General Biology Lab

Strawberry DNA Extraction

Background

The native wild or wood strawberry, *Fragaria vesca,* has only two sets of chromosomes (diploid), but the grocery store strawberry, *Fragaria ananassa*, has eight sets of chromosomes(octoploidy) and will supply an abundance of DNA. So, commercial strawberries make an excellent subject for collecting DNA.

Another reason strawberries work so well is that they are soft and easy to smash. Also, ripe strawberries produce enzymes (pectinases and cellulases) which help in breaking down the cell walls making it easier to extract the DNA.

First, you are going to break open the cells of a fresh strawberry by crushing it. Second, you will use a lysis buffer to break down the cellular and nuclear membranes to separate the DNA from the other cell parts. Third, you will filter the solid material out with a piece of cheesecloth and collect the liquid containing the DNA. Finally, you precipitate the DNA from the solution using cold ethanol.

After completing this lab, you will have a sample of pure strawberry DNA and you will never again look at a strawberry in the same way.

Objectives

The purpose of this activity is become familiar with lab procedures for extracting DNA, collect a DNA sample and observe the physical characteristics of DNA.

Materials

- Zip seal plastic bag
- 1 strawberry
- 10 ml lysis buffer
- cheesecloth
- small plastic cup
- 95% ethanol (ever clear)
- ice water bath
- test tube
- Plastic stir stick
- Safety goggles

Safety Precautions

- Most of the chemicals are fairly mild but treat all chemicals with respect.
- Wear safety goggles.
- Make sure you wash your hands after the lab.

Procedure

1. Obtain a fresh strawberry. If the green leaves (sepals) on the strawberry have not yet been removed; remove them.
2. Place the strawberry in a zip seal plastic bag. Press the air out and seal it.
3. Gently mash the bagged strawberry with your fingers for 5 minutes. Don't break the bag.
4. Add 10 ml of lysis buffer to the bag. Press the air out carefully and seal the bag.
5. Mash the bagged strawberry with the lysis buffer for 2 minutes.

   CAUTION: Mix carefully, the fewer bubbles created the better your results.
6. Cut one of the bottom corners of your baggie off and squeeze the strawberry pulp along with the liquid into a small cup covered with cheesecloth.
7. Rinse the pulp with water to ensure you obtain as much DNA as possible.
8. Discard the baggie, cheesecloth and the strawberry pulp into the trash can.
9. Place the filtrate into a test tube, but leave room to add the alcohol.
10. **Slowly** drizzle **ice-cold** ethanol **along the side of the test tube** until DNA begins to appear. It will look somewhat like cotton candy fibers.
11. Keep the test tube at eye level so you can see what is happening! Pay attention to the characteristics of the DNA as it precipitates.

Analysis

1. What did the DNA look like?

2. In order to study our genes, scientists must extract the DNA from human tissue. Would you expect the method of DNA extraction we used for the strawberry to be the same for human DNA? Explain?

3. Is the DNA in any cell in the human body the same? Explain your answer.

4. If you wanted to extract DNA from a living person, which cells would you use and why?

5. Please list two reasons why a scientist might want to study the DNA of strawberries.

Name: _____ Lab Activity

General Biology

Strawberry DNA Extraction

1. What is the function of DNA?

_____

_____

2. Where is DNA located?

_____

3. What are the three basic steps for DNA extraction?

_____

_____

_____

4. How do these steps differ for extraction of DNA from bacteria?

_____

5. What is the purpose of the salt solution in this experiment?

_____

6. Why was detergent added to the extraction buffer?

_____

7. Why does the DNA rise to the top after addition of the alcohol?

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"The greater the scientist, the more he is impressed with his ignorance of reality, and the more he realizes that his laws and labels, descriptions and definitions, are the products of his own thought.

They help him to use the world for purposes of his own devising rather than understand and explain it."

--Alan W. Watts