

Skills and Strategies

- Processing and Analyzing Data
- Evaluating
- Communicating

Safety

- Handle the glass rod carefully.
- Dispose of materials as directed by your teacher.

What You Need

- small piece of ripe banana
- small resealable plastic bag
- graduated cylinders
- 10 mL 0.9% table salt in water
- 3 mL dishwashing liquid
- cheesecloth
- 250 mL beaker
- large test tube
- test tube rack
- ice-cold isopropanol
- stirring rod

Isolating DNA

To study DNA, scientists must first isolate it from the rest of the material of the cell. This can be done by breaking open the cell and the nucleus, and then isolating the DNA. In this investigation, you will isolate DNA from the cells of a banana.

Question

How can DNA be isolated from plant cells, and what does it look like?

Procedure

1. Work with a partner. Place about one quarter of a ripe banana in a small resealable plastic bag. Seal the bag, and use your fingers to squash the banana until no visible chunks remain.
2. Use a graduated cylinder to measure 10 mL of the table salt solution, and add it to the bag. Mix thoroughly by gently squeezing the contents of the bag.
3. Use a graduated cylinder to measure 3 mL of dishwashing liquid, and add it to the bag. Mix gently so that you do not create any bubbles.
4. Lay a piece of cheesecloth over a beaker. One partner will hold the cloth steady. The other partner should pour the banana mixture onto the cloth, over the beaker.
5. Allow any liquid to pass through into the beaker. Wrap the cheesecloth around the banana mixture that remains and gently squeeze out any remaining liquid into the beaker. Dispose of the banana residue as your teacher instructs.
6. Transfer 2 mL of the liquid to a large test tube.
7. Use a graduated cylinder to measure 8 mL of ice-cold isopropanol.
8. Tilt the test tube. Gently pour the isopropanol down the inside of the tube. The isopropanol layer should “float” on the banana liquid.
9. Let the solution sit for 2–3 minutes. You will see a white substance forming where the two layers meet. This is the DNA.

- Carefully insert a glass stirring rod and swirl it slowly in the alcohol layer to collect the DNA and remove it from the test tube.
- Record your observations.
- Dispose of all materials according to your teacher's instructions.

Process and Analyze

- The DNA appeared as a white solid, called a precipitate, when it came in contact with the rubbing alcohol. What physical property of DNA does this step in the procedure depend on?
- Soaps interact with and disrupt cell membranes. Why is it necessary to disrupt the cell membrane in this investigation?
- Do you think the process of isolating DNA would be very different if you were to use a vegetable, animal cells, or a different fruit? Explain why or why not.

Conclude and Communicate

- Describe the appearance of the DNA collected. Is it what you expected? Explain your answer.
- The photo below shows purified DNA. Do you think the DNA you isolated is pure, or are there other components of the cell mixed in? Explain.



DNA from a laboratory sample