

are said not to enter the inferior peduncle but to pass with the ventral spinocerebellar fasciculus. The cerebellar reflex arc is supposed to be completed by the fibers of the superior peduncle which pass from the cerebellum to the red nucleus of the mid-brain where some of their terminals and collaterals form synapses with neurons whose axons descend to the spinal cord in the rubrospinal fasciculus. The terminal and collaterals of this fasciculus end either directly or indirectly about the motor cells in the anterior column.

The ventral spinocerebellar fasciculus, since most of its fibers pass to the cerebellum, is also supposed to be concerned in the conduction of unconscious muscle sense. The location of its cells of origin is uncertain. They are probably in or near the dorsal nucleus of the same and the opposite side; various other locations are given, the dorsal column, the intermediate zone of the gray matter and the central portion of the anterior column. The neurons of the first order whose central fibers enter the fasciculus cuneatus from the dorsal roots send collaterals and terminals to form synapses with these cells. The fibers which come from the opposite gray columns cross some in the white and some in the gray commissure and pass with fibers from the same side through the lateral funiculus to the marginal region ventral to the dorsal spinocerebellar fasciculus. The fasciculus begins about the level of the third lumbar nerve and continues upward on the lateral surface of the spinal cord and medulla oblongata until it passes under cover of the external arcuate fibers. It passes just dorsal to the olive and above this joins the lateral edge of the lateral lemniscus along which it runs, ventral to the roots of the trigeminal nerve, almost to the level of the superior colliculus, it then crosses over the superior peduncle, turns abruptly backward along its medial border, enters the cerebellum with it and ends in the vermis of the same and the opposite side. Some of its fibers are said to join the dorsal spinocerebellar fasciculus in the medulla oblongata and enter the cerebellum through the inferior peduncle. A number of fibers are said to continue upward in the dorsolateral part of the tegmentum as far as the superior colliculus and a few pass to the thalamus. They probably form part of the sensory or higher reflex path.

The posterior root fibers conducting impulses of **pain** and **temperature** probably terminate in the posterior column or the intermediate region of the gray matter soon after they enter the spinal cord. The neurons of the second order are supposed to pass through the anterior commissure to the superficial antero-lateral fasciculus (tract of Gowers) and pass upward in that portion of it known as the lateral spinothalamic fasciculus. This fasciculus lies along the medial side of the ventral spinocerebellar fasciculus. It is stated by some authors that the pain fibers pass upward in the antero-lateral ground bundles. In some of the lower mammals this pathway carries the pain fibers upward by a series of neurons some of which cross to the opposite side, so that in part there is a double path. In man, however, the lateral spinothalamic fasciculus is probably the most important pathway. On reaching the medulla these fibers continue upward through the *formatio reticularis* in the neighborhood of the median fillet to the thalamus, probably its ventro-lateral region. Whether higher neurons convey the pain impulses to the cortex through the internal capsule is uncertain. The pathway is probably more complex and Head is of the opinion that our sensations of pain are essentially thalamic. The pain and temperature pathways in the lateral spinothalamic fasciculus are not so closely intermingled but that one can be destroyed without injury to the other.

Ransom suggests that the non-medullated fibers of the posterior roots, which turn into Lissauer's tract and ascend or descend for short distances not exceeding one or two segments and finally end in the *substantia gelatinosa*, are in part at least pain fibers and that the fasciculus of Lissauer and the *substantia gelatinosa* represent part of the mechanism for reflexes associated with pain conduction and reception while the fibers to the higher centers pass up in the spinothalamic tract.