receptors). The medial processes of the ganglion cells grow into the medulla spinalis as the posterior roots of the spinal nerves.

The posterior nerve root enters the medulla spinalis in three chief bundles, medial, intermediate, and lateral. The **medial** strand passes directly into the fasciculus cuneatus: it consists of coarse fibers, which acquire their medullary sheaths about the fifth month of intrauterine life; the **intermediate** strand consists of coarse fibers, which enter the gelatinous substance of Rolando; the **lateral** is composed of fine fibers, which assume a longitudinal direction in the tract of Lissauer, and do not acquire their medullary sheaths until after birth. In addition to these medullated fibers there are great numbers of non-medullated fibers which enter with the lateral bundle. They are more numerous than the myelinated fibers. They arise from the small cells of the spinal ganglia by T-shaped axons similar to the myelinated. They are distributed with the peripheral nerves chiefly to the skin, only a few are found in the nerves to the muscles.[1]

Having entered the medulla spinalis, all the fibers of the posterior nerve roots divide into ascending and descending branches, and these in their turn give off collaterals which enter the gray substance (Fig. 676). The descending fibers are short, and soon enter the gray substance. The ascending fibers are grouped into long, short, and intermediate: the long fibers ascend in the fasciculus cuneatus and fasciculus gracilis as far as the medulla oblongata, where they end by arborizing around the cells of the cuneate and gracile nuclei; the short fibers run upward for a distance of only 5 or 6 mm. and enter the gray substance; while the intermediate fibers, after a somewhat longer course, have a similar destination. All fibers entering the gray substance end by arborizing around its nerve cells or the dendrites of cells, those of intermediate length being especially associated with the cells of the dorsal nucleus.

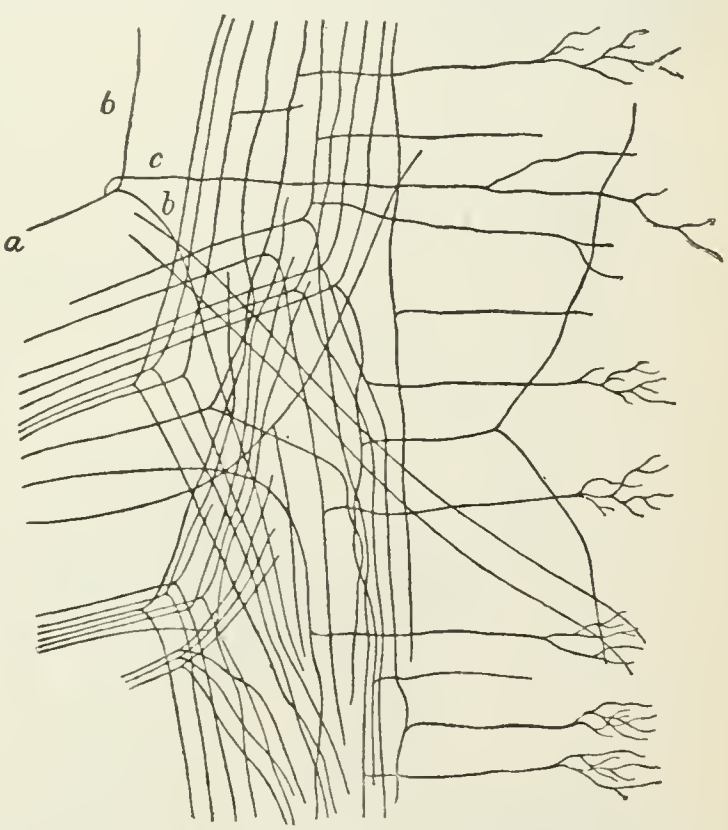

FIG. 676.—Posterior roots entering medulla spinalis and dividing into ascending and descending branches. (Van Gehuchten.) *a*. Stem fiber. *b*, *b*. Ascending and descending limbs of bifurcation. *c*. Collateral arising from stem fiber.

The long fibers of the posterior nerve roots pursue an oblique course upward, being situated at first in the lateral part of the fasciculus cuneatus: higher up, they occupy the middle of this fasciculus, having been displaced by the accession of other entering fibers; while still higher, they ascend in the fasciculus gracilis. The upper cervical fibers do not reach this fasciculus, but are entirely confined to the fasciculus cuneatus. The localization of these fibers is very precise: the sacral nerves lie in the medial part of the fasciculus gracilis and near its periphery, the lumbar nerves lateral to them, the thoracic nerves still more laterally; while the cervical nerves are confined to the fasciculus cuneatus (Fig. 673).

[1] Ransom, Brain, 1915, 38.