

OLFACTION AND TASTE

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Martini 6th: pp 565-569, 7th: 550-554, 8th: 562-

SPECIAL SENSES: senses which require special organ to serve as **Sensory Apparatus**

Receptors: All sense organs are **transducers**, receive info from environment, transduce to electrochemical nerve impulse send message to brain

Quality of sensation determined by **area of brain stimulated**

If given area of brain stimulated, sensation is felt appropriate and sense to area felt.

This explains phantom-limb, referred pain, olfactory nerve stimulated yields smell sensation

Three main type or receptors:

chemical	taste and smell
mechanical	auditory and balance
photo	vision (infrared on skin).

CHEMICAL: TASTE AND SMELL

SMELL: Olfactory organs (p 562)

Olfactory epithelium with **stereocilia** embedded in **mucus** (from Bowman's glands) in roof of nasal cavity
Efferent nerve fibers pass through **cribriform plate** of the ethmoid bone.

Sniffing directs air flow over this epithelium. Conchae direct away, stopped up nose prevents smelling
as few as four molecules can activate receptor.

Olfactory cortex on **inferior surface of temporal lobes**, reaches without going to thalamus

limbic system connections, hypothalamus lead to **profound emotions** and memories associated. **(Including sex)**

Mechanism poorly understood, but can detect $1/5 \times 10^{10}$, far more sensitive than taste

Stereochemical hypothesis says size and shape (stereochemistry) determine perception of smell.

(50 primary smells, but can distinguish 2,000 - 4,000)

Smell detects only **volatile chemicals**. These **dissolve in mucus** secretions.

Ciliary proteins bind chemical, these trigger cAMP synthesis. cAMP opens Na channels, impulse ensues.

Accommodation: sense of smell easily fatigued. Strong at first, unnoticed soon.

Some moths can smell a female several miles away.

TASTE: gustation: (p 565)

papillae on the tongue, incorrectly called "Taste buds", may have taste buds located on sides

tip of tongue	filiform: (hair shaped)	do not have taste buds
side of tongue	fungiform (fungus shaped)	has about five taste buds
back of tongue	circumvallate (around wall)	has as many as 100 taste buds

Four basic tastes: sweet, salty, sour, bitter. (also **umami**, pleasant amino acids, and **water**)

Different taste buds for each, but appear essentially alike, mostly fungiform.

bitterness	back of tongue	$1/2 \times 10^8$, (1 oz/122,300 gal swimming pool)
sour:	side of tongue	$1/3 \times 10^5$
salty:	anterior border	1/400
sweet:	anterior tip	1/200

Go via CN VII **facial** (anterior 2/3rds) and CN IX **glossopharyngeal** (post 1/3rd of tongue)
medulla oblongata nucleus solitarius

Note that "flavor" is a combination of taste and smell.