

Molecular Inheritance – DNA

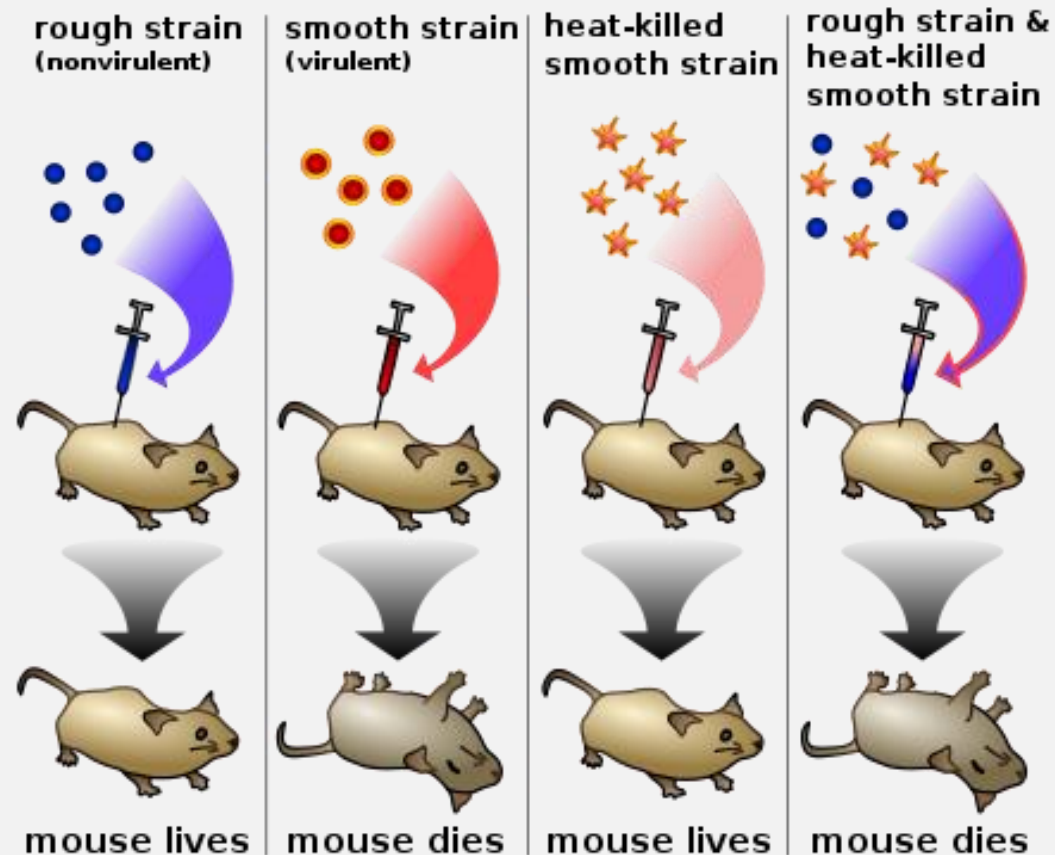
history



<https://www.dnalc.org/view/16375-Animation-17-A-gene-is-made-of-DNA-.html>

Griffith's Experiment

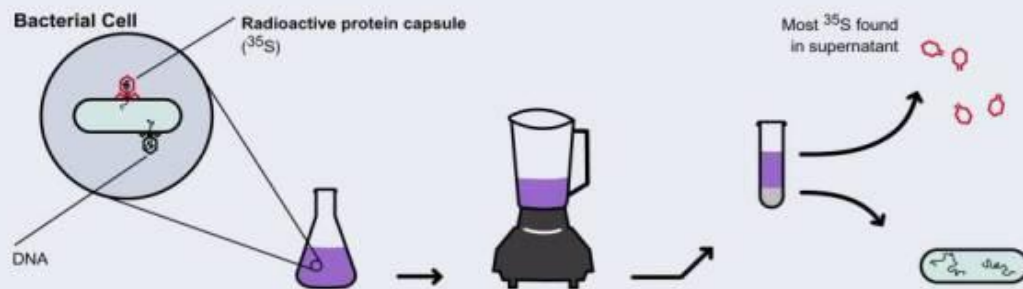
- transformation
- conclusion – genetic material is not made of proteins
- Avery, McCarty & MacLeod proved only DNA could transform



<http://highered.mheducation.com/olc/dl/120076/bio21.swf>

Hershey-Chase Experiment

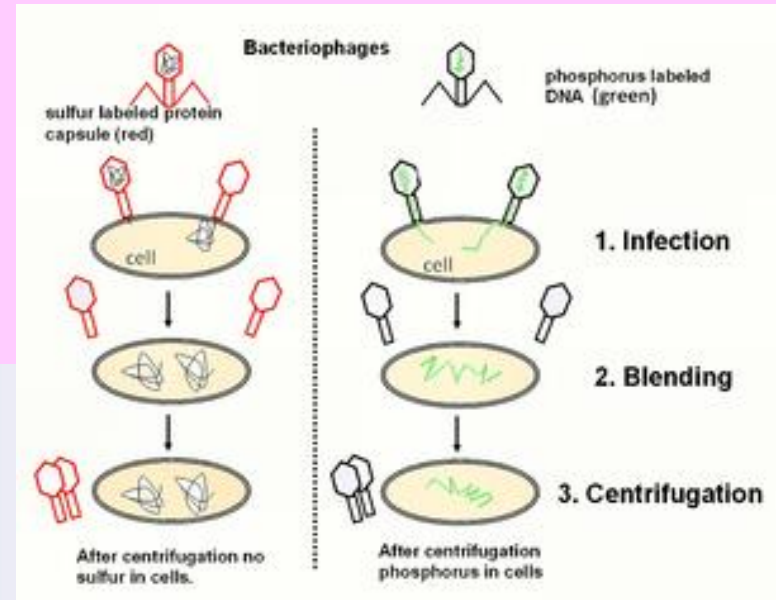
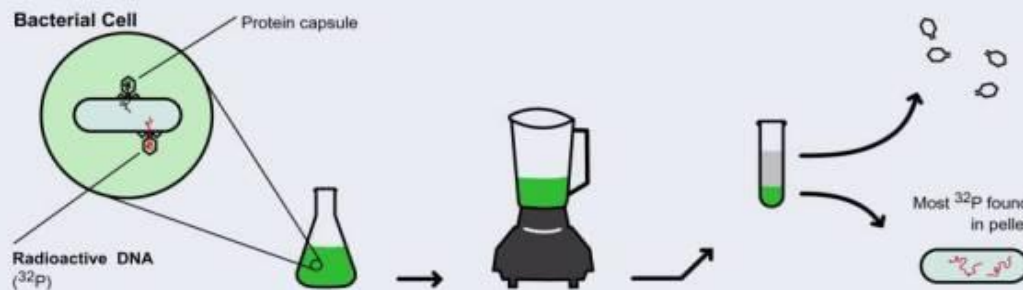
- blender experiment
- conclusion – DNA is being transferred, not proteins



Labeled phages infect bacteria.

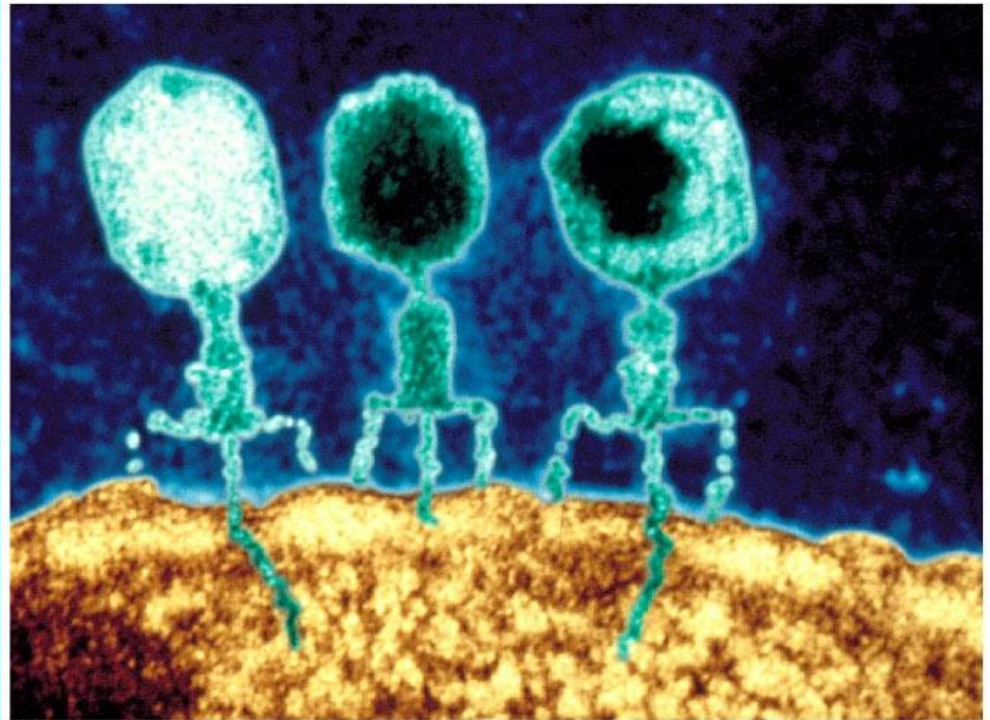
Blender separates phages outside the bacteria from the cells and their contents

Cells and Phages are separated by centrifugation.



- used labeled sulfur & phosphorus bacteriophages to see which one transferred to the cell

- Used viruses to show that the genetic material was DNA not protein. The viruses they used were bacteriophages (viruses that infect bacteria).
- The results showed that the tagged DNA was found in the pellet. DNA therefore must have been the genetic material.



<https://www.dnalc.org/view/15251-Discovering-the-rules-of-complementary-base-pairing-Erwin-Chargaff.html>

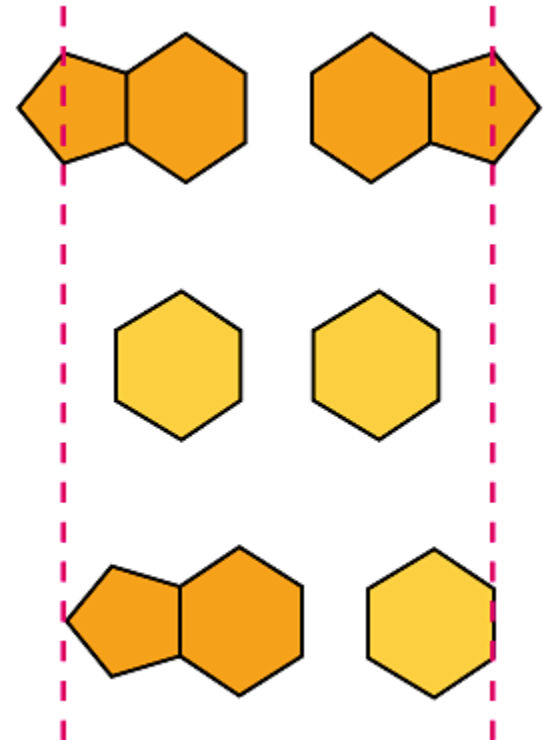
Chargaff

- discovered complimentary base pairs by calculating the nitrogenous bases

Purine + purine: too wide

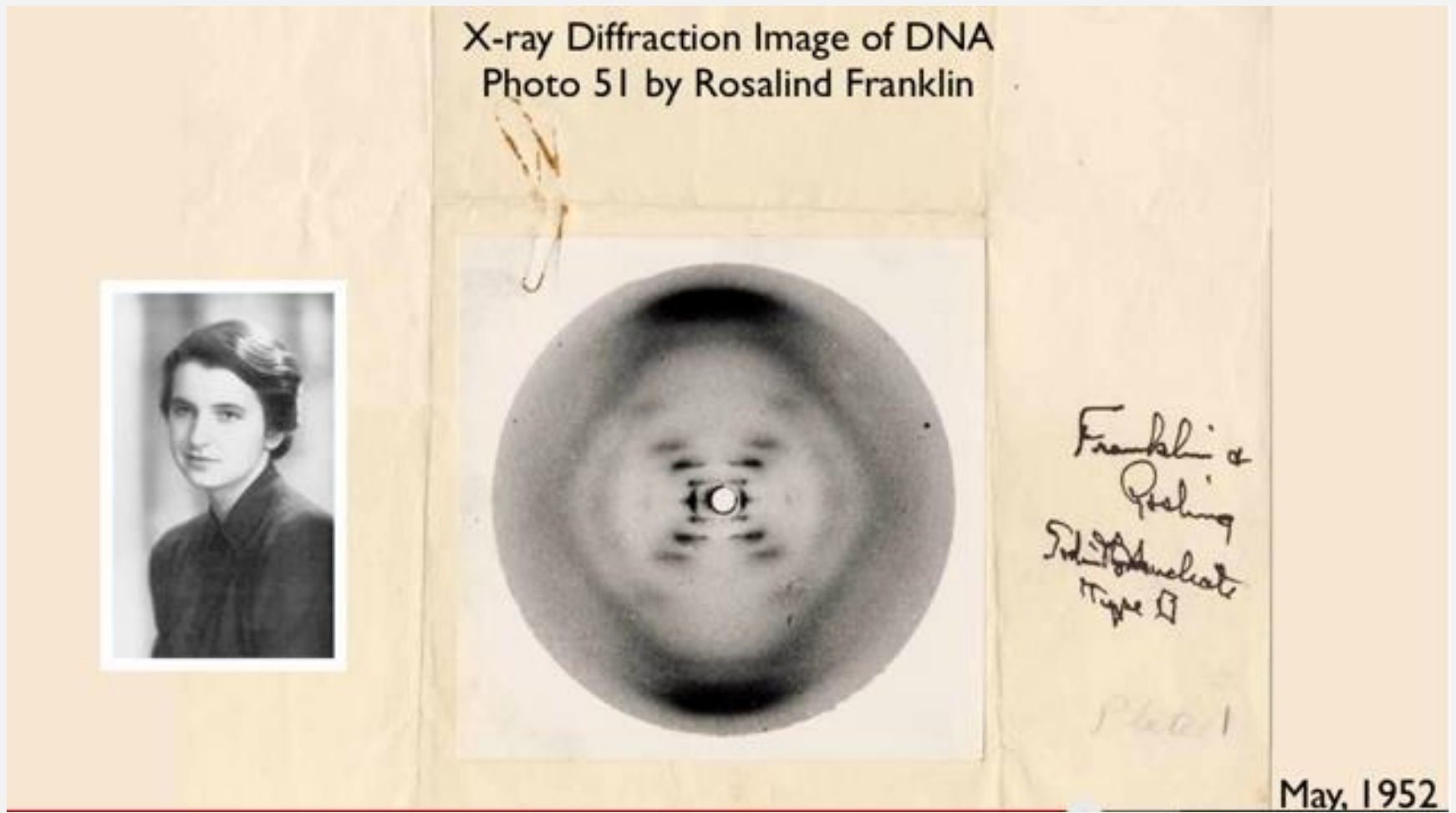
Pyrimidine + pyrimidine: too narrow

Purine + pyrimidine: width consistent with X-ray data



Rosalind Franklin

- worked on x-ray crystallography to determine the shape of DNA



Watson & Crick

- Watson and Crick used her results and some experimental models to solve the puzzle of DNA's structure.
- Watson and Crick published the model of DNA in *Nature* in 1953.



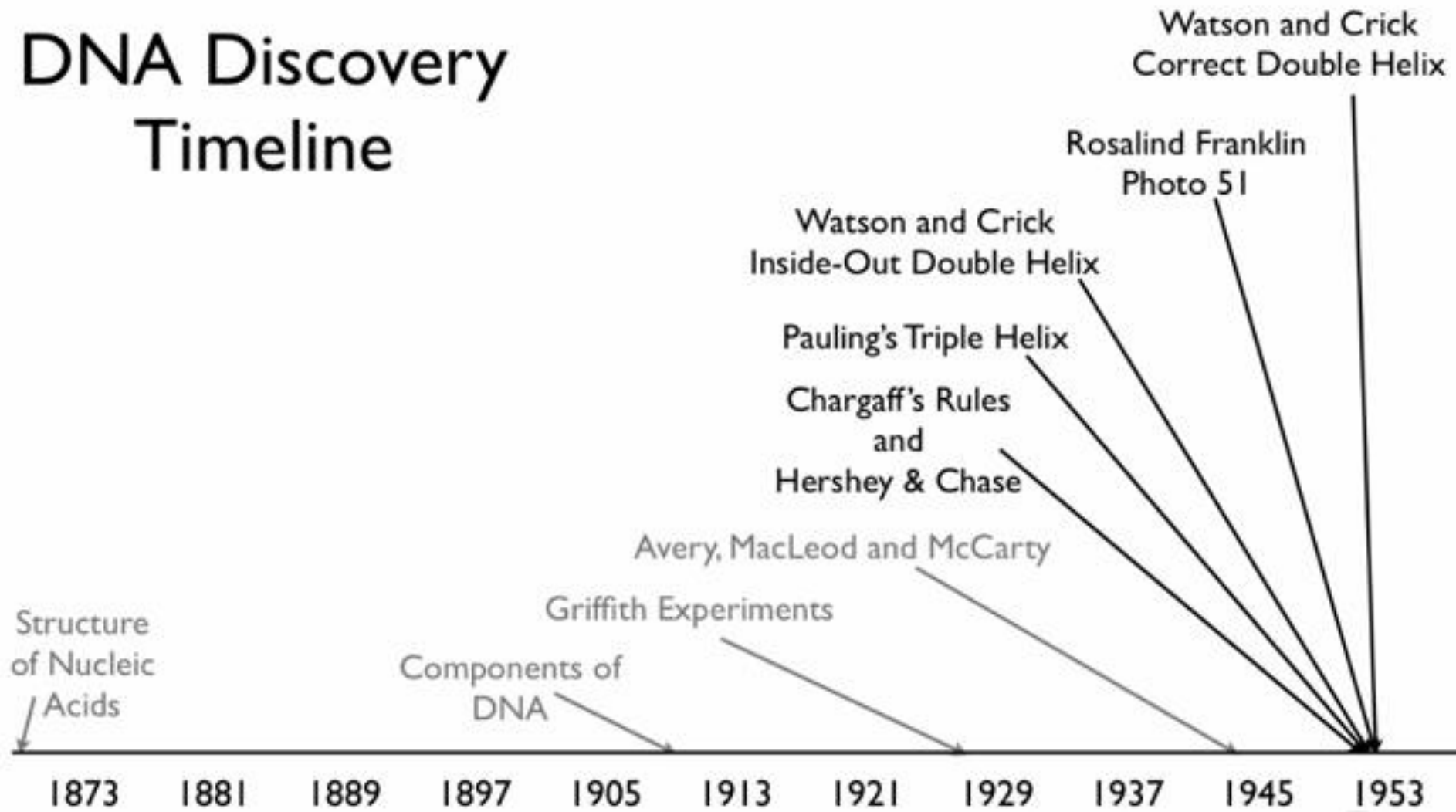
<https://www.dnalc.org/view/15452-Discovering-the-double-helix-structure-James-Watson-.html>

Stolen?

"There's a myth which is, you know, that Francis and I basically stole the structure from the people at King's. I was shown Rosalind Franklin's x-ray photograph and, whooo! that was a helix, and a month later we had the structure, and Wilkins should never have shown me the thing. I didn't go into the drawer and steal it, it was shown to me, and I was told the dimensions, a repeat of 34 angstroms, so, you know, I knew roughly what it meant and, uh, but it was that the Franklin photograph was the key event. It was, psychologically, it mobilized us..."

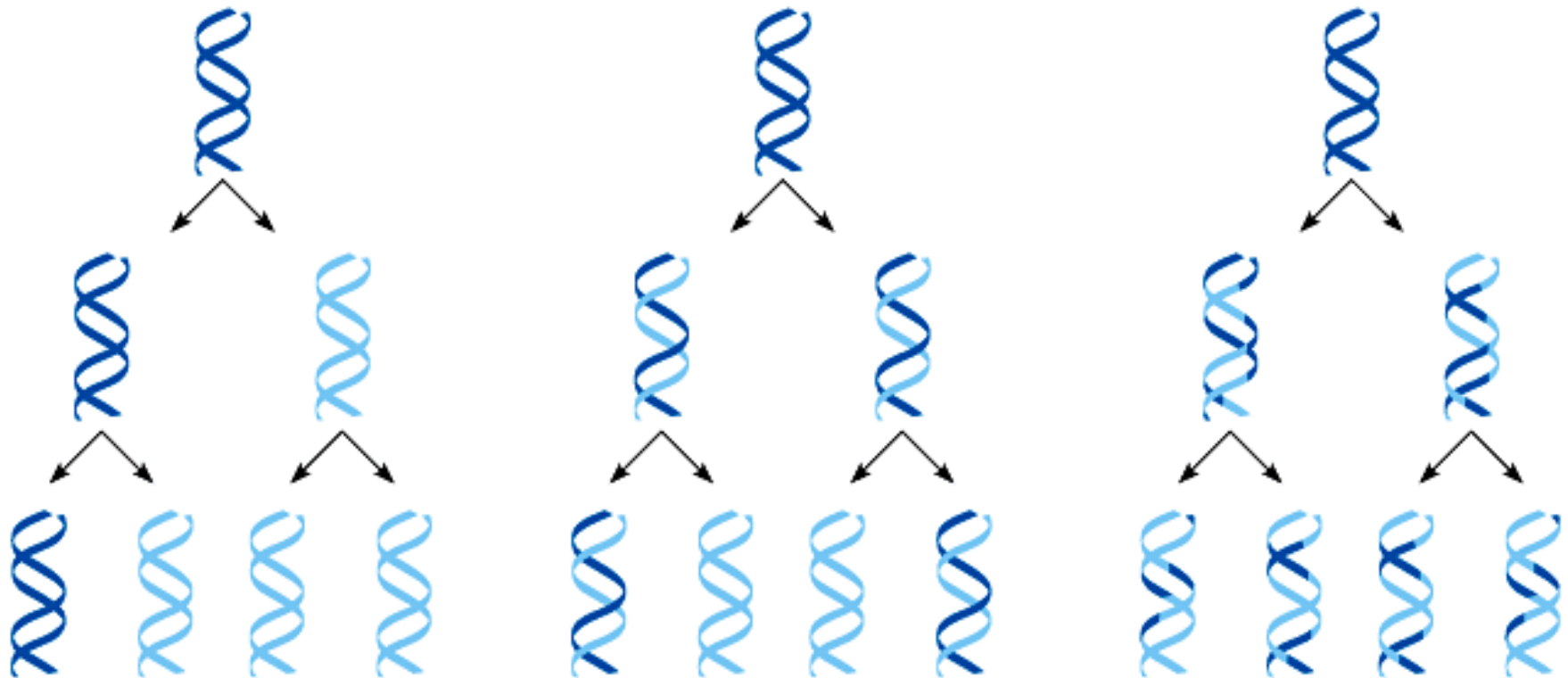
James Watson. James Watson, Center for Genomic Research Inauguration, Harvard. September 30, 1999.

DNA Discovery Timeline



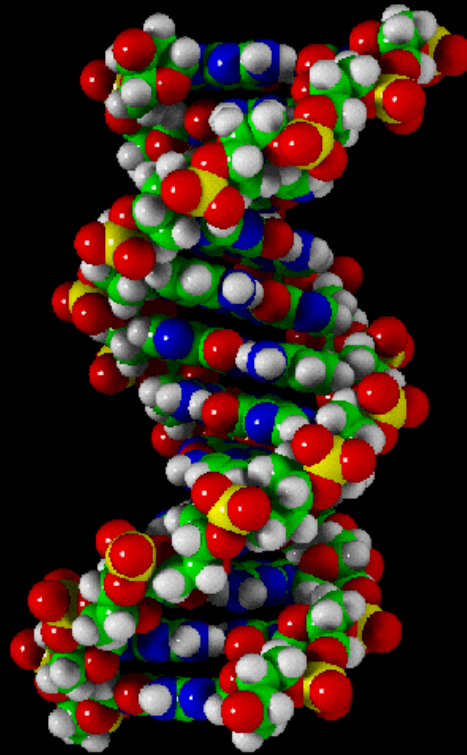
Meselson & Stahl

- designed an experiment to see if DNA was always conserved (intact), semi-conserved (only one side at a time), or if it was dispersed (pieced together) during replication.



- <http://highered.mheducation.com/olc/dl/120076/bio22.swf>

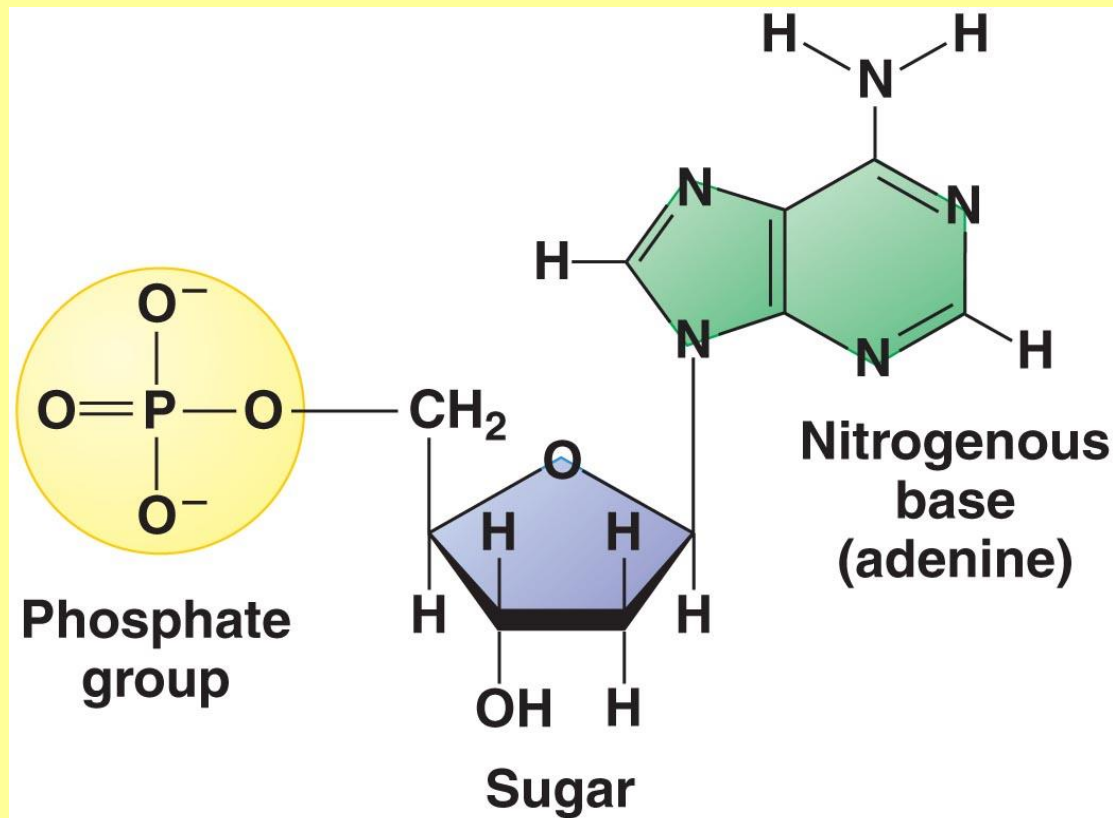
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DNA Structure

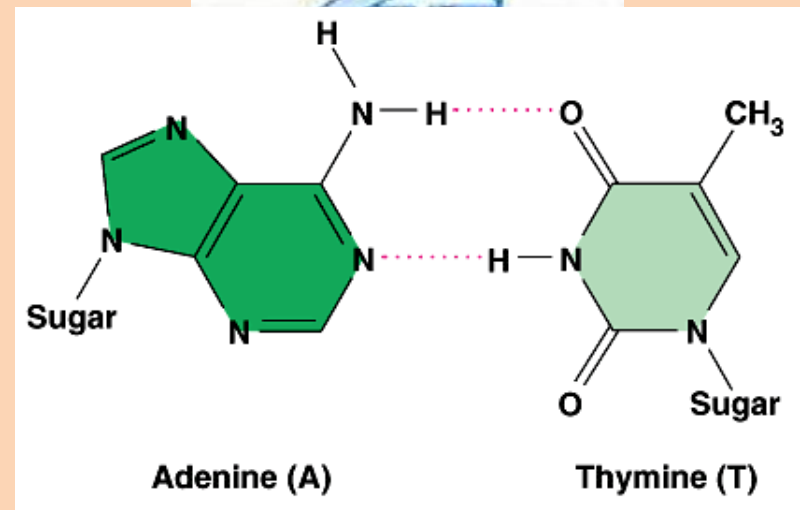
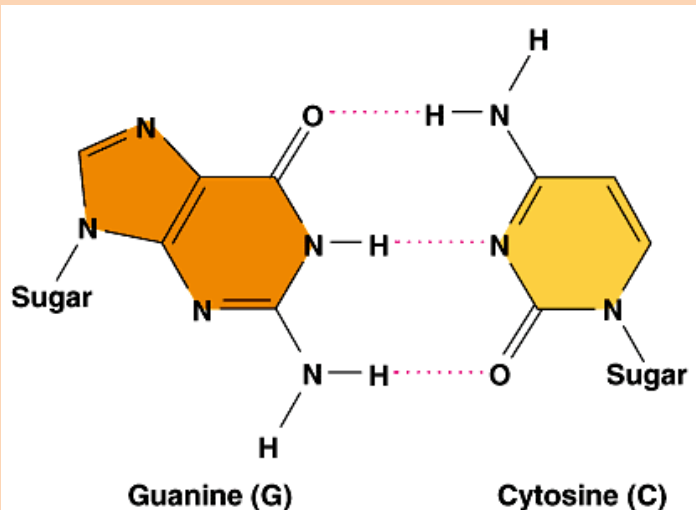
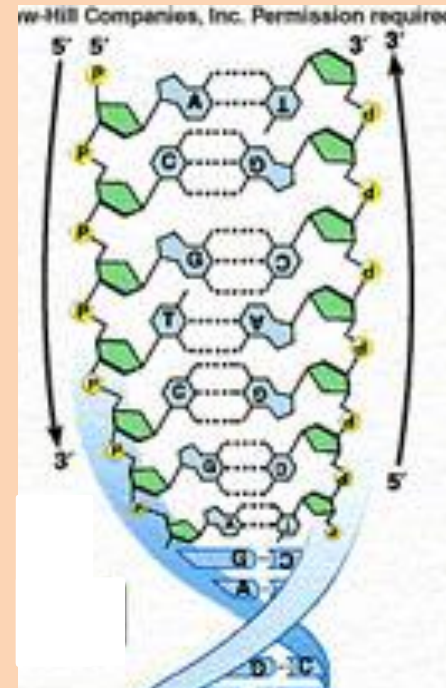
DNA Structure - Nucleotides

- Each nucleotide contains a 5 carbon sugar called deoxyribose, a nitrogenous base, and a phosphate.
- Bonds between phosphates and sugar are called phosphodiester bond.



DNA Structure - Nucleotides

- Two strands run anti-parallel and are joined by hydrogen bonds.
- A double hydrogen bond is between the A and T.
- A triple hydrogen bond is between G and C.



DNA Structure

- Have a 3' end (which carbon is exposed) and a 5' end.
- The 5' end has a phosphate.
- The 3' end has an OH group

