Before

Healthy fruit snack?

OR...

LABORATORY EXPERIMENT?

After

(FRUIT SHOWN ACTUAL SIZE)

DNA Extraction from Strawberries

Introduction: DNA (Deoxyribonucleic Acid) is found within the cells of all living organisms. DNA molecules function as instructions to make the protein and RNA molecules that contribute to the structure and function of cells. DNA molecules are large polymers of the nucleotide bases A, G, C and T. These four bases assemble into a sequence that make up the instructions, analogous to the way letters come together to form words, sentences, and paragraphs to convey information. The order of the nucleotides that make up the DNA molecule is important because it codes for the instructions the cell needs to make all of the other molecules that contribute to its structure and function.

DNA Extraction: Strawberries have large amounts of DNA as they have eight of each chromosome. We will use salt and detergent to disrupt the cell and nuclear membranes to release the DNA. Salt also adds positive charge and neutralizes the negative charge of the DNA that is a result of the phosphate backbone. After the lipid molecules of the membranes are disrupted with the detergent we will filter the insoluble cell debris from other macromolecules that are soluble in water. Next we will add ethanol. Because ethanol is less polar than water the DNA will precipitate.

Materials Per Person:
10 ml DNA Extraction Buffer
1 strawberry
1 freezer bag
1 funnel
1 test tube rack
1 test tube
cheesecloth
wooden rod
5 ml cold ethanol
1 microfuge tube

Protocol:
1. Place one strawberry in a plastic bag and seal tightly pressing out excess air.
2. Mash the strawberry for one minute.
3. Add 10 ml DNA extraction buffer and seal the bag tightly again.
4. Mash the strawberry and DNA extraction buffer for one minute.
5. Filter the liquid through a cheesecloth-lined funnel into a collection tube.
6. Collect about 4 ml of filtrate.
    a. If the liquid is not moving through the filter, you can use the bottom of the ethanol tube to press it through.
7. Slowly add 5 ml of cold ethanol along the side of the test tube.
8. Watch as the ethanol layer will separate the DNA from the buffer.
9. Use a wooden rod to spool the DNA by twirling and put into a microfuge tube.
10. Pour the excess liquid in the sink, discard the cheesecloth and tube in the trash can.
11. Clean up your area and wash your hands.

DNA Extraction Buffer: Enough for 100 strawberries
100 mL (3/8 cup) liquid dishwashing soap or shampoo (without conditioner)
0.30 grams (a pinch) meat tenderizer, containing the enzyme papain
15 grams (2 teaspoons) salt
900 mL (3 3/4 cups) water