

fat, but must be referred largely to loss of tone in the abdominal and visceral musculature and is weighty evidence of functional decadence.

We speak properly of the tone of the various sphincters of the body, and few physiologists will be found to maintain as formerly that this tone was due to a purely automatic or independent activity of centres in the spinal cord. It is practically impossible to reconcile such a conception with the facts. We must now bear in mind that it has been shewn that the very contraction of a muscle gives rise to incoming impulses which must tend to complete the circuit for reflex action.

Moreover, all those mechanisms which protect the sense organs of the body, the various look-out stations, so to speak, act unquestionably reflexly. Winking and the secretion of tears (when not crocodile ones), the movements of the ears, as I have witnessed many times in individuals sitting in front of me at a concert, sneezing, etc., are reflexes. The internal mechanisms of the eye, both for accommodation and the changes in the pupil, are only in the most indirect way voluntary.

When the in-coming impulses from below by way of the vagi are cut off from the respiratory centre in the medulla oblongata, its action is seriously impaired, and when withdrawn from above also by removal of the brain anterior to the bulb, there results only a miserable spasmodic action, a gasping or sobbing rather than anything worthy the name respiration.

So thoroughly reflex is the action of the vaso-motor centre that though we speak of this region of the brain sending out tonic impulses, we no longer think of this function as absolutely independent of the incoming or afferent impulses; on the contrary, one of the classical experiments in physiology consists in showing that the stimulation of the chorda tympani, by which we produce dilation of the vessels of the submaxillary gland, is an imitation of the effect of the introduction of food into the mouth except that we act on the out-going limb of the reflex arc instead of the in-going one.

A good many acts that have become almost wholly reflex were originally as purely voluntary. We have only to watch the efforts of the child in learning to walk to be aware of the fact that the facility which it shows in carrying out this complicated act after a few weeks has only been attained after thousands of efforts affected by the best will-power it could command. Yet the adult is hampered, rather than aided in walking when he attempts to guide each step by volition.

In learning any new thing requiring muscular co-ordination we endeavor to pass as rapidly as possible from the voluntary to the reflex stage. Those of us who cycle can remember with amusement our