CHAPTER FIFTEEN

Answers to WHAT DID YOU LEARN?

1. *Rostral* means "toward the nose," and *caudal* means "toward the tail." In human brain anatomy, one structure is rostral to another if it is closer to the forehead and caudal to another if it is closer to the spinal cord.
2. The three primary vesicles are the prosencephalon, mesencephalon, and rhombencephalon.
3. A single depression is a sulcus; multiple depressions are called sulci.
4. The gray matter layer in the superficial region of the cerebral hemispheres is called the cortex; deep within the cerebral hemispheres, the gray matter forms oval to spherical bodies called nuclei. The white matter lies deep to the gray matter of the cortex and surrounds the nuclei.
5. The four cranial dural septa are the falx cerebri, tentorium cerebelli, falx cerebelli, and diaphragma sellae. The falx cerebri projects into the longitudinal fissure between the left and right cerebral hemispheres. Anteriorly, its inferior portion attaches to the crista galli of the ethmoid bone; posteriorly, its inferior portion attaches to the internal occipital crest and the tentorium cerebelli. The tentorium cerebelli separates the occipital and temporal lobes of the cerebrum from the cerebellum. It lies over the posterior cranial fossa and is shaped like a crescent. The falx cerebelli extends into the midsagittal line inferior to the tentorium cerebelli and divides the left and right cerebellar hemispheres. It is located in the posterior cranial fossa. The diaphragma sellae is a continuation of the dural sheet that forms a "roof" over the sella turcica of the sphenoid bone.
6. A choroid plexus is found in each ventricle, and is composed of a layer of specialized ependymal cells covered by a capillary-rich layer of pia mater. The choroid plexus produces CSF (cerebrospinal fluid).
7. The third ventricle is located in the midline of the diencephalon.
8. The blood-brain barrier almost completely isolates neural tissue from the general circulation by strictly regulating what substances can exit the vascular system and enter the interstitial fluid of the brain. Without the blood-brain barrier, the brain would be exposed to many more substances (e.g., drugs, waste products being transported in the blood) or to variations in the levels of normal substances (such as hormones, ions, etc.), and these substances could adversely affect brain function.
9. The corpus callosum provides the main means by which communication occurs between the cerebral hemispheres. Commissural fiber tracts extend between the hemispheres through the corpus callosum.
10. The five lobes are the frontal lobe, parietal lobe, temporal lobe, occipital lobe, and insula. The frontal lobe is primarily concerned with voluntary motor functions, concentration, verbal communication, decision making, planning, and personality. The parietal lobe is concerned with sensory reception as well as understanding speech and formulating words. The temporal lobe is involved with hearing, interpreting speech and language, and smell. The occipital lobe receives and processes incoming visual information and compares it to past visual experiences. The insula is involved in memory and the interpretation of taste.

11. The athlete damaged an area of his right frontal lobe—specifically, the right primary motor cortex on the medial side adjacent to the longitudinal fissure.
12. Association areas integrate new sensory inputs with memories of past experiences. The motor and sensory regions of the cortex are connected to adjacent association areas that process and interpret incoming data or coordinate a motor response.
13. The epithalamus forms the posterior roof of the diencephalon and covers the third ventricle. The posterior region of the epithalamus houses the pineal gland. It secretes melatonin, a hormone that helps regulate circadian rhythms.
14. The thalamus refers to paired oval masses of gray matter on either side of the third ventricle. Sensory information for all conscious senses except olfaction are processed there and projected to the sensory cortex.
15. The infundibulum connects the pituitary gland to the hypothalamus.
16. The tectum in the midbrain contains the superior colliculi (visual reflex center) and the inferior colliculi (auditory reflex center).
17. The autonomic respiratory centers in the pons are the pneumotaxic and apneustic centers.
18. The cerebellum contains the flocculonodular lobes, folia, and a vermis.
19. The vasomotor center is in the medulla oblongata. It controls blood pressure by regulating the contraction and relaxation of smooth muscle in the walls of the smallest blood vessels and thereby altering vessel diameter.
20. The cingulate gyrus is an internal mass of cerebral cortex internal to the longitudinal fissures and superior to the corpus callosum surrounding the diencephalon. The hippocampus is a nucleus located superior to the parahippocampal gyrus that connects to the diencephalon by the fornix.
21. CN 7 innervates the lacrimal glands and most of the salivary glands.
22. CN 6 innervates the lateral rectus eye muscles.
23. The trochlear nerve supplies the superior oblique muscles, which move the eyeball inferiorly and laterally.