MOLECULAR MECHANISMS OF SALT RECEPTION IN INSECT

Hiromasa Kijima, Shozo Iida and Shigeo Yoshino
Department of physics, Faculty of Science, Nagoya University

SUMMARY

The fleshfly, *Boetcherisca peregrina*, has about 200 taste sensory hairs on its labellum. Four taste neurons belong to a taste hair: they are a salt receptor, a sugar receptor, a water receptor and an unkown taste neuron. A taste hair has two lumina: outer and inner lumina. Each taste neuron sends its sensory dendrite through the inner lumen to the taste hair tip, where the distal part of the dendrite recieves the taste stimulus which have difused into the tip of the inner lumen through a small pore at the sensory hair apex.

We studied here the molecular transduction mechanisms of the salt receptor neuron, by examining the fluctuation of the receptor current which flows through the outer lumen from the base to the tip and flows into the tip of the sensory dendrite of the salt receptor neuron, when the neuron is stimulated by the salt solution. The receptor current was recorded as the potential drop between the two glass microelectrodes inserted into the distal and proximal part of the outer lumen, respectively. When the taste hair tip was treated with TTX solution for several minutes, impluse generation was completely depressed for hours, but the receptor current remained intact. The fluctuation of the receptor current, which reflected the open-close dynamics of the ion channels activated by the salt stimulation, was analyzed by computing autocorrelation function and power spectrum. The results of the analysis suggested that the cation directly activates the transduction ion channel of the salt sensation, located on the membrane of the sensory dedrite tip.

We also succeeded to isolate the taste neuron from the labellum of the pupa 2 - 3 days before eclosion.