



# DNA Extraction Lab

## Living vs. Non-Living Things



Name: \_\_\_\_\_ Date: \_\_\_\_\_ Block: \_\_\_\_\_

HS-LS1-1: Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.

### Background information:

DNA is the molecule that carries all genetic information and instructions for organisms. This very molecule is what makes us different from anything else in the world! The questions...is DNA found in both living and non-living things? This lab will use several household agents for allowing you extract DNA from various items. 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.

**Define the underlined terms: Also, go ahead and label the DNA figures on page 4 of the lab.**

1. DNA (what is it made of?) \_\_\_\_\_
2. Lipid bilayer: \_\_\_\_\_
3. Nucleus: \_\_\_\_\_
4. Negative charge (which particle in an atom does this?) \_\_\_\_\_
5. Soluble: \_\_\_\_\_

### Problem Statements:

Does DNA have the same structure in different organisms? Is DNA found in both living and non-living things?

### Hypothesis:

IF \_\_\_\_\_  
 \_\_\_\_\_

**Materials Needed:** *These items may already be prepared at your lab stations.*

- |   |                                     |
|---|-------------------------------------|
| ▪ 2-3 strawberries<br>(or other fresh fruits & veggies) | ▪ Several plastic Cups and spoons   |
| ▪ 1 Tbsp Flour  | ▪ 3-4 Coffee filters                |
| ▪ Resealable plastic bags                               | ▪ ½ cup <b>COLD</b> Rubbing Alcohol |
| ▪ 2 tsp dish detergent                                  | ▪ Several Coffee Stirrers or straws |
|   | ▪ 1 tsp of salt                     |

## Procedures:

1. In groups of 2-3:
  - One student is the assistant (gets buffer solution, hold funnel while pouring juice into baggie, and puts/cleans up materials).
  - 1-2 students is in charge of extracting the DNA from the living and non-living items.
2. You may follow the laminated sheet provided or continue reading these procedures...
  - Place 2-3 cut pieces of strawberry in a zip-lock bag, press the air out, and then seal it.
  - Softly mash the strawberry/banana/potato with your fingers until it becomes a juice puree (should take 1-2 minutes).
3. In a plastic cup, make your DNA extraction liquid.
  - Mix together 2 teaspoons of detergent, 1 teaspoon of salt and  $\frac{1}{2}$  cup of water.
4. Add 2 teaspoons of the DNA extraction liquid into the bag with the strawberries (or item you are extracting DNA from). This will further break open the cells.
5. Reseal the bag and gently smash for another minute (avoid making too many soap bubbles).
6. Place the coffee filter inside another plastic cup.
7. Open the bag and pour the strawberry liquid into the filter.
  - You can twist the filter just above the liquid and gently squeeze the remaining liquid into the cup.
8. **With Mrs. Newsome's help or under supervision**, tilt the cup to one side and pour down the side of the cup an equal amount of cold rubbing alcohol as there is strawberry liquid.
  - **DO NOT** mix or stir! You have just isolated the DNA from the rest of the material contained in the cells of the strawberry (or item you are extracting DNA from).
9. Within a few seconds, watch for the development of a white cloudy substance (DNA) in the top layer above the strawberry extract layer.
  - Twirl your straw/stir stick slowly and it will wrap around it. It'll look like SNOT!
10. Extraction is complete! You will need to repeat these steps for each item you extract DNA from.

## Variables:

1. What is the independent variable? [**The thing we are purposely changing**] \_\_\_\_\_  
\_\_\_\_\_
2. What is the control? [**The thing kept the same?**] \_\_\_\_\_

## Data Collection:

Record your observations of the DNA you see in each of your cups in the chart below.

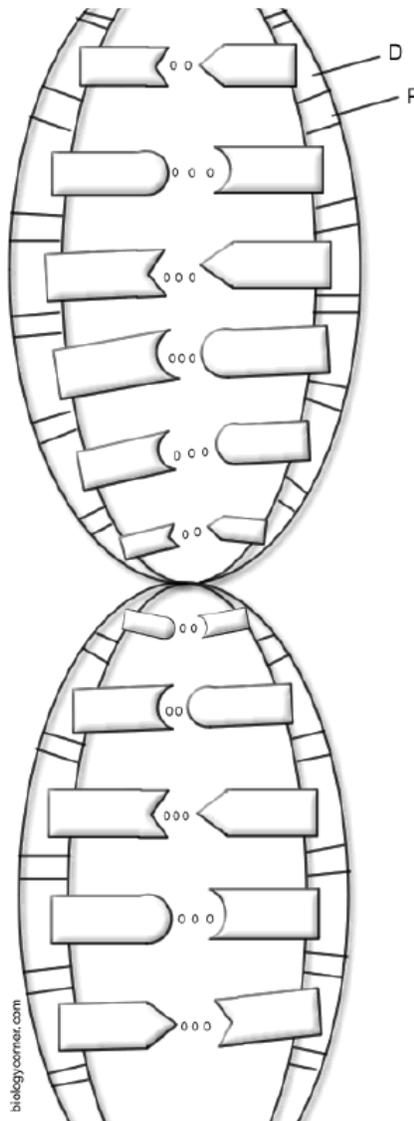
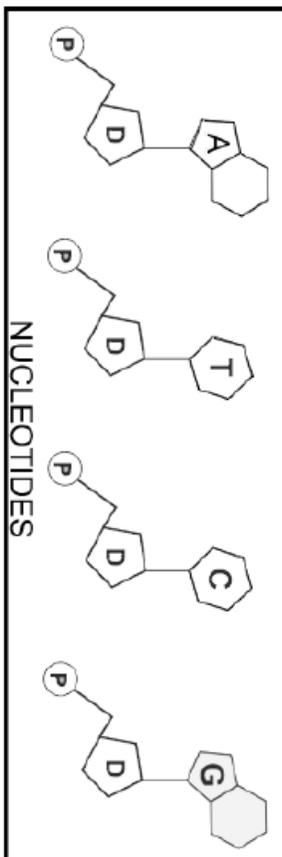
Strawberry	Banana
Cheek Cells	Potato or Carrot
Flour	Other: _____

## Conclusion:

3. Was your hypothesis correct? \_\_\_\_\_ Explain why it was or not. \_\_\_\_\_  
\_\_\_\_\_
4. What did you learn from this experiment? \_\_\_\_\_  
\_\_\_\_\_
5. Where is DNA located in the cell? \_\_\_\_\_ The soap buffer dissolves lipids of the plasma membrane which is composed of two rows of \_\_\_\_\_

6. DNA is built from nucleotide. Does the phosphate and sugar backbone provide the genetic code? \_\_\_\_\_  
 Do nitrogen bases provide the genetic code? \_\_\_\_\_
7. Which part of a nucleotide made the banana and strawberry different? \_\_\_\_\_
8. Many of the fruits and vegetables today have been genetically modified. If a scientist wanted to genetically engineer a plant, what would the first step be? \_\_\_\_\_
- 
9. Scientist can cut out a gene from one organism and place that gene into another organism, like a fruit plant. Give 4 benefits of genetically engineered food plants.
1. \_\_\_\_\_
  2. \_\_\_\_\_
  3. \_\_\_\_\_
  4. \_\_\_\_\_

### Color the DNA Molecule



**Choose your own colors and create a key!  
 COLOR AND LABEL both of the pictures!**

Color the thymines.

Color the adenines.

Color the guanines.

Color the cytosines.

Color the Deoxyribose (D)

Color the Phosphates (P)

Color the Hydrogen Bonds