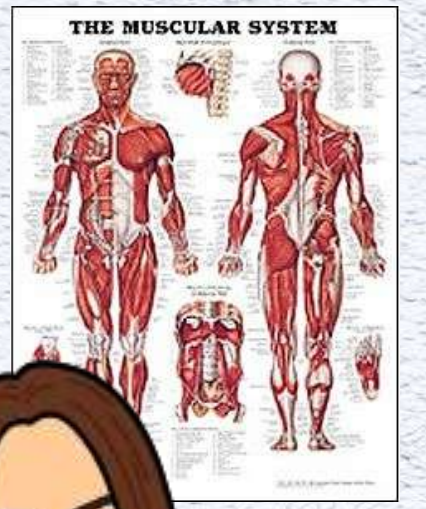
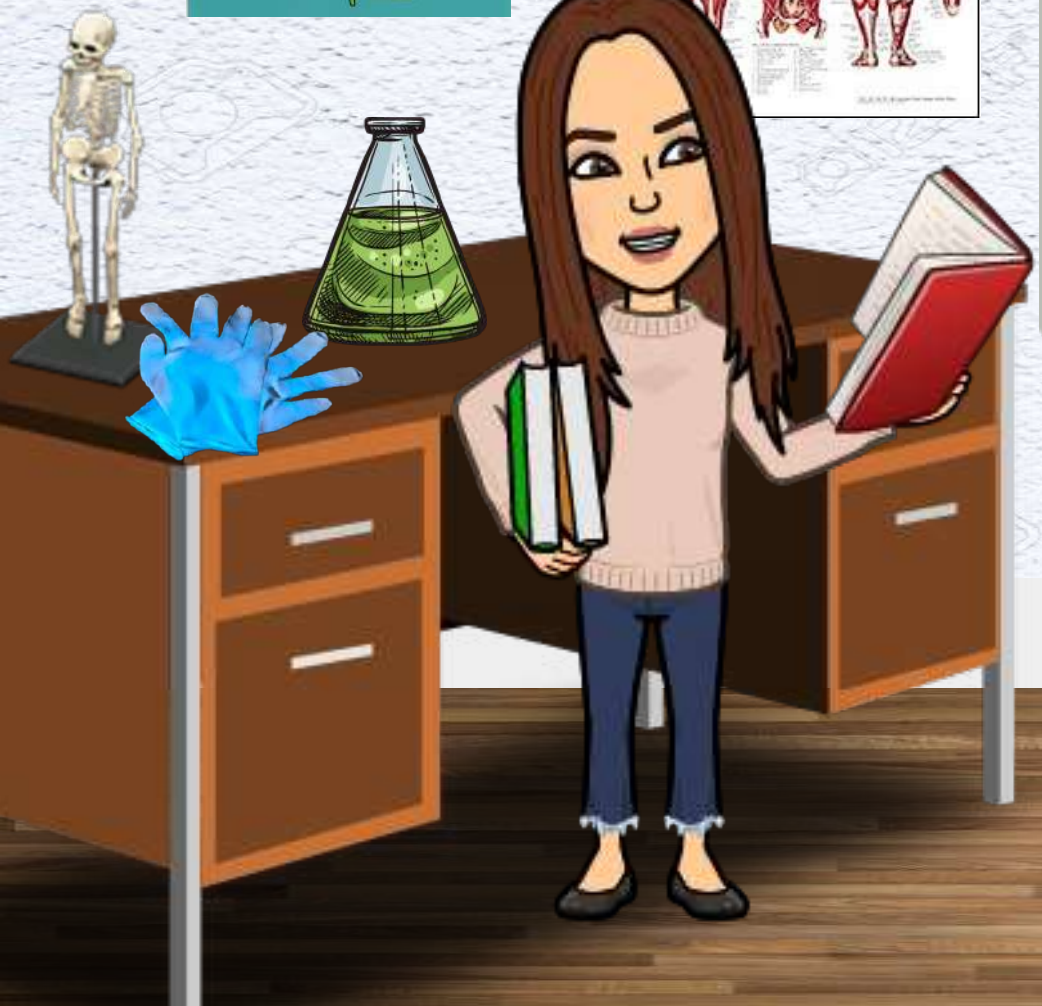
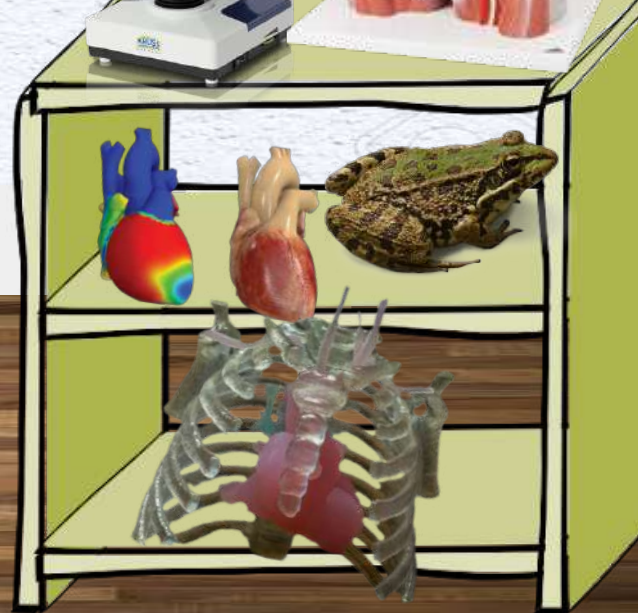
March 22, 2021

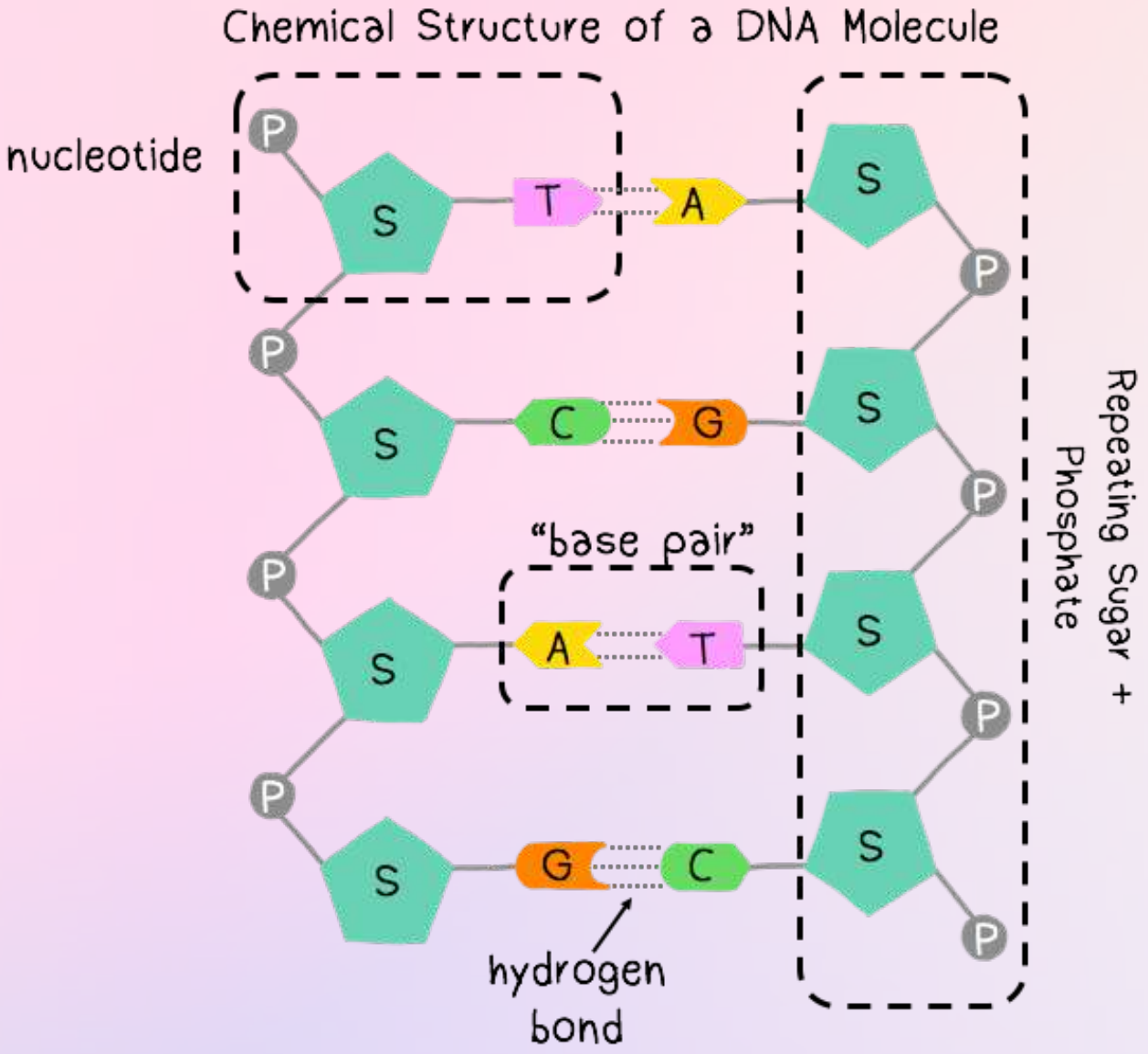
DNA- The Universal Genetic Code

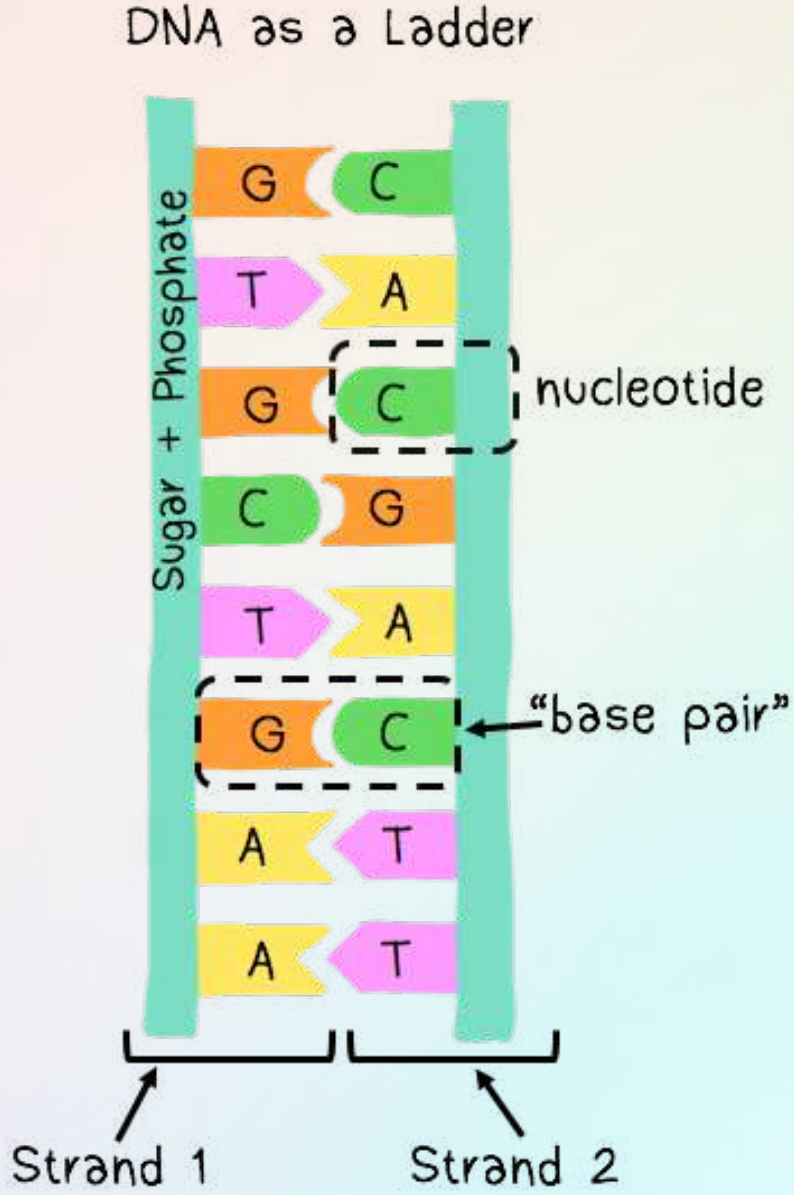




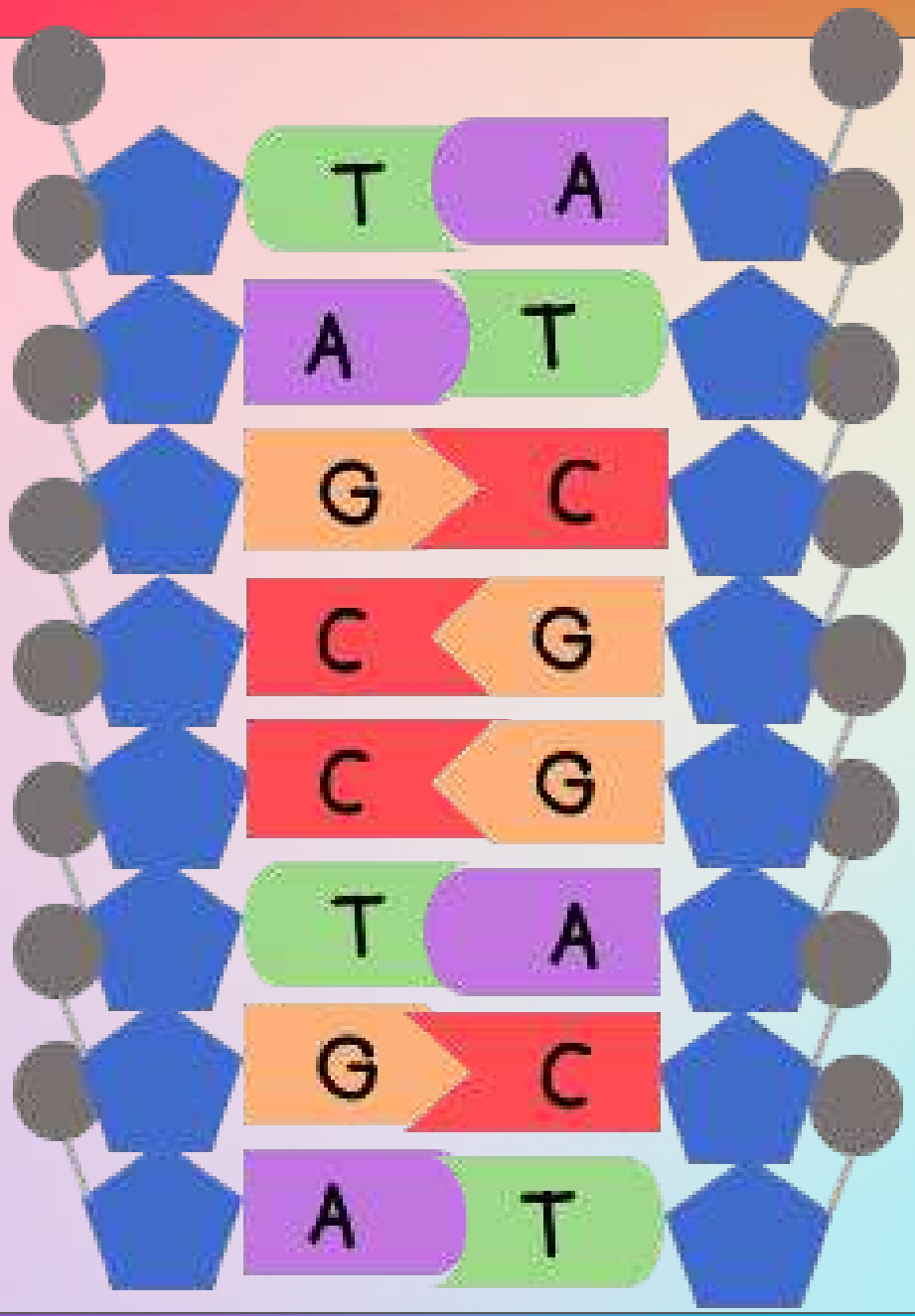


DNA Structure

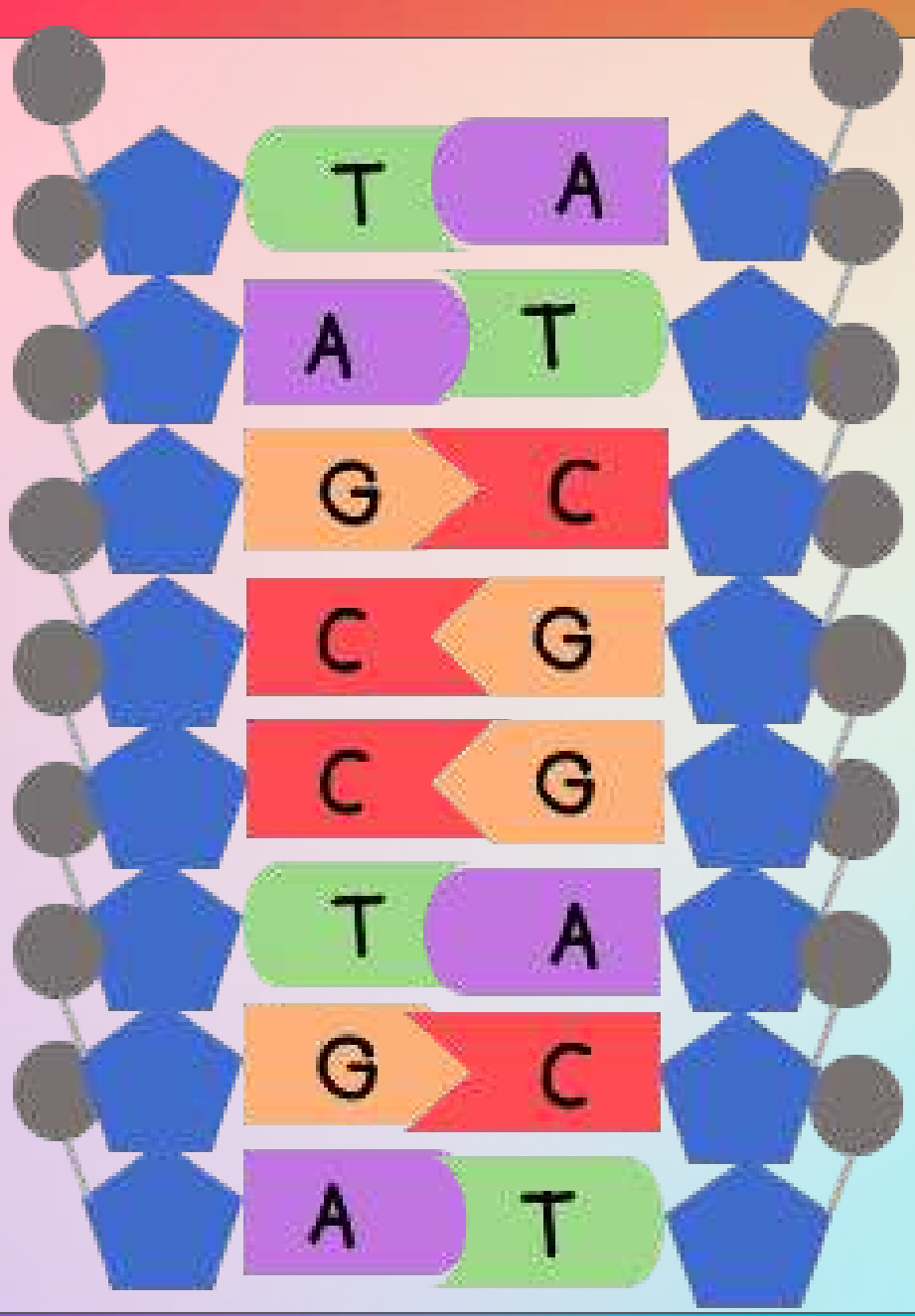


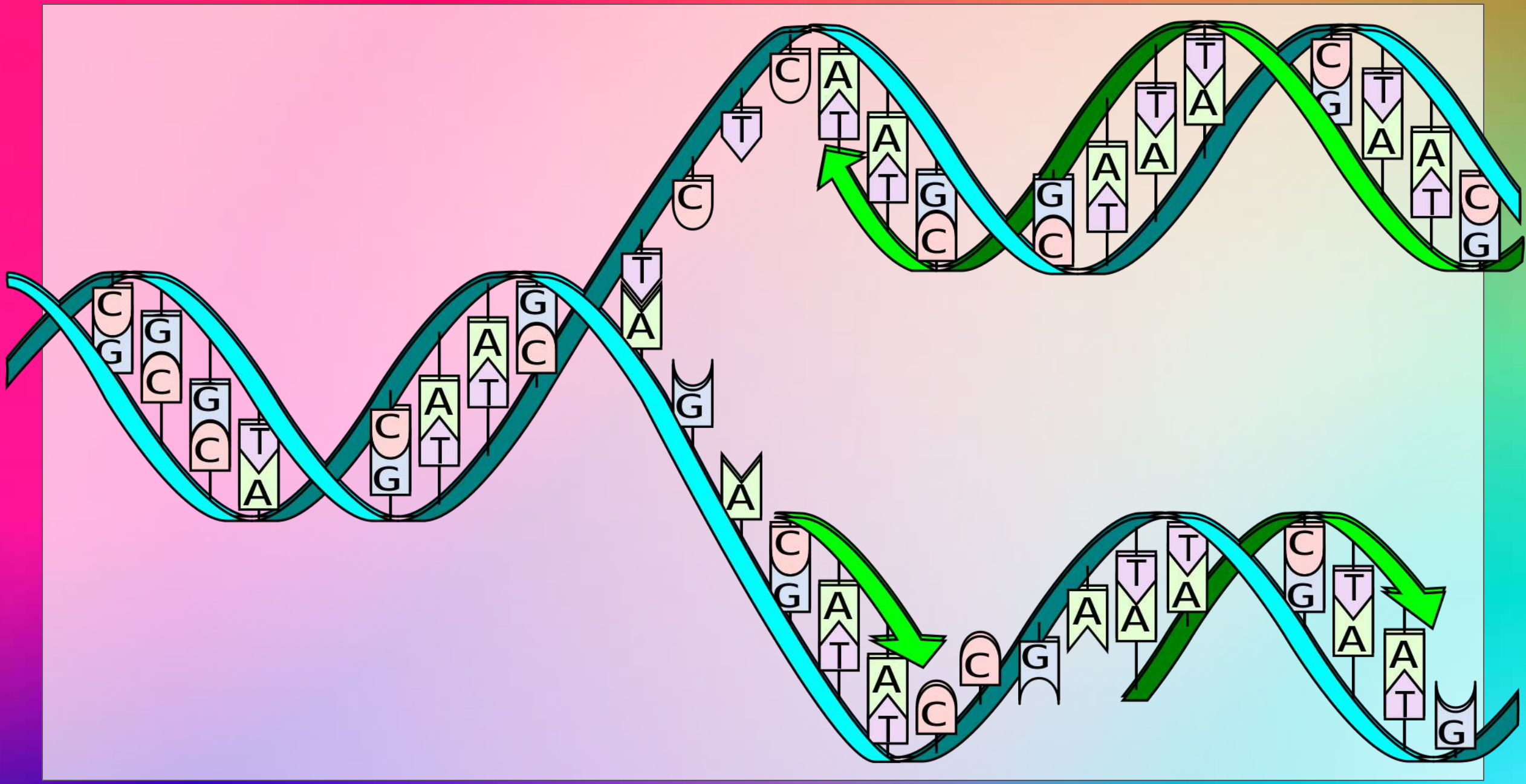


How would you describe the 2 strands of DNA compared to each other?...



DNA is made of 2 strands that are COMPLEMENTARY to each other




C G
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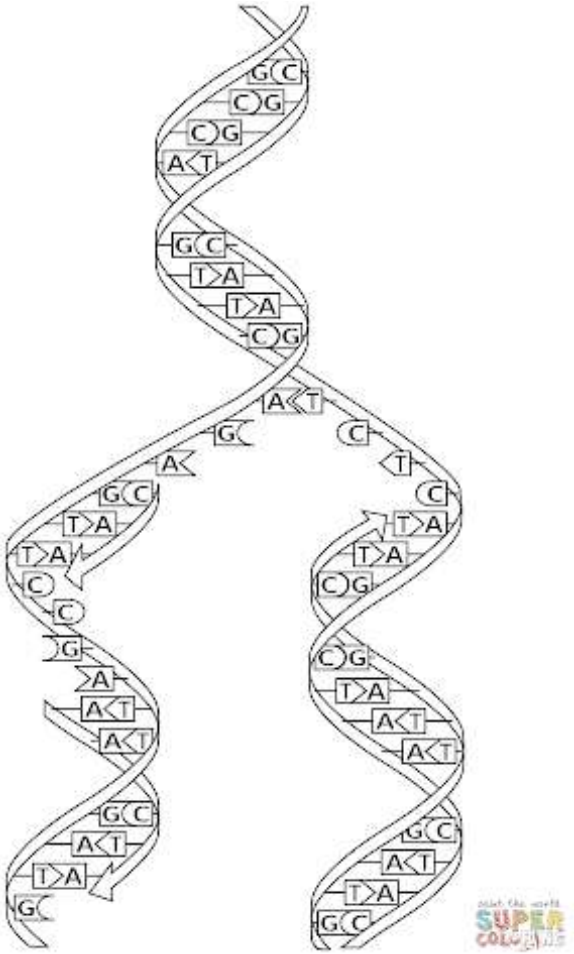
Lesson 2- DNA- A Universal Genetic Code



Learning Objectives:

- Explain why DNA is called a UNIVERSAL genetic code
- Define GENE
- Explain what makes the genetic code of one organism different than another.
- State the relationship between the nucleus, chromosomes, genes, and bases

2. **What makes DNA the universal genetic code? How are organisms different than one another, and what does DNA code for?**

- DNA is considered the *universal genetic code* because ALL organisms have DNA, *AND*, all DNA is written from **the same 4 bases**- a sequence of G, C, A, and T.
- What makes one organisms different from another is the ***sequence of bases*** in their genetic code.
- Sequences of bases that code for information are called **genes**. Different organisms have *different genes*, and different genes code for *different traits.*

ACGATGCTGATGTAGATATGTAGCGCGCGCGATATCGTAGCTGAGAGATTATATT
ATTAGCGCGCTAGCTGATACGATATATGCTAGCACGTAGCTGATATCGCGGAAGCGC
GATAGTCGTAGCTGATGCGAGTGCTGATGCAGATGATGATGCTAGTAGGCGGGCGCT
ATATTATCGAAGATCGAGAGATACTCTCTGAGAGCGATCGATCGACTAGCTACGATCG
AGCATTAGACGATAGCTACGATCGACGGAGCAGACGCATGACTCGAGATTAAGACGC
TATGACTACAGCTAGCATCGACTAGACTAGCGAGCGACTACTGAATCAGCGATCAGA
GCCTATACGAGGAGAGATATAGCGCGCGATATACGGCACTATTACGGACTAGATCGA
TCGATATCGAATCGATCG

A gene is a specific SEGMENT of DNA. A gene is a SPECIFIC SEQUENCE OF BASES.

CGTACTGAGTAAATCGTGACTGTCGTGCTGTAGTCGTAGATTA
GCTAGTCGGGCTCTCTATAGATGATGCGCGGAATATTGCTGCG
CGATGATGCTAACTGACTGATGACGTCTTAGCGGCGTAATATC
GTAGCGCGTCTCGATGCGATAGCCGTAGAGCTAGCGCTAGTA
GCGCGATGATCGTAGGATGTGCCAAATGCCGCTGATGATGTTC
GTAGCGGCCTAGTGACTGGGATGTAGCGAGATCGTGATGCGG
TTAGCTGA

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GCTAGTCGGGCTCTCTATAGATGATGCGCGGAATATTGCTGCG
CGATGATGCTAACTGACTGATGACGTCTTAGCGGCGTAATATC
GTAGCGCGTCTCGATGCGATAGCCGTAGAGCTAGCGCTAGTA
GCGCGATGATCGTAGGATGTGCCAAATGCCGCTGATGATGTTC
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CGATGATGCTAACTGACTGATGACGTCTTAGCGGCGTAATATC
GTAGCGCGTCTCGATGCGATAGCCGTAGAGCTAGCGCTAGTA
GCGCGATGATCGTAGGATGTGCCAAATGCCGCTGATGATGTTC
GTAGCGGCCTAGTGACTGGGATGTAGCGAGATCGTGATGCGG
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CGATGATGCTAACTGACTGATGACGTCTTAGCGGCGTAATATC
GTAGCGCGTCTCGATGCGATAGCCGTAGAGCTAGCGCTAGTA
GCGCGATGATCGTAGGATGTGCCAAATGCCGCTGATGATGTTC
GTAGCGGCCTAGTGACTGGGATGTAGCGAGATCGTGATGCGG
TTAGCTGA

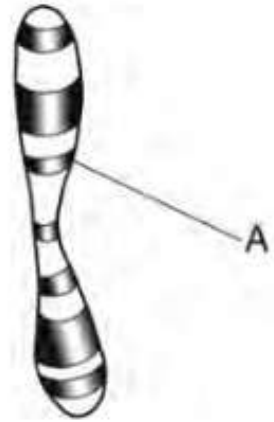
- Look at the DNA sequences below. We can say that each *sequence* represents a **gene**. Let's say this gene codes for a *receptor* found on liver cells. Let's look at this gene in 4 different mammals.
- Are the sequences exactly the same? NO- because we are looking at *different organisms*.
- Are the sequences very similar? Yes, they are *quite similar*. This makes sense, because mammals are similar to each other and have very similar organs and organ systems.

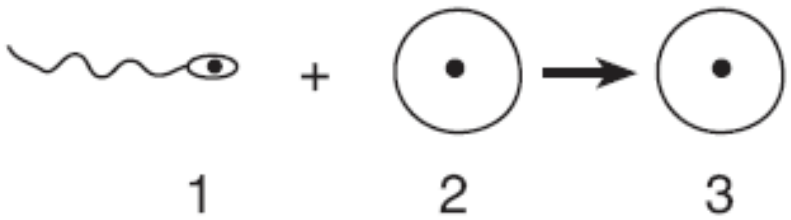
DNA sequence that codes for a receptor found on liver cells.

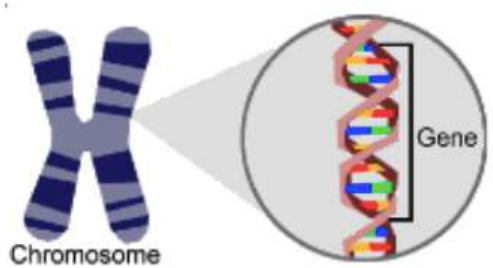
HUMAN	A	G	G	T	C	G	T	A	T	G	A	C	T	A	G
GORILLA	A	G	G	A	C	G	T	A	T	A	A	C	T	A	G
HORSE	A	G	G	T	G	G	T	G	A	G	A	C	T	A	G
DOG	C	G	G	T	C	G	T	A	T	G	A	C	A	A	G

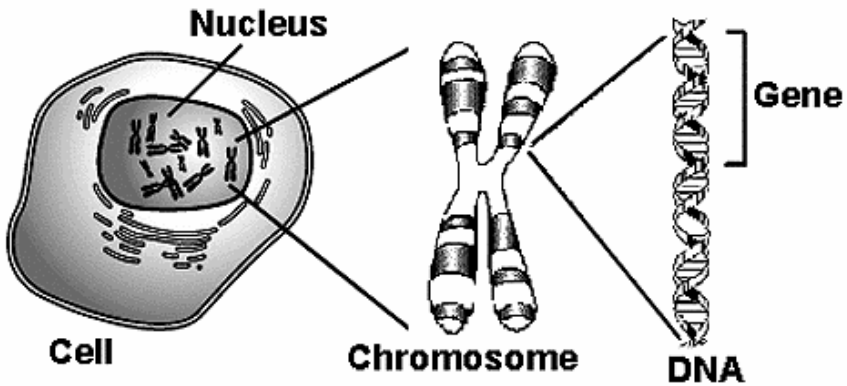
So, what exactly is a gene? How many genes do I have? Where did I get them from? What exactly do they code for?

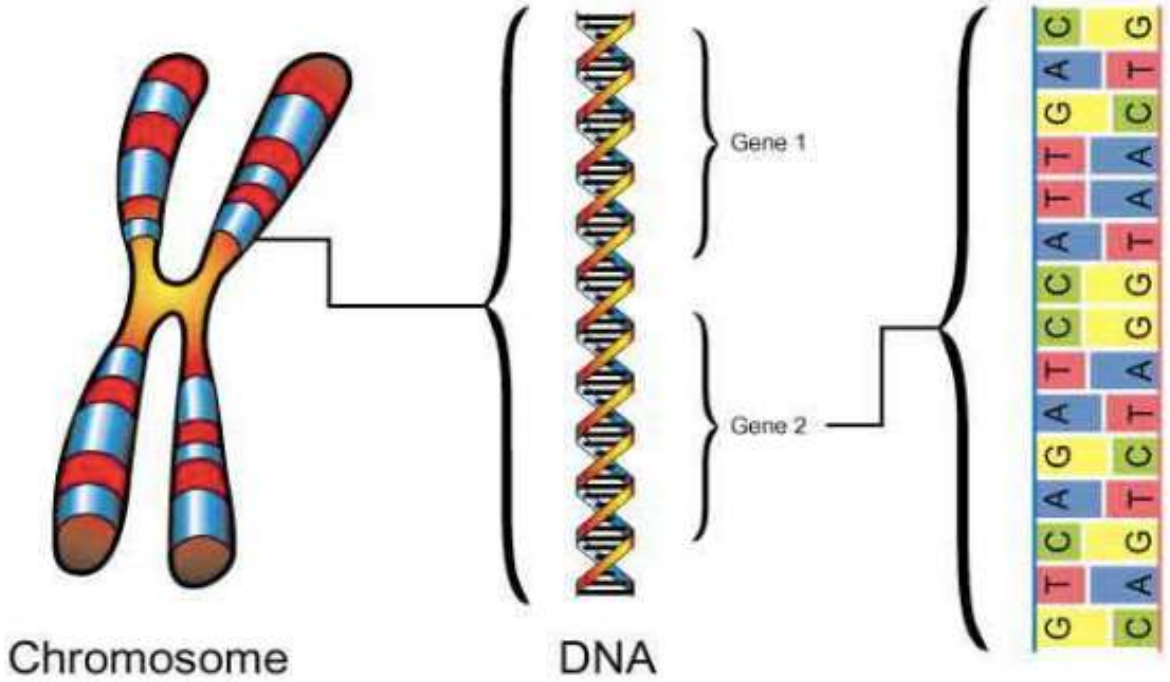
- You have about 25,000 different genes that you *inherited from your parents.* **Half** of your genes came from your mother and **half** of your genes came from your father.
- Your genes are found in your **chromosomes**. Chromosomes are "organized DNA" (like a yarn ball). Each chromosome has thousands of genes, each located in a specific place.
- The picture to the right represents a single chromosome. The "*stripe*" represents a **GENE**.



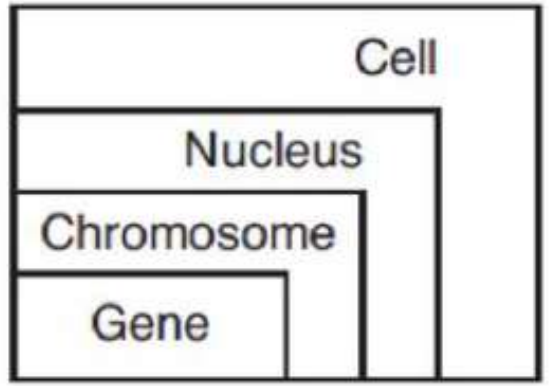






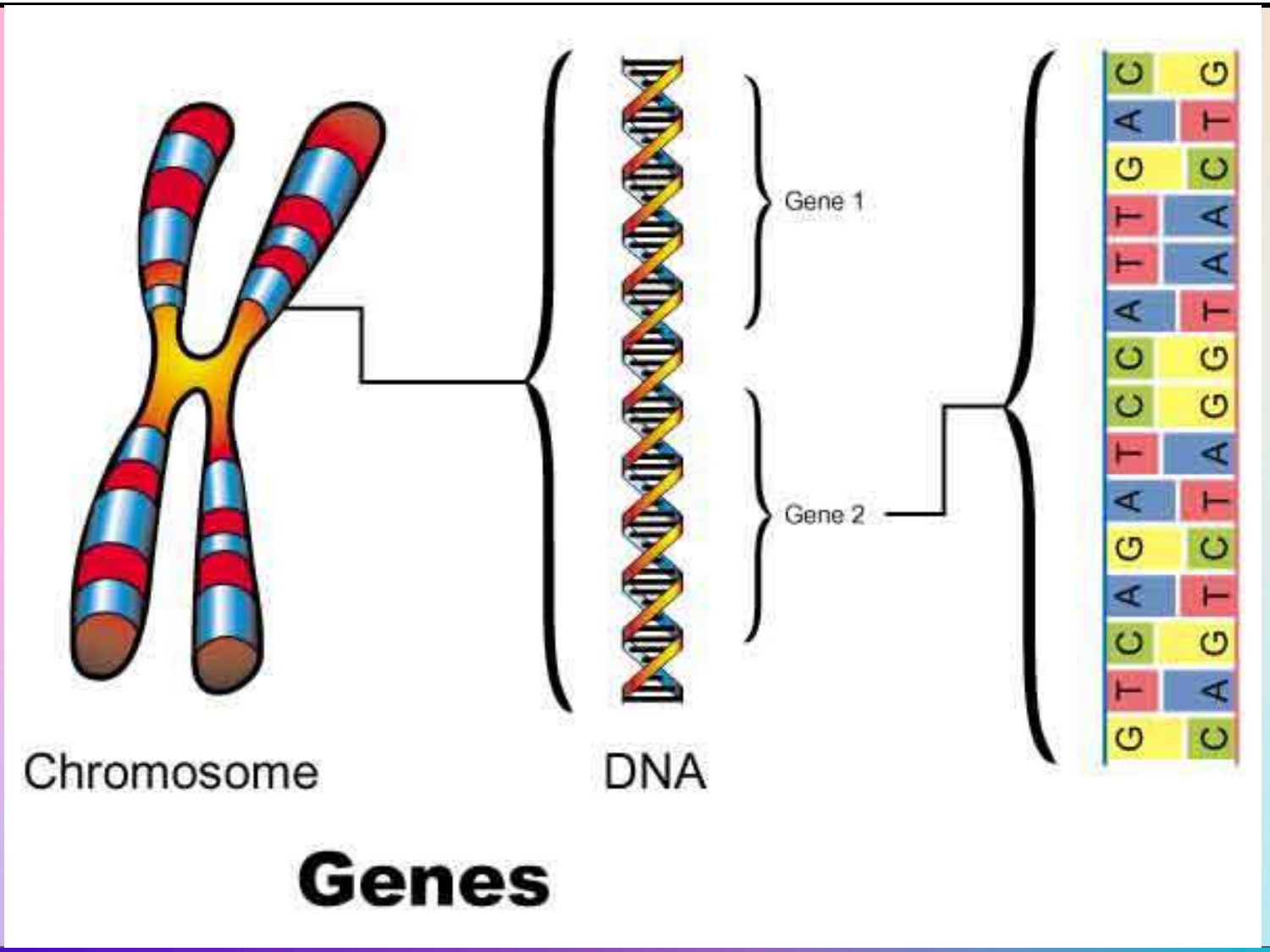


Here is a representation of a chromosome. The chromosome has “stripes” or “bands” on it. Each stripe represents a gene. A gene is a sequence of DNA. You can see that each gene is written from a specific sequence of bases.



This picture shows the levels of organization in a cell. Each cell has an organelle called the nucleus, which contains your genetic material. Your DNA is organized into chromosomes, and each chromosome contains thousands of genes.

Genes are found on chromosomes.



Sort the levels of organization

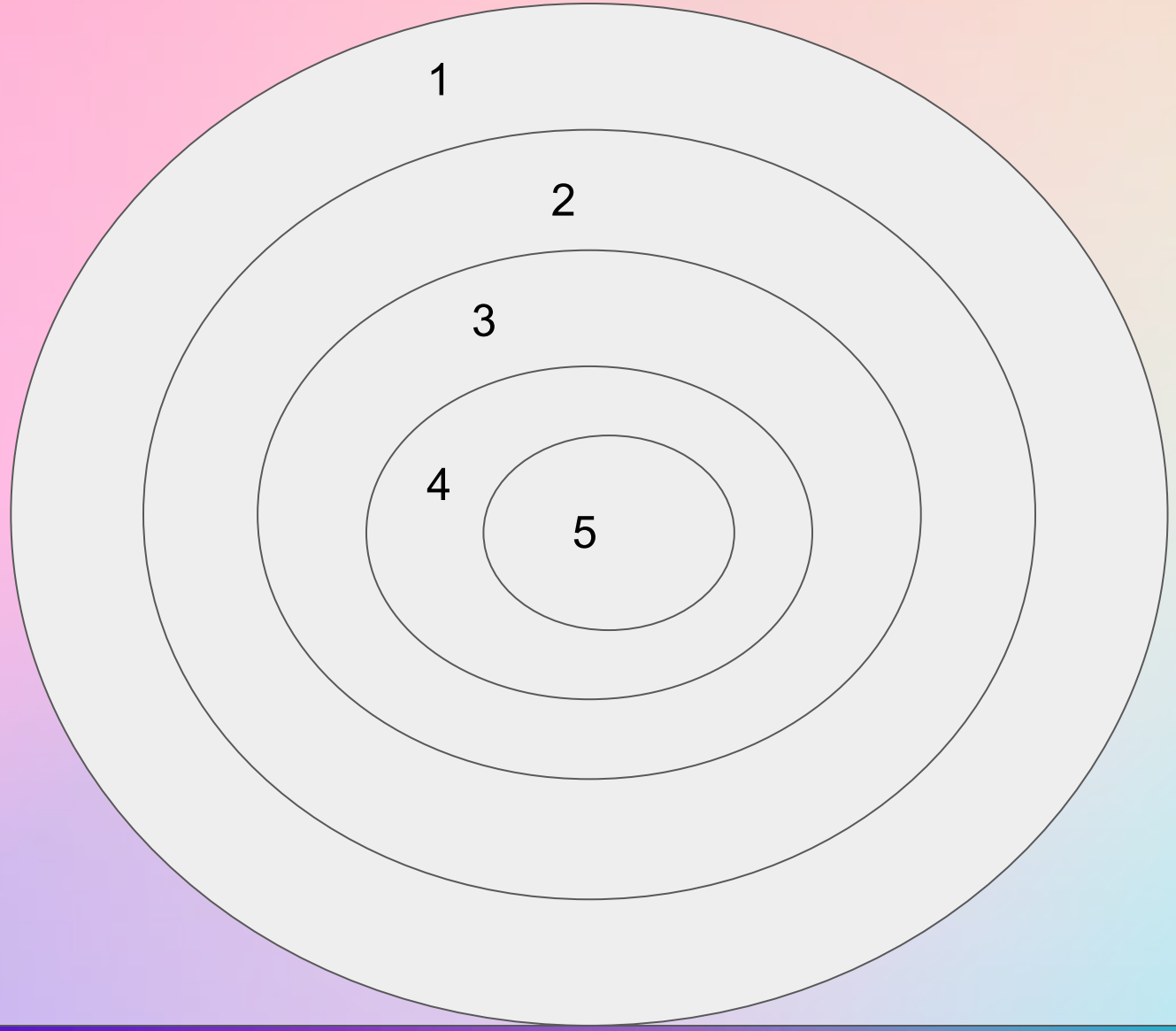
Nucleus

Gene

Cell

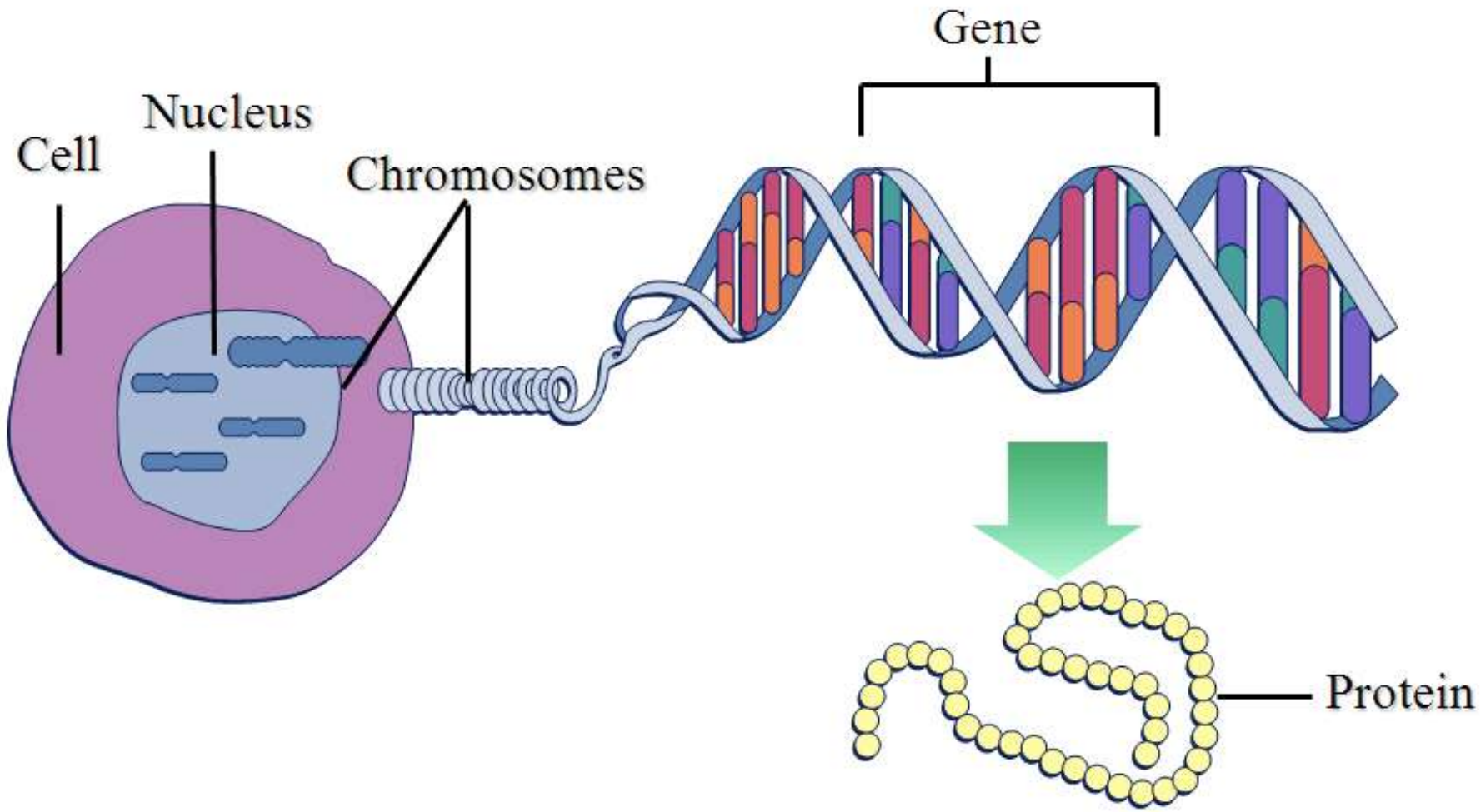
Base

Chromosome

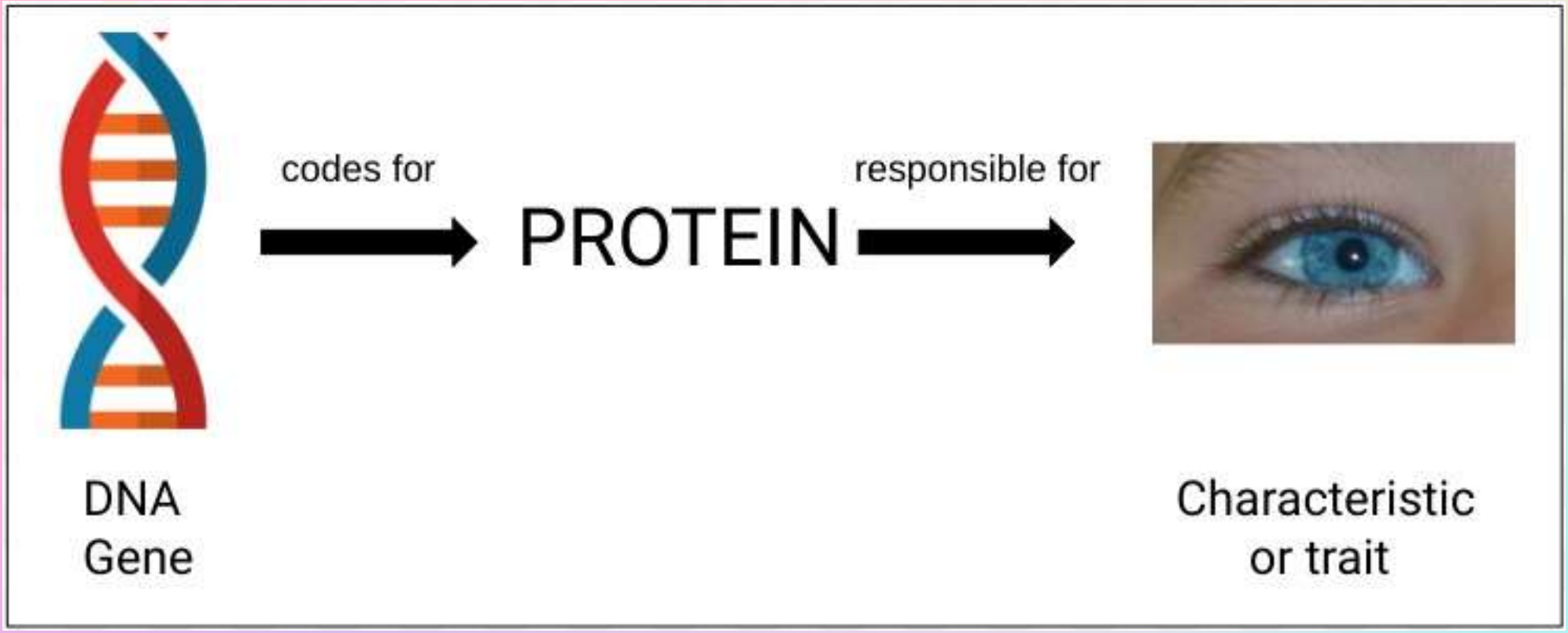


So, what exactly does each gene code for?...

- **A gene is a segment of DNA that codes for a specific PROTEIN**. Yes, PROTEIN. If you have 25,000 different genes, that means that you have the instructions to build 25,000 *different proteins*. DNA codes for **PROTEIN**!



What exactly do genes code for?...



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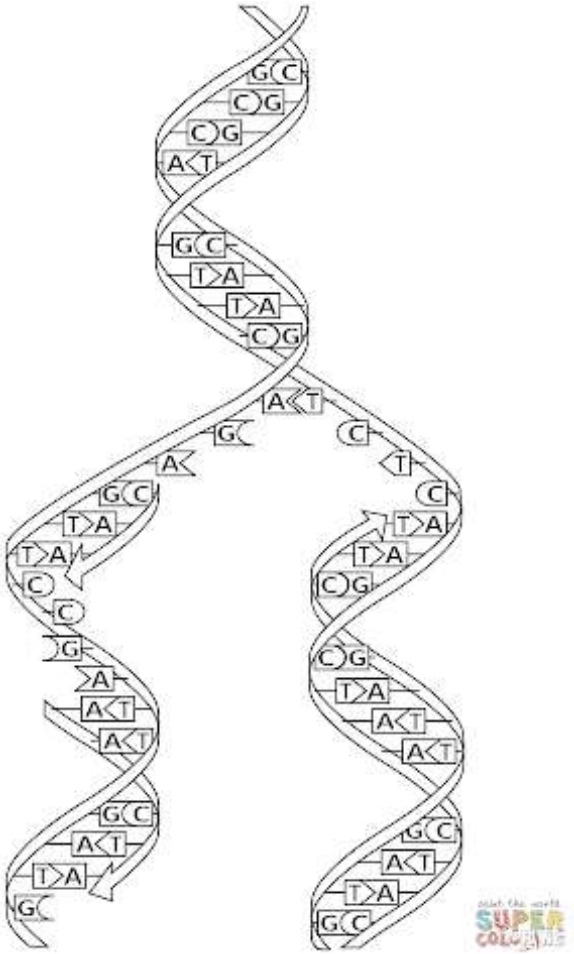

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