#OK4HSTEM

STRAWBERRY DNA

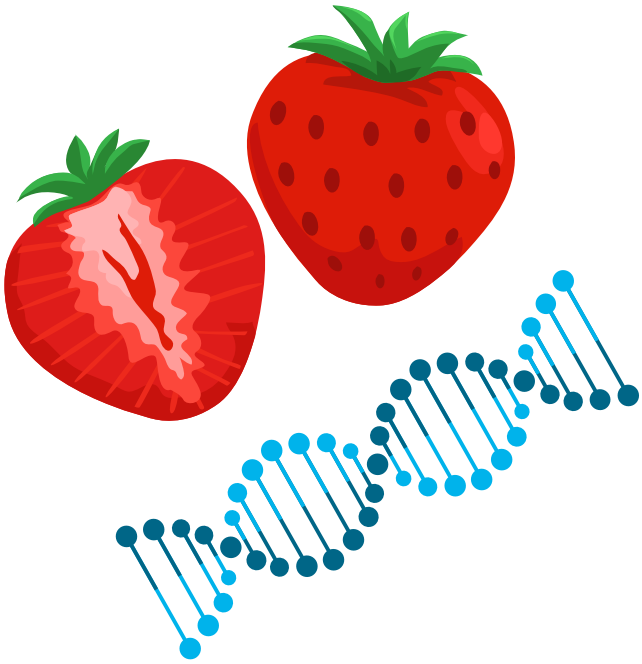
OVERVIEW

DNA stands for deoxyribonucleic acid. DNA is a molecule that holds unique genetic instructions for all plants and mammals, and is found in nearly every cell. Not only does DNA serve as a map for genetic traits, it provides needed information for organisms to develop, survive and reproduce.

When extracting DNA, strawberries provide a good plant source due to the sheer amount of DNA that they yield. There are three main ingredients in the DNA extraction liquid: soap, salt and isopropyl alcohol.

Each ingredient plays a key role in the extraction process. Soap breaks down the cell membrane, allowing access to the nucleus where the majority of DNA is stored. Salt removes protein chains that are attached to the DNA.

The isopropyl alcohol causes DNA to precipitate, or come out of, the solution, because it cannot dissolve in the alcohol. Therefore, you are able to visually see the strands of DNA that were extracted.



RELATED PROJECT AREAS

- Science/Engineering/Technology
- Food Science

LIFE SKILLS

Critical Thinking and Learning to Learn

STEM ABILITIES

Hypothesize, Use Tools, Observe, Measure, Infer, Evaluate

MATERIALS

Per Youth:

- Plastic Zipper Bag
- 2 Medium-Sized Strawberries without leaves (Fresh or Frozen)
- 1 Plastic Cup
- 1 Coffee Filter
- 2 Coffee Stirrer or Craft Stick
- Cold Rubbing Alcohol
- Rubber Band

This experiment requires making a solution that can be shared among 20 youth.

Extraction Solution:

- 4 Teaspoons Dish Detergent
- 2 Teaspoon Salt
- 1 Cup Water
- Plastic Cup

STEPS

1. Prepare the extraction solution by combining dish detergent, salt, and water in a plastic cup. Mix well and set aside.
2. Place strawberries in plastic zipper bag. Make sure stems or leaves are removed.
3. Crush strawberries in the sealed zipper bag.
4. Add two teaspoons of extraction liquid into the bag and gently squeeze bag until liquid is combined with the strawberries.
5. Place a coffee filter over a plastic cup and secure with a rubber band.
6. Pour the contents of the bag into the coffee filter. Allow contents to seep through the filter. This may take several minutes. The coffee stirrer or craft stick can be used to gently stir the contents in the filter, encouraging additional liquid to drip into the cup.
7. Note the amount of strawberry liquid in the cup. Carefully pour an equal amount of cold rubbing alcohol down the side of the cup. Do not mix.
8. Observe DNA forming a layer over the strawberry liquid. DNA will resemble a white stringy substance.
9. For further observation, use a clean coffee stirrer or craft stick to pick up the DNA strands.

CRITICAL THINKING

- Why do you think scientists are interested in isolating DNA?
- Experiment extracting DNA from other fruits and vegetables. Can you extract your own DNA using the solution?

RESOURCES

Steve Spangler Science: https://www.stevespanglerscience.com/lab/experiments/strawberry-dna/

The GENETICS Project: http://www.gs.washington.edu/outreach/dhillon_dnaprocedure.pdf

DNA Blueprint for Life: http://aitc.okstate.edu/lessons/intermed/dna.pdf