

DNA - An Introduction

DRAW or EXPLAIN each of the following terms as you remember from grade 11

Gene

Allele

Nucleotide

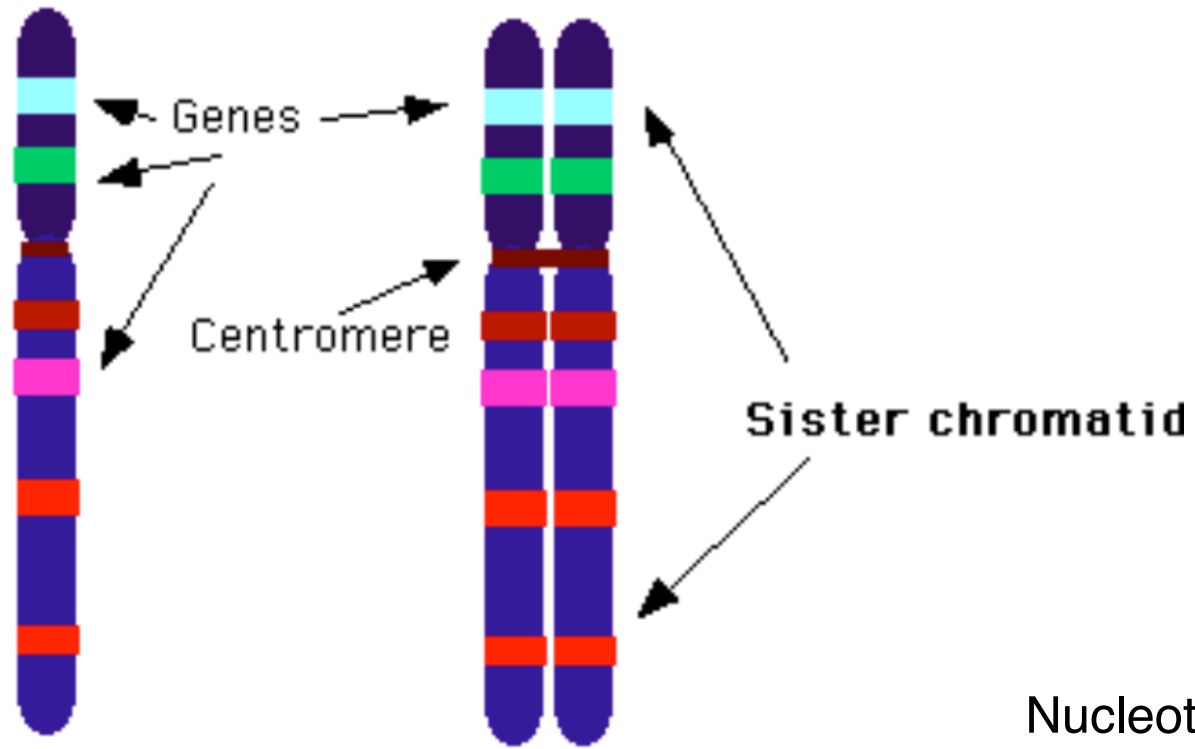
Chromosome

Chromatid

Chromatin

Homologous Chromosomes





GENE (ALLELE A)

ATC CCA GCT CCC ACA GGG AAG GAT GAT GCC CAG CAG

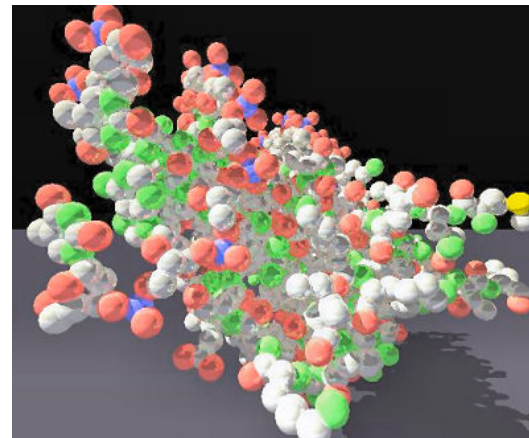
GENE (ALLELE a)

ATC CCA GCT CCC ACA GGG ATG GAT GAT GCC CAG CAG

What carries the genetic information?

How did scientists determine that DNA carried genetic information?

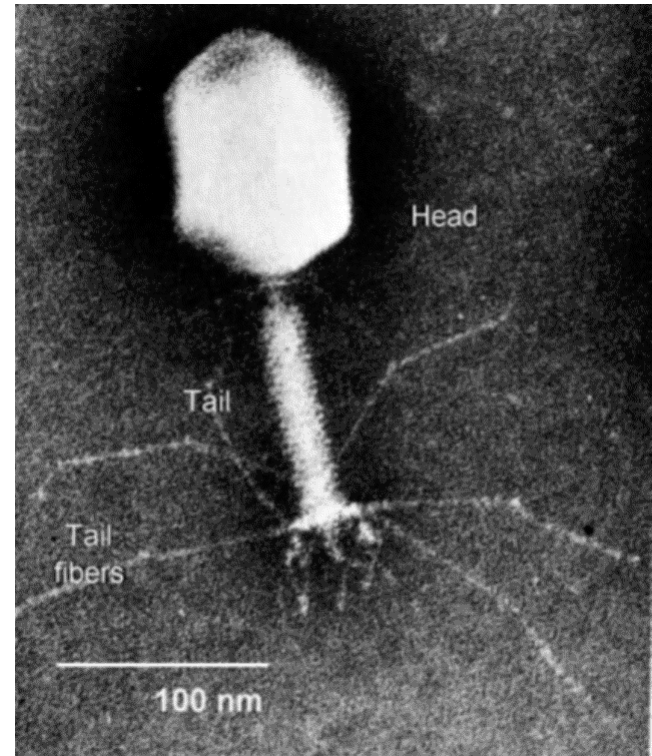
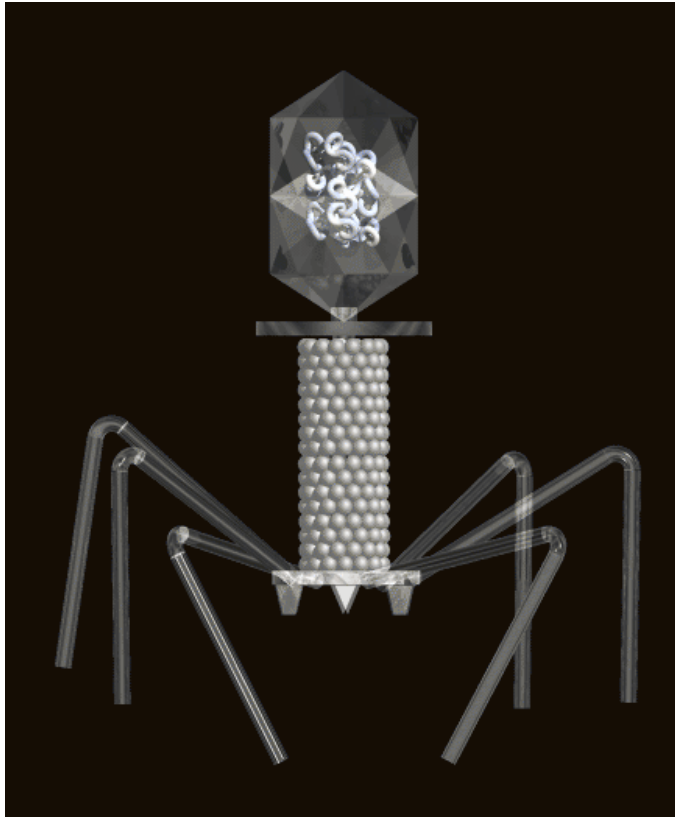
(Instead of protein, which is a more complicated molecule & therefore thought to be a better candidate?)



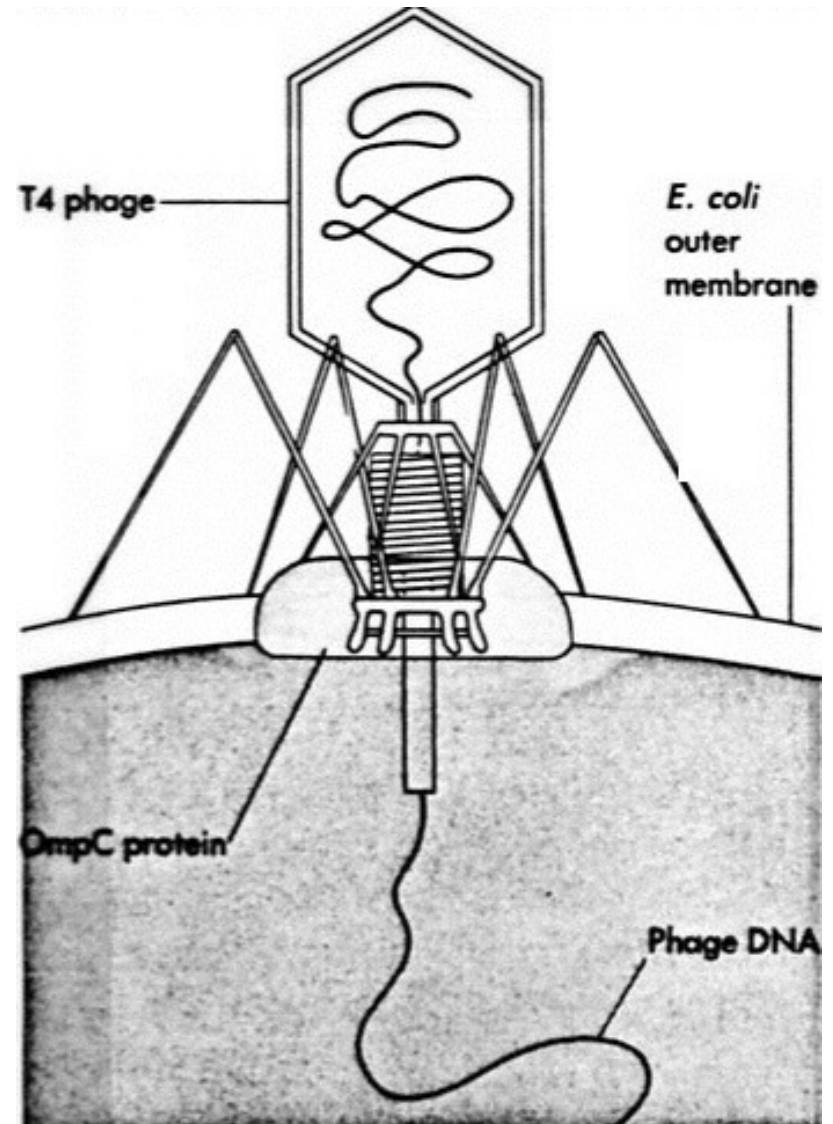
Hershey and Chase



The T-4 Bacteriophage

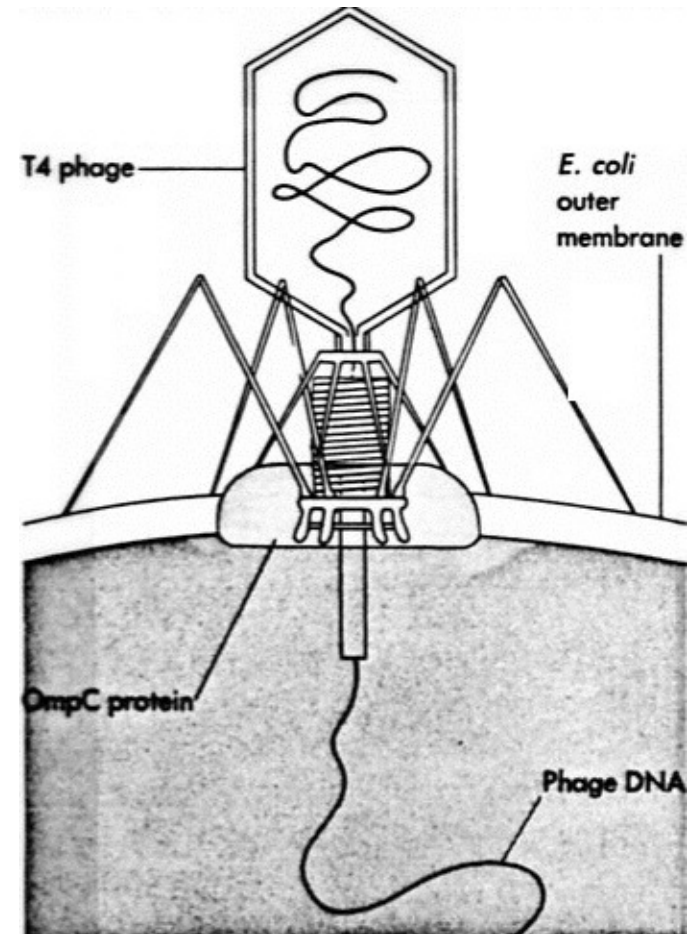


Remember: viruses consist of a protein coat surrounding a DNA or RNA
DNA or Protein that contained hereditary material?



Start with radioactively marked T4

Mark either the protein coat (radioactive sulphur) or DNA (radioactive phosphorus) determine which situation results in radioactivity in next generation...
i.e., is it the protein or the DNA that contains the hereditary information?



Bacteriophage



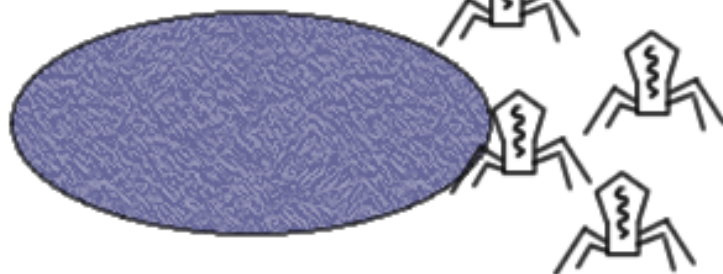
Proteins contain radioactive sulfur



Phage infects bacteria



Bacteria and new phages are analyzed

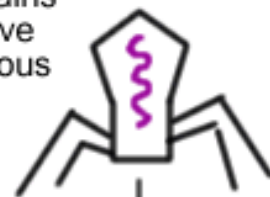


None are radioactive

Bacteriophage



DNA contains radioactive phosphorous



Phage infects bacteria



Bacteria and new phages are analyzed



Both bacteria and new phages are radioactive

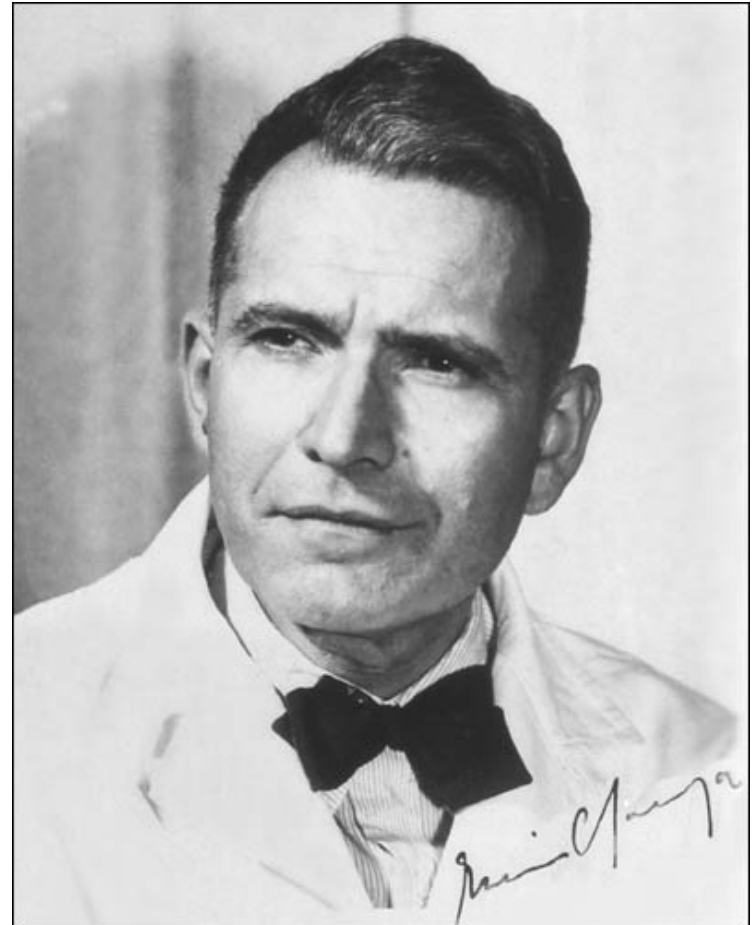
Chargaff

Chargaff's Rule:

- proportionally $A = T$ and $C = G$

$A=30.9\%$ and $T=29.4\%$

$G=19.9\%$ and $C=19.8\%$





Structure of DNA

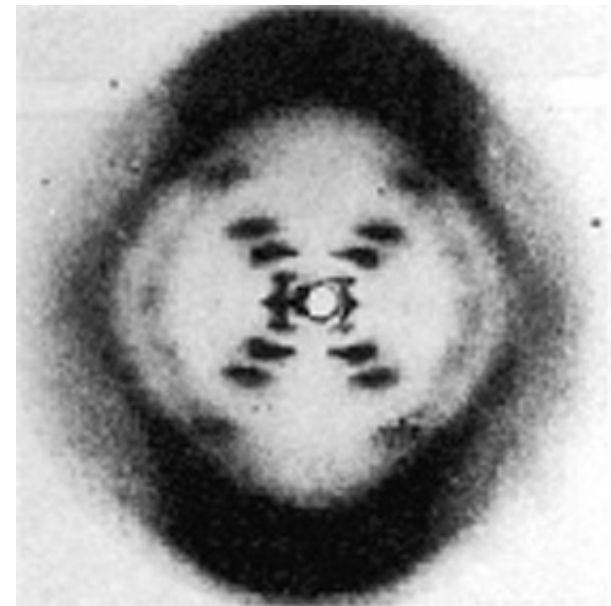
- Rosalind Franklin working in Wilkin's lab used X-ray diffraction to look at molecular structure
- 1952 created an x-ray image of DNA

PHOTO 51



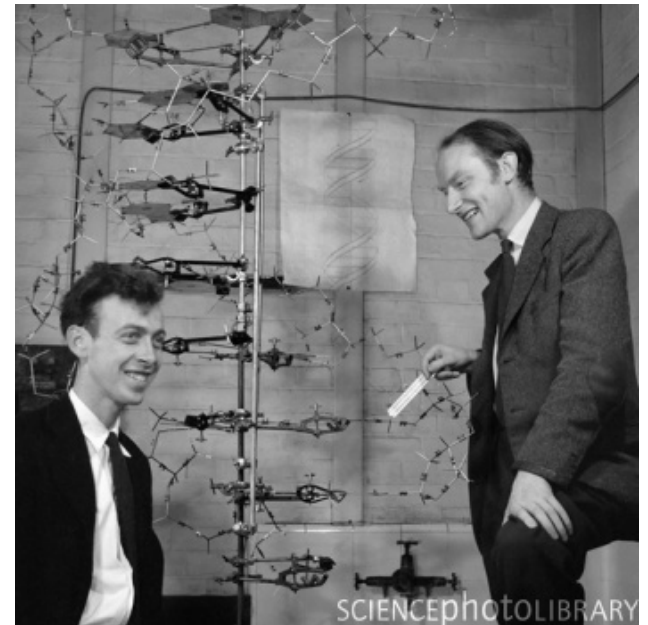
Structure of DNA

- realized DNA was a tight coil
- Wilkins, showed her photographs and calculations which was the key ingredient for WATSON and CRICK to create their model.



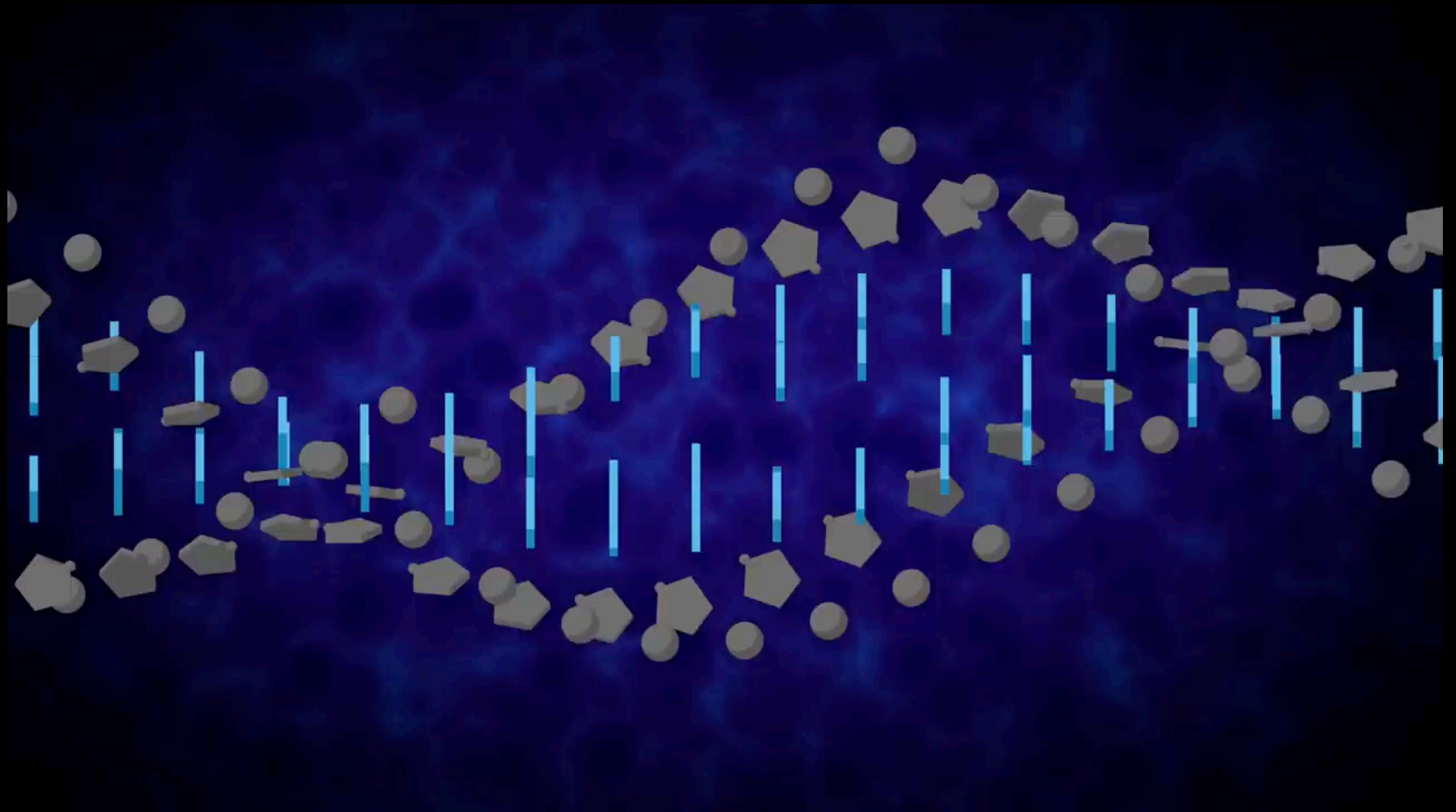
Watson & Crick

- used Franklin's data & Chargaff's info & determined the double helix structure
- their model also implied how DNA is replicated in the cell in a semi conservative manner

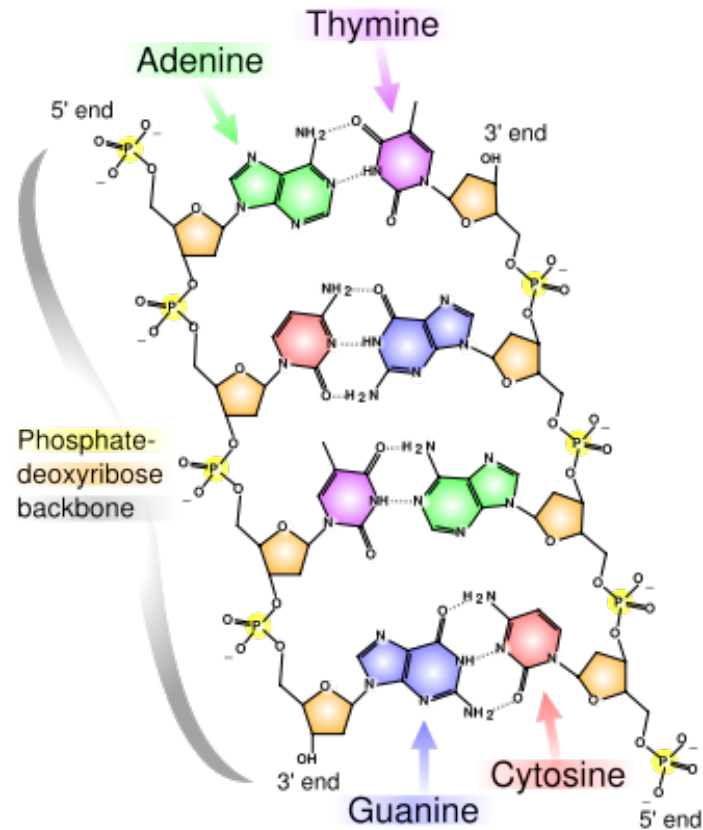
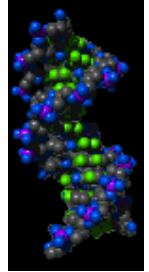


The Nobel Prize in Physiology or Medicine **1962** was awarded jointly to Francis **Crick**, James **Watson** and Maurice **Wilkins** *"for their discoveries concerning the molecular structure of nucleic acids and its significance for information transfer in living material"*.



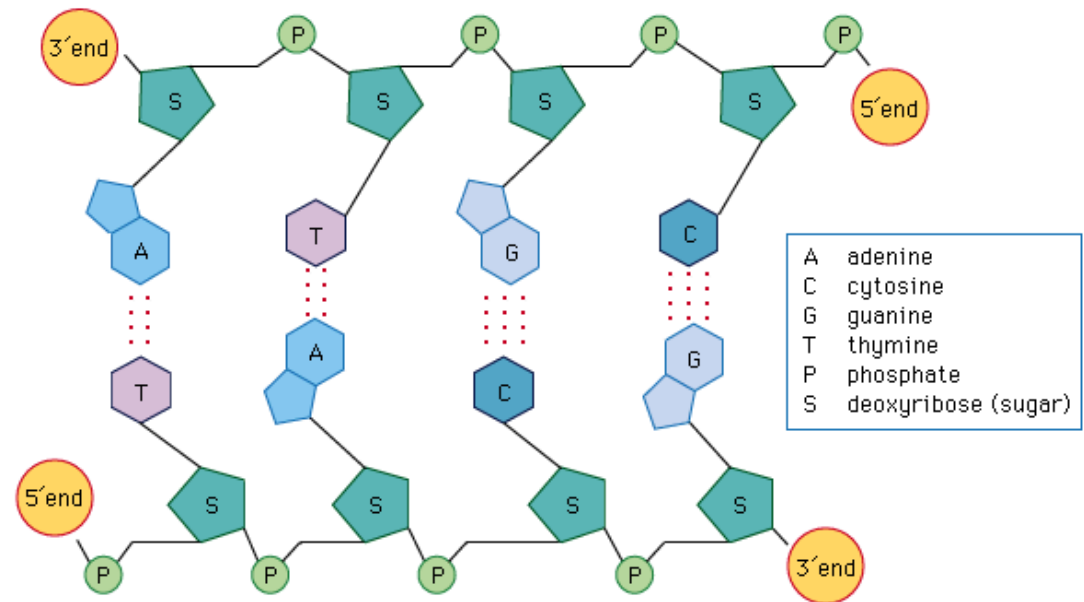


What is DNA made of?



What is DNA made of?

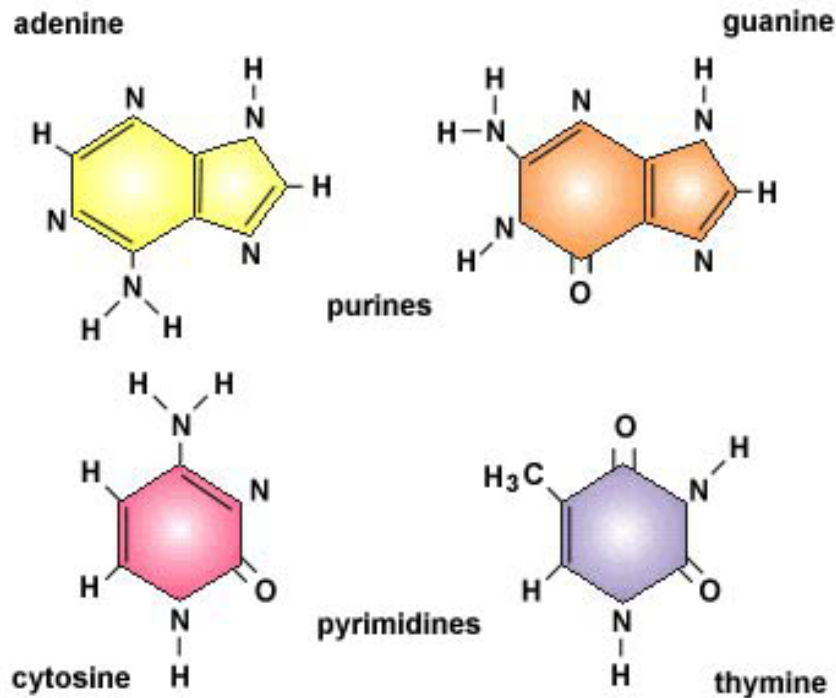
- made of a series of units called nucleotides (monomers)
- each nucleotide contains 3 parts:
 - deoxyribose (5-C) sugar (*Ribose sugar in RNA*)
 - nitrogen-containing base (4 types)
 - phosphate



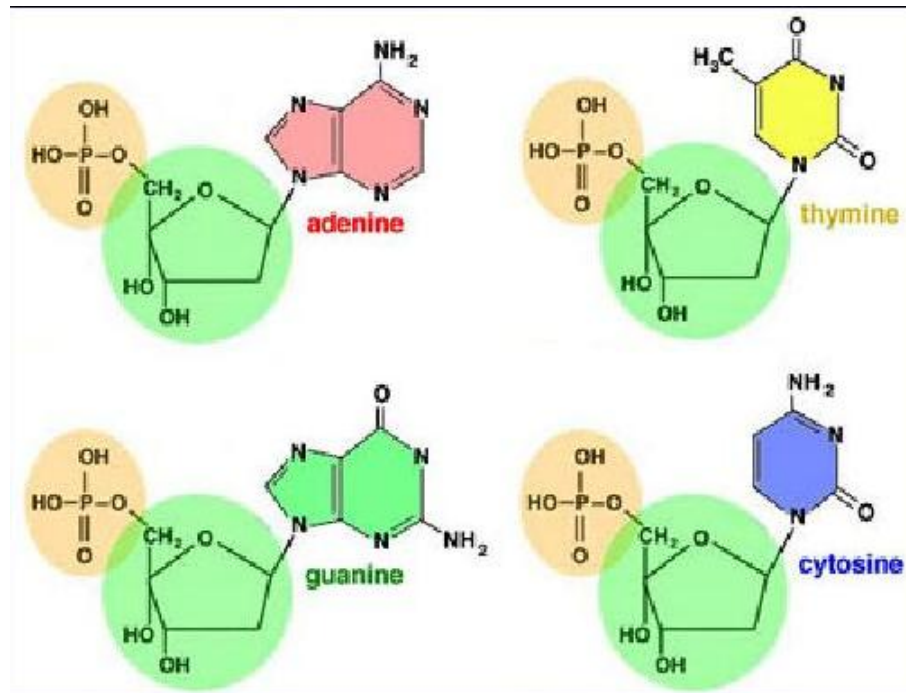
What is DNA made of?

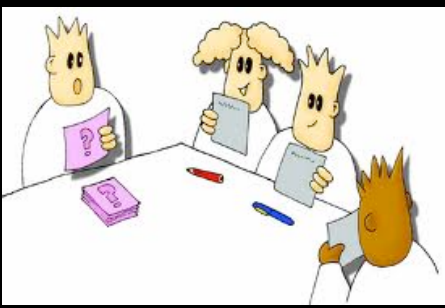
- the 4 nitrogen containing bases are:

- adenine (A)
- guanine (G)
- thymine (T)
- cytosine (C) (*• uracil (U) in RNA*)



adenine (purines) - thymine (pyrimidines)
guanine (purines) - cytosine (pyrimidines)



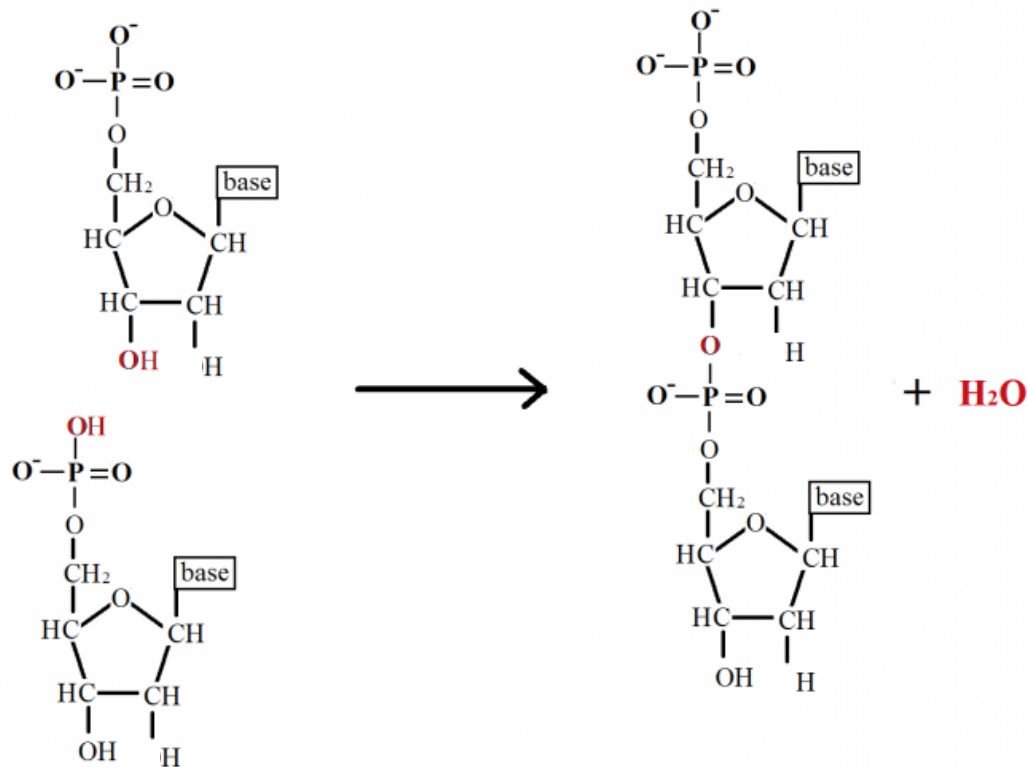


Which is the real strand of DNA?

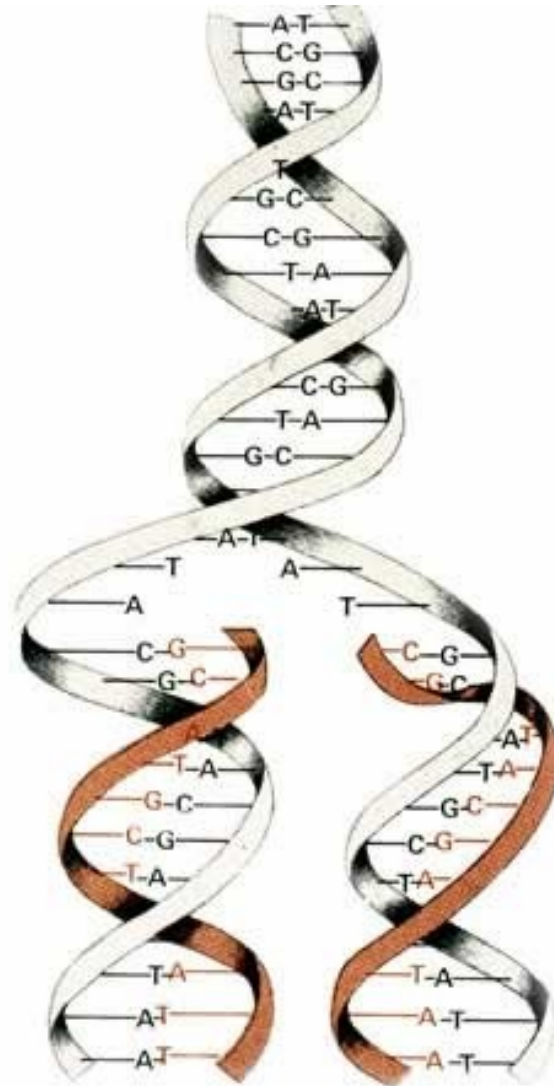
%A	%C	%G	%T
10	10	30	50
30	30	20	20
15	35	35	15
20	40	40	20

Structure of DNA

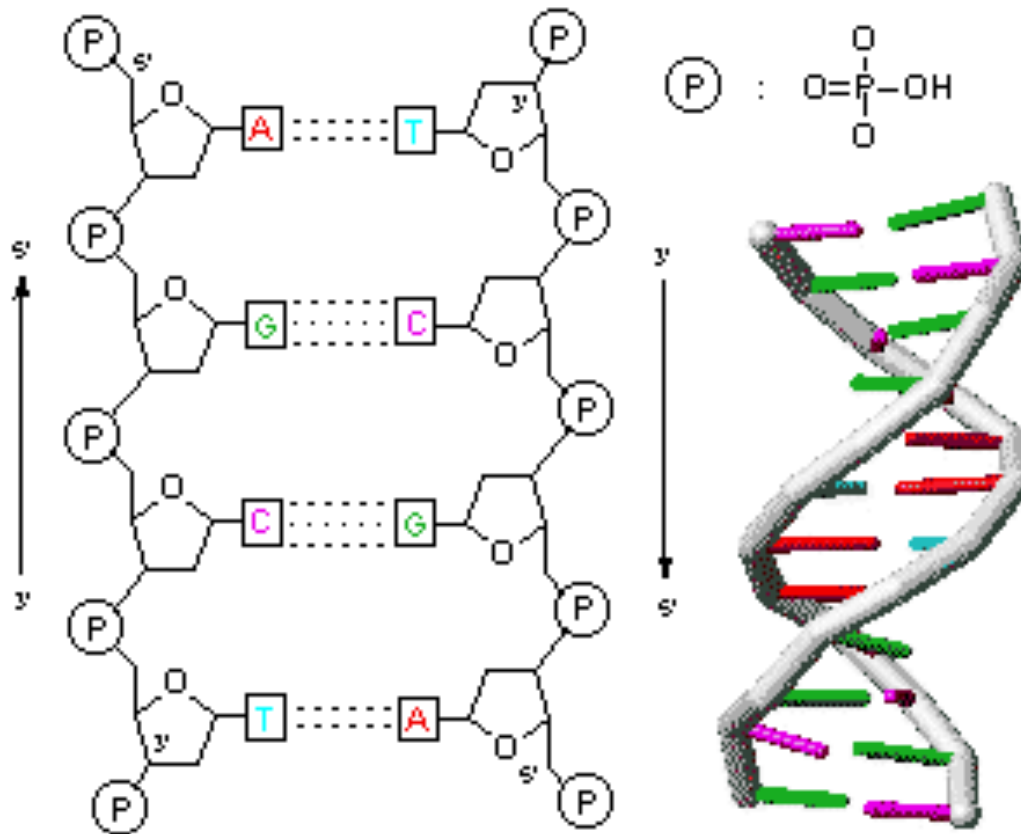
- double helix
- sugar & phosphate forms the backbone of ladder
- Phosphodiester bonds connect one sugar to the next phosphate



- nitrogenous bases forms the rungs

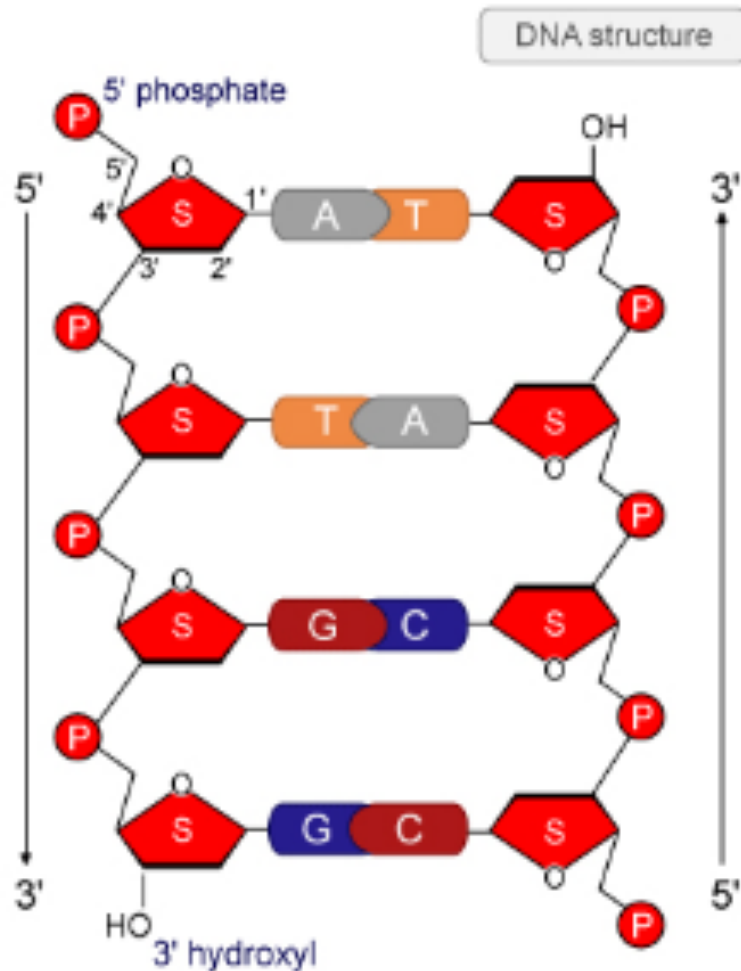


- hydrogen bonds hold nitrogen bases together
(hydrogen bonds = weak bonds between (+) hydrogen & (-) oxygen or nitrogen)

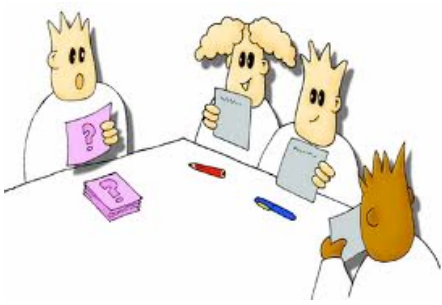


DNA strands are “anti-parallel”

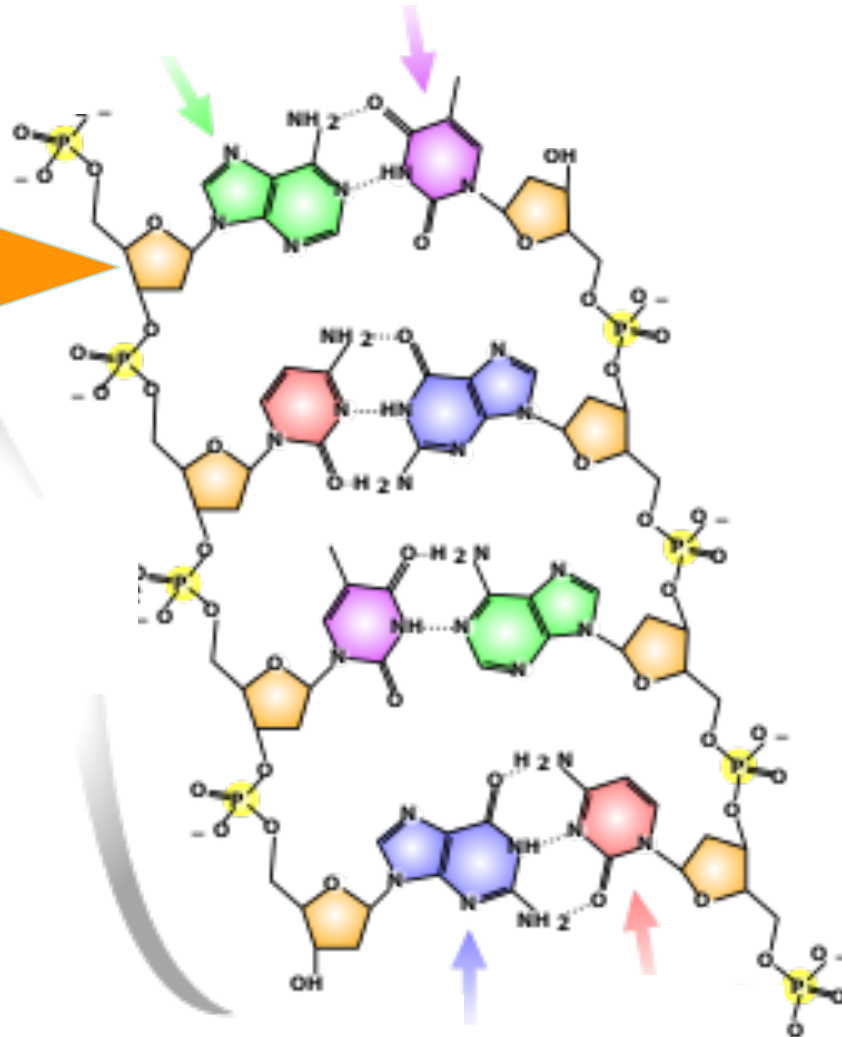
- each strand is oriented in the opposite direction (relative to sugar-phosphate background)



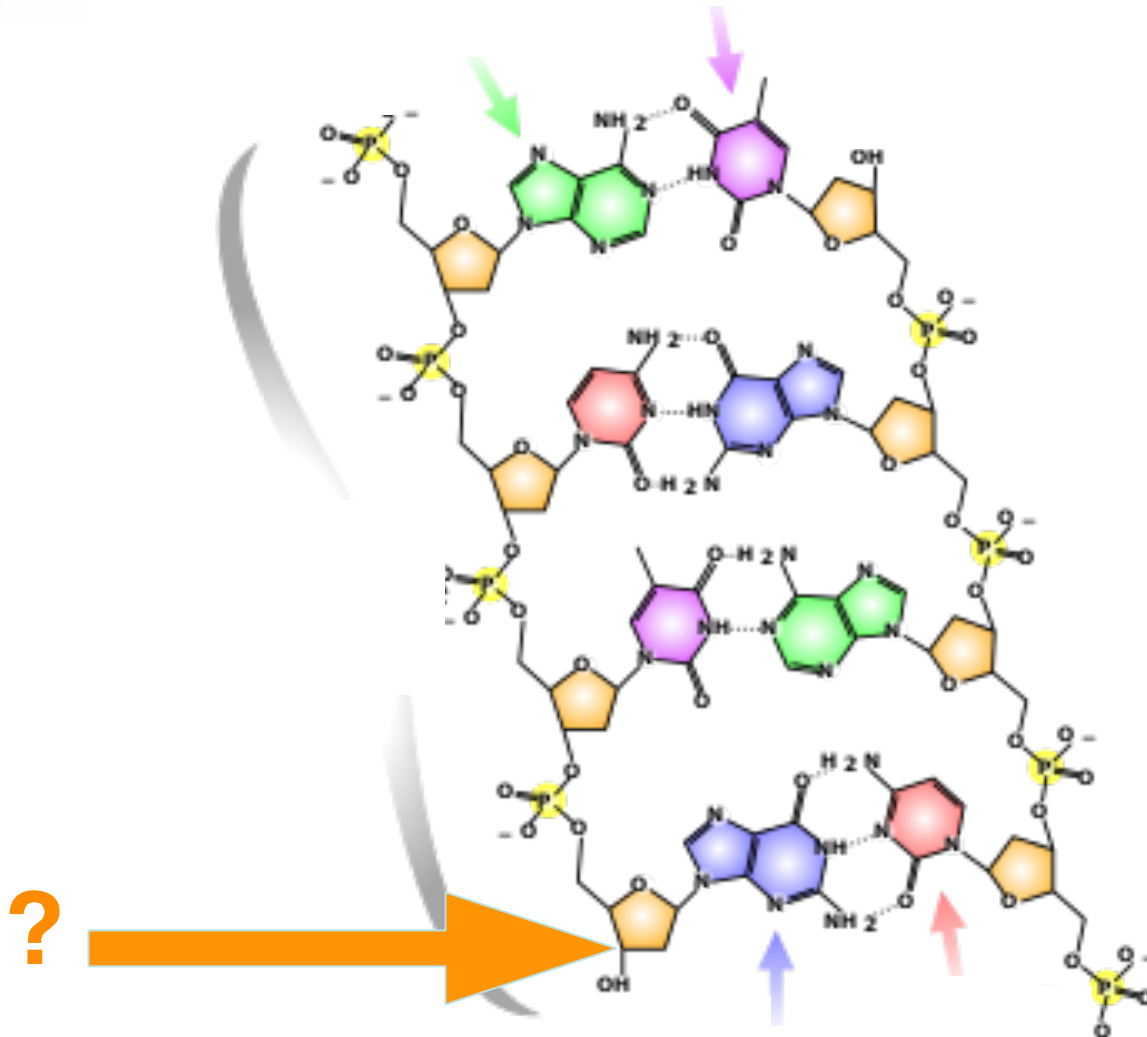
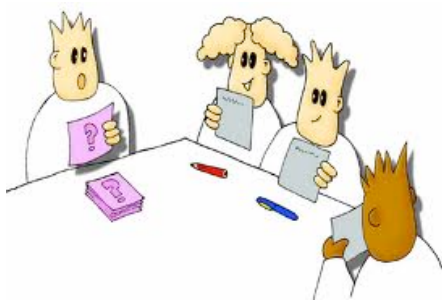
Identify the following structures

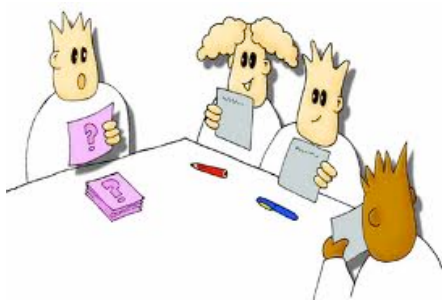


?



Identify the end.





Identify the Bond.

