A very good explanation of DNA, RNA etcetera can be found at http://www.chemguide.co.uk/organicprops/aminoacids/dna1.html#top.
The following pictures show the details of the contruction of DNA, RNA & proteins; the former two at the beginning, the latter at the end of
The process of building proteins from DNA.

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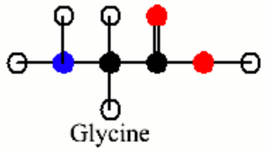
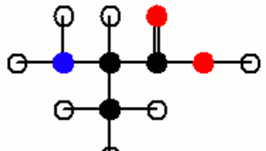
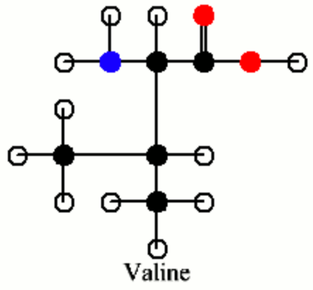
Title
The Construction Of DNA & Proteins

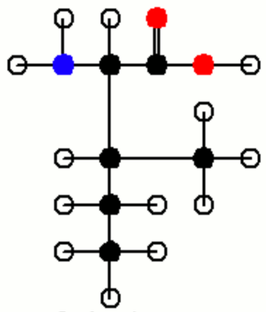


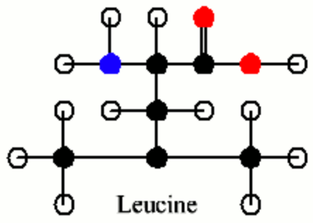
Glycine can be treated as a group.

Hydrocarbon side chains

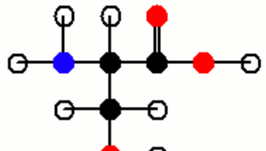


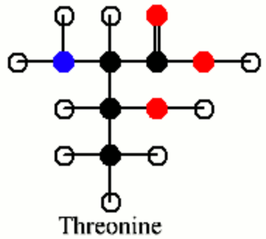




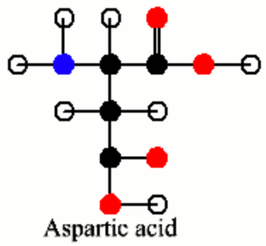


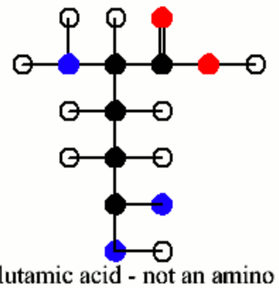
Hydroxyl side chains



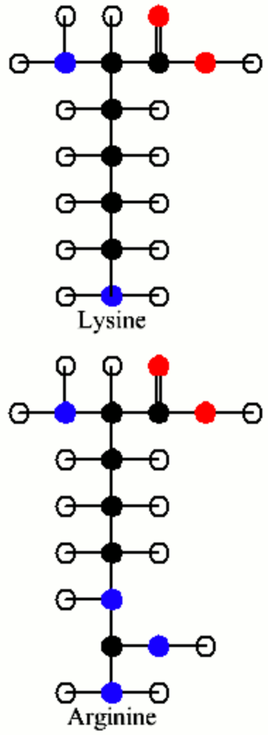


Carboxylic acid side chains

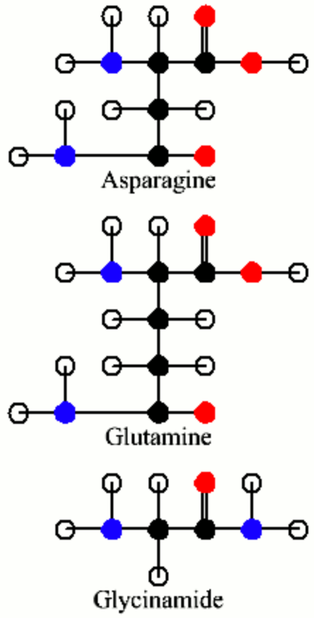




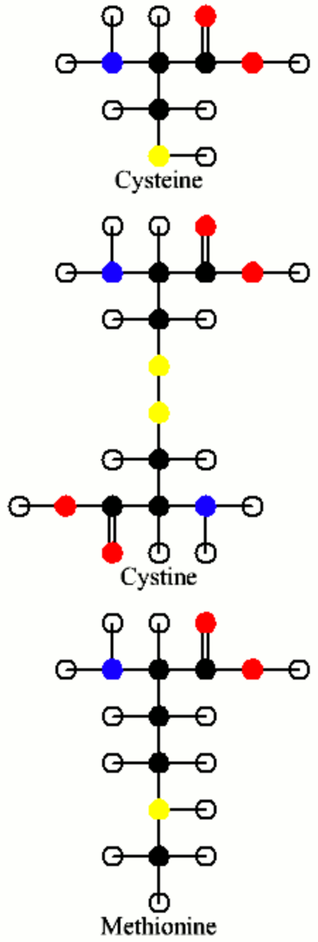
Amino side chains



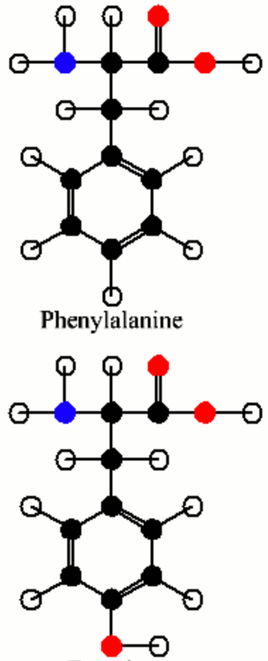
Amide side chains

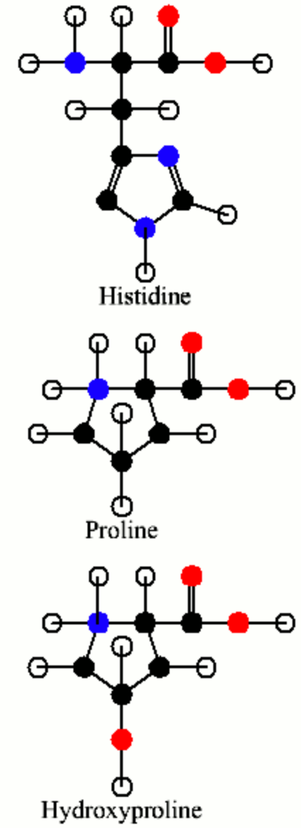


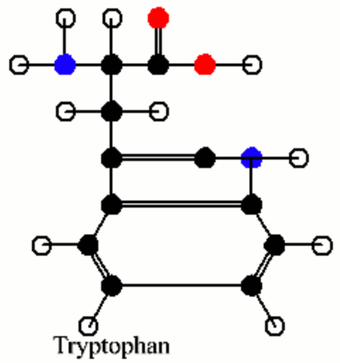
Sulphur side chains

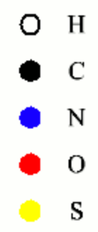


Ring side chains









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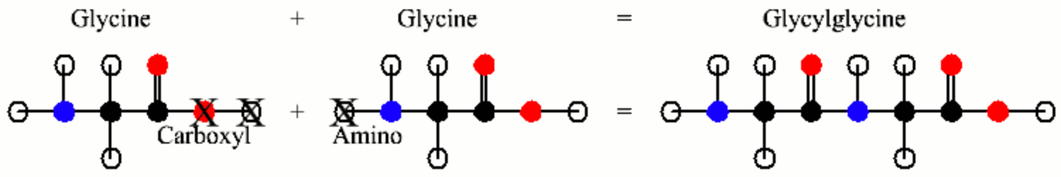
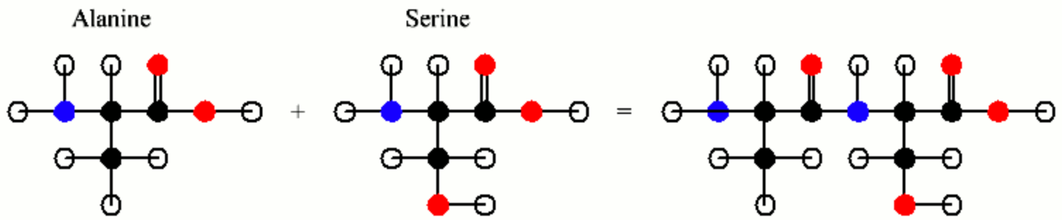
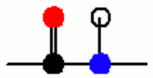
The Construction Of Proteins: 2 The Joining Of Amino Acids

To join, the carboxyl group of one joins the amino of the other, & H2O is lost.






is called a Peptide link

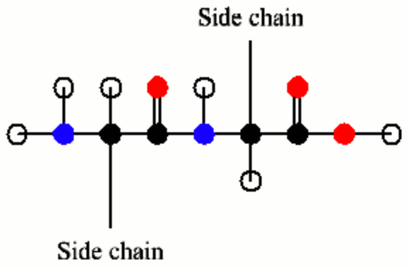
Hence, glycylglycine is a peptide.

Any number of amino acids can be joined.

Peptides are di, tri, tetra, penta... or Polypeptides.

A string of glycines is Polyglycine.

More gemerally, with different amino acids:

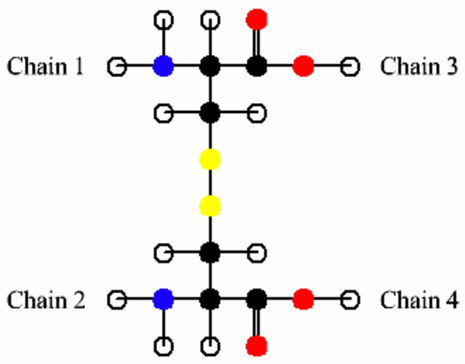


This polypeptide is described as a polyglycine backbone with side chains.

Almost all polypeptides comprise ≥22 amino acids.

Protein are one or more joined polypeptide chains.

Chains are joined across cistines by the disuphide link.



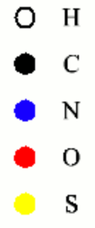
The characteristics of proteins are decided by the side chains: size, shape & charge (+ve, 0 or -ve).

Attachment to another molecule is via side chain to side chain. It can be +ve to -ve or shape to shape.

If the other molecule is in a foreign protein, a virus or bacterium, the little beggar will be rendered useless.

Proteins can be biological catalysts called Enzymes. The reacting molecules join the enzyme in positions & orientations which maximise the rate of reaction.

When a H is between two Ns, two Os or a N & an O, a hydrogen bond is formed, which can bend the backbone.



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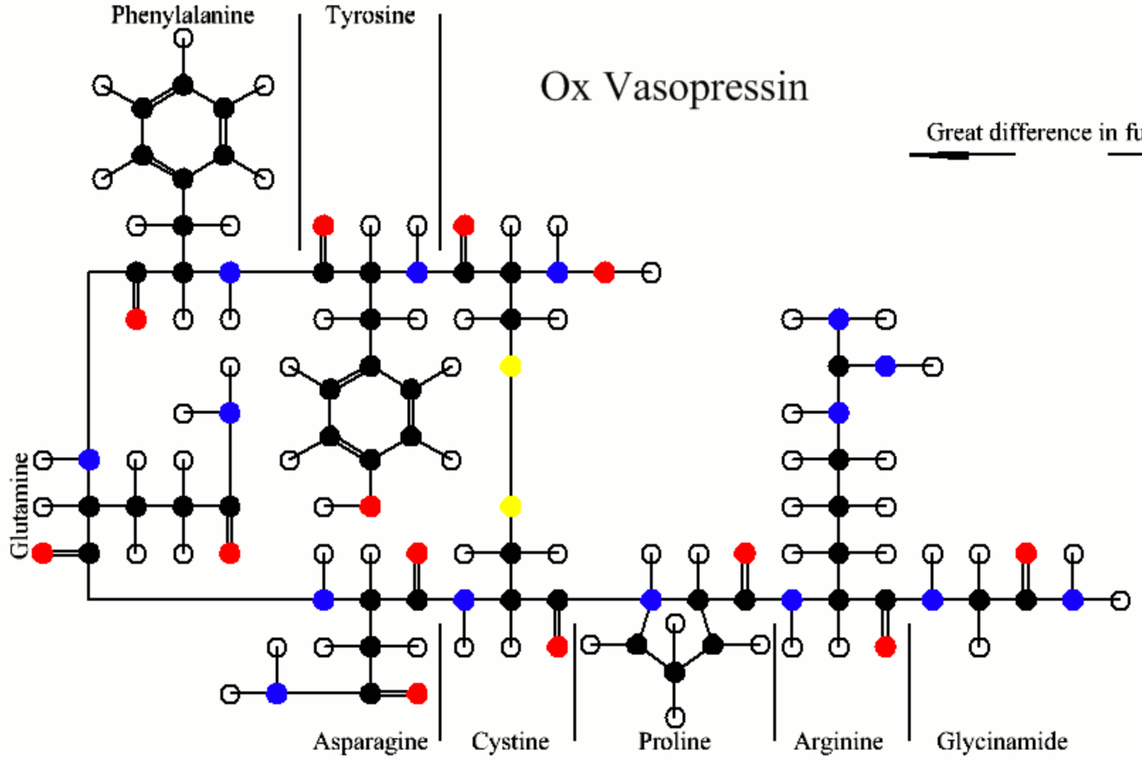
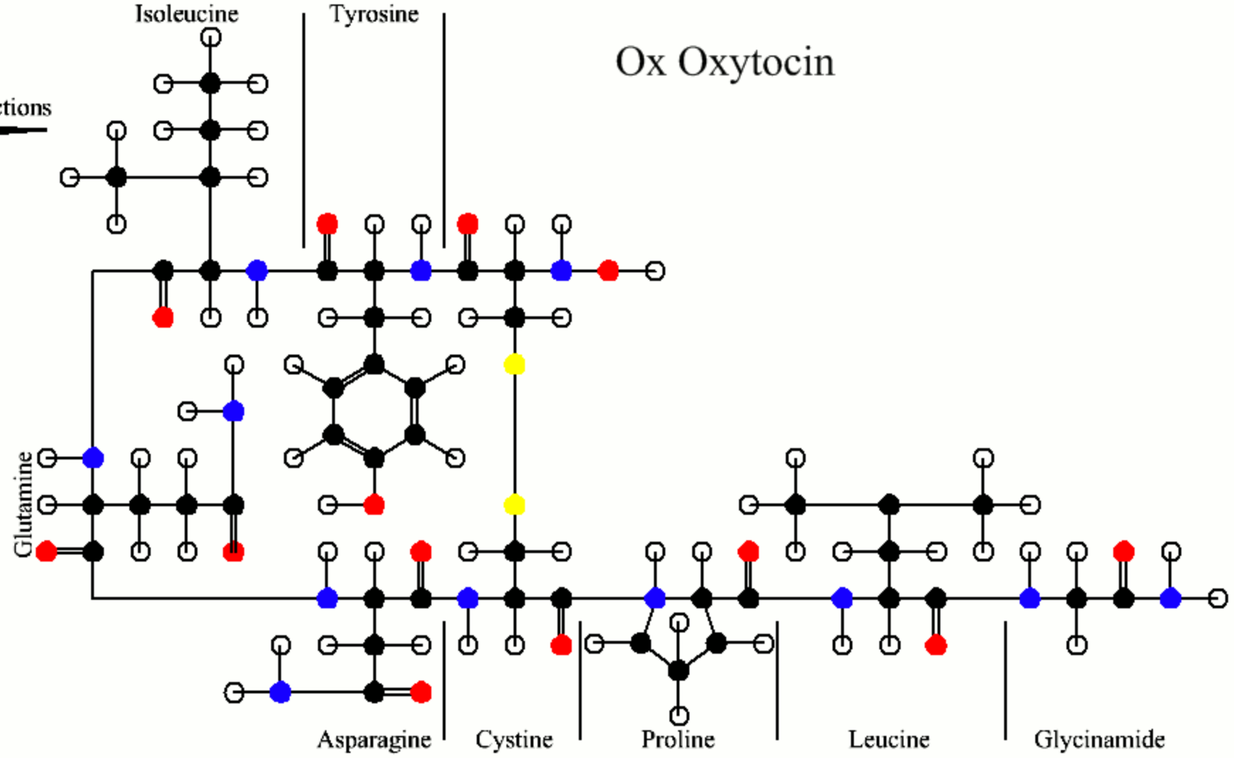
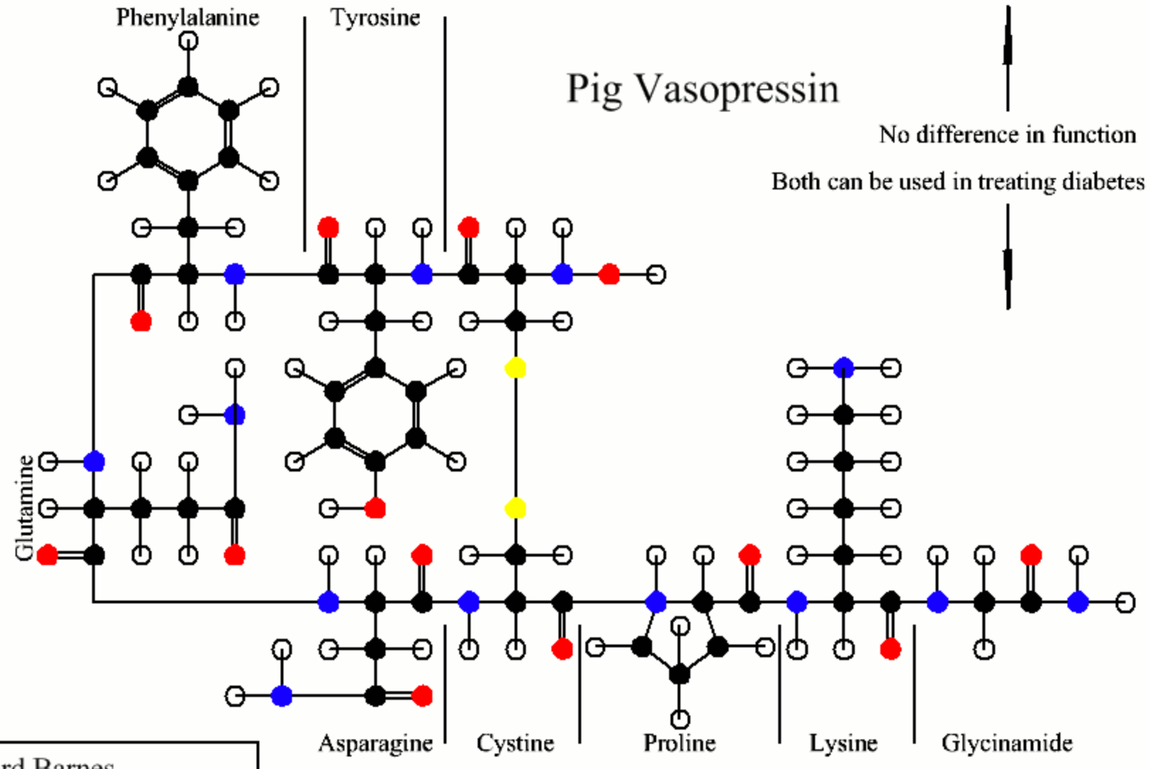
The Construction Of Proteins: 3 The Joining Of Amino Acids



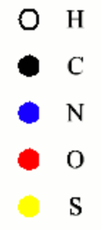
Great difference in functions





No difference in function

Both can be used in treating diabetes insipidus



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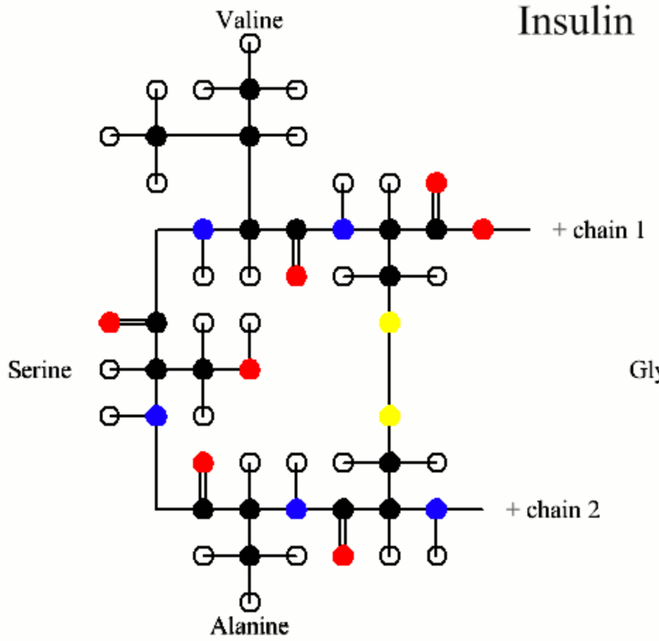
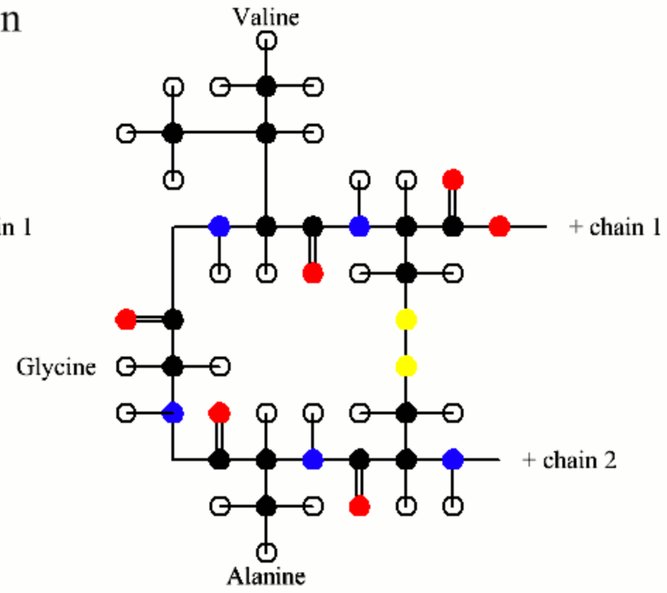
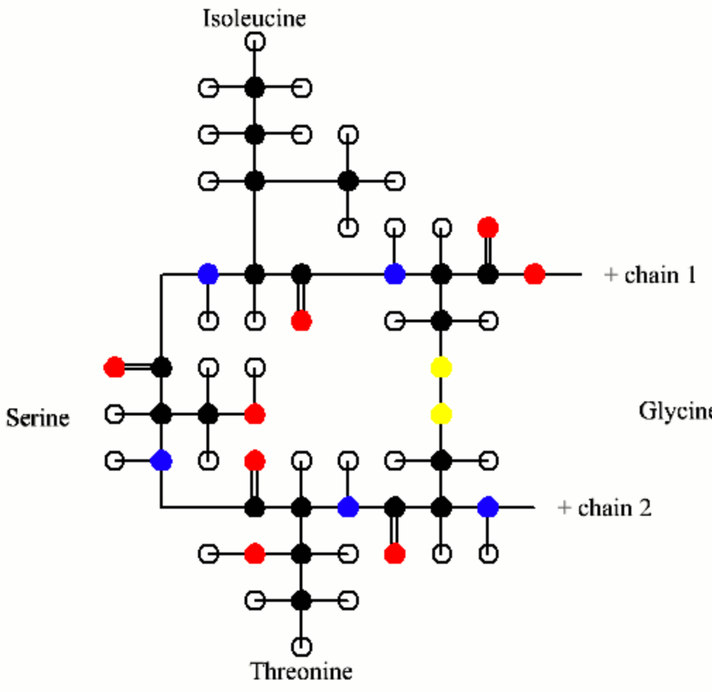
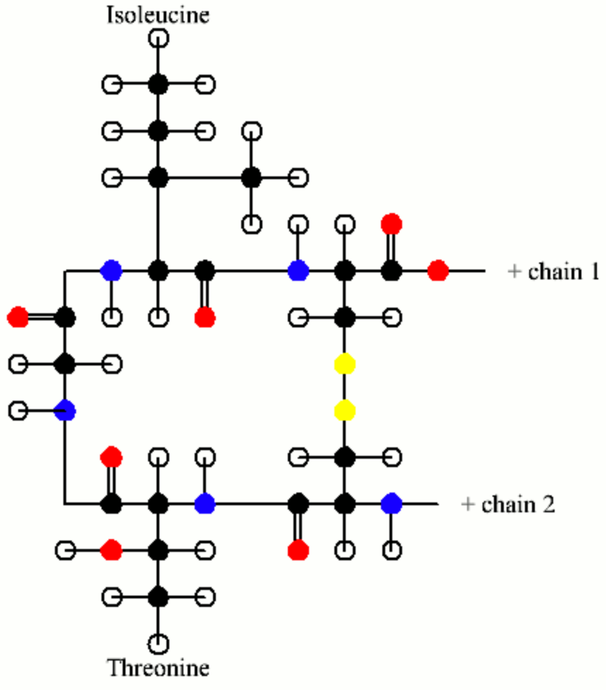
The Construction Of Proteins: 4 Proteins & Function

Insulin









Hæmoglobin

It is made of 2 pairs of chains.

Each of a pair is identical; one pair is two chains of 282 amino acids, the other is two chains of 292 amino acids.

One chain contains glutamic acid.

If a different one is manufactured, then the hæmoglobin will be worse at joining to O, & can crystalize, damaging the wall of the red corpuscle cell. This can cause death.

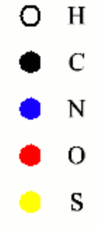
(Glutamic acid: hæmoglobing A, valine: hæmoglobin B, lysine: hæmoglobin C)

So accuracy of protein structure can be critically important.

The chains, each comprising 56 amino acids, are identical.

These proteins differ only slightly & all are used to treat diabetes melitus.

An individual might develope antibodies against one type, but can then use another.



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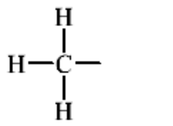
The Construction Of Proteins: 5 Proteins & Sensitivity

Groups

Combinations



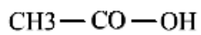
Methyl

CH3—H

Methane

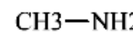
CH3—OH

Methyl alcohol



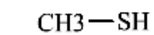
CH3—CO—OH

Acetic acid



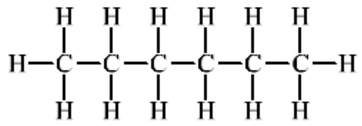
CH3—NH2

Methyl amine

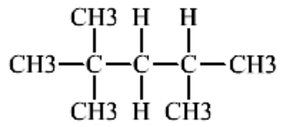


CH3—SH

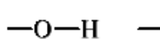
Methyl mercaptan



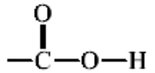
n-octane



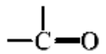
Isooctane



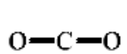
Hydroxyl



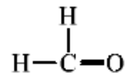
Carboxyl or Carboxylic acid



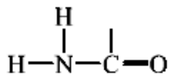
Carbonyl



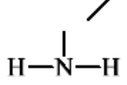
Carbon dioxide



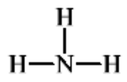
Formaldehyde



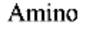
Amide



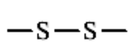
Amino



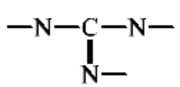
Ammonia



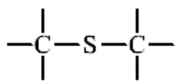
Thiol



Disulphide



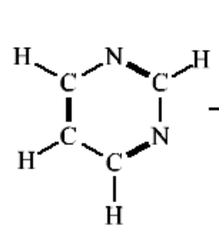
Guanido



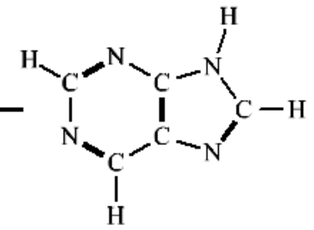
Thio-ether

Chains

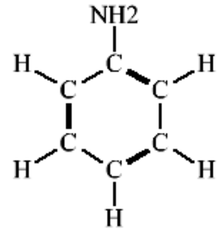
Rings



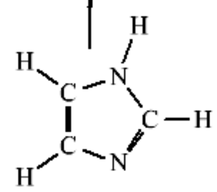
Pyrimidine



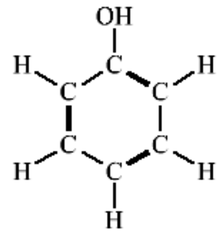
Purine



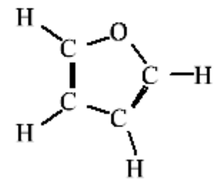
Anline



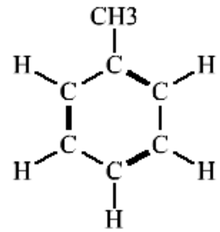
Imidazole



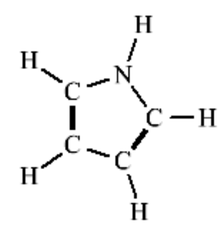
Phenol



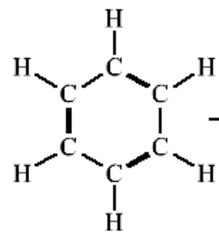
Furan



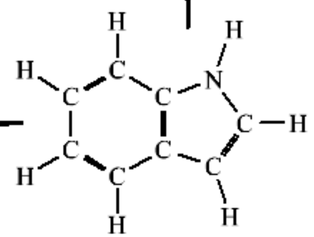
Toluene



Pyrrole



Benzene



Indole

A group is simply a combination of atoms which occurs frequently

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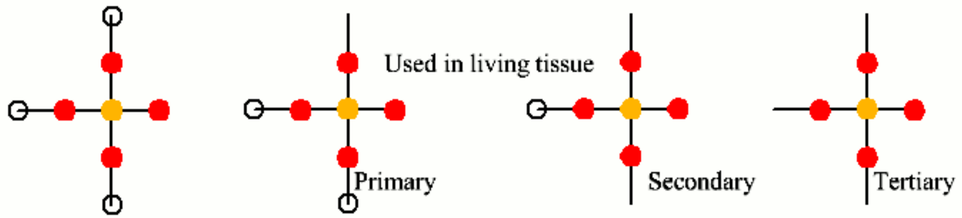
DNA 1: Examples of Groups

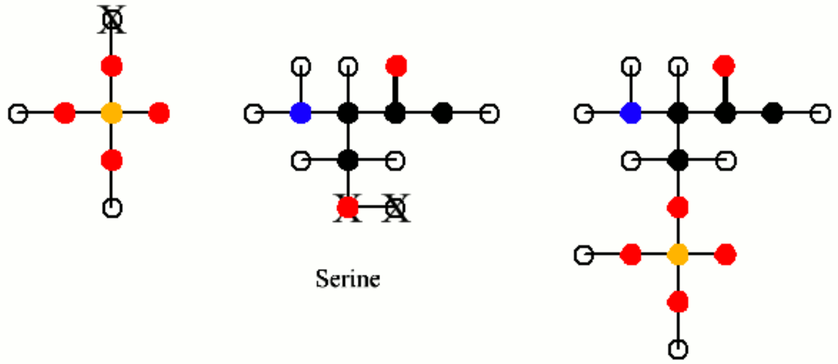
Phosphate groups

P & N usually use three bonds but both can use a fourth of different type.



Phosphoric acid

Phosphate groups



Serine

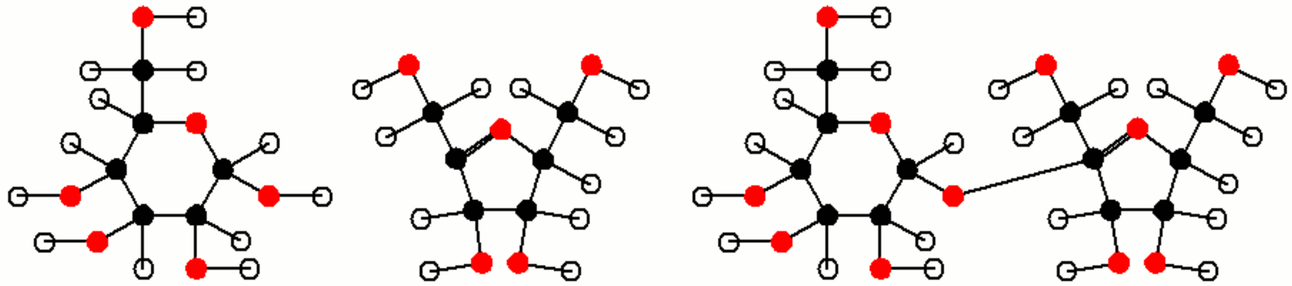
Phosphoric acid + Serine (an amino acid) - H2O = Phosphoserine

Phosphoserine can occur in proteins instead of serine. Then the protein is called a phosphoprotein.

Some sugars

There are many sugars & combinations thereof.

Glucose + fructose = sucrose



Glucose

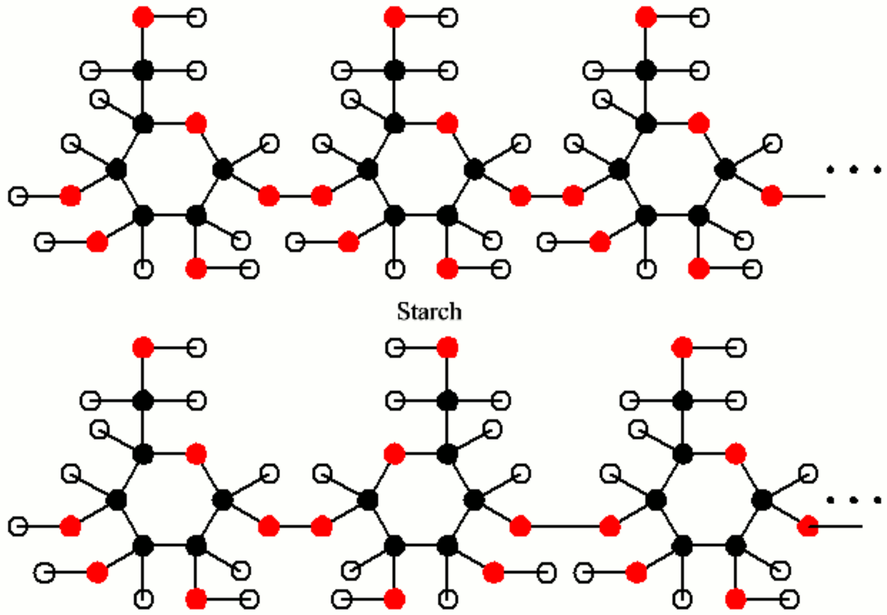
Fructose

Sucrose: beet, cane & maple sugars

Glucose + Galactose = Lactose

Some sugars (some synthetic) have N-, P- or S-containing groups joined

n glucose = Starch or Cellulose

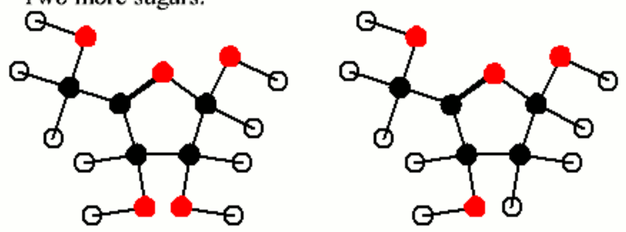


Starch

Cellulose

All these compounds, simple, combined & modified, form the Carbohydrates.

Two more sugars:



Ribose

Deoxyribose

H
O
N
C
P

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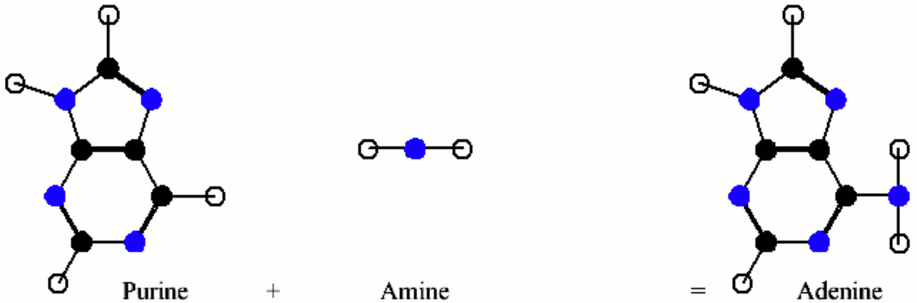
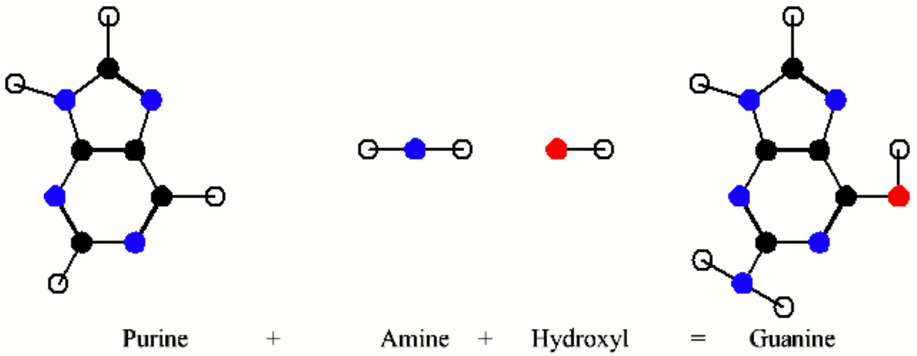
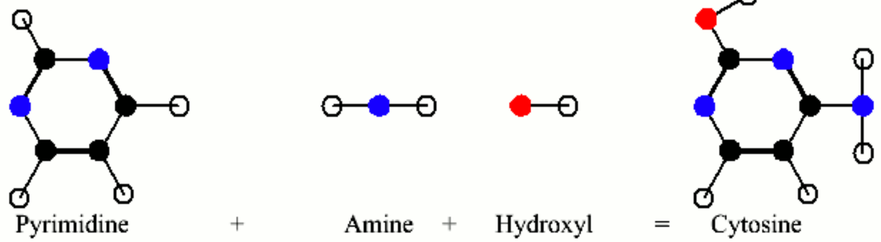
DNA 2: Phosphate Groups & Sugars



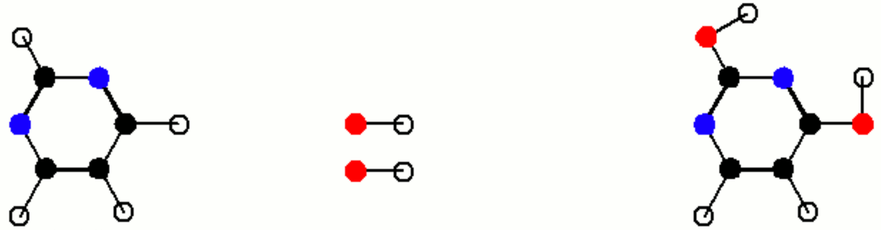
Purine + Amine = Adenine



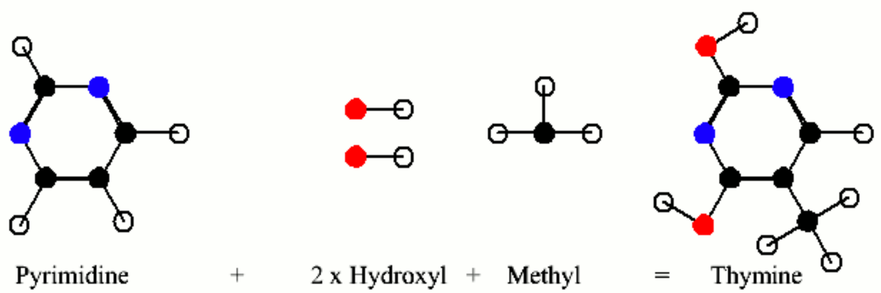
Purine + Amine + Hydroxyl = Guanine



Pyrimidine + Amine + Hydroxyl = Cytosine



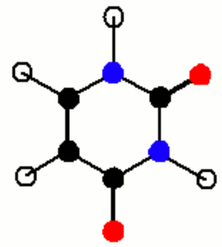
Pyrimidine + 2 x Hydroxyl = Uracil



Pyrimidine + 2 x Hydroxyl + Methyl = Thymine

Tautomerism

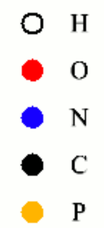
In some organic compounds a H can move amongst the atoms if double bonds are present, & such a move causes the switching of a double bond, eg, uracil:



Tautomerism coes not change the function.

Cytosine variations

A few variations of cytosine occur, but do not change the function.



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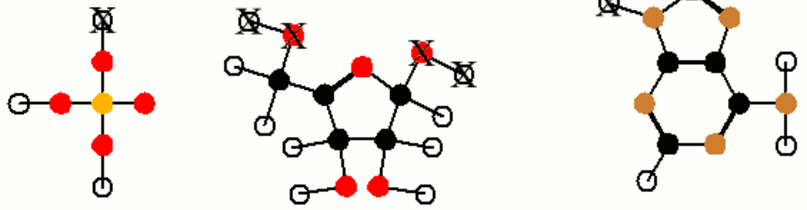
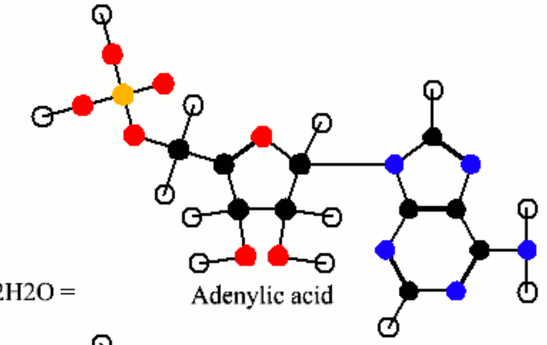
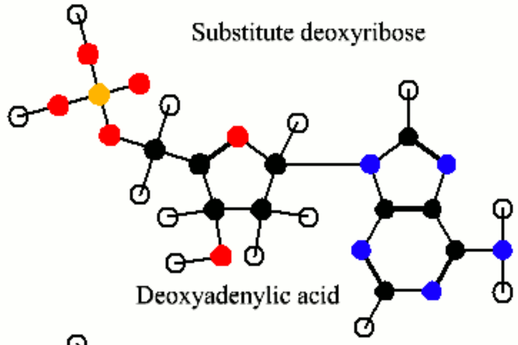
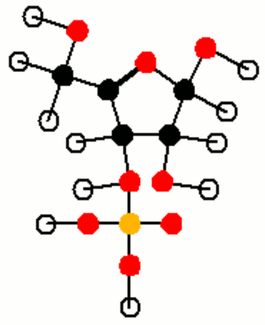
DNA 3: Purines & Pyramidines

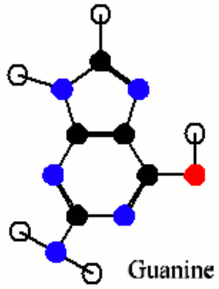


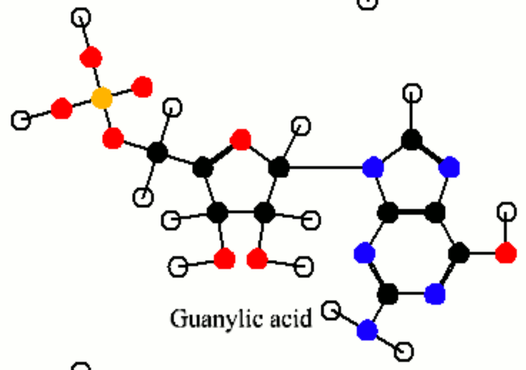


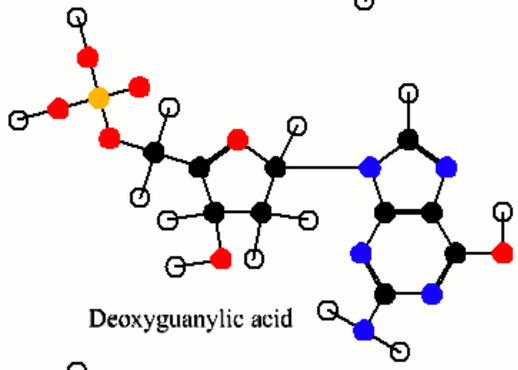


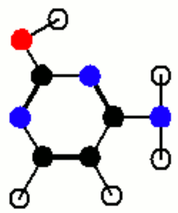
The acid & sugar can join like this, too.

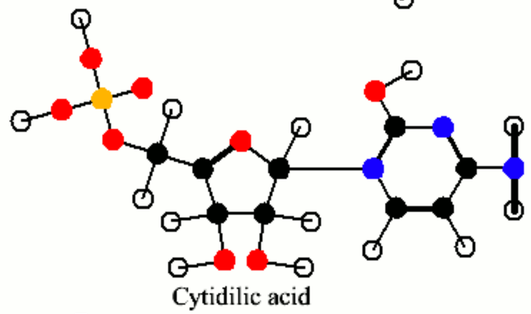


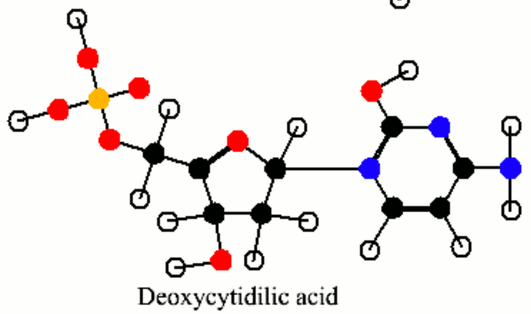








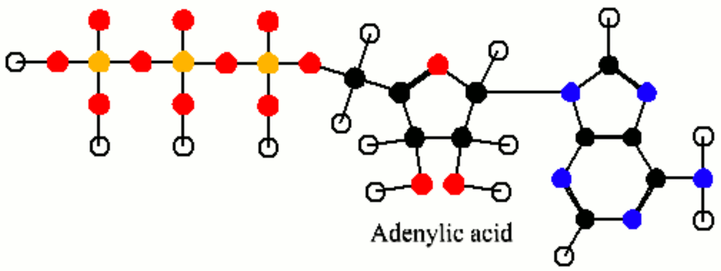




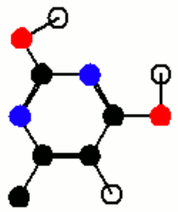
Variations of these nucleotides are very important.

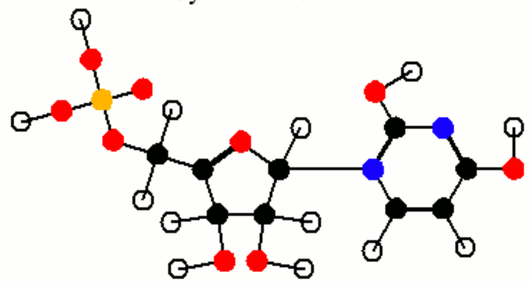
Ribonucleotides with two or three primaries are used to store & transport energy.

Adenosine triphosphate

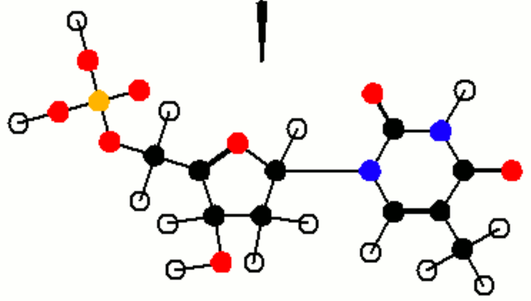


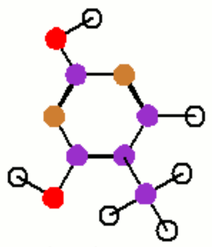
Adenylic acid





These four are called bases & are components of DNA



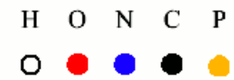


These four are called bases & are components of RNA

Ribose is sometimes replaced by glucaose or another carbohydrate.

The purine or pyrimidine is sometimes replaced by other N-containg rings.

These nucleotides are rendered acidic by the phosphate group, so are called Nucleic acids.



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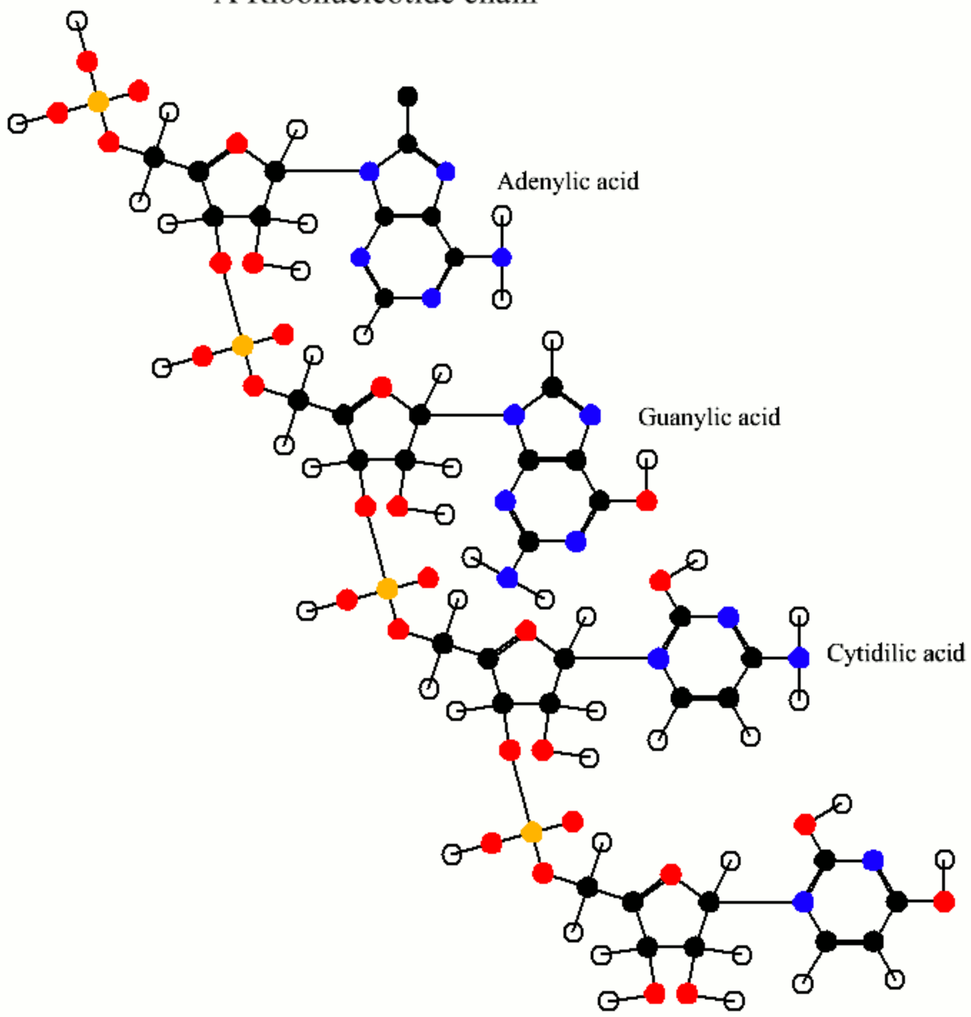
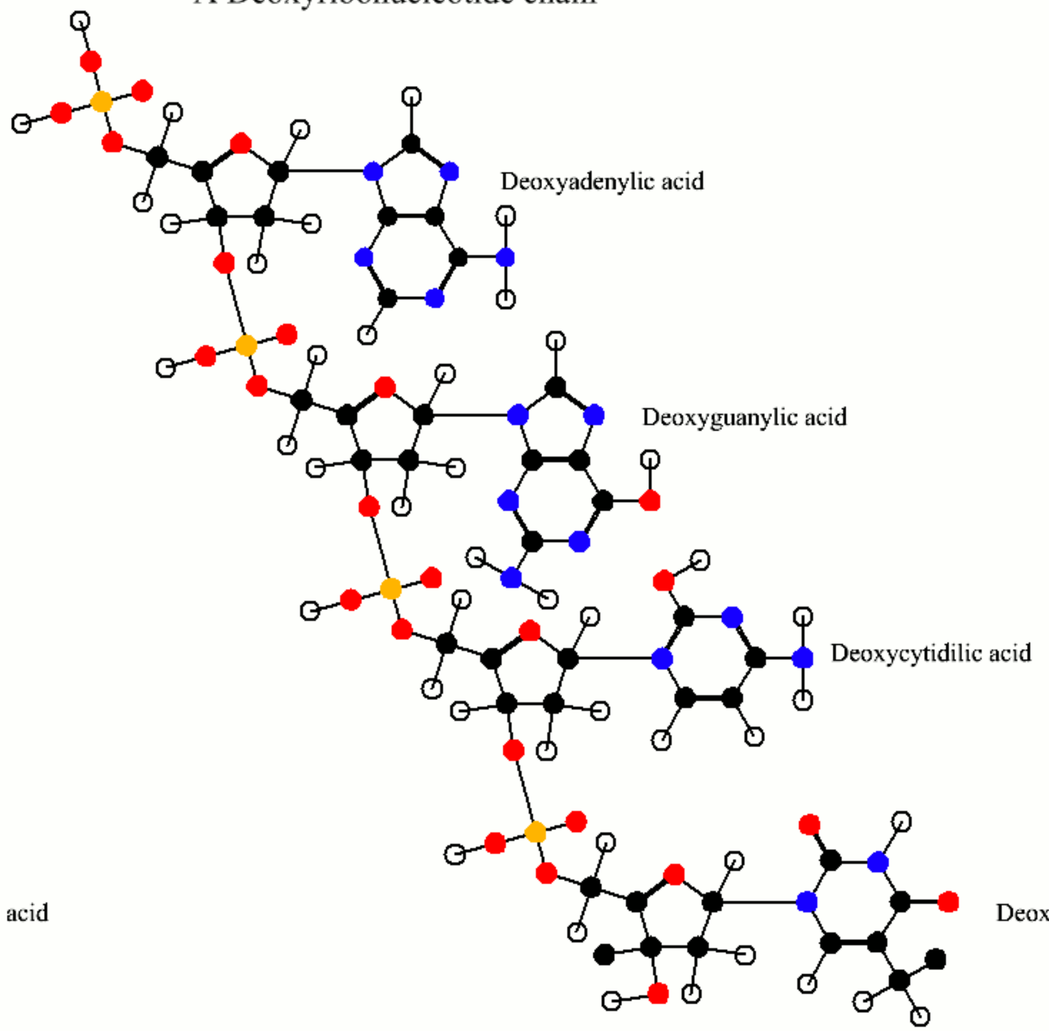
DNA 4: Some Nucleotides

The two possible connections between the acid & the sugar enable the building of polynucleotide chains.

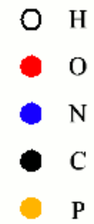
A Ribonucleotide chain



A Deoxyribonucleotide chain



The chains can be any length & the acids can be in any order.



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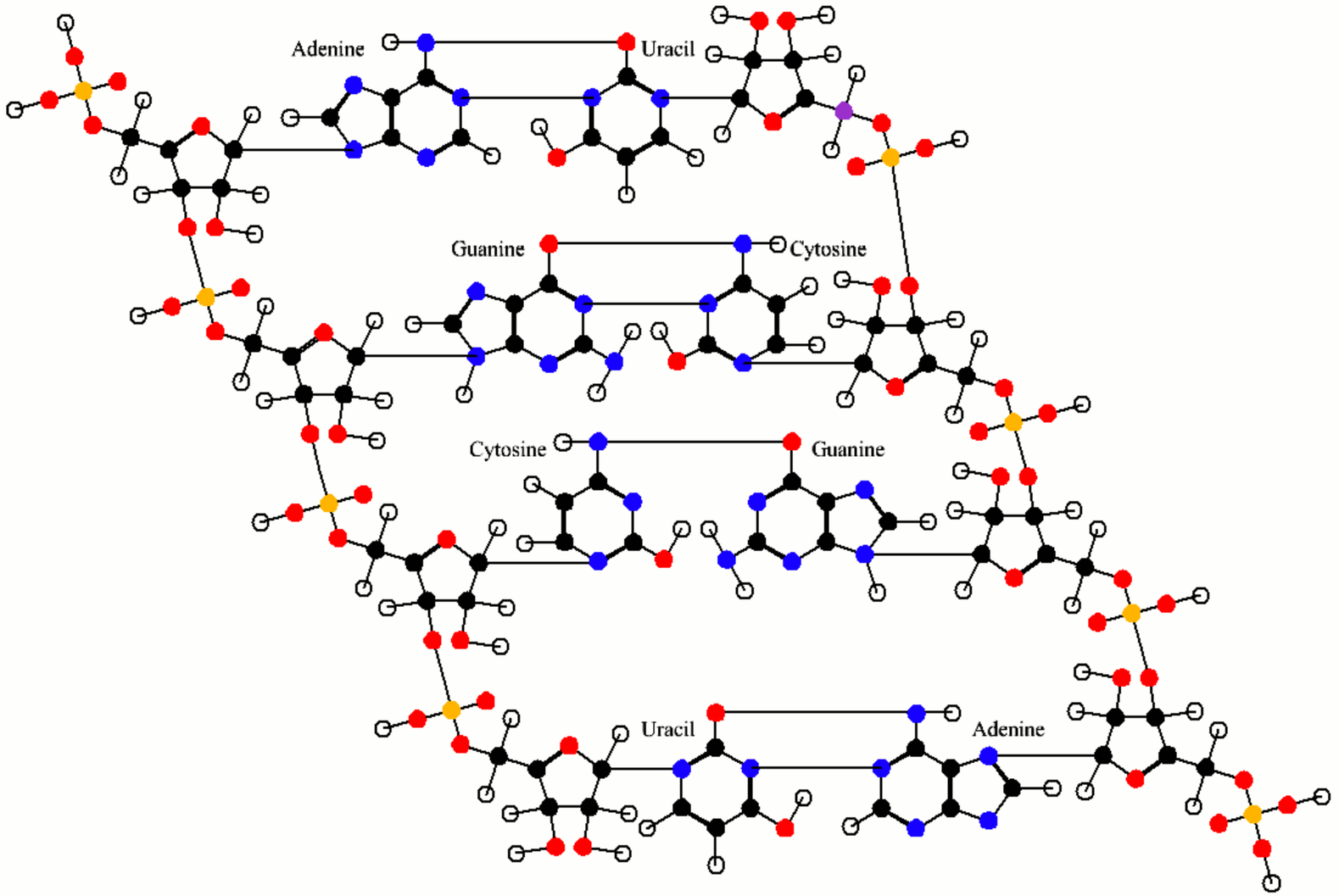
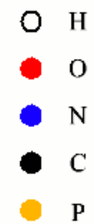
DNA 5: Polynucleotides

Any purine or pyrimidine can join with any other. In this situation if other purines or pyrimidines were used then the distance between the chains would vary, & such a structure cannot form. This also means that adenine & uracil can link, & guanine & cytosine can link.

Two ribonucleotide chains are shown, joined by the purines & pyrimidines. Once joined, the chains form a double helix. Double ribonucleotide chains, with thousands of nucleotides (with A, G, C & U in any position), form a molecule of RiboNucleic Acid.



In a cell some RNA is in the nucleus & most is outside.



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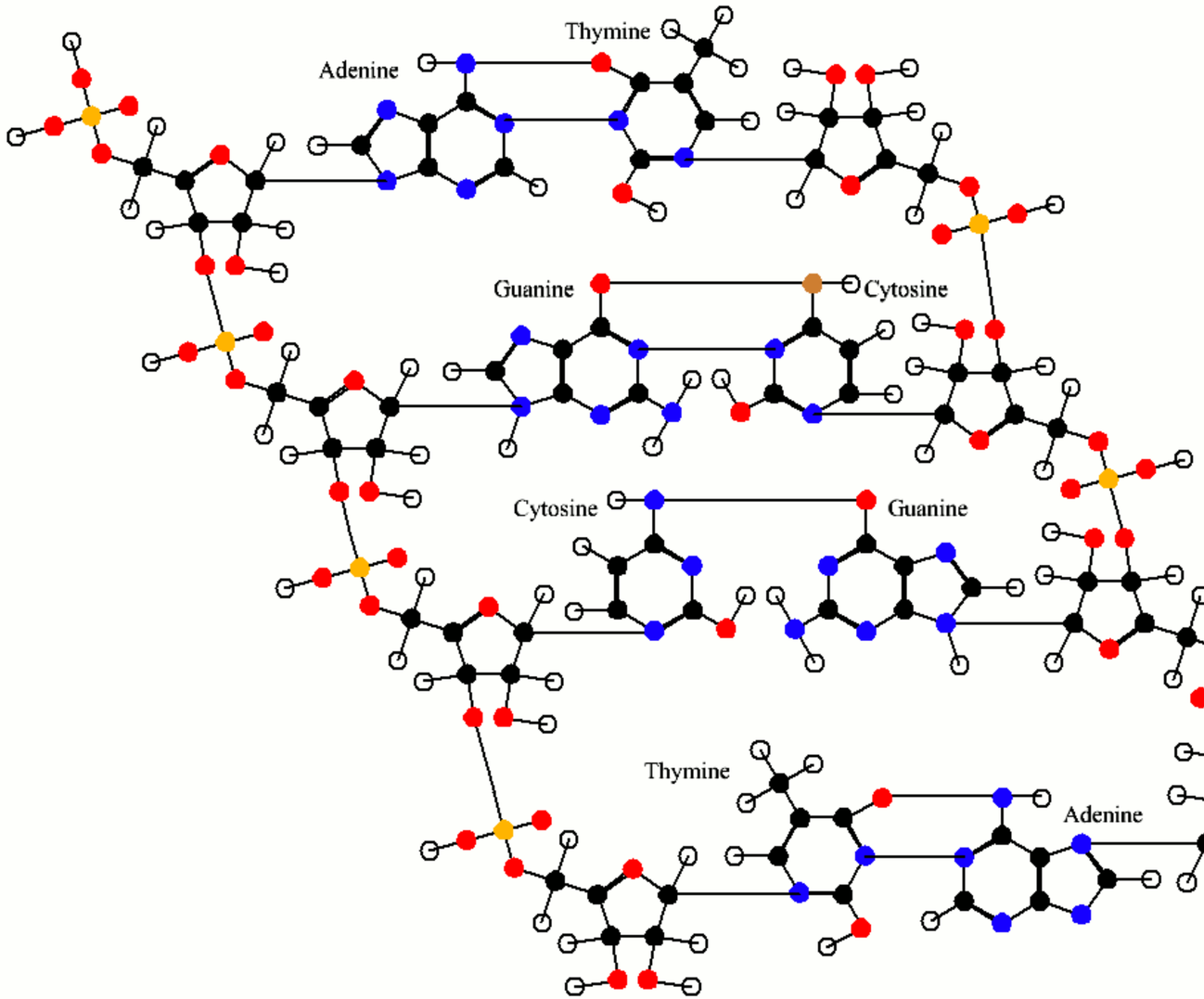
DNA 6: Links Between The Purines & Pyrimidines

Two deoxyribonucleotide chains are shown, joined by the purines & pyrimidines. Once joined, the chains form a double helix. Double deoxyribonucleotide chains, with thousands of nucleotides (with A, G, C & T in any position), form a molecule of DeoxyriboNucleic Acid.



In a cell DNA is in the nucleus & in mitochondria.
(A prokaryote does not have a separate nucleus.)

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DNA 7: Another Double Chain

H
O
N
C
P