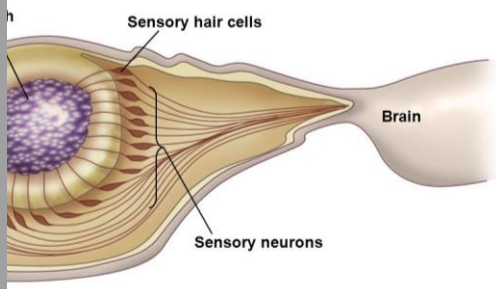
Sensory Mechanisms in Invertebrate Animals

Sensory receptors in invertebrate animals are also present. Similar to vertebrates invertebrates must also monitor their environment to survive. Though a more thorough investigation on vertebrate receptors has been made, and many of these receptors have been understood, there are also some identified sensory receptors for a wide variety of stimuli in invertebrates. Scientists have stated that many of these animals have eyes ranging from simple to compound which may see a limited number and types of colors. Sensory receptors for gravity, sound, heat, humidity, air and chemicals in water or air have been documented.

Lumbricus or e lum Annelida has a great number of epidermal is sensitive to light as well as other stim dant in the anterior and posterior ends of y. The sense cells have nerve fibers connec t performate the animal's cuticle at one end, ystem, at the other end.

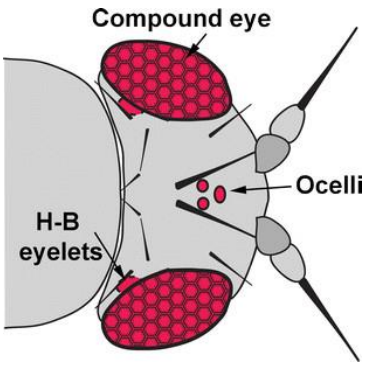
Shelled orga Phylum Mollusca equilibrium in wa small vesicle that



calcareous concentration called statolith. The vesicle known as statocyst is located at the pedal ganglia of the mollusc. Also, molluscs has an ospharidium which the organism may have used to test water that enters the mantle cavity. Sensory cells are also abundant in the organisms siphon and are sensitive to contact and light.

In the arthropod group, the sense of touch is
specialized hairs in various parts of the body. The
the organism to find food and avoid obstacles arou
Though the arthopods have eyes, it is not used for
only to detect moving objects. Another group of the
represented by spiders is the arachnids. They are
sensory hairs on their pedipalps and walking legs.
principal sense organ are their eight eyes which a
see objects at a distance of about 12 cm.

Insects have **compound eye and ocellus** for vision and light perception, respectively. They can also detect sound with a pair of auditory organs that consist of a **tympanum.** The antennae contains their



receptor organ for smell while the mouthparts have organs of taste as well as touch because it contains the hairlike organs sensitive during physical contact with objects or other animals.

For marine invertebrates like echinoderms, the tube feet is their principal sense organ which receive nerve fibers from the radial nerve cords. The radial nerve cords terminates to a pigmental mass called the **eye**. The eye is a light receptor organ for this group.

Animals Movement

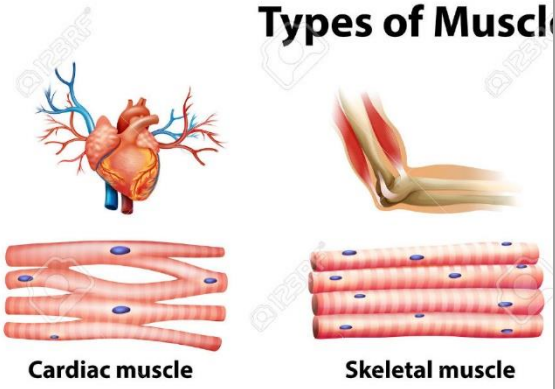
Animal sensory was discussed for inve
vertebrates. The sensory receptors are made u
neurons that transmits impulses towards the ce
system for processing. After the brain or spi
processed the stimulus, it will generate an approp
which will be transmitted to effector organs such
glands. This transmission is important because it
organism to react according to the stimulus. Musc
common organ that carries out the response as d
brain.

Locomotion is the movement of an entire organism caused by muscular contractions. In producing movement, muscles work together with the skeletal elements of an organism. Skeleton provides the attachment site for muscles. There are three types

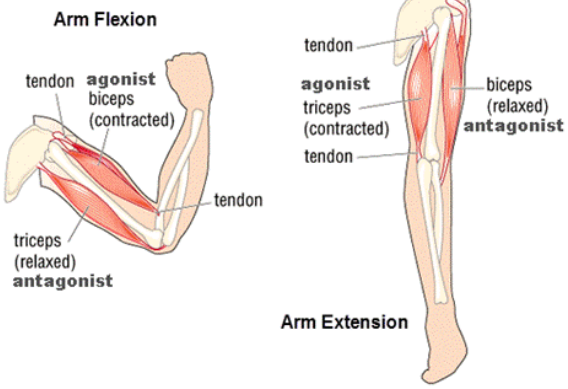
of skeleton in the animal kingdom, exoskeleton, hydrostatic skeleton and endoskeleton. Exoskeleton is like an armor covering the body of most invertebrates. Attachment of muscles is internally located. On the other hand, endoskeleton of vertebrates are located inside, with muscle attachment outside the bone. The hydrostatic skeleton of soft-bodied invertebrates usually relies on the organism's fluid content and its musculature.

Vertebrate Muscle

Muscles of vertebrates can be grou[redacted]keletal muscles are striated and voluntary. [redacted]uscles attached to bones. Cardiac muscles are [redacted]luntary producing the pumping action of the h[redacted]racts. And finally, visceral muscles are smoot[redacted]. The visceral muscles do not have striati[redacted]ber or muscle cells. They line walls of intern[redacted]or the heart.



According to action, the skeletal muscle may fall under three categories. Agonist are muscles that contracts to pull a bone towards another bone. While another muscle group relaxes during a movement is called antagonist. Small m with the agonist to stabilize movement produced Stabilizing muscle group are synergist. Individu belong to both groups depending on the movement instance, biceps branchii is a muscle found o surface of the arm. When this muscle contracts the arm, it is an agonist but when the arm is s or extended the biceps becomes an agonist.



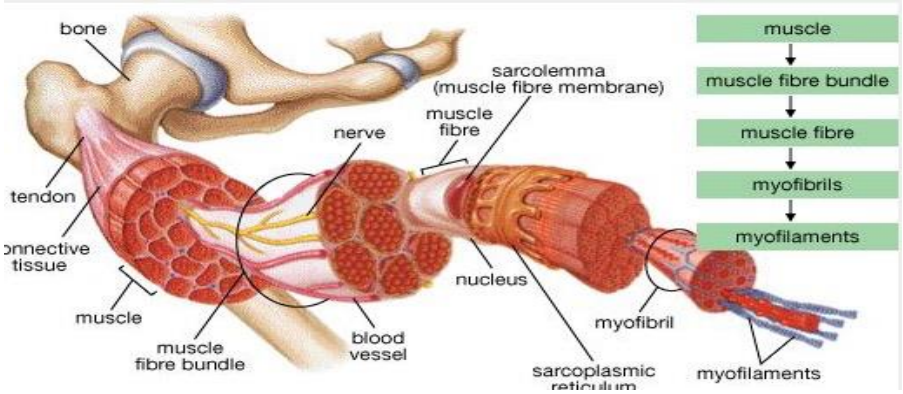
Bones are the s t of muscles to produce movement. Tendon is of a muscle to a bone. Muscles may be attach n limited to no movement. This fixed connectio as the origin. While a movable type of tendo When a body part move it is usually in the dire origin.

A muscle may be nsor, adductor, abductor, pronator, supinator, evertor, or circumductor

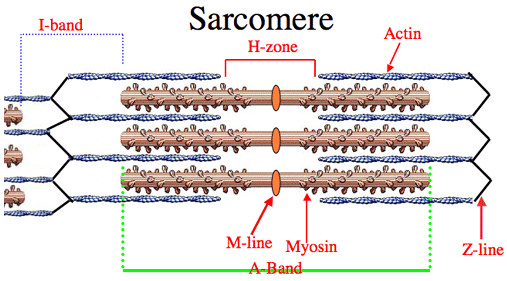
depending on the movement produced when the specific muscle contracts.

Anatomy of Muscles

A muscle bundle is bound together by a connective tissue referred to as epimysium. Inside the bundle are smaller groups of muscle called muscle fascicle that is also surrounded by an extension of the epimysium, the perimysium. Units inside the smaller muscle groups in the fascicle is enveloped by the endomysium. These connective tissue coverings converge at the end of the bundle and becomes a tendon connecting the muscle to the bone.



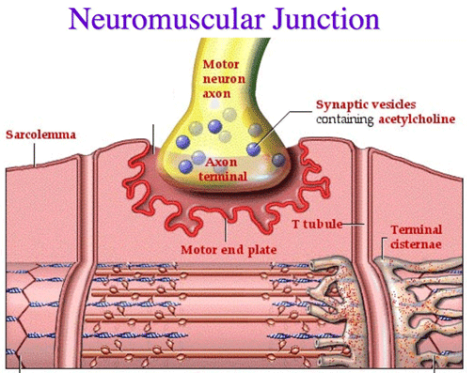
Inside the longitudinal muscle cell called myofiber are striations which was found out to be made of two



types called thin myofilament and thick myofilament. These myofilament is contained in the functional unit of a myofiber called the sarcomere. The thin myofilament is made up of protein actin that is attached at one end to the Z-line of the sarcomere. The thick myofilament is made up of myosin that is free at one end to interact with actin and is attached to the opposite myosin at the M line. I band refers to the zone that only contains thin myofilament including the Z line while the H zone is the middle part of the sarcomere that only has myosin protein of thick myofilament. A band encompasses the length of the thick myofilament which includes the H zone as well as the overlapped part of the thick myofilament with the thin myofilament.

Muscle Contration

Muscle contraction is a result of the impulse from the motor neurons at the neuromuscular junction. The axon terminals of the motor neurons has vesicles that contains acetycholine (Ach). When the electrical signal reach the ends of the axons, the vesicle fuse with the plasma membrane and release Ach in the synapse or the gap between the axon and the muscle fiber. The Ach binds with the receptors found in the



sarcollema, and affects the membrane potential of the myofiber. This change will affect the transverse tubule that traverses the sarcoplasmic reticulum in the cell.

Once the reticulum is affected by the membrane potential, calcium ions will be re sarcoplasm of the myofiber. Since there are more the sarcoplasmic reticulum compared to the out Ca^{2+} will continuously flow out of the tubules. the possibility that a calcium ion will bind found in the thin myofilament. When calcium suc with the actin a conformational change will happ This conformational change results to the slig tropomyosin that will expose the myosin binding s

The sliding filament theory of Huxley and Hanson explains how a muscle contract. Muscle contraction starts when ATP attached to the myosin head of the thick filament is hydrolyzed to ADP and inorganic phosphate. While the actin molecule of the thin filament has calcium ions attached to its receptor and the binding site of the myosin head is exposed. This two events allow the attachment of the myosin head to the thin filament farther down from the previous attachment. When the inorganic phosphate is released from the hydrolyzed ATP, the neck of the

myosin head bends back to [redacted]osition resulting to a power stroke. The power [redacted]move the entire thin filament to the middle of [redacted] causing the shortening of the sarcomere, and bec[redacted]verlapping of thin and thick myofilament, the sar[redacted]lges. Thus, contraction is the shortening and bu[redacted]e fibers. When ADP is released from the myosin h[redacted] remains to be attached to the thin filament. The [redacted]at when an ATP molecule attaches to the myosin hea[redacted]isconnection of the two myofilament. Attachment wi[redacted]en ATP is hydrolyze to ADP and inorganic phosphate

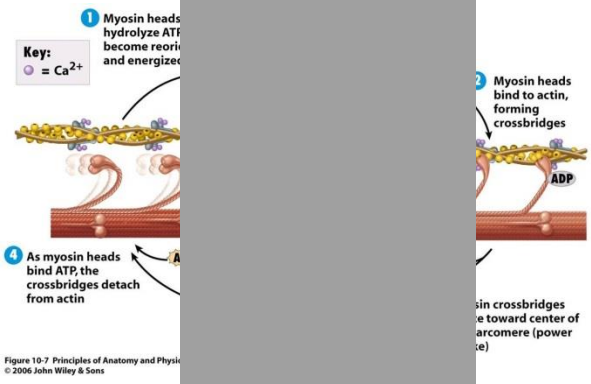


Figure 10-7 Principles of Anatomy and Physi
© 2006 John Wiley & Sons