Genetics

Traits and where they come from……

What are Traits?

Traits: Brainstorm with a partner – ***Where*** *do traits come from?* ***Who*** *and* ***What*** *are responsible for these traits?*

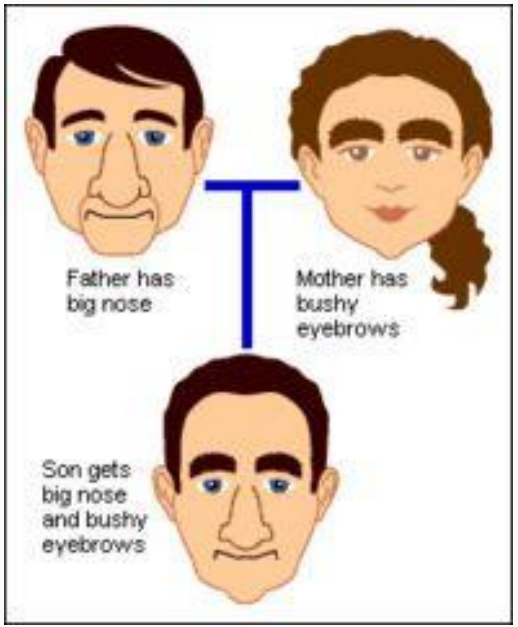
Watch: http://learn.genetics.utah.edu/content/basics/traits/

Some terms to be familiar with….

Genetics: The study of how different qualities, called traits, are passed down from parent to child.

Some terms to be familiar with…..

Inherited traits: A trait or character that is genetically inherited or passed down from generation to generation.



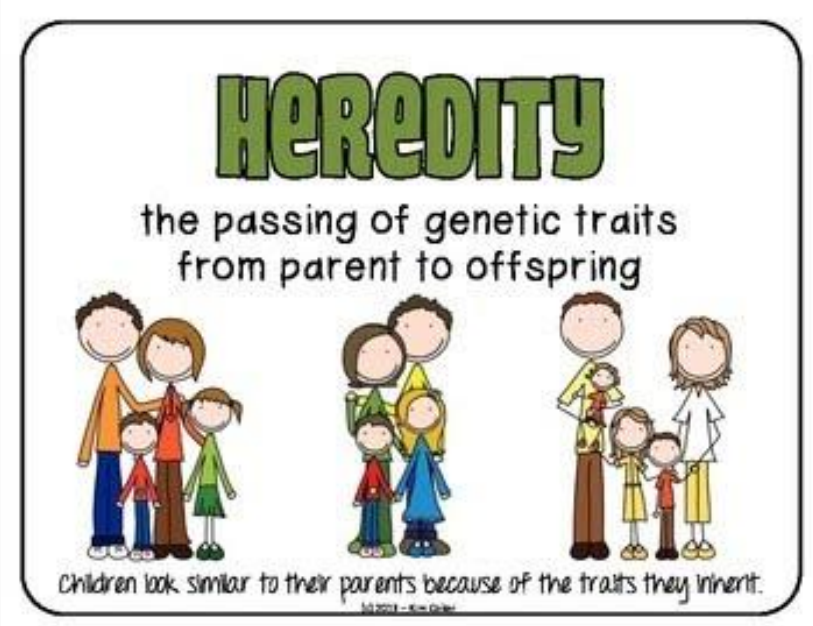
Some terms to be familiar with…..

Non-Inherited traits: Not all traits are inherited. Non-inherited traits are learned traits or traits that can be acquired through action (ie. a child learning manners, a weightlifter gaining muscle etc.).

...what are some others?

Some terms to be familiar with…..

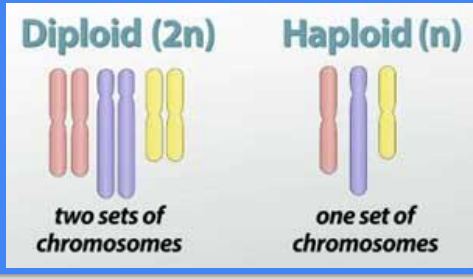
Heredity: Is the process by which features and characteristics are passed on from parents to children before they are born.



Some terms to be familiar with……

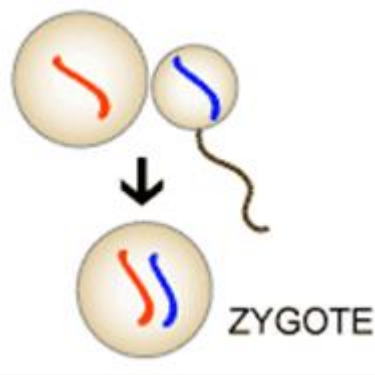
Genome: The total genetic information present in an organism's cell (unique to each organism)

How is Genetic Material Inherited?



- Inheritance describes how genetic material is passed on from parent to offspring.
- We get one copy of our genome from each of our parents.
- Most of our cells contain two sets of 23 chromosomes? (they are diploid).
- An exception to this rule are the sex cells (egg and sperm), also known as gametes, which only have one set of chromosomes each (they are haploid).

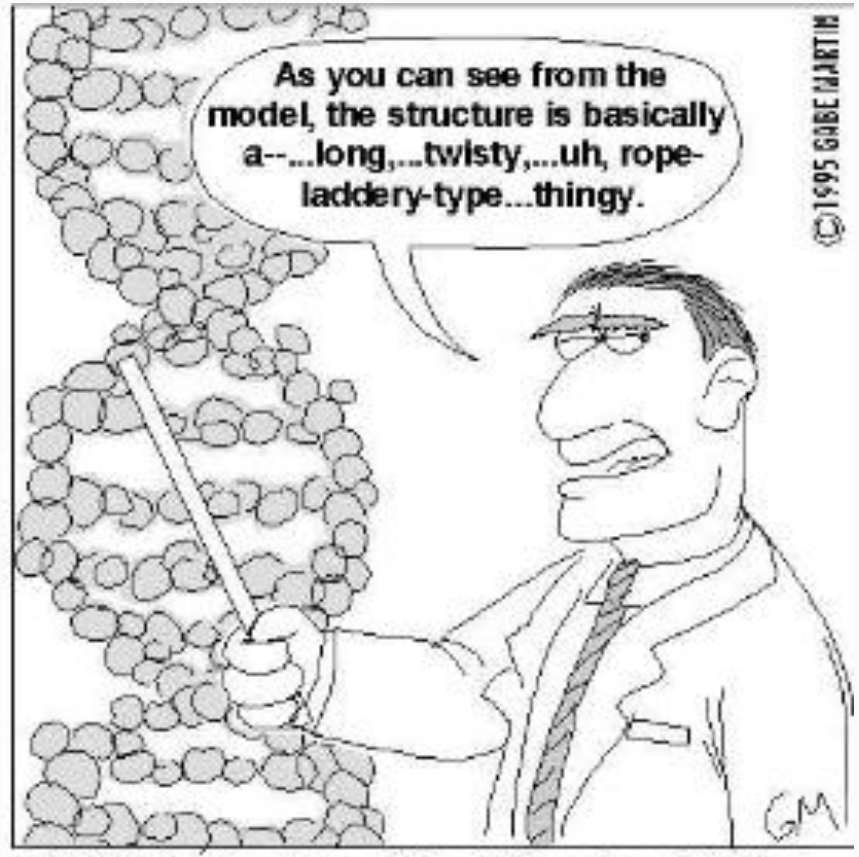
How is Genetic Material Inherited?



- However, in sexual reproduction the sperm cell combines with the egg cell to form the first cell of the new organism in a process called fertilization.
- This cell (the fertilized egg) has two sets of 23 chromosomes (diploid) and the complete set of instructions needed to make more cells, and eventually a whole person.
- This passing down of genetic material is evident if you examine the traits of members of the same family, from average height to hair and eye colour to nose and ear shape, as they are usually similar.

DNA

What do we remember about the structure and function of DNA?



1953: The structure of the DNA molecule is first described.

DNA: An Organism's Genetic Material

DNA: **D**eoxyribo**n**ucleic **a**cid - https://www.youtube.com/watch?v=zwibgNGe4aY

- Stores the genetic information of an organism
- Genetic information determines how an organism looks, functions, and behaves

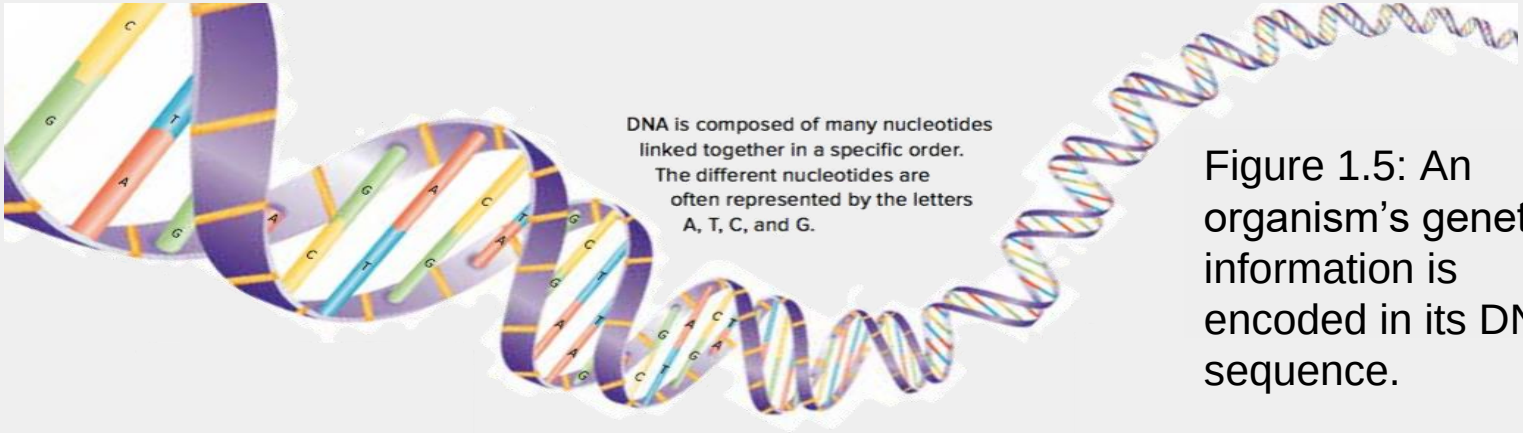


Figure 1.5: An organism's genetic information is encoded in its DNA sequence.

DNA: Structure and Function

Structure of DNA:

- Two long strands shaped like a twisted ladder
- Consists of many copies of four different chemical building blocks called *nucleotides*: adenine (A), thymine (T), cytosine (C), guanine (G)
- DNA sequence: The specific order of nucleotides; the "code" that holds the genetic information

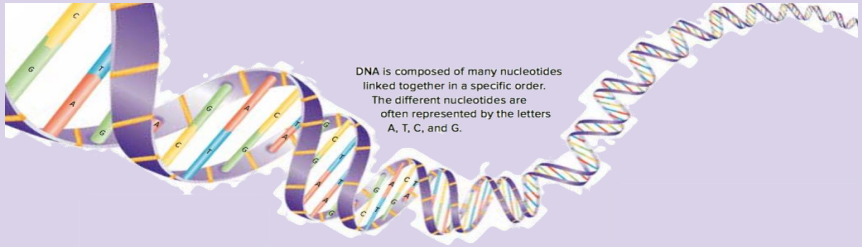


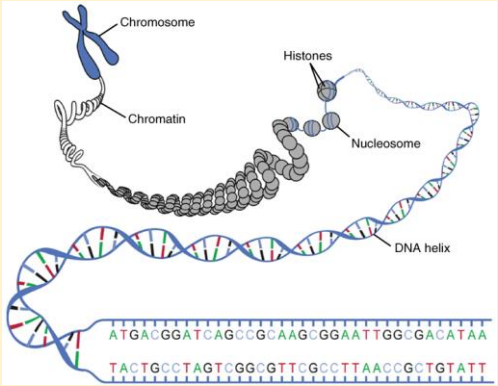
Figure 1.5: DNA

DNA: Structure and Function (continued)

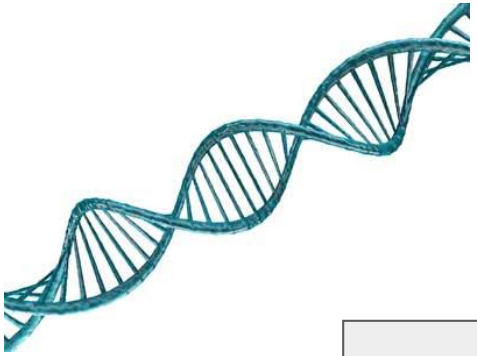
https://www.youtube.com/watch?v=uXdzuz5Q-hs

Function of DNA:

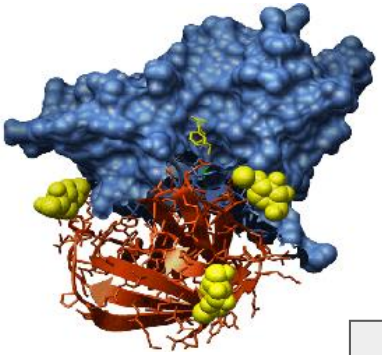
- Stores the genetic information of an organism
- An organism's **DNA** is stored in each of its cells
  - **DNA** molecules coil and compact into a condensed form called ***chromatin*** to fit into the cells
  - Just before reproduction: **DNA** condenses further into structures called ***chromosomes***
  - During reproduction: Copies of **chromosomes** (and therefore **DNA**) are transferred to the offspring.



*How **DNA** and **Traits** are connected…….*



Code for



Which then produce

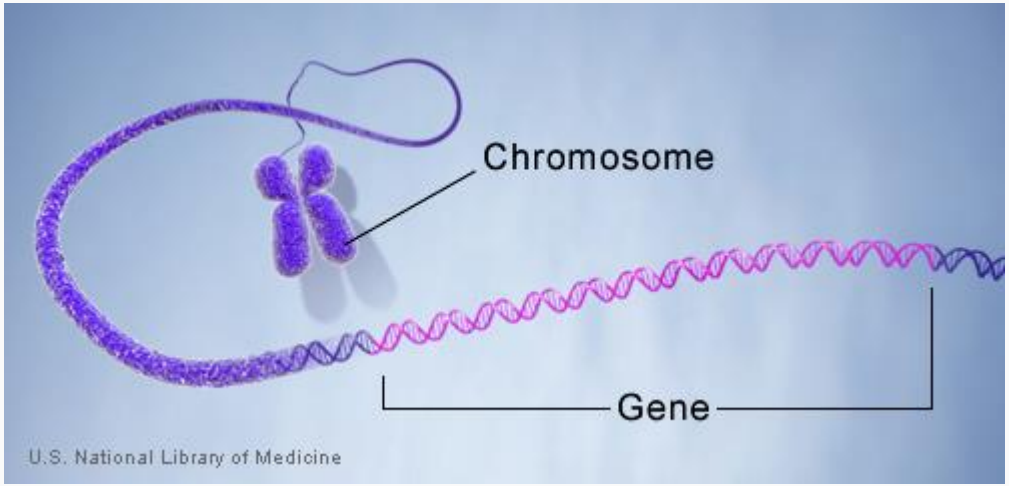
DNA (genes)

PROTEINS

TRAITS

Protein Synthesis

A **gene** is a segment of DNA that codes for a specific **protein**.

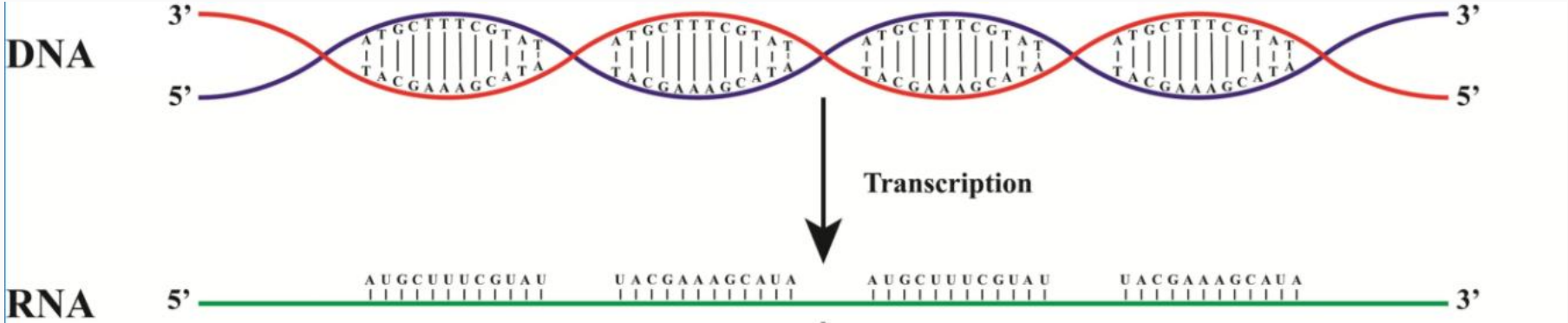


Protein Synthesis

Gene expression occurs in two phases.

Phase 1: Transcription in the nucleus

DNA to RNA

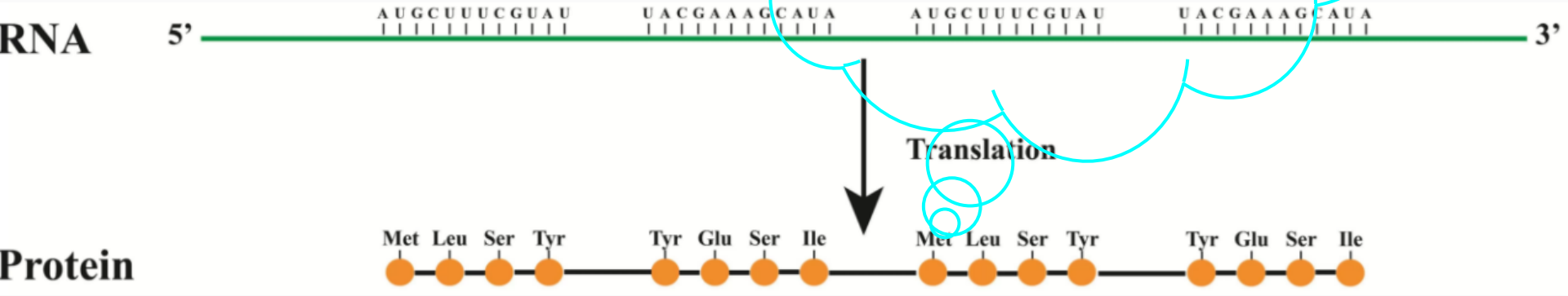


Protein Synthesis

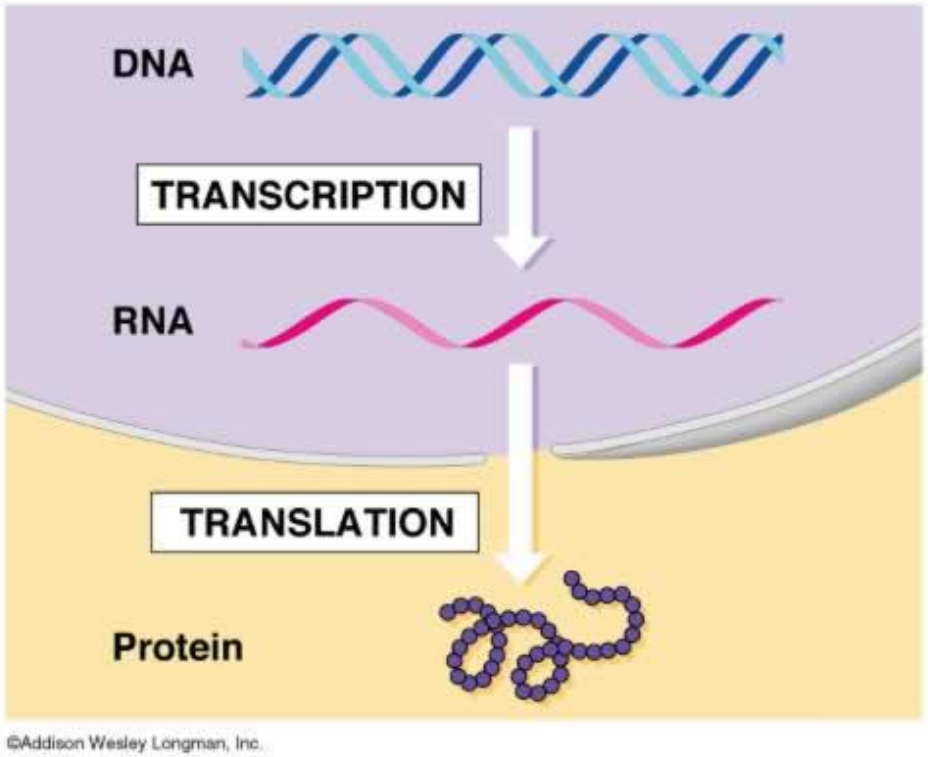
Phase 2: Translation at the ribosome

RNA to protein

Proteins are made up of building blocks called amino acids



Protein Synthesis



Watch:
https://www.youtube.com/watch?v=gG7uCskUOrA