Extracting DNA from a Banana



Grade: 8th Grade | **Topic:** Banana DNA Extraction | **Measurement:** US Customary (cups, ounces, inches, etc.)

Purpose

This experiment shows how to extract DNA from a banana using household items. It helps students see DNA with their own eyes and understand what DNA is made of.

Hypothesis

If I mash a banana and mix it with soap and salt, then I will be able to see the DNA strands because the soap breaks open the cells and the salt helps the DNA stick together.

Materials

- 1 ripe banana
- 1/2 cup water
- 1 teaspoon salt
- 2 teaspoons liquid dish soap
- 1 clear drinking glass or small bowl
- 1 coffee filter or paper towel
- 1 small cup for mixing
- 1 wooden stir stick or spoon
- 1 toothpick or clean wooden skewer
- Measuring spoons
- A few drops of rubbing alcohol (chilled in the freezer for 30 minutes)
- Small clear container or test tube (optional)

Procedure

- 1. Peel the banana and place about half of it into the clear glass or small bowl.
- 2. Mash the banana thoroughly with the wooden stir stick or spoon until it becomes a smooth paste.
- 3. In the small cup, mix 1/2 cup of water, 1 teaspoon of salt, and 2 teaspoons of liquid dish soap gently until the salt dissolves.
- 4. Pour the soap solution into the mashed banana and stir gently for 2 minutes. Avoid creating too many bubbles.
- 5. Place the coffee filter or paper towel over another clean glass or bowl.
- 6. Slowly pour the banana and soap mixture onto the coffee filter to strain out the solids. Let the liquid drip through for about 10 minutes.
- 7. Carefully pour the filtered liquid into a small clear container or test tube if you have one.
- 8. Tilt the container and slowly add the chilled rubbing alcohol down the side so it forms a layer on top of the banana liquid. Use about the same amount of rubbing alcohol as banana liquid.
- 9. Wait quietly for 2–5 minutes. White, stringy, cloudy strands will start to appear between the two layers. This is the banana's DNA.

10. Use the toothpick or skewer to spool (twist and lift) the DNA strands out of the liquid for closer observation.

Results

White, thread-like strands should appear in the alcohol layer, showing the DNA extracted from the banana cells.

Conclusion

The soap broke open the banana cells and released the DNA into the liquid. The salt helped the DNA clump together, and the cold alcohol caused the DNA to become visible as strands.

Learning Objectives

- Understand that DNA is a molecule inside cells that carries genetic information.
- Learn how to break open cells to release DNA using simple materials.
- Observe the physical appearance of DNA outside of cells.
- Practice following scientific steps carefully to conduct an experiment.

Teacher Notes:

Key Concept: DNA is a molecule that carries genetic instructions inside all living cells. This activity reveals DNA by breaking cell membranes with soap and making DNA visible with salt and alcohol.

Answer/Explanation: Dish soap dissolves the lipid membranes of cells, releasing DNA into the solution. Salt helps neutralize the DNA's charge, allowing it to clump together, and alcohol causes the DNA to precipitate out of the liquid, making it visible.

Teaching Tips:

• Make sure the rubbing alcohol is very cold before starting for best results. 2. Stir gently to avoid breaking the DNA strands. 3. Explain each step's purpose to help students understand the science behind it. 4. Encourage careful observation and drawing of the DNA strands to reinforce learning.

Relevant Standards: NGSS MS-LS1-1: Conduct an investigation to provide evidence that living things are made of cells., NGSS MS-LS3-1: Develop and use a model to describe why structural changes to genes (mutations) may affect proteins and traits.

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