DIENCEPHALON, BRAINSTEM, AND THE CEREBELLUM

Diencephalon "through the head", named for its central location in the middle of the brain

1. **Thalamus "inner room"**: major processing and relay information center for cerebrum ("air traffic control")—brain connection for optic nerve
2. **Hypothalamus "under thalamus"**: primary controller of homeostasis
    a. body temperature
    b. food and water intake
    c. sleep and circadian rhythms
    d. controls the pituitary gland
    e. part of our limbic system (emotional brain)
    f. can regulate brainstem activities to alter heart rate, blood pressure and breathing
    g. involved in memory
3. **Epithalamus "upon the thalamus"**: contains pineal gland, which releases melatonin
    a. Released in the dark, makes us increasingly sleepy as it builds up in the brain
    b. May play a role in reproductive cycles and/or sexual desire

Brainstem

1. **Midbrain**: This area of the brain begins under the diencephalon and extends down to the pons. There are large tracts of white matter relaying information to and from higher brain centers.
    a. **Cerebral peduncles**: anterior bulges of midbrain. Contain the substantia nigra, a nucleus whose neurons release dopamine and are critical for fine motor movements. A deficiency in dopamine-release from these neurons results in **Parkinson's disease**.
    b. Corpora quadrigemina: Four posterior bulges off the midbrain that are important for some visual and auditory protective reflexes.
2. **Pons**: nuclei involved in breathing, location of several cranial nerves attachment to the brain. Hypothalamus can fine-tune or override these nuclei.
3. **Medulla** oblongata: contains nuclei that control breathing, heart rate and blood pressure. Hypothalamus can fine-tune or override these nuclei.

Functions of the cerebellum:

balance, posture
coordination of skeletal movements
word association/puzzle solving

How it works: Movement requests from the precentral gyrus are integrated with sensory information from proprioceptors around the body, as well as visual and equilibrium (from inner ear) signals. Armed with this information, the cerebellum sends back to the cerebrum a recommended "blueprint" for carrying out movement requests. The cerebellum can also send impulses down to the spinal cord to initiate movements.