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!