cortex are conducted by the pyramidal tract fibers (**corticopontine fibers**). These fibers probably terminate in relation with association neurons which control the coördinated action of all the eye muscles. This association and coördination mechanism is interposed between the terminals and collaterals of the voluntary fibers and the neurons within the nuclei of origin of the motor fibers to the eye muscles. The fibers of the posterior longitudinal bundle are supposed to play an important role in the coördination of the movements of the eyeball. Whether it is concerned only with coördinations between the vestibular apparatus and the eye or with more extensive coördinations is unknown. Many fibers of the posterior longitudinal bundle have their origin in the terminal nuclei of the vestibular nerve and from the posterior longitudinal bundle many collaterals and terminals are given off to the abducent nucleus as well as to the trochlear and oculomotor nuclei. The abducens nucleus probably receives collaterals and terminals from the ventral longitudinal bundle (tectospinal fasciculus); fibers which have their origin in the superior colliculus, the primary visual center, and are concerned with visual reflexes. Others probably come from the reflex auditory center in the inferior colliculus and from other sensory nuclei of the brain-stem.

The **Trigeminal Nerve** (V *cranial*) contains somatic motor and somatic sensory fibers. The motor fibers arise in the motor nucleus of the trigeminal and pass ventro-laterally through the pons to supply the muscles of mastication. The sensory fibers arise from the unipolar cells of the semilunar ganglion; the peripheral branches of the T-shaped fibers are distributed to the face and anterior two-thirds of the head; the central fibers pass into the pons with the motor root and bifurcate into ascending and descending branches which terminate in the sensory nuclei of the trigeminal.

The **motor nucleus** of the trigeminal is situated in the upper part of the pons beneath the lateral angle of the fourth ventricle. It is serially homologous with the facial nucleus and the nucleus ambiguus (motor nucleus of the vagus and glossopharyngeal) which belong to the motor nuclei of the lateral somatic group. The axons arise from large pigmented multipolar cells. The motor nucleus receives reflex collaterals and terminals, (1) from the terminal nucleus of the trigeminal of the same and a few from the opposite side, via the central sensory tract (trigeminothalamic tract); (2) from the mesencephalic root of the trigeminal; (3) from the posterior longitudinal bundle; (4) and probably from fibers in the formatio reticularis. It also receives collaterals and terminals from the opposite pyramidal tract (corticopontine fibers) for voluntary movements. There is probably a connecting or association neuron interposed between these fibers and the motor neurons.

The **terminal sensory nucleus** consists of an enlarged upper end, the **main sensory nucleus**, and a long more slender descending portion which passes down through the pons and medulla to become continuous with the dorsal part of the posterior column of the gray matter especially the substantia gelatinosa of the spinal cord. This descending portion consists mainly of substantia gelatinosa and is called the **nucleus of the spinal tract of the trigeminal nerve.**

The **main sensory nucleus** lies lateral to the motor nucleus beneath the superior peduncle. It receives the short ascending branches of the sensory root. The descending branches which form the **tractus spinalis**, pass down through the pons and medulla on the lateral side of the **nucleus of the tractus spinalis**, in which they end by collaterals and terminals, into the spinal cord on the level of the second cervical segment. It decreases rapidly in size as it descends. At first it is located between the emergent part of the facial nerve and the vestibular nerve, then between the nucleus of the facial nerve and the inferior peduncle. Lower down in the upper part of the medulla it lies beneath the inferior peduncle and is broken up into bundles by the olivocerebellar fibers and the roots of the ninth and tenth cranial nerves. Finally it comes to the surface of the medulla under the tubercle of

Rolando and continues in this position lateral to the fasciculus cuneatus as far as the upper part of the cervical region where it disappears.

The cells of the sensory nucleus are of large and medium size and send their axons into the formatio reticularis where they form a distinct bundle, the **central path of the trigeminal** (*trigeminothalamic tract*), which passes upward through the formatio reticularis and tegmentum to the ventro-lateral part of the thalamus. Most of the fibers cross to the trigeminothalamic tract of the opposite side. This tract lies dorsal to the medial fillet; approaches close to it in the tegmentum and terminates in a distinct part of the thalamus. From the thalamus impulses are conveyed to the somatic sensory area of the cortex by axons of cells in the thalamus through the internal capsule and corona radiata. Many collaterals are given off in the medulla and pass from the trigeminothalamic tract to the motor nuclei, especially to the nucleus ambiguus, the facial nucleus and the motor nucleus of the trigeminal.

The somatic sensory fibers of the vagus, the glossopharyngeal and the facial nerves probably end in the nucleus of the descending tract of the trigeminal and their cortical impulses are probably carried up in the central sensory path of the trigeminal.

The **mesencephalic root** (*descending root of the trigeminal*) arises from unipolar cells arranged in scattered groups in a column at the lateral edge of the central gray matter surrounding the upper end of the fourth ventricle and the cerebral aqueduct. They have usually been considered as motor fibers that join the motor root, but Johnston claims that they join the sensory root of the trigeminal, that they develop in the alar, not in the basal lamina, and that the pear-shaped unipolar cells are sensory in type.

The **Trochlear Nerve** (*IV cranial*) contains somatic motor fibers only. It supplies the superior oblique muscle of the eye. Its nucleus of origin, **trochlear nucleus**, is a small, oval mass situated in the ventral part of the central gray matter of the cerebral aqueduct at the level of the upper part of the inferior colliculus. The axons from the nucleus pass downward in the tegmentum toward the pons, but turn abruptly dorsalward before reaching it, and pass into the superior medullary velum, in which they cross horizontally, to decussate with the nerve of the opposite side, and emerges from the surface of the velum, immediately behind the inferior colliculus. The cells of the trochlear nucleus are large, irregular and yellowish in color. The nuclei of the two sides are separated by the raphé through which dendrites extend from one nucleus to the other. They receive many collaterals and terminals from the posterior longitudinal bundle which lies on the ventral side of the nucleus.

There are no branches from the fibers of the pyramidal tracts to these nuclei; the volitional pathway must be an indirect one, as is the case with other motor nuclei.

The **Oculomotor Nerve** (*III cranial*) contains somatic motor fibers to the Obliquus inferior, Rectus inferior, Rectus superior, Levator palpebræ superioris and Rectus medialis muscles and sympathetic efferent fibers (preganglionic fibers) to the ciliary ganglion. The postganglionic fibers connected with these supply the ciliary muscle and the sphincter of the iris. The axons arise from the nucleus of the oculomotor nerve and pass in bundles through the posterior longitudinal bundle, the tegmentum, the red nucleus and the medial margin of the substantia nigra in a series of curves and finally emerge from the oculomotor sulcus on the medial side of the cerebral peduncle.

The **oculomotor nucleus** lies in the gray substance of the floor of the cerebral aqueduct subjacent to the superior colliculus and extends in front of the aqueduct a short distance into the floor of the third ventricle. The inferior end is continuous with the trochlear nucleus. It is from 6 to 10 mm. in length. It is intimately