

MUSCLES OF FACIAL EXPRESSION

CN: color starred muscles
& note those below also
that were added in

CN: Use your lightest colors for O and Q. Use warm and cheerful colors for the muscles producing a smile (A-H). Color the muscles reflecting sadness (I-O) with greens, blues, and grays. (1) Begin with the smiling side, and color only the muscles identified by titles A-H. Color those muscles

in the profile view below. (2) Repeat the process with the sad side. Note that a portion of frontalis (I) has been cut away to reveal corrugator supercilii (J). (3) Color the titles at the bottom and the related muscles on the lower view. Include the portions of the auricular muscles that disappear beneath the ear.

* ORBICULARIS OCULI_A

* NASALIS_B

LEVATOR LABII SUPERIORIS ALAEQUE NASI_C

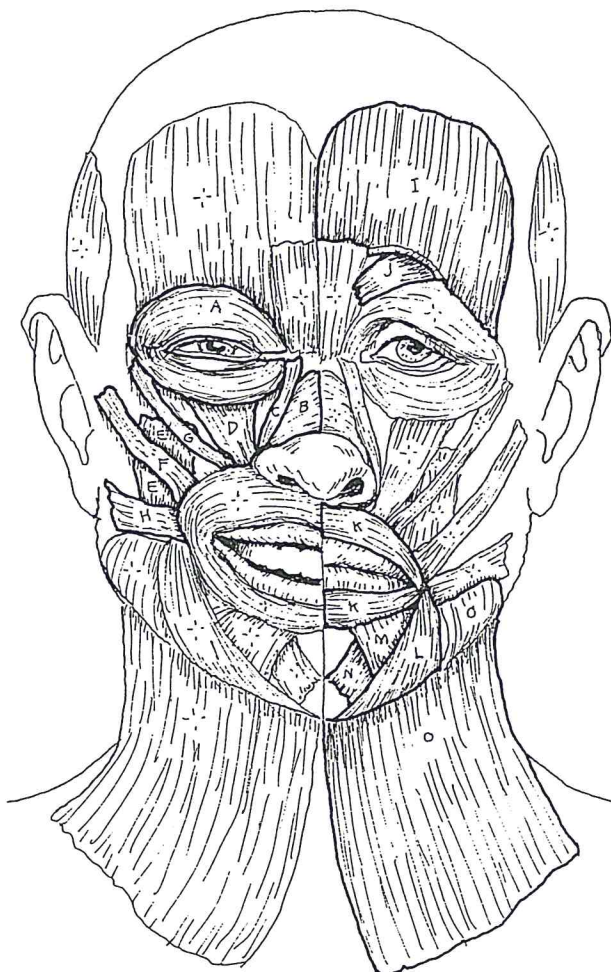
LEVATOR LABII SUPERIORIS_D

LEVATOR ANGULI ORIS_E

* ZYGOMATICUS MAJOR_F

* ZYGOMATICUS MINOR_G

RISORIIUS_H



* FRONTALIS_I
CORRUGATOR SUPERCILII_J

* ORBICULARIS ORIS_K
DEPRESSOR ANGULI ORIS_L

DEPRESSOR LABII INFERIORIS_M

MENTALIS_N

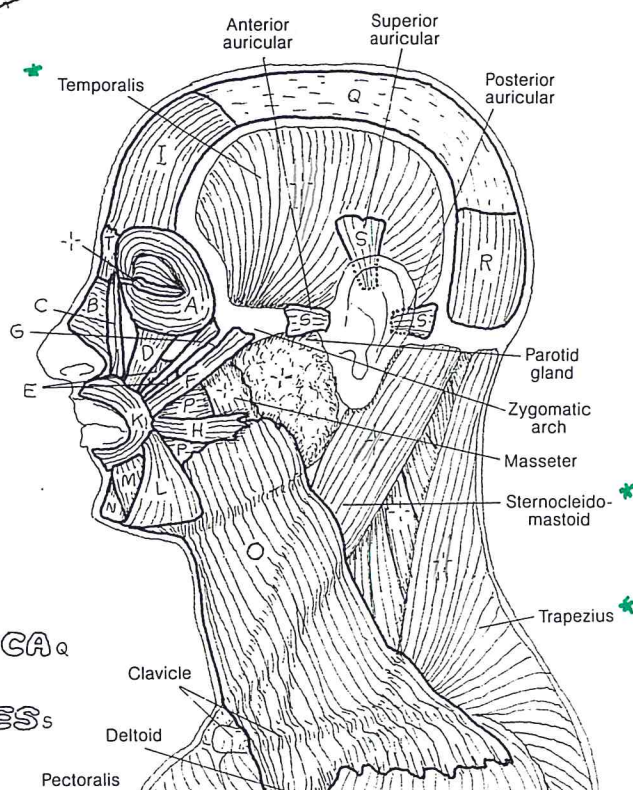
* PLATYSMA_O

The muscles of facial expression are generally thin, flat bands arising from a facial bone or cartilage and inserting into the dermis of the skin or the fibrous tissue enveloping the sphincter muscles of the orbit or mouth.

These muscles are generally arranged into the following regional groups: (1) the epicranial group (*occipitofrontalis* moving the scalp); (2) the orbital group (*orbicularis oculi*, *corrugator supercilii*); (3) the nasal group (*nasalis*, *procerus*); (4) the oral group (*orbicularis oris*, *zygomaticus major* and *minor*, the *levators* and the *depressors* of the lips and angles of the mouth, *risorius*, *buccinator*, and part of *platysma*); and (5) the group moving the ears (*auricular muscles*). The general function of each of these muscles is to move the skin wherever they insert. As you color each muscle, try contracting it on yourself while looking into a mirror, and see what develops.

Orbicularis oculi and *oris* are sphincter muscles, tending to close the skin over the eyelids and tighten the lips, respectively. Contractions of the cheek muscle *buccinator* makes possible rapid changes in volume of the oral cavity, as in playing a trumpet or squirting water. The *nasalis* muscle has both compressor and dilator parts, which influence the size of the anterior nasal openings.

* BUCCINATOR_P
GALEA APONEUROTICA_Q
* OCCIPITALIS_R
AURICULAR MUSCLES_S
PROCERUS_T

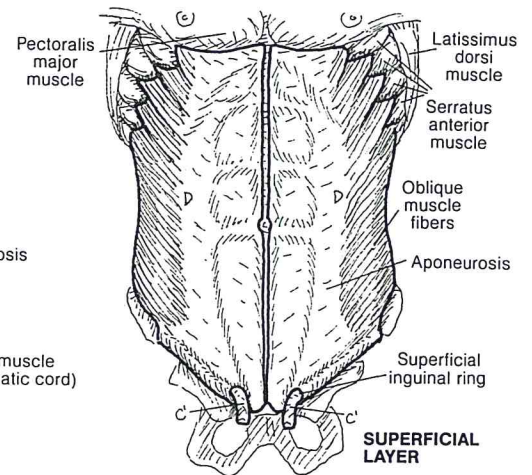
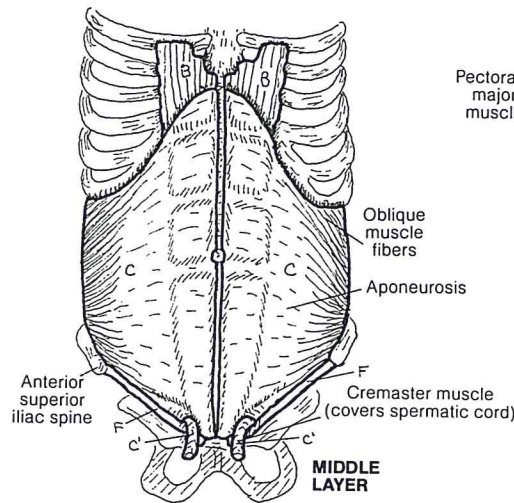
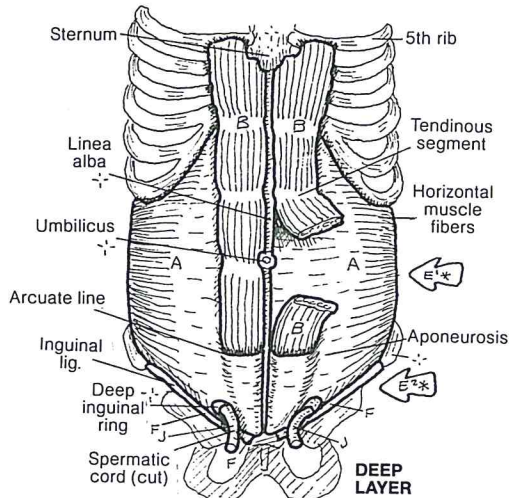


MUSCLES OF ANTERIOR ABDOMINAL WALL & INGUINAL REGION

CN: Use a dark color for J and bright ones for B and I. (1) Color the 3 layers of the abdominal wall. (2) Color the sheath of the rectus abdominis in the lower left illustration gray. Color the two locator arrows gray in this and the upper illustration. (3) Beginning with J and K, and followed by H, color the coverings of the spermatic cord.

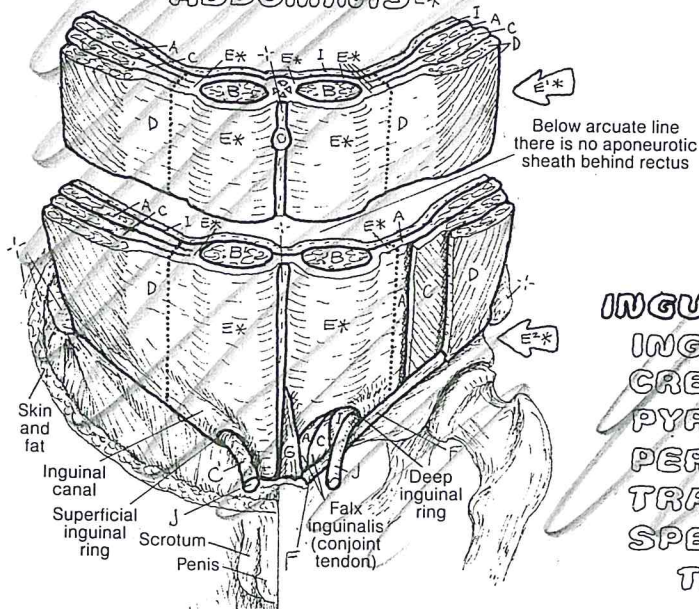
ANTERIOR ABDOMINAL WALL

TRANSVERSUS ABDOMINIS_A
RECTUS ABDOMINIS_B
INTERNAL OBLIQUE_C
EXTERNAL OBLIQUE_D



Each segmented rectus abdominis muscle arises from the pubic crest and tubercles and inserts on the lower costal cartilages and xiphoid process (sternum). They are flexors of the vertebral column. The sheath of the rectus varies in its extent, running from deep to superficial from below upward, as illustrated. Below the arcuate line, no muscle contributes to its posterior layer (E₂); in the middle, all three flat aponeuroses contribute equally to the sheath (E₁); above, the anterior sheath is formed from external oblique; posteriorly, the rectus contacts the costal cartilages.

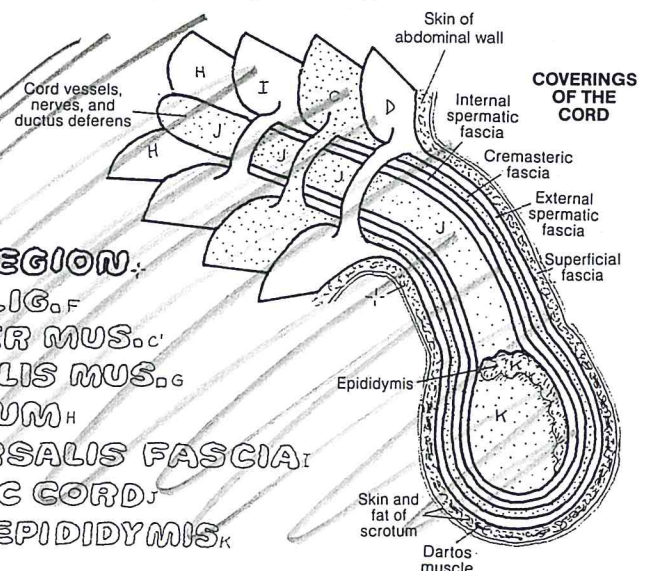
SHEATH OF RECTUS ABDOMINIS_{E1*}



The inguinal region is the lower medial part of the abdominal wall, characterized by a canal with inner (deep) and outer (superficial) openings or rings. This canal carries the spermatic cord (ductus deferens and its vessels, testicular vessels, lymphatics) in the male and the round ligament of the uterus in the female. The testes and spermatic cords "descend" (by differential growth) into outpocketings of the anterior abdominal wall, collectively called the scrotum. In their descent, they push in front of them layers of fibers from the three flat muscles of the abdominal wall and their aponeuroses, much as a finger might push against four layers of latex to form a four-layered finger glove. These are the coverings of the cord: internal, cremasteric, and external spermatic fasciae. The lower fibers of internal oblique are unique in that they continue in loops around the spermatic cord as the cremaster muscle; the two are connected by cremasteric fascia. The canal area is a weak point, subject to protrusions of fat or intestine (hernias) from within the abdominal cavity, either directly through the wall (direct inguinal hernia) or indirectly through the canal (indirect inguinal hernia).

INGUINAL REGION

INGUINAL LIG._F
CREMASTER MUS._{C'}
PYRAMIDALIS MUS._G
PERITONEUM_H
TRANSVERSALIS FASCIA_I
SPERMATIC CORD_J
TESTIS/EPIDIDYMIS_K



MUSCLES OF SCAPULAR STABILIZATION

TRAPEZIUS_A

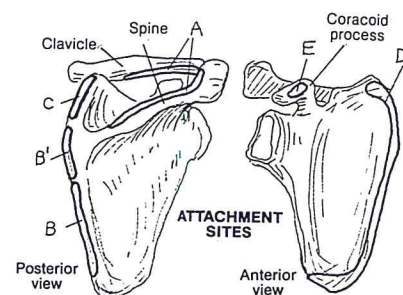
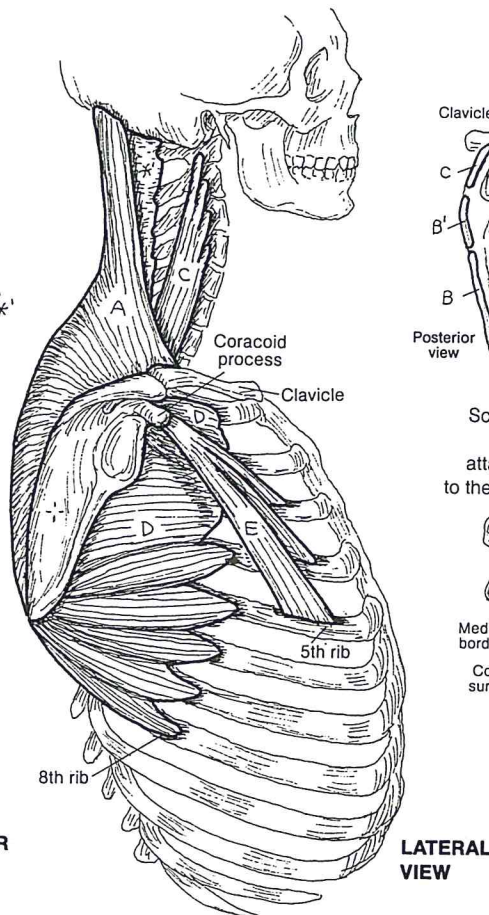
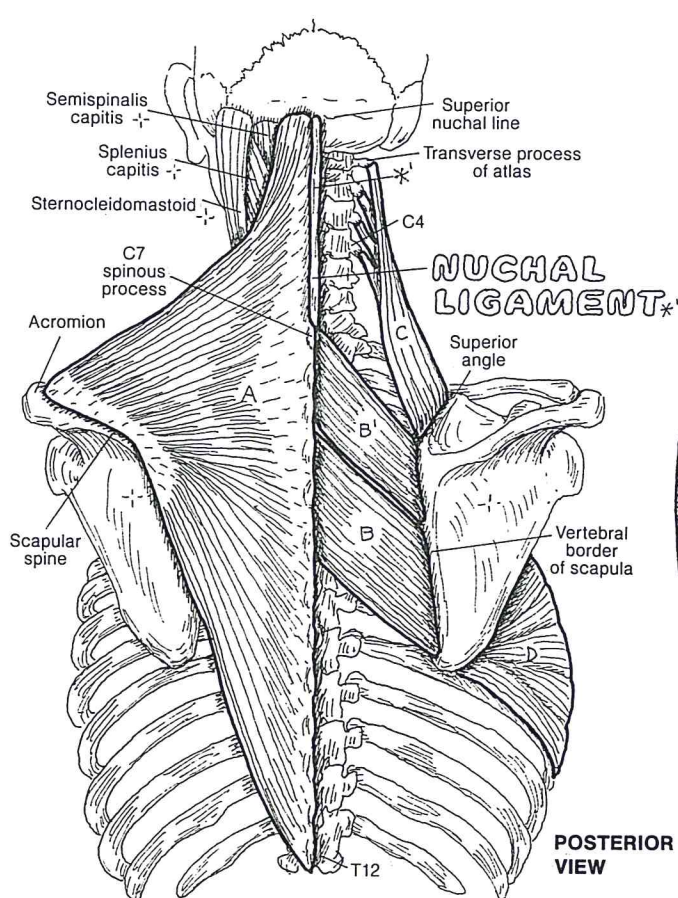
RHOMBOID MAJOR_B, MINOR_B

LEVATOR SCAPULAE_C

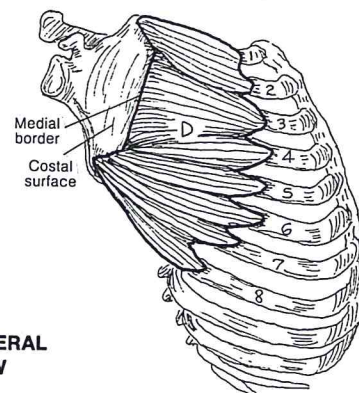
SERRATUS ANTERIOR_D

PECTORALIS MINOR_E

CN: (1) Color the six muscles of scapular stabilization. Note that the two rhomboids receive the same color (B). In the two main views, color gray the nuchal ligament and its title. (2) Color the attachment site diagrams at upper right. (3) In the illustrations below describing scapular movement, note that the three regions of trapezius (A) play different roles. Color gray the scapulae, the arrows, and the movement titles.



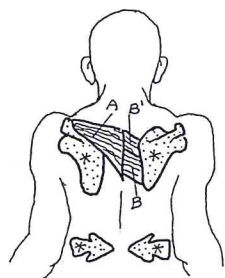
Scapula is shown pulled away from the thorax to reveal attachment of serratus anterior to the medial border of the scapula.



The scapula lies on the posterior thorax, roughly from T2 to T8. It has no direct bony attachment with the axial skeleton. Enveloped by muscle, it glides over the fascia-covered thorax during upper limb movement (scapulothoracic motion). Bursae have been reported between the thorax and the scapula; so has bursitis. The scapula is dynamically moored to the axial skeleton by muscles attaching the scapula to the axial skeleton. These *muscles of scapular stabilization* make possible considerable scapular mobility and, therefore, shoulder/arm mobility.

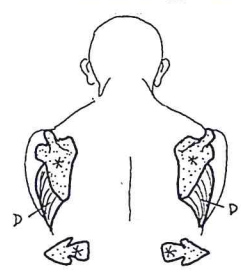
Note the roles of these six muscles in scapular movement, and note how the shoulder and arm are affected. *Pectoralis minor* assists *serratus anterior* in protraction of the scapula such as in pushing against a wall; it also helps in depression of the shoulder and downward rotation of the scapula. Consider the power resident in serratus anterior and trapezius in pushing or swinging a bat. Note the especially broad sites of attachment of the *trapezius* muscle. Trapezius commonly manifests significant tension with hard work—mental or physical. A brief massage of this muscle often brings quick relief.

MOVEMENTS OF THE SCAPULA*



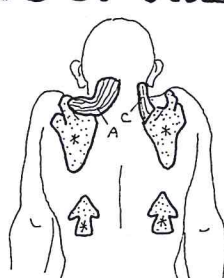
RETRACTION_{*}

Military posture
("squaring the shoulders")



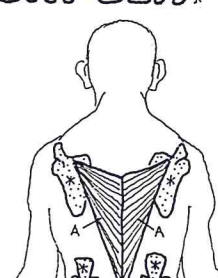
PROTRACTION_{*}

Pushing forward with
outstretched arms and hands.



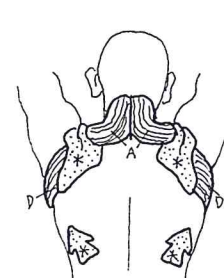
ELEVATION_{*}

Shrugging the shoulders
or protecting the head.



DEPRESSION_{*}

Straight arms on parallel
bars, holding weight.



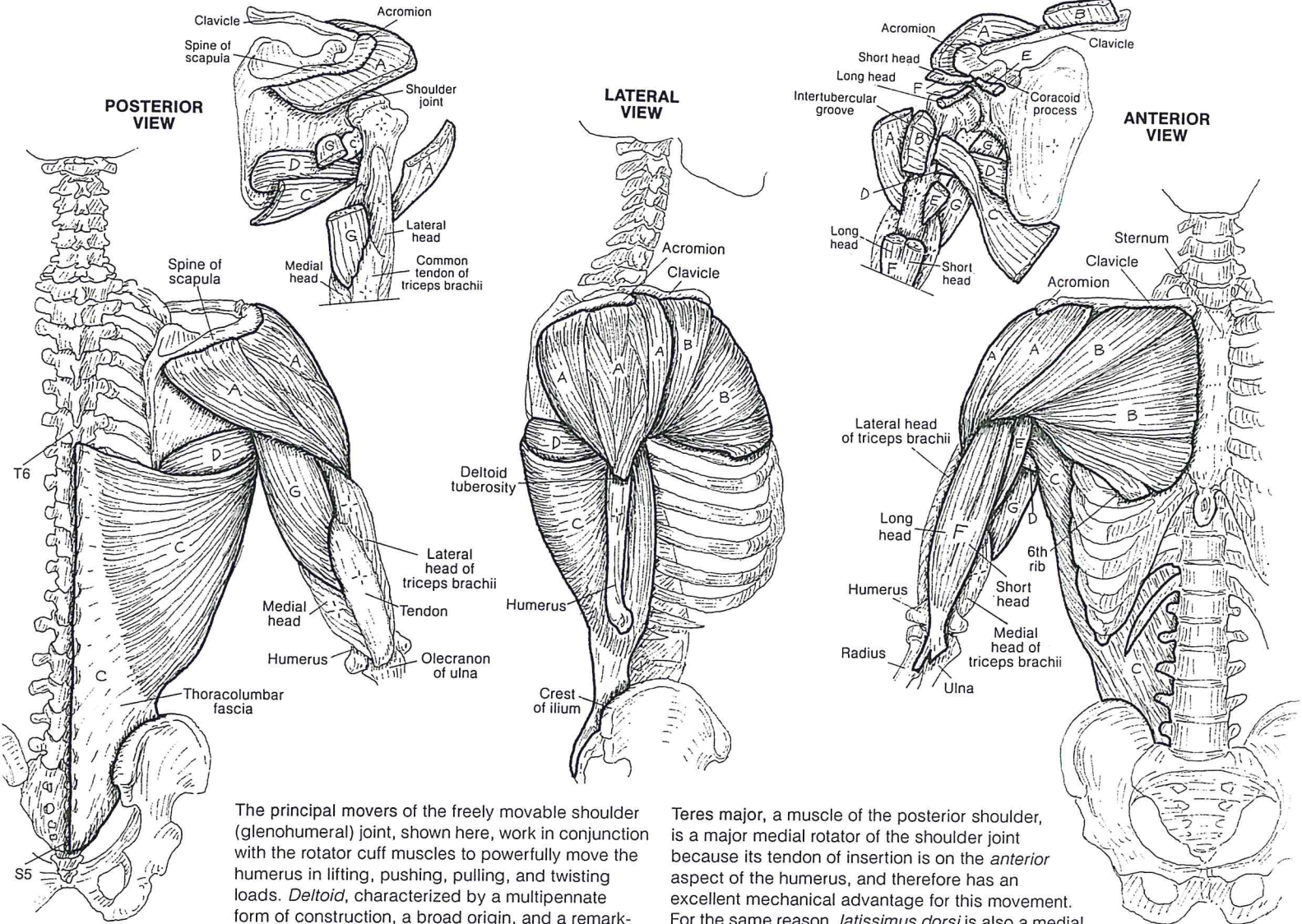
UPWARD ROT._{*}

Lifting or reaching
over head.

MOVERS OF SHOULDER JOINT

DELTOID_A PECTORALIS MAJOR_B
 LATISSIMUS DORSI_C TERES MAJOR_D
~~CORACOBRACHIALIS_E~~ BICEPS BRACHII_F
 TRICEPS BRACHII (LONG HEAD)_G

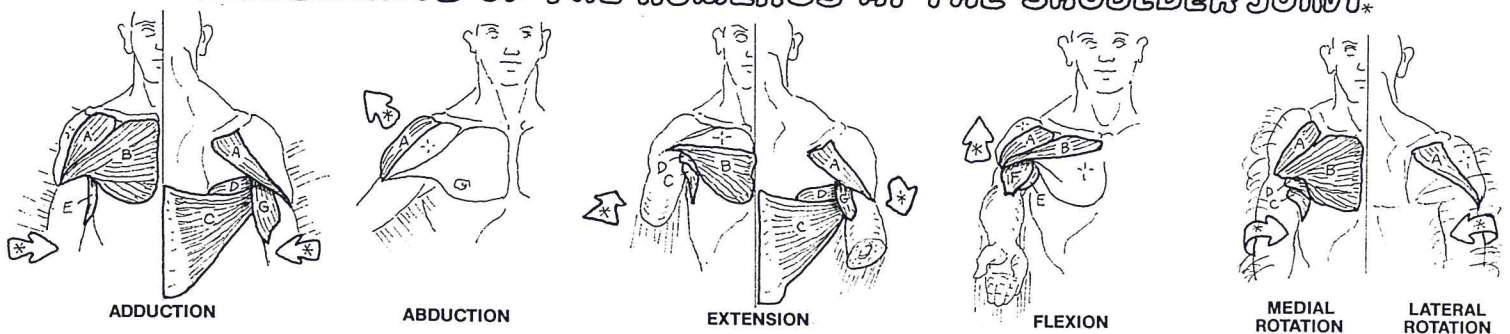
CN: (1) Begin with both posterior views; note that the biceps and triceps are not shown on the lateral view.
 (2) When coloring the muscles below, note the actions of different parts of the deltoid (A) and pectoralis major (B).



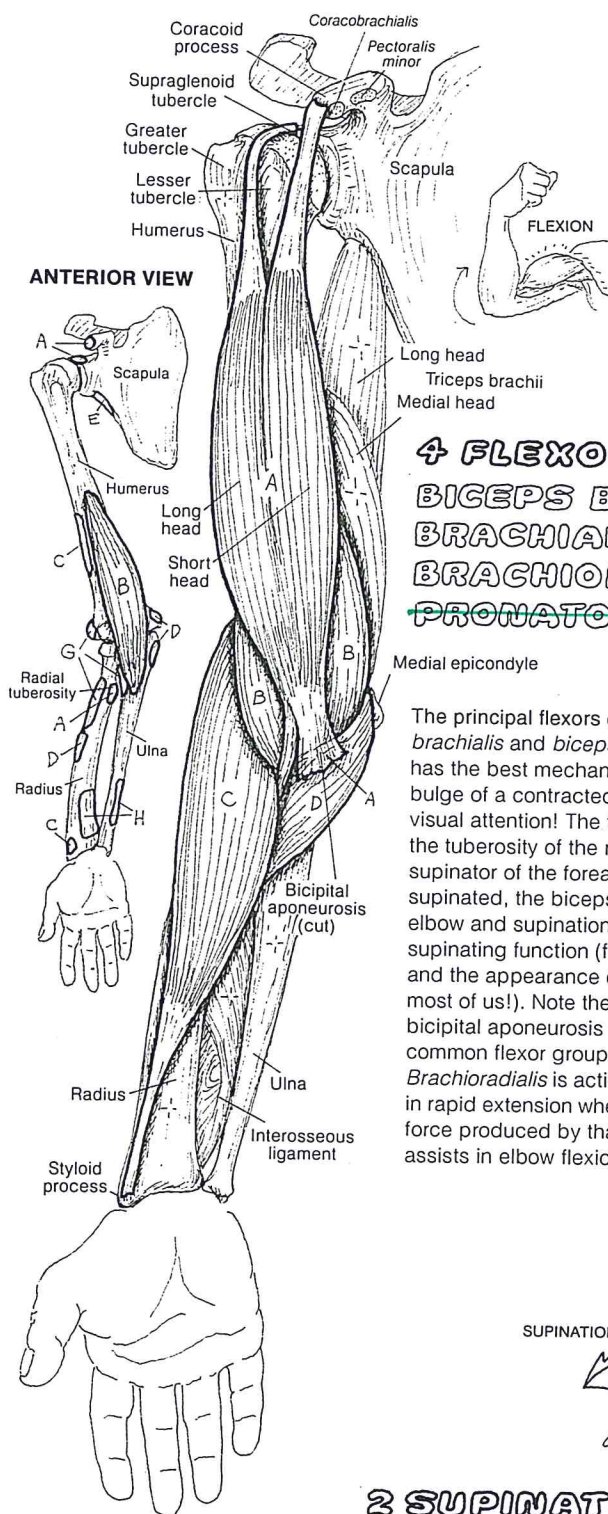
The principal movers of the freely movable shoulder (glenohumeral) joint, shown here, work in conjunction with the rotator cuff muscles to powerfully move the humerus in lifting, pushing, pulling, and twisting loads. *Deltoid*, characterized by a multipennate form of construction, a broad origin, and a remarkably short lever arm, is a powerful mover of the humerus in flexion, extension, and abduction. The clavicular (upper) fibers of *pectoralis major* are effective in flexing the shoulder joint; the sternal/abdominal (lower) fibers extend the flexed joint. Both are effective medial rotators as well.

Teres major, a muscle of the posterior shoulder, is a major medial rotator of the shoulder joint because its tendon of insertion is on the anterior aspect of the humerus, and therefore has an excellent mechanical advantage for this movement. For the same reason, *latissimus dorsi* is also a medial rotator of the joint in addition to being a major extensor. Both heads of *biceps brachii* are active in resisted flexion. *Coracobrachialis* is not a significant mover in either flexion or adduction, and the long head of *triceps brachii* is not a major mover in extension of the shoulder joint.

MOVEMENTS OF THE HUMERUS AT THE SHOULDER JOINT*



MOVERS OF ELBOW & RADIOULNAR JOINTS

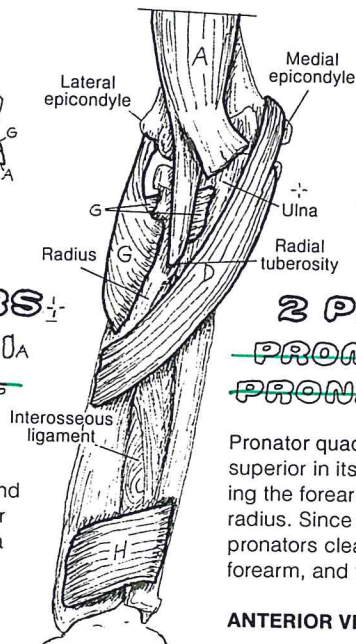
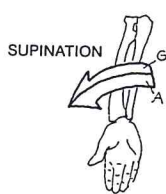


4 FLEXORS BICEPS BRACHII_A BRACHIALIS_B BRACHIORADIALIS_C PRONATOR TERES_D

The principal flexors of the elbow joint are *brachialis* and *biceps brachii*, of which the former has the best mechanical advantage. Yet it's the bulge of a contracted biceps that gets all the visual attention! The tendon of biceps inserts at the tuberosity of the radius, making the muscle a supinator of the forearm as well. With the limb supinated, the biceps works to fulfill flexion of the elbow and supination of the elbow. Take away the supinating function (flexing the pronated elbow), and the appearance of biceps is disappointing (in most of us!). Note the additional attachment of the bicipital aponeurosis into the deep fascia of the common flexor group (not shown) in the forearm. *Brachioradialis* is active in flexion of the elbow and in rapid extension where it counters the centrifugal force produced by that movement. *Pronator teres* assists in elbow flexion as well as pronation.

2 SUPINATORS BICEPS BRACHII_A SUPINATOR_E

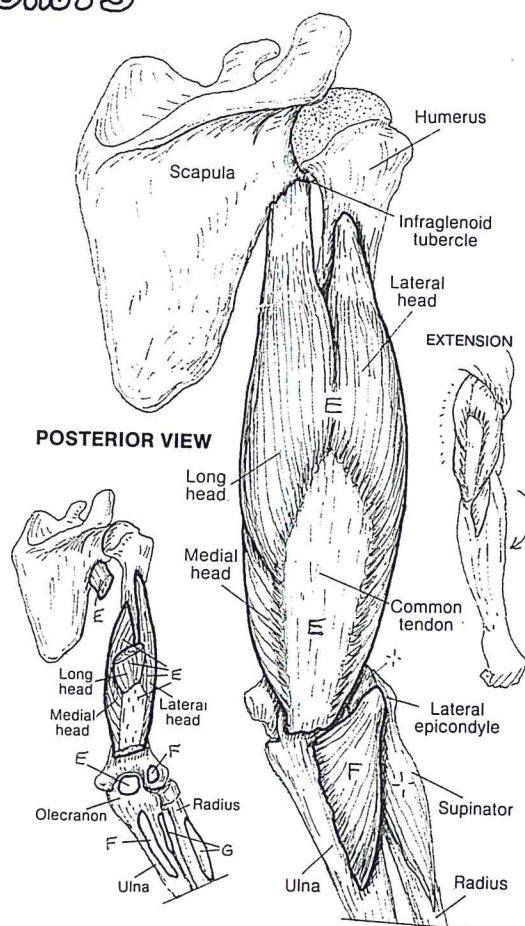
Biceps brachii is the more powerful supinator of the elbow, but *supinator* is important in maintaining supination. *Supinator* arises from the lateral aspect of the elbow, passing obliquely downward and forward to a rather broad insertion on the upper lateral and anterior surface of the radius. A bundle of fibers from the upper lateral ulna passes behind the radius to join the lateral fibers of *supinator*.



2 PRONATORS PRONATOR TERES_D PRONATOR QUADRATUS_H

Pronator quadratus is the principal pronator of the elbow joint, superior in its mechanical advantage to *pronator teres*. Pronating the forearm (palm down) involves medial rotation of the radius. Since only the radius can rotate in the forearm, the pronators clearly cross the radius on the anterior side of the forearm, and their origin is ulnar.

ANTERIOR VIEW



2 EXTENSORS TRICEPS BRACHII_E ANCONEUS_F

The principal extensor of the elbow joint is the three-headed *triceps brachii* with its massive tendon of insertion. The smaller *anconeus* assists in this function. *Triceps* is a powerful antagonist to the elbow flexors.

POSTERIOR VIEW