

The nervous system is the chief apparatus regulating relationships between an organism and its environment and coordinating the actions of its organs. The tick central nervous system is more condensed and centralized than in other Chelicerata. This is caused by fusion of all ganglia of the brain and abdominal nerve cord into a single mass, the synganglion (Ioffe, 1963; Tsvileneva, 1964; Obenchain, 1974a). The synganglion lies anteriorly at the level of coxae II. In adult Dermacentor variabilis, the synganglion is 500 μm long, 400 μm wide, and 250 μm thick (Obenchain, 1974a). Dorsally, the synganglion surface is separated from the exoskeleton by layers of trachea, muscles and midgut diverticulae; ventrally it borders the midgut and anterior part of the reproductive system. The esophagus first runs ventrally below the anterior part of the synganglion, then enters it and passes dorsally over the posterior part. In passing through the synganglion, the esophagus divides it into two: the pre-esophageal and the postesophageal parts (Fig. 270).

Synganglion anatomy

The pre-esophageal part of the synganglion consists of the protocerebrum, optic lobes, cheliceral and pedipalp ganglia, and stomodeal bridge. The postesophageal part consists of four pairs of pedal ganglia and the unpaired opisthosomal ganglion. Associative centers are represented by several bilaterally symmetrical glomerular structures (Ioffe, 1963; Tsvileneva, 1964; Obenchain, 1974a). Anterodorsal, posterodorsal and ventral glomeruli in the pre-esophageal part are connected by nerve fiber trunks (Fig. 269) (Ioffe, 1963; Obenchain, 1974a). A complex of nerve fibers and trunks in the post-esophageal part of the synganglion forms a five-level commissure-connective system (Ioffe, 1963).

The nerve trunks arising from the ganglia are formed by axons of both receptor and motor cells. Three sets of paired nerves and one set of unpaired nerves extend from the pre-esophageal part of the synganglion (Fig. 269). One paired nerve set originates from the optic lobes. A second pair leaves the ventrolateral surface of the cheliceral ganglia and goes to the chelicerae. The third pair innervates the pedipalps. The unpaired nerve provides the pharynx. The postesophageal part of the synganglion gives rise to four pairs of pedal ganglia and several pairs of opisthosomal nerves (Fig. 269). Fine lateral "sympathetic" nerves arise from the nerve trunk bases of the first pedal ganglia. These sympathetic nerves connect all four pedal nerve trunks on each side of the synganglion (Fig. 269).