Chapter IV SALIVARY GLANDS

Yu. S. Balashov

The role of the salivary glands is important in ixodid feeding and transmitting infectious agents. Numerous publications have been devoted to their anatomical and cytological aspects.

Two types of alveoli, or acini, were found in Ixodes ricinus, agranular (or pyramidal) and granule-secreting. Subsequent, histological studies of Rhipicephalus appendiculatus (Till, 1961), Hyalomma asiaticum (Balashov and Dzhafarov, 1966; Balashov and Vorobieva, 1977) and Haemaphysalis spinigera (Chinery, 1965) showed two secretory alveoli types in females and three in males. Pyramidal alveoli are designated type I and granule-secreting alveoli types II, III, and IV. Several types of secretory cells in each type of secretory alveoli indicate structural and functional complexity of tick salivary glands.

Electron microscope investigations confirm this classification of alveoli and reveal several additional secretory cell types (Dzhafarov, 1964; Balashov and Dzhafarov, 1966; Kirkland, 1971; Coons and Roshdy, 1973; Meredith and Kaufman, 1973). Cell types and modes of salivary gland secretion differ between ixodid genera and especially between the subfamilies Ixodinae and Amblyomminae. These differences are particularly obvious during tick feeding, when salivary glands are most active.

Salivary glands produce saliva consisting of many components. Various aspects of salivary gland physiological activity and biochemical composition of saliva are discussed in specialized reviews (Balashov, 1967; Sauer, 1977). Biochemical analysis demonstrates that the saliva of feeding female Boophilus microplus contains proteins, carbohydrates and lipids. Sodium and chlorine ions are highly concentrated; of potassium, calcium and magnesium ions are less concentrated. All amino acids present in hemolymph are also found in saliva.

Salivation occurs throughout tick feeding. One of the most important components of saliva is the material which hardens to form the cement sheath surrounding the tick mouthparts in host skin. Tick saliva causes the sharply increased permeability of the host skin blood capillaries at the attachment site that leads to hemorrhage formation. Saliva antigenic properties induce antibody appearance in host blood. Active anticoagulants in tick saliva are believed to prevent host blood coagulation, but precise evidence for their presence has not been obtained. During feeding, tick salivary glands also serve an osmoregulatory function, releasing with saliva the superfluous water and salt obtained with host blood and lymph.

From studies on tick salivary gland structure and function, one cannot, unfortunately, find any correspondence