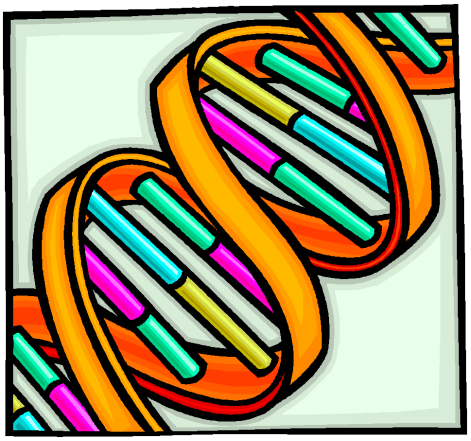
Name_____

Strawberry DNA Extraction Lab

Background:



Is there DNA in my food? Absolutely! Deoxyribonucleic acid (DNA) is a long molecule that contains the genetic instructions used in the development and functioning of all known living organisms, including the plants we eat. This incredible molecule can be easily seen with the naked eye when collected from thousands of cells.

In this lab, you will extract strands of DNA from the nuclei of strawberry cells. We'll use strawberries because their cells are easy to break open, and they are octoploid (they have eight copies of each chromosome), meaning they have a lot of DNA.

First, you will mash the strawberries to break the cells' walls and expose the inner membranes. As you gently mash the strawberries, the cells will mix with the DNA extracting solution, which is a mixture of soap, salt, and water). The soap from the solution dissolves the lipid bilayers (inner membranes) of the cells and nuclei, exposing the DNA. The salt breaks up proteins bound to the DNA and helps the DNA solidify and appear when the rubbing alcohol is added. Next, filtering the mixture will get rid of the strawberry cell parts that are bigger than DNA. And finally, adding rubbing alcohol will precipitate the DNA (cause it to come out of the solution) and make it become visible. The colder the rubbing alcohol, the less soluble the DNA will be in it, so make sure to keep it cold.

Pre-lab questions:

1. What do you think the DNA will look like?

2. Where is DNA found?

Materials Needed:

- Ziploc bag containing 3 strawberries and 3 tablespoons of DNA extracting solution
- Funnel
- Plastic cup
- 2 squares of cheesecloth
- Graduated test tube
- Pipette
- Microcentrifuge tubes, 1 for each member of the group
- Yarn, 1 piece for each member of the group

Collect at step #7

- 3 ml rubbing alcohol

Procedure:

1. Collect your materials.
2. Carefully remove most of the air from the Ziploc bag containing the strawberries and DNA extracting solution, and seal the bag well.
3. Gently mash the strawberries through the bag. Be careful not to break the bag, but mix the strawberry mash thoroughly.
4. Place the funnel in the plastic cup. It should sit on the rim of the cup.
5. Place the two squares of cheesecloth into the funnel, forming a liner for straining.
6. Carefully pour the strawberry mixture into the funnel, making sure to catch the solids with the cheesecloth. After filtering the mixture, remove the cheesecloth, and place it into the Ziploc bag for disposal.
7. Add 5 ml of the filtered strawberry extract to the graduated test tube using the funnel. Hold the tube near the top so that the heat from your hand does not affect the extraction.
8. Remove the funnel, and use the pipette to forcefully add 3 ml of the isopropyl or rubbing alcohol to the test tube. Take care not to tilt or tip the test tube; do not mix the two liquids.
9. Observe the line between the strawberry mixture and the alcohol. You will notice a white, thread-like cloud appearing at this line. This is the strawberry DNA. The DNA will clump together and float to the top of the alcohol layer.
10. Holding the tube still, observe the tubes of others around you. Do you notice any differences?
11. Using the pipette, add some DNA strands and some of the alcohol in the test tube to each person's microcentrifuge tube. Repeat steps 6 to 8 if necessary to collect enough DNA for everyone's microcentrifuge tube.
12. Close the cap of the microcentrifuge tube tightly around a piece of yarn and tie the ends of the yarn to make a necklace.
13. Clean up! Dump the remaining strawberry solution where instructed, throw away the Ziploc bags, and collect the cups, test tubes, funnels, and pipettes to clean so they can be used again.



Conclusions and Analysis

Each step in the extraction procedure aids in isolating DNA from other cellular materials. Explain why each step was necessary and put the DNA extraction procedure into context by answering the questions below.

1. Why did you have to mash the strawberries?

2. What was the purpose of the salt in the DNA extracting solution?

3. What was the purpose of the soap in the DNA extracting solution?

4. Explain what happened in the final step when you added alcohol to your strawberry extract. (Hint: DNA is soluble in water but not in ethanol)

5. What did the DNA look like? Draw a section of DNA.

6. Is there DNA in your food? How do you know?

7. Why is it useful for scientists to be able to extract DNA from an organism? List two reasons.