PTC Testing

Overview: Stick your tongue out and look in a mirror. What do you see? Those tiny bumps all over your tongue aren't really your taste buds. They are papillae, and most of them do contain taste buds, which are the tiny sensory organs on your tongue that allow you to taste food. More specifically, they help you to distinguish between sweet, sour, salty, and bitter flavors. It's tiny microvilli (hair-like protrusions) on the papillae that have the taste receptors which send the sweet, sour, salty, or bitter messages to the brain.

Today, we will check to see if you have a dominant or recessive gene for a distinct genetic characteristic. We'll do this by testing your reaction to the taste of a chemical called phenylthiocarbamide (or PTC, for short). The interesting thing about PTC is that some people can taste it – and generally have a very adverse reaction. However, some people can't taste it at all.

Materials

- PTC paper
- family members

Experiment

1. Put the PTC paper in your mouth. If you have the dominant gene, it will usually taste pretty bitter. It might also be sour or even a little sweet. If it tastes like a piece of paper, you have a recessive gene.
2. After testing your paper, be sure to note whether you are a *taster* or *non-taster*.
3. Now test at least five more people in your family and note their reactions as *tasters* or *non-tasters*. Also note their relationship to you.
4. If you have enough PTC paper, make a genetic tree of your responses. Put Mom and Dad at the center and list you and your siblings branching out beneath them. Then list both sets of grandparents above each of your parents. For an interesting visual representation, circle the names of family members who test positive and leave the negative testers uncircled.

PTC Testing Data Table

Subject tested	Taster or Non-Taster?	Dominant or Recessive Gene?

Reading

The gene that determines whether or not you can taste PTC is a part of your DNA (deoxyribonucleic acid). It is the genetic blueprint that you were born with and it determines everything about you: from hair color to the size of your feet. But DNA also plays an important role in how your five senses function. Colorblindness is a genetic deficiency in which a person cannot see colors or has a difficult time with distinguishing them. It can range in severity. Some people who are colorblind can't tell the difference between colors like red and green, but some see no colors at all. Everything looks like a black and white movie to them. Just like colorblindness, our taste sensitivity can vary. Maybe this explains why some people like liver and Brussels sprouts and others can't stand them!

So to relate this to our test, the ability to taste PTC comes from a gene. We know that if both of your parents can taste it, there is a high likelihood that you will be able to taste it, too. About 70%, or 7 out of 10, people can taste it. But what does it mean? In truth, not a lot. It doesn't mean you have a highly developed palate or a better sense of taste. It just means you are lucky enough to have inherited a gene that allows you to taste a disgusting, bitter chemical on a piece of paper.

Exercises

1. What are the tiny hair-like organelles that send taste messages to your brain called?
2. What are the bumps on your tongue called?
3. What kind of trait does this experiment test?

Answers to Exercises: PTC Testing

1. What are the tiny hair-like organelles that send taste messages to your brain called? (microvilli)
2. What are the bumps on your tongue called? (papillae)
3. What kind of trait does this experiment test? (a genetic trait – dominant or recessive gene)