425 Receptor sensitivity underlies the behavioural effectiveness of chemosensory avoidance movements of the legs of locusts.

Philip Newland and Ibrahim Gaaboub

School of Biological Sciences, University of Southampton, Bassett Crescent East, Southampton SO16 7PX, UK

Unlike vertebrates the taste receptors of insects are distributed over the mouthparts, body and legs. In insects the sense of taste is used to select and reject food, select appropriate egg-laying sites and to avoid noxious chemicals in the environment. Here we have analysed some of the coding properties of the taste receptors, or basiconic sensilla, on different regions of the legs of locusts and related them to behavioural responses evoked through chemical contact.

We analysed the responses of taste receptors to two behaviourally relevant chemicals, sucrose and sodium chloride (NaCl). In response to stimulation with 500mM NaCl sensory neurones innervating receptors along the dorsal or ventral surfaces of the hind and fore legs progressively produced more spikes towards the tarsus, so that tarsal taste receptors responded at twice the frequency (approx. 20Hz) of proximal sensilla (approx. 10Hz). Similarly, 100mM sucrose applied to distal receptors on the hind and fore legs evoked more spikes than when applied to proximal receptors. Basiconic sensilla tested with a range of NaCl concentrations were more sensitive on the tarsus compared to proximal sites.

Behavioural studies showed that the frequency of leg withdrawal movements to droplets of chemicals applied to a leg increased with increasing NaCl and sucrose concentrations. For a given concentration the frequency of withdrawal was greater when it was applied to the tarsus compared to proximal femur. The foreleg was more responsive than the hind leg to NaCl whereas the frequency of withdrawal was similar to sucrose for both legs.

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426 An olfactory receptor expressed in ganglia of the autonomic nervous system

Joerg Strotmann, Martina Weber and Heinz Breer

Institute of Physiology, University of Hohenheim, Garbenstrasse 30, 70593 Stuttgart, Germany

Recent studies of genetically manipulated mice have provided evidence that olfactory receptors (ORs) may have important functions in addition to recognizing odorous compounds; receptor proteins apparently play a role in targeting olfactory axons to their correct glomerulus in the olfactory bulb. It has been suggested that they may contribute to the complex process of precise cell-cell recognition. These observations have shed some new light on the originally obscure finding that some of the OR genes are expressed not only in olfactory sensory neurons (OSNs) but also in other tissues. The results have vitalized the idea that OR proteins participate in cell recognition and tissue formation in these organs, culminating in the so-called area-code hypothesis. In this