

dinate to the two autonomic systems, partly independent of them; the plexuses of Auerbach and Meissner of the intestinal wall may be cited as an example.

#### THE EFFECTS OF ELECTRICAL STIMULATION OF THE OPPOSING AUTONOMIC SYSTEMS.

In the region of the eye, electrical stimulation of the sympathetic causes dilatation of the pupil (*M. dilatator iridis*) and contraction of the orbital muscle, while electrical stimulation of the mid-brain autonomic (*N. III*) contracts the pupil (*M. sphincter iridis*) and causes accommodation spasm (*M. ciliaris*).

In the salivary glands, stimulation of the sympathetic arrests salivary secretion, while stimulation of the hind-brain autonomic (*chorda tympani*) causes profuse salivation.

In the cardiac area, electrical stimulation of the sympathetic (*N. accelerator*) causes tachycardia, while electrical stimulation of the hind-brain autonomic (*N. vagus*) causes bradycardia.

In the digestive system electrical stimulation (*N. vagus*) causes increased secretion and hypermotility, while excitation of the sympathetic diminishes secretion and leads to relaxation of the smooth muscle.

In the pelvic domain electrical stimulation of the *N. pelvicus* causes contraction of the detrusor of the bladder, while electrical stimulation of the sympathetic relaxes this.

#### CHEMICAL STIMULATION OF THE OPPOSING AUTONOMIC SYSTEMS.

The effects of chemical substances upon the autonomic nervous system as a whole and upon its various parts have been studied especially by the pharmacologists and experimental physiologists.

Nicotine acts up on each of the two antagonistic autonomic systems, interrupting conduction at the junction (synapse) of the pre-ganglionic fibres with the cell bodies of the neurones which give rise to the post-ganglionic fibres in the ganglia.

Certain chemical substances, however, show an elective affinity for one or the other of the two autonomic systems. For the sake of brevity, the craniosacral autonomic system is usually referred to as the "vagal system," since it includes the autonomic fibres of the *N. vagus*, while the cervico-thoraco-lumbar autonomic system is usually referred to briefly as the "sympathetic system."

Epinephrin, or adrenalin, heightens the activity of the organs innervated by the sympathetic proper, but does not directly affect the functions depending upon innervation by the vagal system. The administration of epinephrin, therefore, is followed by symptoms similar to these yielded by electrical stimulation of the sym-