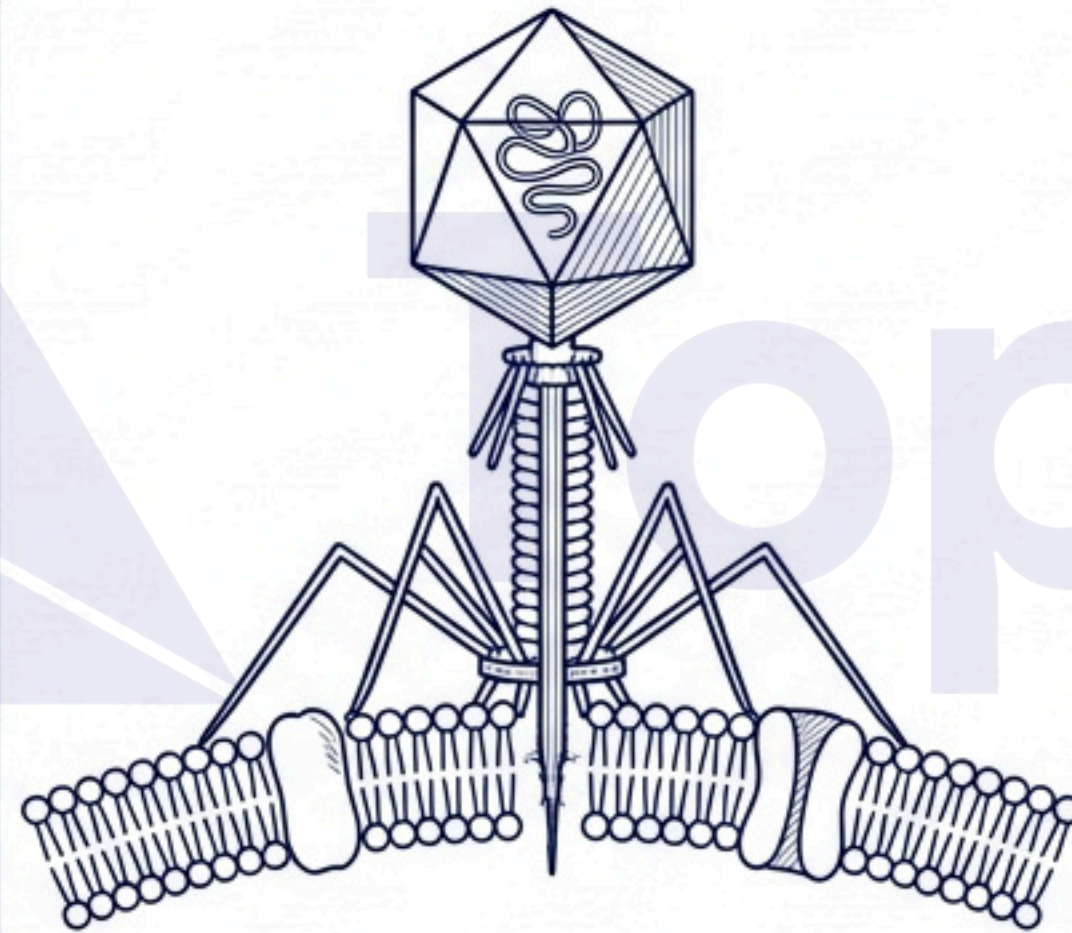


The Hershey-Chase Experiment

The Unequivocal Proof that DNA is the Genetic Material

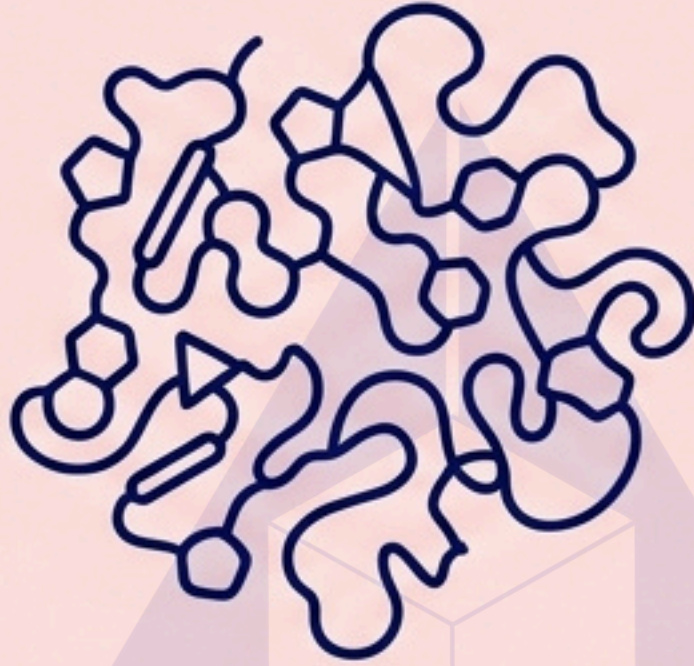


Researchers: Alfred Hershey & Martha Chase

Year: 1952

Subjects: Bacteriophage & E. coli

The 1952 Molecular Mystery



The Suspect: Proteins

For decades, scientists believed proteins were the **genetic material** because their complex structure (20 different amino acids) seemed necessary to carry complex genetic codes.

VS.

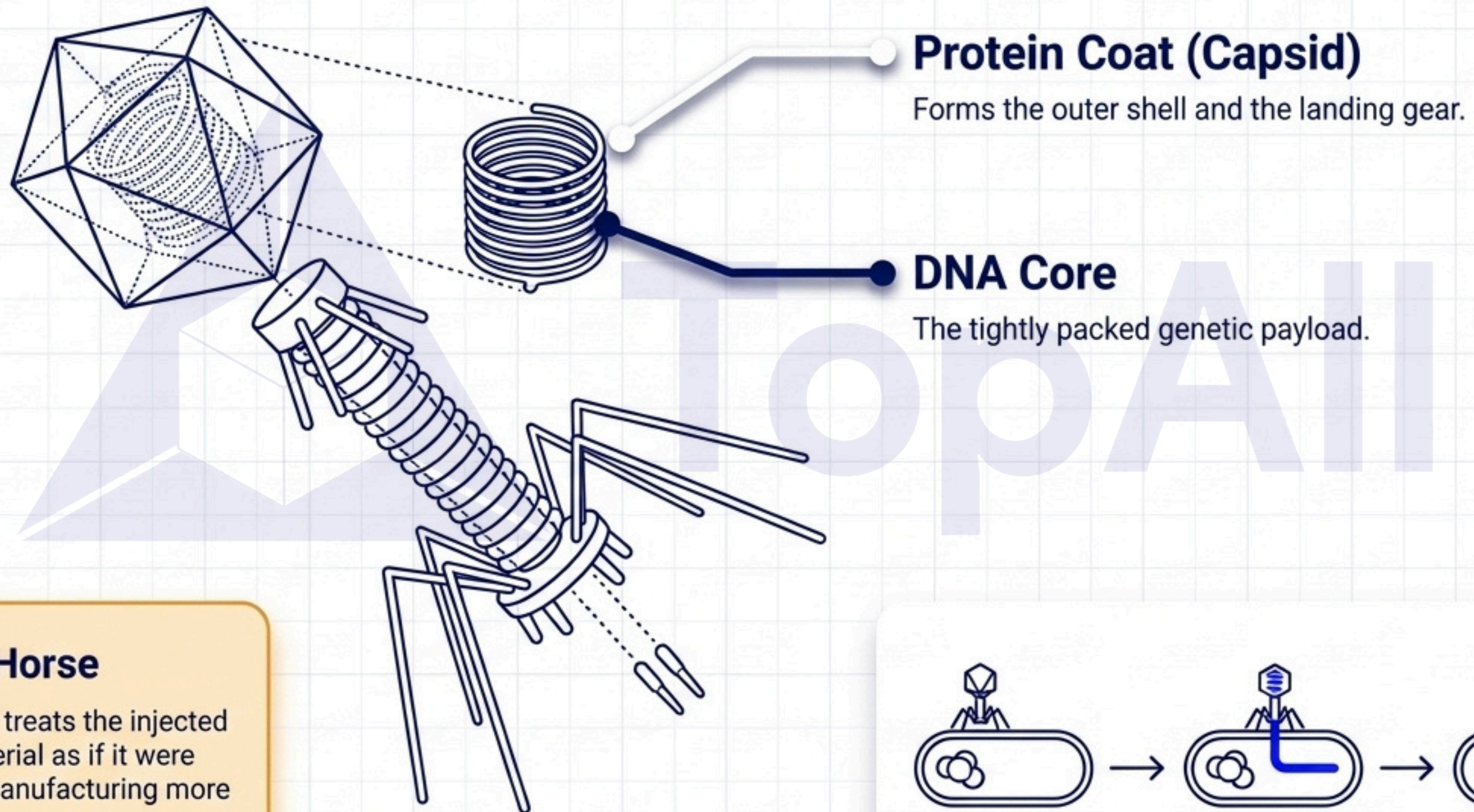


The Underdog: DNA

DNA was thought to be **too simple** and **uniform** (only 4 distinct bases) to possibly hold the blueprint for life.

When a virus infects a host, which of these two molecules does it inject to hijack the cell?

Anatomy of the Invader: The Bacteriophage



The Trojan Horse

The bacterial cell treats the injected viral genetic material as if it were its own, blindly manufacturing more virus particles.



The Ingenious Strategy: Radioactive Tagging

Hershey and Chase needed a way to track the Protein and the DNA separately. They used radioactive isotopes as chemical tags based on unique elemental differences.



Isotope Targeting Matrix		
	DNA	Protein
Phosphorus (P)	 DNA contains Phosphorus.	 Protein does NOT.
Sulfur (S)	 DNA does NOT.	 Protein contains Sulfur.

Batch 1: Viruses grown in radioactive ^{32}P will only have radioactive DNA.

Batch 2: Viruses grown in radioactive ^{35}S will only have radioactive Protein.



You've Learned the Theory. Let's Test Them Now.

$$E=mc^2$$



Turn theory into marks with **unlimited MCQs, smart analysis, and focused revision.**

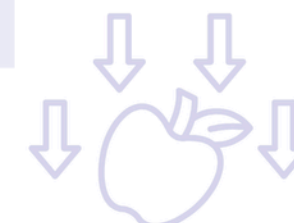
Practice Now



At prep.topall.app

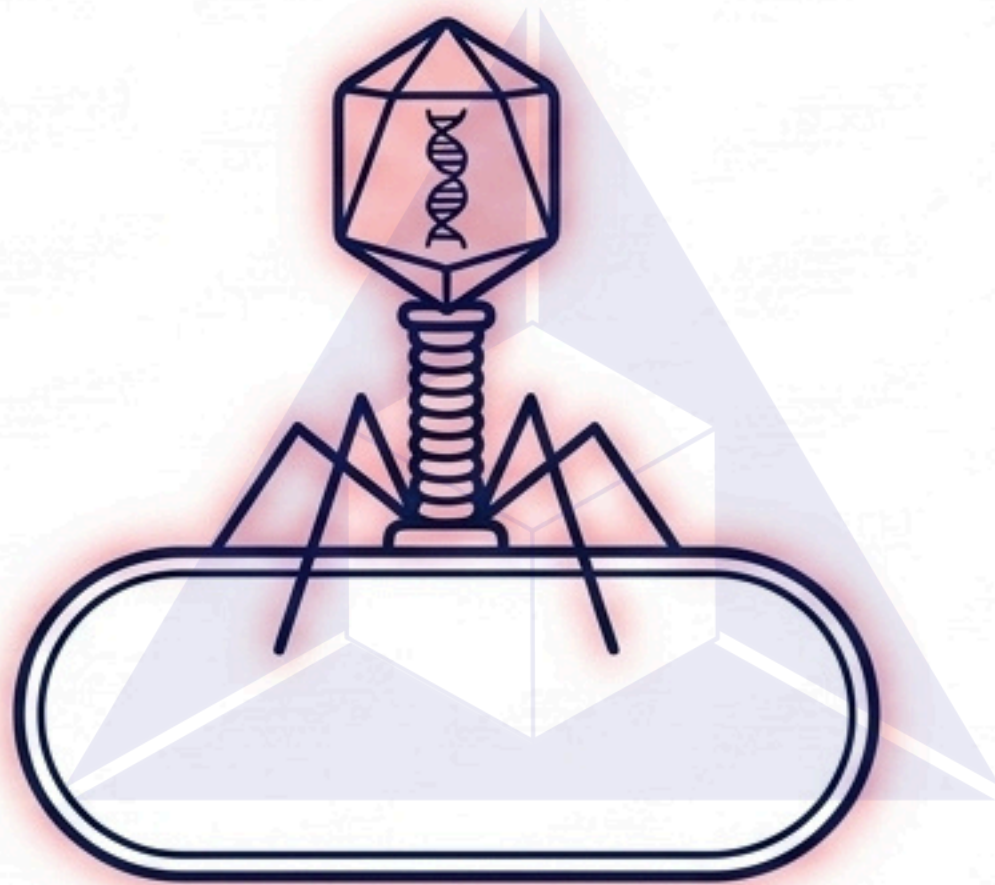
Key Highlights

- » Free Study Material, Videos & Infographics
- » Push Your Limits with Level-Based Challenges
- » Climb the Leaderboard Among Fellow Aspirants
- » Practice Unlimited MCQs for NEET & JEE
- » Get Clear Explanations, Not Just Marks
- » Track Your Performance Smarter



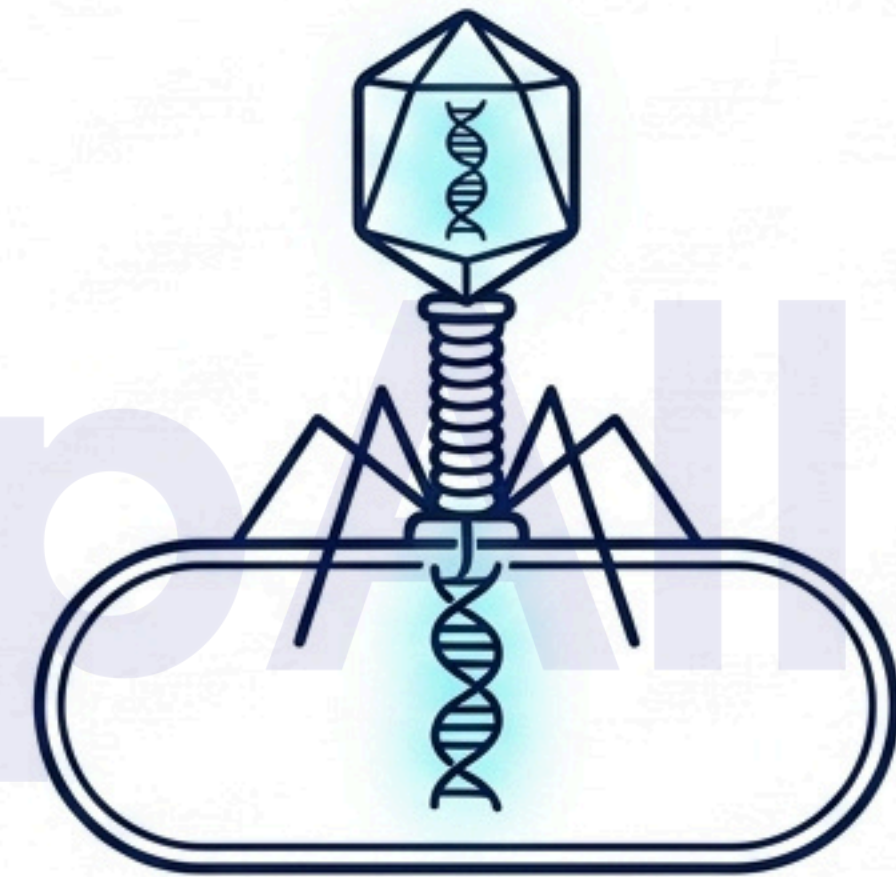
Step 1: Infection

^{35}S -labeled Protein



Radioactive phages attach to *E. coli*.

^{32}P -labeled DNA



Radioactive phages attach to *E. coli*.

The phages inject their genetic material into the bacteria, but the physical coats remain attached to the outside.

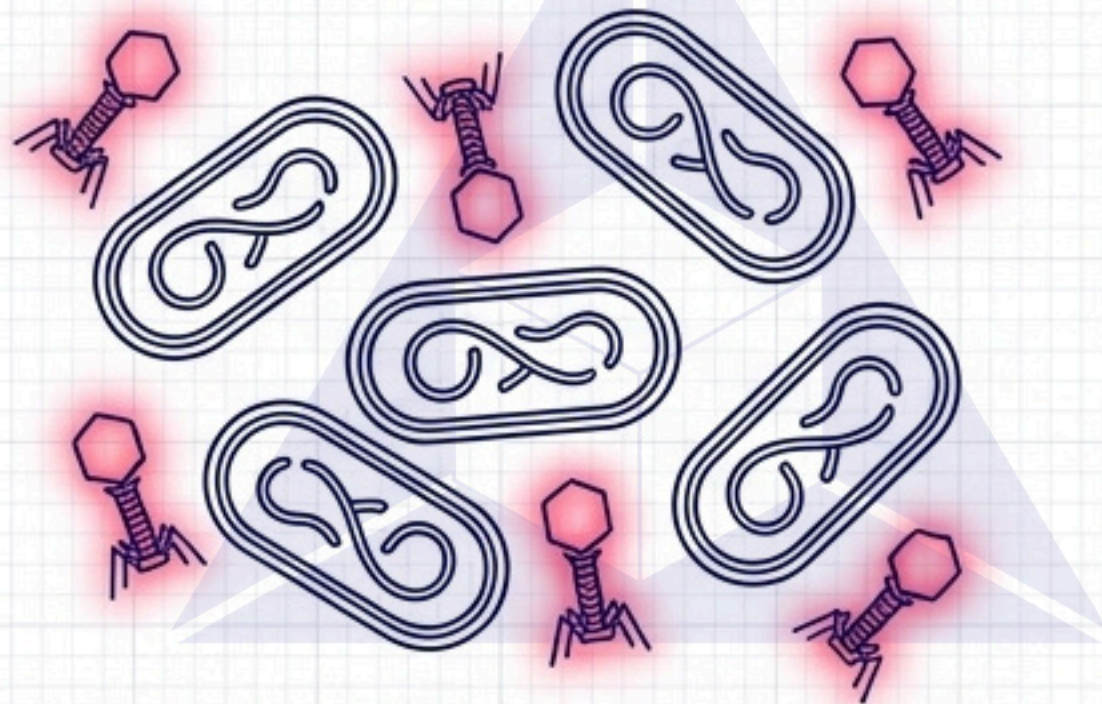
Step 2: Blending

Why a blender?

Agitating the solution in a standard kitchen blender creates enough shear force to rip the empty viral coats off the surface of the bacteria without breaking the bacterial cells open.

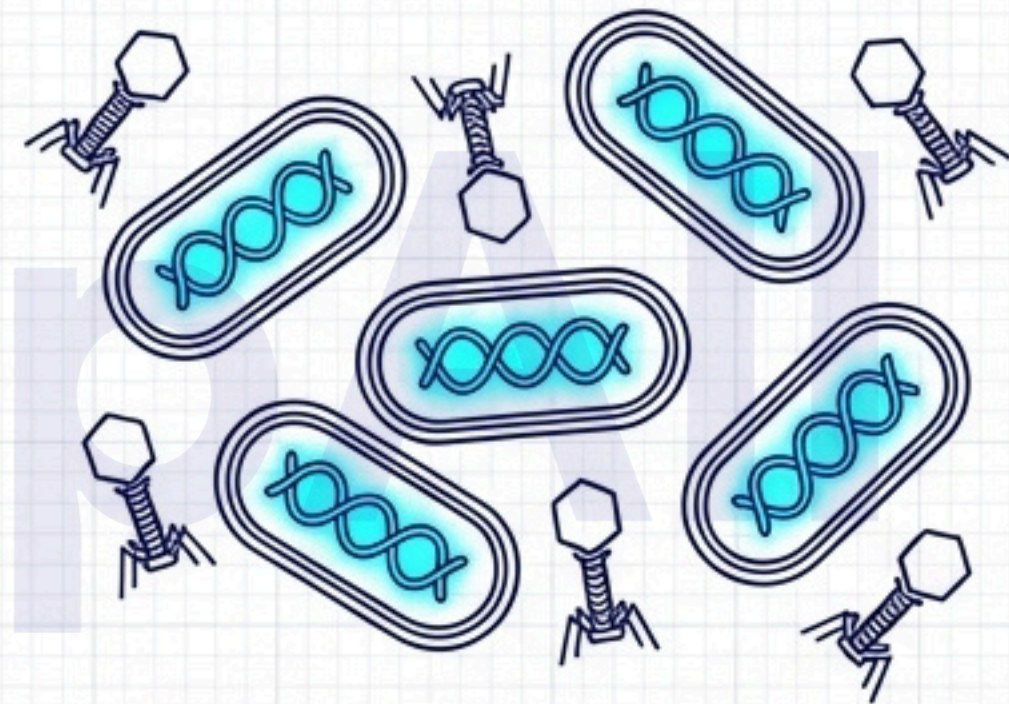


^{35}S -labeled Protein



Radioactive phage coats are detached and floating.

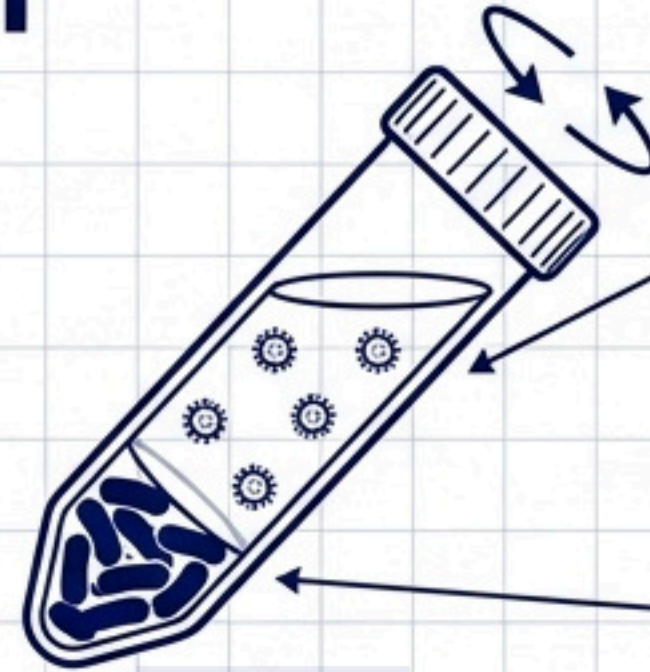
^{32}P -labeled DNA



Radioactive DNA remains inside the E. coli.

The viral coats are successfully removed from the bacteria. We now have a mixture of heavy bacterial cells and light viral shells.

Step 3: Centrifugation



Top Layer (Supernatant):
Lighter viral particles stay suspended in the liquid.

Bottom Layer (Pellet):
Heavier E. coli bacterial cells are forced to the bottom.

^{35}S Protein



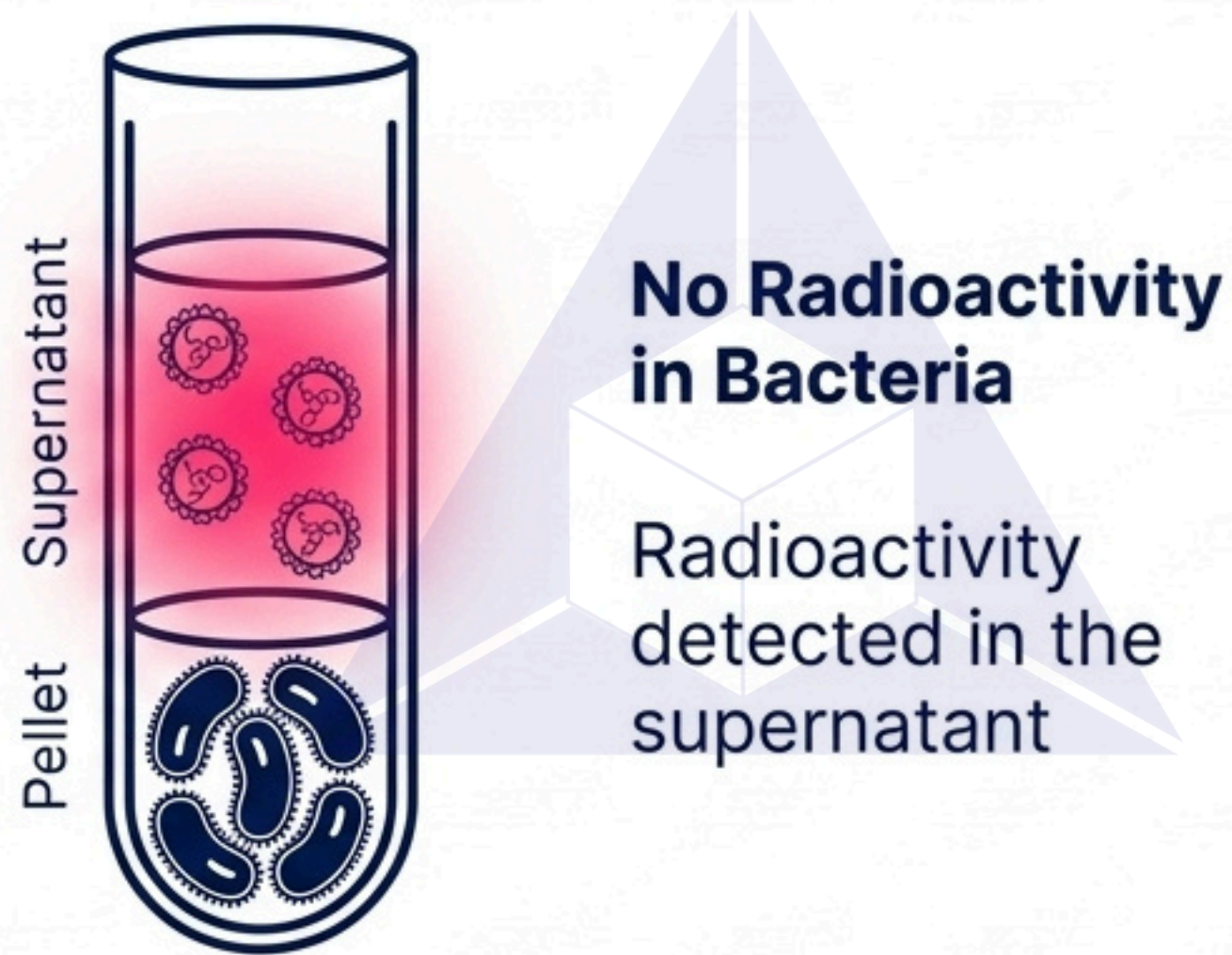
^{32}P DNA



By separating the mixture, Hershey and Chase could measure exactly where the radioactivity ended up.

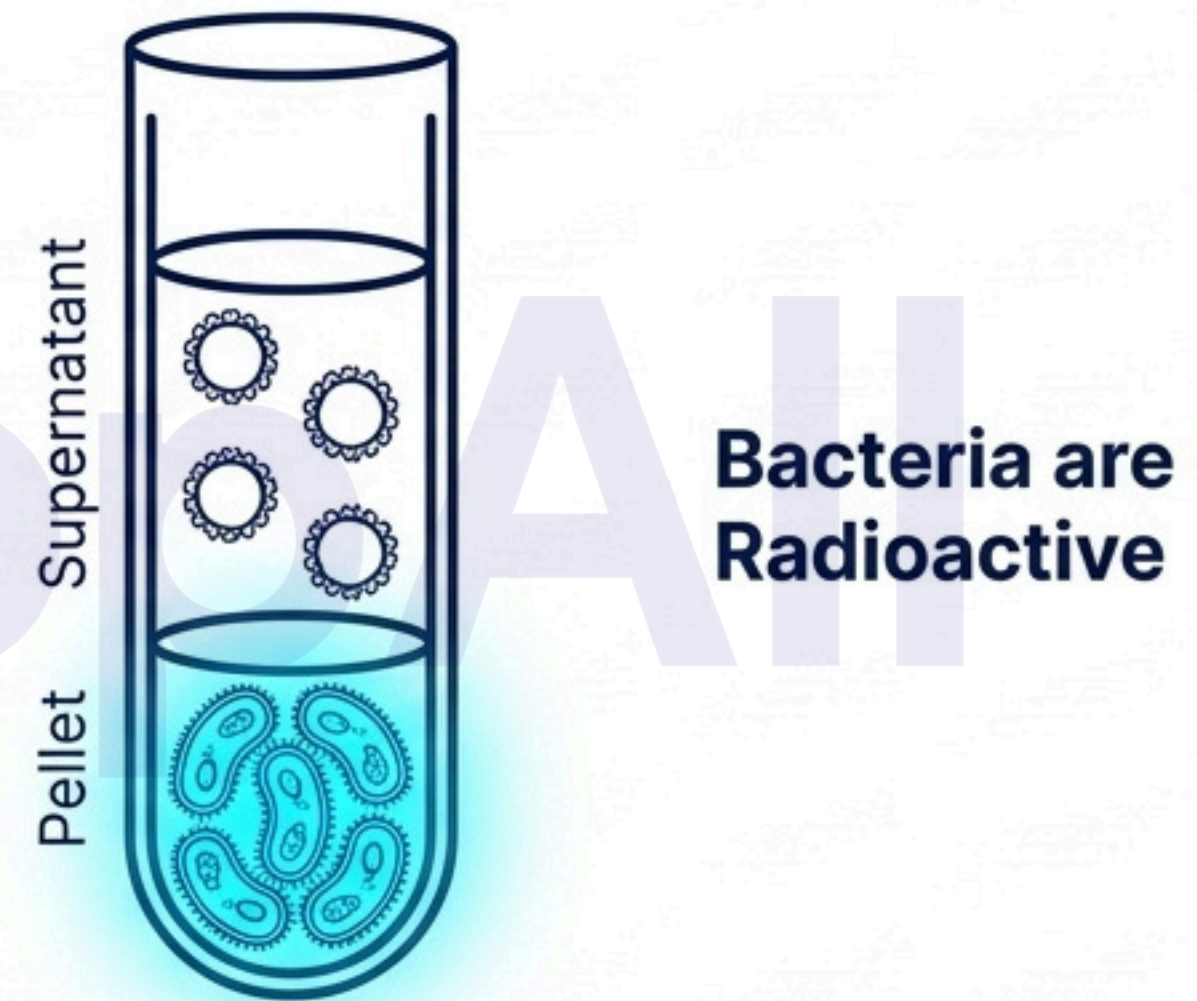
The Revealing Results

^{35}S Protein Track



Conclusion: Proteins did NOT enter the bacteria. They stayed outside.

^{32}P DNA Track



Conclusion: DNA passed from the virus into the bacteria.

The Unequivocal Proof



DNA is the Genetic Material.

The **Hershey-Chase** experiment unequivocally resolved the debate. Because only the radioactive DNA entered the bacterial cells to produce new viruses, it was proven that DNA—not protein—is the **hereditary blueprint of life**.

1869: Nuclein
Discovered

1928: Griffith's
Transforming Principle

1952: **Hershey-Chase
Proof**

1953: Watson & Crick
Double Helix



You've Learned the Theory.

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