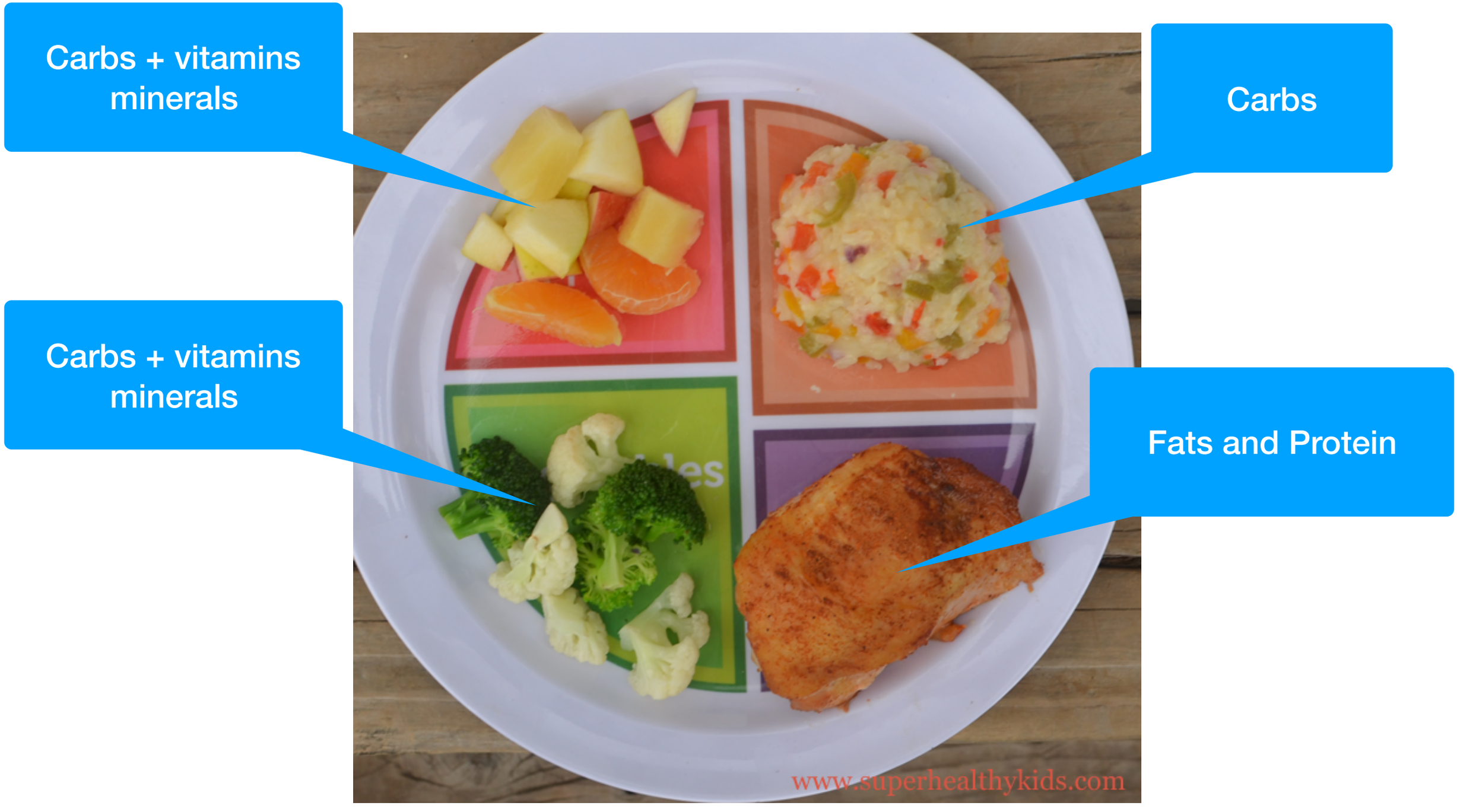
Molecules of Metabolism



Molecular Biology

Molecular biology explains living processes in terms of the chemical substances involved.

DNA (a nucleic acid) - Watson and Crick's discovery of structure lead to a Revolution in Biology to study biological molecule.

Biochemical molecules are largely **CARBON** based

- Carbohydrates made of carbon and water (building blocks :sugars)
- Lipids made of C and H2O mostly (building blocks: fatty acids)
- Proteins made of C, H, N, O, (S) (Amino acids)
- Nucleic acids made C, H, O, N, P (Sugar in nitrogenous bases)

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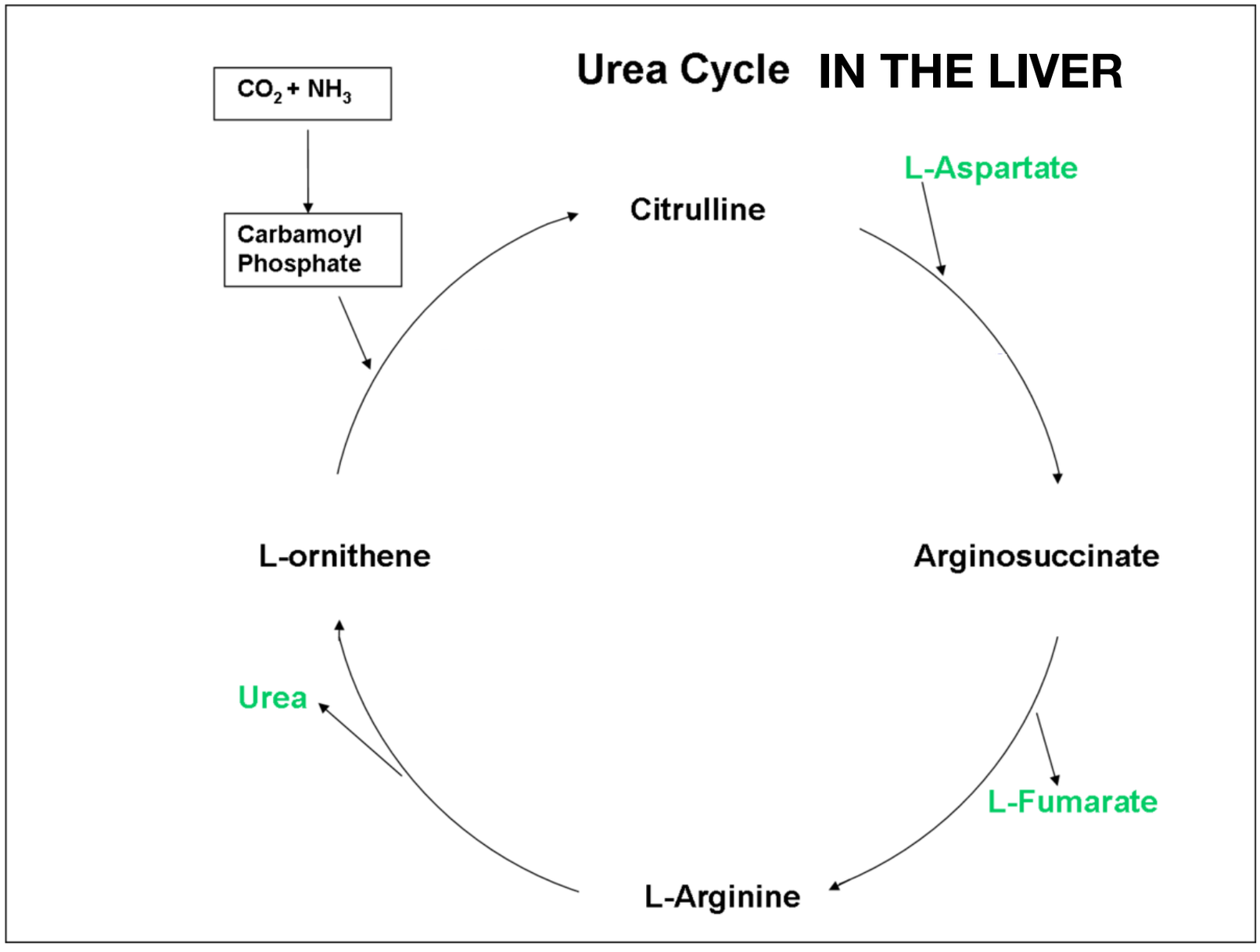
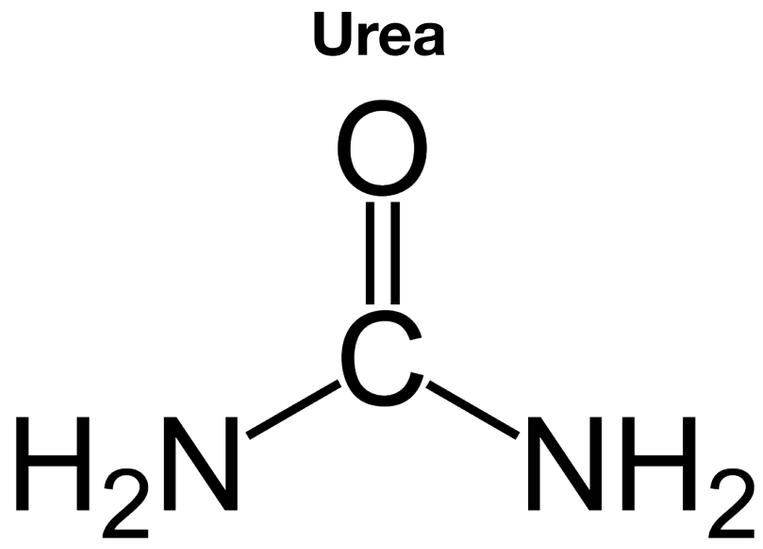
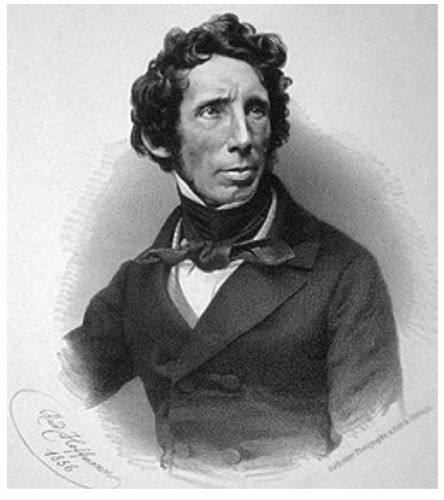


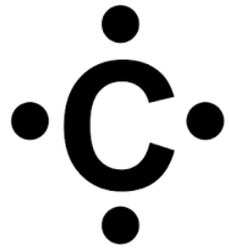


Friedrich Wöhler disproves theory of Vitalism



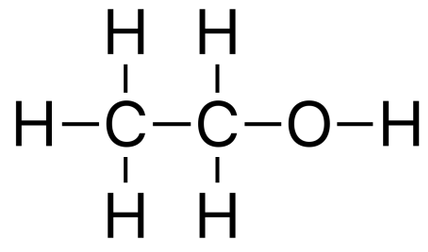
Biochemical molecules are largely **CARBON** based

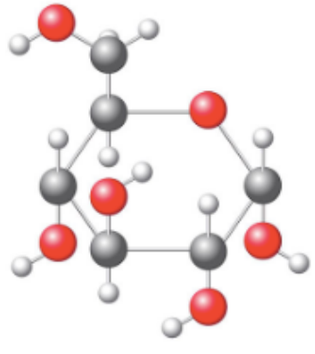
Carbons atoms forms 4 covalent bonds (molecular compounds)

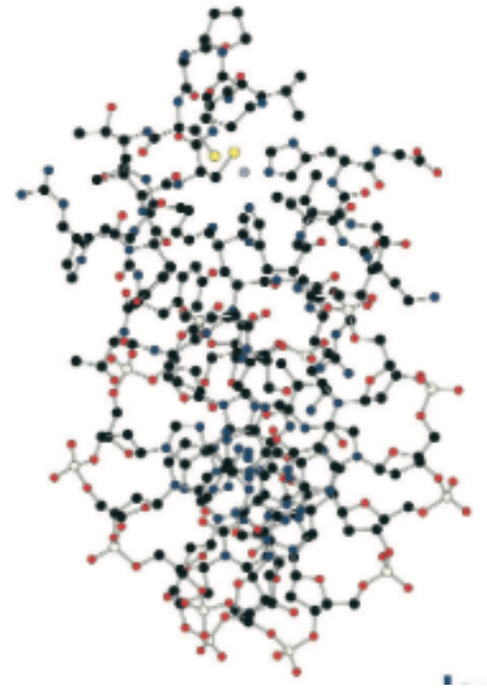


- sharing electrons
- the strongest bonds in biological systems

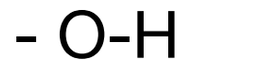
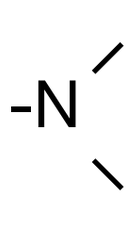
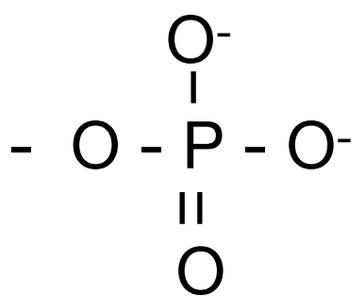
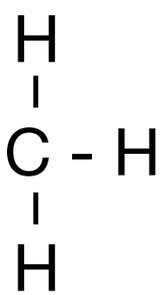
Carbon compounds are diverse in nature







Molecular common molecular groups to know

	Molecular drawing	Simplified notation
Hydroxyl		-OH
Carboxyl		-COOH
Amine		$-NH_2$
Phosphate		$-PO_4^{2-}$
Methyl		$-CH_3$

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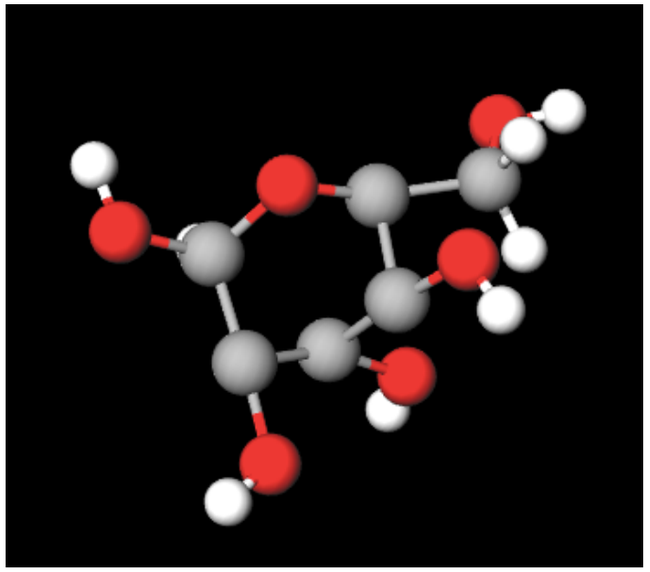
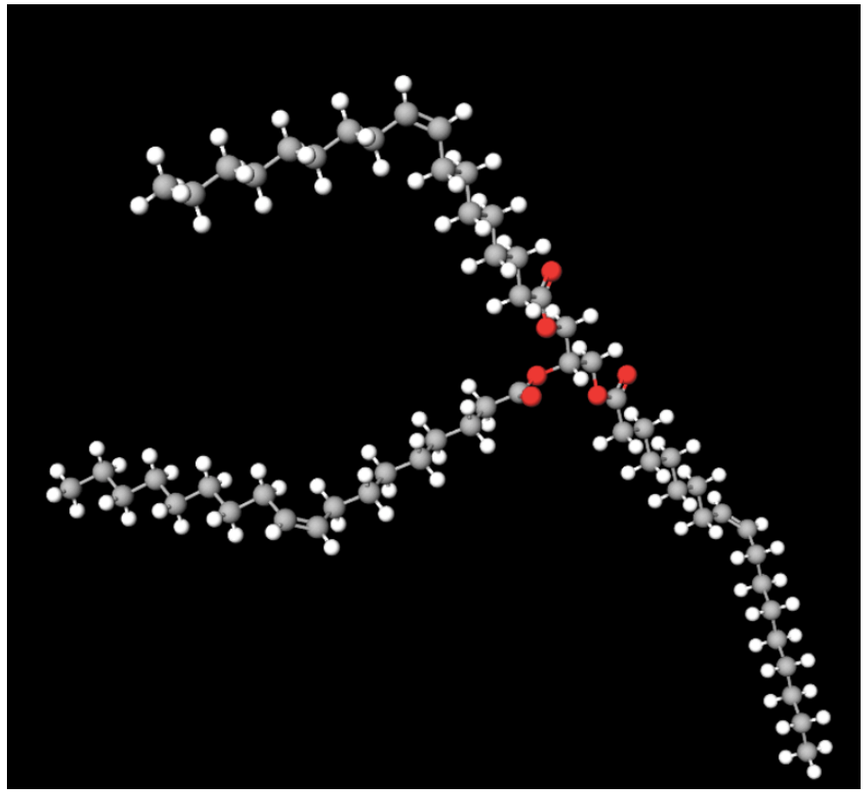
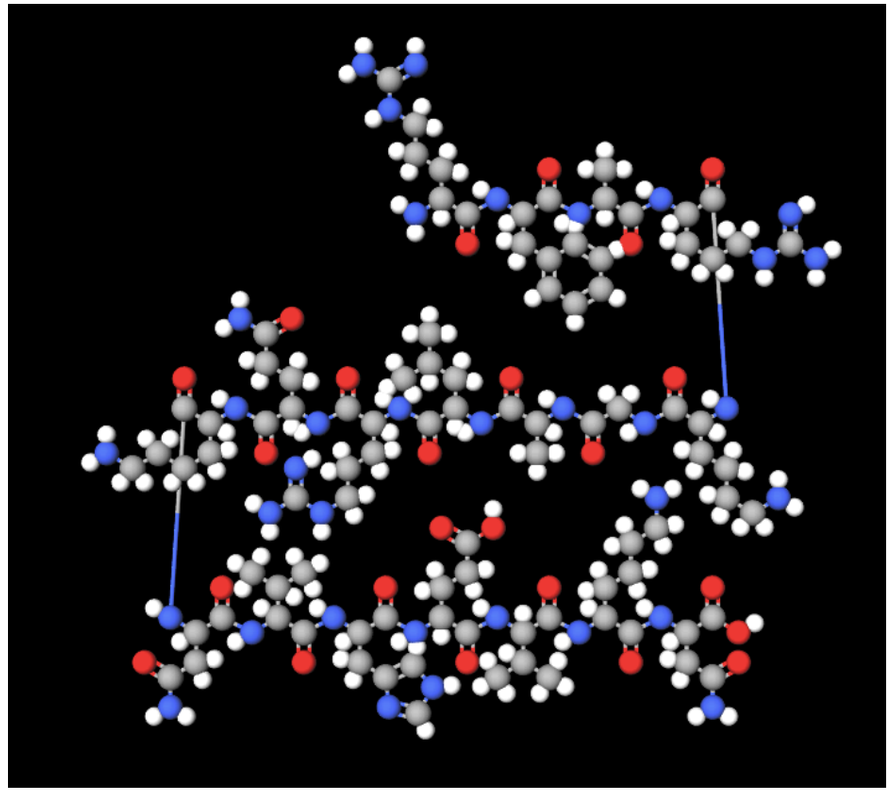
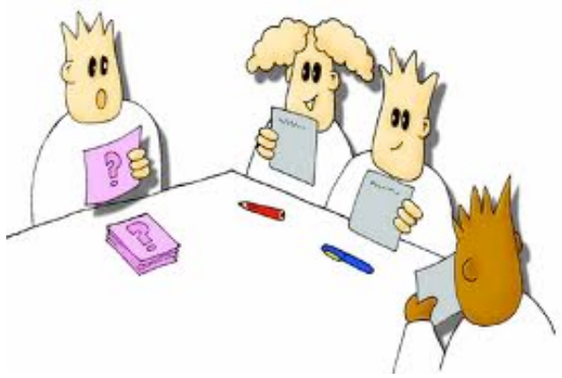
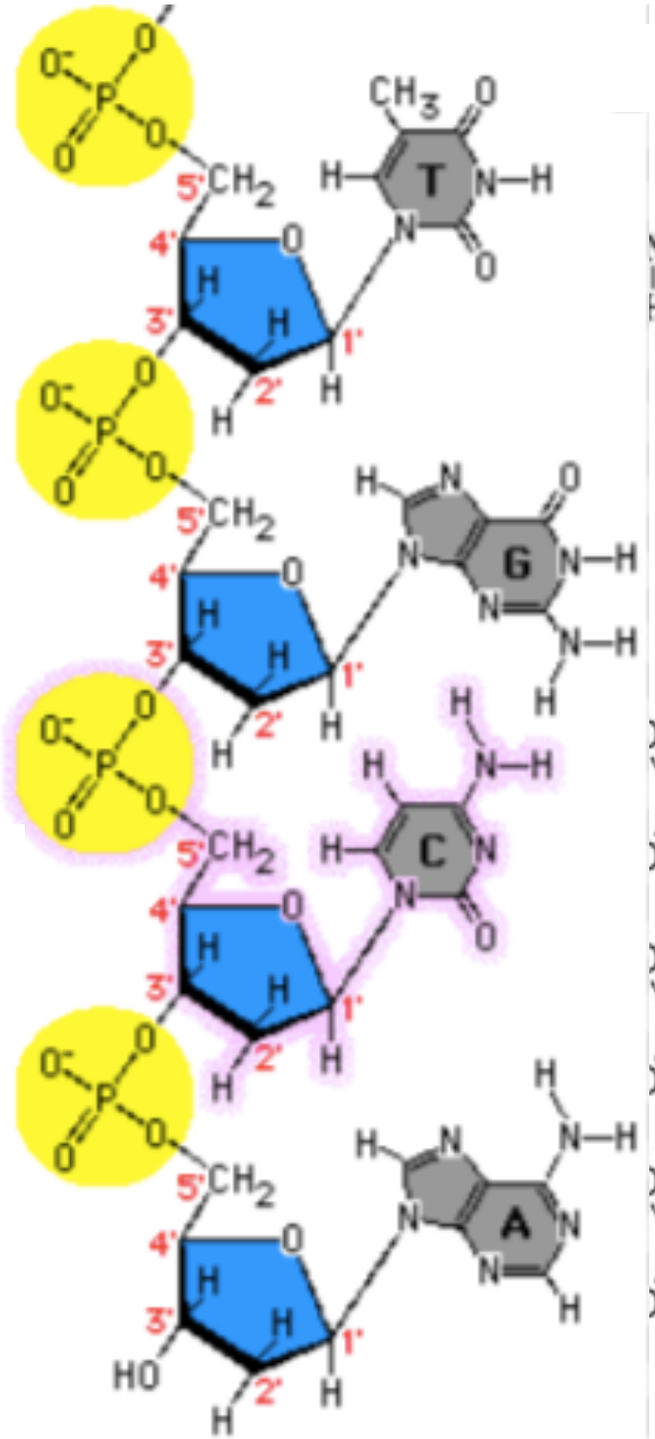


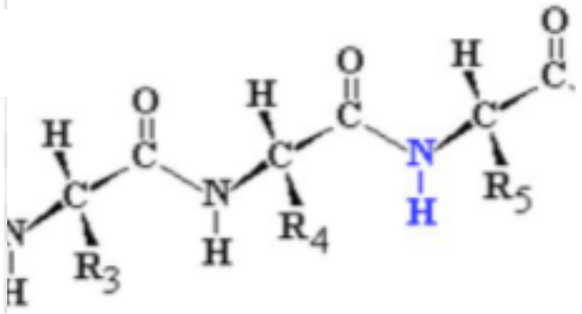


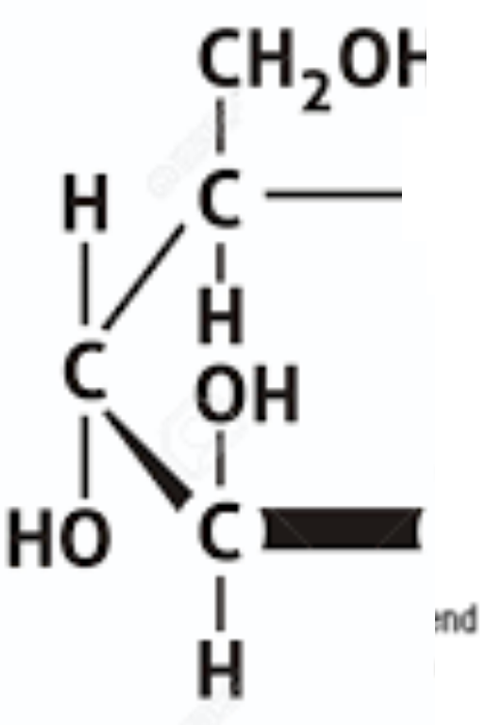




Which of the four biological moles is it?

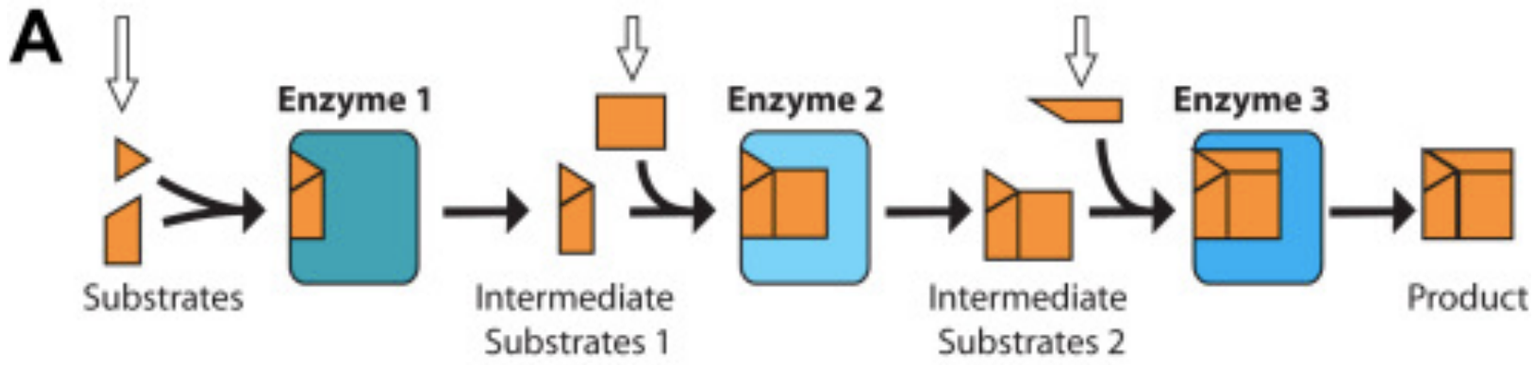






Metabolism

Is the web of all biological pathways and reactions in living things.

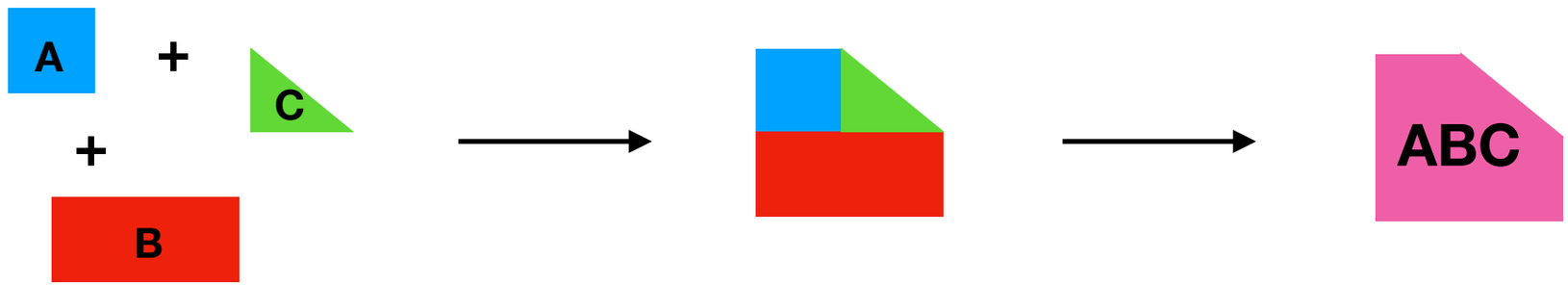


- enzyme driven reactions eg. digestion (extracellular)
  cellular respiration (intercellular)

- multi-stepped processes ie hundreds to thousands of reactions.

Anabolism

The synthesis of complex molecules from simpler molecules



eg. Building protein (ribsomes)

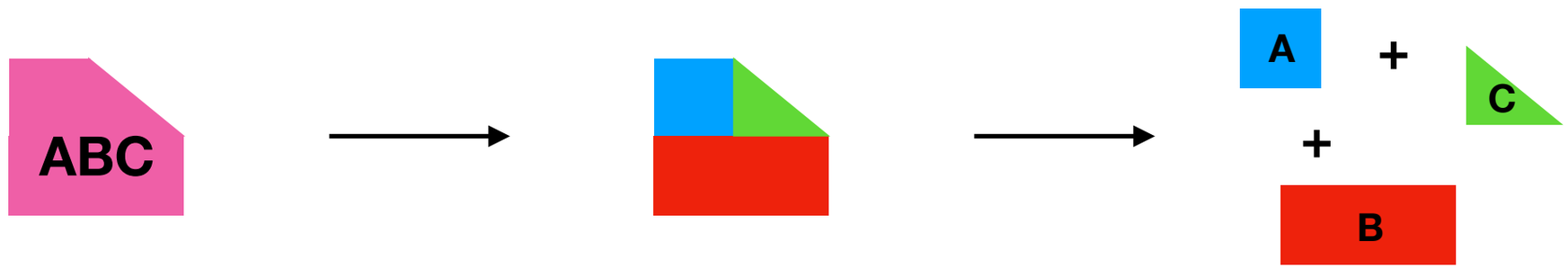
Photosynthesis in chloroplasts (CO_2 +H_2O —> $C_6H_{12}O_6$)

DNA replication (making copies during mitosis)

Build of complex carbohydrates from simple sugars

Catabolism

The breakdown of complex molecules into simpler molecules



eg. Digestion of food in the mouth, stomach and small intestine

Cellular respiration ($C_6H_{12}O_6 \rightarrow CO_2 + H_2O$)