Spinach DNA Extraction

A Lesson on DNA Extraction

Background Information:

After preforming this experiment students will understand that DNA is the blueprint of all life . Everything living (including spinach) contains DNA (Deoxyribonucleic Acid). DNA is a long, stringy molecule. Blending the spinach breaks it down to its simplest cellular form. The salt helps it stick together. DNA normally stays dissolved in water, but adding soap to the blended spinach helps further access the DNA. When salty DNA comes in contact with alcohol it makes the strands hold onto each other and it becomes undissolved. This is called precipitation. The physical force of the DNA clumping together as it precipitates pulls more strands along with it as it rises into the alcohol. In this experiment, meat tenderizer acted as an enzyme to cut proteins away from the DNA, just like a pair of scissors.

Materials Needed:

- 1/2 cup of Fresh Spinach
- 1 cup Ice Cold Water
- 1/4 teaspoon Salt
- 2 tablespoons Liquid Detergent (clear preferred)
- Meat Tenderizer (One Pinch)
- Blender
- Strainer
- Stop Watch or Timer
- Small Stir Stick or Straw
- Ice Cold 90% Ethanol or Isopropyl Alcohol
- Paper Towels

Procedure:

1. Blend 1/4 tsp. salt,1 cup ice cold water (no ice) and 1/2 cup fresh spinach together in the blender at high speed until you see formation of a soup like substance.
2. Use a strainer and pour the blended substance into a measuring glass, then discard the pulp. Carefully stir 2 tablespoons of liquid detergent into the liquid and wait for 10 minutes.
3. Slowly and carefully stir in one pinch of meat tenderizer so that he DNA is not broken apart because it will be harder to see.
4. Record the volume of liquid in the measuring cup. Slowly stir in ice cold isopropyl alcohol until you have about the same amount of alcohol as you do the mixture.
5. After adding the alcohol, wait for about 3 minutes. The liquid mixture will turn murky and there will be an appearance of a cobwebby substance which will be the DNA.

Level: 5-7 Grade

Subjects/Standards:

Subject:
Science

Standards:
Science as Inquiry
Life Science

Activity Description:
Students will actively take part in an experiment to see if they can extract DNA from spinach. This activity will show students that all living things contain DNA. This will also give the students an appreciation for science.

Question:
Does Spinach contain DNA?

Hypothesis:
Students will predict if they can extract DNA from spinach.

Conclusion:
Students will extract the DNA and record if their hypothesis was correct.

Source:
Oklahoma Department of Agriculture, Food and Forestry

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