SUMMARY AND GENERAL CONCLUSIONS
The common Indian lithophilous scorpion *Buthus tamulus* was used as the experimental animal. The location and distribution of long hair sensilla (LHS) on metasoma were studied under binocular stereomicroscope and drawings were made using camera Lucida. Counting and labeling of LHS was done according to their emergence during postnatal development. The innervation, ganglionic nerve distribution and central projection of identified single LHS were traced using the cobalt sulphide silver intensification method. Electrical recordings were made using the standard electrophysiological equipment. To establish the functional role, LHS were ablated and behavioral studies were conducted.

The LHS are arranged in longitudinal rows along the prominent carinae. They are more on ventral and lateral sides and the density of hair increase from proximal to distal segments. Highest number occur on terminal V segment and telson. During postnatal development LHS emerge in bilateral pairs in each stadia and the location of each such pair is constant during various stages of development. On the metasoma the total number of LHS in just born are 56, first instar 66 and in adults 234.

Retrograde COCl₂ filling showed that each LHS is innervated by a cluster of seven somata located about 60 μm deep at the hair base.
Four cells are spindle shaped and the remaining are globular. The largest cell measured 30 μm and the smallest 15 μm in diameter. The dendrites arising from these cells terminate on one side at the base of the hair.

Retrograde cobalt fills were used to trace and map the major nerve branches innervating the metasomatic segments and telson. 6th abdominal ganglion is located at the rostral region of III metasomatic segment. On each side of the 6th ganglion two major peripheral nerves arises, 7th abdominal ganglion is located at the anterior region of IV segment and from this ganglion two major peripheral nerves arises, and at posterior region, segmental and telsonic nerves arises. All these nerve branches divide and redivide into fine branches. Cobalt studies further revealed the location and distribution of motor and interneurons in a ganglia. Each sensory fibre entering a ganglion through segmental nerves or through connectives terminate intraganglionically or function as a through fibre.

Anterograde cobalt filling of single LHS on the metasoma showed that sensory axons enter the respective segmental ganglion, ascend ipsilaterally through the next anterior ganglia and terminate in a fourth ganglion. In each ganglion these plurisegmental fibres give off collateral branches that terminate in the ganglionic neuropil. Some
collaterals arising from afferent fibres of both sides cross the midline of the ganglion and form transverse commissures. The middle and the lower half of the ganglia are predominantly formed of this "tactile neuropil" arising from LH-sensilla. Fibres entering heterolateral connectives were not found. Descending afferent fibers caudal to the segments bearing the cobalt filled hairs were also absent.

The terminal arborizations of these collateral branches end in small blebs, presumed to be presynaptic endings. The transverse commissures consisting of a large number of such bleb-like endings are arranged in such a way as to provide for intensive synaptic contacts between the sensory tracts and motor and interneurons in the ganglia of the ventral nerve cord. Several ascending contra-and ipsilateral interneurons give off dendritic processes whose branches arborize and terminate in the region of the tactile neuropil of each ganglion. Similarly from segmental motor neurons dendritic branches arise that terminate dorsal to anterior commissures.

The shafts of single tactile hair were deflected from their resting position with a probe attached to the diaphragm of a loudspeaker and square wave pulses were delivered. The hair sensilla were also stimulated using air currents and electrical activity was recorded. Recordings from peripheral nerves after deflections of a hair showed
single or multiple spike discharges. A single large spike could be recorded from ipsilateral anterior connective of the ventral nerve cord, indicating a through conducting nature of the sensory pathways. Strong deflections of a single hair activated several ipsilateral and fewer contralateral ascending interneurons and some segmental motor neurons. Single or multiple spikes were also elicited to different wind velocities.

To application of salt, sugar, acid solutions etc., LHS did not show any response. Similarly, exposure of LHS to different odors and sounds also did not arouse electrical activity. The adequate stimulus to elicit LHS response seems to be deflection of hair shaft by external objects or by air currents. Results indicate that LHS discharge spike activity to deflection of the hair shaft in all directions.

When LHS are stimulated by a probe or air current, Buthus exhibited defensive behavior. Experiments were tried using air currents to clarify the part played by LHS in defensive responses. Tests conducted for intact animals were compared with the performance of scorpions which have been deprived of these hair sensilla. These experiments indicate that the adequate stimulus for eliciting a defensive response is displacement of LHS. Thus the LHS apparently function as tactile mechanoreceptors.