

What's the big deal about DNA? Middle School / High School

Introduction

DNA, three little letters that hold such power over every living thing. DNA, deoxyribonucleic acid, holds the codes which are the building blocks that create the proteins for making each living thing and their specific structure within a species. It gives each one traits, even though we may or may not see them, which produces a unique organism. Think of your own traits. People can see your eye color, or that you have curly hair, but they don't see your blood type, or that you may be allergic to peanuts. Your DNA carries all the messages needed to make you unique and the same is true for plants such as corn.

Corn, while it seems like a simple plant, is very complex. It has a much more complicated genome, which is the complete set of chromosomes of an organism, than one might expect. Corn has 2 billion base pairs making it one of the most difficult plants to decode. The base pairs, adenine-thymine and guanine-cytosine make up the genetic sequence which determines the specific traits of each kernel of corn. These traits provide information for plant height, kernel color, and shape of the kernel.

In recent years, due to the understanding of the corn genome, research has allowed scientists to alter the genetic codes to increase corn's resistance to certain diseases and drought which enables farmers to produce more corn to meet the growing population in our world. The video like below will give you a look at the origin of corn as we know it today.

https://www.youtube.com/watch?time_continue=361&v=mBuYUb_mFXA&feature=emb_logo

Activity

This activity will allow you to look at DNA. Keep in mind that DNA is located inside of the nucleus of each cell and in order for you to get it out of the cell you will need to add a few products to the cells to break down both the nuclear and cell membranes.

The process you will use will allow you to look at your own DNA, however, many other things can be used as well. Provided at the end of this activity in the resources section is a link to an activity that uses corn. Try both if you have time.

Materials

- Drinking glass
- Small cup, see through would be best
- Isopropyl alcohol 70% or higher (chilled in the freezer overnight)
- 1 tsp measuring spoon
- Contact lens cleaner or meat tenderizer

- Table salt
- Water
- Liquid dish soap
- Toothpick, popsicle stick or straw

Directions

- 1. Fill a glass with water. Add 1 Tbsp of salt to the water and stir until dissolved.
- 2. Place 3 Tbsp of the salt water into your small plastic cup.
- 3. Put this water in your mouth and "gargle" or swish it around in your mouth for one minute.
- 4. After one-minute spit your salt water back into your plastic cup.
- 5. Add 1-2 drops of liquid dish soap to the cup. Swirl to mix.
- 6. Add 2 drops of lens cleaner to your solution and again swirl to mix.
- 7. Measure out 6 Tbsp of chilled alcohol, tilt your cup of saliva solution to about 45 degrees and pour the alcohol down the side of the cup so as not to disturb the solution.
- 8. Let sit for 1-2 minutes and look for a white "thread" to appear, this is your DNA.

Questions

1. What is the purpose of adding the dish soap?

2. What role does the salt play?

3. How does the alcohol help us see the DNA?



Resources

- Kansas Corn *DNA extraction from corn: How can we see the raw material of life?* Find the procedures for a lab similar to the one in this lesson which uses corn. https://kscorn.com/wp-content/uploads/2017/09/dna-extraction-from-corn.pdf
- HHMI Biointeractive The Mysterious Origin of Corn (Video 17:51 minutes) This video shares how a simple grass evolved into the plant we know today as corn. https://www.youtube.com/watch?time_continue=361&v=mBuYUb_mFXA&feature=emb_logo
- National Human Genome Research Institute National DNA Day This site offers many resources to help celebrate National DNA Day on April 25th, 2020. https://www.genome.gov/dna-day
- NOVA *Extract Your DNA* (Video 2:45 minutes) This short video demonstrates the processes of the DNA extraction activity. https://www.youtube.com/watch?v=DaaRrR-ZHP4
- Scientific America Cracked Corn: Scientists Solve Maize's Genetic Code Short article comparing the corn and human genome. https://www.scientificamerican.com/article/corn-genome-cracked/

