12–1 DNA

Griffith and Transformation

Fredrick Griffith

Trying to learn how certain bacteria causes pneumonia.

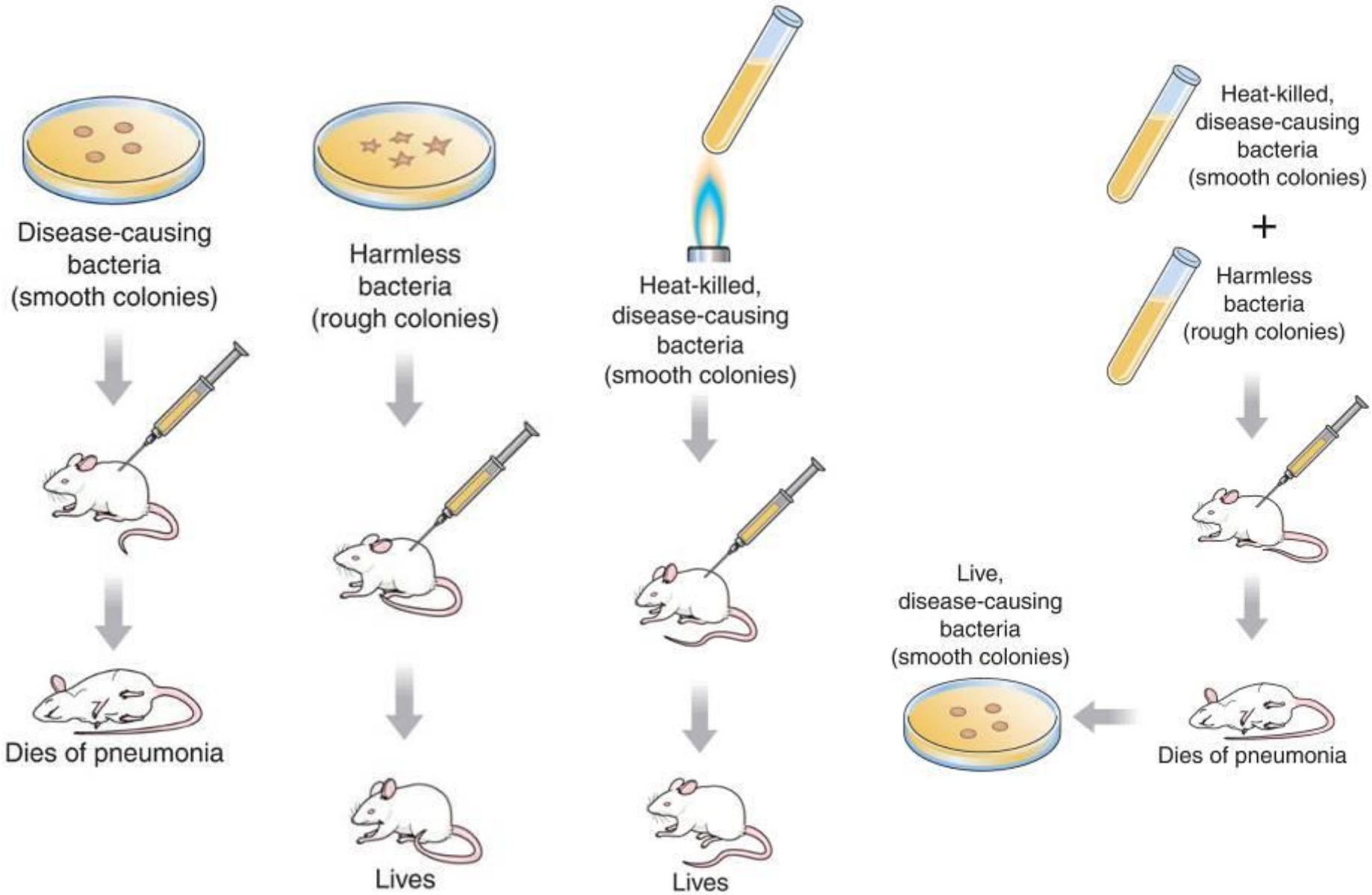
Observed 2 strains of bacteria.

Griffith made two observations:

(1) disease-causing strain- smooth colonies

(2) harmless strain- rough colonies

Griffith's Experiments (pg. 288)



Griffith's Experiments (pg. 288)

Smooth colonies of bacteria- cause disease

Rough colonies of bacteria- do not cause disease

Part 1: Bacteria (smooth colonies) → injected into mouse → mouse dies

Part 2: Bacteria (rough colonies) → injected into mouse → mouse lives

Part 3: Boil Bacteria (smooth colonies) → injected into mouse → mouse lives

Part 4: Mix boiled bacteria (smooth colonies) with bacteria (rough colonies) → injected into mouse → mouse dies

Transformation

The harmless strain had transformed into the disease-causing strain.

Griffith called this process **transformation**

Avery and DNA

Oswald Avery repeated Griffith’s work and concludes that DNA is the cause of transformation.

What did scientists discover about the relationship between genes and DNA?

Avery and DNA

Avery and other scientists discovered that the nucleic acid DNA stores and transmits the genetic information from one generation of an organism to the next.

The Hershey-Chase Experiment

Alfred Hershey and Martha Chase studied viruses to determine if genes were made of proteins or of DNA.

Bacteriophages

A virus that infects bacteria is known as a **bacteriophage.**

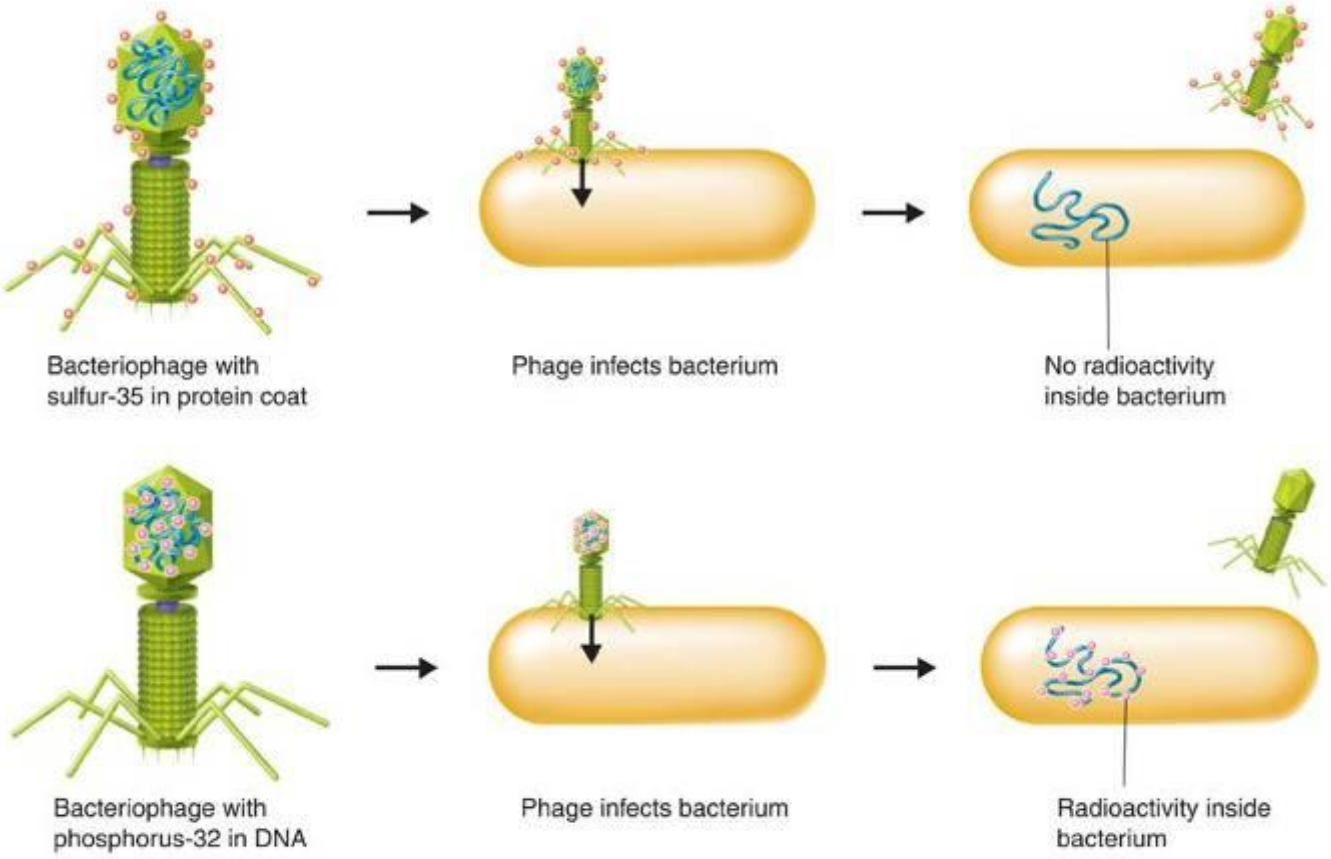
Bacteriophages are composed of a DNA or RNA core and a protein coat.

The Hershey-Chase Experiment

Hershey and Chase used radioactive labels.

<u>Phosphorus-32 (^{32}P)-</u> used to label DNA

<u>Sulfur-35 (^{35}S)-</u> used to label protein coat **Pg. 290**



Hershey and Chase concluded that the genetic material of the bacteriophage was DNA, not protein.

What is the overall structure of the DNA molecule?

The Components and Structure of DNA

DNA is made up of **nucleotides**.

A nucleotide is made up of:

1) a five-carbon sugar- deoxyribose
2) a phosphate group

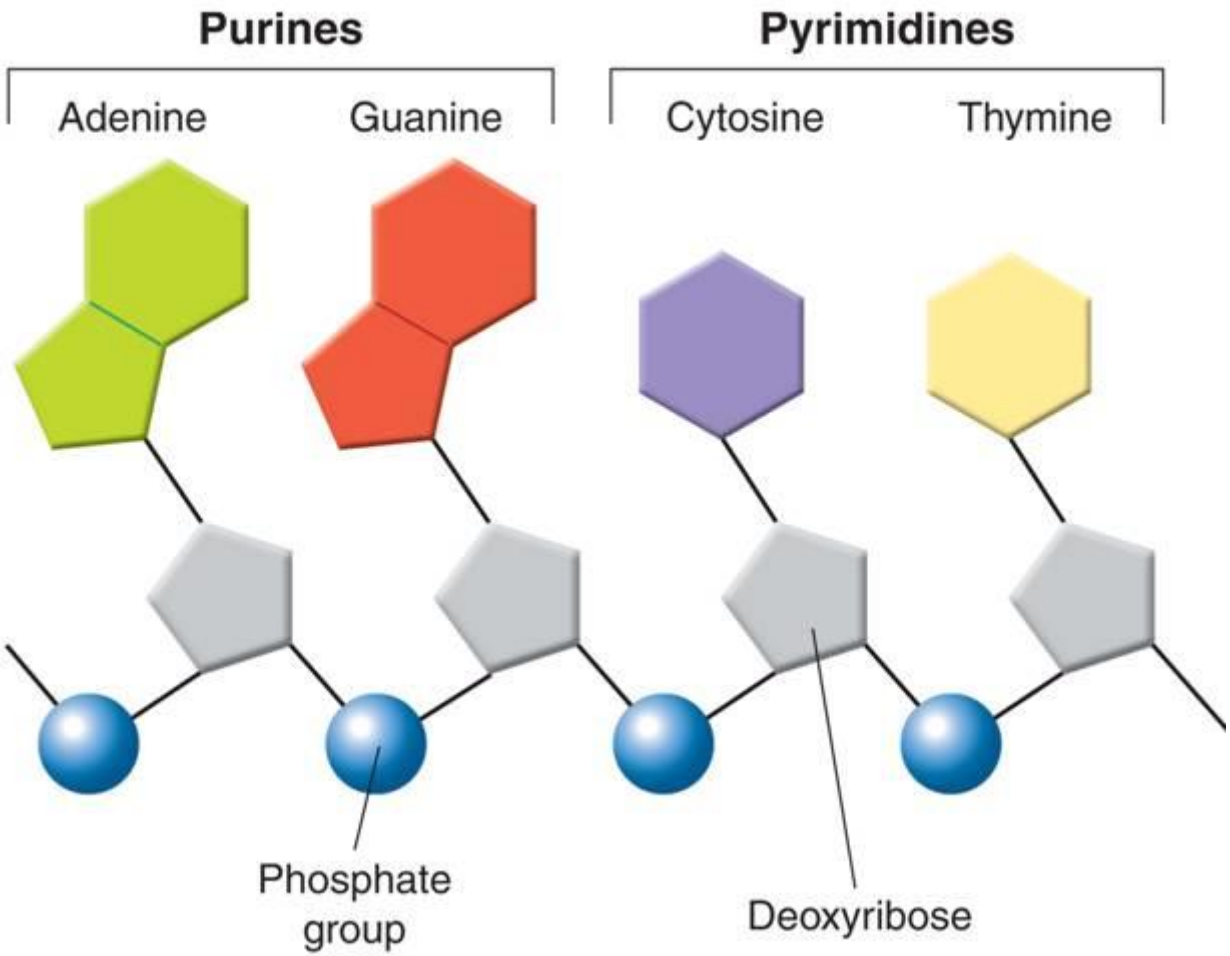
} **DNA Backbone**

3) a nitrogenous base.

The Components and Structure of DNA

Four nitrogeno bases of DNA:

- adenine
- guanine
- cytosine
- thymine



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Chargaff's Rules

Discovered that:

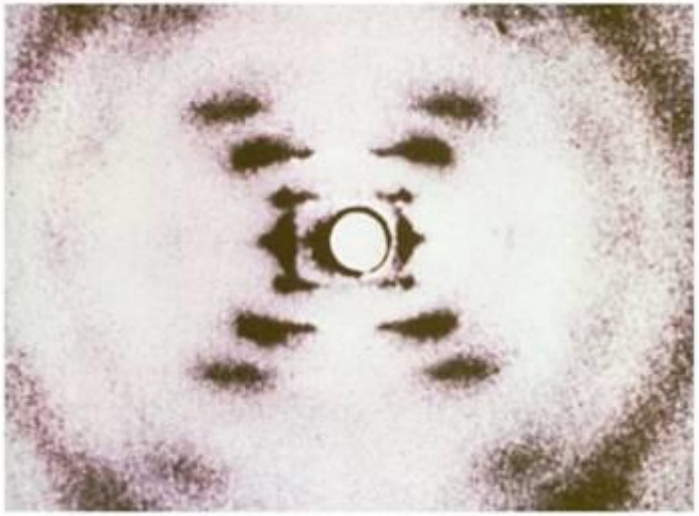
Adenine bonds with Thymine or vice versa

Guanine bonds with Cytosine or vice versa

A-T or T-A

C-G or G-C

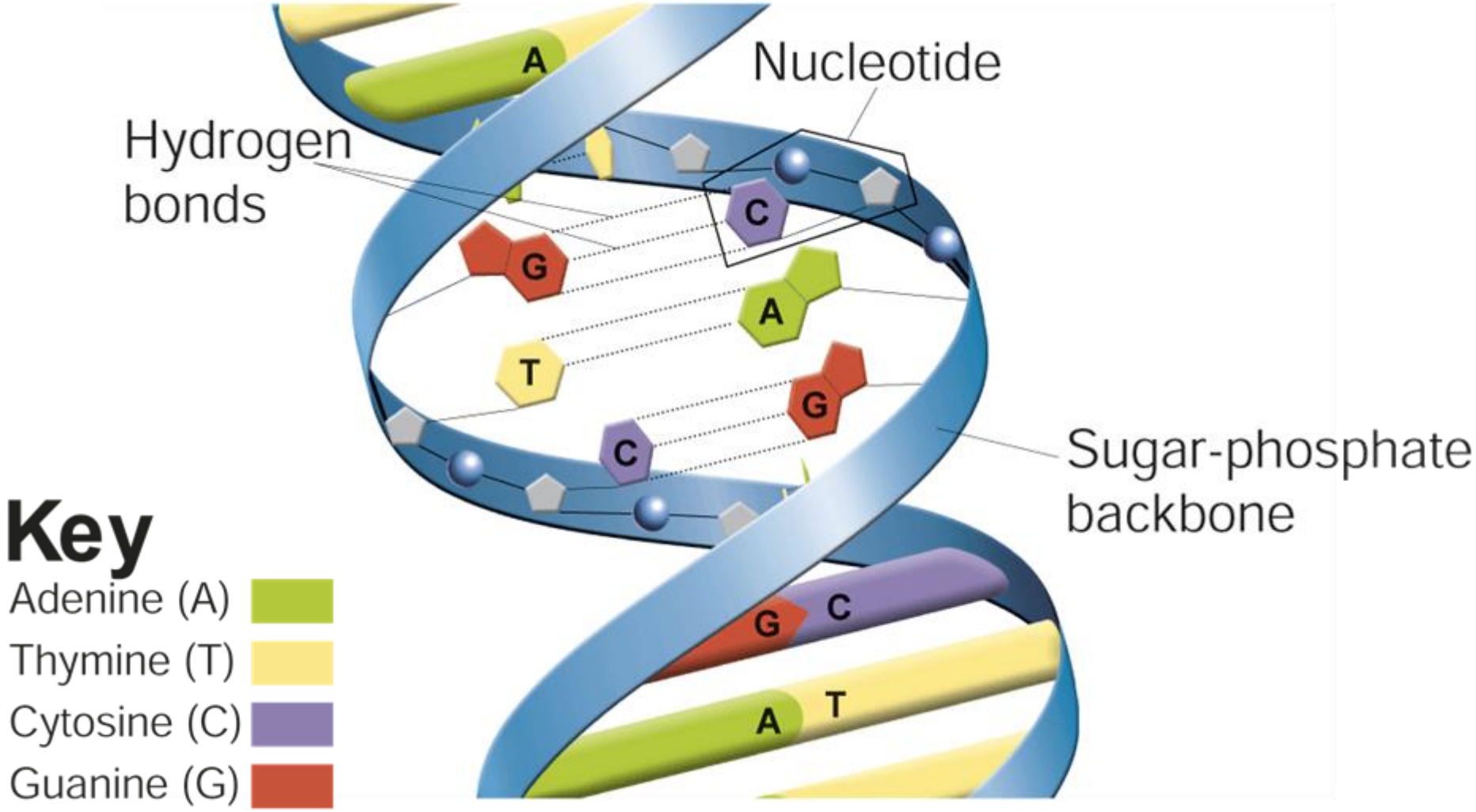
Rosalind Franklin used X-ray diffraction to learn about the structure of DNA.



The Double Helix

Watson and Crick's model of DNA was a double helix, in which two strands were wound around each other.

DNA Double Helix



The Components and Structure of DNA

Watson and Crick discovered the principle of **base pairing**.

Hydrogen bonds form between nitrogenous bases.

Base pairing explained Chargaff's rules.