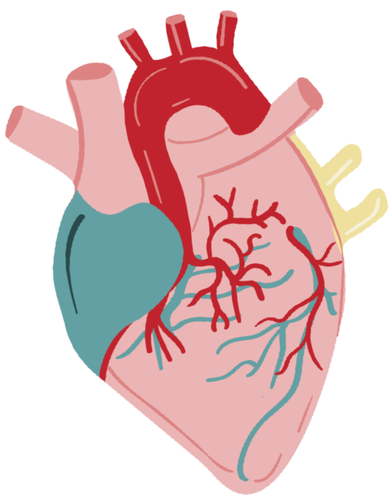
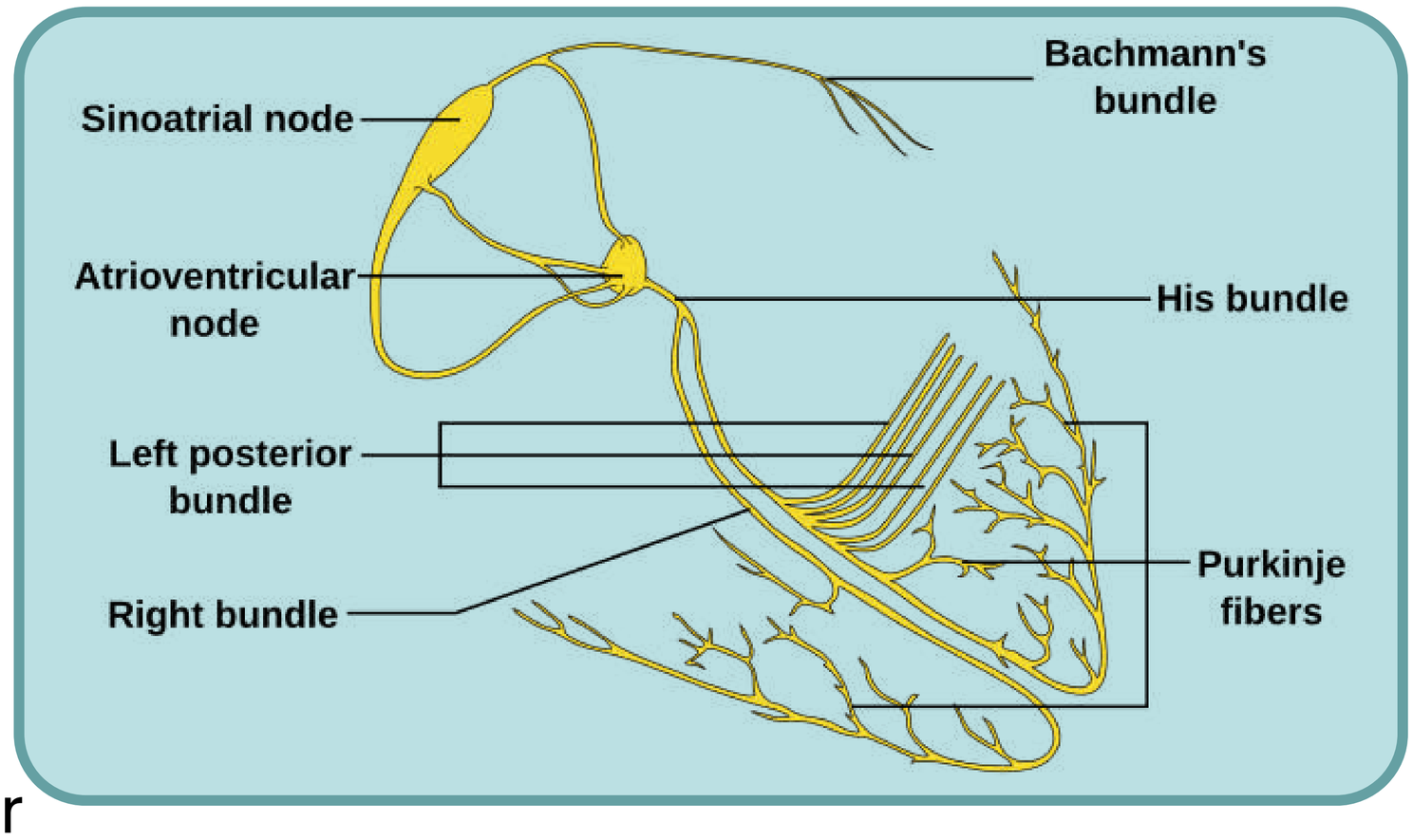
Muscular System

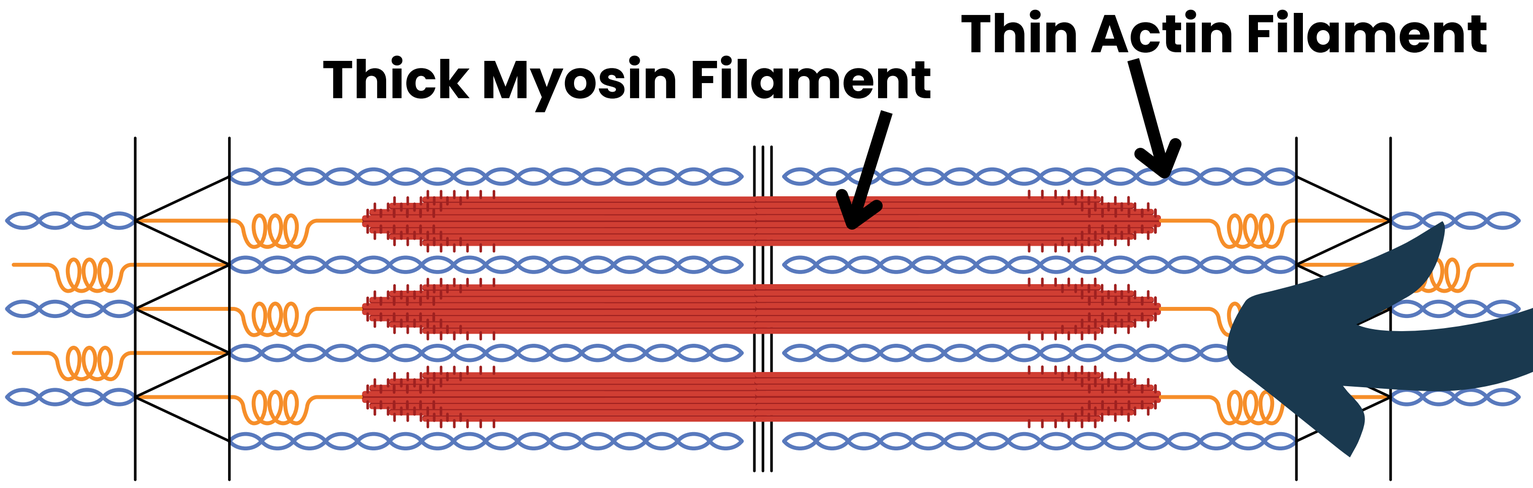
Cardiac Muscle



- Cardiac muscle is only found in the heart.
- It is a thick muscle that is strong enough to pump blood through the pulmonary and systemic circuits.
- It is involuntary, which means that you do not have to voluntarily contract the muscle.
  - This is because it is controlled by the SA node (sinoatrial node) that depolarizes and polarizes to control contractions.
    - The AV node (atrioventricular node) receives the depolarization and sends electrical impulses through the Purkinje fibers to contract the ventricles.



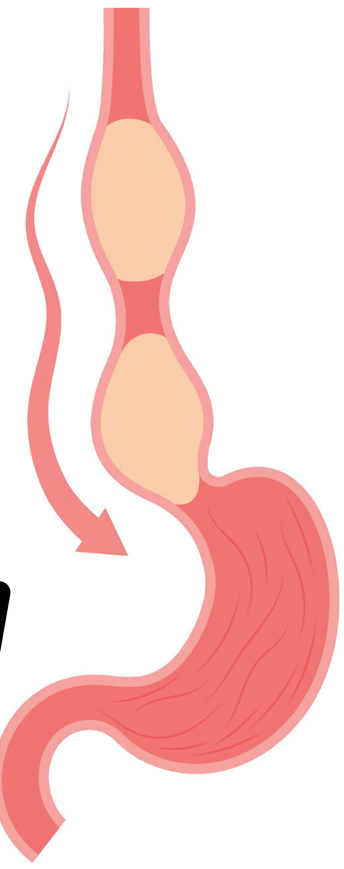
- It is made out of three layers: the epicardium (outside), myocardium (thick middle), and endocardium (inside).
- Cardiac muscle is made out of structures called sarcomeres.



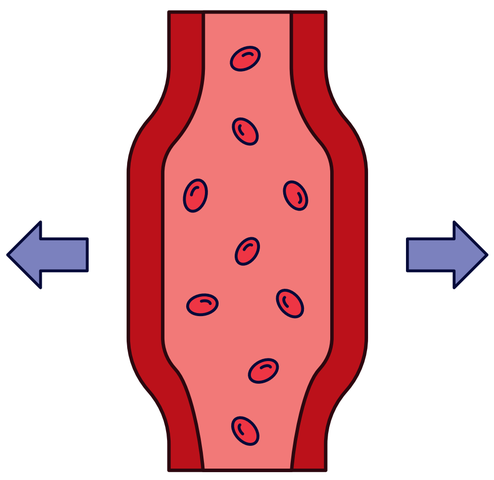
Sarcomeres are elongated cells made from protein filaments. Actin and myosin are the proteins that allow the sarcomeres to slide and contract.

Muscular System

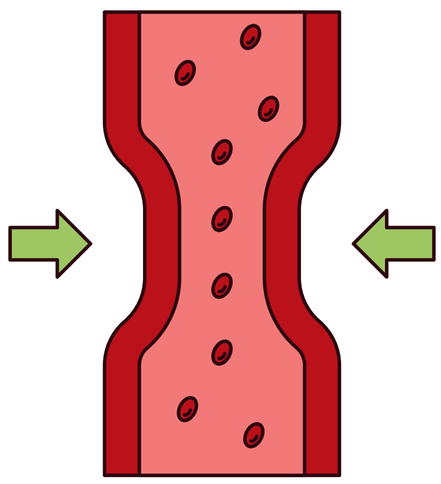
Smooth Muscle



- Smooth muscle is found in the digestive, respiratory, reproductive, urinary, integumentary, cardiovascular, and circulatory system.
- It is an involuntary muscle group that is in charge of involuntary muscle contractions that move bolus and chyme through the digestive system.
- The muscle contractions in the digestive system (especially in the esophagus) are called peristalsis.
    - Peristalsis is when the muscles contract in a rhythm to bring the food down into the stomach.
- Smooth muscle is non-striated, which means it isn't made up of sarcomeres.
- Smooth muscle controls blood pressure and flow in the circulatory system.



    - It relaxes the blood vessel to lower blood pressure and contracts the blood vessel to raise blood pressure.

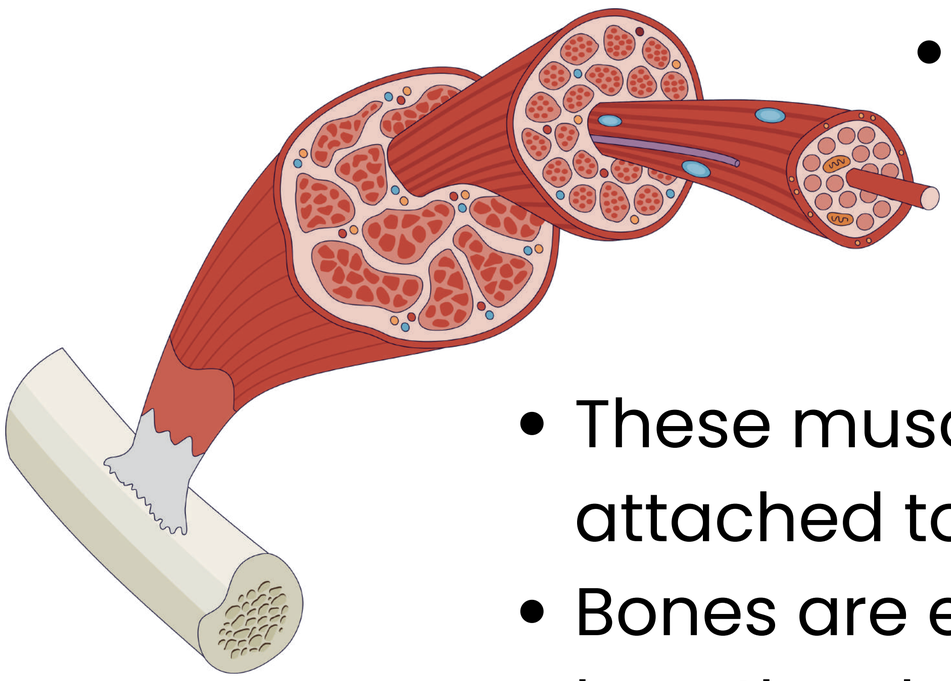


- The arrector pili muscles are made of smooth muscle.

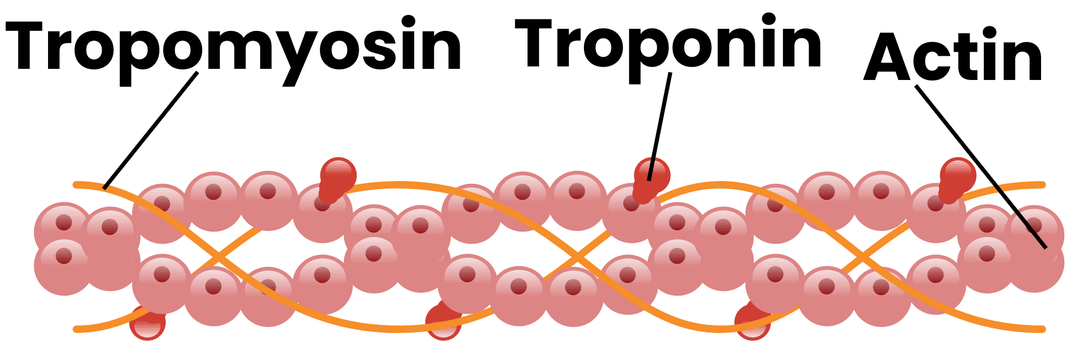
The arrector pili muscles are what make the hair on your skin stand up due to cold or fear.

Muscular System

Skeletal Muscle



- Skeletal muscle is the only voluntary muscle group. This is the muscle group you use to move around and lift things.
- These muscles are all over the body. They are attached to bones by tendons.
- Bones are essential to muscles because that is how they have leverage.
- Skeletal muscles are striated. That means that they have a striped and layered appearance due to the sarcomeres.
- Troponin and tropomyosin are proteins that work together to regulate muscle contraction.
  - The sliding filaments that these proteins regulate to contract a muscle are actin and myosin filaments.



- Skeletal muscles are made of bundles of myofibrils made from actin and myosin.
- Skeletal muscles help maintain body temperature because of the amount of energy they use (energy produces heat).

These muscles maintain posture and balance.