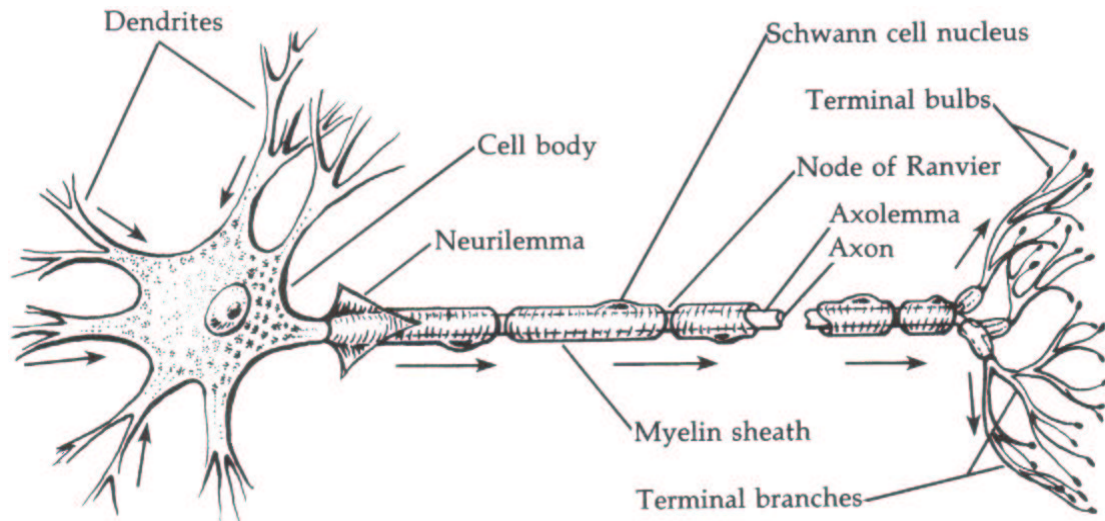


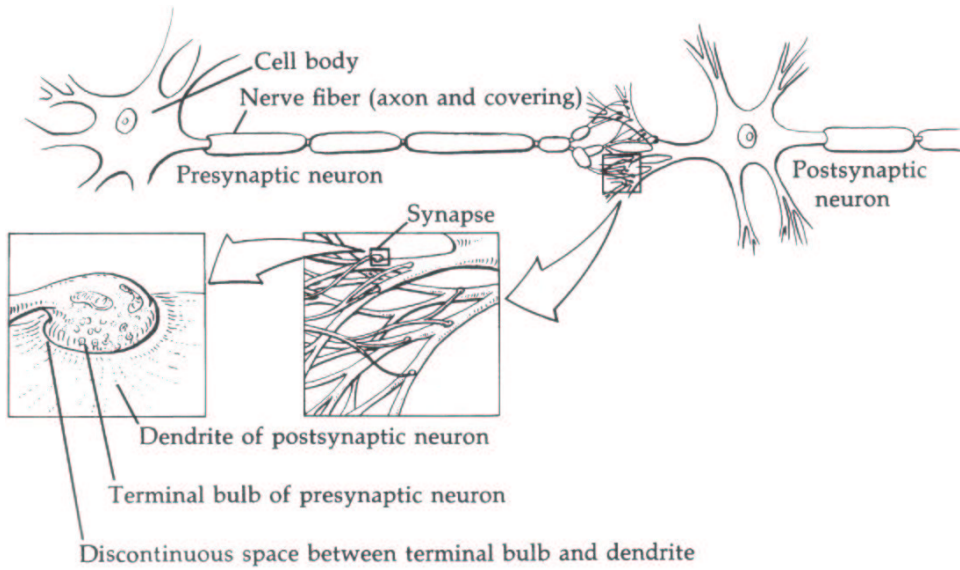
Nervous System
ANS 215
Physiology and Anatomy of
Domesticated Animals

Neuron

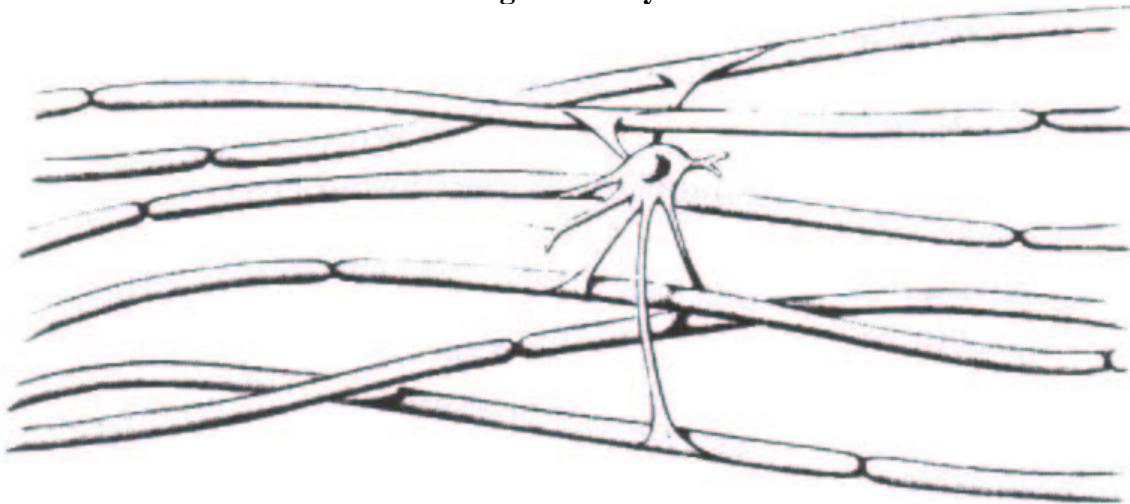
- Functional unit of the nervous system
- Consists of: cell body, axon, dendrites



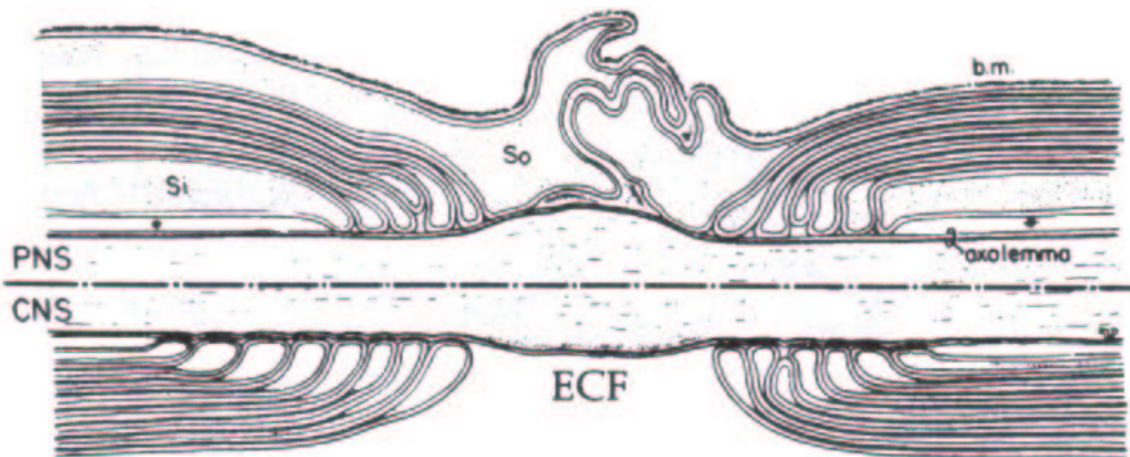
- Cell membrane = axolemma
- Myelin sheath = neurolemma; Increases the speed of conduction.
- Mammalian neurons can be bipolar (one axon and one dendrite) or multipolar (many branching dendrites and one axon).
- The axon and its myelin sheath are called a nerve fiber.



Oligodendrocyte



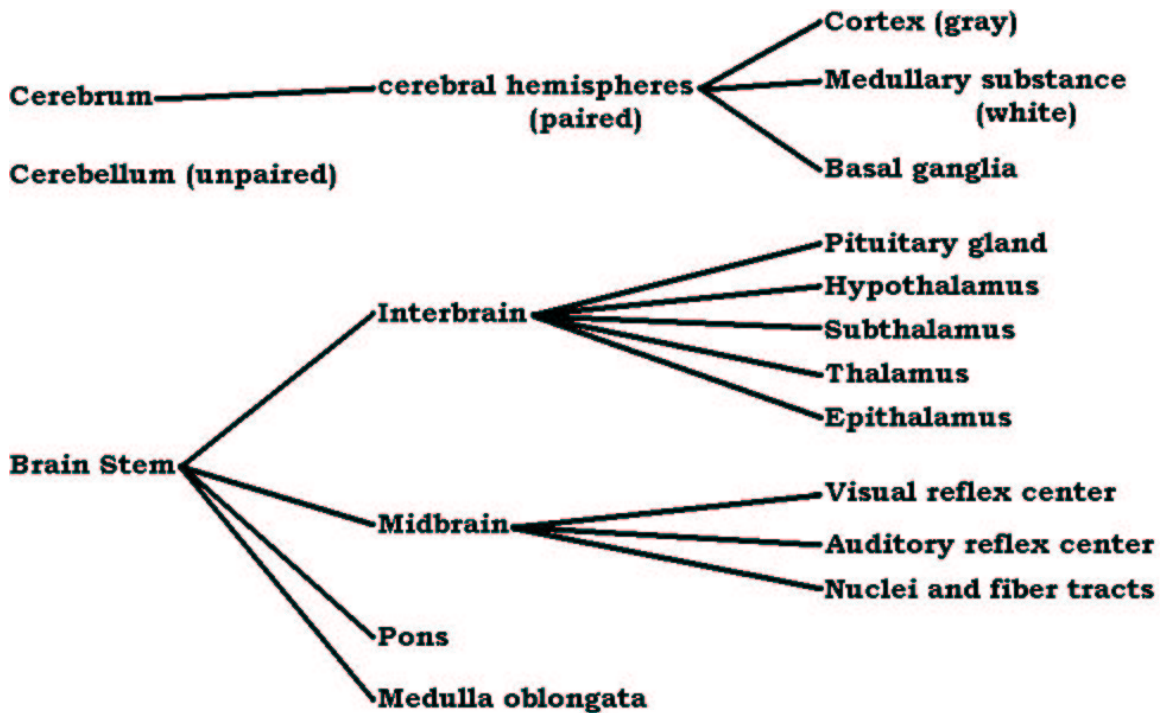
Node of Ranvier

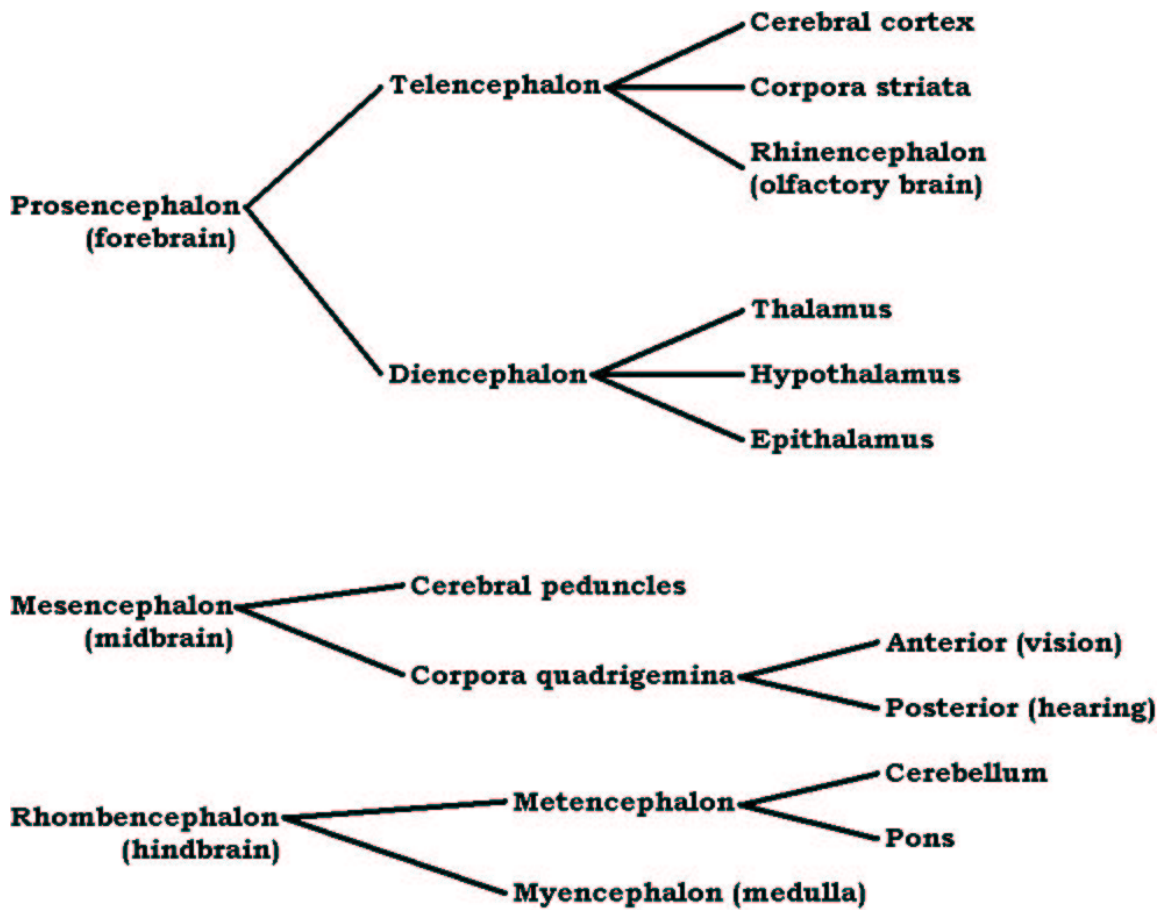


Nervous System Organization

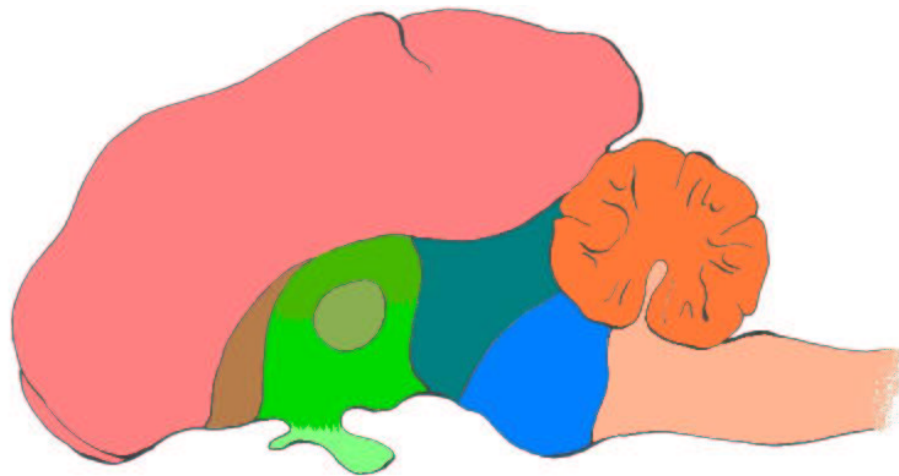
- Central Nervous System (CNS)
 - brain
 - spinal cord
- Peripheral Nervous System (PNS)
 - cranial nerves
 - spinal nerves
 - autonomic nerves
 - ganglia

Subdivisions of the Brain



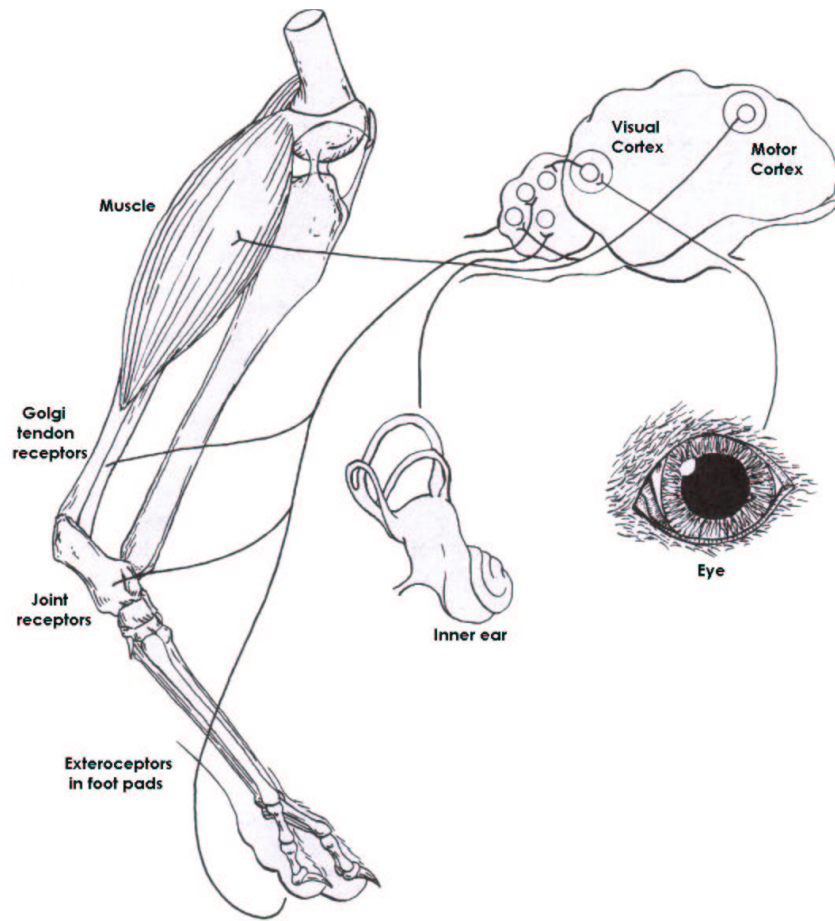


Location of Brain Subdivisions

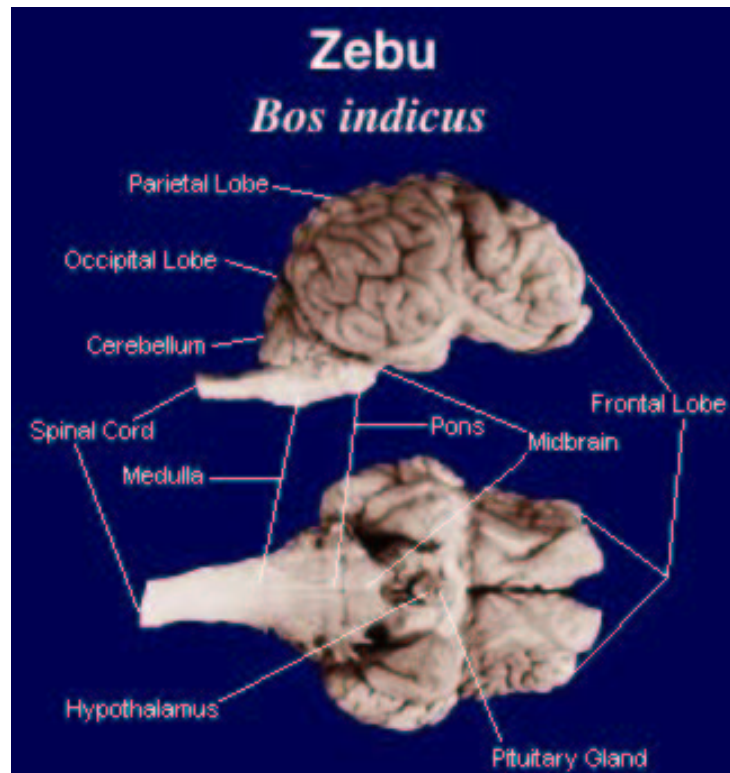


- Cerebral Hemisphere ■ basal ganglion ■ epithalamus ■ thalamus ■ hypothalamus
- pituitary gland ■ midbrain ■ cerebellum ■ pons ■ Medulla

Sources of Input to Cerebellum



The Brain



Zebus (*Bos taurus indicus*) are the sacred cattle of India. There are 30 or more breeds, each of which originated in a province of India. Zebus have a characteristic hump over the shoulder and a large dewlap. They may be colored pale fawn, bay, gray or black. They interbreed with other kinds of cattle, and both they and their hybrids are valued for their ability to resist heat, ticks and insects.

Brain Stem

Midbrain

- Visual reflex center
- Auditory reflex center
- Nuclei and fiber tracts

Pons and Medulla Oblongata

- Up and down pathways
- Reflex centers

Interbrain

- Hypothalamus – integration
- Thalamus – relay center
- Epithalamus – olfactory and pineal gland

Cerebellum

- Not concerned with consciousness or sensation
- Controls motor function
- Makes adjustments to prevent distortion of inertia and momentum

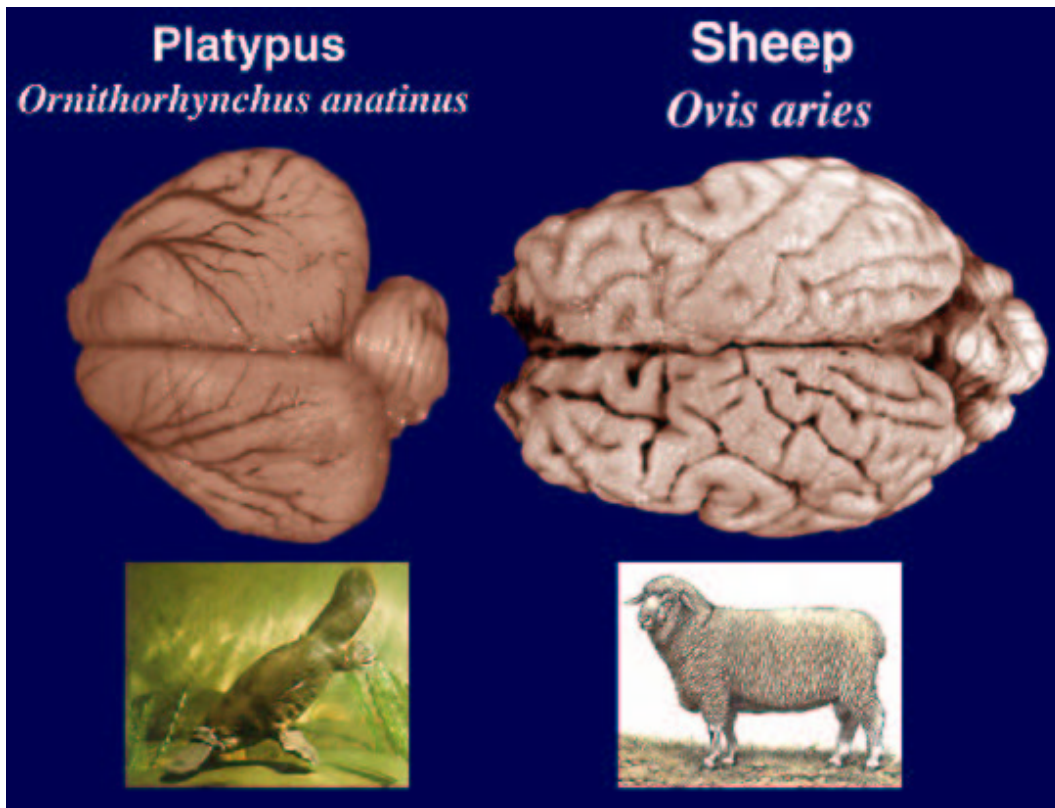
Basal Ganglia

- Control of complex semi-voluntary movements (walking, running)
- Lie deep within the cerebral hemispheres
- Composed of separate, large pools of neurons

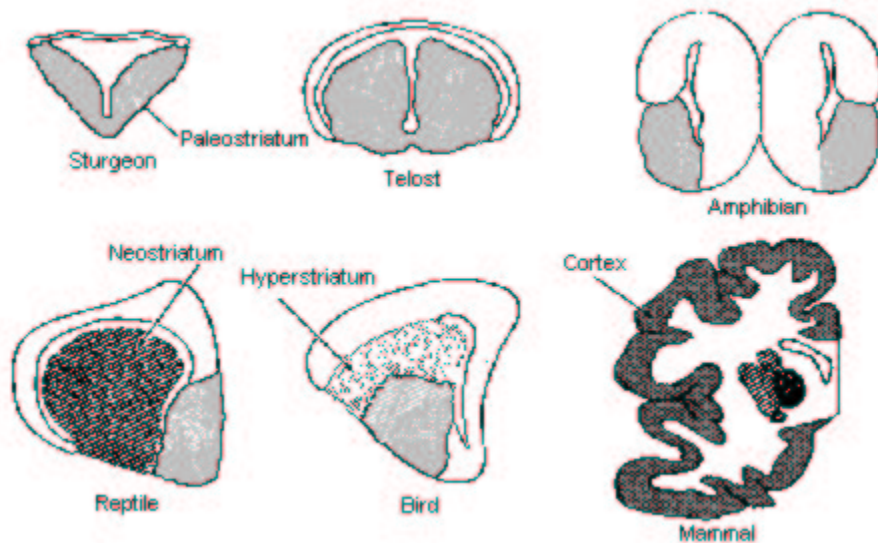
Cerebrum

- Cortex – covering of gray matter
- Medulla – white matter
 - Association fibers, commissural fibers (connect two hemispheres)
 - Projection fibers (connect cortex to other parts of brain and spinal cord)
- 2 hemispheres that contain:
 - Sensory areas
 - Reactions that result in consciousness
 - High degree of educability
 - Highest nervous correlation (association)
 - Decussation
 - Motor area size and number of complex skeletal muscles movements

Evolution and Growth of the Cerebrum

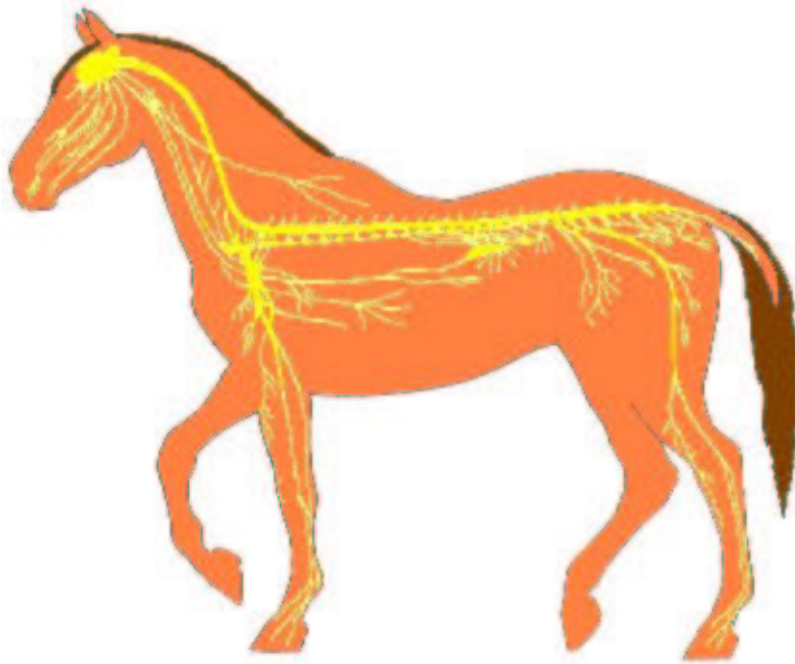


Evolution of Cerebral Hemispheres



Evolution of the cerebral hemispheres as seen in cross sections. Only the left hemisphere is shown in the lower figures. Light gray indicates the paleostriatum. Reptiles and birds have added new nuclear masses (neostriatum and hyperstriatum). Mammals have developed a cortex. Note the old striatal complex (now called basal ganglia) still present in the mammal.

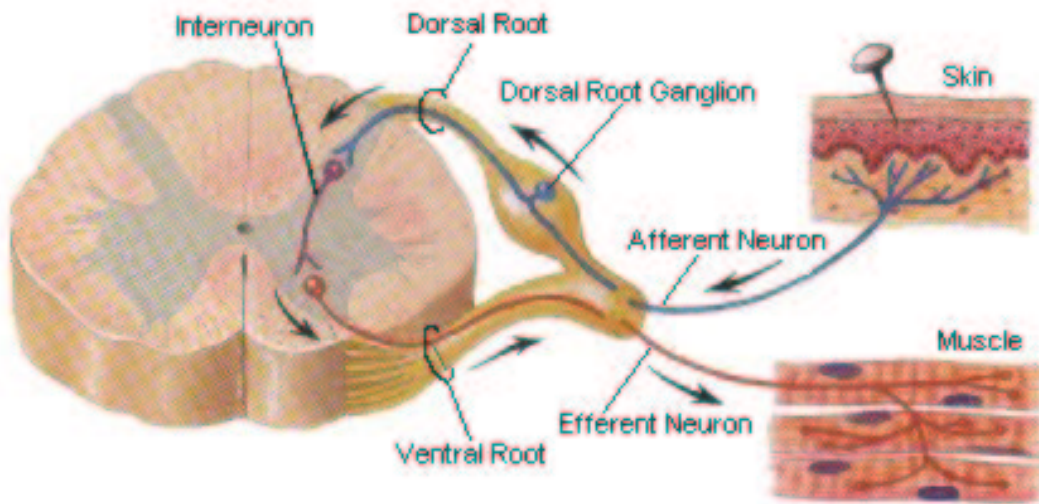
Brain and Spinal Nerves



Spinal Cord

- Most caudal portion of the Central Nervous System
- Continuation of medulla
- Segmented, 31 pairs of spinal nerves
- Sensory afferent fibers
- Motor efferent fibers
- Ascending pathways sensory information
- Descending pathways motor information

Spinal Nerve



Cranial Nerves

Number	Name	Type	Distribution
I	Olfactory	Sensory	Nasal mucous membrane (sense of smell)
II	Optic	Sensory	Retina of eye (sight)
III	Oculomotor	Motor	Most Muscles of eye Parasympathetic to ciliary muscle and circular muscle of iris
IV	Trochlear	Motor	Dorsal oblique muscle of eye
V	Trigeminal	Mixed	Sensory - to eye and face; motor - to muscles of mastication
VI	Abducens	Motor	Retractor and lateral muscles of eye
VII	Facial	Mixed	Sensory - region of ear and taste to cranial two-thirds of tongue; motor - to muscles of facial expression; parasympathetic - to mandibular and sublingual salivary glands
VIII	Vestibulocochlear	Sensory	Cochlea (hearing); semicircular canals (equilibrium)
IX	Glossopharyngeal	Mixed	Sensory - to pharynx and taste to caudal third of tongue; motor - muscle of pharynx; parasympathetic - to parotid salivary glands
X	Vagus	Mixed	Sensory - to pharynx and larynx; motor - to muscles of larynx; parasympathetic - to visceral structures in the thorax and abdomen
XI	Spinal accessory	Motor	Motor - to muscles of shoulders and neck
XII	Hypoglossal	Motor	Motor - to muscles of tongue