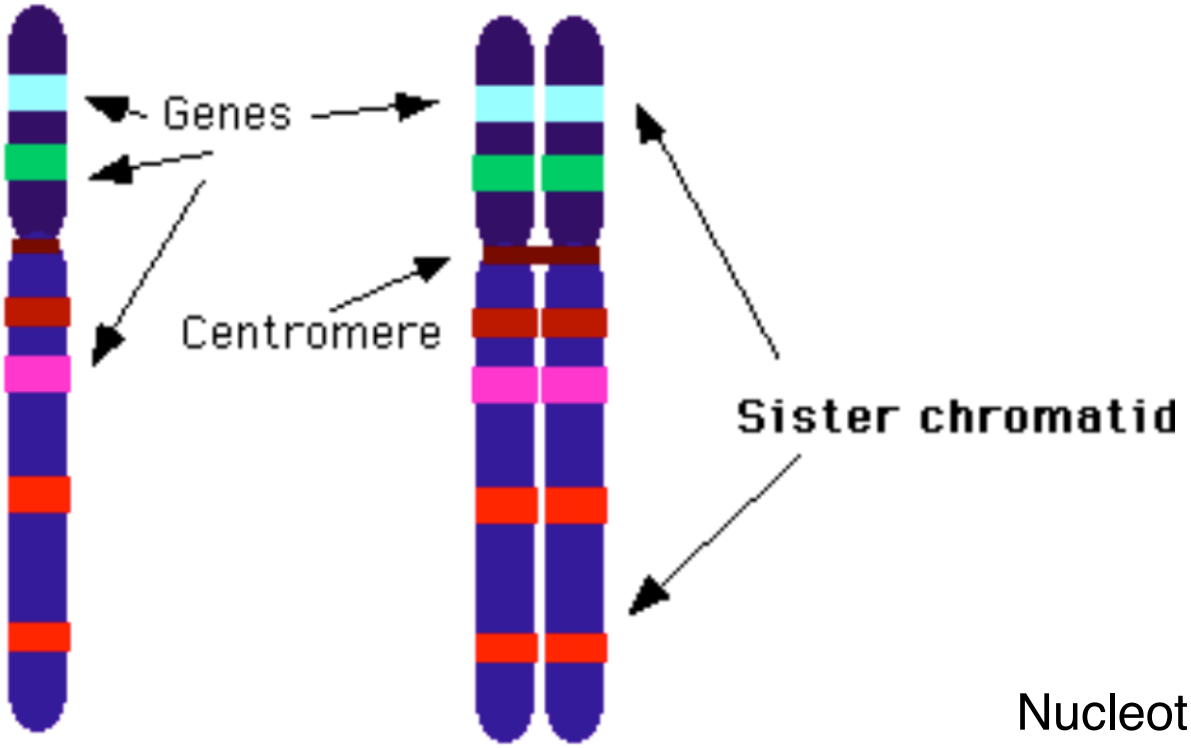
DNA

2.6



Nucleotide

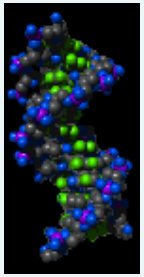
GENE (ALLELE A)

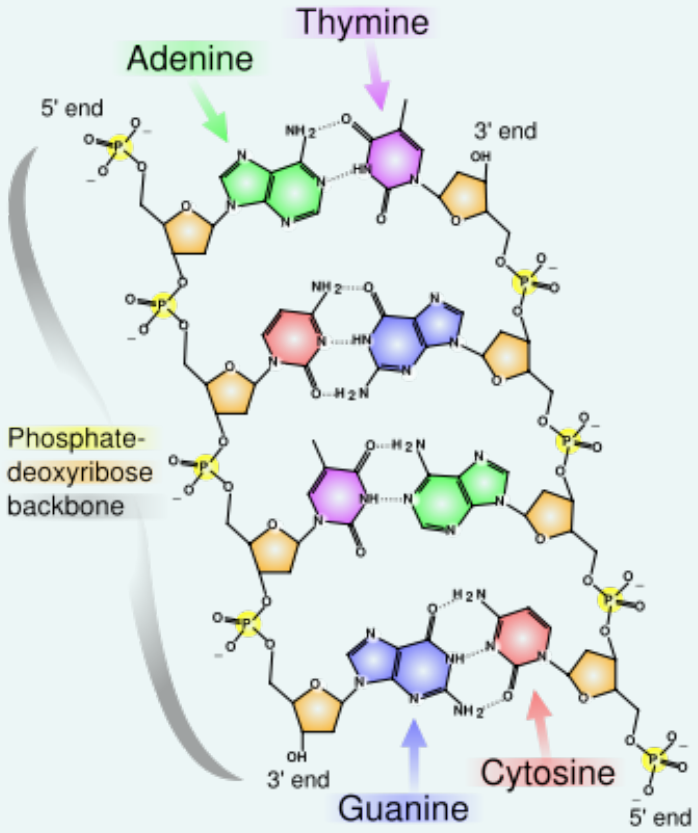
ATC CCA GCT CCC ACA GGG AAG GAT GAT GCC CAG CAG

GENE (ALLELE a)

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

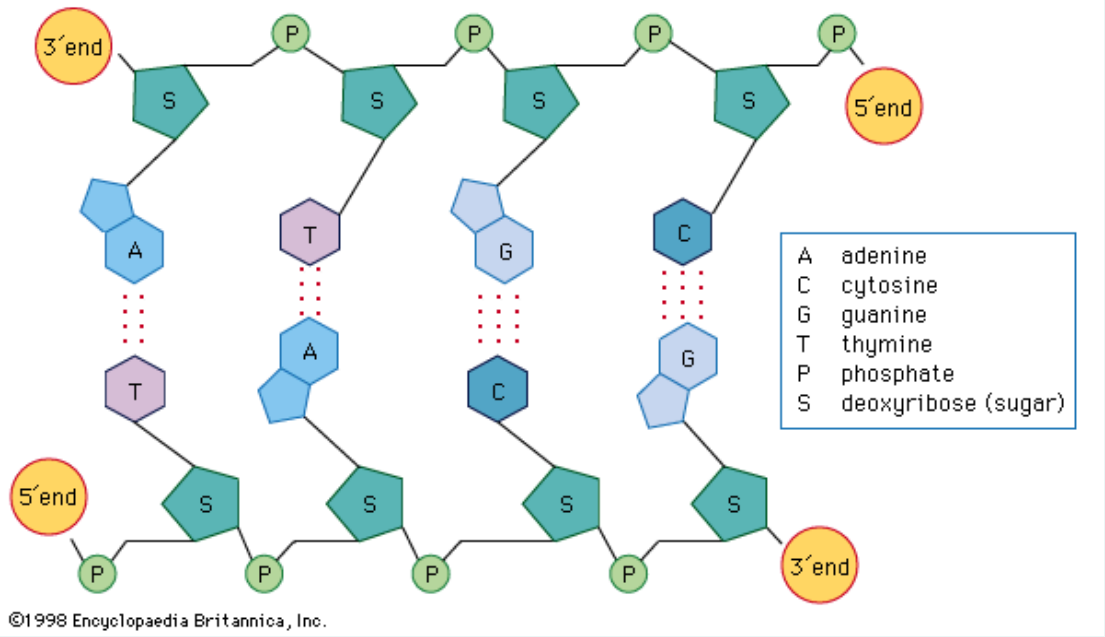
What is DNA made of?





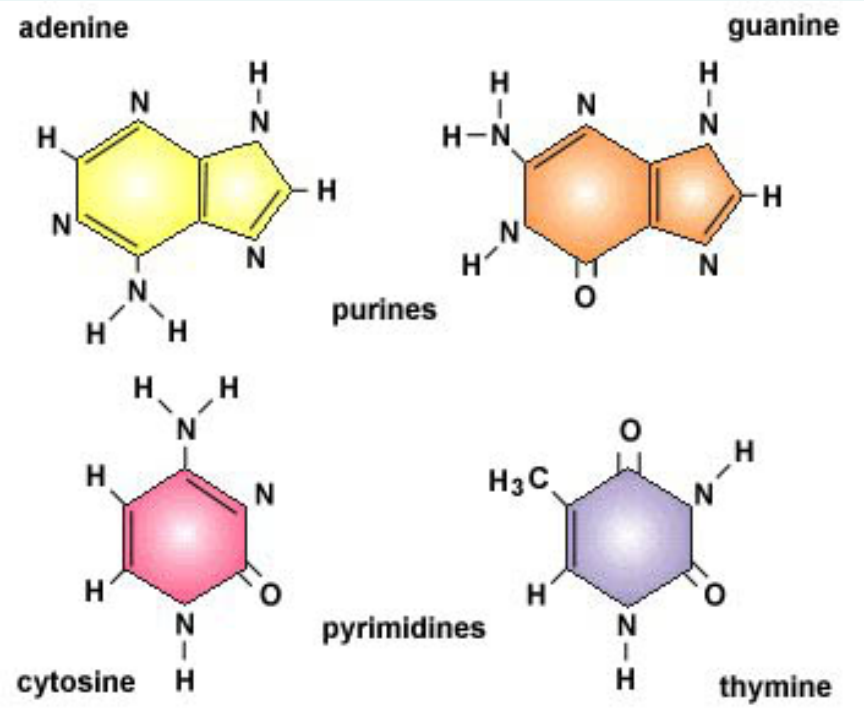
What is DNA made of?

- 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

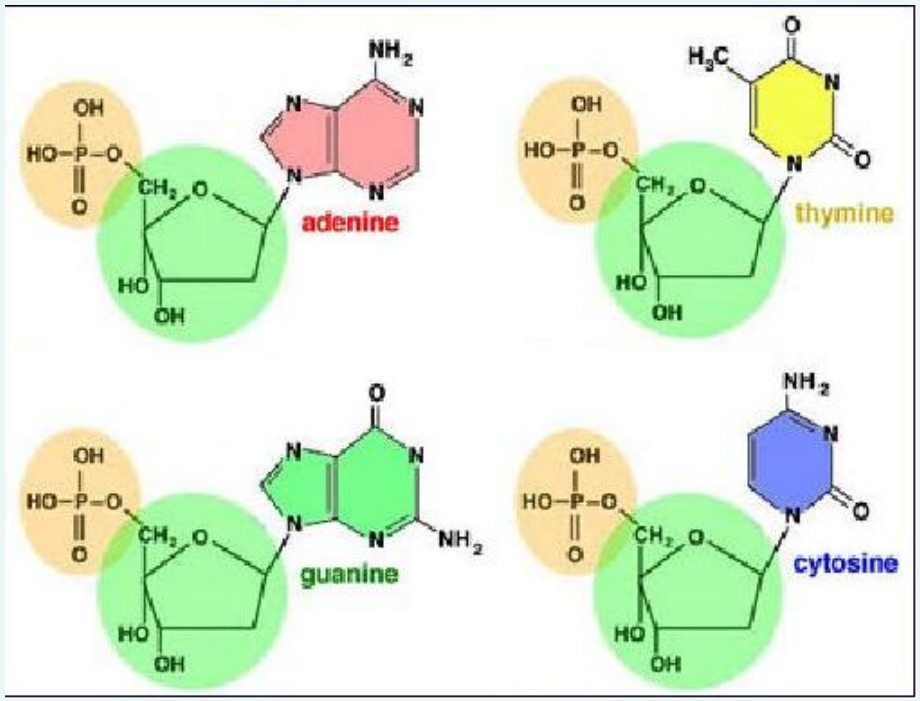


What is DNA made of?

- the 4 nitrogen containing bases are:
  - adenine (A) • guanine (G)
  - thymine (T) • cytosine (C) (• *uracil (U) in RNA)*



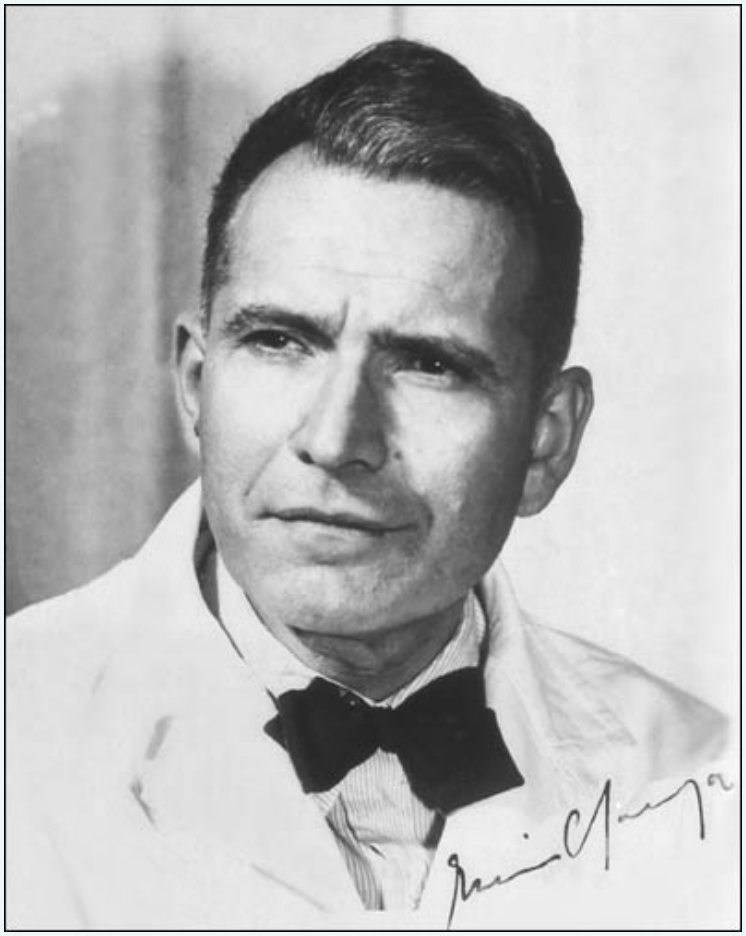
adenine (purines) - thymine (pyrimidines)
guanine (purines) - cytosine (pyrimidines)

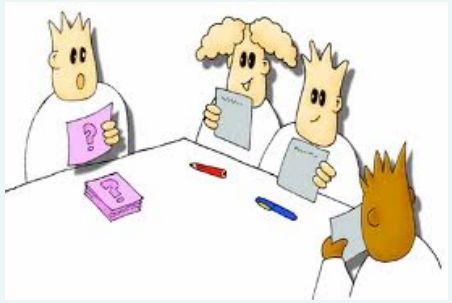


Chargaff

A=30.9% and T=29.4%

G=19.9% and C=19.8%





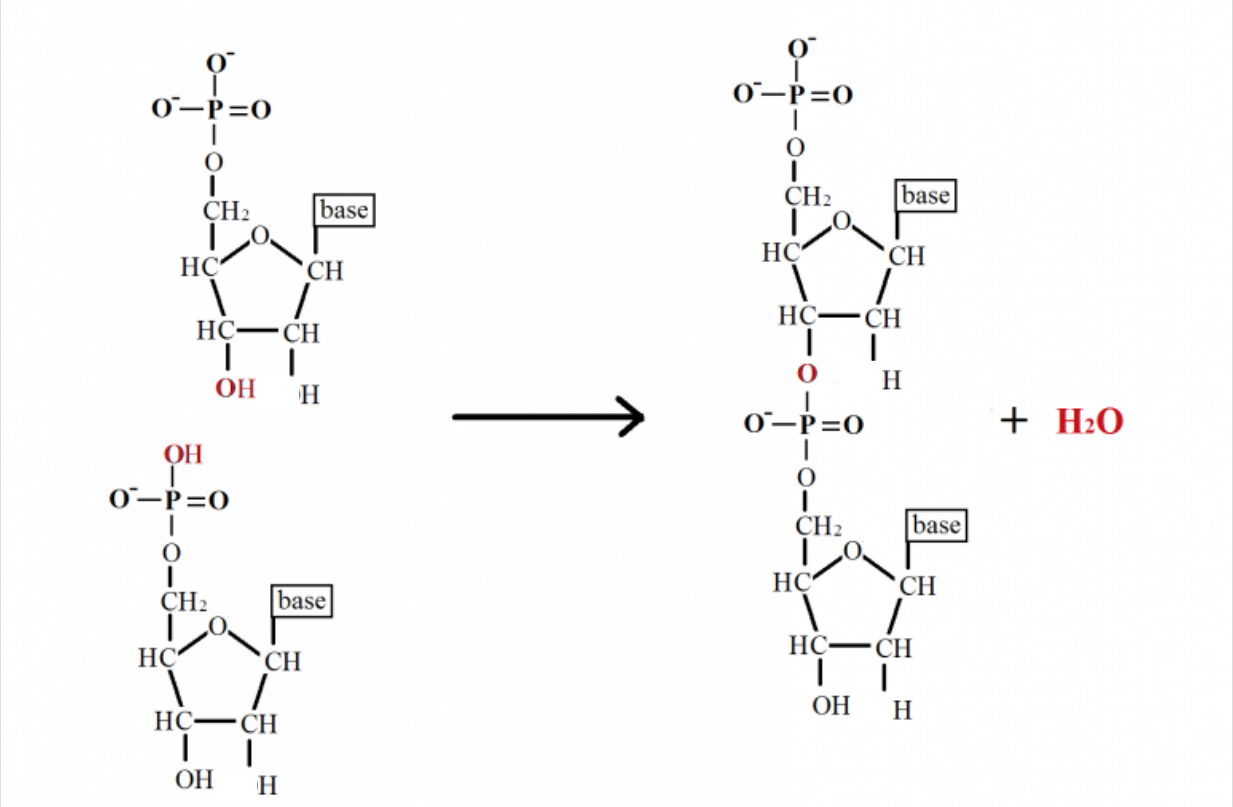
Which is the real strand of DNA?

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

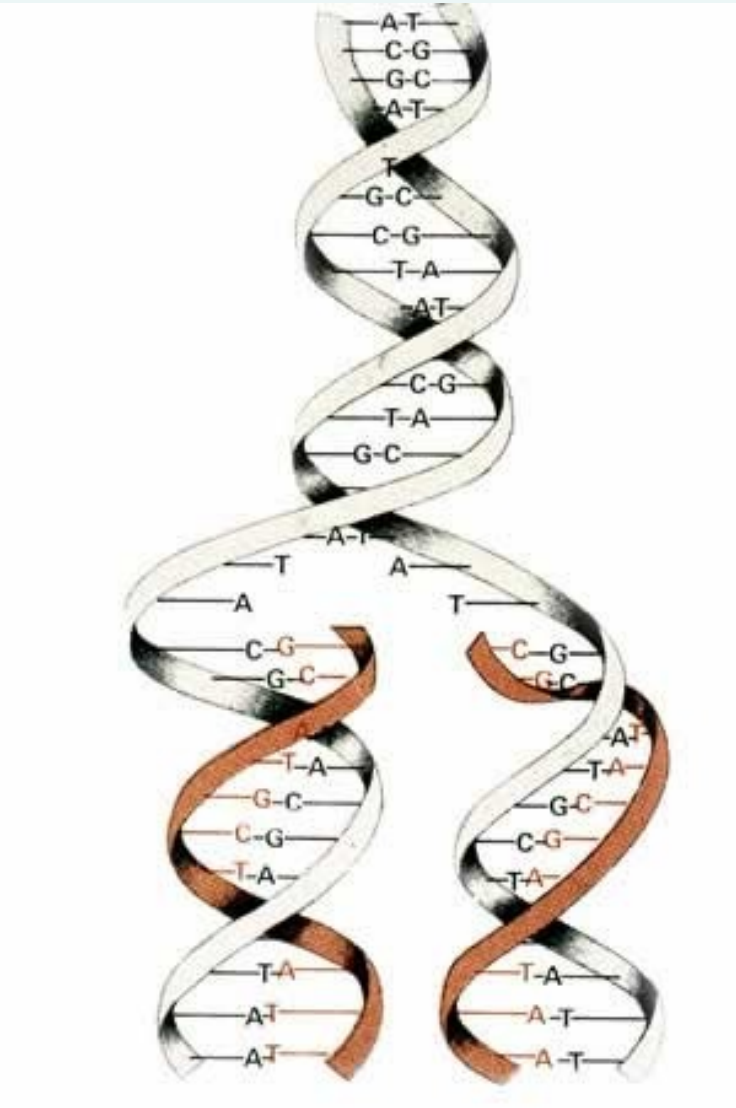
Structure of DNA

- double helix
- sugar & phosphate forms the backbone of ladder

-<u>Phosphodiester</u> bonds connect one sugar to the next phosphate

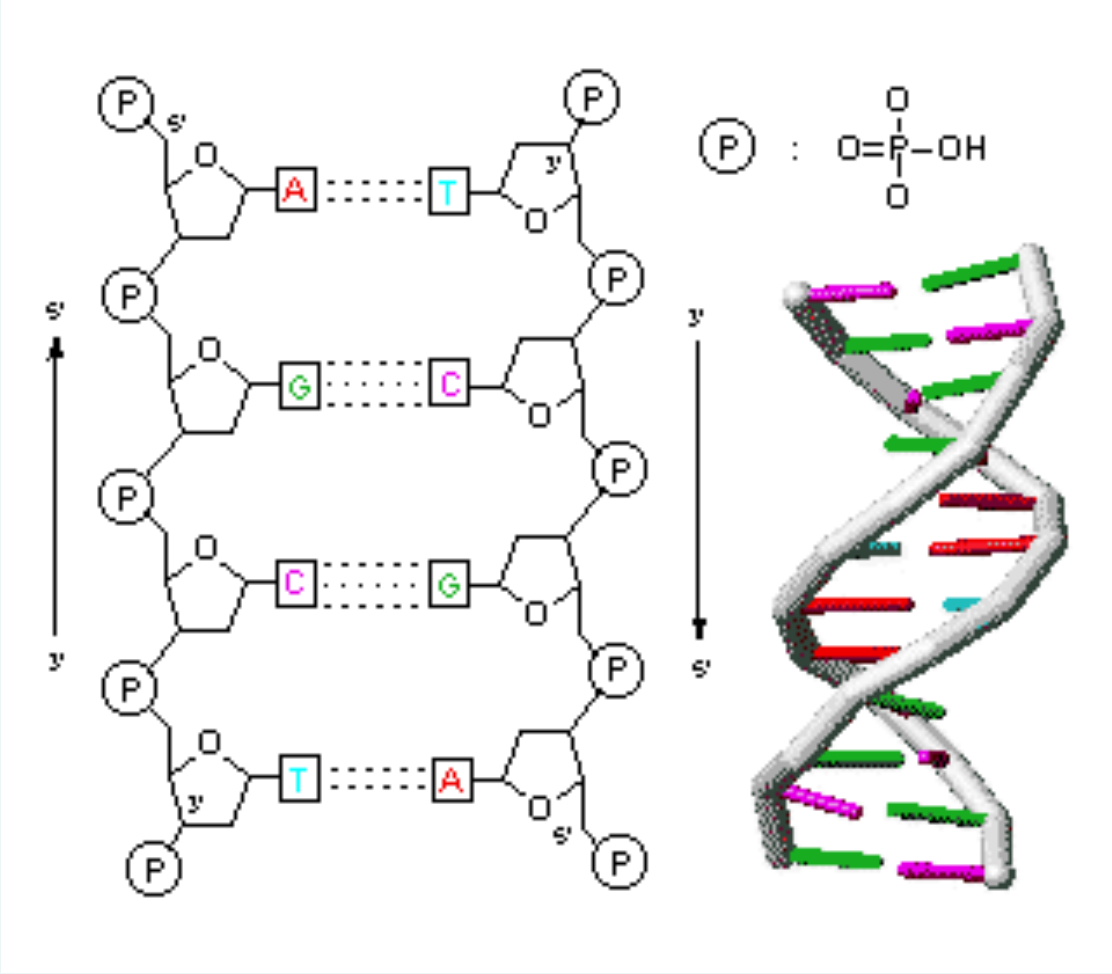


- nitrogenous bases forms the rungs



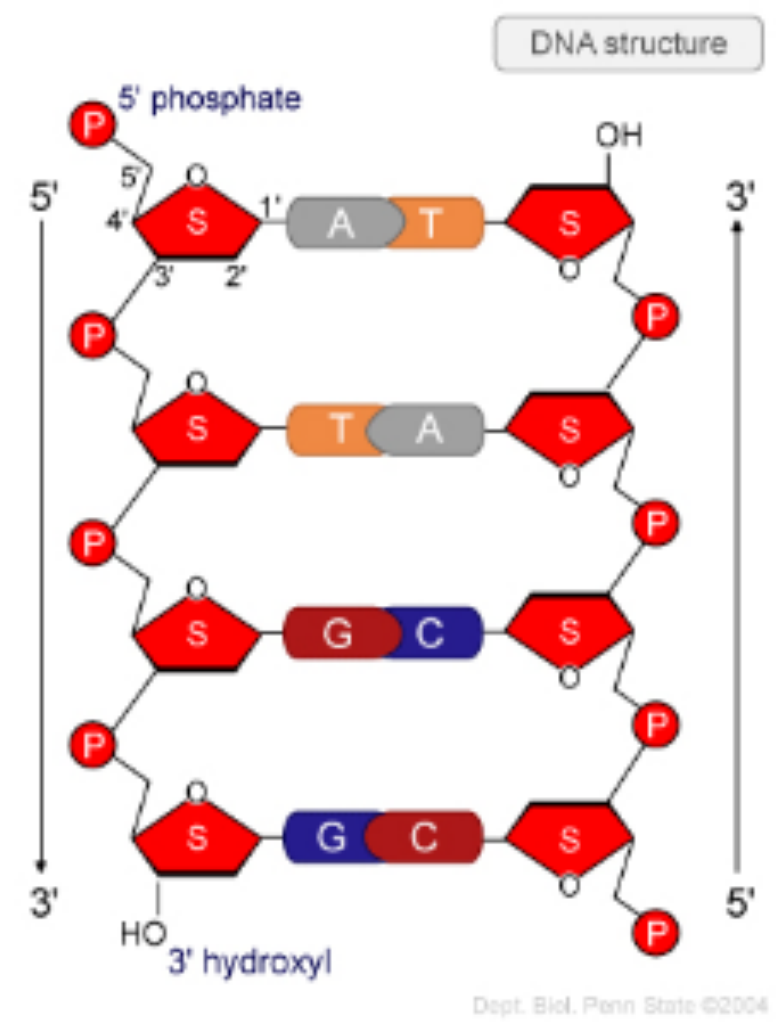
- hydrogen bonds hold nitrogen bases together

(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)

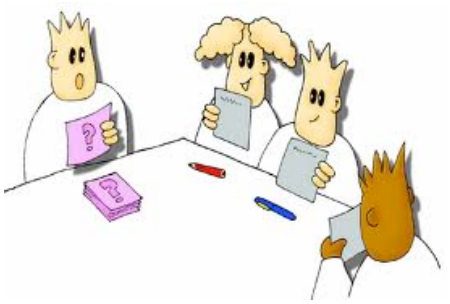


RNA STRUCTURE

DNA vs. RNA

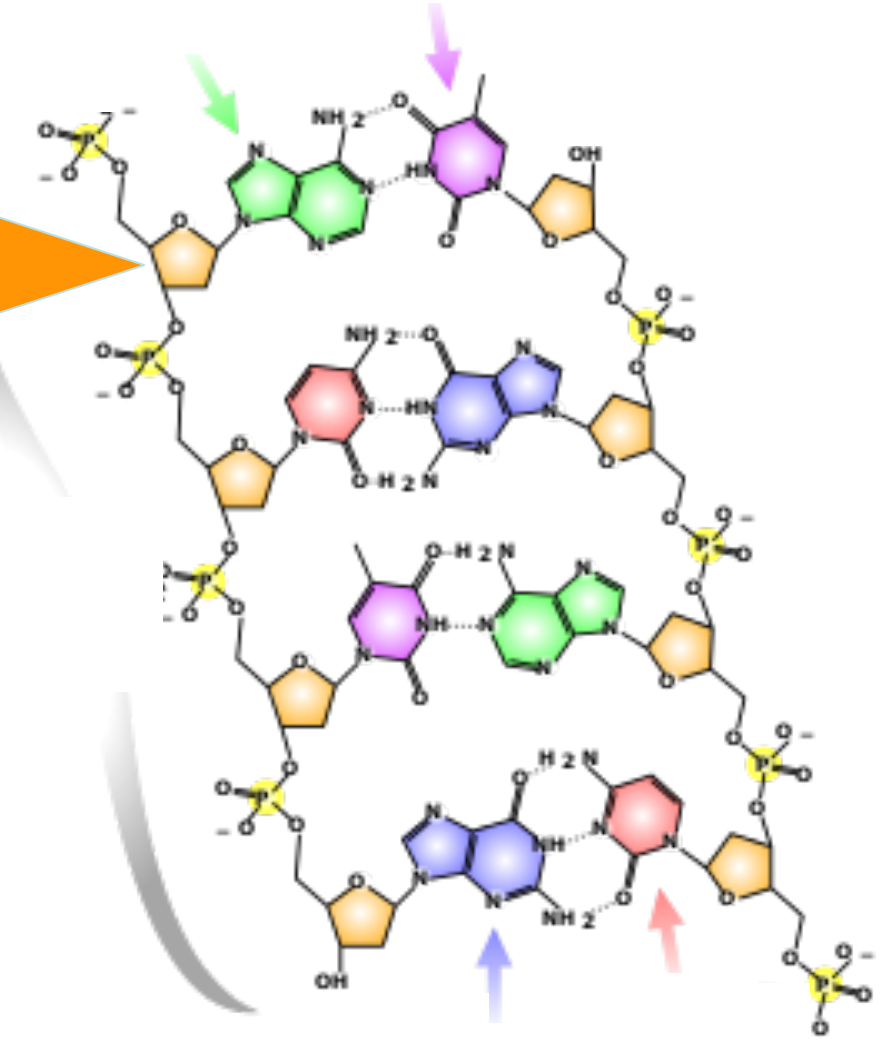
Double stranded

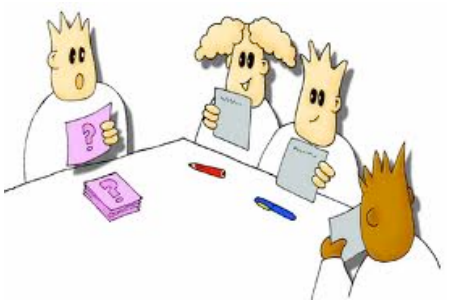
Single Stranded



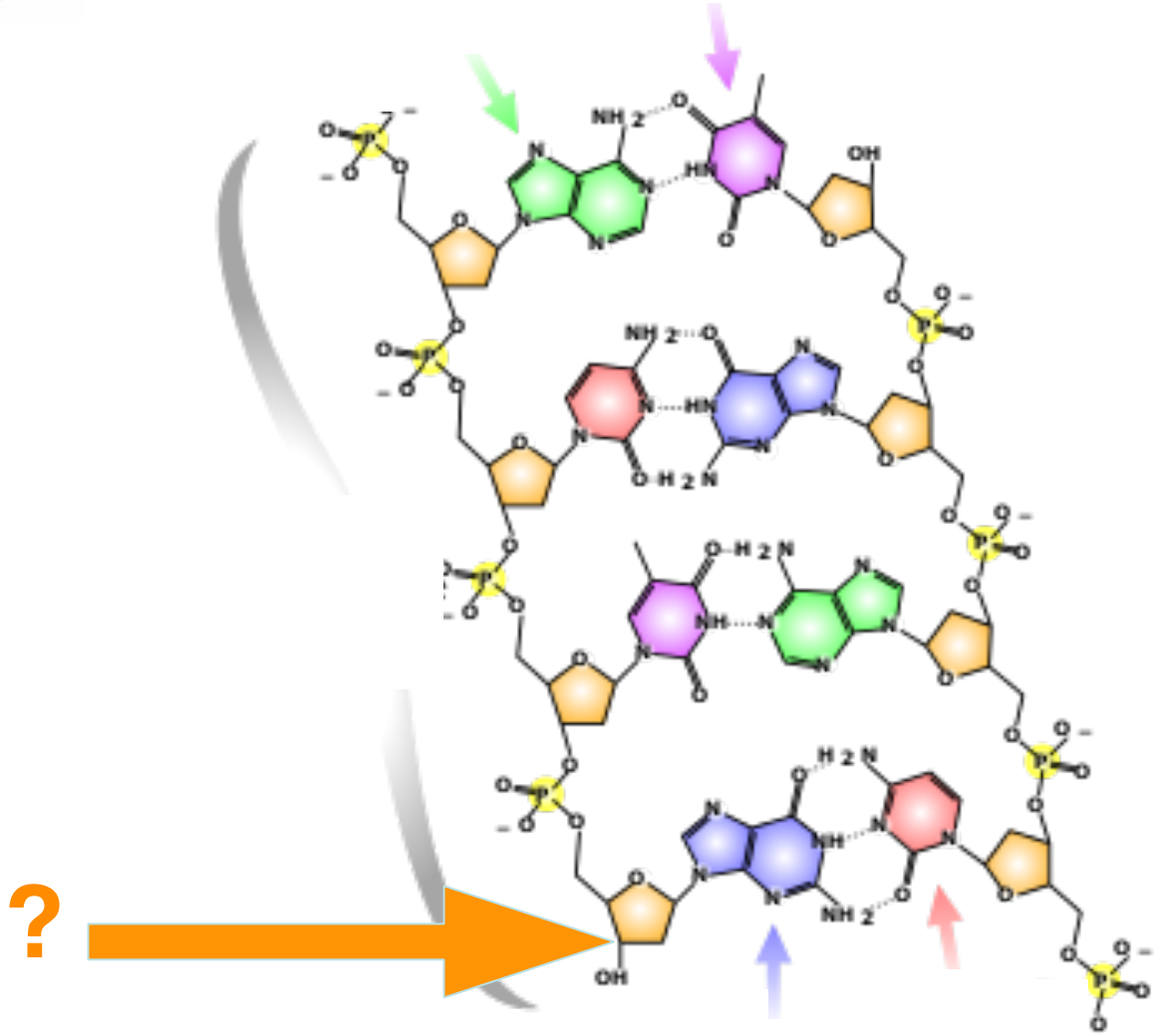
Identify the following structures

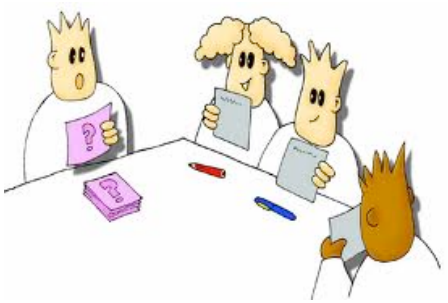
?



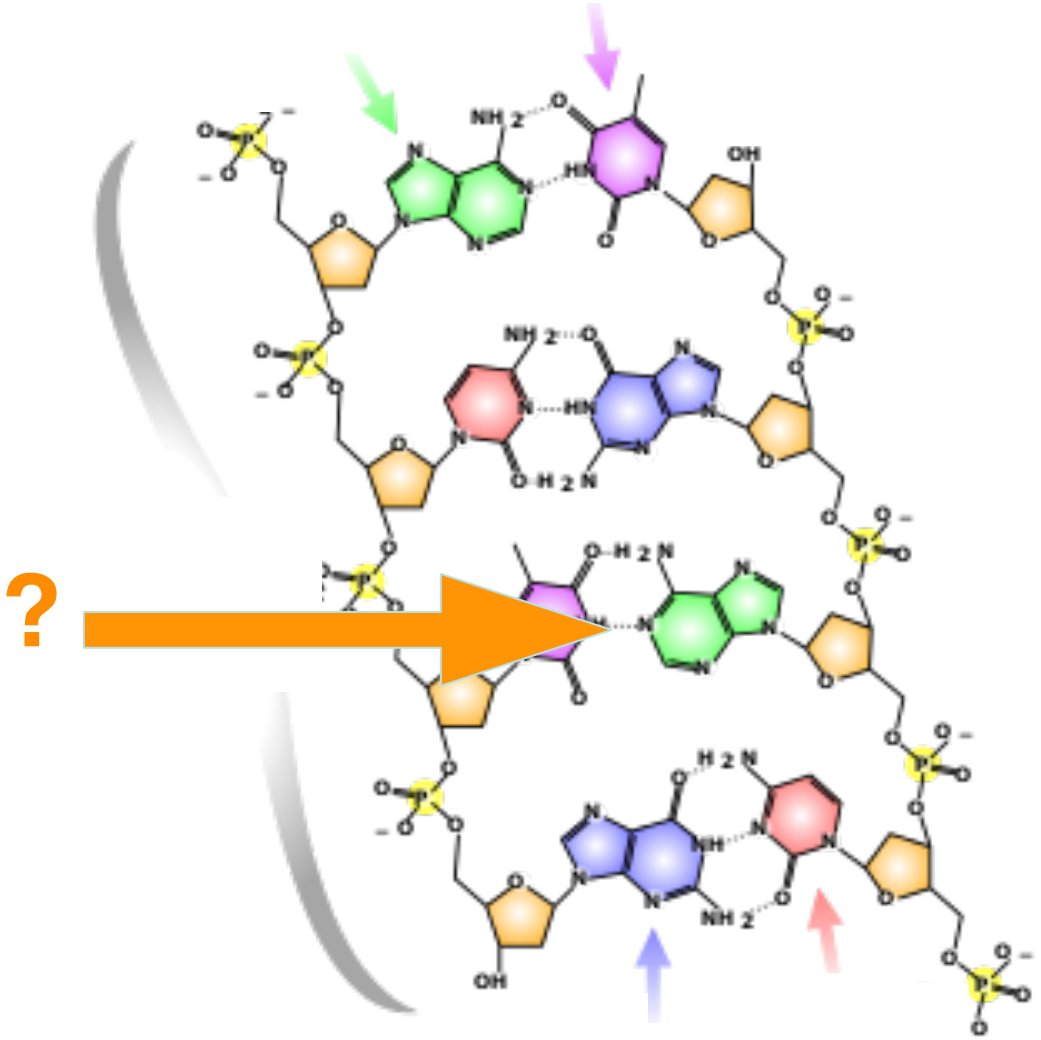


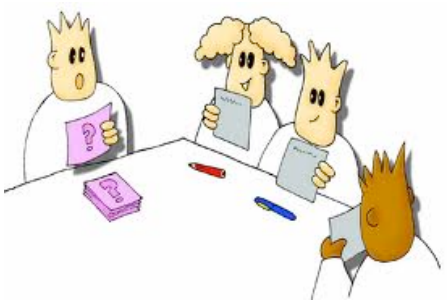
Identify the end.



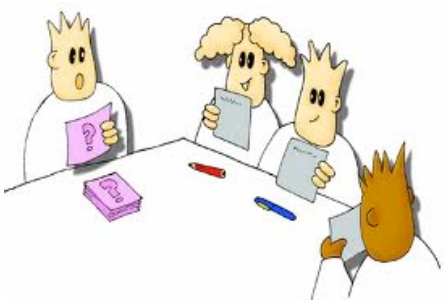


Identify the bond.

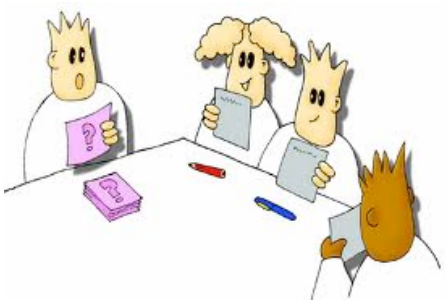




A **DNA** molecule consists of 32% Adenine. What percentage of the molecules is Cytosine?



A **DNA** molecule consists of 28% Thymine. The molecule is 1000 **BASE PAIRS** long. How many Thymine molecules if that?

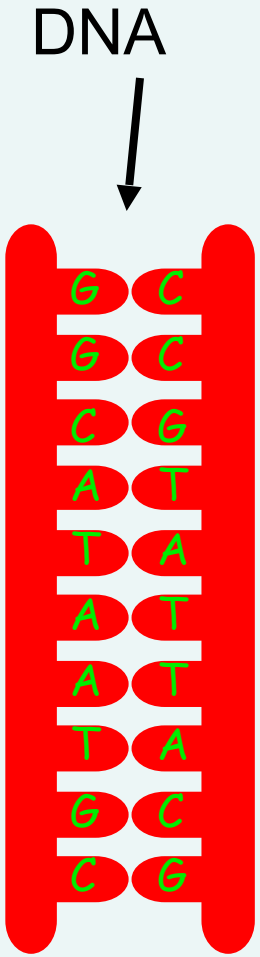


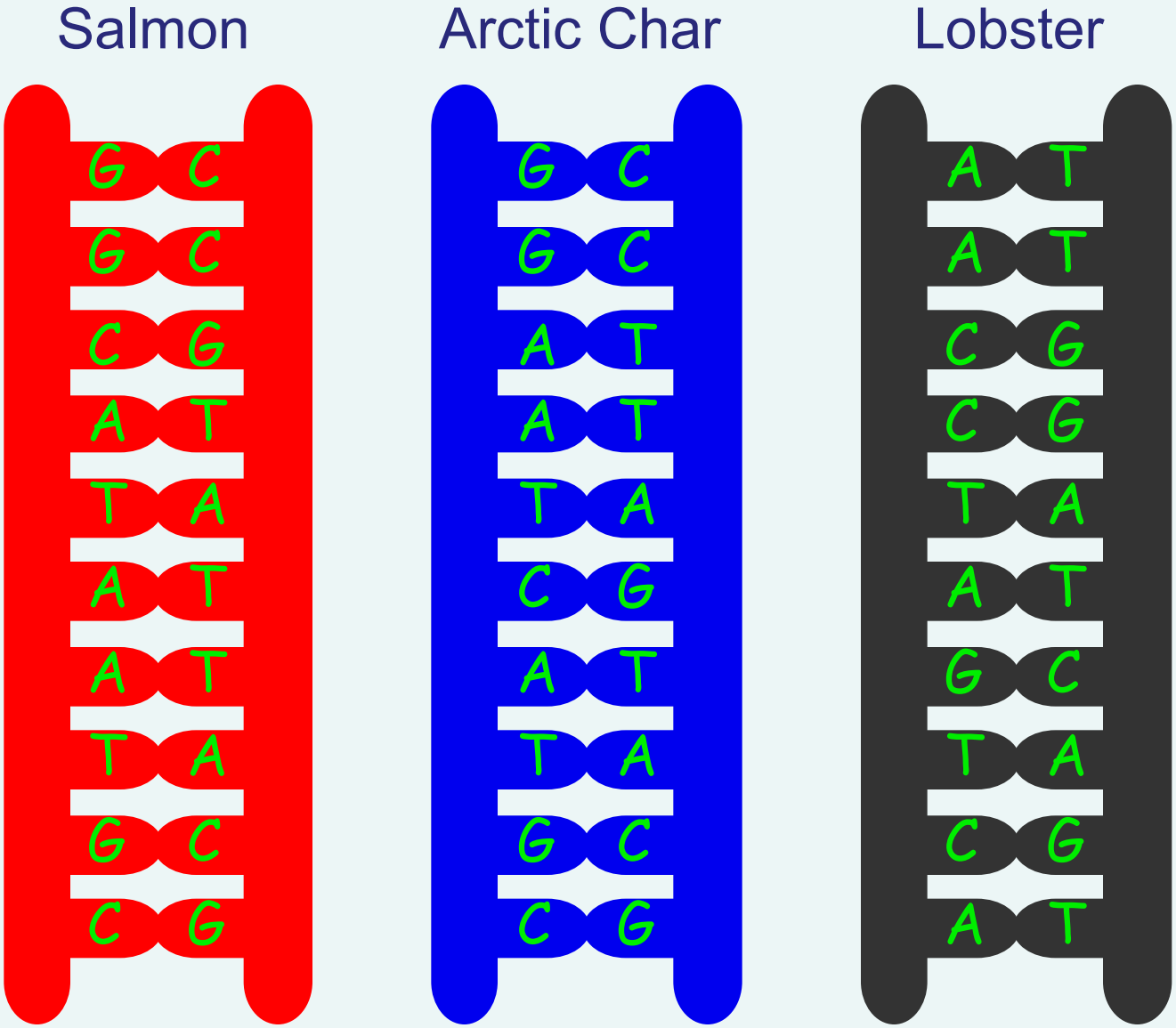
An **RNA** molecule consists of 15% Guanine. What percentage of Thymine is present?



Simply put….

- DNA is a set of instructions to make proteins
- The passing of information from nucleus to ribosomes is;
  DNA is converted to RNA ,which is sent to ribosomes to build proteins




Salmon
G C
G C
C G
A T
T A
A T
A T
T A
G C
C G
Arctic Char
G C
G C
A T
A T
T A
C G
A T
T A
G C
C G
Lobster
A T
A T
C G
C G
T A
A T
G C
T A
C G
A T

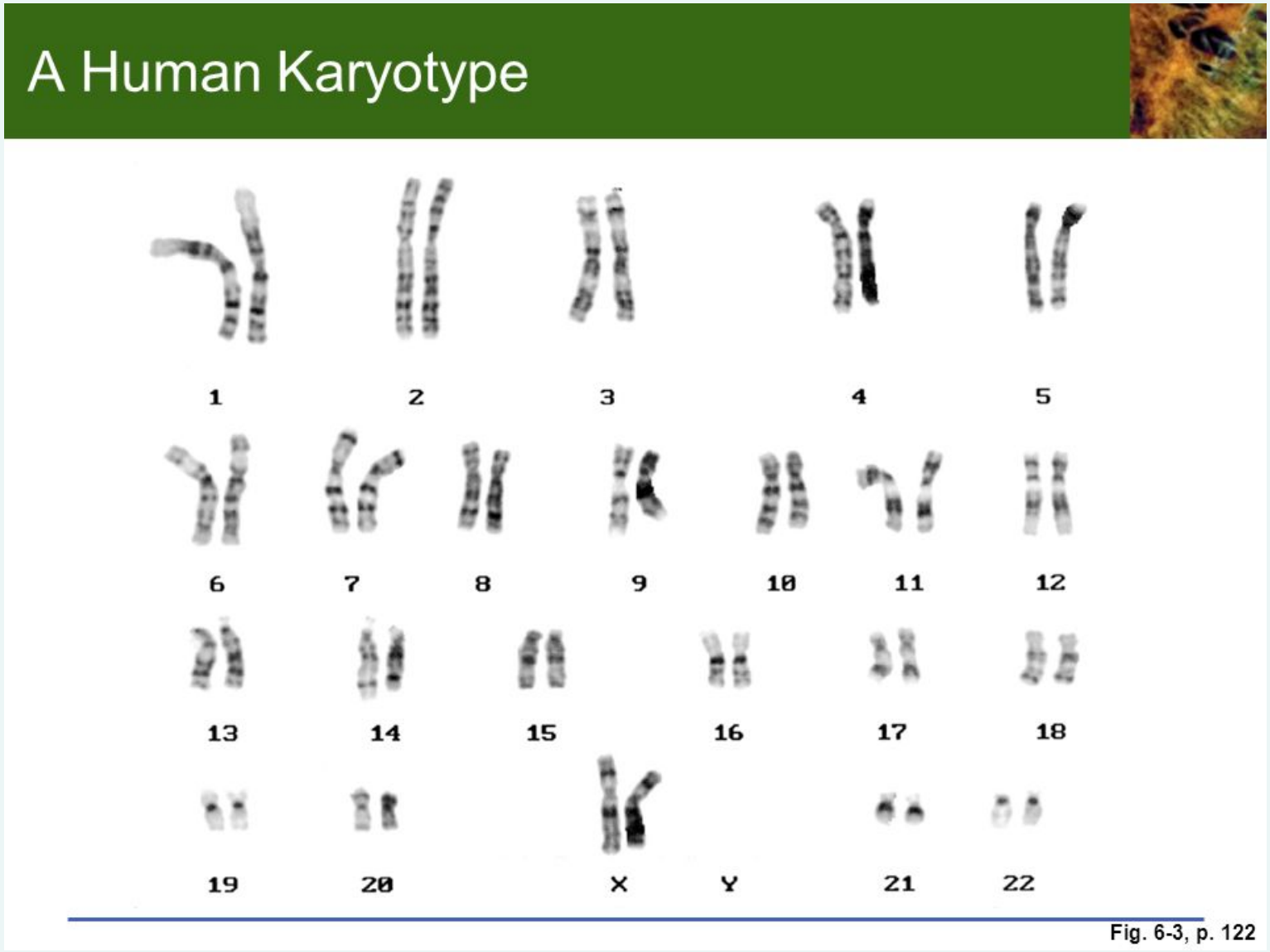
- All living things contain the 4 base pairs

- Number & order of nitrogenous bases is important in determining what the organisms is *(a fern vs a human vs a worm)*

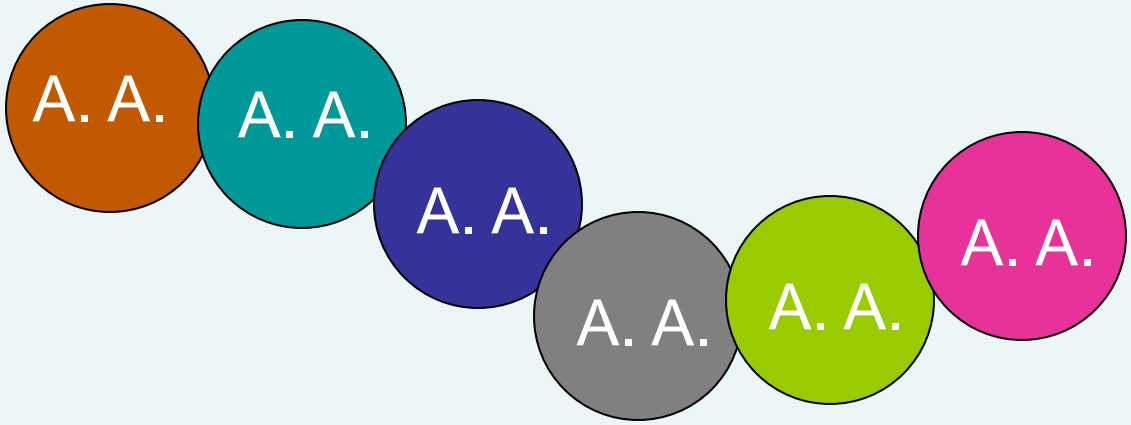
- Closer the species have closer matching the DNA

Human beta chain	0
Gorilla	1
Gibbon	2
Rhesus monkey	8
Dog	15
Horse, cow	25
Mouse	27
Gray kangaroo	38
Chicken	45
Frog	67
Lamprey	125
Sea slug (a mollusk)	127
Soybean (leghemoglobin)	124

Humans —> approximately 3.2 billion base pairs



- Sections of each chromosomes contain many sets of instruction for making proteins
- ***a set of instructions for a protein is a **gene**.
- ≈ 19,000-20,000 gene instructions in humans



DNA

A Musical Lecture by

Glenn Wolkenfeld

Let's Review DNA!

1. **Explain** is the role of the sugar and the phosphate groups in the structure of nucleic acids?

2. **Compare and contrast** DNA and RNA?

3. **Annotate** a diagram showing the linkage between two base pairs.

4. **List** the following terms in order of size: replicated chromosome, genome, gene, nucleus, chromatid, nucleotide

5. Complete the Data Based Questions on page 107 Based on Chargaff's Data and 109 on DNA Bases