

Retronasal Smelling

When something is smelled from within the mouth (*retronasal*) as opposed to being sniffed from outside the skull (*orthonasal*), it can lead to a different perception.

The classic example is that of the durian fruit, which has the stench of raw sewage but smells good in the mouth and, of course, has a pleasant taste. More evidence comes

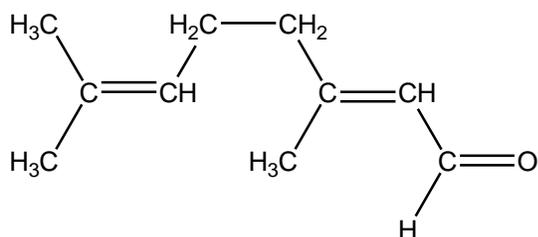


durian fruit

from patients who have lost their orthonasal sense and who are indifferent to the smell of rotten eggs. And yet they can still detect the offensive odor if the responsible gas, H_2S , is introduced into their mouths at the same low concentration of 4 ppm. As if smell wasn't complicated enough already, since different molecules of the same type have to interact with a variety of nasal receptors in a combination-lock-like mechanism to trigger a specific reaction in the brain.

Orthonasal and retronasal olfactory information have been shown to be processed differently on a cerebral level. It is the latter whose data is coupled with that of taste. Other studies suggests that retronasal smelling may often have a trigeminal (facial nerve) component that is not available to orthonasal smelling.

The retronasal mechanism has recently shed light on what makes some tomatoes more



geranial
 $C_{10}H_{16}O$

appealing than others. It turns out that out of a number of the tomato's different volatile components, very few impact its actual taste. But in a retronasal reaction, consumers perceive more sweetness in proportion to the odor of an aldehyde known as geranial, an isomer of the lemon-compound citral. Mutant tomatoes specifically deficient in the biosynthesis of three apocarotenoids (O_2 -cleaved carotenoids), including geranial and two ketones, but with the same amount of sugars, acids and other volatiles, were

considered less sweet and less likable by consumers.

SOURCES

[http://www.cell.com/current-biology/abstract/S0960-9822\(12\)00408-3](http://www.cell.com/current-biology/abstract/S0960-9822(12)00408-3)

<http://archotol.jamanetwork.com/article.aspx?articleid=649745>

Behav Neurosci. 2004 Apr;118(2):412-9.

<http://psych.cornell.edu/sites/default/files/Mechanism%20and%20consequences%20of%20retronasal%20smellng.%20chemoJune08.pdf>