

Taste Blind?

Core Concepts

- Receptors, nerve cell pathways, and taste areas of the brain are involved in sensing tastes.
- People differ in their response to taste sensations.
- A correlation is a relationship between two variables that tend to occur together.
- Some characteristics associated with the nervous system and behavior can be inherited.

Class time required:

Three forty minute class periods (an additional class period if Parts 6 and 7 are done).

Teacher Provides:

For each student

- 1 copy **Taste Blind?** student handout. Only copy pages you will have students complete. Parts 6 and 7 are optional extensions for honors or advanced classes.
- 1 color copy of **Taste and the Nervous System** diagram sheet (page v). This may be laminated or put in a sheet protector if used for multiple classes. If needed, this may be duplicated in black/white.
- Small plastic bag labeled “Control Paper” containing several pieces of control taste paper. Order 144116 control test paper from Wards.
- Small plastic bag labeled “PTC Paper” containing several strips of PTC taste paper. Order 144116 PTC test paper from Wards *NOTE: Some students find the PTC taste very unpleasant. Consider providing small cups of water or pieces of hard candy to help students get rid of the lingering PTC taste.*
- Optional—a small piece of washed raw broccoli for each student to taste. Many students have never tasted raw broccoli. *Follow appropriate food safety procedures and do not force students to try the raw broccoli.*

For the class:

- Four signs placed in different areas of the room:

Tasters who like uncooked broccoli

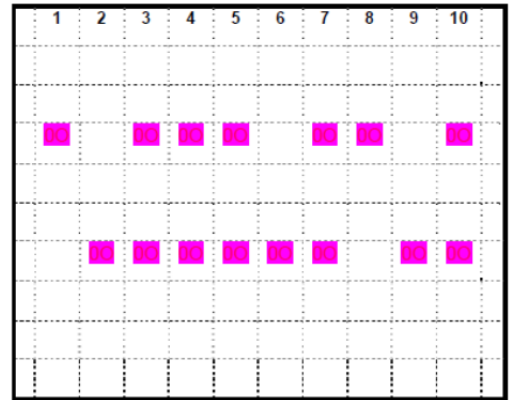
Tasters who do not like uncooked

Non-tasters who like uncooked

Non-tasters who do not like uncooked

For *Part 5: PTC Inheritance*, each student team will need:

- Simulated paper gel (see page vi). Cut out and use a cotton swab to apply tiny spots of 1% phenolphthalein in the locations shown on the right.
- Tube or cup of labeled “DNA Stain” containing 1/8 teaspoon of Arm & Hammer washing soda.
- Plastic plate (6 or 7 inch) or tray large enough to fit the simulated paper gel.
- Plastic stirrer
- Access to water



Suggested Class Procedure:

1. Distribute to each student one copy of **Taste Blind?** Read the paragraph in the box in **Part 1: Are you taste blind.**
2. Distribute a bag of control paper and PTC paper to each student. Ask students to read and follow the directions to determine if they are PTC tasters or non-tasters.
3. Count the number of students who are tasters. Count the number of students who are non-tasters when indicated in the instructions. Write this information on the board.
4. Provide an opportunity for students to share their answers for the question 8 in Part 1.
5. Distribute copies of **Taste and the Nervous System** diagram sheet to each student.
6. Students work individually or with a partner to complete **Part 2: PTC Tasting and the Nervous System.**
7. Ask several students to share their answers to the questions in Part 2.
8. Students work individually or with a partner to complete **Part 3: Taste Receptors and Evolution.** This may be done as homework or in class.
9. Ask several students to share their answers to the questions in Part 3.
10. For **Part 4: PTC Tasting and Broccoli Tasting**, consider giving students an opportunity to taste small samples of uncooked broccoli. Students answer question 1 by circling the picture that best describes them. Read the research question and the definition for “correlation” aloud to the class.
11. Allow time for each student to write a hypothesis in question 2.

12. Students move to stand by the sign that best describes them. *Some students may have difficulty deciding whether they like or do not like broccoli. You may need to encourage these students to select the one that best fits them.*
13. Count and record the number of students on each sign. Record these in large numbers on each of the signs.
14. Students work individually or with a partner to complete **Part 4: PTC Tasting and Broccoli Tasting**.
15. Ask several students to share their answers to the questions 6, 7, and 8 in **Part 4**.
16. **Part 5: PTC Inheritance** requires prior instruction on pedigree analysis. If students have not done pedigrees, step them through the process by asking the following questions:
 - Which individuals have the **tt** genotype? Hint: They would be non-tasters. Write **tt** for these individuals.
 - Which individuals have at least one **T** gene? Hint: They would be tasters. Write a **T** for these individuals.
 - Which individuals with a **T** gene had to get a **t** gene from one of their parents? Hint: They would have one parent who had the **tt** genotype. Add a **t** after the **T** for these individuals.
 - Which individuals with a **T** gene had a **t** gene that they passed on to a **tt** offspring? Add a **t** after the **T** for these individuals.
 - Write a **?** after the **T** for the all of the remaining individuals.
17. Distribute lab materials need for students to complete Part 5. Each student team will need:
 - Simulated paper gel (see page vi) that you have spotted with phenolphthalein.
 - Tube or cup of labeled “DNA stain” containing 1/8 teaspoon of Arm & Hammer washing soda.
 - White plastic plate (6 or 7 inch) or white foam meat tray large enough to fit the simulated paper gel.
 - Plastic stirrer
 - Access to water

Note: Parts 6 and 7 are optional. They were designed for honors or advanced classes.

18. **Part 6: PTC Population Genetics and Evolution** applies Hardy-Weinberg conditions to explore the evolution of PTC tasting. Students should work in small groups to brainstorm ideas for a scenario in which the seven conditions are NOT met.
19. Have several groups share their ideas for a scenario in which evolution of a population with only homozygous dominant tasters.

20. **Part 7: Population Genetics and PTC Tasting** asks students to use the Hardy-Weinberg equation to calculate gene and genotype frequencies. After using the data provided, you may wish to ask students to apply what they learned to collect and analyze data from their class and/or other classes.

Additional Teacher or Student Resources:

- ***PTC: Genes and Bitter Taste*** at <http://learn.genetics.utah.edu/content/begin/traits/ptc/>
- ***Scientists Find Bitter Taste Gene*** at <http://faculty.washington.edu/chudler/bitter.html>
- ***A Word about PTC Safety*** at <http://teach.genetics.utah.edu/content/begin/traits/tree.html>
Scroll to the bottom of the page.

Taste and the Nervous System

