LIPIDS

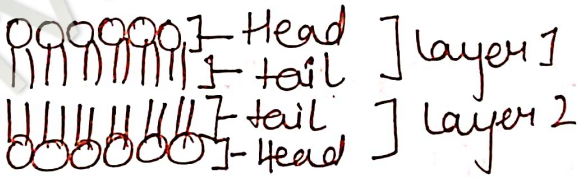
→ Lipids are large and diverse group of naturally occurring organic compounds that are soluble in non-polar organic solvents. (e.g. ether, chloroform, acetone and benzene) and generally insoluble in water.

→ They are all esters of moderate to long chain fatty acids including fats, waxes, steroids and oils.

Importance:

→ Cell membrane is bilayered with a type of a lipid called as phospholipids. ~~Phospholipids with a type of~~ a

→ Phospholipids have a head that is polar and attract water (Hydrophilic) and have two tails that are non-polar and do not attract water (hydrophobic)



(i) FATTY ACIDS :-

→ They are building blocks of lipids. Fatty acids are composed of a chain of methylene groups with a carboxyl functional group at one end.

→ General formula of fatty acids is

$$CH_3(CH_2)_nCOOH$$

→ The fatty acid chains are usually between 10 and 20 carbon atoms.

→ The fatty "tail" is non-polar (Hydrophobic) while the carboxyl "head" is litter polar (Hydrophilic)

→ Fatty acids can be saturated (they have as many hydrogen bonded to their carbons) or it can be unsaturated (with one or more double bonds connecting their carbons, hence fewer hydrogens.

Eg:-

$CH_3-(CH_2)-COOH$ — Palmitic acid

$CH_3-(CH_2)_{16}-COOH$ — Stearic acid

Saturated fatty acids

$CH_3(CH_2)_7CH=CH(CH_2)_7COOH$ — Oleic acid

$CH_3(CH_2)_4CH=CHCH_2CH=CH(CH_2)_7COOH$ — Linoleic acid

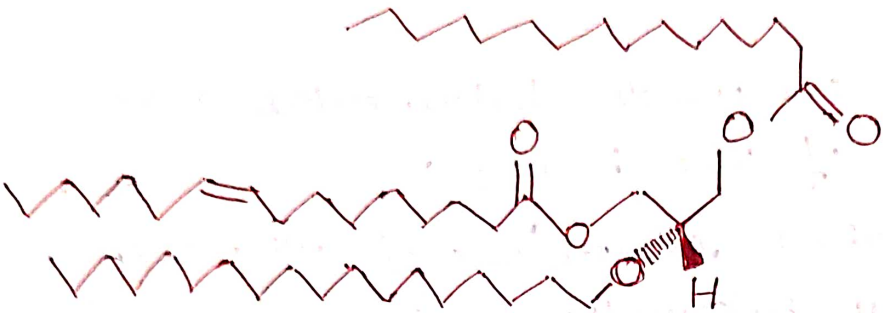
Unsaturated fatty acids

(ii) Triglycerides :-

— Triglycerides are lipids obtained from food sources of fat such as cooking oils, butter & animal fats.

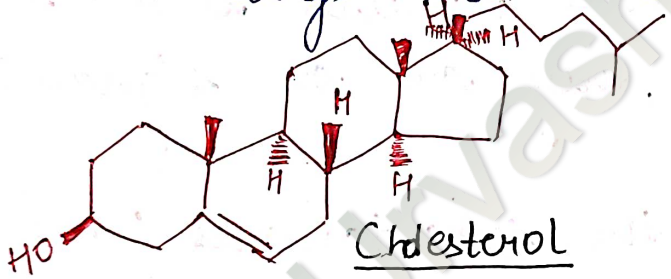
→ These are monomers of lipids containing

fatty acids linked by a molecule of glycerol. They are energy storage molecules.



A triglyceride

(iii) Steroids:- A steroid is a type of organic compound that contains a specific arrangement of four cycloalkane rings that are joined to each other.



Cholesterol

Eg:- Cholesterol, estradiol & testosterone.

(iv) Waxes:- Waxes are composed of a single, highly complex alcohol joind to a long fatty acid in a ester linkage.

- These are important structural lipids often found as protective coatings on the surfaces of leaves stems, hair, skin etc.
- They form protective barriers against water loss and make rigid architecture of complex

structures such as honeycombs.

Functions of lipids :-

1. lipids are storage compounds, triglycerides serves as reserve energy of the body.
2. lipids are important component of cell membranes structure in eukaryotic cells.
3. They act electrical insulations to the nerve fibers where myelin sheath contains lipids.
4. Some lipids like prostaglandins and steroid hormones act as cellular metabolic molecules.
5. As lipids are small molecules and are insoluble in water, they act as signalling molecules.
6. layers of fats in the subcutaneous layer, provides insulation and protection from cold Body temperature maintenance is done by brown fat.
7. Polyunsaturated phospholipids are important constituents of phospholipids, they provide fluidity and flexibility to the cell membranes.
8. Fatty acids like linoleic acid & linolenic acids are precursors of many different types of prostaglandins and thromboxanes. These play an important role in pain, fever, inflammation and blood clotting.