

**SNS COLLEGE OF ALLIED HEALTH SCIENCE**  
Affiliated to The Tamil Nadu Dr M.G.R Medical University, Chennai



**DEPARTMENT OF OPERATION THEATRE AND ANAESTHESIA**

**TECHNOLOGY**

**COURSE NAME: BIOCHEMISTRY**

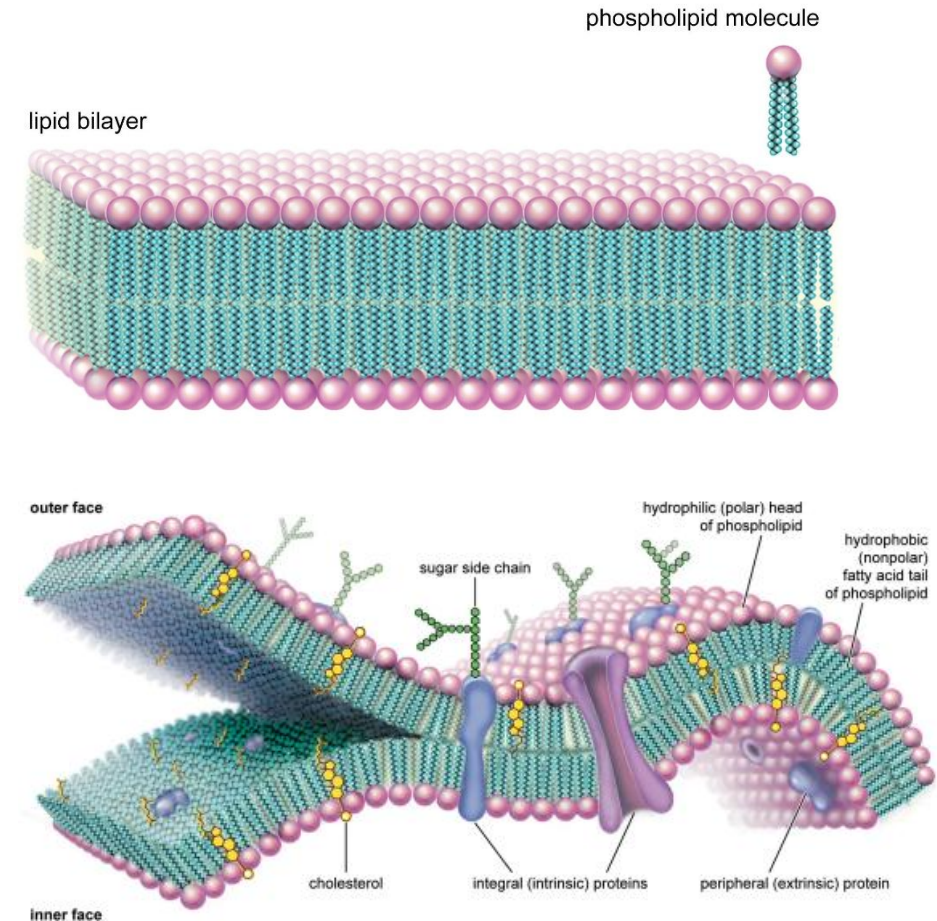
**UNIT : 3**

**TOPIC : LIPIDS & ITS CLASSIFICATION**

**FACULTY NAME: MITHRA V**

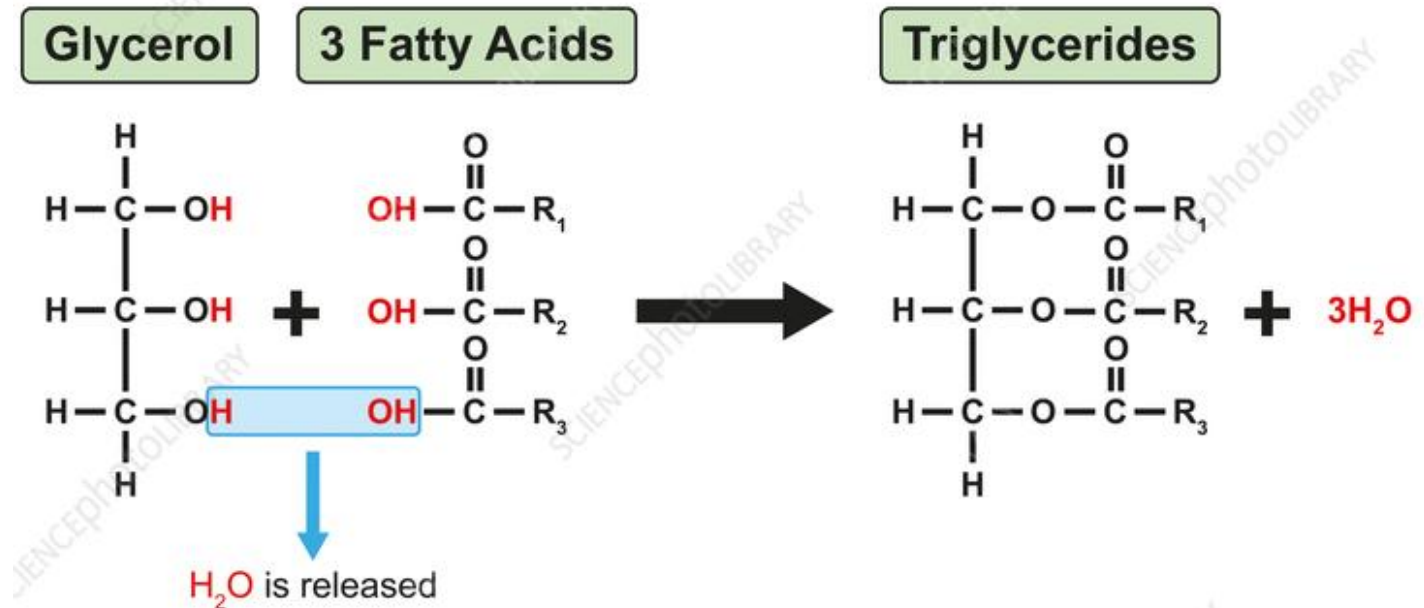
# LIPIDS (DEFINE)

- Heterogeneous organic compounds
- Esters or amides of fatty acids
- Insoluble in water, soluble in non-polar solvents
- Classified as Simple, Complex and Derived
- **Functions of Lipids**
  - Structural component of cell membranes
  - Energy storage
  - Insulation & organ protection
  - Hormones & signaling molecules



# SIMPLE LIPIDS

- **Triglycerides** (fats & oils)
  - 1 glycerol + 3 fatty acids
  - Solid = fats, liquid = oils
- **Key Components of Triglycerides**
- **Glycerol**: 3-carbon alcohol, sweet, viscous, non-toxic
- **Fatty acids**: Long chain,  $-\text{CH}_3$  at one end,  $-\text{COOH}$  at other



- Waxes
  - Fatty acid + long-chain alcohol
  - Examples: beeswax, carnauba wax, spermaceti



# COMPLEX LIPIDS

- **Phospholipids (Phosphatides)**

- Hydrophilic head (phosphate + glycerol) + 2 hydrophobic tails (fatty acids)

- **Glycerophospholipids** (glycerol-based)

- **Sphingophospholipids** (sphingosine-based → form ceramide)

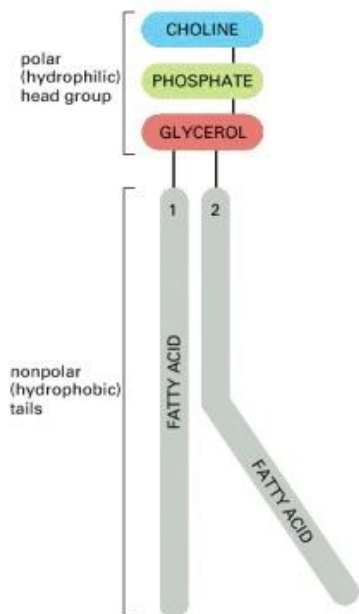
- **Glycolipids**

- Lipid + Carbohydrate (glycosidic bond)

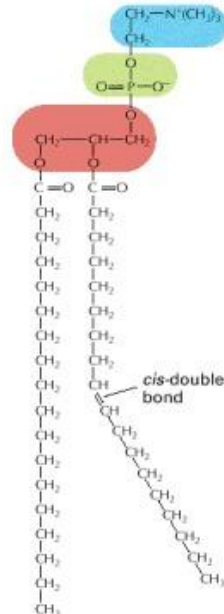
- **Roles:** Cell recognition, blood group determination, membrane stability, immunity

- **Types:** Cerebrosides, Gangliosides

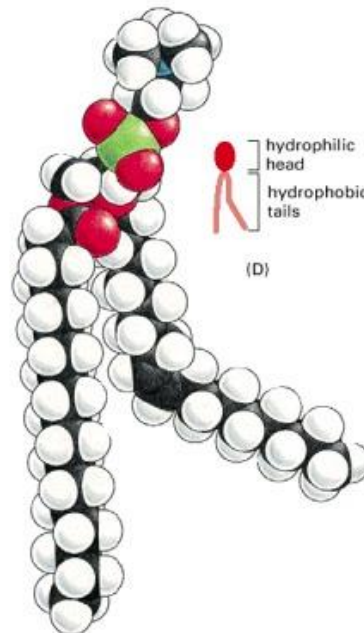
# COMPLEX LIPIDS



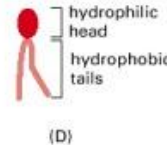
(A)



(B)



(C)



(D)

## space-filling model

### phospholipid molecule

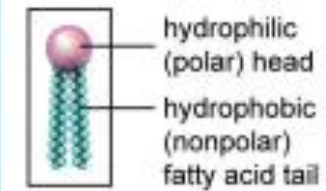


### fatty acid molecule

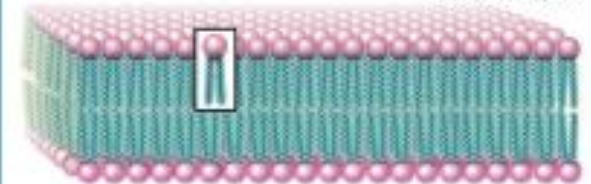


## generic simplified depiction

### phospholipid molecule



### lipid bilayer



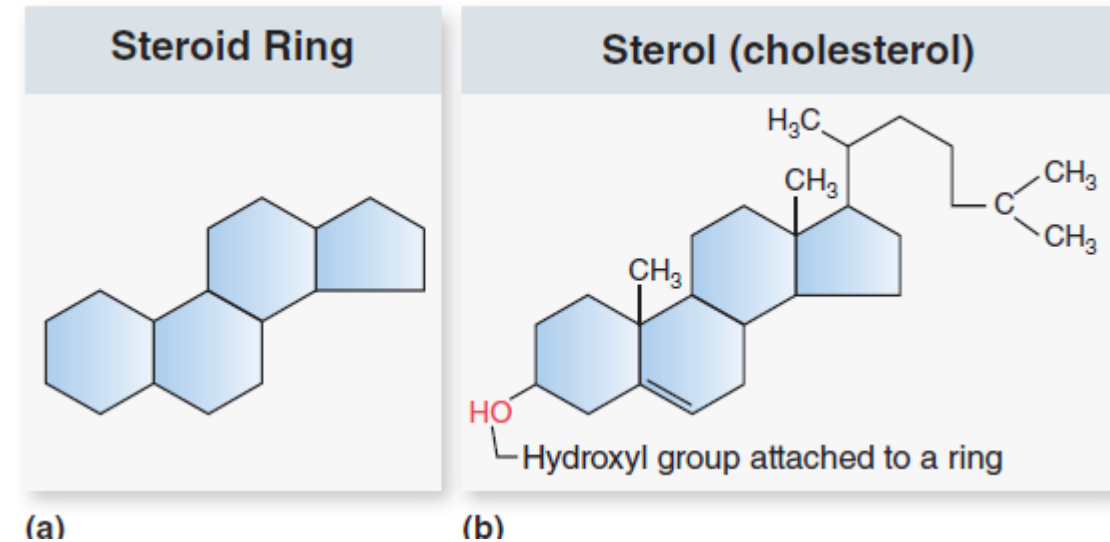
### fatty acid molecule



micelle

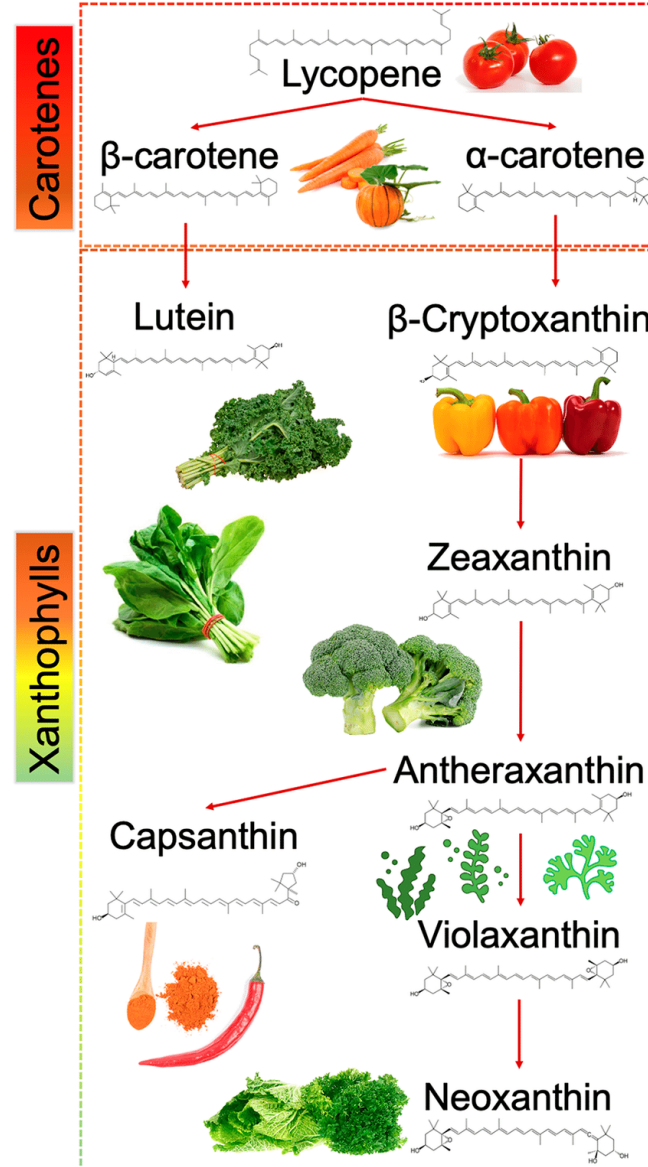
# DERIVED LIPIDS

- Fatty acids, steroids, fatty aldehydes, ketone bodies, lipid-soluble vitamins, and hormones.
- **Steroids & Sterols**
- Fused ring structure, hydrophobic (insoluble in water)
- **Examples:** cholesterol, phytosterols, ergosterol
- Regulate membrane fluidity, some act as hormones
- Plant sterols ↓ cholesterol absorption

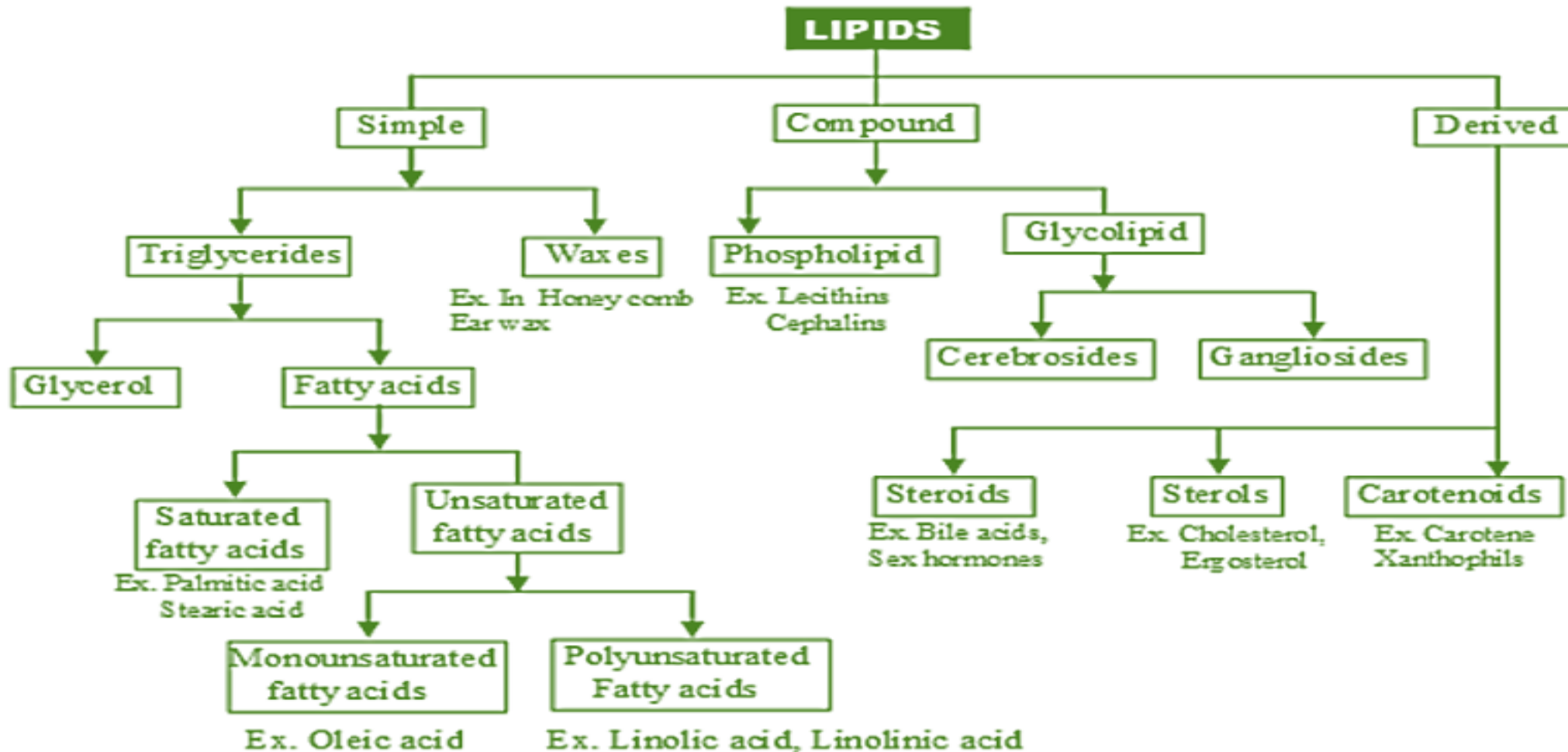


# CAROTENOIDS AND XANTHOPHYLLS

- Carotenoids (pigments) - give the color to many fruits and vegetables.
- Carotenes (only C & H):  $\alpha$ -carotene,  $\beta$ -carotene, lycopene
- Xanthophylls (contain O): crucial role in photosynthesis, absorbing and releasing light energy
- Eg: Lutein, Zeaxanthin, Fucoxanthin
- Antioxidant & Anti-inflammatory properties
- Others: Fatty aldehydes, ketone bodies, lipid-soluble vitamins, hormones



# LIPIDS - CLASSIFICATION SUMMARY



# REFERENCES

- Lehninger Principles of Biochemistry – 7th Edition, 2017
- Textbook of Biochemistry with Clinical Correlations (Devlin) – 7th Edition, 2010
- <https://lipidmaps.org/index.php/resources/education/classification>
- [https://bio.libretexts.org/Bookshelves/Biochemistry/Fundamentals\\_of\\_Biochemistry\\_\(Iakubowski and Flatt\)/01: Unit I-  
Structure and Catalysis/10: Lipids/10.01: Introduction to lipids](https://bio.libretexts.org/Bookshelves/Biochemistry/Fundamentals_of_Biochemistry_(Iakubowski_and_Flatt)/01:_Unit_I-_Structure_and_Catalysis/10:_Lipids/10.01:_Introduction_to_lipids)

# THANK YOU