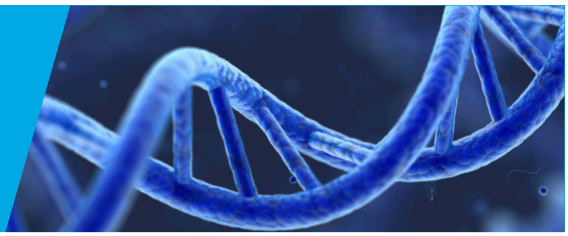
CURIOSITY AT HOME

DNA EXTRACTION



Use common kitchen items to extract DNA from fruits & veggies.`



MATERIALS

- Fruits or vegetables (strawberries are ideal)
- Blender or food processor (substitution: large Ziploc bag. If using this substitution, the fruit or vegetable needs to be soft enough to squish with your fingers)
- Salt
- Liquid dish detergent
- Toothpicks
- Meat tenderizer (if not available, try pineapple juice or contact lens solution)
- Test tube (or small clear plastic cup)
- Strainer
- Measuring cups
- Bowl or jar
- Isopropyl (rubbing) alcohol (refrigerated is preferable)
- Science notebook or paper
- Something to write with
- Microscope and slides (optional)
- Paperclip (optional)

PROCEDURE

- Place 1 cup cold water, ¼ teaspoon salt, and ½ cup of fruit or vegetable in blender. If no blender is available, squish together in large Ziploc bag.
- Blend for 5–15 seconds (more time for firm veggies). You want to create a soup-like texture.
- Use the strainer to strain the mixture into a bowl or jar.
- Add 2 tablespoons of liquid dish detergent to the strained mixture and swirl the jar to mix the soap well without creating any suds.
- Let the mixture sit for 5–10 minutes.
- Pour the mixture into the test tube until it's about halfway full.
- Wet a toothpick, dip it in the meat tenderizer and stir it into the mixture. Stir gently. If using pineapple juice or contact lens solution, pour a few drops in.
- Carefully pour isopropyl alcohol into the test tube. Ideally, you should pour the alcohol down the side so that it forms a clear layer above your "soupy" mixture. Add about as much alcohol as you have mixture.
- Watch as the DNA rises to the top of the mixture. Little bubbles will form, and the DNA will attach to these bubbles. If you gently stir the alcohol layer with a toothpick or a small hook (try a paperclip), you will see some slime-like, stringy material near the top. This is the DNA.



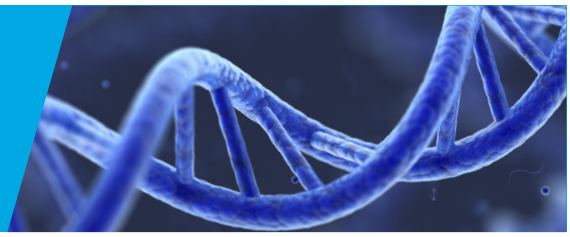
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CURIOSITY AT HOME

DNA EXTRACTION



EXPLORE MORE

If you have access to a microscope and clean slides, look at the DNA under magnification. Try different fruits and vegetables. Which yield the best results? Does it matter if the fruit or vegetable matter is cooked first?

DID YOU KNOW?

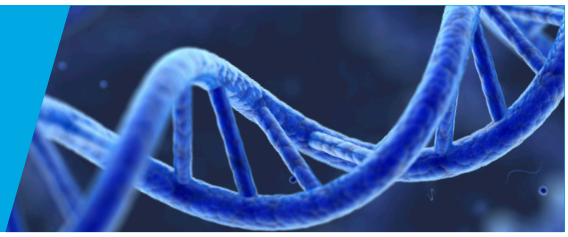
DNA, or deoxyribonucleic acid, is the name of the long complex chain of protein found in all plant and animal cells, including in humans! It gives cells instructions on what to do. It tells your body everything from how to grow to what color to make your eyes. Your DNA is unique to you, unless you have an identical twin. Surprisingly though, the part of your DNA that makes you different from other people is only a tiny amount—all humans share 99.9% percent of our DNA with each other.

WHAT'S HAPPENING?

Blending breaks up the vegetable or fruit into smaller pieces but doesn't necessarily break open individual cells. The detergent bonds with certain components, called lipids, within the cell membrane, breaking open the cell and allowing everything in the cell to spill out. However, the DNA is still interwoven around proteins for protection and structure. The enzymes in meat tenderizer cut those proteins, allowing the DNA to separate. The alcohol floats on top because it is less dense. The DNA rises to the top, where it precipitates because it is insoluble (won't dissolve) in alcohol.

CURIOSITY AT HOME

DNA EXTRACTION



K–2 GRADE EXPLORATION

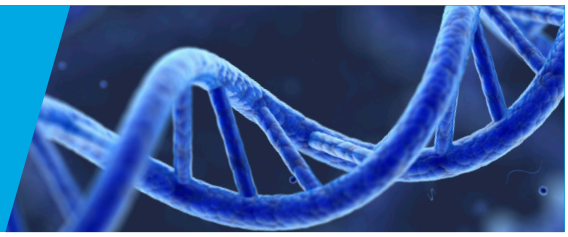
- Draw a picture of yourself in your science journal. What parts of you are made by your DNA? Label some of them.
- Look at this picture of a litter of kittens. How are the babies all alike? How are they different? Do you think their DNA is very different, a little different, or exactly the same? What do you expect the mother and father cats looks like?



Source: RN3DLL, https://commons.wikimedia.org/wiki/File:Scottish_Kitten.JPG

CURIOSITY AT HOME

DNA EXTRACTION



3–5 GRADE EXPLORATION

- Some traits that an animal has are because of its DNA, and some are because of the environment it grew up in. For instance, a bird has wings because of their DNA, but if another bird taught it to fly, that's something they learned in their environment. In your science journal, make a table. On one side, list traits that you have because of your DNA. On the other side, put traits that you have because of your environment.
- Look at this picture of a litter of kittens. How are the babies all alike? How are they different? Do you think their DNA is very different, a little different, or exactly the same? What do you expect the mother and father cats looks like?



Source: RN3DLL, https://commons.wikimedia.org/wiki/File:Scottish_Kitten.JPG

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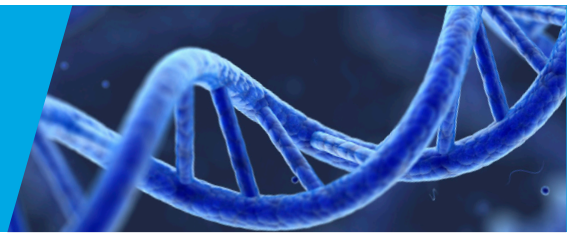
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Solids: ice, bubble wrap, pumice (rocks), bread; Liquids: soap, boiling water, soda)

CURIOSITY AT HOME

DNA EXTRACTION



6–8 GRADE EXPLORATION

- Animals and plants have two sets of genes, which are carried in the cells in a structure called a chromosome. Each individual gets one set of chromosomes from each genetic parent. Some genes can cover up the ability of other genes to show through, for instance if someone has one gene for brown eyes and one gene for green eyes, they will have brown eyes. Genes that cover other genes up are called dominant genes. Genes that get covered up by other genes are called recessive genes. In a real experiment, a scientist took two pea plants, one with purple flowers and one with white flowers, and cross-pollinated them. All the offspring had purple flowers. Which gene is dominant: white or purple? Write down your reasoning in your science notebook.
- Bonus challenge: All of the second generation of pea plants have one purple gene and one white gene. If the scientist cross-pollinated two of these second-generation plants together, what will the third generation look like? Will all the third-generation plants have the same flower color, or will it depend on which gene the parent passes on to each offspring? Draw the table below in your science notebook and use it to help you make your prediction.

	Purple	White
Purple		
White		