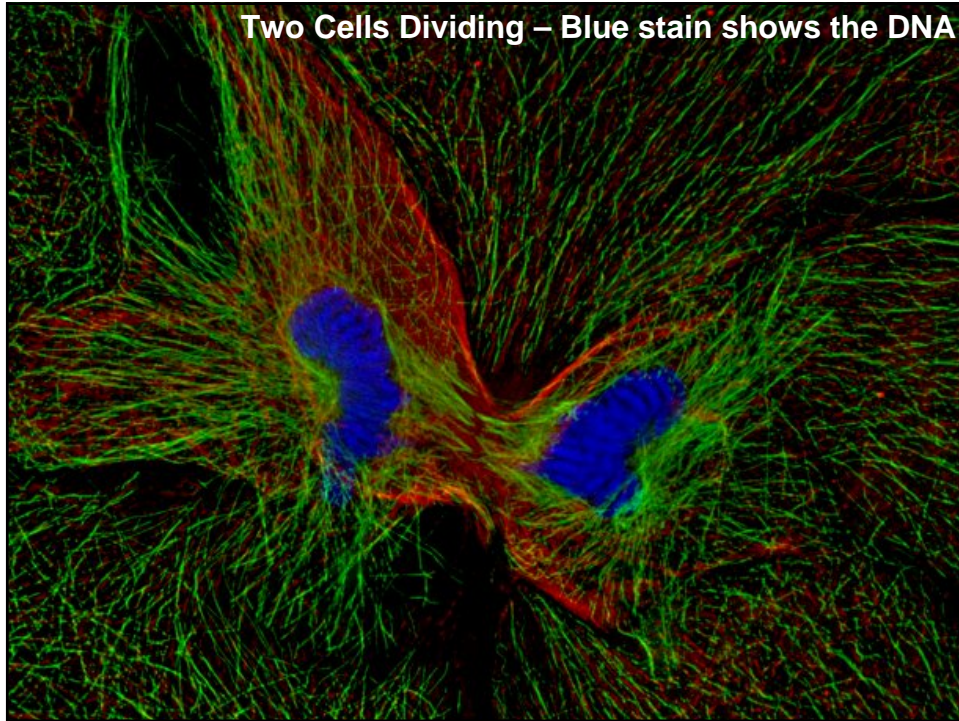


Two Cells Dividing – Blue stain shows the DNA



Timeline of DNA Discoveries

- **1859** - Charles Darwin publishes *The Origin of Species*, in which he promotes the theory of natural selection — that members of a population who are better adapted to the environment are more likely to survive and pass on their traits. No theory regarding **how traits are passed** from generation to generation has been proved true in experiments as of Darwin's time.
- **1866** - Gregor Mendel, an Austrian monk, publishes his findings on the laws of inheritance based on experiments, begun in 1857, with pea plants. His research lays the foundation for studies of inheritance of traits.
- **1944** - Oswald Avery, Colin MacLeod, and Maclyn McCarty report evidence that, at least in bacteria, the molecule that carries genetic information is deoxyribonucleic acid (DNA).
- **1952** - The experiments of Martha Chase and Alfred Hershey provide final proof that DNA is the substance that transmits inherited traits from one generation to the next. Hershey receives a Nobel Prize in 1969 for this work.

Your body is made up of trillions of cells. Each of your cells can be very different from another. For example, they can specialize in a particular function, such as carrying oxygen (red blood cells), absorbing food (intestinal cells) or sensing light (cells in your eyes).

In other ways, your cells have a lot in common. For instance, at the center of almost all of your cells is a ball-shaped structure called the nucleus, inside of which are 46 thread-like structures called chromosomes. These chromosomes contain the estimated 35,000 genes that, in many ways, make us who we are.

To understand how we end up with a given set of genes, we need to learn more about DNA and the chromosomes.

Instructions that provide almost all of the information necessary for a living organism to grow and function are in the nucleus of every cell.

These instructions tell the cell what role it will play in your body.

The instructions are in the form of a molecule called deoxyribonucleic acid, or DNA.

DNA is the chemical responsible for preserving, copying and transmitting information within cells and from generation to generation.

In humans, the DNA molecule consists of two ribbon-like strands that wrap around each other, resembling a twisted ladder. This is often described as a double helix. DNA is contained in tightly coiled packets called chromosomes, found in the nucleus of every cell. Chromosomes consist of the double helix of DNA wrapped around proteins.

The twisted ladder is made up of repeating units called nucleotides, each of which is a single building block of DNA. Nucleotides are composed of one sugar-phosphate molecule (the linear strands or outer rails of the ladder) and one base. DNA consists of two nucleotide strands joined by weak chemical bonds between the two bases, forming base pairs. A base pair is a rung or step on the ladder of the DNA. The bases are called A (for adenine), C (for cytosine), T (for thymine) and G for guanine.

A series of 3 base pairs forms a "codon"

The codon is like a "word" in the "sentence" that makes a gene

Structure

Made up of a **nucleotide** (DNA molecule)

A nucleotide has 3 parts:

1. **Phosphate group**
2. **Deoxyribose**, a **5-carbon sugar**
3. **4 Nitrogenous bases**

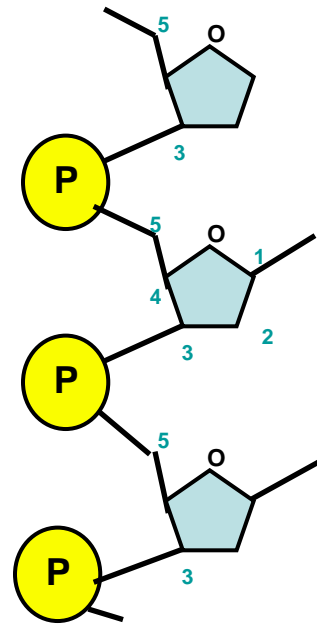
1 & 2 make up the long parts of the ladder; 3 makes up the rungs

Deoxyribose

A 5-carbon sugar

“ose” = sugar
ribose, glucose, fructose

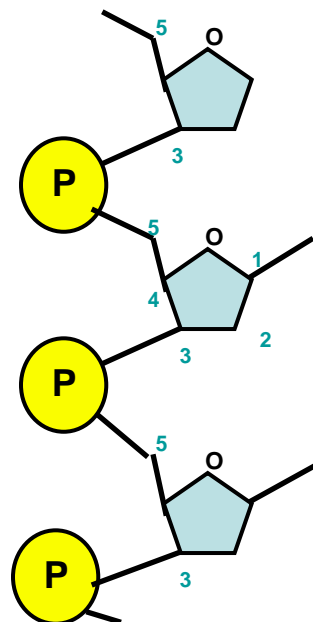
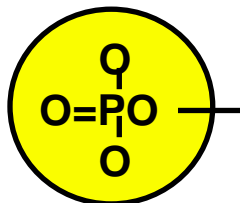
This helps make up the backbone of the ladder along with.....



The Phosphate Group

- Phosphate joins with deoxyribose to form **the backbone** of the ladder

Phosphate Group



Nitrogenous bases form the rungs of the ladder

Purines: double ring of carbon and nitrogen atoms:

- Adenine abbreviated as A
- Guanine abbreviated as G

Pyrimadines: single ring of carbon and nitrogen atoms

- Thymine abbreviated as T
- Cytosine abbreviated as C

Base pairing Rule

Adenine **always** pairs with Thymine

A – T

Guanine **always** pairs with Cytosine

G – C

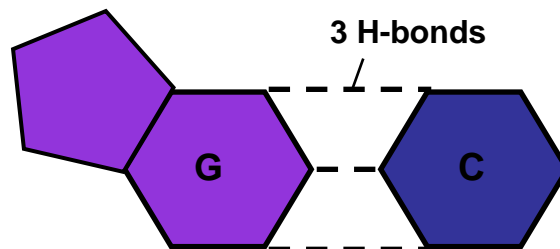
Always

Always

Always

BASE-PAIRINGS

<u>Purines</u>	<u>Pyrimidines</u>	Base Pairs
Adenine (A)	Thymine (T)	A = T
Guanine (G)	Cytosine (C)	C ≡ G



Chargaff's Rule

- Adenine must pair with Thymine
- Guanine must pair with Cytosine
- Their amounts in a given DNA molecule will be **about the same**.





DNA is a large molecule packaged in chromosomes in the nucleus of cells.

The DNA molecule contains genes that direct the production of proteins by the ribosomes.

Proteins are molecules that play a critical role in the structure, function, and regulation of your body's cells, tissues, and organs. Every protein is made up of a chain of building blocks called amino acids.

http://genetics.gsk.com/flash_dna_actual.htm