tapering part of the cell undergoes still further elongation, and forms the axis-cylinder of the cell.

The lateral walls of the medulla spinalis continue to increase in thickness, and the canal widens out near its dorsal extremity, and assumes a somewhat lozenge-shaped appearance. The widest part of the canal serves to subdivide the lateral wall of the neural tube into a **dorsal** or **alar**, and a **ventral** or **basal lamina** (Figs. 642, 643), a subdivision which extends forward into the brain. At a later stage the ventral part of the canal widens out, while the dorsal part is first reduced to a mere slit and then becomes obliterated by the approximation and fusion of its walls; the ventral part of the canal persists and forms the central canal of the adult medulla spinalis. The caudal end of the canal exhibits a conical expansion which is known as the **terminal ventricle**.

The ventral part of the mantle layer becomes thickened, and on cross-section appears as a triangular patch between the marginal and ependymal layers. This thickening is the rudiment of the anterior column of gray substance, and contains many neuroblasts, the axis-cylinders of which pass out through the marginal layer and form the anterior roots of the spinal nerves (Figs. 640,642, 643). The thickening of the mantle layer gradually extends in a dorsal direction, and forms the posterior column of gray substance. The axons of many of the neuroblasts in the alar lamina run forward, and cross in the floor-plate to the opposite side of the medulla spinalis; these form the rudiment of the anterior white commissure.

About the end of the fourth week nerve fibers begin to appear in the marginal layer. The first to develop are the short intersegmental fibers from the neuroblasts in the mantle zone, and the fibers of the dorsal nerve roots which grow into the medulla spinalis from the cells of the spinal ganglia. By the sixth week these dorsal root fibers form a well-defined **oval bundle** in the peripheral part of the alar lamina; this bundle gradually increases in size, and spreading toward the middle line forms the rudiment of the posterior funiculus. The long intersegmental fibers begin to appear about the third month and the cerebrospinal fibers about the fifth month. All nerve fibers are at first destitute of medullary sheaths. Different groups of fibers receive their sheaths at different times—the dorsal and ventral nerve roots about the fifth month, the cerebrospinal fibers after the ninth month.

By the growth of the anterior columns of gray substance, and by the increase in size of the anterior funiculi, a furrow is formed between the lateral halves of the cord anteriorly; this gradually deepens to form the anterior median fissure. The mode of formation of the posterior septum is somewhat uncertain. Many believe that it is produced by the growing together of the walls of the posterior part of the central canal and by the development from its ependymal cells of a septum of fibrillated tissue which separates the future funiculi graciles.

Up to the third month of fetal life the medulla spinalis occupies the entire length of the vertebral canal, and the spinal nerves pass outward at right angles to the medulla spinalis. From this time onward, the vertebral column grows more rapidly than the medulla spinalis, and the latter, being fixed above through its continuity with the brain, gradually assumes a higher position within the canal. By the sixth month its lower end reaches only as far as the upper end of the sacrum; at birth it is on a level with the third lumbar vertebra, and in the adult with the lower border of the first or upper border of the second lumbar vertebra. A delicate filament, the **filum terminale**, extends from its lower end as far as the coccyx.

The Spinal Nerves.—Each spinal nerve is attached to the medulla spinalis by an anterior or ventral and a posterior or dorsal root.

The fibers of the anterior roots are formed by the axons of the neuroblasts which lie in the ventral part of the mantle layer; these axons grow out through the overlying marginal layer and become grouped to form the anterior nerve root (Fig. 641).