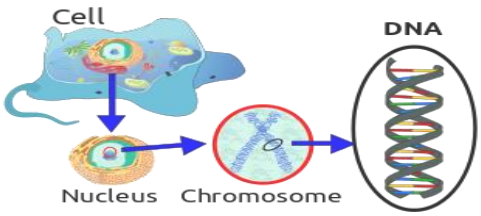
Science in Motion
Ursinus College

Name_____ Section_____

Extracting DNA from Strawberries

Background

All organisms are made of cells and almost all cells contain DNA. All living organisms have DNA, which is short for deoxyribonucleic acid; it is the blueprint for everything that happens inside an organism's cells. Overall, DNA tells an organism how and when to make proteins, which controls how an organism develops and functions.



Animals, plants, fungi, and protists have DNA inside a specialized structure called a nucleus. Bacteria have DNA, but their DNA is not inside a nucleus. Each cell has an entire copy of the same set of instructions, and this set is called the genome. In this activity, strawberries will be used because each strawberry cell has eight copies of the genome, giving them a lot of DNA per cell. (Most organisms only have two genome copies per cell.)

Scientists study DNA for many reasons: They can figure out how the instructions stored in DNA help your body to function properly. They can use DNA to make new medicines or genetically modify crops to be resistant to insects. They can solve crimes from DNA left at crime scenes. Scientists can even use ancient DNA to reconstruct evolutionary histories!

The process to get DNA out of strawberries has several steps. First, to get the DNA from cells, detergent is used to break open (lyse) the cells and break apart the nuclear membrane so that the DNA is released into solution. Next salt is used to clump the DNA together. Finally, alcohol is added to the solution which causes the DNA to precipitate out. We will see the DNA as a fine, white, stringy, goop.

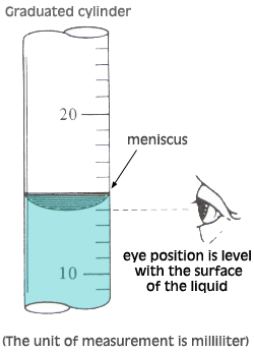
Materials

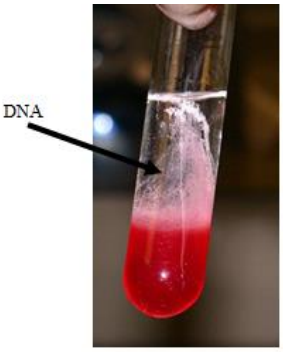
- Isopropanol (Rubbing alcohol)
- Dishwashing liquid (for hand-washing dishes)
- Graduated Cylinder (50 ml)
- Erlenmeyer flask
- Cheesecloth
- 5 frozen strawberries (thawed)
- Bamboo Skewer
- Salt
- Water
- Graduated Cylinder (10ml)
- Test Tube
- Funnel
- Ziploc freezer bag

Preparation

1. Chill the isopropanol in the freezer.
2. Prepare extraction buffer (containing 95 mL distilled water, 5 mL dishwasher soap and 1.5g table salt)
3. Thaw strawberries.
4. Put 10 ml graduated cylinder on ice

Procedure





1. Place 4-5 thawed strawberries into a Ziploc freezer bag. Squeeze out the air and seal the bag. Crush the strawberries with the palm of your hand for two minutes. This will expose the cells.

2. Measure 20 mL of extraction buffer using a 50 mL graduated cylinder. Add the extraction buffer to the bag, push out the air, and reseal the bag. Crush again for 1 minute.

3. Filter the liquid through the funnel containing a moist cheesecloth into the Erlhenmeyer flask.

4. Measure 10 mL (using the 50 mL graduated cylinder) of the liquid and transfer into the crystalizing dish.

5. Measure 10 mL of cold isopropanol (alcohol) into a cold 10mL graduated cylinder. SLOWLY pour the cold isopropanol along the side of the crystalizing dish. This should form a layer on top of the filtered extract. You don't want the strawberry extract and the alcohol to mix.

6. Carefully insert a bamboo skewer into the interface between the ethanol and extract in the crystalizing dish. Do not disturb the lower extract. Slowly curl the loop clockwise and pull out the white goopy DNA. Be careful NOT TO MIX the two layers of liquids.

7. Clean up by throwing away the used cheese cloth and Ziploc baggie. Use a sink to rinse out the crystalizing dish.

Name: _____

Questions

1. Describe what the DNA that you extracted looks like. _____

_____

2. What is a graduated cylinder used for? _____

_____

3. After what part of the procedure were you able to see the DNA? _____

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4. Could DNA be extracted from another fruit such as a banana? Why or why not?

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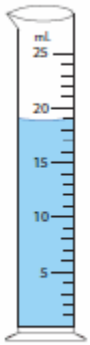
5. What is the amount of liquid in this graduated cylinder?



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