1–3
INTRODUCTION TO BRAIN STRUCTURE II

The introduction to the brain continues with this "exploded" view of the brain and upper spinal cord. You have become acquainted with the cerebral hemispheres on the two previous plates, and here you can visualize them in relation to the rest of the brain. Again, structures in this illustration that were shown earlier have been given the same subscripts and should be colored as before.

Reserve the colors used for B, C, D, E, H, I, and J in the previous plate and use them here for the same structures. Color the heading Cerebral Hemisphere, titles B through F, and related structures in the two upper illustrations.

The cerebral hemispheres consist of five lobes, four of which you have colored in a side view of the brain. Here you see those lobes as you look into the inside (medial) surface of the right hemisphere. In this case, the left hemisphere has been completely removed to permit such a view. Moving backward from the front one can see the medial surfaces of the *frontal* (B), *parietal* (E), and *occipital* (D) lobes, overlapping from the outer or lateral surface. The view also shows the underside of the *temporal lobe* (C) and the collarlike *limbic lobe* (A; *limbic,* "of a margin or border") arranged around the junction of the cerebral hemisphere with the brain stem. Some functions of the frontal, temporal, parietal, and occipital lobes have been presented on Plates 1-1 and 1-2. The limbic lobe is involved with sexual and emotional aspects of behavior and with the processing of memory.

Beneath the surface of the hemispheres are great masses of fibers (not shown) conducting impulses in all directions and large groups of cells forming discrete bodies at the base of each hemisphere: these are the *basal ganglia* (F; sing. *ganglion,* "knot"). Their major role seems to be the programming and execution of movement (motor activity). Diseases of the basal ganglia are manifested by tremors and uncontrolled movements.

Color the heading Upper Brain Stem, titles G through L, and related structures.

The uppermost part of the brain stem (tucked away into the concave bases of the hemispheres) consists largely of the *thalamus* (G), *hypothalamus* (K; *hypo-,* "below"), and *pineal gland* (L). The thalamus serves as the sensory gateway to the cerebral hemispheres. The pathways for all senses except smell stop in the thalamus before proceeding into the hemispheres. The hypothalamus packs a remarkable roster of functions into its small size (barely larger than four peas). It controls the visceral nervous system, which stimulates contraction of muscle fibers and glandular secretions in the internal organs; it regulates appetite, thirst, and temperature; and it controls the hormonal secretions from the pituitary gland and, thereby, many of the endocrine glands of the body.

The small pineal gland, located behind the thalamus, functionally resembles a biological clock, regulating body rhythms and sexual activity.

Color the rest of the headings, titles M through N, and related structures.

The middle portion of the brain stem is the *midbrain* (M), which, in part, controls automatic (reflex) patterns associated with the visual and auditory systems. Its deeper parts are concerned with other important movement patterns. The lower brain stem is a part of the hindbrain and consists of the *medulla* (J) and *pons* (H), which have been presented in Plate 1-2. The *cerebellum* (I) is the other part of the hindbrain, and its function has been described in Plate 1-2 as well.

The *spinal cord* (N) is continuous with the medulla at the base of the skull and is enclosed in the neural canal of the spine or vertebral column. It includes both ascending (generally sensation-related) and descending (generally movement-related) pathways for the conduction of impulses to and from the brain. As the most primitive portion of the human nervous system, the spinal cord receives sensory information from all parts of the body (except the face) and sends commands for motor activity.