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Articles Highlighted

Zinc Nanoparticles Enhance Odorant Responses

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Zinc nanoparticles of 2 nm in diameter contain 40–300 atoms. Viswaprakash et al. isolated such particles from blood samples. When added in femptomolar to picomolar concentrations to odorant vapor pulses used to stimulate isolated rat septal olfactory epithelium, zinc nanoparticles strongly enhanced odorant-induced responses of olfactory sensory neurons as assessed by electroolfactogram and whole-cell patch clamp. Zinc nanoparticles alone or other metal nanoparticles mixed with the odorant stimulus did not produce effects. In marked contrast, zinc ions in the same concentration range diminished responses of olfactory sensory neurons to odorants. Although the site of action could not be determined, the authors speculate that zinc nanoparticles increase the number of receptor–G protein couplings and could be used to enhance and sustain initial olfactory events.

Mice Discriminate "Odorless" Mineral Oils

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Mineral oil is generally described as an odorless substance and therefore used as a common diluent for oil-based odorants and odorant mixtures in many olfaction experiments. Gamble and Smith show that trained mice readily detected mineral oils and discriminated between pairs of mineral oils from different sources. The mice also discriminated between cineole/mineral oil mixtures containing the same odorant concentration but differed in the mineral oil brand. Thus, this diluent appears to possess an odor and should be used with caution in olfactory experiments as mixture interactions can occur and unintentionally alter the perception of the target odorants.

Insights into a Crow's Nose

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It is general belief that birds do not possess a well-developed sense of smell accounting for the indifference to studying avian chemosensation and slowing down our advance in knowledge. However, in some avian species foraging behavior, individual identification or navigation appears to be guided by olfactory cues. Yokosuka et al. investigated the olfactory system of the Japanese Jungle Crow. Although *Corvidae* can distinguish feeds by olfaction, the authors found a poorly developed nasal olfactory system, small and fused olfactory bulbs with a scattered distribution of mitral and tufted cells and barely visible glomeruli. However, like mammals Crows have separate projections of the left and right olfactory nerve to the olfactory bulb. The Crow's olfactory nerves bound few lectins only when compared with mammals, which is consistent with the general poor development of the bird's olfactory system. Thus, Crows appear to have a limited but functional sense of smell and could provide a model to examine the significance of having pairs of olfactory bulbs and left and right olfactory nerve circuits in most vertebrates.

Gestational Diabetes Mellitus and Sweet Taste

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Gestational diabetes mellitus (GDM), that is, glucose intolerance during pregnancy, has been associated with exaggerated sweet taste preference. Tepper et al. designed a longitudinal study to assess sweet taste changes during pregnancy in women with GDM compared with women with normal glucose tolerance (NGT) and nonpregnant controls. They found that late in pregnancy women with GDM liked moderately sweetened milk shakes more than women with NGT. In addition, liking of sweet solutions was correlated with fasting insulin and leptin levels in women with GDM only. The data suggest that higher hedonic ratings for sweet taste in GDM may be related to elevated satiety hormone levels and that the desire for sweets could influence the dietary management of GDM.

Changes in the Olfactory System during Salmons' Lives

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Juvenile salmons imprint to odorants of their natal rivers and use olfaction to find these again when running upstream

as adults to spawn. Kudo et al. present data suggesting that the number of olfactory sensory neurons is synchronized with body size throughout a salmon's life offering an approach to study the mechanisms underlying homing migration.

Antagonistic Odor Interactions

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The best predictor of binary mixture quality is the relation between perceived intensities of the component odorants before mixing. However, this may not be true in case of receptor antagonism. A human olfactory receptor for bourgeonal is known to be blocked by undecanal. Brodin et al. investigated the principles of odor integration for the simultaneous presence of agonist and antagonist. Unlike a control mixture, the bourgeonal–undecanal mixture was dominated by the antagonists but only at higher concentrations suggesting a low-affinity receptor antagonism *in vivo*. Significantly stronger bourgeonal than undecanal was needed to form a symmetric quality supporting the hypothesis that agonist/antagonist presentations can yield percepts dominated by that of the antagonist.

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