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project exclusively to the olfactory lobe, which is organized into glomeruli much like the antennal lobe of insects and is thought to have a odotopic organization. This pathway is sometimes referred to as the 'olfactory pathway' (1). The non-aesthetasc – LAN pathway has input from many different types of sensilla – 9 types in *P. argus* (2). Non-aesthetasc sensilla are bimodally (chemo- and mechanoreceptor) innervated, and their sensory neurons project to the LAN. The LAN, which also receives motor innervation, has a stratified organization reminiscent of a topotopic organization. What is the functional distinction between these two pathways? Some functional redundancy in these pathways is known – either pathway can mediate learning, discrimination, and distance localization of food odors (3-5). But some functional differences are also known. One type of non-aesthetasc sensillum – asymmetric sensilla – is necessary and sufficient to mediate a motor behavior evoked by the food odor L-glutamate – antennular grooming behavior (6). Aesthetascs appear to be necessary for behavioral responses to pheromones such as social (aggregation) and sexual cues (7,8). Thus, these two antennular chemosensory pathways have some redundancy, but also appear to differ in their responsiveness to pheromones and in their control of sensory-motor behaviors.

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Interaction between olfactory and gustatory inputs in insect behavior

Behavior of insects is governed by chemical and physical signals impinging on specialized sensory organs. Volatile chemical signals are detected by the olfactory sense and result in upwind orientation by conspecifics receiving them. Detection of less volatile chemical signals by the gustatory sense results in behaviors such as copulation, biting and ingestion. However, seldom are these signals encountered in isolation; more often multiple chemical signals are detected simultaneously and the insect receiving them must process the information and appropriate a response. We investigated behavior of Colorado potato beetles challenged by simultaneous olfactory and gustatory stimuli. An open ambulatory Y-track olfactometer was used to measure insect preferences, number of turns made during orientation, and time to make a choice between stimuli. Olfactory stimuli were delivered to one-side of the device; gustatory stimuli were painted on the other side. Behavioral conflicts and preferences were discovered between stimulus pairs. For example, females took more time and made more turns when confronted with a volatile plant attractant and sucrose compared to the plant attractant and a male extract. We will examine behavioral hierarchies revealed by our studies and discuss how they may relate to reproduction and feeding.

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Effect of precocene II - juvenile hormone inhibitor on chemoreceptor organs of Colorado potato beetle, *Leptinotarsa decemlineata* Say. (Col.: Chrysomelidae)

The Colorado potato beetle (CPB), *Leptinotarsa decemlineata* Say. (Col.: Chrysomelidae), is the most serious insect pest of the cultivated potato and major pest worldwide. The increasing incidence of resistance to almost very insecticide used against it may lead to serious control problems. Precocene, juvenile hormone inhibitor, exerts cytotoxic effects on corpora allata of sensitive insects' species, which leads to the necrosis of parenchymal cells, the source of juvenile hormone. Recently it has been observed that, precocenes significantly reduce the life of the last instar larvae, induce ecdysis of larval cuticule and formation of abnormal puparia and these effects can be reversed by juvenile hormone administration.
Chemoreceptor organs of holometabola insects' larvae are good model for analysis of effect biological compound, as far as the number of sensilla permanently for all larvae instars. Topical application of precocene II occurred on the dorsal part of 2nd instar larval abdomen by applying 1 µl (10 ng) solution of precocene II in acetone (1%) with a micropipette.
Sensillae on the apex of the third segment and 2 basiconica, 2 trichoid and 1 conical sensillae on the distal part of the second segment. Based on the laboratory studies, with the second instar larval, which were treated 1% Precocene II, after the first molting the considerable changes of antenna cuticle structure were observed. The second and third segments of antenna in many larvae were merged, on second segment have 1-5 sensilla; on top third segment some larvae have only 2-6 sensilla. For some larvae other anomalies were observed also full reduction conical sensilla and preservation of a cuticle of the previous instar.
On the maxillary palp of control larvae have 16 basiconica, 4 trichoid and 1 digitiform sensilla. All basiconica sensilla are placed on the distal apex of third segment. Results of experiments on treated larvae showed, that boundary between two terminal segments of palp often fades, and so the number of sensilla is reduced.
On the labial palp of control larvae have 11 basiconica sensilla. All this sensilla are placed on the distal apex of second segment. Based on experiments, on labial palp often have remainder of cuticle of the previous instar, the number of sensilla is reduced up to 3-11, and in some cases all sensilla are reduced.
Study of section through antenna and palps in treated larvae showed reduction of receptor cells and their dendrites. The structure of cuticle of sense organs differs from the control. Study of imago after emergence from pupa showed, that in some imago were observed reduction in number of sensilla only in maxillary and labial palps and were not observed change in antenna.
Thus, precocene II for CPB larvae cause considerable changes in chemoreceptor organs that expressed in a reduction number of sensilla, and neurons. Most considerable changes in chemoreceptor organs in antenna, maxillary and labial palps are observed after larvae treatment on several series instars. The work was supported by RFBR (grant № 04-04-48779).

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Drosophila melanogaster is repelled by carbon dioxide: behavioural observations in adults and larvae

With their olfactory and gustatory systems insects are able to monitor their chemical environment. They selectively detect and respond to those molecules, which aid their orientation toward feeding sources, oviposition sites and mates. Detection of certain chemicals may also be essential to avoid toxins or other dangerous situations. CO_2 is a rather unspecific cue, constantly present at a relatively high level of 0.035%in the atmosphere. Nevertheless, it is perceived by many insect species and modulates their behaviours.
We are investigating the behavioural responses of *Drosophila melanogaster* to CO_2. These flies feed on fermenting fruits, which produce large amounts of CO_2. We have characterized a class of CO_2 specific receptor neurons in the antenna and discovered that the G-protein coupled receptor Gr21a is expressed exclusively in these cells. Flies in which we have genetically ablated Gr21a expressing cells do not respond to CO_2.
In a choice situation with four converging airflows, individual flies are repelled by high CO_2 concentrations, above 0.1%. However, from physiological experiments we know that their receptor neurons can detect shifts in CO_2 concentrations of as little as 0.02%. In order to reveal behavioural responses close to sensory thresholds we tested 0.02% CO_2 on a background of an attractive odour mixture and found that females were