



Smithsonian
National Museum of American History
Lemelson Center for the Study of Invention and Innovation



This experiment is a preview of the hands-on experiments being offered at the Lemelson Center's brand new exhibit, Spark!Lab, opening in the National Museum of American History on November 21, 2008. Spark!Lab has activities to engage scientists and inventors of all ages.

Extract DNA From The Comfort of Your Own Home...Amaze Your Friends!

Here's what you need:

- zip lock bag (heavy duty)
- 3 fresh strawberries
- 1 pinch, table salt (NaCl)
- 8 drops, shampoo (without conditioner)
- Strainer
- Ice cold Isopropyl rubbing alcohol
- Small clear glass or test tube
- Large paper clip, straightened out



Here's What You Do:

1. Wash the strawberries and remove the sepals (the green leaves)
2. Place the strawberry in a zip lock plastic bag and crush it with your fist
3. Add the salt and shampoo to the mashed strawberry mixture in the bag, zip it up and squeeze it in your hands for 1 minute.
4. Place the strainer over the small glass.
5. Pour the strawberry-shampoo mixture into the strainer. Filter the mixture into the glass.
6. Slowly pour ice-cold rubbing alcohol into the glass, until it is about half full. The ethanol will form a separate layer on top of the strawberry filtrate.

7. Keep the glass still at eye level; do not shake it. Watch what happens. DNA will begin to appear where the alcohol and filtrate layer meet.
8. Carefully Scoop out the DNA with the straightened end of the paper clip. What does the DNA look like?
9. Touch the DNA. What does it feel like?
10. Discard the mashed strawberries and solution. Wash your equipment and clean your experiment area.
11. Wash your hands!

So...What Just Happened?

Crushing the strawberries breaks open many of the strawberry cells, where the DNA is. The soap in the shampoo breaks down the membranes of the cells, releasing the DNA. The salt makes the DNA molecules stick together, and separate from the proteins that are also released from the cells.

The strainer will retain cell debris and unmashed pieces of fruit. The DNA will pass through the gauze into the glass.

DNA is not soluble in alcohol, so it precipitates. What you see are long, rope-like DNA molecules in the alcohol.

What is DNA?

DNA is inside the cells of every living thing, including you. The information contained in your DNA is an important part of who you are because it includes characteristics such as eye color and blood type that you inherited from your parents. Long, twisting molecules of DNA inside cells wind tightly around proteins to form chromosomes. Each chromosome contains segments of DNA called genes. Genes tell every cell in your body what to do. They are the built-in assembly, instruction, and repair manuals for every living thing.

Why do Scientists Extract DNA?

Extracted DNA is used in many ways:

- to locate a gene that causes an inherited characteristic, such as a hereditary disease
- to determine a child's biological parent
- to match suspects with evidence, such as bloodstains, from the scene of a crime
- to make a clone
- to replace genes in an organism with genes from another (gene replacement therapy)