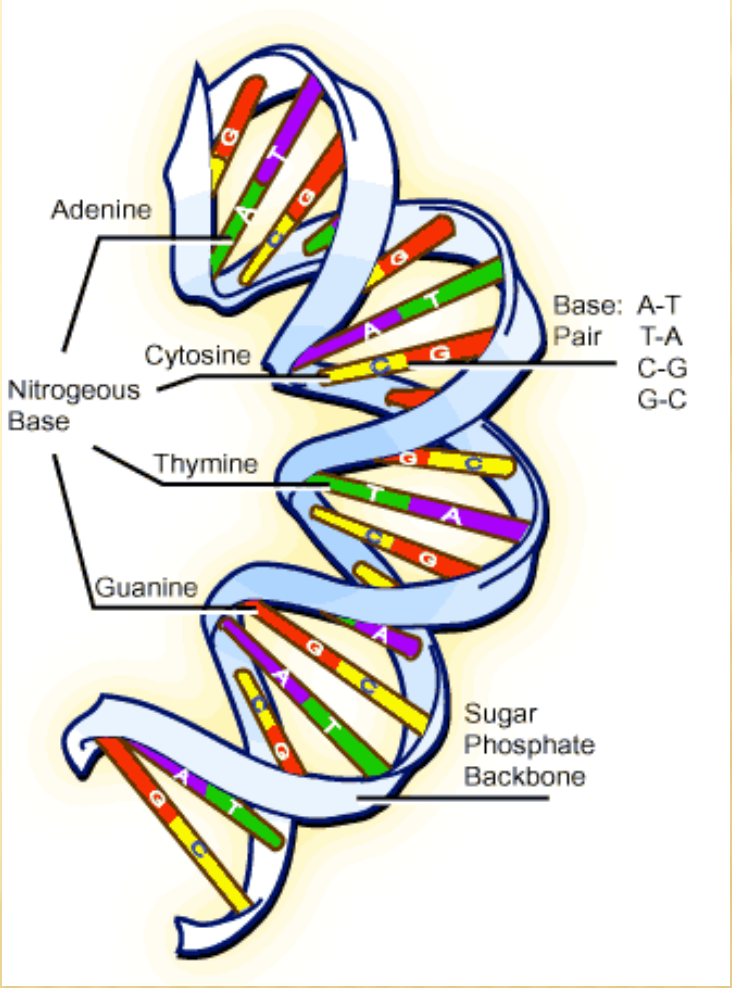
DNA - DEOXYRIBOSE NUCLEIC ACID

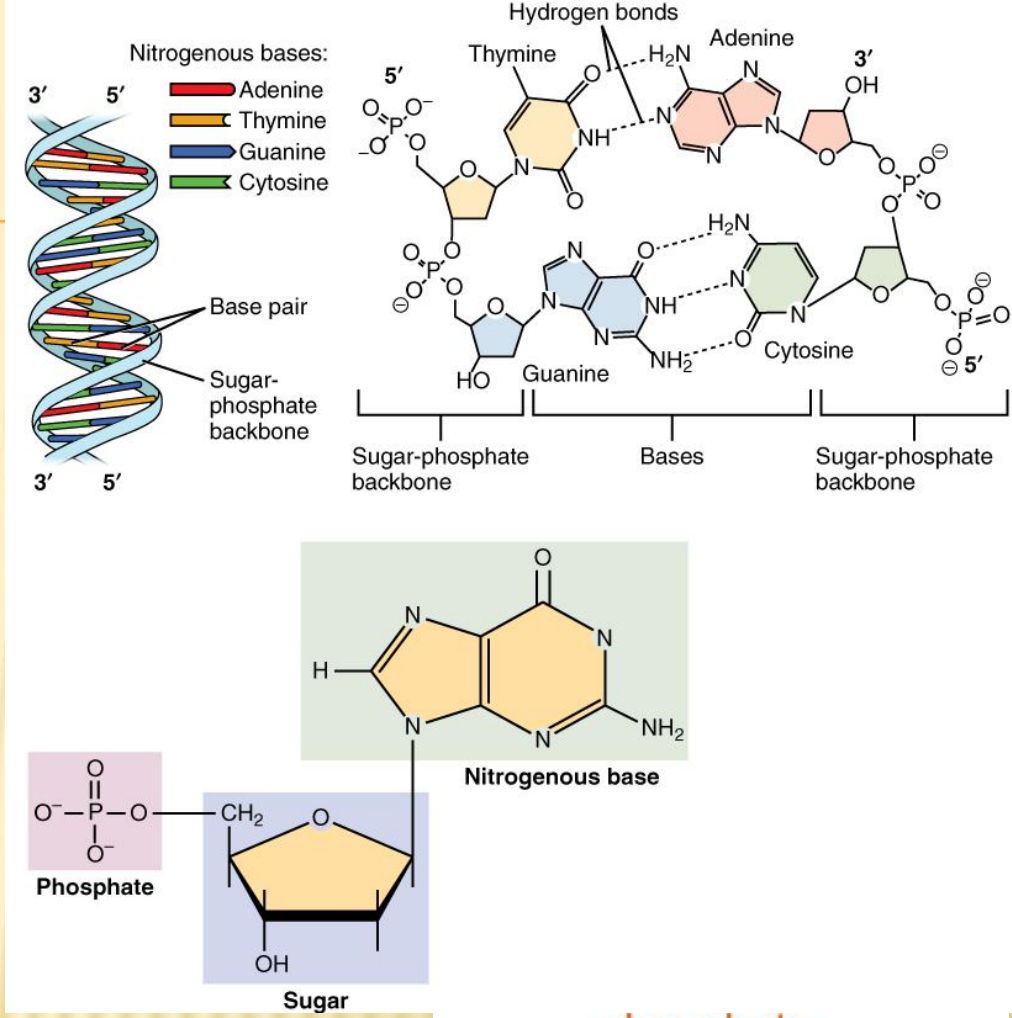
- Composed of nucleotides

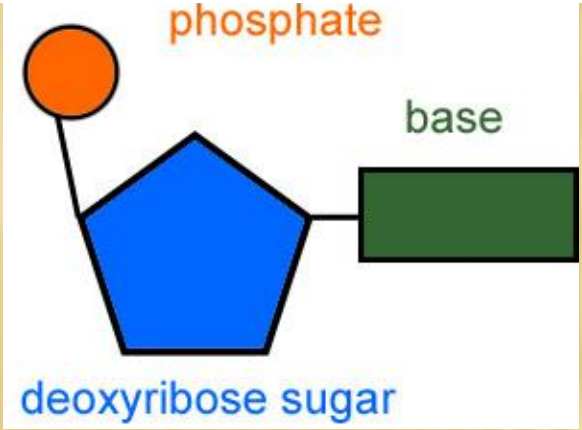
- Ideal genetic material
  - store and transmit genetic information
  - replicate
  - undergo changes (mutate)



NUCLEOTIDE

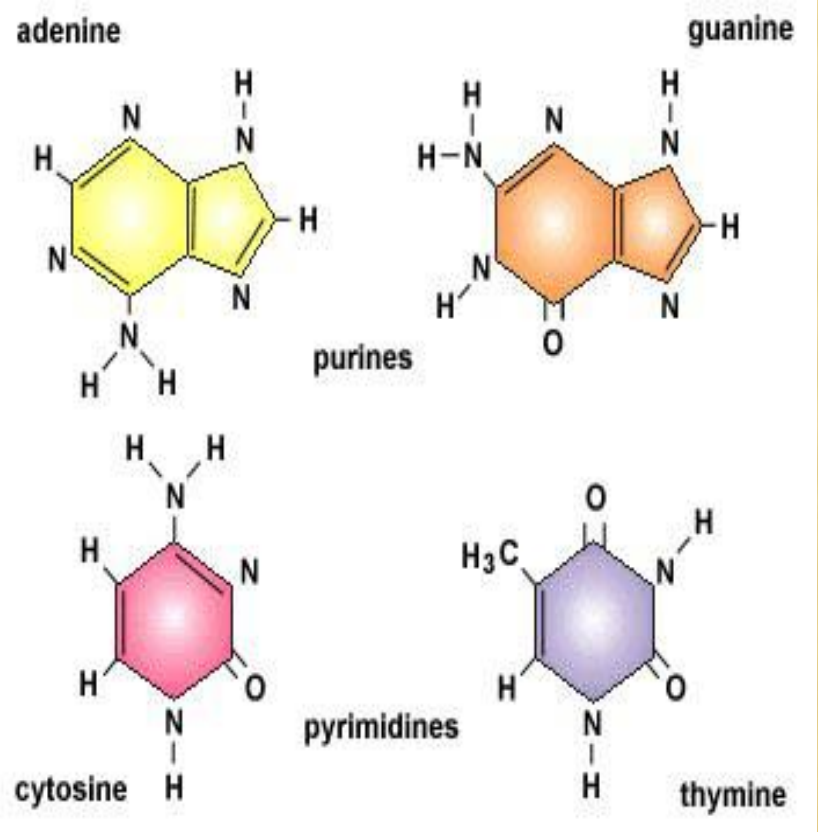
- Subunits or building blocks of nucleic acid (DNA, RNA
- Deoxyribose sugar
- Phosphate group
- Nitrogenous base
  - A, T, C, G





NITROGENOUS BASES

- 4 Bases
  - Adenine (A), Thymine (T), Cytosine (C), Guanine (G)
- Purine – Double ring
  - A and G
- Pyrimidine – single ring
  - T and C



CHARGAFF'S RULE

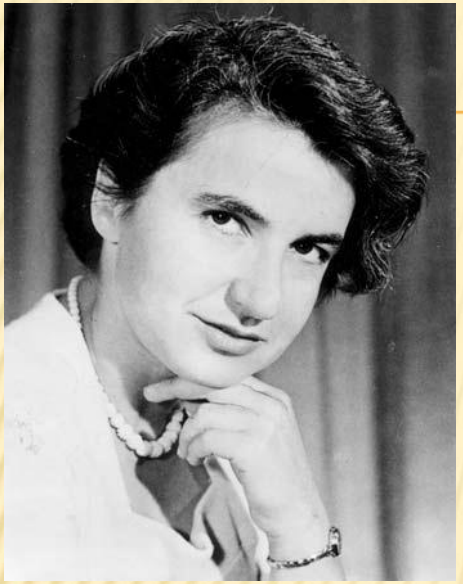
- Amount of guanine equals amount of cytosine
  - Amount of adenine equals thyamine
- Chargaff's rule: C=G A=T

Chargaff's DNA Data Base Composition in Various Species (%)

Species	A	T	G	C
Homo sapiens	31.0	31.5	19.1	18.4
Drosophila melanogaster	27.3	27.6	22.5	22.5
Zea mays	25.6	25.3	24.5	24.6
Neurospora crassa	23.0	23.3	27.1	26.6
Escherichia coli	24.6	24.3	25.5	25.6
Bacillus subtilis	28.4	29.0	21.0	21.6

New Base Pairs

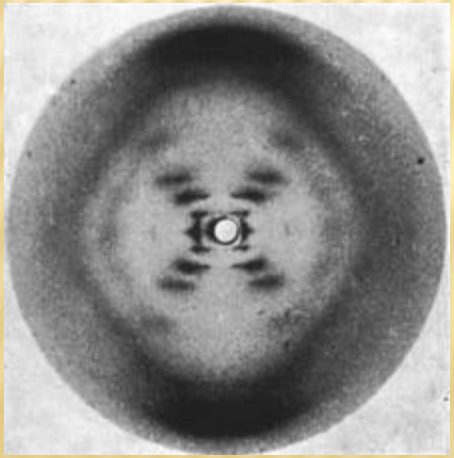
http://www.huffingtonpost.com/2014/05/07/living-organism-artificial-dna_n_5283



DISCOVERING STRUCTURE OF DNA

X – Ray Diffraction

- Maurice Wilkins and Rosalind Franklin
- http://www.youtube.com/watch?v=JiME-W58KpU&sns=em



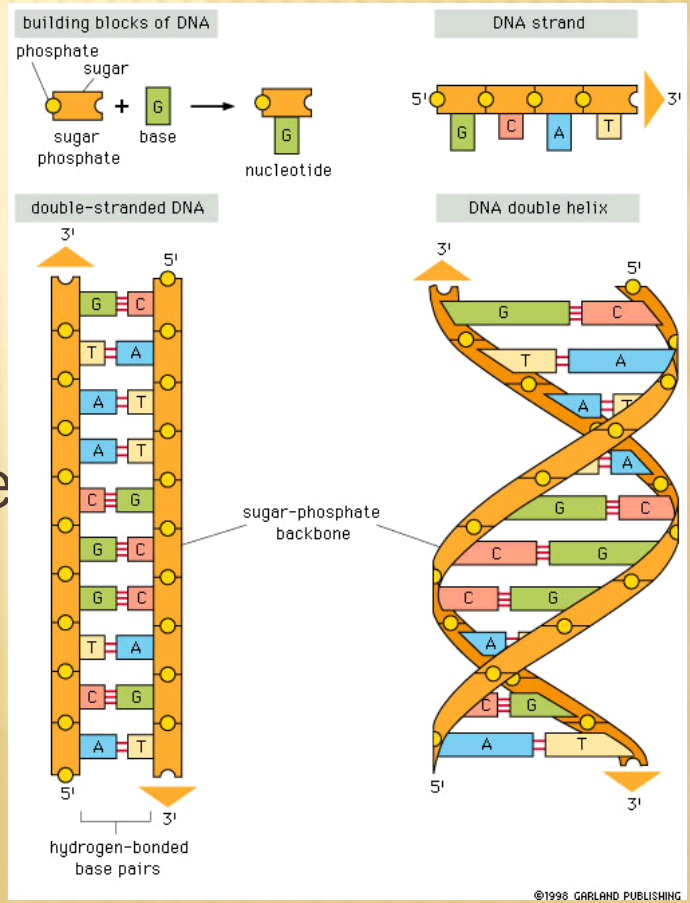
- Photo 51
  - Indicated DNA was a double helix
- http://www.pbs.org/wgbh/nova/photo51/

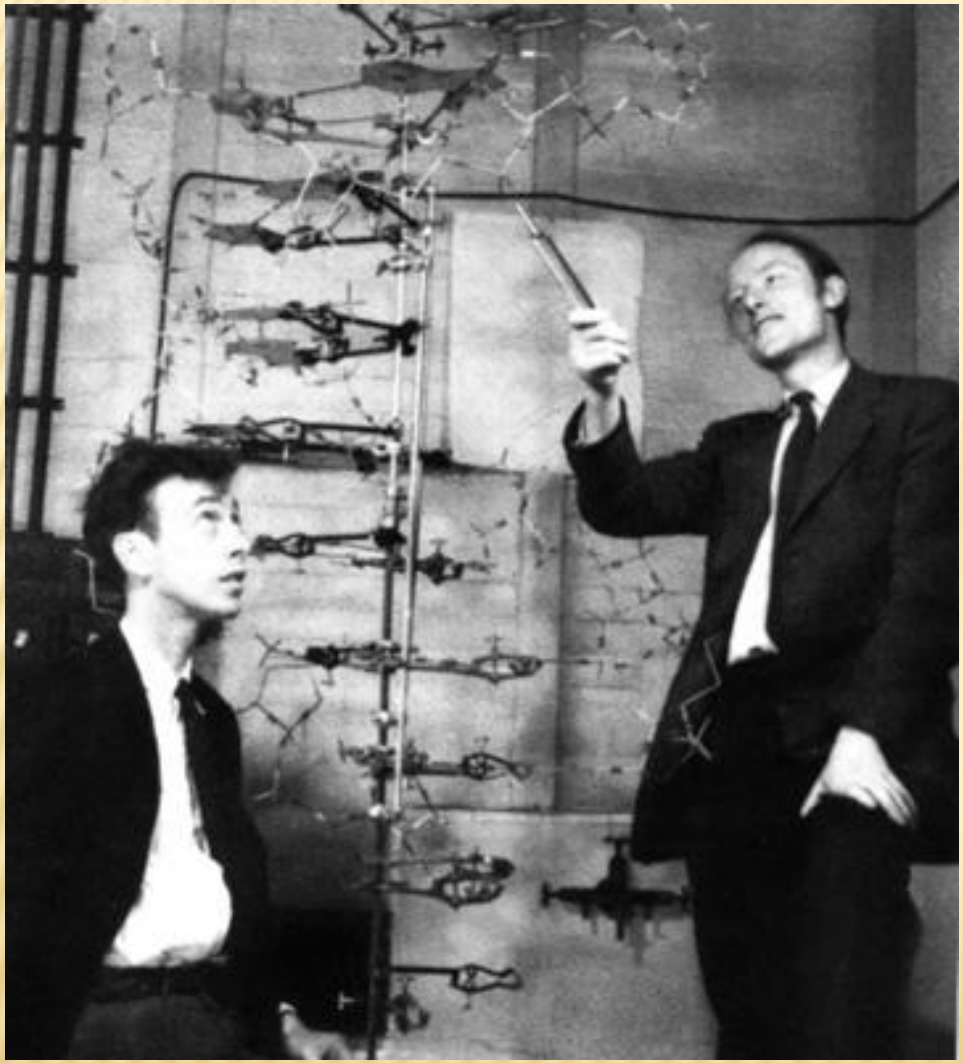
DNA IS A DOUBLE HELIX

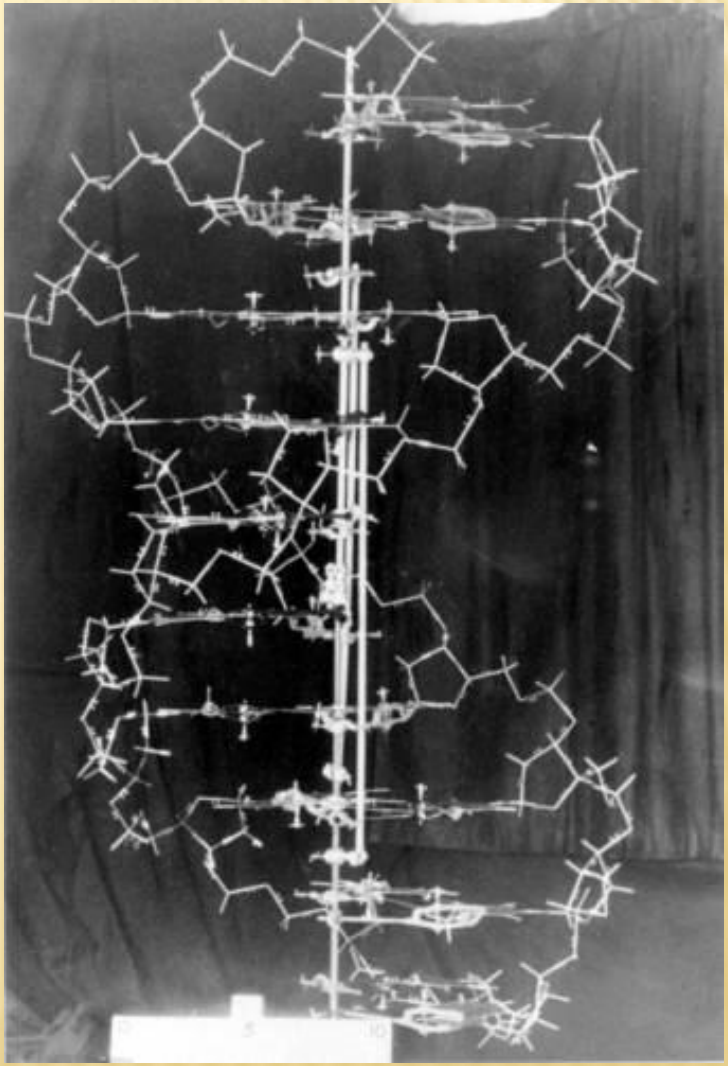
James Watson and Francis Crick

Similar to ladder that is twisted

- Sugar and phosphate form the backbone
- Bases lie between the backbone
  - Nucleotides
    - A, G, T, C
  - Held together by H-bonds between the bases
    - A-T – 2 H bonds
    - G-C – 3 H bonds







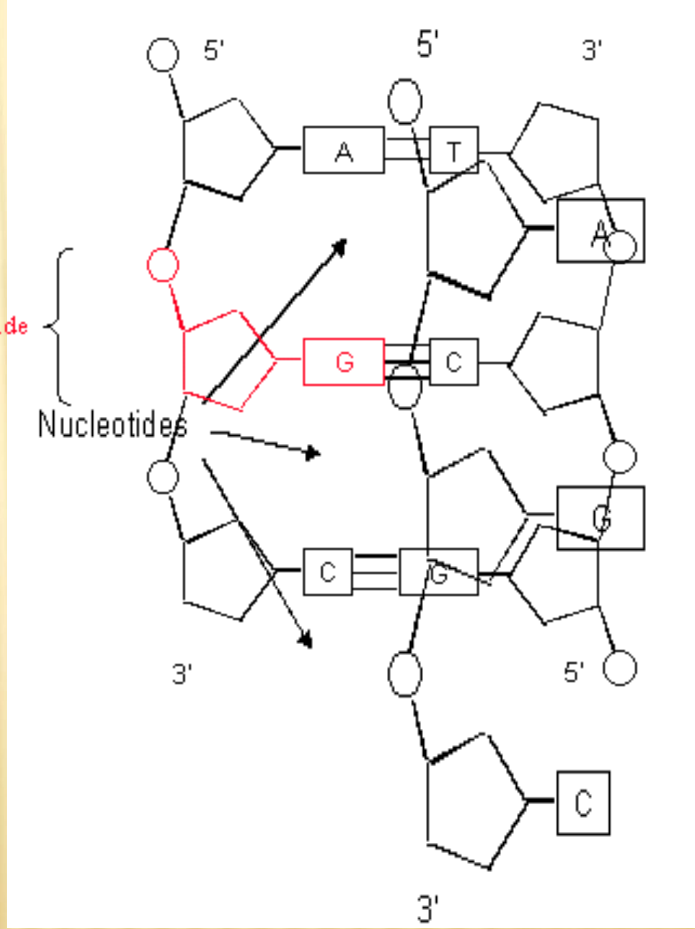
DNA IS COMPLEMENTARY

- Complementary: bases on one strand match bases on the other strand
  - (A-T and G-C)

Example: Strand 1- ATG GGC CTA
Strand 2- TAC CCG GAT

ORIENTATION OF DNA

- The nucleotides form a chain
- Phosphate end is the 5' end
  - The opposite end is the 3' end
- Q: Since DNA is complementary, what end matches with the 5’ end?

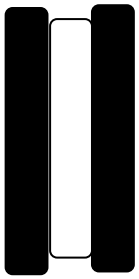


FINAL THOUGHTS: DNA

- Similar to a ladder
  - Rails (outside of ladder) are deoxyribose and phosphate
  - Base pairs are rungs of ladder
  - Twisted

Remember

DNA is like an Oreo

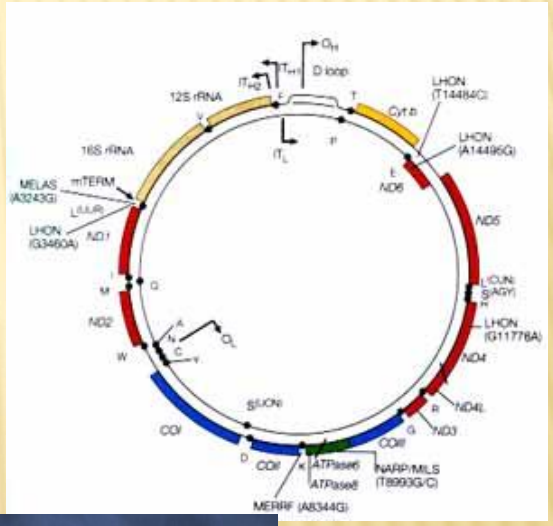


Phophates + sugars = cookies

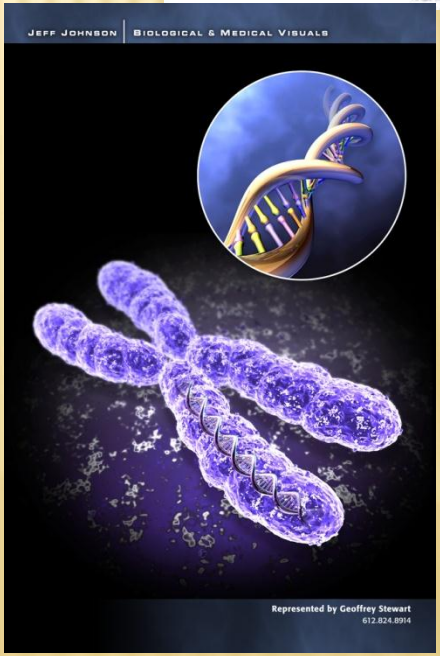
Bases = cream filling

CHROMOSOME STRUCTURE

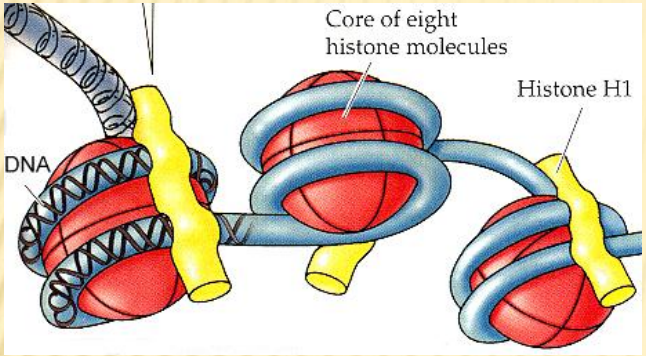
- Prokaryotes – DNA in the shape of a ring



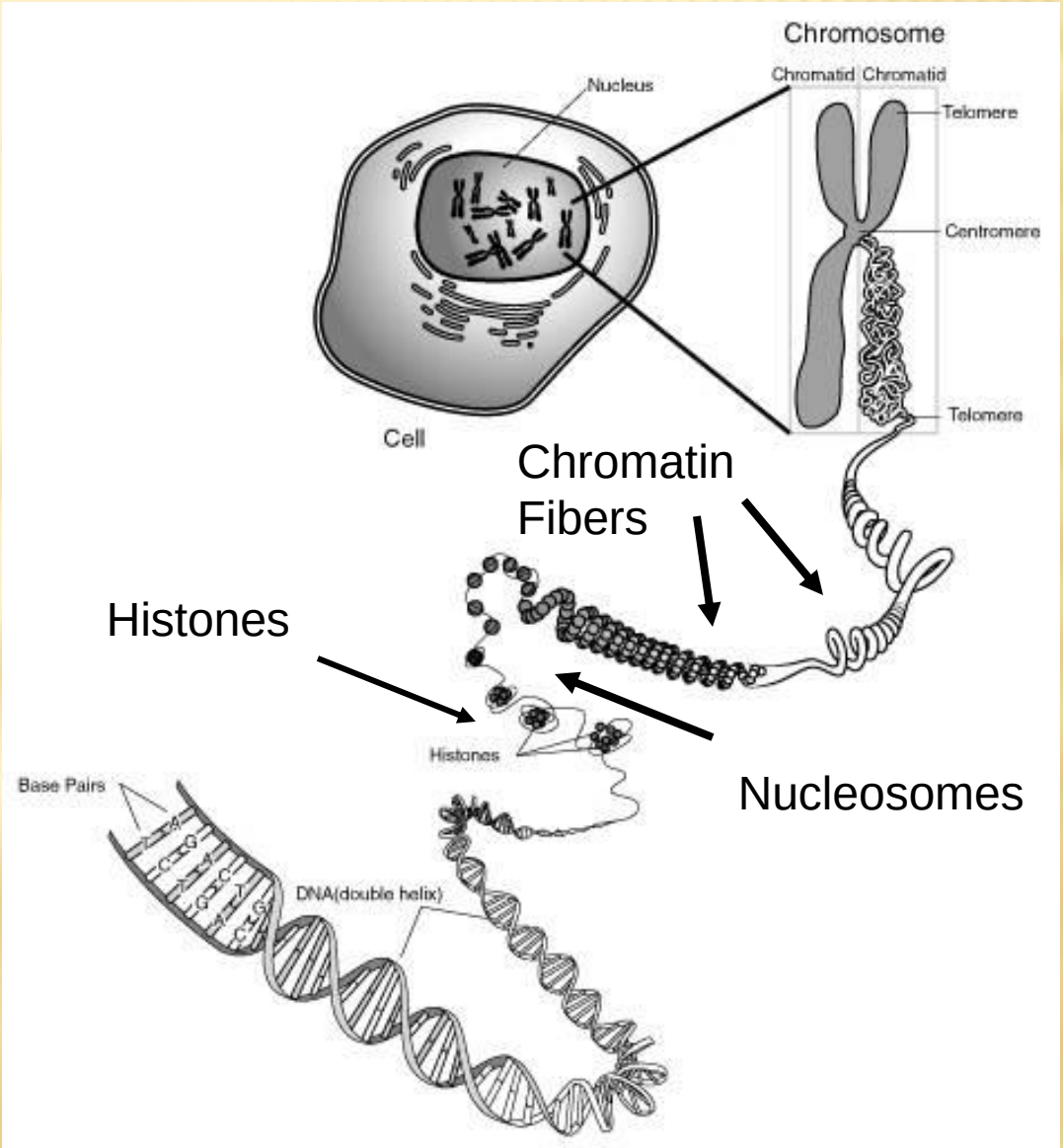
- Eukaryotic – chromosomes
  - 51 – 245 million base pairs



CHROMOSOME STRUCTURE

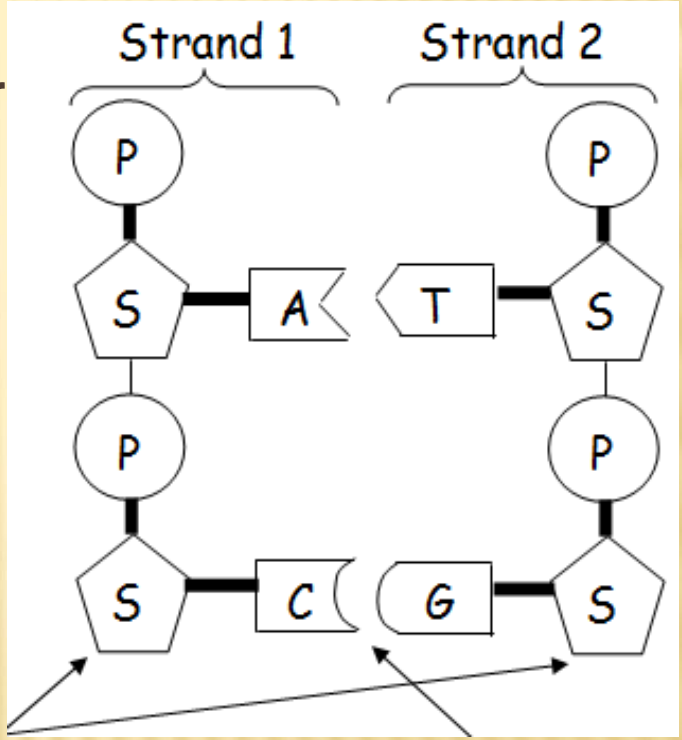


- DNA wraps around histones
- histones form nucleosome



REMEMBER!!

- 2 strands allow bases to pair
  - A binds T with 2 H bonds
  - C binds G with 3 H bonds

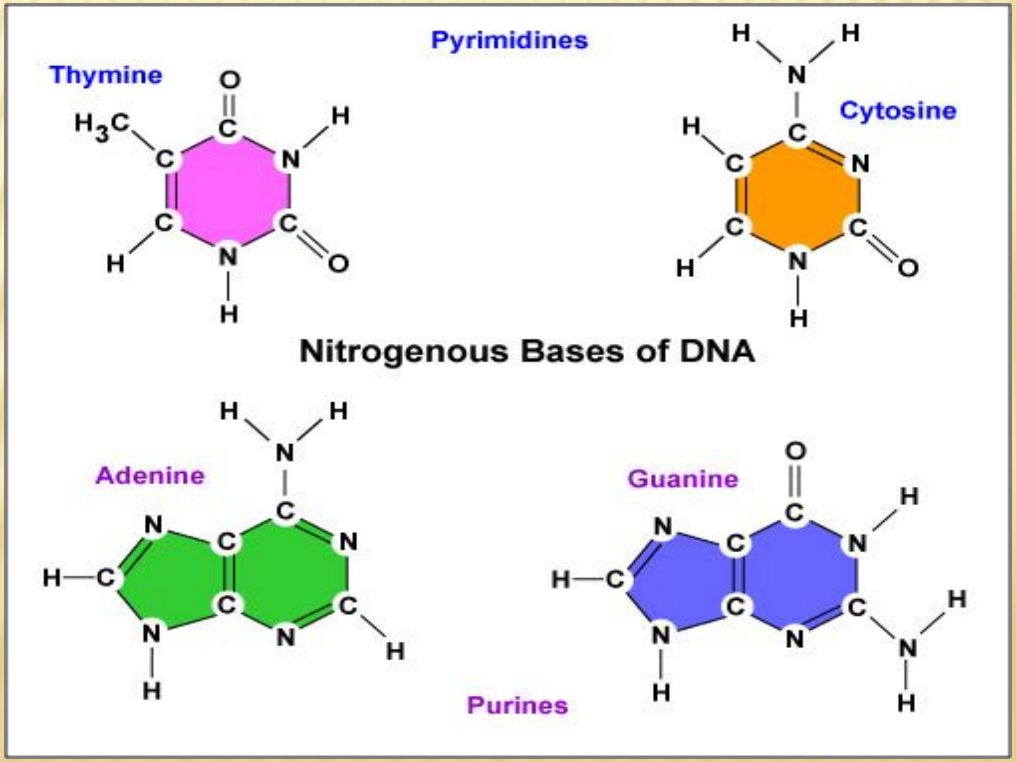


Phosphates + sugars on the outside

Bases on the inside (Bases fit like puzzle pieces)

INFO ON BASES

- Purine – double ring base
  - Guanine, Adenine
- Pyrimidine – single ring base
  - Cytosine, Thymine



SELF-CHECK

1. IF THERE IS 40% CYTOSINE IN DNA, HOW MUCH ADENINE IS THERE?

2. WHAT TECHNIQUE DID FRANKLIN USE TO TAKE A PICTURE OF DNA, & WHAT DID HER PICTURE SHOW?

3. DRAW A PICTURE OF DNA AND LABEL ITS PIECES.