

# **A Matter of Taste (and Smell)**

*Sensation & Perception*

## **TASTE**

### **PROTECTING YOUR BODY**

Your sense of taste protects you from unsafe foods. If you ate poisonous or rotten foods, you would probably spit them out immediately, because they usually taste revolting. That way, you stop them from entering your stomach.

Your sense of taste also helps you maintain a consistent chemical balance in your body. Liking sugar and salt for example, satisfies your body's need for carbohydrates and minerals. Similarly, eating sour foods such as oranges and lemons supplies your body with essential vitamins.

### **TASTE BUDS**

Your mouth contains around 10,000 taste buds, most of which are located on and around the tiny bumps on your tongue. Every taste bud detects five primary tastes:

- Sour
- Sweet
- Bitter
- Salty
- Umami - salts of certain acids (for example monosodium glutamate or MSG)

Each of your taste buds contains 50-100 specialised receptor cells. Sticking out of every single one of these receptor cells is a tiny taste hair that checks out the food chemicals in your saliva. When these taste hairs are stimulated, they send nerve impulses to your brain. Each taste hair responds best to one of the five basic tastes.

### **TASTES AND FLAVOURS**

For you to enjoy the full flavour of a sizzling Sunday roast or a rich chocolate mousse, you need more than your basic tastes. You also require your sense of smell. If you have a cold, the lining of your nose swells and you temporarily lose your sense of smell. Even though your tongue is still able to identify the basic tastes, the food you eat will taste bland.

Additionally, temperature and texture influence how much you appreciate foods. When you eat 'hot' foods like chilli peppers, you actually excite the pain receptors in your mouth.

### **GENETICS OF TASTE**

Does broccoli taste bitter? Is eating hot peppers intensely painful? Scientific evidence suggests a genetic basis for food preferences -- and it's all on the tip of the tongue. Infants are born with a genetically determined number of taste buds. Some have only a few hundred, while others have tens of thousands per square centimeter. The mushroom-shaped structures on the tip of your tongue are called fungiform papillae. Each contains about a half dozen taste buds. Other bumps on the tongue are different kinds of papillae that do not contain taste buds.

Linda Bartoshuk, is professor of surgery and taste researcher at Yale University School of Medicine. She divides people into three groups: supertasters (25% of the population), medium tasters (50%) and nontasters (25%). According to her research, supertasters have many more taste buds per square centimeter, which enables them to experience the taste, temperature and texture of foods more keenly than nontasters.

Of all the senses, taste is the least understood. We do know that smell is closely associated with taste. In the 1930s, researchers accidentally discovered a chemical substance that was tasteless to about 25% of people and bitter to the

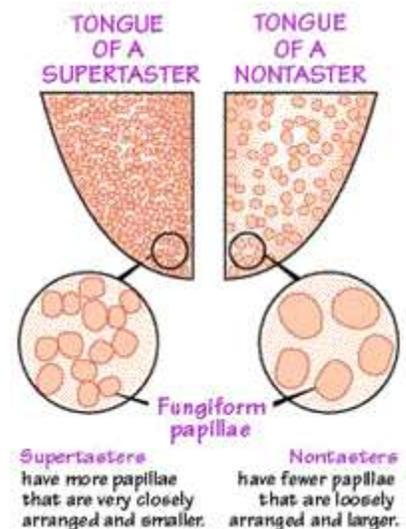
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other 75%. Today's genetic studies continue to provide more data about the complex sense of taste.

### ACTIVITY: ARE YOU A SUPERTASTER?

Here's a simplified adaptation of Bartoshuk's taster test you could try using blue food coloring and a plastic reinforcement ring for a three-hole binder (paper reinforcement rings get mushy). Use a cotton swab to wipe some blue food coloring on the tip of your tongue. Place the ring on your tongue. If you are a medium taster, you'll see only a few little "mushrooms" inside the ring's opening. If you're a supertaster, you'll find more than 25 of them within the circle. How many do you count?



### QUESTIONS

1. What might be some evolutionary advantages to being a supertaster -- for animals and humans?
2. What other factors might explain a person's food preferences?
3. Supertasters find coffee and cruciferous vegetables (broccoli, cabbage) too bitter, and sugary foods sickeningly sweet. Supertasters can also detect gradations in fat; for example, they can taste the difference between skim and whole milk. Using these findings, design a taste-testing experiment to identify supertasters.
4. Columbus and other explorers introduced peppers to the rest of the world, along with other New World foods like potatoes and tomatoes. Research different kinds of peppers used in cuisines throughout the U.S. and the world. What peppers are grown in your area or available at local markets?
5. All peppers are rated on a heat scale (bell peppers are zero). Look up the ratings at: [www.wiw.org/~corey/chile/scoville.html](http://www.wiw.org/~corey/chile/scoville.html)

## SMELL

### WARNING MECHANISM

Your sense of smell warns you of dangers such as smoke and poisonous gases. It also helps you appreciate the full flavours of food and drink. Your sense of smell is **10,000 times** more sensitive than your sense of taste.

### OLFACTORY RECEPTORS

You are able to detect thousands of different smells. The receptors that sense smells are called **olfactory receptors**. They occupy a stamp-sized area in the roof of your **nasal cavity**, the hollow space inside your nose.

Tiny hairs, made of nerve fibres, dangle from all your olfactory receptors. They are covered with a layer of mucus. If a smell, formed by chemicals in the air, dissolves in this mucus, the hairs absorb it and excite your olfactory receptors. A few molecules are enough to activate these extremely sensitive receptors.

### LINKED TO MEMORIES

When your olfactory receptors are stimulated, they transmit impulses to your brain. This pathway is directly connected to your **limbic system**, the part of your brain that deals with emotions. That's why your reactions to smell are rarely neutral - you usually either like or dislike a smell. Smells also leave long-lasting impressions and are strongly linked to your memories. The scent of mown grass, for example, might remind you of a childhood summer holiday, and the smell of chocolate chip cookies may make you think of your grandmother.

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