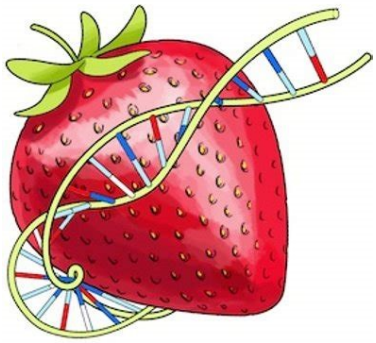
Strawberry DNA Extraction

A Lesson on DNA Extraction



Background Information:

The process for discovering biotechnology begins with a strong foundation of understanding DNA. DNA is found in all living things. Sections of DNA are referred to as genes. These genes code for specific amino acids. Amino acids form together to make long changes which are called proteins. These proteins are expressed to give an organism its unique characteristics.

Objectives:

1. Students can explain that desired genes can be inserted into bacteria to be replicated by a process called genetic engineering.
2. Students followed the DNA extraction procedures and isolated DNA with a scoop to retrieve from one sample. Or the student was not able to extract DNA but analyzed the procedures and evaluated where an error in the procedures may have happened.
3. Students can explain function of the restriction enzymes, bacterial plasmids, bacteria and antibiotics during genetic engineering.

Video Needed:

"Genetic Engineering" by MIT K12 Videos
https://www.youtube.com/watch?v=nfC689EIUVk (7:20)

Materials needed:

- Strawberries
- Zip-Closure Sandwich Bags
- DNA Extracting Solution (mix about 1 cup of clear liquid detergent and 1/4 cup salt into a gallon of water)
- Funnels
- Plastic Cups
- Gauze or Cheesecloth
- Test Tubes
- Droppers
- Denatured Alcohol
- Paper Towels

Level: High School

Standards:
Next Generation Science Standards
LS1.B—Growth and Development of Organisms
LS3.A—Inheritance of Traits
LS3.B—Variation of Traits

Activity Description:
Students will actively take part in an experiment to see if they can extract DNA from strawberries.

Source:
Saint Louis Science Center
Bringing Biotechnology to Life

Procedure:

1. Place a strawberry in a zip-closure bag and remove most of the air before you seal the bag.
2. Mash the strawberry through the bag in your hand. Do not hit against the table.
3. Add 2 tablespoons of the DNA extracting solution.
4. Continue mixing and mashing the bag in your hand.
5. Place a piece of gauze over the large opening of the funnel.
6. Place funnel in a plastic cup. It should sit on the rim.
7. Carefully pour the strawberry mixture into the funnel making sure to catch the solids with gauze.
8. Take a dropper full of the liquid in the cup and place in the test tube.
9. Add alcohol until you have about the same amount of alcohol as you do the mixture. Take care not to tilt or tip the test tube; do not mix the two liquids.
10. Observe the line between the strawberry mixture and the alcohol. You will notice a white thread-like cloud appearing at this line. This is strawberry DNA. The DNA will clump together and float to the top of the alcohol layer.
11. Observe the test tubes of others around you. Do you notice any differences?
12. When finished observing the DNA, you may collect the DNA and dispose of materials as directed.

Discussion:

Compare your DNA sample with those of other classmates and discuss the following questions:

1. Did everyone's DNA look the same?
2. Why did some people have more DNA?
3. Why is isolating DNA an important process?
4. What do you think scientists can learn from studying DNA?

Questions To Consider:

1. What are genes?
2. What is genetic engineering?
3. What is the role of bacterial plasmids in genetic engineering?
4. What is the role of bacteria in genetic engineering?
5. What is used to separate the desired gene from the other genes after plating the bacteria?

Optional Extension Opportunities:

1. Weigh strawberry prior to testing, and the DNA after separating. Create a class graph evaluating the relationship between weight and amount of DNA collected.
2. Increase the variables (e.g. hot vs cold alcohol, type of soap used in buffer, frozen vs. unfrozen samples, etc.) and compare results.