

Chapter Opener



Figure 17.1 Embryonic Development of The Human Brain

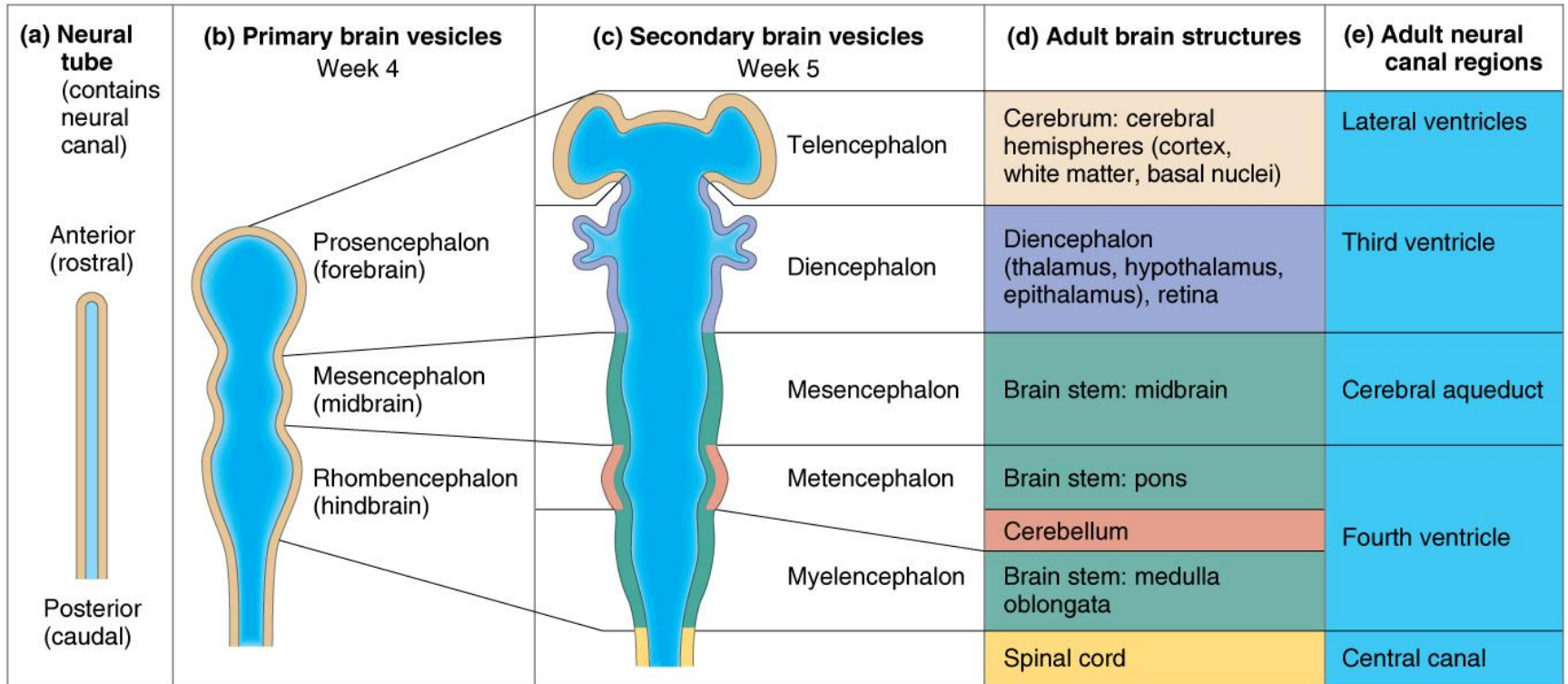


Figure 17.2a External Features of The Cerebral Hemispheres

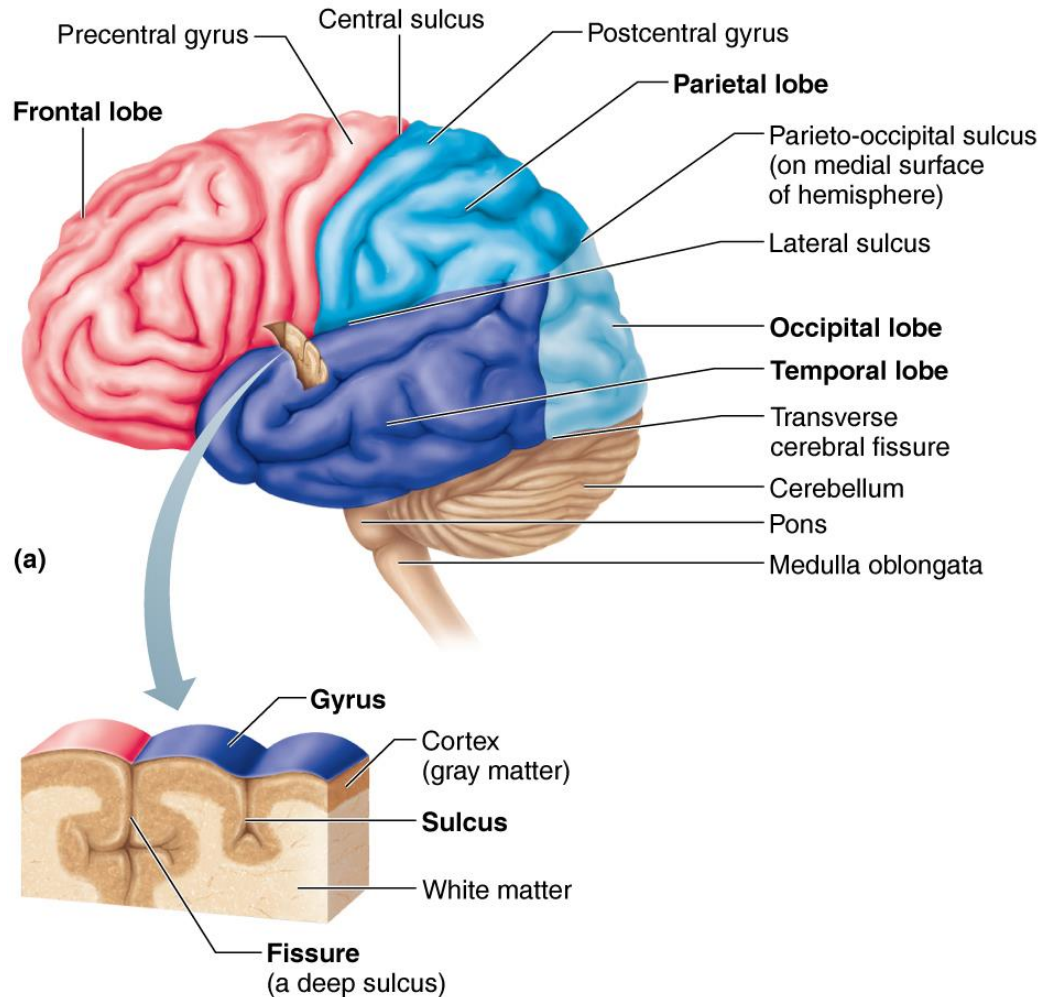
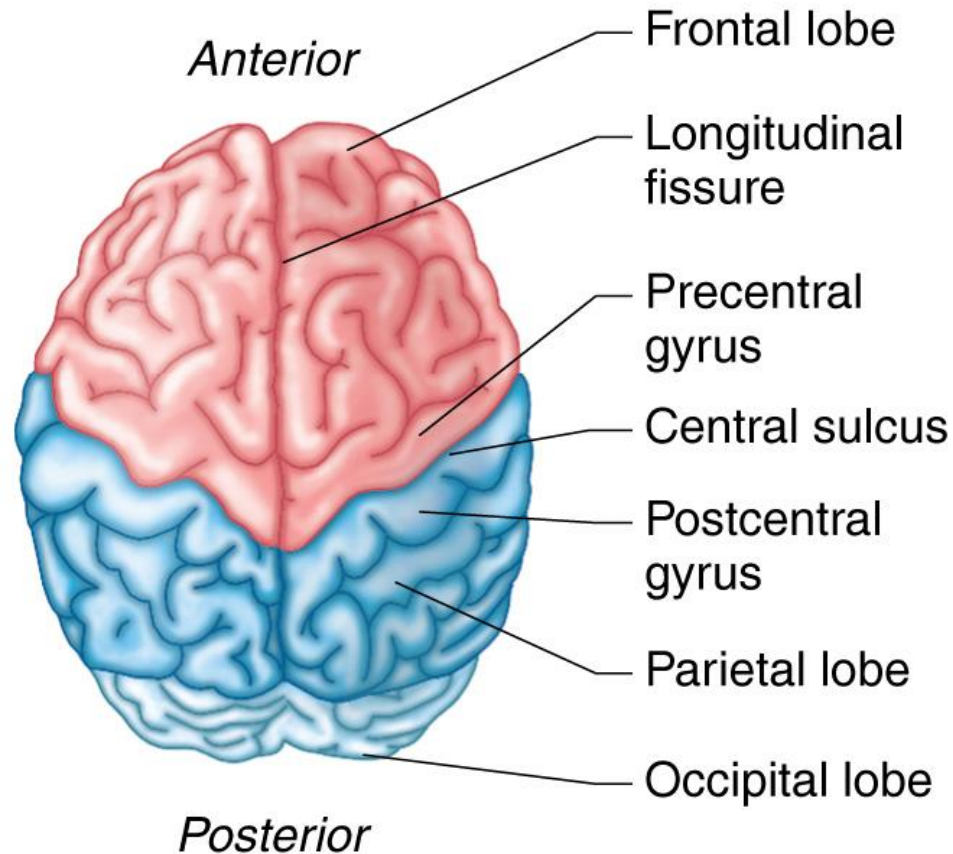
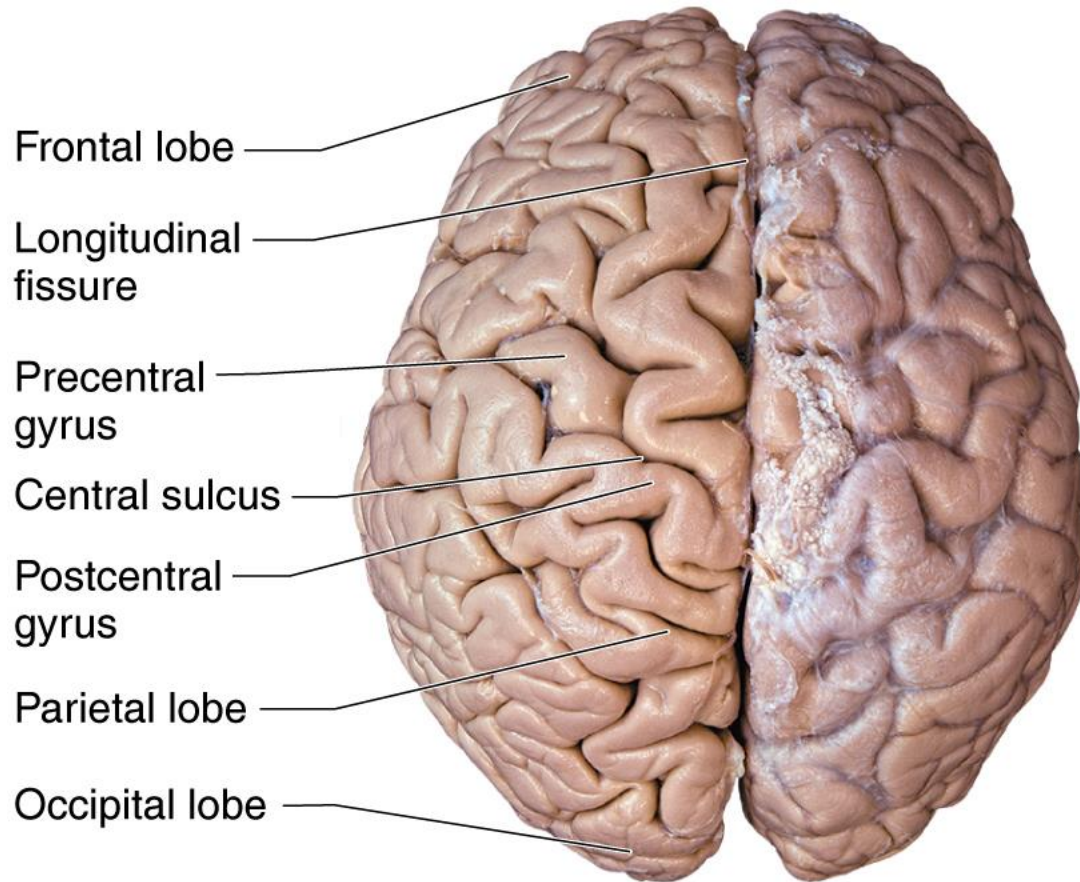


Figure 17.2b External Features of The Cerebral Hemispheres



(b)

Figure 17.2c External Features of The Cerebral Hemispheres



(c)

Figure 17.3 Ventral (Inferior) Aspect of the Human Brain, Showing The Three Regions of The Brain Stem

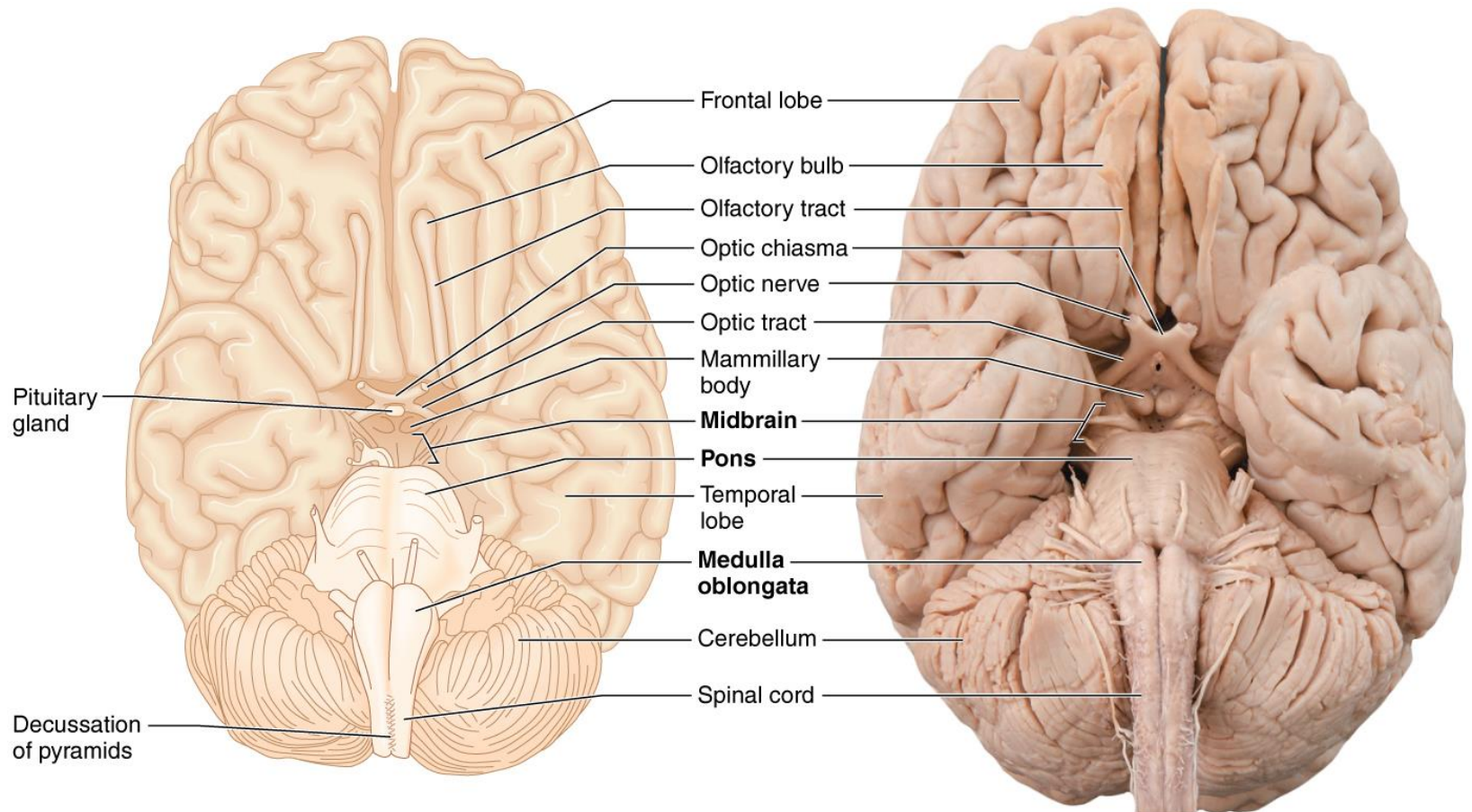


Figure 17.3-1 Ventral (inferior) Aspect of the Human Brain, Showing The Three Regions of The Brain Stem

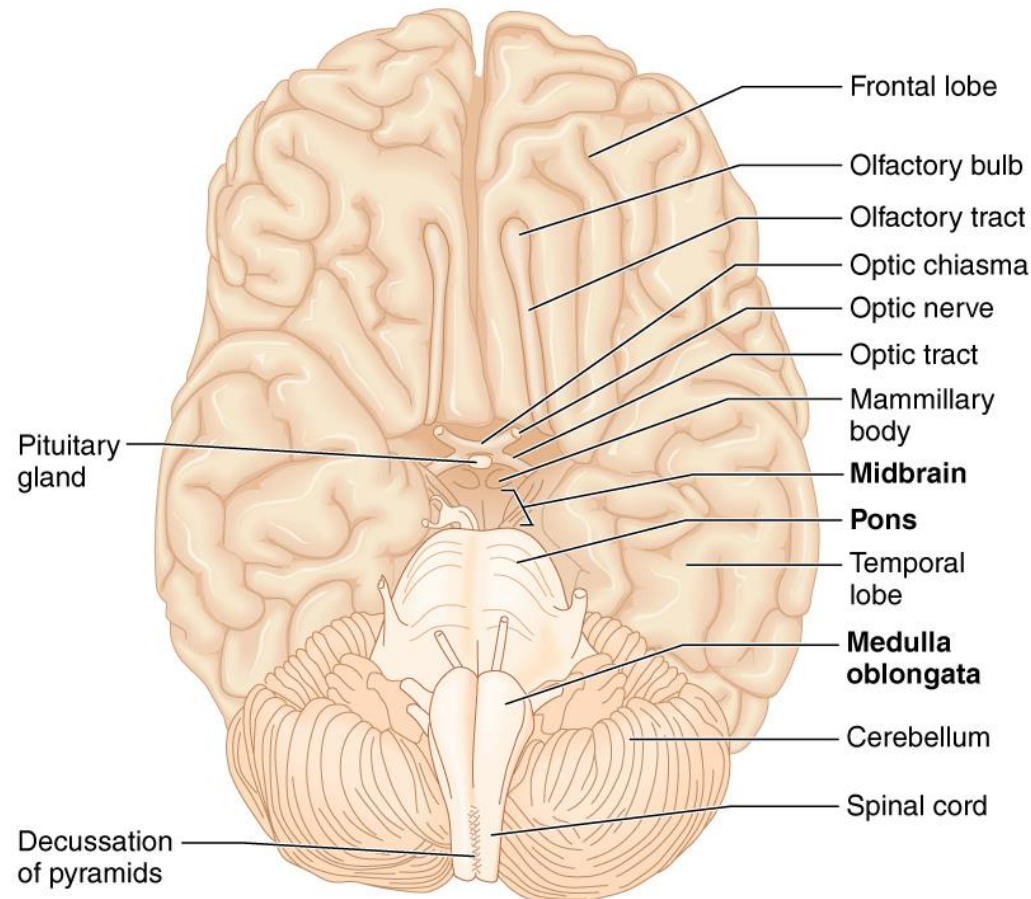
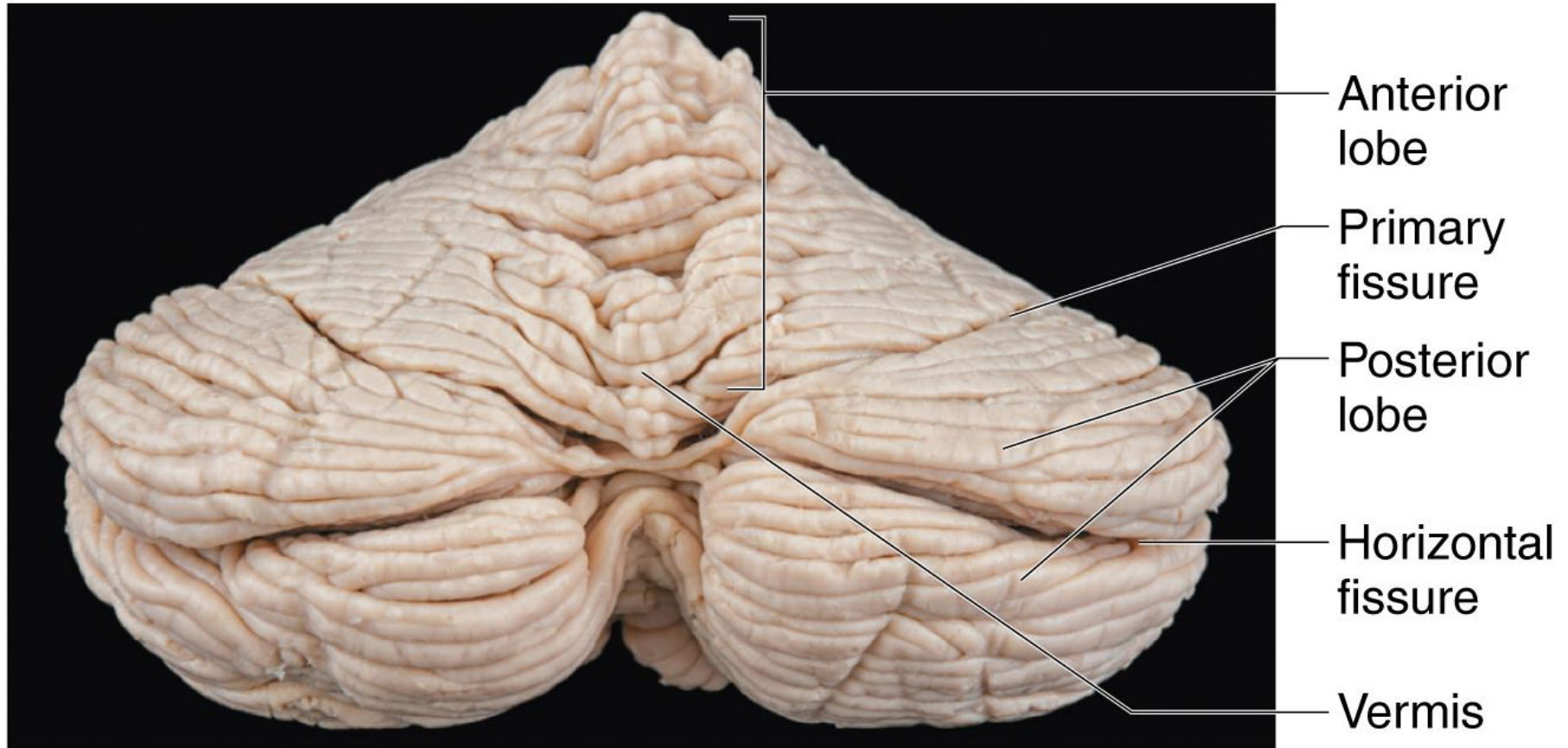
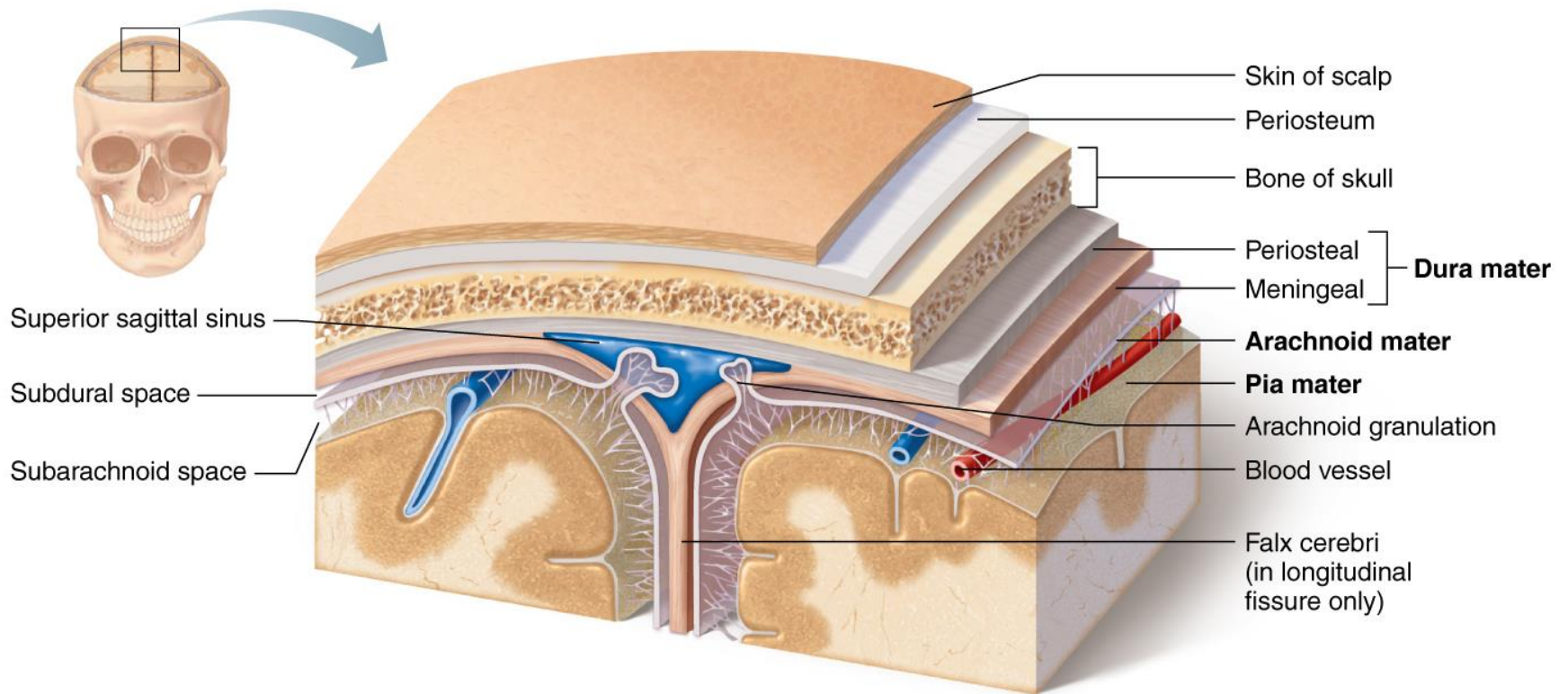


Figure 17.6a Cerebellum



(a)

Figure 17.7a Meninges of The Brain



(a)

Figure 17.9 Ventral Aspect of The Human Brain, Showing The Cranial Nerves

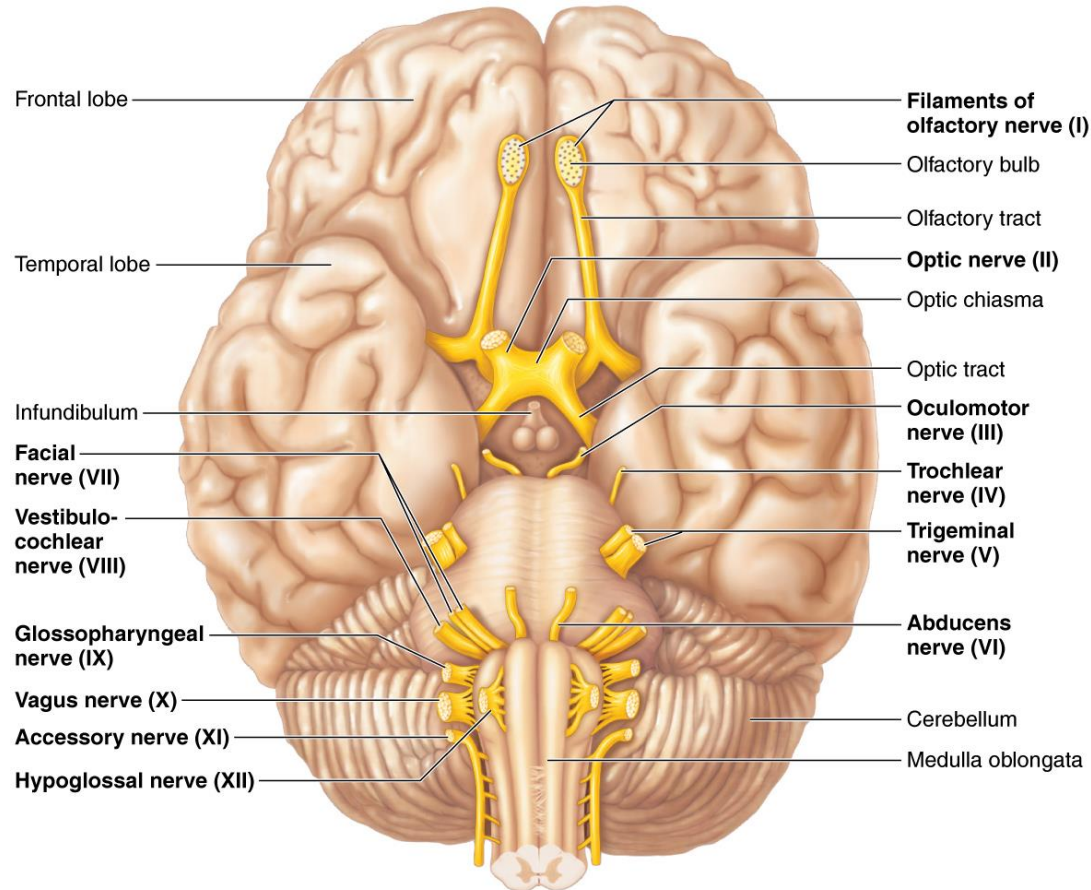


Table 17.2 The Cranial Nerves (Figure 17.9)

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Number and name	Origin and course	Function*	Testing
I. Olfactory	Fibers arise from olfactory epithelium and run through cribriform foramina of ethmoid bone to synapse in olfactory bulb.	Purely sensory—carries afferent impulses for sense of smell.	Person is asked to sniff aromatic substances, such as oil of cloves and vanilla, and to identify each.
II. Optic	Fibers arise from retina of eye and pass through optic canal of sphenoid bone. Fibers partially cross over at the optic chiasma and continue on to the thalamus as the optic tracts. Final fibers of this pathway travel from the thalamus to the primary visual cortex as the optic radiation.	Purely sensory—carries afferent impulses associated with vision.	Vision and visual field are determined with eye chart and by testing the point at which the person first sees an object (finger) moving into the visual field. Fundus of eye viewed with ophthalmoscope to detect papilledema (swelling of optic disc, or point at which optic nerve leaves the eye) and to observe blood vessels.
III. Oculomotor	Fibers emerge from ventral midbrain and course ventrally to enter the orbit. They exit from skull via superior orbital fissure.	Primarily motor—somatic motor fibers to inferior oblique and superior, inferior, and medial rectus muscles, which direct eyeball, and to levator palpebrae muscles of the superior eyelid; parasympathetic fibers to smooth muscle controlling lens shape and pupil size.	Pupils are examined for size, shape, and equality. Pupillary reflex is tested with penlight (pupils should constrict when illuminated). Convergence for near vision is tested, as is subject's ability to follow objects with the eyes.

Table 17.2-1 The Cranial Nerves (Figure 17.9)

Table 17.2 The Cranial Nerves (Figure 17.9) (continued)

Number and name	Origin and course	Function*	Testing
I. Olfactory	Fibers arise from olfactory epithelium and run through cribriform foramina of ethmoid bone to synapse in olfactory bulb.	Purely sensory—carries afferent impulses for sense of smell.	Person is asked to sniff aromatic substances, such as oil of cloves and vanilla, and to identify each.
IV. Trochlear	Fibers emerge from midbrain and exit from skull via superior orbital fissure.	Primarily motor—provides somatic motor fibers to superior oblique muscle that moves the eyeball.	Tested with cranial nerve III.
V. Trigeminal	Fibers run from face to pons and form three divisions: mandibular division fibers pass through foramen ovale in sphenoid bone, maxillary division fibers pass via foramen rotundum in sphenoid bone, and ophthalmic division fibers pass through superior orbital fissure of sphenoid bone.	Mixed—major sensory nerve of face; conducts sensory impulses from skin of face and anterior scalp, from mucosae of mouth and nose, and from surface of eyes; mandibular division also contains motor fibers that innervate muscles of mastication and muscles of floor of mouth.	Sensations of pain, touch, and temperature are tested with safety pin and hot and cold probes. Corneal reflex tested with wisp of cotton. Motor branch assessed by asking person to clench the teeth, open mouth against resistance, and move jaw side to side.
VI. Abducens	Fibers leave inferior pons and exit from skull via superior orbital fissure.	Primarily motor—carries somatic motor fibers to lateral rectus muscle that abducts the eyeball.	Tested with cranial nerve III.
VII. Facial	Fibers leave pons and travel through temporal bone via internal acoustic meatus, exiting via stylomastoid foramen to reach the face.	Mixed—supplies somatic motor fibers to muscles of facial expression and the posterior belly of the digastric muscle; parasympathetic motor fibers to lacrimal and salivary glands; carries sensory fibers from taste receptors of anterior tongue.	Anterior two-thirds of tongue is tested for ability to taste sweet (sugar), salty, sour (vinegar), and bitter (quinine) substances. Symmetry of face is checked. Subject is asked to close eyes, smile, whistle, and so on. Tearing is assessed with ammonia fumes.

Table 17.2-2 The Cranial Nerves (Figure 17.9)

Table 17.2 The Cranial Nerves (Figure 17.9) (continued)

Number and name	Origin and course	Function*	Testing
I. Olfactory	Fibers arise from olfactory epithelium and run through cribriform foramina of ethmoid bone to synapse in olfactory bulb.	Purely sensory—carries afferent impulses for sense of smell.	Person is asked to sniff aromatic substances, such as oil of cloves and vanilla, and to identify each.
VIII. Vestibulocochlear	Fibers run from inner ear equilibrium and hearing apparatus, housed in temporal bone, through internal acoustic meatus to enter pons.	Mostly sensory—vestibular branch transmits impulses associated with sense of equilibrium from vestibular apparatus and semicircular canals; cochlear branch transmits impulses associated with hearing from cochlea. Small motor component adjusts the sensitivity of the sensory receptors.	Hearing is checked by air and bone conduction using tuning fork.
IX. Glossopharyngeal	Fibers emerge from medulla oblongata and leave skull via jugular foramen to run to throat.	Mixed—somatic motor fibers serve pharyngeal muscles, and parasympathetic motor fibers serve salivary glands; sensory fibers carry impulses from pharynx, tonsils, posterior tongue (taste buds), and from chemoreceptors and pressure receptors of carotid artery.	A tongue depressor is used to check the position of the uvula. Gag and swallowing reflexes are checked. Subject is asked to speak and cough. Posterior third of tongue may be tested for taste.
X. Vagus	Fibers emerge from medulla oblongata and pass through jugular foramen and descend through neck region into thorax and abdomen.	Mixed—fibers carry somatic motor impulses to pharynx and larynx and sensory fibers from same structures; very large portion is composed of parasympathetic motor fibers, which supply heart and smooth muscles of abdominal visceral organs; transmits sensory impulses from viscera.	As for cranial nerve IX (IX and X are tested together, since they both innervate muscles of throat and mouth).

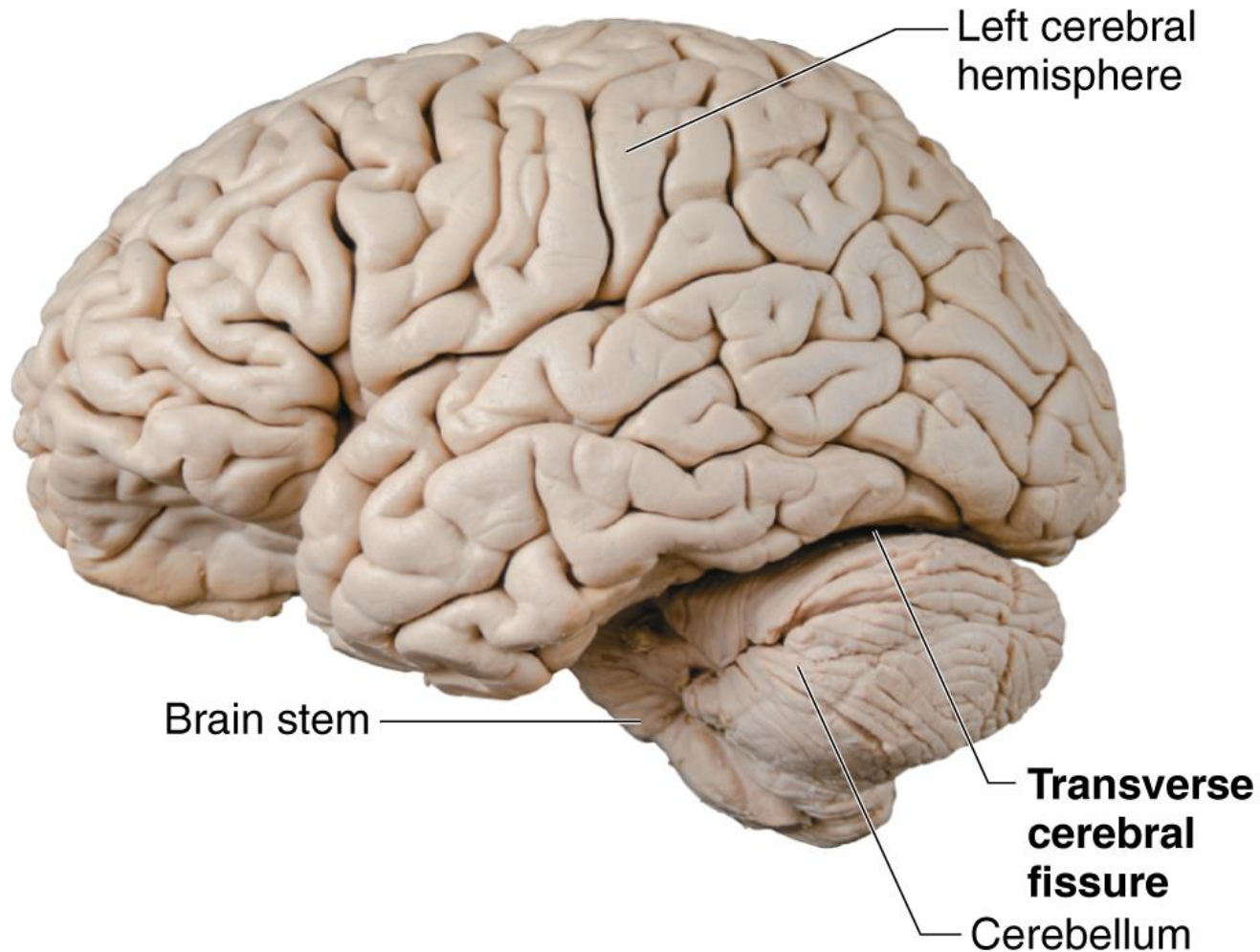
Table 17.2-3 The Cranial Nerves (Figure 17.9)

Table 17.2 The Cranial Nerves (Figure 17.9) (continued)

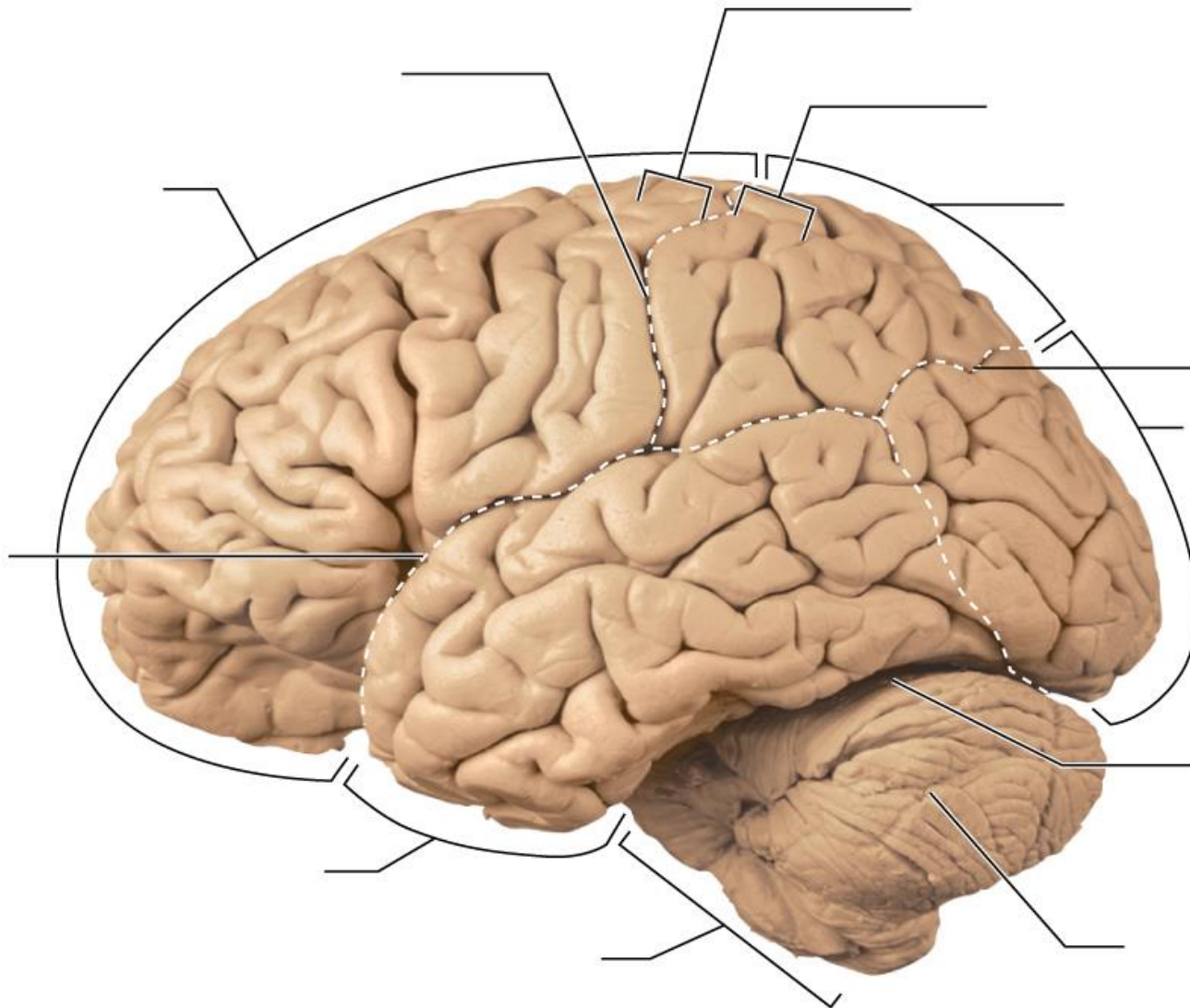
Number and name	Origin and course	Function*	Testing
XI. Accessory	Fibers arise from the superior aspect of spinal cord, enter the skull, and then travel through jugular foramen to reach muscles of neck and back.	Mixed (but primarily motor in function)—provides somatic motor fibers to sternocleidomastoid and trapezius muscles.	Sternocleidomastoid and trapezius muscles are checked for strength by asking person to rotate head and shrug shoulders against resistance.
XII. Hypoglossal	Fibers arise from medulla oblongata and exit from skull via hypoglossal canal to travel to tongue.	Mixed (but primarily motor in function)—carries somatic motor fibers to muscles of tongue.	Person is asked to protrude and retract tongue. Any deviations in position are noted.

*Does not include sensory impulses from proprioceptors.

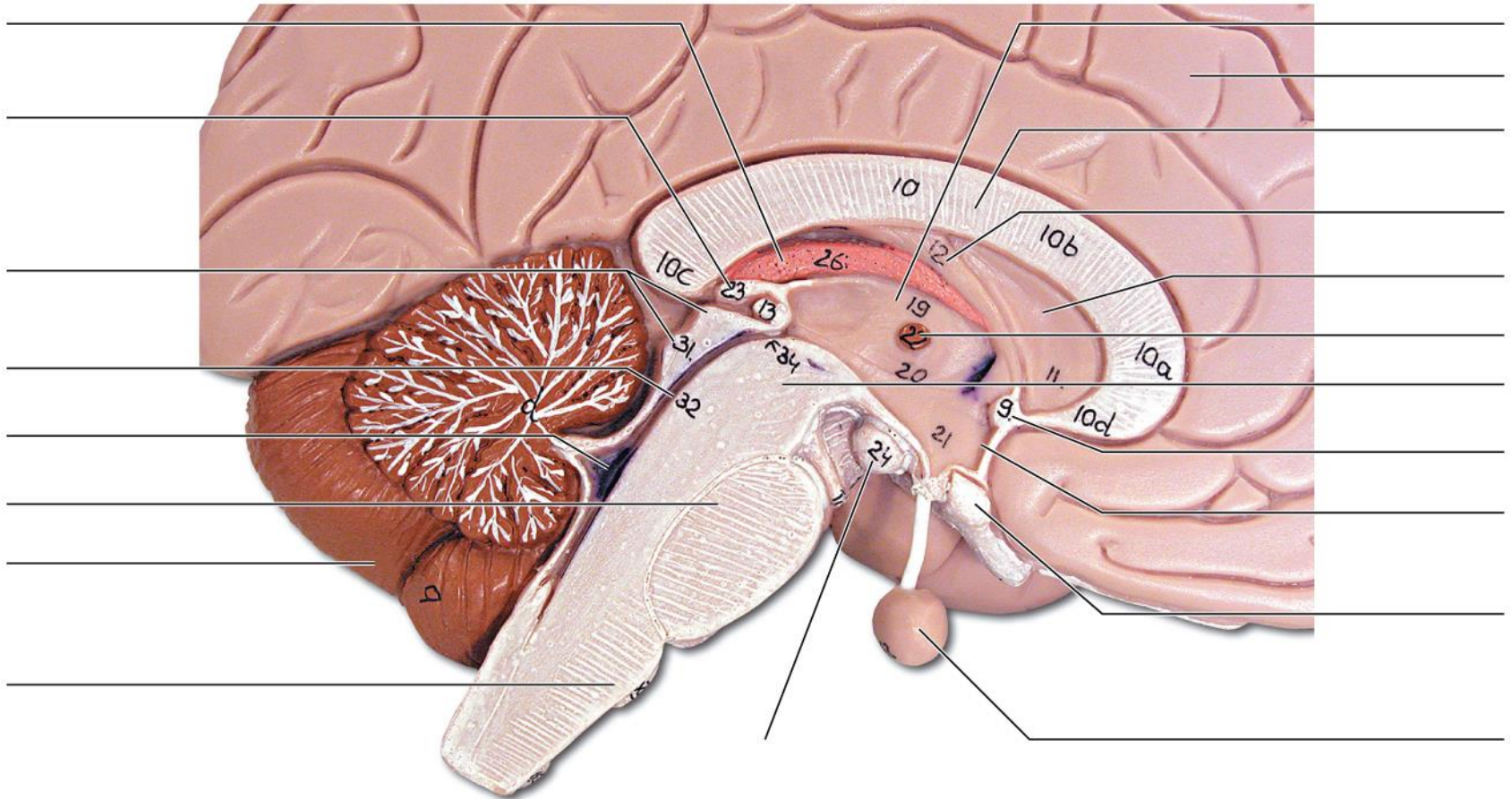
Figure 17.10 Photograph of Lateral Aspect of The Human Brain



Review Figure 17.01



Review Figure 17.02



Review Figure 17.04

