- **Myelin** and **the nodes of Ranvier** increase the speed with which electrical signals pass down the axon
- Ex: Astrocytes(provide metabolic stability for neurons and involved in formation of blood brain barrier, helps maintain constant ion concentrations in extracellular fluid), microglia(remove cellular debris)

- Sensory and motor neurons as well as interneurons form pathways in a nervous system
  - There are three main types of Neurons(refer to drawings):
    - **Sensory**: detect or sense information from outside world, such as light, taste, smell, or heat
      - Detect internal body conditions, such as blood pressure and body temperature
      - **Afferent**, transmit signals to CNS
      - Arrangement allows for rapid transmission of sensory signal to CNS
    - **Motor**: send signals away from CNS and produce a response
      - Causes movement, secretion of hormones
      - **Efferent**, do not branch into two main processes
    - **Interneuron**: forms interconnections between other neurons in CNS
      - Signals set between interneurons are critical in interpretation of information that CNS receives and the response it produces
      - Arrangements allow for complex connections with other cells
- Neurons transmit information to each other through a series of connections that form a circuit
  - Simple circuit(**reflex arc**) allows an organism to respond rapidly to inputs from sensory neurons and consists of only a few neurons
    - Stimulus from sensory neurons → sent to CNS, but signal is not really interpreted (not very many interneurons involved) → motor neurons, where a response is produced (knee jerk)
    - Allows animals to respond quickly to dangerous situations

41.2 Electrical Properties of Neurons

- Neurons establish differences in ion concentration and electric charge across their membranes
  - A neuron is said to be electrically **polarized**
  - Difference between electric charges along inside and outside surfaces of a cell membrane is called **potential difference** or **membrane potential**
  - **Resting potential** refers to the membrane potential of a cell that is not sending nerve impulses
  - Negative ions within the cell are drawn to the positive ions arrayed on the outer surface of the plasma membrane
  - More positive charges along the outside surface of a neuron (abundant in extracellular environment) and more negative charges inside (abundant in cytosol)
    - Potassium concentration higher inside cell (-), sodium concentration higher outside cell (+)
    - Number of ions contributing to resting membrane potential is small compared to total number of ions inside and outside cell
  - Ions that are critical in the establishment of resting potential:
    - Na^+ (sodium)
    - K^+ (potassium)
    - Cl^- (chloride)