



Banana DNA Extraction: Visualizing Deoxyribonucleic Acid

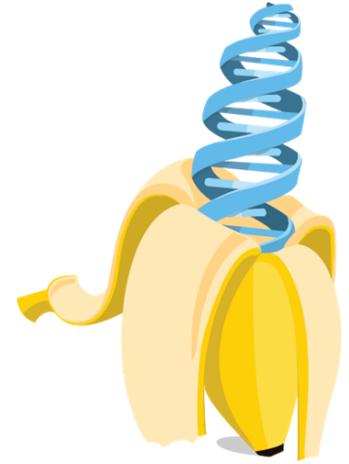
VIDEO: <https://youtu.be/bHBml65MXs0>

INTRODUCTION:

All living things contain genetic information known as DNA (or deoxyribonucleic acid). DNA, along with RNA, are nucleic acids commonly found in the nucleus. These macromolecules provide basic instructions for the growth and development of organisms. Both you and bananas have DNA, yet the specific genes present in the DNA give each of you unique traits.

A single DNA molecule forms a double-helix because it consists of two nucleotide strands twisted together. However, you cannot see the shape of a single molecule without a high-powered microscope. But if you extracted all of the DNA out of a piece of banana, then you could see and even touch the DNA.

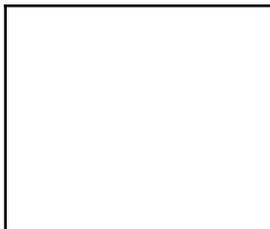
In this lab, you will use three common household chemicals to extract DNA out of banana cells. The table below explains the role of salt, soap, and rubbing alcohol in DNA extraction you will conduct:



Household Chemical	Role in DNA Extraction
Salt	Binds to the DNA molecule to make it visible to the naked eye.
Soap	Breaks down the cell's membranes to get the DNA out of the nucleus.
Rubbing Alcohol	Creates an insoluble layer for the DNA to be visible in.

PRE-LAB COMPREHENSION QUESTIONS:

1. What does DNA stand for? _____
2. Name two examples of nucleic acids. _____ & _____
3. In which organelle is DNA stored in cells? _____
4. Circle TRUE or FALSE: Both plants and animals have DNA.
5. Sketch the double-helix structure of DNA below:



MATERIALS RECEIPT	
PRICES ARE APPROXIMATE	
Banana (¼)	\$0.50
Salt (2tsp)	\$0.50
Dish Soap (1tsp)	\$2.50
Ziploc Bag (quart)	\$2.50
Rubbing Alcohol (¼ cup)	\$3.50
Coffee Filter (1)	\$2.50
Toothpick (1)	\$1.50
Warm Water (¼ cup)	N/A
Clear/Short Glass (1)	N/A
Spoon (1)	N/A
TOTAL	\$13.50

PURPOSE:

To visualize DNA molecules by extracting it from the nuclei of banana cells.

PROCEDURE:

1. Place the rubbing alcohol in the freezer to chill until step #9.
2. In the Ziploc bag, mush the banana half until all lumps are gone and the fruit creates a pudding. (DO NOT RIP THE BAG!)
3. In the clear glass, mix ½ cup of warm water with 2 tsp of salt. Use the spoon to dissolve the salt.
4. Pour the saltwater solution into the Ziploc bag and mix gently. (DO NOT RIP THE BAG!)



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5. Add 1 tsp of soap into the Ziploc bag and mix more rigorously than step #3. (DO NOT MAKE IT TOO FOAMY!)
6. Set the Ziploc bag aside. Secure the coffee filter around the top of the clear glass, making a cup out of it that can strain liquid.
7. Slowly pour and strain the contents from the Ziploc bag through the coffee filter and into the clear glass. (DO NOT LET ANY SOLID THROUGH!)
8. Once all of the liquid from the Ziploc bag is strained, throw away the used coffee filter and Ziploc bag.
9. Tilt the clear glass and slowly pour $\frac{1}{2}$ cup of freezing cold rubbing alcohol down the side of the cup. This should create a top layer of alcohol. (DO NOT POUR TOO FAST!)
10. Let the clear glass sit for 3-5 min.
11. Use the wooden toothpick to start poking the clumps of DNA in the alcohol layer. You can spin the toothpick in place to gather it..

DATA/OBSERVATIONS:

Sketch the model after extraction. **Label** the alcohol, DNA, and unwanted banana cell parts.

DNA Extraction Model

CONCLUSION:

1. **Describe** what the DNA molecules looked like after extraction.
2. Which ingredient (salt, soap, or alcohol) was the most important? Use **reasoning** to **justify** your response.
3. **Name** five abiotic factors in an ecosystem that you cannot extract DNA from. **Explain** why these things cannot have DNA extracted from them.