

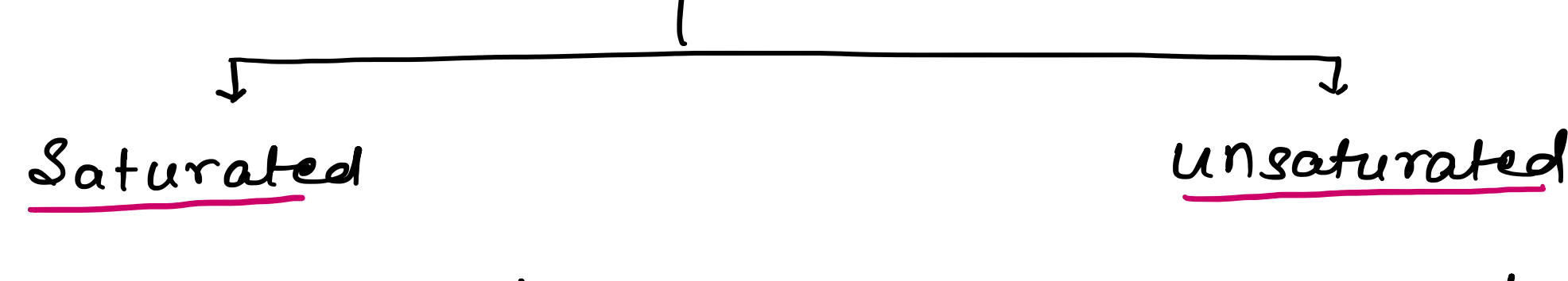
"Lipids" (CHO)

* Lipids are generally insoluble in water

* They could be simple fatty acids.



* Fatty acids are of two types



• do not possess double bond in their carbon chain

• one or more double bond in their carbon chain



eg. Palmitic acid (16C)
Stearic acid (18C)

eg. Oleic acid (17C)

eg. Linoleic acid (18C)

eg. Linolenic acid (19C)

eg. Arachidonic acid (20C)

* unsaturated fatty acids have lower melting point than the saturated fatty acids

* Most animal lipids are saturated fatty acids

* Most plant lipids are unsaturated fatty acids

** oil from marine fish (eg Mackerel) is rich in omega-3 fatty acids.

=> Another simple lipid is Glycerol which is trihydroxy propane

CLASSIFICATION OF LIPIDS

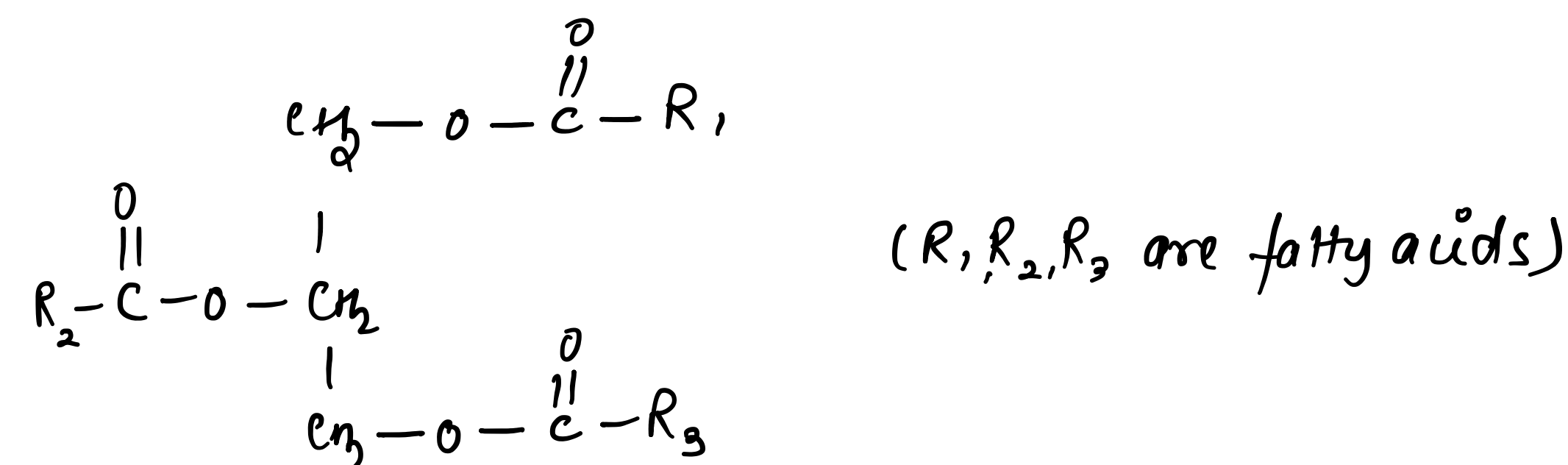
* Lipids are classified into three types.

(1) simple (2) compound (3) Derived

(1) Simple lipid :- They are formed by fatty acid and alcohol eg. fats, suberin, cutin, wax

(i) Neutral or true fats :-

They are triglycerides formed by esterification of three molecules of fatty acids with one molecule of glycerol.



If $\text{R}_1 = \text{R}_2 = \text{R}_3$ (rarely similar), fat is called pure fats

eg. Tripalmitin, Tristearin

If $\text{R}_1 \neq \text{R}_2 \neq \text{R}_3$ fat is called mixed fat eg. Butter

For commercial use fats are differentiated into $\begin{cases} \text{Hard fats} \\ \text{oils} \end{cases}$

-> oils are those fats which are liquid at room temperature b/c they have low melting point eg. Gingelly oil

-> PUFA containing oil are good for person having cardiovascular diseases. (eg sunflower oil)

(ii) waxes :-

They are fatty acid esters of long chain monohydric alcohol like cetyl, ceryl or myrcyl

eg. Ear wax = Cerumen -> lubricating ear drum

Bees wax = secreted from abdominal glands

(2) Compound or conjugated lipid :-

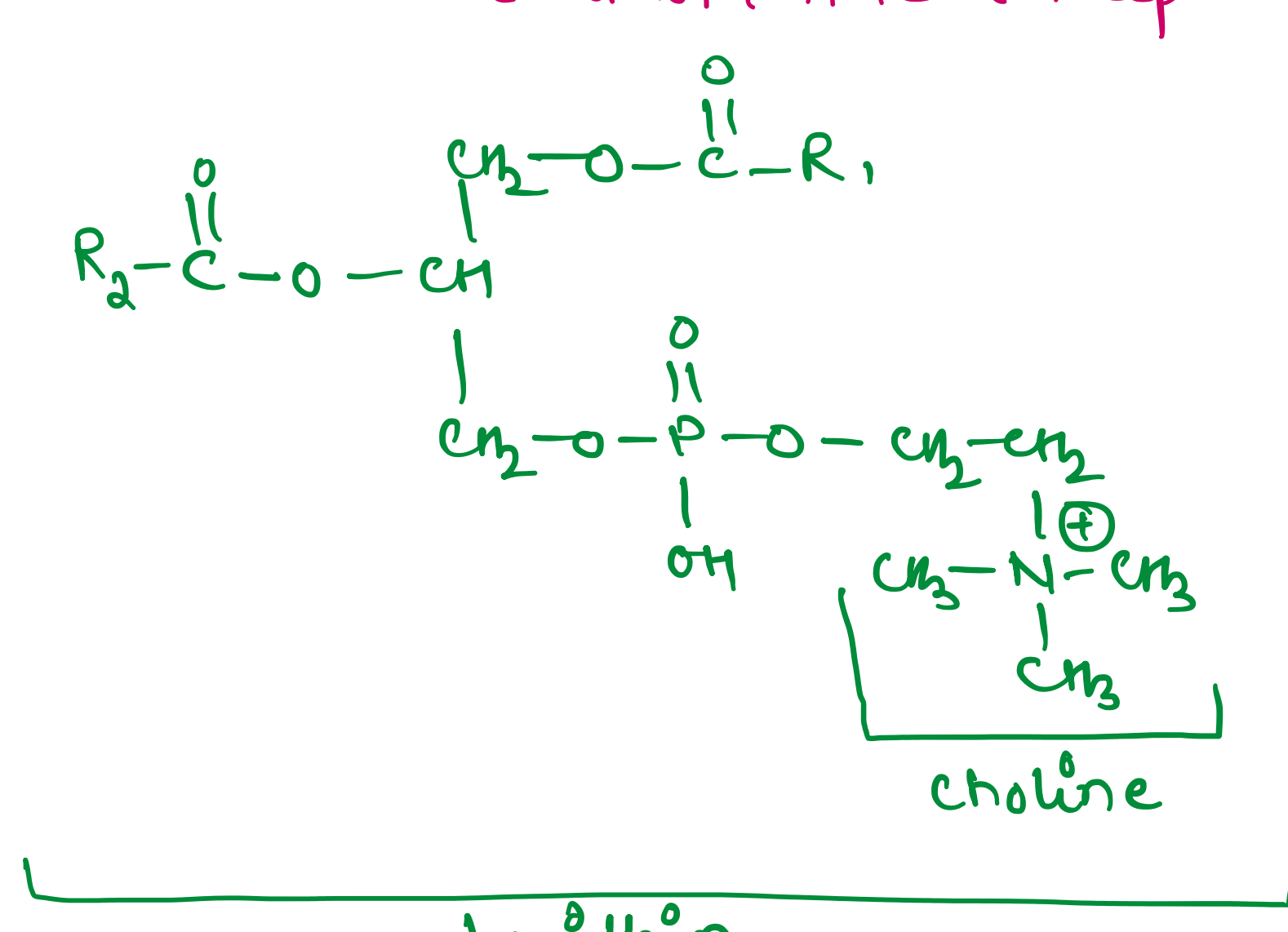
Possess additional groups besides fatty acids and alcohol.

eg. Phospholipids, glycolipids, lipoproteins

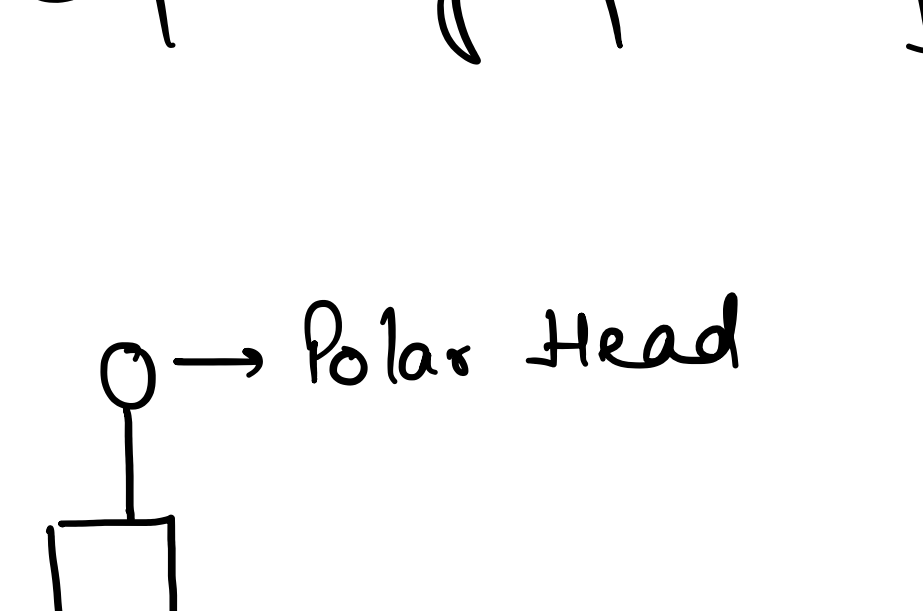
Phospholipids -> They are triglyceride lipids where one fatty acid is replaced by phosphoric acid which is often linked to additional nitrogenous group like

choline in Lecithin

ethanolamine in Cephalin



Phospholipids are amphipathic molecule carrying both hydrophilic polar group & hydrophobic non-polar group.



○ -> Polar Head

▭ -> Nonpolar tails

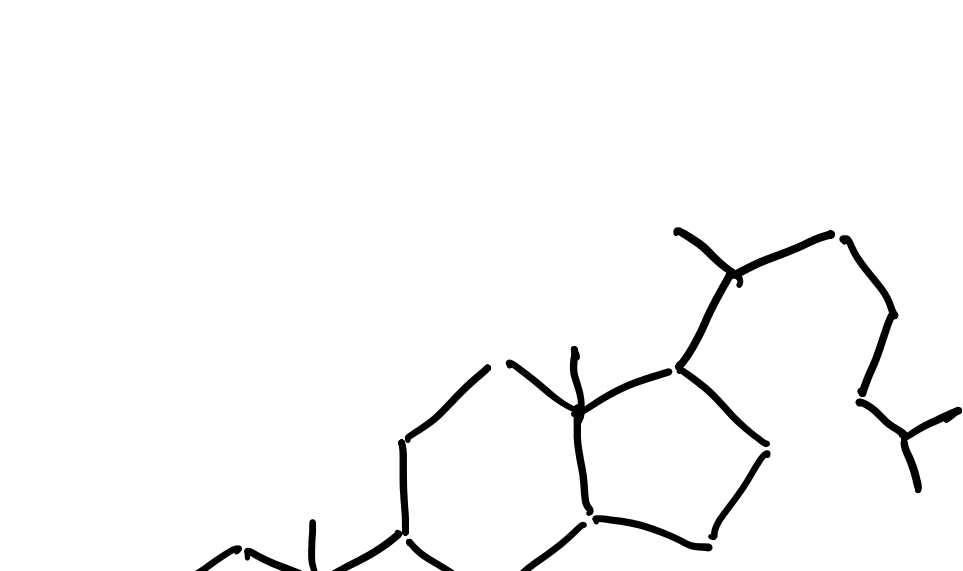
In aqueous medium they form double layer.

This lipid bilayer is the basic component of all cell membranes.

** Some tissues especially the neural tissues have lipid lipids with more complex structures.

eg. sphingomyelins, cerebroside, gangliosides

Cholesterol :-



* It is most common sterol found in many animals, human beings and some plants.

* It is precursor of most steroid hormones

* It forms vit D

* It is constituent of animal cell membrane

* It helps in forming bile salts.

Functions of Lipids :->

1. fats serve as food reserve in both plants and animals.

Hibernating animals store extra fat prior to onset of winter.

2. fats stored in oil seeds.

3. They form insulating layer below the skin of animals. Eg. whale has a very thick layer of subcutaneous fat called blubber.

4. In animals fat produce a shock absorbing cushion around eye ball, kidneys, glands

5. Myelin sheath around nerve take part in electrical insulation.

6. Desert animals use fat as source of metabolic water.

7. fat gives twice energy as compare to carbohydrate



8. Phospholipids, glycolipids and sterols are components of cell membrane.