The brain has a remarkable ability to adapt in the event of damage — in many cases shifting responsibility for specific cognitive functions to other non-damaged brain regions. This ‘plasticity’ can be crucial in aiding recovery from stroke, trauma, and peripheral damage such as eye or ear damage. Over the past thirty years our view of cortical plasticity has evolved greatly. Early studies suggested that changes to cortical function due to peripheral lesions could only occur during development and that these plastic changes were specific to a particular temporal window or ‘critical period’. Over time, it has been demonstrated that cortical modifications as a consequence of either peripheral or central lesions can induce adaptive, or beneficial, changes in cortical function in an effort to preserve or enhance function. More recently, studies have identified that many of these adaptive changes, once thought only possible in the developing brain, are also possible in the mature or developed brain. At present, many laboratories are defining the beneficial capabilities of cerebral cortex plasticity, upon which many proactive and therapeutic strategies may be developed in order to maximise the ‘reprogramming’ capabilities of the cerebrum. This book describes these exciting studies and examines adaptive cortical plasticity in a variety of systems (visual, auditory, somatomotor, cross-modal, language, and cognition).
The investigations undertaken during the triennium 1910–1912 were quite diverse, being dispersed over many and varied topics. The harvest of acquisition in the field of the spinal cord degeneration and regeneration was copious and highly interesting. In the spinal cord such favorable conditions are often established, following the simultaneous section of the white matter and sensory and motor roots. The connective tissue cells of scars also possess the capability of elaborating neurotropic materials during the initial phases. Not all of the deviated dorsal column fibers or sprouts arising from the lesioned motor and sensory roots respond to neurotropic processes. Cajal's studies on traumatized subjects revealed the existence of notable phenomena of compensation—morphological adaptation of the neurons to the artificial physiological conditions promoted by the mutilation. From the point of view of regeneration, the cerebrum and cerebellum are less active than the ganglia and spinal cord.