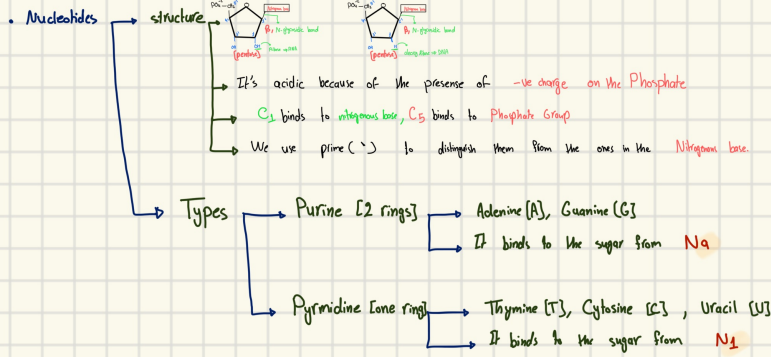
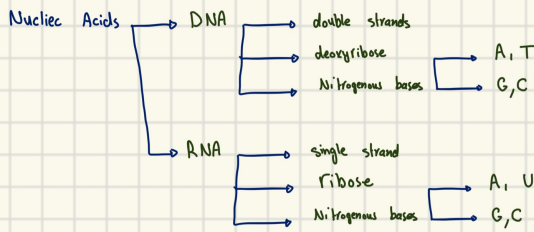


Nucleic Acids

- Nucleic acids are
 - Ribonucleic acid [RNA]
 - Deoxyribonucleic acid [DNA]
- They're linear polymers consisting of **nucleotides** via **phosphodiester bonds**.
- DNA is **cold**, it can be associated with proteins to form **chromosomes**.



- Normally in prokaryotes and eukaryotes the **DNA** is **double stranded**
 x but in viruses you can find single DNA or double RNA **RNA** is **single stranded**
 , in our study we focus on organisms from bacteria and higher

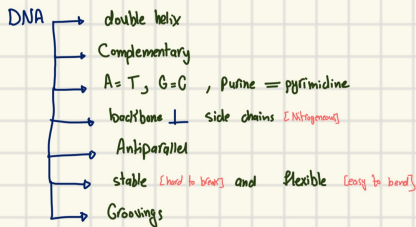


- Sugar + nitrogenous base = **nucleoside**
- Sugar + nitrogenous base + 1 Phosphate = **monophosphate nucleoside**
- Sugar + nitrogenous base + 2 Phosphate = **diphosphate nucleoside**
- Sugar + nitrogenous base + 3 Phosphate = **triphosphate nucleoside**
- nucleotide name**

- Nucleoside Names**
 - Adenosine ; adenylylate
 - Cytidine ; cytidylate
 - Guanosine ; Guanylate
 - Uridine ; Uridylate
 - Deoxythymidine ; deoxythymidylate

- Sequence of nucleotides in the DNA are normally presented **5' → 3'**
 and letter d can be added to indicate its a deoxynucleotide. **ribonucleotide : d(GACT)** or.
- Nucleotides are linked to each other via **phosphodiester bond** [C5 (sugar) bonded to phosphate] and C3]
 addition to DNA is always from the free end 3'

If the sequence is GATCC
 the sequence would be GCATC
 (the sequence of the strand is reversed)



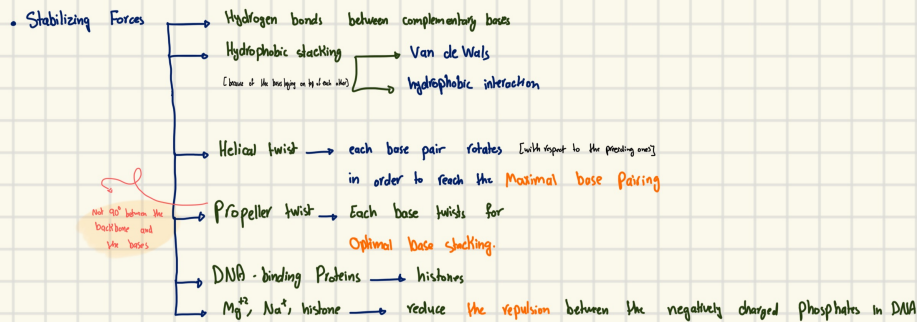
- Hydrogen bonds between the nitrogenous bases stabilize the structure [A ↔ T 2 bonds, G ↔ C 3 bonds]
 A = T, G = C
- Nitrogenous bases are **embedded** inside the helix [oriented inward]
 and the backbone [phosphate + sugar] are outside

- DNA in each cell is approximately 2m

- Grooves**: They are present in the DNA due to the helix structure
 and there's 2 types **major, minor grooves**
 - major groove allows the protein binding to the DNA

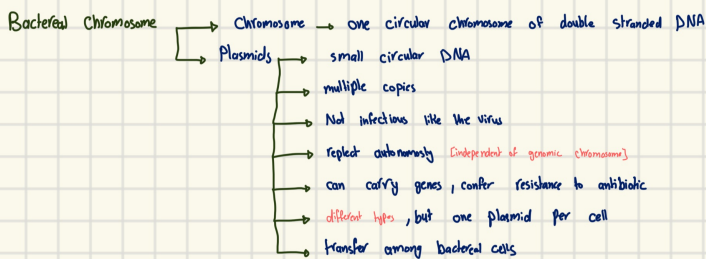
- Eukaryotes DNA is coiled to package the large DNA
 - complexed with **proteins** mainly histones
 - Chromatin = **DNA + protein**
 - The structural unit of chromatin is **nucleosome**
- Histone core structure is **octamer** [2 molecules of H2A, H2B, H3, H4]
 - Octamer + DNA wrapped + **H1** = Chromatosome
 - sealing and stabilizing
- Free DNA is called DNA linker; it connects 2 nucleosomal core particles to form the nucleosome
- The DNA makes **2 turns** around the histone
- DNA is negatively charged, histones are positive charge → Facilitating DNA interactions and charge neutralization
 - electrostatic interaction
- Even though, all cells have the same genes; they don't function in the same way. cuz they differ in the active segments.

- + Histone 1 → More tight → heterochromatin [inactive]
- Histone 1 → More relaxed → euchromatin [active]



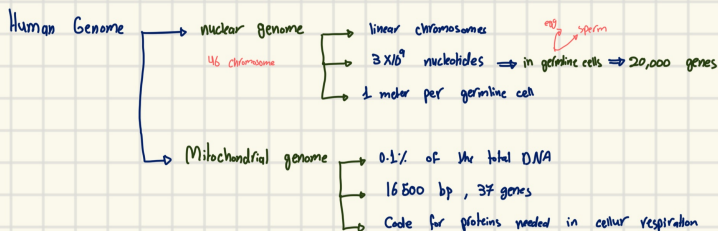
Genome: ^{Total collection of DNA} Total genetic material in a living being [specifying individually, cells]

Prokaryotes lack a Nucleus and other organelles
Eukaryotes have a truly Nucleus



• E-coli bacteria has 4×10^6 bp [2mm] DNA; 4200 genes

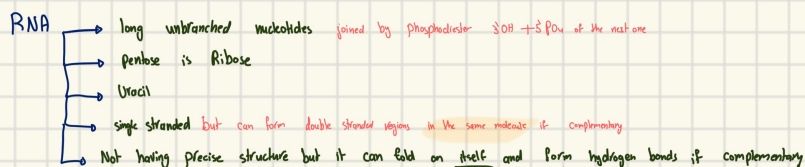
- single circular double stranded DNA



Germline cells → haploid → 1 copy of each chromosome [Mitochondrial OR Paternal]
Somatic cells → diploid → 2 copies of each chromosome [Mitochondrial AND Paternal] → homologous chromosome

Chromosome

- chromatid
- sister chromatids



• Some RNAs act as enzymes they're called Ribozymes