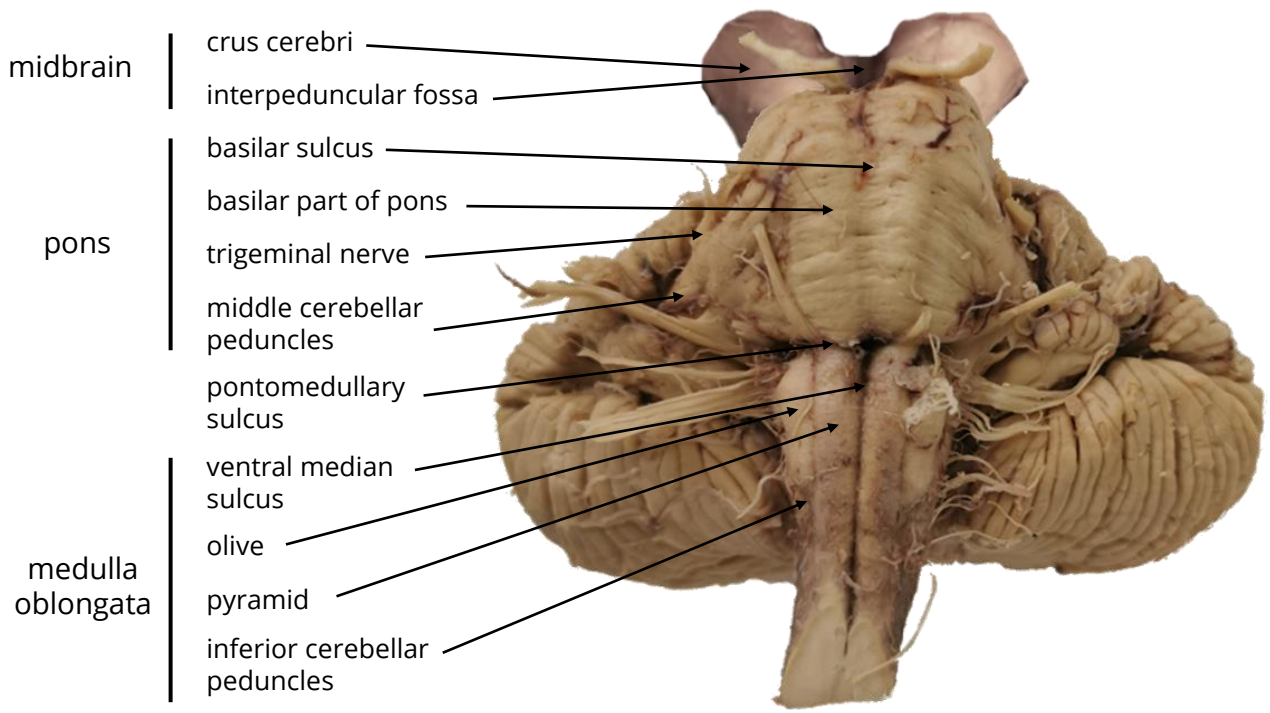
Brainstem

The brainstem is located inferior to the cerebrum and ventral to the cerebellum. It contains nuclei and white matter. The three main parts of the brainstem are the midbrain, pons and medulla oblongata. Surfaces of the brainstem

Ventral surface of the brainstem

In the ventral surface of the midbrain, notice two broad columns of white matter, crus cerebri (legs of the brain). They are composed of ascending and descending fibers that connect the spinal cord and the brainstem with the cerebrum. The deep depression between them is the interpeduncular fossa. The ventral surface of the pons is divided by the trigeminal nerve (CN V) into two parts. The medial part is the basilar part of pons, along its midline find the basilar sulcus where the basilar artery sits. The lateral parts are the middle cerebellar peduncles. The pontomedullary sulcus separates between the pons and the medulla oblongata. Along the midline of the ventral surface of the medulla oblongata, find the ventral median sulcus. On either side of it there is an elongated bulge that contains motor fibers from the cortex to the spinal cord, the pyramid. These fibers cross sides at the border between the medulla oblongata and the spinal cord in the pyramidal decussation. Lateral to each pyramid, find an oval bulge, the olive, that contains nuclei involved in the processing of auditory and motor information. At the lateral aspect of the medulla oblongata, find the inferior cerebellar peduncles.



Dorsal surface of the midbrain

Remove the cerebellum to expose the dorsal surface of the brainstem. In the midbrain, notice four round bulges, the corpora quadrigemina. The two superior bulges, superior colliculi, are each connected by the superior brachium to the lateral geniculate nucleus (LGN) of the thalamus and are part of the visual system. The two inferior bulges, inferior colliculi, are each connected by the inferior brachium to the medial geniculate nucleus (MGN) of the thalamus and are part of the auditory system. Inferior to the corpora quadrigemina, find the superior cerebellar peduncles that connect the midbrain and the cerebellum.

Dorsal surface of the pons and medulla oblongata: floor of the fourth ventricle

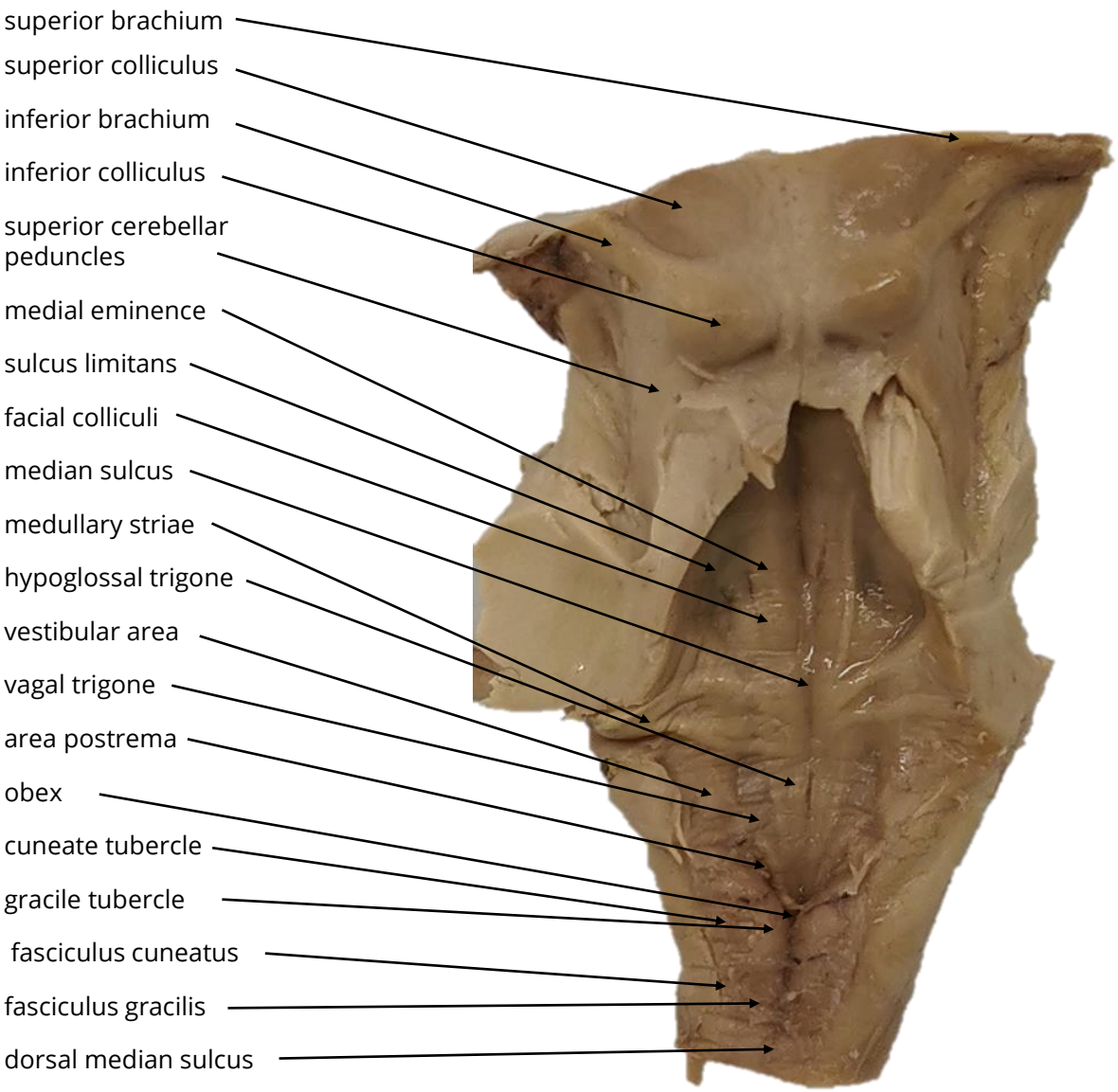
The dorsal surface of the pons and the open superior part of the medulla oblongata form the floor of the fourth ventricle, the rhomboid fossa. Along its midline, find the median sulcus. Across it, the bundles of white matter of the medullary striae divide the rhomboid fossa to a superior triangle that belongs to the pons and an inferior triangle that belongs to the medulla oblongata. In the superior triangle, on each side of the median sulcus notice an elongated bulge, the medial eminence. It is defined laterally by the sulcus limitans. In the lower part of the medial eminence find the facial colliculi. They each contain the nucleus of the abducens nerve that is surrounded by the fibers of the facial nerve.The inferior triangle is divided into three sub-triangles that contain the nuclei of cranial nerves. The most medial is the hypoglossal trigone. Next to it is the vagal trigone and the most lateral is the vestibular area. In its inferior part, the fourth ventricle becomes narrower until it ends at the obex (barrier). Its small opening is continuous with the central canal of the spinal cord. The margins of the obex are the location of the area postrema that is involved in the vomiting reflex.

Dorsal surface of the inferior medulla oblongata

The inferior part of the medulla oblongata is closed.

The dorsal median sulcus runs along its midline. On each of its sides, find two round bulges, the gracile tubercle and cuneate tubercle. They contain the gracile nucleus and cuneate nucleus. Inferior to them, find their white matter, the fasciculus gracilis and fasciculus cuneatus. They all belong to the sensory system.

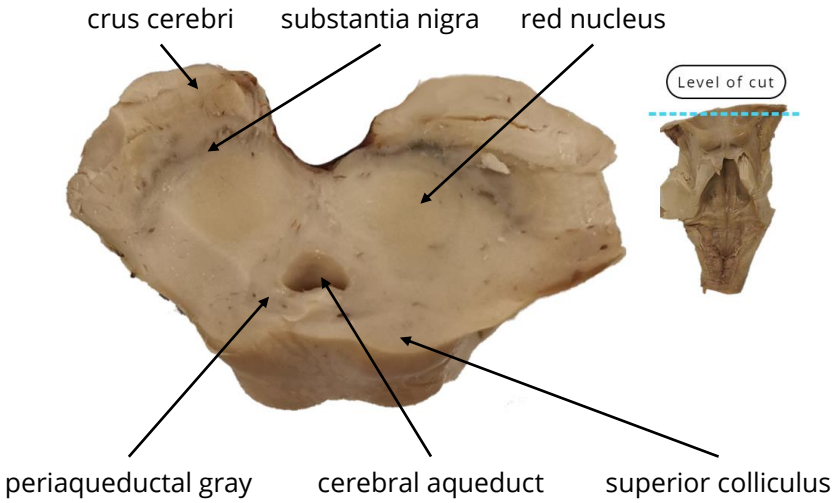
Dorsal surface of the brainstem



Horizontal sections of the brainstem

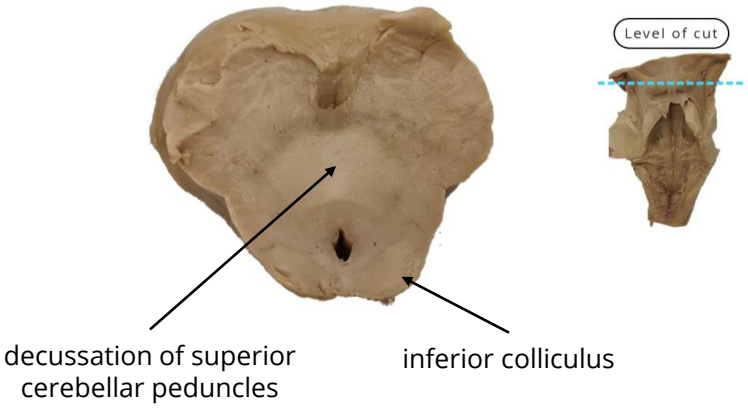
Midbrain: section through the superior colliculi

In order to separate the brain stem from the rest of the brain we made a cut in the midbrain at the level of the superior colliculi. Notice the hole of the cerebral aqueduct at the center and the periaqueductal gray that surrounds it. It divides the midbrain into the dorsal tectum and the ventral tegmentum. The tectum contains the superior colliculi and the tegmentum contains the red nucleus and substantia nigra. Anterior to the substantia nigra find the crus cerebri. Together, the crus cerebri and the tegmentum make up the cerebral peduncle.



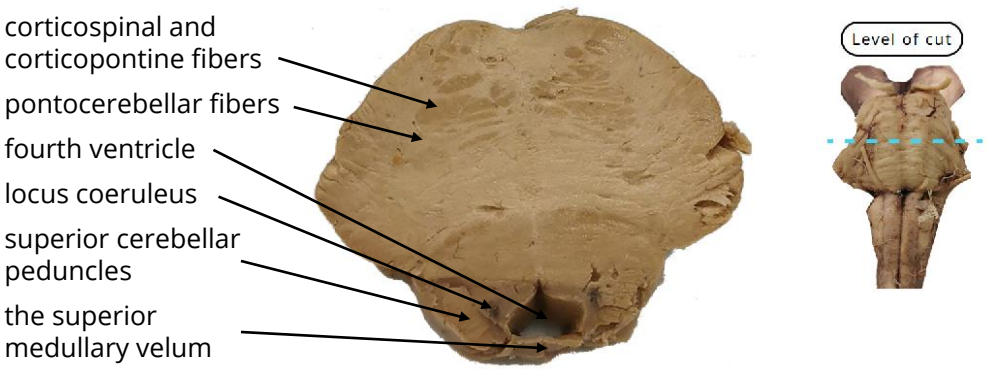
Midbrain: section through the inferior colliculi

Make cut in the midbrain at the level of the inferior colliculi. In the center, find the decussation of superior cerebellar peduncles.



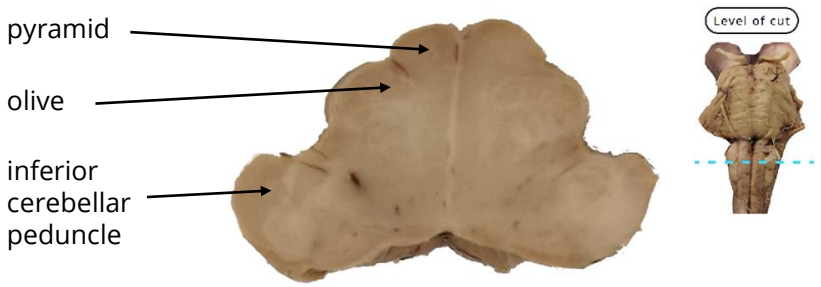
Pons: section through the trigeminal nerve

Make a cut in the pons at the level of the trigeminal nerve. In the basilar part, the light colored lateral fibers of the pontocerebellar fibers can be seen. Their cell bodies are located in the nuclei of the pons and they pass through the middle cerebellar peduncle to the cerebellum. The vertical corticospinal and corticopontine fibers that are continuous with fibers of the midbrain and medulla are cut perpendicularly to their orientation and therefore appear darker. Posterior to the pons, find the superior cerebellar peduncles and the superior medullary velum between them. Near the wall of the fourth ventricle locate a bluish spot, the locus coeruleus.



Medulla oblongata: section through the olive nucleus

Make a cut in the medulla oblongata at the level of the olive nucleus. In the ventral part, find the pyramid. Dorsal to it, identify the convoluted shape of the olive nucleus. Most lateral, find the inferior cerebellar peduncles.



Cross section of the medulla oblongata - pyramidal decussation

Make a cut in the medulla oblongata below the olive. Notice the crossing of the pyramid fibers, the pyramidal decussation.