Chapter II THE INTEGUMENT.

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As in other arthropods, the tick integument consists of the cuticle and a single layer of epidermal cells which secrete the cuticle (fig. 79) (Lees, 1947, 1952; Balashov, 1960a, 1967). Cuticle forming the exoskeleton functions in support and protection and also, due to its high water impermeability, has an important role in regulating of water balance. The cuticle contains two primary layers clearly distinguished in the light microscope, the outer layer, epicuticle, and the inner layer, procuticle. The epicuticle is a thin (1-4 um), nonchitinous layer which in the electron microscope has a multilayered structure. The epicuticle has considerable flexibility but is nonextensible. Extensible parts of tick cuticle (unsclerotized part of the idiosoma) stretch where the epicuticle forms deep folds which unfold during engorgement (figs. 79, 80). In contrast, smooth or slightly wavy epicuticular surface of the hard areas of the tick body do not stretch during engorgement.

The procuticle, 1-100 um in thickness, is composed mainly of the polysaccharide, chitin, bound with proteins. Cuticle strength is determined by the degree of sclerotization of cuticular proteins. Depending on degree of sclerotization, three types of procuticle can be identified: completely sclerotized exocuticle, nonsclerotized endocuticle and partly sclerotized mesocuticle. Exocuticle is present in hard parts of tick body such as the capitulum, scutum, and cuticle of legs and various sclerites and appendages. Endo- and mesocuticle are extensible; this is important for realization of tick engorgement during blood intake. The idiosomal extensible cuticle of a newly molted tick consists of endocuticle, which undergoes partial sclerotization and turns into mesocuticle during postmolting development. Endocuticle also forms movable articulations.

The unfed tick integument.

Procuticle. In the electron microscope, the procuticle of the extensible part of the idiosoma of unfed nymphal Hyalomma asiaticum has a finely fibrillar structure without lamellae (figs. 80, 81) (Amosova, 1975). Numerous pore canals penetrate the procuticle. They are narrow (100-200 nm) and relatively straight in the main body of the procuticle, but broaden and branch in the cuticular folds (figs. 79, 80, 81). The pore canal lumen contains a network of filaments. The pore canals terminate beneath the epicuticle, where aggregates of electron dense material lie in their distial ends (fig. 80). At larger magnification, the pore canals are seen to join with the epicuticular filaments (fig. 82).