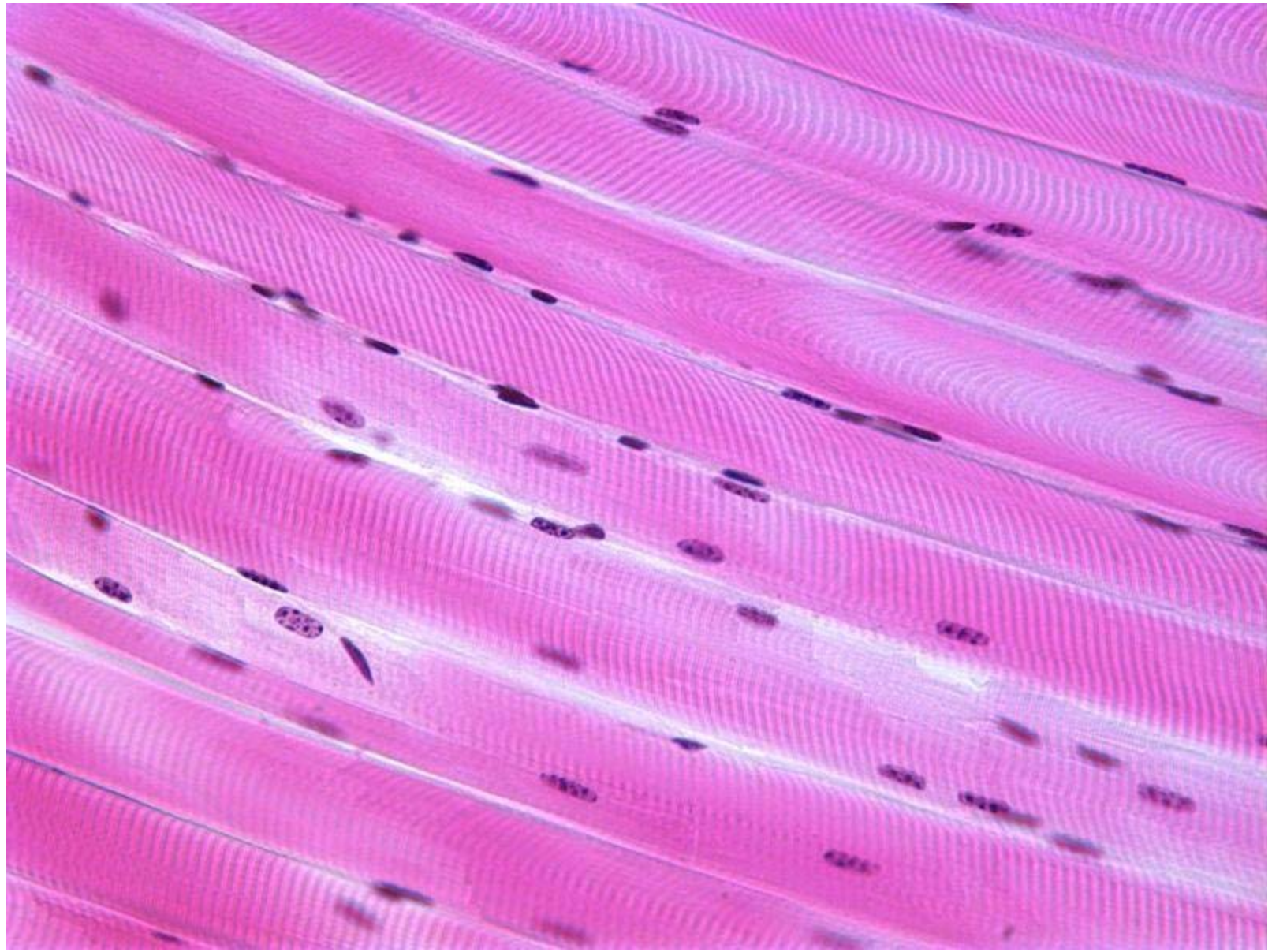


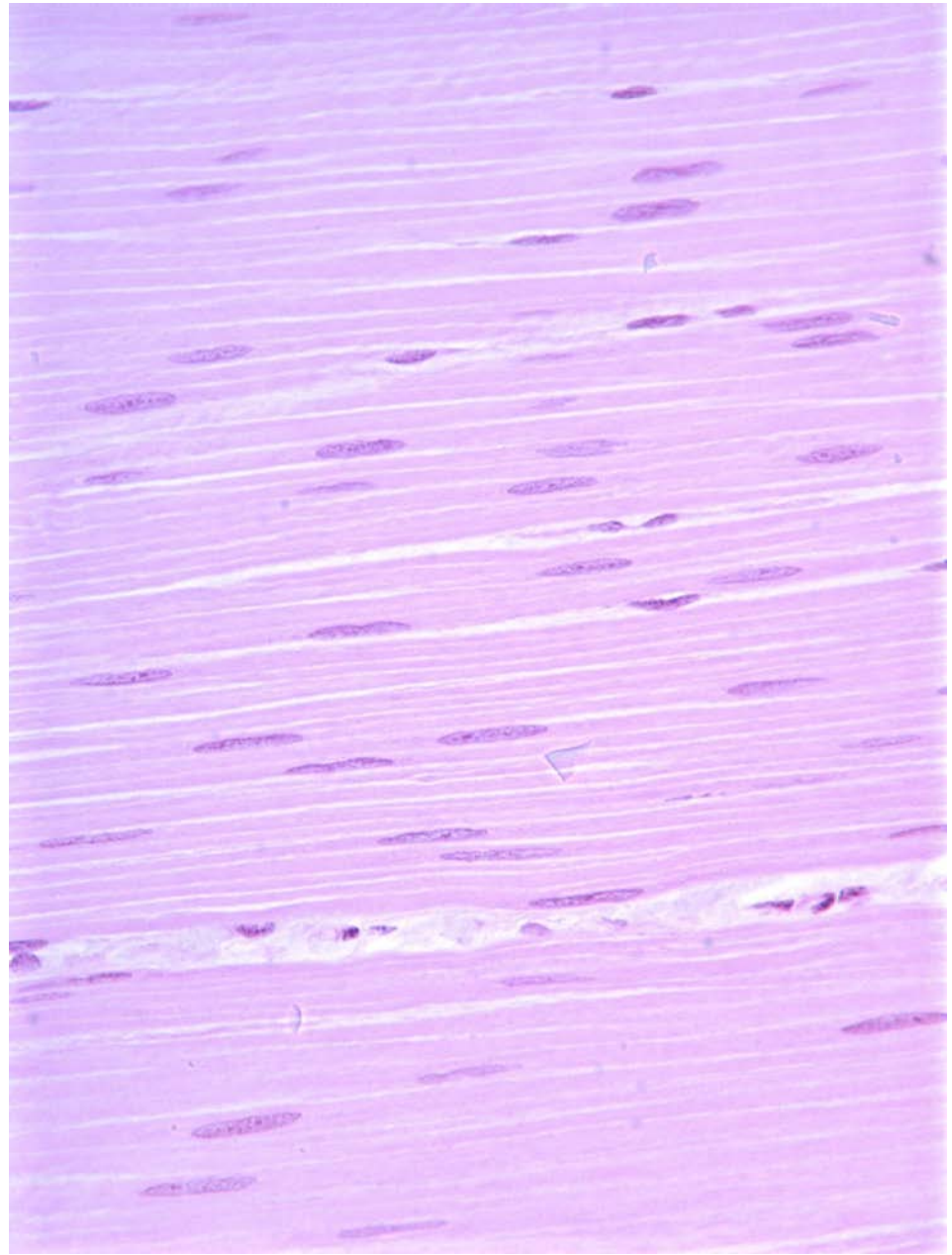


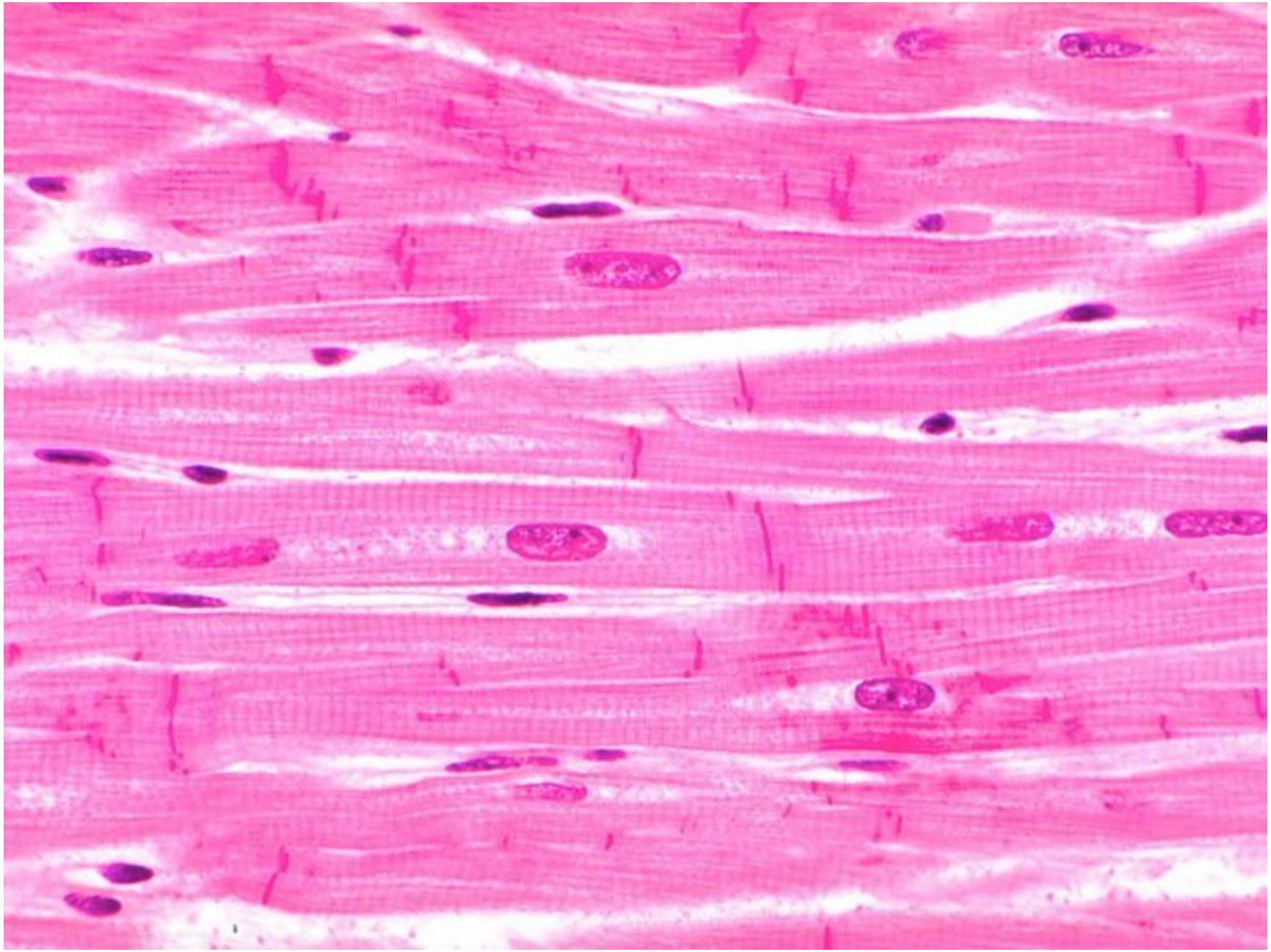




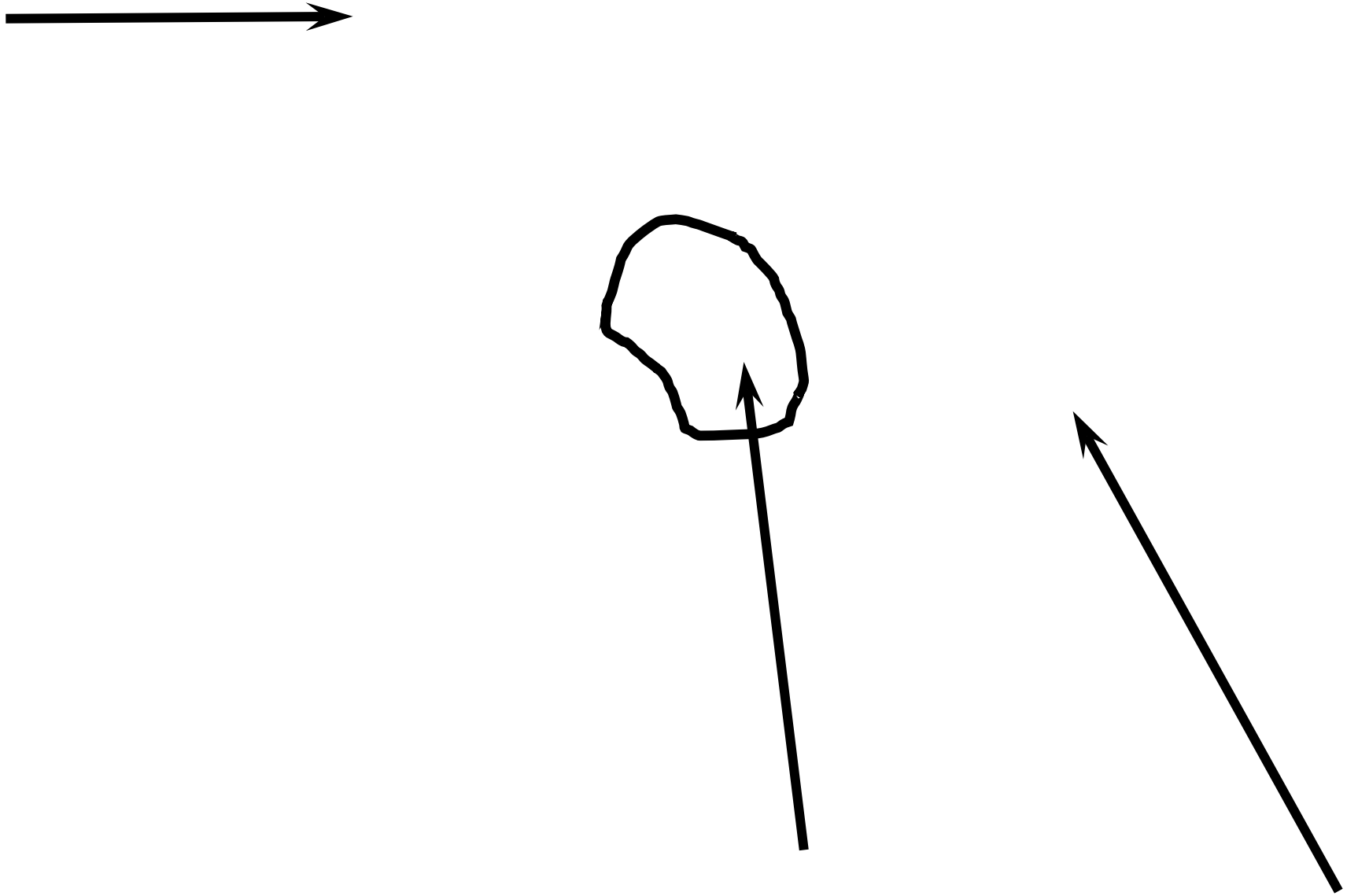








4X
Objective



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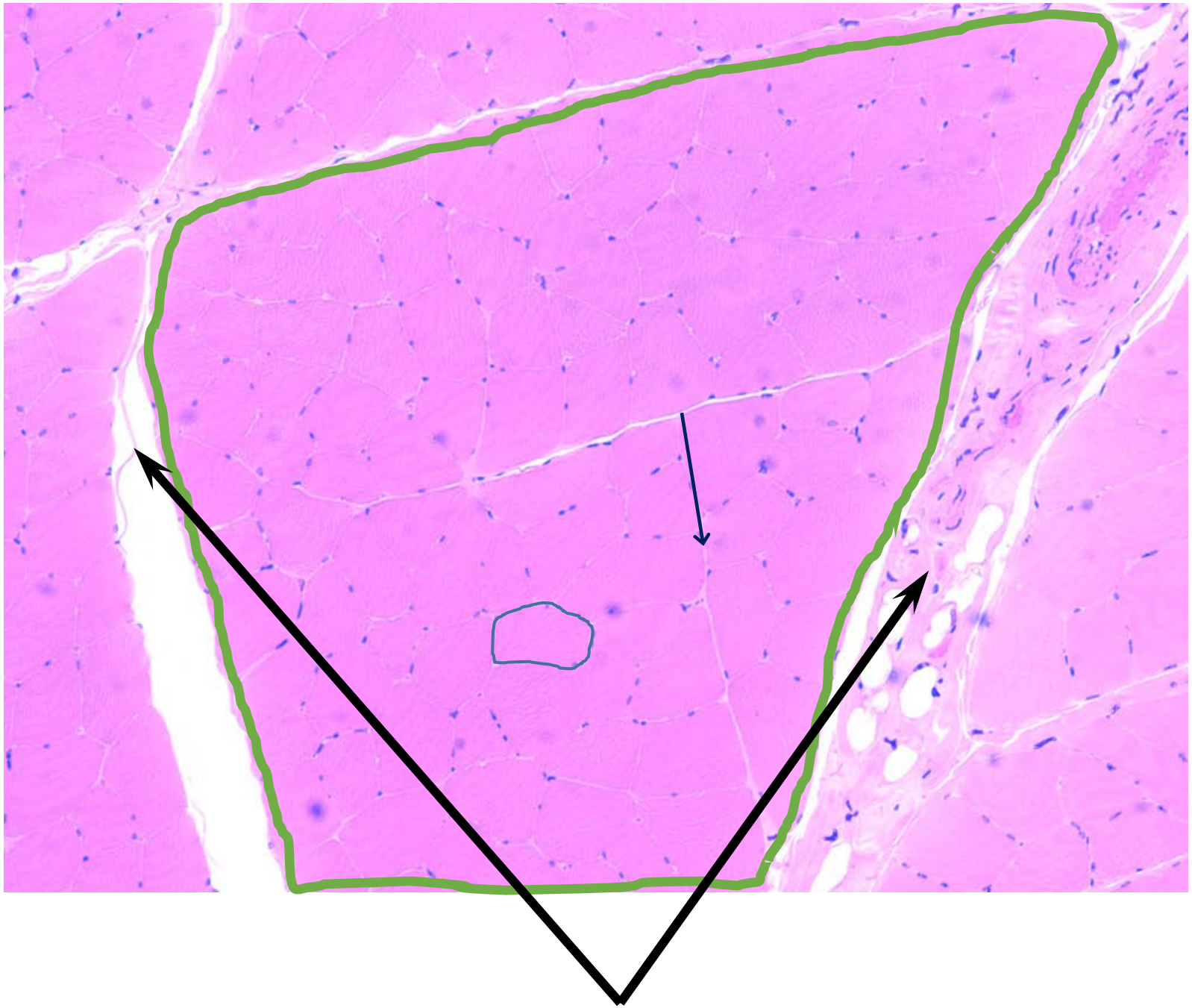
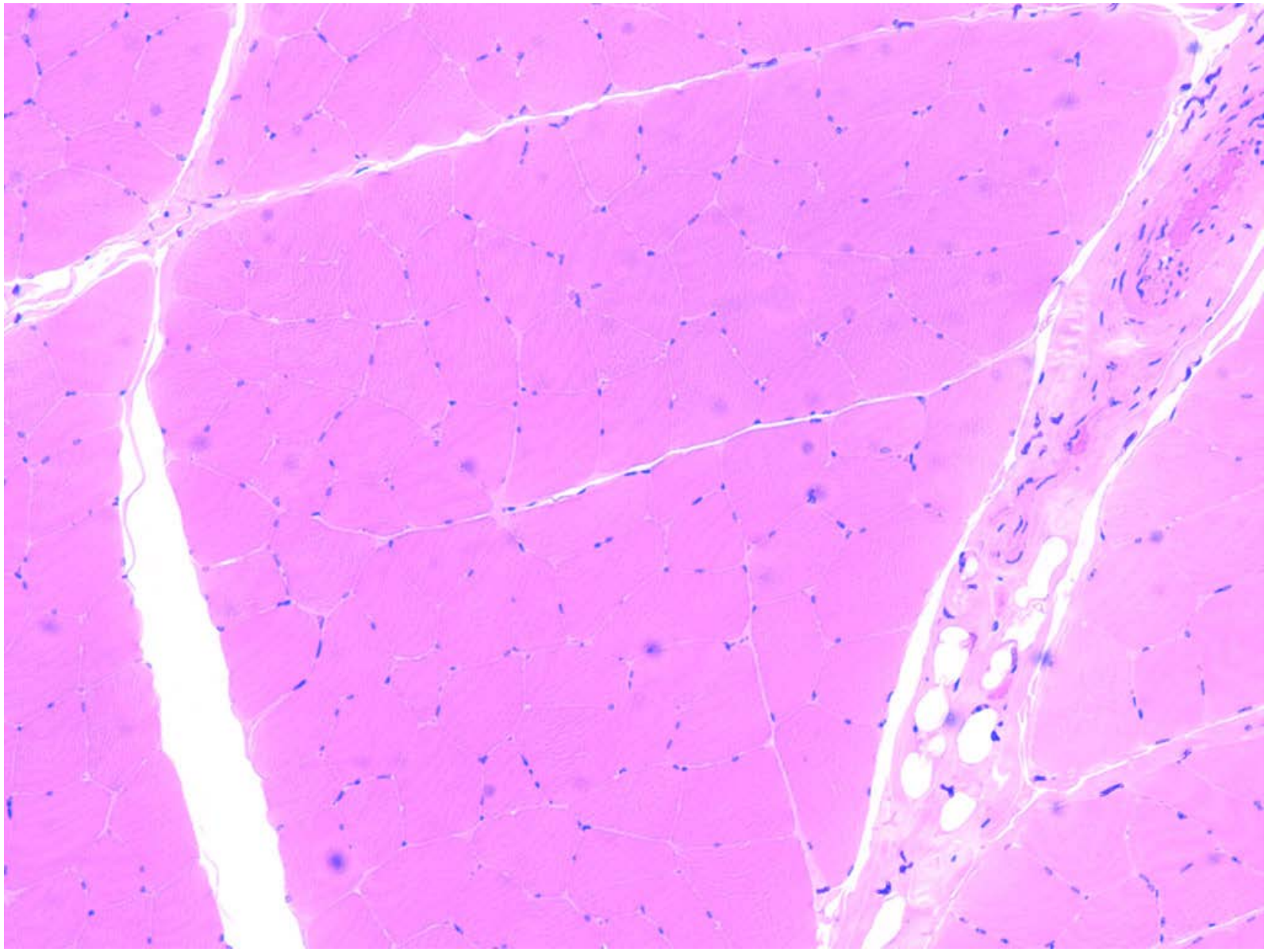
Objective



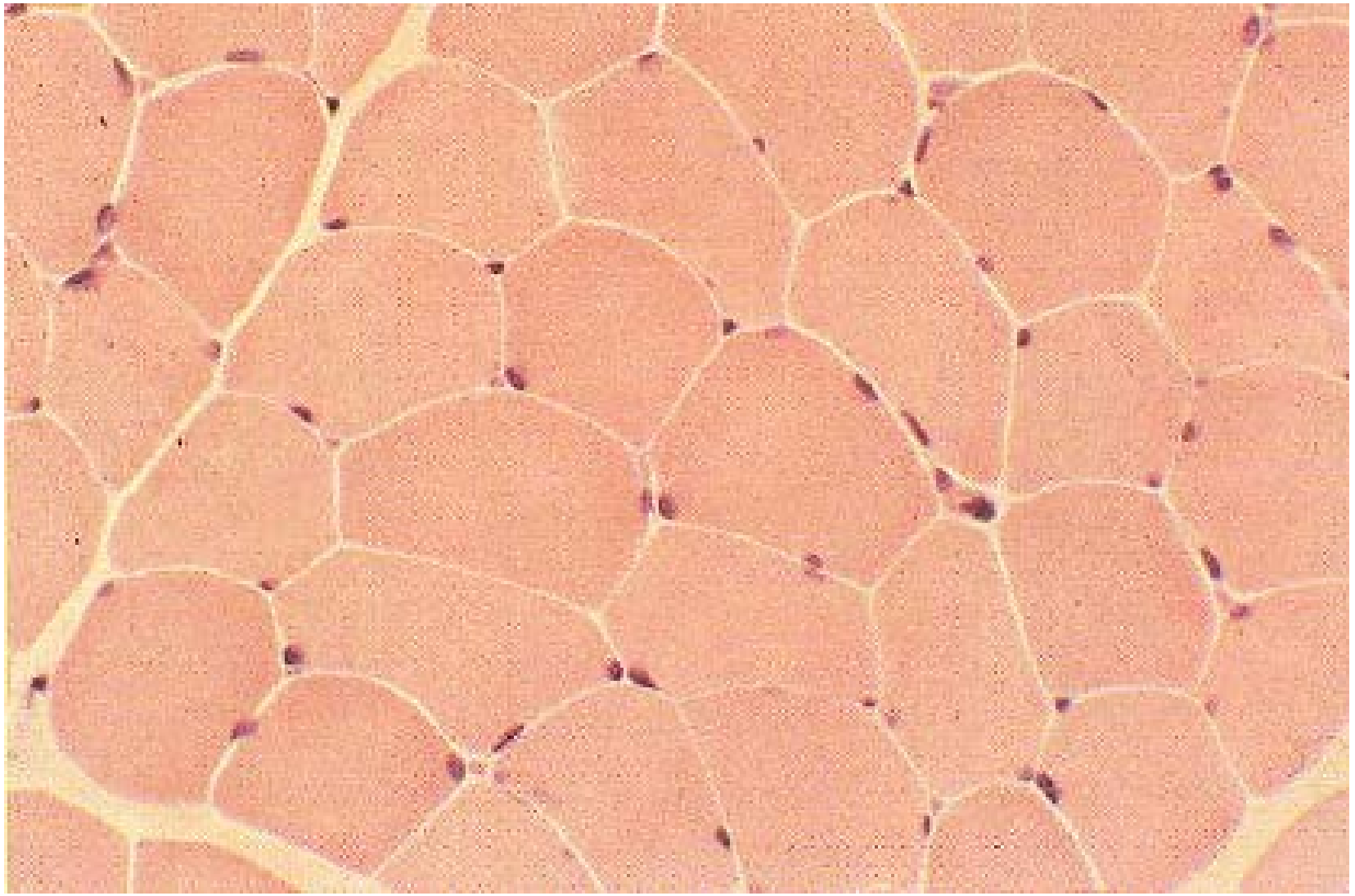
10X Objective



10X Objective

100X Objective

100X Objective



Use the following pictures to help you identify terms from the lab term handout.

Another good resource is the Visible Body ATLAS app: http://atlas.visiblebody.com

Don't forget that to use the link to download to a personal device, the device must first be connected to the MCPA Wi-Fi at the Rockville campus.

***There are a LOT of muscles…you DO NOT need to learn them all so only focus on the ones from the Unit 3 Terms handout!!

Before Studying the Muscles…

Take about 30 minutes to 1 hour to learn how they are named (in Chapter 10 of the Marieb text + a few slides here) so that you can break down the names and get hints about where to look for them or how to distinguish them from other muscles!

Ex: **Sternocleidomastoid** (Yikes that is a mouthful!)

- **Sterno-** is for the sternum, it has an end that attaches here.
- **-cleido-** is for the clavicle, it has an end that attaches here too.
- **-mastoid** is for the mastoid process on the inferior side of the temporal bone, its last attachment point.

The name tells you EXACTLY where to look for it, a muscle running diagonally up the side of the neck from the sternum/clavicle to the mastoid process!

One Other Place for AWESOME Information on Muscle Names!!

This instructor does a fantastic job of going through info. related to muscle names:

https://youtu.be/ESR9PADGo2U

10.2 Naming Skeletal Muscles

- **Muscle location**: bone or body region with which muscle associated
  - Example: **temporalis** (over temporal bone)
- **Muscle shape**: distinctive shapes
  - Example: **deltoid** muscle (*deltoid* = triangle), **orbicularis** muscles (orb = round)
- **Muscle size:**
  - Example: **maximus** (largest), **minimus** (smallest), **longus** (long)

10.2 Naming Skeletal Muscles

- **Direction of muscle fibers or fascicles:**
  - Example: **rectus** (fibers run straight), **transversus** (fibers run at right angles/side-to-side in transverse plane), and **oblique** (fibers run at diagonal angles to/from midline of the body)
- **Number of origins:**
  - Example: **biceps** (two origins) and **triceps** (three origins)

10.2 Naming Skeletal Muscles

- **Location of attachments**: named according to point of origin and insertion (origin named first)
  - Example: **sternocleidomastoid** attaches to sternum and clavicle, with insertion on mastoid process
- **Muscle action**: named for action they produce
  - Example: flexor or extensor, abductor or adductor
- Several criteria can be combined
  - Example: **extensor** (extends) **carpi** (wrist) **radialis** (radius) **longus** (length is long)

Muscles of the Head, Neck, and Trunk

Figure 10.4 Superficial muscles of the body: Anterior view.

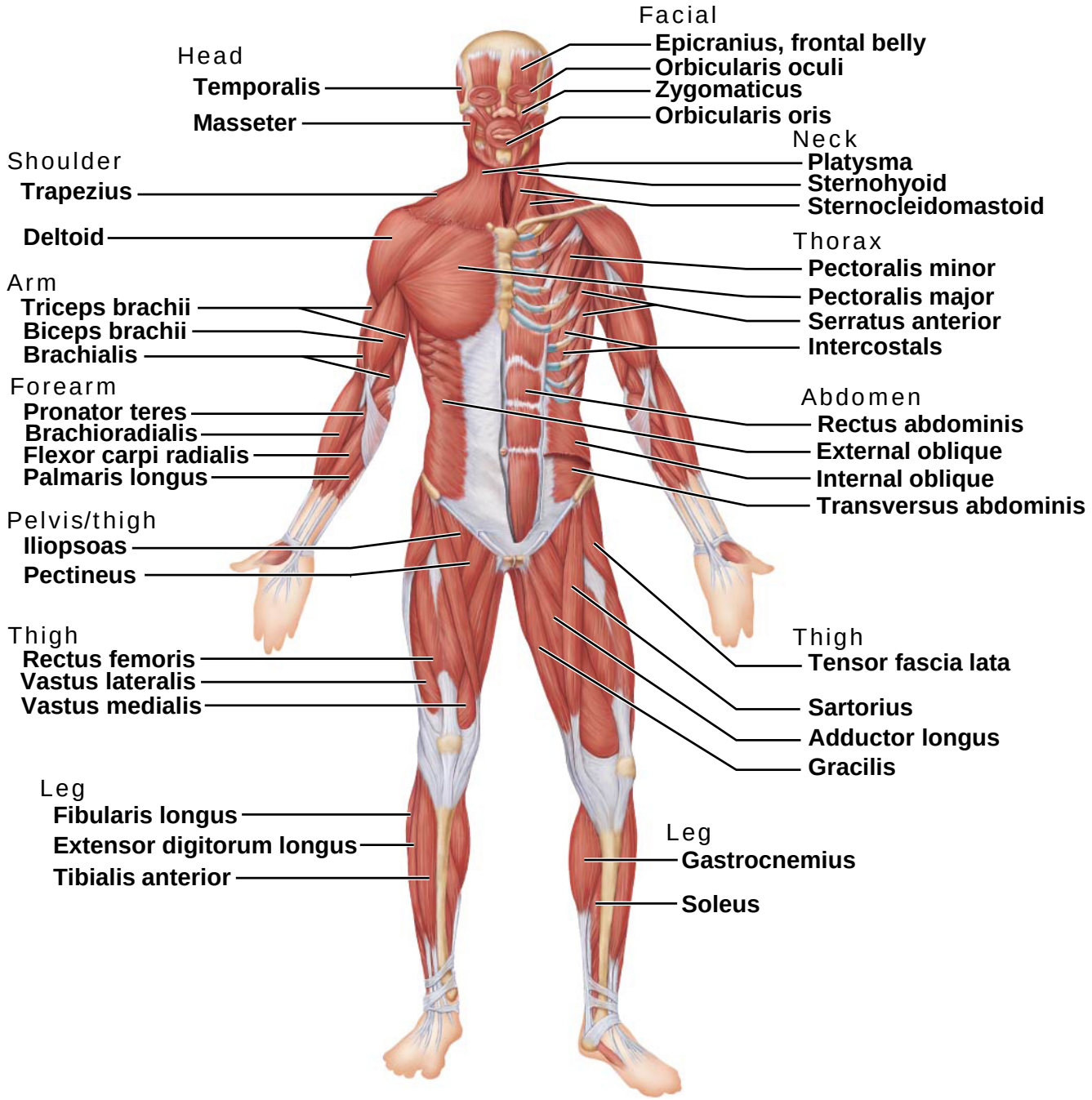


Figure 10.5 Superficial muscles of the body: Posterior view.

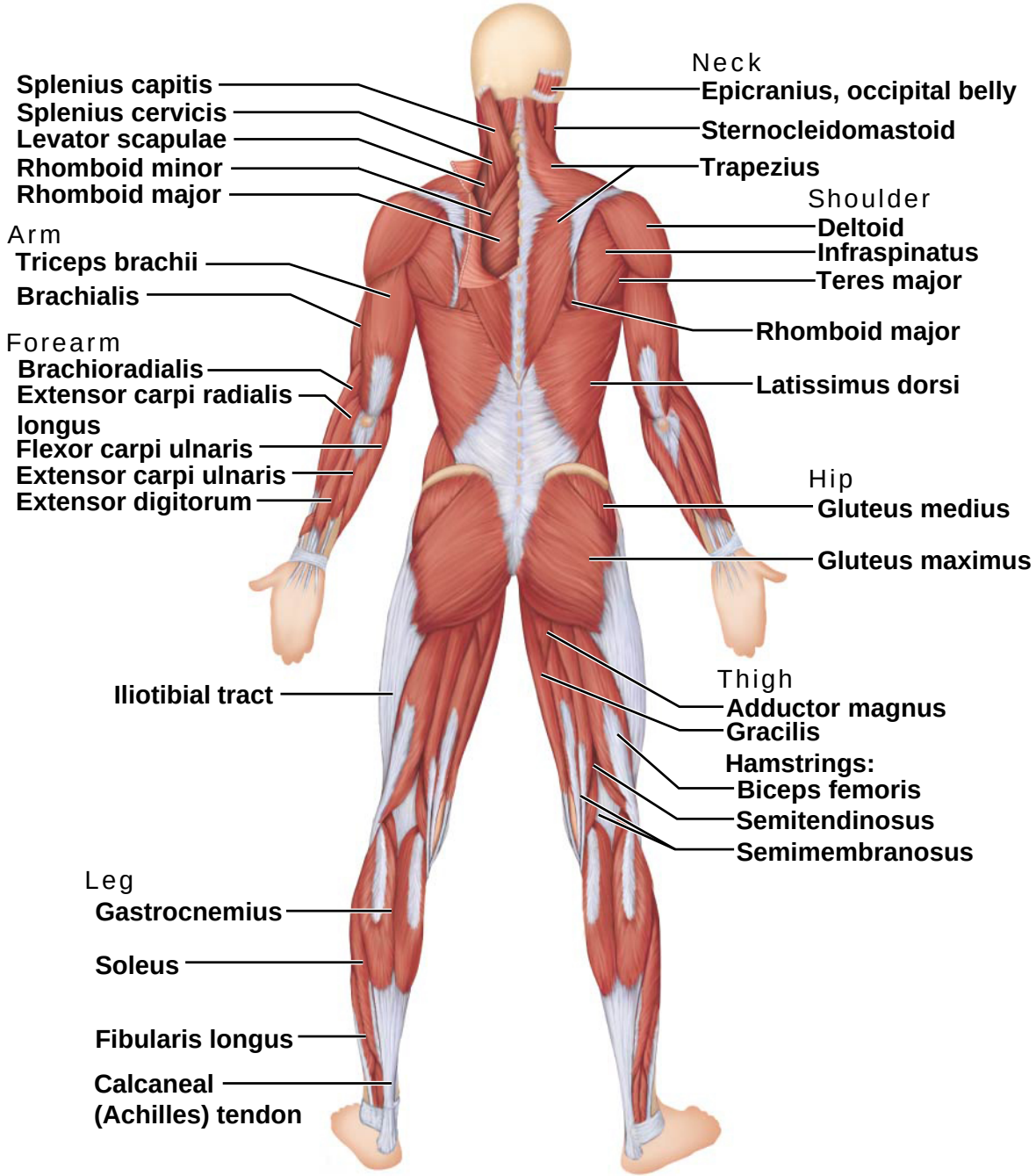


Table 10.1 Muscles of the Head, Part I: Facial Expression (Figures 10.6 and 10.7) *(continued)*

MUSCLE	DESCRIPTION	ORIGIN (O) AND INSERTION (I)	ACTION	NERVE SUPPLY
MUSCLES OF THE FACE				
Corrugator supercilii (kor′ah-ga-ter soo″per-sĭ″le-i) (*corrugo* = wrinkle; *supercilium* = eyebrow)	Small muscle; activity associated with that of orbicularis oculi	O—arch of frontal bone above nasal bone I—skin of eyebrow	Draws eyebrows medially and inferiorly; wrinkles skin of forehead vertically (as in frowning)	Facial nerve
Orbicularis oculi (or-bik′u-lar-is ok′u-li) (*orb* = circular; *ocul* = eye)	Thin, flat sphincter muscle of eyelid; surrounds rim of the orbit	O—frontal and maxillary bones and ligaments around orbit I—tissue of eyelid	Closes eye; produces blinking and squinting; draws eyebrows inferiorly	Facial nerve (cranial VII)
Zygomaticus—major and minor (zi-go-mat′ĭ-kus) (*zygomatic* = cheekbone)	Muscle pair extending diagonally from cheekbone to corner of mouth	O—zygomatic bone I—skin and muscle at corner of mouth	Raises lateral corners of mouth (smiling muscle)	Facial nerve
Risorius (ri-zor′e-us) (*risor* = laughter)	Slender muscle inferior and lateral to zygomaticus	O—lateral fascia associated with masseter muscle I—skin at angle of mouth	Draws corner of lip laterally; tenses lips; synergist of zygomaticus	Facial nerve

Table 10.1 Muscles of the Head, Part I: Facial Expression (Figures 10.6 and 10.7) *(continued)*

MUSCLE	DESCRIPTION	ORIGIN (O) AND INSERTION (I)	ACTION	NERVE SUPPLY
MUSCLES OF THE FACE, CONT.				
Levator labii superioris (lĕ-va′tor la′be-i soo-per″e-or′is) (*leva* = raise; *labi* = lip; *superior* = above, over)	Thin muscle between orbicularis oris and inferior eye margin	O—zygomatic bone and infraorbital margin of maxilla I—skin and muscle of upper lip	Opens lips; raises and furrows upper lip	Facial nerve
Depressor labii inferioris (de-pres′or la′be-i in-fer″e-or′is) (*depressor* = depresses; *infer* = below)	Small muscle running from mandible to lower lip	O—body of mandible lateral to its midline I—skin and muscle of lower lip	Draws lower lip inferiorly (as in a pout)	Facial nerve
Depressor anguli oris (ang′gu-li or-is) (*angul* = angle, corner; *or* = mouth)	Small muscle lateral to depressor labii inferioris	O—body of mandible below incisors I—skin and muscle at angle of mouth below insertion of zygomaticus	Draws corners of mouth down and laterally (a grimace); zygomaticus antagonist	Facial nerve
Orbicularis oris	Complicated, multilayered muscle of the lips with fibers that run in many different directions; most run circularly	O—arises indirectly from maxilla and mandible; fibers blend with fibers of other facial muscles associated with the lips I—encircles mouth; inserts into muscle and skin at angles of mouth	Closes lips; purses and protrudes lips; kissing and whistling	Facial nerve

Table 10.1-4 Muscles of the Head, Part I: Facial Expression *(continued)*

Table 10.1 Muscles of the Head, Part I: Facial Expression (Figures 10.6 and 10.7) *(continued)*

MUSCLE	DESCRIPTION	ORIGIN (O) AND INSERTION (I)	ACTION	NERVE SUPPLY
MUSCLES OF THE FACE, CONT.				
Mentalis (men-ta′lis) (*ment* = chin)	One of the muscle pair forming a V-shaped muscle mass on chin	O—mandible below incisors I—skin of chin	Wrinkles chin; protrudes lower lip (as in a pout)	Facial nerve
Buccinator (buk′sĭ-na″tor) (*bucc* = cheek or "trumpeter")	Thin, horizontal cheek muscle; principal muscle of cheek; deep to masseter (see also Figure 10.8)	O—molar region of maxilla and mandible I—orbicularis oris	Compresses cheek (as in whistling and sucking); holds food between teeth during chewing; draws corner of mouth laterally; well developed in nursing infants	Facial nerve
Platysma (plah-tiz′mah) (*platy* = broad, flat)	Unpaired, thin, sheetlike superficial neck muscle; not strictly a head muscle, but plays a role in facial expression	O—fascia of chest (over pectoral muscles and deltoid) I—lower margin of mandible, and skin and muscle at corner of mouth	Tenses skin of neck (as during shaving); helps depress mandible; pulls lower lip back and down, producing downward sag of mouth	Facial nerve

Figure 10.6b Lateral view of muscles of the scalp, face, and neck.

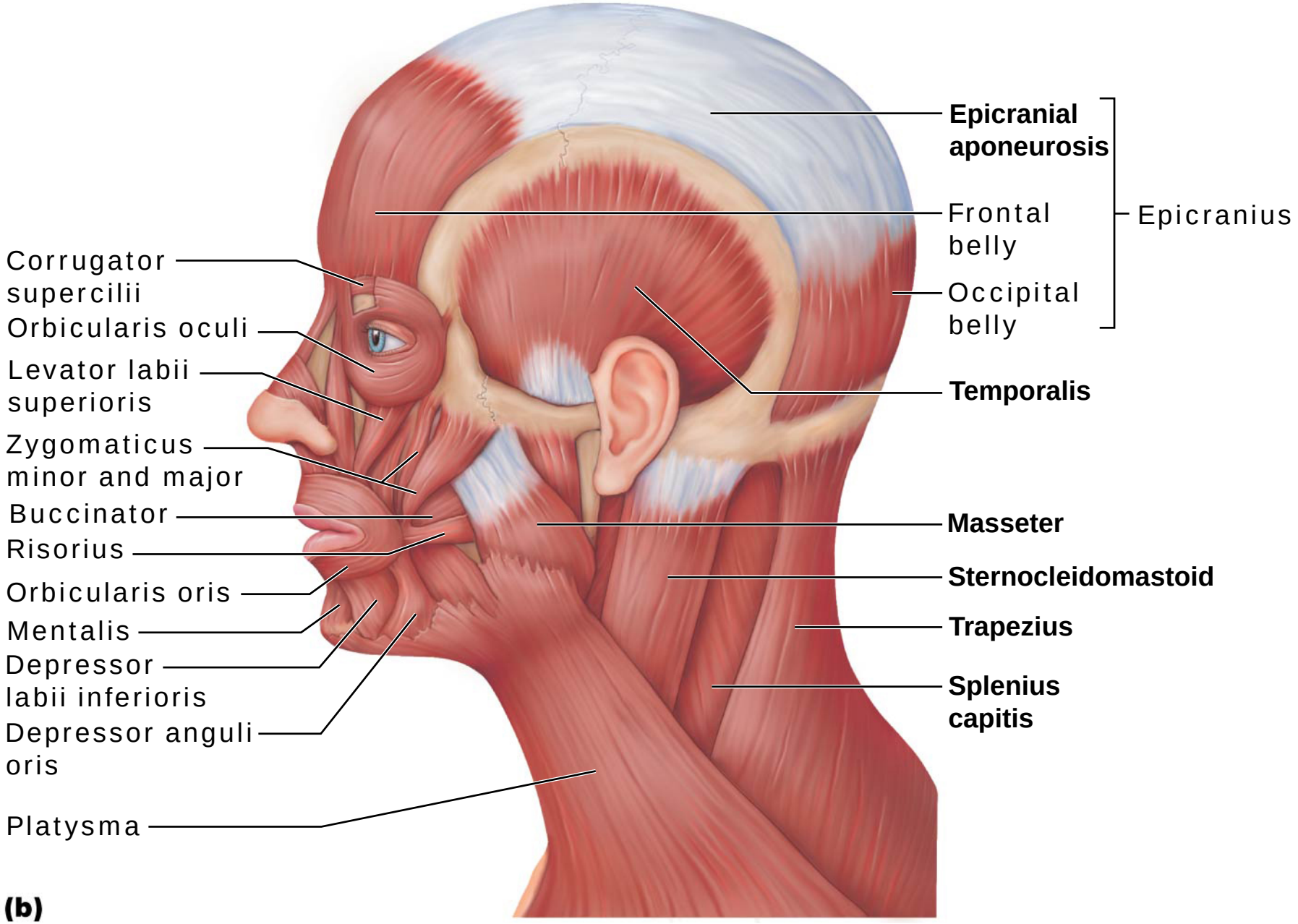


Table 10.2-1 Muscles of the Head, Part II: Mastication and Tongue Movement

Table 10.2 Muscles of the Head, Part II: Mastication and Tongue Movement (Figure 10.8)

MUSCLE	DESCRIPTION	ORIGIN (O) AND INSERTION (I)	ACTION	NERVE SUPPLY
MUSCLES OF MASTICATION				
Masseter (mah-se′ter) (*maseter* = chewer)	Powerful muscle that covers lateral aspect of mandibular ramus	O—zygomatic arch and zygomatic bone I—angle and ramus of mandible	Prime mover of jaw closure; elevates mandible	Trigeminal nerve (cranial V)
Temporalis (tem″por-ă′lis) (*tempora* = time; pertaining to the temporal bone)	Fan-shaped muscle that covers parts of the temporal, frontal, and parietal bones	O—temporal fossa I—coronoid process of mandible via a tendon that passes deep to zygomatic arch	Closes jaw; elevates and retracts mandible; maintains position of the mandible at rest; deep anterior part may help protract mandible	Trigeminal nerve
Medial pterygoid (me′de-ul ter′ĭ-goid) (*medial* = toward median plane; *pterygoid* = winglike)	Deep two-headed muscle that runs along internal surface of mandible and is largely concealed by that bone	O—medial surface of lateral pterygoid plate of sphenoid bone, maxilla, and palatine bone I—medial surface of mandible near its angle	Acts with the lateral pterygoid muscle to protract (pull anteriorly) the mandible and promote side-to-side (grinding) movements; synergist of temporalis and masseter muscles in elevation of the mandible	Trigeminal nerve
Lateral pterygoid (*lateral* = away from median plane)	Deep two-headed muscle; lies superior to medial pterygoid muscle	O—greater wing and lateral pterygoid plate of sphenoid bone I—condylar process of mandible and capsule of temporomandibular joint	Provides forward sliding and side-to-side grinding movements of the lower teeth; protracts mandible	Trigeminal nerve
Buccinator	See Table 10.1	See Table 10.1	Compresses the cheek; keeps food between grinding surfaces of teeth during chewing	Facial nerve (cranial VII)

Figure 10.8 Muscles promoting mastication and tongue movements.

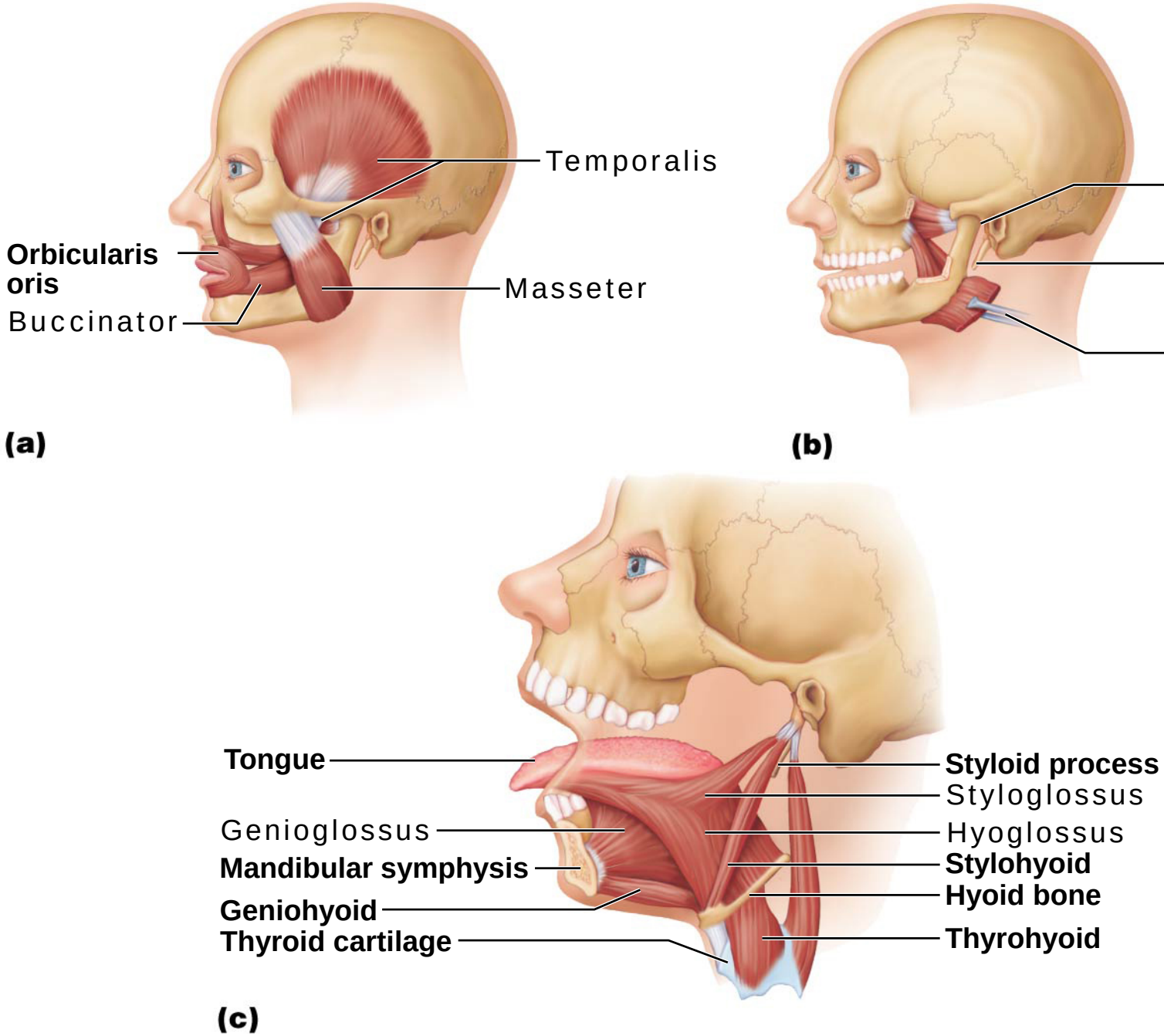


Figure 10.8a Muscles promoting mastication and tongue movements.

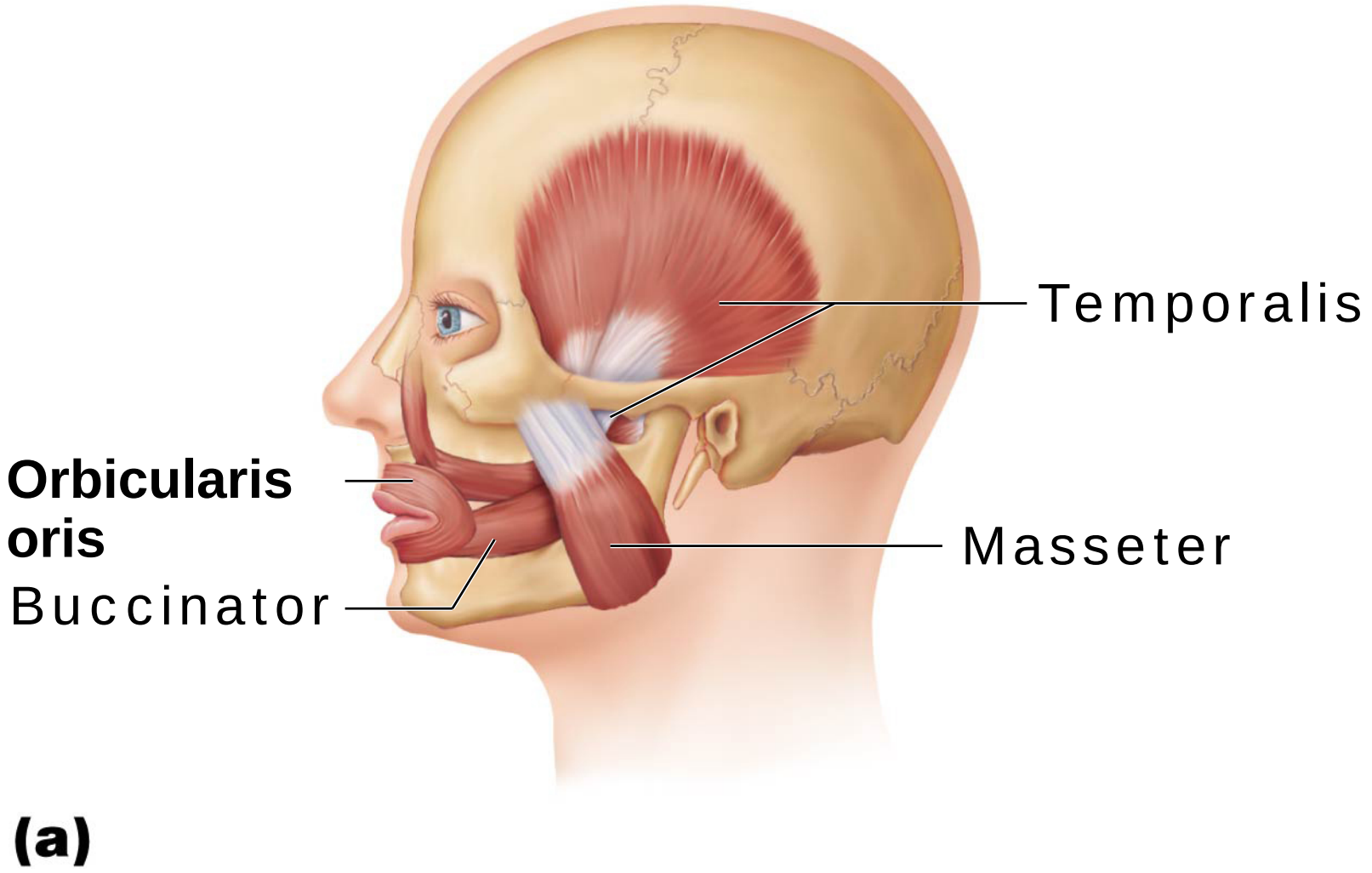


Figure 10.8b Muscles promoting mastication and tongue movements.

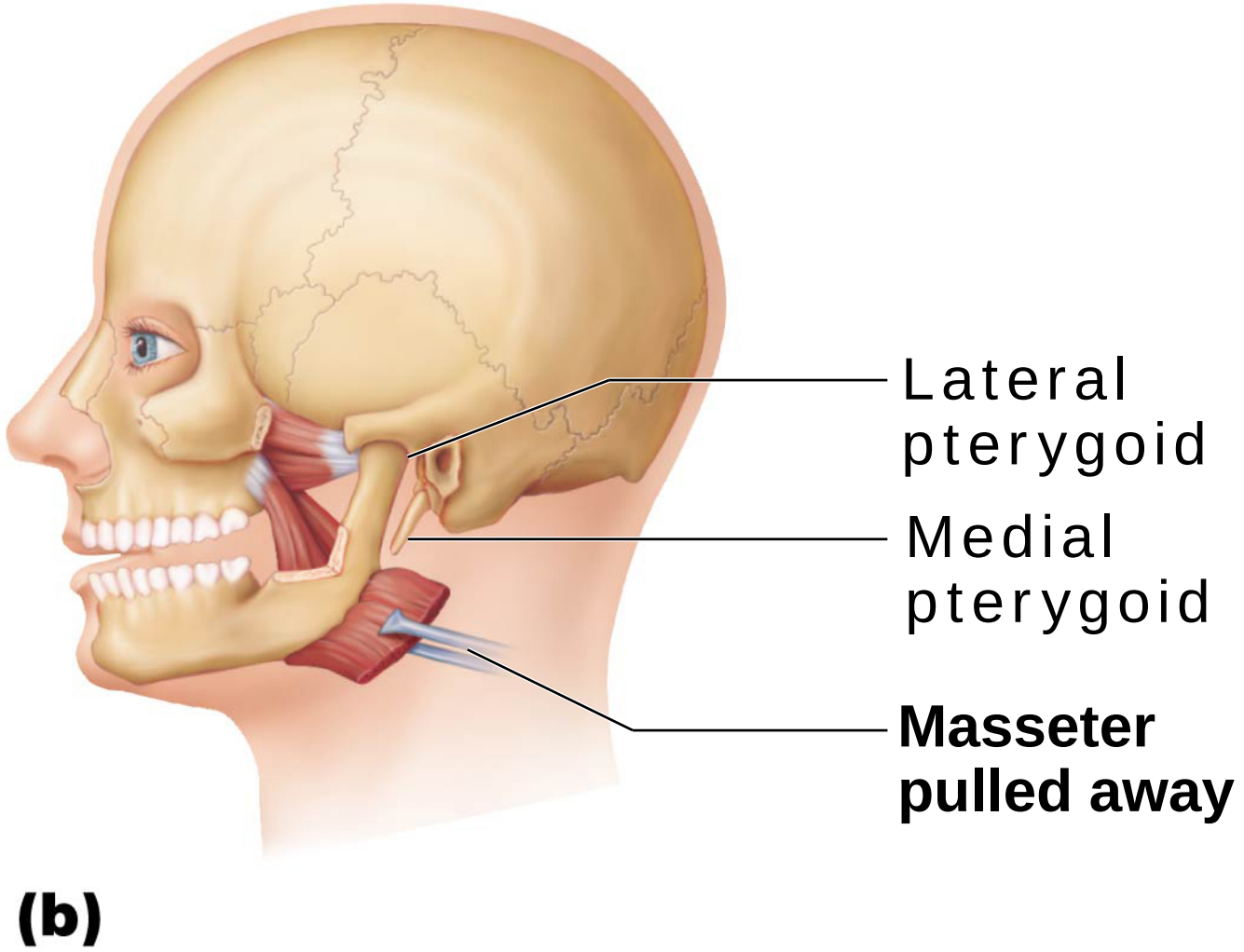


Figure 10.8c Muscles promoting mastication and tongue movements.

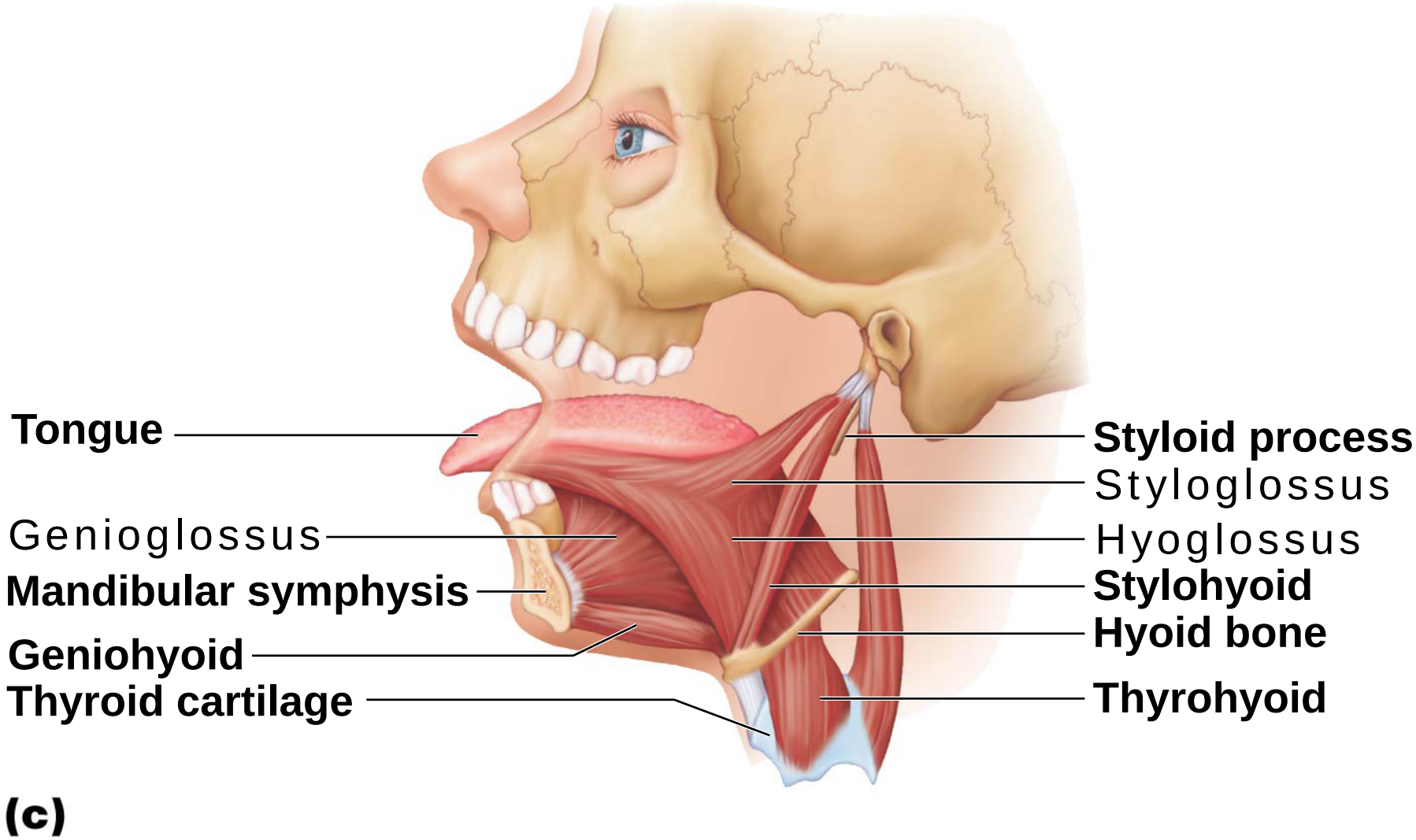


Table 10.3-1 Muscles of the Anterior Neck and Throat: Swallowing

Table 10.3 Muscles of the Anterior Neck and Throat: Swallowing (Figure 10.9)

MUSCLE	DESCRIPTION	ORIGIN (O) AND INSERTION (I)	ACTION	NERVE SUPPLY
SUPRAHYOID MUSCLES (soo″prah-hi′oid)	Muscles that help form floor of oral cavity, anchor tongue, elevate hyoid, and move larynx superiorly during swallowing; lie superior to hyoid bone			
Digastric (di-gas′trik) (*di* = two; *gaster* = belly)	Consists of two bellies united by an intermediate tendon, forming a V shape under the chin	O—lower margin of mandible (anterior belly) and mastoid process of temporal bone (posterior belly) I—by a connective tissue loop to hyoid bone	Open mouth and depress mandible; acting in synergy, the digastric muscles elevate hyoid bone and steady it during swallowing and speech	Mandibular branch of trigeminal nerve (cranial V) for anterior belly; facial nerve (cranial VII) for posterior belly
Stylohyoid (sti″lo-hi′oid) (also see Figure 10.8c)	Slender muscle below angle of jaw; parallels posterior belly of digastric muscle	O—styloid process of temporal bone I—hyoid bone	Elevates and retracts hyoid, thereby elongating floor of mouth during swallowing	Facial nerve
Mylohyoid (mi″lo-hi′oid) (*myle* = molar)	Flat, triangular muscle just deep to digastric muscle; this muscle pair make a sling that forms the floor of the anterior mouth	O—medial surface of mandible I—hyoid bone and median raphe (a median strip of connective tissue between the mylohyoid muscles)	Elevates hyoid bone and floor of mouth, enabling tongue to exert backward and upward pressure that forces food into pharynx	Mandibular branch of trigeminal nerve
Geniohyoid (je′ne-o-hi″oid) (also see Figure 10.8c) (*geni* = chin)	Narrow muscle in contact with its partner medially; runs from chin to hyoid bone deep to mylohyoid	O—inner surface of mandibular symphysis I—hyoid bone	Pulls hyoid bone superiorly and anteriorly, shortening floor of mouth and widening pharynx to receive food	First cervical spinal nerve via hypoglossal nerve (cranial XII)

Table 10.3 Muscles of the Anterior Neck and Throat: Swallowing (Figure 10.9) *(continued)*

MUSCLE	DESCRIPTION	ORIGIN (O) AND INSERTION (I)	ACTION	NERVE SUPPLY
INFRAHYOID MUSCLES	Straplike muscles that depress the hyoid bone and larynx during swallowing and speaking (see also Figure 10.10c)			
Sternohyoid (ster″no-hi′oid) (*sterno* = sternum)	Most medial muscle of the neck: thin; superficial except inferiorly, where covered by sternocleidomastoid	O—manubrium and medial end of clavicle I—lower margin of hyoid bone	Depresses larynx and hyoid bone if mandible is fixed; may also flex skull	Cervical spinal nerves 1–3 (C_1–C_3) through ansa cervicalis (slender nerve root in cervical plexus)
Sternothyroid (ster′no-thi′roid) (*thyro* = thyroid cartilage)	Lateral and deep to sternohyoid	O—posterior surface of manubrium of sternum I—thyroid cartilage	Depresses larynx and hyoid bone	As for sternohyoid
Omohyoid (o″mo-hi′oid) (*omo* = shoulder)	Straplike muscle with two bellies united by an intermediate tendon; lateral to sternohyoid	O—superior surface of scapula I—hyoid bone, lower border	Depresses and retracts hyoid bone	As for sternohyoid
Thyrohyoid (thi″ro-hi′oid) (also see Figure 10.8c)	Appears as a superior continuation of sternothyroid muscle	O—thyroid cartilage I—hyoid bone	Depresses hyoid bone or elevates larynx if hyoid is fixed	First cervical nerve via hypoglossal nerve
PHARYNGEAL CONSTRICTOR MUSCLES (far-rin′je-al)				
Superior, middle, and inferior pharyngeal constrictor muscles	Three paired muscles whose fibers run circularly in pharynx wall; superior muscle is innermost and inferior one is outermost; substantial overlap	O—attached anteriorly to mandible and medial pterygoid plate (superior), hyoid bone (middle), and laryngeal cartilages (inferior) I—posterior median raphe of pharynx	Constrict pharynx during swallowing, which propels food to esophagus (via a massagelike action called peristalsis)	Pharyngeal plexus [branches of vagus nerve (X)]

Figure 10.9 Muscles of the anterior neck and throat used in swallowing.

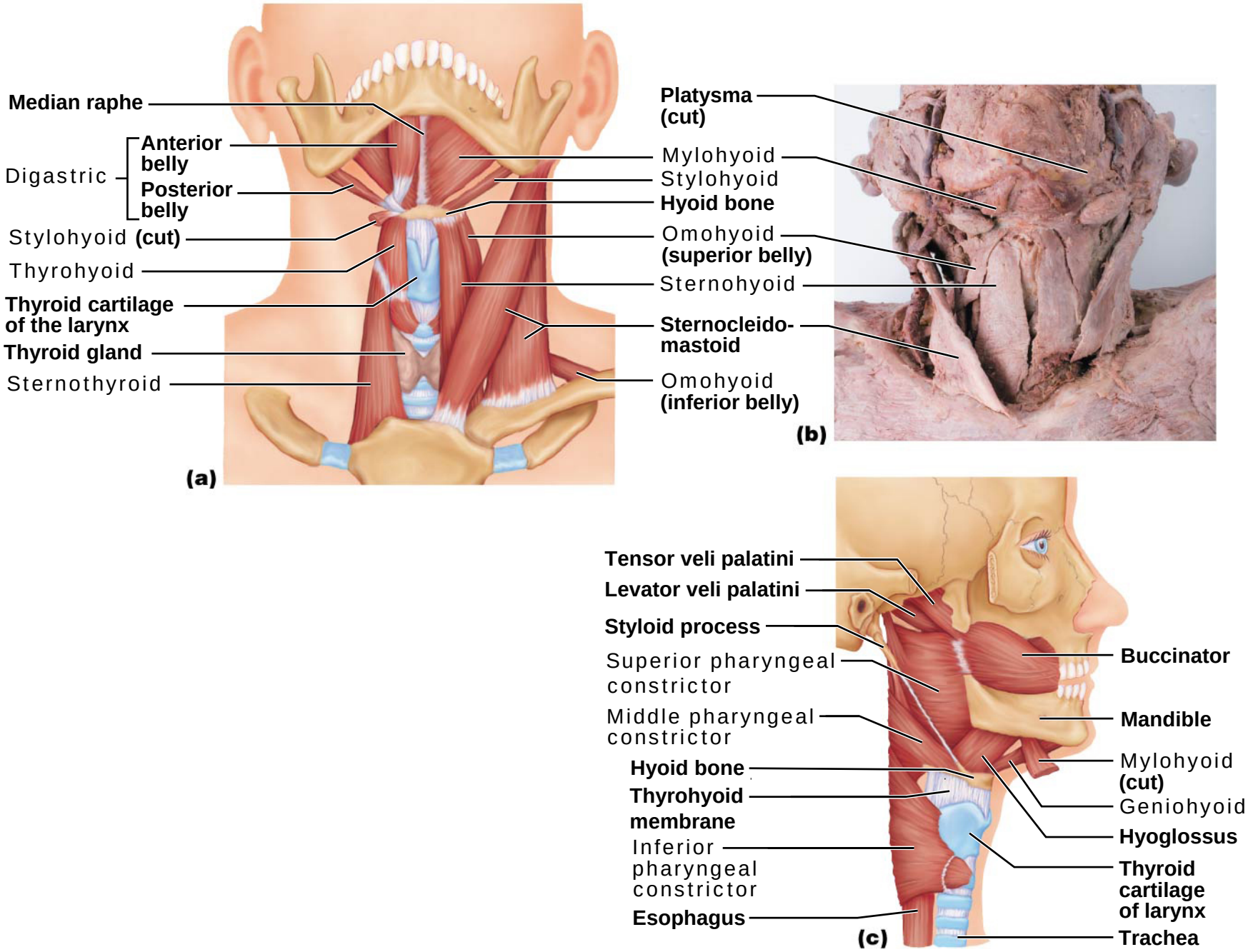


Figure 10.9a Muscles of the anterior neck and throat used in swallowing.

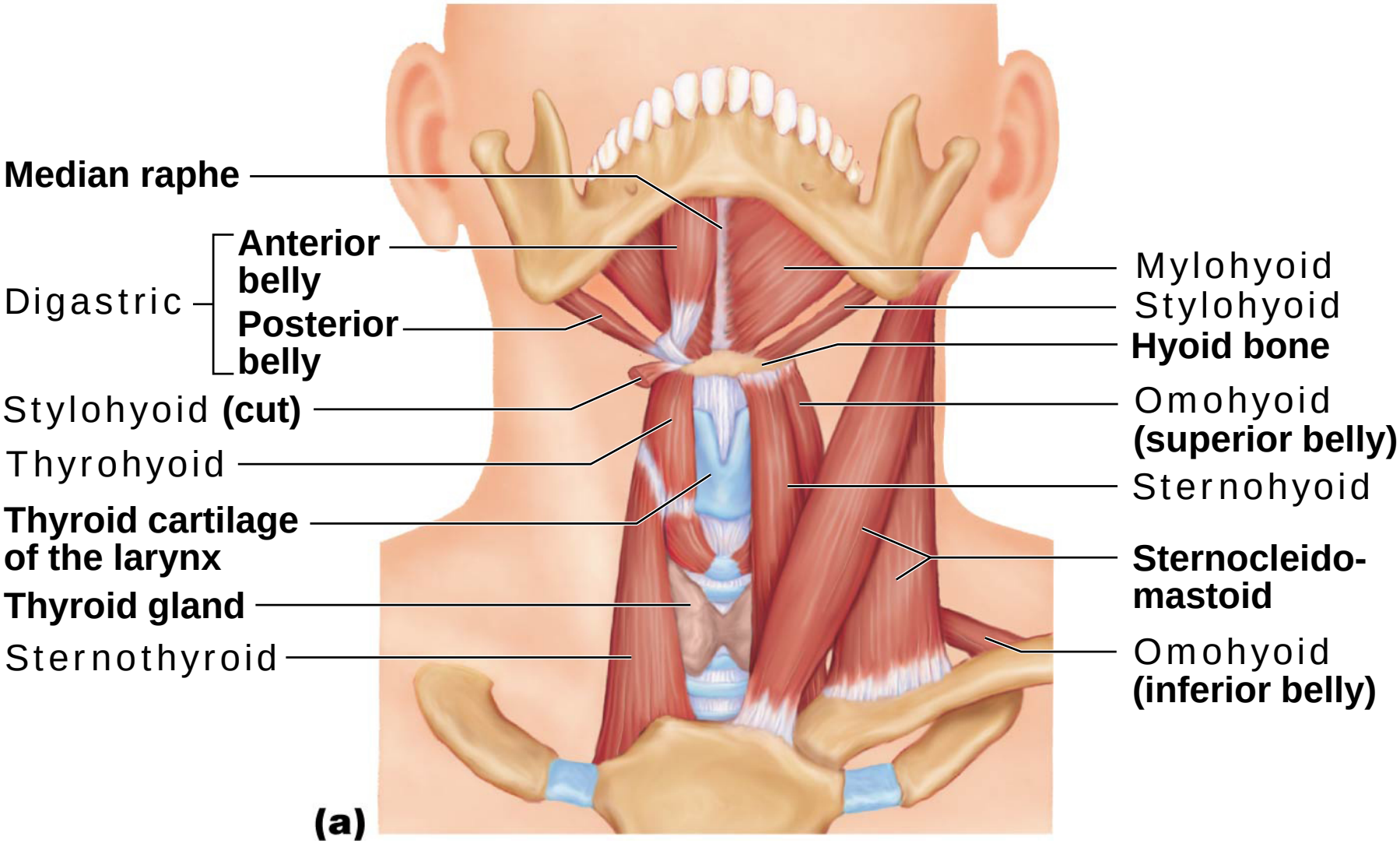


Figure 10.9c Muscles of the anterior neck and throat used in swallowing.

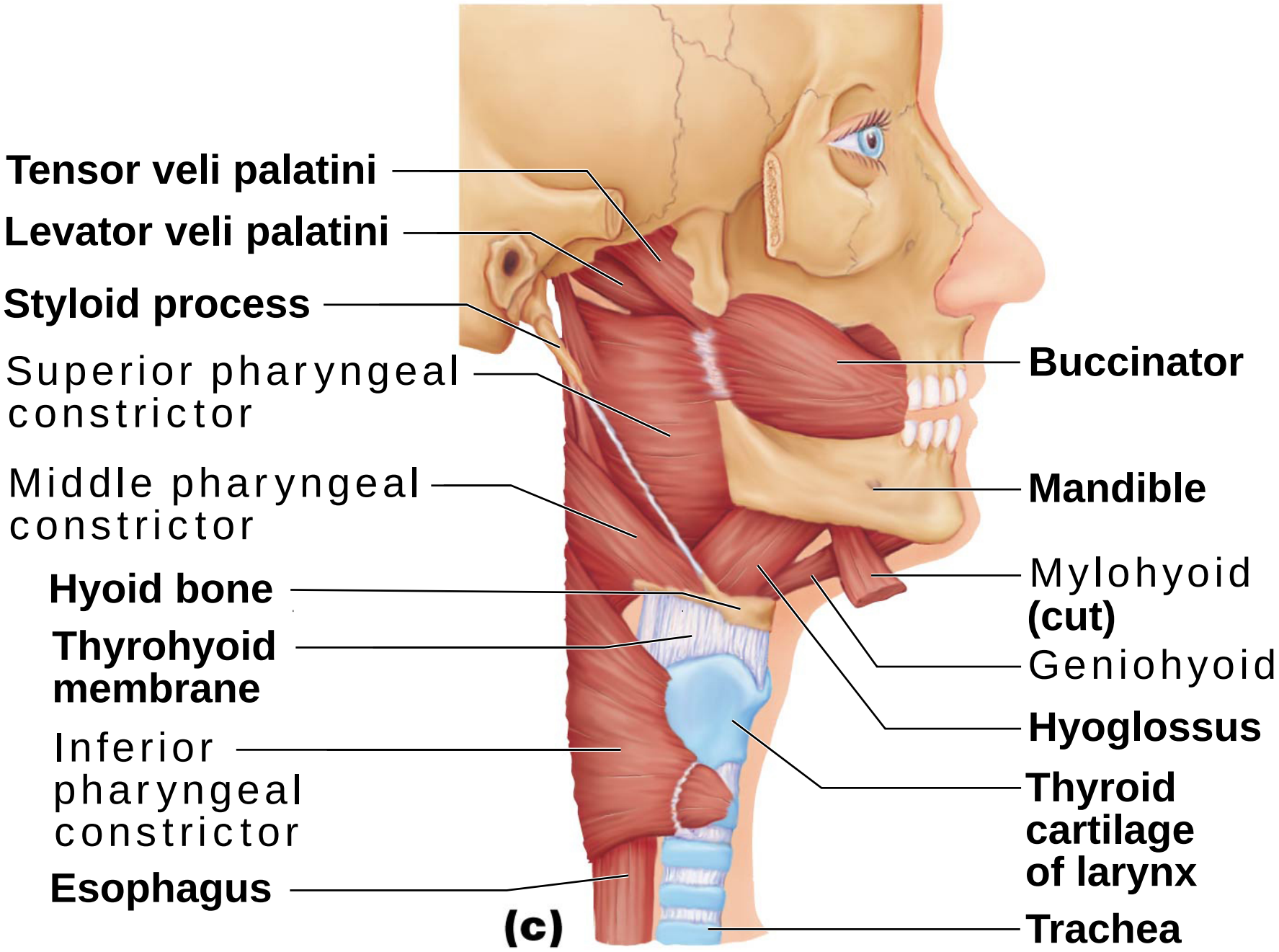


Table 10.4-1 Muscles of the Neck and Vertebral Column: Head Movements and Trunk Extension

Table 10.4 Muscles of the Neck and Vertebral Column: Head Movements and Trunk Extension (Figure 10.10)

MUSCLE	DESCRIPTION	ORIGIN (O) AND INSERTION (I)	ACTION	NERVE SUPPLY
ANTEROLATERAL NECK MUSCLES (Figure 10.10a and c)				
Sternocleidomastoid (ster″no-kli″do-mas′toid) (*sterno* = breastbone; *cleido* = clavicle; *mastoid* = mastoid process)	Two-headed muscle located deep to platysma on anterolateral surface of neck; fleshy parts on either side of neck delineate limits of anterior and posterior triangles; key muscular landmark in neck	O—manubrium of sternum and medial portion of clavicle I—mastoid process of temporal bone and superior nuchal line of occipital bone	Flexes and laterally rotates the head; simultaneous contraction of both muscles flexes neck, generally against resistance as when raising head when lying on back; acting alone, each muscle rotates head toward shoulder on opposite side and tilts or laterally flexes head to its own side	Accessory nerve (cranial nerve XI) and branches of cervical spinal nerves C_2 and C_3 (ventral rami)
Scalenes (ska′lēnz)—anterior, middle, and posterior (*scalene* = uneven)	Located more laterally than anteriorly on neck; deep to platysma and sternocleidomastoid	O—transverse processes of cervical vertebrae I—anterolaterally on first two ribs	Elevate first two ribs (aid in inspiration); flex and rotate neck	Cervical spinal nerves
INTRINSIC MUSCLES OF THE BACK (Figure 10.10b, d, e)				
Splenius (sple′ne-us)—capitis and cervicis portions (kă′pĭ-tis; ser-vis′us) (*splenion* = bandage; *caput* = head; *cervi* = neck) (Figures 10.10b and 10.7b)	Broad bipartite superficial muscle (capitis and cervicis parts) extending from upper thoracic vertebrae to skull; capitis portion known as "bandage muscle" because it covers and holds down deeper neck muscles	O—ligamentum nuchae,* spinous processes of vertebrae C_7–T_6 I—mastoid process of temporal bone and occipital bone (capitis); transverse processes of C_2–C_4 vertebrae (cervicis)	Extend or hyperextend head; when splenius muscles on one side are activated, head rotates and bends laterally toward same side	Cervical spinal nerves (dorsal rami)

*The ligamentum nuchae (lig″ah-men′tum noo′ke) is a strong, elastic ligament extending from the occipital bone of the skull along the tips of the spinous processes of the cervical vertebrae. It binds the cervical vertebrae together and inhibits excessive head and neck flexion, thus preventing damage to the spinal cord in the vertebral canal.

Figure 10.10a Muscles of the neck and vertebral column that move the head and trunk.

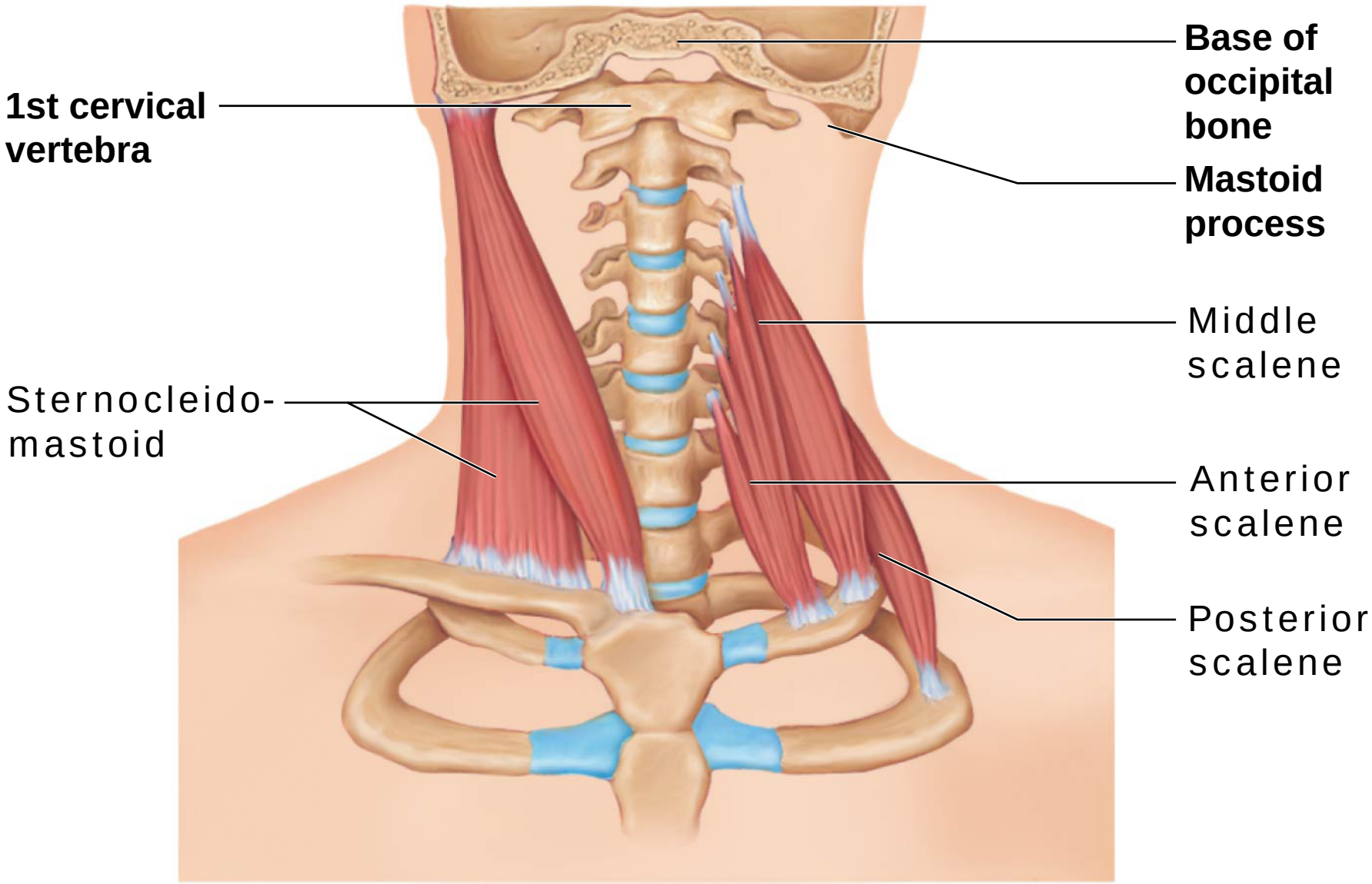


Table 10.4 Muscles of the Neck and Vertebral Column: Head Movements and Trunk Extension (Figure 10.10) *(continued)*

MUSCLE	DESCRIPTION	ORIGIN (O) AND INSERTION (I)	ACTION	NERVE SUPPLY
INTRINSIC MUSCLES OF THE BACK (Figure 10.10b, d, e)				
Erector spinae (e-rek′tor spi′ne) Also called **sacrospinalis** (Figure 10.10d, left side)	Prime mover of back extension. Each side consists of three columns—the iliocostalis, longissimus, and spinalis muscles—forming the intermediate layer of intrinsic back muscles. Erector spinae provide resistance that helps control action of bending forward at the waist and act as powerful extensors to promote return to erect position. During full flexion (i.e., when touching fingertips to floor), erector spinae are relaxed and strain is borne entirely by ligaments of back. On reversing the movement, these muscles are initially inactive, and extension is initiated by hamstring muscles of thighs and gluteus maximus muscles of buttocks. As a result of this peculiarity, lifting a load or moving suddenly from a bent-over position can injure muscles and ligaments of back and intervertebral discs. Erector spinae muscles readily go into painful spasms following injury to back structures.			
• **Iliocostalis** (il″e-o-kos-tă′lis)—lumborum, thoracis, and cervicis portions (lum′bor-um; tho-ra′sis) (*ilio* = ilium; *cost* = rib; *thorac* = thorax)	Most lateral muscle group of erector spinae muscles; extend from pelvis to neck	O—iliac crests (lumborum); inferior 6 ribs (thoracis); ribs 3 to 6 (cervicis) I—angles of ribs (lumborum and thoracis); transverse processes of cervical vertebrae C_4–C_6 (cervicis)	Extend and laterally flex the vertebral column; maintain erect posture; acting on one side, bend vertebral column to same side	Spinal nerves (dorsal rami)
• **Longissimus** (lon-jis′ĭ-mus)—thoracis, cervicis, and capitis parts (*longissimus* = longest)	Intermediate tripartite muscle group of erector spinae; extend by many muscle slips from lumbar region to skull; mainly pass between transverse processes of vertebrae	O—transverse processes of lumbar through cervical vertebrae I—transverse processes of thoracic or cervical vertebrae and to ribs superior to origin as indicated by name; capitis inserts into mastoid process of temporal bone	Thoracis and cervicis act together to extend and laterally flex vertebral column; capitis extends head and turns the face toward same side	Spinal nerves (dorsal rami)

Table 10.4 Muscles of the Neck and Vertebral Column: Head Movements and Trunk Extension (Figure 10.10) *(continued)*

MUSCLE	DESCRIPTION	ORIGIN (O) AND INSERTION (I)	ACTION	NERVE SUPPLY
INTRINSIC MUSCLES OF THE BACK (Figure 10.10b, d, e)				
• **Spinalis** (spi-nā′lis)—thoracis and cervicis parts (*spin* = vertebral column, spine)	Most medial muscle column of erector spinae; cervicis usually rudimentary and poorly defined	O—spinous process of upper lumbar and lower thoracic vertebrae I—spinous process of upper thoracic and cervical vertebrae	Extends vertebral column	Spinal nerves (dorsal rami)
Semispinalis (sem′e-spī-nā′lis)—thoracis, cervicis, and capitis regions (*semi* = half) (Figure 10.10d, right side)	Composite muscle forming part of deep layer of intrinsic back muscles; extends from thoracic region to head	O—transverse processes of C_7–T_{12} I—occipital bone (capitis) and spinous processes of cervical (cervicis) and thoracic vertebrae T_1–T_4 (thoracis)	Extends vertebral column and head and rotates them to opposite side; acts synergistically with sternocleidomastoid muscle of opposite side	Spinal nerves (dorsal rami)
Quadratus lumborum (kwod-ra′tus lum-bor′um) (*quad* = four-sided; *lumb* = lumbar region) (See also Figure 10.20a)	Fleshy muscle forming part of posterior abdominal wall	O—iliac crest and lumbar fascia I—transverse processes of lumbar vertebrae L_1–L_4 and lower margin of 12th rib	Laterally flexes vertebral column when acting separately; when pair acts jointly, lumbar spine is extended and 12th rib is fixed; maintains upright posture; assists in forced inspiration	T_{12} and upper lumbar spinal nerves (ventral rami)

Figure 10.10b Muscles of the neck and vertebral column that move the head and trunk.

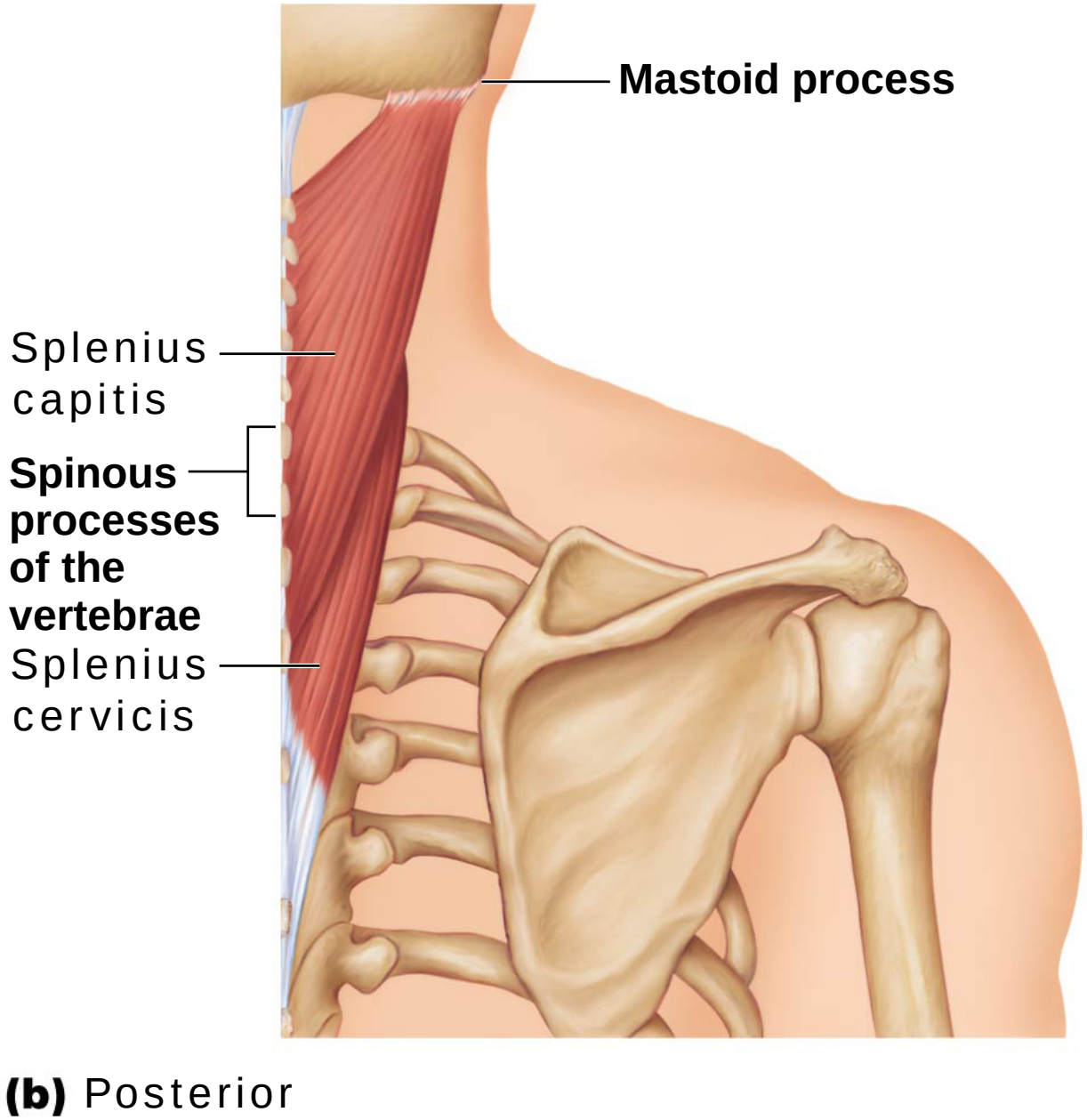


Figure 10.10d Muscles of the neck and vertebral column that move the head and trunk.

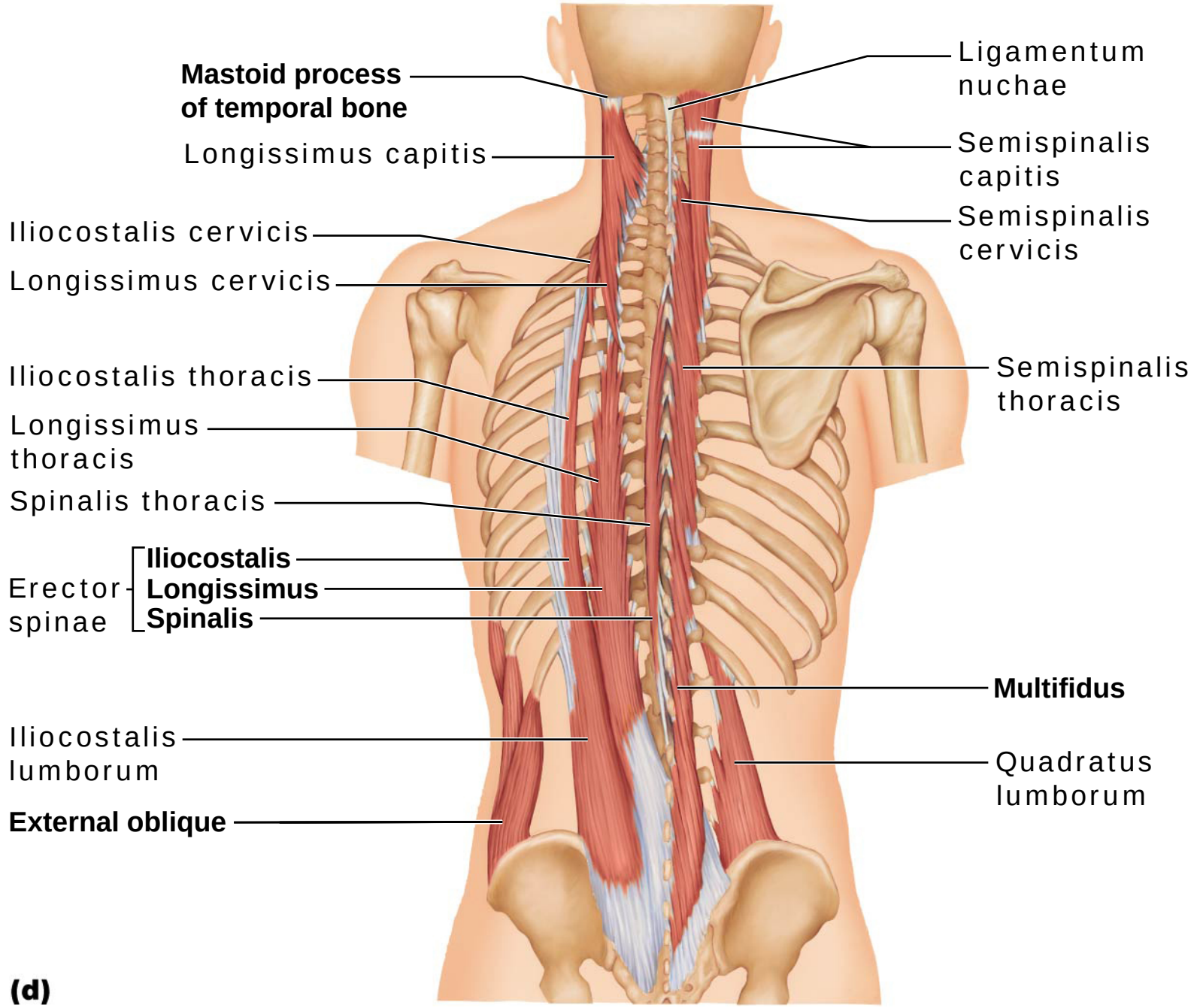


Table 10.5 Deep Muscles of the Thorax: Breathing (Figure 10.11)

MUSCLE	DESCRIPTION	ORIGIN (O) AND INSERTION (I)	ACTION	NERVE SUPPLY
External intercostals (in″ter-kos′talz) (*external* = toward the outside; *inter* = between; *cost* = rib)	11 pairs lie between ribs; fibers run obliquely (down and forward) from each rib to rib below; in lower intercostal spaces, fibers are continuous with external oblique muscle, forming part of abdominal wall	O—inferior border of rib above I—superior border of rib below	With first ribs fixed by scalene muscles, pull ribs toward one another to elevate rib cage; aid in inspiration; synergists of diaphragm	Intercostal nerves
Internal intercostals (*internal* = toward the inside, deep)	11 pairs lie between ribs; fibers run deep to and at right angles to those of external intercostals (i.e., run downward and posteriorly); lower internal intercostal muscles are continuous with fibers of internal oblique muscle of abdominal wall	O—superior border of rib below I—inferior border (costal groove) of rib above	With 12th ribs fixed by quadratus lumborum, muscles of posterior abdominal wall, and oblique muscles of the abdominal wall, they draw ribs together and depress rib cage; aid forced expiration; antagonistic to external intercostals	Intercostal nerves
Diaphragm (di′ah-fram) (*dia* = across; *phragm* = partition)	Broad muscle pierced by the aorta, inferior vena cava, and esophagus, forms floor of thoracic cavity; dome shaped in relaxed state; fibers converge from margins of thoracic cage toward a boomerang-shaped central tendon	O—inferior, internal surface of rib cage and sternum, costal cartilages of last six ribs and lumbar vertebrae I—central tendon	Prime mover of inspiration; flattens on contraction, increasing vertical dimensions of thorax; when strongly contracted, dramatically increases intra-abdominal pressure	Phrenic nerves

*Although there is a third (deepest) muscle layer of the thoracic wall, the muscles are small and discontinuous. Additionally, their function is unclear, so they are not included in this table.

Figure 10.11 Muscles of respiration.

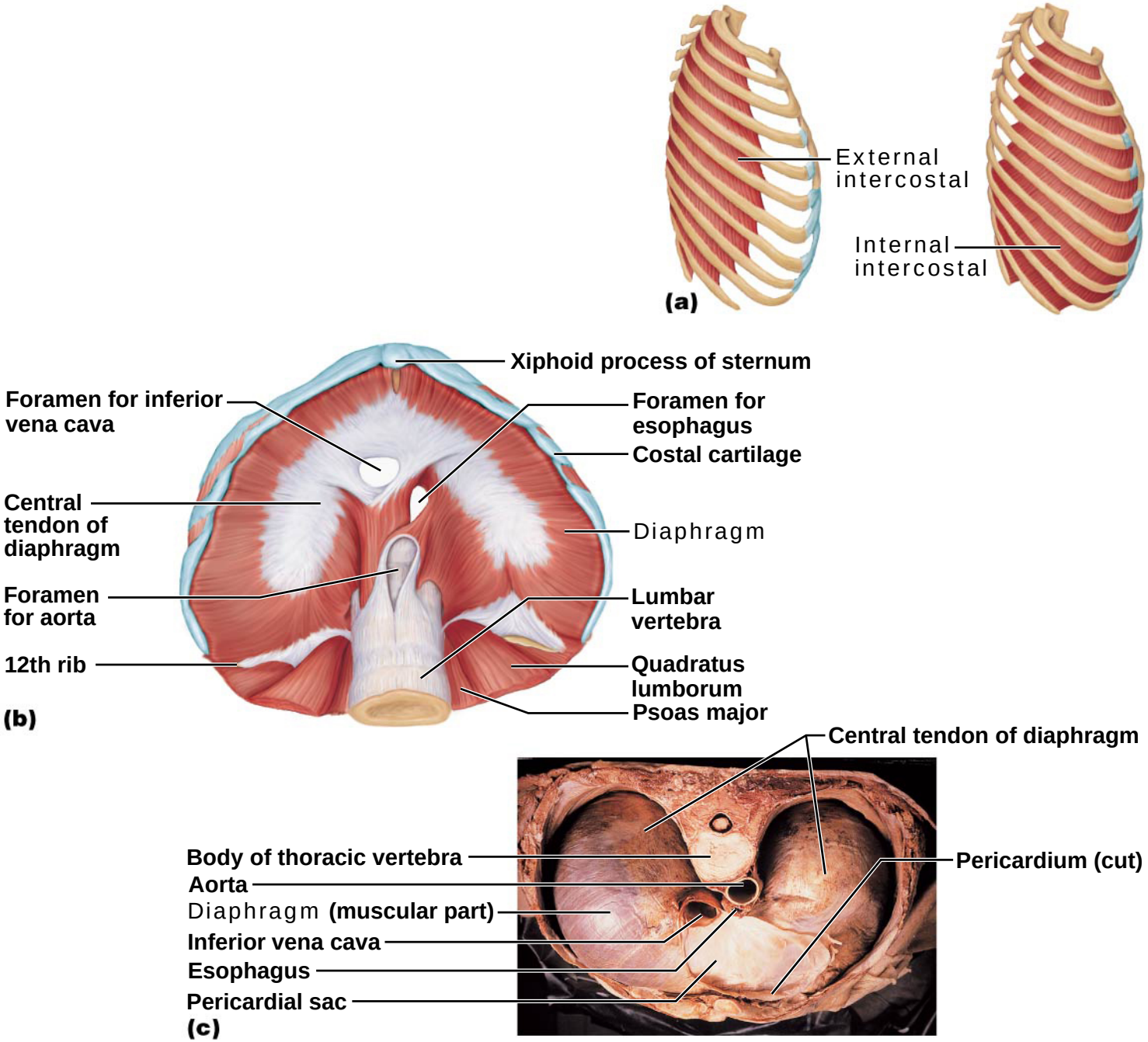


Figure 10.11a Muscles of respiration.

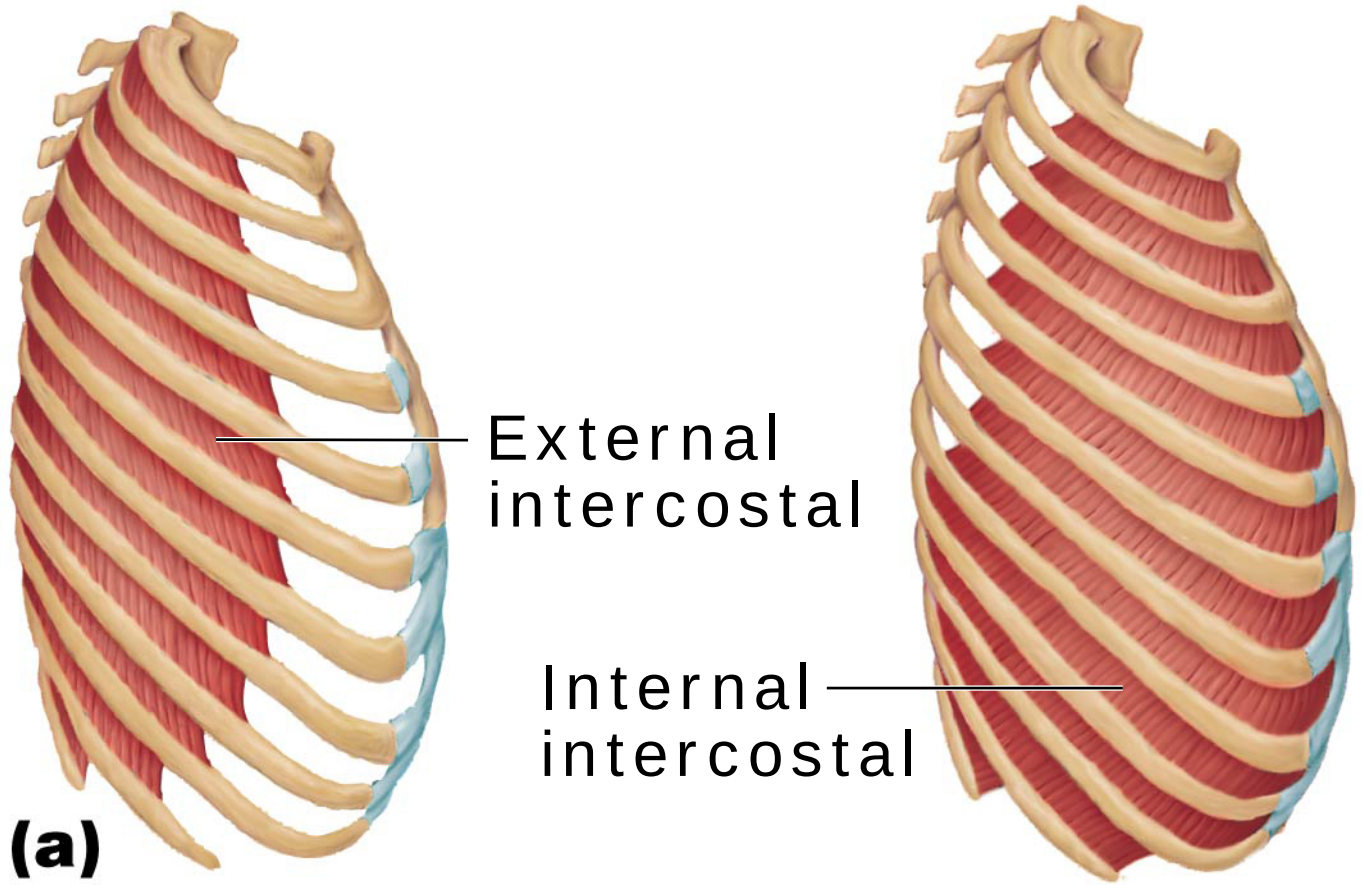


Figure 10.11b Muscles of respiration.

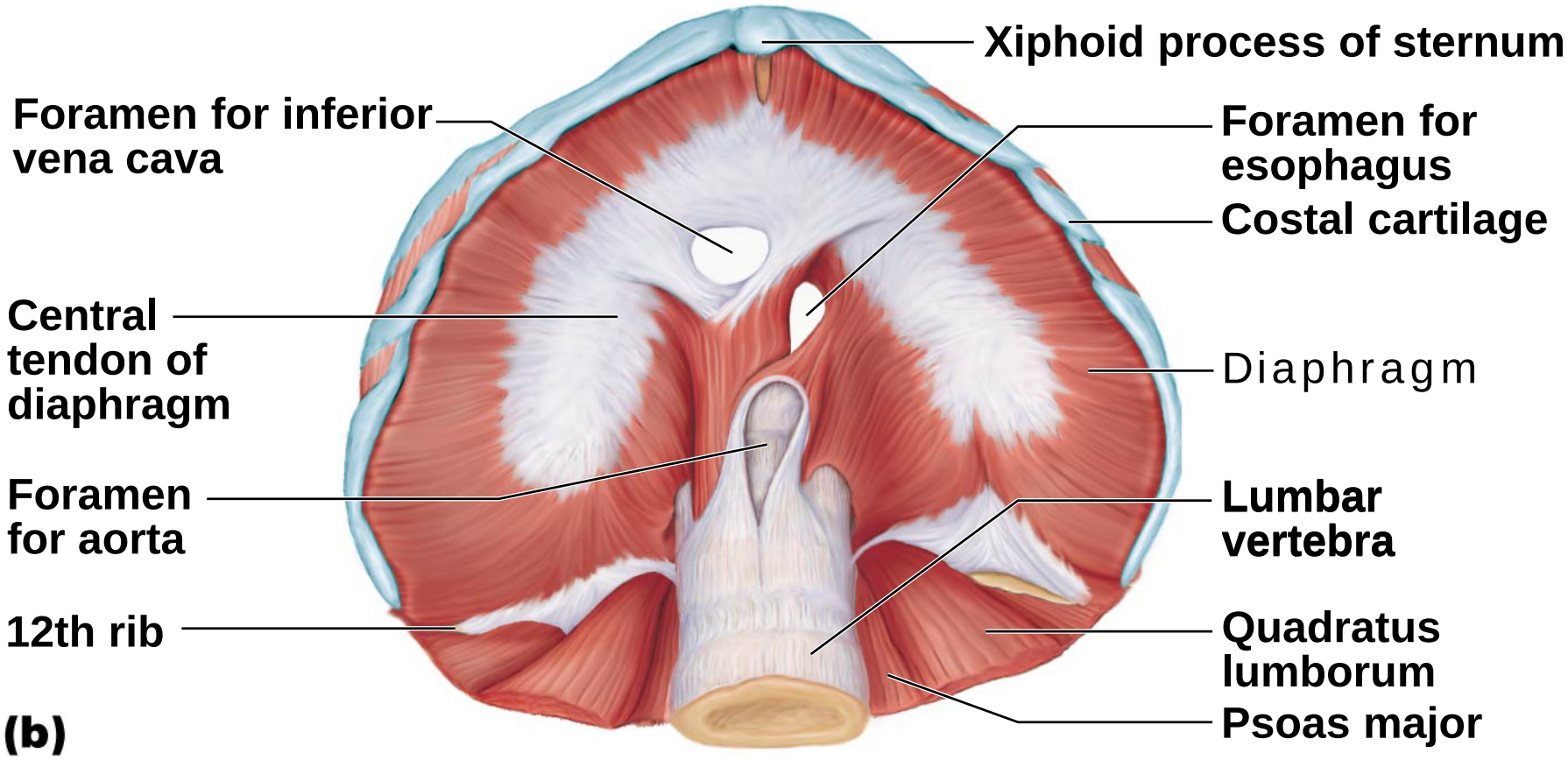


Table 10.6 Muscles of the Abdominal Wall: Trunk Movements and Compression of Abdominal Viscera

Table 10.6 Muscles of the Abdominal Wall: Trunk Movements and Compression of Abdominal Viscera (Figure 10.12)

MUSCLE	DESCRIPTION	ORIGIN (O) AND INSERTION (I)	ACTION	NERVE SUPPLY
MUSCLES OF THE ANTERIOR AND LATERAL ABDOMINAL WALL	Four paired flat muscles; important in supporting and protecting abdominal viscera; promote lateral flexion and flexion of vertebral column			
Rectus abdominis (rek′tus ab-dom′ĭ-nis) (*rectus* = straight; *abdom* = abdomen)	Medial superficial muscle pair; extend from pubis to rib cage; ensheathed by aponeuroses of lateral muscles; segmented by three tendinous inter-sections	O—pubic crest and symphysis I—xiphoid process and costal cartilages of ribs 5–7	Flex and rotate lumbar region of vertebral column; fix and depress ribs, stabilize pelvis during walking, increase intra-abdominal pressure; used in sit-ups, curls	Intercostal nerves (T_6 or T_7–T_{12})
External oblique (o-blēk′) (*external* = toward outside; *oblique* = running at an angle)	Largest and most superficial of the three lateral muscles; fibers run downward and medially (same direction outstretched fingers take when hands are in pants pockets); aponeurosis turns under inferiorly, forming inguinal ligament	O—by fleshy strips from outer surfaces of lower eight ribs I—most fibers insert into linea alba via a broad aponeurosis; some insert into pubic crest and tubercle and iliac crest	When pair contract simultaneously, flex vertebral column and compress abdominal wall and increase intra-abdominal pressure; acting individually, aid muscles of back in rotating trunk and flexing laterally; used in oblique curls	Intercostal nerves (T_7–T_{12})
Internal oblique (*internal* = toward the inside; deep)	Most fibers run upward and medially; however, the muscle fans so its inferior fibers run downward and medially	O—lumbar fascia, iliac crest, and inguinal ligament I—linea alba, pubic crest, last three or four ribs, and costal margin	As for external oblique	Intercostal nerves (T_7–T_{12}) and L_1
Transversus abdominis (trans-ver′sus) (*transverse* = running straight across)	Deepest (innermost) muscle of abdominal wall; fibers run horizontally	O—inguinal ligament, lumbar fascia, cartilages of last six ribs; iliac crest I—linea alba, pubic crest	Compresses abdominal contents	Intercostal nerves (T_7–T_{12}) and L_1

Figure 10.12 Muscles of the abdominal wall.

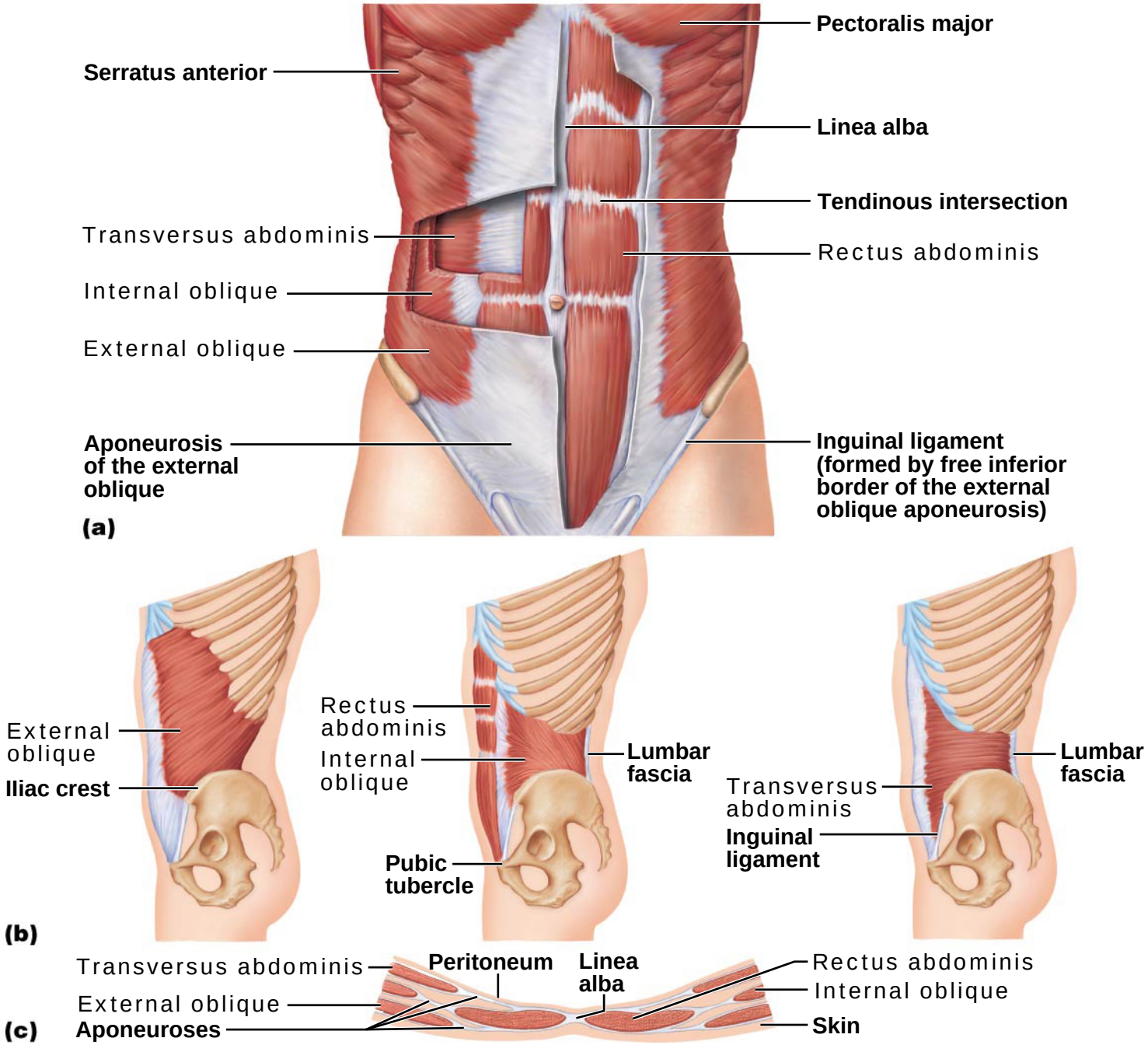


Figure 10.12a Muscles of the abdominal wall.

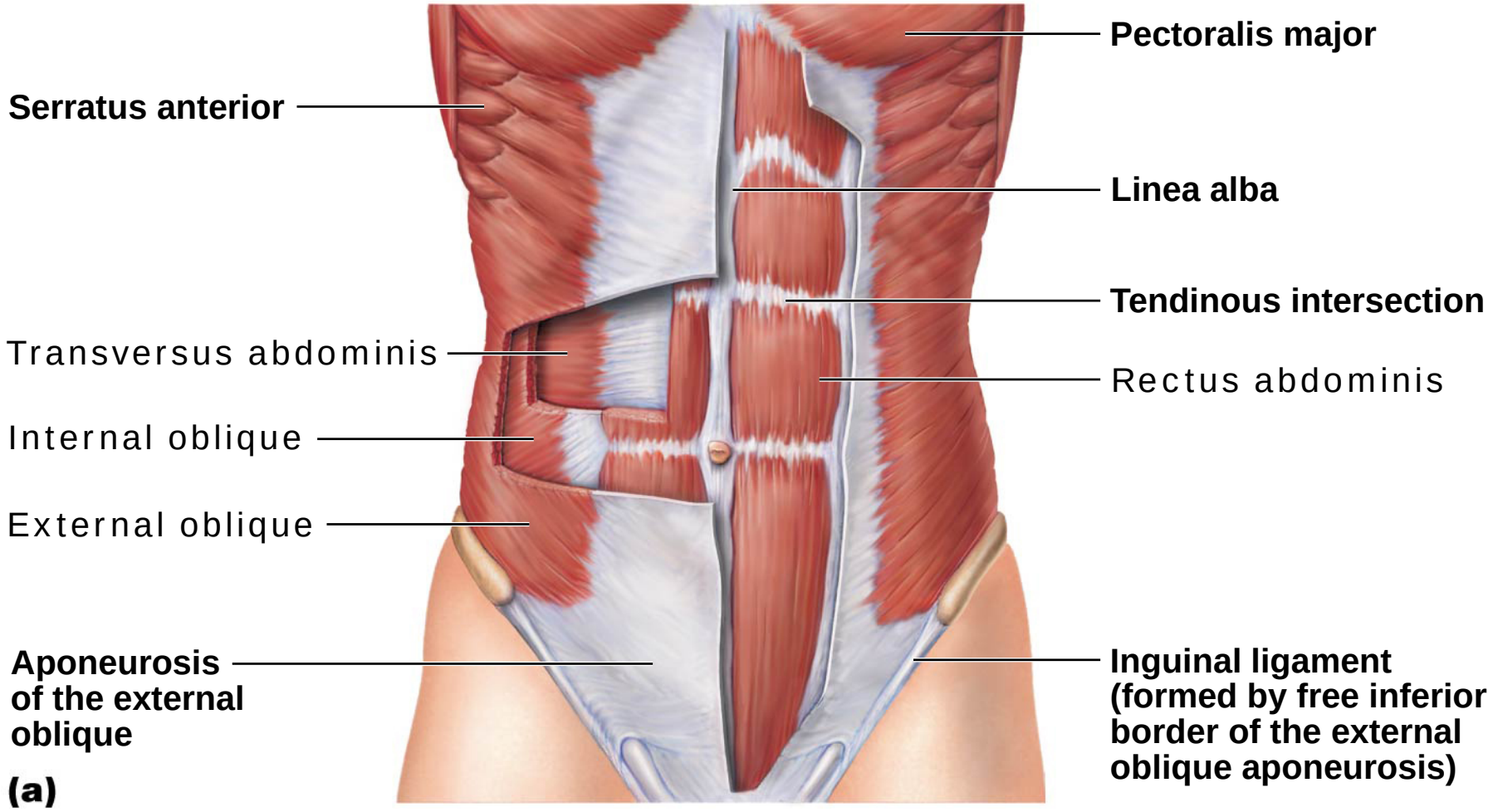


Figure 10.12b Muscles of the abdominal wall.

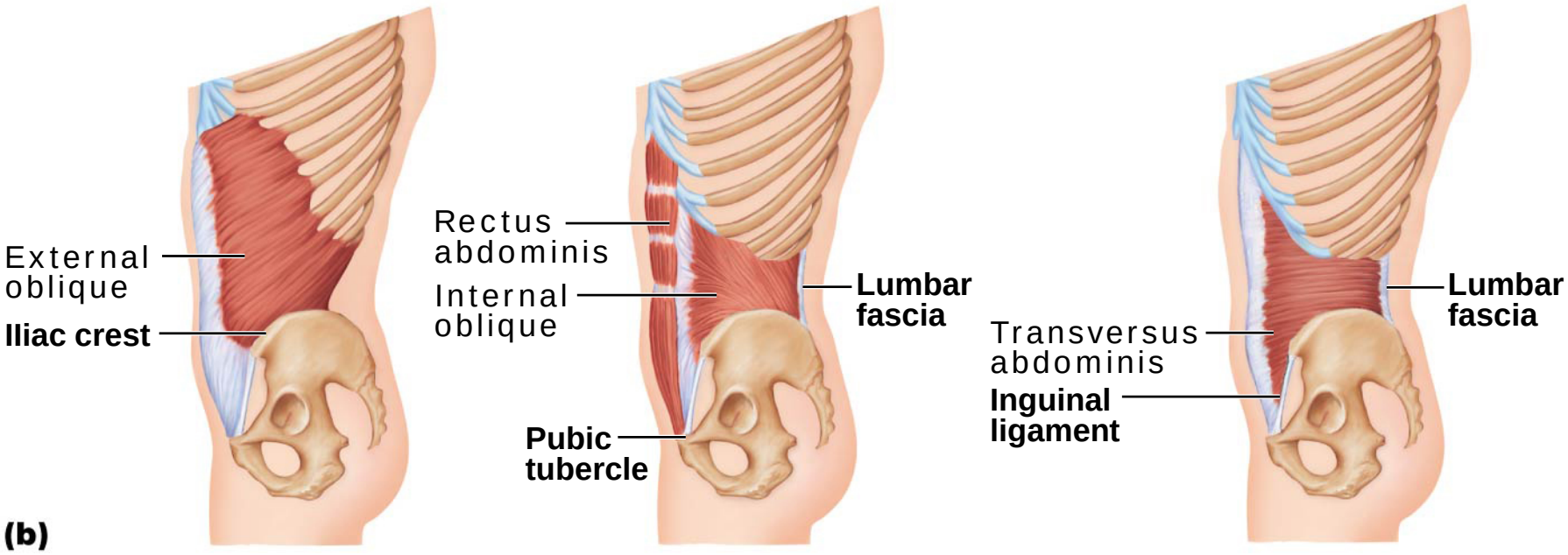


Figure 10.12c Muscles of the abdominal wall.

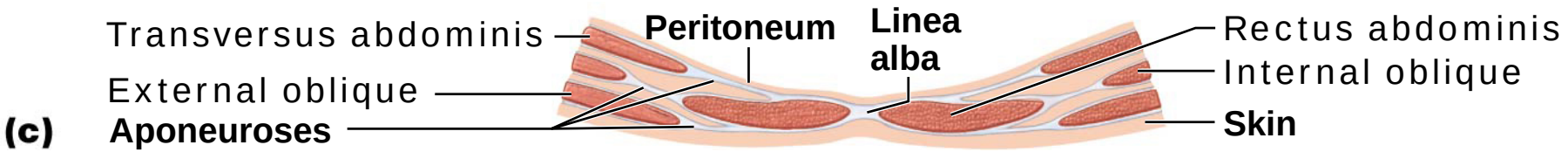


Table 10.9-1 Muscles Crossing the Shoulder Joint: Movements of the Arm (Humerus)

Table 10.9 Muscles Crossing the Shoulder Joint: Movements of the Arm (Humerus) (Figure 10.15)

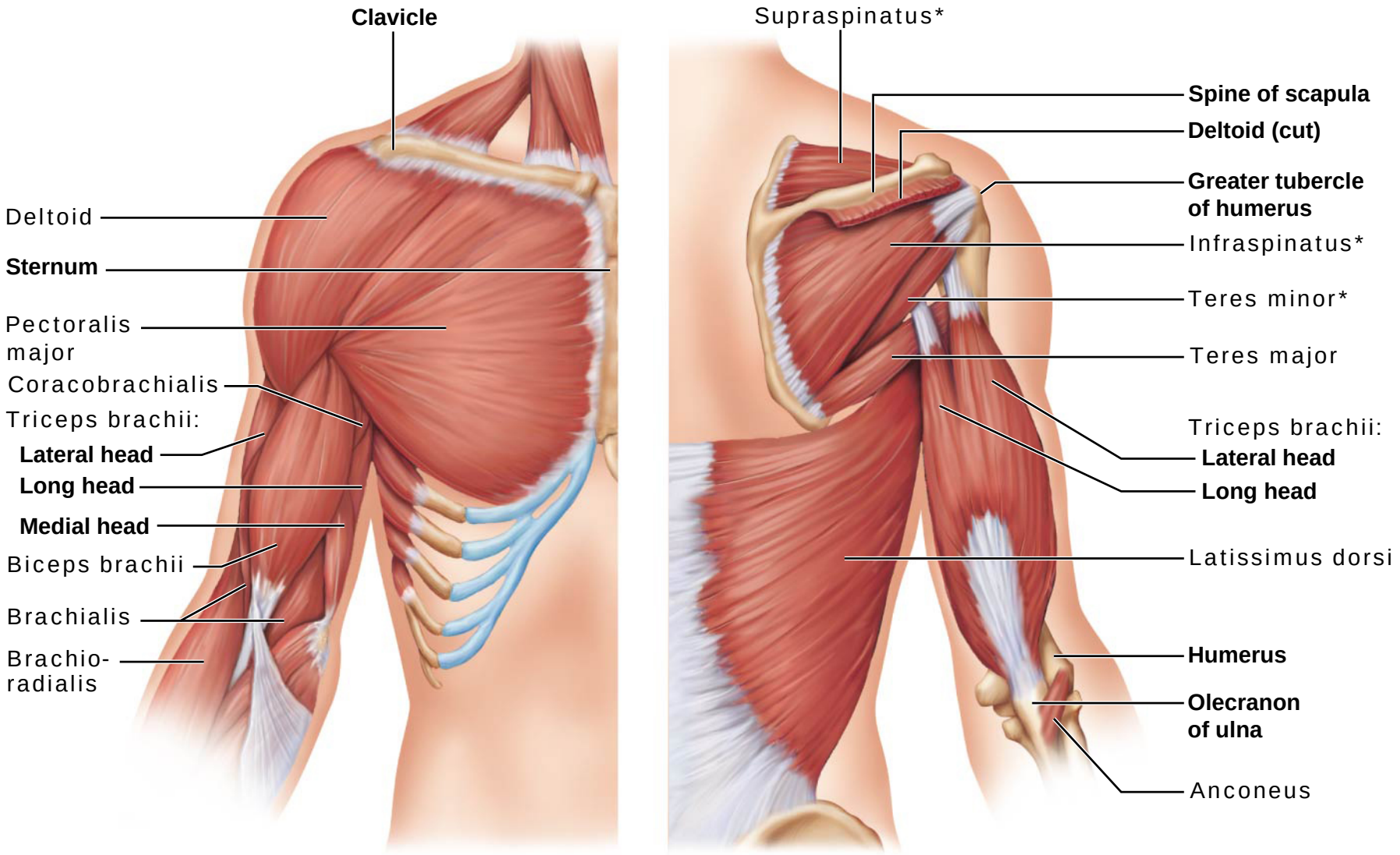
MUSCLE	DESCRIPTION	ORIGIN (O) AND INSERTION (I)	ACTION	NERVE SUPPLY
Pectoralis major (pek″to-ra′lis ma′jer) (*pectus* = breast, chest; *major* = larger)	Large, fan-shaped muscle covering superior portion of chest; forms anterior axillary fold; divided into clavicular and sternal parts	O—sternal end of clavicle, sternum, cartilage of ribs 1–6 (or 7), and aponeurosis of external oblique muscle I—fibers converge to insert by a short tendon into intertubercular sulcus and greater tubercle of humerus	Adducts and medially rotates arm against resistance; clavicular part assists in flexion when arm is extended and sternal part assists in extension when the arm is flexed; with scapula (and arm) fixed, pulls rib cage upward, thus can help in climbing, throwing, pushing, and forced inspiration	Lateral and medial pectoral nerves (C_5–C_8 and T_1)
Deltoid (del′toid) (*delta* = triangular)	Thick, multipennate muscle forming rounded shoulder muscle mass; a common site for intramuscular injection, particularly in males, where it tends to be quite fleshy	O—embraces insertion of the trapezius; lateral third of clavicle; acromion and spine of scapula I—deltoid tuberosity of humerus	Prime mover of arm abduction when all its fibers contract simultaneously; antagonist of pectoralis major and latissimus dorsi, which adduct the arm; if only anterior fibers are active, can act powerfully in flexing and rotating arm medially, therefore is a synergist of pectoralis major; if only posterior fibers are active, causes extension and lateral rotation of arm; active during rhythmic arm-swinging movements while walking	Axillary nerve (C_5 and C_6)

Table 10.8-1 Superficial Muscles of the Anterior and Posterior Thorax: Movements of the Scapula and Arm

Table 10.8 Superficial Muscles of the Anterior and Posterior Thorax: Movements of the Scapula and Arm (Figure 10.14)

MUSCLE	DESCRIPTION	ORIGIN (O) AND INSERTION (I)	ACTION	NERVE SUPPLY
MUSCLES OF THE ANTERIOR THORAX (Figure 10.14a)				
Pectoralis minor (pek″to-ra′lis mi′nor) (*pectus* = chest, breast; *minor* = lesser)	Flat, thin muscle directly beneath and obscured by pectoralis major	O—anterior surfaces of ribs 3–5 (or 2–4) I—coracoid process of scapula	With ribs fixed, draws scapula forward and downward; with scapula fixed, draws rib cage superiorly	Medial and lateral pectoral nerves (C_6–C_8)
Serratus anterior (ser-a′tus) (*serratus* = saw)	Fan-shaped muscle; lies deep to scapula, deep and inferior to pectoral muscles on lateral rib cage; forms medial wall of axilla; origins have serrated (sawtooth) appearance; paralysis results in "winging" of vertebral border of scapula away from chest wall, making arm elevation impossible	O—by a series of muscle slips from ribs 1–8 (or 9) I—entire anterior surface of vertebral border of scapula	Rotates scapula so its inferior angle moves laterally and upward; prime mover to protract and hold scapula against chest wall; raises point of shoulder; important role in abducting and raising arm and in horizontal arm movements (pushing, punching); called "boxer's muscle"	Long thoracic nerve (C_5–C_7)
Subclavius (sub-kla′ve-us) (*sub* = under, beneath; *clav* = clavicle)	Small cylindrical muscle extending from rib 1 to clavicle	O—costal cartilage of rib 1 I—groove on inferior surface of clavicle	Helps stabilize and depress pectoral girdle	Nerve to subclavius (C_5 and C_6)

Figure 10.15a-b Muscles crossing the shoulder and elbow joints, causing movements of the arm and forearm, respectively.



***Rotator cuff muscles**

Figure 10.14a Superficial muscles of the thorax and shoulder acting on the scapula and arm.

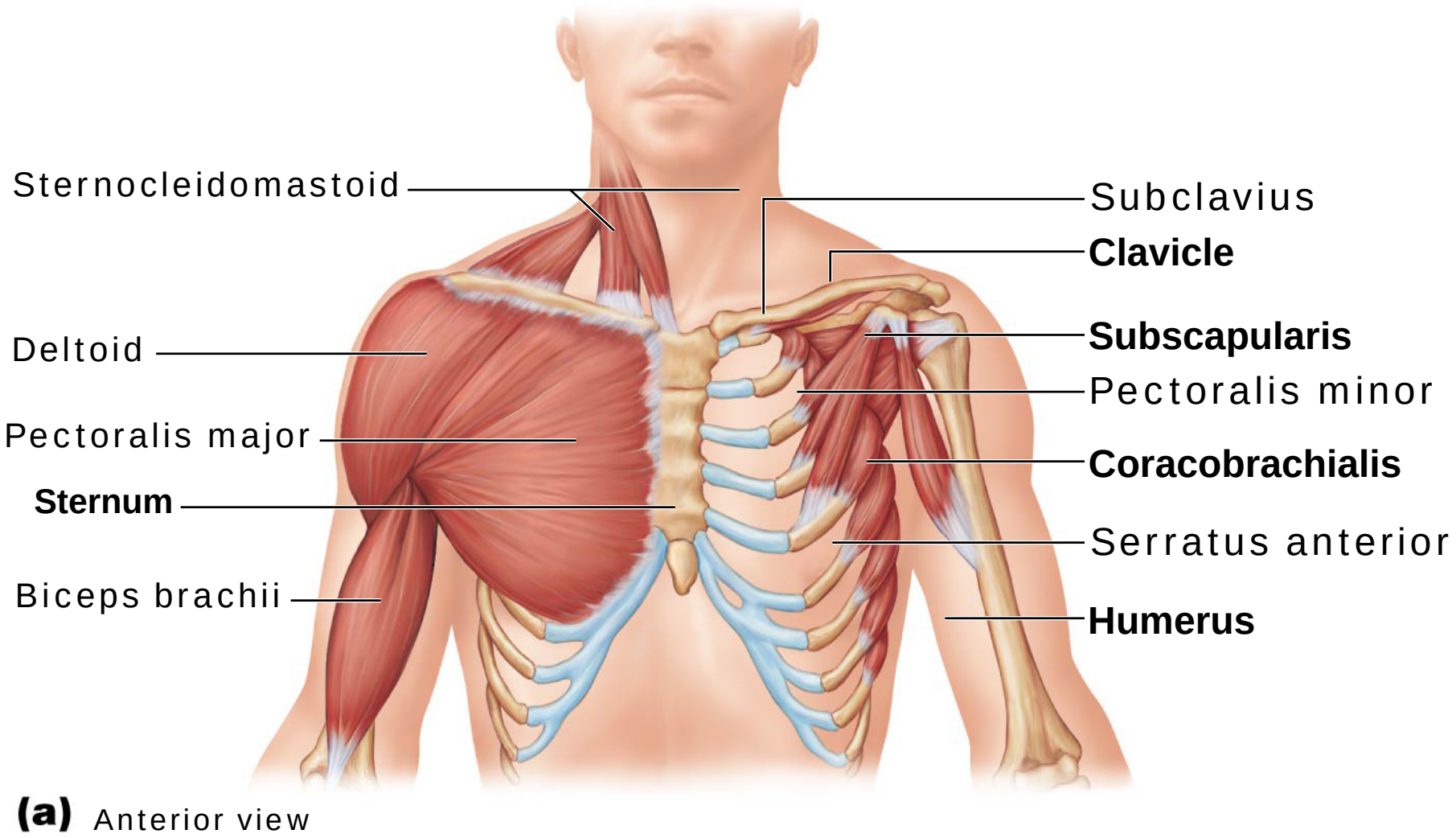
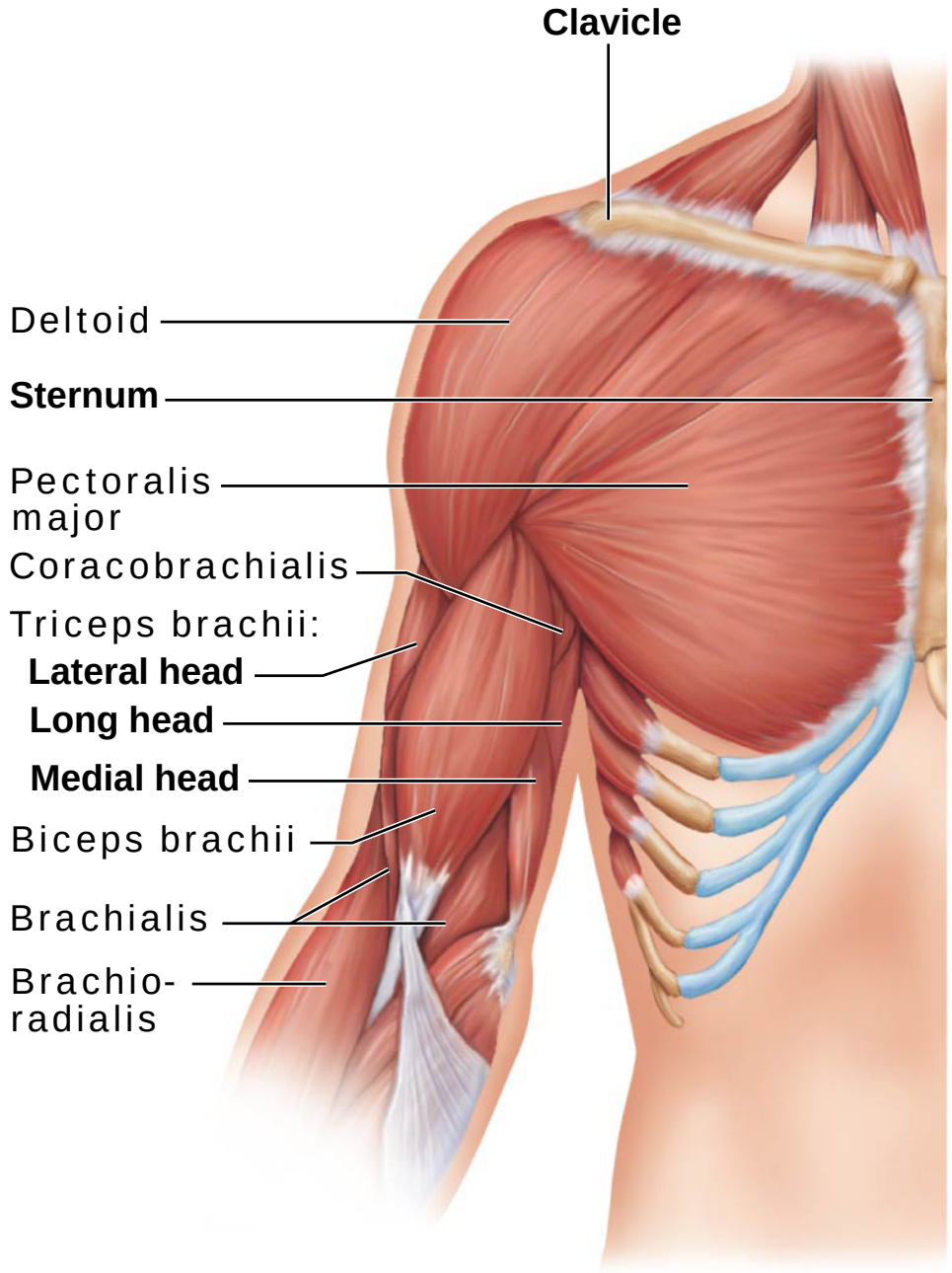


Table 10.10 Muscles Crossing the Elbow Joint: Flexion and Extension of the Forearm (Figure 10.15) *(continued)*

MUSCLE	DESCRIPTION	ORIGIN (O) AND INSERTION (I)	ACTION	NERVE SUPPLY
ANTERIOR MUSCLES				
Biceps brachii (bi′seps) (*biceps* = two heads)	Two-headed fusiform muscle; bellies unite as insertion point is approached; tendon of long head helps stabilize shoulder joint	O—short head: coracoid process; long head: supraglenoid tubercle and lip of glenoid cavity; tendon of long head runs within capsule and into intertubercular sulcus of humerus I—by common tendon into radial tuberosity	Flexes and supinates forearm; these actions usually occur at same time (e.g., when you open a bottle of wine, it turns the corkscrew and pulls the cork); weak flexor of arm at shoulder	Musculocutaneous nerve (C_5 and C_6)
Brachialis (bra′ke-al-is)	Strong muscle that is immediately deep to biceps brachii on distal humerus	O—front of distal humerus; embraces insertion of deltoid muscle I—coronoid process of ulna and capsule of elbow joint	A major forearm flexor (lifts ulna as biceps lifts the radius)	Musculocutaneous nerve
Brachioradialis (bra″ke-o-ra″de-al′is) (*radi* = radius, ray) (also see Figure 10.16)	Superficial muscle of lateral forearm; forms lateral boundary of cubital fossa; extends from distal humerus to distal forearm	O—lateral supracondylar ridge at distal end of humerus I—base of radial styloid process	Synergist in flexing forearm; acts to best advantage when forearm is partially flexed and semipronated; stabilizes elbow during rapid flexion *and* extension	Radial nerve (an important exception: the radial nerve typically serves extensor muscles)

Figure 10.15a Muscles crossing the shoulder and elbow joints, causing movements of the arm and forearm, respectively.



(a) Anterior view

Table 10.8 Superficial Muscles of the Anterior and Posterior Thorax: Movements of the Scapula and Arm (Figure 10.14) *(continued)*

MUSCLE	DESCRIPTION	ORIGIN (O) AND INSERTION (I)	ACTION	NERVE SUPPLY
MUSCLES OF THE POSTERIOR THORAX (Figure 10.14c–e)				
Trapezius (trah-pe′ze-us) (*trapezion* = irregular four-sided figure)	Most superficial muscle of posterior thorax; flat and triangular in shape; upper fibers run inferiorly to scapula; middle fibers run horizontally to scapula; lower fibers run superiorly to scapula	O—occipital bone, ligamentum nuchae, and spinous processes of C_7 and all thoracic vertebrae I—a continuous insertion along acromion and spine of scapula and lateral third of clavicle	Stabilizes, elevates, retracts, and rotates scapula; middle fibers retract (adduct) scapula; superior fibers elevate scapula (as in shrugging the shoulders) or help extend head with scapula fixed; inferior fibers depress scapula (and shoulder)	Accessory nerve (cranial nerve XI); C_3 and C_4
Levator scapulae (skap′u-le) (*levator* = raises)	Located at back and side of neck, deep to trapezius; thick straplike muscle	O—transverse processes of C_1–C_4 I—medial border of scapula, superior to spine	Elevates/adducts scapula in synergy with superior fibers of trapezius; tilts glenoid cavity downward when scapula is fixed, flexes neck to same side	Cervical spinal nerves and dorsal scapular nerve (C_3–C_5)
Rhomboids (rom′boidz)—major and minor (*rhomboid* = diamond shaped)	Two roughly diamond-shaped muscles lying deep to trapezius and inferior to levator scapulae; rhomboid minor is the more superior muscle	O—spinous processes of C_7 and T_1 (minor) and spinous processes of T_2–T_5 (major) I—medial border of scapula	Stabilize scapula; act together (and with middle trapezius fibers) to retract (adduct) scapula, thus "squaring shoulders"; rotate scapula so that glenoid cavity is downward (as when lowering arm against resistance; e.g., paddling a canoe)	Dorsal scapular nerve (C_4 and C_5)

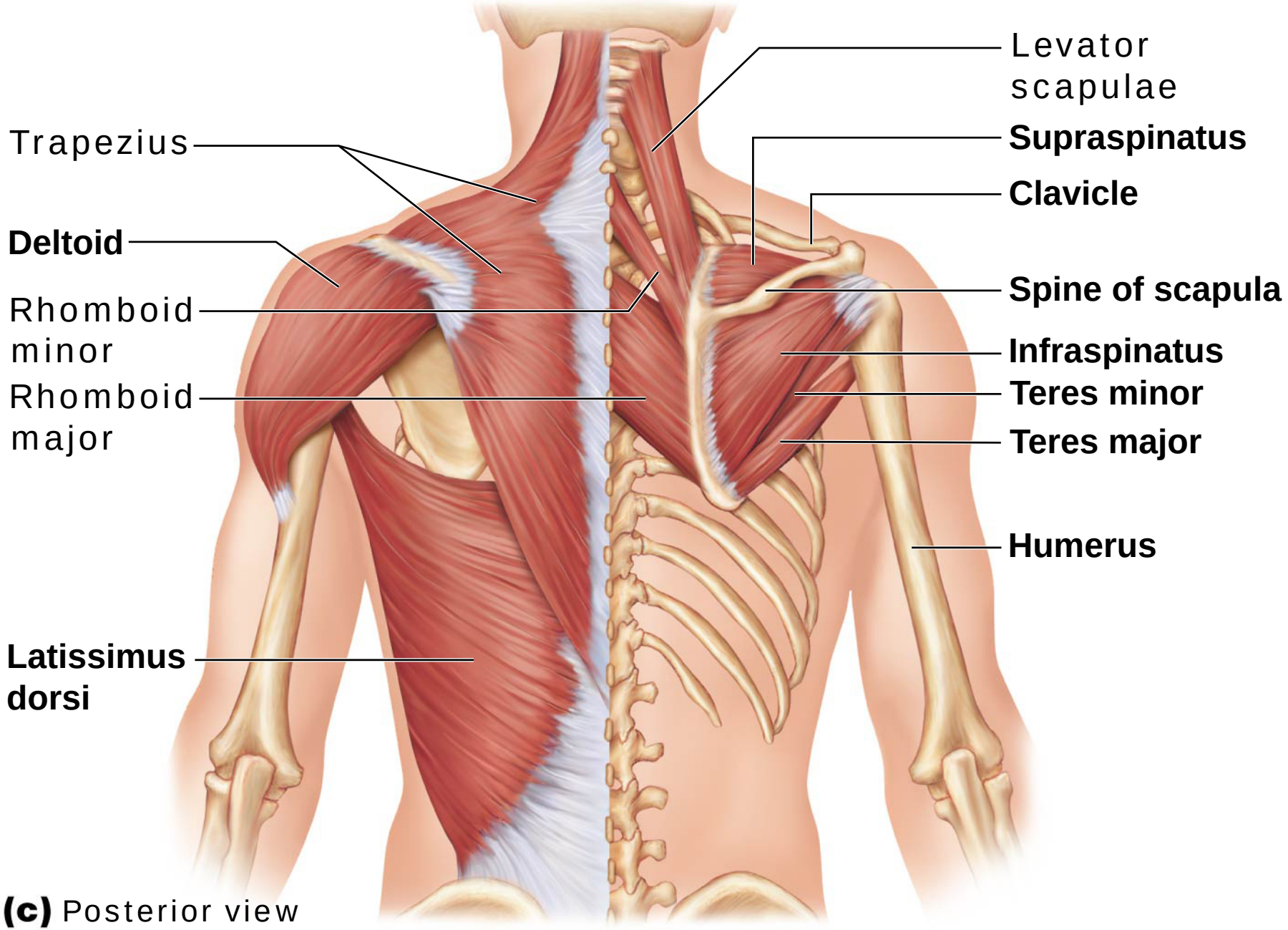
Table 10.9 Muscles Crossing the Shoulder Joint: Movements of the Arm (Humerus) (Figure 10.15) *(continued)*

MUSCLE	DESCRIPTION	ORIGIN (O) AND INSERTION (I)	ACTION	NERVE SUPPLY
Latissimus dorsi (lah-tis′ĭ-mus dor′si) (*latissimus* = widest; *dorsi* = back)	Broad, flat, triangular muscle of lower back (lumbar region); extensive superficial origins; covered by trapezius superiorly; contributes to the posterior wall of axilla	O—indirect attachment via lumbodorsal fascia into spines of lower six thoracic vertebrae, lumbar vertebrae, lower 3 to 4 ribs, and iliac crest; also from scapula's inferior angle I—spirals around teres major to insert in floor of intertubercular sulcus of humerus	Prime mover of arm extension; powerful arm adductor; medially rotates arm at shoulder; depresses scapula; plays important role in lowering arm in a power stroke, as in striking a blow, hammering, swimming, and rowing; with arms fixed overhead, it pulls the rest of the body upward and forward, as in chin-ups	Thoracodorsal nerve (C_6–C_8)
Subscapularis (sub-scap″u-lar′is) (*sub* = under; *scapular* = scapula)	Forms part of posterior wall of axilla; tendon of insertion passes in front of shoulder joint; a rotator cuff muscle	O—subscapular fossa of scapula I—lesser tubercle of humerus	Chief medial rotator of arm, assisted by pectoralis major; helps hold head of humerus in glenoid cavity, stabilizing shoulder joint	Subscapular nerves (C_5–C_7)

Table 10.9 Muscles Crossing the Shoulder Joint: Movements of the Arm (Humerus) (Figure 10.15) *(continued)*

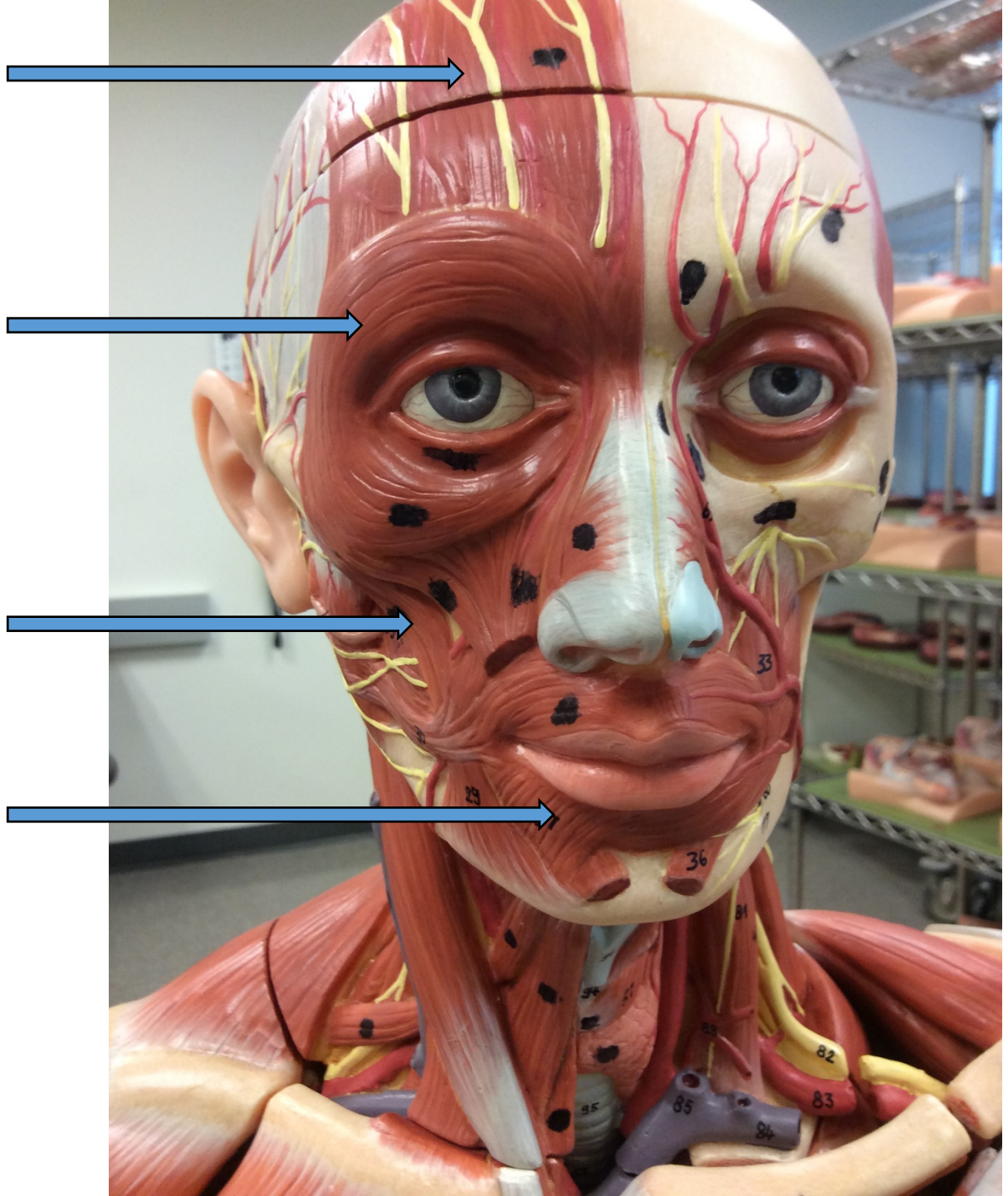
MUSCLE	DESCRIPTION	ORIGIN (O) AND INSERTION (I)	ACTION	NERVE SUPPLY
Supraspinatus (soo″prah-spi-nah′tus) (*supra* = above, over; *spin* = spine)	Named for its location on posterior aspect of scapula; deep to trapezius; a rotator cuff muscle	O—supraspinous fossa of scapula I—superior part of greater tubercle of humerus	Initiates abduction of arm, stabilizes shoulder joint; helps prevent downward dislocation of humerus, as when carrying a heavy suitcase	Suprascapular nerve
Infraspinatus (in″frah-spi-nah′tus) (*infra* = below)	Partially covered by deltoid and trapezius; named for its scapular location; a rotator cuff muscle	O—infraspinous fossa of scapula I—greater tubercle of humerus posterior to insertion of supraspinatus	Rotates arm laterally; helps hold head of humerus in glenoid cavity, stabilizing the shoulder joint	Suprascapular nerve
Teres minor (te′rēz) (*teres* = round; *minor* = lesser)	Small, elongated muscle; lies inferior to infraspinatus and may be inseparable from that muscle; a rotator cuff muscle	O—lateral border of dorsal scapular surface I—greater tubercle of humerus inferior to infraspinatus insertion	Same action(s) as infraspinatus muscle	Axillary nerve
Teres major	Thick, rounded muscle; located inferior to teres minor; helps form posterior wall of axilla (along with latissimus dorsi and subscapularis)	O—posterior surface of scapula at inferior angle I—crest of lesser tubercle on anterior humerus; insertion tendon fused with that of latissimus dorsi	Extends, medially rotates, and adducts arm; synergist of latissimus dorsi	Lower subscapular nerve (C_6 and C_7)
Coracobrachialis (kor″ah-ko-bra″ke-al′is) (*coraco* = coracoid; *brachi* = arm)	Small, cylindrical muscle	O—coracoid process of scapula I — medial surface of humerus shaft	Flexes and adducts arm; synergist of pectoralis major	Musculocutaneous nerve (C_5–C_7)

Figure 10.14c Superficial muscles of the thorax and shoulder acting on the scapula and arm.



Use the following pictures to help you practice finding the terms from the lab term handout on unlabeled images.

- Remember, you won't learn them if you don't take plenty of time to practice!
- Also, be sure to mix up the order once you get comfortable with the unlabeled slides.
- Over the weekend, once you are feeling confident with the pictures here, do the muscle model quizzes in PAL (from the Pearson website) to get practice with new pictures that you haven't seen.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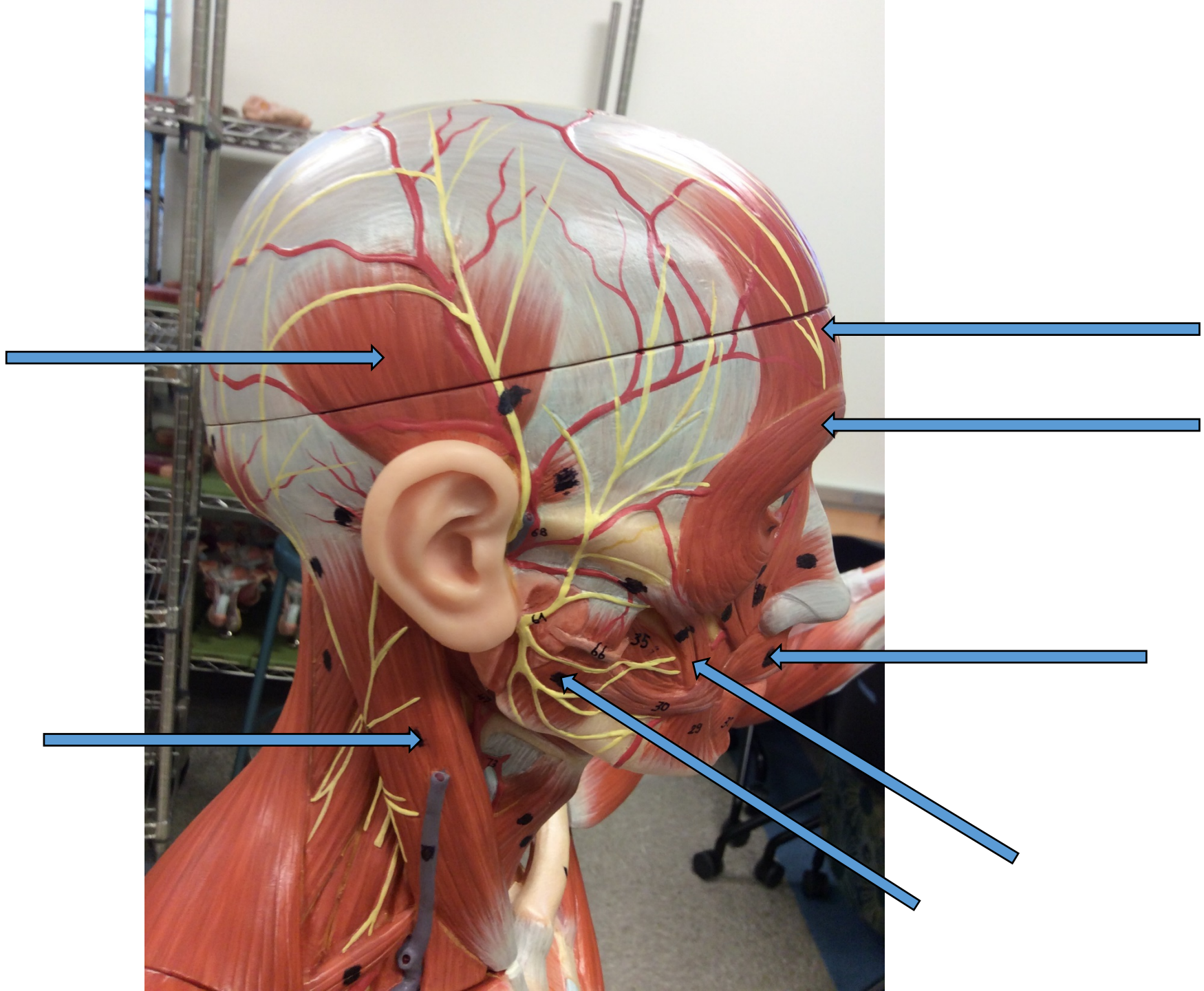
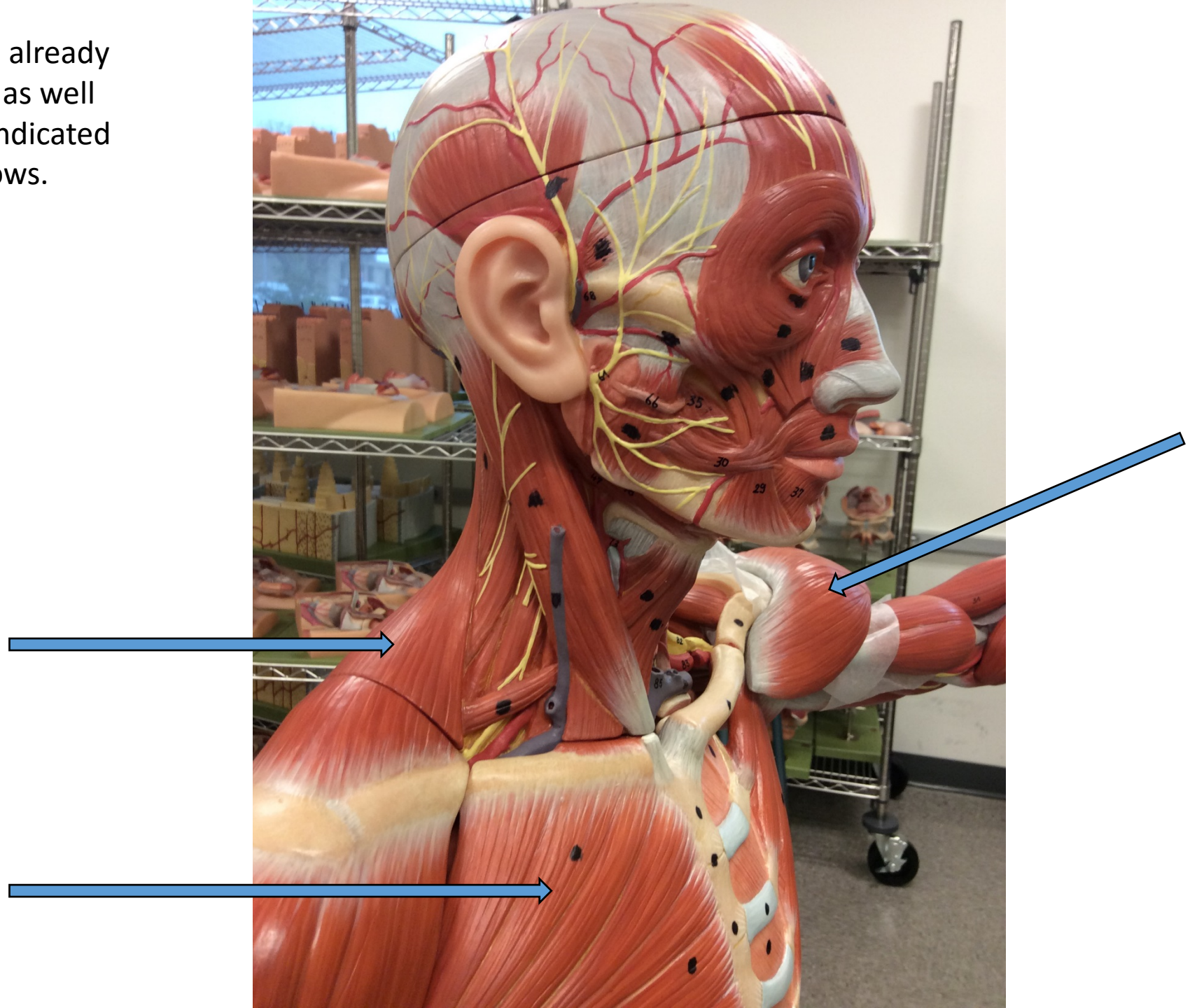
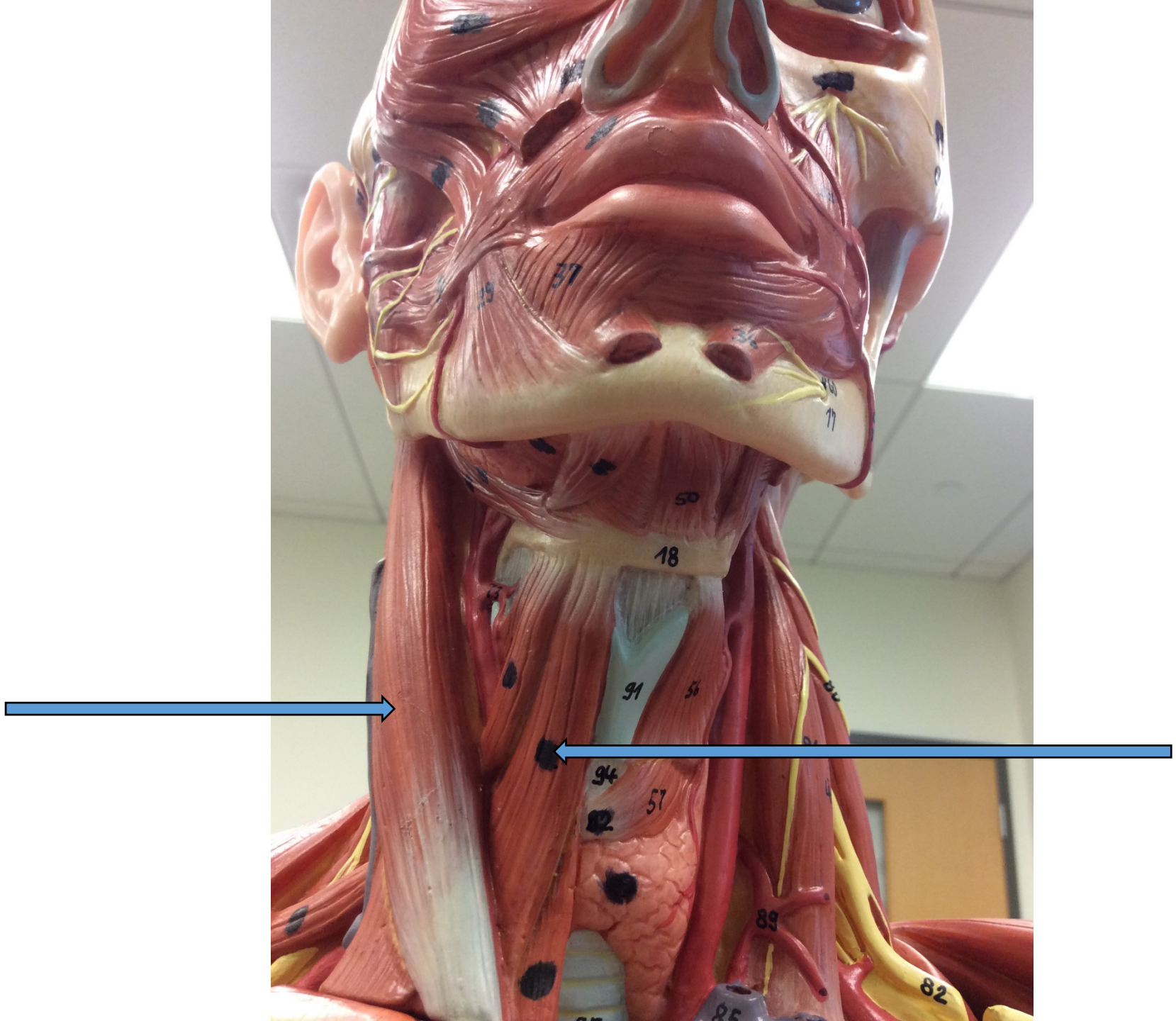


Identify muscles already identified here as well as the muscles indicated by new arrows.

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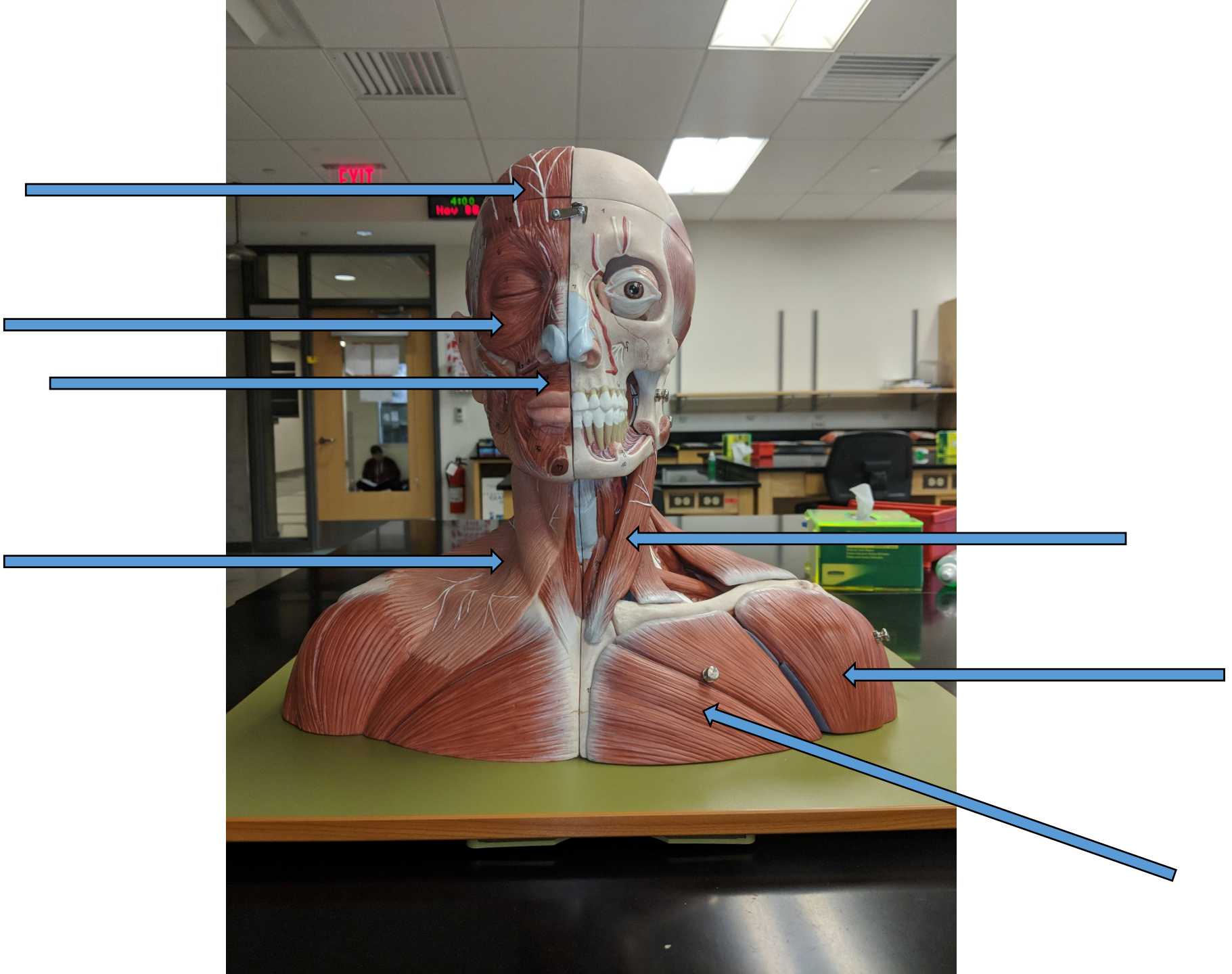
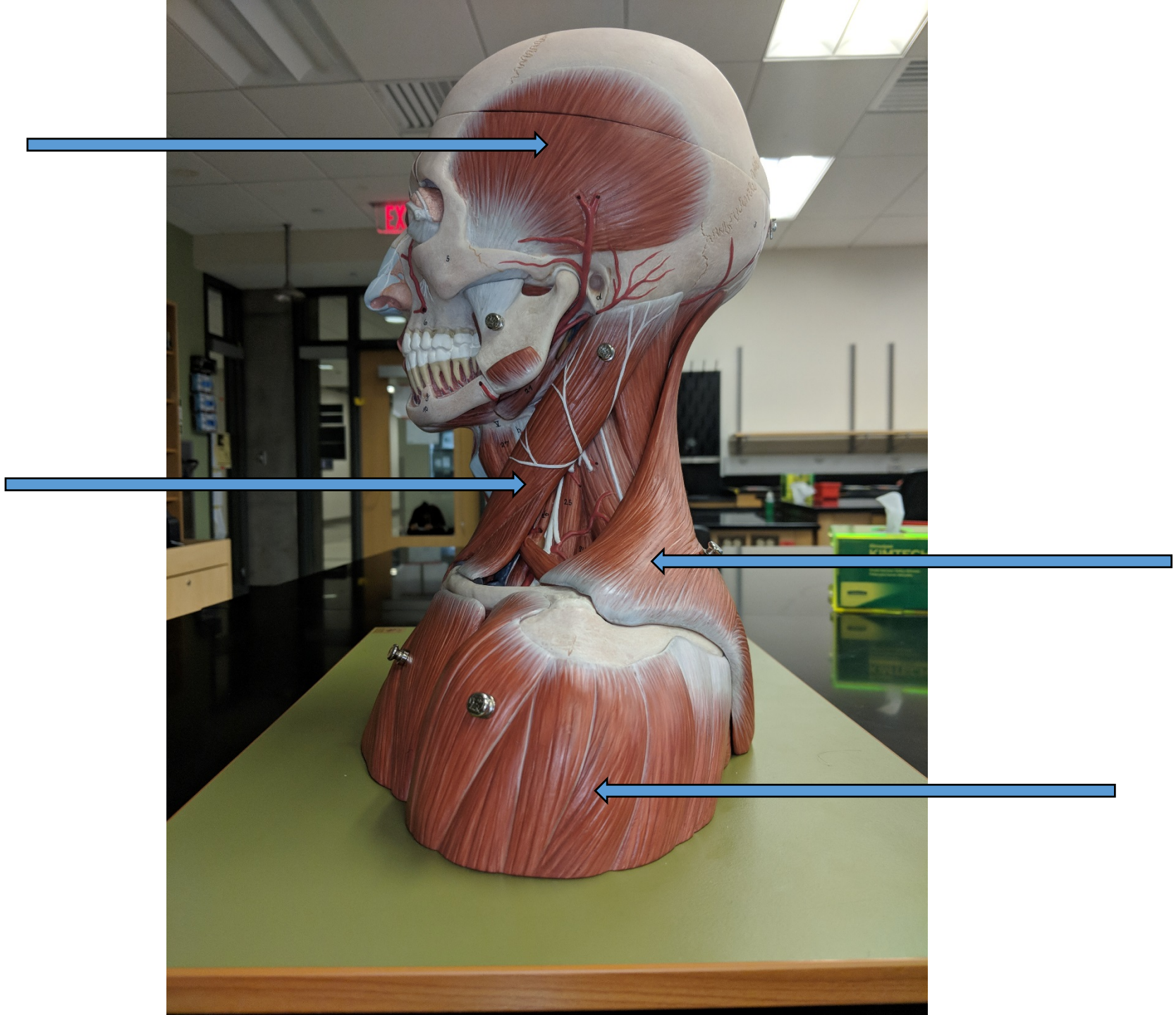
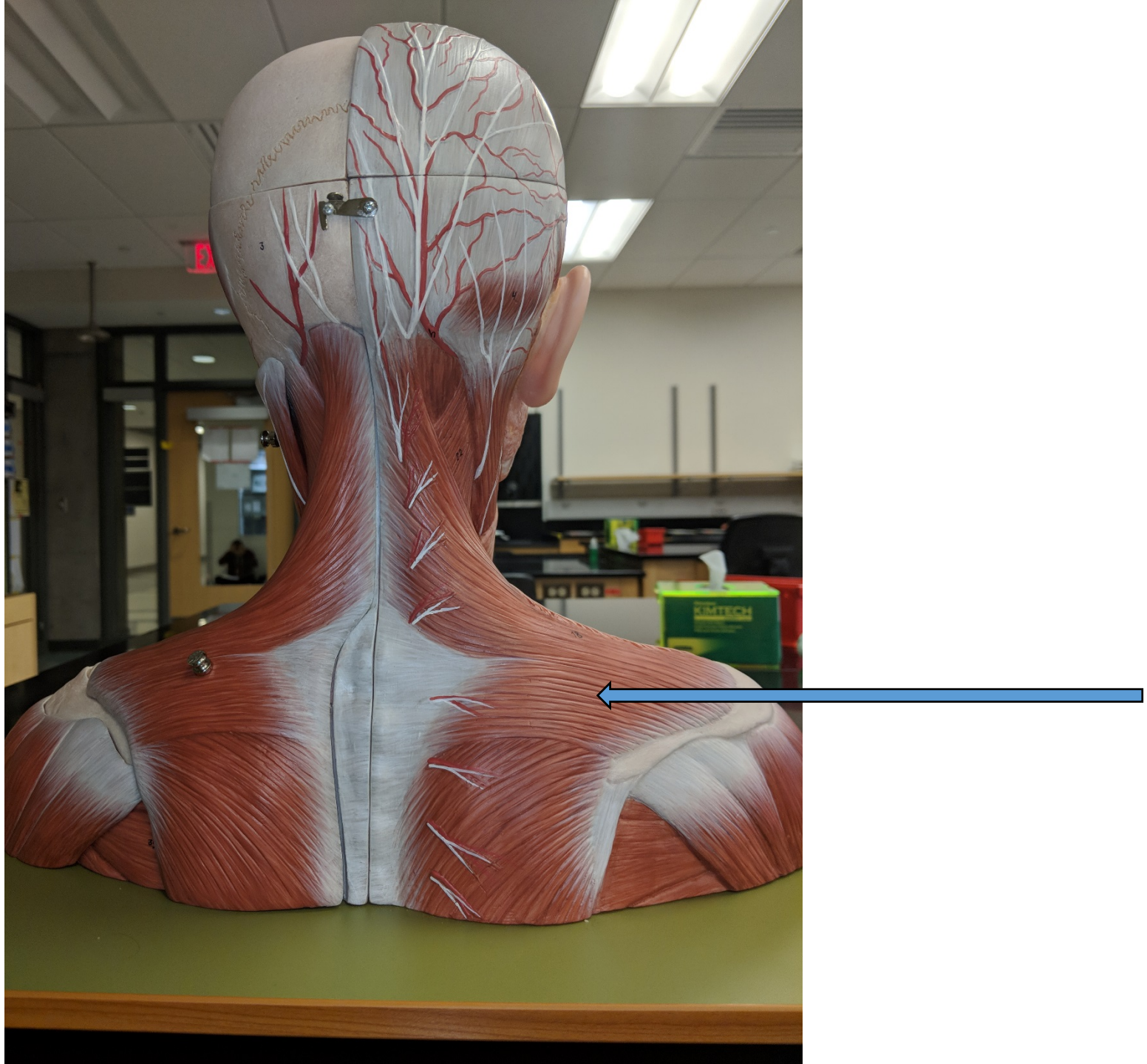
Group of 3 muscles. You need to know the name of the group.



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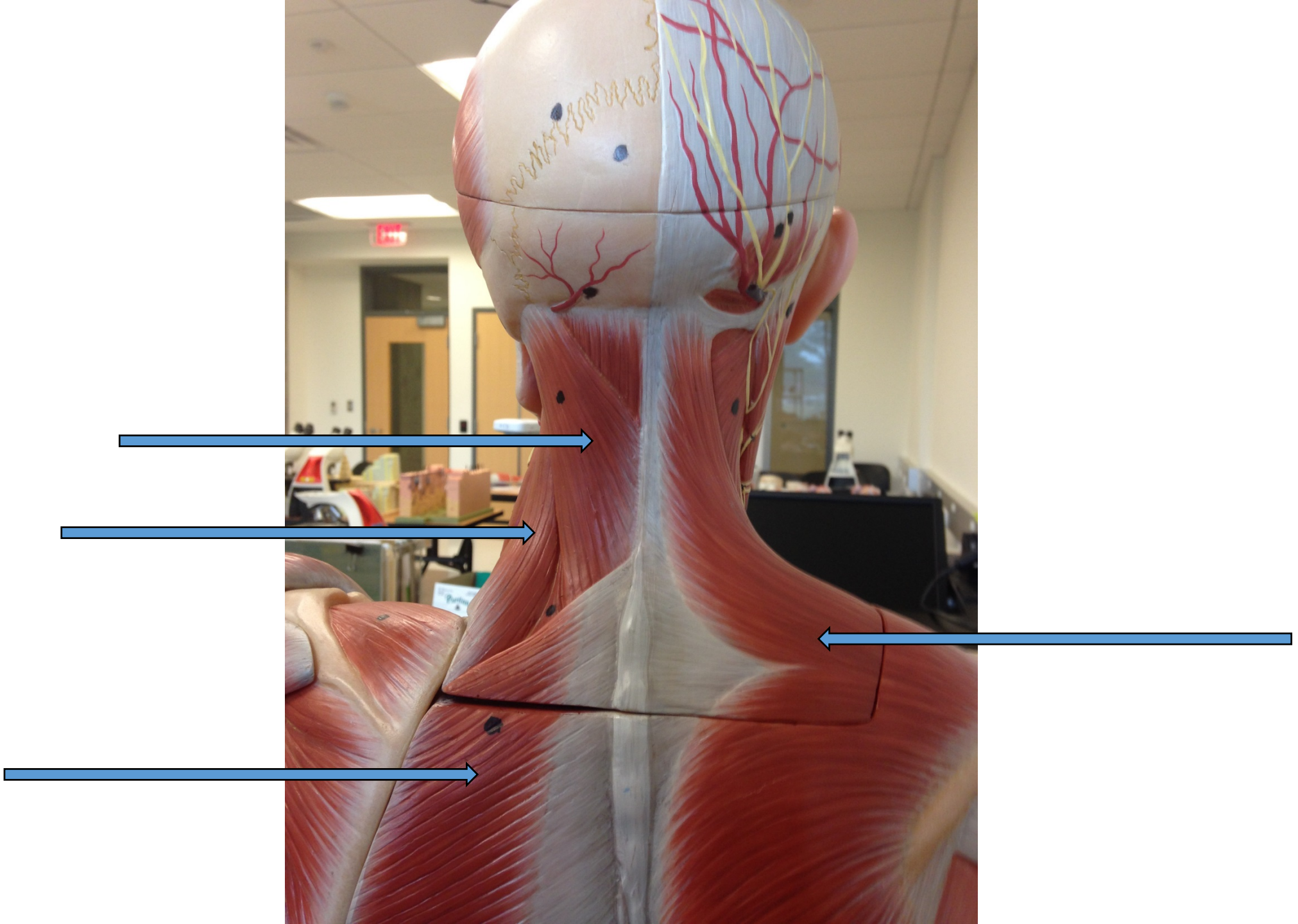
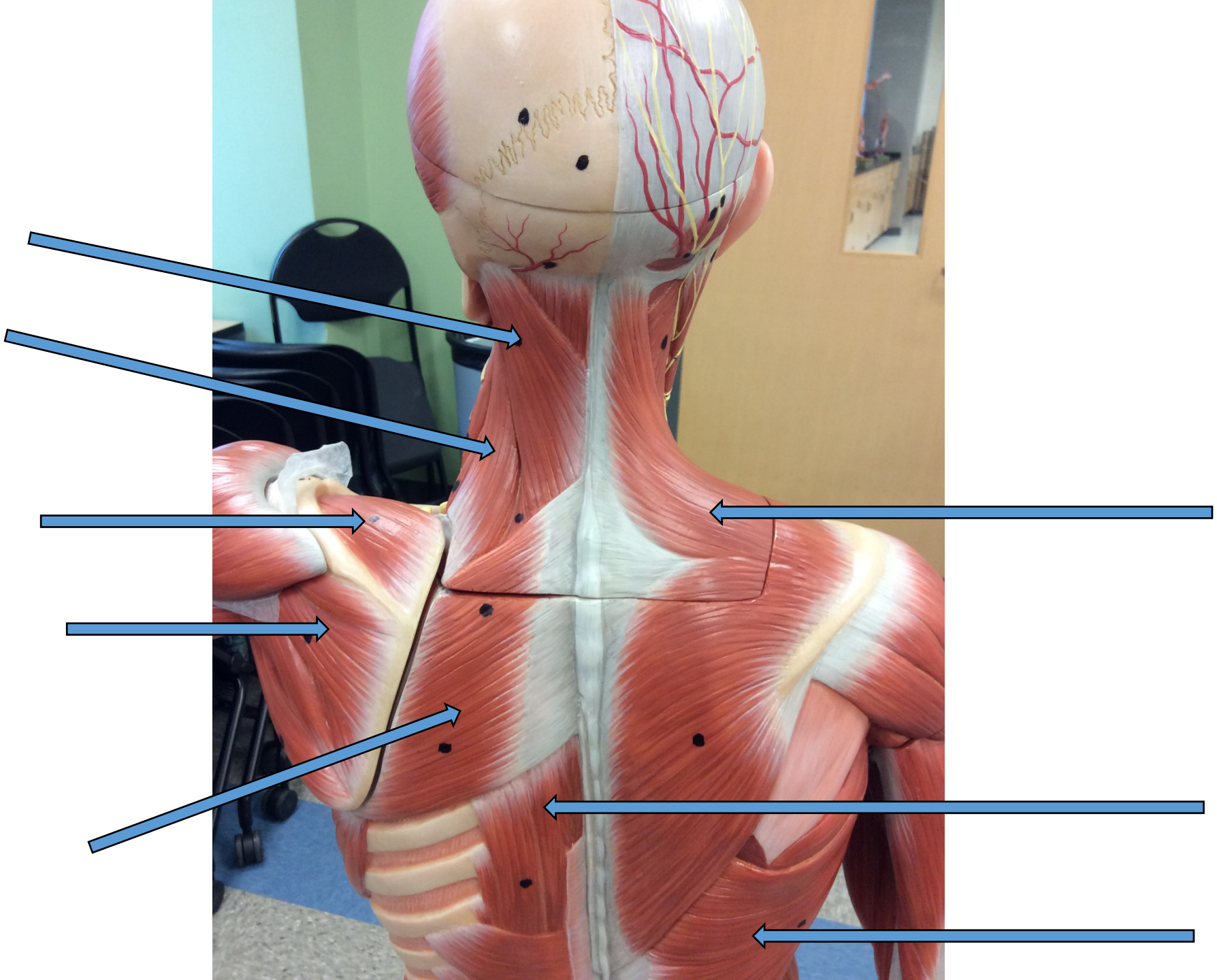
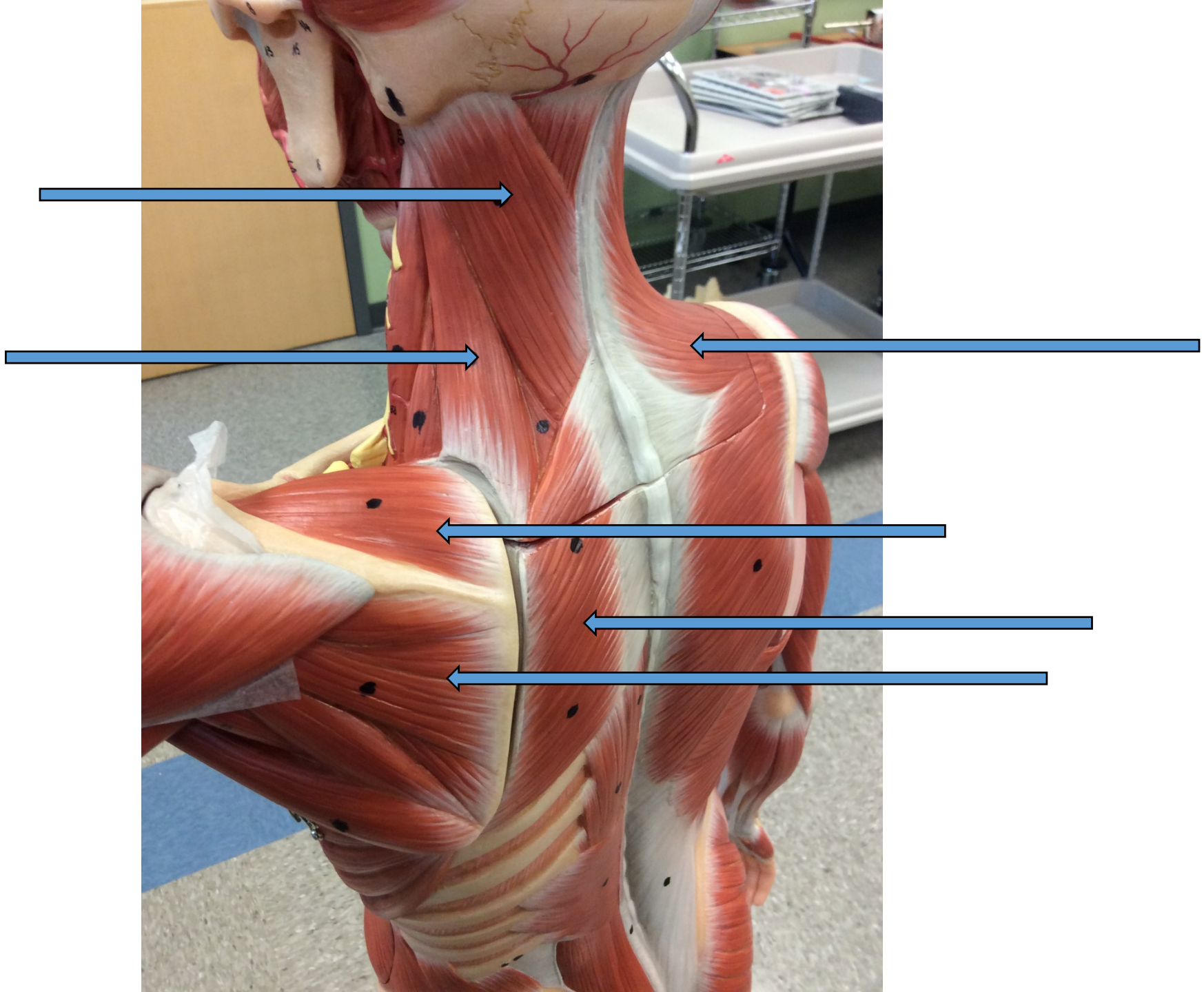
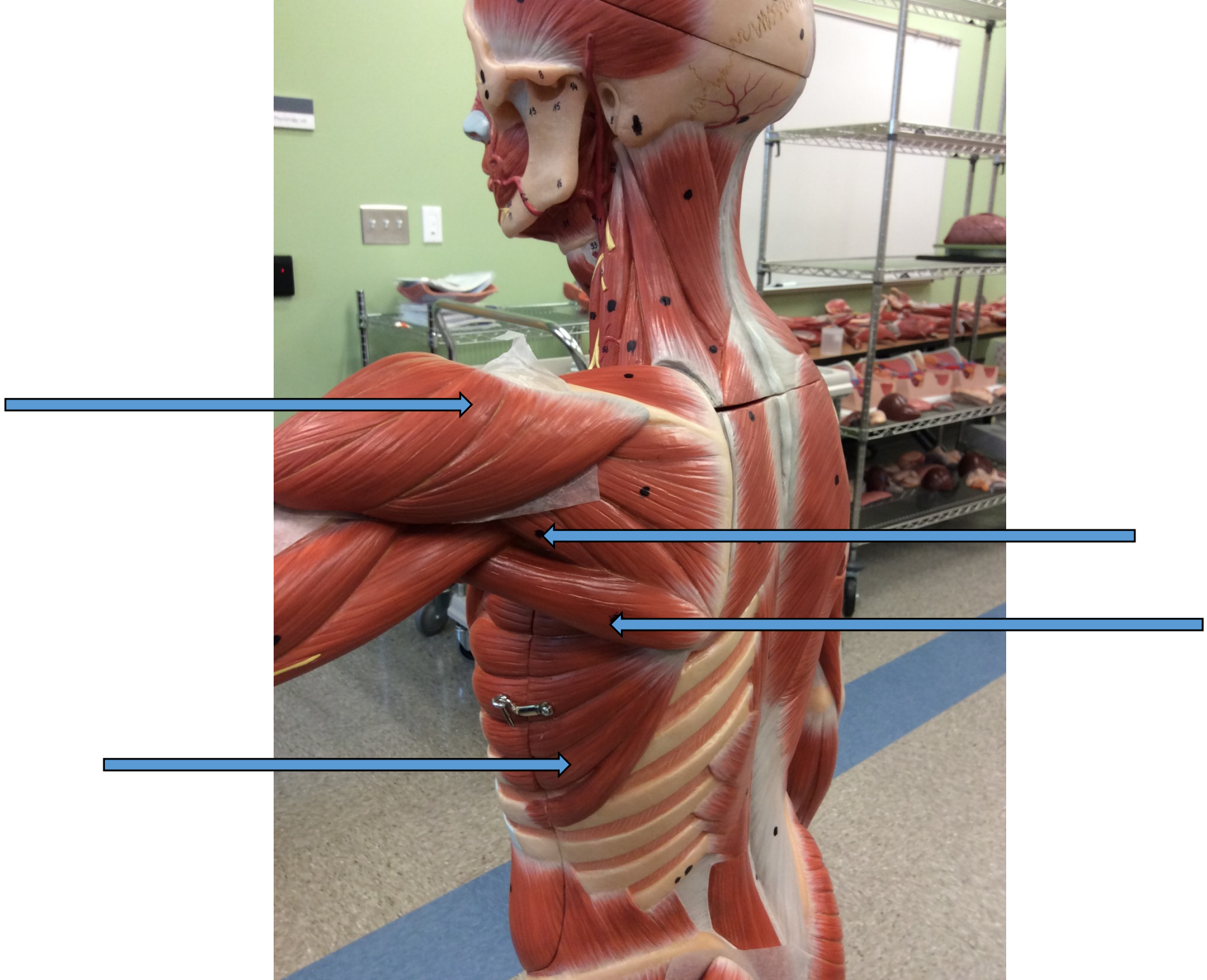
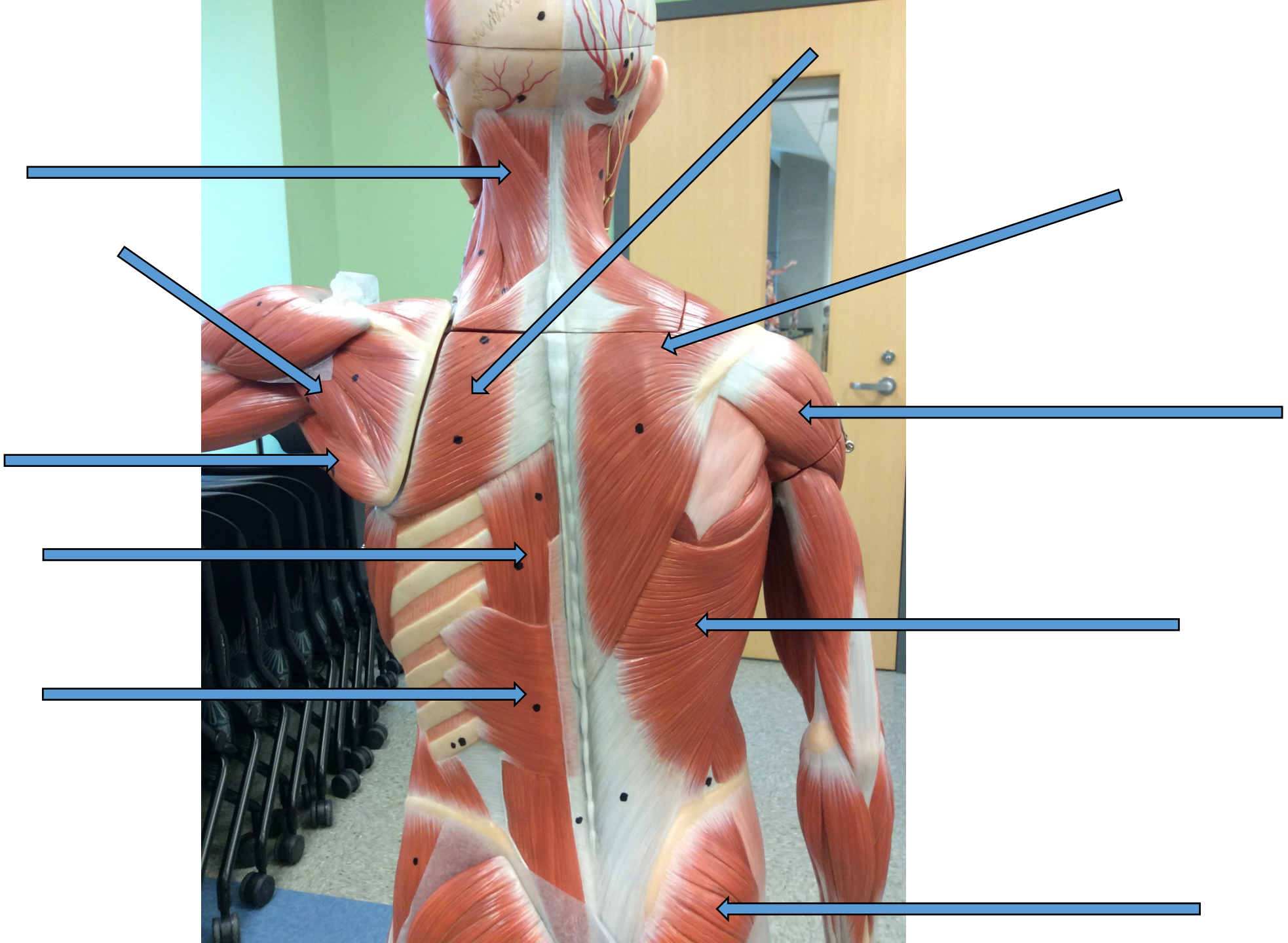


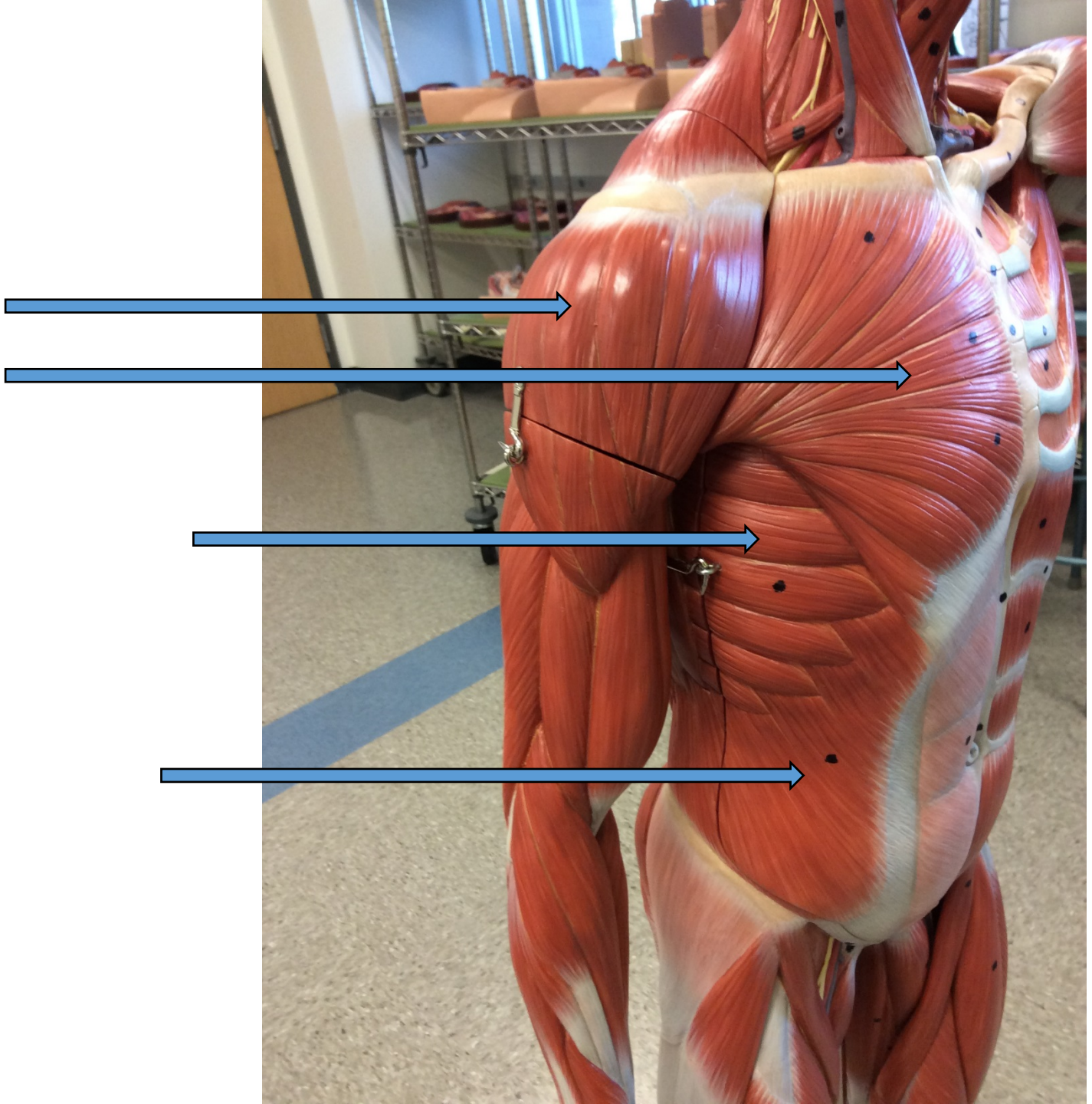
Find same muscles as previous picture.

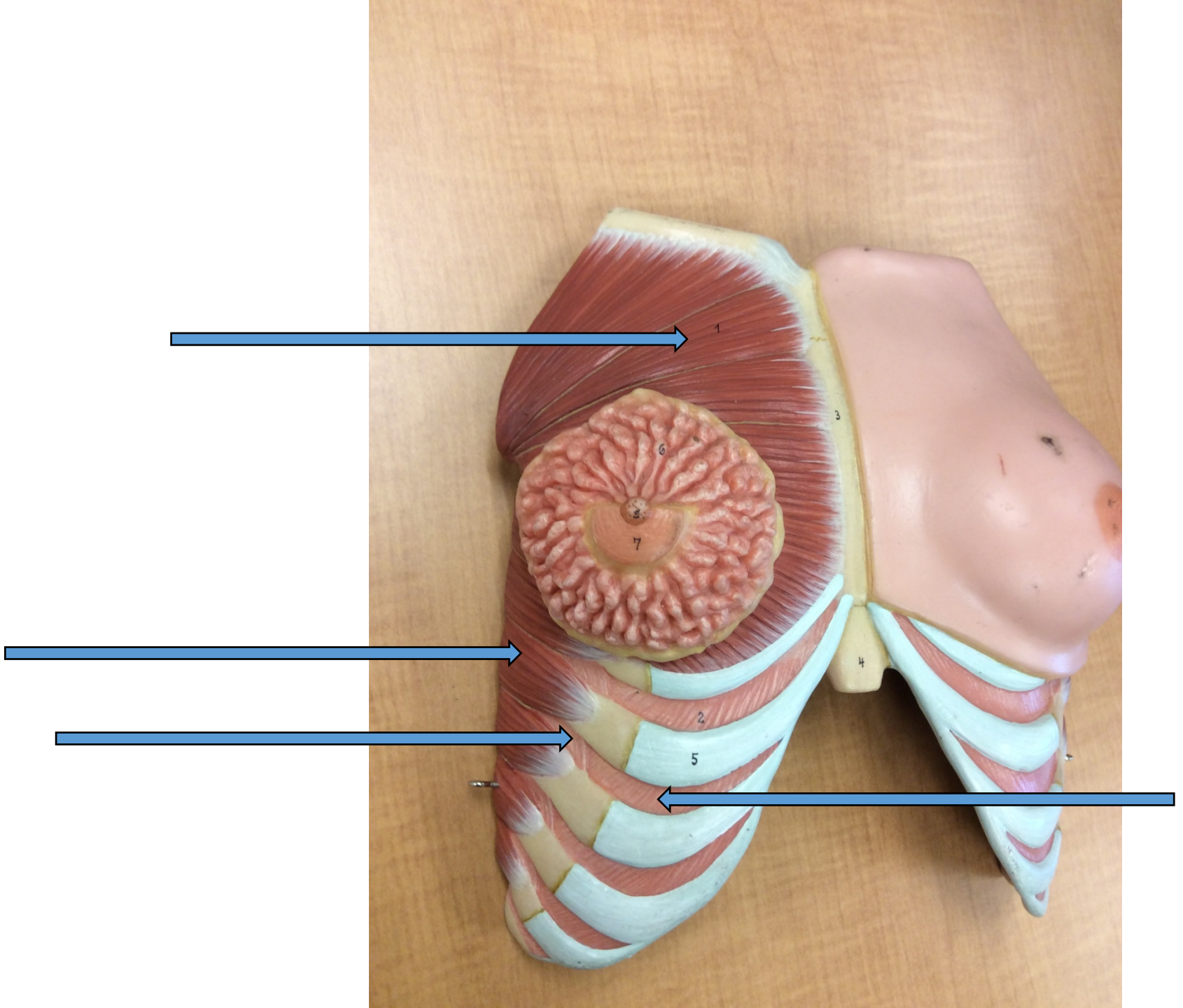








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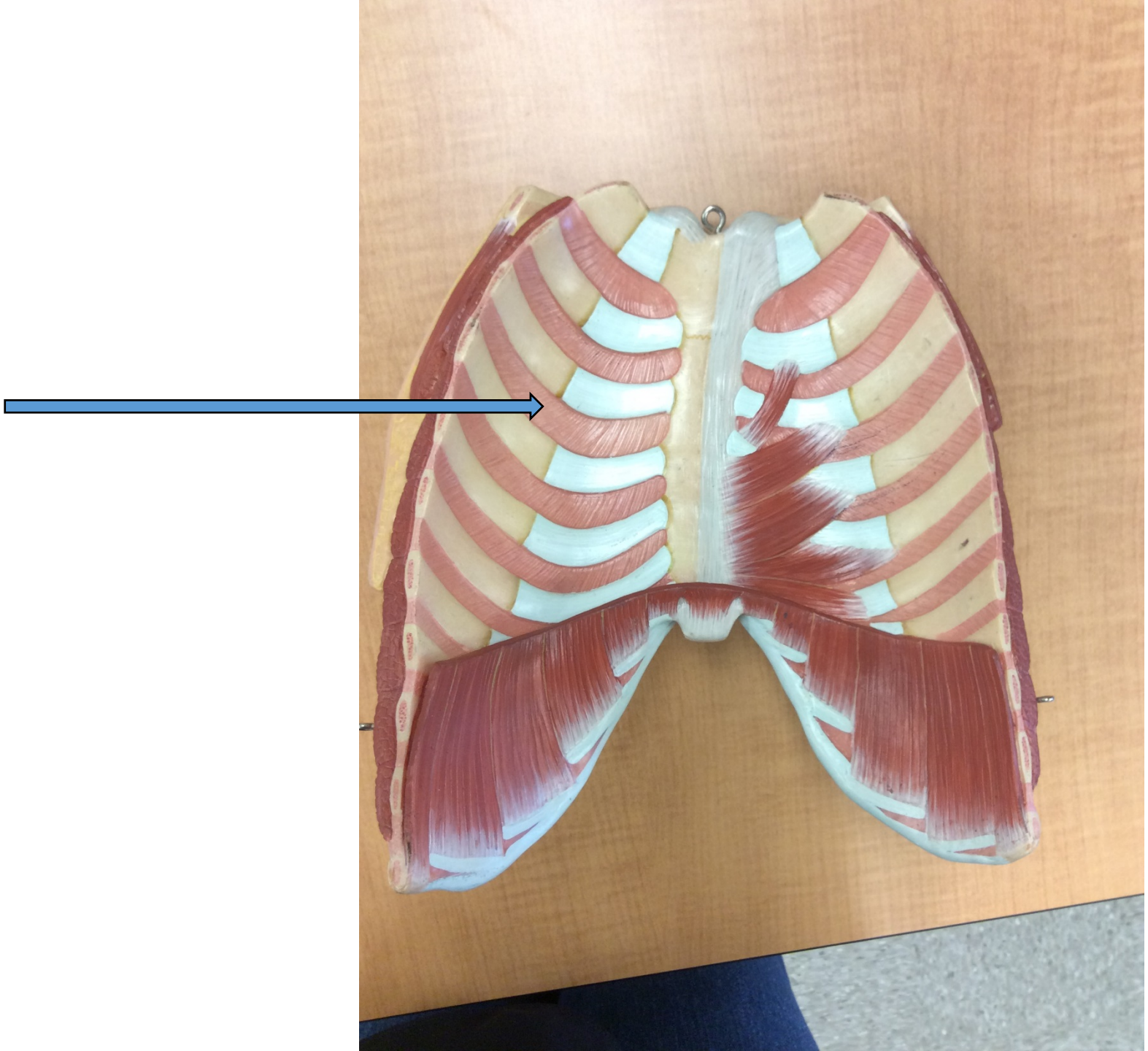
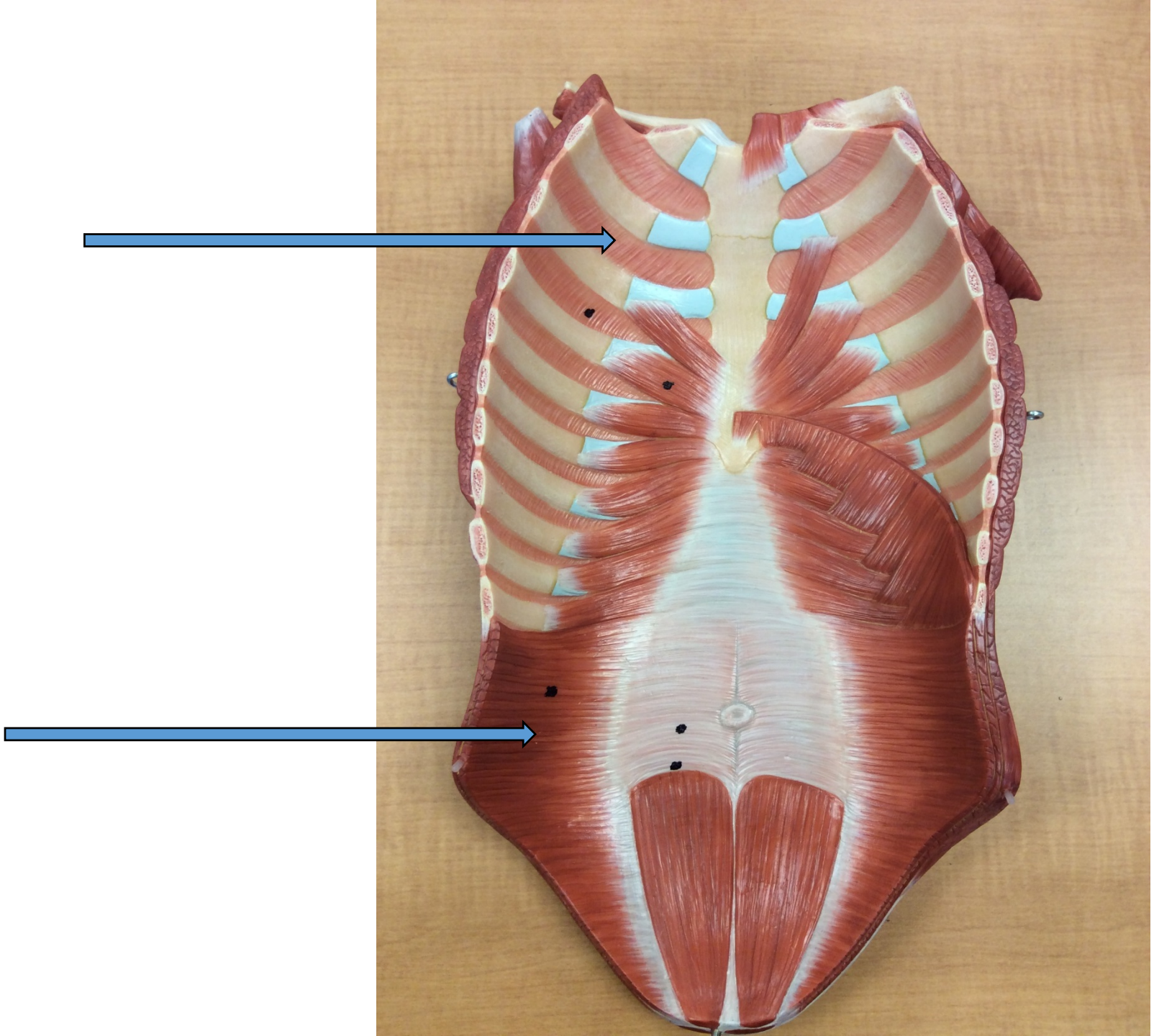
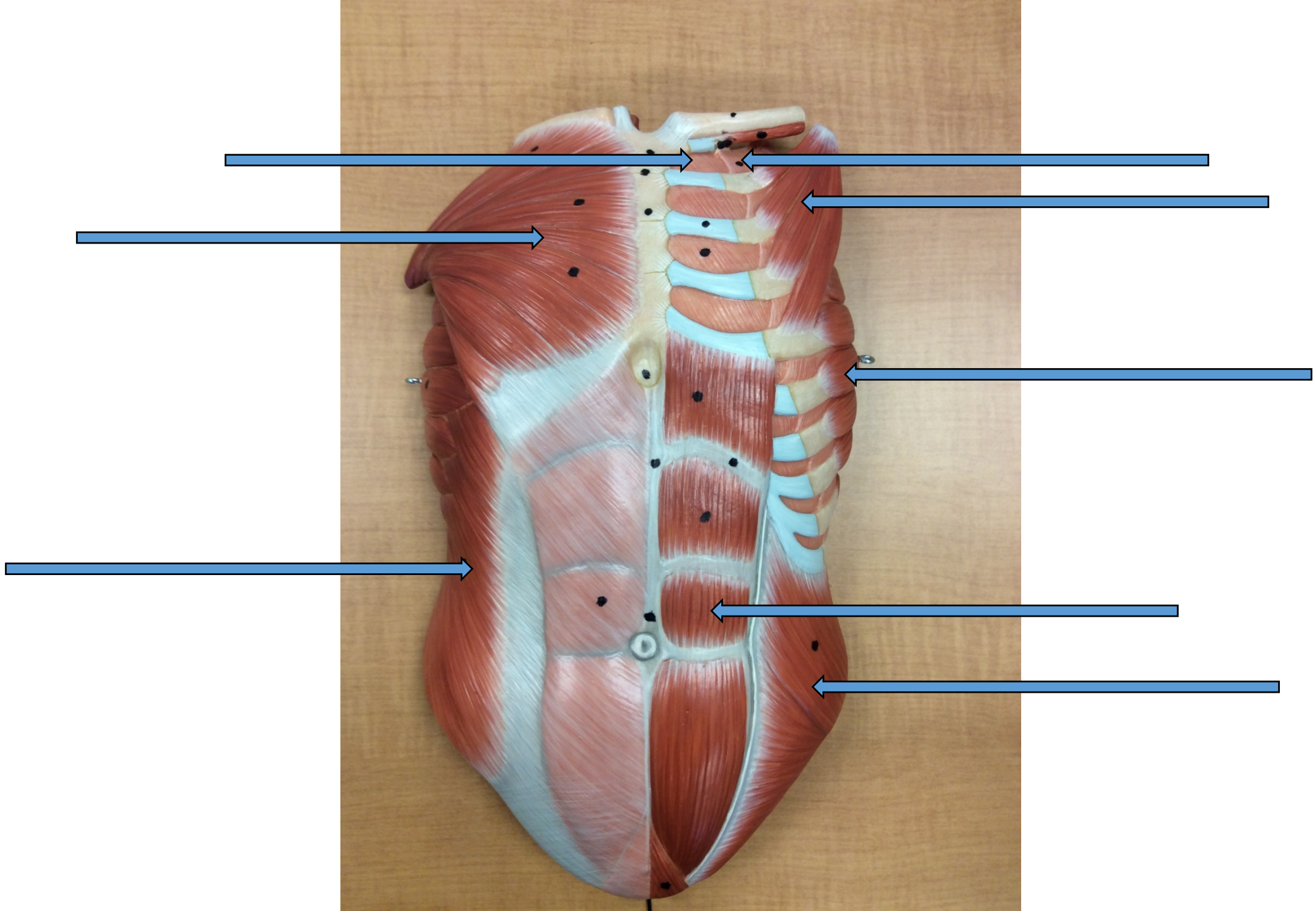
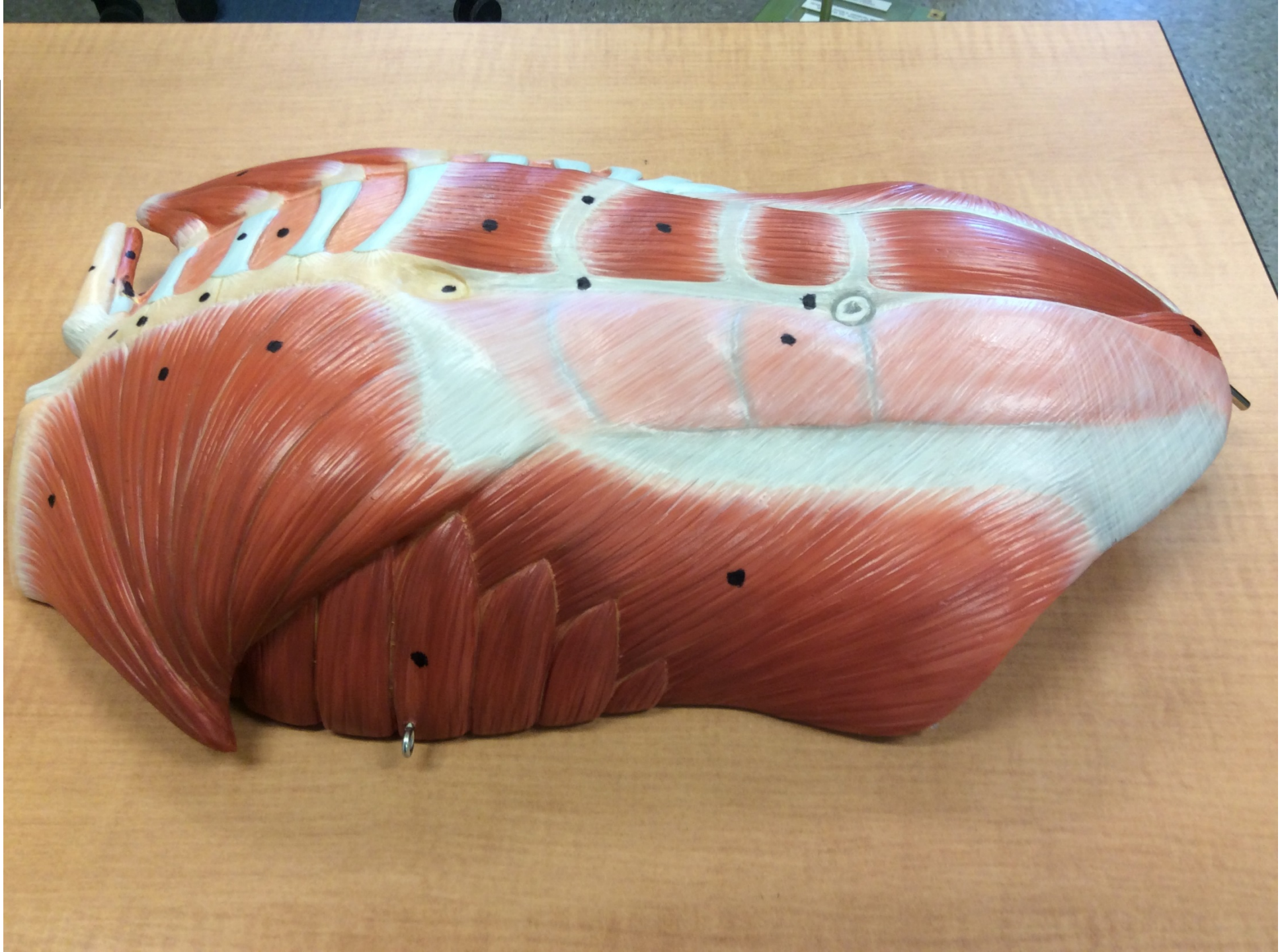


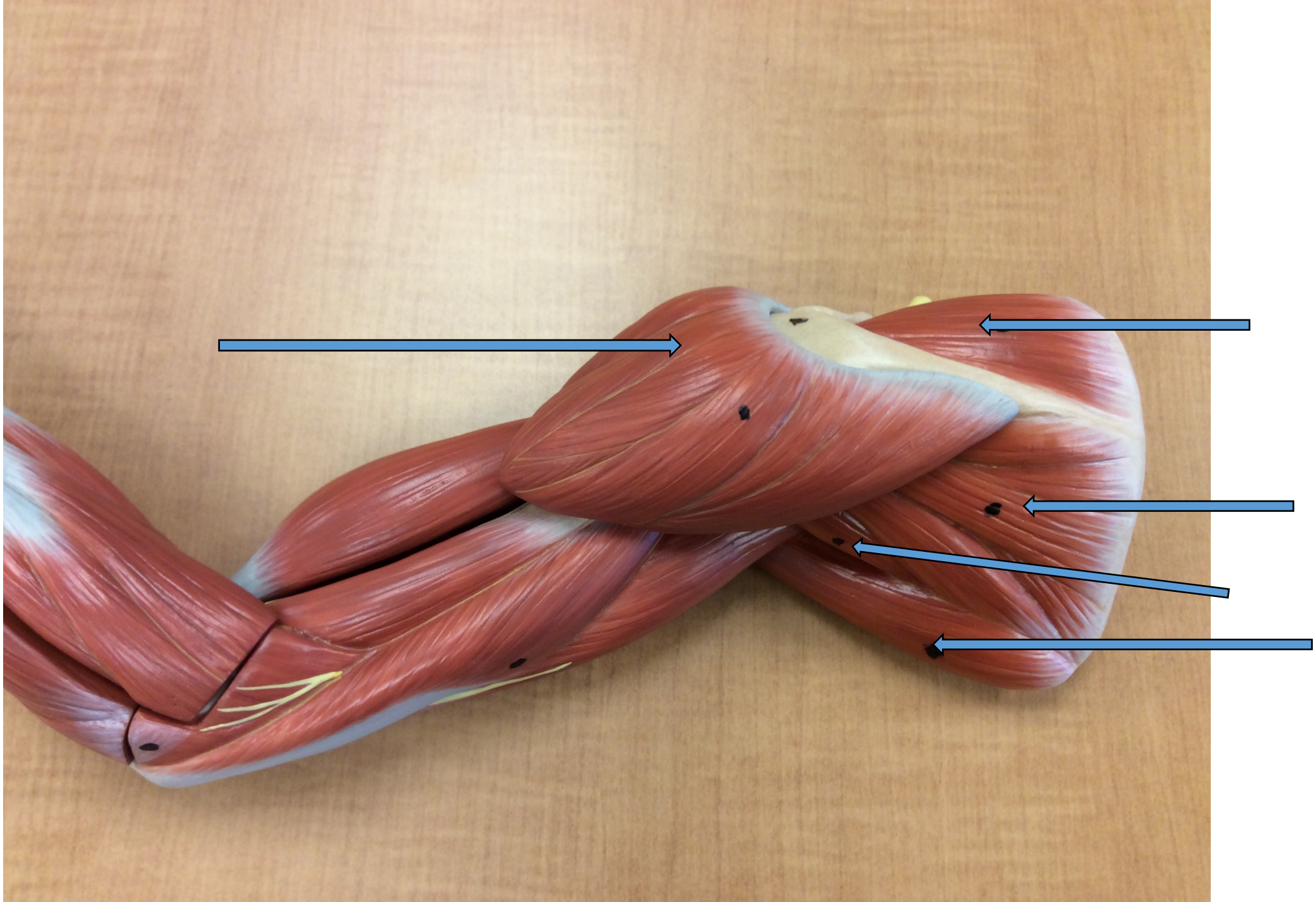


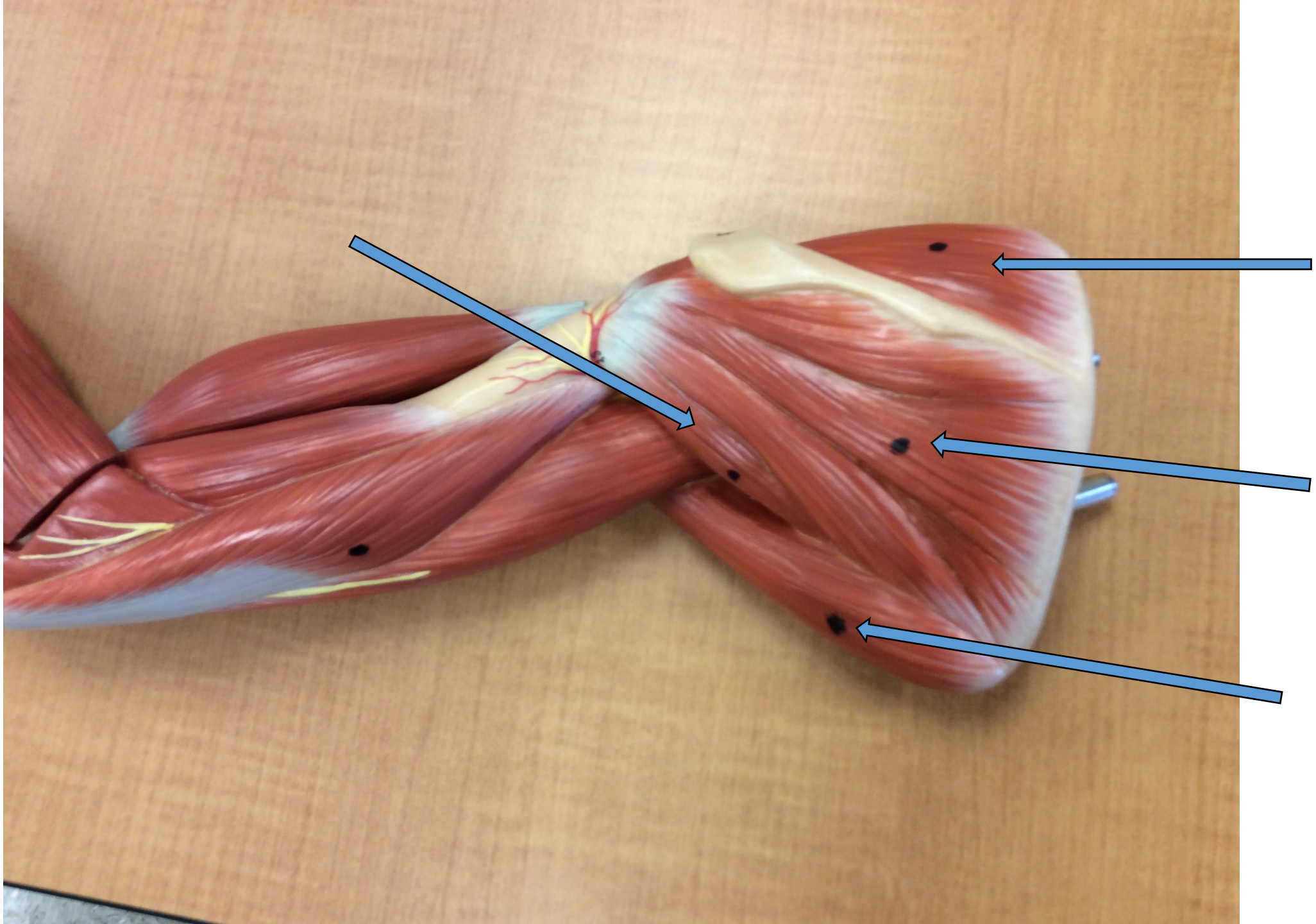


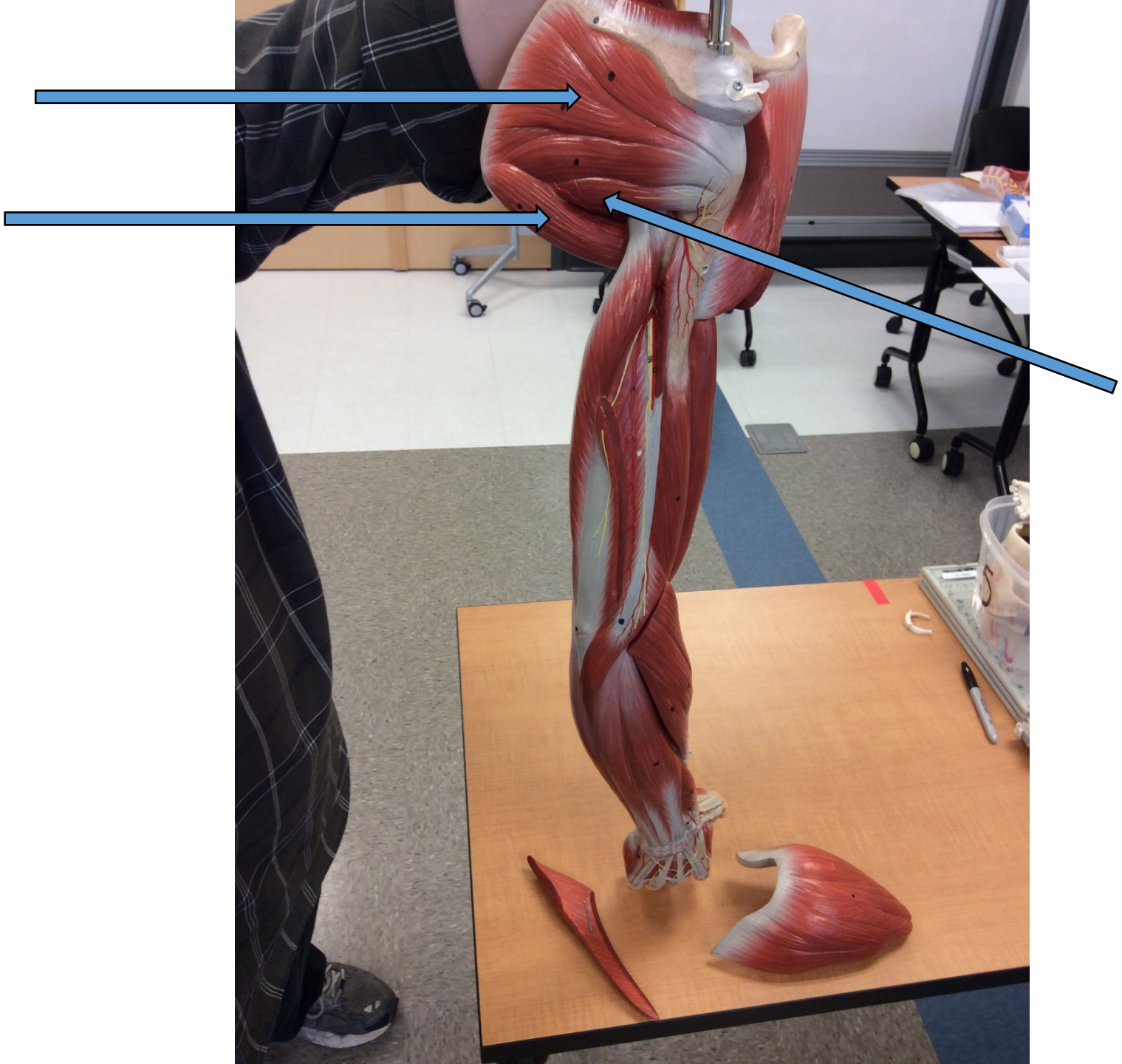
Find muscles previously identified.

Find muscles previously identified.









Use the following pictures to help you identify terms from the lab term handout.

Another good resource is the Visible Body ATLAS app: http://atlas.visiblebody.com

Don't forget that to use the link to download to a personal device, the device must first be connected to the MCPA Wi-Fi at the Rockville campus.

***There are a LOT of muscles…you DO NOT need to learn them all so only focus on the ones from the Unit 3 Terms handout!!

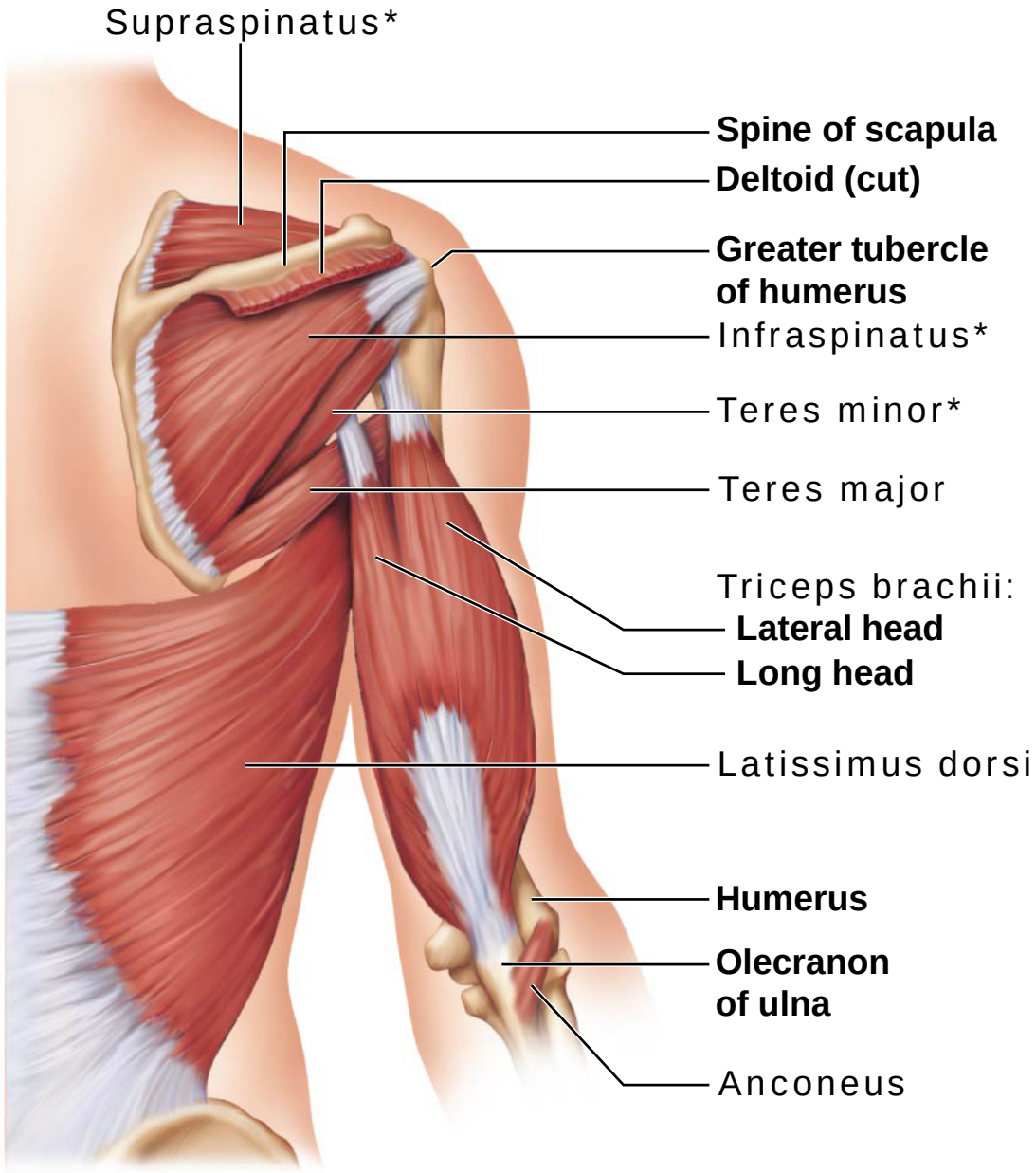
Muscles of the Upper Limbs (Arm)

Table 10.10-1 Muscles Crossing the Elbow Joint: Flexion and Extension of the Forearm

Table 10.10 Muscles Crossing the Elbow Joint: Flexion and Extension of the Forearm (Figure 10.15)

MUSCLE	DESCRIPTION	ORIGIN (O) AND INSERTION (I)	ACTION	NERVE SUPPLY
POSTERIOR MUSCLES				
Triceps brachii (tri′seps bra′ke-i) (*triceps* = three heads; *brachi* = arm)	Large fleshy muscle; the only muscle of posterior compartment of arm; three-headed origin; long and lateral heads lie superficial to medial head	O—long head: infraglenoid tubercle of scapula; lateral head: posterior shaft of humerus; medial head: posterior humeral shaft distal to radial groove I—by common tendon into olecranon of ulna	Powerful forearm extensor (prime mover, particularly medial head); antagonist of forearm flexors; long and lateral heads mainly active in extending the forearm against resistance; long head tendon may help stabilize shoulder joint and assist in arm adduction	Radial nerve (C_6–C_8)
Anconeus (an-ko′ne-us) (*ancon* = elbow) (see Figure 10.17)	Short triangular muscle; partially blended with distal end of triceps on posterior humerus	O—lateral epicondyle of humerus I—lateral aspect of olecranon of ulna	May control ulnar abduction during forearm pronation; synergist of triceps brachii in elbow extension	Radial nerve

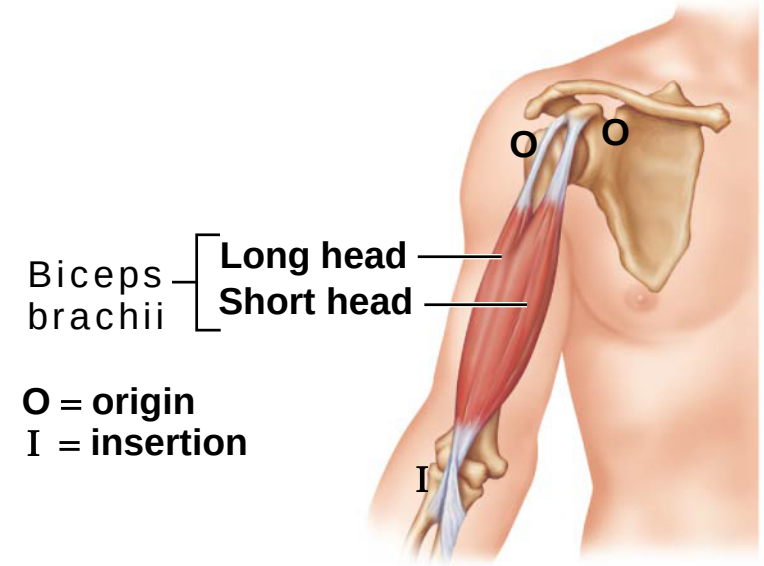
Figure 10.15b Muscles crossing the shoulder and elbow joints, causing movements of the arm and forearm, respectively.



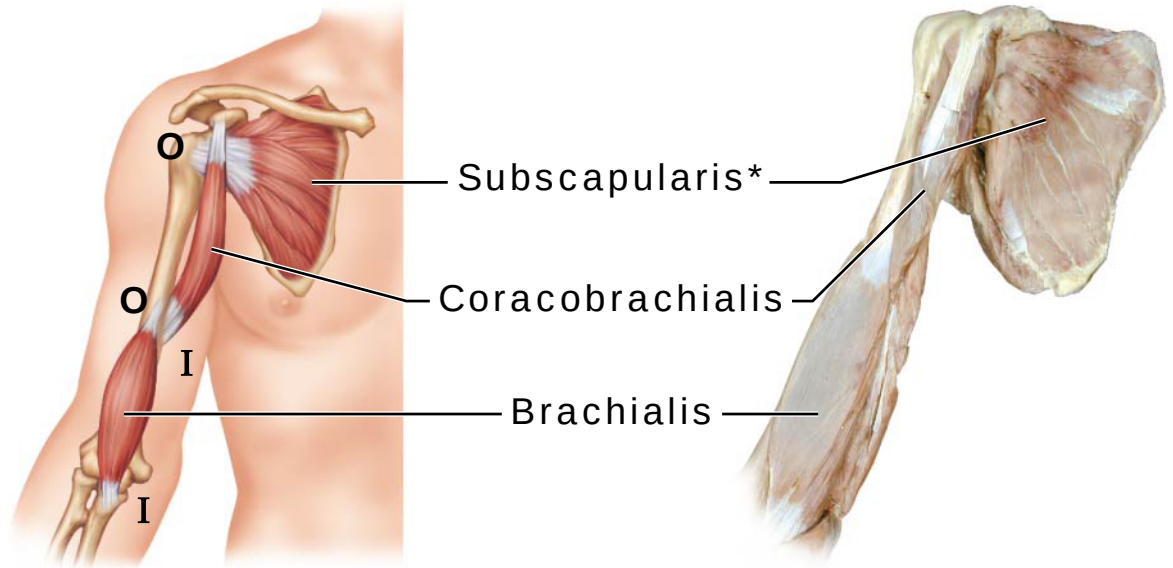
(b) Posterior view

***Rotator cuff muscles**

Figure 10.15c-d Muscles crossing the shoulder and elbow joints, causing movements of the arm and forearm, respectively.



(c) Anterior view



(d) Anterior view

***Rotator cuff muscles**

Figure 10.15c Muscles crossing the shoulder and elbow joints, causing movements of the arm and forearm, respectively.

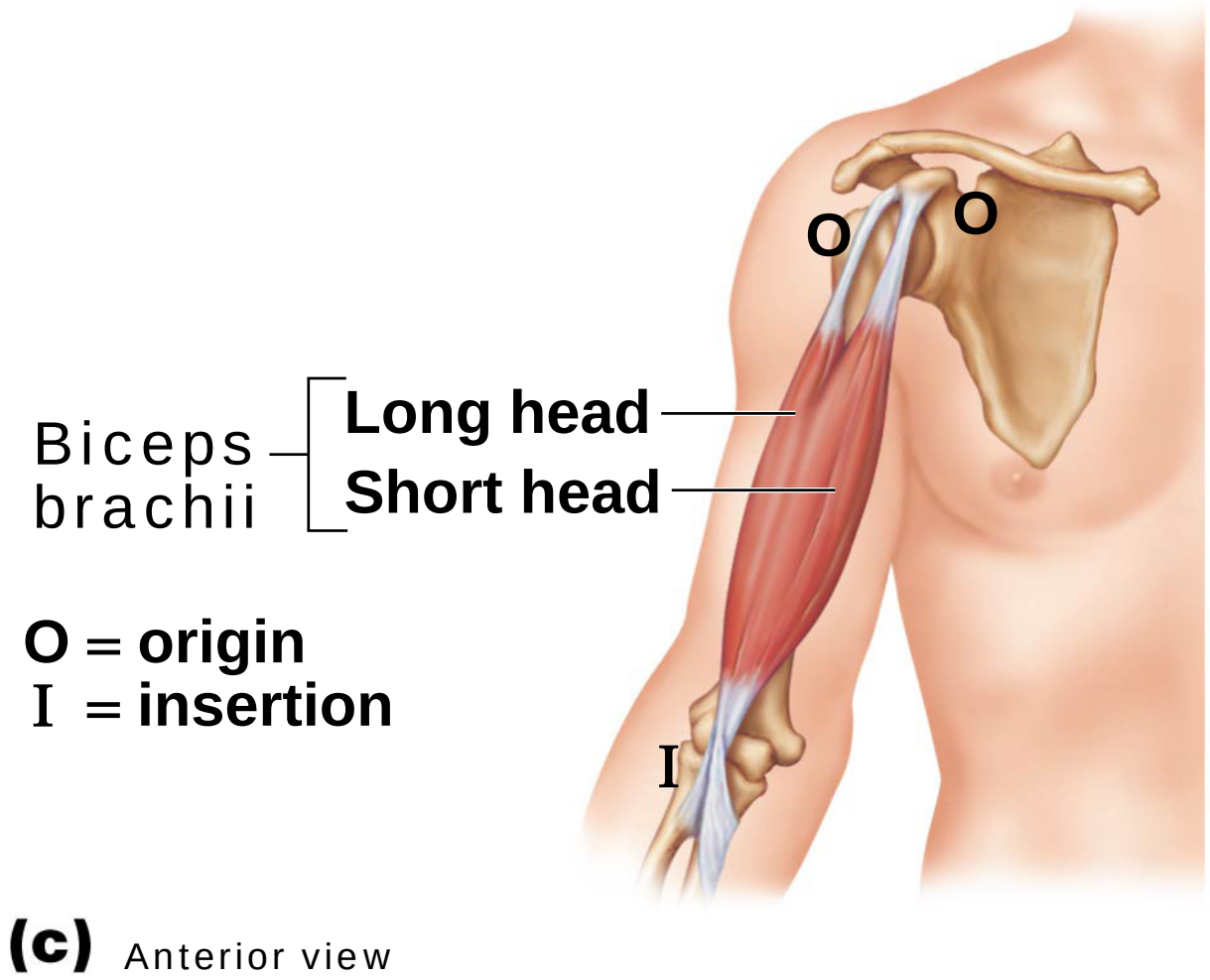
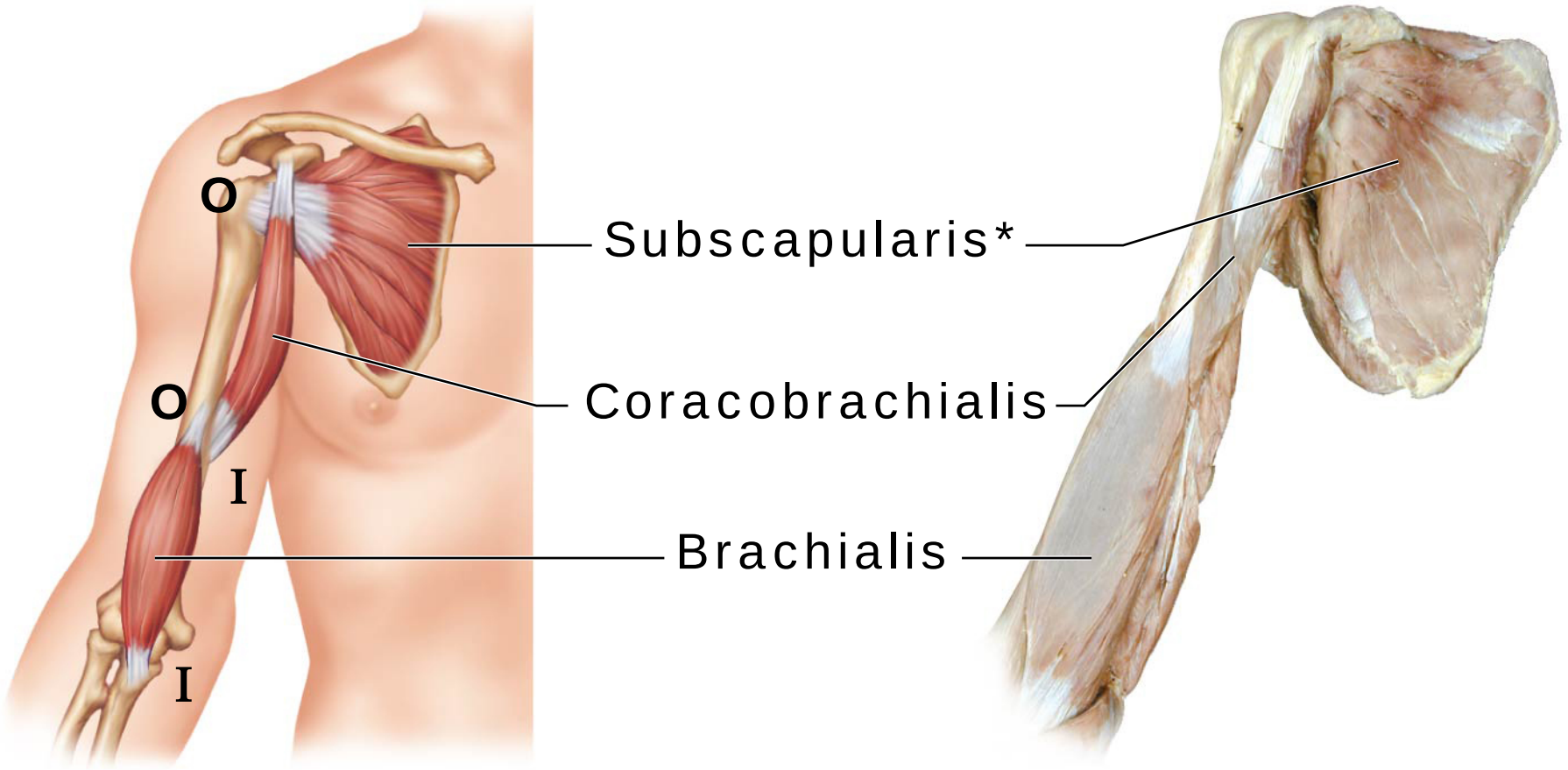


Figure 10.15d Muscles crossing the shoulder and elbow joints, causing movements of the arm and forearm, respectively.



(d) Anterior view

***Rotator cuff muscles**

Table 10.11-1 Muscles of the Forearm: Movements of the Wrist, Hand, and Fingers

Table 10.11 Muscles of the Forearm: Movements of the Wrist, Hand, and Fingers (Figures 10.16 and 10.17)

MUSCLE	DESCRIPTION	ORIGIN (O) AND INSERTION (I)	ACTION	NERVE SUPPLY
PART I: ANTERIOR MUSCLES (Figure 10.16)	These eight muscles of the anterior fascial compartment are listed from the lateral to the medial aspect. Most arise from a common flexor tendon attached to the medial epicondyle of the humerus and have additional origins as well. Most of their tendons of insertion are held in place at the wrist by a thickening of deep fascia called the *flexor retinaculum.*			
Superficial Muscles				
Pronator teres (pro-na′tor te′rēz) (*pronation* = turning palm posteriorly, or down; *teres* = round)	Two-headed muscle; seen in superficial view between proximal margins of brachioradialis and flexor carpi radialis; forms medial boundary of cubital fossa	O—medial epicondyle of humerus; coronoid process of ulna I—by common tendon into lateral radius, midshaft	Pronates forearm; weak flexor of elbow	Median nerve
Flexor carpi radialis (flek′sor kar′pe ra″de-al′is) (*flex* = decrease angle between two bones; *carpi* = wrist; *radi* = radius)	Runs diagonally across forearm; midway, its fleshy belly is replaced by a flat tendon that becomes cordlike at wrist	O—medial epicondyle of humerus I—base of second and third metacarpals; insertion tendon easily seen and provides guide to position of radial artery at wrist (used for taking pulse)	Powerful flexor and abductor of hand; weak synergist of elbow flexion	Median nerve
Palmaris longus (pahl-ma′ris lon′gus) (*palma* = palm; *longus* = long)	Small fleshy muscle with a long insertion tendon; often absent; may be used as guide to find median nerve that lies lateral to it at wrist	O—medial epicondyle of humerus I—palmar aponeurosis; (fascia of palm)	Tenses skin and fascia of palm during hand movements; weak wrist flexor; weak synergist for elbow flexion	Median nerve
Flexor carpi ulnaris (ul-na′ris) (*ulnar* = ulna)	Most medial muscle of this group; two-headed; ulnar nerve lies lateral to its tendon	O—medial epicondyle of humerus; olecranon and posterior surface of ulna I—pisiform and hamate bones and base of fifth metacarpal	Powerful flexor and adductor of hand in synergy with extensor carpi ulnaris (posterior muscle); stabilizes wrist during finger extension	Ulnar nerve (C_7 and C_8)
Flexor digitorum superficialis (dĭ″jĭ-tor′um soo″per-fish″e-al′is) (*digit* = finger, toe; *superficial* = close to surface)	Two-headed muscle; more deeply placed (therefore, actually forms an intermediate layer); overlain by muscles above but visible at distal end of forearm	O—medial epicondyle of humerus, coronoid process of ulna; shaft of radius I—by four tendons into middle phalanges of second to fifth fingers	Flexes wrist and middle phalanges of second to fifth fingers; the important finger flexor for speed and flexion against resistance	Median nerve (C_7, C_8, and T_1)

Table 10.11 Muscles of the Forearm: Movements of the Wrist, Hand, and Fingers (Figures 10.16 and 10.17) *(continued)*

MUSCLE	DESCRIPTION	ORIGIN (O) AND INSERTION (I)	ACTION	NERVE SUPPLY
PART I: ANTERIOR MUSCLES (Figure 10.16) CONT.	These eight muscles of the anterior fascial compartment are listed from the lateral to the medial aspect. Most arise from a common flexor tendon attached to the medial epicondyle of the humerus and have additional origins as well. Most of their tendons of insertion are held in place at the wrist by a thickening of deep fascia called the *flexor retinaculum*.			
Deep Muscles				
Flexor pollicis longus (pah′lĭ-sis) (*pollix* = thumb)	Partly covered by flexor digitorum superficialis; parallels flexor digitorum profundus laterally	O—anterior surface of radius and interosseous membrane I—distal phalanx of thumb	Flexes distal phalanx of thumb	Branch of median nerve (C_8,T_1)
Flexor digitorum profundus (pro-fun′dus) (*profund* = deep)	Extensive origin; overlain entirely by flexor digitorum superficialis	O—coronoid process, anteromedial surface of ulna, and interosseous membrane I—by four tendons into distal phalanges of second to fifth fingers	Flexes distal interphalangeal joints; slow-acting flexor of any or all fingers; helps flex wrist	Medial half by ulnar nerve; lateral half by median nerve
Pronator quadratus (kwod-ra′tus) (*quad* = square, four-sided)	Deepest muscle of distal forearm; passes downward and laterally; only muscle that arises solely from ulna and inserts solely into radius	O—distal portion of anterior ulnar shaft I—distal surface of anterior radius	Prime mover of forearm pronation; acts with pronator teres; also helps hold ulna and radius together	Median nerve (C_8 and T_1)

Figure 10.16 Muscles of the anterior fascial compartment of the forearm acting on the right wrist and fingers.

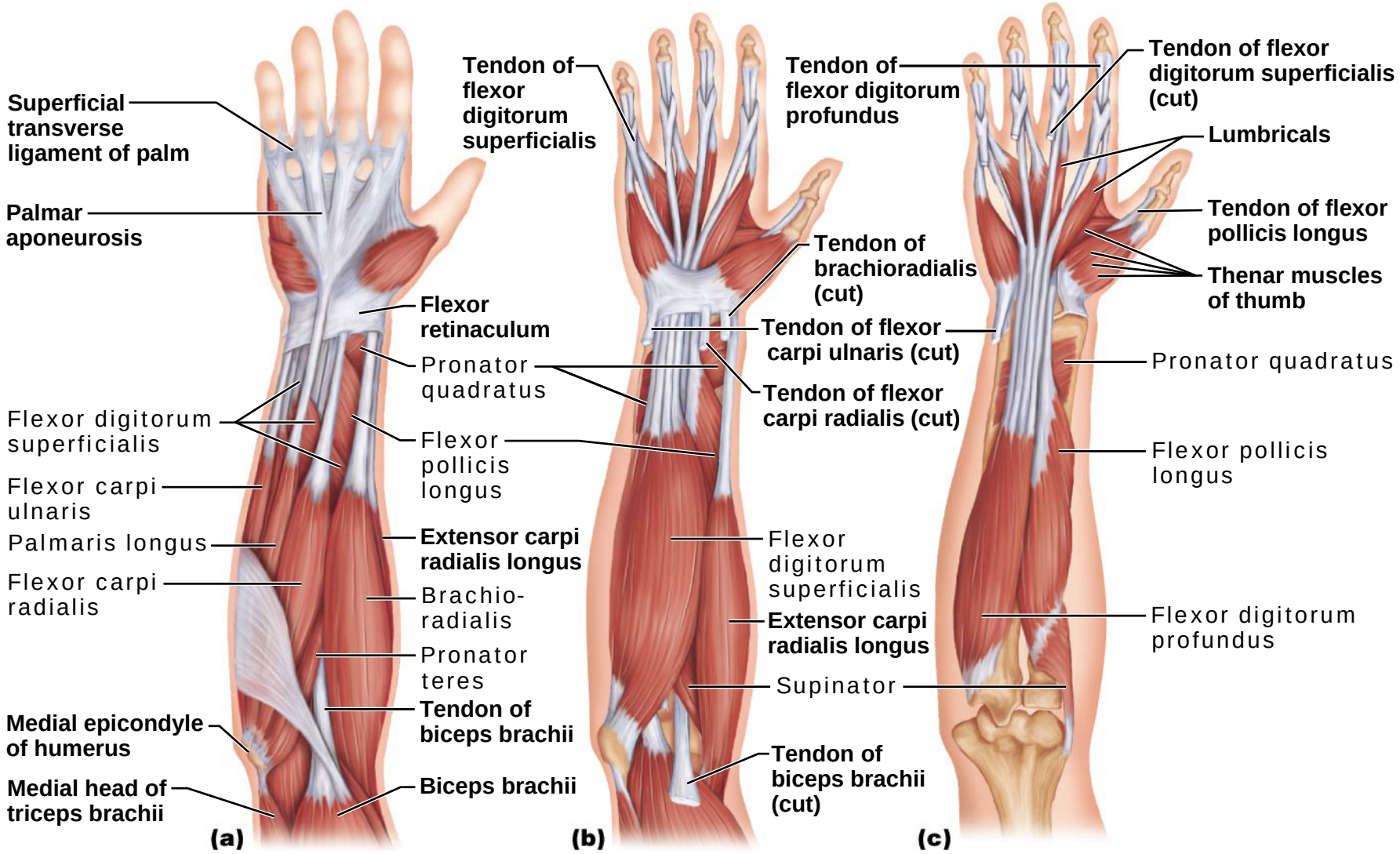


Figure 10.16a Muscles of the anterior fascial compartment of the forearm acting on the right wrist and fingers.

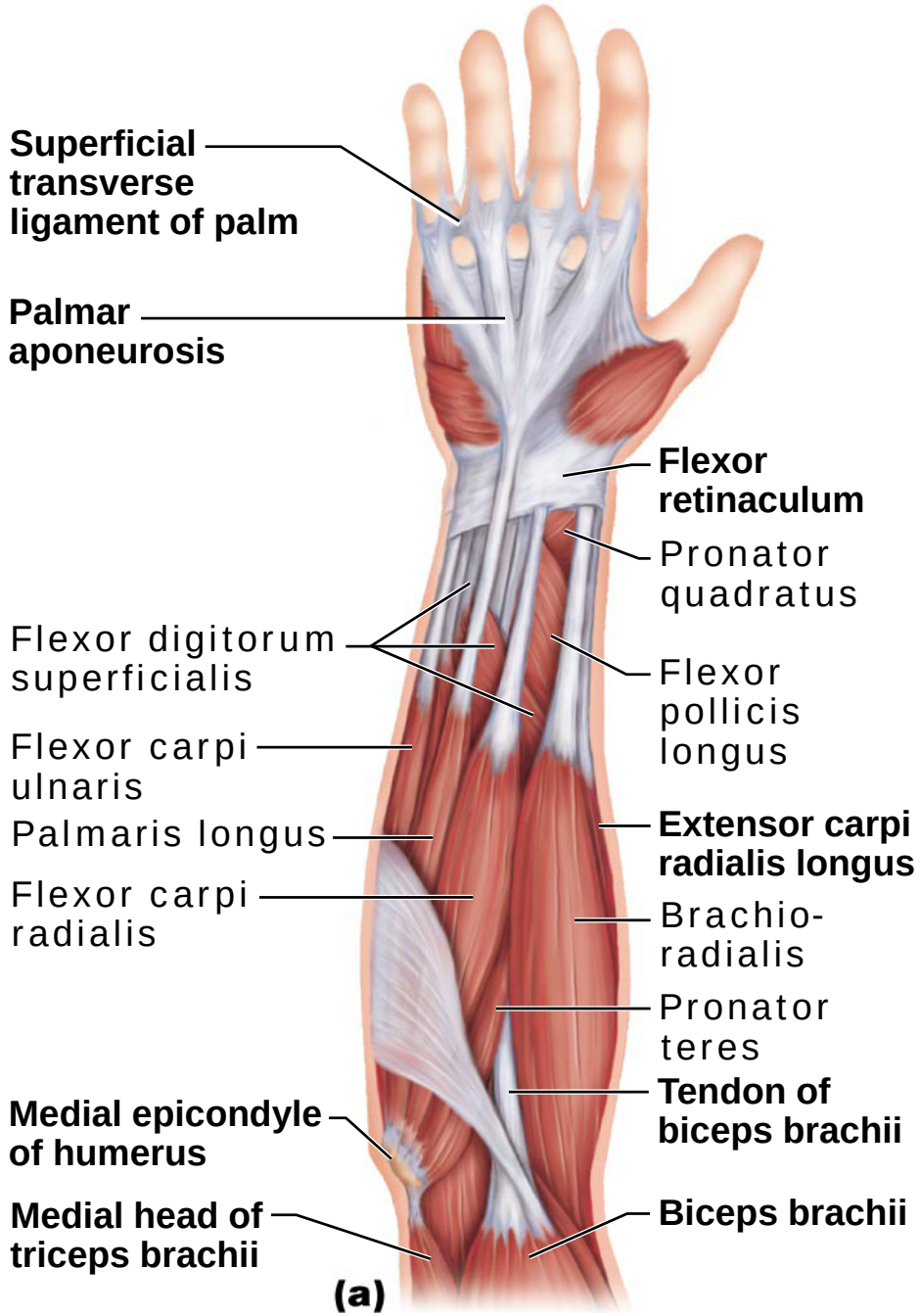


Figure 10.16b Muscles of the anterior fascial compartment of the forearm acting on the right wrist and fingers.

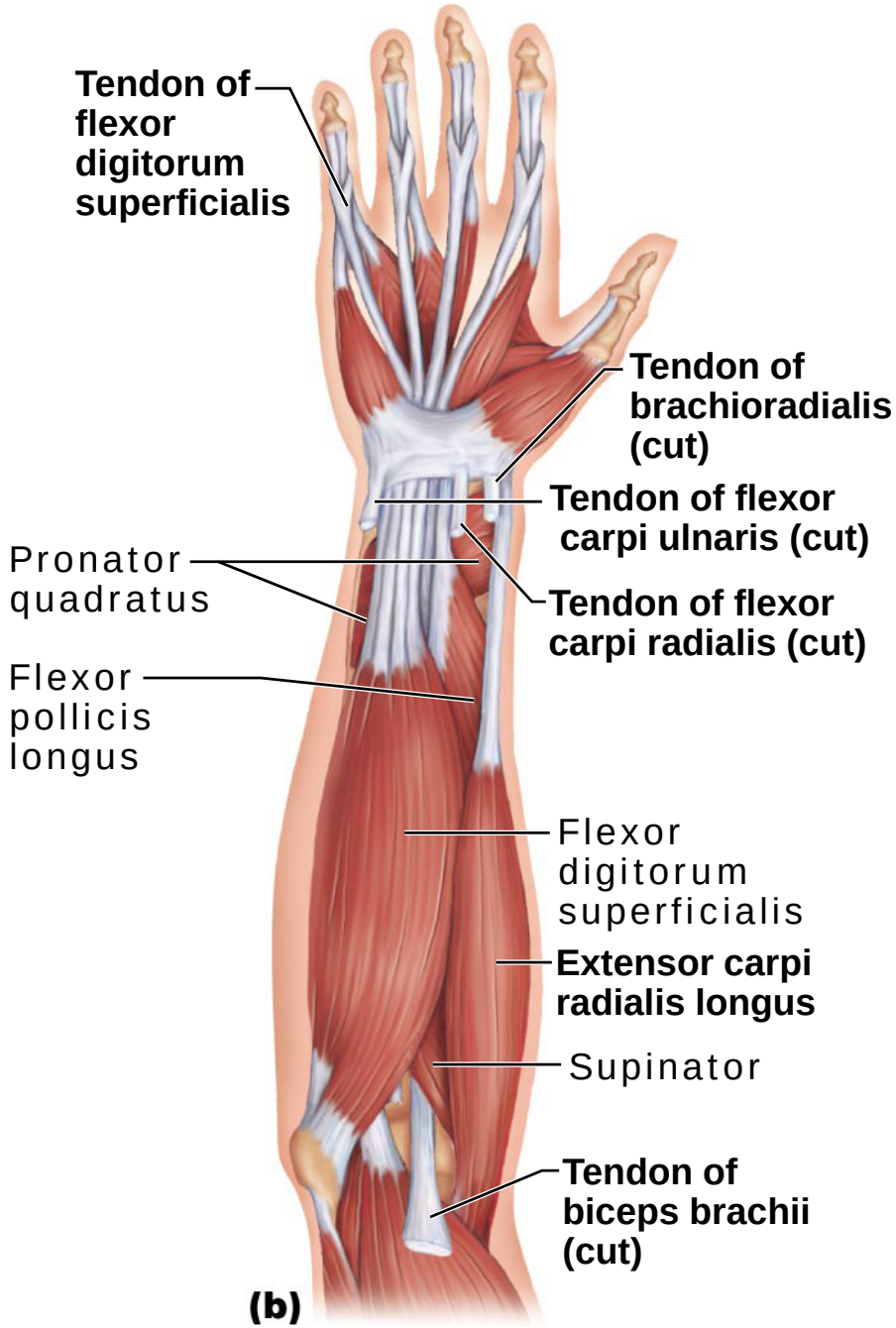


Figure 10.16c Muscles of the anterior fascial compartment of the forearm acting on the right wrist and fingers.

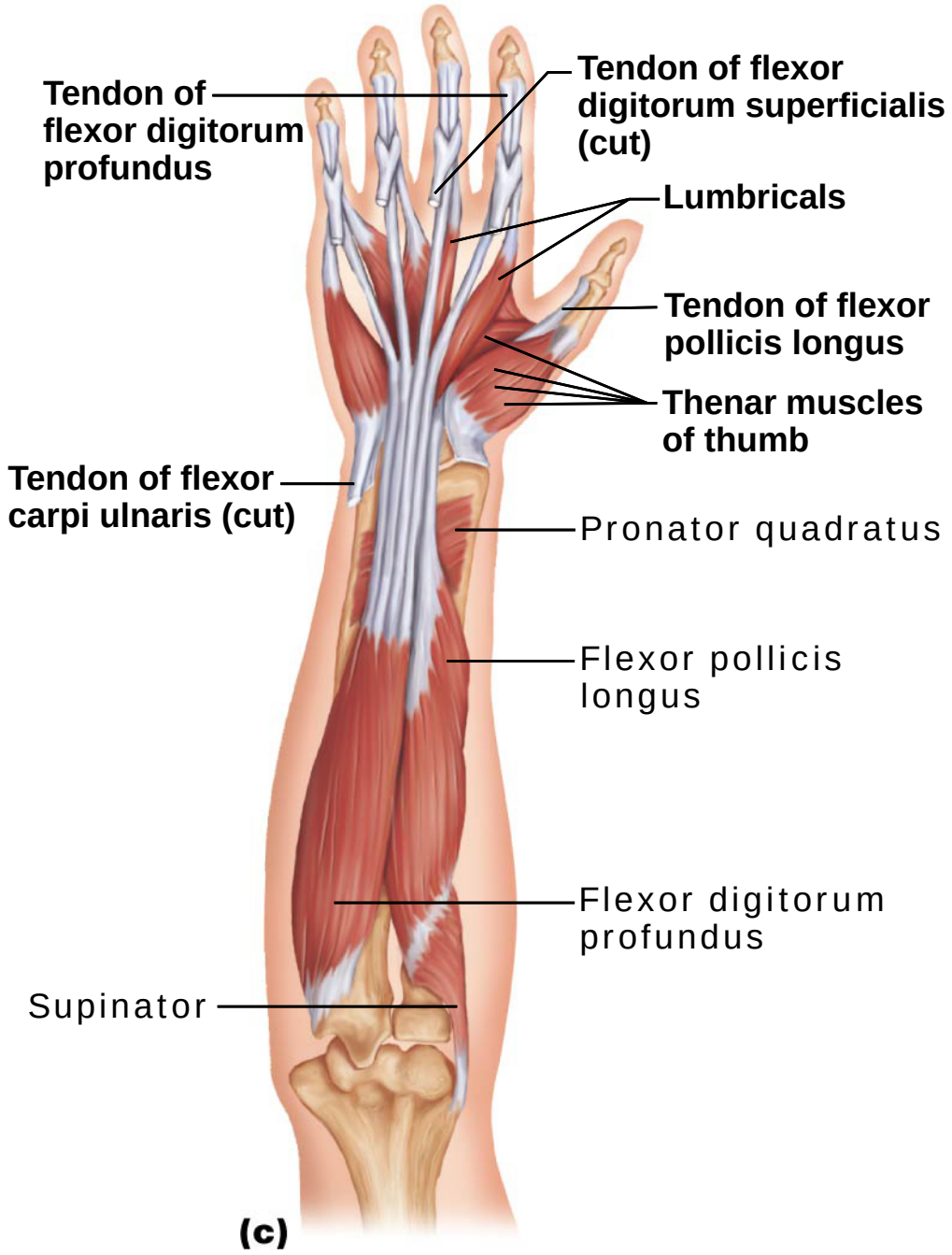


Table 10.11 Muscles of the Forearm: Movements of the Wrist, Hand, and Fingers (Figures 10.16 and 10.17) *(continued)*

MUSCLE	DESCRIPTION	ORIGIN (O) AND INSERTION (I)	ACTION	NERVE SUPPLY
PART II: POSTERIOR MUSCLES (Figure 10.17)	These muscles of the posterior fascial compartment are listed from the lateral to the medial aspect. They are all innervated by the radial nerve or its branches. More than half of the posterior compartment muscles arise from a common extensor origin tendon attached to the posterior surface of the lateral epicondyle of the humerus and adjacent fascia. The extensor tendons are held in place at the posterior aspect of the hand by the *extensor retinaculum,* which prevents "bowstringing" of these tendons when the wrist is hyperextended. The *extensor* muscles of the fingers end in a broad hood over the dorsal side of the digits, the extensor expansion.			
Superficial Muscles				
Brachioradialis	See Table 10.10	See Table 10.10	See Table 10.10	See Table 10.10
Extensor carpi radialis longus (ek-sten'sor) (*extend* = increase angle between two bones)	Parallels brachioradialis on lateral forearm, and may blend with it	O—lateral supracondylar ridge of humerus I—base of second metacarpal	Extends hand in conjunction with extensor carpi ulnaris and abducts hand in conjunction with flexor carpi radialis	Radial nerve (C_6 and C_7)
Extensor carpi radialis brevis (brĕ'vis) (*brevis* = short)	Shorter than extensor carpi radialis longus and lies deep to it	O—lateral epicondyle of humerus I—base of third metacarpal	Extends and abducts hand; acts synergistically with extensor carpi radialis longus to steady wrist during finger flexion	Deep branch of radial nerve
Extensor digitorum	Lies medial to extensor carpi radialis brevis; a detached portion of this muscle, called *extensor digiti minimi,* extends little finger	O—lateral epicondyle of humerus I—by four tendons into extensor expansions and distal phalanges of second to fifth fingers	Prime mover of finger extension; extends hand; can abduct (flare) fingers	Posterior interosseous nerve, a branch of radial nerve (C_5 and C_6)
Extensor carpi ulnaris	Most medial of superficial posterior muscles; long, slender muscle	O—lateral epicondyle of humerus and posterior border of ulna I—base of fifth metacarpal	Extends hand in conjunction with extensor carpi radialis and adducts hand in conjunction with flexor carpi ulnaris	Posterior interosseous nerve

Table 10.11-4 Muscles of the Forearm: Movements of the Wrist, Hand, and Fingers *(continued)*

Table 10.11 Muscles of the Forearm: Movements of the Wrist, Hand, and Fingers (Figures 10.16 and 10.17) *(continued)*

MUSCLE	DESCRIPTION	ORIGIN (O) AND INSERTION (I)	ACTION	NERVE SUPPLY
PART II: POSTERIOR MUSCLES (Figure 10.17) CONT.	These muscles of the posterior fascial compartment are listed from the lateral to the medial aspect. They are all innervated by the radial nerve or its branches. More than half of the posterior compartment muscles arise from a common extensor origin tendon attached to the posterior surface of the lateral epicondyle of the humerus and adjacent fascia. The extensor tendons are held in place at the posterior aspect of the hand by the *extensor retinaculum,* which prevents "bowstringing" of these tendons when the wrist is hyperextended. The *extensor* muscles of the fingers end in a broad hood over the dorsal side of the digits, the extensor expansion.			
Deep Muscles				
Supinator (soo″pĭ-na′tor) (*supination* = turning palm anteriorly or upward)	Deep muscle at posterior aspect of elbow; largely concealed by superficial muscles	O—lateral epicondyle of humerus; proximal ulna I—proximal end of radius	Assists biceps brachii to forcibly supinate forearm; works alone in slow supination; antagonist of pronator muscles	Posterior interosseous nerve
Abductor pollicis longus (ab-duk′tor) (*abduct* = movement away from median plane)	Lateral and parallel to extensor pollicis longus; just distal to supinator	O—posterior surface of radius and ulna; interosseous membrane I—base of first metacarpal and trapezium	Abducts and extends thumb	Posterior interosseous nerve
Extensor pollicis brevis and longus	Deep muscle pair with a common origin and action; overlain by extensor carpi ulnaris	O—dorsal shaft of radius and ulna; interosseous membrane I—base of proximal (brevis) and distal (longus) phalanx of thumb	Extends thumb	Posterior interosseous nerve
Extensor indicis (in′dĭ-sis) (*indicis* = index finger)	Tiny muscle arising close to wrist	O—posterior surface of distal ulna; interosseous membrane I—extensor expansion of index finger; joins tendon of extensor digitorum	Extends index finger (digit II) and assists in extending wrist	Posterior interosseous nerve

Figure 10.17 Muscles of the posterior fascial compartment of the right forearm acting on the wrist and fingers.

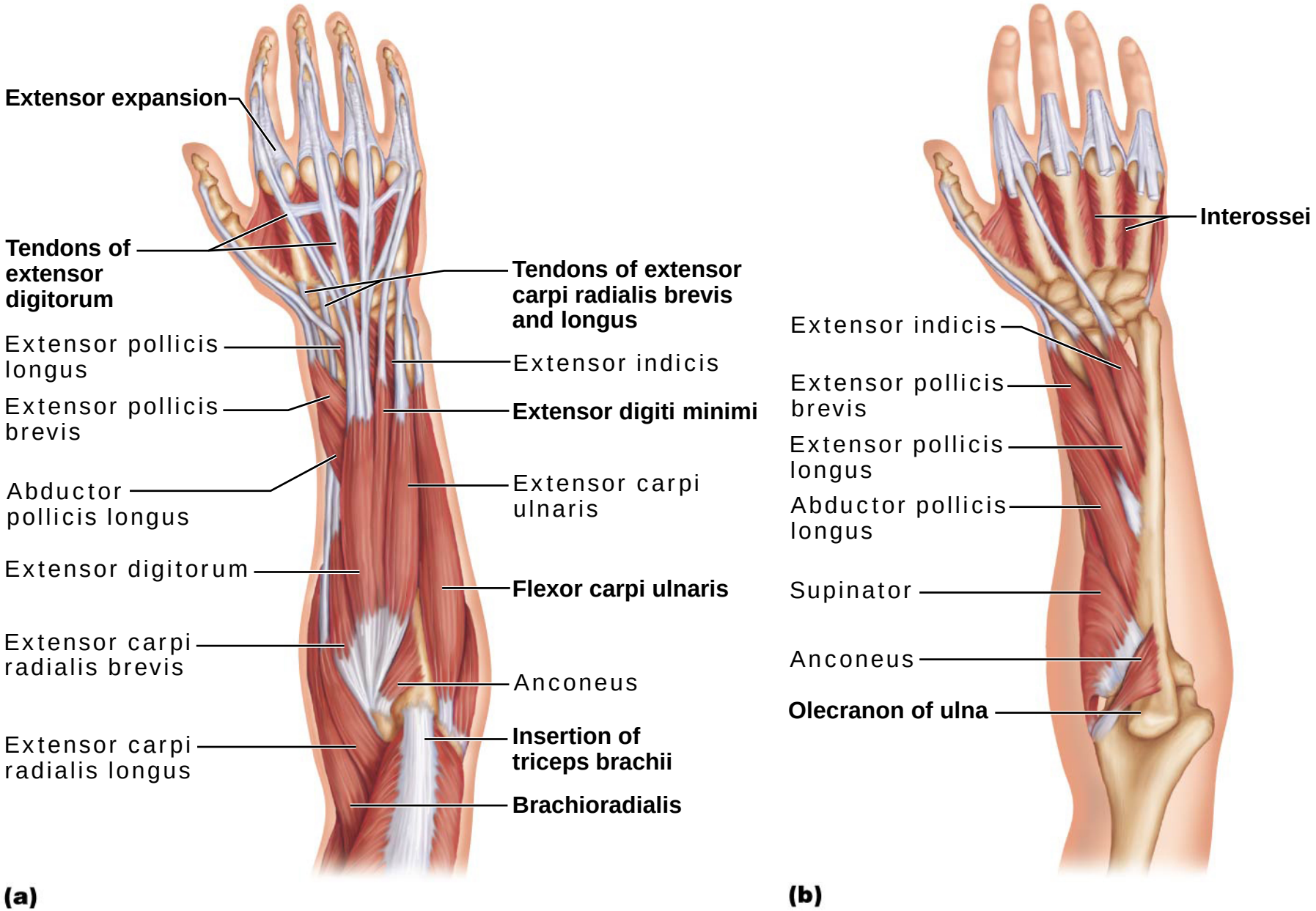


Figure 10.17a Muscles of the posterior fascial compartment of the right forearm acting on the wrist and fingers.

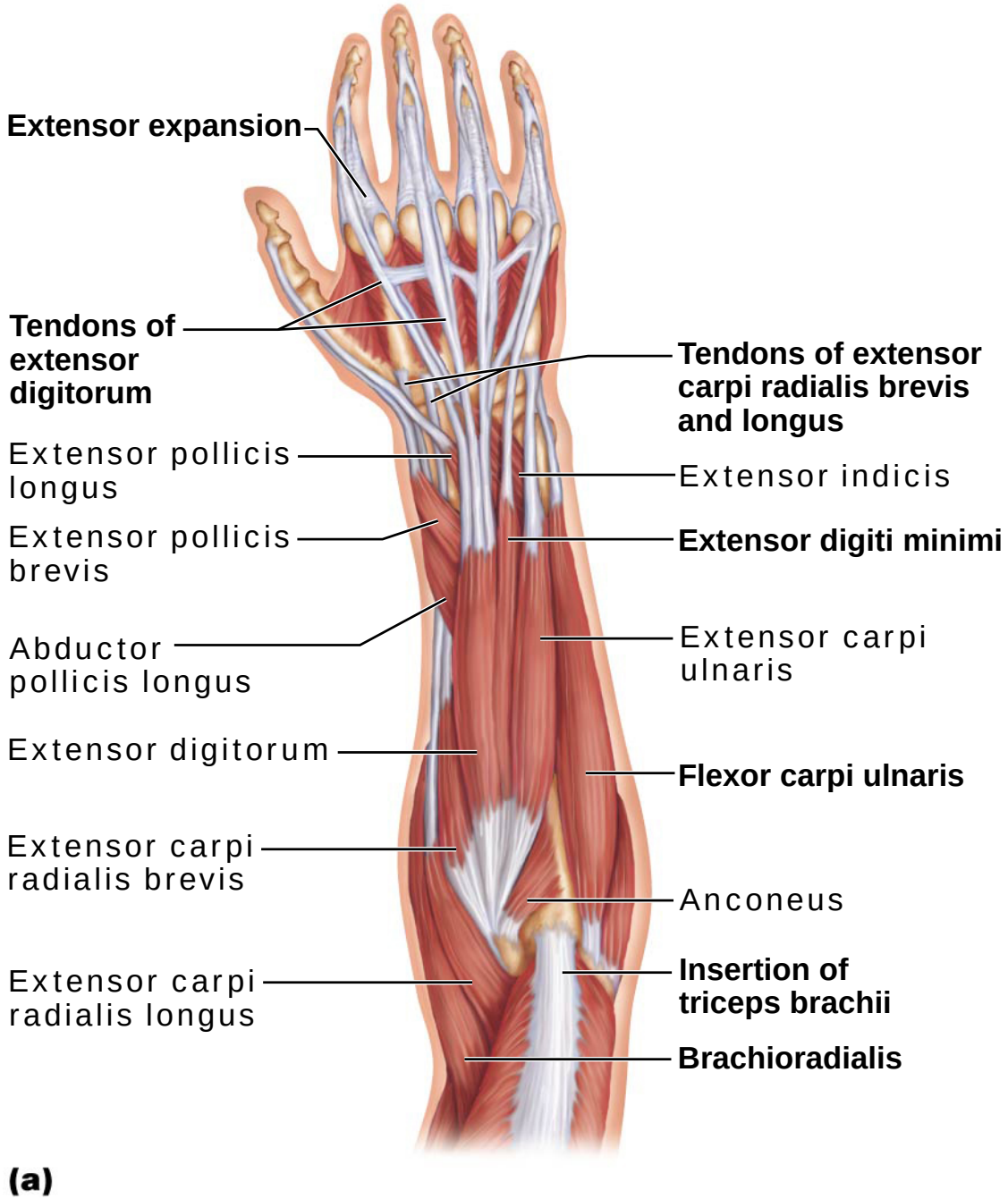


Figure 10.17b Muscles of the posterior fascial compartment of the right forearm acting on the wrist and fingers.

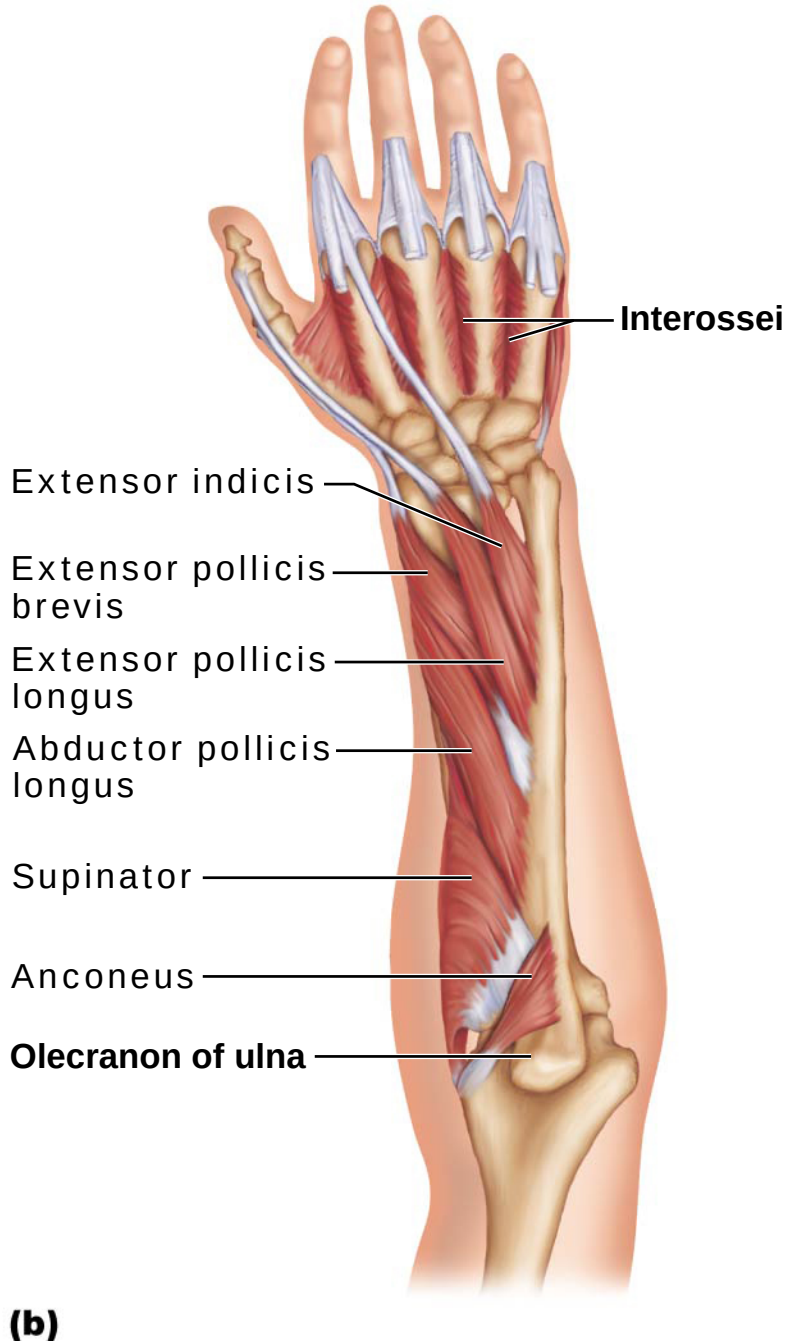


Table 10.13-1 Intrinsic Muscles of the Hand: Fine Movements of the Fingers

Table 10.13 Intrinsic Muscles of the Hand: Fine Movements of the Fingers (Figure 10.19)

MUSCLE	DESCRIPTION	ORIGIN (O) AND INSERTION (I)	ACTION	NERVE SUPPLY
THENAR MUSCLES IN BALL OF THUMB (the′nar) (*thenar* = palm)				
Abductor pollicis brevis (*pollex* = thumb)	Lateral muscle of thenar group; superficial	O—flexor retinaculum and nearby carpals I—lateral base of thumb's proximal phalanx	Abducts thumb (at carpometacarpal joint)	Median nerve (C_8, T_1)
Flexor pollicis brevis	Medial and deep muscle of thenar group	O—flexor retinaculum and nearby carpals I—lateral side of base of proximal phalanx of thumb	Flexes thumb (at carpometacarpal and metacarpophalangeal joints)	Median (or occasionally ulnar) nerve (C_8, T_1)
Opponens pollicis (o-pō′nenz) (*opponens* = opposition)	Deep to abductor pollicis brevis, on metacarpal I	O—flexor retinaculum and trapezium I—whole anterior side of metacarpal I	Opposition: moves thumb to touch tip of another finger of the same hand	Median (or occasionally ulnar) nerve
Adductor pollicis	Fan-shaped with horizontal fibers; distal to other thenar muscles; oblique and transverse heads	O—capitate bone and bases of metacarpals II–IV; front of metacarpal III I—medial side of base of proximal phalanx of thumb	Adducts and helps to oppose thumb	Ulnar nerve (C_8, T_1)

Table 10.13 Intrinsic Muscles of the Hand: Fine Movements of the Fingers (Figure 10.19) *(continued)*

MUSCLE	DESCRIPTION	ORIGIN (O) AND INSERTION (I)	ACTION	NERVE SUPPLY
HYPOTHENAR MUSCLES IN BALL OF LITTLE FINGER				
Abductor digiti minimi (dĭ′jĭ-ti min′ĭ-mi) (*digiti minimi* = little finger)	Medial muscle of hypothenar group; superficial	O—pisiform bone I—medial side of proximal phalanx of little finger	Abducts little finger at metacarpophalangeal joint	Ulnar nerve
Flexor digiti minimi brevis	Lateral deep muscle of hypothenar group	O—hamate bone and flexor retinaculum I—same as abductor digiti minimi	Flexes little finger at metacarpophalangeal joint	Ulnar nerve
Opponens digiti minimi	Deep to abductor digiti minimi	O—same as flexor digiti minimi brevis I—most of length of medial side of metacarpal V	Helps in opposition: brings metacarpal V toward thumb to cup the hand	Ulnar nerve

Figure 10.19 Hand muscles, ventral views of right hand.

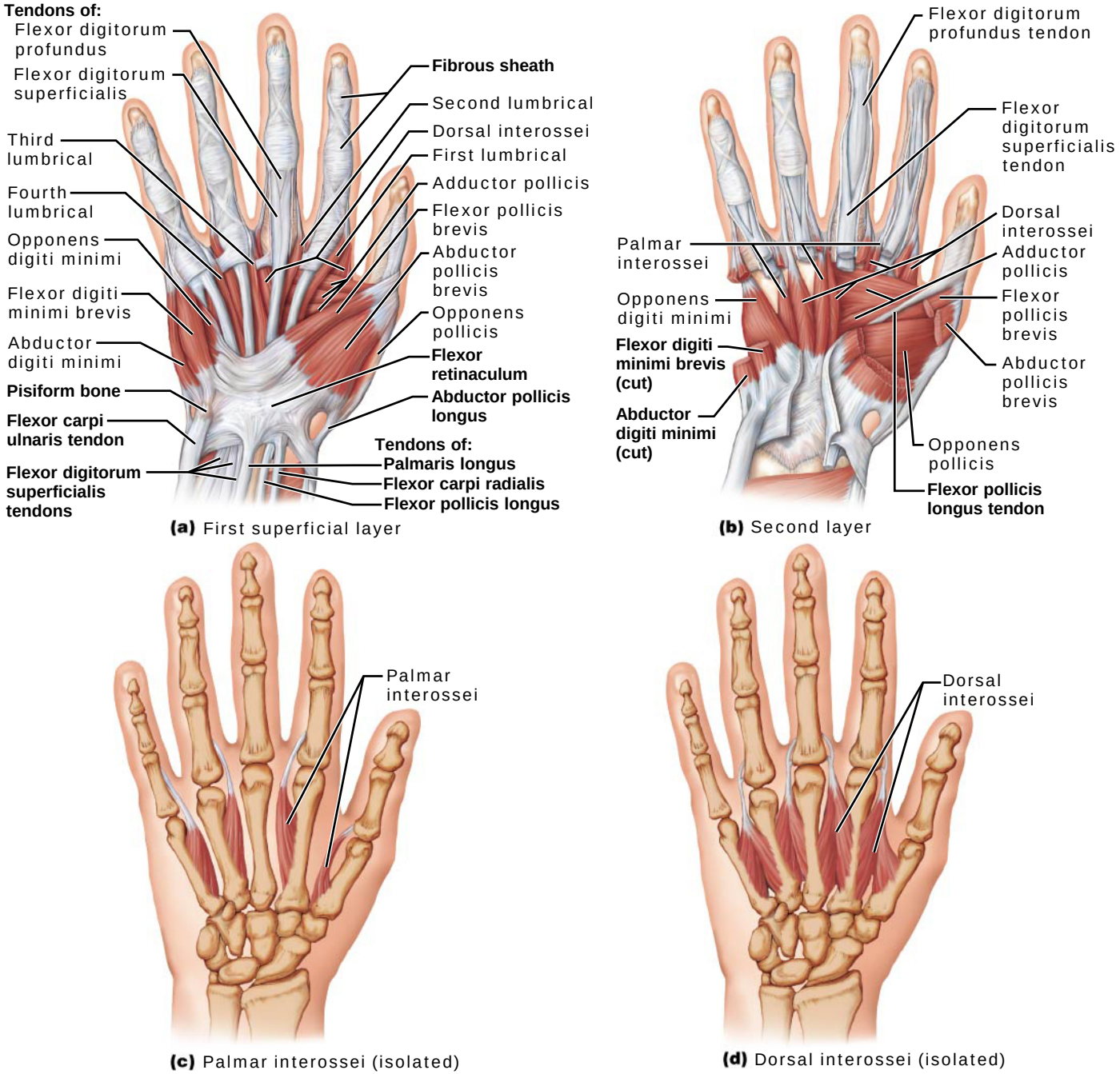
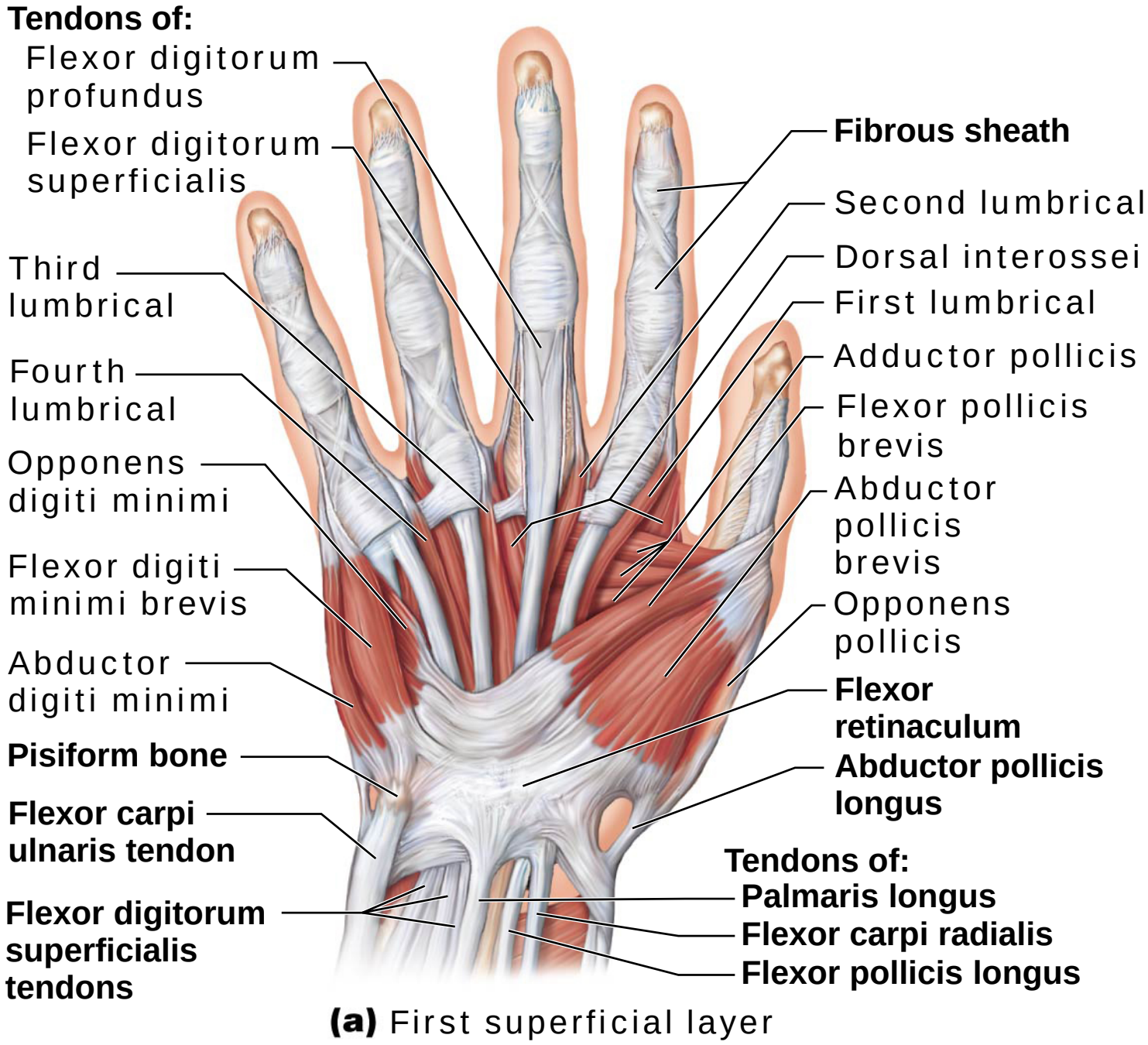


Figure 10.19a Hand muscles, ventral views of right hand.



(a) First superficial layer

Muscles of the Hip and Lower Limbs (Leg)

Table 10.14-1 Muscles Crossing the Hip and Knee Joints: Movements of the Thigh and Leg

Table 10.14 Muscles Crossing the Hip and Knee Joints: Movements of the Thigh and Leg (Figures 10.20 and 10.21)

MUSCLE	DESCRIPTION	ORIGIN (O) AND INSERTION (I)	ACTION	NERVE SUPPLY
PART I: ANTERIOR AND MEDIAL MUSCLES (Figure 10.20)				
Origin on the Pelvis or Spine				
Iliopsoas (il″e-o-so′us)	Iliopsoas is a composite of two closely related muscles (iliacus and psoas major) whose fibers pass under the inguinal ligament (see Figure 10.12) to insert via a common tendon on the femur.			
• **Iliacus** (il-e-ak′us) (*iliac* = ilium)	Large, fan-shaped, more lateral muscle	O—iliac fossa and crest, ala of sacrum I—lesser trochanter of femur via iliopsoas tendon	Iliopsoas is the prime mover for flexing thigh, or for flexing trunk on thigh as during a bow	Femoral nerve (L_2 and L_3)
• **Psoas major** (so′us) (*psoa* = loin muscle; *major* = larger)	Longer, thicker, more medial muscle of the pair (butchers refer to this muscle as the tenderloin in animals)	O—by fleshy slips from transverse processes, bodies, and discs of lumbar vertebrae and T_{12} I—lesser trochanter of femur via iliopsoas tendon	As above; also flexes vertebral column laterally; important postural muscle	Ventral rami (L_1–L_3)
Sartorius (sar-tor′e-us) (*sartor* = tailor)	Straplike superficial muscle running obliquely across anterior surface of thigh to knee; longest muscle in body; crosses both hip and knee joints	O—anterior superior iliac spine I—winds around medial aspect of knee and inserts into medial aspect of proximal tibia	Flexes, abducts, and laterally rotates thigh; a weak knee flexor; helps produce the cross-legged position	Femoral nerve

Table 10.14-2 Muscles Crossing the Hip and Knee Joints: Movements of the Thigh and Leg *(continued)*

Table 10.14 Muscles Crossing the Hip and Knee Joints: Movements of the Thigh and Leg (Figures 10.20 and 10.21) *(continued)*

MUSCLE	DESCRIPTION	ORIGIN (O) AND INSERTION (I)	ACTION	NERVE SUPPLY
Muscles of the Medial Compartment of the Thigh				
Adductors (ah-duk′torz)	Large muscle mass consisting of three muscles (magnus, longus, and brevis) forming medial aspect of thigh; arise from inferior part of pelvis and insert at various levels on femur. All are used in movements that press thighs together, as when astride a horse; important in pelvic tilting movements that occur during walking and in fixing the hip when the knee is flexed and the foot is off the ground. Obturator nerve innervates entire group. Strain or stretching of this muscle group is called a "pulled groin."			
• **Adductor magnus** (mag′nus) (*adduct* = move toward midline; *magnus* = large)	Triangular muscle with a broad insertion; a composite muscle that is part adductor and part hamstring in action	O—ischial and pubic rami and ischial tuberosity I—linea aspera and adductor tubercle of femur	Anterior part adducts and medially rotates and flexes thigh; posterior part is a synergist of hamstrings in thigh extension	Obturator nerve and sciatic nerve (L_2–L_4)
• **Adductor longus** (*longus* = long)	Overlies middle aspect of adductor magnus; most anterior of adductor muscles	O—pubis near pubic symphysis I—linea aspera	Adducts, flexes, and medially rotates thigh	Obturator nerve (L_2–L_4)
• **Adductor brevis** (*brevis* = short)	In contact with obturator externus muscle; largely concealed by adductor longus and pectineus	O—body and inferior pubic ramus I—linea aspera above adductor longus	Adducts, flexes, and medially rotates thigh	Obturator nerve
Pectineus (pek-tin′e-us) (*pecten* = comb)	Short, flat muscle; overlies adductor brevis on proximal thigh; abuts adductor longus medially	O—pubis (and superior ramus) I—from lesser trochanter inferior to the linea aspera on posterior aspect of femur	Adducts, flexes, and medially rotates thigh	Femoral and sometimes obturator nerve
Gracilis (grah-sĭ′lis) (*gracilis* = slender)	Long, thin, superficial muscle of medial thigh	O—inferior ramus and body of pubis and adjacent ischial ramus I—medial surface of tibia just inferior to its medial condyle	Adducts thigh, flexes and medially rotates leg, especially during walking	Obturator nerve

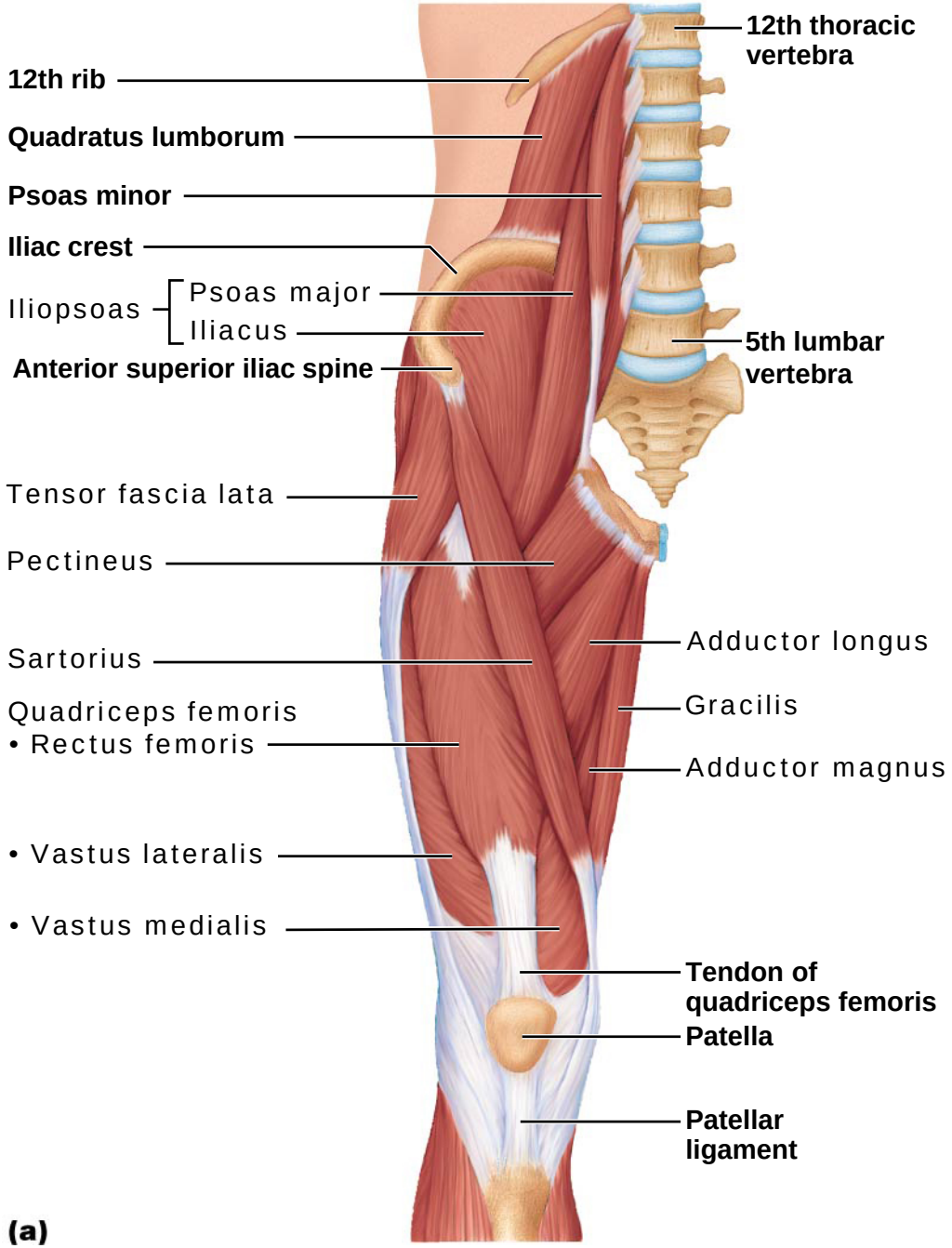
Table 10.14-3 Muscles Crossing the Hip and Knee Joints: Movements of the Thigh and Leg *(continued)*

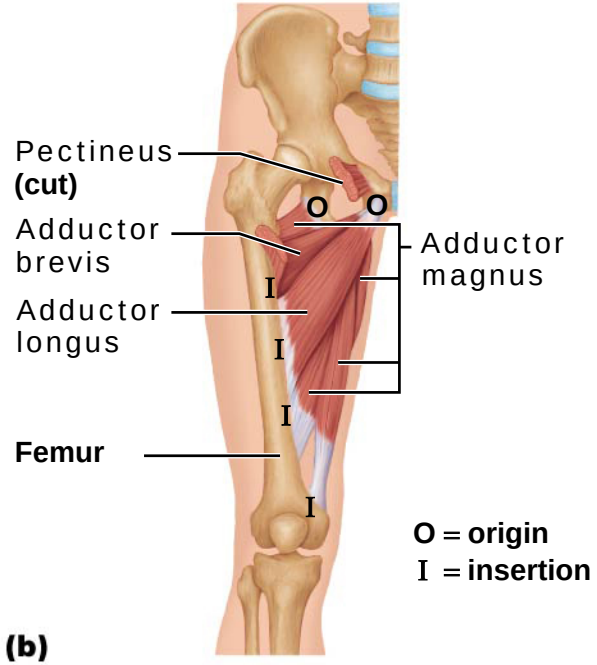
Table 10.14 Muscles Crossing the Hip and Knee Joints: Movements of the Thigh and Leg (Figures 10.20 and 10.21) *(continued)*

MUSCLE	DESCRIPTION	ORIGIN (O) AND INSERTION (I)	ACTION	NERVE SUPPLY
Muscles of the Anterior Compartment of the Thigh				
Quadriceps femoris (kwod′rĭ-seps fem′o-ris)	Arises from four separate heads (*quadriceps* = four heads) that form the flesh of front and sides of thigh. These heads (rectus femoris, and lateral, medial, and intermediate vasti muscles) have a common insertion tendon, the *quadriceps tendon*, which inserts into the patella and then via the *patellar ligament* into tibial tuberosity. The quadriceps is a powerful knee extensor used in climbing, jumping, running, and rising from seated position. The tone of quadriceps plays an important role in strengthening the knee joint. Femoral nerve innervates the group.			
• **Rectus femoris** (rek′tus) (*rectus* = straight; *femoris* = femur)	Superficial muscle of anterior thigh; runs straight down thigh; longest head and only muscle of group to cross hip joint	O—anterior inferior iliac spine and superior margin of acetabulum I—patella and tibial tuberosity via patellar ligament	Extends leg and flexes thigh at hip	Femoral nerve (L_2–L_4)
• **Vastus lateralis** (vas′tus lat″er-a′lis) (*vastus* = large; *lateralis* = lateral)	Largest head of the group, forms lateral aspect of thigh; a common intramuscular injection site, particularly in infants (who have poorly developed buttock and arm muscles)	O—greater trochanter, intertrochanteric line, linea aspera I—as for rectus femoris	Extends and stabilizes leg	Femoral nerve
• **Vastus medialis** (me″de-a′lis) (*medialis* = medial)	Forms inferomedial aspect of thigh	O—linea aspera, intertrochanteric and medial supracondylar lines I—as for rectus femoris	Extends leg	Femoral nerve
• **Vastus intermedius** (in″ter-me′de-us) (*intermedius* = intermediate)	Obscured by rectus femoris; lies between vastus lateralis and vastus medialis on anterior thigh	O—anterior and lateral surfaces of proximal femur shaft I—as for rectus femoris	Extends leg	Femoral nerve
Tensor fascia lata (ten′sor fă′she-ah la′tah) (*tensor* = to make tense; *fascia* = band; *lata* = wide)	Enclosed between fascia layers of anterolateral aspect of thigh; functionally associated with medial rotators and flexors of thigh	O—anterior aspect of iliac crest and anterior superior iliac spine I—iliotibial tract*	Steadies the leg and trunk on thigh by making iliotibial tract taut; flexes and abducts thigh; rotates thigh medially	Superior gluteal nerve (L_4 and L_5)

*The iliotibial tract is a thickened lateral portion of the *fascia lata* (the fascia that ensheathes all the muscles of the thigh). It extends as a tendinous band from the iliac crest to the knee (see Figure 10.21a).

Figure 10.20 Anterior and medial muscles promoting movements of the thigh and leg.





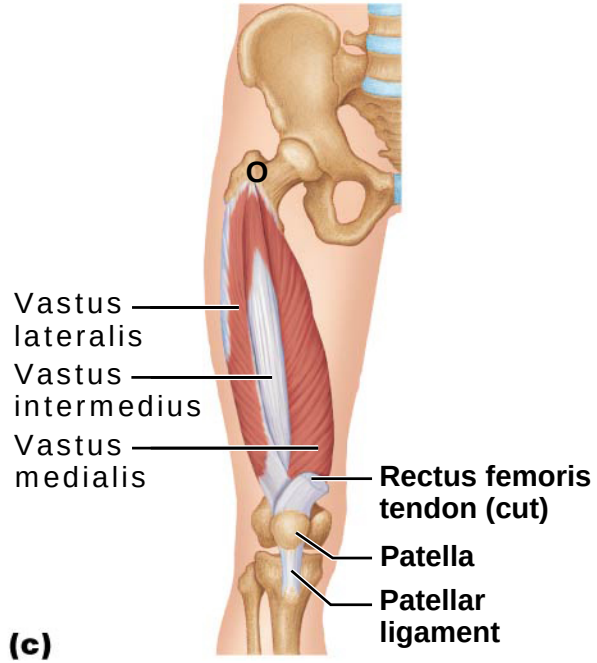


Figure 10.20a Anterior and medial muscles promoting movements of the thigh and leg.

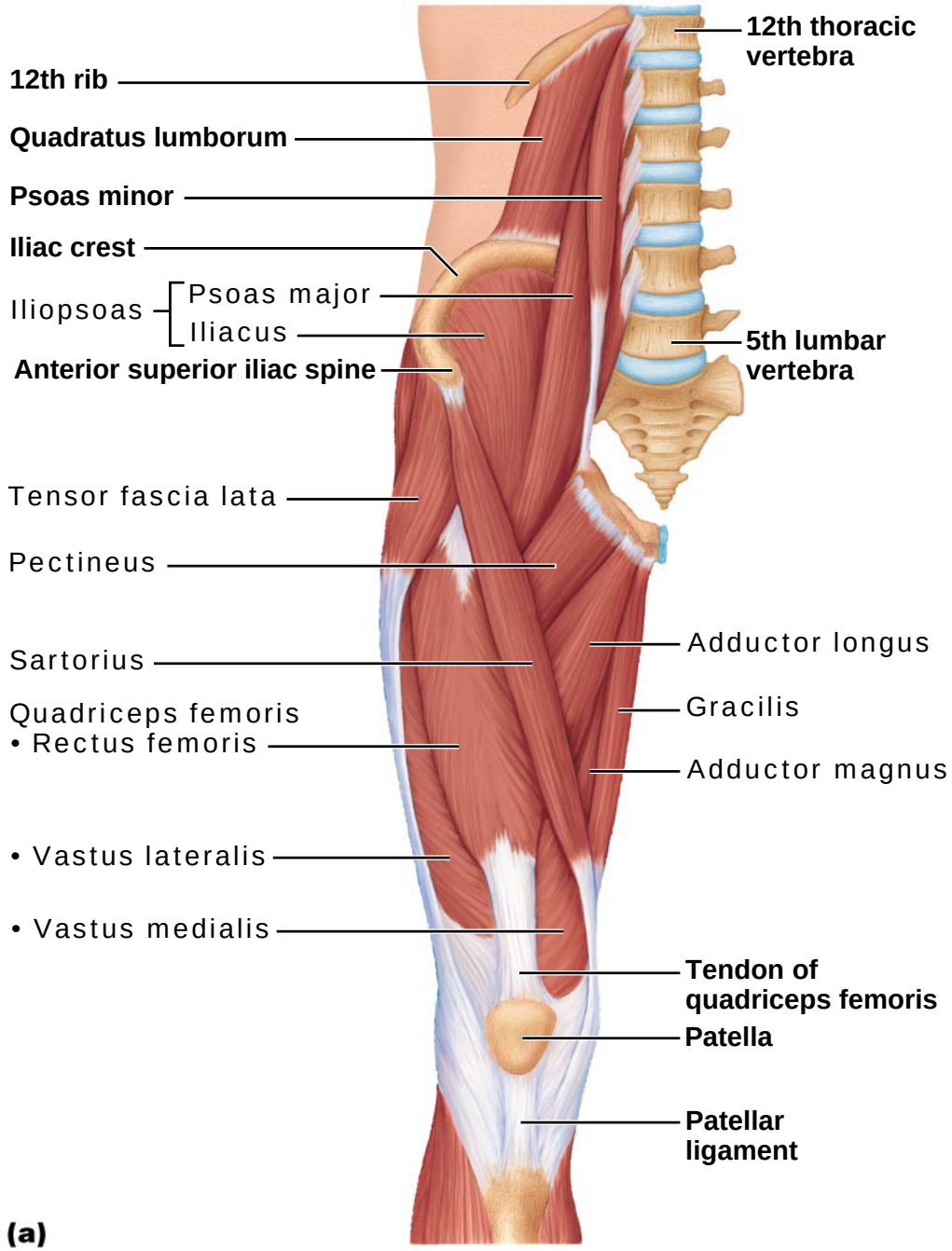


Figure 10.20b Anterior and medial muscles promoting movements of the thigh and leg.

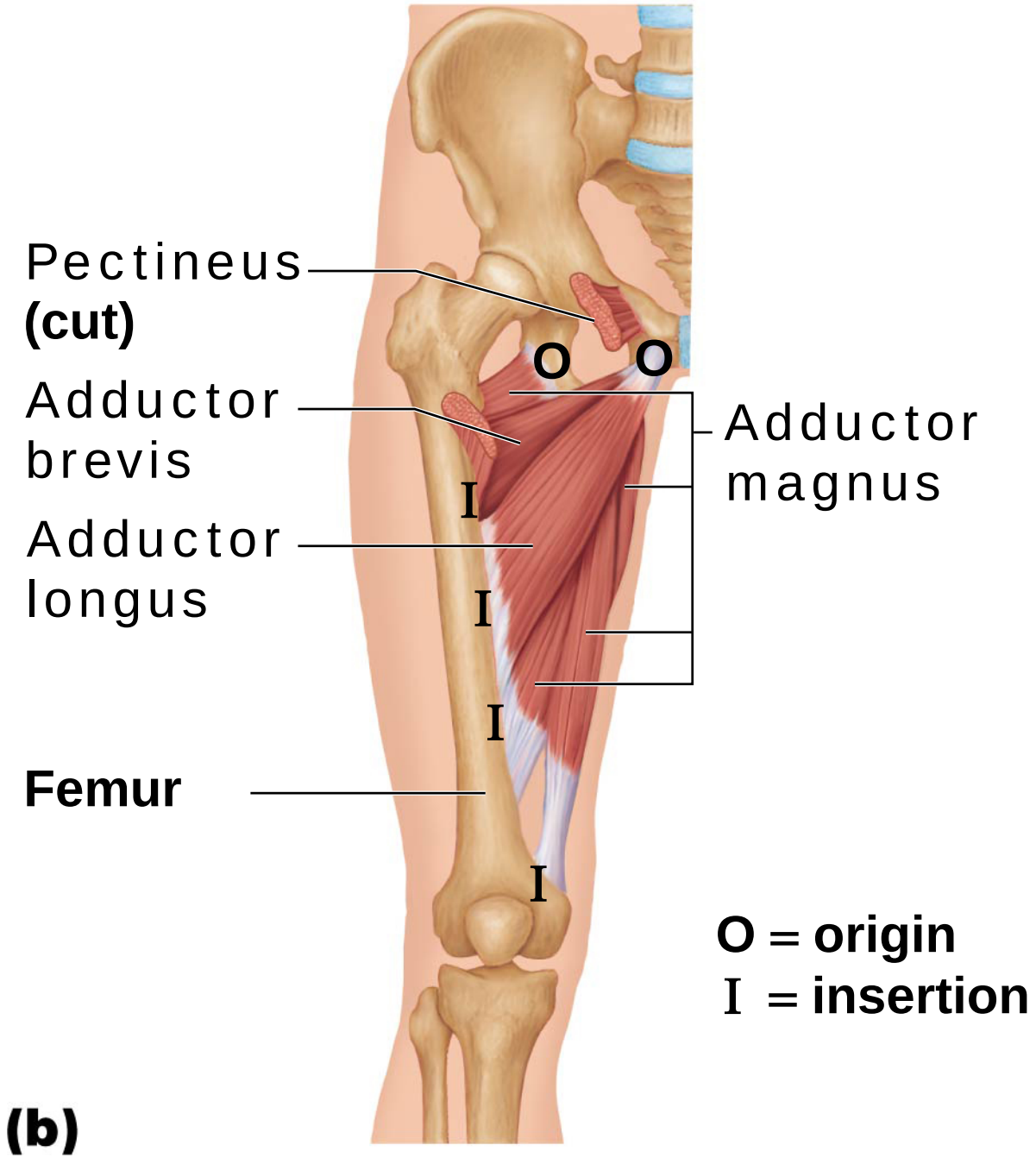


Figure 10.20c Anterior and medial muscles promoting movements of the thigh and leg.

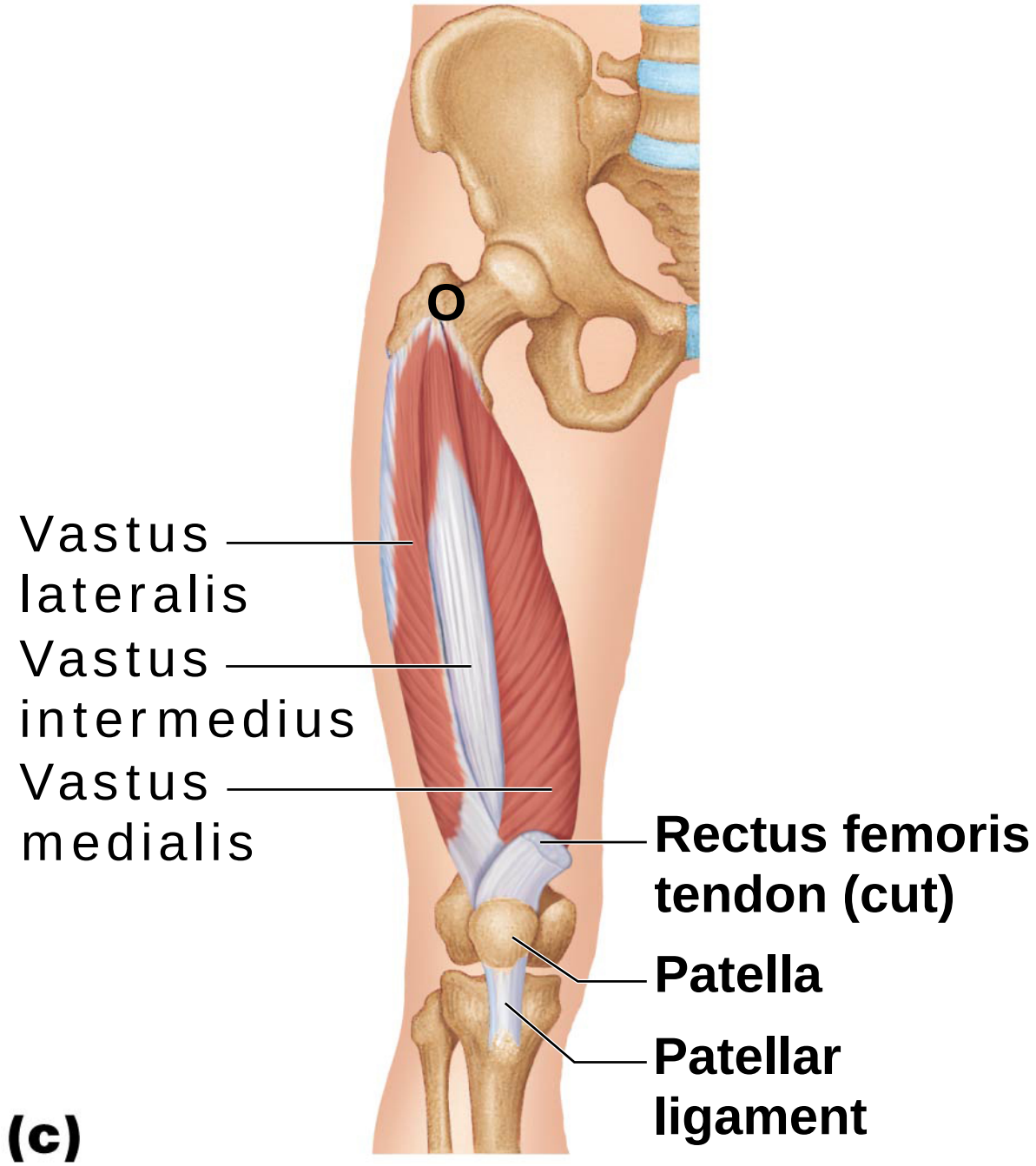


Table 10.14-4 Muscles Crossing the Hip and Knee Joints: Movements of the Thigh and Leg *(continued)*

Table 10.14 Muscles Crossing the Hip and Knee Joints: Movements of the Thigh and Leg (Figures 10.20 and 10.21) *(continued)*

MUSCLE	DESCRIPTION	ORIGIN (O) AND INSERTION (I)	ACTION	NERVE SUPPLY
PART II: POSTERIOR MUSCLES (Figure 10.21)				
Gluteal Muscles—Origin on Pelvis				
Gluteus maximus (gloo′te-us mak′sĭ-mus) (*glutos* = buttock; *maximus* = largest)	Largest and most superficial gluteus muscle; forms bulk of buttock mass; fibers are thick and coarse; site of intramuscular injection (dorsal gluteal site); overlies large sciatic nerve; covers ischial tuberosity only when standing; when sitting, moves superiorly, leaving ischial tuberosity exposed in the subcutaneous position	O—dorsal ilium, sacrum, and coccyx I—gluteal tuberosity of femur; iliotibial tract	Major extensor of thigh; complex, powerful, and most effective when thigh is flexed and force is necessary, as in rising from a forward flexed position and in thrusting the thigh posteriorly in climbing stairs and running; generally inactive during standing and walking; laterally rotates and abducts thigh	Inferior gluteal nerve (L_5, S_1, and S_2)
Gluteus medius (me′de-us) (*medius* = middle)	Thick muscle largely covered by gluteus maximus; important site for intramuscular injections (ventral gluteal site); considered safer than dorsal gluteal site because less chance of injuring sciatic nerve	O—between anterior and posterior gluteal lines on lateral surface of ilium I—by short tendon into lateral aspect of greater trochanter of femur	Abducts and medially rotates thigh; steadies pelvis; its action is extremely important in walking; e.g., muscle of limb planted on ground tilts or holds pelvis in abduction so that pelvis on side of swinging limb does not sag and foot of swinging limb can clear the ground	Superior gluteal nerve (L_5, S_1)
Gluteus minimus (mĭ′nĭ-mus) (*minimus* = smallest)	Smallest and deepest gluteal muscle	O—between anterior and inferior gluteal lines on external surface of ilium I—anterior border of greater trochanter of femur	As for gluteus medius	Superior gluteal nerve (L_5, S_1)

Table 10.14 Muscles Crossing the Hip and Knee Joints: Movements of the Thigh and Leg (Figures 10.20 and 10.21) *(continued)*

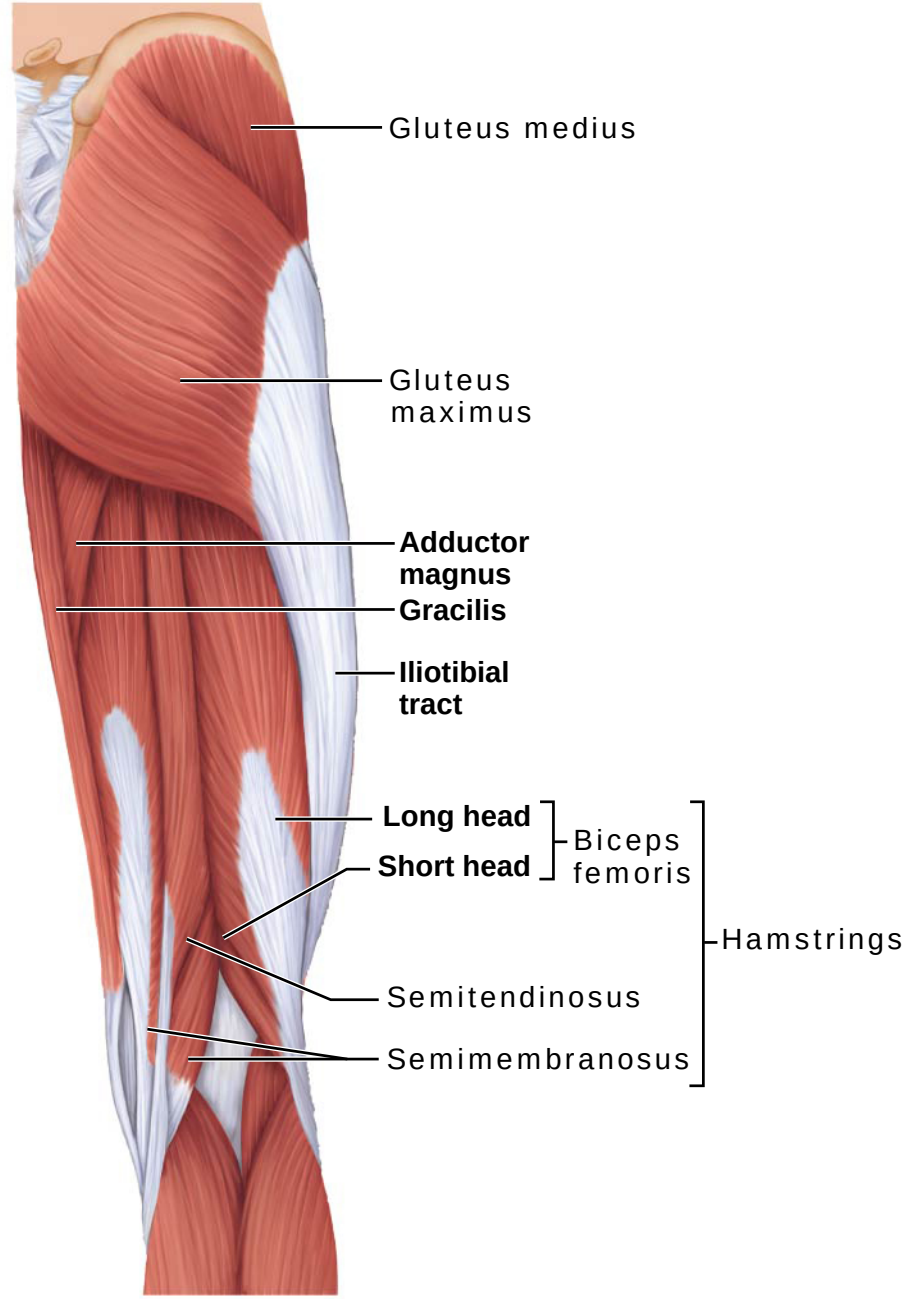
MUSCLE	DESCRIPTION	ORIGIN (O) AND INSERTION (I)	ACTION	NERVE SUPPLY
Lateral Rotators				
Piriformis (pir′ĭ-form-is) (*piri* = pear; *forma* = shape)	Pyramidal muscle located on posterior aspect of hip joint; inferior to gluteus minimus; issues from pelvis via greater sciatic notch	O—anterolateral surface of sacrum (opposite greater sciatic notch) I—superior border of greater trochanter of femur	Rotates extended thigh laterally; because inserted above head of femur, can also help abduct thigh when hip is flexed; stabilizes hip joint	S_1 and S_2, L_5
Obturator externus (ob″tu-ra′tor ek-ster′nus) (*obturator* = obturator foramen; *externus* = outside)	Flat, triangular muscle deep in superomedial aspect of thigh	O—outer surfaces of obturator membrane, pubis, and ischium, margins of obturator foramen I—by a tendon into trochanteric fossa of posterior femur	As for piriformis	Obturator nerve
Obturator internus (in-ter′nus) (*internus* = inside)	Surrounds obturator foramen within pelvis; leaves pelvis via lesser sciatic notch and turns acutely forward to insert on femur	O—inner surface of obturator membrane, greater sciatic notch, and margins of obturator foramen I—greater trochanter in front of piriformis	As for piriformis	L_5 and S_1
Gemellus (jĕ-mĕ′lis)—superior and inferior (*gemin* = twin, double; *superior* = above; *inferior* = below)	Two small muscles with common insertions and actions; considered extrapelvic portions of obturator internus	O—ischial spine (superior); ischial tuberosity (inferior) I—greater trochanter of femur	As for piriformis	L_5 and S_1
Quadratus femoris (*quad* = four-sided square)	Short, thick muscle; most inferior lateral rotator muscle; extends laterally from pelvis	O—ischial tuberosity I—intertrochanteric crest of femur	Rotates thigh laterally and stabilizes hip joint	L_5 and S_1

Table 10.14-6 Muscles Crossing the Hip and Knee Joints: Movements of the Thigh and Leg *(continued)*

Table 10.14 Muscles Crossing the Hip and Knee Joints: Movements of the Thigh and Leg (Figures 10.20 and 10.21) *(continued)*

MUSCLE	DESCRIPTION	ORIGIN (O) AND INSERTION (I)	ACTION	NERVE SUPPLY
Muscles of the Posterior Compartment of the Thigh				
Hamstrings	The hamstrings are fleshy muscles of the posterior thigh (biceps femoris, semitendinosus, and semimembranosus). They cross both the hip and knee joints and are prime movers of thigh extension and knee flexion. The group has a common origin site and is innervated by sciatic nerve (actually two nerves, the tibial and common fibular nerves wrapped in a common sheath). Ability of hamstrings to act on one of the two joints spanned depends on which joint is fixed—if knee is fixed (extended), they extend hip; if hip is extended, they flex knee. However, when hamstrings are stretched, they tend to restrict full accomplishment of antagonistic movement; e.g., if knees are fully extended, it is difficult to flex the hip fully (and touch your toes), and when the thigh is fully flexed as in kicking a football, it is almost impossible to extend the knee fully at the same time (without considerable practice). Name of this muscle group comes from old butchers' practice of using their tendons to hang hams for smoking. "Pulled hamstrings" are common sports injuries in those who run very hard, e.g., football halfbacks.			
• **Biceps femoris** (*biceps* = two heads)	Most lateral muscle of the group; arises from two heads	O—ischial tuberosity (long head); linea aspera, lateral supracondylar line, and distal femur (short head) I—common tendon passes downward and laterally (forming lateral border of popliteal fossa) to insert into head of fibula and lateral condyle of tibia	Extends thigh and flexes leg; laterally rotates leg, especially when knee is flexed	Sciatic nerve—tibial nerve to long head, common fibular nerve to short head (L_5–S_2)
• **Semitendinosus** (sem″e-ten″dĭ-no′sus) (*semi* = half; *tendinosus* = tendon)	Lies medial to biceps femoris; although its name suggests that this muscle is largely tendinous, it is quite fleshy; its long slender tendon begins about two-thirds of the way down thigh	O—ischial tuberosity in common with long head of biceps femoris I—medial aspect of upper tibial shaft	Extends thigh and flexes leg; with semimembranosus, medially rotates leg	Sciatic nerve—tibial nerve portion (L_5–S_2)
• **Semimembranosus** (sem″e-mem″brah-no′sus) (*membranosus* = membrane)	Deep to semitendinosus	O—ischial tuberosity I—medial condyle of tibia; via oblique popliteal ligament to lateral condyle of femur	Extends thigh and flexes leg; medially rotates leg	Sciatic nerve—tibial nerve portion (L_5–S_2)

Figure 10.21a-b Posterior muscles of the right hip and thigh.



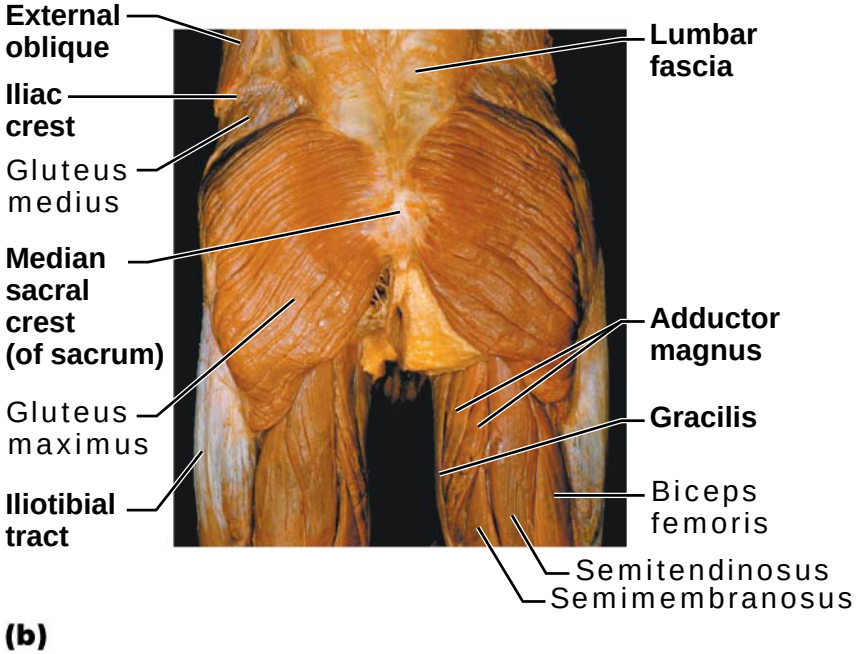


Figure 10.21a Posterior muscles of the right hip and thigh.

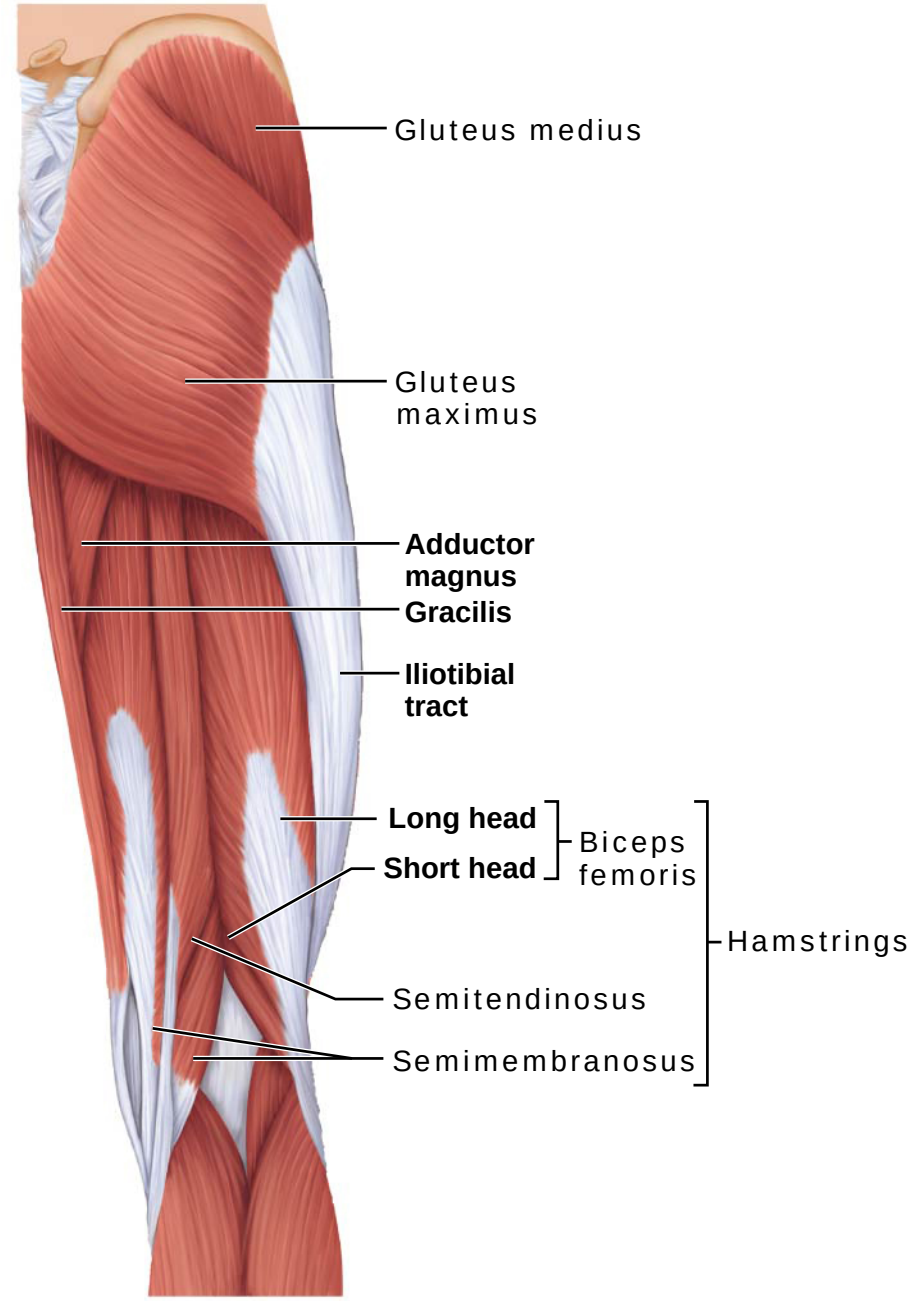


Figure 10.21c Posterior muscles of the right hip and thigh.

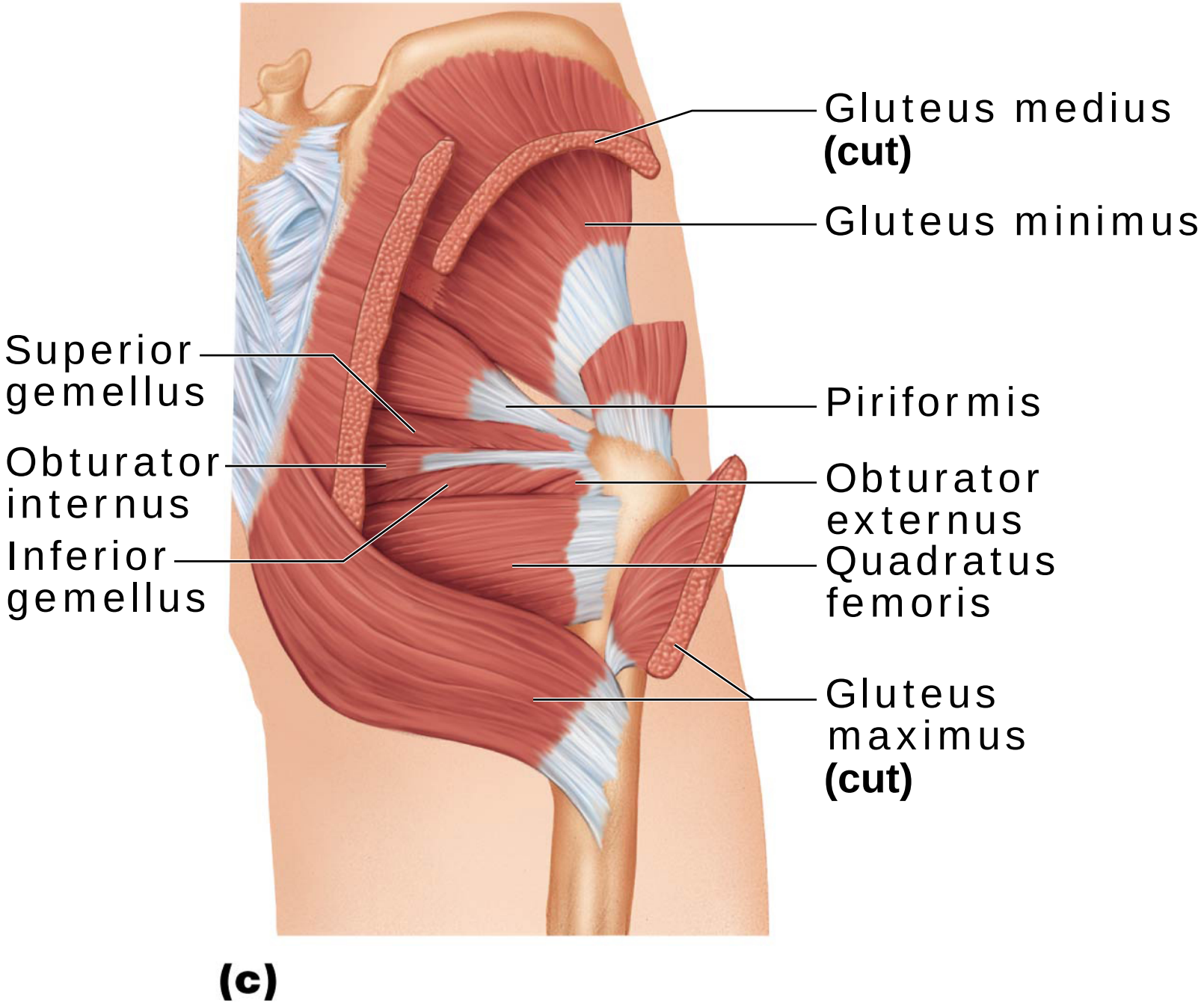


Table 10.15-1 Muscles of the Leg: Movements of the Ankle and Toes

Table 10.15 Muscles of the Leg: Movements of the Ankle and Toes (Figures 10.22 to 10.24)

MUSCLE	DESCRIPTION	ORIGIN (O) AND INSERTION (I)	ACTION	NERVE SUPPLY
PART I: MUSCLES OF THE ANTERIOR COMPARTMENT (**Figures 10.22** and **10.23**)	All muscles of the anterior compartment dorsiflex the ankle. Paralysis of the anterior muscle group causes *foot drop*, which requires that the leg be lifted unusually high during walking to prevent tripping over one's toes.			
Tibialis anterior (tib″e-a′lis) (*tibial* = tibia; *anterior* = toward the front)	Superficial muscle of anterior leg; laterally parallels sharp anterior margin of tibia	O—lateral condyle and upper 2/3 of tibial shaft; interosseous membrane I—by tendon into inferior surface of medial cuneiform and first metatarsal bone	Prime mover of dorsiflexion; inverts foot; helps support medial longitudinal arch of foot	Deep fibular nerve (L_4 and L_5)
Extensor digitorum longus (*extensor* = increases angle at a joint; *digit* = finger or toe; *longus* = long)	Unipennate muscle on anterolateral surface of leg; lateral to tibialis anterior muscle	O—lateral condyle of tibia; proximal 3/4 of fibula; interosseous membrane I—middle and distal phalanges of second to fifth toes via extensor expansion	Prime mover of toe extension (acts mainly at metatarsophalangeal joints); dorsiflexes foot	Deep fibular nerve (L_5 and S_1)
Fibularis (peroneus) tertius (fib-u-lar′ris ter′shus) (*fibular* = fibula; *tertius* = third)	Small muscle; usually continuous and fused with distal part of extensor digitorum longus; not always present	O—distal anterior surface of fibula and interosseous membrane I—tendon inserts on dorsum of fifth metatarsal	Dorsiflexes and everts foot	Deep fibular nerve (L_5 and S_1)
Extensor hallucis longus (hal′u-sis) (*hallux* = great toe)	Deep to extensor digitorum longus and tibialis anterior; narrow origin	O—anteromedial fibula shaft and interosseous membrane I—tendon inserts on distal phalanx of great toe	Extends great toe; dorsiflexes foot	Deep fibular nerve (L_5 and S_1)

Figure 10.22 Muscles of the anterior compartment of the right leg.

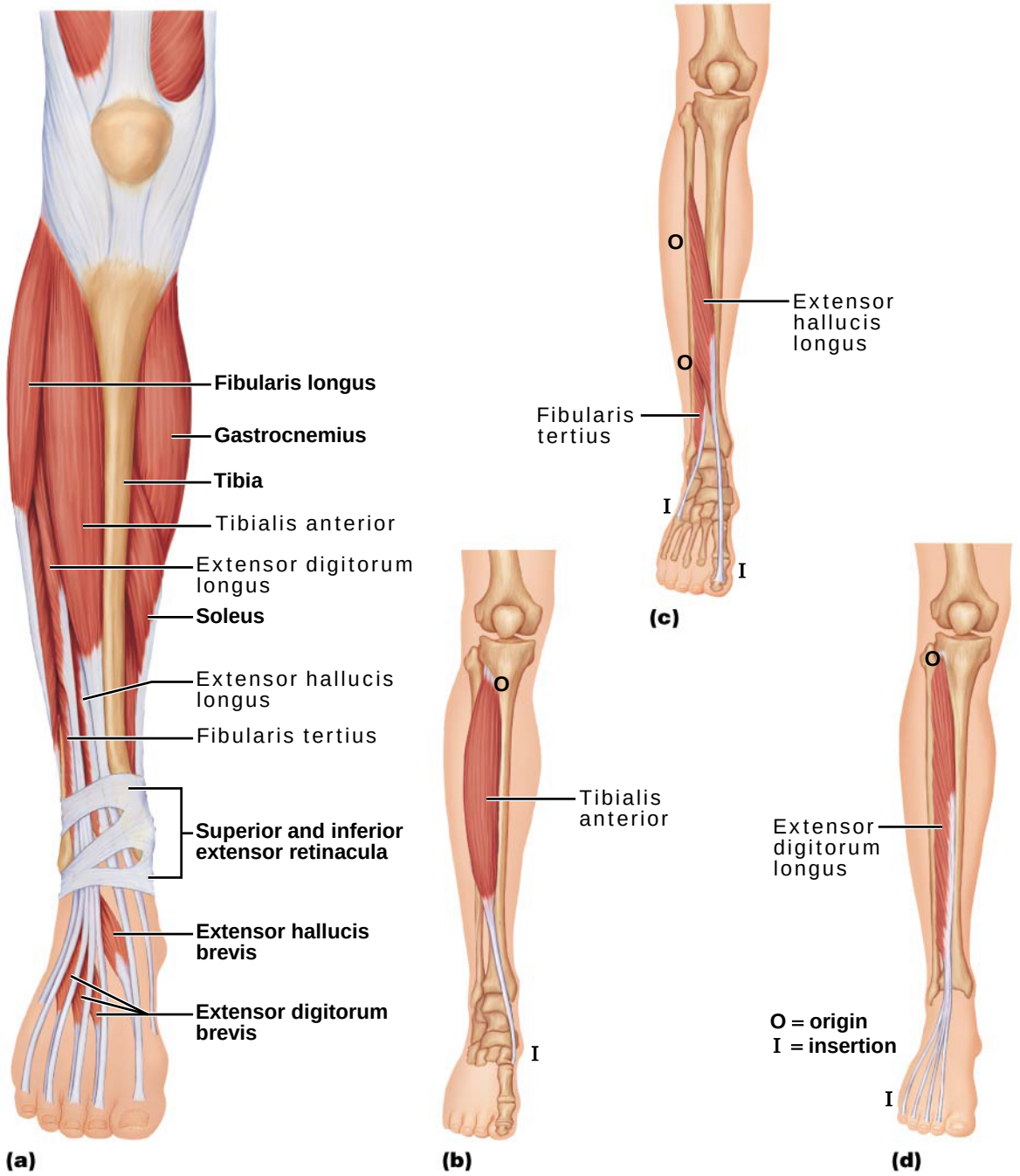


Figure 10.22a Muscles of the anterior compartment of the right leg.

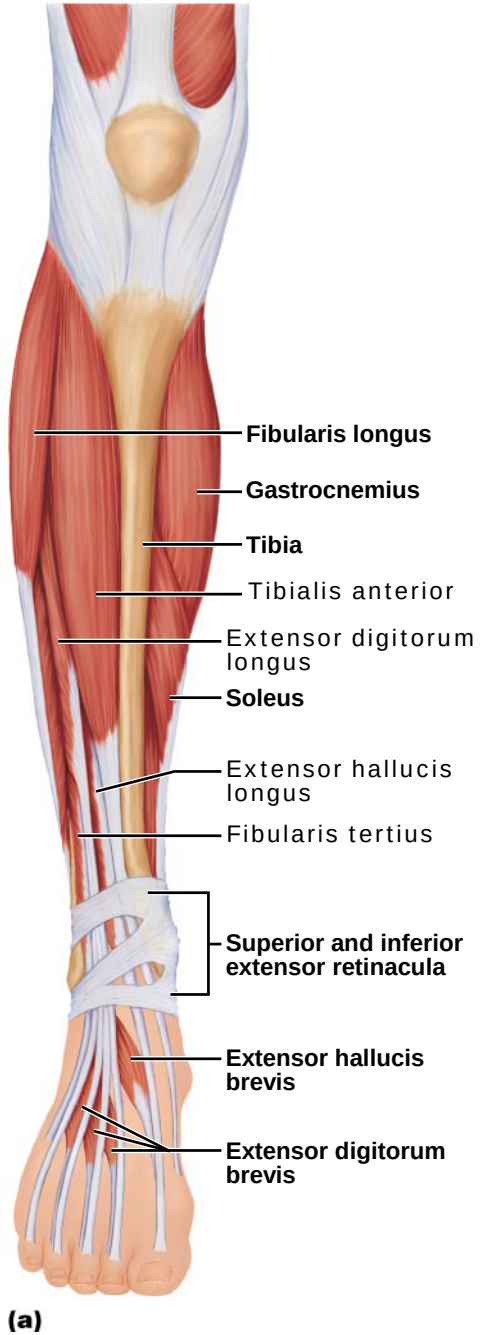


Figure 10.22b Muscles of the anterior compartment of the right leg.

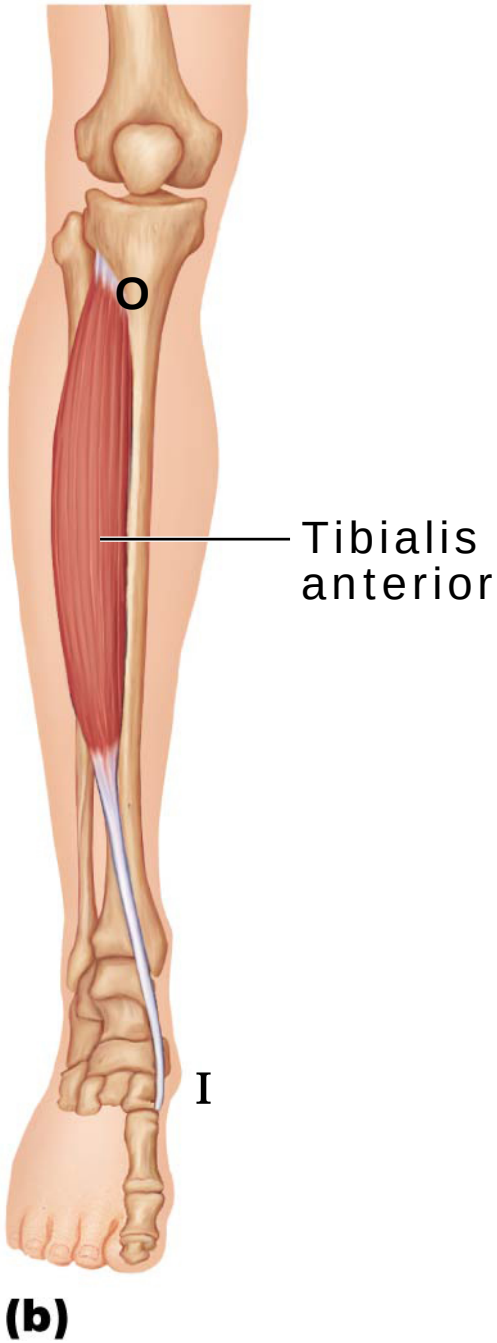


Figure 10.22d Muscles of the anterior compartment of the right leg.

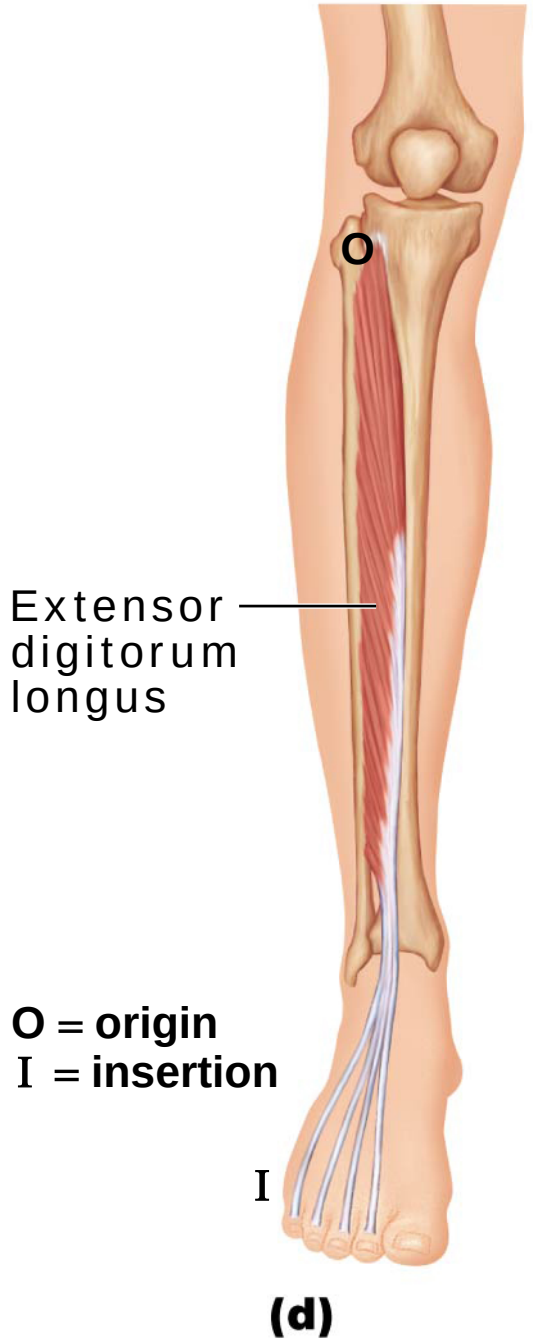


Table 10.15 Muscles of the Leg: Movements of the Ankle and Toes (Figures 10.22 to 10.24) *(continued)*

MUSCLE	DESCRIPTION	ORIGIN (O) AND INSERTION (I)	ACTION	NERVE SUPPLY
PART II: MUSCLES OF THE LATERAL COMPARTMENT (Figures 10.23 and 10.24) Besides plantar flexion and foot eversion, these muscles stabilize the lateral ankle and lateral longitudinal arch of the foot.				
Fibularis (peroneus) longus (See also Figure 10.22)	Superficial lateral muscle; overlies fibula	O—head and upper portion of lateral fibula I—by long tendon that curves under foot to first metatarsal and medial cuneiform	Plantar flexes and everts foot; may help keep foot flat on ground	Superficial fibular nerve (L_5–S_2)
Fibularis (peroneus) brevis (*brevis* = short)	Smaller muscle; deep to fibularis longus; enclosed in a common sheath	O—distal fibula shaft I—by tendon running behind lateral malleolus to insert on proximal end of fifth metatarsal	Plantar flexes and everts foot	Superficial fibular nerve

Figure 10.23 Muscles of the lateral compartment of the right leg.

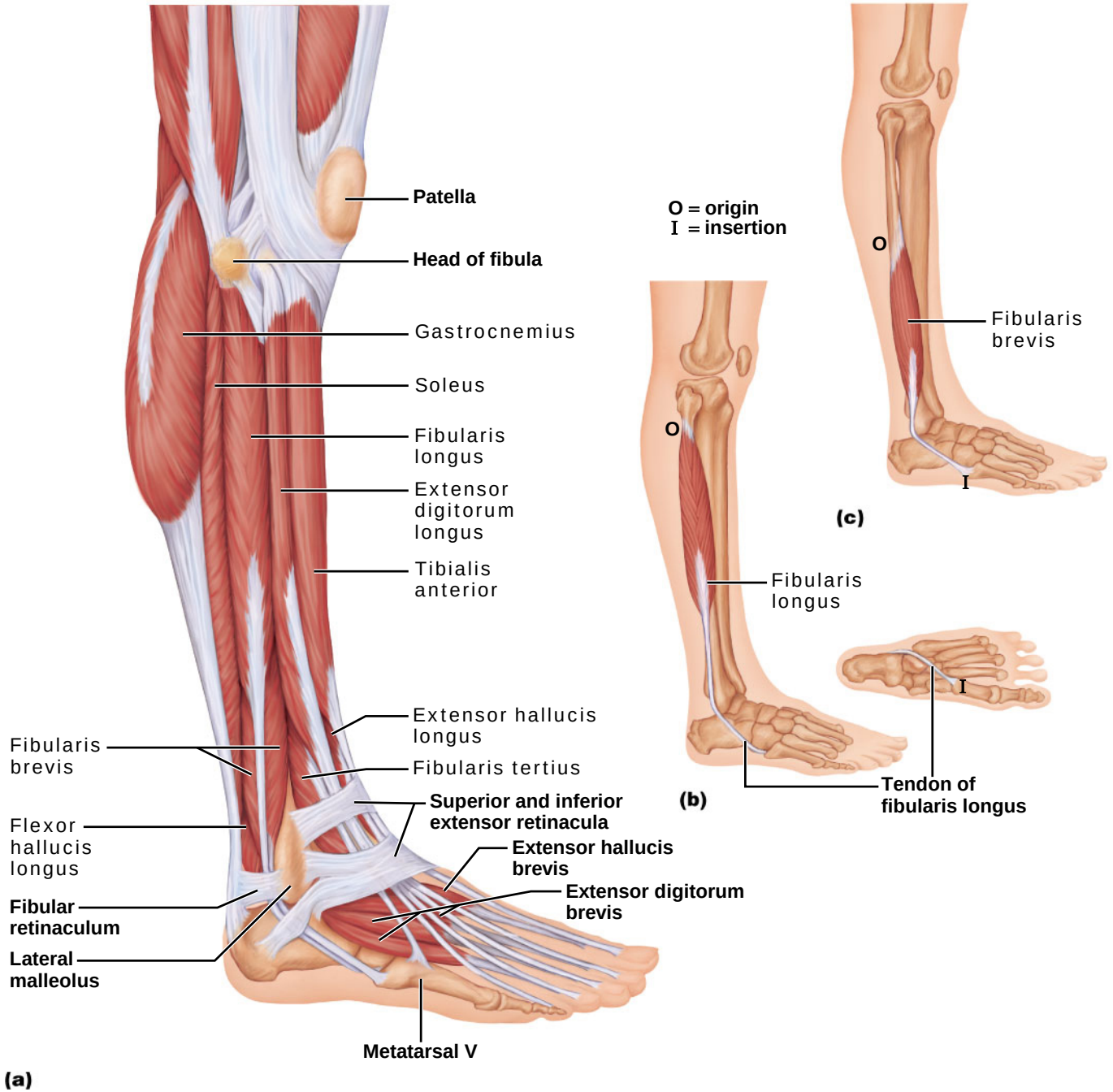


Figure 10.23a Muscles of the lateral compartment of the right leg.

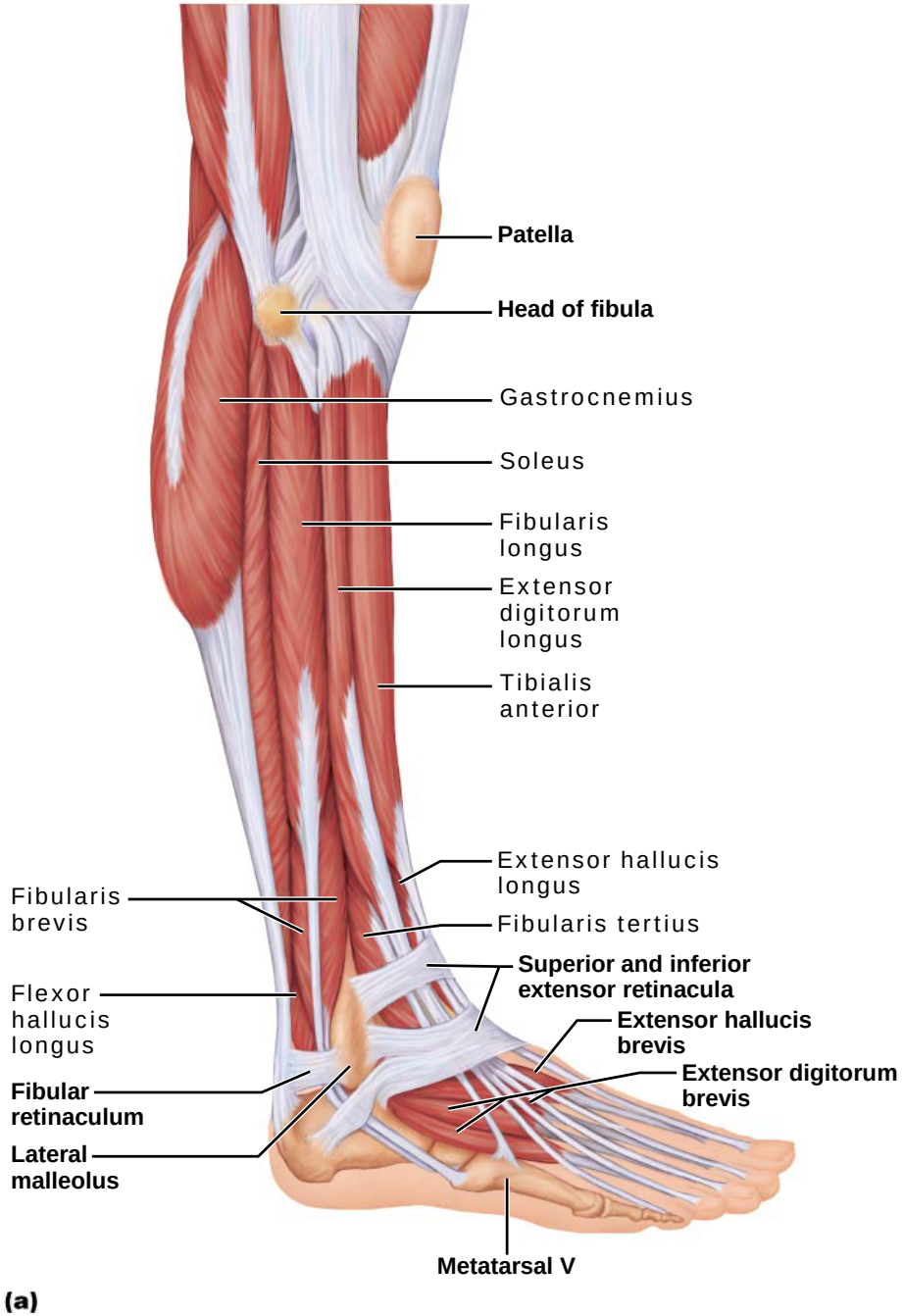


Figure 10.23b Muscles of the lateral compartment of the right leg.

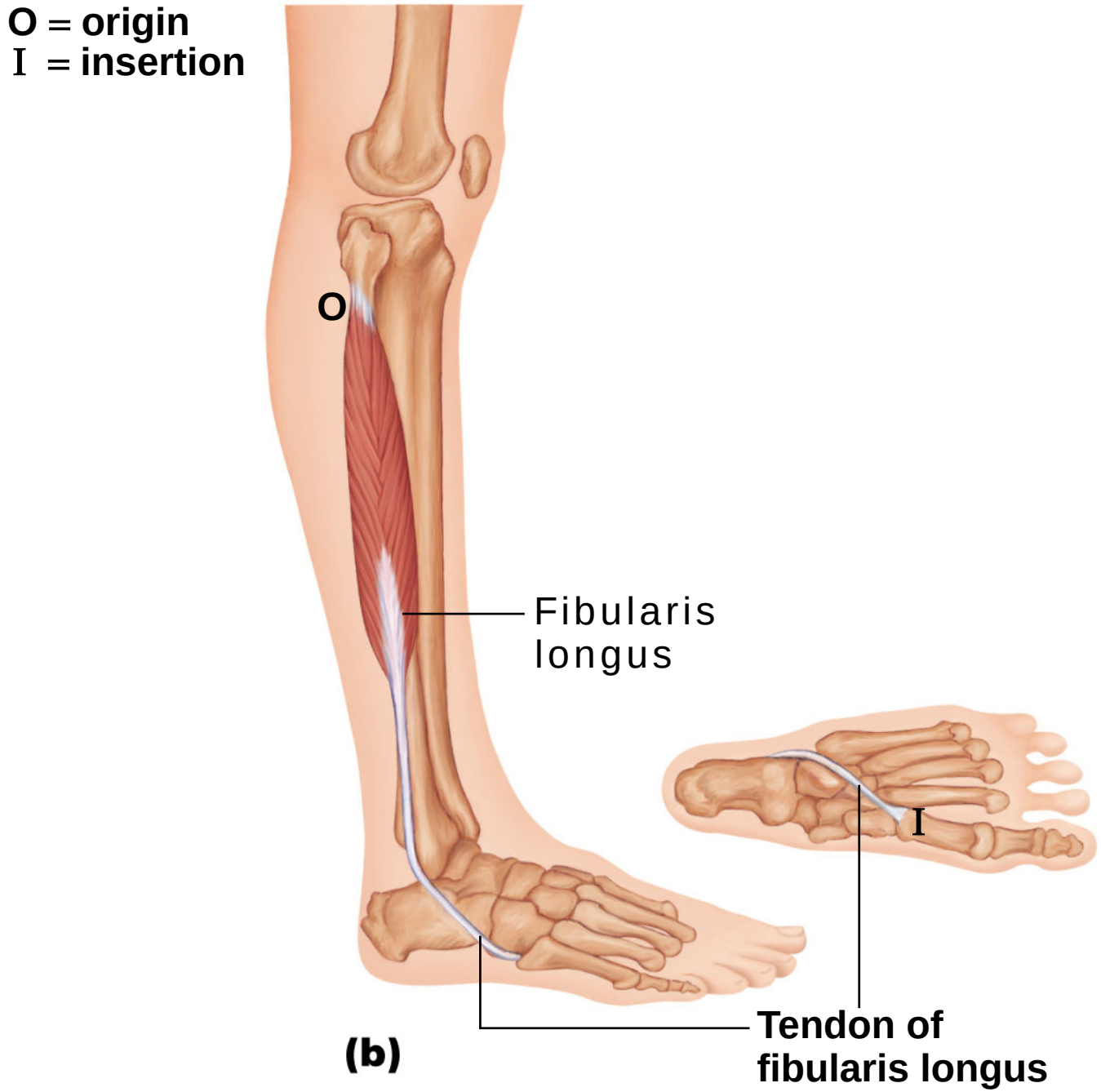


Figure 10.23c Muscles of the lateral compartment of the right leg.

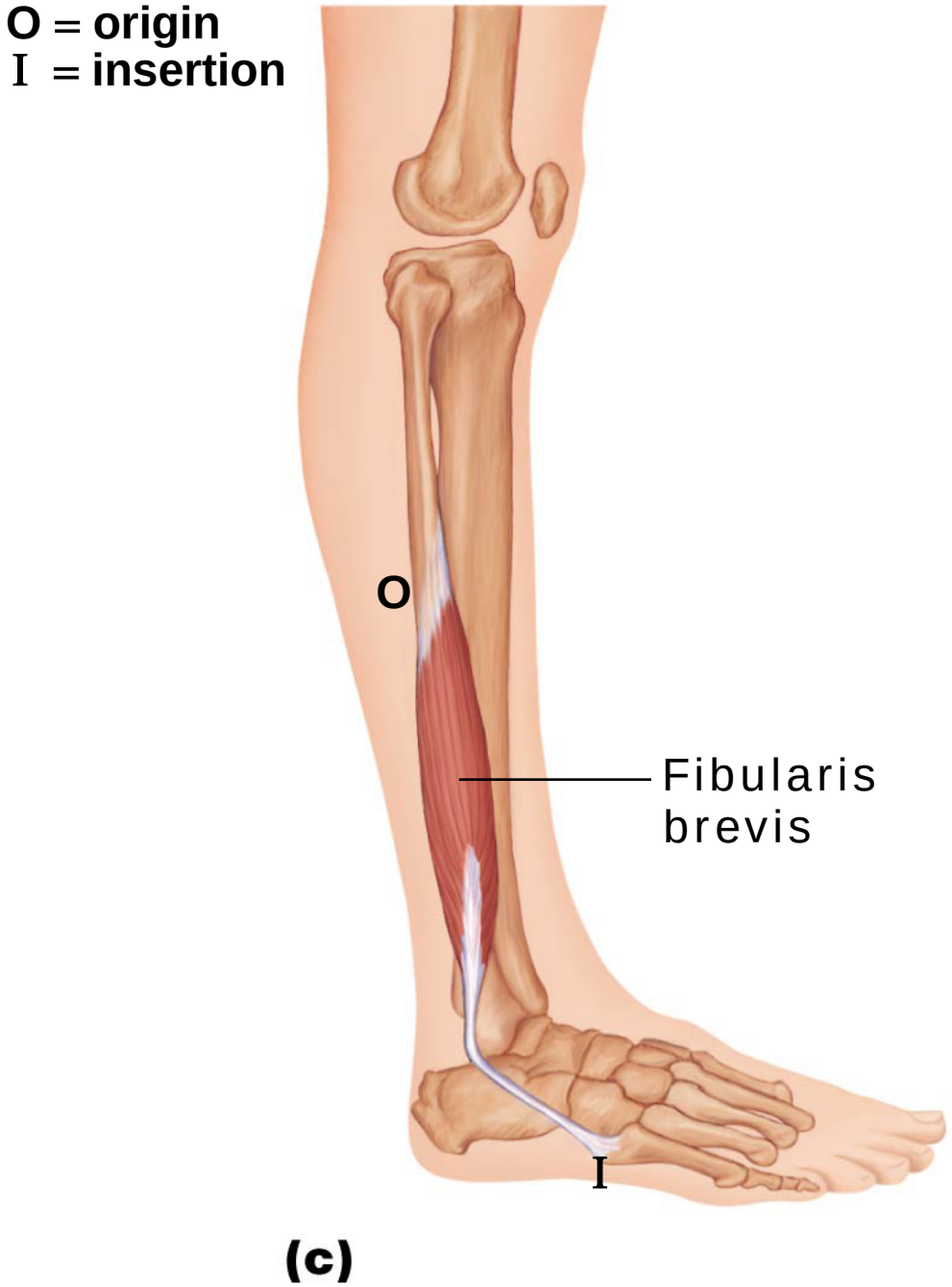


Table 10.15-3 Muscles of the Leg: Movements of the Ankle and Toes *(continued)*

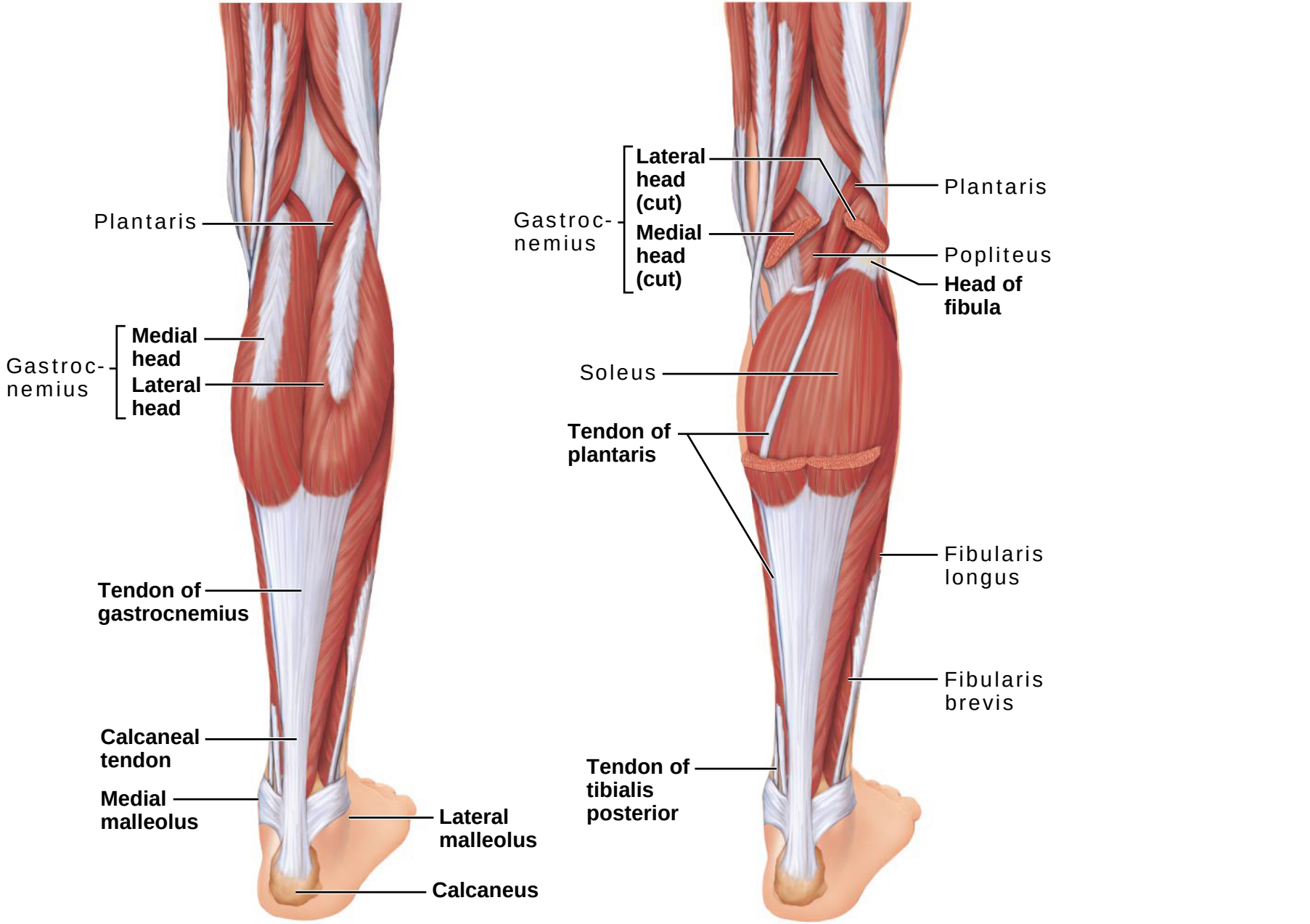
Table 10.15 Muscles of the Leg: Movements of the Ankle and Toes (Figures 10.22 to 10.24) *(continued)*

MUSCLE	DESCRIPTION	ORIGIN (O) AND INSERTION (I)	ACTION	NERVE SUPPLY
PART III: MUSCLES OF THE POSTERIOR COMPARTMENT (Figure 10.24) The muscles of the posterior compartment act together to plantar flex the ankle.				
Superficial Muscles				
Triceps surae (tri″seps sur′e) (See also Figure 10.23)	Refers to muscle pair (gastrocnemius and soleus) that shapes the posterior calf and inserts via a common tendon into the calcaneus of the heel; this *calcaneal* or *Achilles tendon* is the largest tendon in the body. Prime movers of ankle plantar flexion.			
• **Gastrocnemius** (gas″truk-ne′me-us) (*gaster* = belly; *kneme* = leg)	Superficial muscle of pair; two prominent bellies that form proximal curve of calf	O—by two heads from medial and lateral condyles of femur I—posterior calcaneus via calcaneal tendon	Plantar flexes foot when leg is extended; because it also crosses knee joint, it can flex knee when foot is dorsiflexed	Tibial nerve (S_1, S_2)
• **Soleus** (so′le-us) (*soleus* = fish)	Broad, flat muscle, deep to gastrocnemius on posterior surface of calf	O—extensive origin from superior tibia, fibula, and interosseous membrane I—as for gastrocnemius	Plantar flexes foot; important locomotor and postural muscle during walking, running, and dancing	Tibial nerve
Plantaris (plan-tar′is) (*planta* = sole of foot)	Generally a small, feeble muscle, but varies in size and extent; may be absent	O—posterior femur above lateral condyle I—via a long, thin tendon into calcaneus or its tendon	Helps to flex leg and plantar flex foot	Tibial nerve

Table 10.15 Muscles of the Leg: Movements of the Ankle and Toes (Figures 10.22 to 10.24) *(continued)*

MUSCLE	DESCRIPTION	ORIGIN (O) AND INSERTION (I)	ACTION	NERVE SUPPLY
Deep Muscles (Figure 10.24c–f)				
Popliteus (pop-lit′e-us) (*poplit* = back of knee)	Thin, triangular muscle at posterior knee; passes inferomedially to tibial surface	O—lateral condyle of femur and lateral meniscus of knee I—proximal tibia	Flexes and rotates leg medially to unlock extended knee when flexion begins; with tibia fixed, rotates thigh laterally	Tibial nerve (L_4–S_1)
Flexor digitorum longus (*flexor* = decreases angle at a joint)	Long, narrow muscle; runs medial to and partially overlies tibialis posterior	O—extensive origin on the posterior tibia I—tendon runs behind medial malleolus and inserts into distal phalanges of second to fifth toes	Plantar flexes and inverts foot; flexes toes; helps foot "grip" ground	Tibial nerve (L_5–S_2)
Flexor hallucis longus (See also Figure 10.23)	Bipennate muscle; lies lateral to inferior aspect of tibialis posterior	O—midshaft of fibula; interosseous membrane I—tendon runs under foot to distal phalanx of great toe	Plantar flexes and inverts foot; flexes great toe at all joints; "push off" muscle during walking	Tibial nerve (L_5–S_2)
Tibialis posterior (*posterior* = toward the back)	Thick, flat muscle deep to soleus; placed between posterior flexors	O—superior tibia and fibula and interosseous membrane I—tendon passes behind medial malleolus and under arch of foot; inserts into several tarsals and metatarsals II–IV	Prime mover of foot inversion; plantar flexes foot; stabilizes medial longitudinal arch of foot (as during ice skating)	Tibial nerve (L_4 and L_5)

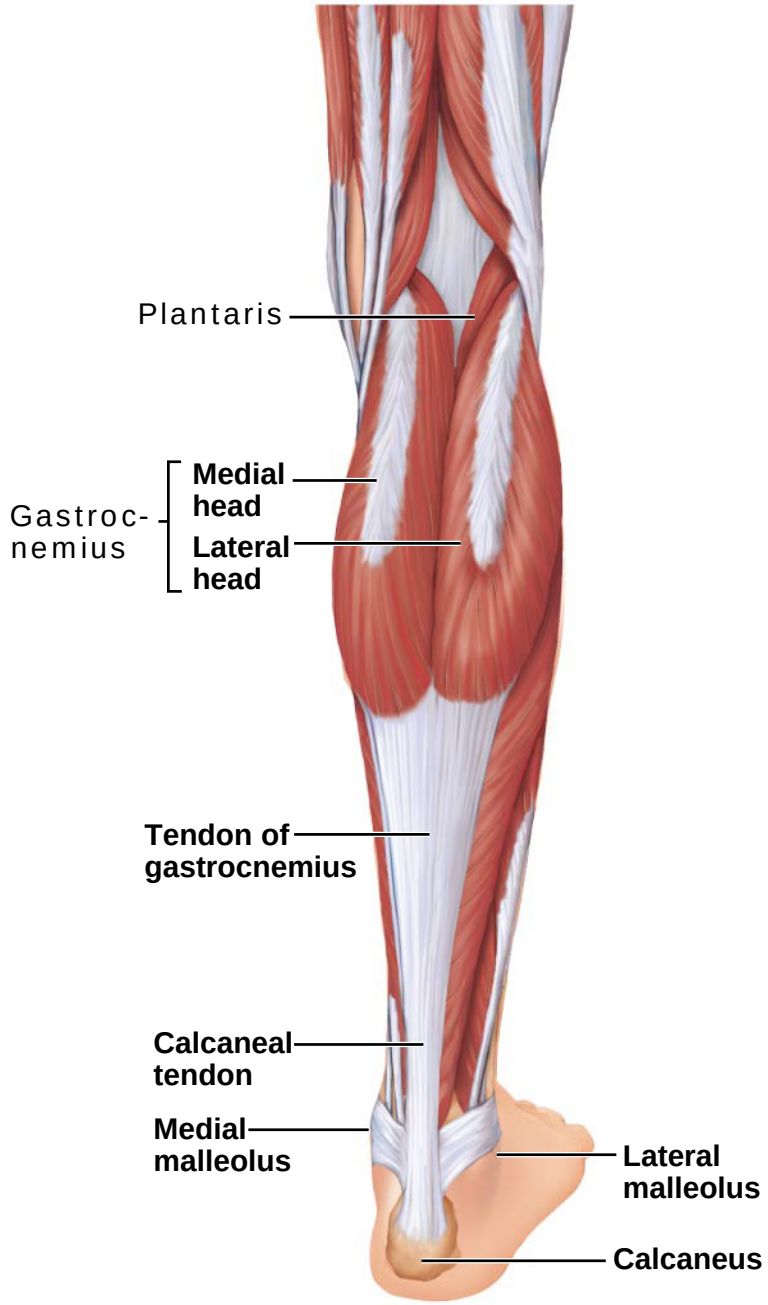
Figure 10.24a-b Muscles of the posterior compartment of the right leg.



(a) Superficial view of the posterior leg.

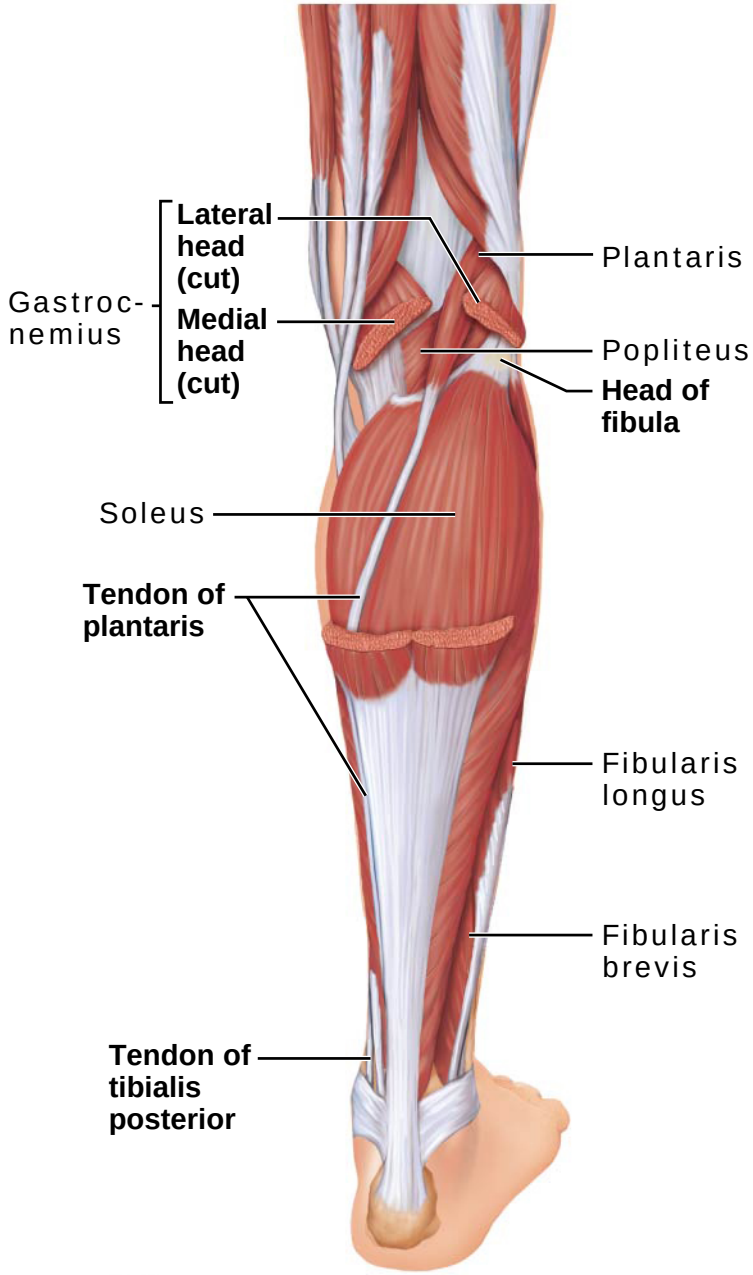
(b) The gastrocnemius has been removed to show the soleus immediately deep to it.

Figure 10.24a Muscles of the posterior compartment of the right leg.



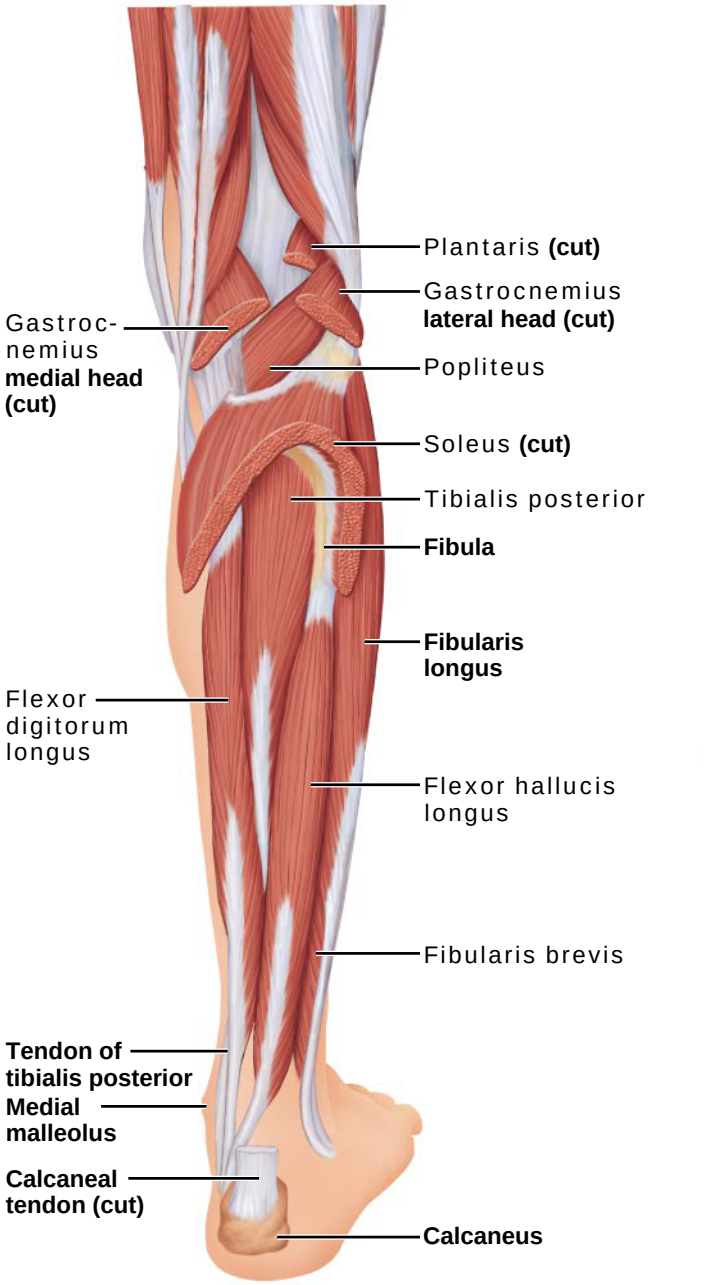
(a) Superficial view of the posterior leg.

Figure 10.24b Muscles of the posterior compartment of the right leg.

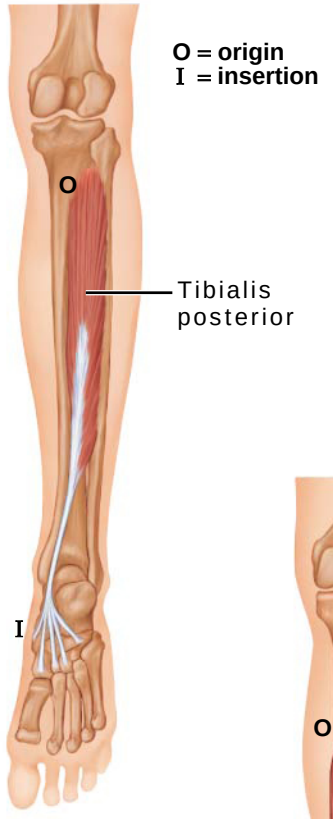


(b) The gastrocnemius has been removed to show the soleus immediately deep to it.

Figure 10.24c-f Muscles of the posterior compartment of the right leg.

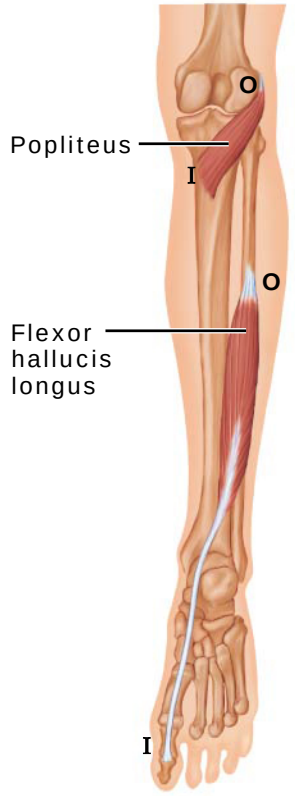


(c) The triceps surae has been removed to show the deep muscles of the posterior compartment.



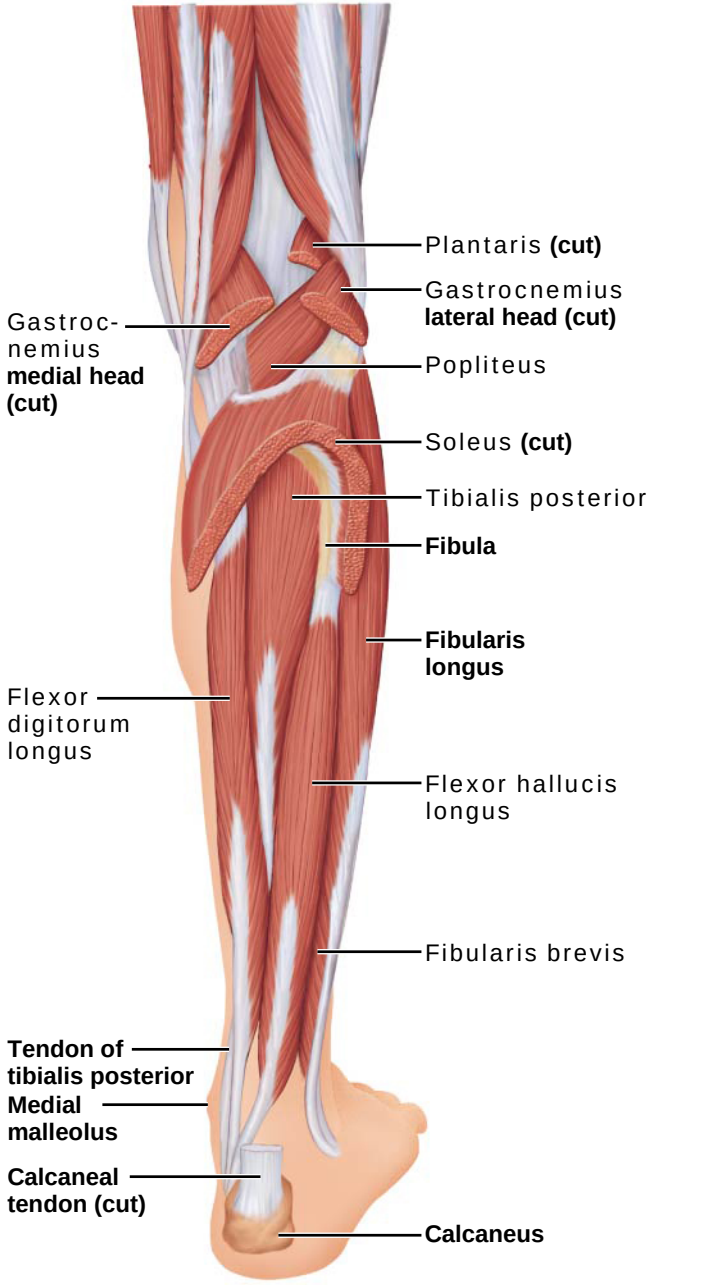
(d) Isolated tibialis posterior.

(e) Isolated flexor digitorum longus.



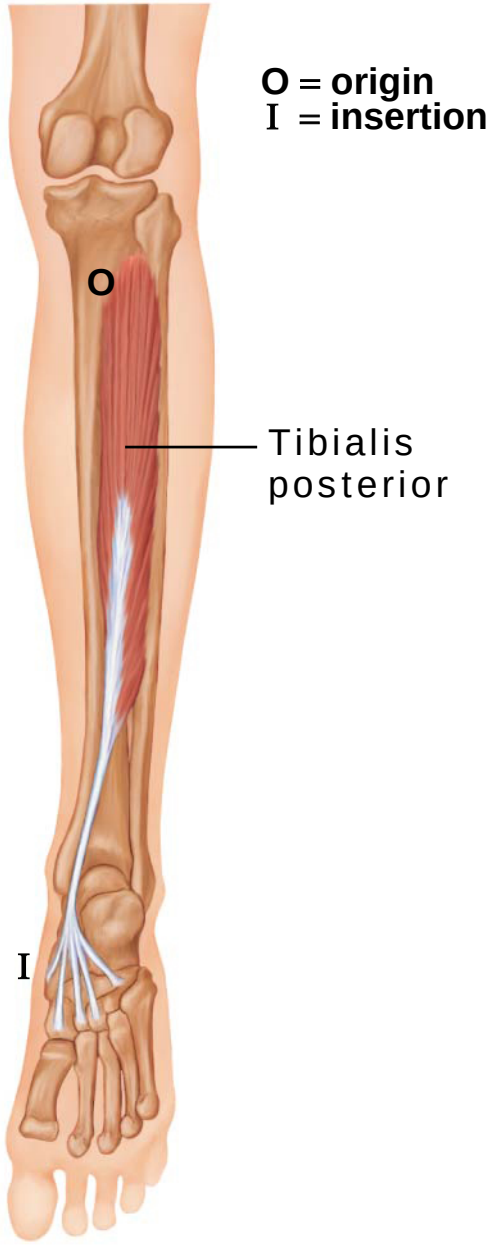
(f) Isolated popliteus and flexor hallucis longus.

Figure 10.24c Muscles of the posterior compartment of the right leg.



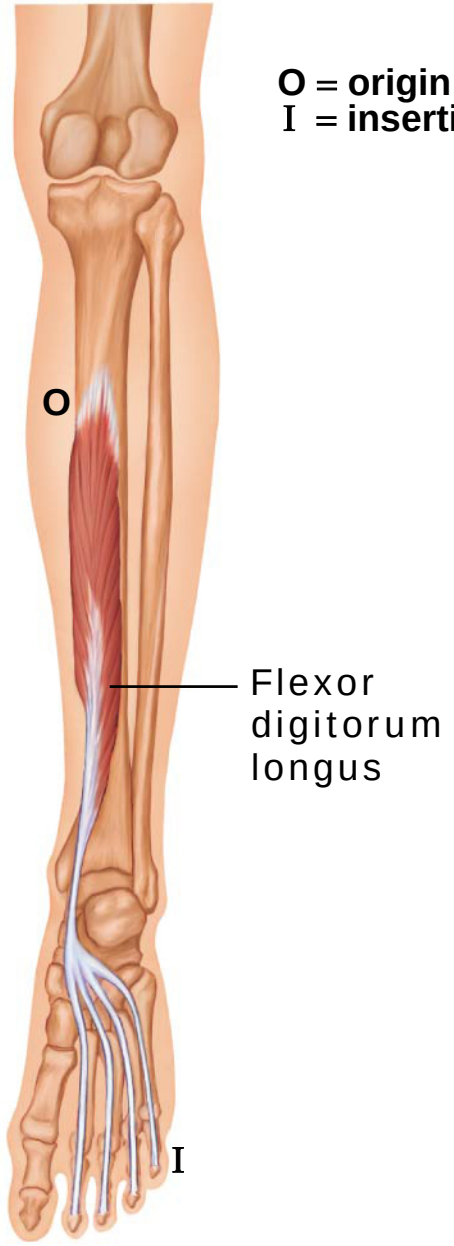
(c) The triceps surae has been removed to show the deep muscles of the posterior compartment.

Figure 10.24d Muscles of the posterior compartment of the right leg.



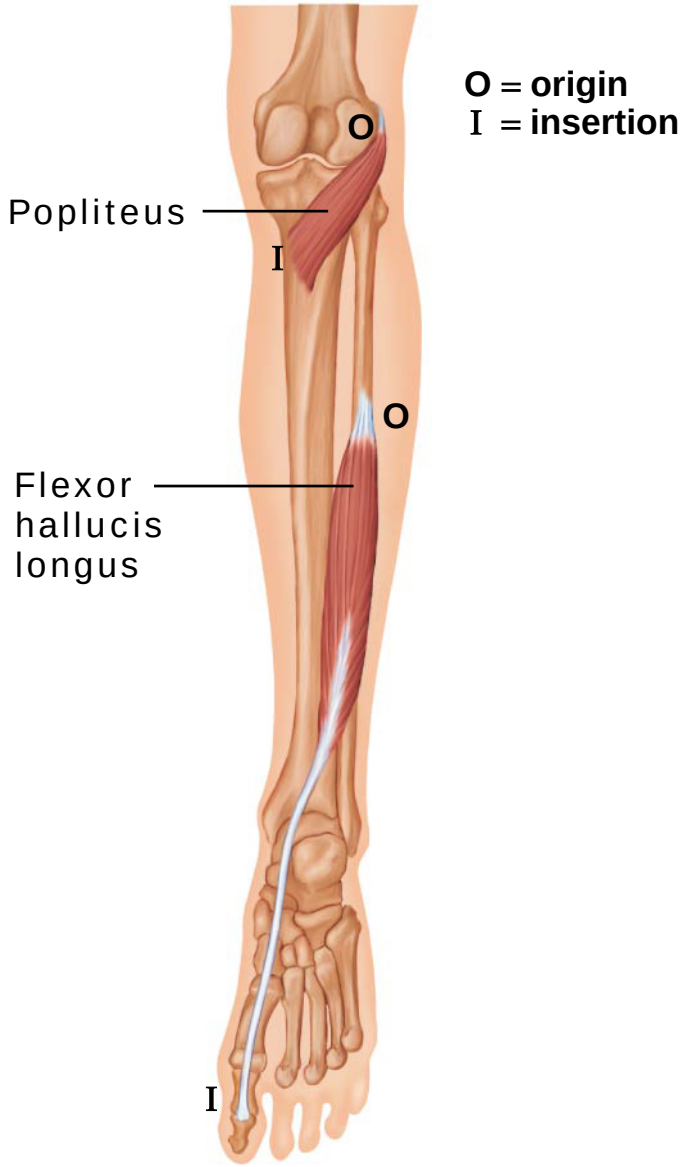
(d) Isolated tibialis posterior.

Figure 10.24e Muscles of the posterior compartment of the right leg.



(e) Isolated flexor digitorum longus.

Figure 10.24f Muscles of the posterior compartment of the right leg.



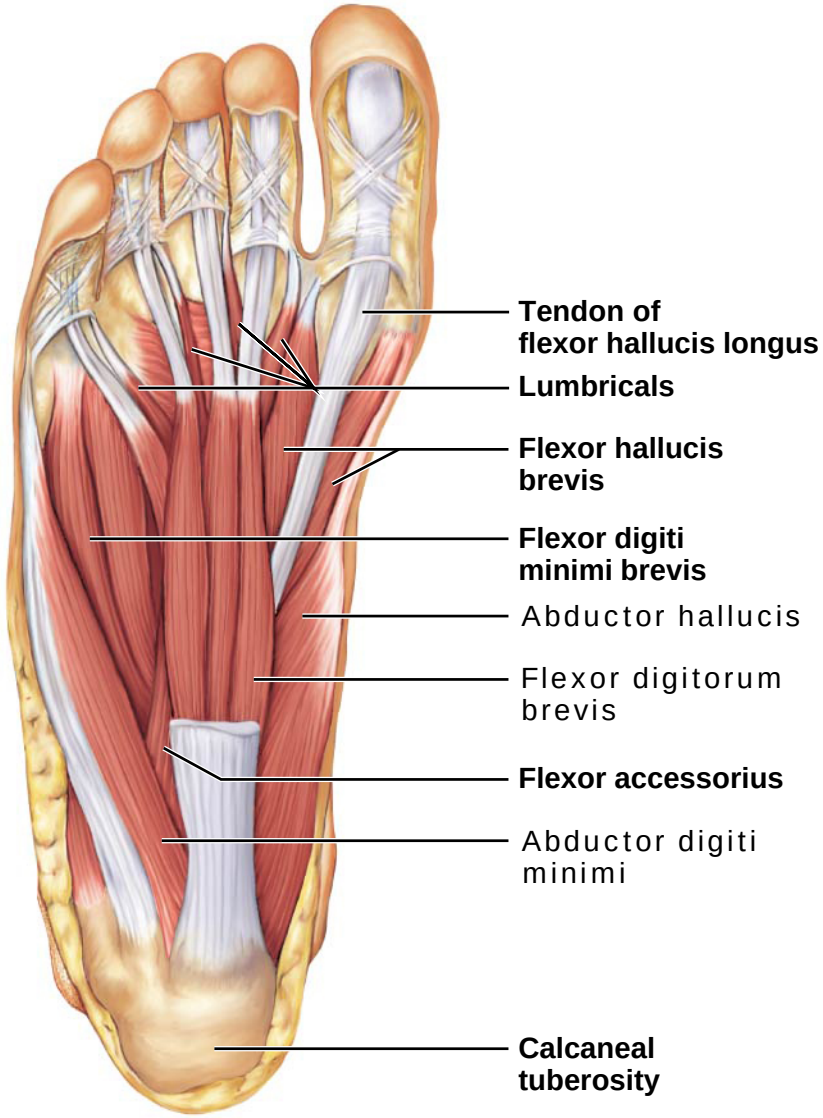
(f) Isolated popliteus and flexor hallucis longus.

Table 10.16-1 Intrinsic Muscles of the Foot: Toe Movement and Arch Support

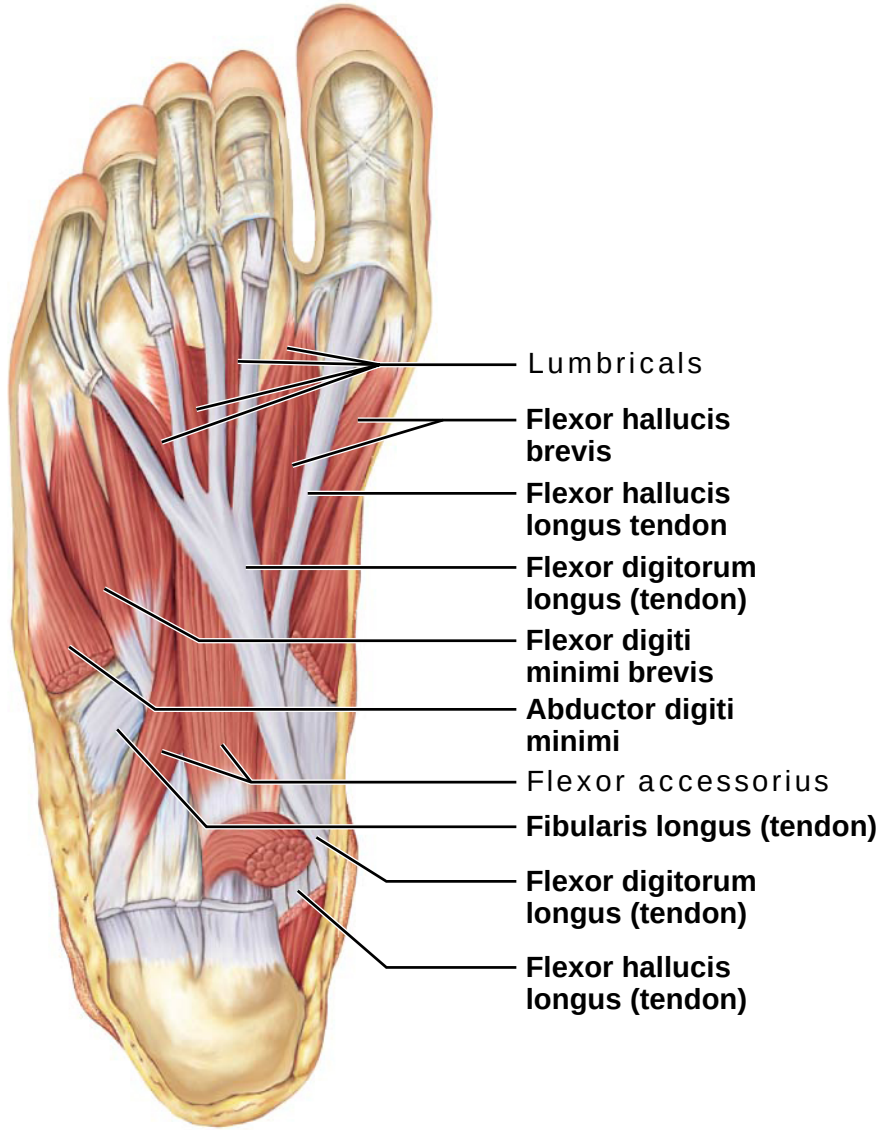
Table 10.16 Intrinsic Muscles of the Foot: Toe Movement and Arch Support (Figure 10.25)

MUSCLE	DESCRIPTION	ORIGIN (O) AND INSERTION (I)	ACTION	NERVE SUPPLY
MUSCLES ON DORSUM OF FOOT				
Extensor digitorum brevis (Figures 10.22a and 10.23a)	Small, four-part muscle on dorsum of foot; deep to the tendons of extensor digitorum longus; corresponds to the extensor indicis and extensor pollicis muscles of forearm	O—anterior part of calcaneus bone; extensor retinaculum I—base of proximal phalanx of great toe; extensor expansions on second to fourth or fifth toes	Helps extend toes at metatarsophalangeal joints	Deep fibular nerve (L_5 and S_1)
MUSCLES ON SOLE OF FOOT—FIRST LAYER (MOST SUPERFICIAL) (Figure 10.25)				
Flexor digitorum brevis	Bandlike muscle in middle of sole; corresponds to flexor digitorum superficialis of forearm and inserts into digits in the same way	O—calcaneal tuberosity I—middle phalanx of second to fourth toes	Helps flex toes	Medial plantar nerve (a branch of tibial nerve, S_1 and S_2)
Abductor hallucis (hal′u-sis) (*hallux* = great toe)	Lies medial to flexor digitorum brevis (recall the similar thumb muscle, abductor pollicis brevis)	O—calcaneal tuberosity and flexor retinaculum I—proximal phalanx of great toe, medial side, in the tendon of flexor hallucis brevis)	Abducts great toe	Medial plantar nerve
Abductor digiti minimi	Most lateral of the three superficial sole muscles (recall similar abductor muscle in palm)	O—calcaneal tuberosity I—lateral side of base of little toe's proximal phalanx	Abducts and flexes little toe	Lateral plantar nerve (a branch of tibial nerve, S_1, S_2, and S_3)
MUSCLES ON SOLE OF FOOT—SECOND LAYER				
Flexor accessorius (quadratus plantae)	Rectangular muscle just deep to flexor digitorum brevis in posterior half of sole; two heads (see also Figure 10.25c)	O—medial and lateral sides of calcaneus I—tendon of flexor digitorum longus in midsole	Straightens out the oblique pull of flexor digitorum longus	Lateral plantar nerve
Lumbricals	Four little "worms" (like lumbricals in hand)	O—from each tendon of flexor digitorum longus I—extensor expansion on proximal phalanx of second to fifth toes, medial side	By pulling on extensor expansion, flex toes at metatarsophalangeal joints and extend toes at interphalangeal joints	Medial plantar nerve (first lumbrical) and lateral plantar nerve (second to fourth lumbrical)

Figure 10.25a-b Muscles of the right foot, plantar aspect.

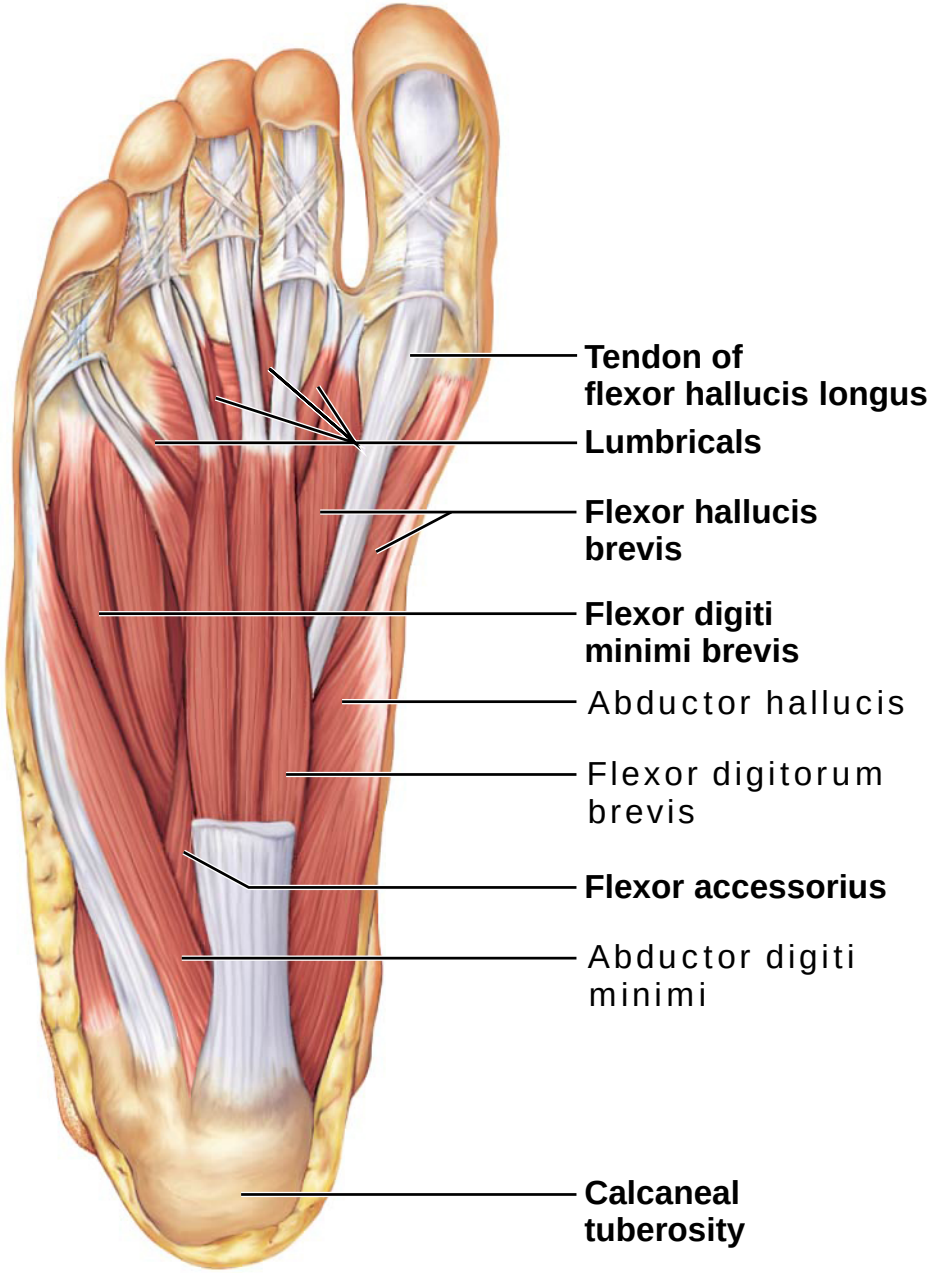


(a) First layer (plantar aspect)



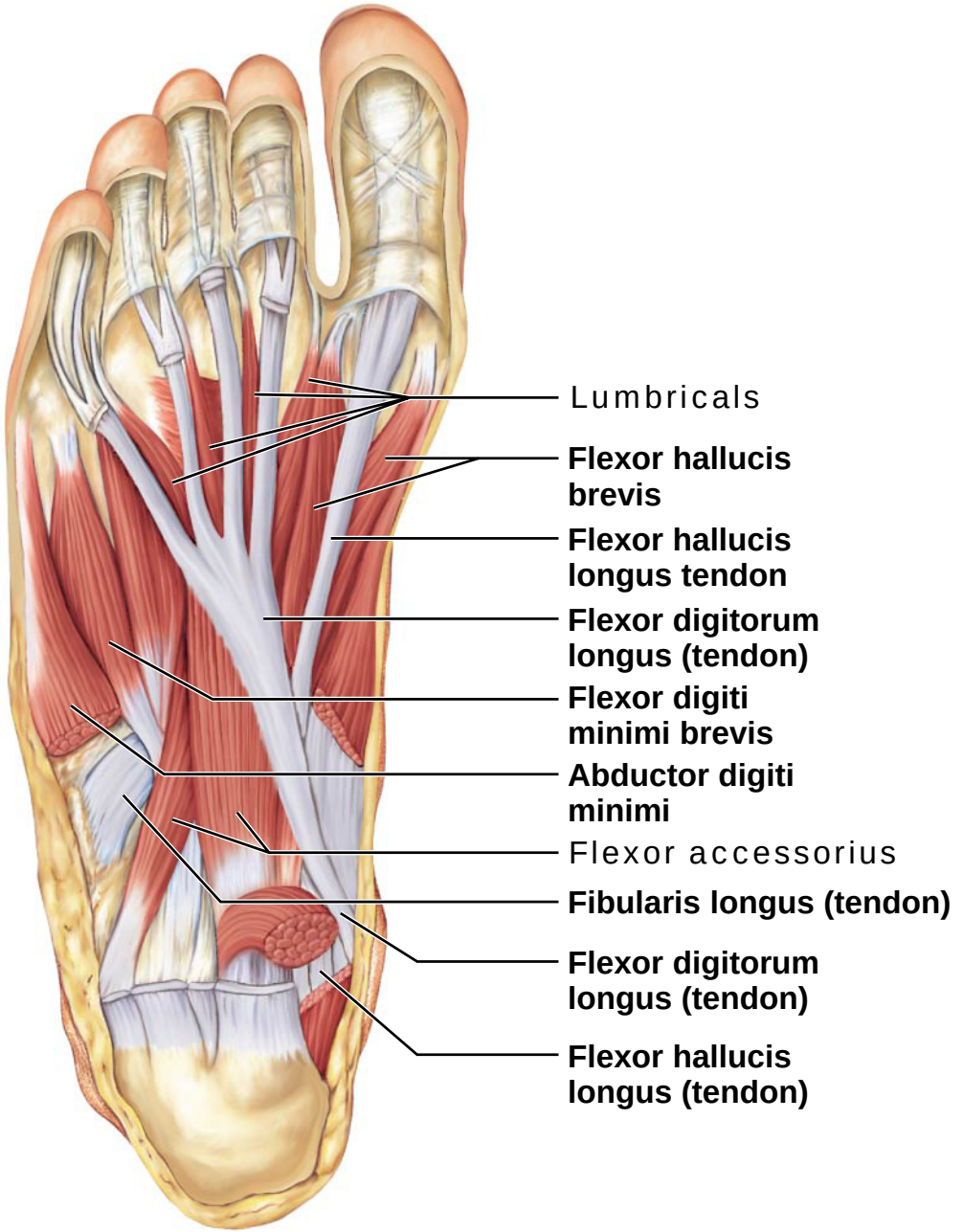
(b) Second layer (plantar aspect)

Figure 10.25a Muscles of the right foot, plantar aspect.



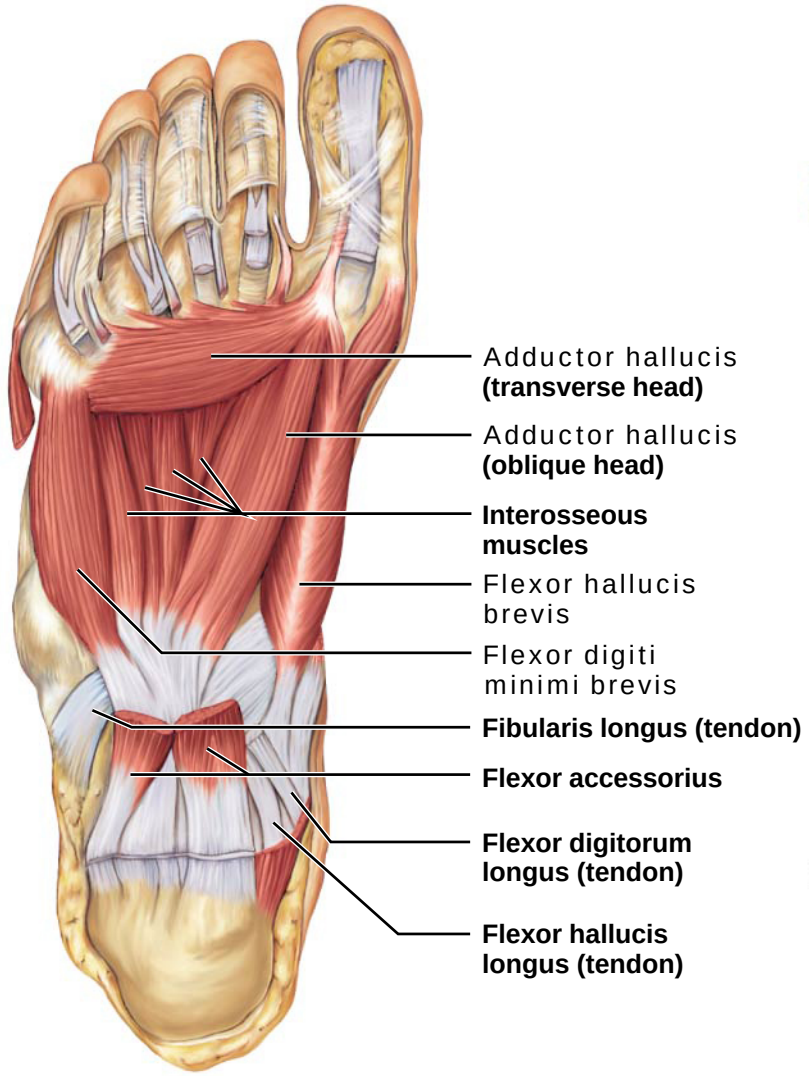
(a) First layer (plantar aspect)

Figure 10.25b Muscles of the right foot, plantar aspect.

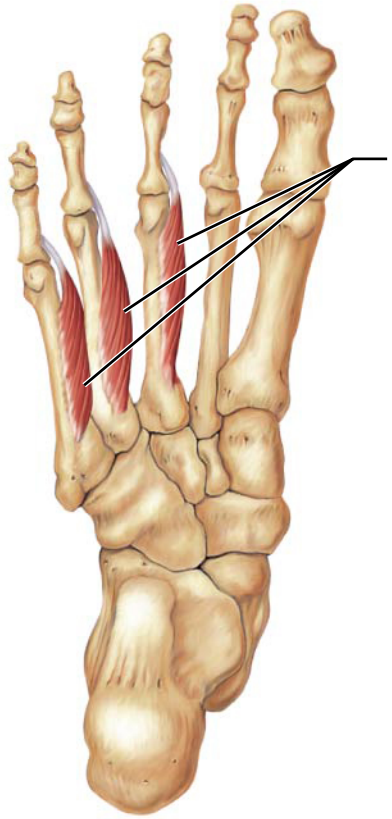


(b) Second layer (plantar aspect)

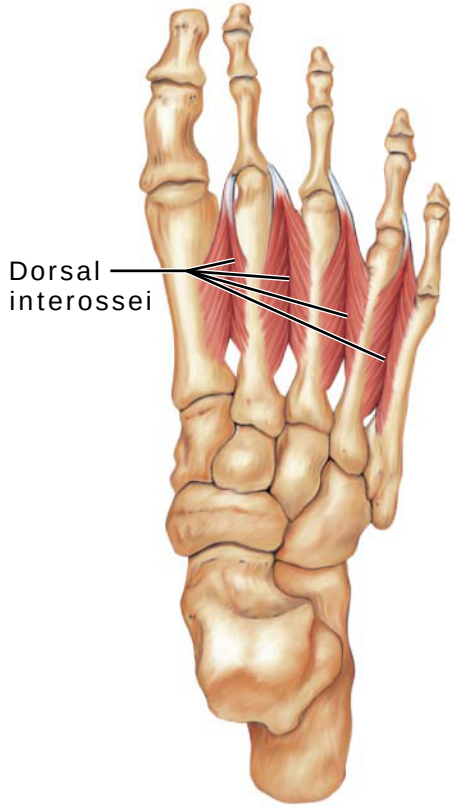
Figure 10.25c-e Muscles of the right foot, plantar aspect *(continued)*.



(c) Third layer (plantar aspect)

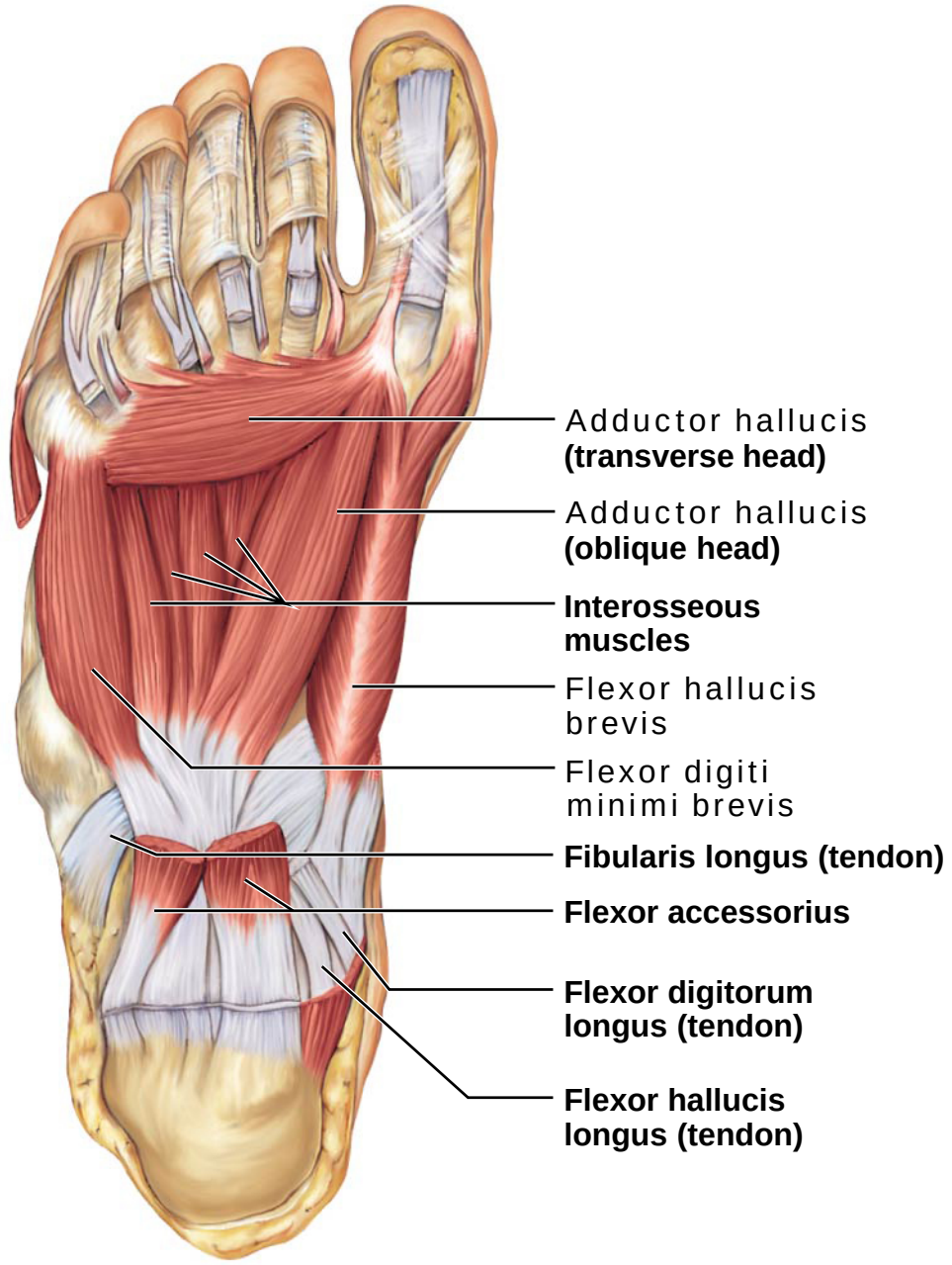


(d) Fourth layer (plantar aspect): plantar interossei



(e) Fourth layer (dorsal aspect): dorsal interossei

Figure 10.25c Muscles of the right foot, plantar aspect.

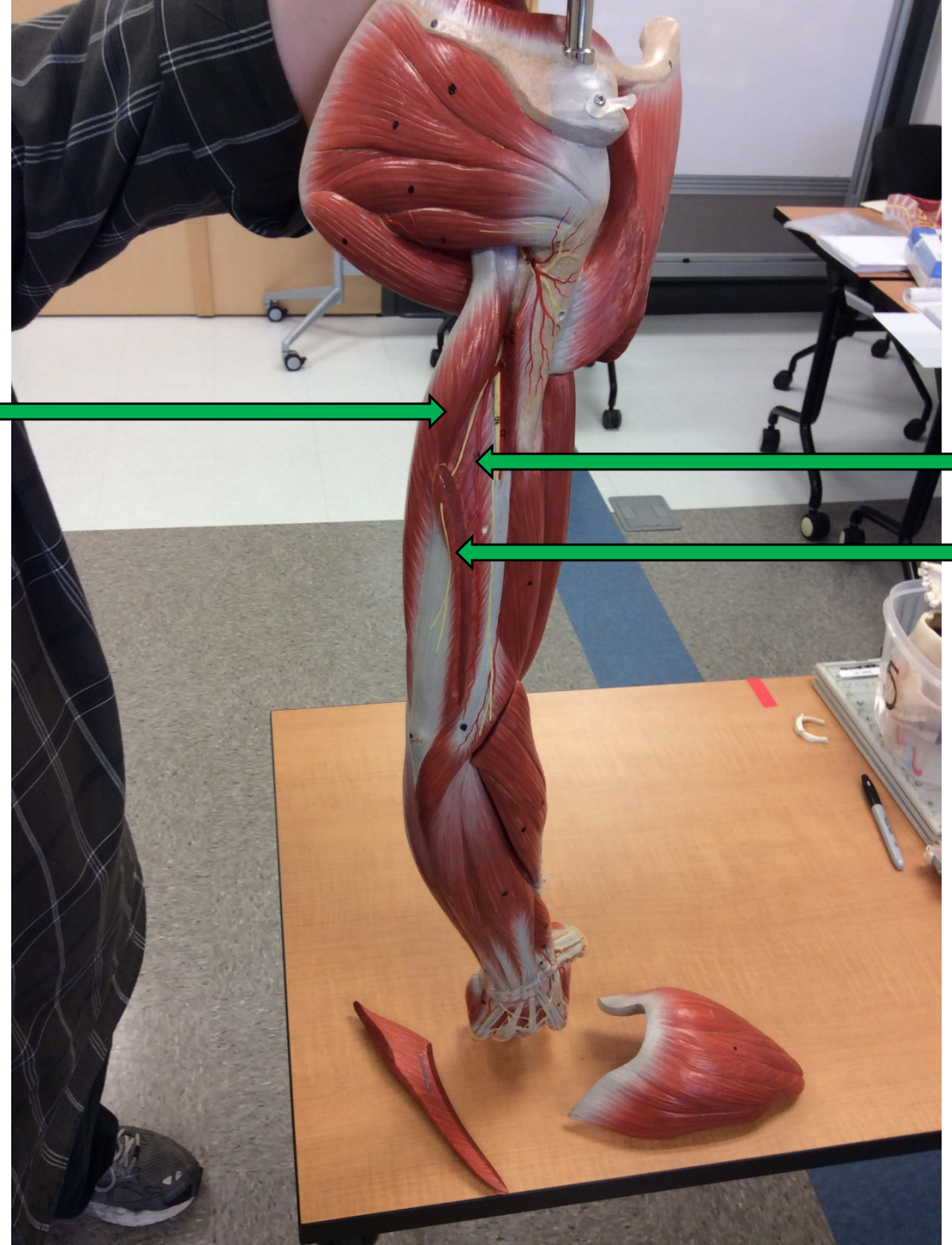


(c) Third layer (plantar aspect)

Use the following pictures to help you practice finding the terms from the lab term handout on unlabeled images.

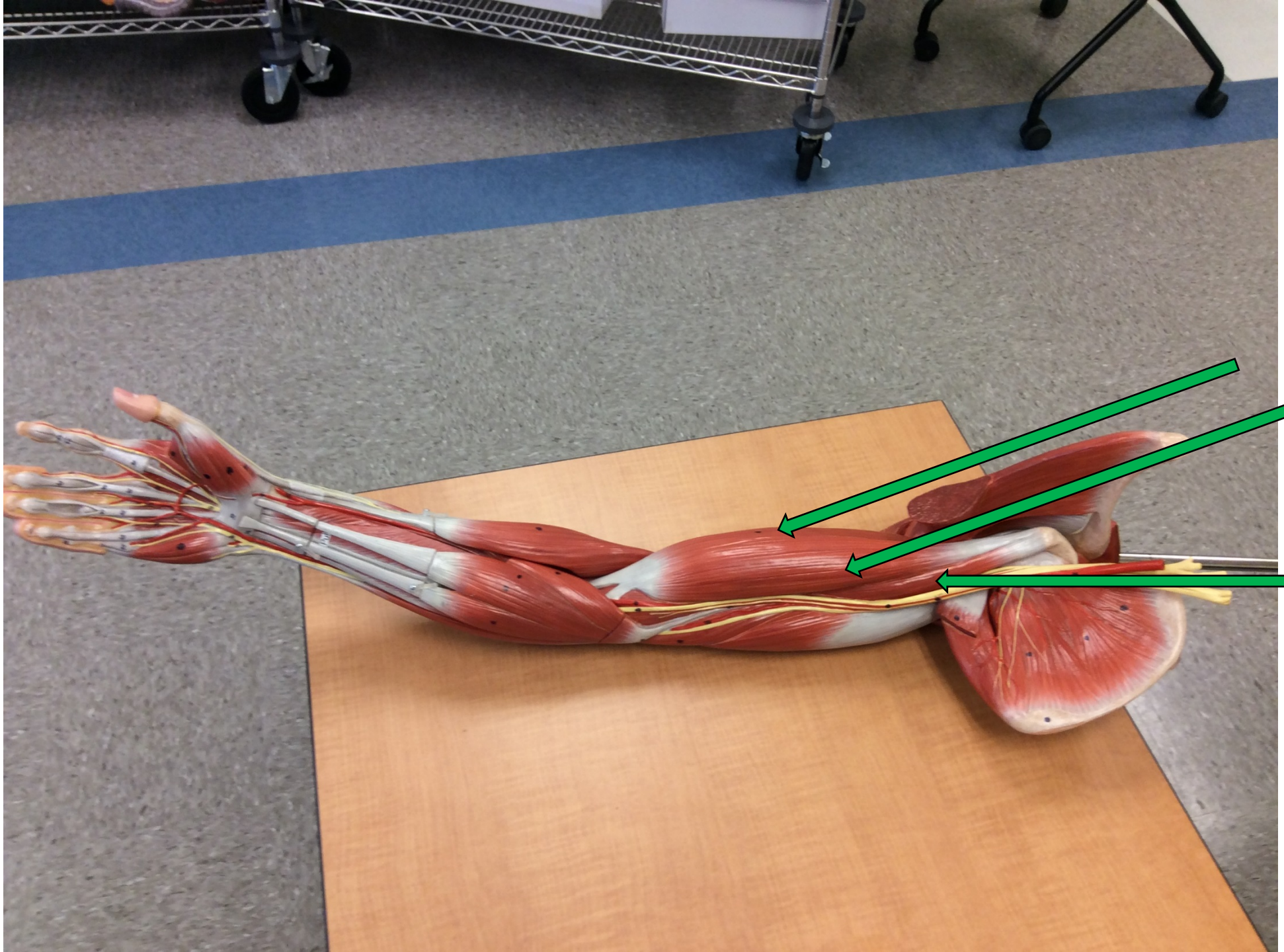
- Remember, you won't learn them if you don't take plenty of time to practice!
- Also, be sure to mix up the order once you get comfortable with the unlabeled slides.
- Over the weekend, once you are feeling confident with the pictures here, do the muscle model quizzes in PAL (from the Pearson website) to get practice with new pictures that you haven't seen.

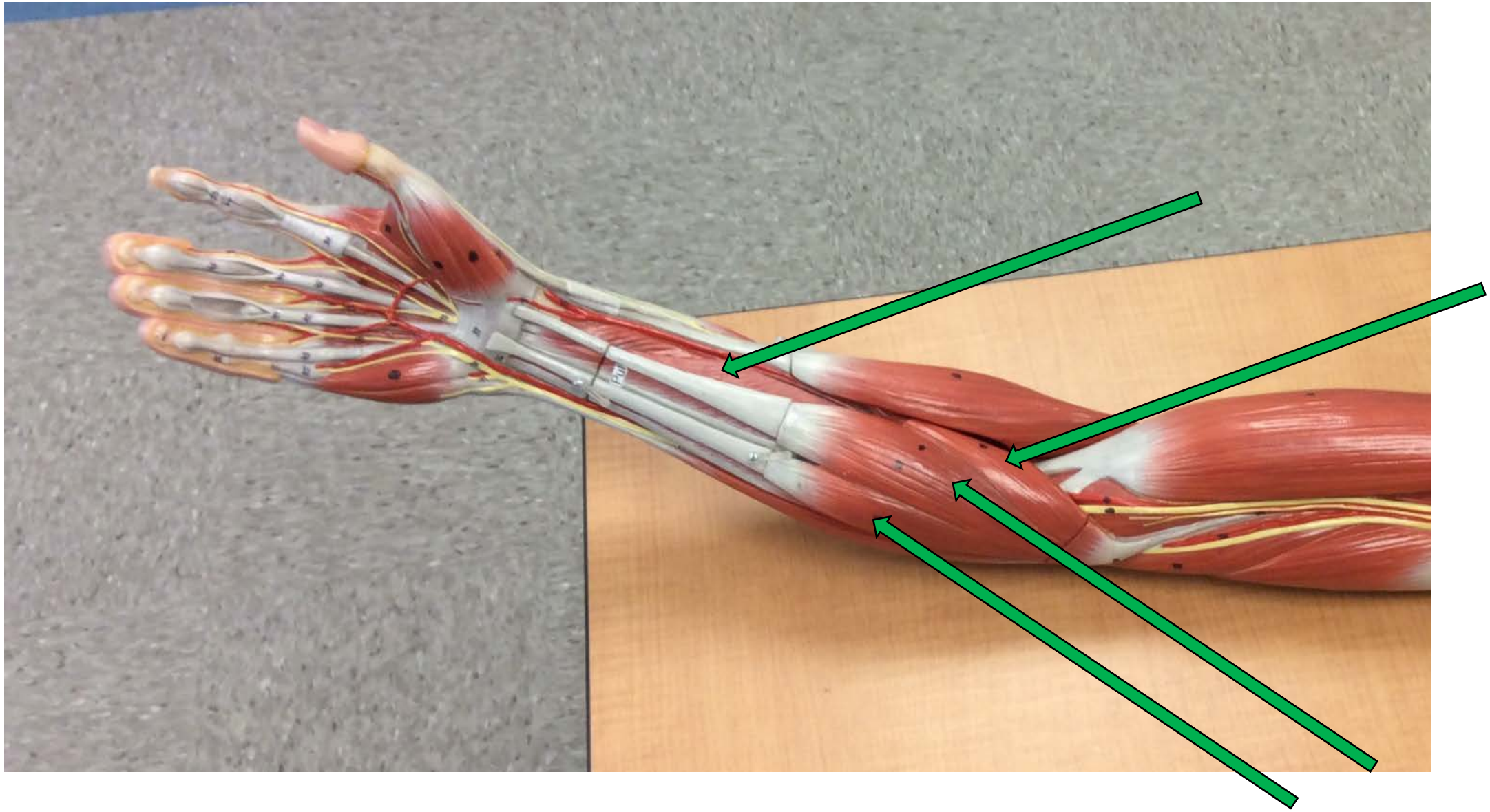
Muscles of the Upper Limbs (Arm)



This muscle is deep to the cut muscle.

This muscle has been cut.

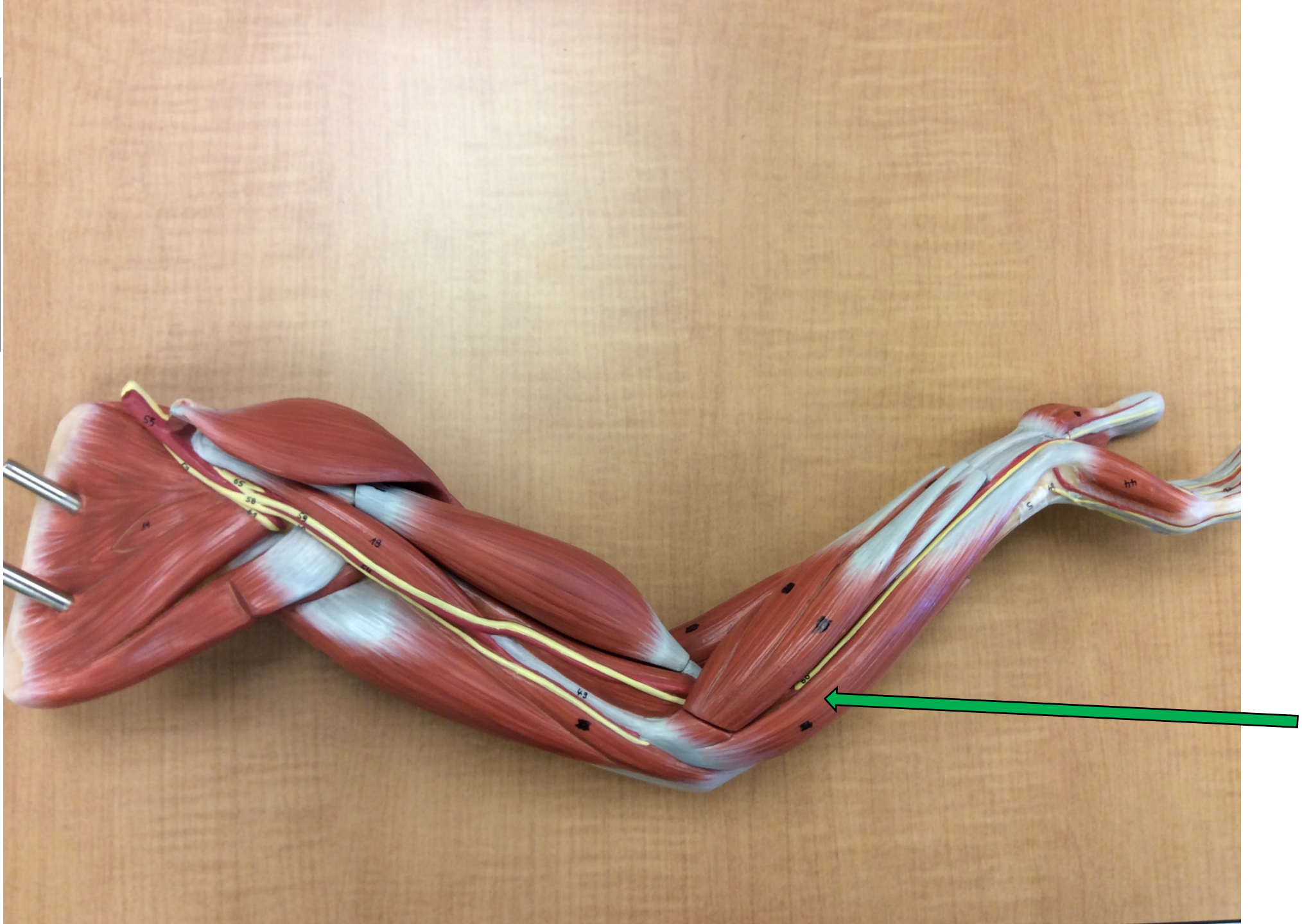




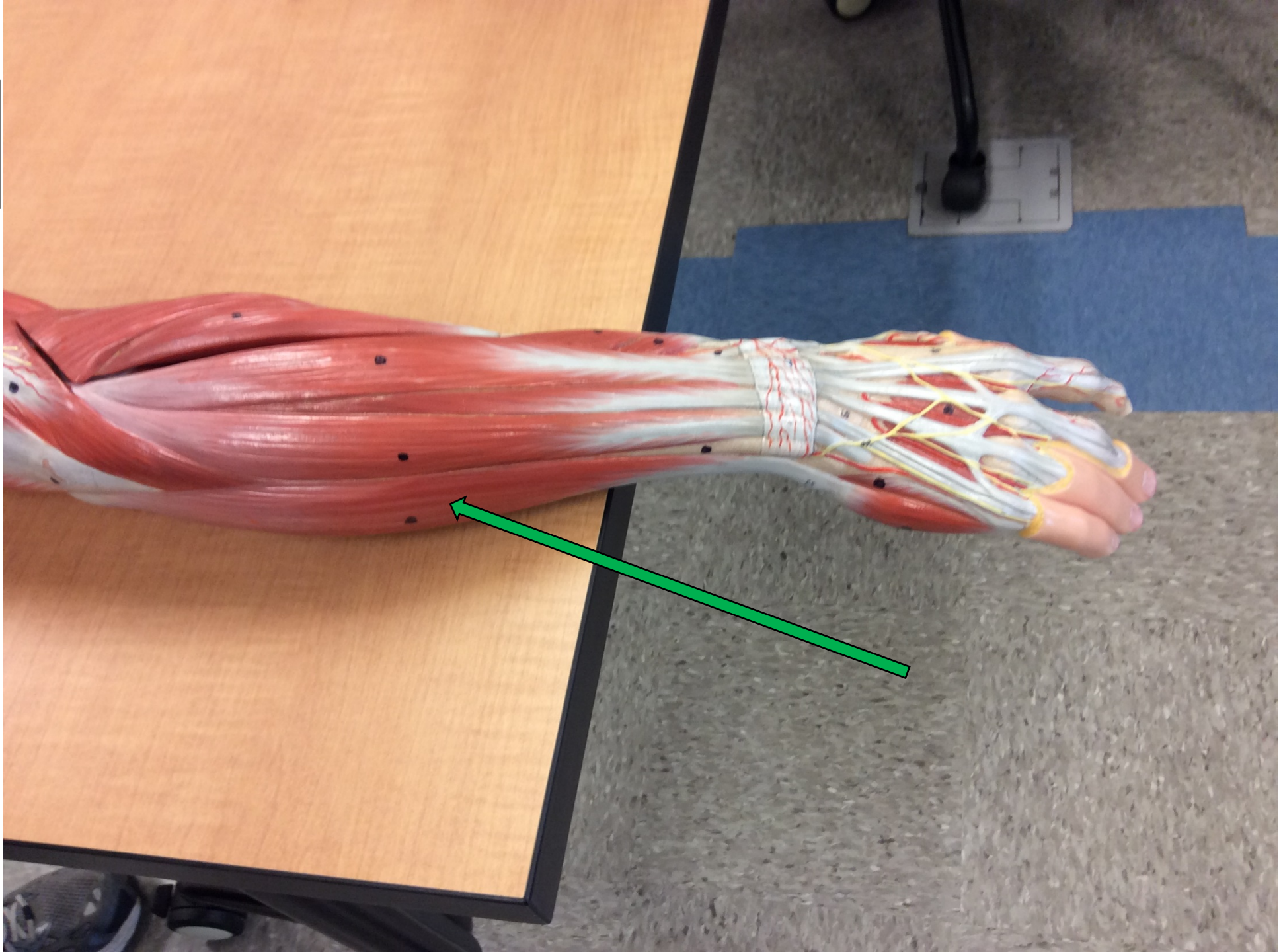
Find same muscles as previous picture.

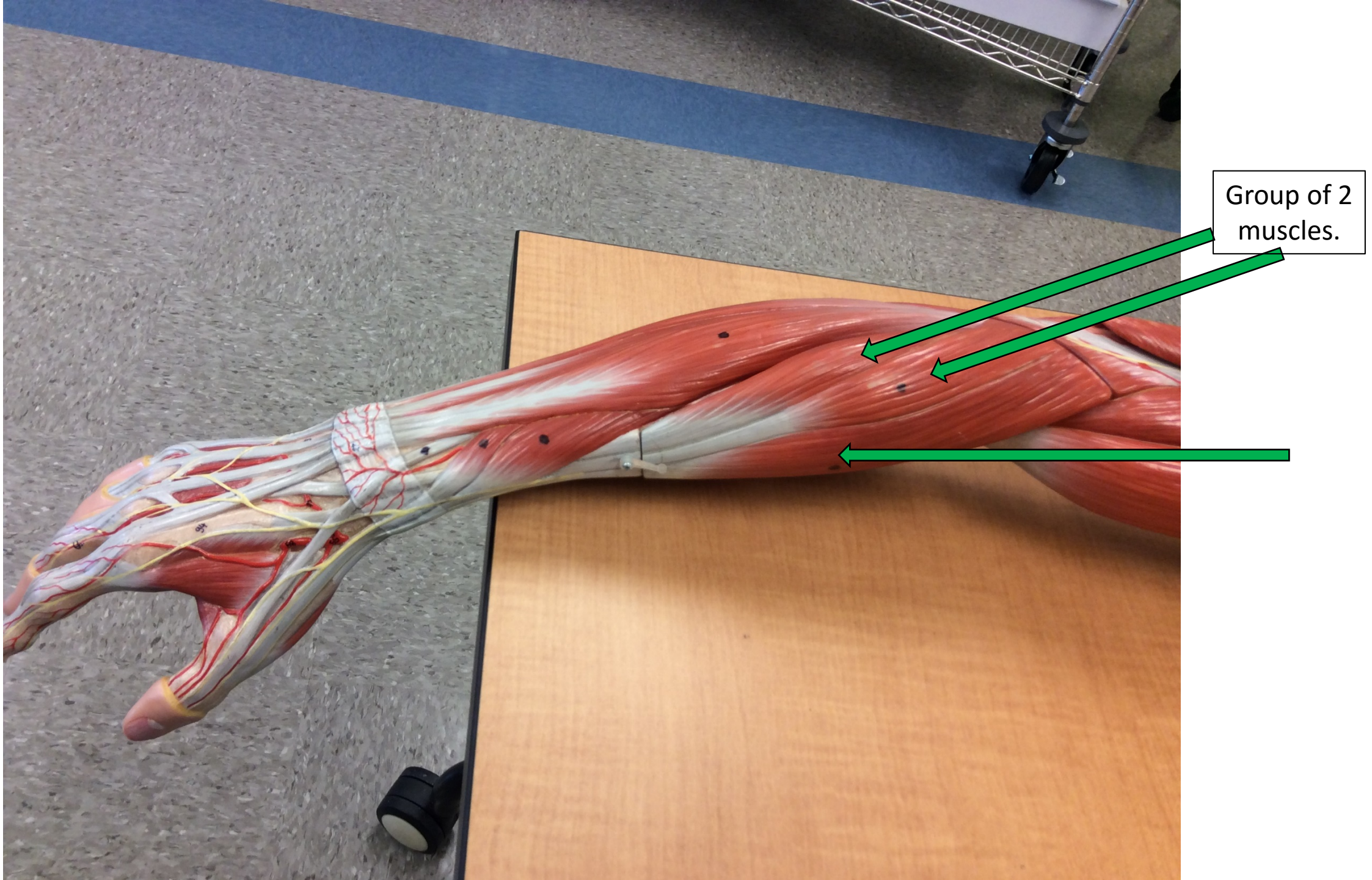
Note: this is the opposite arm.

Find the thumb to determine which side of the arm you are viewing here.



Same muscle as previous picture.

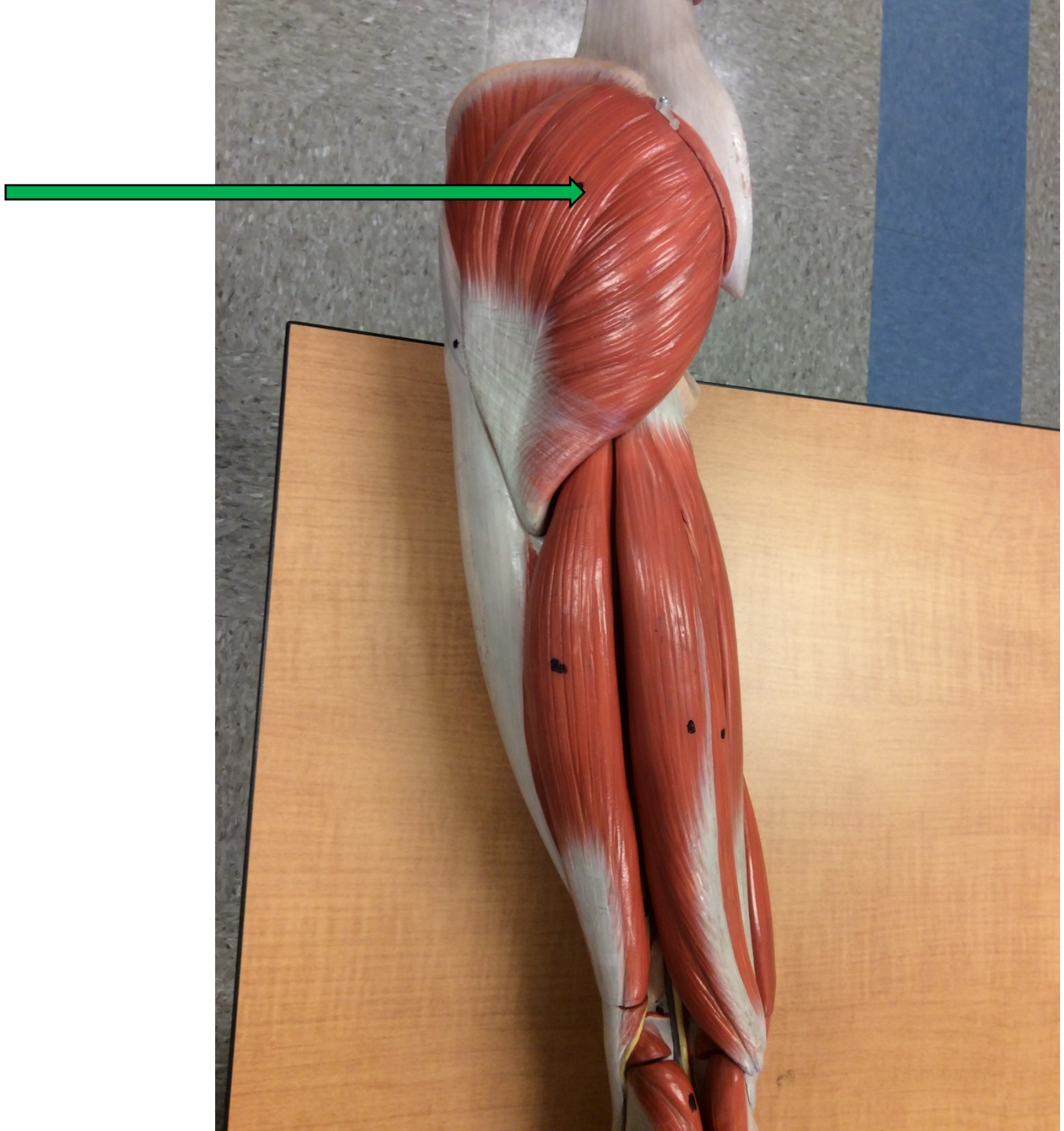


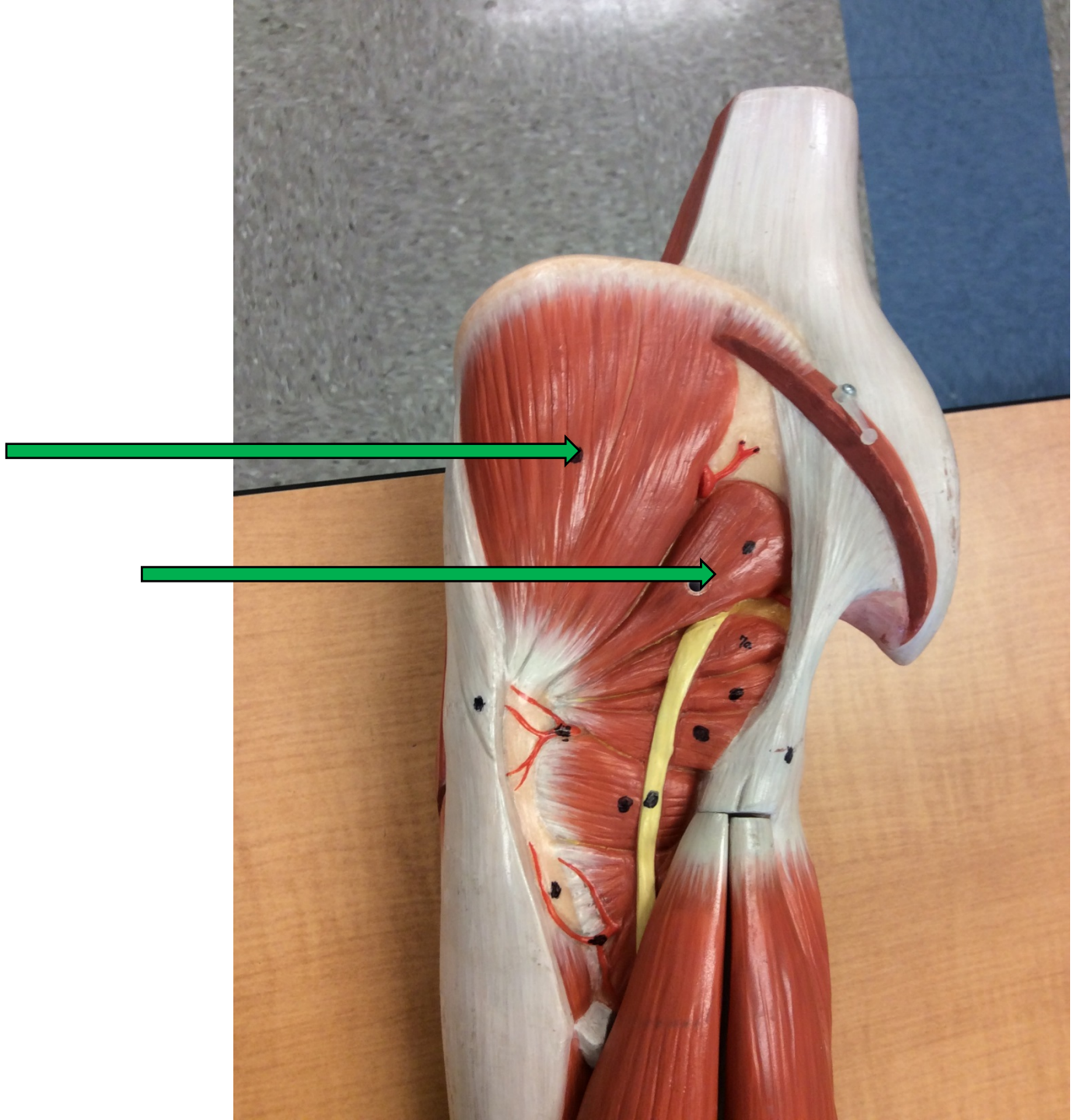

Group of 2 muscles.

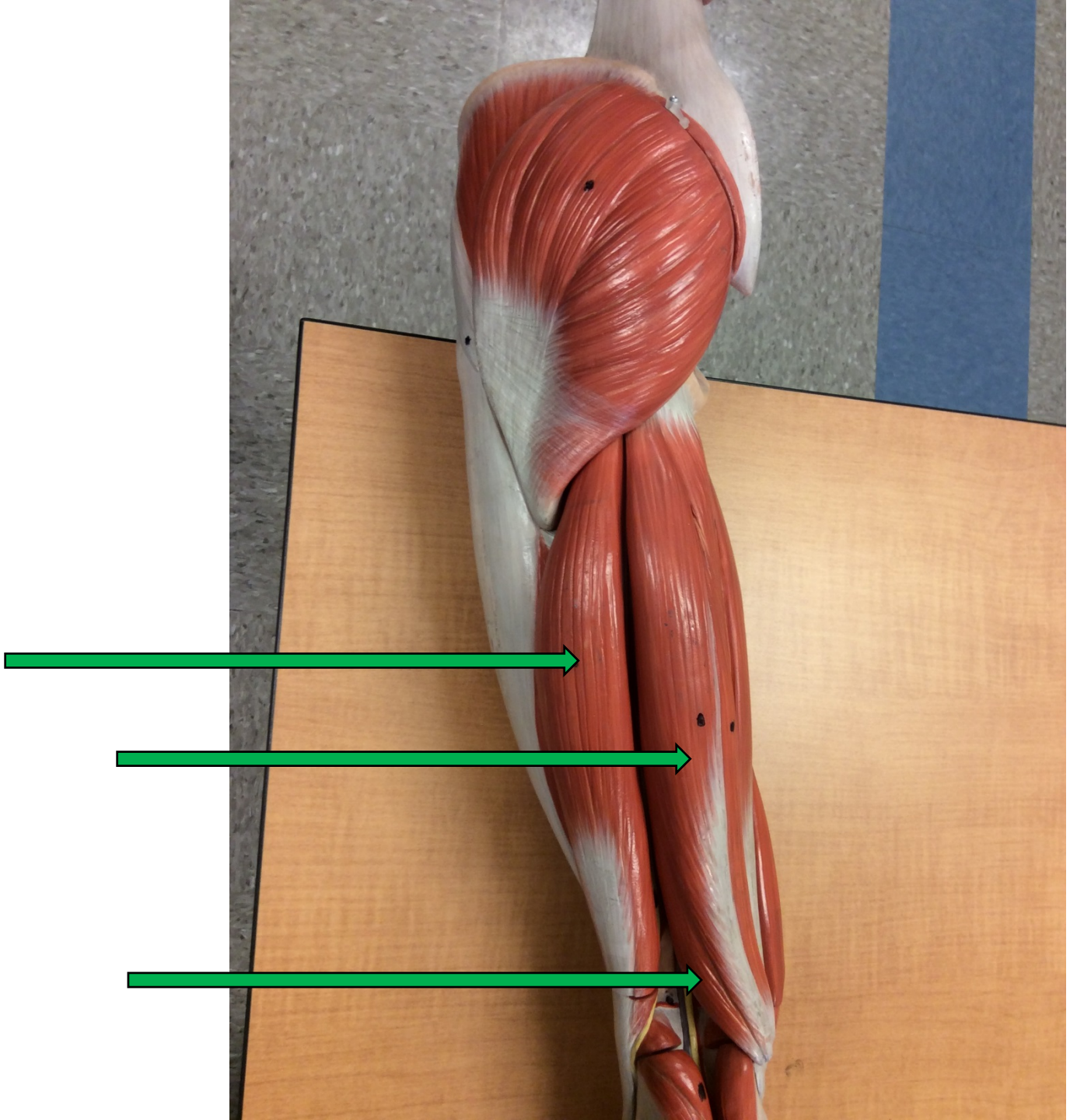
Same as the single muscle from the previous picture.

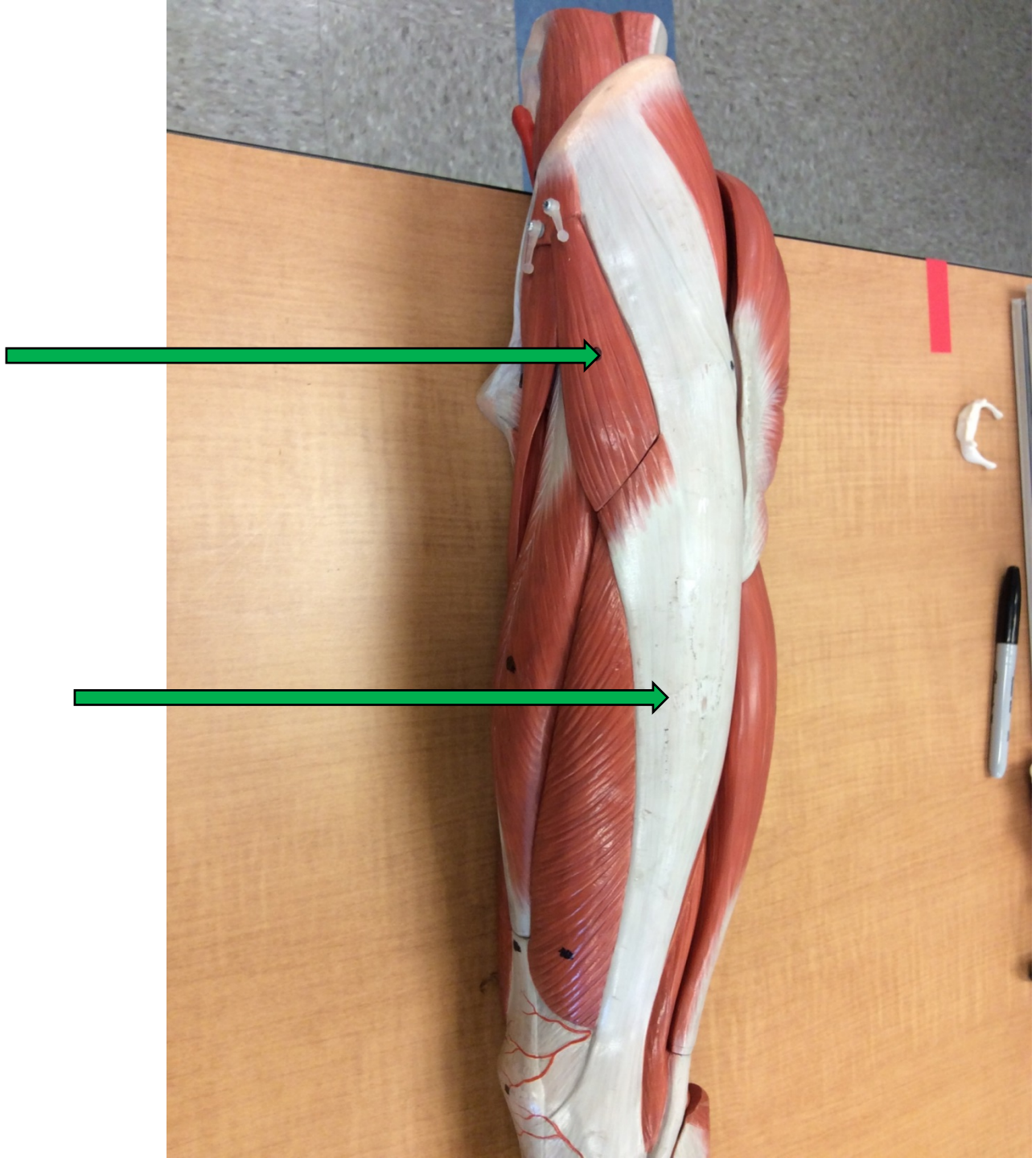
Can you find any other previously identified muscles in this picture?

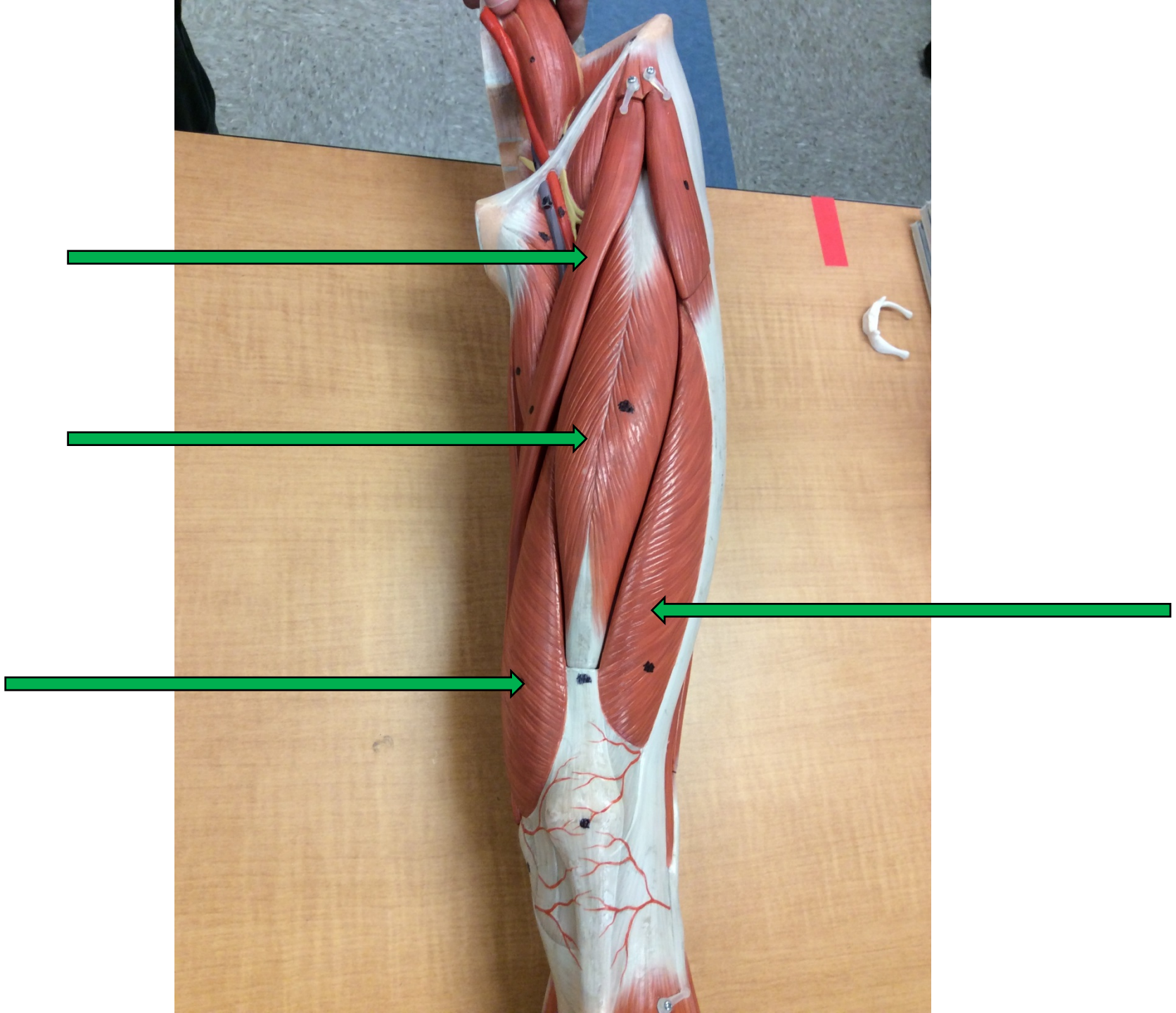
Muscles of the Hip and Lower Limbs (Leg)



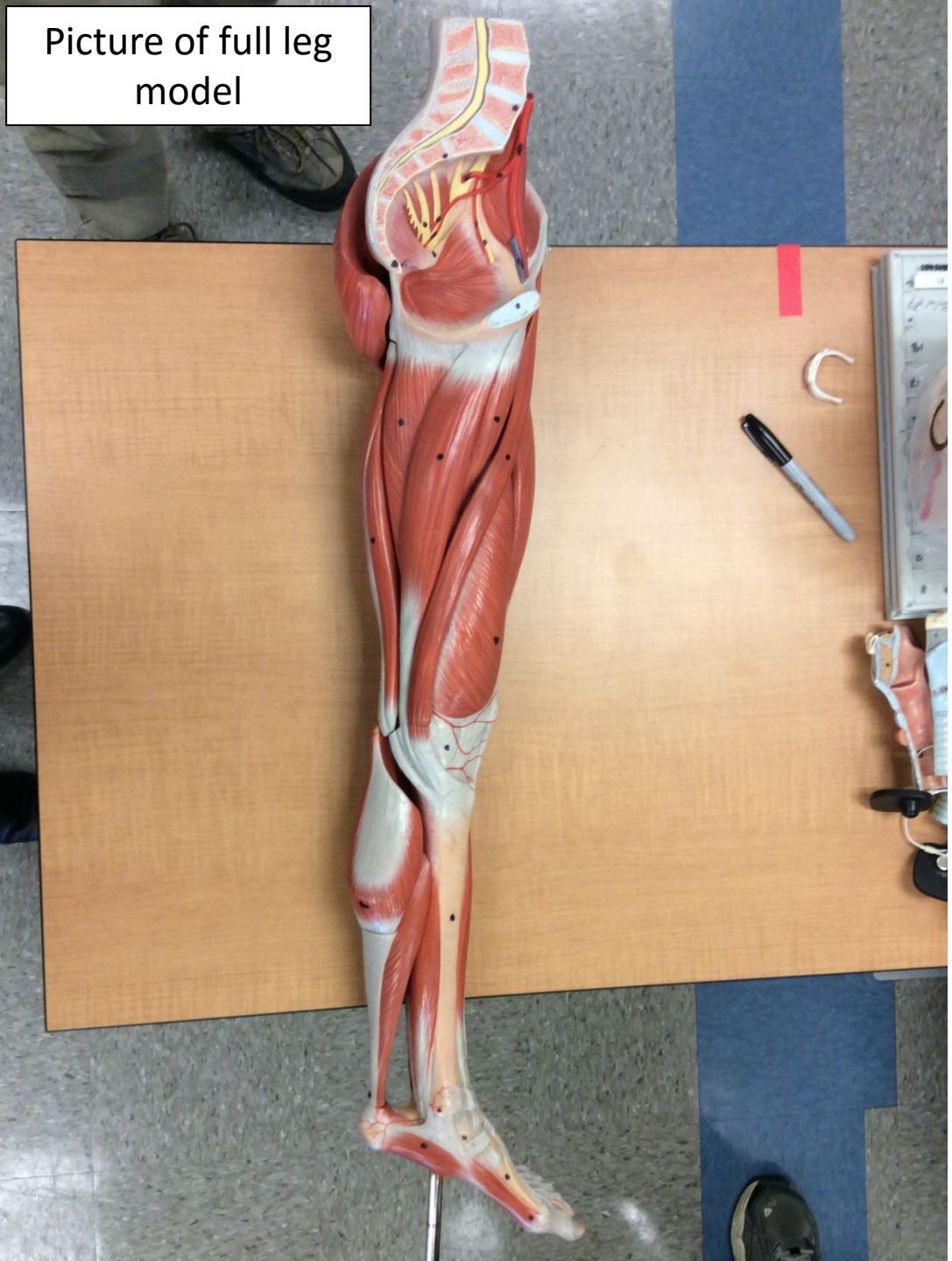




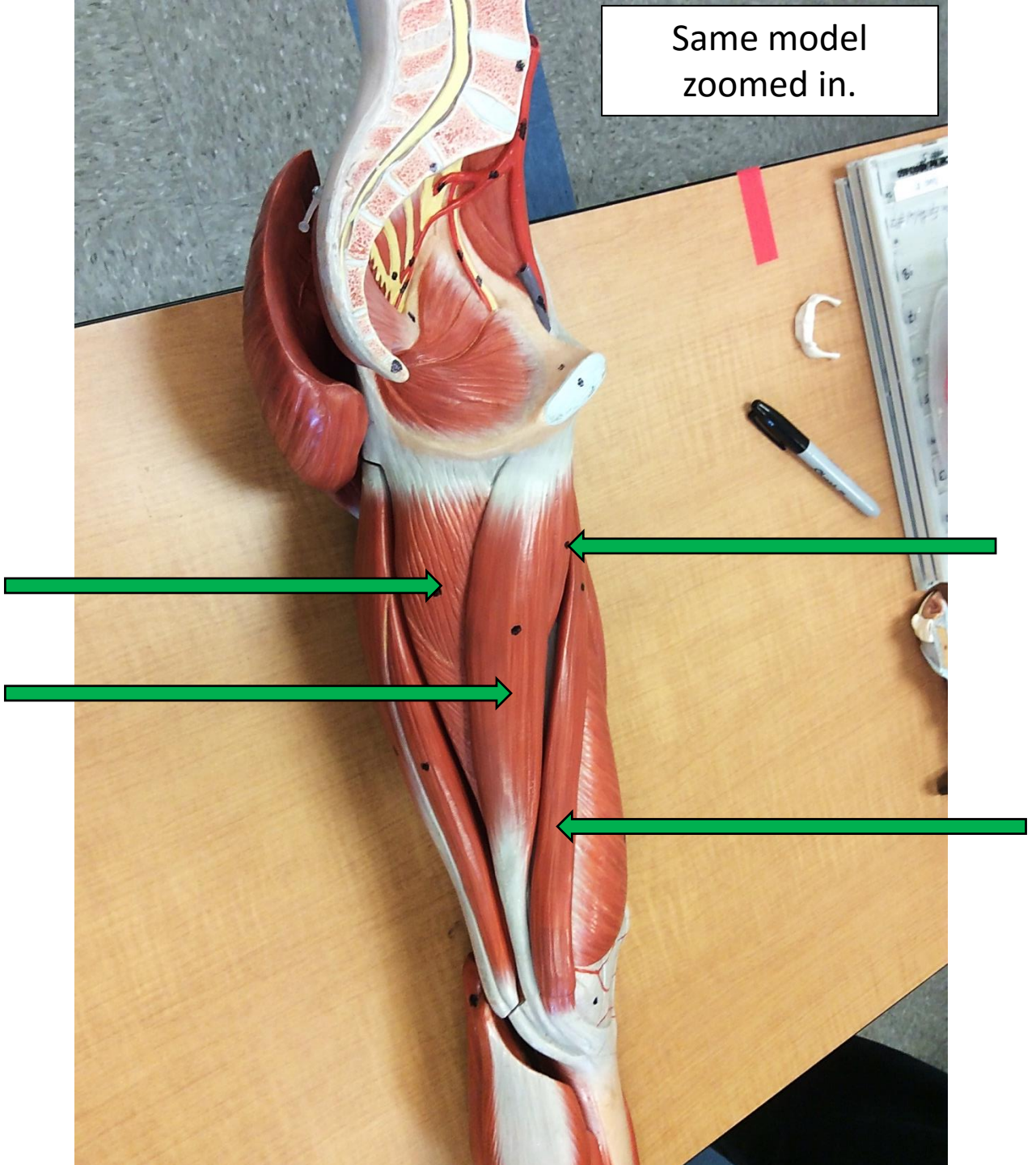


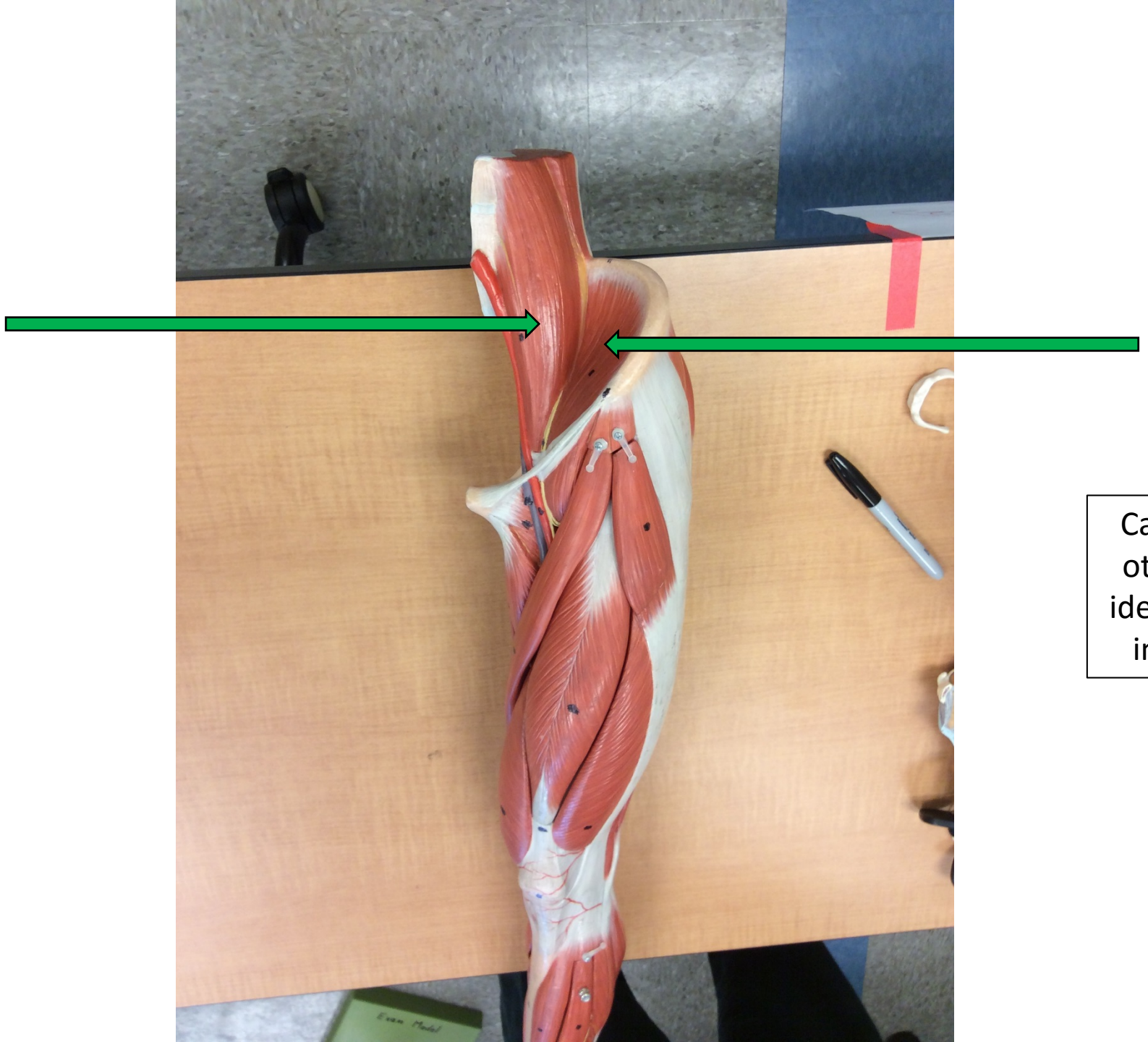


Picture of full leg model



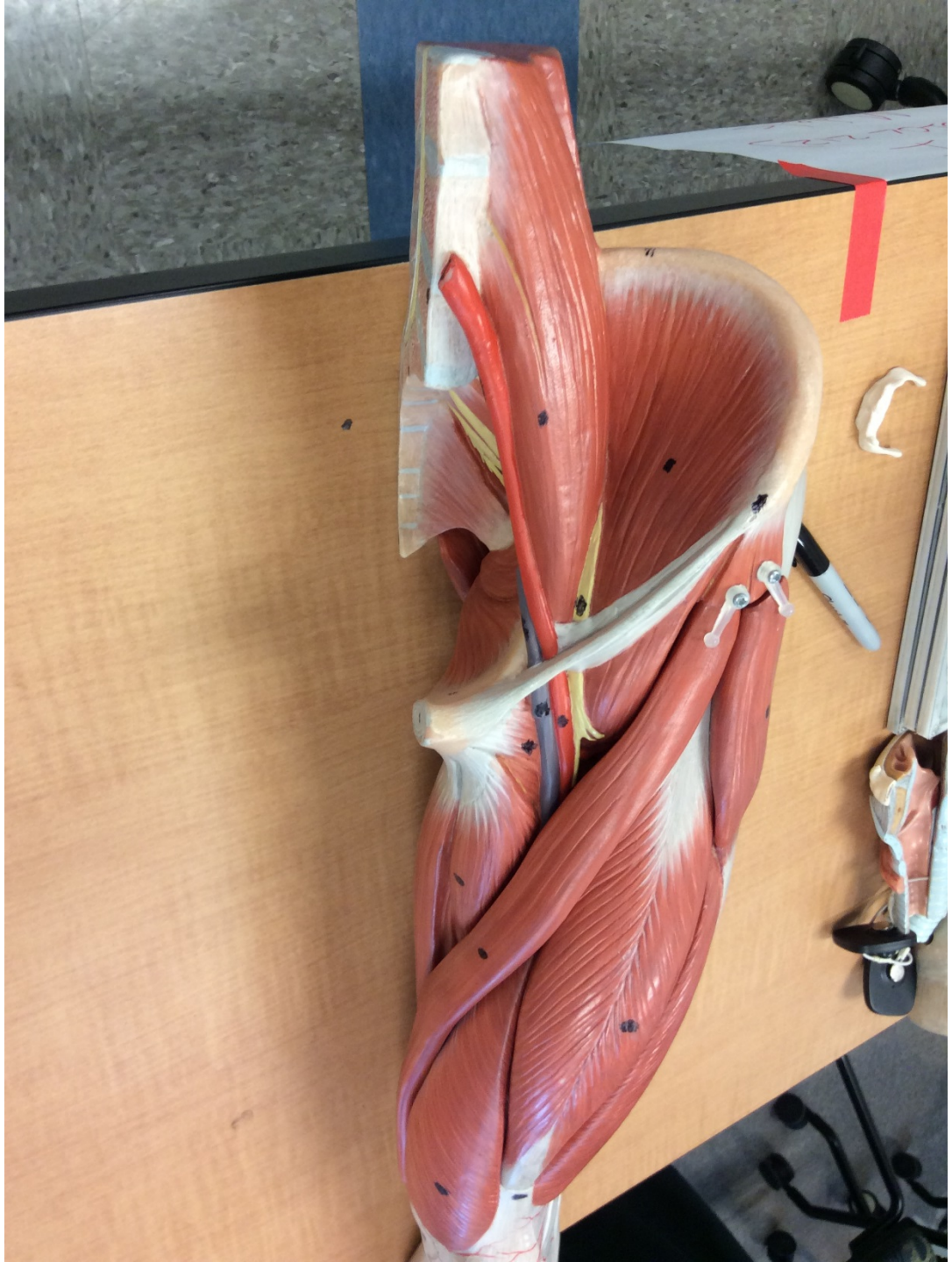
Same model zoomed in.





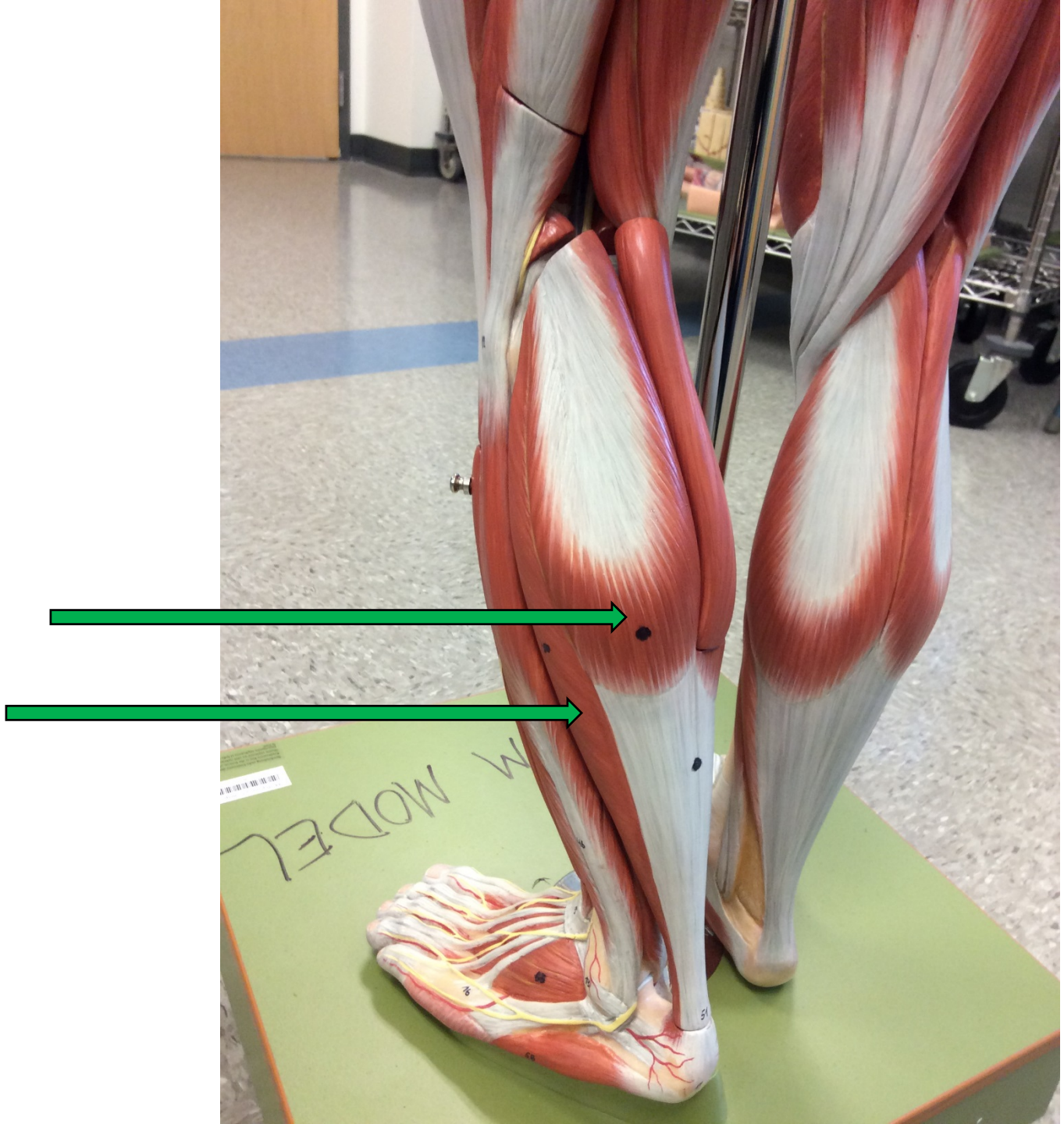
Can you find any other previously identified muscles in this picture?

Same muscles as previous picture, but better view of some medial muscles.

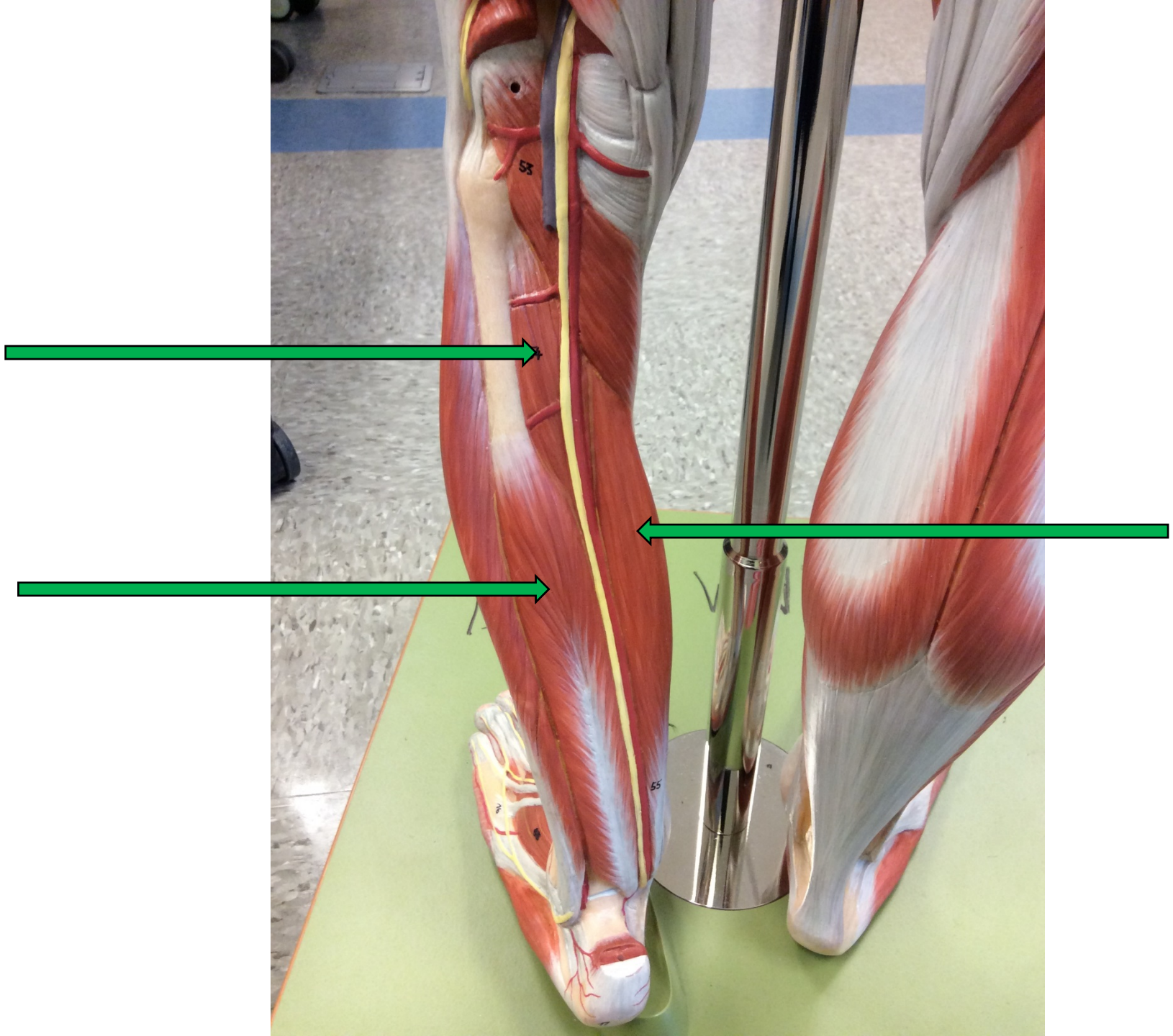


Can you find any other previously identified muscles in this picture?

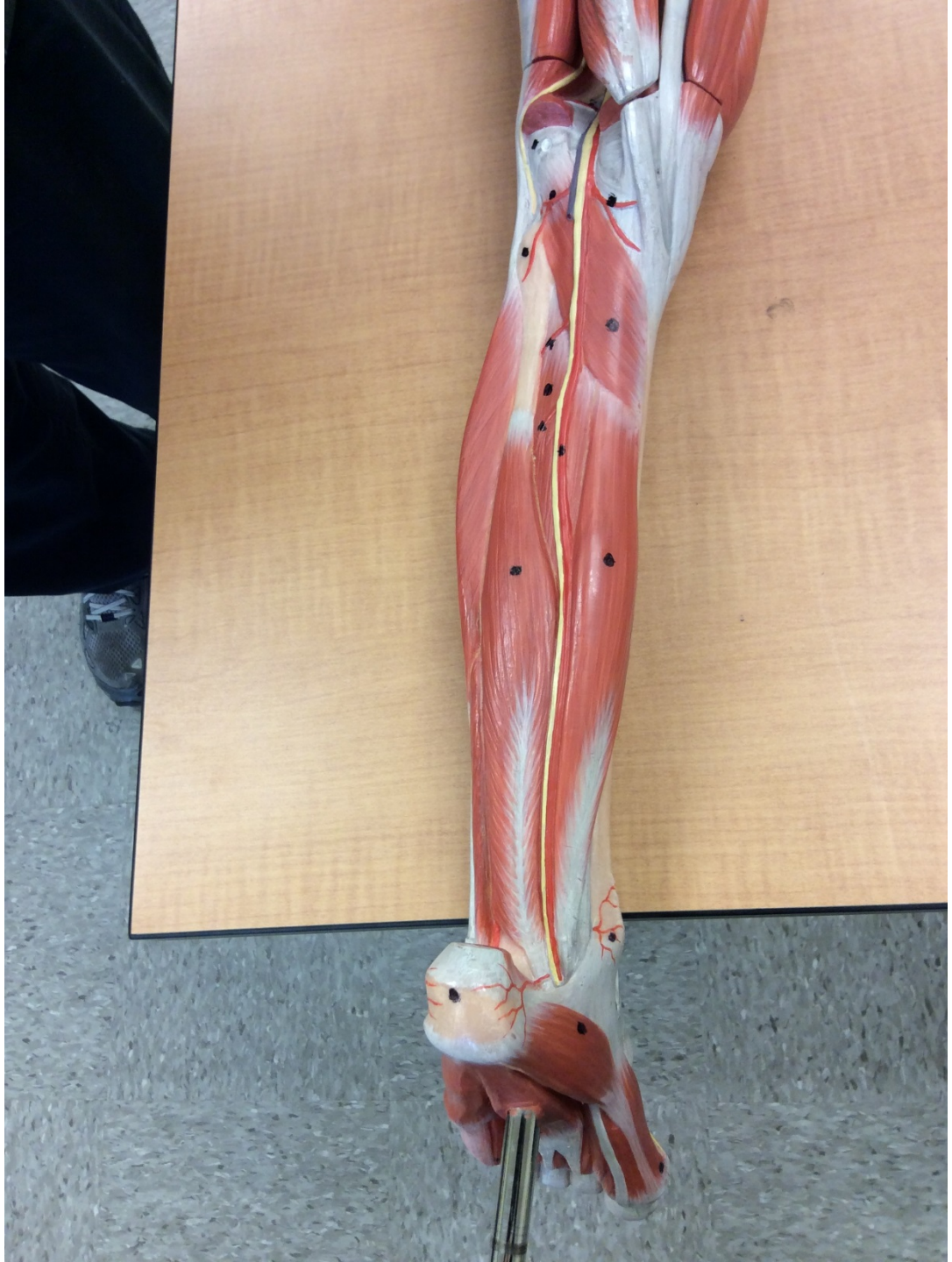
Can you find any other previously identified muscles in this picture?



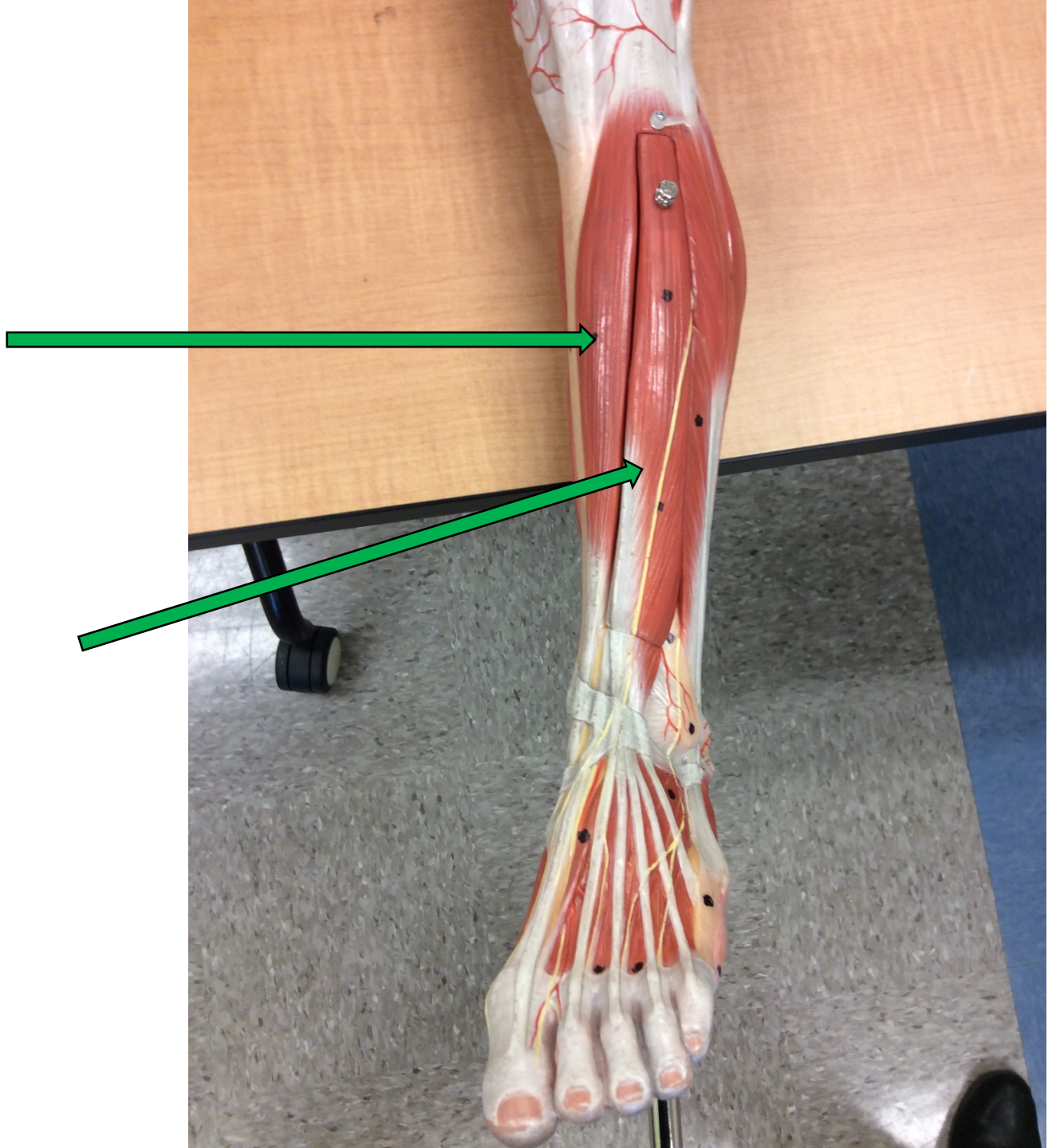
Notice what was removed.

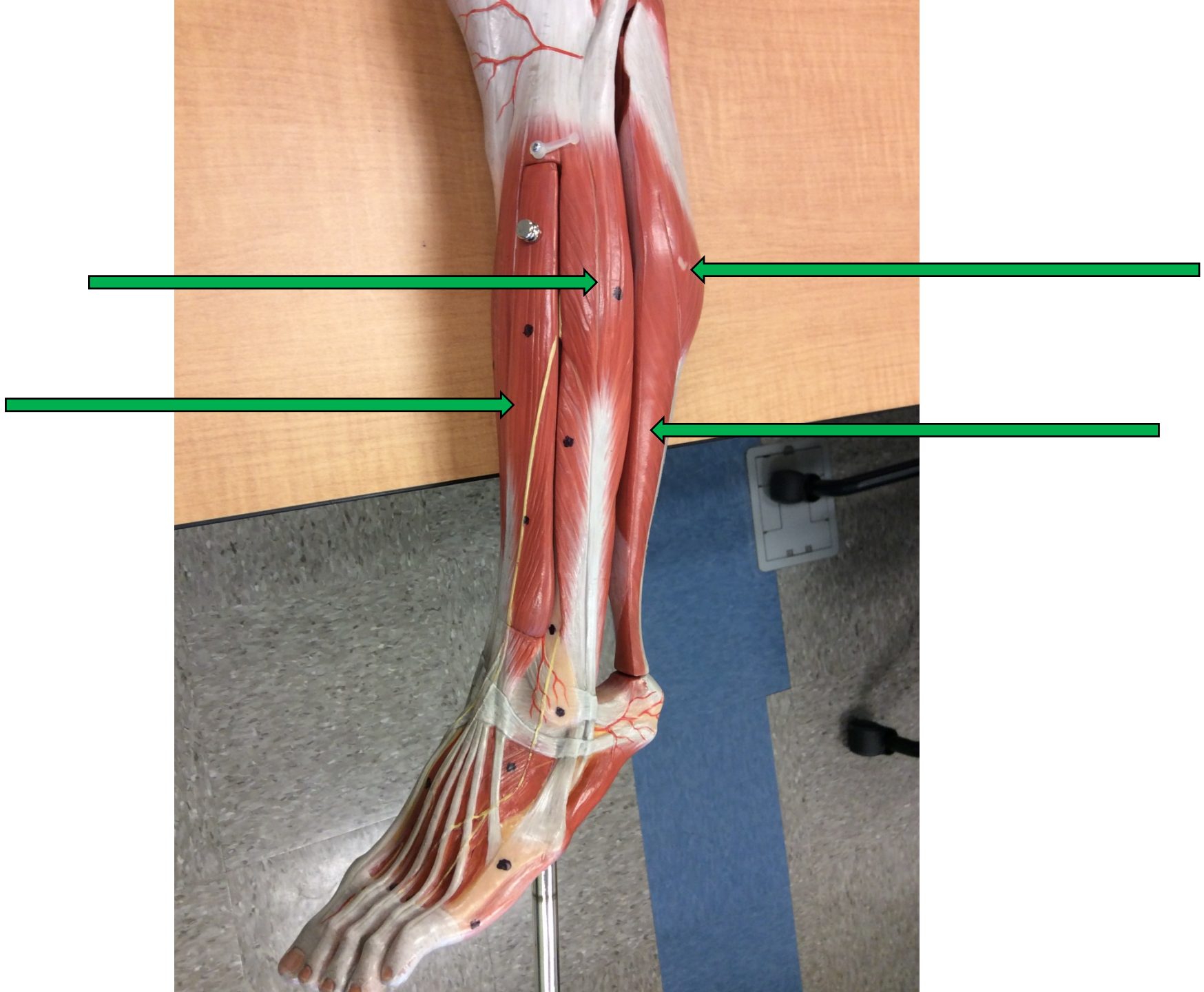


Can you find any other previously identified muscles in this picture?



Can you find any other previously identified muscles in this picture?





Same muscles as previous picture, but better view of posterior muscles.