

How to Extract DNA from a Strawberry

Major concepts

Cells are the basic unit of life and make up all plants, animals and bacteria. Deoxyribonucleic acid, or DNA, is the molecule that controls everything that happens in the cell. DNA contains instructions that direct the activities of cells and, ultimately, the body. This activity will demonstrate how DNA can be isolated from a strawberry using common household materials.

Objectives

- To learn an easy way to extract DNA from a strawberry using household products
- To see a large sample of DNA

Background

This DNA extraction activity results in a large quantity of DNA that can be seen with the naked eye. It is an easy activity and, if you follow the instructions, there is almost no way to make a mistake that would affect the results. It is much more effective than extracting DNA from any other source because strawberries are soft and easy to smash. In addition, ripe strawberries produce enzymes (pectinases and cellulases), which are chemicals that help in breaking down the cell walls.

Strawberries have enormous genomes. Humans have two copies of each chromosome (diploid genome). A chromosome is an organized package of DNA found in the nucleus of the cell. Strawberries have up to eight copies of each chromosome (octoploid genome).

Materials (per person)

- 1 resealable plastic bag
- Strawberries (fresh or frozen)
- 2 teaspoons of dish detergent
- 1 teaspoon of salt
- ½ cup of water
- 2 plastic cups (One cup will be used for the filtering apparatus below)
- Filtering apparatus: coffee filter and plastic cup
- Ice cold 90 percent rubbing alcohol
- 1 wooden popsicle stick or plastic coffee stirrer

Procedures

1. Pull off any green leaves on the strawberry that have not been removed yet.
2. Put the strawberry into the plastic bag, seal it and gently smash it for about two minutes. Completely crush the strawberry. This starts to break open the cells and release the DNA.
3. In a plastic cup, make your DNA extraction liquid: mix together 2 teaspoons of detergent, 1 teaspoon of salt and ½ cup of water.
4. Add 2 teaspoons of the DNA extraction liquid into the bag with the strawberry. This will further break open the cells.
5. Reseal the bag and gently smash for another minute (Avoid making too many soap bubbles).

6. Place the coffee filter inside the other plastic cup.
7. Open the bag and pour the strawberry liquid into the filter. You can twist the filter just above the liquid and gently squeeze the remaining liquid into the cup.
8. Next, pour down the side of the cup an equal amount of cold rubbing alcohol as there is strawberry liquid. Do not mix or stir. You have just isolated the DNA from the rest of the material contained in the cells of the strawberry.
9. Within a few seconds, watch for the development of a white cloudy substance (DNA) in the top layer above the strawberry extract layer.
10. Tilt the cup and pick up the DNA using a plastic coffee stirrer or wooden stick.