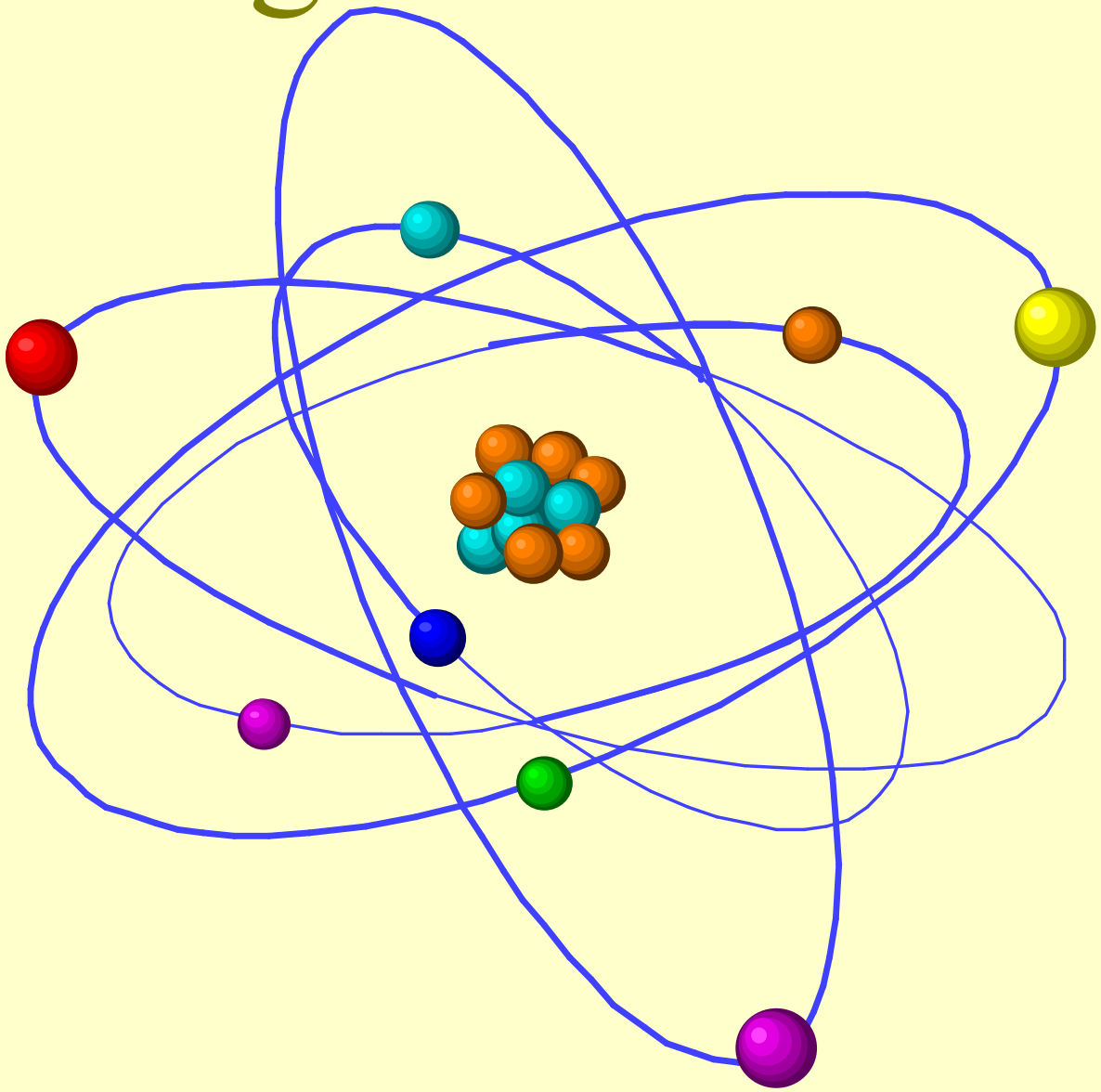
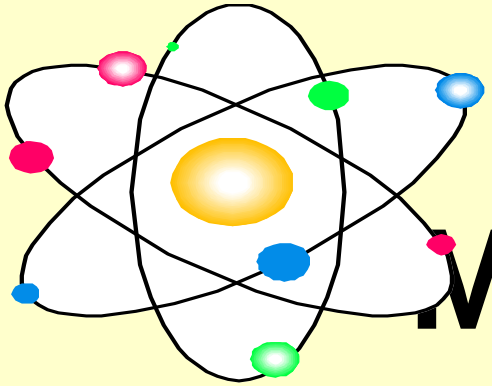
Biological Molecules

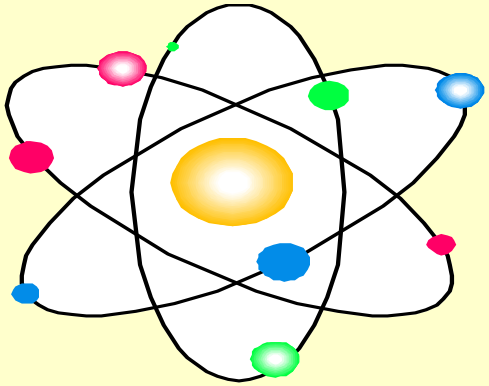




ORGANIC MOLECULES

ALL LIVING THINGS contain organic molecules

- **Carbohydrate**
- **Lipids**
- **Proteins**
- **Nucleic Acids**



ORGANIC MOLECULES

- ALL CONTAIN A CARBON backbone, and hydrogen and oxygen.

Organic Molecule Made up of…

Carbohydrate	**C, H, O**
Lipids	**C, H, O**
Proteins	**C, H, O, N**
Nucleic Acids	**C, H, O, N, P**

1. Each kind of organic molecule is made up of a different monomers.

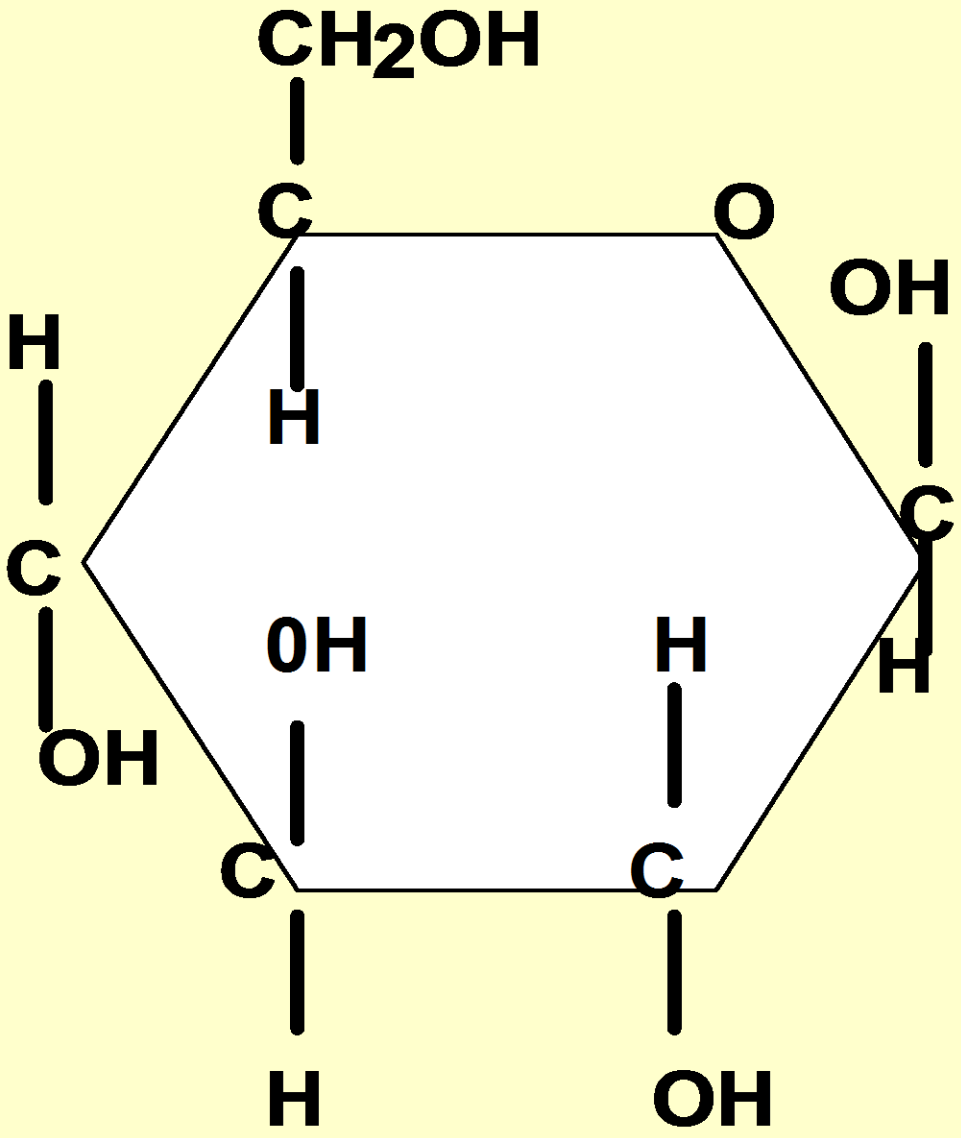
2. Monomer - small individual molecules that connect to make up a polymer

3. Polymer – a large molecule composed of repeating individual molecules called monomers

4. All organic molecules important to life are large polymers.

CARBOHYDRATES

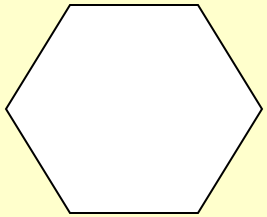
- **Examples - Sugars, starches and cellulose**
- **Sources sugar, wheat, rice, corn, potato**
- **Used by organisms for quick ENERGY**

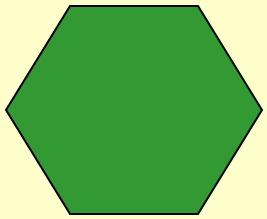


GLUCOSE

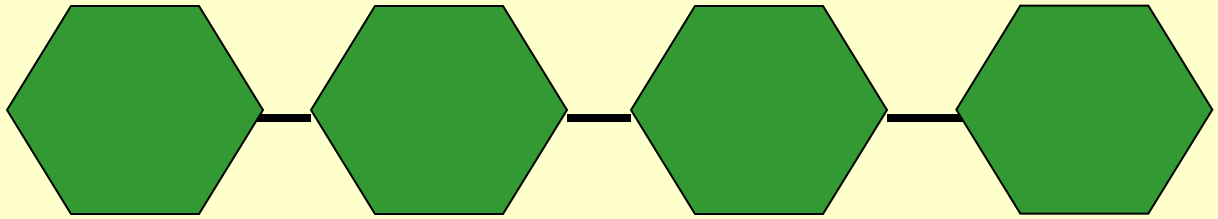
$C_6H_{12}O_6$

(fill in blank)



MONOMER = 

Monosaccharide
(basic building block)

POLYMER = 

Polysaccharide

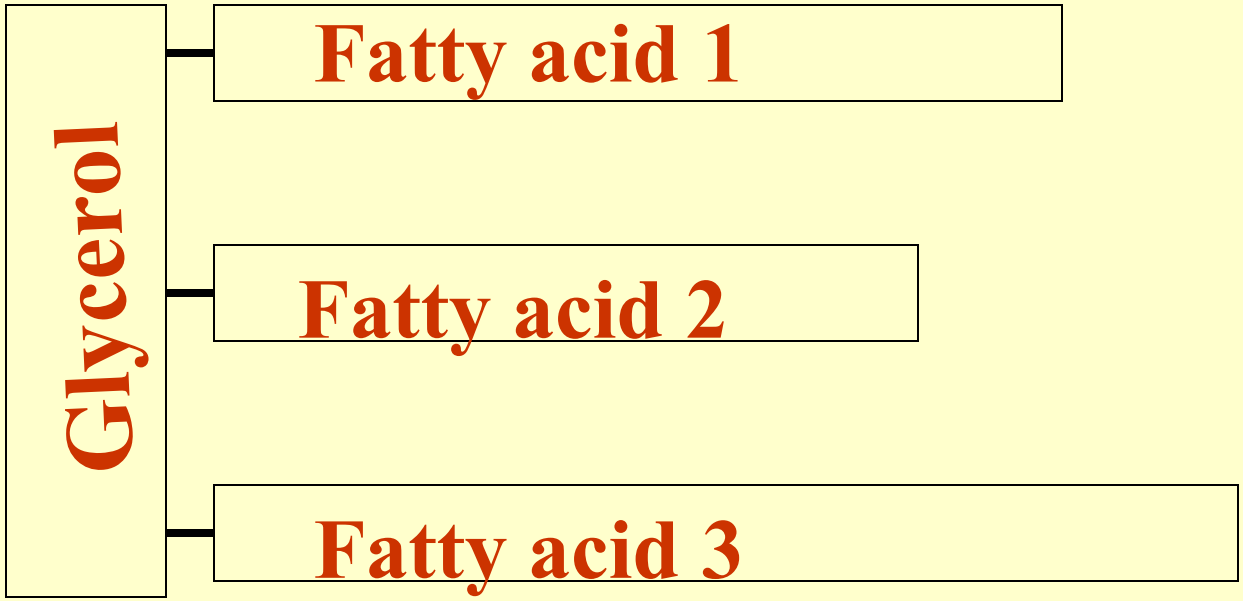
LIPIDS

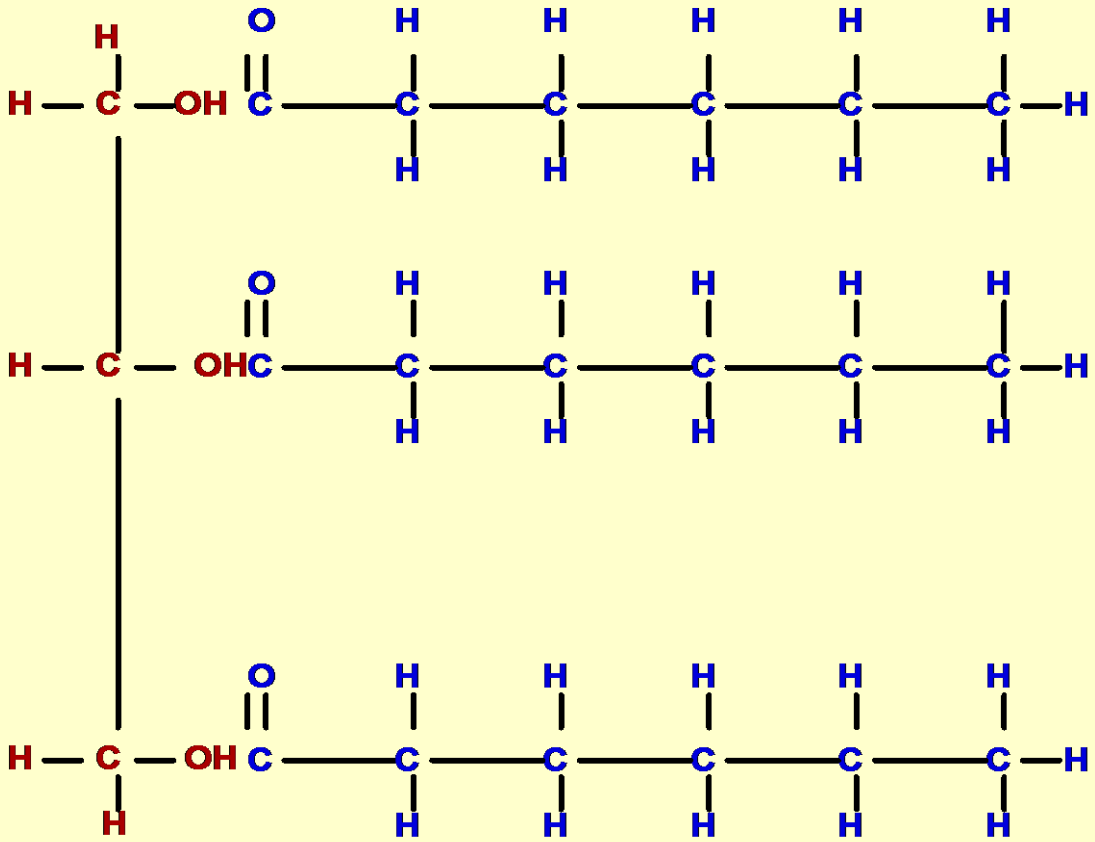
- **Examples – Fats and Oils**
- **Sources - waxes, steroids, butter, cholesterol, animal fats**
- **Used by organisms for long term energy storage and insulation**
- **Do not mix with water**

- Monomers = glycerol

  = any 3 fatty acids

- Polymer = 1 glycerol & 3 fatty acids bonded together



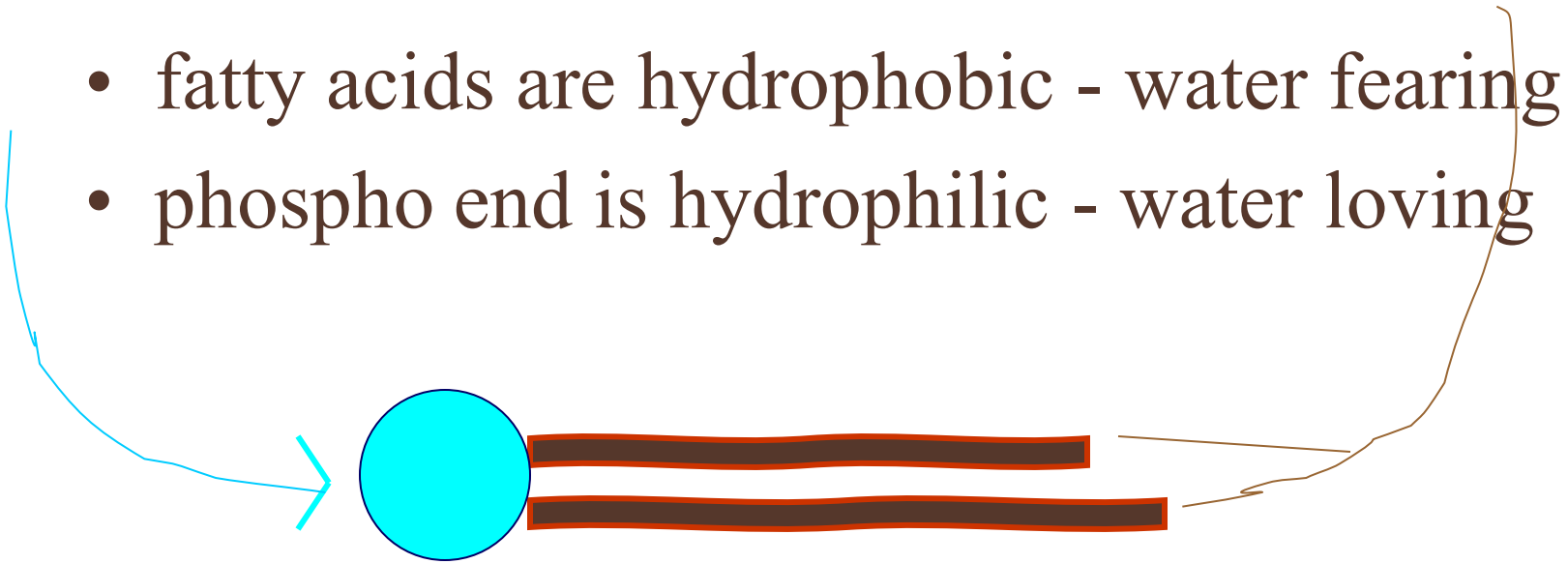


$C_{21}H_{41}O_6$

Lipids - phospholipids

- 1 Glycerol and 2 Fatty acids
- **Make up cell membranes**

- fatty acids are hydrophobic - water fearing
- phospho end is hydrophilic - water loving

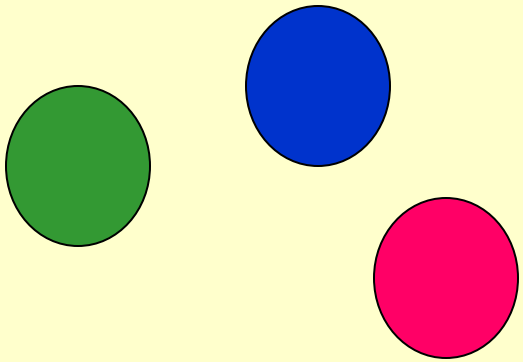


PROTEINS

- **Examples – meats, nuts and beans**
- **Sources – meats, nuts and beans**
- **Uses - makes muscle, hair and nails and enzymes**
- **Enzyme** - a molecule that speeds up or slows down a chemical reaction so that it can occur at body temperature.

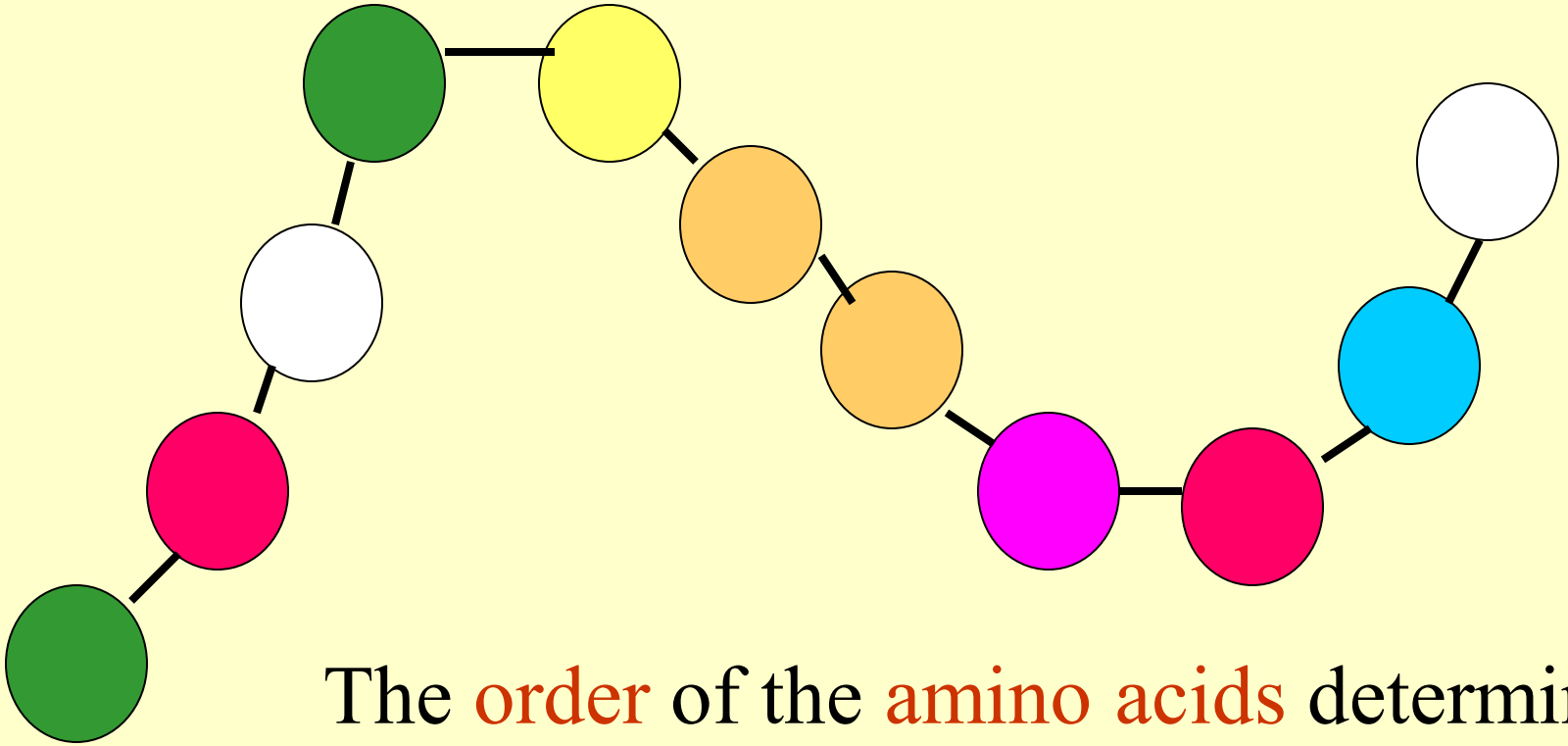
- Monomer – amino acids (20 different kinds)

(basic building blocks)

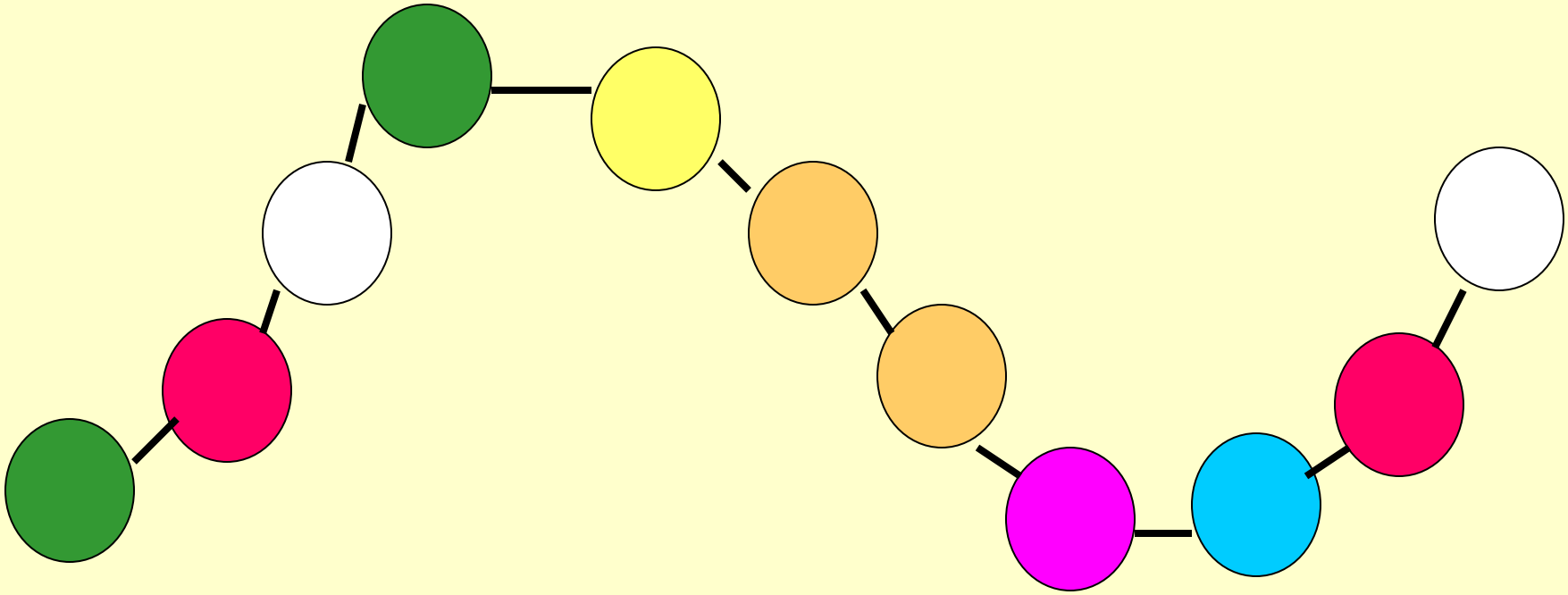


Alanine	Arginine
Asparagine	Aspartic Acid
Cysteine	Glutamic Acid
Glutamine	Glycine
Histidine	Isoleucine
Leucine	Lysine
Methionine	Phenylalanine
Proline	Serine
Threonine	Tryptophan
Tyrosine	Valine

Polymer – a chain of 50 –500 amino acids bonded by a peptide bond (polypeptide)



The order of the amino acids determines what protein you will make and what its function will be.



If there are between 50-500 amino acids per protein and 20 different amino acids, how many different kinds of proteins are possible.

$$\mathbf{50^{20} + 51^{20} + 52^{20} + \ldots\ldots 500^{20} = TMTC}$$

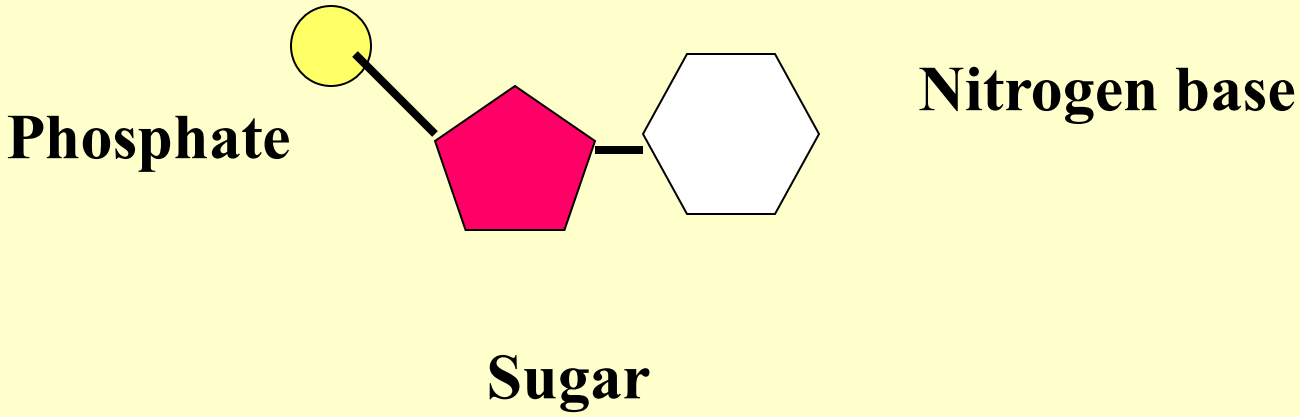
Some Human Proteins…

- hemoglobin transports oxygen in the blood
- lysozyme hydrolyzes bacterial cell walls
- collagen most serves as scaffolding for support of tissues and organs, abundant protein
- pepsin hydrolyzes dietary protein in the stomach
- trypsin hydrolyzes dietary protein in the small intestine
- casein found in milk, supplies amino acids to newborns
- insulin acts as a signal for the fed state
- myoglobin stores oxygen in muscle cells
- ferritin stores iron in the spleen
- rhodopsin transmits visual signals
- fibrin forms the insoluble network of blood clots
- amylase hydrolyzes starch in the mouth
- thrombin catalyzes the conversion of fibrinogen to fibrin
- antibody binds to a foreign antigen

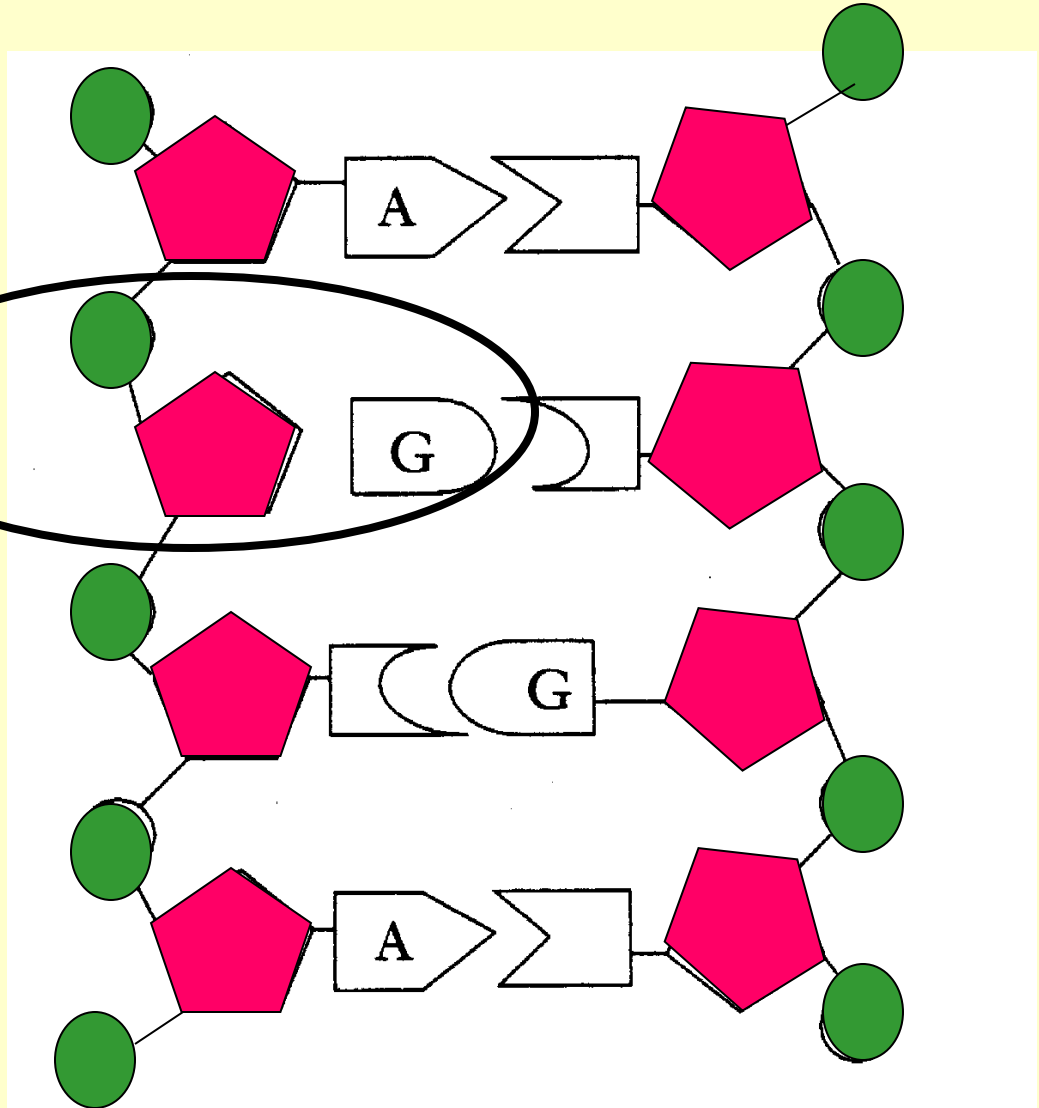
NUCLEIC ACIDS

- Examples: DNA and RNA
- Sources: Nitrogen, sugars, phosphates
- Uses - Makes chromosomes (genetic information)

Monomer – Nucleotides



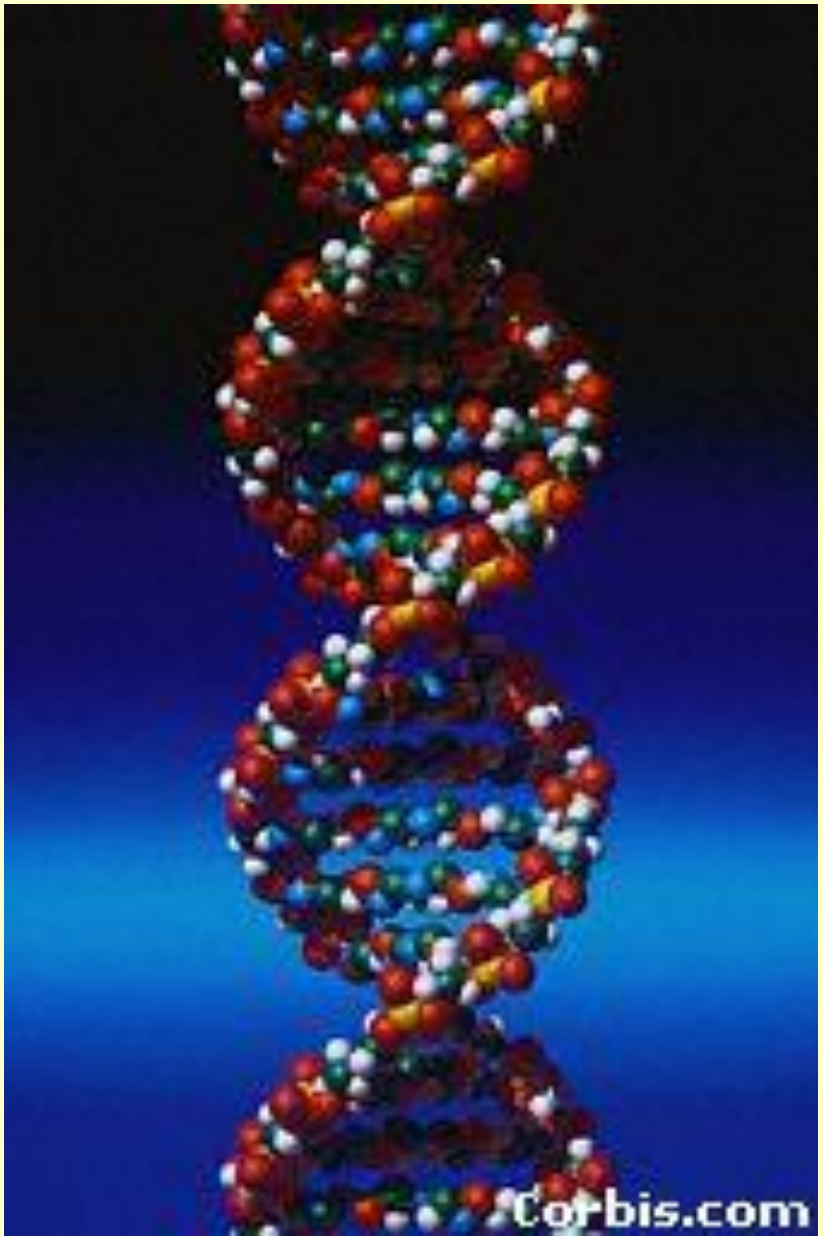
Polymer = a chain of nucleotides bonded together



Nucleotide

How many nucleotides does this DNA molecule contain?

8



DNA - double helix

- 1. NUCLEIC ACIDS direct the cell to produce specific PROTEINS.
- The CARBOHYDRATES and LIPIDS provide the energy for the cell to make PROTEINS.
- The PROTEINS your body make determine your physical traits (hair color, eye color, height...) and body functions (blood clotting, carrying oxygen, digesting food…)