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GIRLS INSPIRING RISING LADIES IN STEM

Name: _____ Date: _____

TOPIC #3: DNA STRUCTURE AND REPLICATION

STRAWBERRY DNA EXTRACTION

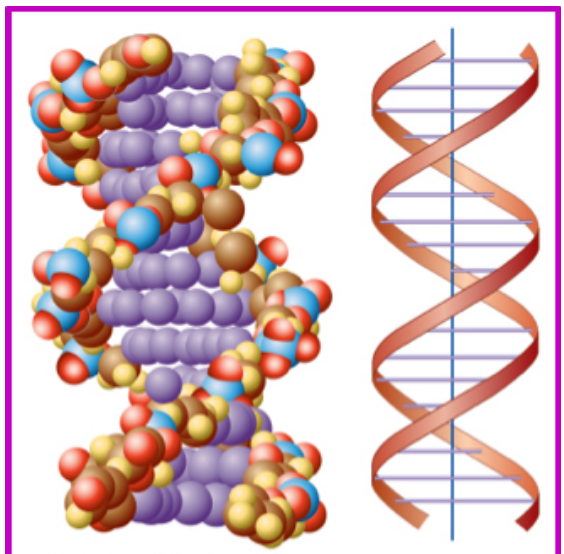
SCIENTIST OF THE DAY: ROSALIND FRANKLIN

Rosalind Franklin was born in 1920 in London. Her father hated the idea of her going to college, saying that it was “unfit for a lady.” However, the women in her family helped her stand up to her father and she went on to earn a PhD. During her life, scientists had just begun discovering the existence of DNA. However, no one knew what DNA actually looked like. Rosalind was committed to finding out and spent hours using an x-ray with the hopes of capturing an image of DNA. She was eventually successful in uncovering its structure! This was a huge accomplishment; in fact, it was so significant that her work was stolen and published by two men without Rosalind's permission or knowledge. Rosalind never received recognition for her work in her lifetime, but today we remember and celebrate her as one of the most influential women in science!



BACKGROUND

DNA stands for deoxyribonucleic acid. It is present in every cell in our body. **DNA** is a double stranded material that holds all of our genetic information. Genetic information is information about an organism that determines how an organism will look and function, such as the color of a person's hair or



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eyes. We inherit this genetic information from our parents - that's why we look like our family members!

DNA carries many pieces of genetic information. Each piece is called a gene. **Genes** are the unit of genetic information that we inherit from our relatives. The **genome** acts as a genetic library that holds of all the genes present in a cell or organism. All living organisms have DNA—from humans, rats, tomatoes, or even bacteria. DNA tells the organism how to develop and function. Each cell has a copy of the same set of instructions.

NEW WORDS

- **DNA:** blueprint for all living organisms; a double stranded material that holds all of our genetic information that determines how we look and function.
- **Gene:** a unit of information that is passed on from one generation to the next that dictates specific traits that an organism will display.
- **Chromosome:** carrying genetic information in the form of genes.
- **Genome:** the complete set of genetic material in an organism.
- **Cell:** smallest unit of life.
- **Nucleus:** part of the cell that has the genetic information.
- **Organism:** any living thing that can react to stimuli, reproduce, and grow.

TODAY'S EXPERIMENT

This experiment will extract (remove) the DNA from the strawberries cells. The soap will lyse, or pop, the cells, so the DNA is released into solution. The rubbing alcohol causes the DNA to precipitate out (solid form from the liquid portion of the solution). Cheesecloth is placed in the funnel and used as a filter. When extracting DNA, it is important to make sure that you are getting rid of all the extra junk that is present in the sample that isn't DNA. This is because we want the DNA to be pure, meaning that it contains nothing else. Pure DNA is important for genotyping to ensure that we are observing the correct genomic data of an organism.

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SCIENCE CONCEPT: SOURCES OF ERROR

Humans are not perfect, and scientists are no exception to this. We all make mistakes, and sometimes we make mistakes during an experiment. If something goes wrong in an experiment, it is likely that the results you yield are not reliable or true. When a mistake occurs during an experiment, it is called a source of error. This could be anything from accidentally skipping a whole step to just adding a drop too much of water. DNA extraction is a complex process that allows for there to be many sources of error. Be sure to make note of any possible sources of error that may occur in your experiment and how they would affect your results.

MATERIALS LIST

- | | |
|--|---|
| ☐ Rubbing Alcohol | ☐ Measuring Cups |
| ☐ Dish Soap | ☐ Spoons |
| ☐ Salt | ☐ Plastic Cups |
| ☐ Cheesecloth | ☐ Tweezers |
| ☐ Strawberries | |

PROCEDURE

1. Mix one half teaspoon of salt, one third cup of water and one tablespoon of dishwashing liquid in a glass or small bowl. Set the mixture aside. This is your extraction liquid.
2. Completely line the funnel with cheesecloth. Insert the funnel tube into the tall drinking glass (not the glass with the extraction liquid in it).
3. Put the strawberries (tops removed) into a resealable plastic sandwich bag and push out all of the extra air. Seal the bag tightly, and squeeze for two minutes.
4. Add three tablespoons of the extraction liquid you prepared to the strawberries in the bag. Push out all of the extra air and reseal the bag. Squeeze the mixture for one minute.
5. Pour the strawberry mixture from the bag into the funnel. Let it drip through the cheesecloth and into the tall glass until there is very little liquid left in the funnel (only wet pulp remains).

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6. Tilt the jar and very slowly pour the $\frac{1}{2}$ cup of rubbing alcohol down its side. Pour until the alcohol has formed approximately a one-inch-deep layer on top of the strawberry liquid. You may not need all of the one half cup of alcohol to form the one-inch layer. Do not let the strawberry liquid and alcohol mix.
7. Study the mixture inside of the jar. The strawberry DNA will appear as gooey clear/white stringy stuff.
8. Dip the bamboo skewer into the jar where the strawberry liquid and alcohol layers meet and then pull up the skewer.

DATA

	What you did:	Observations:	Source of Error:
Step 1			
Step 2			
Step 3			
Step 4			

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Step 5			
Step 6			
Step 7			
Step 8			
Additional Observations			

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QUESTIONS

1. What materials did you use to make your extraction liquid?

2. What did the DNA look like?

3. List any possible sources of error that may have occurred throughout the experiment.

4. How do you think your sources of error affected your results?

EXPERIMENT LINKS

- <https://www.stevespanglerscience.com/lab/experiments/strawberry-dna>

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EXIT PASS

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X S Z W G R E Z Z K C C I G L S A Y P U
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DNA
GENOME
ORGANISM
GENOTYPE

GENE
CELL
STRAWBERRY
ROSALINDFRANKLIN

CHROMOSOME
NUCLEUS
CHEESECLOTH