Chapter VI. TISSUES OF THE INTERNAL ENVIRONMENT

L. I. Amosova

Tissues of the tick internal environment are the loose connective tissue, fat body, and hemolymph.

The loose connective tissue has been shown by the light microscope to contain extracellular material and desmoblasts (Tsvileneva, 1961b, 1963). In arthropods, the chitinous exoskeleton provides the chief support, thus connective tissue extracellular material is sparse (Arhhurst, 1968). Basal laminae (or membranes) and connective tissue sheaths covering all internal organs are the chief examples of extracellular material in loose connective tissue. In the electron microscope, these sheaths, containing an amorphous matrix and fibers, have a fine fibrillar appearance. Collagenous fibers are present in some sheaths, as in neurilemma. The most developed tick connective tissue sheaths are those surrounding the ovaries (tunica propria, Fig. 351) and central nervous system (neurilemma, Fig. 272).

Fat body

The tick fat body is less developed than in insects, where the fat body stores reserve materials and is an important organ of intermediate metabolism, functionally corresponding to the vertebrate liver (Wigglesworth, 1967). Midgut digestive cells are a place for storing proteins, lipids and carbohydrates and may also be involved in intermediate metabolism (Balashov, 1961b).

Histological studies of ixodid ticks in various physiological phases showed the presence in the hemocoel of cell strand network corresponding to the insect fat body (Tsvileneva, 1961b; Balashov, 1963a, 1967; Obenchain and Oliver, 1971). Fat body elements are especially abundant around large tracheal trunks in the so-called tracheal complex. Obenchain and Oliver (1971) divide the adult tick fat body in the same manner as the insect fat body, into central and peripheral portions. The former consists of the fat body parts surrounding the reproductive system; the latter includes the cell strands closely associated with the tracheal trunks and located below the epidermis. Using histochemical techniques, neutral lipids, non-specific esterases, glycogen, and proteins have been identified in ixodid fat body cells (Tsvileneva, 1961b; Obenchain and Oliver, 1971). This finding indicates the possible participation of these cells in the metabolism of lipids, proteins and carbohydrates. A high RNA content has also been demonstrated in some cells.

Cell composition heterogeneity in the tick fat body has been shown by several authors. Tsvileneva (1961b, 1963) observed two kinds of cells, differing in the basophylia of their cytoplasm and a number of other features. Similarly