COMPOSITION AND CENTRAL CONNECTIONS OF THE CRANIAL NERVES.

The cranial nerves are more varied in their composition than the spinal nerves. Some, for example, contain somatic motor fibers only, others contain the various types of fibers found in the spinal nerves, namely, somatic motor, sympathetic efferent, somatic sensory and sympathetic sensory. In addition there are included the nerves of the special senses, namely, the nerves of smell, sight, hearing, equilibration and taste.

The **Hypoglossal Nerve** (*XII cranial*) consists of somatic motor fibers only and supplies the muscles of the tongue. Its axons arise from cells in the hypoglossal nucleus and pass forward between the white reticular formation and the gray reticular formation to emerge from the antero-lateral sulcus of the medulla. The hypoglossal nuclei of the two sides are connected by many commissural fibers and also by dendrites of motor cells which extend across the midline to the opposite nucleus. The hypoglossal nucleus receives either directly or indirectly numerous collaterals and terminals from the opposite pyramidal tract (cortico-bulbar or cerebro-bulbar fibers) which convey voluntary motor impulses from the cerebral cortex. Many reflex collaterals enter the nucleus from the secondary sensory paths of the trigeminal and vagus and probably also from the nervus intermedius and the glosso-pharyngeal. Collaterals from the posterior longitudinal bundle and the ventral longitudinal bundle are said to pass to the nucleus.

The **Accessory Nerve** (*XI cranial*) contains somatic motor fibers. The **spinal part** arises from lateral cell groups in the anterior column near its dorso-lateral margin in the upper five or six segments of the cord, its roots pass through the lateral funiculus to the lateral surface of the cord. It supplies the Trapezius and Sternocleido-mastoideus. The **cranial part** arises from the nucleus ambiguus, the continuation in the medulla oblongata of the lateral cell groups of the anterior column of the spinal cord from which the spinal part has origin. The upper part of the nucleus ambiguus gives motor fibers to the vagus and glossopharyngeal nerves. The cranial part sends it fibers through the vagus to the laryngeal nerves to supply the muscles of the larynx. The root fibers of the cranial part of the accessory nerve pass anterior to the spinal tract of the trigeminal while those of the vagus pass through or dorsal to the trigeminal root, and emerge in the line of the postero-lateral sulcus. The nucleus of origin of the spinal part undoubtedly receives either directly or indirectly terminals and collaterals controlling voluntary movements from the pyramidal tracts. It is probable that terminals and collaterals reach the nucleus either directly or indirectly from the rubrospinal and the vestibulospinal tracts. It is also connected indirectly with the spinal somatic sensory nerves by association fibers of the proper fasciculi. The cranial part receives indirectly or directly terminals and collaterals from the opposite pyramidal tract and form the terminal sensory nuclei of the cranial nerves. A few fibers of the cranial part are said to arise in the dorsal nucleus of the vagus and are thus sympathetic efferent. They are said to join the vagus nerve.

The **Vagus Nerve** (*X cranial*) contains somatic sensory, sympathetic afferent, somatic motor, sympathetic efferent and (taste fibers?). The afferent fibers (somatic sensory, sympathetic, and taste) have their cells of origin in the jugular ganglion and in the nodosal ganglion (ganglion of the trunk) and on entering the medulla divide into ascending and descending branches as do the sensory fibers of the posterior roots of the spinal nerves after they enter the spinal cord.

(1) The **somatic sensory fibers** are few in number, convey impulses from a limited area of the skin on the back of the ear and posterior part of the external auditory meatus, and probably join the spinal tract of the trigeminal nerve to terminate in its nucleus. Connections are probably established through the central path of the trigeminal with the thalamus and somatic sensory area of the cortex for the