**Bio 9: Unit 5 DNA Extraction from Wheat Germ**

DNA is the genetic code found in all cells that tells your body what to do and what it is. Each DNA strand is very long and there is a strand in every cell. In this lab we will use wheat germ to extract and observe the DNA strands. Wheat germ is the embryo of wheat seeds. It is in the wheat germ that the nucleus of a wheat cells can be found. The DNA is found in the nucleus of the wheat germ. In this lab, we will use heat and detergent to extract the DNA from the wheat germ. The cell membrane and nuclear envelope that surround the DNA are made of thin layers of fat. We use heat in our experiment to soften the membrane of the cell. As you know, fats get softer when they are warm. Also, the heat will destroy chemicals called enzymes that will destroy DNA. If we don’t use the right amount of heat in this experiment, then these enzymes will cut up the DNA. We will also use detergent to help extract the DNA. Detergents, such as dish soap, are used by us to clean fat and proteins off dishes and clothes. This same detergent can be used to break apart the fats in the cell membrane and nuclear envelop. When both membranes are broken up, the DNA can float out of the cell and sit in the solution. After the cell has broken up, you will still not be able to see the DNA. You can add alcohol to the mixture to see the DNA. DNA strands will naturally be attracted to the alcohol and will collect on the border between the alcohol and the water/soap mixture.

**Objective**

* To observe the physical and chemical properties of DNA
* Understand one process of DNA extraction
* Demonstrate proficiency with one technique of DNA extraction

**Pre-lab Questions:**

* 1. Where is DNA found in cells?
  2. What are two reasons you will need to use heat in the experiment?
  3. How will using dish soap allow you to see DNA from the wheat germ?
  4. Why do you use alcohol in this lab?
  5. Write a hypothesis: What does the DNA in the cell look like?

**Materials:**

1 gram of wheat germ

1 mL of liquid dish detergent

14 mL of alcohol

20 mL of hot water (50-60 °C)

Test tubes or beakers

Graduated cylinder

Paper clip pipette

**Procedure**

1. Place 1 gram or 1 teaspoon of raw wheat germ in a 50 ml test tube, beaker.
2. Add 20 ml or 1 tablespoon of hot (50-60 °C) tap water and mix constantly for 3 minutes.
3. Add 1 ml of detergent and mix gently every minute for 5 minutes. Try not to create foam.
4. Use an eyedropper, pipette, or piece of paper towel to remove any foam from the top of the solution.
5. Tilt the test tube, beaker or jar at an angle. SLOWLY pour 14 ml of alcohol down the side so that it forms a layer on top of the water/wheat germ/detergent solution. Do not mix the two layers together. DNA precipitates at the water-alcohol interface (the boundary between the water and the alcohol). Therefore, it is crucial to pour the alcohol very slowly so that it forms a layer on top of the water solution. If the alcohol mixes with the water, it will become too dilute and the DNA will not precipitate.
6. Let the test tube or beaker sit for a few minutes. White, stringy, filmy DNA will begin to appear where the water and alcohol meet. You will usually see DNA precipitating from the solution at the water-alcohol interface as soon as you pour in the alcohol. If you let the preparation sit for 15 minutes or so, the DNA will float to the top of the alcohol.

You can usually get more DNA to precipitate from the solution by using one of the DNA-collecting tools (such as a paper clip) to gently lift the water solution up into the alcohol. This allows more DNA to come in contact with the alcohol and precipitate. Use a glass or paper clip hook or a wooden stick to collect the DNA.

1. **Optional**: Make a wet mount slide of the DNA, stain with Methylene blue and place it under a microscope and complete the lab activity handout. **(Caution: Methylene blue will stain you)**

**Observations:** Did you get DNA? What did it look like? How long did it take you to do the experiment?

**Conclusion:** On a separate sheet of paper, write a 1 page conclusion. (Conclusion should include the following: Was your hypothesis correct? Overview of how you did the experiment, 3 threes reasons for possible errors or ways to improve the lab, possible future lab ideas, did you learn anything? Was the lab interesting and why or why not?)