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Topic: Strawberry DNA Extraction Lab

Summary: Students will extract DNA from both bananas and strawberries. This is a great lab to do while introducing biomolecules for nucleic acids.

NGSS Standards: *HS-LS3-1* Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.

Time Length: 60 minutes

Background Knowledge: The soap is to dissolve the lipid bilayer around the cell and nucleus. The salt is to neutralize the negative charge of the DNA. The alcohol is used because DNA is soluble in water but not soluble in alcohol. The bubbles on the DNA in the alcohol layer are just dissolved gasses and are not part of the DNA.

Prerequisite Knowledge: Students have been introduced to cell organelles and know that DNA has the same structure in all organisms.

Pre-Lab

Set-up stations: alcohol station with ice-cold alcohol and a buffer station with two graduated cylinders. The buffer should be made using a large flask and then be poured into a 100mL beaker.

Accommodations: Students with an IEP can take the handout home if they need extra time but must finish the lab procedures in class.

Editable DOCX File and Answer Key:

Available at www.ngsslifescience.com

Strawberry DNA Extraction Lab

Driving Question:

Is DNA really found in all organisms?

Materials:

- Strawberries (fresh or thawed), and fresh bananas
- Cheesecloth
- Small funnel
- 90% Ethanol *ice-cold*
- Graduated cylinders
- Large test tubes
- Zip-lock freezer bags
- 1L Erlenmeyer flask and 100 mL beaker
- 10 mL graduated cylinder
- 7 mL DNA buffer
 - 50 mL dish soap
 - 15 g salt
 - 900 mL tap water
- Glass stirring rod
- Safety goggles

Procedures:



1. In groups of 2: one student is in charge of extracting the strawberry DNA, and the other student is in charge of extracting the banana DNA.
2. Place one strawberry in a zip-lock bag, press the air out, then seal it. Softly mash the strawberry/banana with your fingers until it becomes a juice puree (1-2 minutes).
3. Add 10 mL of buffer to the strawberry/banana and then press the air out of the bag and seal.
4. Mash the strawberry/banana carefully for 1 minute without creating many bubbles.
5. Place the test-tube in a cup. Put the funnel on top of the test-tube. Place the cheesecloth on top of the funnel.
6. Open the bag and drain carefully the strawberries/bananas on top of the cheesecloth to fill the test-tube with $\frac{1}{4}$ juice. The juice will drain through the cheesecloth but the chunks of strawberries/bananas will not pass through into the test-tube.
7. Tilt the test-tube and pour in an equal amount of alcohol, $\frac{1}{4}$ of test-tube, through the funnel and down the sides of the test-tube. This will allow for better separation of the DNA.
8. Place the test-tube so that it is eye level. Using the stirring rod, collect DNA at the boundary of alcohol and strawberry juice. Do not stir the strawberry/banana juice; only stir in the above alcohol layer.
9. Gently remove the stirring rod and examine what the DNA looks like. Clean up using the teacher's instructions after you have finished the lab write-up.

Variables:

1. Independent Variable _____

Data:

2. Draw the amount of DNA you see in each of your test tubes in the diagrams below.

Strawberry	Banana
	

Definition Questions:

3. Did both plants have DNA? Circle Yes or No

4. DNA is made from many monomers called _____

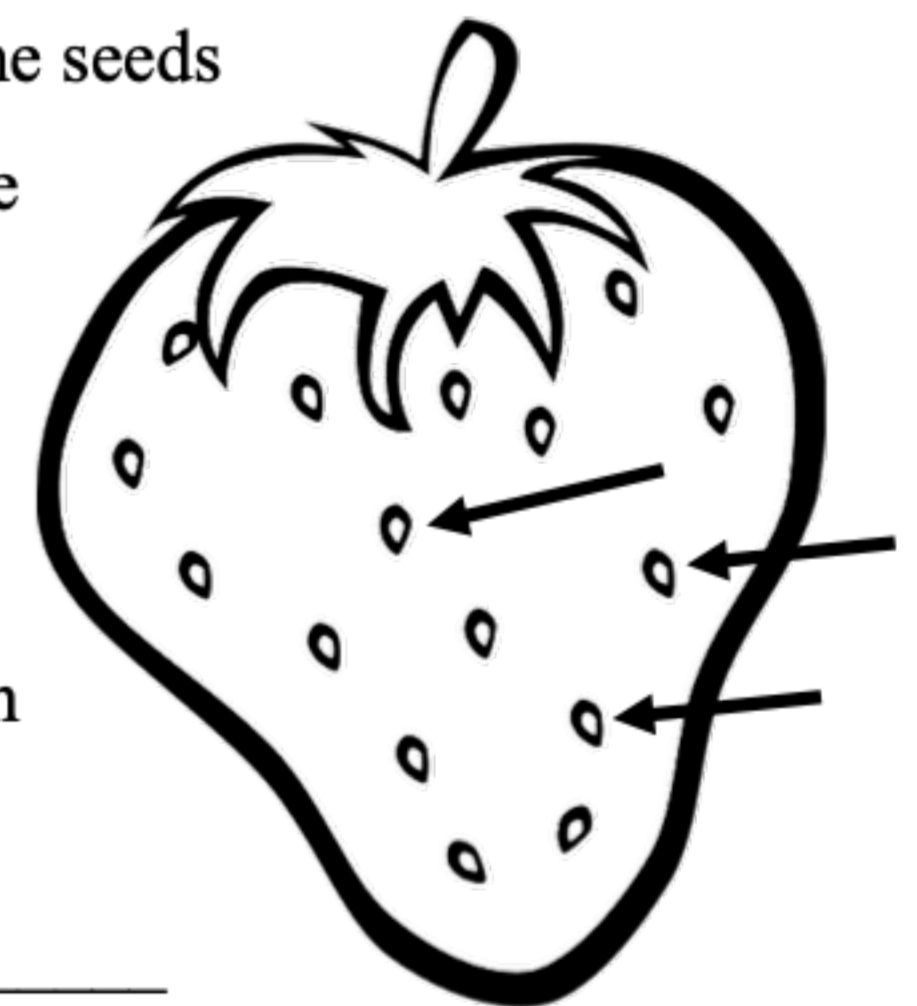
5. Do seeds have DNA? Circle Yes or No

Practical Application Questions:

6. Corn, soybeans, & tomatoes have been genetically engineered. How could a scientist get access to each plant's DNA? _____

7. Make a prediction about the nucleotide (A, T, C, and G) sequences in strawberries and the nucleotide sequences in bananas. _____

8. The strawberry has many seeds on the outside; arrows are pointing to the seeds in the picture. Predict how DNA is transferred from the parent plant to the offspring? _____



9. Strawberry plants have 8 sets of chromosomes, called octoploid. Banana trees have 2 sets of chromosomes, called diploid. Use information from this lab to **ask two questions** about your drawings of the extracted strawberry and banana DNA. (#1) _____

(#2) _____