

Chapter VIII.      SENSORY ORGANS  
V. P. Ivanov and S. A. Leonovich

Ticks have a variety of well-developed sensory organs. There are receptor setae on all surfaces of the tick body. More complex receptor structures are the palpal organ (on the distal palpal segment) and Haller's organ (on the dorsal surface of leg I). Some Ixodoidea have a pair of eyes.

The hairlike receptor organs of Ixodoidea like of other arthropods are known as the sensilla. The sensilla is an elementary sensory organ, and irrespective of function, consists of similar basic elements: receptor cells, cuticular apparatus (cuticular seta), and enveloping cells. The receptor cells are bipolar: two processes extend from the perykaria: the central process, or axon, and the peripheral process, or dendrite. The central processes extend to corresponding regions of the synganglion; the peripheral processes extend directly to body surface cuticular setae. The cilium, with special modifications, extends from the apical surface of the peripheral process. The modified cilium, the perceptive apparatus of the sensilla proper, directly perceives the external stimulus. These bipolar receptor cells, in which each peripheral process carries one modified cilium to the apical surface, characterize arthropod sensilla (Slifer, 1970; McIver, 1975). Basally, the cilium ultrastructural organization is similar to common cilia or flagella, which are present, for example, in ciliated epithelium. Modified cilia may differ in apical structure, depending on the kind of irritant the cell responds to: mechanical, smell or taste stimuli, or other environmental parameters. Specific features characterize cuticular setae of functionally different organs. There is usually an obvious correlation between sensilla structure and function. In olfactory sensilla, the thin setal walls are perforated by numerous pores. In taste sensilla, the setae usually have only one pore on the apex. In tactile sensilla, the setae are usually pivotal and lack an inner cavity. Ixodoidea sensilla organization is based on these structural principles. The hairlike receptor organs of Ixodoidea and other arthropod groups differ structurally in only minor details such as fine structure of the cuticular setae and cilia of the receptor cells.

#### Taste organs

The highly developed, specialized organs of tick chemosensory perception have an important role in the complicated behavioral reaction patterns of host seeking, finding optimum places for feeding, and sexual activity (Lahille, 1905; Hindle and Merriman, 1912; Lees, 1948; Feldman-Muhsam and Borut, 1971). As in most other arthropods, Ixodoidea have distant chemoreceptor or olfactory