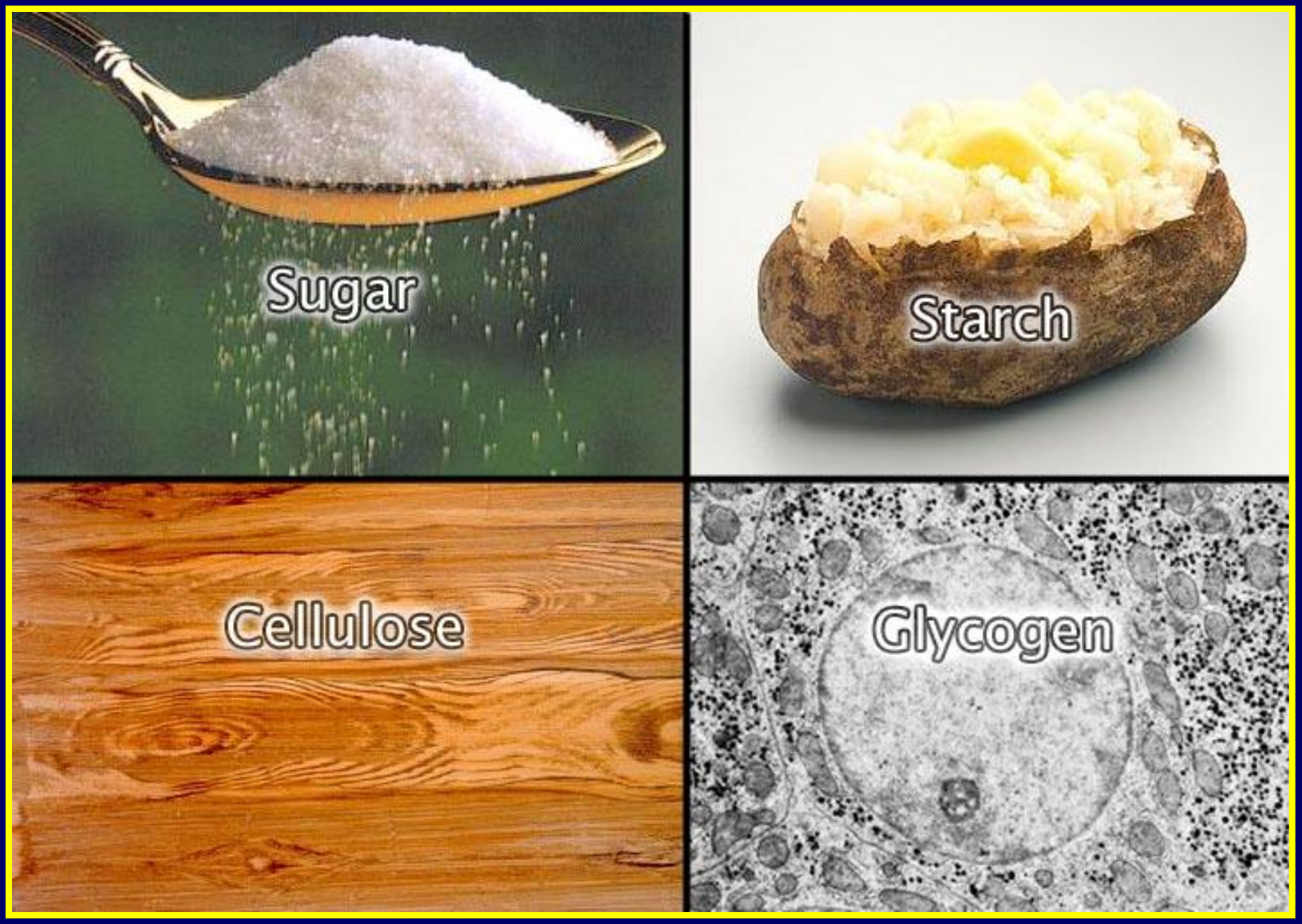
Biochemistry

Objective 2.1: Compare and Contrast the structure and function of the following organic molecules: Carbohydrates, Proteins, Lipids, and Nucleic Acids

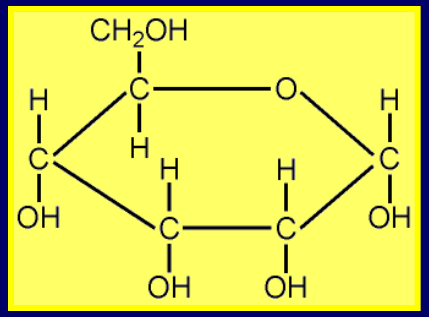
Carbohydrates



Carbohydrates contain carbon, hydrogen, and oxygen in a 1:2:1 ratio

$C_6 H_{12} O_6$

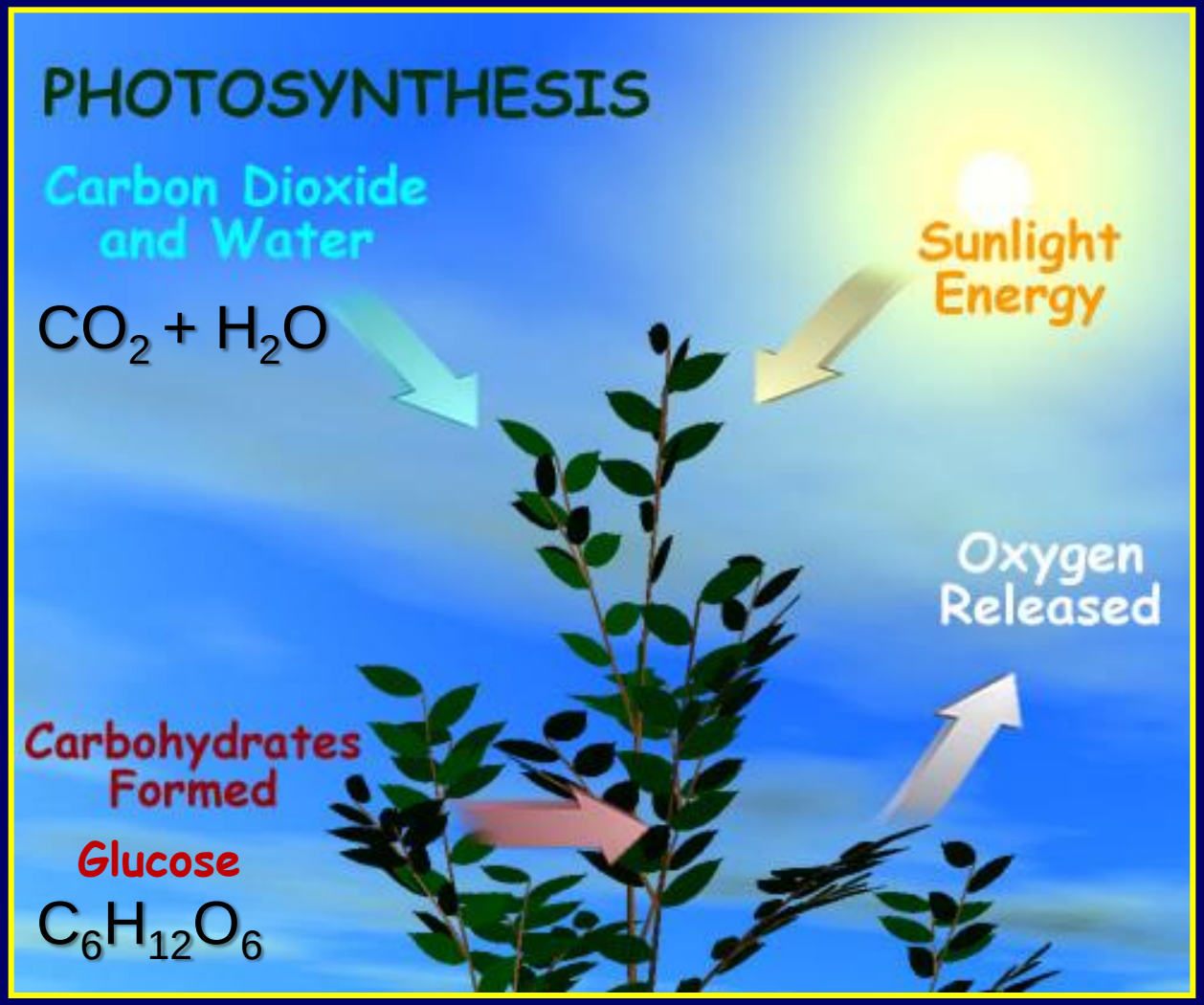
Monomers or subunits are called Monosaccharides

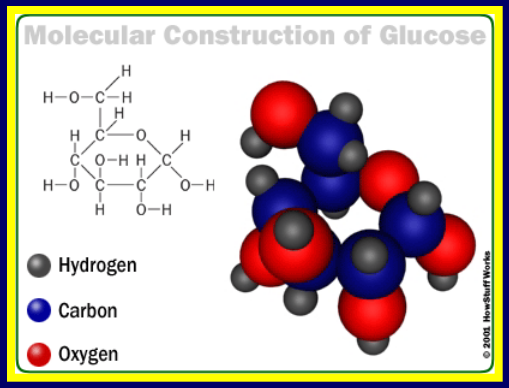


Functions include energy and structure

Basic Structure consists of chains of carbon rings

Plants make the most basic monosaccharide sugar, glucose, sugar during photosynthesis





Glucose

$C_6 H_{12} O_6$

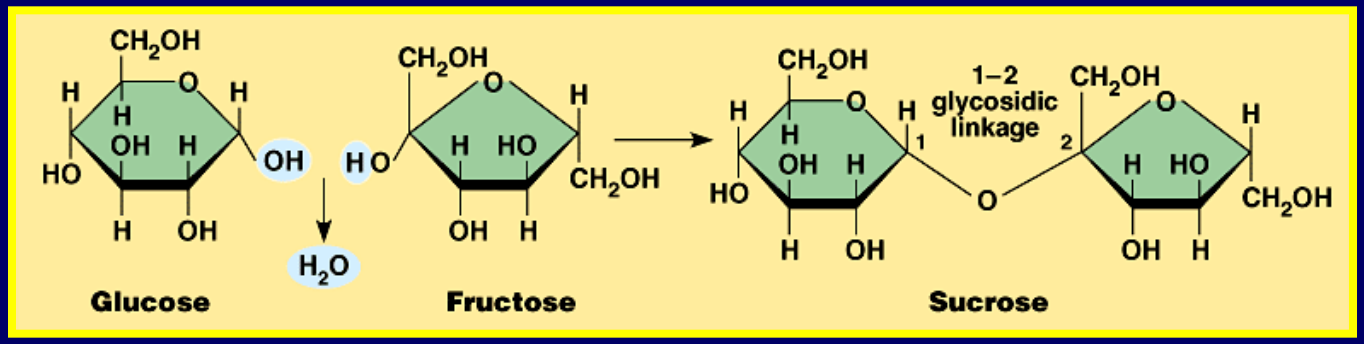
Glucose molecules can be rearranged to form other simple sugars such as fructose, sucrose, maltose, and lactose. All of which are provide quick energy.

Fructose

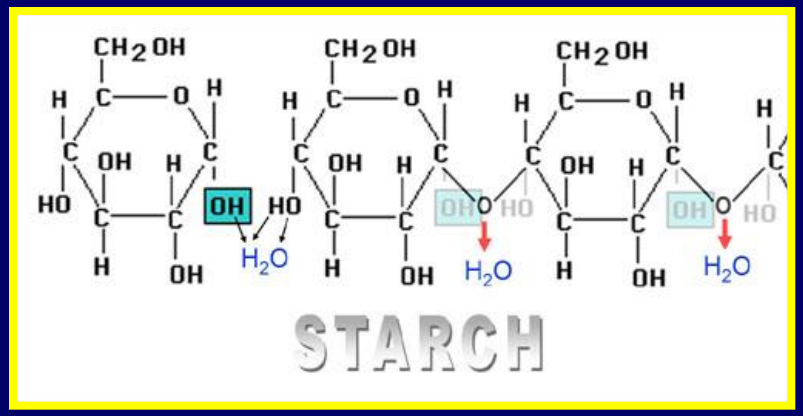
Sucrose

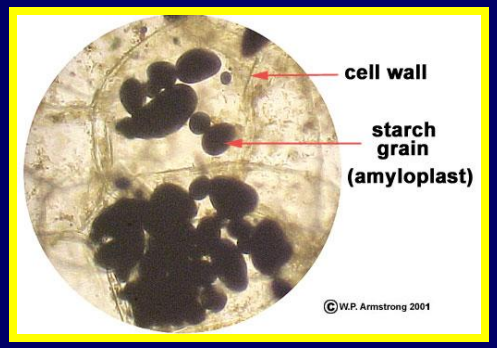
Maltose

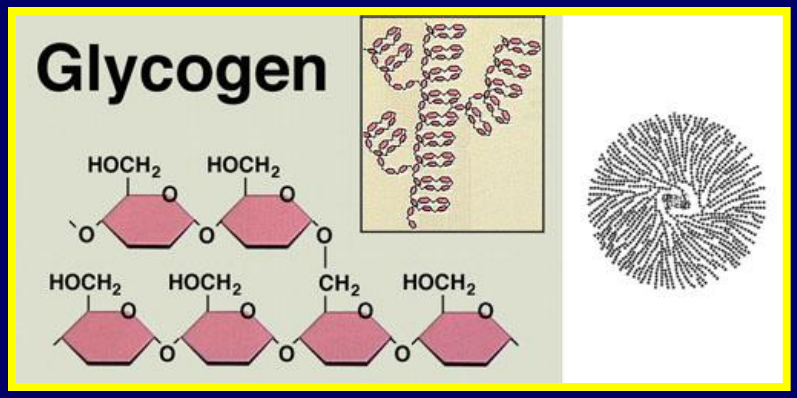
Lactose

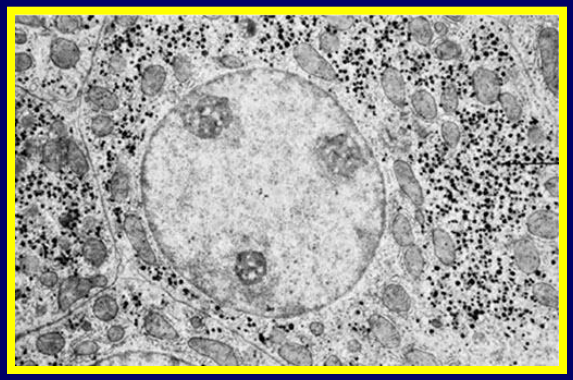


Thousands of glucose molecules can also be combined to form large polysaccharide molecules such as starch and glycogen that can be a source of stored energy.

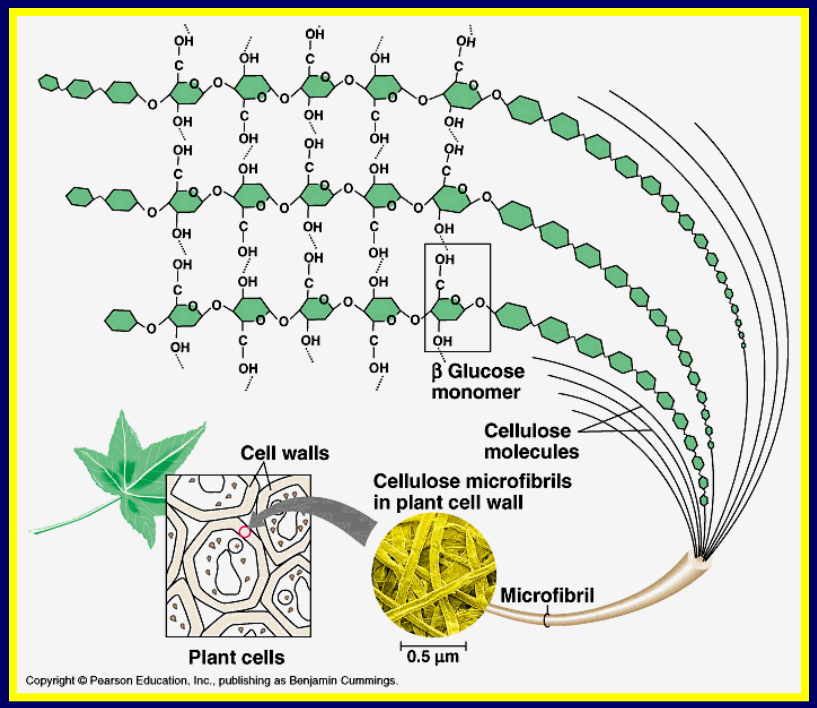




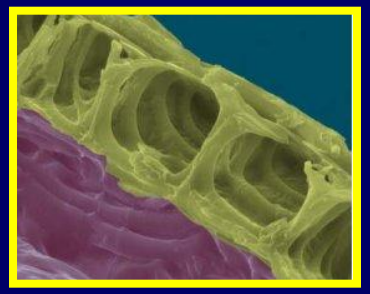




Glucose can also be used to create polysaccharides that provide structure.



Plants join glucose molecules into a polysaccharide called cellulose that they use to build cell walls.



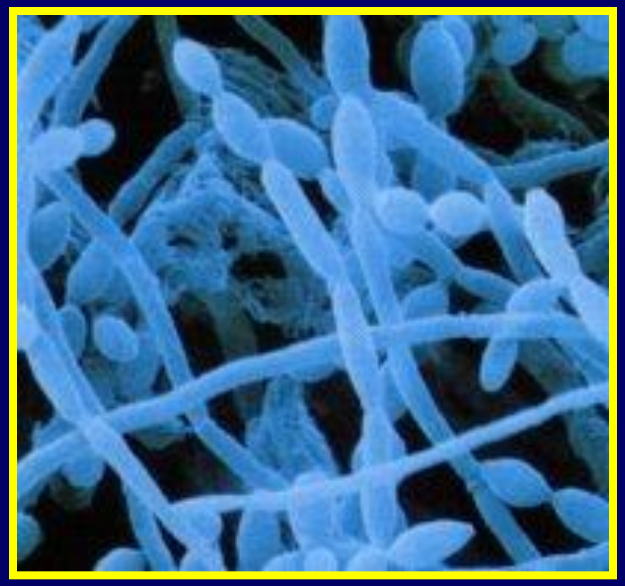
Some invertebrates join glucose molecules into long polysaccharides, called chitin, that they use to provide structure in exoskeletons.

Chitin

(Kite – in)

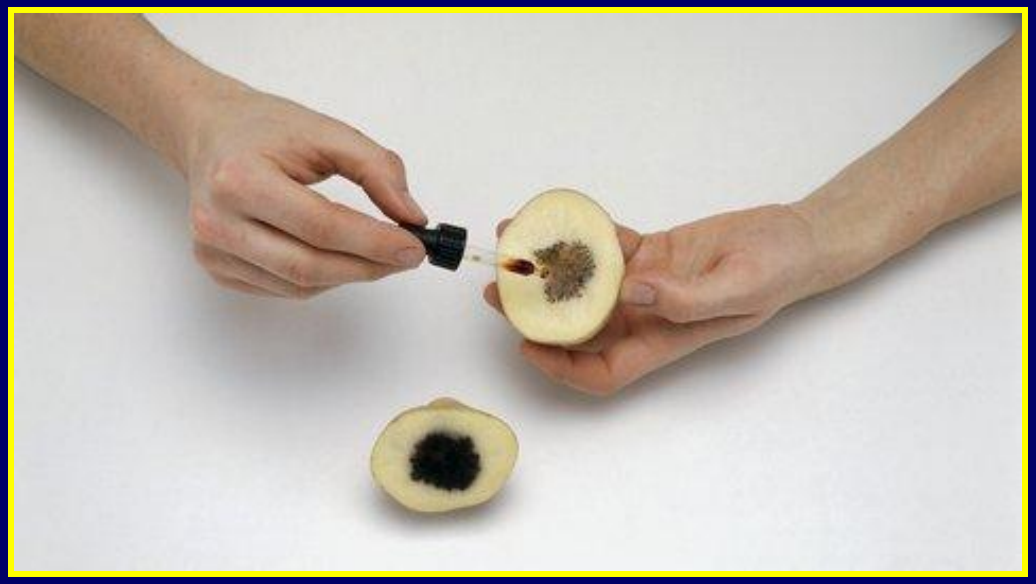
Chitin is also used for structure in the cell walls of mushrooms and other fungi.

Chitin

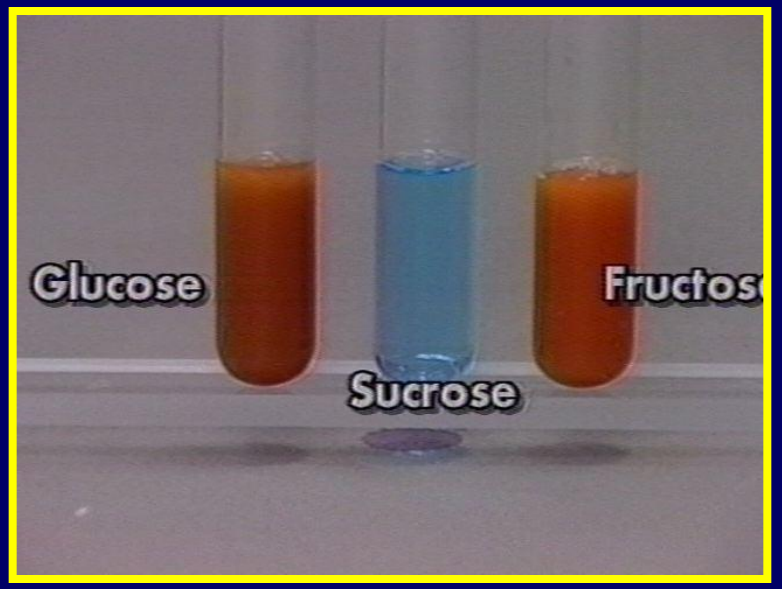


Chitin has a high ability to absorb metals which can make eating mushrooms dangerous.

Identification Tests for Carbohydrates



The application of iodine will cause a purplish-black color to appear if starch is present



Simple sugars mixed with Benedict's Solution turn an orange-red color

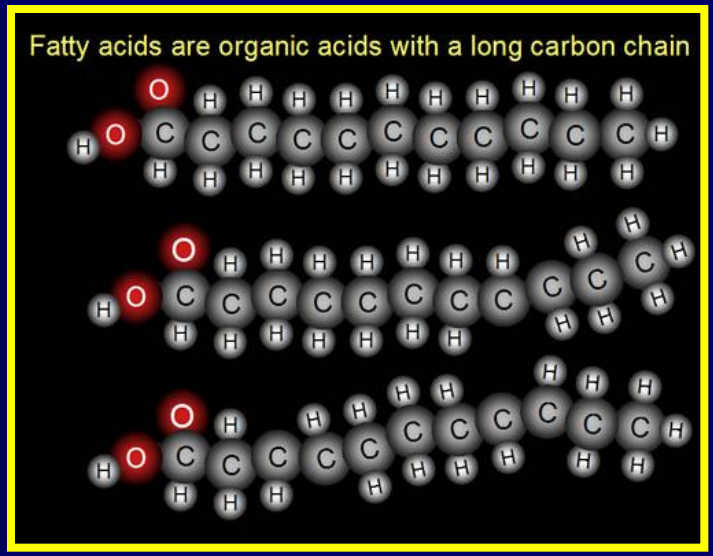
Lipids

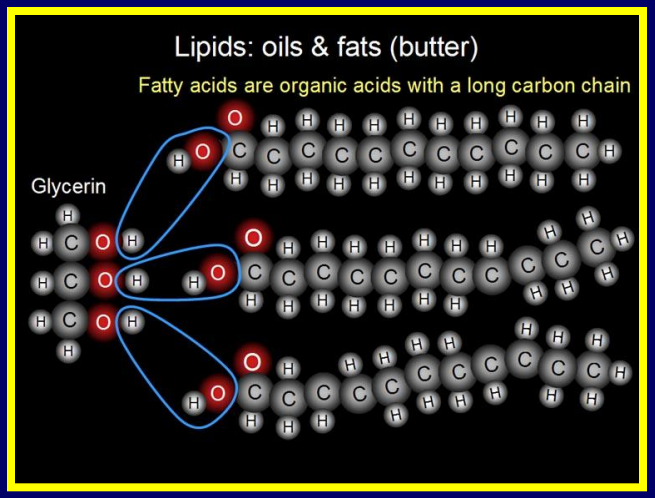

Mazola
Sweet-Unsalted
Premium
Mazola
Rich in CORN OIL
100% PURE
Mazola
CORN OIL
Margarine

Lipids are also made of carbon, hydrogen, and oxygen but have no set ratio.

$C_{57} H_{110} O_6$

Monomers or subunits are called Fatty Acids.



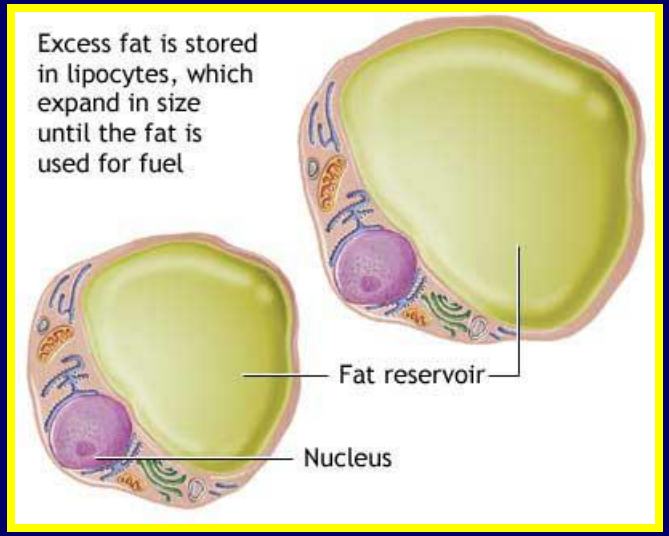


Lipid structure includes a three-carbon glycerol molecule and two or three long hydro-carbon chains.

A major function of lipids is efficient energy storage

Plants store oil inside of seeds so that the embryo plant have a source of energy that does not require a lot of room.

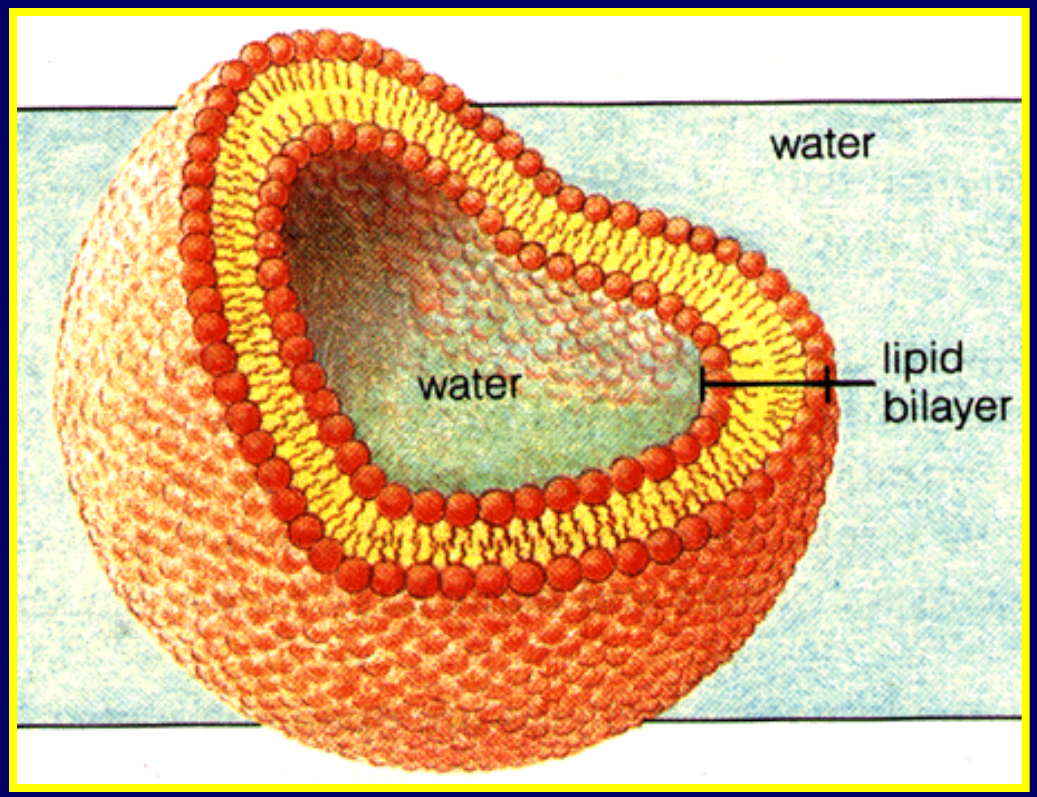
Animals store fat in special fat cells that can swell and shrink as fat is deposited or used.

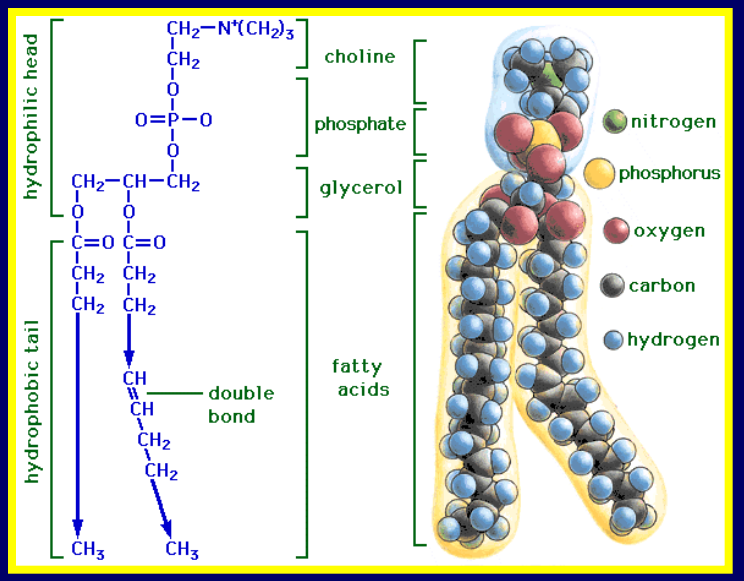


Fat cells cushion organs, insulate, and provides stored energy that can be used when food is scarce.

Waxes are also a form of lipid and help prevent water loss in plants, especially those found in dry environments.

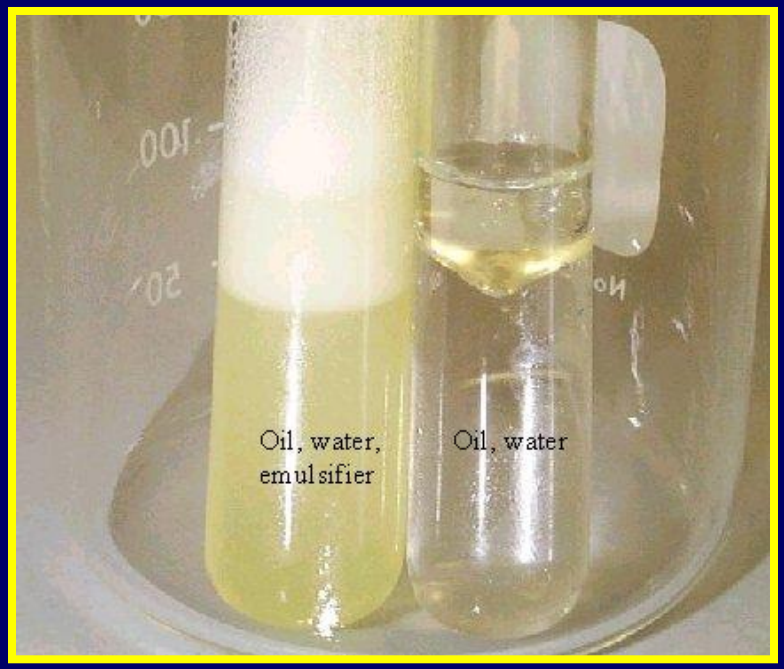
Surrounding all cells is a cell membrane formed of a lipid called a phospholipid that only has two hydrocarbon tails that protects the cells in numerous ways.





Phospholipids

Identification Test for Lipids



When lipids are rubbed on brown paper, a translucent spot appears

Lipids do not dissolve in water

The End