Name:_____
Date:_____

Extracting DNA from Fruit Lab

https://bit.ly/2JUR3o3

Background:

A blueprint is a detailed drawing or map that directs the construction of a building. DNA (deoxyribonucleic acid) is the hereditary material that directs the construction of all living things. Nearly every cell in a person's body has the same DNA. DNA is the blueprint for life. The long, thick fibers of DNA store the information for the functioning of the chemistry of life. DNA is present in EVERY plant and animal cell. The DNA found in many different fruit cells can be extracted using common, everyday materials. We will be using an extraction buffer containing salt to break up protein chains that bind around the nucleic acids and dish soap to dissolve the lipids (fatty parts) of the cell wall and nuclear membrane. The extraction buffer will help provide us access to the DNA inside the nucleus of the cells!

Materials:

- 2 beakers
- Stirring Rods
- 1 small and 1 large Graduated Cylinder
- Half of a banana, kiwi, or strawberry
- 2-3 pinches of salt
- 10mL dish soap
- 125mL of tap water
- Coffee filter
- 20mL 91% isopropyl alcohol – chilled (freezer works best)
- Small test tube or glass

Pre-Lab Questions:

1. What do you think the DNA will look like?
2. Where is DNA found?
3. Why is DNA important to our study of Biotechnology (think about the different sectors of biotechnology that we discussed)?

Procedure:

1. Using a small graduated cylinder measure 10mL of dish soap and pour it into a beaker. Then use a large graduated cylinder to measure 125mL of tap water and add that to the same beaker. Last, add 2-3 pinches of salt to the beaker and mix. Try not to create bubbles when you are stirring. This is called the *extraction buffer*. Set aside until Step 3.

2. In a Ziploc bag, carefully place the fruit and 10 mL of water and then squeeze as much air out of the bag as possible. Carefully mash the fruit and water mixture into a pulp (just enough to make it mushy, but not enough to see through the fruit).

3. Measure 20mL of the extraction buffer using the graduated cylinder and then pour it into the fruit mixture in the bag. Gently mix until it is a uniform consistency. Try not to make too many bubbles when mixing. Set aside for 20 minutes (less time for strawberries).

4. Place the coffee filter on the top of the clean beaker and secure using a rubber band or a second student. Carefully pour the mixture through the filter. Filter until there is about 10mL of fluid in the beaker.

5. Make sure you use a clean graduated cylinder to measure out the 20 mL of alcohol. Very slowly and gently, pour the pre-chilled alcohol into the beaker of filtered fruit and observe what happens.

6. Last, use the wooden stirring stick to pick up the DNA. It will be the congealed substance floating at the top of the liquid in the beaker.
   CONGRATULATIONS! You have isolated DNA, the blueprint for all things living.

Post Lab Discussion Questions:

1. What did the DNA actually look like? Is this what you expected it to look like?

2. Explain what happened in the final step when you added the alcohol to the fruit mixture (hint: DNA is soluble in water (it will dissolve), but not in the alcohol).

3. Why is it important for scientists to be able to remove DNA from an organism? Provide at least 2 reasons.

4. How do you know that there is DNA in your food?

5. How might food scientists use this extraction method to engineer new types of food?

6. Write a self reflection on your behavior and level of group participation for this lab.

7. Write a reflection of this lab (what you learned and how you liked it).

Overview of how it works:

The soap breaks up the membranes of the cell, allowing the DNA to come out of the cell. Filtering the fruit "goo" gets rid of the debris (seeds, etc) that you don't need. The salt can dissolve in water, but not in alcohol. In the fruit "goo", the salt binds to the DNA and when it is put into the alcohol the salt solidifies and can be seen with the DNA. The salt falls to the bottom, leaving only the DNA. The alcohol is kept cold because it helps protect the DNA.