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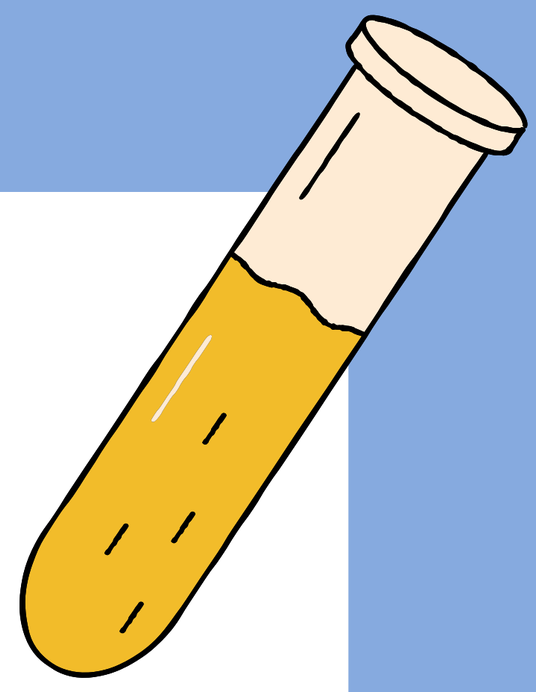

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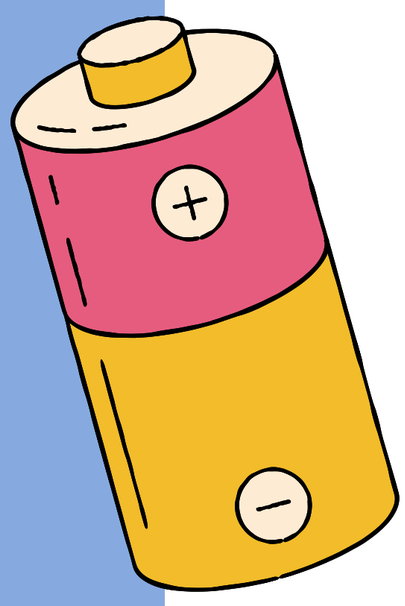
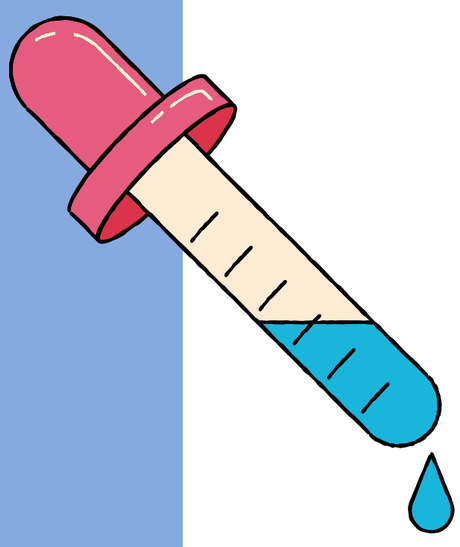


READS

DNA & GENETICS



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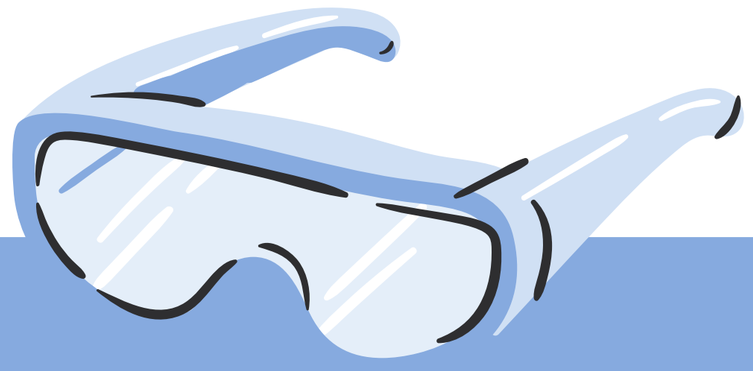
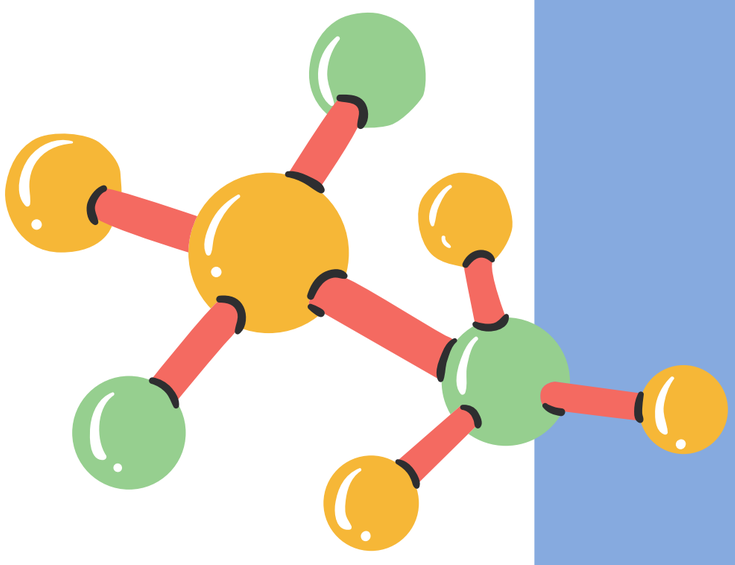




STEM SPARKS READS

WHAT DO WE DO?

The Stem Sparks Reads magazine is a branch of the non-profit STEM Beyound Boundaries. Every month our team writes and shares information about different STEM topics to younger students. We feature different sections in our magazine that is not only engaging but also interesting and interactive. Our goal is to help spark interest in young minds about the STEM field through the art of literature.

For more information visit us on our website:

https://stembeyondboundaries.org/index.php/stem-spark-reads/

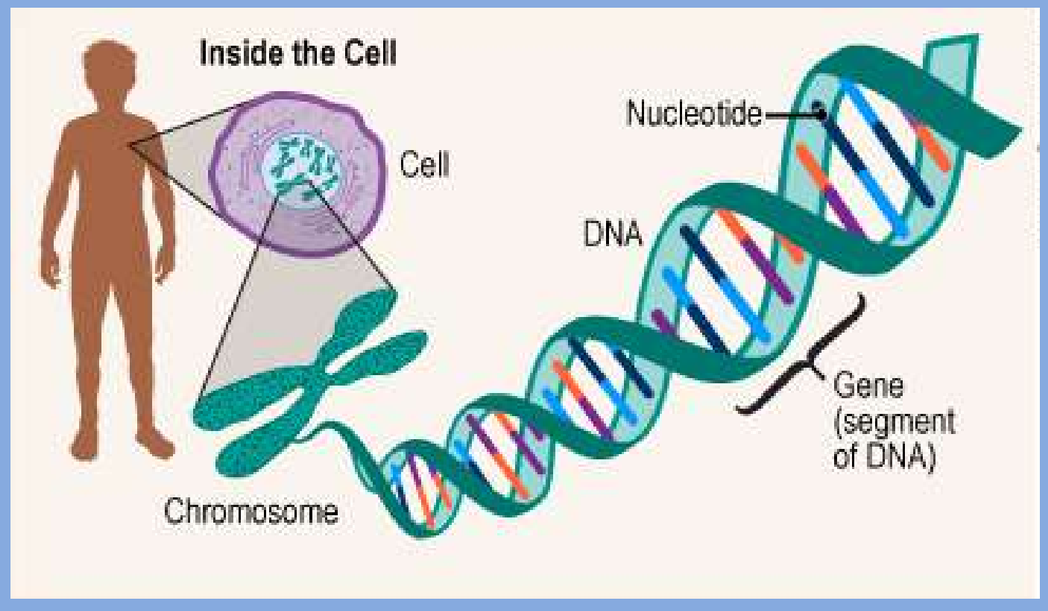
TABLE OF CONTENTS

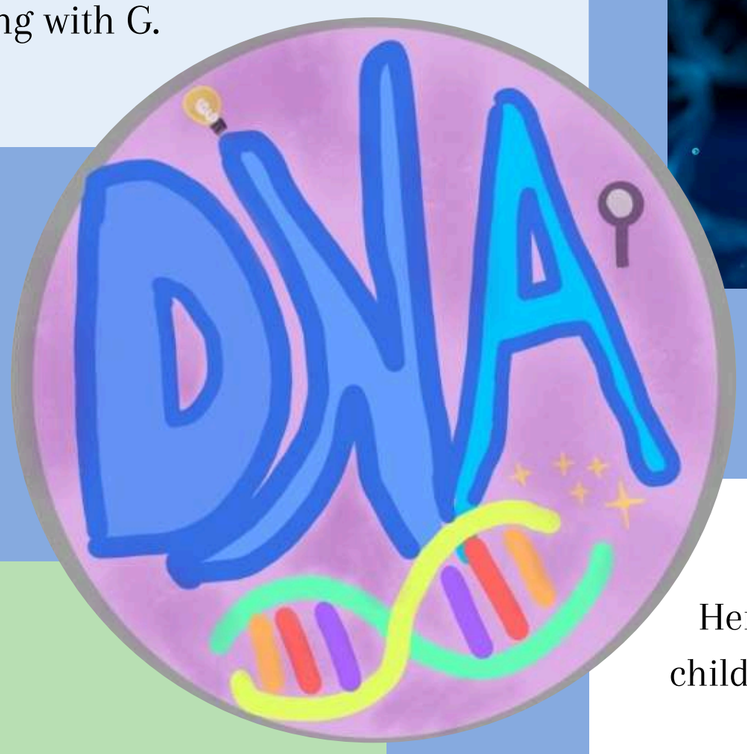
- What is DNA & Genetics?
- Latest News!
- Fun Facts
- History
- Career
- What Does This Have to Do With Me?
- FAQ

INTRO: WHAT IS DNA & GENETICS?

Allison Lin

Have you ever wondered why you have your mom's eyes or your dad's smile? The answer is hidden inside something called DNA!
DNA (Deoxyribonucleic Acid) is the special material found in almost every living thing. Think of it as your body's instruction manual. It contains all the information your cells need to help you grow, stay healthy, and function every day.
DNA tells your body how to build proteins, which are tiny building blocks that help your body do almost everything—from growing hair to beating your heart!
Scientists describe DNA as a double helix, which looks like a twisted ladder or a spiral staircase.
The sides of the ladder are made of sugar and phosphate molecules. The rungs are made of four chemical bases: Adenine (A), Thymine (T), Cytosine (C), Guanine (G).
These bases always pair up the same way, with A pairing with T and C pairing with G.





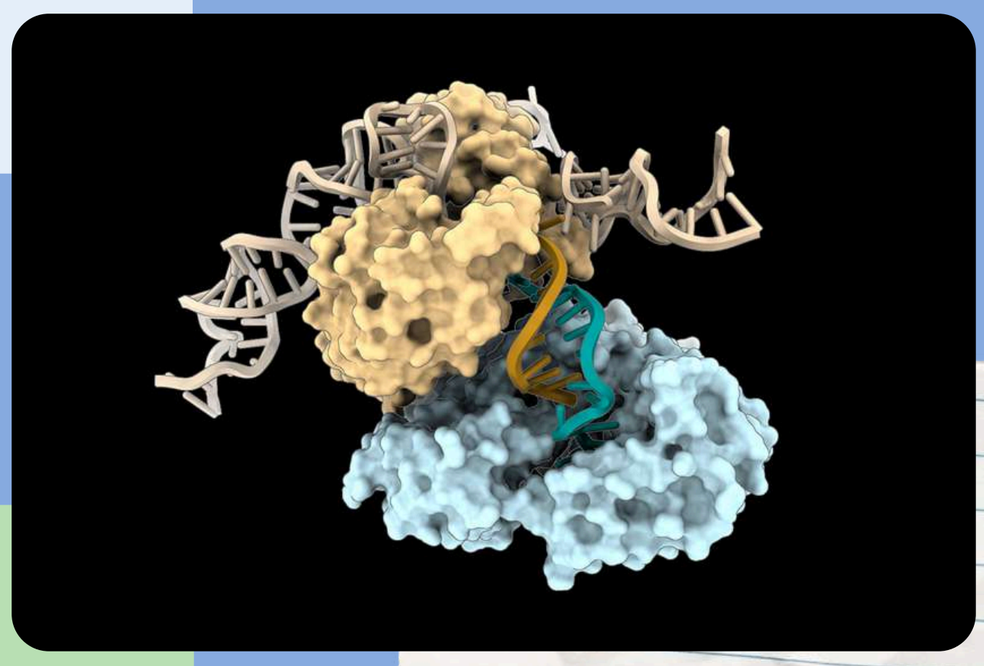
The order of these letters creates the genetic code that makes each living thing unique.
Most of your DNA is stored in the nucleus, which is the control center of a cell. DNA is tightly packed into structures called chromosomes.
A small amount of DNA is also found in the mitochondria, the part of the cell that helps produce energy.
Genetics is the study of how traits are passed from parents to their children. Scientists who study genetics learn how genes influence growth, development, and health.
Genes are small sections of DNA that contain instructions for making proteins. Humans have about 20,000 genes!
Different genes help determine things such as eye color, hair color, height, blood type, and some health conditions.

Heredity is the process of passing traits from parents to children. You receive half of your DNA from your biological mother and half from your biological father.
This is why family members often look alike, but no two people are exactly the same!
Although all humans share about 99.9% of their DNA, there are tiny differences in the remaining 0.1%. These differences are called genetic variation.
Genetic variation helps make each person unique. It can affect appearance, talents and abilities, and certain disease risks.
DNA may be microscopic, but it plays a huge role in your life. It carries the instructions that help build your body, determine many of your traits, and connect you to your family. Thanks to DNA and genetics, every person is one of a kind.!

LATEST NEWS!

Chloe Hsu

In April 2026, researchers discovered a new way that bacteria can produce DNA. For decades, there was one simple rule: DNA could only be made by copying an existing DNA or RNA template. However, researchers at Stanford University found a bacterial defense system called DRT3. It makes enzymes assemble DNA without a template. DRT3 helps bacteria defend themselves against viruses called phages.



It relies on two transcriptases: (1) A normal one that builds single-stranded DNA from RNA template and (2) An unusual enzyme, called Drt3b. Drt3b has amino acids in its active site that mimic a template RNA strand. DRT3 is important because it is a new method for DNA synthesis. DNA synthesis is the process of creating new strands of DNA. Scientists are not sure on how DRT3 stops phages. One possibility on how DRT3 stops phages is that it acts like sponges that attach onto phage components. This discovery shows that there is still a lot to learn in microbial biology. Scientists believe that other bacterial defense systems may be similar to DRT3.

FUN FACTS

Romero Santiago

Despite how small our DNA may seem, you've read how incredible it can be! Here are some more amazing—and at times, crazy—facts about the genetic code that makes us us!

99.9% of all human DNA is identical

There are about 3 billion nucleotide pairs in the human body.

Mitosis, the process of new cells getting formed, takes 30 minutes to an hour per cell, but 8 hours for the process to be wholly finished.

A few grams of DNA could store the entire world's digital data.

DNA can go to the moon and back if fully unraveled.

DNA is folded into 6 millionths of a meter to fit in a single cell.

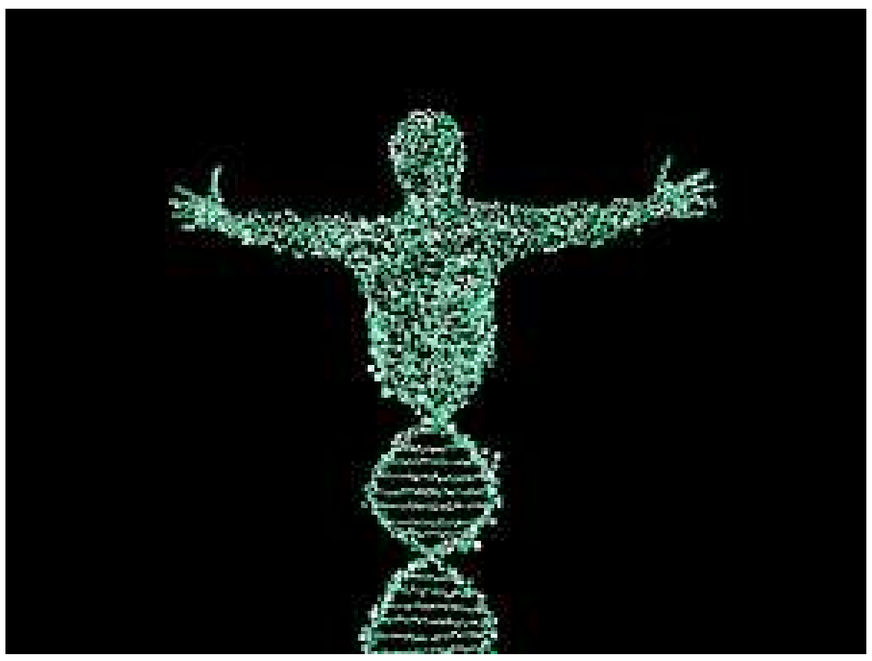
Red blood cells actually have no DNA

Less than 2% of our DNA is genes, instructions for traits of our body, like eye or hair color.

DNA was discovered by accident in 1869 when a French scientist tried to study white blood cells.

There are cases when there are more than four DNA bases.

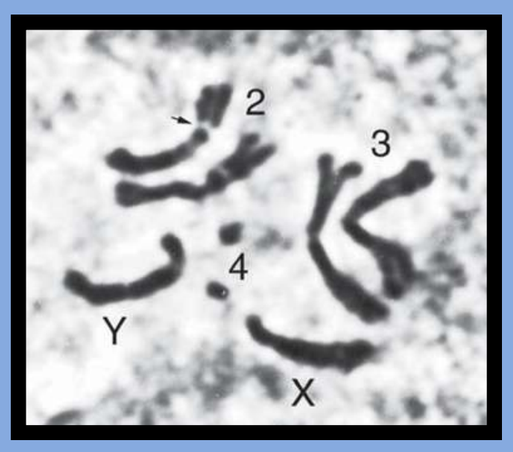
50% of human DNA is the same as that of a cabbage



HISTORY

Our current understanding of genetics comes from a long time of experimentations and discoveries. During Ancient Greece's Classical period, Hippocrates, a philosopher, theorized the idea of Pangenesis, which is the idea that all organs produce their own "seeds" that pass down to the child. This theory continued to pass on even to Charles Darwin, the father of evolutionary theory. But through multiple experiments, one of which was the rediscovery of Mendel's work on genetics, this idea was disproved. During the 1900s, Eric Von Tschermak and many other scientists rediscovered Mendel's work on genetics, launching the field of biology into a whole new understanding. Mendel proved that an organism's genes, traits that organisms have, are passed on discretely, instead of the idea of blending inheritance, that your genes are a balance between your mothers and your fathers genes.

Weiyu Tsay



Later in 1910 Thomas Morgan showed that these genes are part of a larger structure called a chromosome. Along with Alfred Sturtevant, Thomas created the first chromosomal map of a fruit fly (drosophila melanogaster), the first of any biological organism. In 1928, Frederick Griffith proved that genes can be transferred between bacterias in his famous Griffith experiment.

In 1944, Oswald Avery, along with other scientists proved the existence of DNA, and in 1953, Watson and Crick managed to accurately show what the structure of DNA looked like, (Rosalind Franklin first discovered the structure, but never received credit). In 1977, Richard Roberts and Phillip Sharp showed that one gene can produce multiple proteins, showing that we have so much more we don't know about biology and genetics. And this is just a tiny bit about the history of Genetics, we encourage you to explore all the details in this fascinating history.

CAREER

Chloe Lin

There are a variety of careers that surround the knowledge of DNA and genetics, making options less limited. These professions incorporate the way DNA works to real-life challenges. For example, horticulturists use their understanding of plant DNA structures, biology, and natural sciences to determine how they can encourage plants to breed. But work with DNA doesn't just stop there! Crime scene technicians visit unsolved crime scenes to evaluate evidence, such as fingerprints, debris, footprints, hair, and weapons. Similar to crime scene technicians, if a dead body were found on a crime scene, examiners analyze the DNA of those who've deceased to assist in determining how one passed away.

Genetic counselors work closely with their patients to help them understand their risks for certain inherited genetic diseases and to provide evaluation. Genetic counselors are strongly equipped with knowledge about inheritance and how genes are passed down through generations, helping patients become familiar with prevention or lowering their risks. Archaeologists primarily identify and research artifacts or ancient documents from history. By collecting past, useful, DNA traces on artifacts, archaeologists can gain insight to which time period the artifact existed in, different organisms that lived nearby, and which civilizations were present. Lastly, this career is a combination of medicine and the understanding of DNA. Genetically inherited diseases are caused by mutations in DNA that are passed down from parents to offspring or children. When creating and testing new medications made from diverse chemical compounds, pharmacologists incorporate learning about DNA and genetics to better target and efficiently develop a medication for certain genetically inherited diseases such as sickle cell disease, type 2 diabetes, and heart disease. These careers are all driven from different perspectives of DNA, all to benefit the community as a whole by impacting how humans interact with genetics and DNA.

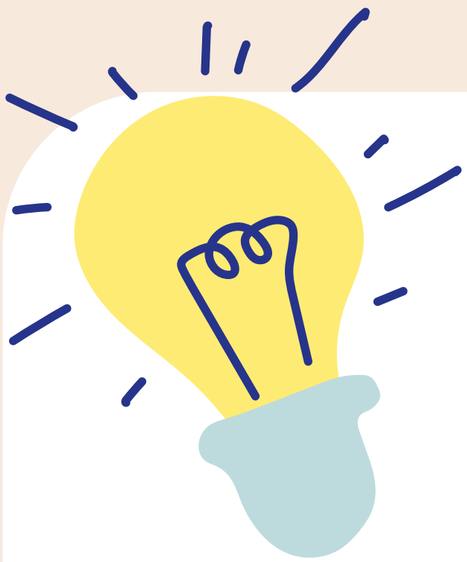
WHAT DOES THIS HAVE TO DO WITH ME?

Claire Lin

DNA and genetics define a lot of who we are and most times, our genetic code has the power to determine our potential as well as our present capabilities. Although many overlook the power of DNA and our biology, it is an important factor of our human biology that is interesting to study. Many aspects of our daily life are driven by our genomes. Subtle genetic tweaks can cause major differences in our genomes that can cause a difference in our behavior and cognition. Now, biology and DNA can impact everything from our simple ways of life all the way to our personal taste preferences. For example, DNA and genetics can determine the difference between whether or not someone likes coffee or tea. It can also determine more generic things, such as what interest kids have in their activities and sports/extracurriculars. Whether it's enjoying basketball or swimming, your genome has the power to highlight your interests as well as your dislikes.

15 years ago, there was research done by British adults about a possible "hobby gene." This was after many scientists noticed that there are a lot of hobbies passed down from generations in the family tree. By discovering this piece of information, it can cause a lot of people to want to change behavior and also pursue specific hobbies. However, talents in areas such as music, athletics, and numerical intelligence have little to no impact from the gene pool and are usually just by chance.
Additionally, DNA and genetics can have the power to determine personality traits. They highlight the differences in whether or not you are introverted, extroverted, creative, or impulsive. Personality traits have a strong correlation with genes and have a strong impact on who we are and what we choose to become.

Finally, genetics have the power to influence the way our brains choose to form connections. This could mean they learn quicker, or maybe the talent in your gene pool is more influential than the talent in someone else's gene pool. A fun fact about personality to behavior correlation is that risk takers are more likely to develop addictions. They tend to take action often without much thought process. Some creative thinkers can also have the possibility to later go on to develop a disease called schizophrenia, which involves symptoms such as hallucinations and also depression. While this is not confirmed as "every risk taker will develop addictions," it is a statistic that is common and shows direct correlations between genetic personality and future adult behavior. It's important to remember that DNA is not an ultimate deciding factor for anyone. While it does influence our natural tendencies to some extent, it doesn't determine the development of problems and can be changed with factors such as environment. Environment heavily influences how we choose to act on our genetic traits but genetic information can be used socially as well to help the public on issues such as relationships, love, and also topics like divorce.



THANK YOU!

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