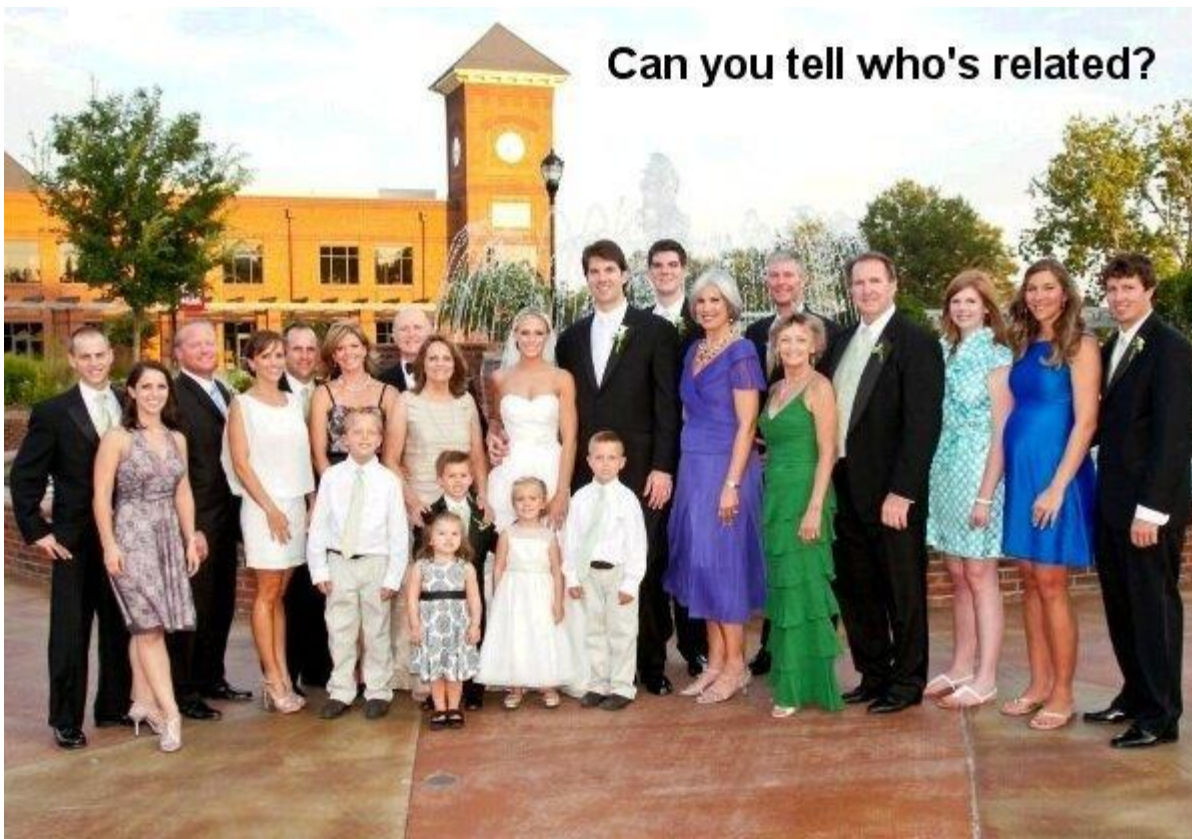


Chapter 4

The Nucleus controls the functions of life

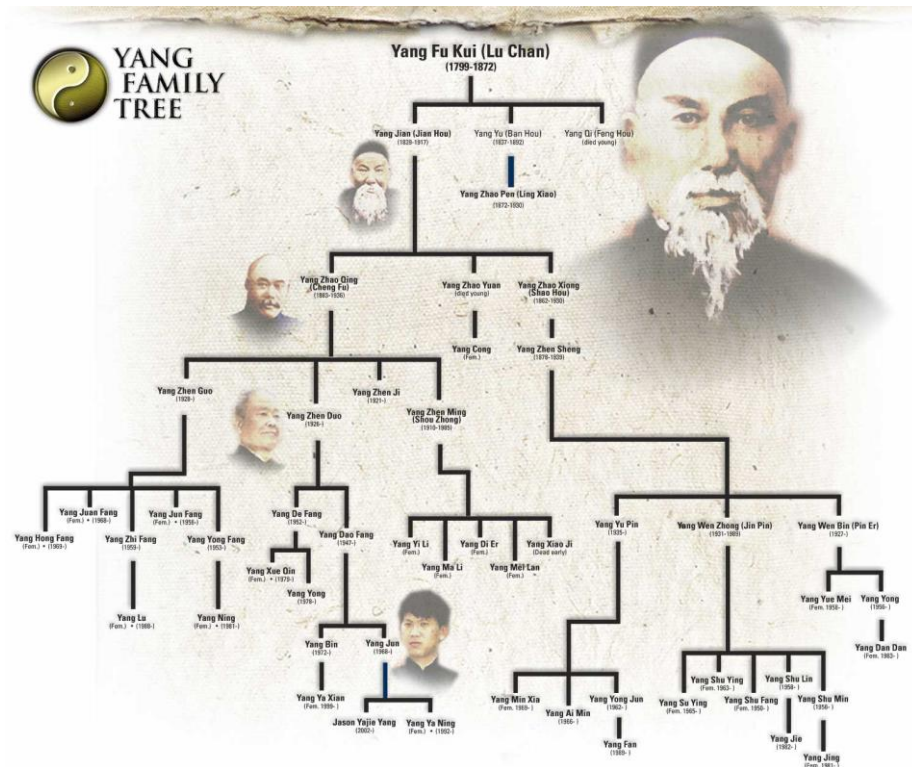
Trait

- A particular feature that can vary in size or form from individual to individual within a species. (Inherited from biological parents)



Heredity

- The process through which patterns of traits are passed on from an individual to its offspring.



Human Traits Inventory

Find a partner...

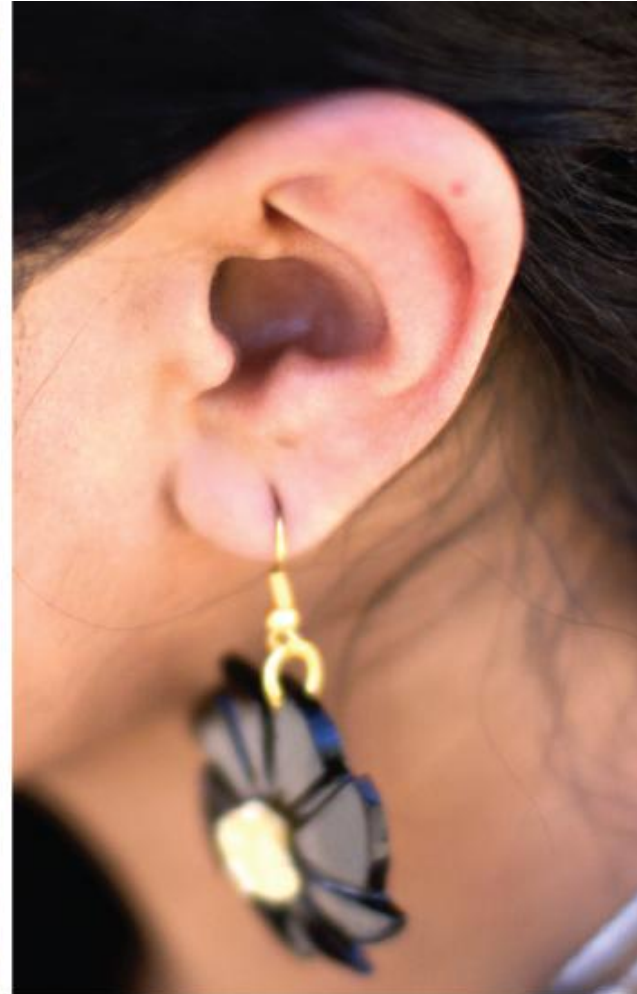
Ability to roll tongue



Attached earlobes

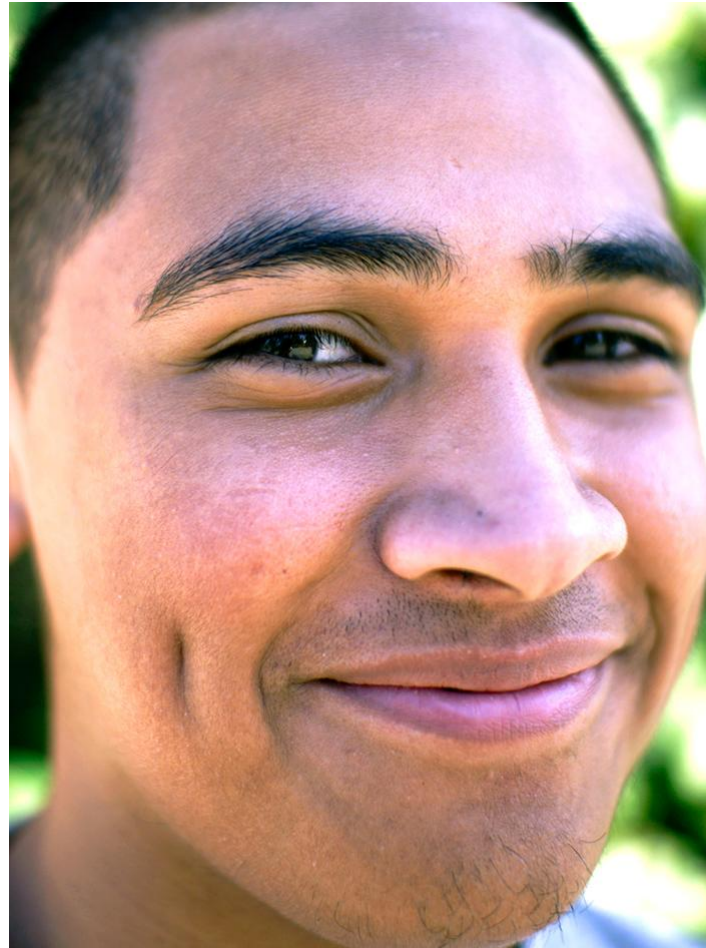


Attached earlobe



Unattached earlobe

Dimples



Right-handed



Widow's peak hairline

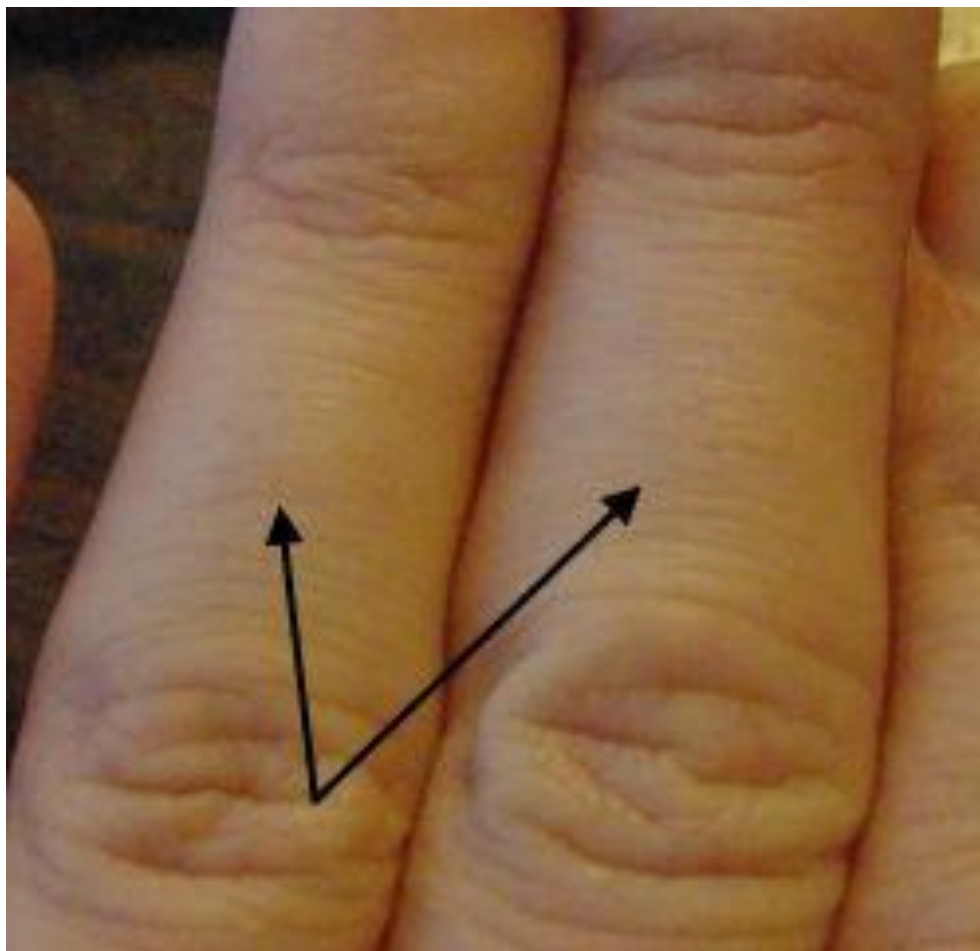


Images courtesy of GregPC

Thumb on top when crossing hands?



Hair on mid-digit



Bent little finger



Second toe longer than big toe



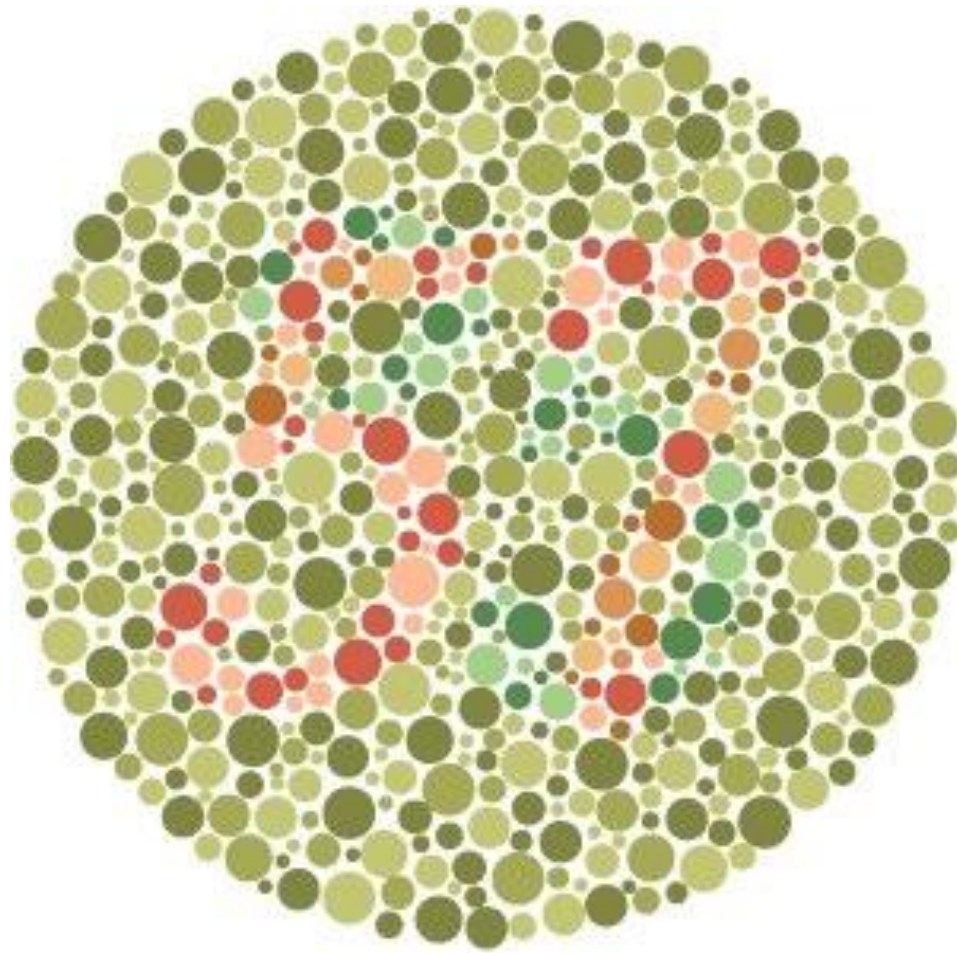
Freckles



Cleft chin



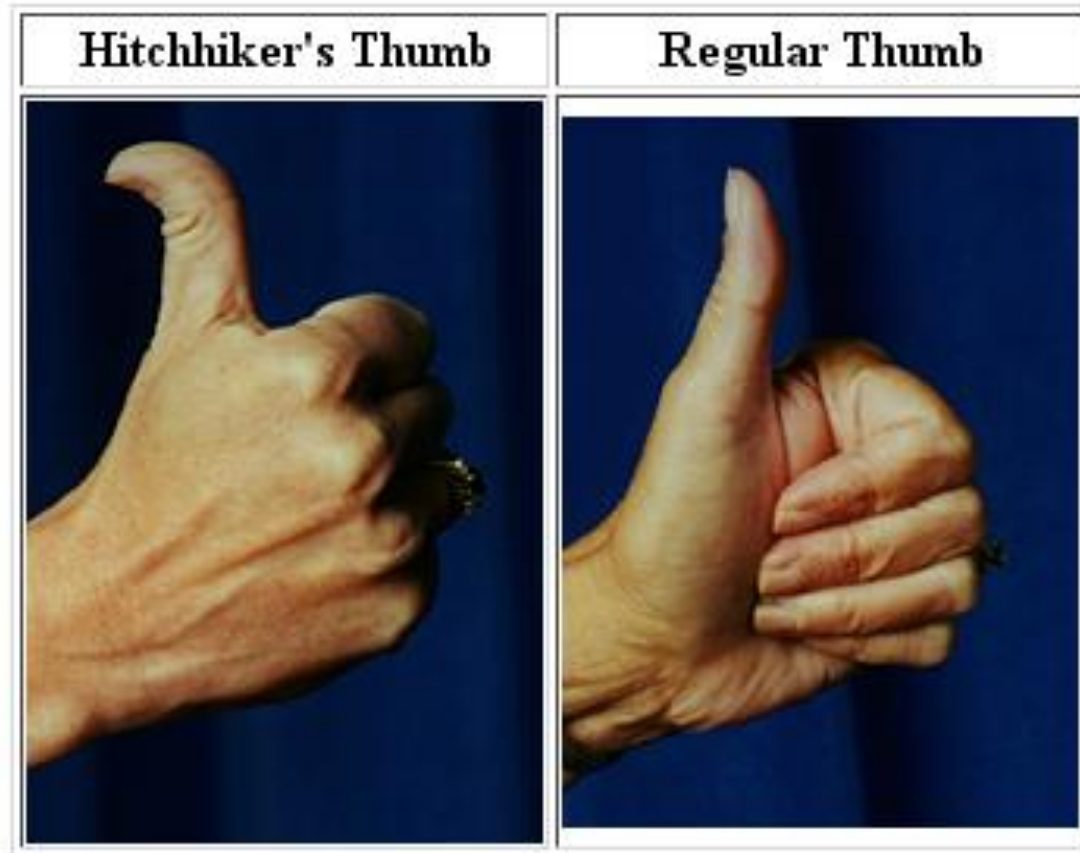
Colourblind



Naturally curly hair



Hitchhiker's thumb



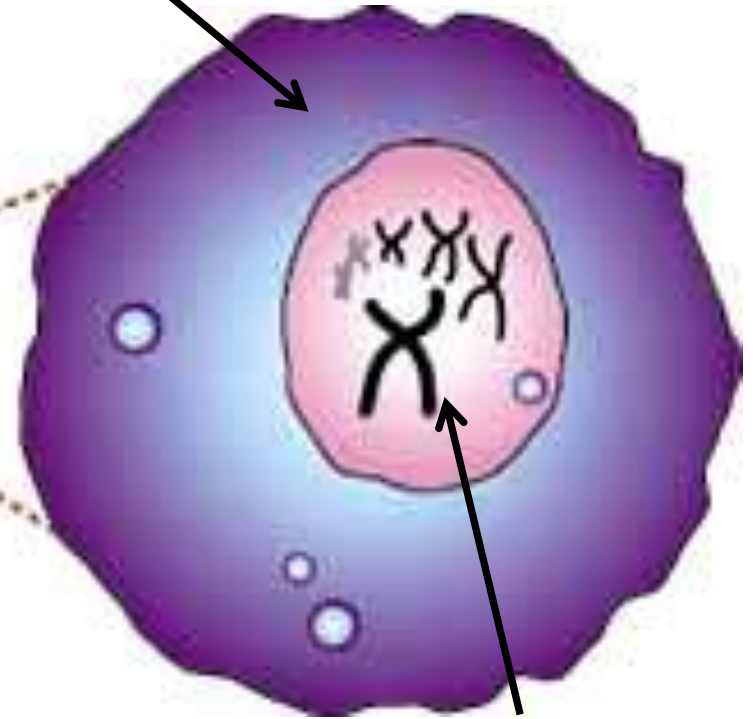
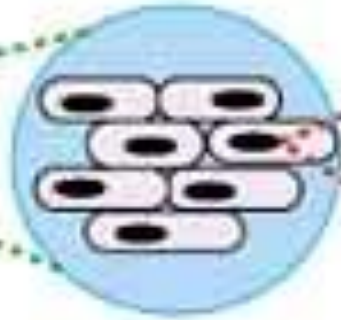
Which traits are dominant??

Let's compile the class results...

Human

Cells

Nucleus (control centre)

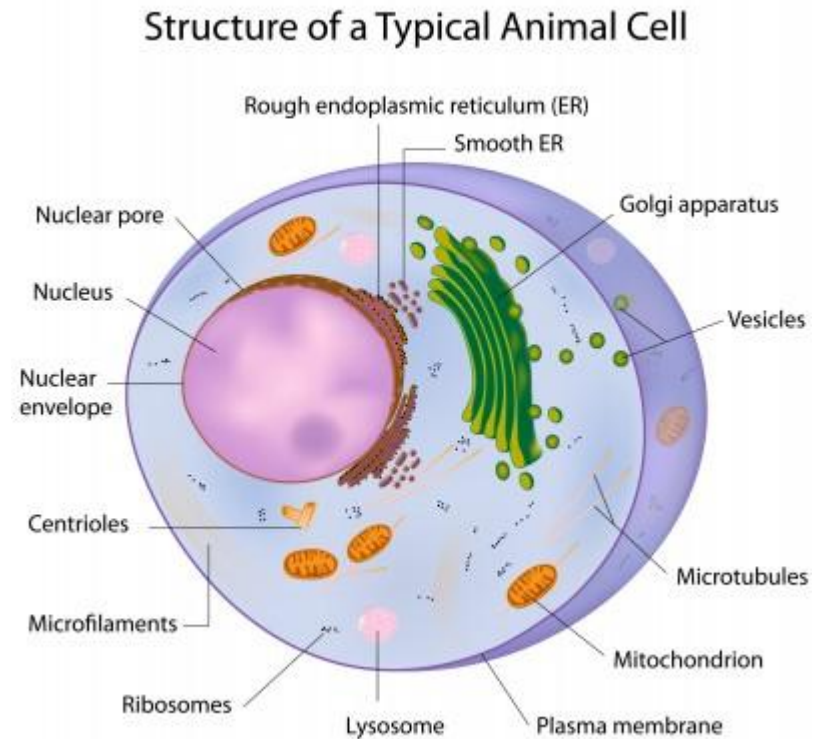


DNA (master set of instructions)

Overview...

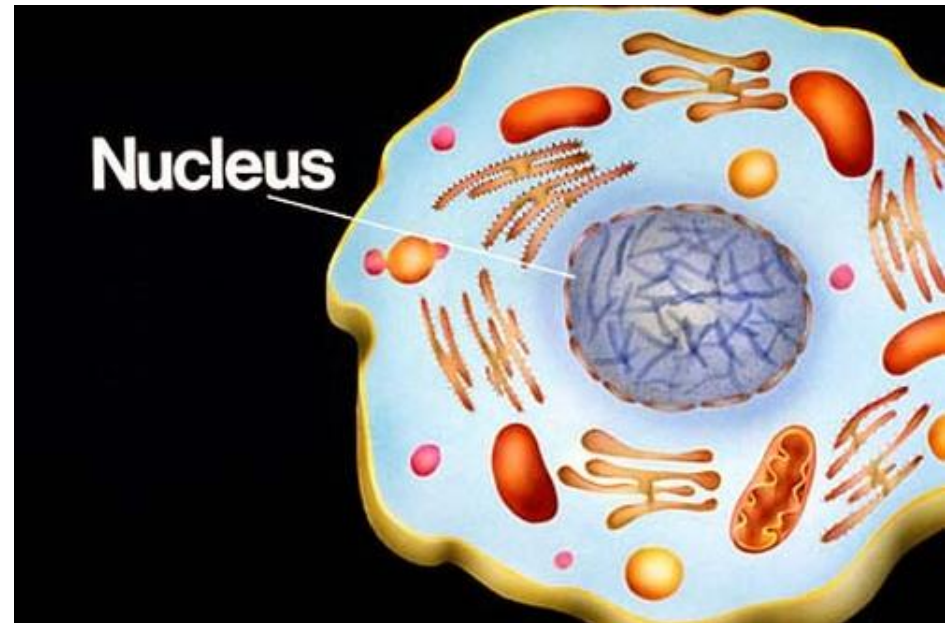
The Nucleus

- The nucleus is the organelle in a cell that is responsible for heredity and for controlling the functions of the cell.
- The information contained in the nucleus instructs your cells to produce or import all the materials it needs



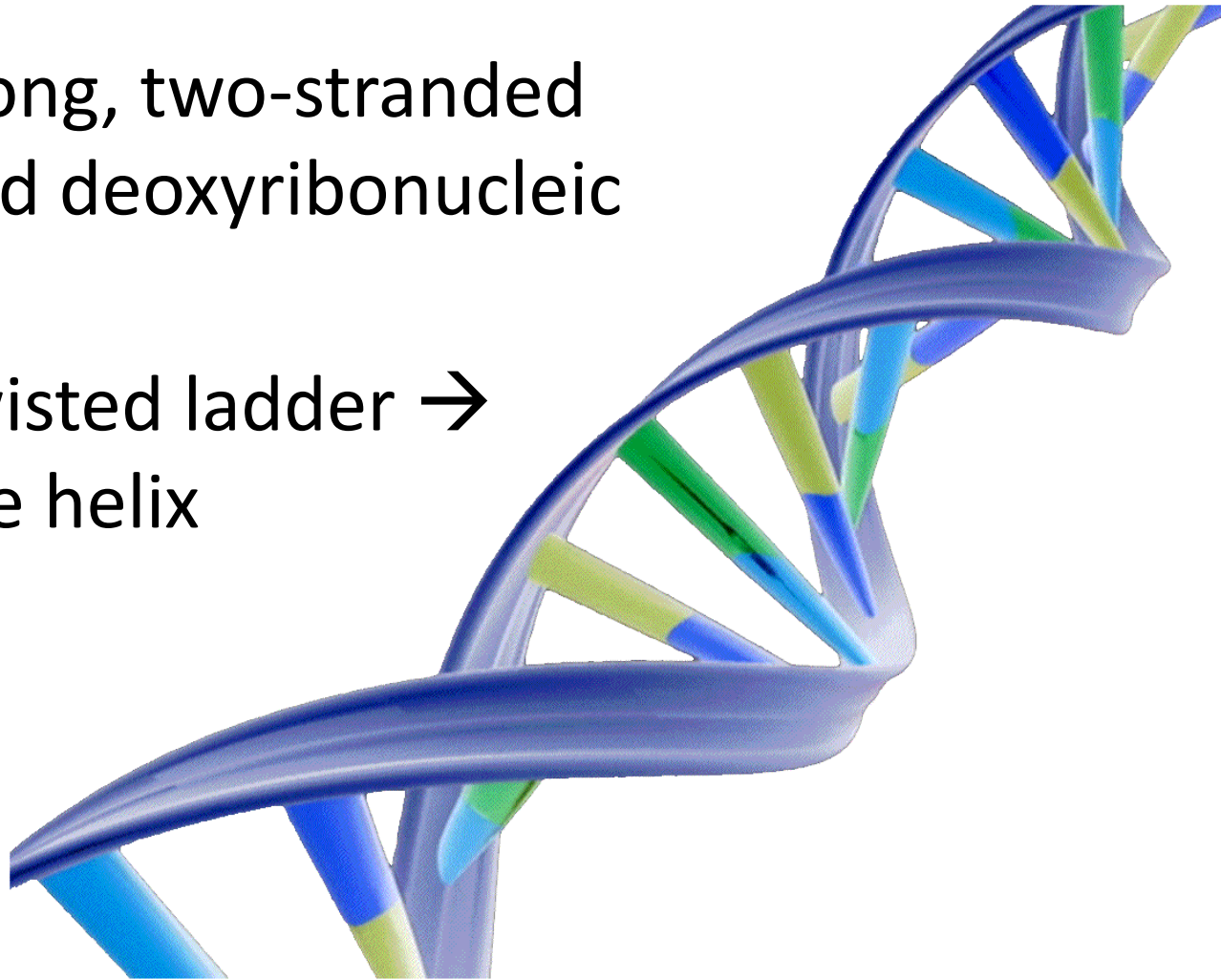
The Nucleus

- Nicknamed the “Control Centre” of the cell and contains the master set of instructions for:
 - What a cell becomes (i.e. blood vs nerve)
 - How it will function
 - When it will grow, divide and die



DNA

- Carries the master set of instructions
- Consists of a long, two-stranded molecule called deoxyribonucleic acid
- Looks like a twisted ladder → called a double helix



DNA

- Sides of the DNA molecule are made of sugar and phosphate
- Steps of the DNA ladder are made of four nitrogen bases:

– Adenine (A)

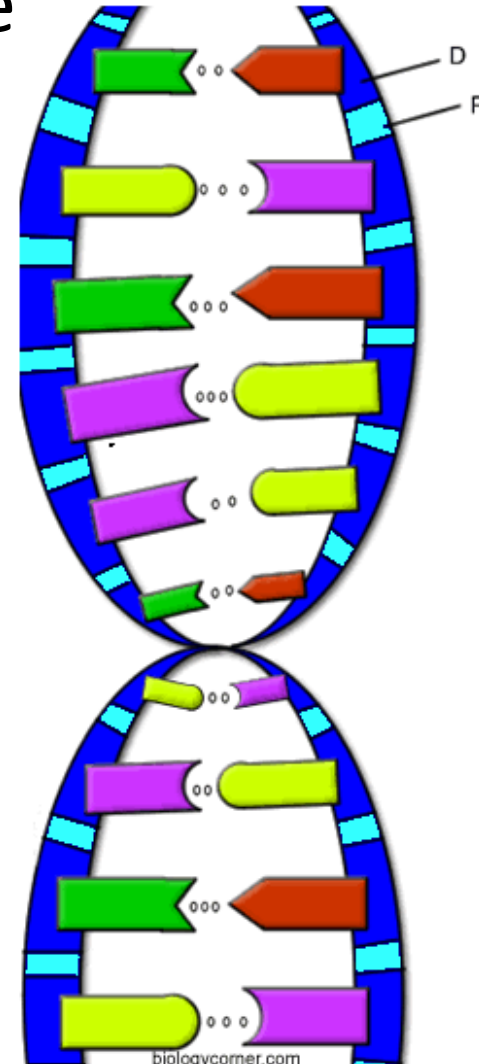
– Thymine (T)

– Guanine (G)

– Cytosine (C)

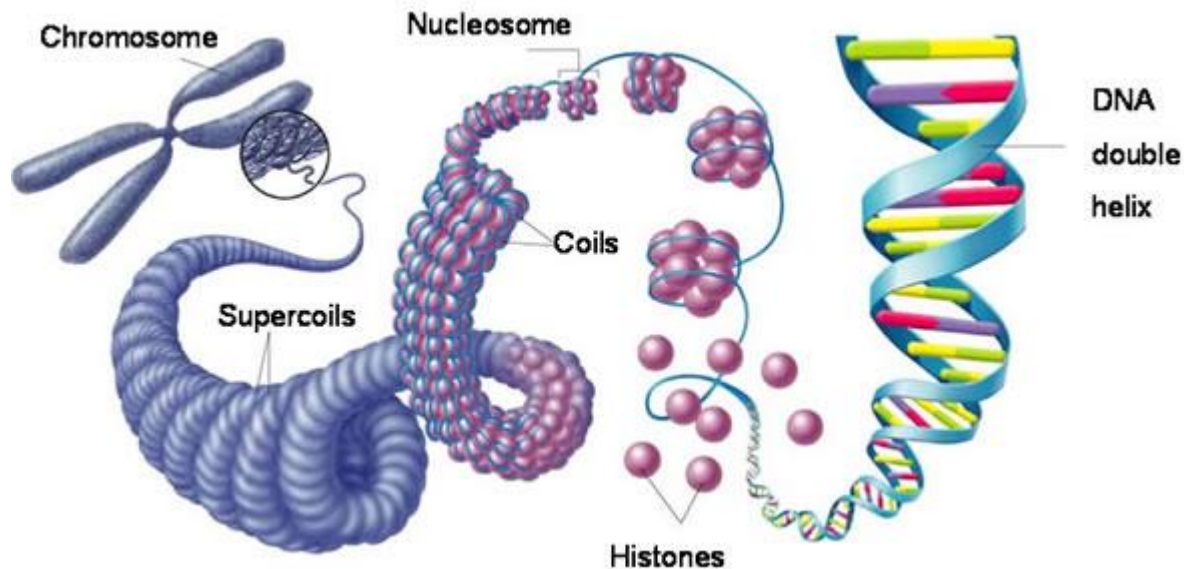
A and T always pair together

C and G always pair together



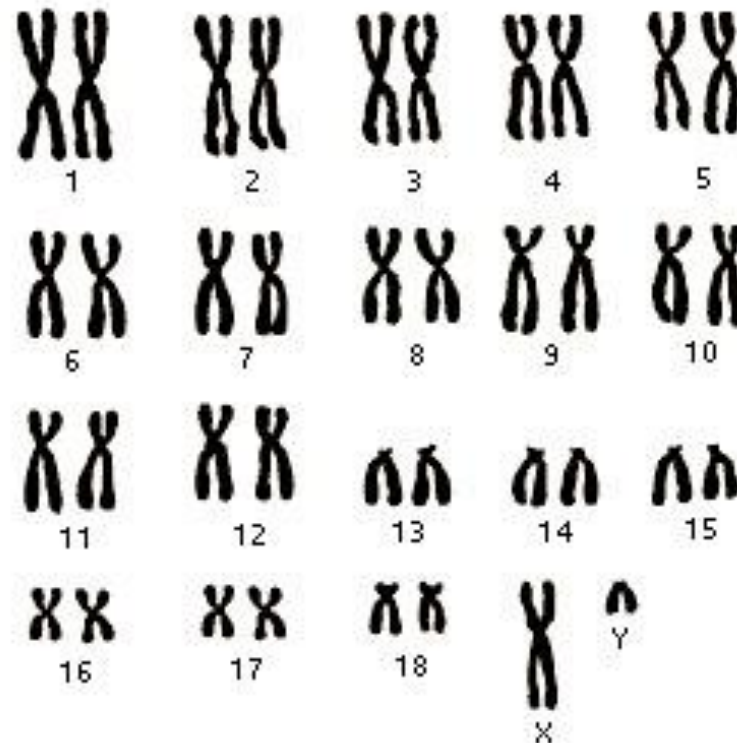
DNA

- DNA is usually loosely coiled so its instructions can be read
- When a cell is ready to divide, each strand folds into a compact, X-shaped structure called a chromosome

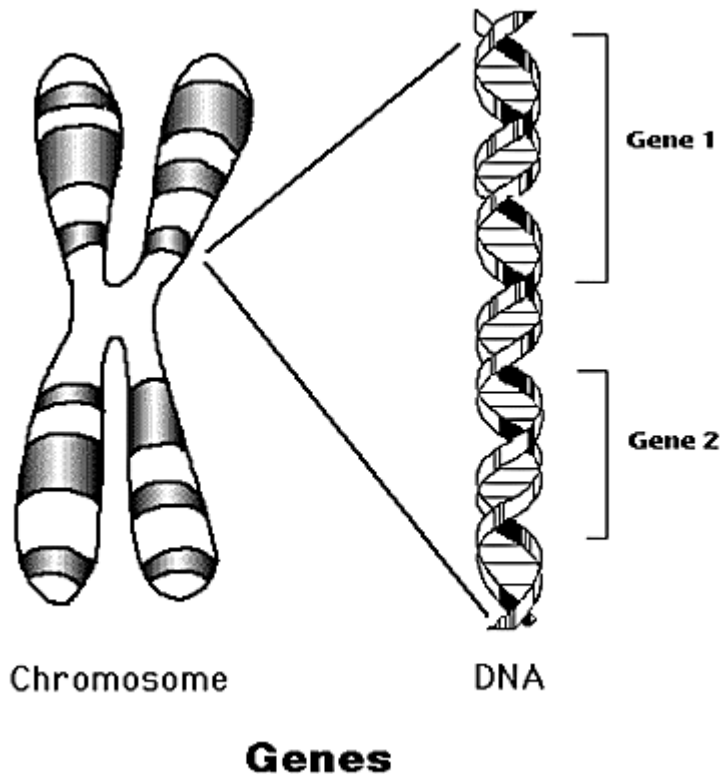


Chromosomes

- Chromosomes are found in the nucleus in pairs
- Most human cells have 46 chromosomes (23 pairs)



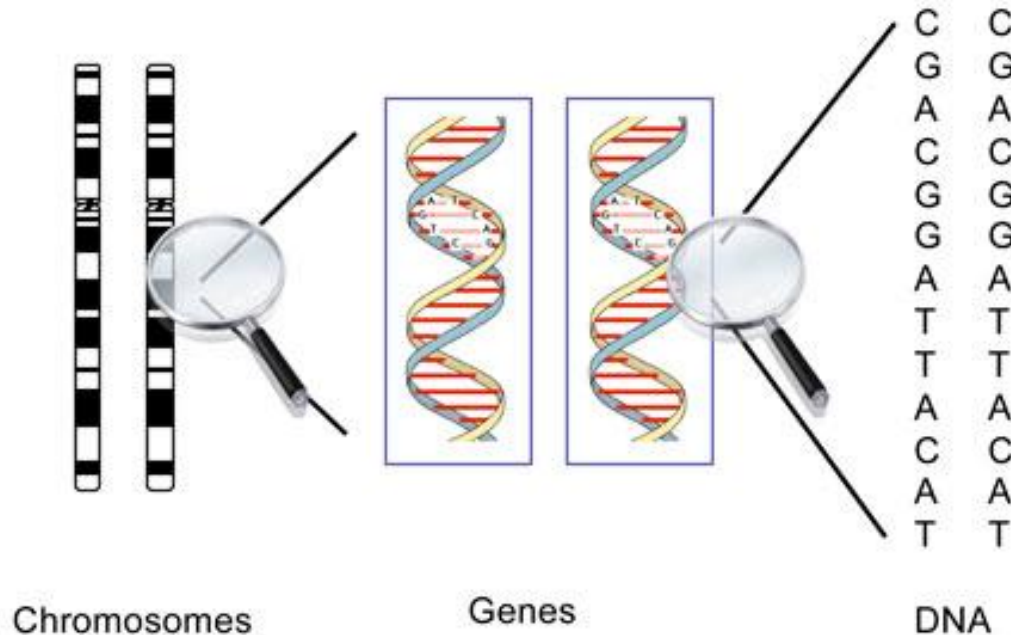
Genes



- Genes are small segments of DNA located at specific places on a chromosome
- Genes store information needed to produce the 90 to 100 thousand proteins needed by the body
- Each chromosome carries thousands of genes (which can make thousands of proteins)

Genes

- Genes vary in length from hundreds to thousands of bases
- The arrangement of bases determines what specific protein is produced



Genes

- Only certain genes are “read” in each cell to produce specific proteins needed by that type of cell (e.g. muscle cells produce proteins to make your muscles work, but they don’t produce insulin)

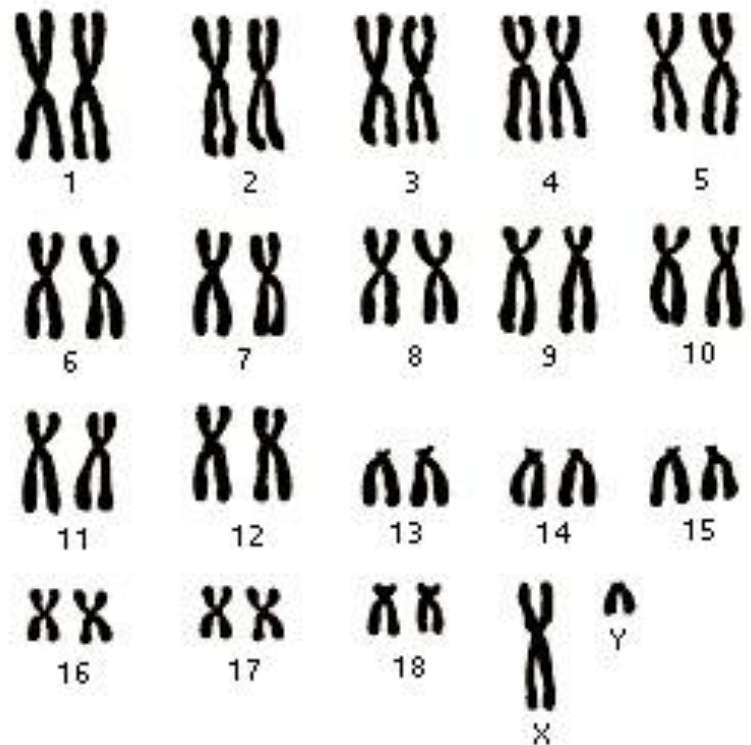


DNA/Gene/Chromosome Analogy

YOU DO NOT NEED TO WRITE THIS!!

DNA/Gene/Chromosome Analogy

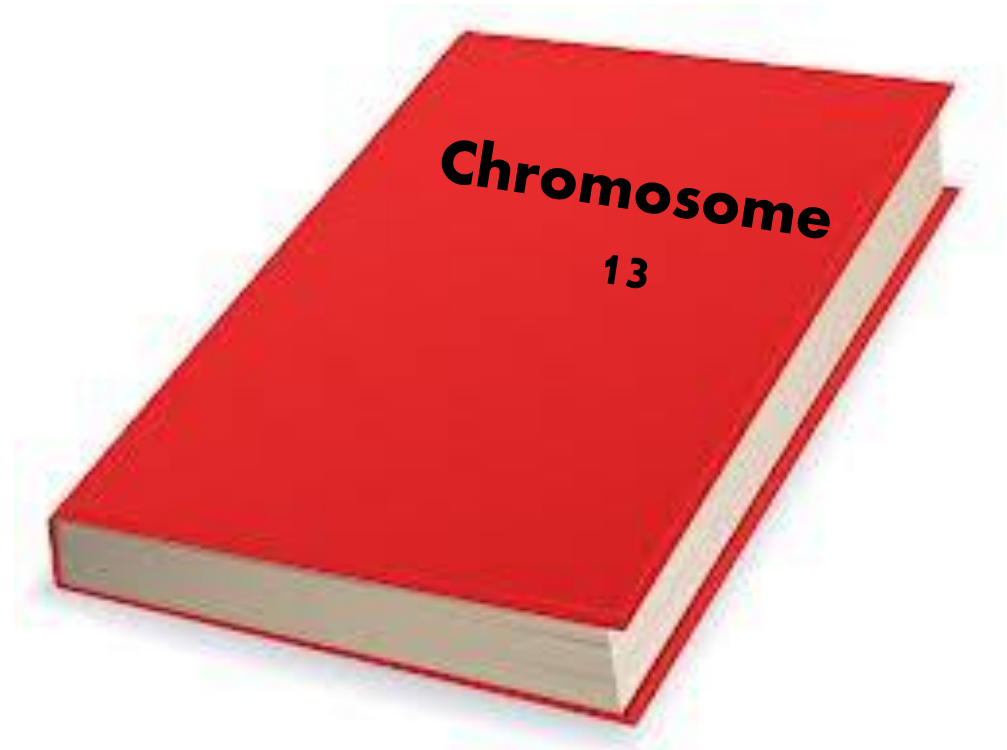
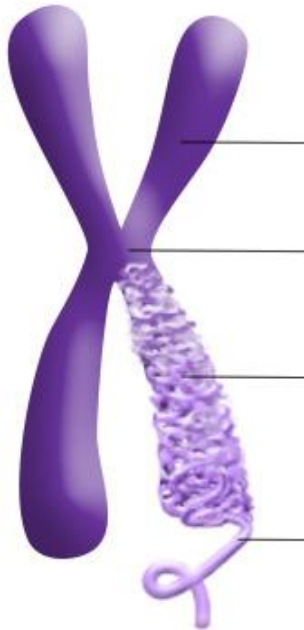
- The full chromosome set is a set of encyclopedias



The Encyclopedia of YOU!

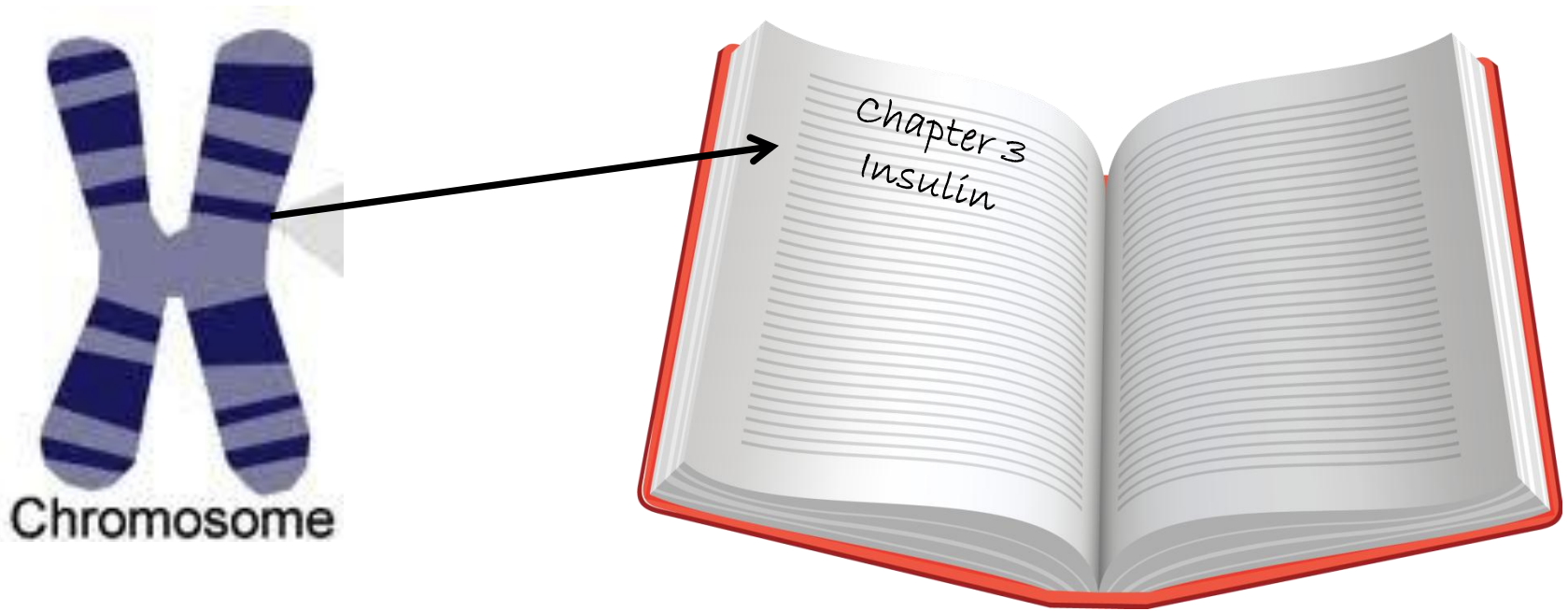
DNA/Gene/Chromosome Analogy

- Each chromosome is one book



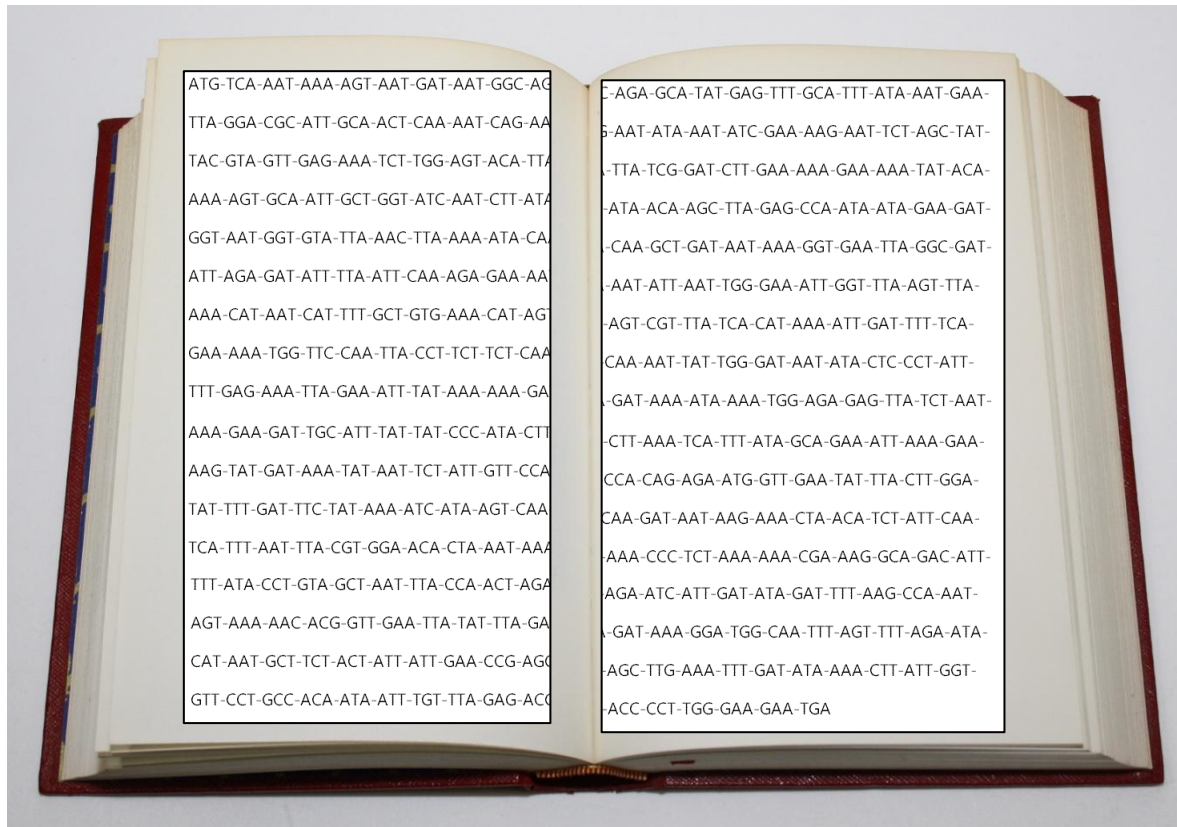
DNA/Gene/Chromosome Analogy

- Each gene is a chapter



DNA/Gene/Chromosome Analogy

- DNA is a chemical alphabet (the language of the books)

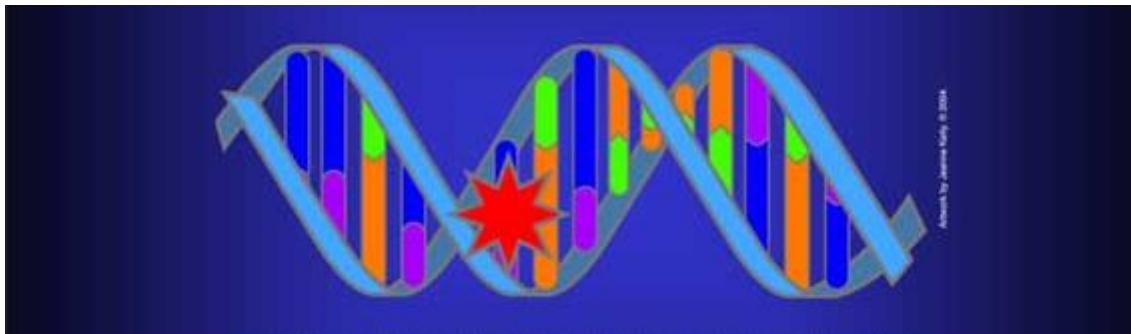


Work

- Read pg 112 to 119
- Answer questions pg 121 #1, 2, 3, 5, 6, 8, 10, 12

Mutations

- A gene mutation is a change in the specific order of the A, G, C and T bases that make up a particular gene



- Mutations can result in positive, negative or no consequences on the protein produced

Mutations – DO NOT WRITE

- DNA sequences are read in threes to create proteins
- For example:

The man ran for the bus and did not get his dog IS READ:

The/man/ran/for/the/bus/and/did/not/get/his/dog

Correct protein is made...

Mutations – DO NOT WRITE

- A substitution mutation:

The man **run** for the bus and did not get his dog IS READ:

The /man/ **run** /for/ the /bus/ and /did/ not /get/ his /dog

- It's wrong, but it still makes sense!

Correct protein is most likely made...

Mutations – DO NOT WRITE

- A different substitution mutation:

The man ran for the bus and did not get his log IS READ:

The/man/ran/for/the/bus/and/did/not/get/his/log

- It's wrong AND some sense is lost!

Correct protein may not be made...

Mutations – DO NOT WRITE

- A deletion/addition mutation:

The man ran for the bus and did not get his dg IS READ:

The/man/ran/for/the/bus/and/did/not/get/his/dg

- It's wrong, but it still makes sense...mostly.

Correct protein may or may not be made...

Mutations – DO NOT WRITE

- A different deletion/addition mutation:

The **m**panranforthebusanddidnotgethisdog IS READ:

The/mpa/nra/nfo/rth/ebu/san/ddi/dno/tge/thi/sdo/g

- It's wrong AND makes NO sense!

Correct protein is NOT made...

Work

- Answer questions pg 131 #1, 3, 4, 5, 6