

Pre-AP Biology

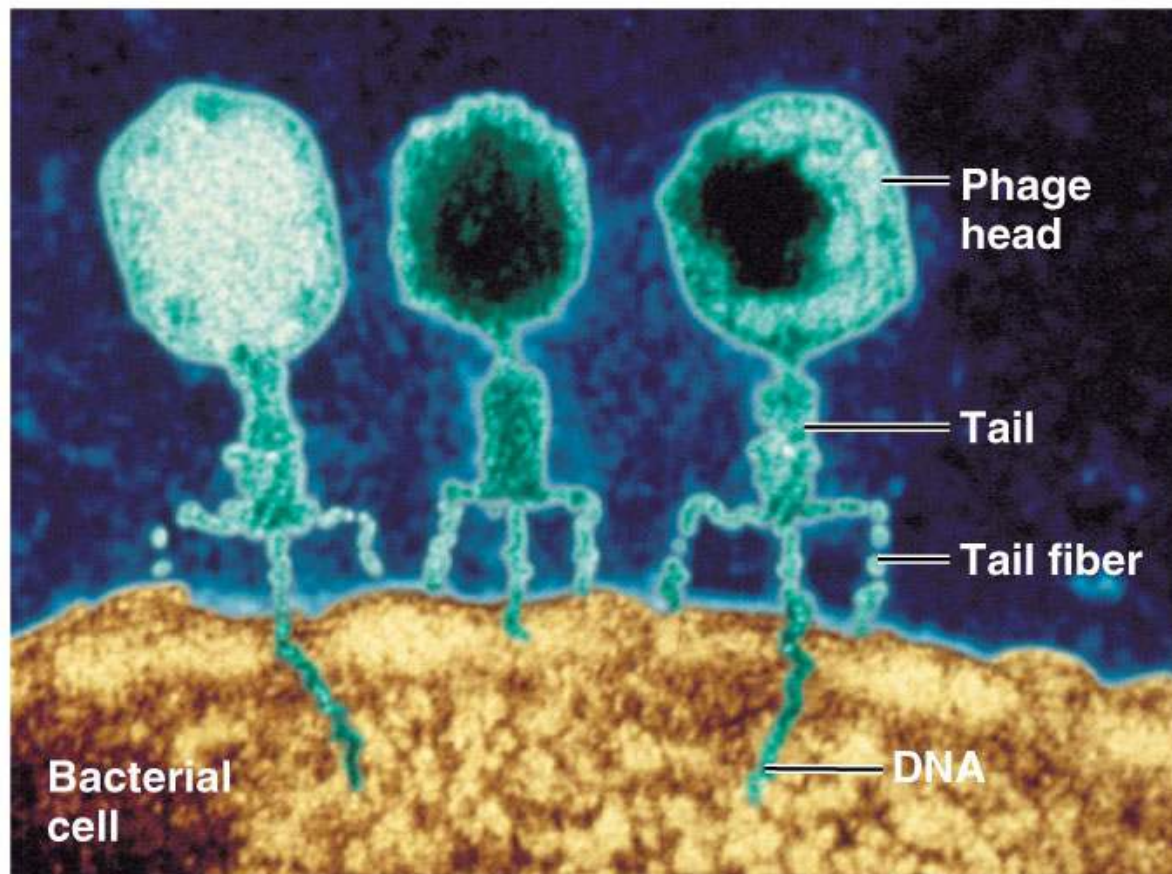
DNA History, Structure, and
Replication (4.1)

Part 1

Alfred Hershey & Martha Chase



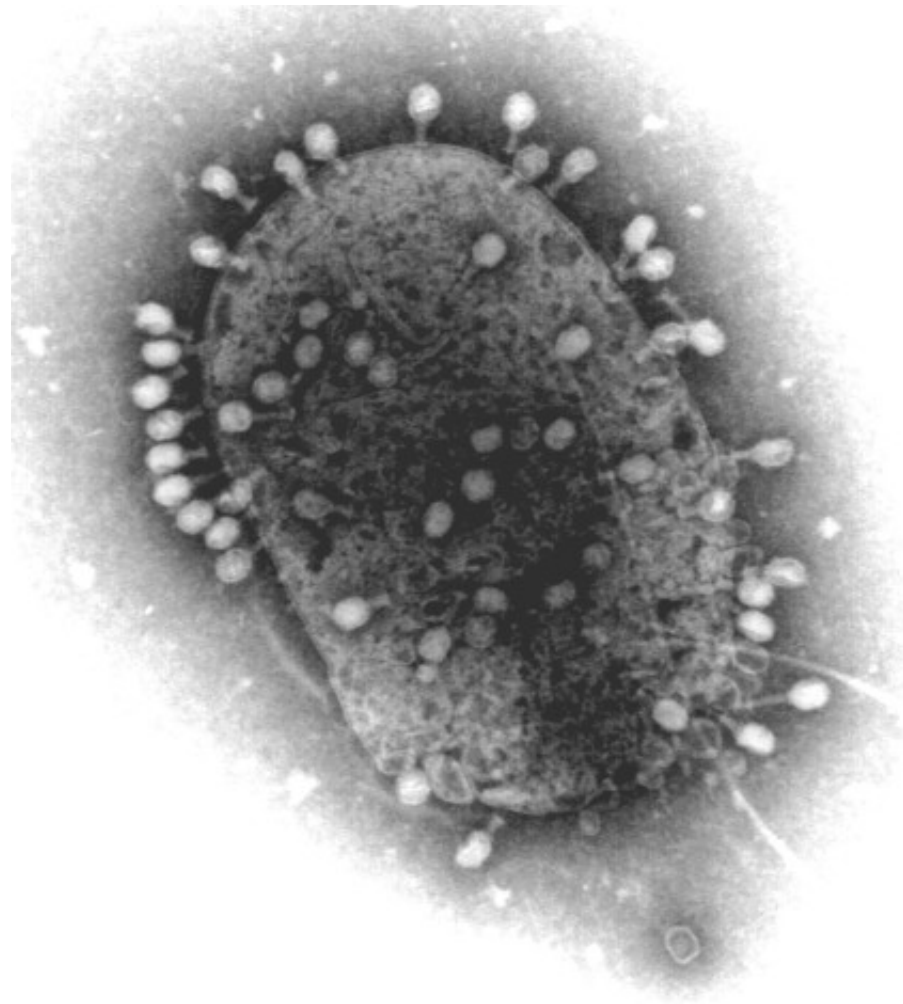
Bacteriophage injecting its DNA into the host cell.



(a) T2 and related phages use their tail pieces to attach to the host cell and inject their genetic material (TEM).

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Electron Microscope View of Bacteriophages on the host cell.

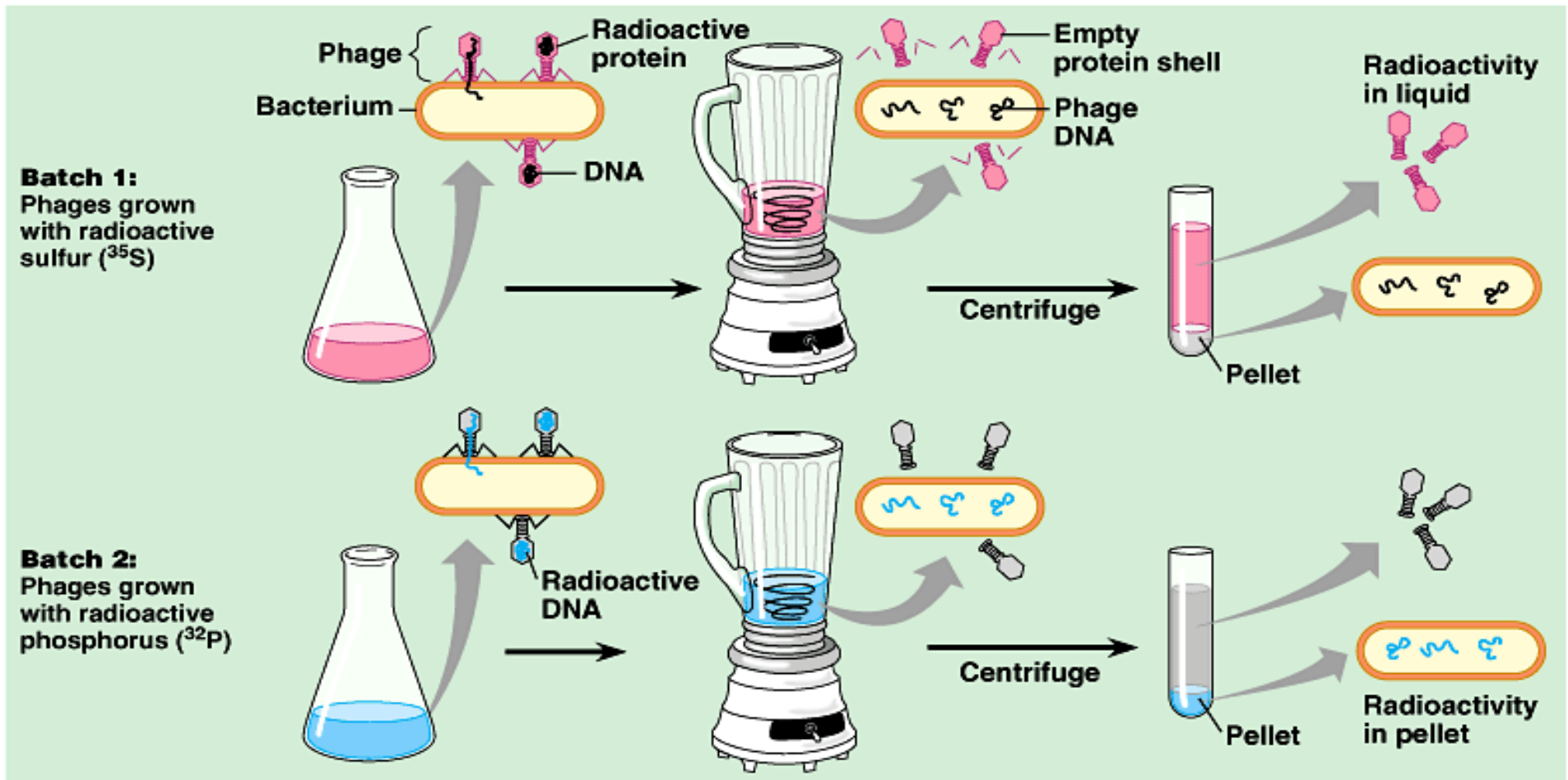


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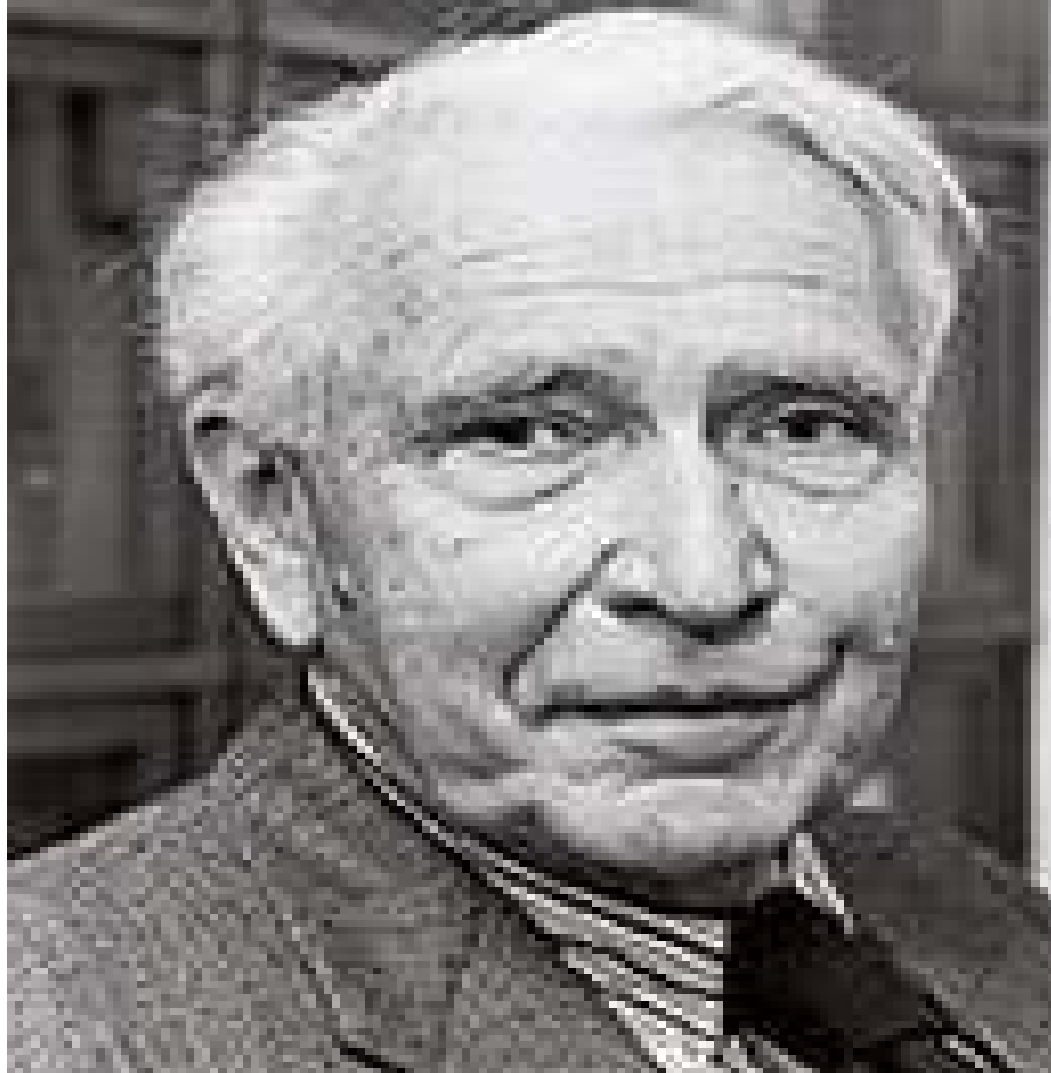
Hershey-Chase experiment

- 1 Mix radioactively labeled phages with bacteria. The phages infect the bacterial cells.
- 2 Agitate in a blender to separate phages outside the bacteria from the cells and their contents.
- 3 Centrifuge the mixture so bacteria form a pellet at the bottom of the test tube.
- 4 Measure the radioactivity in the pellet and the liquid.



(b) The experiment showed that T2 proteins remain outside the host cell during infection, while T2 DNA enters the cell.

Erwin Chargaff



Chargaff's Rule

Adenine = Thymine (DNA) or Uracil (RNA)

&

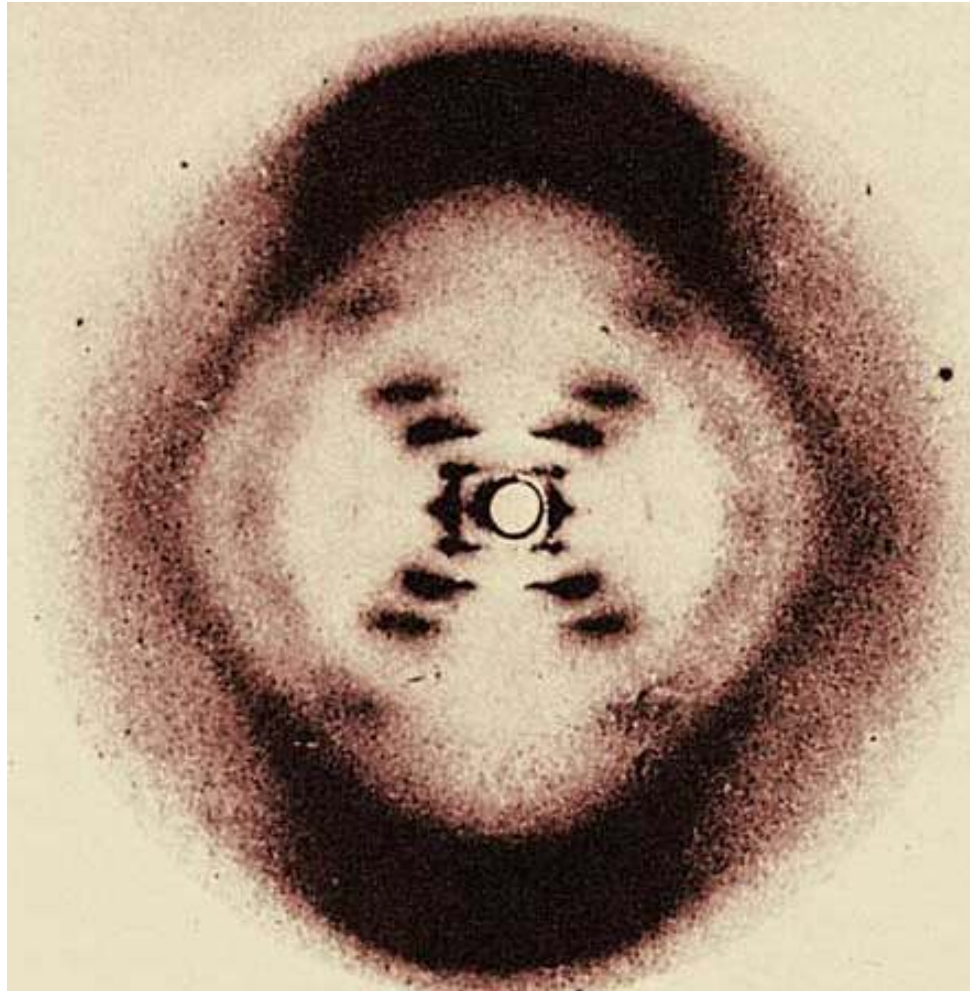
Guanine = Cytosine

If you know the % composition of 1, you can find the % composition of the other 3.

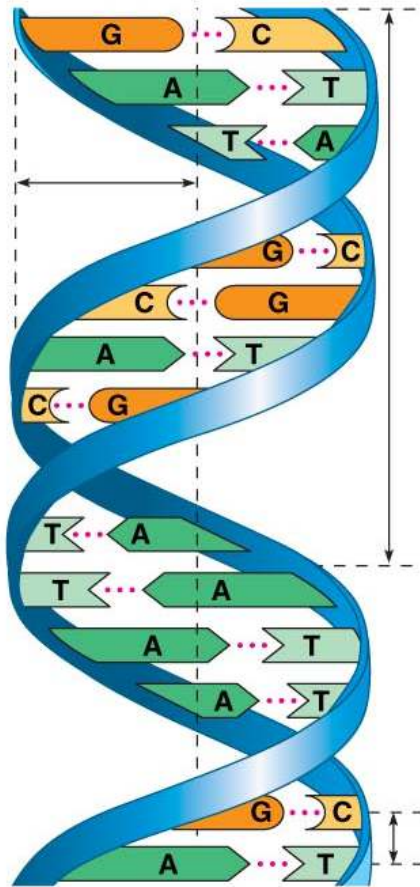
Rosalind Franklin



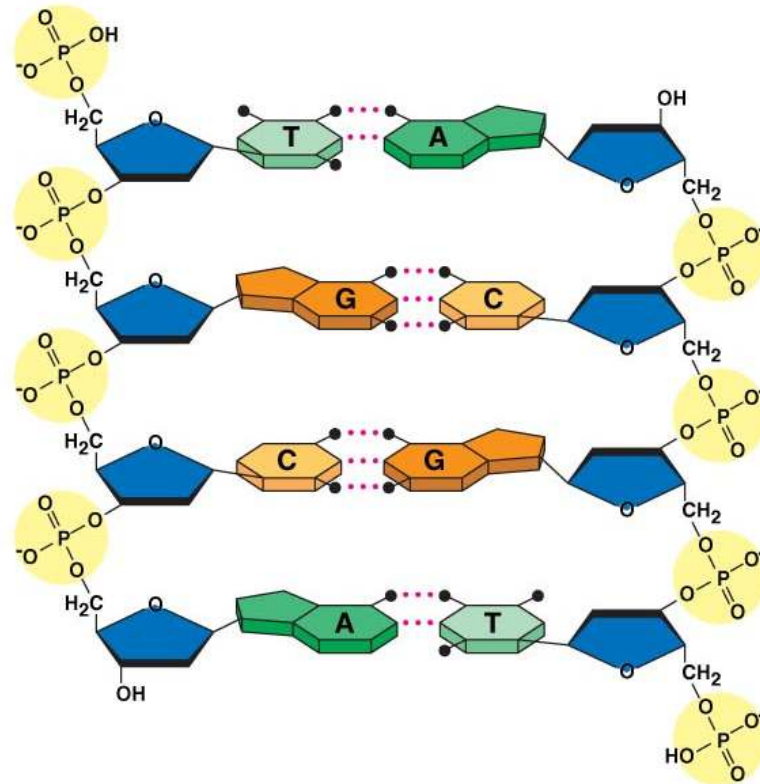
Franklin's X-ray crystallography of DNA molecule.



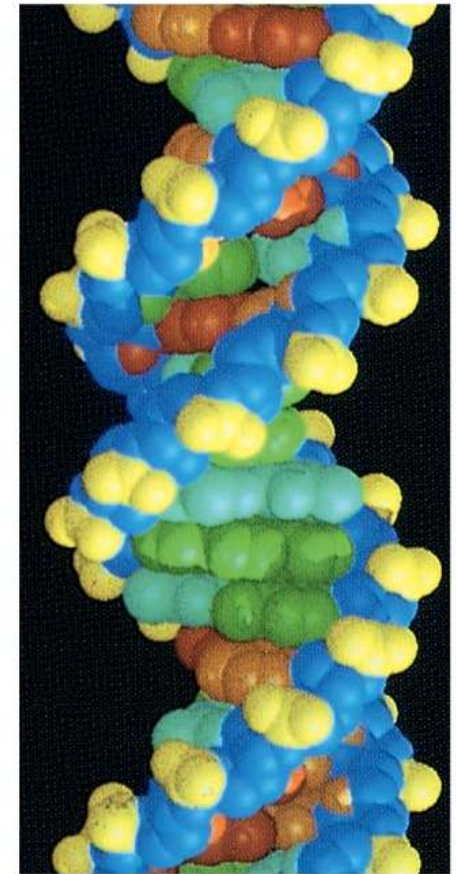
DNA from a side view



(a)

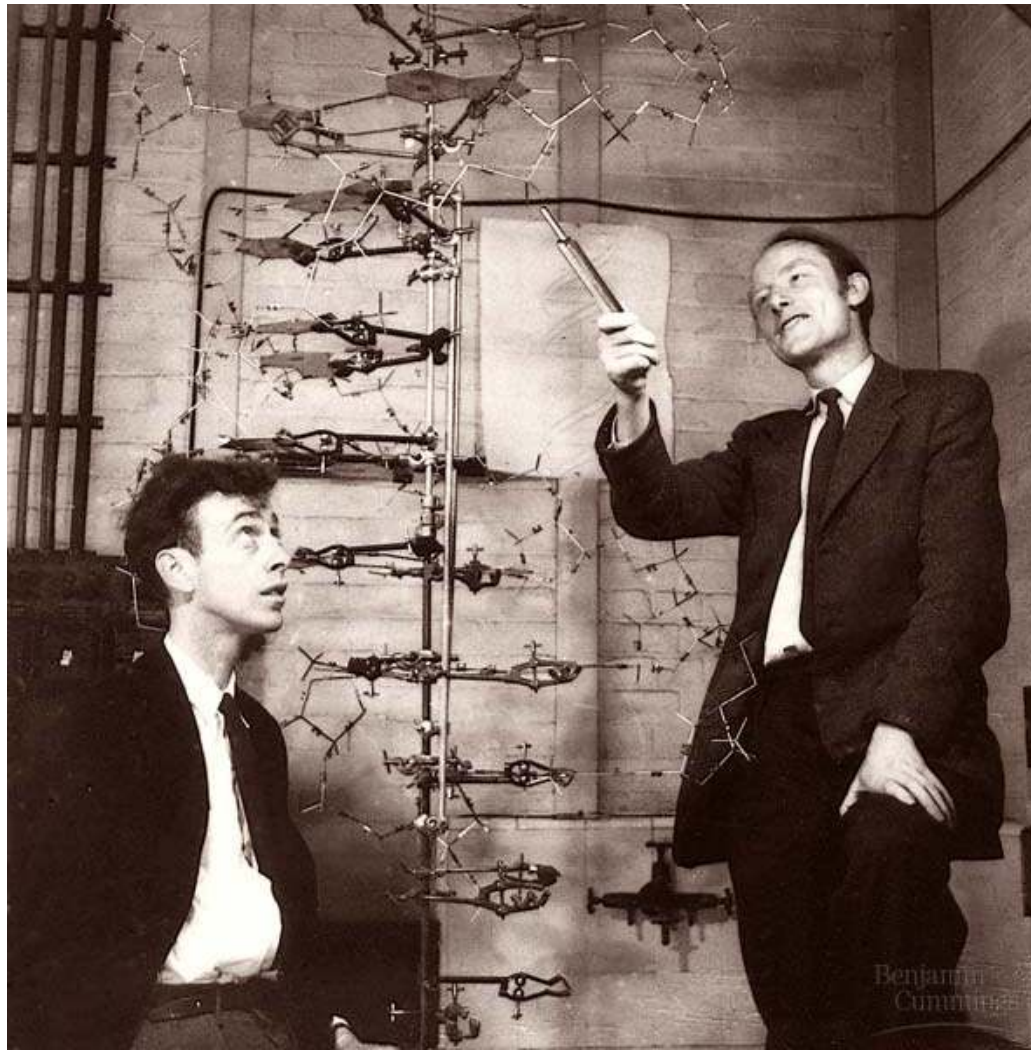


(b)

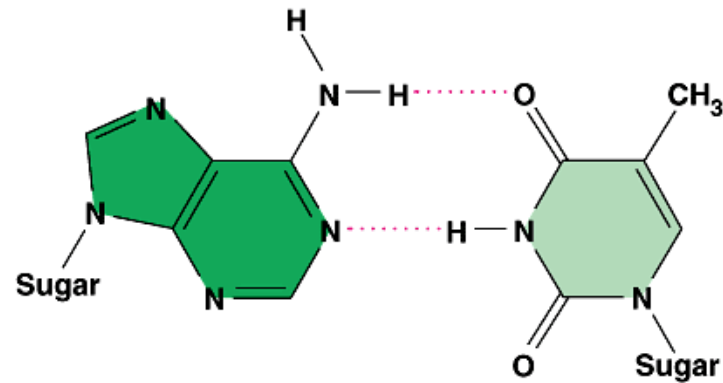


(c)

James Watson & Francis Crick with their DNA model

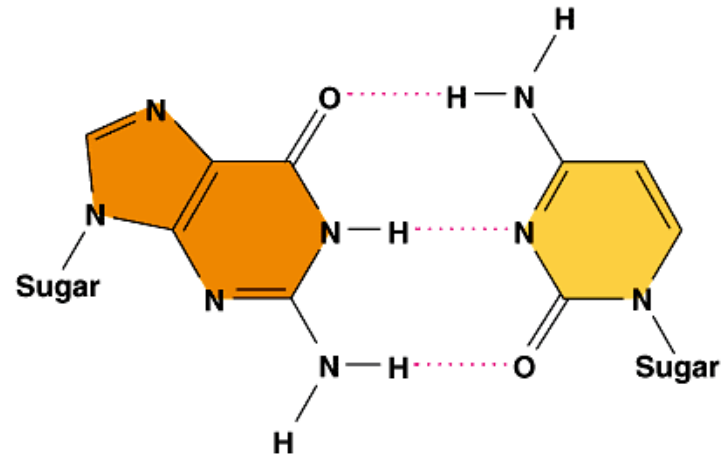


Base Pairing & Hydrogen bonding



Adenine (A)

Thymine (T)



Guanine (G)

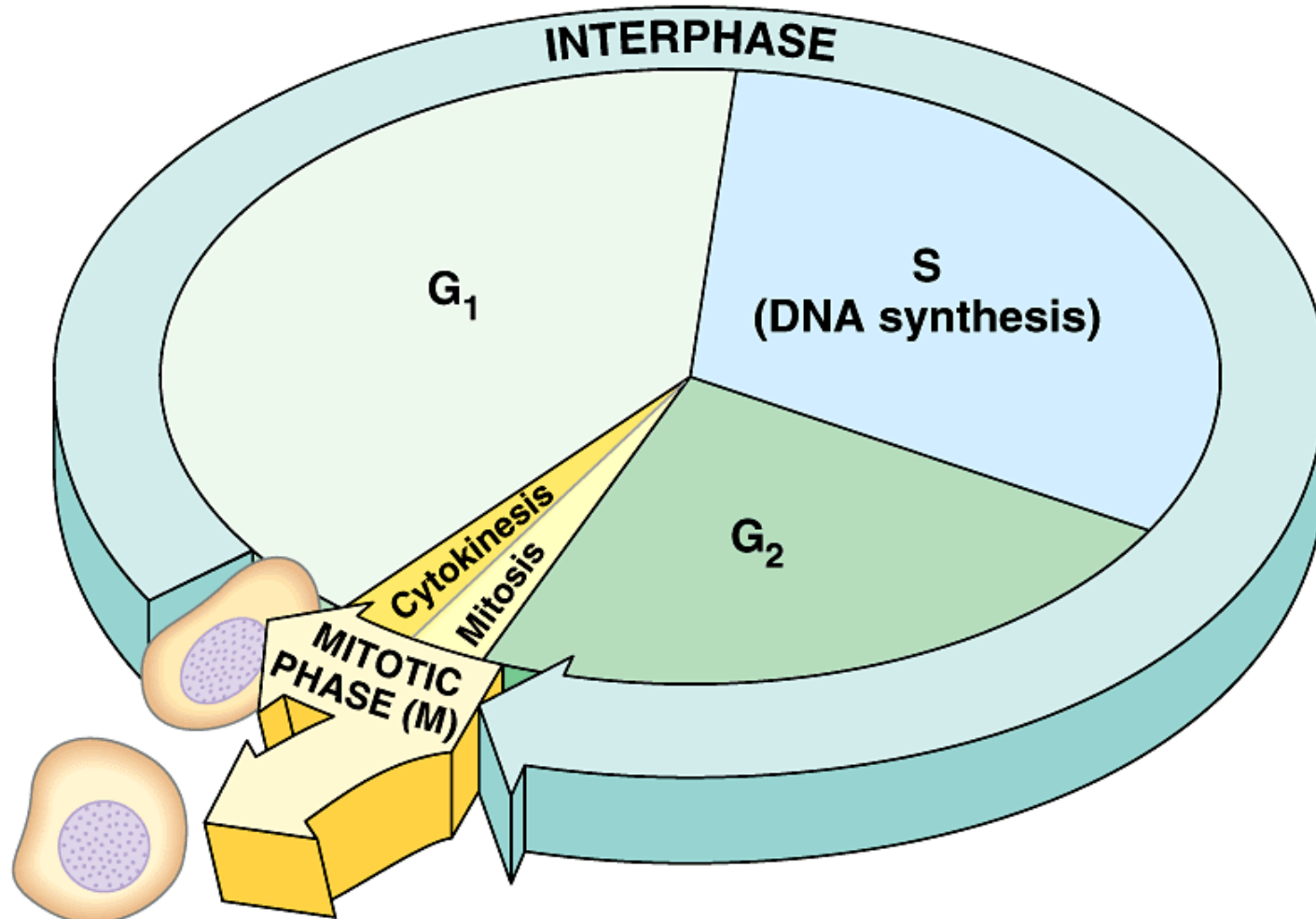
Cytosine (C)

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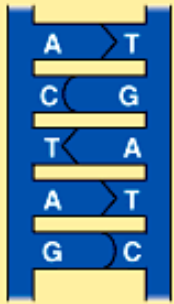
Part 2

S Phase of Cell Cycle

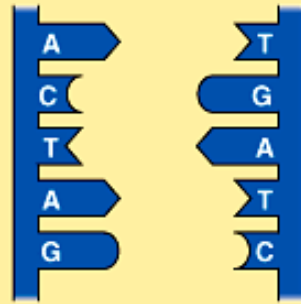


Complimentary base pairing

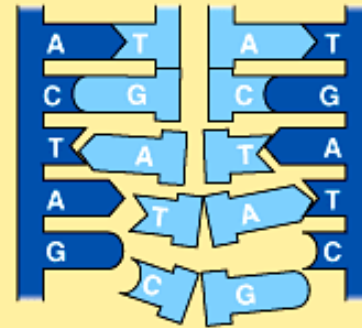
See how the dark blue strand is half (“semi”) of the new strand?



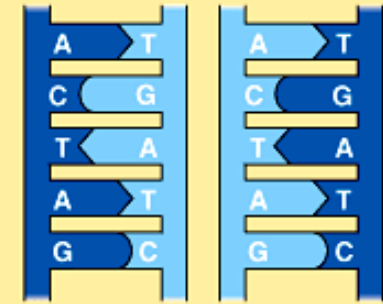
(a) The parent molecule has two complementary strands of DNA. Each base is paired by hydrogen bonding with its specific partner, A with T and G with C.



(b) The first step in replication is separation of the two DNA strands.

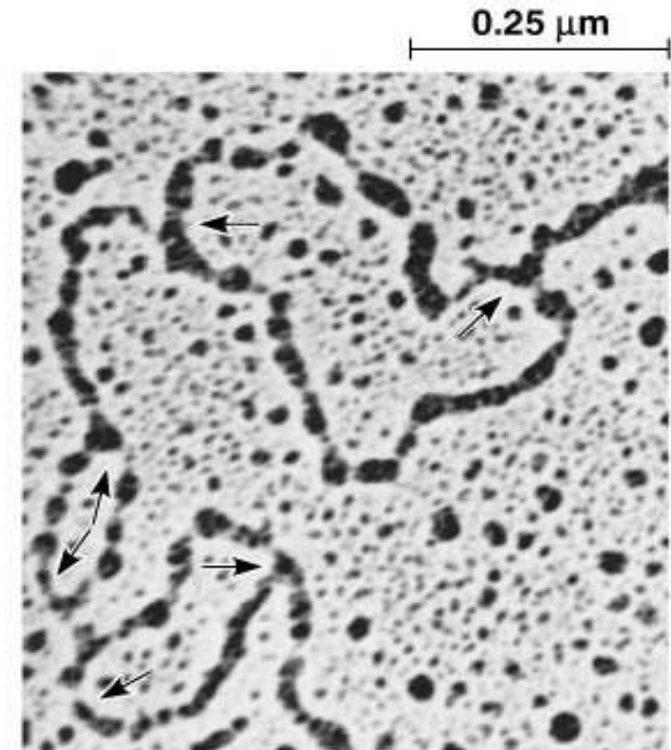
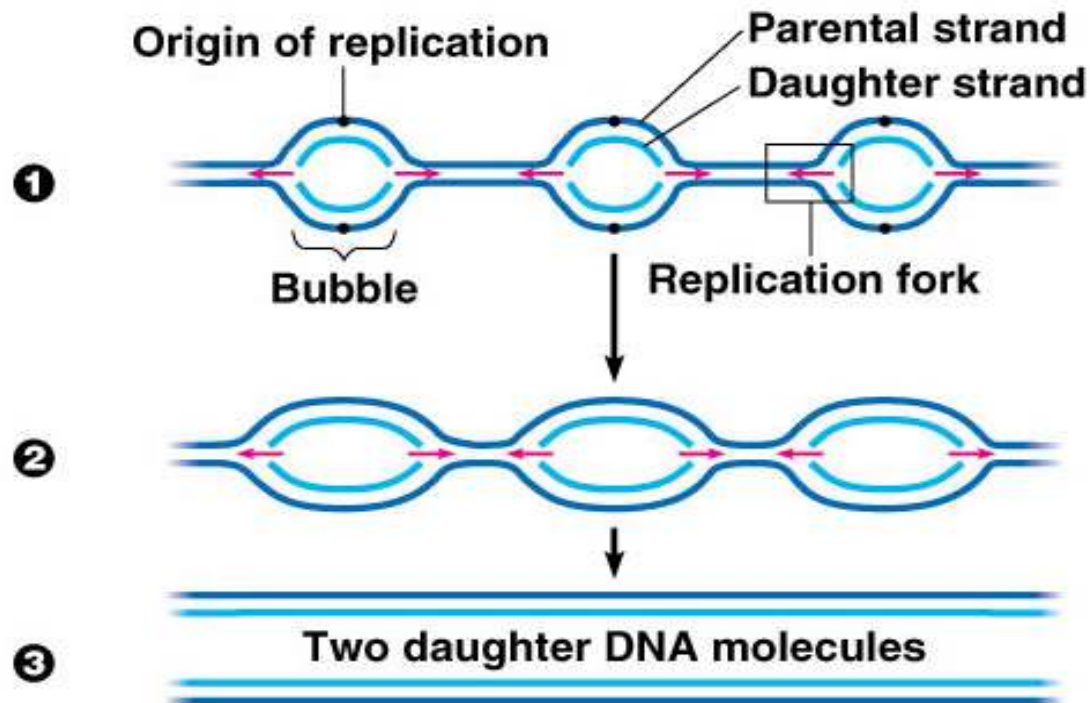


(c) Each parental strand now serves as a template that determines the order of nucleotides along a new complementary strand.



(d) The nucleotides are connected to form the sugar-phosphate backbones of the new strands. Each “daughter” DNA molecule consists of one parental strand and one new strand.

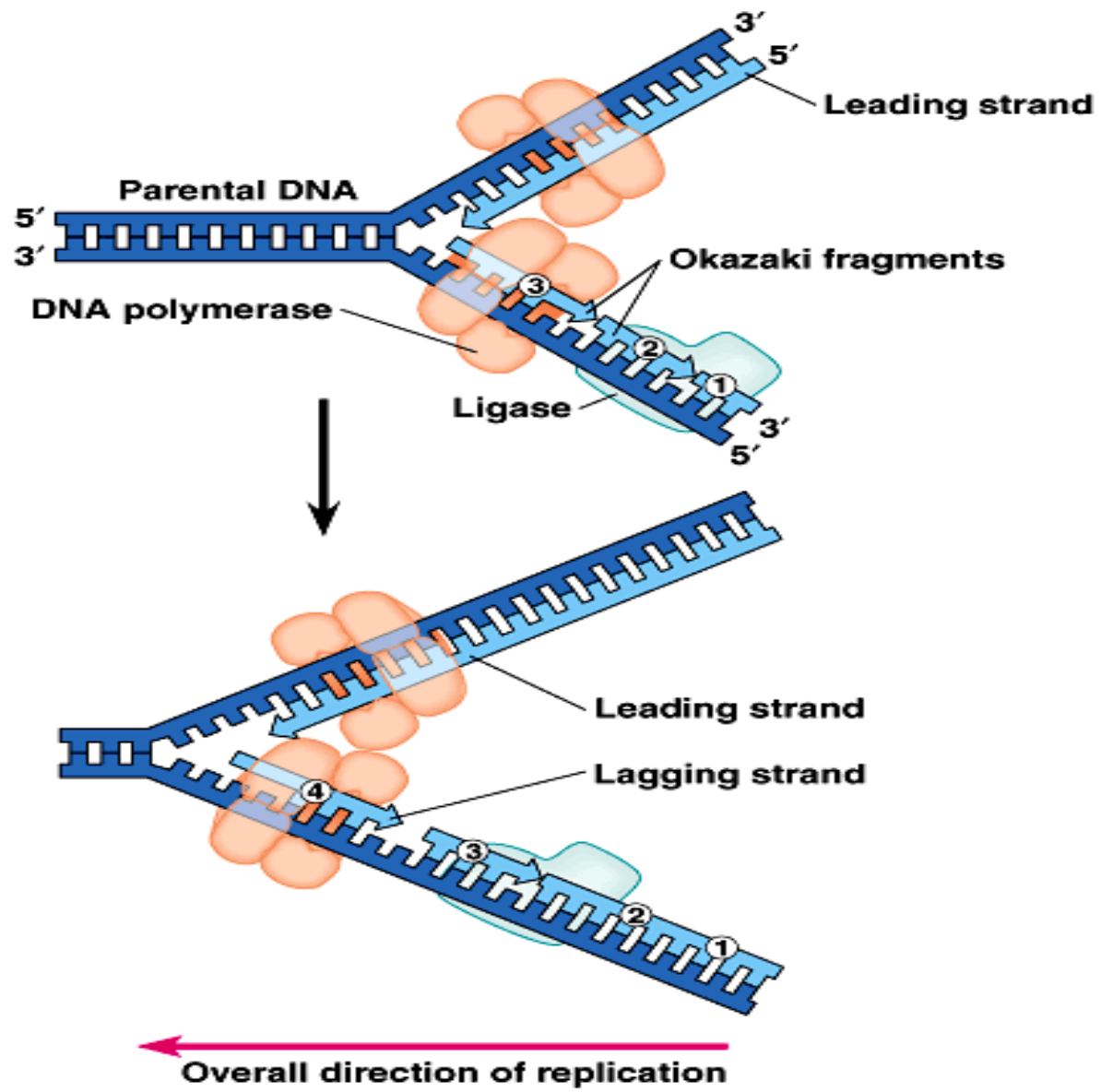
Origins of Replication & Replication Bubbles



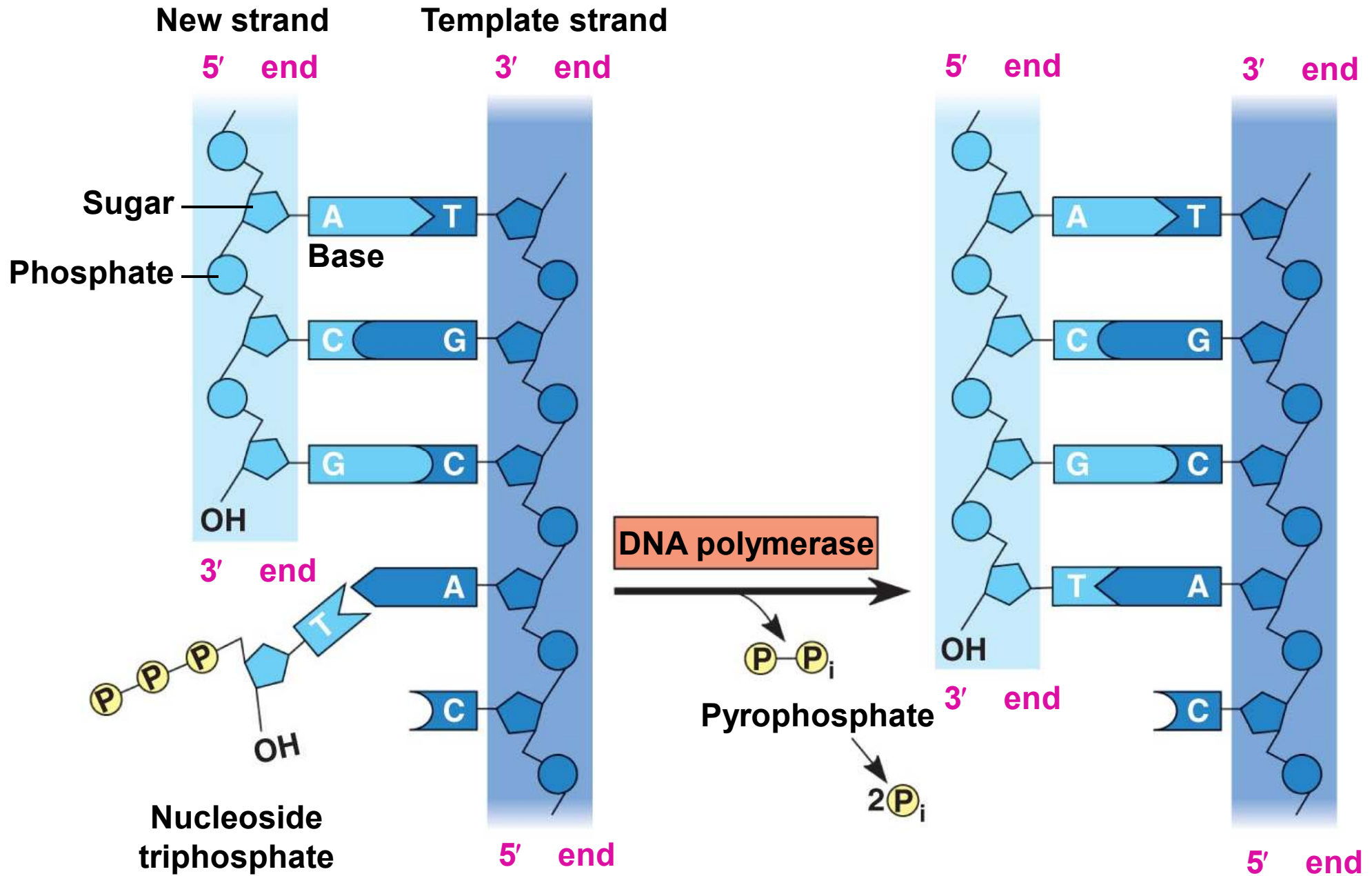
(a) In eukaryotes, DNA replication begins at many sites along the giant DNA molecule of each chromosome.

(b) In this micrograph, three replication bubbles are visible along the DNA of cultured Chinese hamster cells. The arrows indicate the direction of DNA replication at the two ends of each bubble (TEM).

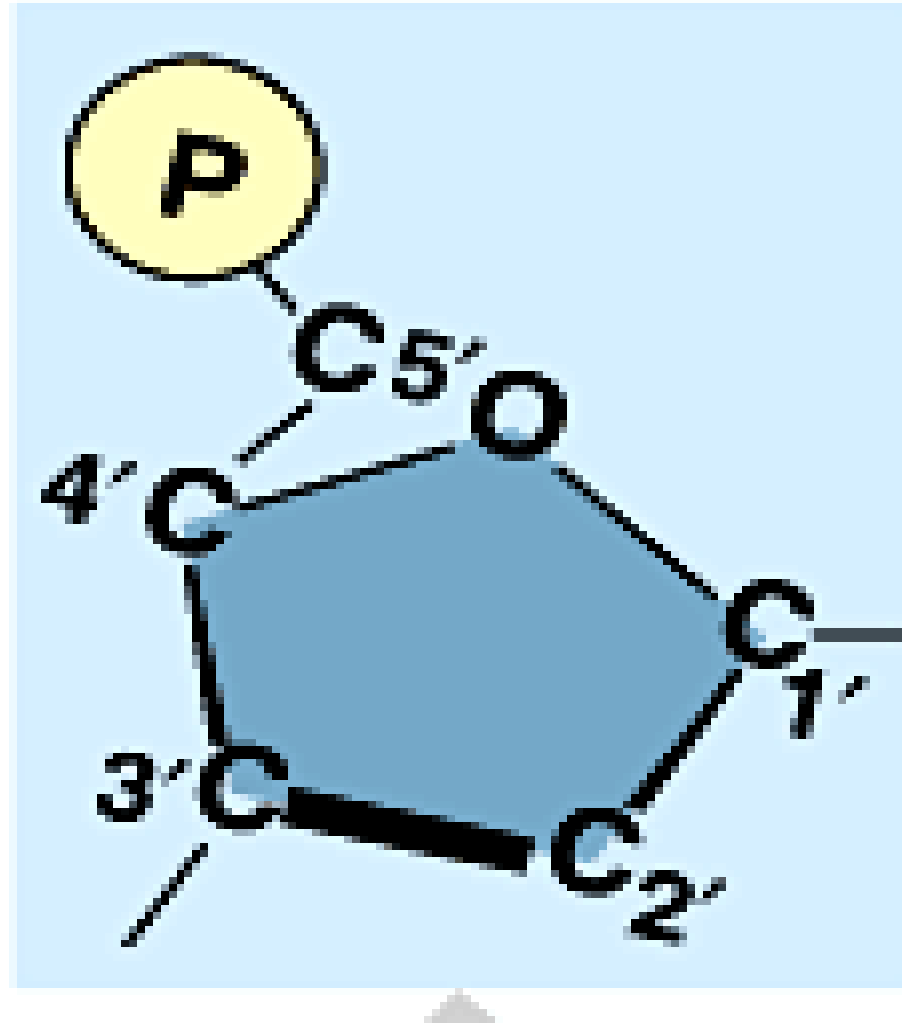
Elongation using DNA Polymerase III



DNA Replication by adding Nucleosides on the 3' end

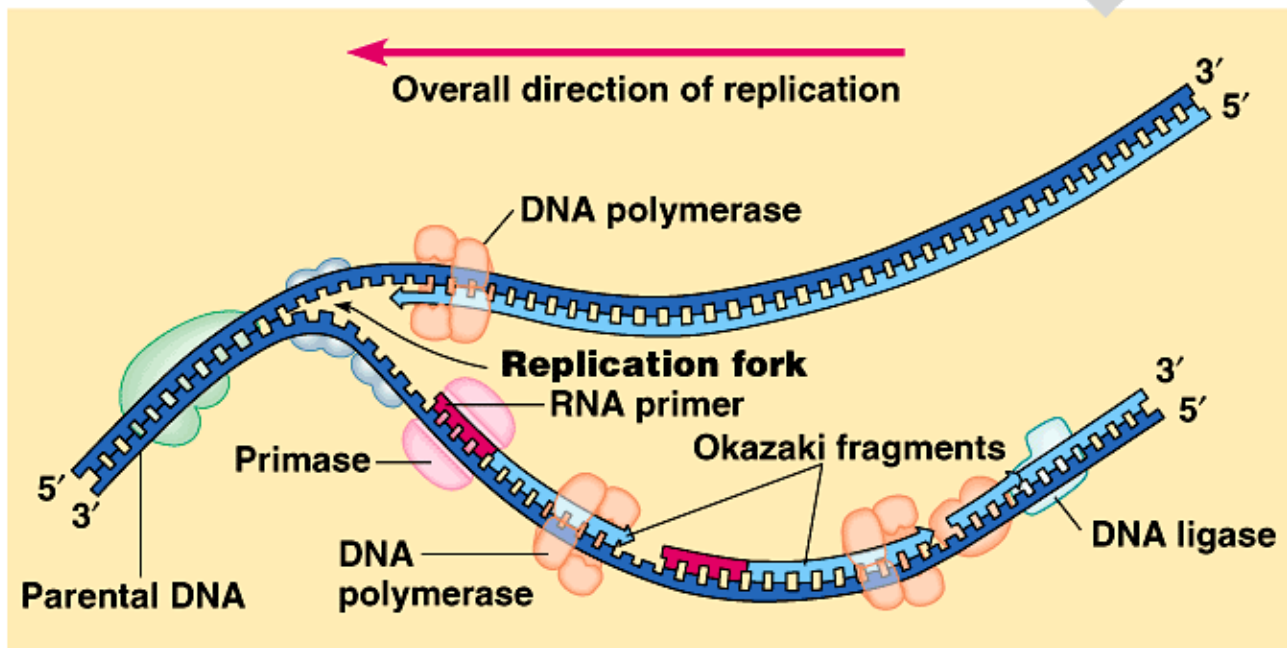
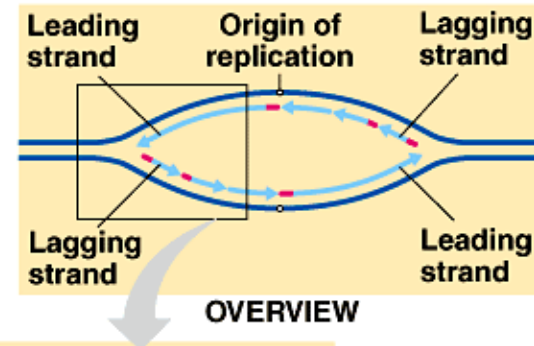


5 Carbon Sugar Important Parts (It could be DNA or RNA)

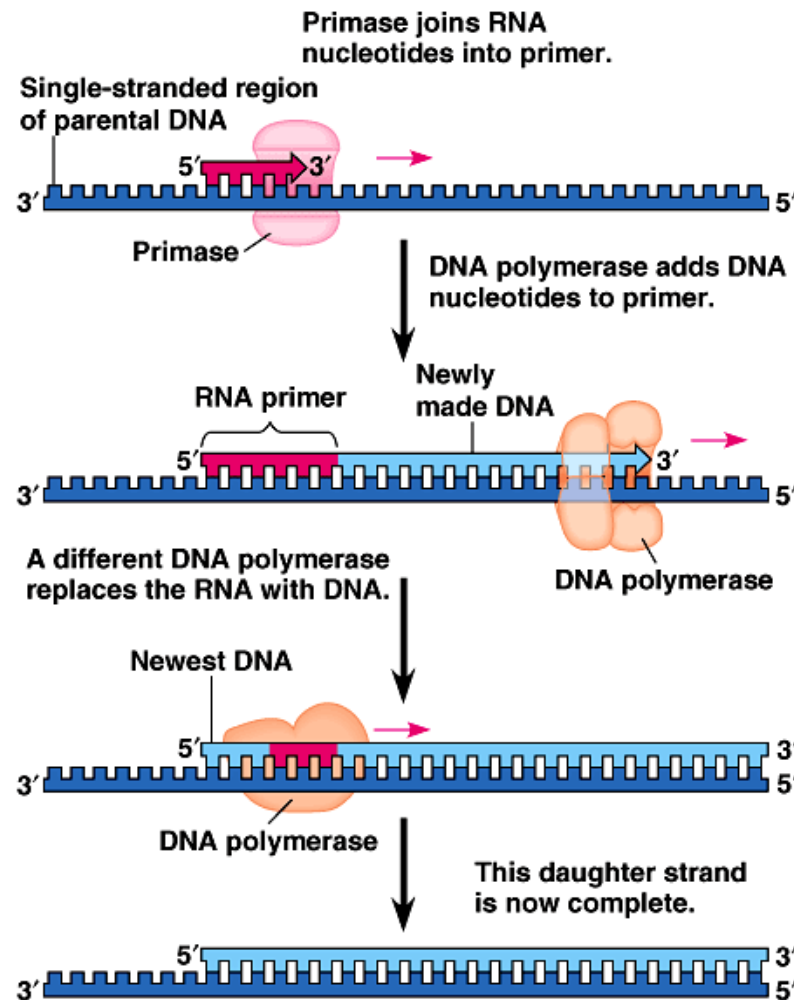


Lead strand(top) versus Lagging strand (bottom)

Helicase is the **GREEN** "blob"



RNA Primer (“starting point”)



Nucleotide Excision Repair

