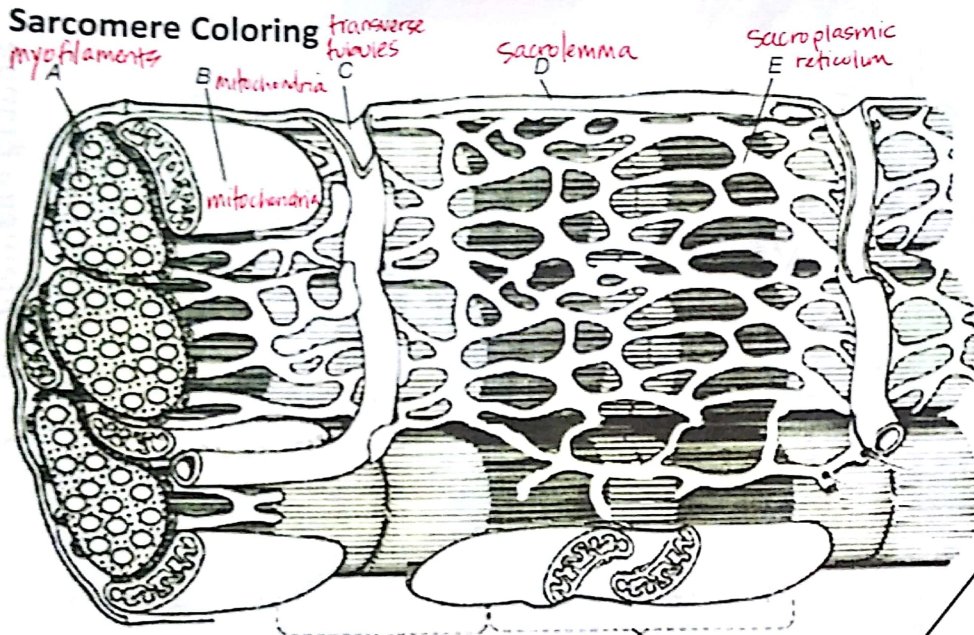
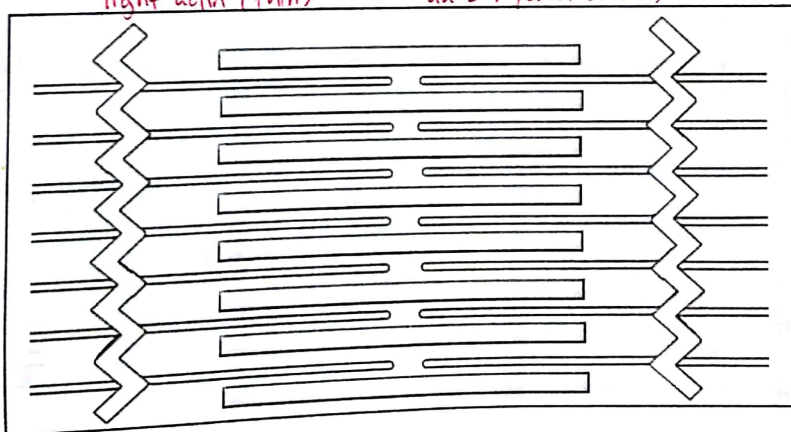


Sarcomere Coloring



I-BAND light actin (thin) A-BAND dark myosin (thick)



Name _____

Color the individual **myofilaments (A)** purple, these are composed of both **thick (myosin)** and **thin (actin) filaments**. **Mitochondria (B)** are dispersed through the muscle fibers, color all mitochondria pink. Recall that mitochondria supply energy, ATP, needed for muscle contraction.

Two types of transport systems are found within the muscle. The **sarcoplasmic reticulum (E)** is a network of tubes that run parallel to the myofilaments. Color this network green. The **transverse tubules (C)** run perpendicular to the filaments – color both yellow. The entire muscle fiber is surrounded by a membrane, the **sarcolemma (D)**, color this membrane brown.

If expanded, the light and dark bands are shown as individual thick and thin filaments. **Color the thick filaments (not labeled red and the thin filaments blue.**

The Z line is the boundary between sarcomeres, named after its shape. **Color the Z-line orange.**

1. What are the two types of myofilaments?
thin & thick
2. The membrane of the muscle fiber is called the:
sarcolemma
3. The sarcomere is defined as the region between two z-lines
4. What structure is similar to the endoplasmic reticulum in other cells, used for transport?
sarcoplasmic reticulum
5. Dark (A) bands are made from myosin
Light bands (I) are made from actin

Sliding Filament Theory

The sliding filament theory explains muscle contraction based on how muscle fibers (actin and myosin) slide against each other to generate tension in the overall muscle.

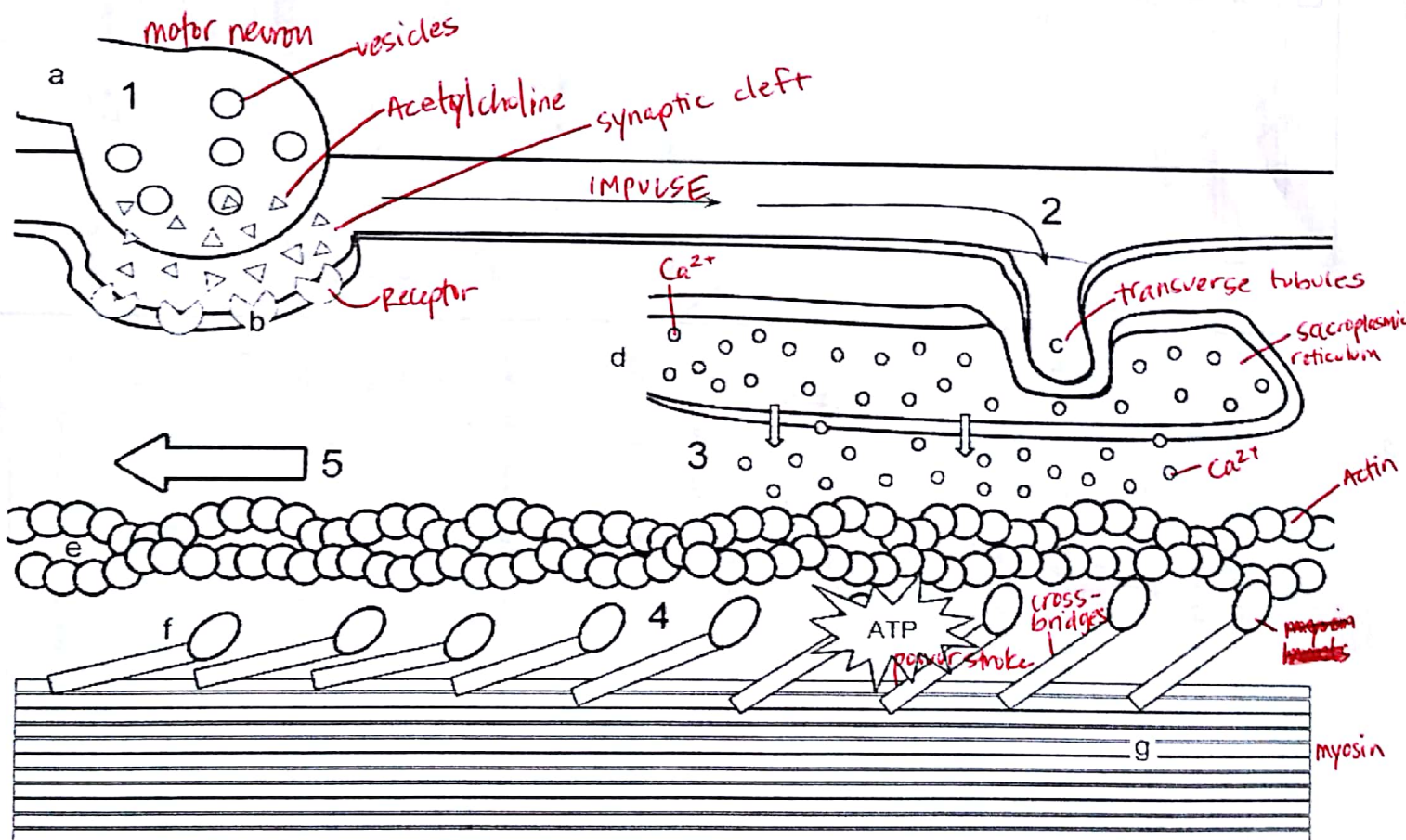
Step 1: A muscle contraction starts in the brain, where signals are sent along the motor neuron (a). Color the motor neuron yellow □. Within the motor neuron are vesicles that contain the neurotransmitter, acetylcholine. Color vesicles gray □ and the triangles that represent the acetylcholine orange □. Acetylcholine reaches the receptors (b) on the muscle sarcolemma which causes an impulse.

Step 2: The impulse travels down the membrane and into the transverse tubules (c) where it causes calcium to be released from the sarcoplasmic reticulum. Color the t-tubule green □ and the circles that represent calcium dark blue □. The sarcoplasmic reticulum is only partially pictured, shade this structure pink.

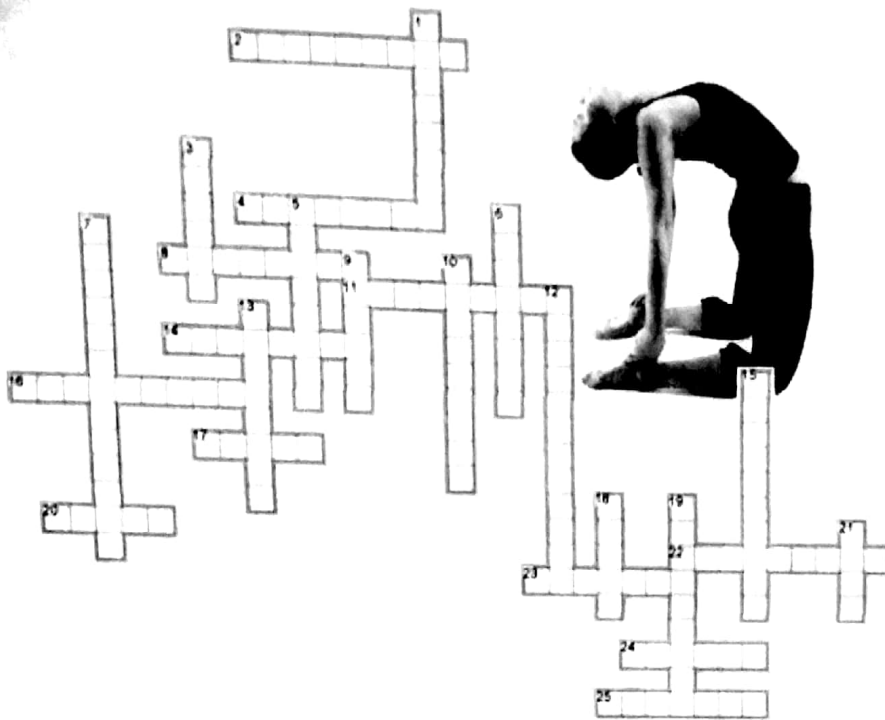
Step 3: Calcium binds to a structure on the actin that causes it to change shape. Color the actin myofilament (e) red. □

Step 4: The change in shape allows myosin heads to form cross-bridges between the actin and the myosin. Color the myosin (g) blue. Color the cross bridges (f) purple.

Step 5: Energy from ATP is used to create a "power stroke" between the two filaments. Color the ATP bright orange. □. The actin filament then slides inward and shortens, or contracts, the whole muscle.



Name: _____ Date: _____

Muscle Anatomy Crossword - Answer Key**ACROSS**

2. section of a myofibril from one Z line to the next Z line - sarcomere
4. bundle of muscle fibers - fascicle
8. theory that explains how muscle contraction works; sliding ___ theory - filament
11. Outermost layer, surrounds entire muscle - epimysium
14. describes muscles that are striped in appearance - striated
16. muscle fiber membrane - sarcolemma
17. space between a neuron and the muscle, synaptic ___ cleft
20. overlapping patterns of actin and myosin; I and A ___ bands
22. membranous channels that surround the myofibrils; sarcoplasmic ___ - reticulum
23. when muscles become tired - fatigue
24. type of muscle found in the digestive tract, involuntary - smooth
25. type of muscle that makes up the heart - cardiac

DOWN

1. helps regenerate ATP, ___ phosphate - adenosine
3. thick filaments of a muscle fiber - myosin
5. type of muscle that connects to bones, voluntary - skeletal
6. store neurotransmitters - vesicles
7. neurotransmitter used to cause muscle contraction - acetylcholine
9. connects muscles to bones - tendons
10. individual muscle fiber - myofibril
12. organelle that provides the energy needed for muscle contraction - mitochondria
13. connects bones to other bones - ligaments
15. surrounds fascicles - perimysium
18. thin filaments of a muscle fiber - actin
19. minimal level of stimulus to cause a contraction - threshold
21. this superhero has huge muscles when he's angry; David Banner - Hulk

Original Document

3 headed muscle, primary flexor of the forearm

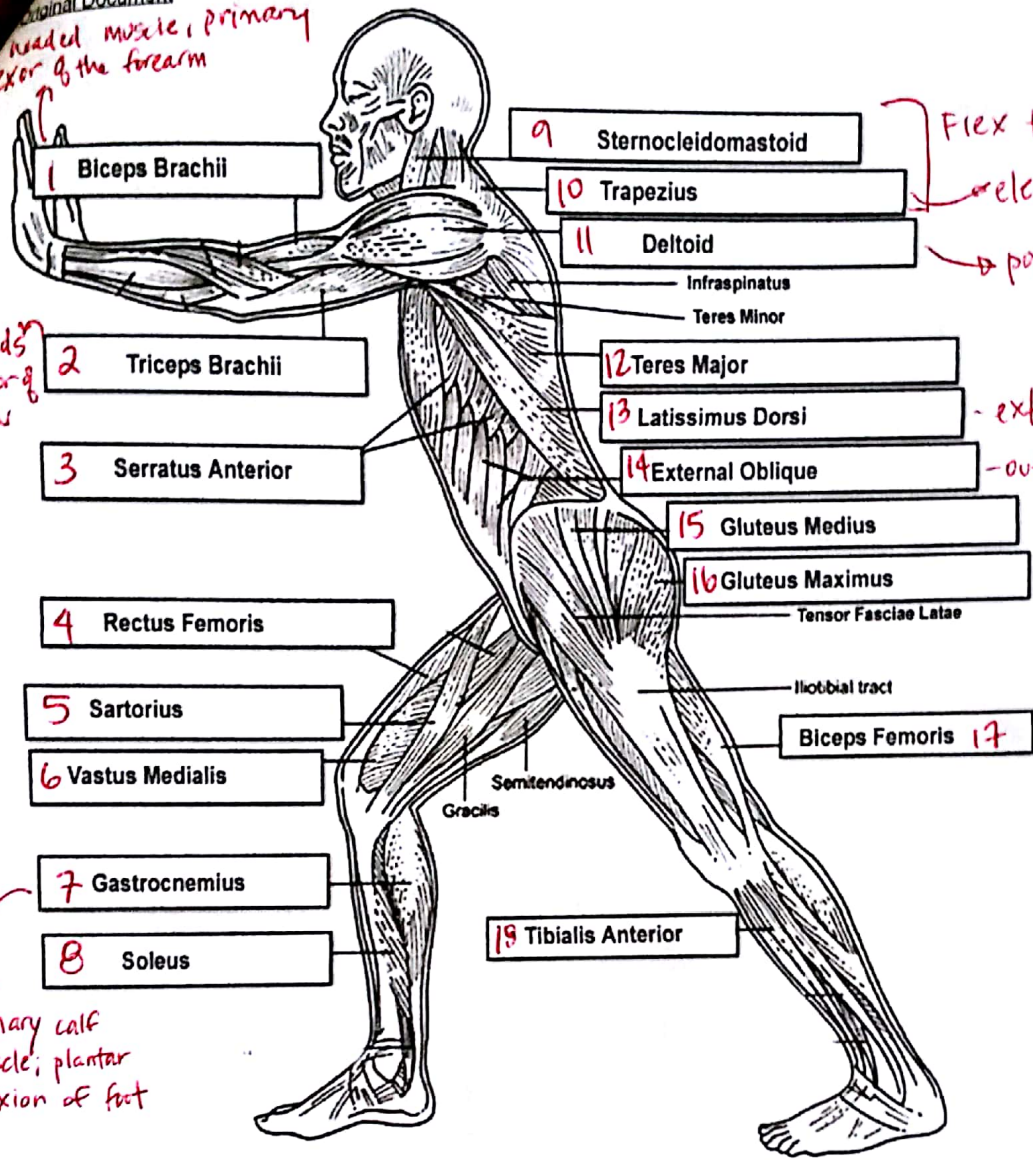
3 heads extensor of elbow

Flex the head on the chest
 elevate shoulders & extend head backwards
 powerful abductor of upper arm

extensor of upper arm
 outermost side layer of abdomen

forms outer contour and most of buttocks content

primary calf muscle; plantar flexion of foot



of the Muscles of the Body Key
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