Biology

Biology is the science of life (or) living matter in all its forms and phenomena.
Biology is divided into botany (Botane= plant). which means the science of plant, and Zoology (Zoon=animal) the science on of animal. Each one of these two major fields were divided into subdivisions like:-

1- Anatomy
2- Cytology
3- Ecology
4- Embryology
5- Histology
6- Physiology
7 pathology
8- Genetics
9- Parasitology
10- Evolution

what is life?
Living organisms can in most cases be differentiated from non living things by certain characteristics, the most important of which are the followings:-

1- Nutrition and growth 2- the nutrition means taking food through the process called ingestion.

2- Movement :- one of the most easily observed activites of most living things is motion.

3- Irritability :- is an inherent property of all protoplasm.

4- Extraction :- means the elimination of the useless substances from the body.

5- Respiration :- means provision (or) gaining of O_2 and the removalB of Co_2.

6- Reproduction :- The ability of an organism by itself (or) in Cooperation with another to produced new organism.

7- Adaptation :- CaPability of living things to survive within new environment (or) Condition which maybe in response to a chang in temperature (or) light (or) may be resulting from genetic differences to produce new varieties which lead to evolution

cells

cellz. is the basic unit of life, and all things are composed of cells.

Most gene are found within a single ch. within nucleoid, and Ribosomes. These primitive cells are called ProKaryotic cells, like bacteria and blue-green algae, while EuKaryotic cells contain ~~the~~ true nuclei and variety of other cell organelles like Plant and animals.

Size of Cells

The cells vary in size accoreling to their Location and function in the organism. Most of the animal and plant cells are in rany of 10-100 M (Micron = 0.001 millimeter). RBCs of man are 7.5 M in diameter, Bacteria (1M).

shape of cellsz- the primary cells develope gradually to show great differentiation with different shapes accoreling to the function. Muscle cells are spindle, nerve cell are irregular, Kidney cells are cuboidal, ~~are~~

Bacterial cellsz -

Bacteria z- are proKaryotic cells. Most bacteria are between 1-10 M in size, therfore, they are just visible with the light microscope. the cell contains Peptidogly can, a complex molecule ~~with~~ with chains of a unique amino disaccharide Joined by peptide chains. In some bacteria-

cell wall is further surrounded by a capsule and(or) gelatinous sheath called a slim layer. Motile bact. usually have long, very thin appendages called flagella (single = flagellum).
A membrane called the plasma membrane regulates the movement of molecules into and out of the cytoplasm the interior of the cell. Cytoplasm in a prok. cell consists of cytosol, a semifluid medium and thousands of ribosomes (small bodies that coordinate the synthesis of proteins. In prok. most genes are found within a single ch. (loop of DNA) located within the nucleoid.

- the chemistry of Organic Molecules -

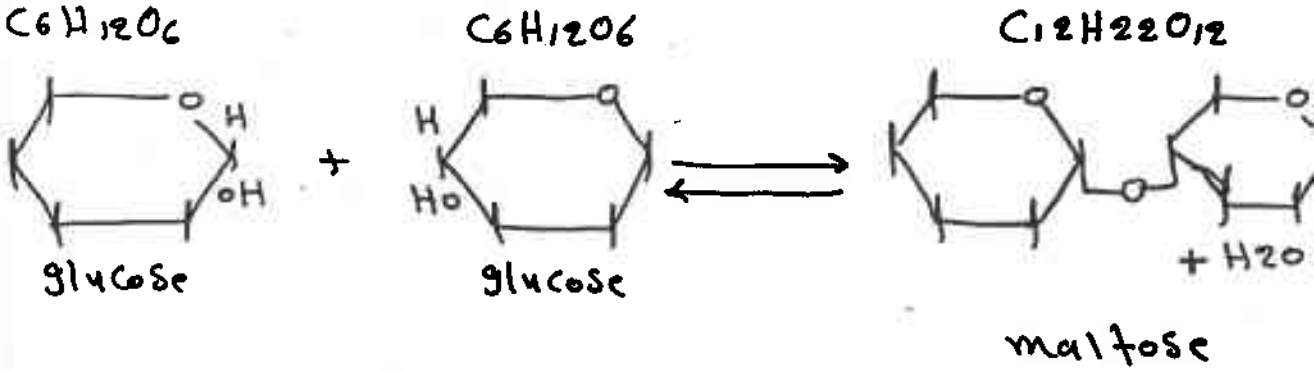
The most common elements in living things are carbon, hydrogen, nitrogen, and oxygen, which consist 95% of your body weight.

Carbon skeletons and functional Groups:

Carbon has four electrons in its outer shell, and this allows it to bond with as many as 4 other atoms. the ability of carbon to bond to itself results in carbon chains of various length and shaps long chains containing 50 (or) more carbon atoms.
Molecules composed only of C and H are hydrophob
But the ~~addition~~ addition of a functional group like -OH (or) -C=O makes the molecule polar and able to interact with other polar molecules. In Particular Polar molecules are hydrophilic.

the blood of animals and fructose is frequently found in fruits. These sugars are isomers of each other they both have the molecular formula $C_6H_{12}O_6$, but they differ in structure (Fig. 1).

- A disaccharide :- contains 2 Mono. that have joined by condensation. Lactose is a disacch. that contains galactose and glucose and is found in milk. Maltose (composed of 2 g. molecules) is a disacch. of interest because it is found in our digestive tract as a result of starch digestion (Fig. 2).



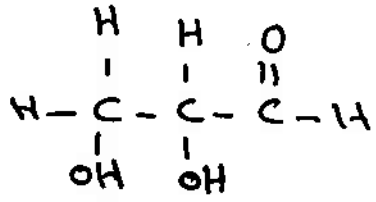
(Fig. 2)

- Polysaccharides :- are long polymers of mono. form. by condensation synthesis, the most common polys-charides are starch, glycogen and cellulose, wh are chains of g. molecules. chitin is a polysacc. th contains a modified g. molecule.

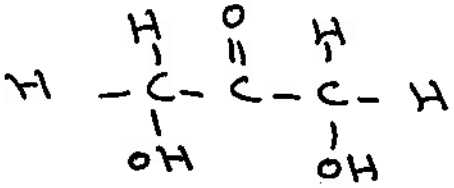
- starch and glycogen :- the structures of starch and glycogen differ only slightly. Glycogen is characterized by many branches. which are side chains of g. that go off from the main chain. starch has fewer branches.

Isomers:-

Iso. also contribute to the diversity of organic molecules. Iso. are molecules that have identical molecular formulas but they are different molecules because the atoms in each are arranged differently for example:-



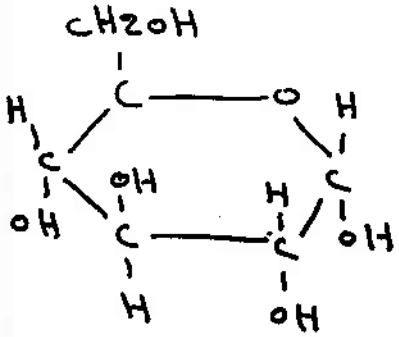
Glyceraldehyde



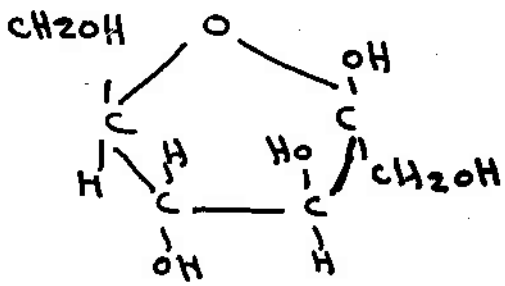
Dihydroxyacetone

1- Carbohydrates:-

The formula means (or) represent Carbohydrate that bear many hydroxyl groups ex:-



glucose



fructose

Fig. ①

Carb. include monosaccharides (one sugar), disaccharides (two sugar bonded together) and polysaccharides (many sugars bonded together). sugars and some polysaccharides (starch and glycogen) serve as energy storage compounds

- Monosaccha- are simple sugars with a carbon backbone of 3-7 atoms. the best known sug. are those that have 6 C (hexoses). glucose is in

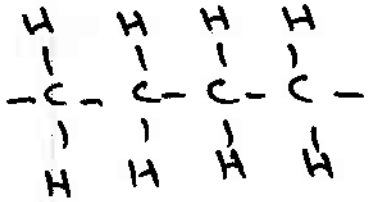
cellulose and chitin:-

Cellulose :- contain glucose molecules that are joined together differently than they are in starch and glycogen. The orientation of the bond between g. molecules in cellulose causes the polymers to be straight and fibrous, making cellulose suitable as a structural compound.

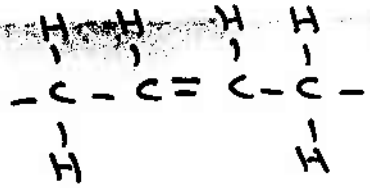
chitin :- which is found in the exoskeleton of crabs and related animals like insects, is also a polymer of g. The linkage between the g. molecules is like that found in cellulose, therfore chitin is not digestible by humans.

2- Lipids :- contain H, C and O but in different ratio and arrangment than in carbohydrates. Many of these are insoluble in water because they lack any polar groups. The most familiar lipids are those found in fats and oils. fat is utilized for both insulation and energy reserves by organisms.

Fats and oils :- Fats and oils contain two types of unit molecules :- Fatty acids and glycerol. Each f. consists of a long hydrocarbon chain with a carboxyl (acid) group at one end. Because the carboxyl group is a polar group, fatty acids are soluble in water. Most of the fatty acids in cells contain 16 to 18 carbon atoms per molecule. Fatty acids are either saturated or unsaturated. saturated have no double bonds between the carbon atoms. unsaturated fatty acids have double bonds in the carbon chain wherever the number of hydrogens is less than two per carbon atom.

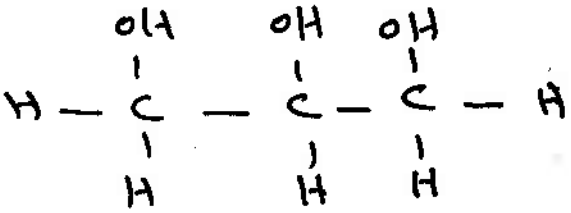


saturated



unsaturated

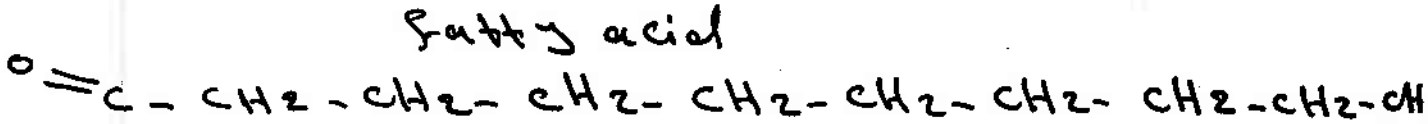
Glycerol 2. is a compound with 3 hydroxyl (-OH) groups which are polar, therfore, glycerol is soluble in water



glycerol

waxes 2. in waxes, a long-chain fatty acid bonds ~~with~~ with a long-chain alcohol. They are soild at normal temperatures because they have a high melting point, they are also waterproof and resistant to degredation. In many plants waxes form a protective cuticle (covering) that ~~is~~ retards the loss of water for all exposed parts. ~~In human~~ In animals, waxes are involved in skin. In humans was is produced by glands in the outer ear cana

Fatty acid

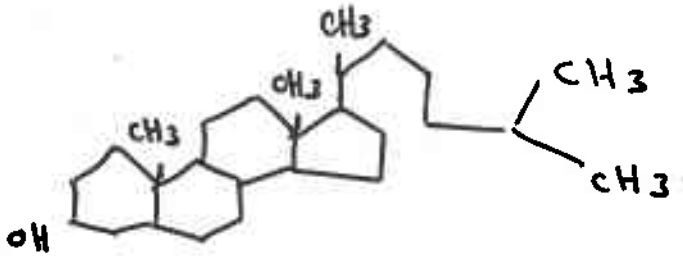


long-chain alcohol

Phospholipids:- one fatty acid replaced by phosphate group (PO_4) like lecithin and cephalin. phospholipids have polar head and non polar tail they arrange themselves in double layer in presence of water.

phospholipid symbol

Steroids:- are lipids have different structure from natural fats. they are bile salts which are synthesi and screted by mammalian liver.



cholestrol

The most abandent steroid in human is cholestrol which present in all body cells (especially nervous tissue).

Proteins:-

A protein is composed of one (or) more polypeptides which are polymers of amino acids. per P. are made up of C, H, O and N. many proteins also contain sulphur and phosphorus. They are tissue builders tissue repairs. proteins are constructed of monome called amino acids. there are 22 amino acids. The amino acids are linked together by peptid bond to form polypeptides. Albumin composed of 50 amino acids, heamoglobin of 574 amino acids.

- Nucleic acids - are polymers of nucleotides with very specific functions in cells. DNA (deoxyribonucl acid) is the genetic material that stores informati regarding its own replication and the order in whi amino acids are to be joined to make a protein. RNA (ribonucleic acid) is another type of nucleic acid. An RNA molecule called messenger RNA (mRN is an intermediary in the process of protein synthe Some of nucleotides have independent metabolic functions in cells. For example, some are compone of coenzymes which facilitate enzymatic reactions. ATP (adenosine triphosphate) is a nucleoti that supplies energy for synthetic reactions and for various other energy-requiring processes in cel