# Chapter 9 Project

## Tricky Taste Buds

### Project Goal + Timeline

In this project, we will be reviewing your knowledge of cell communication with a simple taste experiment. This project should be completed in a group of two students within a two-hour time frame.

Taste perception is due to the interaction of taste molecules in foods (tastants) with taste receptor cells. These cells, which are bundled in clusters called taste buds, have specialized receptors on their surfaces that respond to particular tastants. For example, sweet taste receptors respond to sugar and similar molecules, while bitter taste receptors respond to compounds call alkaloids. The binding of a tastant to a particular receptor stimulates a change in the cell that is transduced to the nervous system to give you the perception of the particular taste.

Is it possible to confuse these taste receptor cells? In this project, you'll be experimenting with two substances, Gymnema tea and miracle fruit tablets, that can affect the perception of taste. Gymnema tea is made from the leaves of the *Gymnema sylvestre* plant, a plant native to India and Africa. The miracle fruit tablets contain the compound miraculin, a compound extracted from the berries of the plant *Synsepalum dulcificum*.

### Directions

#### Part 1: Tricky Taste Buds Experiment

Select one member of your group to be the "Gymnema Tester" and one to be the "Miracle Fruit Tester."

Then, you'll taste eight substances. Have both members of your group taste each substance. In between each substance, rinse your mouth with water.

Taste the following substances in the given order. As you taste each substance, rate each for the perception of sweet, sour, salt, and bitter on a scale from 0 to 5 in the appropriate "Before" row of Table 1 for each substance. (For example, the "Gymnema tester" will complete the "Before tea" row for each substance.) The rating 0 represents no perceived taste while the rating of 5 represents a very intense taste.

- Salt
- Aspartame
- Raw broccoli
- Sugar
- Chocolate candy
- Lemon wedge
- Apple cider vinegar
- Sweet cereal bar

After you've tasted each substance once, get a sample of Gymnema tea and a sample of the miracle fruit tablet.

- For the "Gymnema Tester," hold one ounce of tea in your mouth for 30 seconds. Make sure the tea contacts all areas of the mouth. Then, spit the tea into the sink and rinse your mouth with water.
- For the "Miracle Fruit Tester," allow the tablet to dissolve on your tongue without chewing it, then swish it around your mouth.

Next, have both group members retaste each of the samples, starting with salt and following the order in the list. Continue to rate each sample for each of the taste perceptions on the scale from 0 to 5 to complete Table 1.

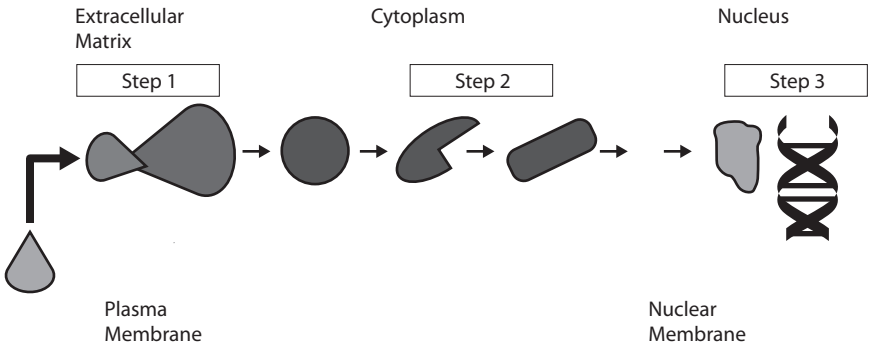
**TABLE 1:** Taste Perceptions Before and After Treatment with Gymnema Tea and Miracle Fruit

| | | Taste ratings (0–5) | | | |
|---|---|---|---|---|---|
| **Substance** | | **Sweet** | **Sour** | **Salty** | **Bitter** |
| Salt | Before tea | | | | |
| | After tea | | | | |
| | Before miracle fruit | | | | |
| | After miracle fruit | | | | |
| Aspartame | Before tea | | | | |
| | After tea | | | | |
| | Before miracle fruit | | | | |
| | After miracle fruit | | | | |
| Raw broccoli | Before tea | | | | |
| | After tea | | | | |
| | Before miracle fruit | | | | |
| | After miracle fruit | | | | |
| Sugar | Before tea | | | | |
| | After tea | | | | |
| | Before miracle fruit | | | | |
| | After miracle fruit | | | | |
| Chocolate candy | Before tea | | | | |
| | After tea | | | | |
| | Before miracle fruit | | | | |
| | After miracle fruit | | | | |
| Lemon wedge | Before tea | | | | |
| | After tea | | | | |
| | Before miracle fruit | | | | |
| | After miracle fruit | | | | |
| Apple cider vinegar | Before tea | | | | |
| | After tea | | | | |
| | Before miracle fruit | | | | |
| | After miracle fruit | | | | |
| Sweet cereal bar | Before tea | | | | |
| | After tea | | | | |
| | Before miracle fruit | | | | |
| | After miracle fruit | | | | |

## Part 2: Conclusion Questions

1. For each substance, compare the taste ratings from before the treatment with the Gymnema tea to the taste rating after the treatment with the Gymnema tea.
2. For each substance, compare the taste ratings from before the treatment with miracle fruit to the taste rating after the treatment with miracle fruit.
3. Based on your response to question 1, what can you conclude about how Gymnema tea affects the sense of taste? Which types of taste were altered?
4. Based on your response to question 2, what can you conclude about how miracle fruit affects the sense of taste? Which types of taste were altered?
5. What might be the possible mechanism for the effect of Gymnema on the perception of taste?

6. What might be the possible mechanism for the effect of miracle fruit on the perception of taste?
7. The following shows a generic signal transduction pathway. Briefly identify and explain each step in the pathway.




## Project Materials

- Salt
- Aspartame
- Raw broccoli
- Sugar
- Chocolate candy
- Lemon wedge
- Apple cider vinegar
- Sweet cereal bar
- Gymnema tea
- Miracle fruit tablets
- Pen or pencil
- Table and questions

## Student Checklist

- ☐ Perform the experiment as stated in the instructions
- ☐ Complete the table from experimental data
- ☐ Complete the Conclusion Questions