

Genetics of Taste

Background:

The sense of taste in humans depends on clusters of sensors called *taste buds*. The taste buds are embedded in the epithelium of the tongue, and many are found on the raised *papillae* of the tongue. A tongue viewed in a mirror might actually look fuzzy because of the papillae. There are many taste buds on each papilla.

Taste sensation involves chemical interactions prior to nerve stimulation. A lot of chemistry occurs on the tongue and as a result, its epithelium is shed and replaced at a rapid rate. Individual taste buds last only a few days before they are replaced.

It is generally accepted that humans can perceive basically four tastes: sweet, salty, sour, and bitter. Particular regions of the tongue have taste buds responsible for these general categories of taste, but the regions overlap to some extent. The tongue can be mapped by dipping toothpicks in different solutions and touching them to different regions of the surface of the tongue. *See Figure 1 for generalized regions of taste often found on the surface of the tongue.* The final ability to "taste" something is a complex interaction between olfactory sensors and stimulation of the taste buds. When a substance is placed in the mouth, it quickly disperses to all four taste areas and creates a nearly instant taste sensation. Where the taste sensation occurs is really not discernible and is of little consequence when we are actually tasting something. What is perhaps more interesting is our ability to taste or not taste a particular substance.

Several interesting chemicals have been discovered that have been used by scientists to explore the genetics of the sense of taste. One of these chemicals is PTC (Phenyl thiocarbamide). Some people taste this bitter-tasting chemical very easily while other people can't taste it at all! People who can taste PTC are referred to as "tasters." Those who cannot taste PTC are called "non-tasters." Not only is the difference in ability to taste this substance interesting, but it has also been found to be an inherited characteristic.

In this lab you will test your ability and the ability of your classmates to taste certain chemicals – PTC, thiourea, and sodium benzoate. Once you have collected the data, you will answer questions based on those numbers.

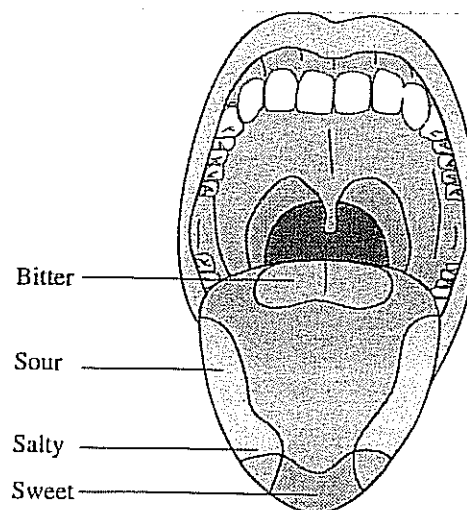


Figure 1

Genetics of Taste: Background Questions

After reading the background information for the genetics of taste lab, answer the following questions.

1. The clusters of sensors in humans are called what?
2. In what two places are taste buds located?
3. Why does a tongue look fuzzy when viewed in the mirror?
4. Why are the epithelial cells of the tongue replaced often?
5. What is the average life span of a tongue epithelial cell?
6. What four tastes can humans generally perceive?
7. Looking at Figure 1, where is the bitter taste sensors located on the tongue?
8. The final ability to taste depends on the interaction between what two things?
9. How does PTC taste to tasters?
10. What has been found to be an inherited characteristic?

Name: _____

Genetics of Taste Worksheet

Class Total Data Chart

	PTC		Thiourea		Sodium Benzoate					
	Taster	Non-taster	Taster	Non-taster	Sweet	Sour	Salty	Bitter	Other	Non-taster
Yourself										
Class Data										
%										

1. How do the percentages of tasters versus non-tasters compare between PTC and thiourea? Were the tasters the same individuals for both substances?

2. What general statement can you make about being a taster and non-taster relative to PTC and thiourea?

3. How does the ability to taste sodium benzoate compare to the ability to taste PTC or thiourea?

4. How would you describe the variation in individuals in their ability to taste different substances?

5. Analyze the statement "The ability to taste is inherited." What do you think? Defend your answer,