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Effects of olfactory self- and cross-adaptation on perceiving odor in a moth

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Abstract

Pheromone orientation in moths is an exemplar of olfactory sensitivity. To avoid cross mating, the responses of males to pheromone blends must be high specificity and temporal resolution. We tested the effects of olfactory self- and cross-adaptation of pheromone compounds and mixtures in *Spodoptera litura* moths by electroantennogram (EAG) recordings. The challenge of *S. litura* antennae to a pulse train of its own pheromone blends of Z9,E11-14:OAc and Z9,E12-14:OAc with 200 ms on/off and 1 s on/off indicated that the repetitive stimulation by 200 ms on/off with high dosages resulted in greater adaptation than that by 1 s on/off with low dosages and the adaptation index of Z9,E11-14:OAc in all treatments is significantly larger than that of Z9,E12-14:OAc, suggesting that high dosages with more frequent stimulation prefer to induce sensory adaptations and a different odor coding exist between the two components in the antennal periphery in this moth. The cross-adaptation EAG test among the two pheromone compounds and Z7-12:OAc and Z9-14:OH from congeneric species of *S. litura* showed that each of these compounds adapted the antenna more to that specific compound. The significantly higher adaptation to Z7-12:OAc and Z9-14:OH than to the pheromone components of *S. litura* induced by themselves suggested that both of them are coded by specific odor receptor neurons which are different from those tuned to the pheromone components of *S. litura*. Thus, we proposed that Z7-12:OAc and Z9-14:OH may play an important role in avoidance of heterospecific mating between *S. litura* and its sympatric moth species.

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