lumbar and the second sacral to the fourth sacral nerves. The somatic motor fibers, efferent fibers, arise from cells in the anterior column of the spinal cord and pass out through the anterior roots to the voluntary muscles. The sympathetic efferent fibers, probably arise from cells in the lateral column or the base of the anterior column and emerge through the anterior roots and white rami communicantes. These are preganglionic fibers which end in various sympathetic ganglia from which postganglionic fibers conduct the motor impulses to the smooth muscles of the viscera and vessels and secretory impulses to the glands. These fibers are also limited to two regions, the first thoracic to the second lumbar and the second sacral to the fourth sacral nerves.

The afferent fibers which pass into the spinal cord establish various types of connections, some within the cord itself for spinal reflexes, others for reflexes connected with higher centers in the brain, while still others conduct impulses of conscious sensation by a series of neurons to the cerebral cortex.

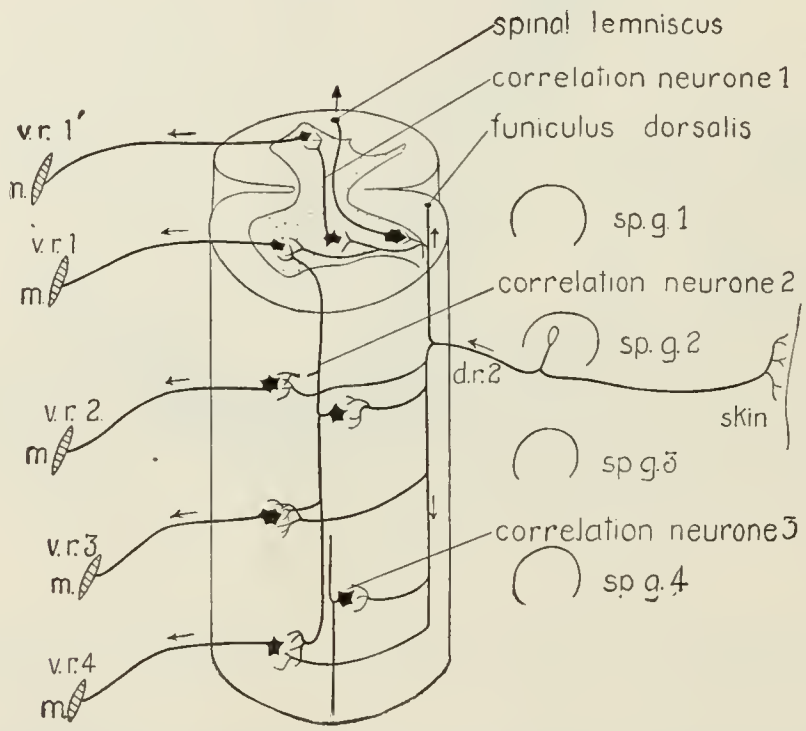

Fig. 758.—Diagram of the spinal cord reflex apparatus. Some of the connections of a single afferent neuron from the skin (*d.r.*2) are indicated: *d.r.*2, dorsal root from second spinal ganglion; *m*, muscles; *sp.g.*1 to *sp.g.*4, spinal ganglia; *v.r.*1[1] to *v.r.*4, ventral roots. (After Herriek.)

The Intrinsic Spinal Reflex Paths.—The collaterals and terminals of the ascending and descending branches of the posterior root fibers which leave the fasciculus cuneatus to enter the gray matter of the spinal cord end in various ways. Many end in the dorsal column, some near its apex, others in the substance of Rolando, others in the intermediate region between the dorsal and ventral columns, others traverse the whole thickness of the gray matter to reach the ventral column, others end in the dorsal nucleus, and others pass through the gray commissure to the dorsal column of the opposite side. All of these collaterals and terminals end in connection with cells or dendrites of cells in the gray columns. The axons of these cells have various destinations, some pass out into the lateral and ventral funiculi and turn upward to reach the brain. Those concerned with the intrinsic spinal reflexes come into relation either directly or indirectly with motor cells in the anterior column. It is very unlikely that either the terminals or collaterals of the dorsal root fibers effect simple direct connections with the motor cells of the ventral column, there is at least one if not several intercalated neurons in the path. These intercalated or correlation neurons may have short axons that do not pass out of the gray matter or the axons may pass out into the proper fasciculi and extend for varying distances