THE HISTORY AND STRUCTURE OF DNA NOTES

Biology B

DNA (Deoxyribonucleic Acid)

History

Frederick Griffith:

* 1928 – Frederick Griffith was trying to figure out how bacteria made people sick.
* \_\_\_\_\_\_\_\_\_\_\_\_\_ – infection that inflames air sacs in one or both lungs, which may fill with fluid.
* Found two strains of bacteria of the same species
  + Smooth (\_\_\_\_\_\_\_)
  + Rough (\_\_\_\_\_\_\_)
* Only the \_\_\_\_\_\_\_\_\_ strain caused pneumonia
* Experimented with mice.
* When he injected the mice with the \_\_\_\_\_\_\_\_ bacteria, it caused pneumonia
* When he injected the mice with the \_\_\_\_\_\_\_ bacteria, the mice remained \_\_\_\_\_\_\_
* He “heat treated” the smooth bacteria
  + This killed the smooth bacteria cells
  + He injected the “heat treated” smooth bacteria into the mice
  + They \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Next experiment:
  + He \_\_\_\_\_\_\_\_ the “heat treated” smooth bacteria with the harmless rough bacteria
  + Injected this mix into the mice
* SHOCKING RESULTS!!!!!!
  + This mix actually made the mice \_\_\_\_\_\_
  + How could this happen if the S-strain cells were dead?

Transformation

* Griffith reasoned that when he mixed the “heat treated” smooth bacteria and the rough bacteria cells, a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ had been transferred from the smooth bacteria cells to the rough bacteria cells
  + This is called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
  + This chemical factor must contain information that could change the harmless bacteria into disease-causing bacteria

Oswald Avery

* 1944 - Avery’s team conducted experiments to narrow down the chemical compound that caused the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in the bacteria cells.
  + They treated the bacteria with \_\_\_\_\_\_\_\_\_\_ that killed proteins, lipids, carbohydrates and other molecules
  + Transformation still happened
  + When they \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (deoxyribonucleic acid), transformation did not occur
    - DNA WAS THE TRANSFORMING FACTOR!!!
* Virus – tiny, nonliving particles that can infect living cells
* Bacteriophage – a kind of virus that infects bacteria.

Hershey and Chase

* Alfred \_\_\_\_\_\_\_\_ and Martha \_\_\_\_\_\_\_\_ conducted experiments on bacteriophage viruses
  + Their experiments \_\_\_\_\_\_\_\_ that DNA was the cell’s genetic material in all living cells
* How could DNA be capable of doing the following with genetic information in the cell?
  + \_\_\_\_\_\_\_\_\_\_\_\_
  + \_\_\_\_\_\_\_\_\_\_\_\_
  + \_\_\_\_\_\_\_\_\_\_\_\_

THE STRUCTURE OF DNA

* DNA – a nucleic acid made up of nucleotides joined into long strands or chains by covalent bonds
* Nucleotides are made up of three basic components:
  + 5-carbon \_\_\_\_\_\_\_\_ – deoxyribose
  + A \_\_\_\_\_\_\_\_\_ group
  + A nitrogenous \_\_\_\_\_\_\_\_\_
    - Adenine (A)
    - Guanine (G)
    - Cytosine (C )
    - Thymine (T)

Erwin Chargaff

* Chargaff conducted experiments and found that:
* \_\_\_\_\_\_\_\_\_\_ (A) and Thymine (T) were found in equal amounts
* Guanine (G) and \_\_\_\_\_\_\_\_\_\_ (C ) were found in equal amounts

\_\_\_\_\_\_\_\_\_\_\_ must pair with Thymine.

\_\_\_\_\_\_\_\_\_\_\_ must pair with Cytosine.

The bases form weak hydrogen bonds.

Rosalind Franklin

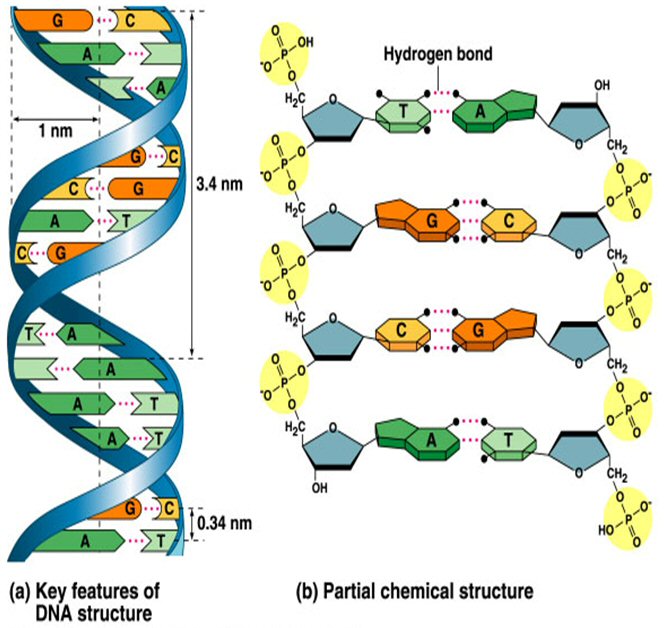
* 1952: Used \_\_\_\_\_\_\_ diffraction to show the pattern of DNA
  + \_\_\_\_\_\_\_ – twisted like the coils of a spring
* 1953: James Watson and Francis Crick used Franklin’s X-ray pattern to build a \_\_\_\_\_\_\_ of the specific structure of DNA

Structure of DNA

* Double Helix – two strands coiled to resemble a twisted \_\_\_\_\_\_\_\_\_\_
* “Legs of the ladder” – \_\_\_\_\_\_\_\_\_\_\_ and Sugar
* “Rungs of the ladder” – Nitrogenous \_\_\_\_\_\_\_ pairs
  + Nitrogenous bases held together with weak hydrogen bonds
* The “legs” and “rungs” together made nucleotides.

Antiparallel Molecule

* Antiparallel molecule – the two strands run alongside each other, but point in \_\_\_\_\_\_\_\_\_\_ directions.
* In a double-stranded DNA molecule, the 5' end (\_\_\_\_\_\_\_\_\_\_\_\_-bearing end) of one strand aligns with the 3' end( \_\_\_\_\_\_\_\_\_\_\_-bearing end)

Base Pairings

* Adenine (A) pairs with Thymine (T)
* \_\_\_\_\_\_\_\_
* Guanine (G) pairs with Cytosine (C )
* \_\_\_\_\_\_\_\_
* Pyrimidines:
  + Thymine (T)
  + Cytosine (C )
* Purines
  + Adenine (A)
  + Guanine (G)
* Pyrimidines pair with Purines!