Talent
Education

BIO130H: Molecular & Cell Biology

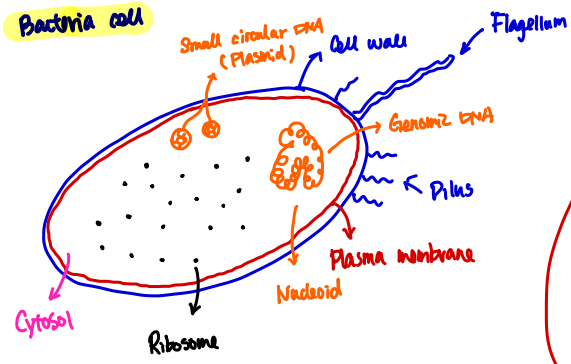
Week 1

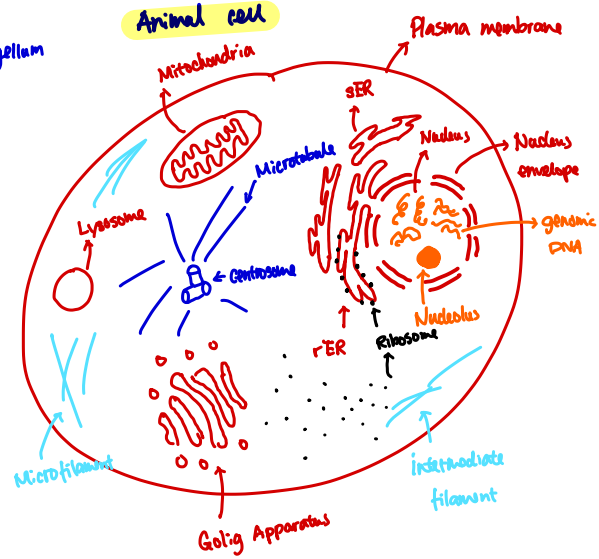
BIOB30H Winter 2021 Week 1

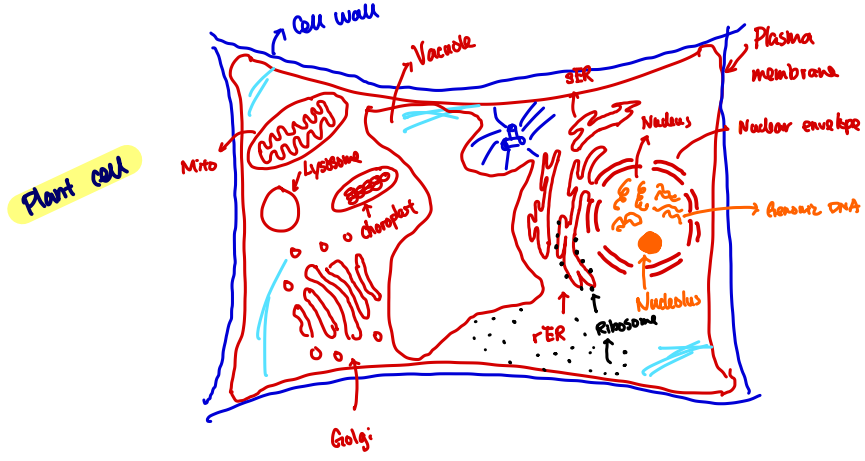
1 Types of cells

- (Eukaryotes
  ↳ 真核细胞
  - Do have nucleus
  - Single-celled . Multicellular
  - Ex. Animals. plants . fungi.

- (Prokaryotes
  ↳ 原核细胞
  - Don't have nucleus
  - Single cell
  - Eg. Bacteria archaea.







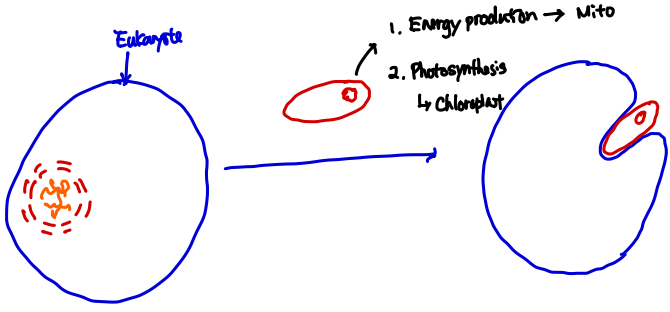
2. Evolution path

prokaryotes ⟶ Eukaryotes

1. Geological evidence

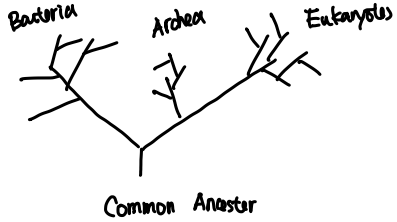
↳ Fossils : Prokaryotes appeared 1 billion years before eukaryotes

2. Mito, chloroplast → Endosymbiont.



Supporting evidence:

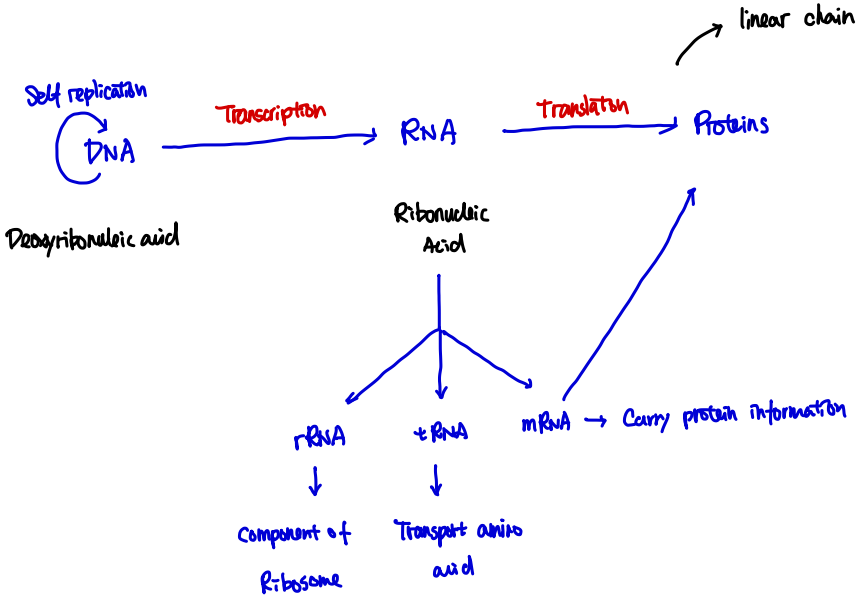
1. Mito and chloroplast have their own genomic DNA (circular) which is similar to prokaryotes
2. Mito and chloroplast have their own protein synthesis, DNA synthesis, and transport machinary.
3. Mito and chloroplast have double membrane
   - ↳ Inner and outer membrane compositions are different.
   - ↳ Engulfed by eukaryotes to acquire double membrane.



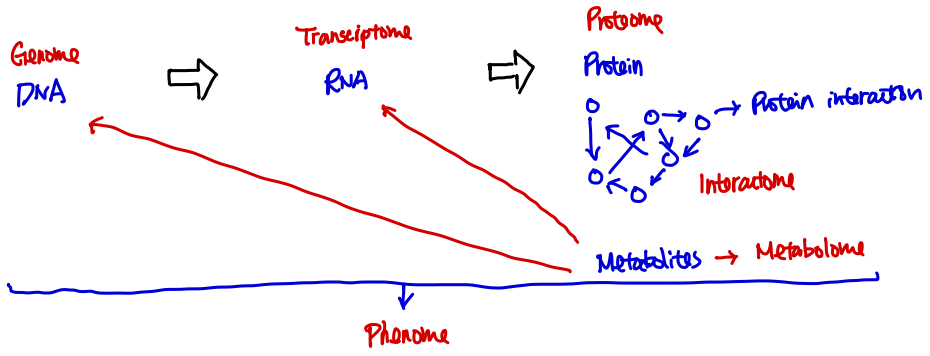
3. Methods to study

- Biochemical approach
- Electrochemical approach
- Model organisms
  - ↳ Rapid development and short lifespan.
  - ↳ Small adult size
  - ↳ Readily available
  - ↳ Tractability → ease of manipulation and modification
  - ↳ Understandable genetics.

4. Information flow → Central Dogma

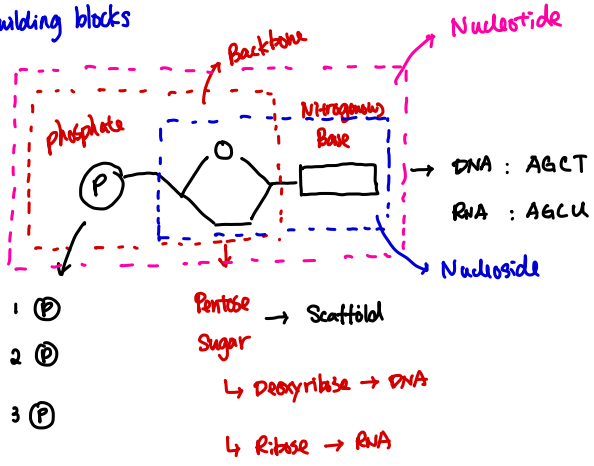


-ome (組, 集合)

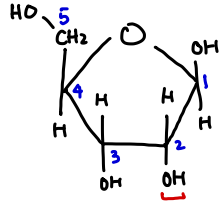


5. Nucleic Acid

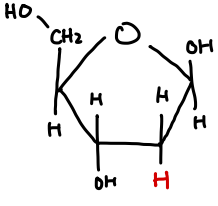
- Building blocks



- Pentose sugar



Ribose

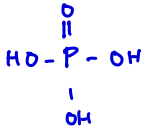


2-deoxyribose

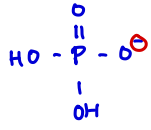
- Phosphate

H_3PO_4

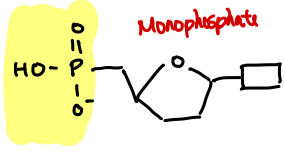
↓



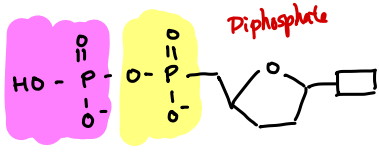
Dissociation →



Negative charge



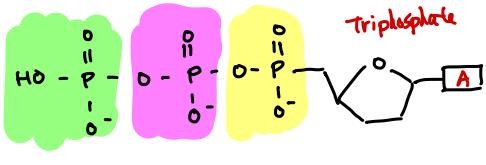
Monophosphate



Diphosphate

Charge of DNA

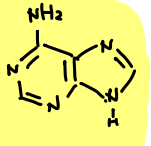
Negative charge



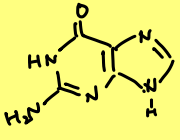
Triphosphate

→ ATP

- Nitrogenous Base

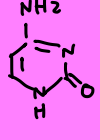


Adenine



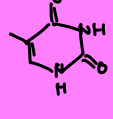
Guanine

Purine

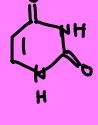


Cytosine

Deamination →



Thymine



Uracil

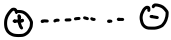
Pyrimidine

DNA : A . G . C , T → dNMP , dNDP , dNTP

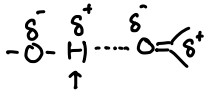
RNA : A . G , C , U → NMP , NDP , NTP

6. Intermolecular Interaction

1. Electrostatic Interaction



2. Hydrogen bond

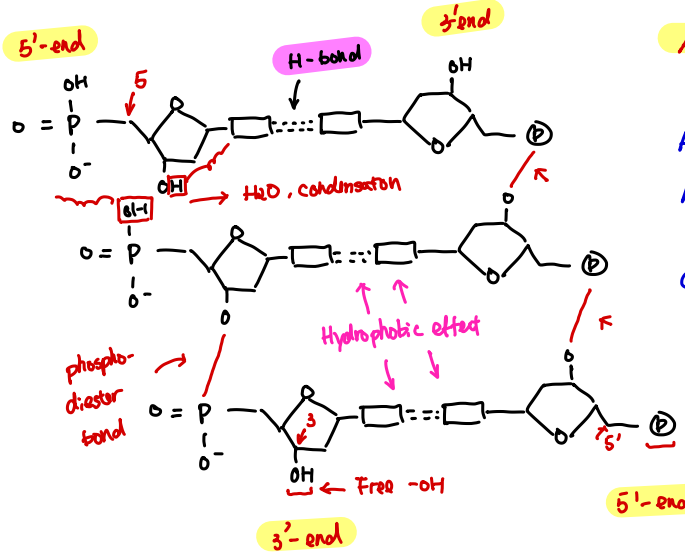


3. van der Waal

4. Hydrophobic effect

→ Individual interaction is generally weak, But, they can sum up to generate strong binding force.

7. DNA Structure



A = T
A = U
→ 2 H-bond

C ≡ G → 3 H-bond