**Modeling Standard B5.1 Relationship of DNA to Chromosomes**

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**Leading Question:**

What is DNA?

**Summary of the Investigation:**

Extract DNA from several organisms, possibly including fruit, vegetables, or students’ cheek cells. Proceed step-wise through the follow-up questions.

**Science Standard**:

B.5.1 Describe the relationship between chromosomes and DNA along with their basic structure and function.

**Equipment Used:**

Classroom: a blender, measuring cups

Per group: coffee filters, small glass container, test tubes, small cups, ethyl alcohol, detergent, salt, bananas, spinach, broccoli, chicken liver, strawberries, split peas, other suitable organism, or gatorade

**Description of Procedures, notes (teacher manual)**

1. Before class, put 1/2 c. (100ml) of organism in blender with 1/8 t. table salt and 1 c. of cold water per class. Blend for 15 seconds.

1. Divide students into groups of four and give each group a small glass jar with about 1/2 c. of the mixture of blended fruit or vegetable. Tell students that the blending separated the cells.
2. Have the add 1 t. of liquid detergent into the glass and gently swirl to mix.
3. Let stand for 5-10 minutes.
4. Pour the mixture into test tubes about 1/3 full.
5. Add a pinch of meat tenderizer to each test tube.
6. Tilt test tube and slowly add ethyl alcohol into each tube down the side on top of the mixture.
7. Clumps of white stringy stuff should form where the water and alcohol meet.
8. A wooden stick or glass rod can be used to pull out the precipitate.

OR

**DNA Extraction from Cheek cells**

1. Place 2ml gatorade into small plastic cups (1 per student).

2. Students swish the gatorade in their mouths & bite the sides of their cheeks for 2 minutes then spit the solution back into their cup (I have all students do this at the same time and I time them).

1. Students transfer their “spit” into a 15 ml test tube (preferably tubes with caps).
2. Students add 5ml of a 25% detergent solution (1 part dish soap/ 3 parts water) to their test tube and invert gently 3 times. Let stand for 15 minutes.
3. Follow step 7 above to complete extraction.

**Follow-up Questions:**

1. What do you think your products are?
2. Describe the products.
3. What were the similarities and differences between your products?
4. Why did we use detergent based on what you know about cell structure? (Do demo. of oil on the surface of water being broken up by a drop of soap. Lead students to realize that the nucleus needs to be broken open for the DNA to “fall out.” The detergent breaks open the sack.)

The students should now know that what they extracted is (primarily) DNA...

1. Is DNA in everything?
2. What do you know about DNA? Where is it? What does it look like?
3. How does a long strand of DNA fit into an organisms’ cells?