

# DNA Extraction

## Objective

The objective of today's exercise is to extract deoxyribonucleic acid (DNA) from spinach. The process requires three ingredients: 1) detergent, 2) enzyme, and 3) alcohol.

## Background

DNA is found in all living organisms. It is commonly referred to as the blueprint of life. What that means is it contains the directions for the development and maintenance of all living organisms. Surprisingly, all these instructions are contained in the sequence of four chemical molecules called nucleotides. These nucleotides are referred to as Guanosine (G), Adenosine (A), Cytosine (C), and Thymidine (T).

## Materials

Blender  
Strainer  
Source of DNA (e.g. spinach, chicken liver)  
Liquid Detergent (e.g. Palmolive)  
Meat Tenderizer  
Rubbing Alcohol  
Measuring Cup  
Test Tube

## Procedure

Place your source of DNA in a blender with enough water to create a mushy substance after 10 seconds of blending.

Pour the mixture into a strainer and collect the liquid into a graduated container (e.g. measuring cup).

Note the amount of liquid you have. Add liquid detergent equivalent to 1/4 of the amount of mixture and stir

To the mixture, add 1 spoonful of tenderizer, stir *gently*, and wait 5 minutes.

Fill a test tube half full with the mixture.

While tilting the test tube to the side, slowly pour in an equal amount of rubbing alcohol.

Watch for a stringy, snotty substance.

## Post-exercise Questions

DNA is found in the nucleus of all eukaryotic cells. The detergent serves to lyse (i.e. break) the cell membrane thereby releasing all of the cells material (e.g. DNA, protein, carbohydrates, etc.) into the mixture. How does the detergent work? (Hint: Think about what detergent is used for and the composition of the cell membrane)

What is meat tenderizer and why did you use it to extract the DNA?

How many layers do you have when you pour the alcohol to the mixture?

Of the layers that you have, where is the DNA and where is the protein? Why do you think this is the case? (Hint: Think about the properties of DNA and protein).