

Name: _____

Period: _____

Strawberry DNA Extraction

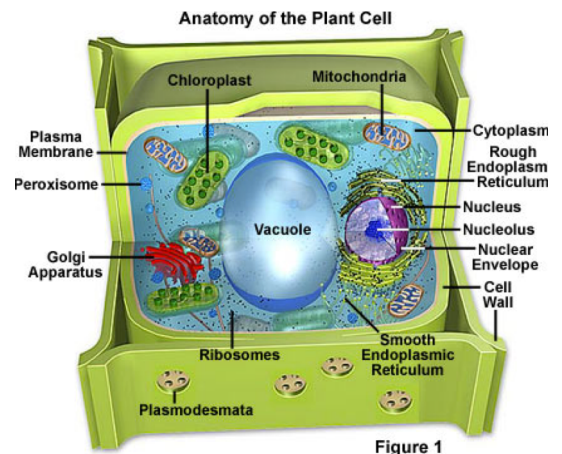
DNA is present in every cell of plants and animals. Strawberries are a good source of DNA because some strawberries are diploid (2 copies of each chromosome – 14 chromosomes in total) and others are even tetraploid or pentaploid (4 or 5 copies of each chromosome). You will never be able to eat a strawberry again without thinking of how much DNA is in it!

The DNA found in strawberry cells can be extracted using common, everyday materials. We will use an extraction buffer containing salt, to break up protein chains that bind around the nucleic acids, and dish soap to dissolve the lipid (fat) part of the strawberry cell wall and nuclear membrane. This extraction buffer will help provide us access to the DNA inside the cells.

Pre-lab questions:

1. List in order all of the structures of the plant cell that we have to go through in order to get to the DNA in the nucleus.

2. What do you think the DNA will look like?



Materials:

dishwashing soap
heavy duty ziploc bag

1 strawberry

20 mL DNA extraction buffer (soapy, salty water)

cheesecloth/coffee filter

beaker

funnel

50mL vial / test tube

glass rod/straw

20 mL ice cold ethanol

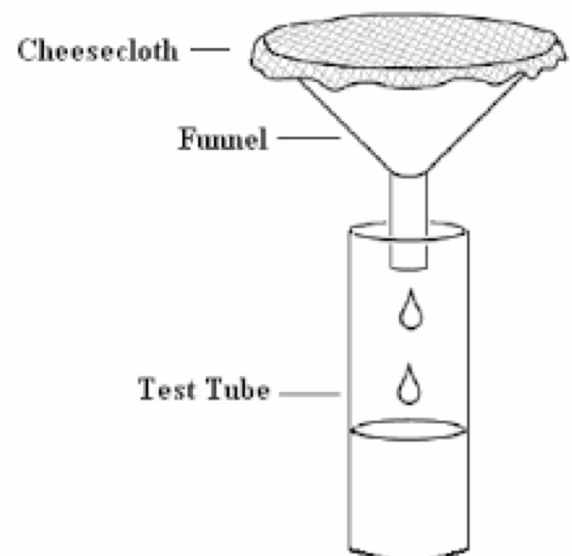
Procedure:

1. Put 1 strawberry into the ziplock bag, squeezing out all air. Gently mash the strawberry to a pulp for **2 minutes**. Open the bag and add **20 mL extraction buffer** into ziplock bag.

2. Filter the mixture through a **cheese cloth** (this will take a few minutes) and save the **filtrate** (liquid coming through). Pour **10 mL of the filtrate** into a test tube.

3. Add **1 drop of detergent** (this breaks apart the cell membrane and nuclear membrane). Gently mix with a **straw** without causing foam.

4. **Immediately** add **20 mL of ICE COLD ethanol** to the test tube by slowly pouring it down the **side of the test tube** to create a layer on top of the filtrate. (DNA is not soluble in ice cold ethanol. When it is added to the mixture, all the components of the mixture except DNA, stay in solution, while the DNA precipitates out.)



5. Let the ethanol sit of 2-3 minutes without disturbing it. Bubbles will form and DNA will precipitate out of the solution at the interface.
6. Gently swirl the DNA and wrap it around a straw. It will look like whitish mucous.
7. The DNA may be lifted out carefully and dried on an absorbent towel. The DNA fibers are thousands and millions of DNA strands.

Conclusions and Analysis

1. It is important that you understand the steps in the extraction procedure and why each step was necessary. Each step in the procedure aided in isolating the DNA from other cellular materials. Match the procedure with its function:

PROCEDURE

FUNCTION

- | | |
|---|---|
| A. Filter strawberry slurry through cheesecloth | ___ To precipitate DNA from solution |
| B. Mash strawberry with salty/soapy solution | ___ Separate components of the cell |
| C. Initial smashing and grinding of strawberry | ___ Break open the cells |
| D. Addition of ethanol to filtered extract | ___ Break up proteins and dissolve cell membranes |

2. Explain what happened in the final step when you added ethanol to your strawberry extract. (Hint: DNA is soluble in water, but not in ethanol)

3. A person cannot see a single cotton thread 100 feet away, but if you wound thousands of threads together into a rope, it would be visible much further away. Is this statement analogous to our DNA extraction? Explain.

4. Why is it important for scientists to be able to remove DNA from an organism? List two reasons.

5. Is DNA found in all living or once living cells?

6. Since the strawberries were once living, and we extracted DNA from them, what does this mean about the foods you eat?

7. Look at the plant cell pictured on this lab handout. Remember that genes are found on chromosomes, and genes control traits. Give at least two examples of traits that are expressed in the strawberry.

8. Humans and strawberries share about 60% of their genes. The human genome is 3 billion (3,000,000,000) base pairs long. How many of these base pairs are in the same sequence as a strawberry? Show your work.