Are you a bitter taster?

Overview

- Today you get to explore the genetics behind your ability to taste bitter substances.
- Even small difference in your DNA code—your **genotype**—can lead to major differences in traits—your **phenotype**.
- You are investigating just one of your bitter-taste genes. Since PTC tasting is easy to test, it's a great way to explore how biomedical research works.

Bitter melon

Some basic genetics concepts

Genes: Your cells' operating instructions spelled out in DNA "code."

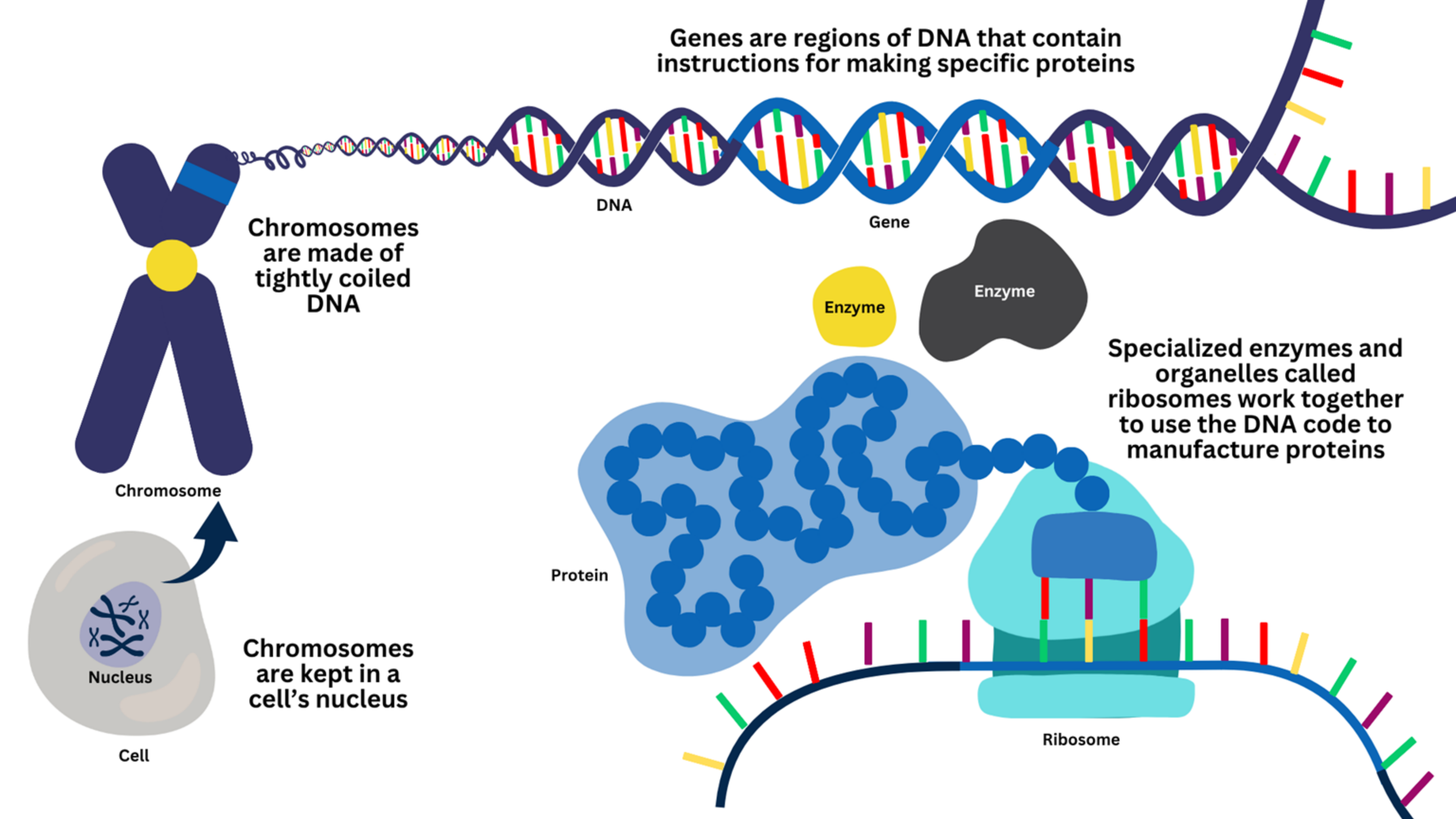
- Everyone's genes are just a little bit different—sometimes quite a bit!

Proteins: Complex molecules with specialized tasks.

- Your cells' machinery "reads" genes to make proteins.
- If your genetic code is different, your proteins might be different, too.

Genotype: Your personal collection of genes

Phenotype: Your personal collection of proteins that make up your body

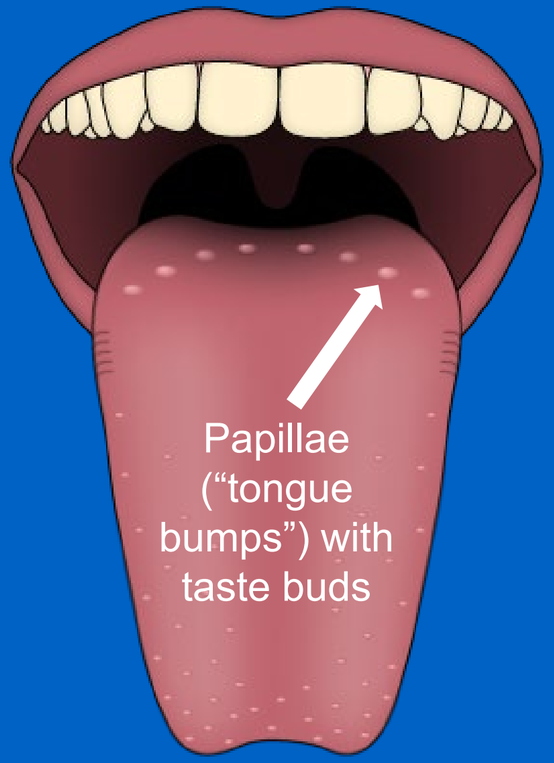

Genes are regions of DNA that contain instructions for making specific proteins
DNA
Gene
Chromosomes are made of tightly coiled DNA
Chromosome
Enzyme
Enzyme
Specialized enzymes and organelles called ribosomes work together to use the DNA code to manufacture proteins
Protein
Ribosome
Nucleus
Chromosomes are kept in a cell's nucleus
Cell

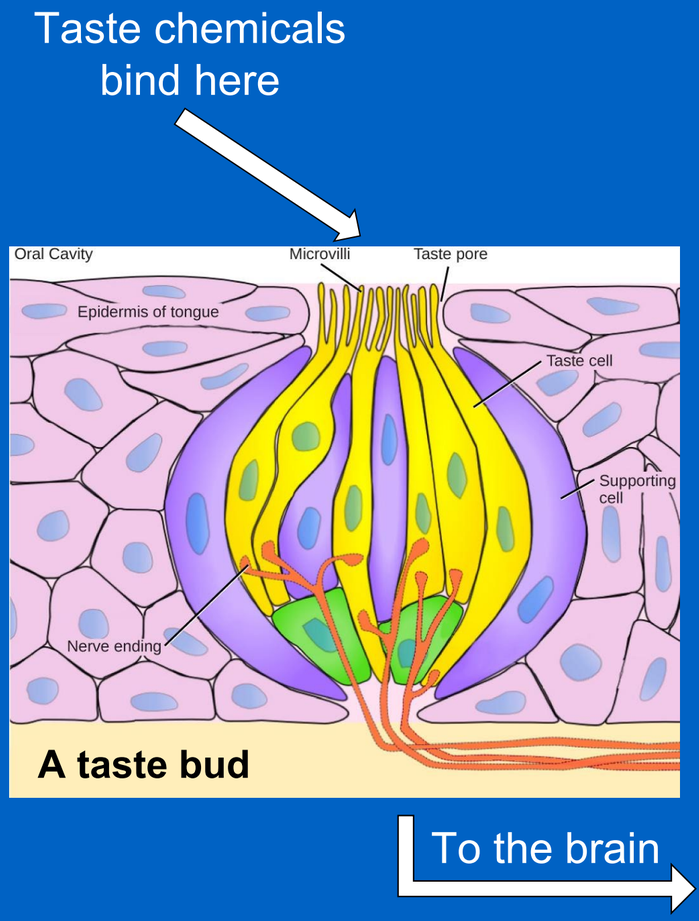
Broccoli: yuck or yum?

1. Some taste preferences are genetic!
2. Some people like bitter foods, like coffee or Brussels sprouts.
3. Others can’t stand them!
4. Why? The DNA sequence of one of their bitter taste receptors is a little different.
5. It’s a gene called **TAS2R38**, which makes a protein in your taste buds.

Our bitter-tasting ability is genetic!

- Each of the 5 tastes has its own receptor cell on your tongue:
  - Bitter
  - Sour
  - Salty
  - Sweet
  - Umami (meaty/savory)
- Each taste-receptor cell has its own receptor proteins.
- When a taste chemical binds to a taste receptor, the receptor cells send signals to your brain.
- Taster Receptor 2 Member 38 (TAS2R38) is a bitter-taste receptor.





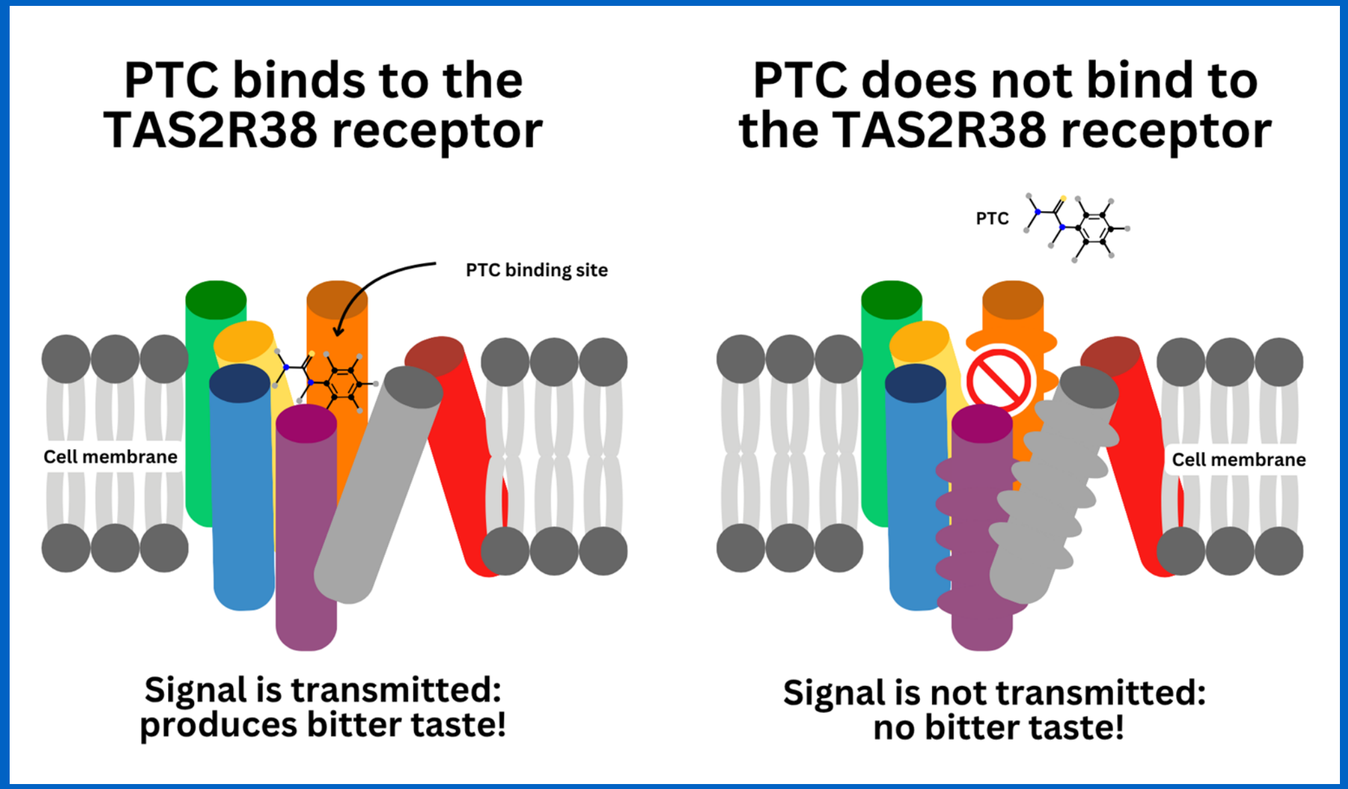
Tasting bitter compounds: How it works

PTC is a bitter chemical . . .

- . . . but only if you have a taster allele (variant) of TAS2R38!

There are two alleles (DNA variants) of TAS2R38:

- Taster: PTC binds to receptor.
- Nontaster: PTC does not bind to receptor.



Can you taste PTC? If so, how bitter is it?

PTC PAPER TASTING PROCEDURE

1. Place a piece of control taste paper on the tip of your tongue. Don't swallow it!

2. Remove the control paper from your tongue and dispose of it in the solid waste container.

3. Rinse your mouth with water and spit into your team's liquid waste container.

4. Place a PTC taste paper on the tip of your tongue. If you don't taste anything at first, leave the paper on your tongue for a few more seconds. Don't swallow it! If you sense a bitter taste, then you are a PTC taster.

5. Rinse your mouth with water and spit into your team's liquid waste container.

There are different levels of PTC tasting ability

If the paper tastes awful, you are a **strong taster**.

If you perceive only a slight bitter taste, you are a **weak taster**.

If it tastes like the control paper, you are a **nontaster**.