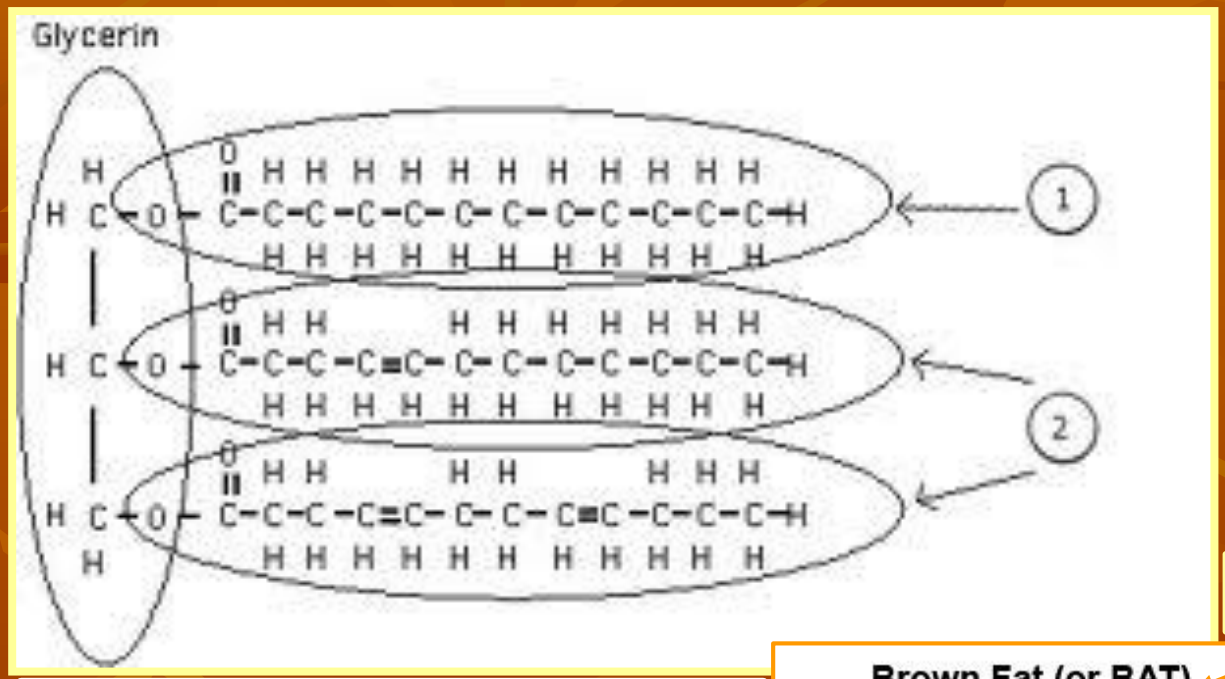
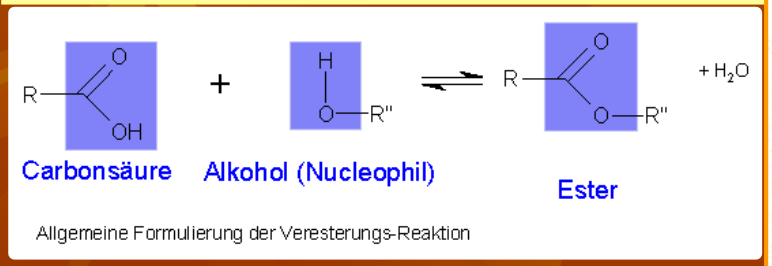
Lipids and carbohydrates

Lipids = a family of various compounds (I. Triglycerides ~ fats, II. Phospholipids /Glycerophospholipids and sphingolipids/, III. Glycolipids /Cerebrosides and gangliosides/, IV. Steroids and V. Carotinoids) that are soluble in organic solvents

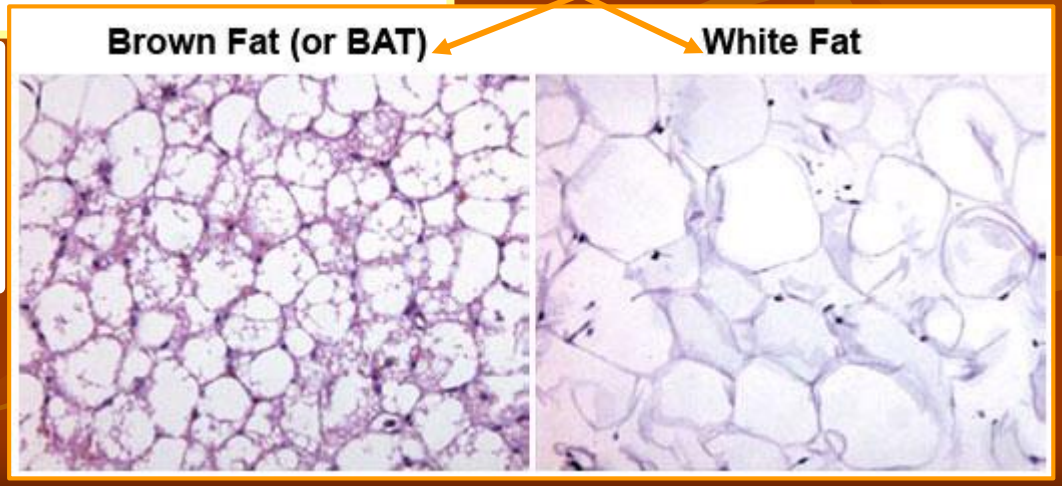
I. Triglycerides/neutral fats



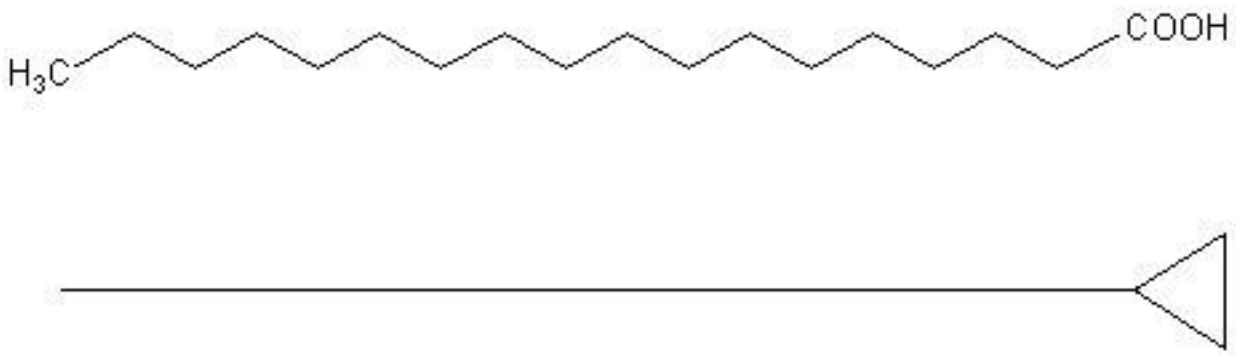


chempage.de

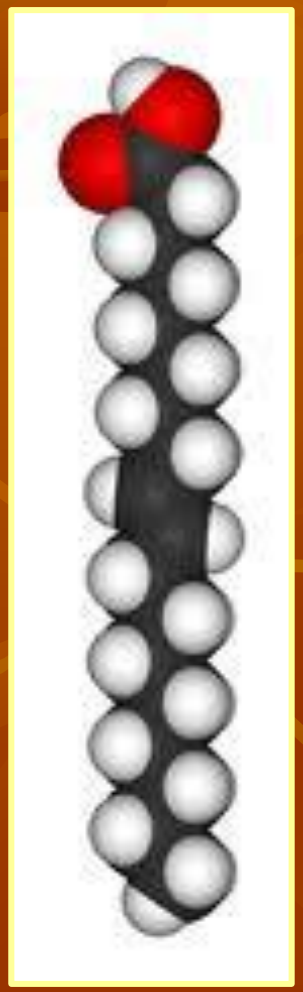
Fat tissue

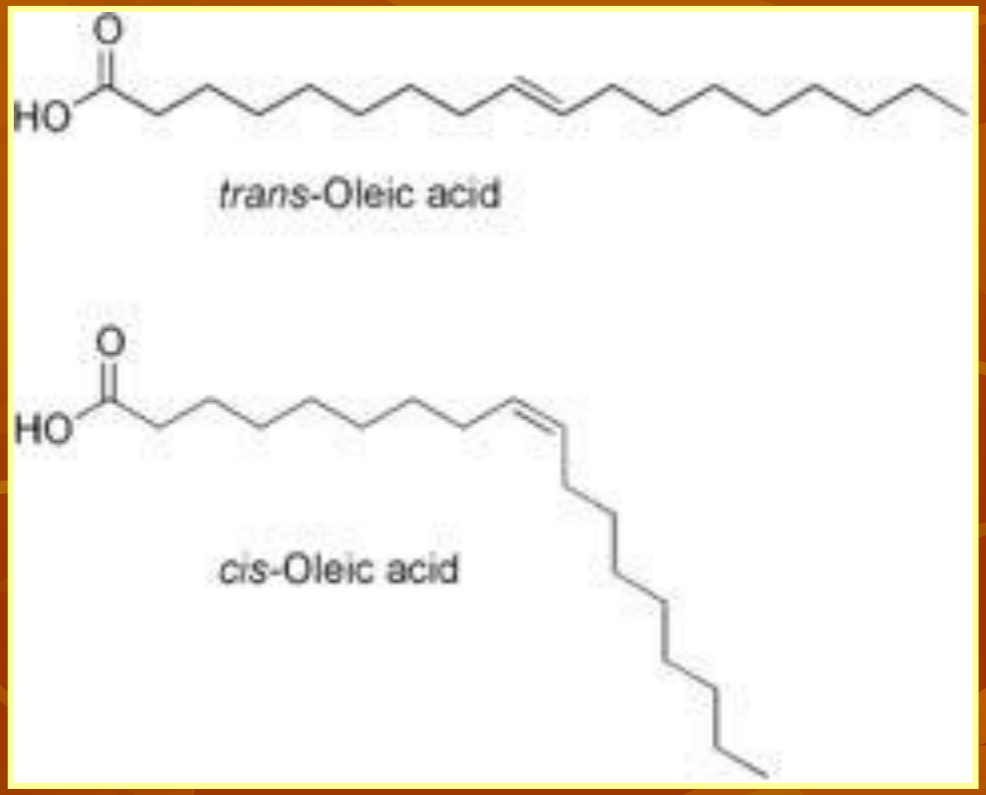


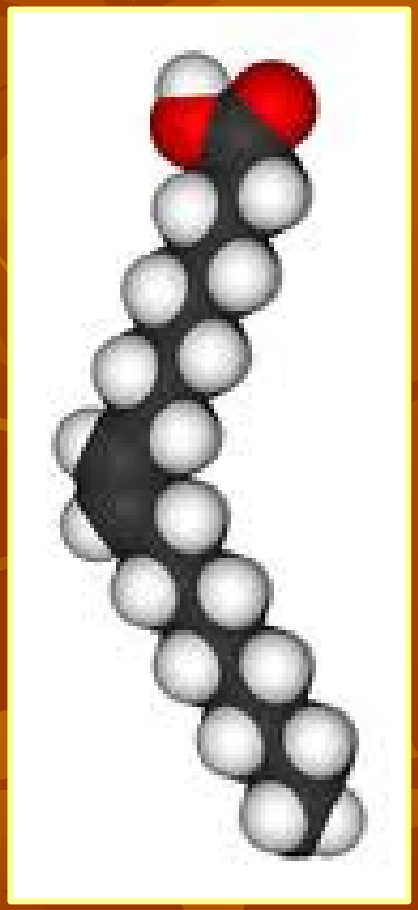
Stearinic acid



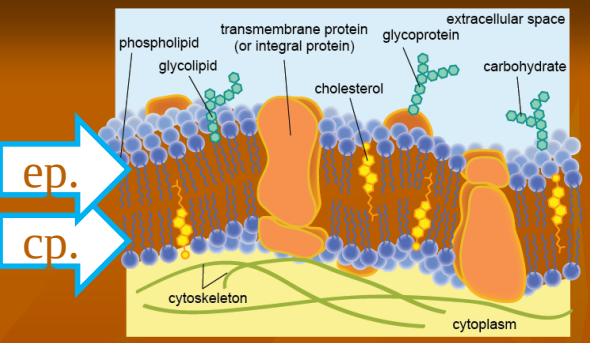
Cis and trans isomers of oleic acid



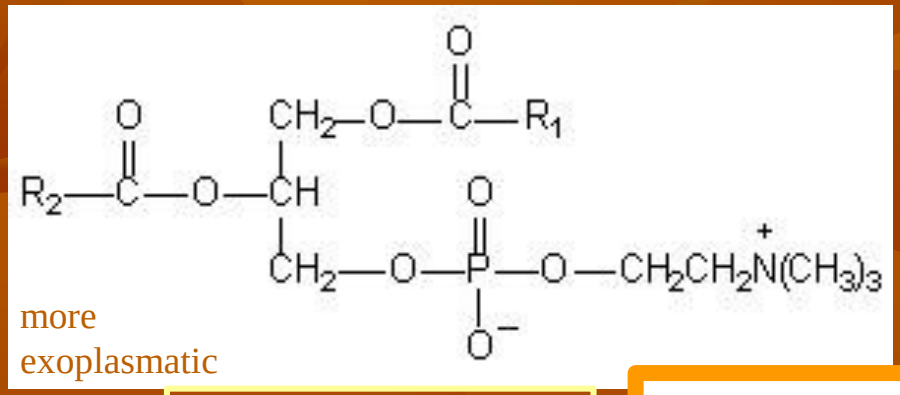




Membrane fluidity – melting point!

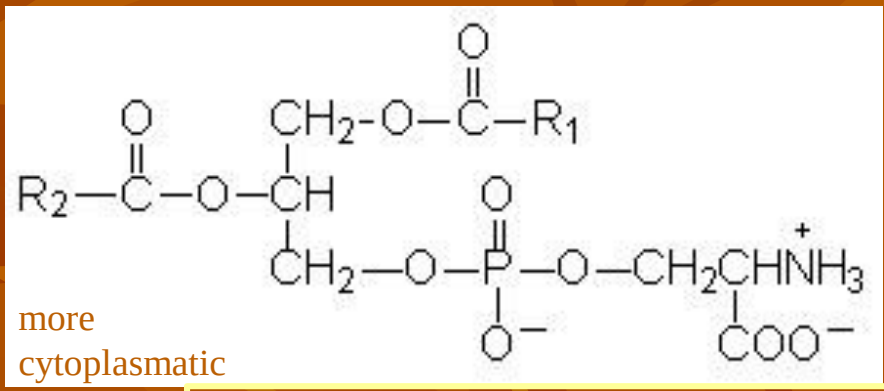


II. Phospholipids 1. - Glycerophospholipids



more exoplasmatic

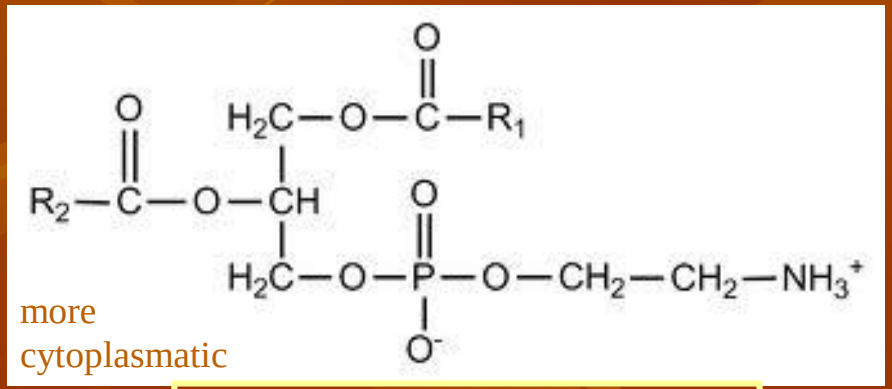
Phospatidyl-cholin



more cytoplasmatic

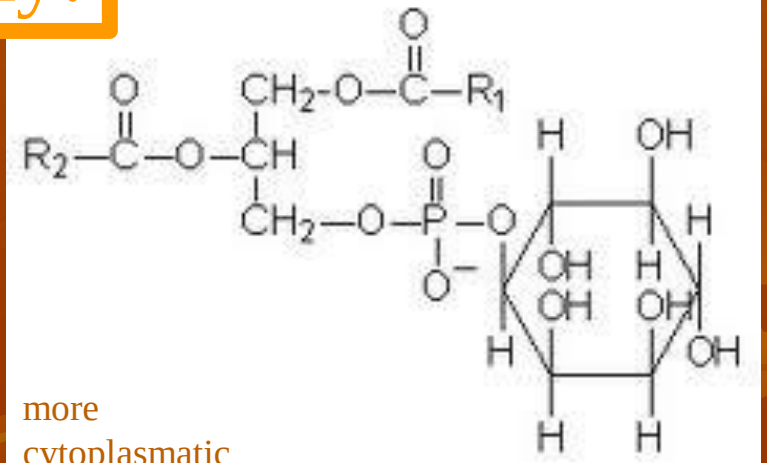
Phosphatidyl-Serin – Apoptosis!

Amphipathy!



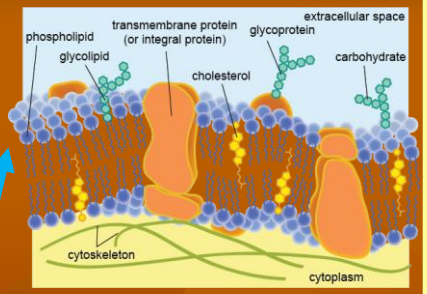
more cytoplasmatic

Phosphatidyl-ethanolamin



more cytoplasmatic

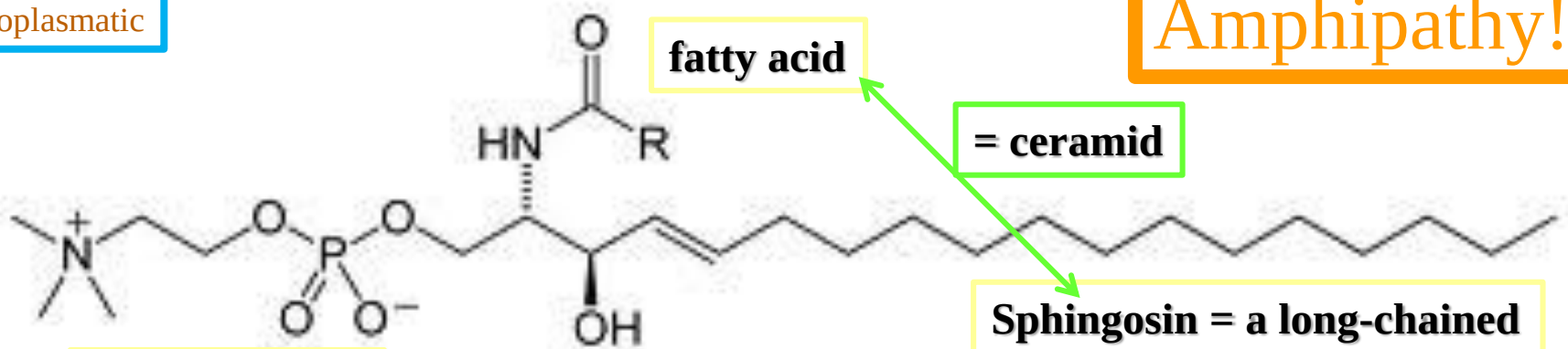
Phosphatidyl-inositol (and intracellular signaling!)



II. Phospholipids 2. - Sphingolipids

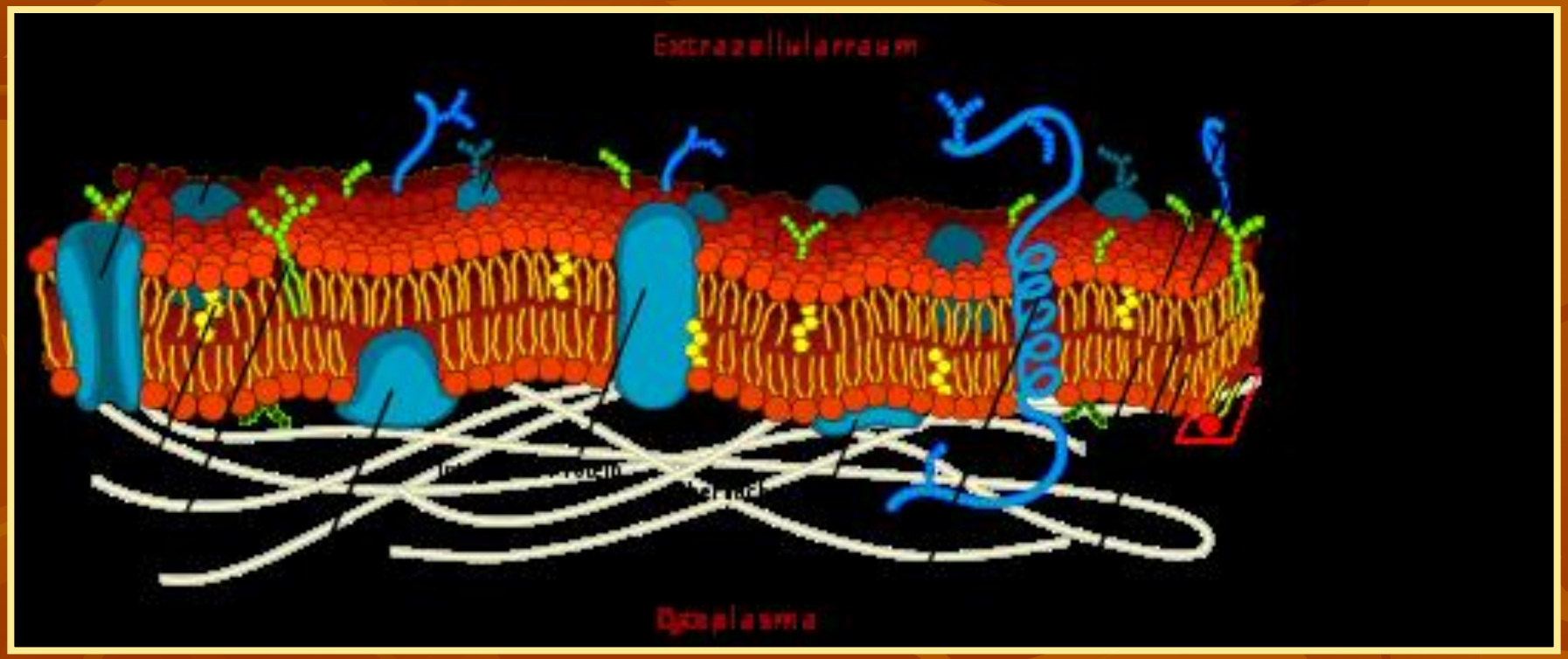
more exoplasmatic

Amphipathy!



Sphingomyelin

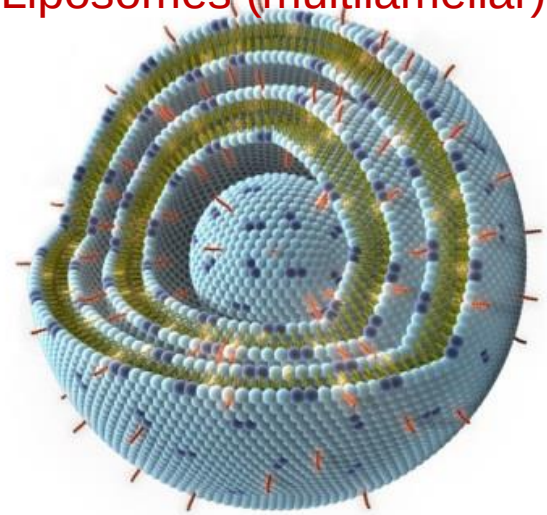
Phospholipid membranes A.



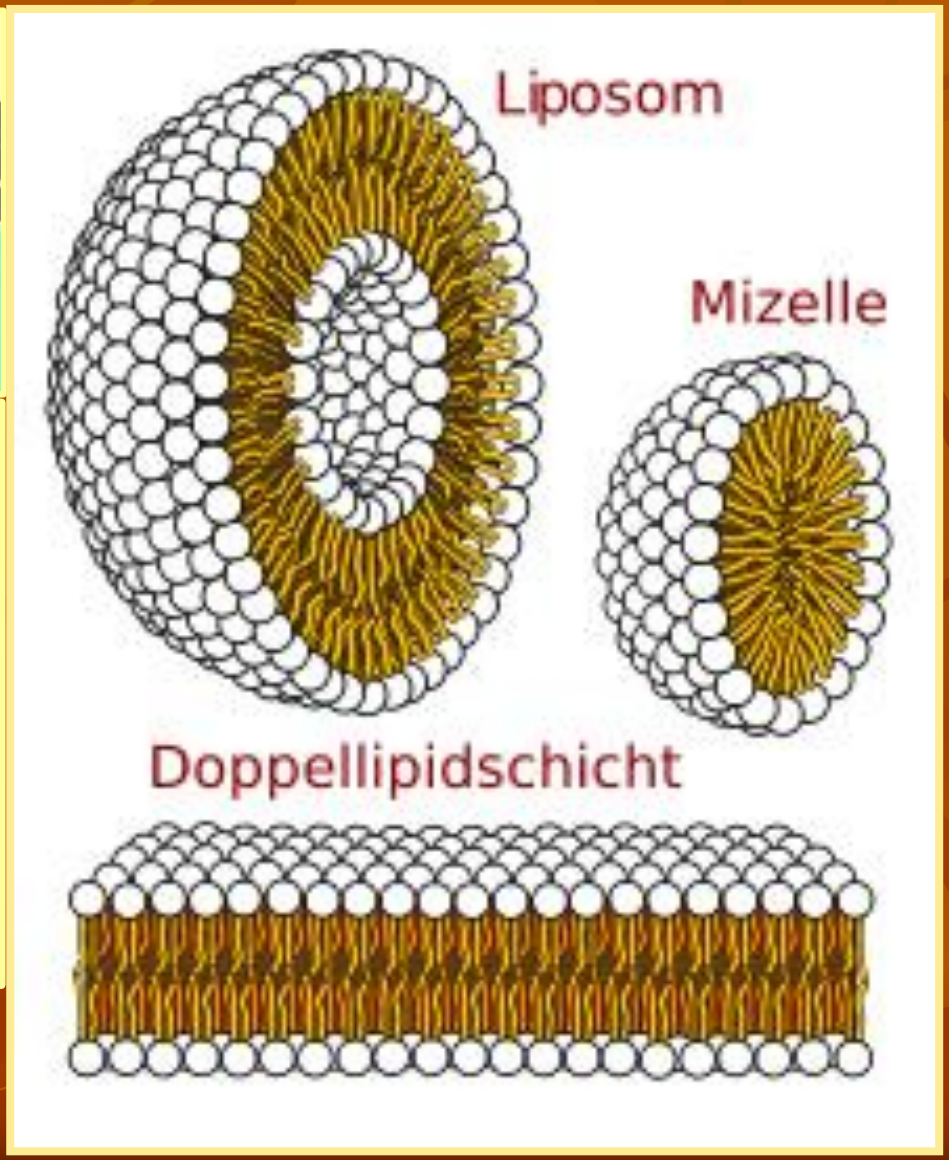
Phospholipid Membranes B.

struggle.net

Liposomes (multilamellar)



vfa.de



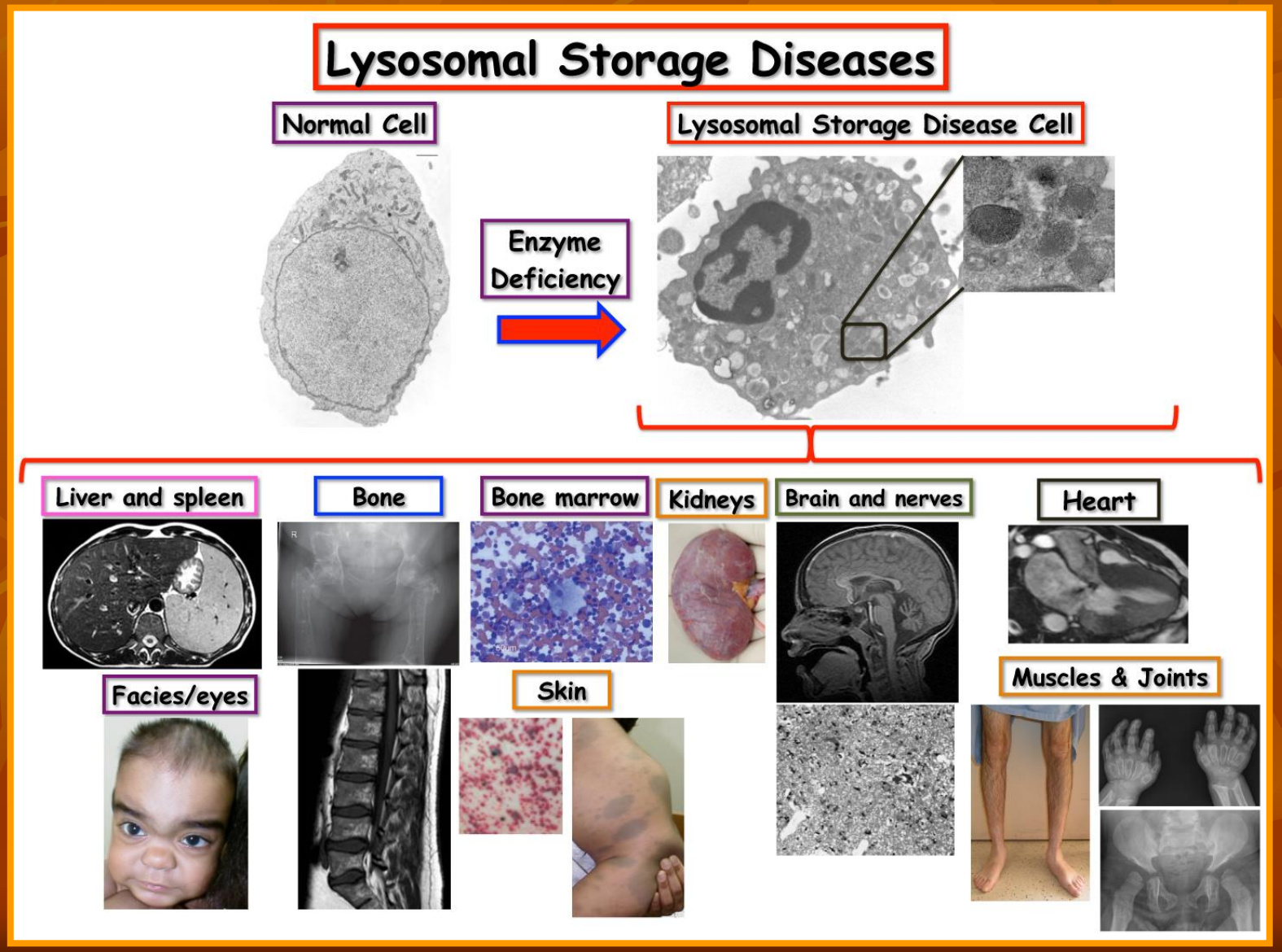
Asymmetric lipid distribution

- bind preferentially to specific, asymmetrically distributed proteins!
- exoplasmatic: eg. sphingomyelin and phosphatidylcholin

- cytoplasmatic: phosphatidylethanolamin, phosphatidylinositol and phosphatidylserin

(externalisation/apoptosis)

Lysosomal storage diseases I.



III. Glycolipids 1.

exoplasmatic localisation (eg. in the outer membrane of red blood cells – A, B, AB, 0 blood groups)

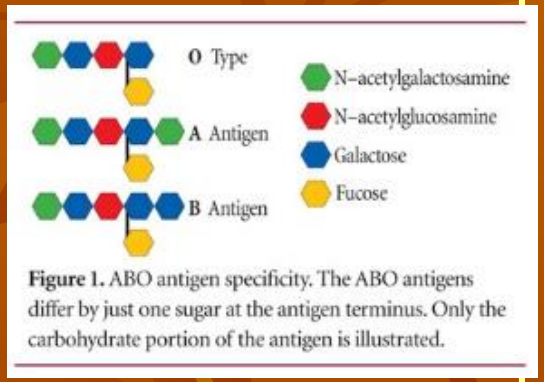
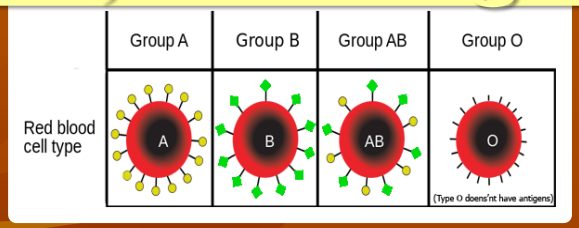


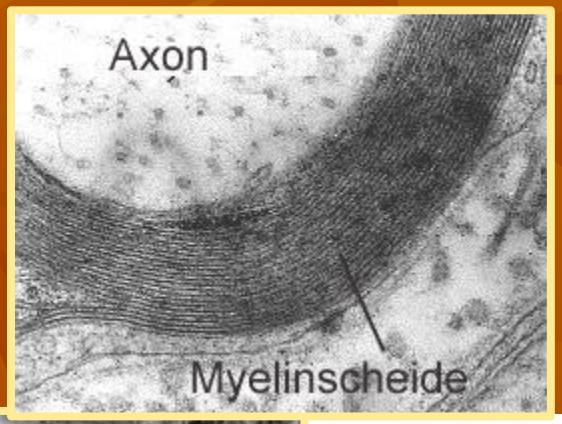
Figure 1. ABO antigen specificity. The ABO antigens differ by just one sugar at the antigen terminus. Only the carbohydrate portion of the antigen is illustrated.

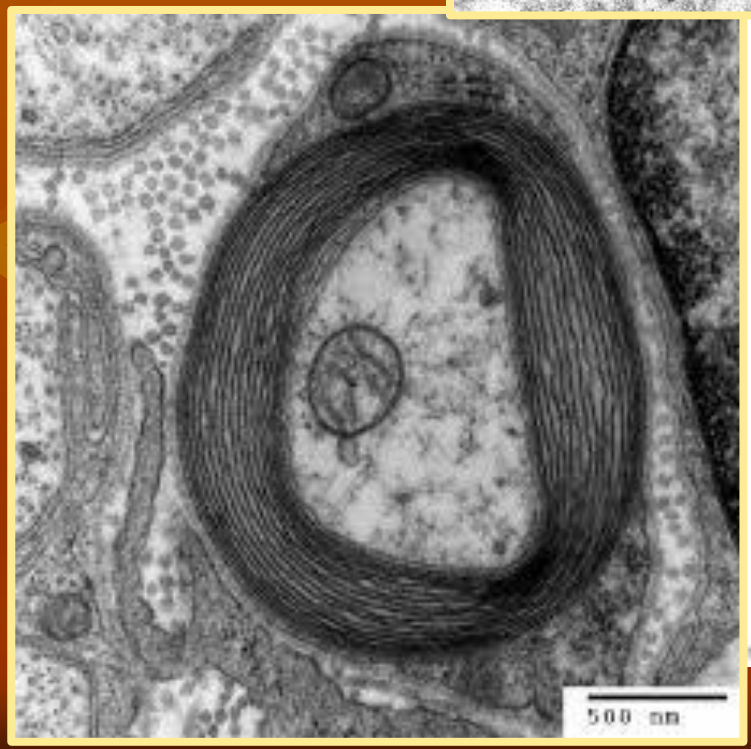


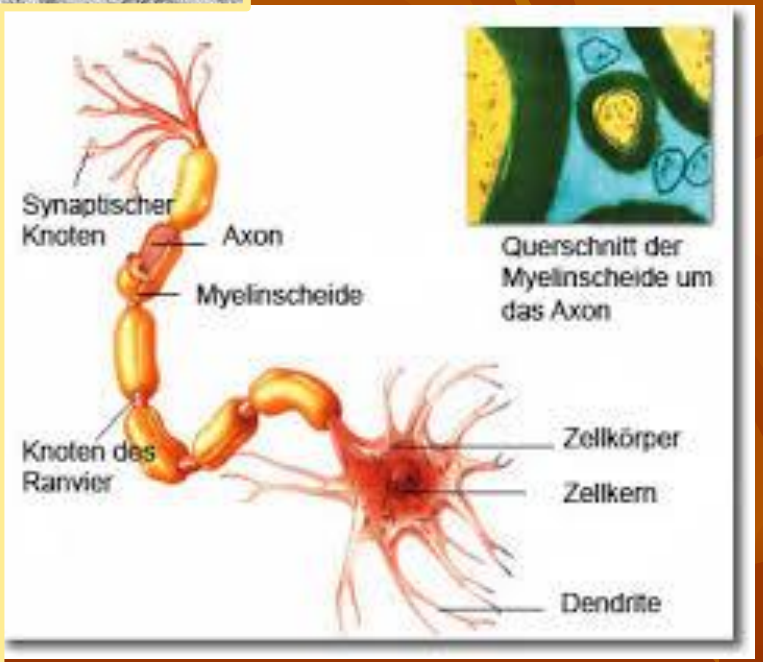
Cerebrosides with a ceramide core

Ganglioside contains the sugar derivative sialinic acid

III. Glycolipids 2. – myelin sheet



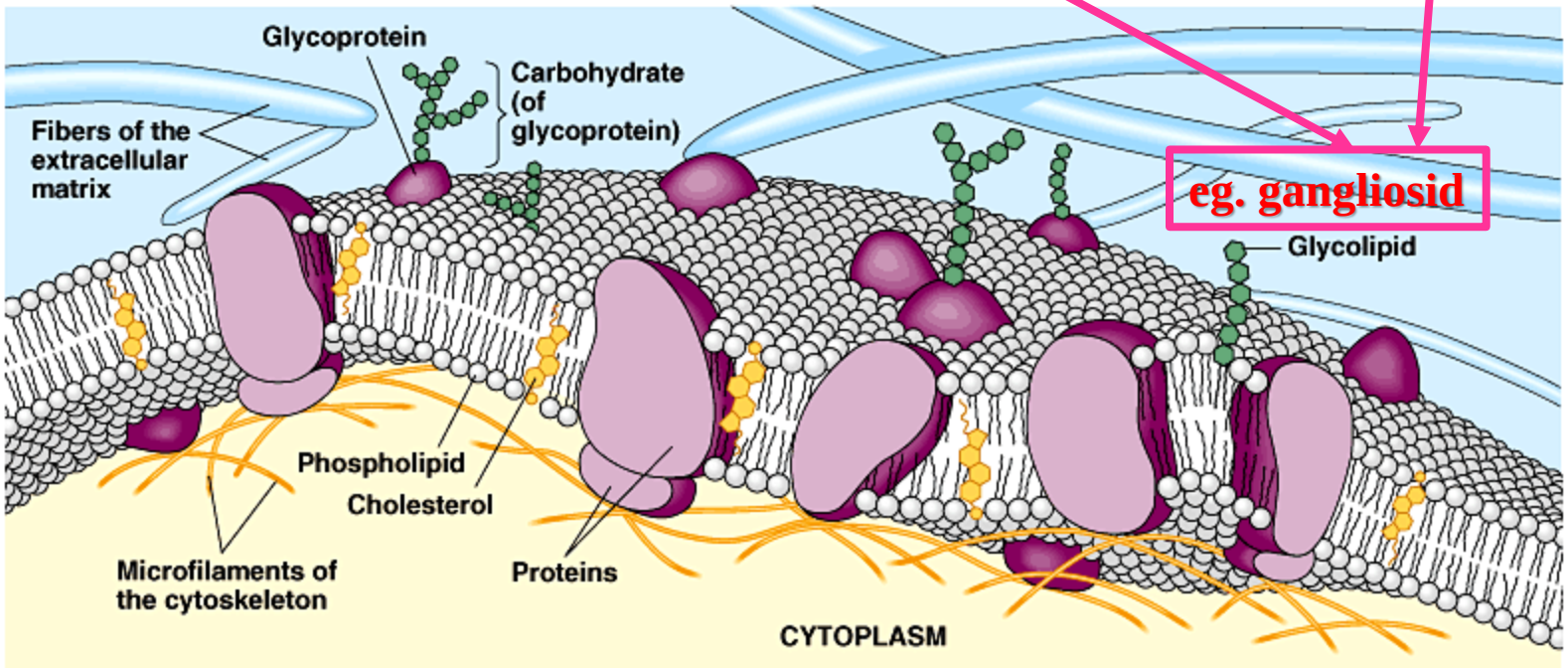




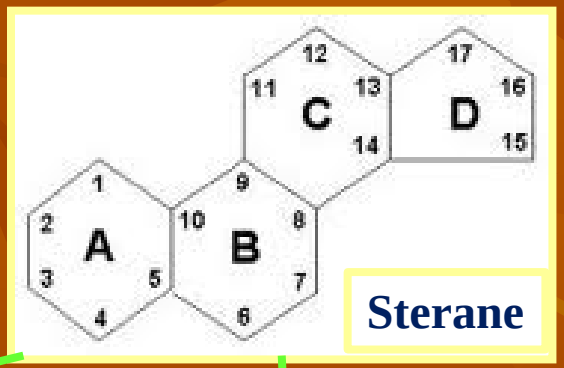
III. Glycolipide 3.

Cholera- and botulinus-toxins

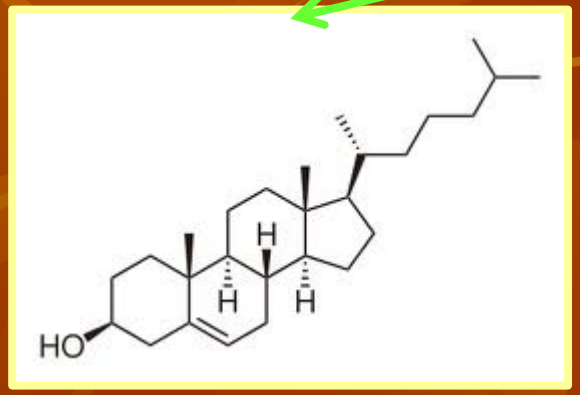
Influenza virus

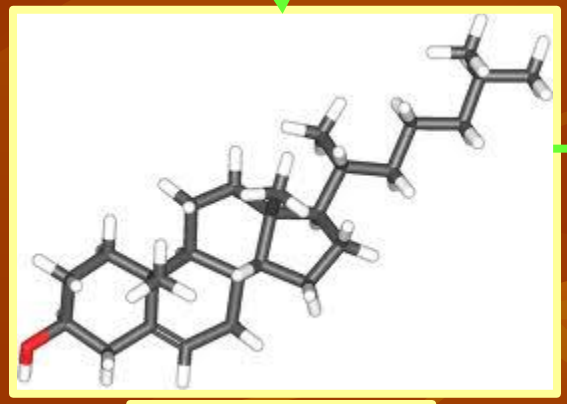


IV. Steroids 1.

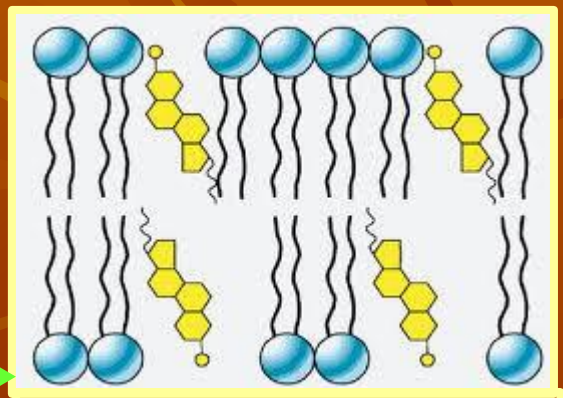


Sterane



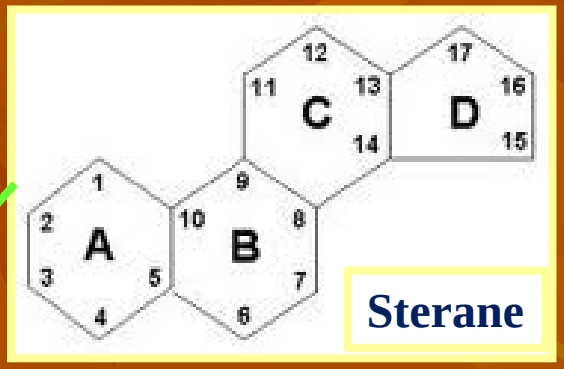


Cholesterol

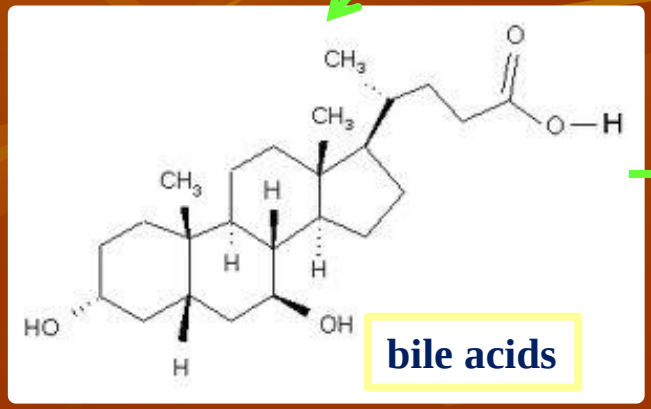


Cholesterol in the plasmamembrane of animal cells (lipid rafts!) ↔ but hardly any in plant and none in prokaryotic PMs.

IV. Steroids 2.



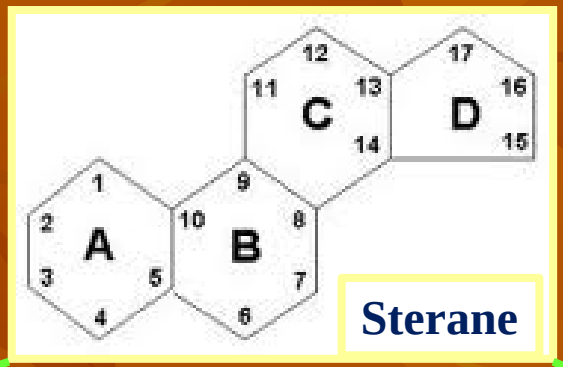
Sterane

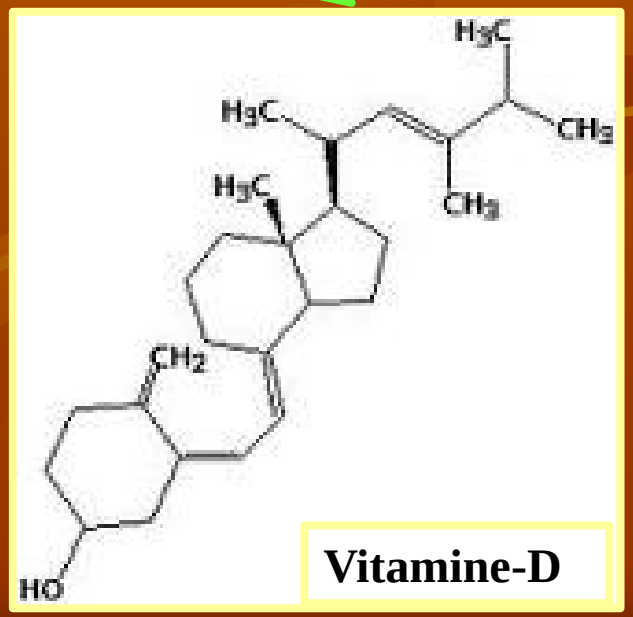


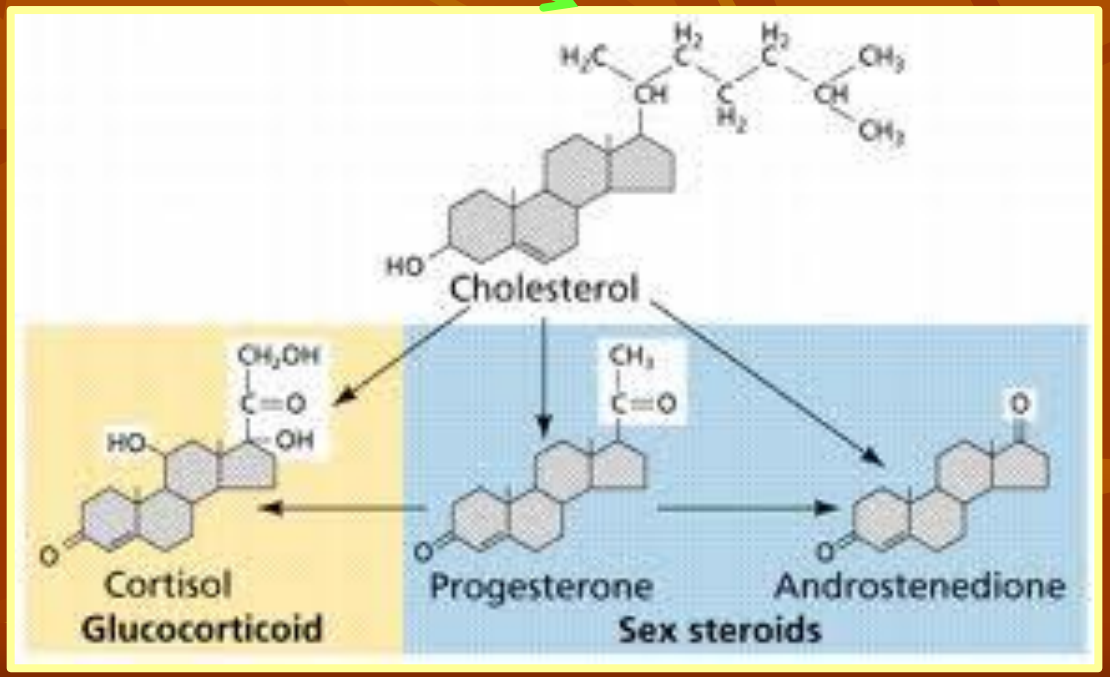
bile acids

→ **gall stones !**

IV. Steroids 3.

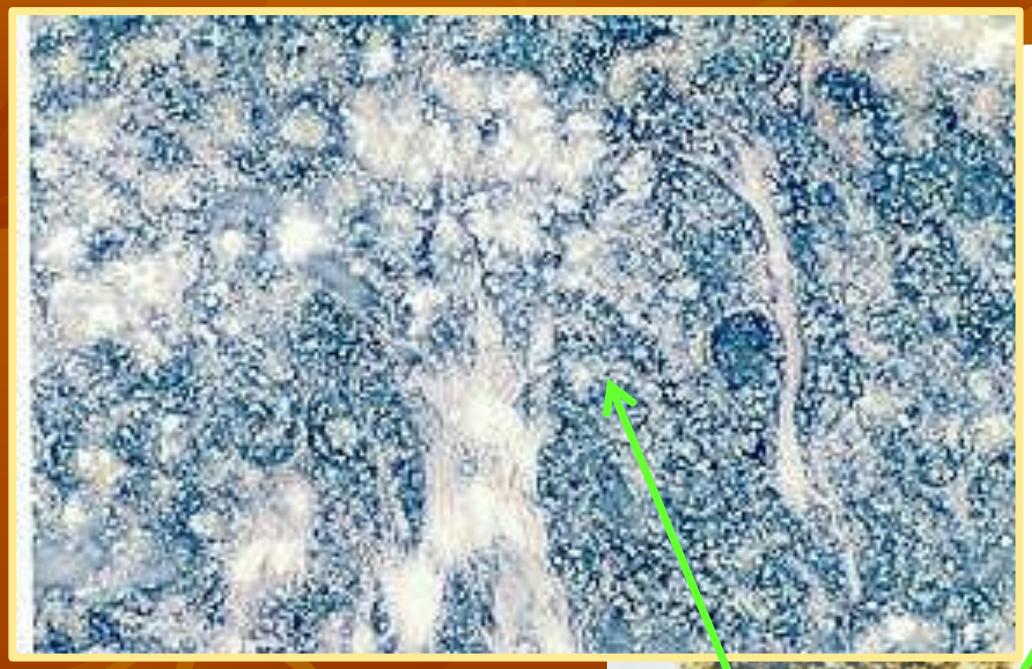


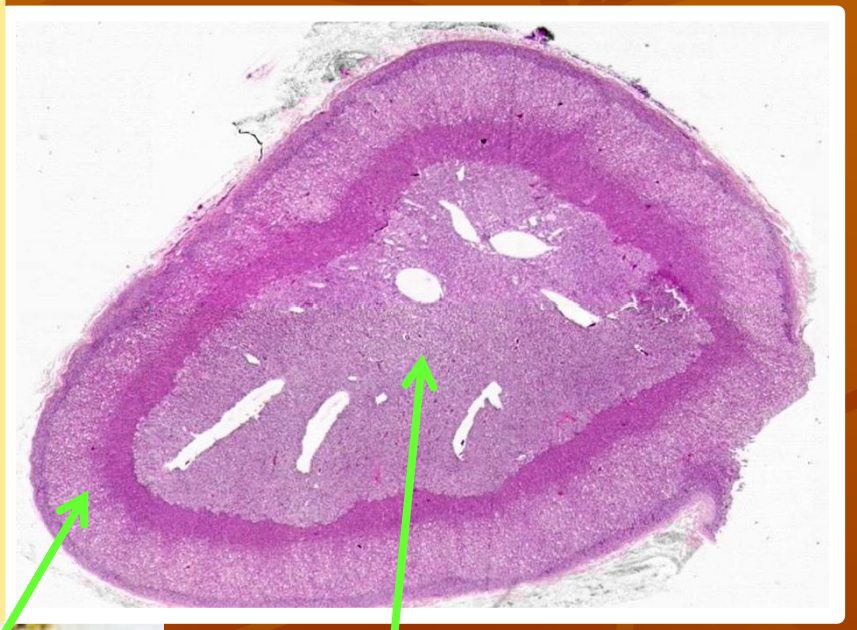




+ mineralocoticoids + estrogens + androgens

IV. Steroids 4.

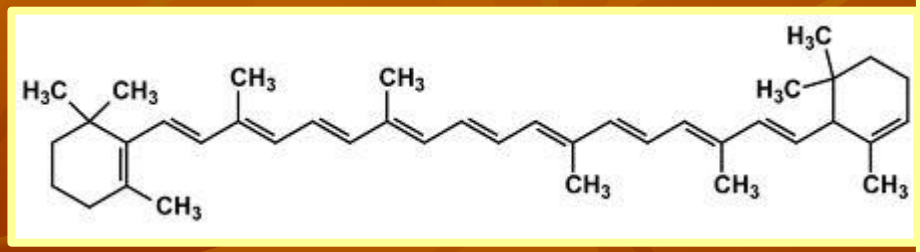




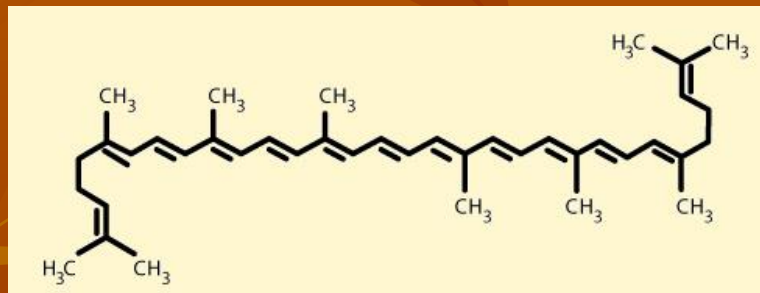
medulla

Adrenal gland - Sudan-B staining!

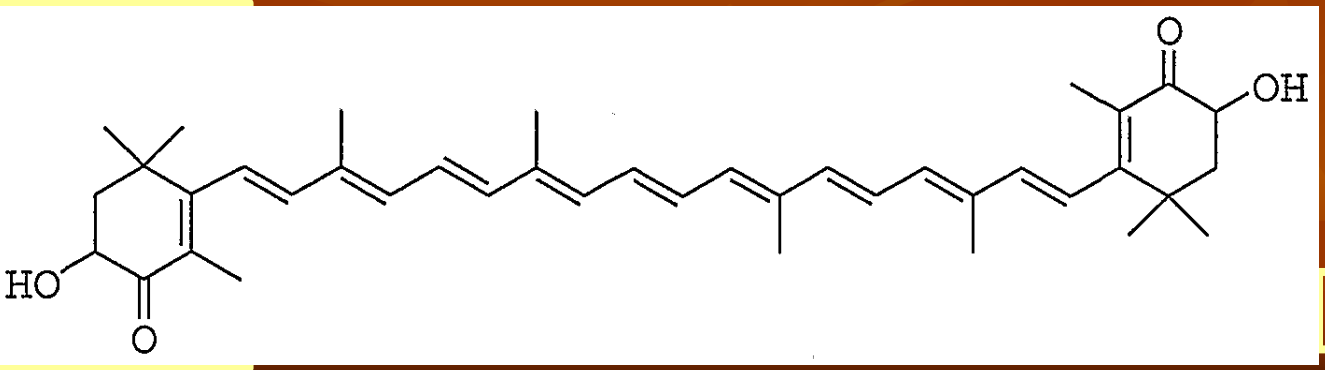
V. Carotinoids 1.



Beta-Carotin

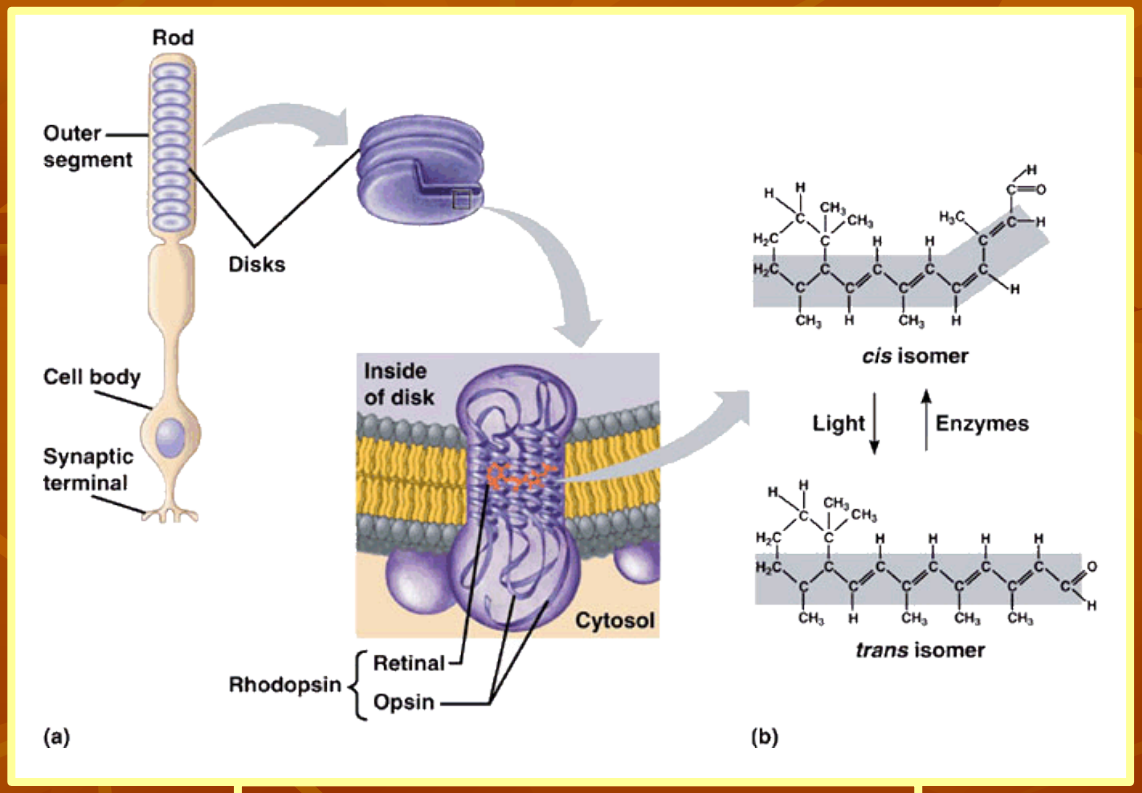


Licopin

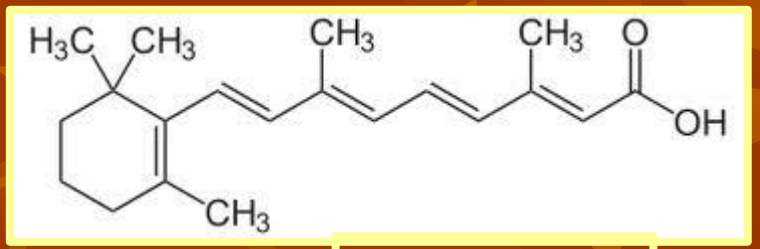


Xanthophyll

V. Carotinoids 2.



<u>Retinal</u> as prosthetic group of the eye pigment rhodopsin



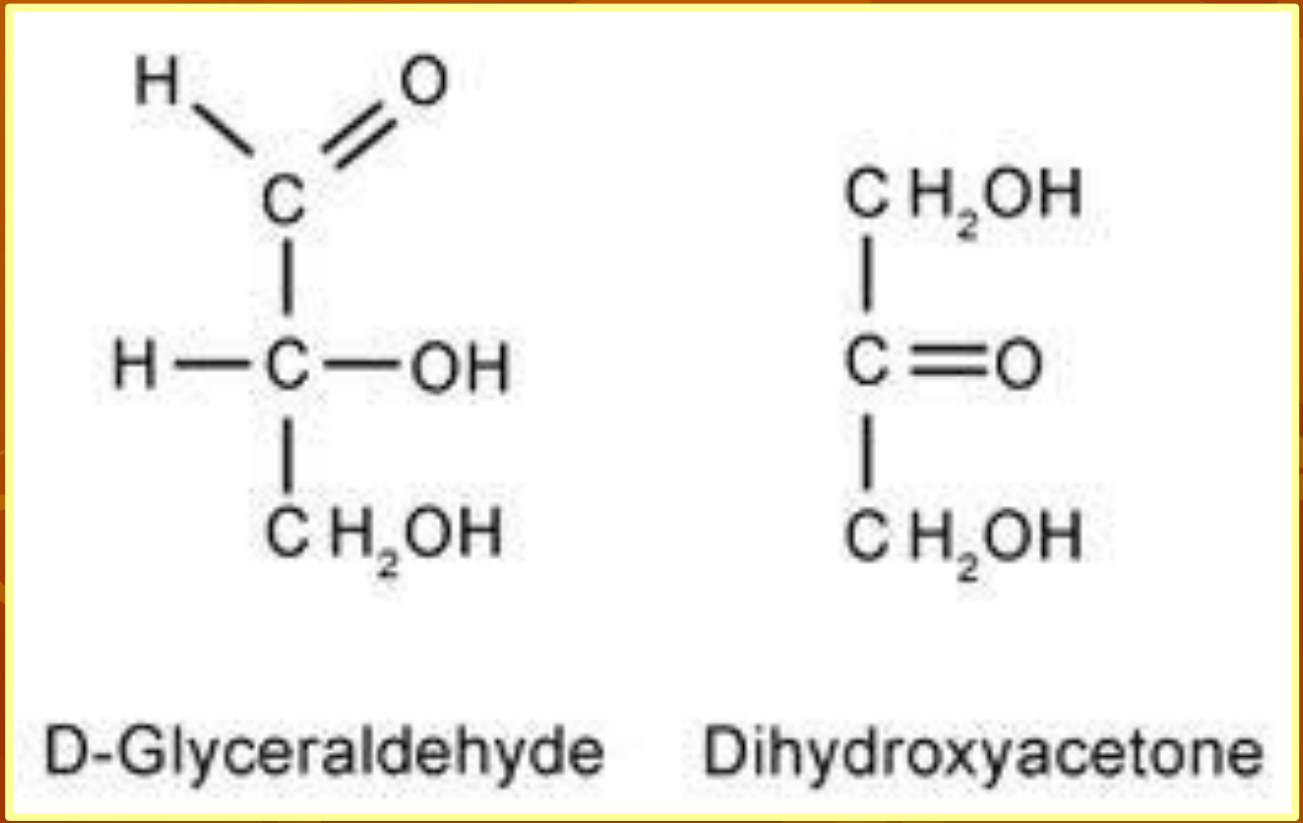
Retinoic acid

Carbohydrates $(CH_2O)_n$
Polihydroxy-aldehides or ketons

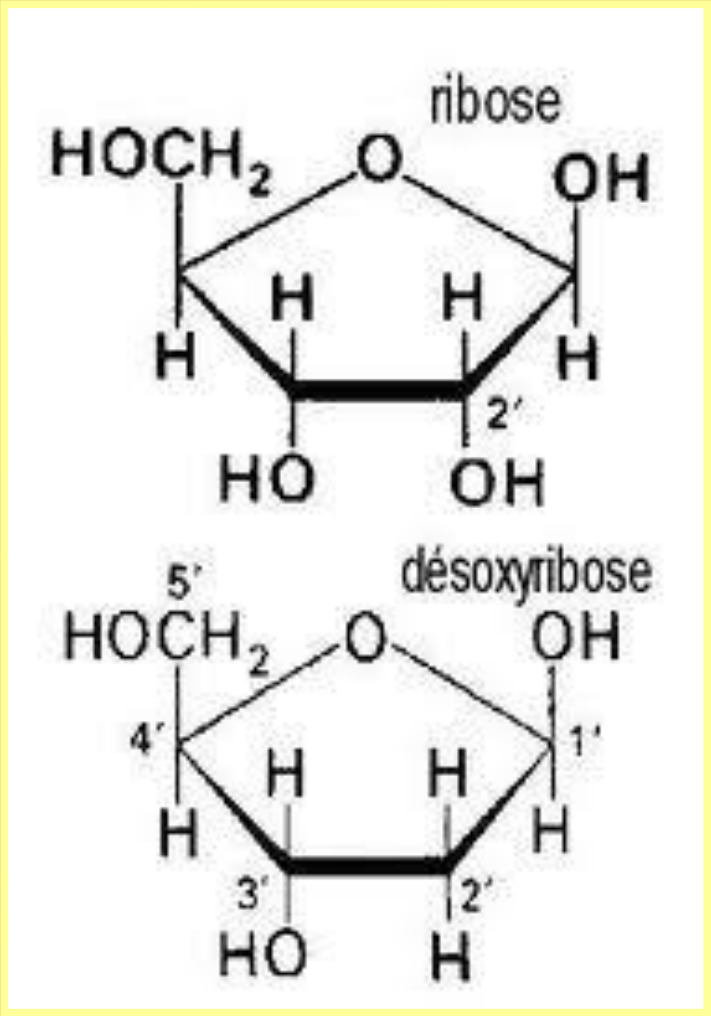
Simple sugars = monosaccharides (C_3 trioses, C_5 pentoses and C_6 hexoses)

Complex sugars = Di-, Oligo- and Polysaccharides

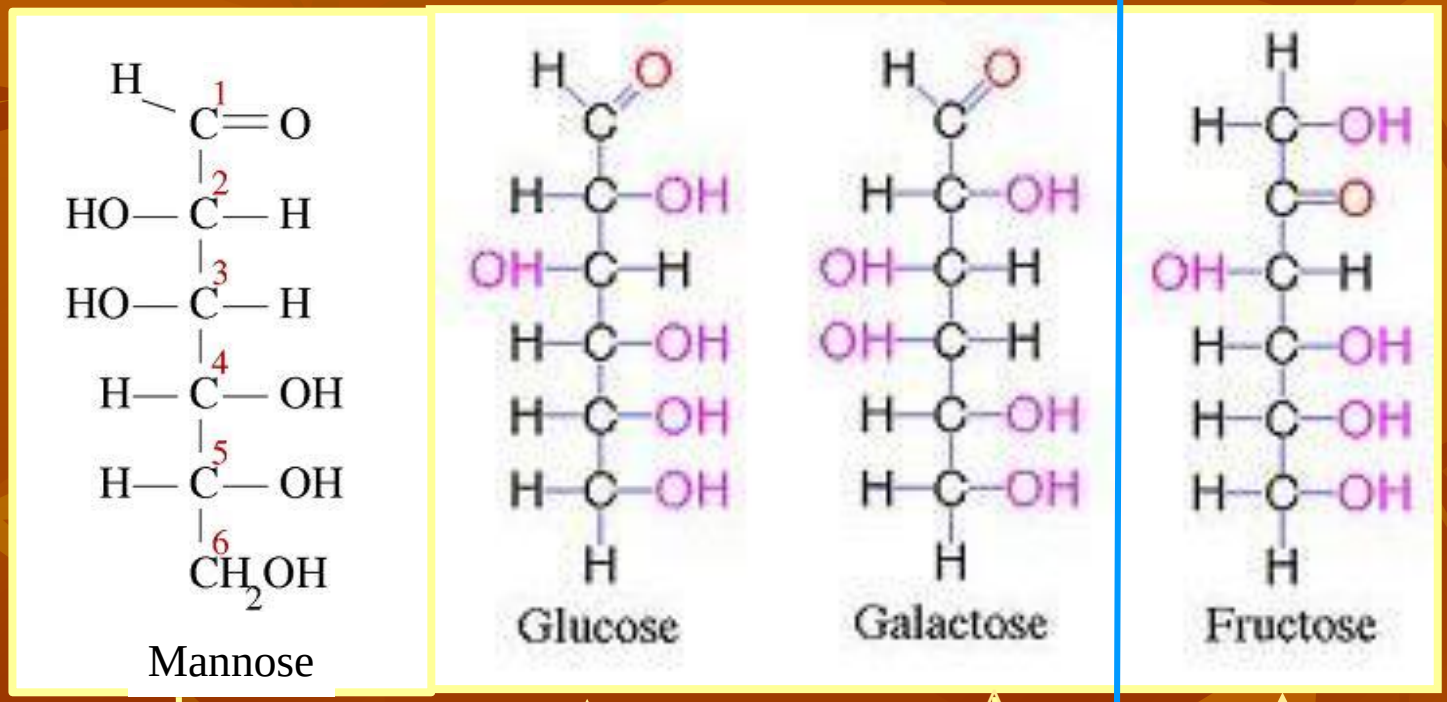
Monosacharides I.-Trioses



Monosacharides II.- Pentoses



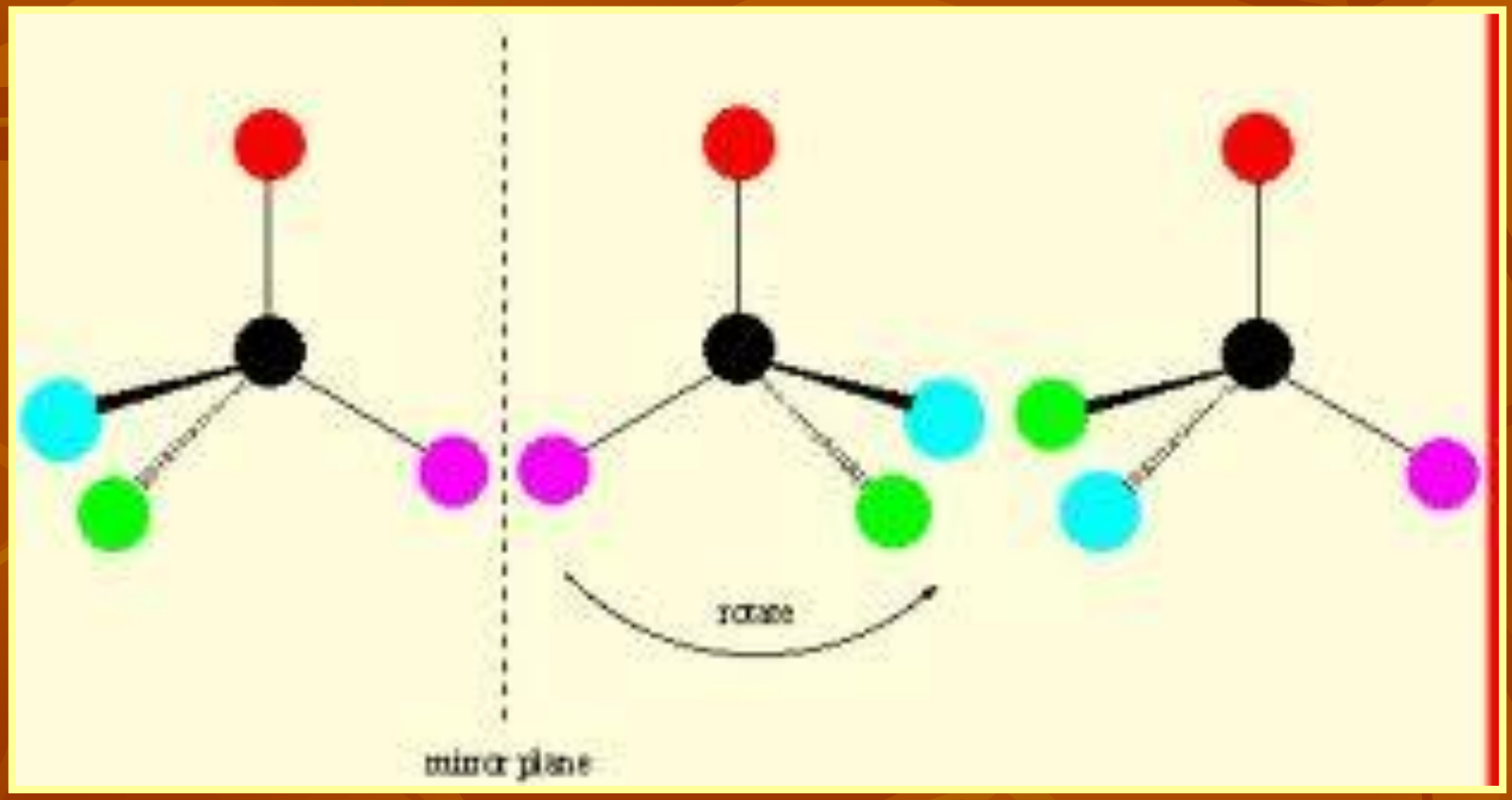
Monosacharides III.- Hexoses



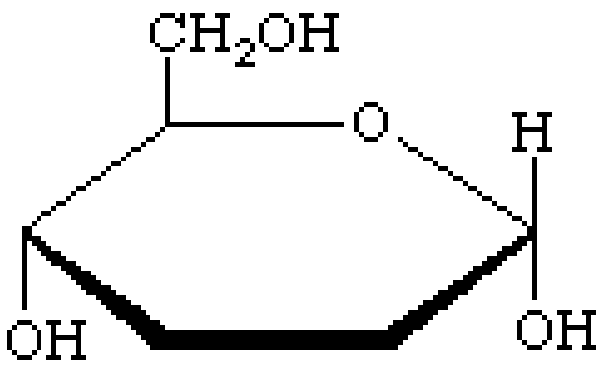
are aldohexose isomers

is a keto-hexose

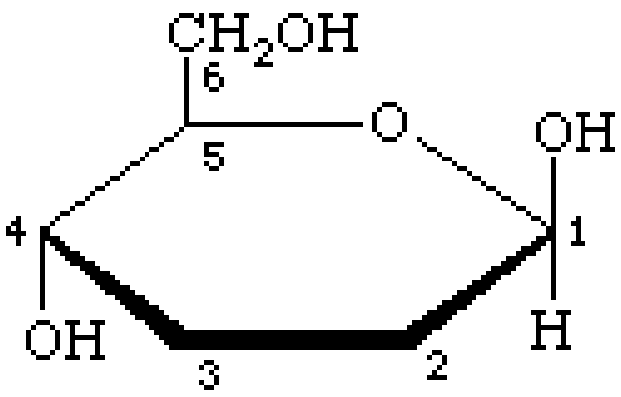
Stereoisomers



Alpha and beta ring conformation

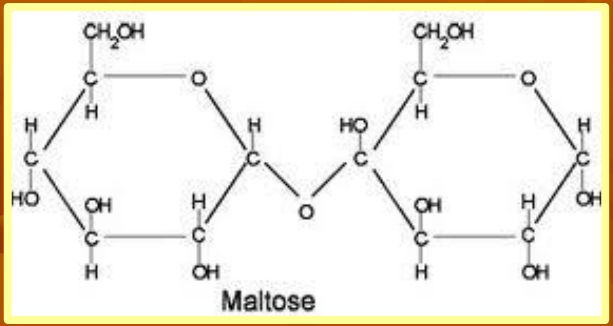


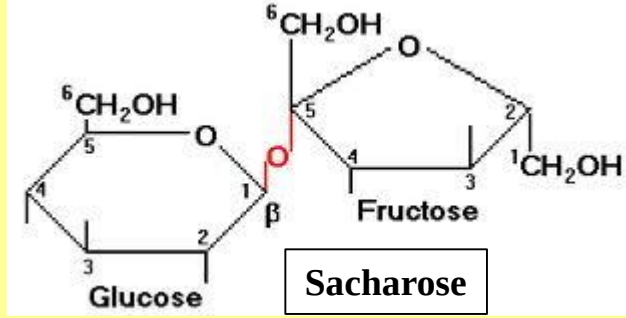
α-D-hexose
(Haworth projection)

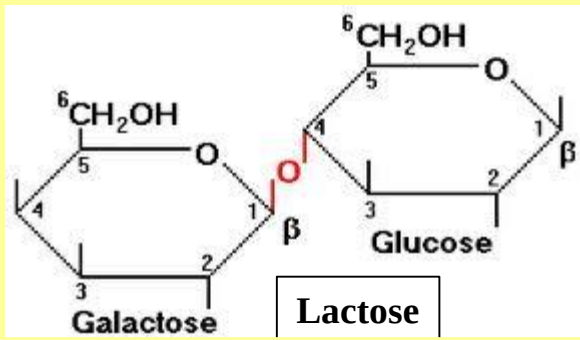


β-D-hexose
(Haworth projection)

Disaccharides



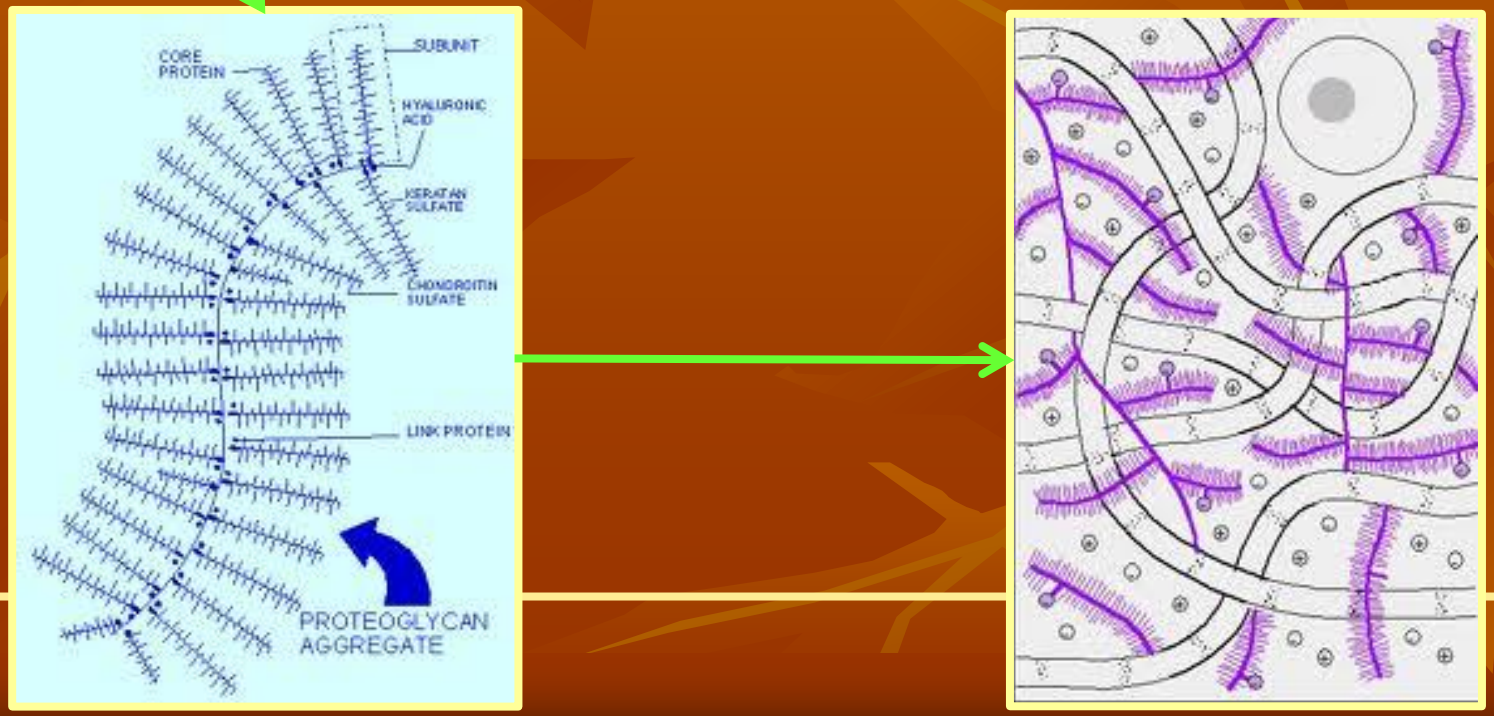




Intolerance is not a rarity !

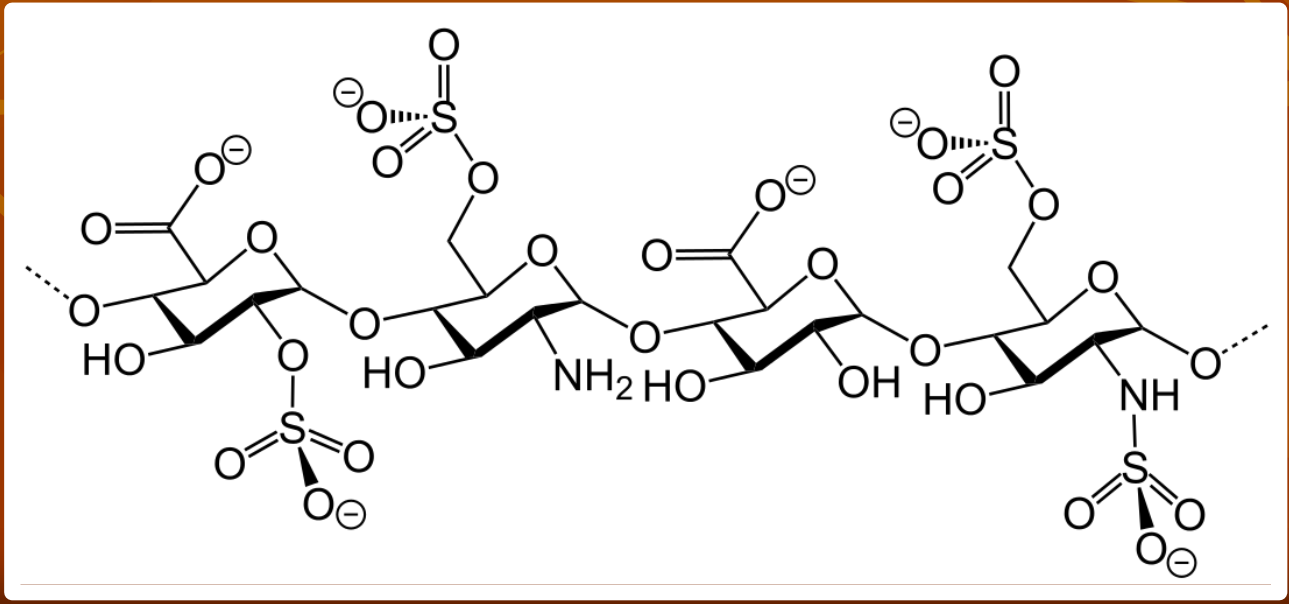
Oligosaccharides I.

- - are important components of glycoproteins, glycolipids, glycosaminoglycans and proteoglycans



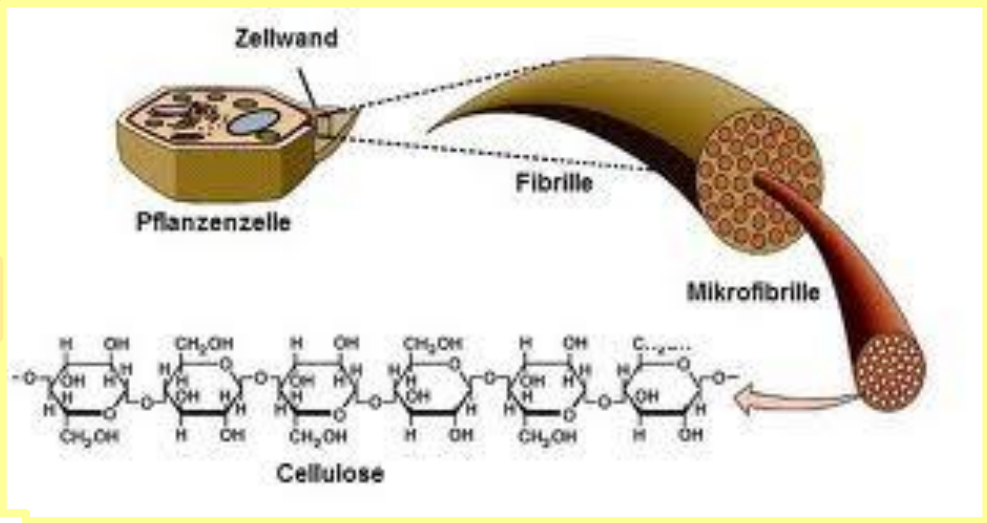
Oligosaccharides II.

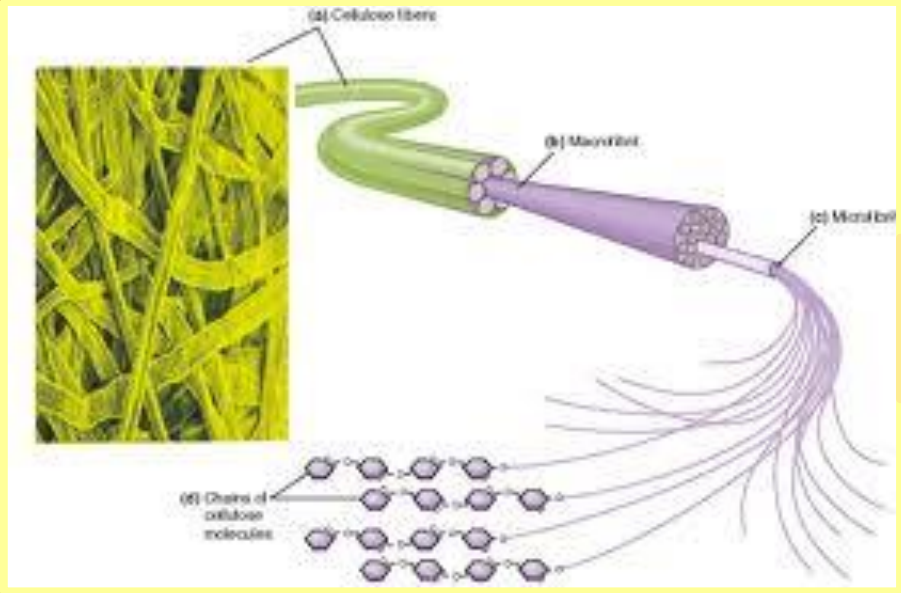
- - Heparin – is an endogenous inhibitor of blood clotting, will be postop. parentheral administered (thromboprophylaxis/-therapy) or added to blood samples to keep them liquid



Polysaccharides I.

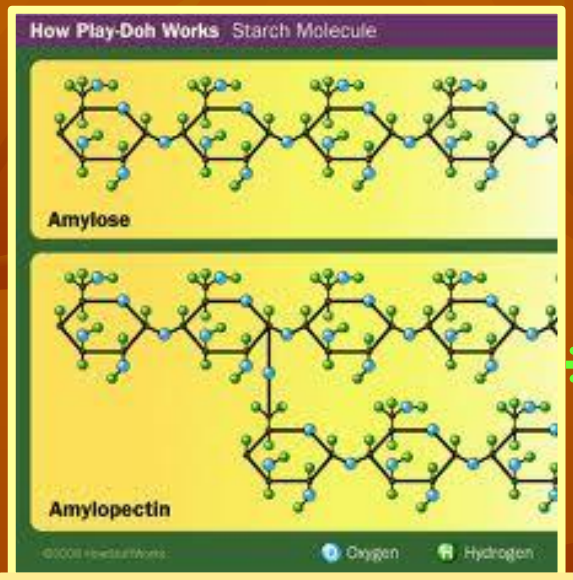
Poly beta1-4 Glucose



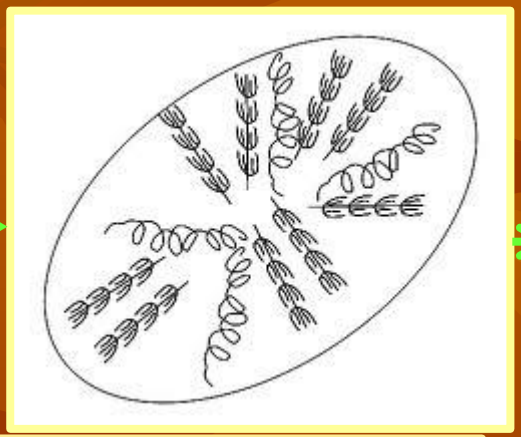


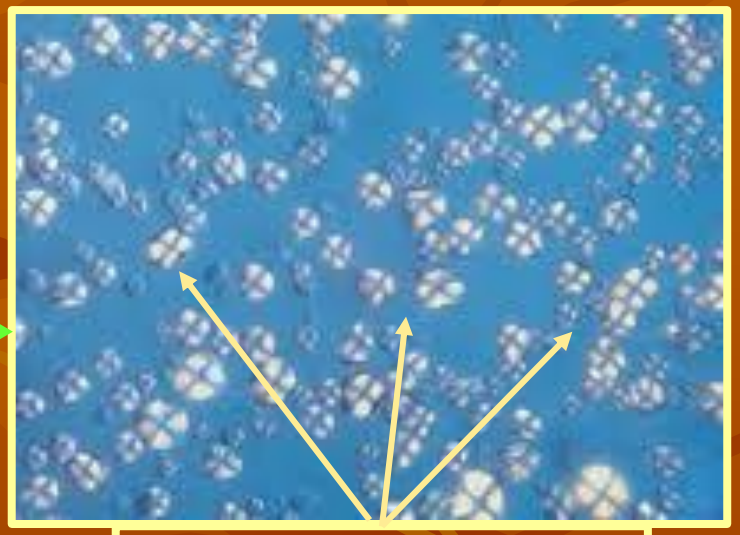
H-bridges between cellulose filaments of the bundle!

Polysaccharides II.



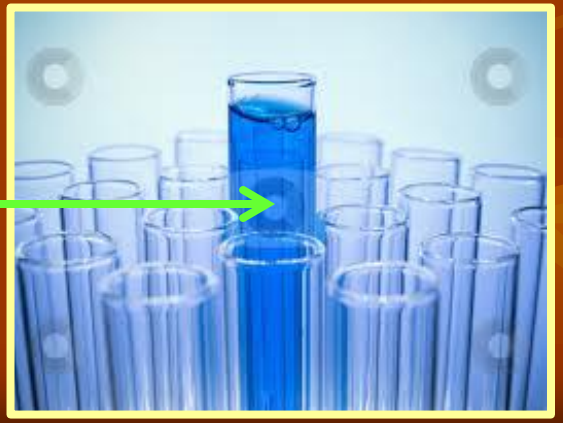
Amylase ofanimals !



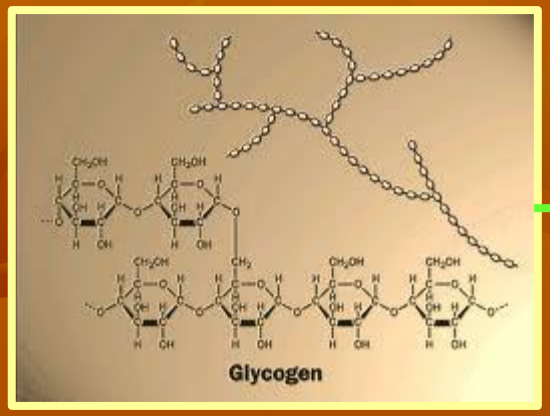


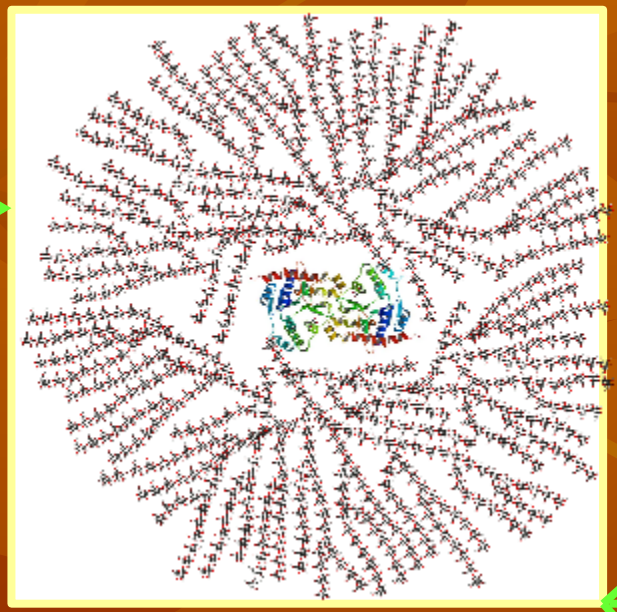
Poly alpha1→ 4 glucose = amylose-helix
+ also alpha1→ 6 branchings in amylopectin

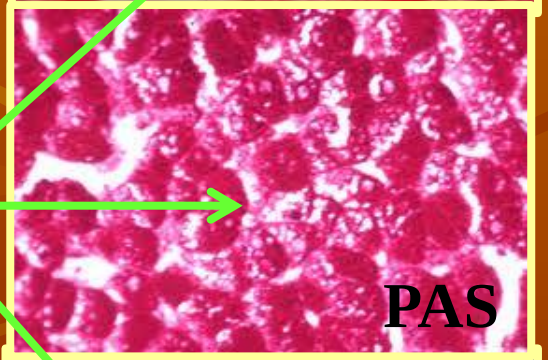
Starch in the polarisation microscope

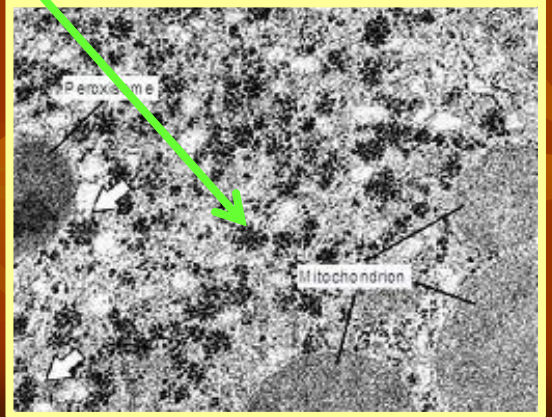


Polysaccharides III.









(Glycogen storage disease = glycogenosis)