order from the thalamus to the cerebral cortex; (2) impulses of unconscious muscle sense, *via* neurons of the second order from the nucleus gracilis and nucleus cuneatus pass in the internal and external arcuate fibers of the medulla oblongata to the inferior peduncle and through it to the cerebellum; (3) impulses of tactile discrimination, *via* neurons of the second order from the nucleus cuneatus and nucleus gracilis pass in the median lemniscus to the thalamus, neurons of the third order pass from the thalamus to the cortex.

The **Posterior Proper Fasciculus** (*posterior ground bundle; posterior basis bundle*) arises from cells in the posterior column; their axons bifurcate into ascending and descending branches which occupy the ventral part of the funiculus close to the gray column. They are intersegmental and run for varying distances sending off collaterals and terminals to the gray matter.

Some descending fibers occupy different parts at different levels. In the cervical and upper thoracic regions they appear as a **comma-shaped fasciculus** in the lateral part of the fasciculus cuneatus, the blunt end of the comma being directed toward the posterior gray commissure; in the lower thoracic region they form a **dorsal peripheral band** on the posterior surface of the funiculus; in the lumbar region, they are situated by the side of the posterior median septum, and appear on section as a semi-elliptical bundle, which, together with the corresponding bundle of the opposite side, forms the **oval area of Flechsig**; while in the conus medullaris they assume the form of a **triangular strand** in the postero-medial part of the fasciculus gracilis. These descending fibers are mainly intersegmental in character and derived from cells in the posterior column, but some consist of the descending branches of the posterior nerve roots. The comma-shaped fasciculus was supposed to belong to the second category, but against this view is the fact that it does not undergo descending degeneration when the posterior nerve roots are destroyed.

Roots of the Spinal Nerves.—As already stated, each spinal nerve possesses two roots, an **anterior** and a **posterior**, which are attached to the surface of the medulla spinalis opposite the corresponding column of gray substance (Fig. 675); their fibers become medullated about the fifth month of fetal life.

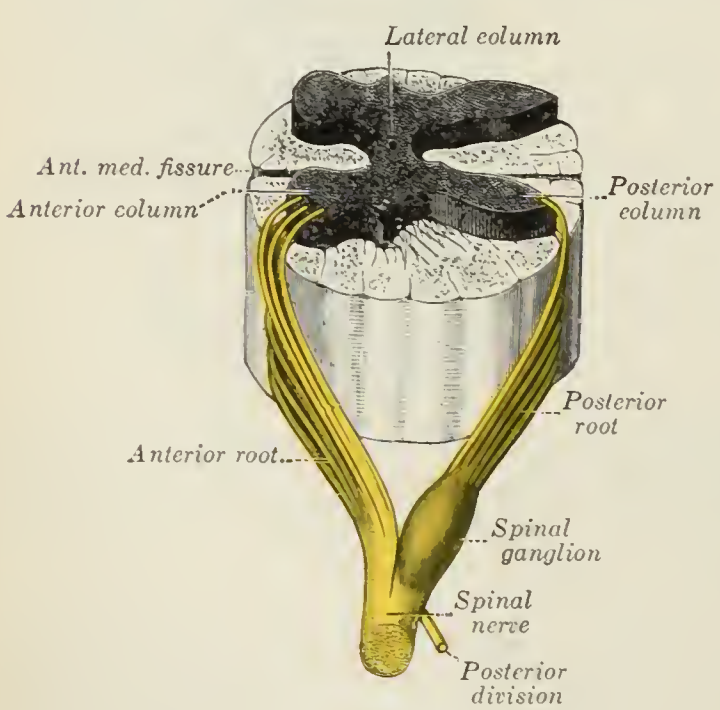

FIG. 675.—A spinal nerve with its anterior and posterior roots.

The **Anterior Nerve Root** (*radix anterior*) consists of efferent fibers, which are the axons of the nerve cells in the ventral part of the anterior and lateral columns. A short distance from their origins, these axons are invested by medullary sheaths and, passing forward, emerge in two or three irregular rows over an area which measures about 3 mm. in width.

The **Posterior Root** (*radix posterior*) comprises some six or eight fasciculi, attached in linear series along the postero-lateral sulcus. It consists of afferent fibers which arise from the nerve cells in a spinal ganglion. Each ganglion cell gives off a single fiber which divides in a T-shaped manner into two processes, medial and lateral. The lateral processes extend to the sensory end-organs of the skin, muscles, tendons, joints, etc. (*somatic receptors*), and to the sensory end-organs of the viscera (*visceral*