



# Welcome to MI Kids!



Dear Parent/Guardian:

Thank you for your interest in MI Kids!

These activities are a great way to encourage your child's curiosity and interest in science.

In the upcoming MI Kids event, your child will learn about the structure, size, and location of the DNA molecule by doing a hands-on activity.

Your child will successfully extract DNA from a strawberry using common household goods. Even though DNA is ultra-microscopic and requires a very powerful microscope in order to view just a single strand, you can actually make DNA *visible* by collecting enough of it and placing it in the right chemical conditions. This fun activity helps your child learn about the structure, size, and location of DNA and how it can be extracted from organisms for the purpose of sequence investigation.

Looking forward to seeing you soon!

- The MI Kids Team



MI Connection: Some microbes found naturally in the environment are helpful and some are harmful. At MI, our lab can extract DNA from environmental microbes that are naturally found in many places such as soils, sediments, streams, groundwater, and even deep subsurface mines! The extracted DNA is then sequenced to identify the presence of bacteria that could possibly aid in the cleanup of spilled chemicals or to identify harmful bacteria that can make people sick.



# Strawberry DNA Extraction

DNA stands for deoxyribonucleic acid and it is found inside the cells of every living organism. In eukaryotes (organisms that are not bacteria), DNA is located in the central compartment of the cell called the **nucleus**. Even though we are unable to see a single molecule of DNA, we can easily make it visible to the naked eye when it is collected from thousands of cells. If you were to take the DNA from just one cell in your body and put it end-to-end, the length would be about 8 feet! Since strawberry cells have many more copies of DNA than human cells, the total amount and total length of DNA is much greater. In this activity, we will release DNA from the strawberry cells, separate the DNA from the rest of the cellular components, and change the chemical conditions so that white “threads” of DNA will become visible before our very eyes!



**Safety Note:** The liquids used in this experiment, namely the extracting solution and the alcohol, should never be swallowed.

## Activity: Extract Strawberry DNA

1. Make **DNA extracting solution** by combining shampoo or liquid soap, kitchen salt, and water. Mix well.
2. Wash the strawberry and remove the sepals (green leaves).
3. Place the strawberry into a zip-lock bag, seal the bag, and crush the strawberry.

### Materials for Each Student

- Strawberry
- Gauze or cheesecloth
- Test tube or other clear, narrow container
- Test tube rack or holder
- Narrow wooden stir stick
- 1 tsp kitchen salt
- Zip-lock bag
- Funnel
- Rubbing alcohol (ice cold)
- 1 Tbsp shampoo or liquid dish detergent
- 1 cup (8 oz.) water
- Black construction paper





# Strawberry DNA Extraction



4. Open the bag and add **2 tablespoons** of the DNA extracting solution into zip-lock bag with strawberry.



5. Close the zip-lock bag and continue mixing and mashing the bag in your hand for 2 minutes.  
*(Crushing the strawberry breaks open many of the cells where the DNA is located. The soap in the extraction solution breaks down the membranes of the cells, releasing the DNA. The salt makes the DNA molecules stick together and separate from the proteins, which are also released from the cells.)*

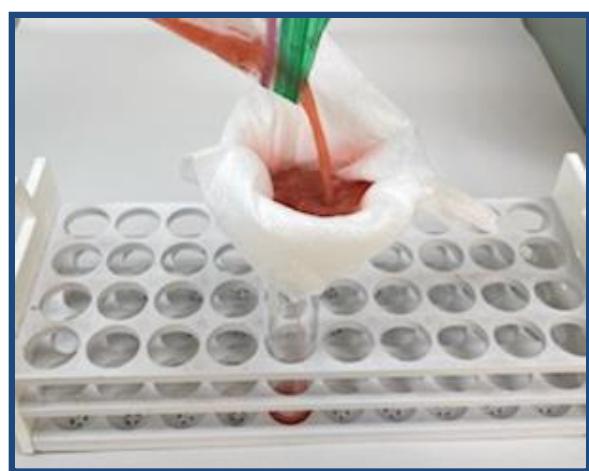


6. Place a funnel in the test tube. Place the piece of gauze in the funnel.

7. Carefully pour the strawberry mixture into the funnel, making sure to catch the solids with the gauze.

*Note: If the liquid is not able to pass through easily, use an extra stir stick or spoon to stir the mixture.*

8. Remove the funnel.





# Strawberry DNA Extraction



9. Carefully pour 3 Tbsp ice cold alcohol into the tube.
10. Keep the tube still at eye level and do not shake it.  
*(DNA is not soluble in alcohol so it precipitates. What you will see are long, rope-like DNA molecules in the alcohol.)*
11. Insert the stir stick into the alcohol solution at the top of the tube and gently stir to collect the DNA threads on the stick, similar to cotton candy.
12. Scoop out the DNA, smear it in a thin layer on the black construction paper, and let it dry.

*(Once dry, you should be able to see its stringy, spider-web structure.)*



## Did you know?

DNA is the blueprint for the construction of cells. The DNA sequence codes for **genes** that make different cell types unique by the way some genes are “turned on” and others are “turned off”. Consider that the DNA in the cells of your heart muscle is the exact same DNA found in the cells of your brain—but they are very different tissues!

## Genes in common?

You don't look much like a fly or a worm. But, believe it or not, you share genes with both of them - and with every other living organism. Scientists study the genes in bacteria, fish, chimpanzees and other living things to learn more about humans.

How much DNA do you share with these living things?

Fruit fly - 36%

Zebrafish - 85%

Bacteria - 7%

Mustard Grass - 15%

Round Worm - 21%

My DNA is 99% identical to your DNA...yet we are so different!