

Reading 2.1 – Do the Traits I Inherited Affect My Sense of Taste or Smell?

Getting ready

Have you ever been told, “Eat your vegetables!”? You know that vegetables are good for your health, but you still might have some that you just do not like. Fill in the two charts below.

Vegetables I like	Vegetables I do not like

Think about the ones that you do not like. Why do you dislike them? You may have different reasons for different vegetables. List the reasons you do not like certain vegetables.



In class, you tasted PTC paper. Some of your classmates thought it tasted bitter, but some people could not taste anything at all. You also tasted Brussels sprouts, which some people thought tasted bitter, too. As you read, you will learn more about the connection between whether people can taste PTC and whether or not they like the taste of some vegetables. As you read, look for the link between these two tastes.

Who discovered PTC and its Link to inherited Traits?

In 1931, Arthur Fox was doing research on artificial sweeteners in the laboratory at the DuPont chemical company. He was using a powdered chemical that accidentally blew into the air around him. He and another scientist got some in their mouths, and the other man said how bitter the chemical tasted. Dr. Fox was surprised because he did not taste anything. Since the chemical he was working on was not dangerous, he decided

to taste it again. Both he and his partner tasted it a second time and got the same results. Dr. Fox did not taste anything, but his partner insisted that it tasted very bitter.



Dr. Fox wanted to learn more about this chemical, so he had friends, family members, and

other scientists taste it. Some people tasted nothing, but others found it extremely bitter. The chemical Fox was using is phenylthiocarbamide (PTC). This is the same chemical you tasted in class. Other scientists began to study people's ability to taste PTC. They discovered that the ability to taste it seemed to be the same within families. Children who could taste PTC also had at least one parent who could taste PTC. Children who could not taste the chemical usually had parents who could not taste it either. It was what *scientists call an inherited trait*. An inherited trait is passed from parents to their children. The evidence was so strong that this trait was inherited and ran in families, that long before scientists knew how to do DNA testing, PTC tasting was used as evidence to prove that people were related to each other.

Why might it be important for people to be sensitive to bitter-tasting things?



What does PTC have to do with Vegetables?

Many plants produce a chemical similar to the bitter tasting PTC in order to protect themselves. If a plant tastes bad, animals are not likely to eat it. In some plants, such chemicals are poisonous. When your ancient human ancestors were living in caves and eating whatever grew nearby, it was important for them to be able to detect plants that might be harmful. Having taste receptors that were sensitive to the bitter chemicals in the plants was important, as it may have saved some people from eating poisonous plants.

In the IQWST LS2 unit, you learn that you have receptors in your fingers that detect pressure and allow you to touch some things and not others. You also have receptors on your tongue that are sensitive to certain tastes. In class, you learned that there are five kinds of tastes: bitter, sweet, sour, salty and umami. You have receptors on your tongue to taste bitter, just like your ancient ancestors did. Just as people are different in many traits, the ability to taste is also different. The ability to taste PTC or the chemicals in Brussels sprouts is not the same for everyone. You do not have to worry about picking and eating poisonous plants, but because some vegetables like Brussels sprouts and broccoli have these bitter chemicals in them, many people do not like them.

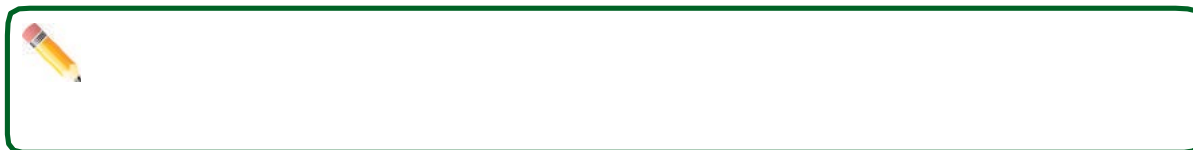
About that Broccoli

If you do not like broccoli, you are not the only one. Back in 1990, the 41st President of the United States, George H. W. Bush, made the following statement: "I do not like broccoli, and I haven't liked it since I was a little kid and my mother made me eat it. And I'm President of the United States and I'm not going to eat any more broccoli!"



Not only did the President not eat any more broccoli, he banned broccoli from the menu at the White House where he lived in Washington, D.C. The entire time he was in the White House, no broccoli was served.

If you gave President Bush a strip of PTC paper, do you think he would be able to taste it? Explain.



Do Inherited Traits Only Affect Taste?

You have learned that different substances have different odors because of the molecules of which they are made. The receptors in your nose detect the molecules of chemicals in the air, and you experience that as being able to smell something. Do you think everyone has the same ability to detect odors? Why?



Almost 200 years ago, doctors began to make a connection between eating certain foods and the odor of human urine. Farmers had grown asparagus for 2000 years, but in the early 1700s, they began using a fertilizer that contained a lot of sulfur. This fertilizer gives asparagus its distinctive flavor. Scientists also believe that it is the source of a strong-smelling urine odor.

It only takes about 20–30 minutes after eating asparagus for the effects to show up in someone's urine. However, not everyone can smell it. Scientists have studied this for years. They discovered that when a person eats asparagus, and their body digests it, a chemical compound containing sulfur is released from the body. Some people's bodies release the compound and some do not. Scientists have discovered that this ability to release the compound is an inherited trait. Based on their studies, scientists believe that about 80% of Americans produce this compound in their urine when they eat asparagus. Those people inherited the trait from their parents.

If so many people produce the chemical, why doesn't everyone smell it? Explain your ideas.



Some scientists believe that only some people produce the smelly urine when they eat asparagus, and only some people have the ability to smell the odor. Studies show that between 75% and 90% of people cannot detect the bad odor. So, even though most people produce the chemical in their bodies, most people cannot smell it in their urine.

You have read about three inherited traits:

1. The tongue's ability to detect PTC (or not).
2. The body's ability to produce smelly urine after eating asparagus (or not).
3. The nose's ability to detect the strong urine smell (or not).

Everyone who has these traits got them from their parents.

Based on what you have done in class and read, do you think that if someone has the trait for tasting PTC, they could still like broccoli or Brussels sprouts? Explain.

