

LIPIDOS

FORMADOS POR C,H,O
CONSTITUÍDO POR UN GRUPO MUY VARIADO DE
ESTRUCTURAS

UNIDAD DE TRIGLICÉRIDOS: ACIDO GRASO

GRUPO FUNCIONAL: CARBOXILO: COOH

FUNCIÓN. ALMACENAMIENTO DE ENERGÍA

RAZÓN: 1.- CONTIENEN MÁS ENLACES C-H
2.- SON MÁS INSOLUBLES

POR CADA ENLACE C-H QUE SE ROMPE: 9 KCAL

CARACTERÍSTICAS QUÍMICAS DE LÍPIDOS

NO POLARES

**NO FORMAN ENLACES DE H CON EL
AGUA:HIDROFÓBICOS**



INSOLUBLES

ACIDOS GRASOS

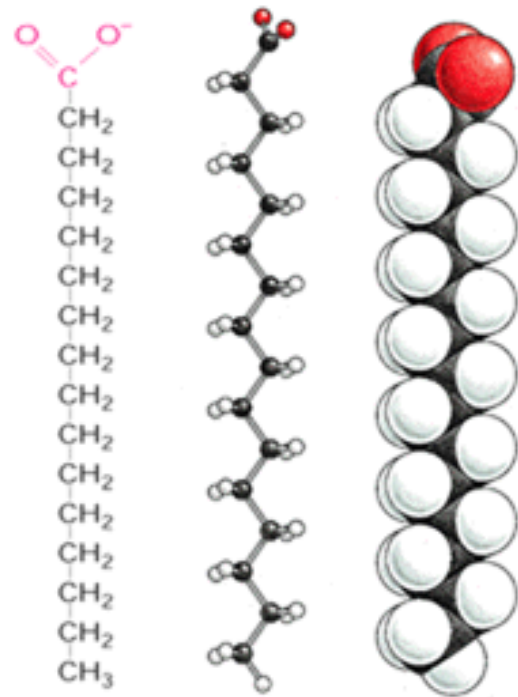




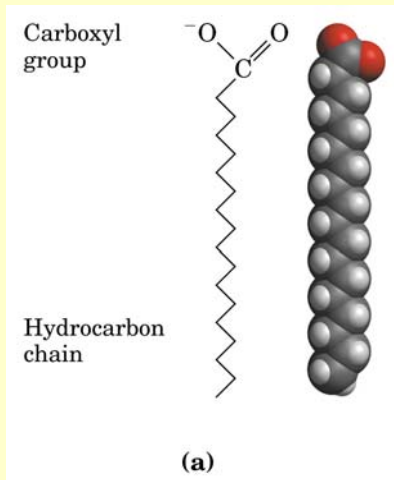


Figure 2-5. Palmitic acid. The carboxylic acid group (*red*) is shown in its ionized form. A ball-and-stick model (*center*) and a space-filling model (*right*) are also shown.

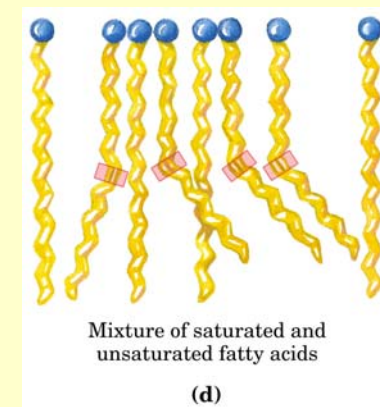
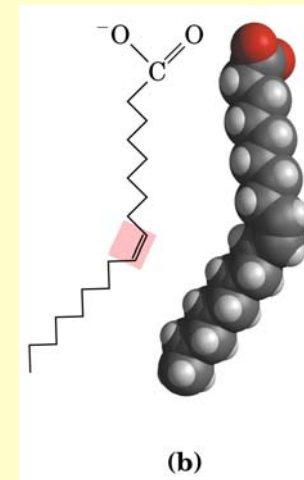
Acid	Stearic	Oleic	Linoleic	α -Linolenic
# of carbons	18	18	18	18
Degree of unsaturation	18:0	18:1	18:2	18:3
Structure (all double bonds are <i>cis</i>)				

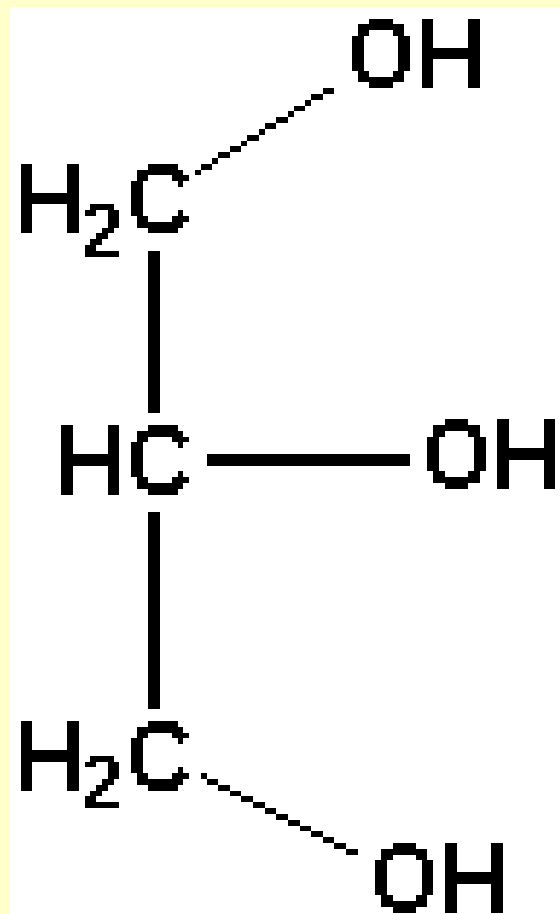
AG lineales: saturaciones

ácidos grasos saturados

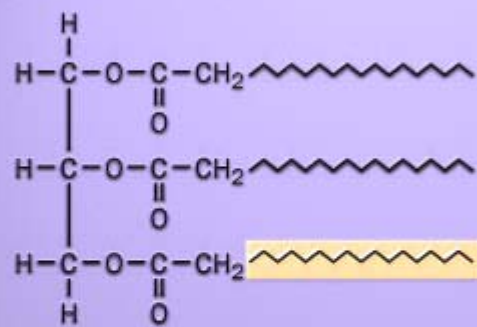


ácidos grasos insaturados

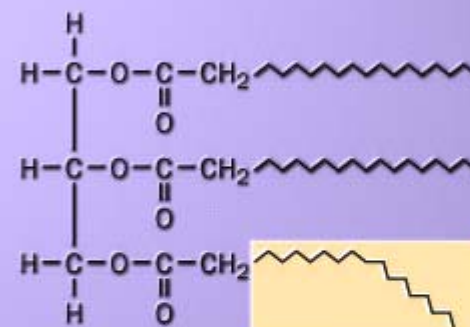




Glycerol



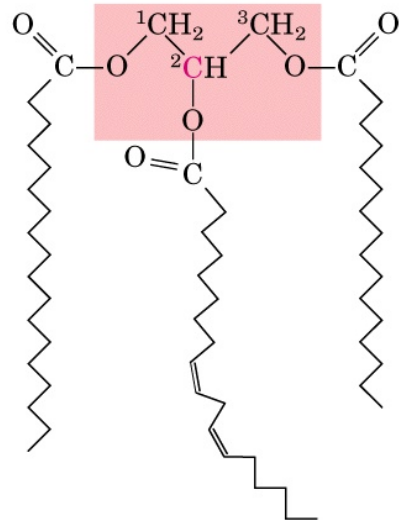
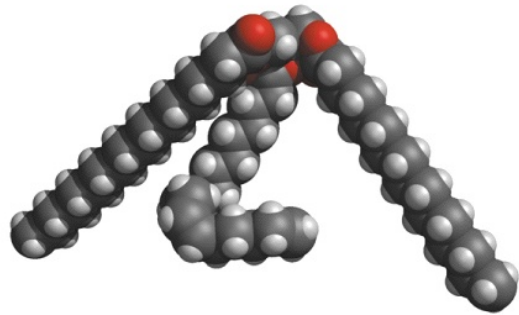
Fat



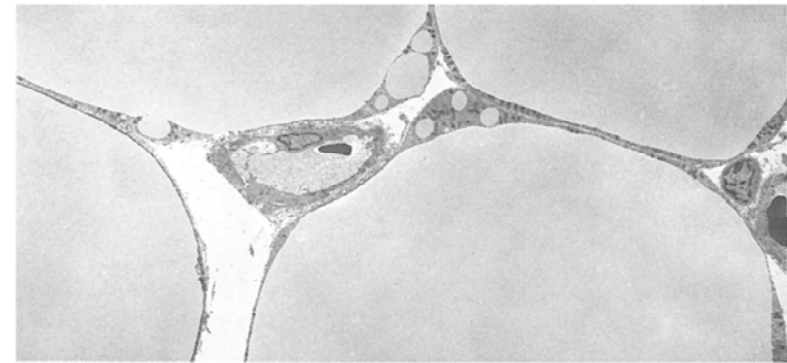
Oil

Triglycerides

Esterificación de AG: Triglicéridos



1-Stearoyl, 2-linoleoyl, 3-palmitoyl glycerol,
a mixed triacylglycerol



(a)

adipocitos

- almacenamiento de energía
- aislante térmico

El grupo acilo está unido al glicerol a través de un enlace éster

Phospholipid



Phosphatidylcholine

Triglyceride



Triacylglycerol

Steroid

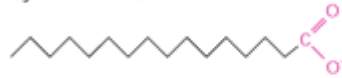


Cholesterol

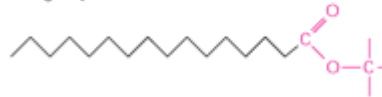
Lipid

CARBOXYL GROUP

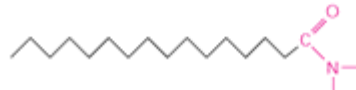
If free, the carboxyl group of a fatty acid will be ionized.



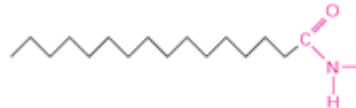
But more usually it is linked to other groups to form either **esters**



or **amides**.

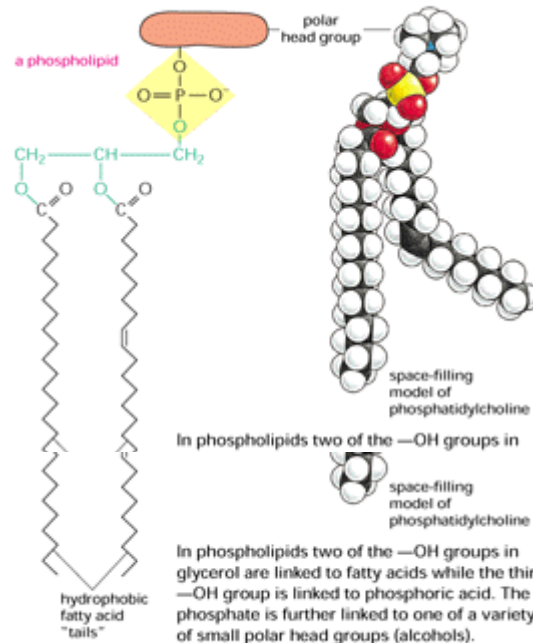


or **amides**.



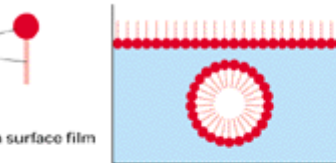
PHOSPHOLIPIDS

Phospholipids are the major constituents of cell membranes.



LIPID AGGREGATES

Fatty acids have a hydrophilic head and a hydrophobic tail.



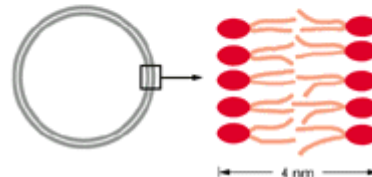
In water they can form a surface film or form small micelles.

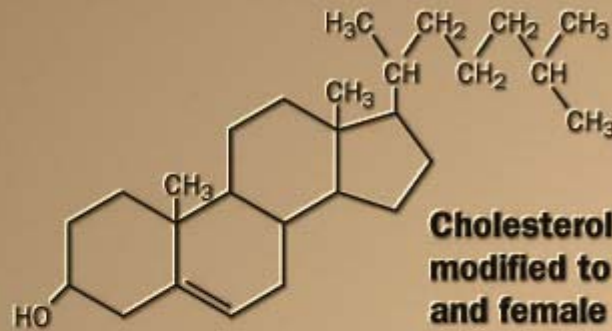
Their derivatives can form larger aggregates held together by hydrophobic forces:

Triglycerides form large spherical fat droplets in the cell cytoplasm.

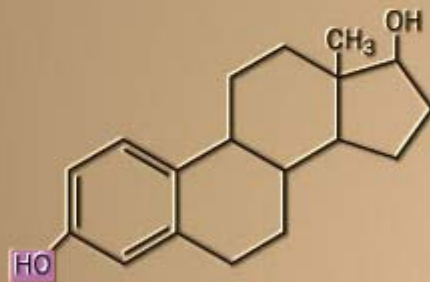


Phospholipids and **glycolipids** form self-sealing lipid bilayers that are the basis for all cellular membranes.

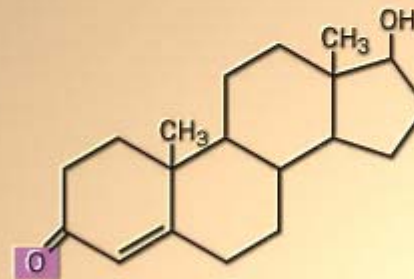




Cholesterol is chemically modified to produce the male and female sex hormones.



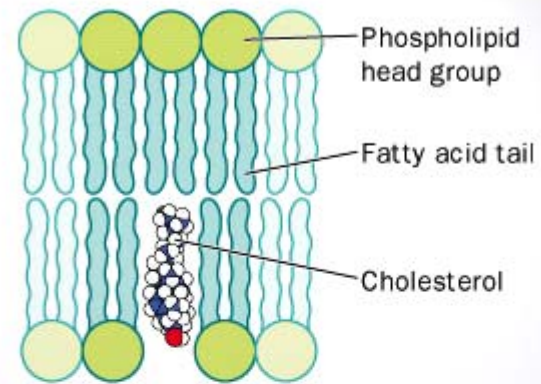
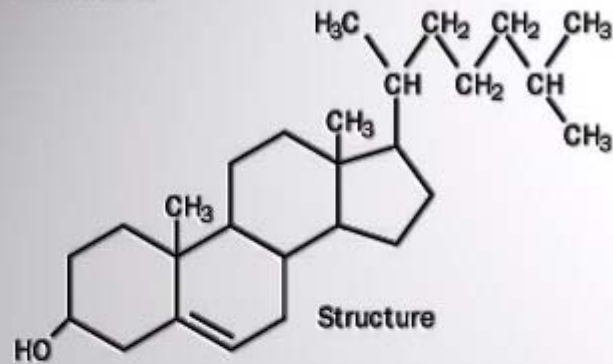
Estradiol is a female sex hormone



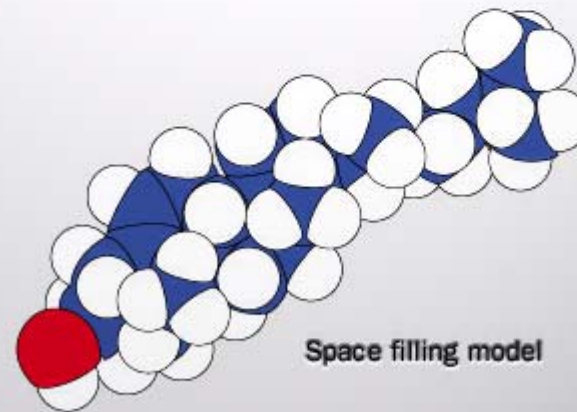
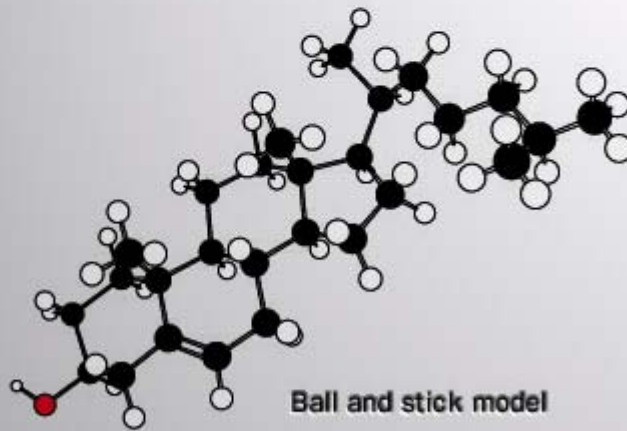
Testosterone is a male sex hormone

Steroid

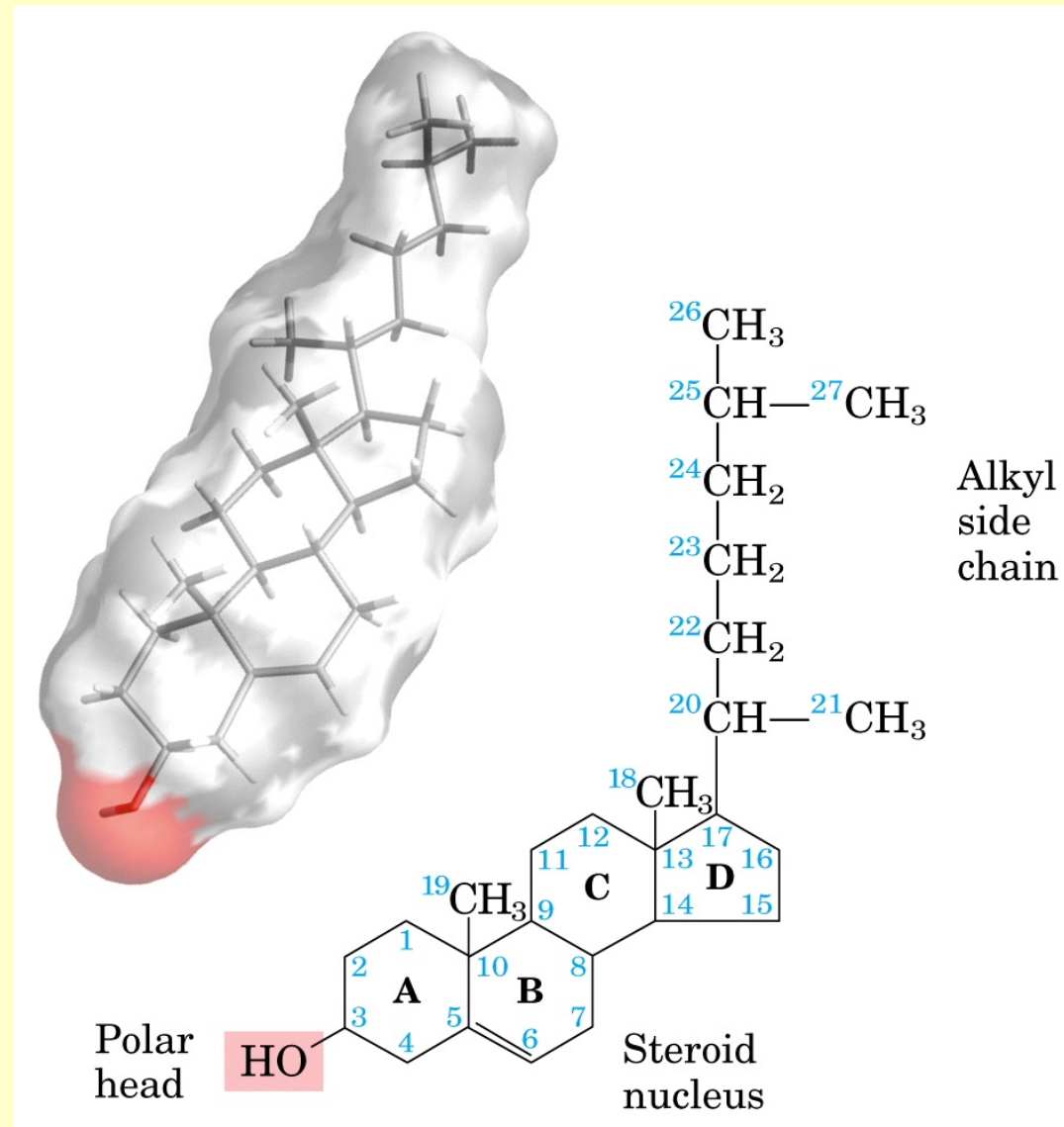
Cholesterol



Plasma membrane



Colesterol



PROTEÍNAS

CONTIENEN: C,H,O,N (S)

FUNCIONES

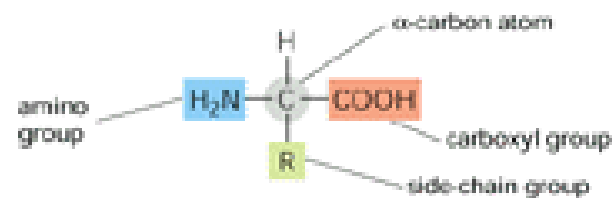
EJEMPLO

Estructural	Fibras, membranas	
Metabólico	Enzimas	
Transporte	Canales iónicos, Hb	
Reconocimiento celular	Antígenos	
Regulación Génica	Activadores	
Defensa	Inmunoglobulinas	

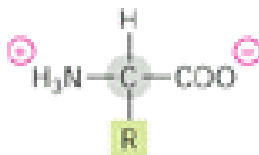
Las proteínas están formadas por 20 aminoácidos

THE AMINO ACID

The general formula of an amino acid is

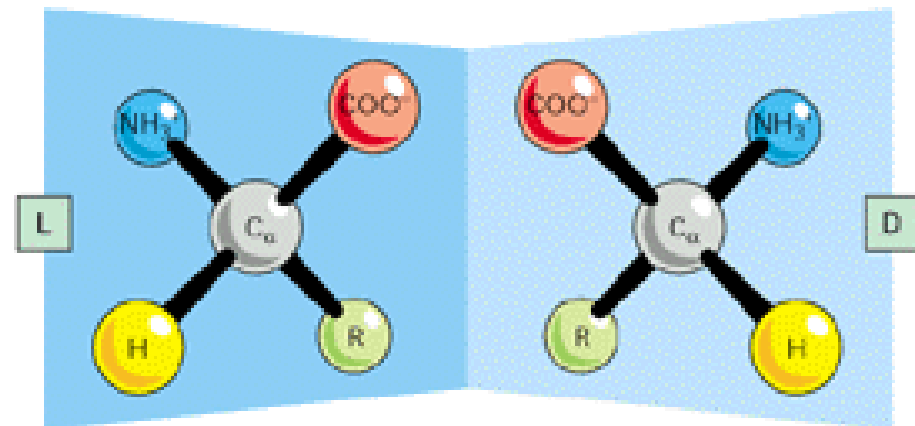


R is commonly one of 20 different side chains.
At pH 7 both the amino and carboxyl groups are ionized.

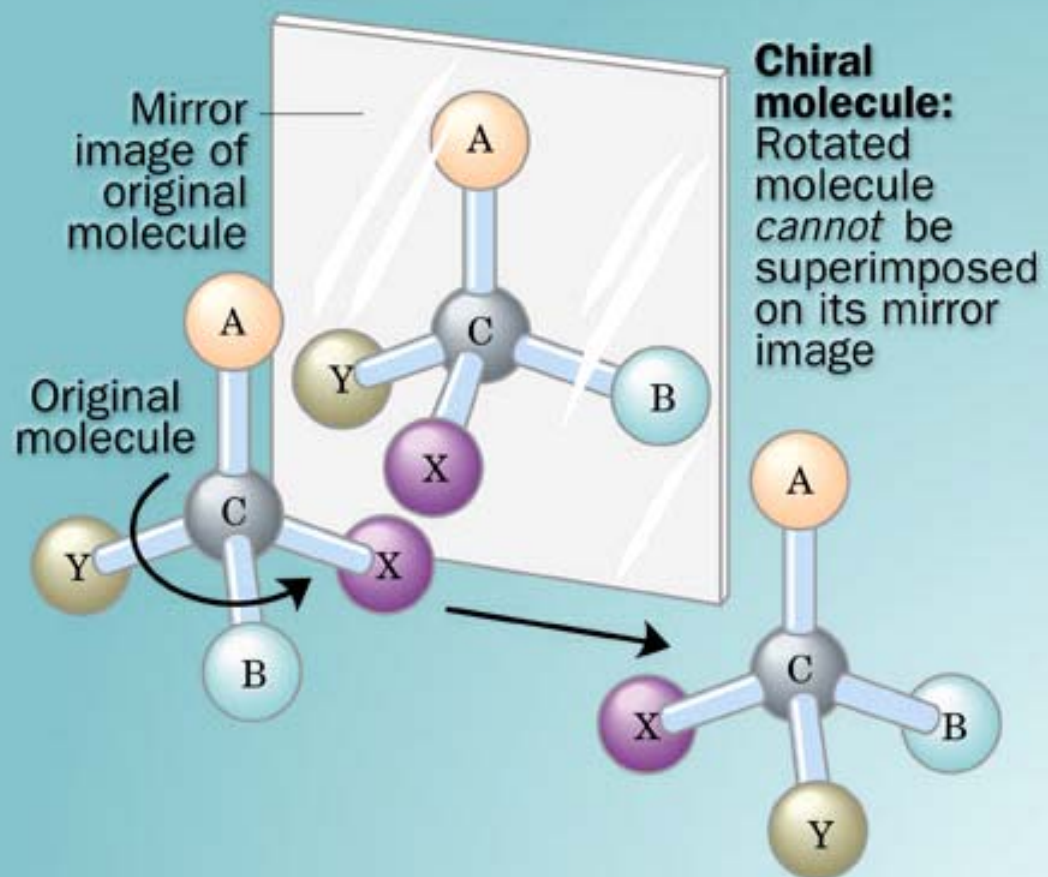


OPTICAL ISOMERS

The α -carbon atom is asymmetric, which allows for two mirror image (or stereo-) isomers, D and L.



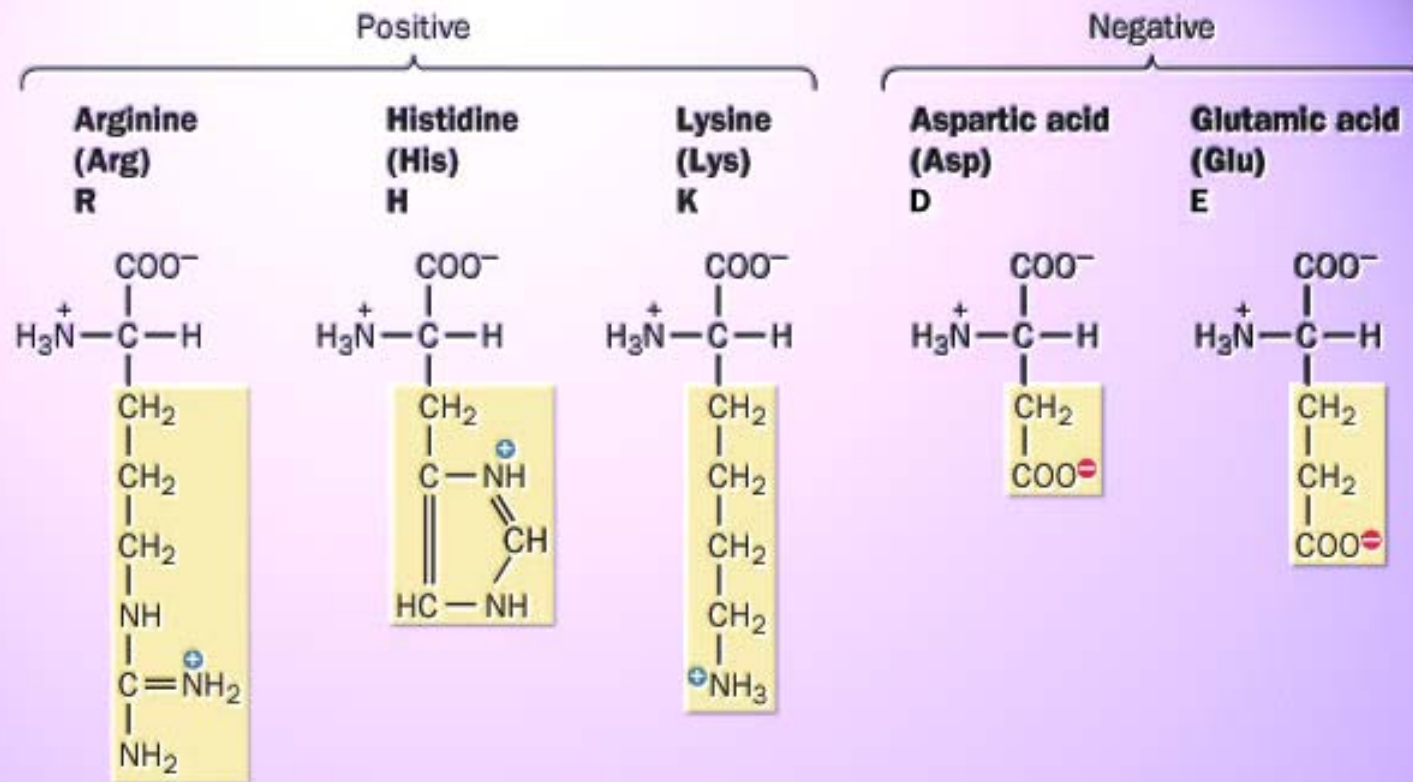
Proteins consist exclusively of L-amino acids.



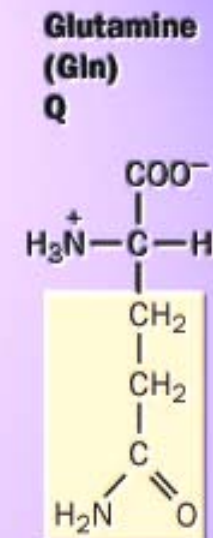
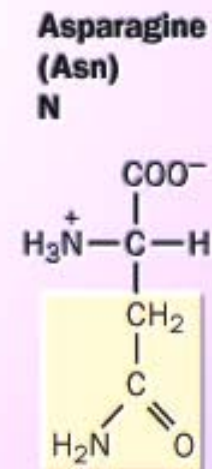
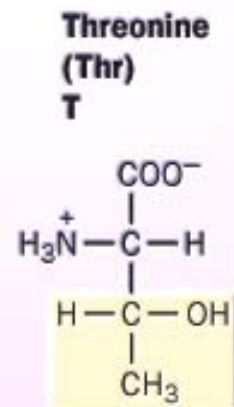
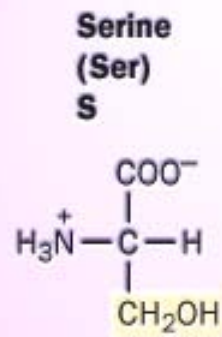
Chirality

**Los aminoácidos se clasifican según
su grupo funcional**

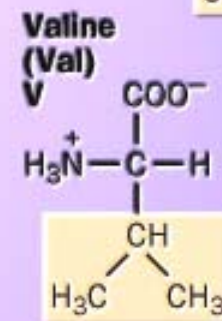
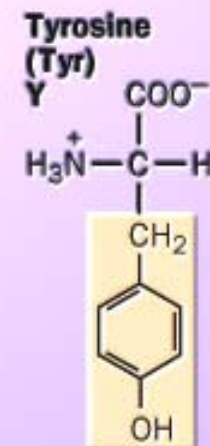
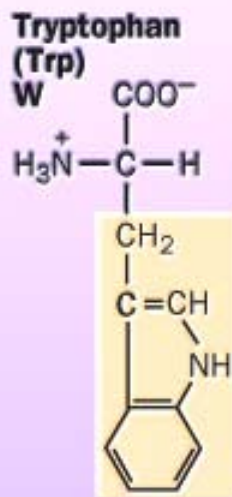
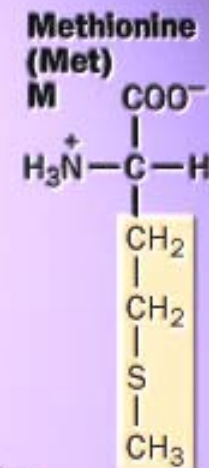
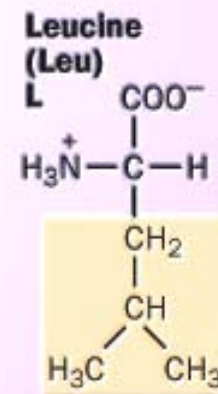
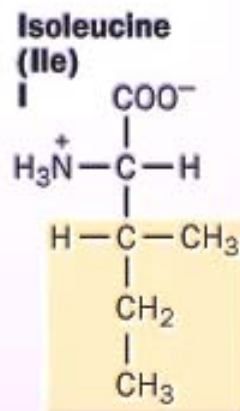
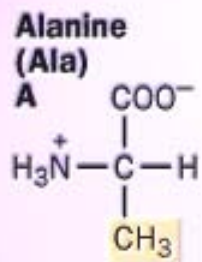
**que le da las características químicas
al aminoácido**



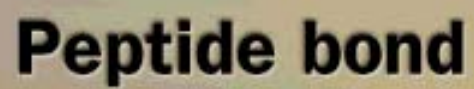
Amino acids with electrically charged side chains



Amino acids with polar but uncharged side chains

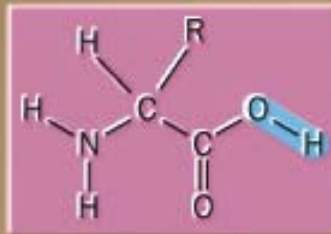


Amino acids with hydrophobic side chains

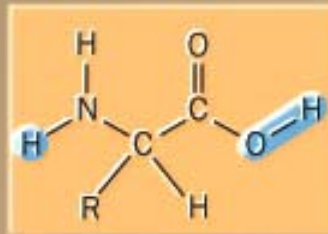


Peptide bond

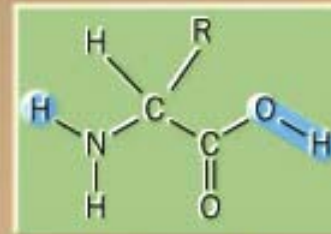
4 Amino acid monomers



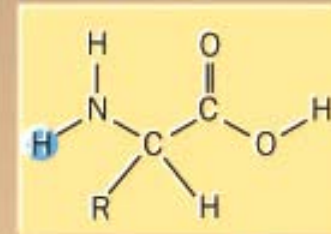
Monomer 1



Monomer 2



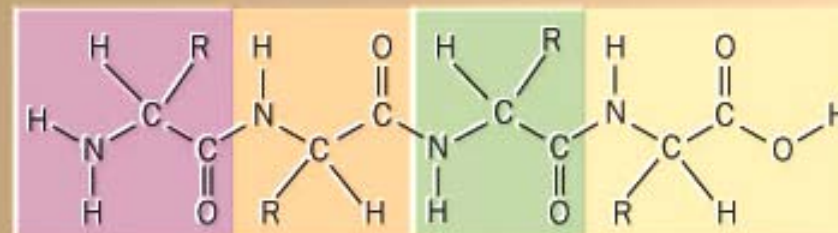
Monomer 3



Monomer 4



Polypeptide



Residue 1

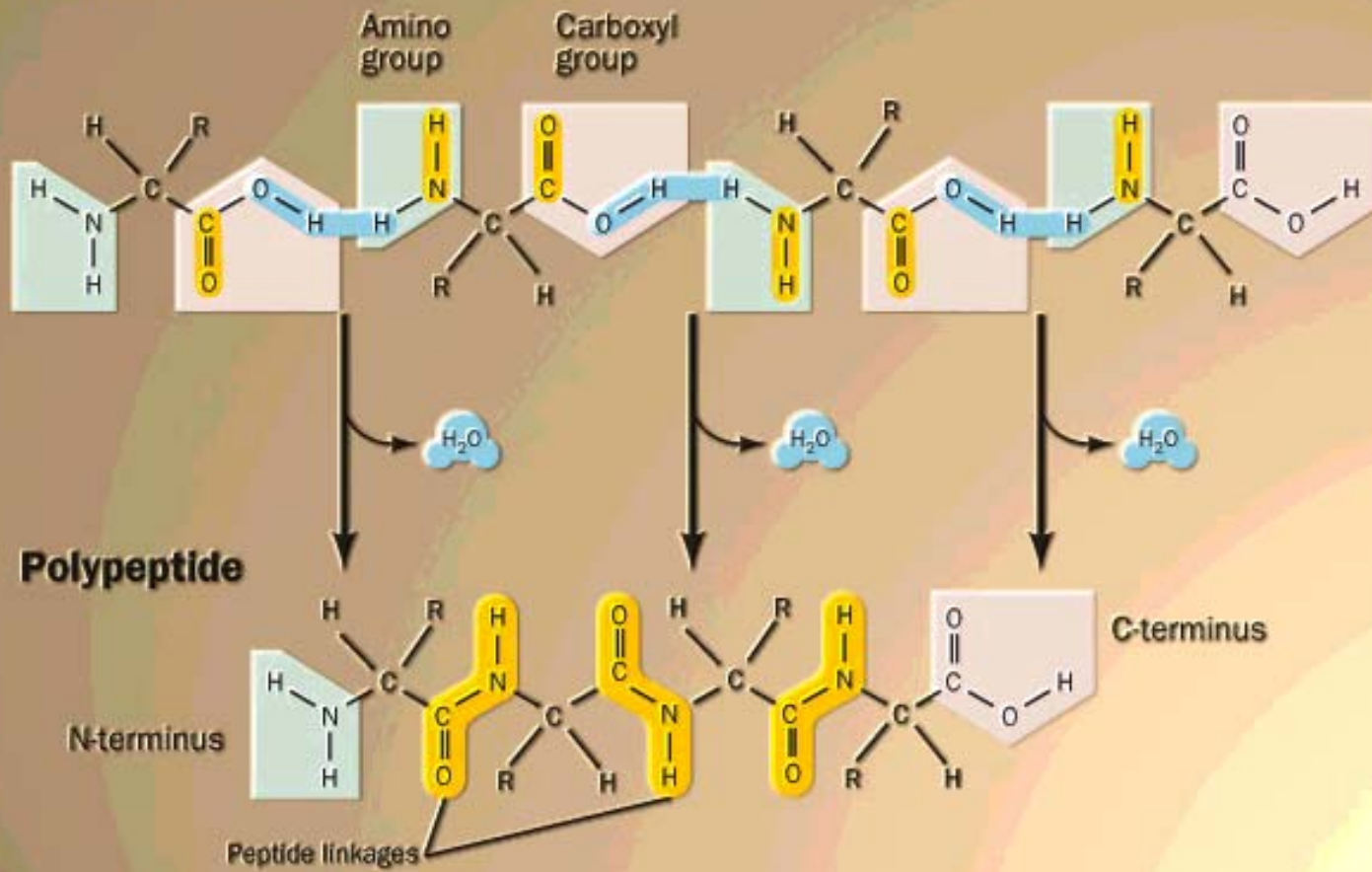
Residue 2

Residue 3

Residue 4

Residue

4 Amino acids



Niveles de organización de las proteínas

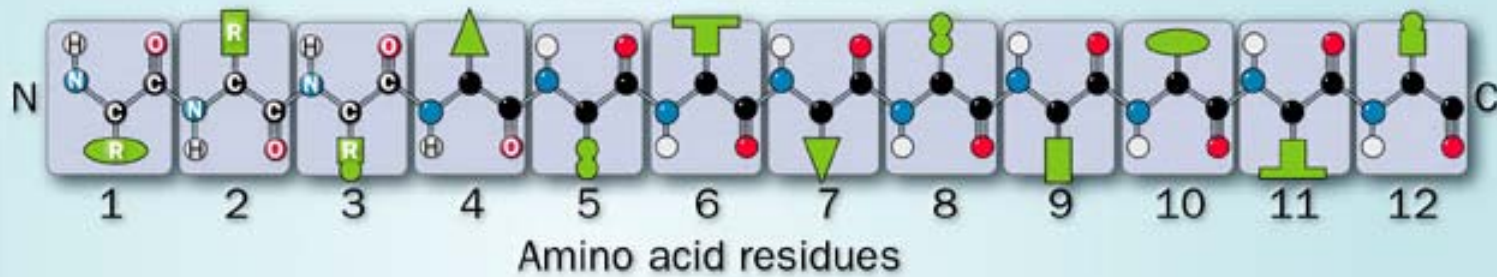
Nivel 1: estructura primaria: enlace peptídico

**Nivel 2: estructura secundaria: doble hélice y beta plegada:
enlaces de H**

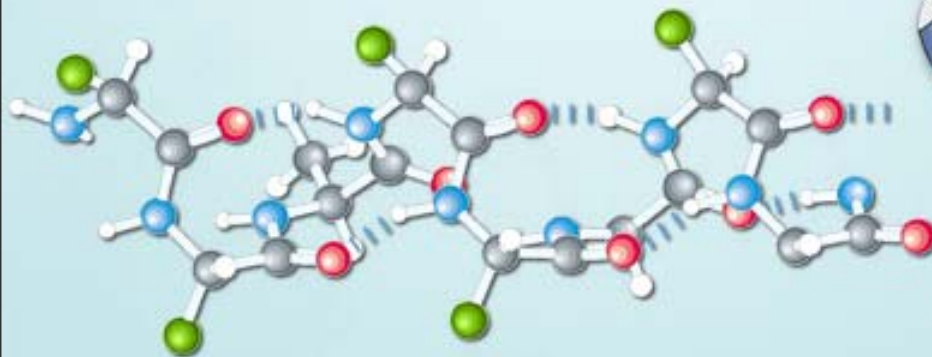
**Nivel 3: estructura terciaria: enlaces disulfuro, fuerzas de
Van der Waals, enlaces hidrofóbicos, atracciones
electrostáticas etc**

**Nivel 4: estructura cuaternaria: interacciones entre las
subunidades**

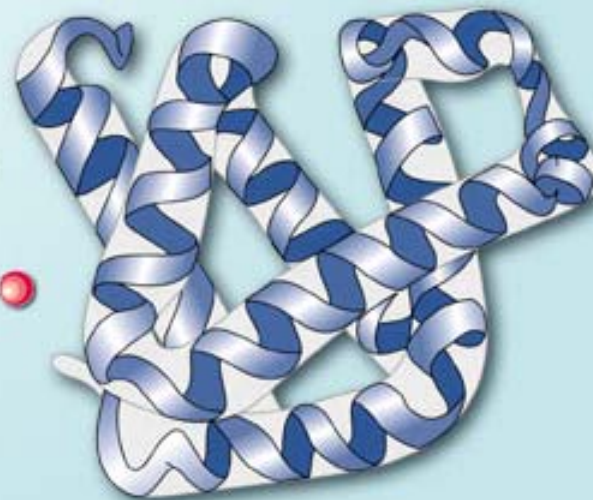
Primary structure

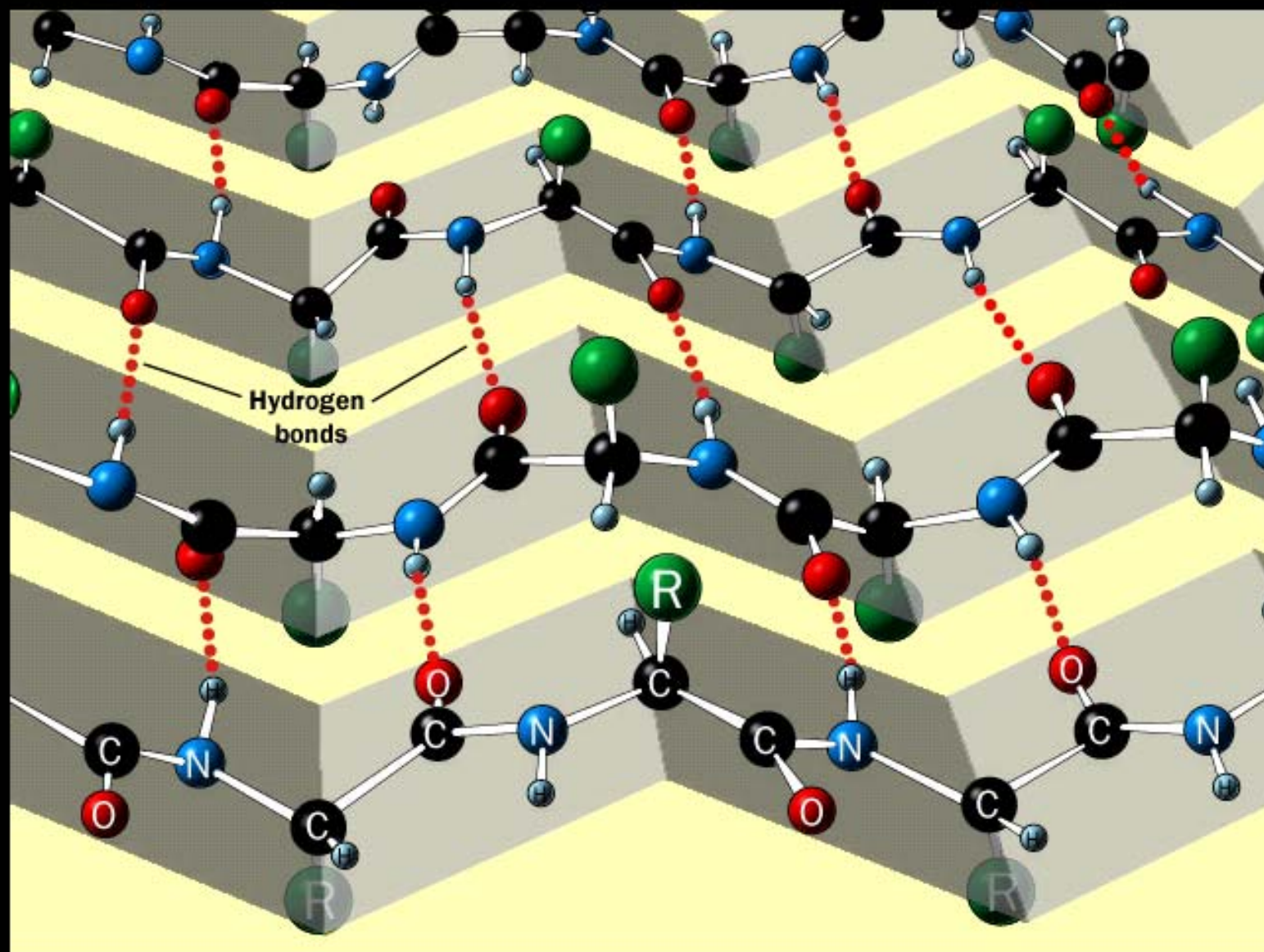


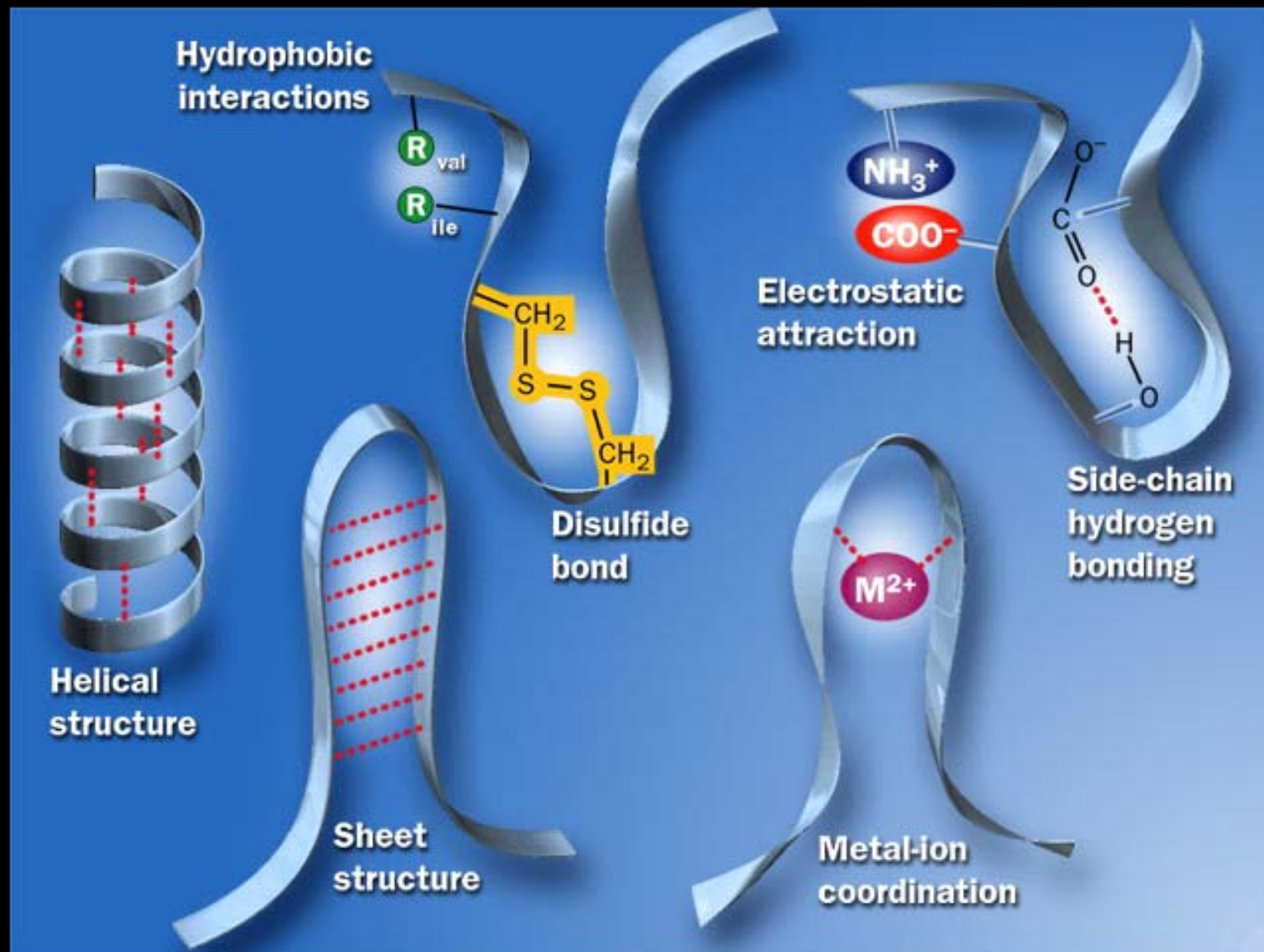
Secondary structure



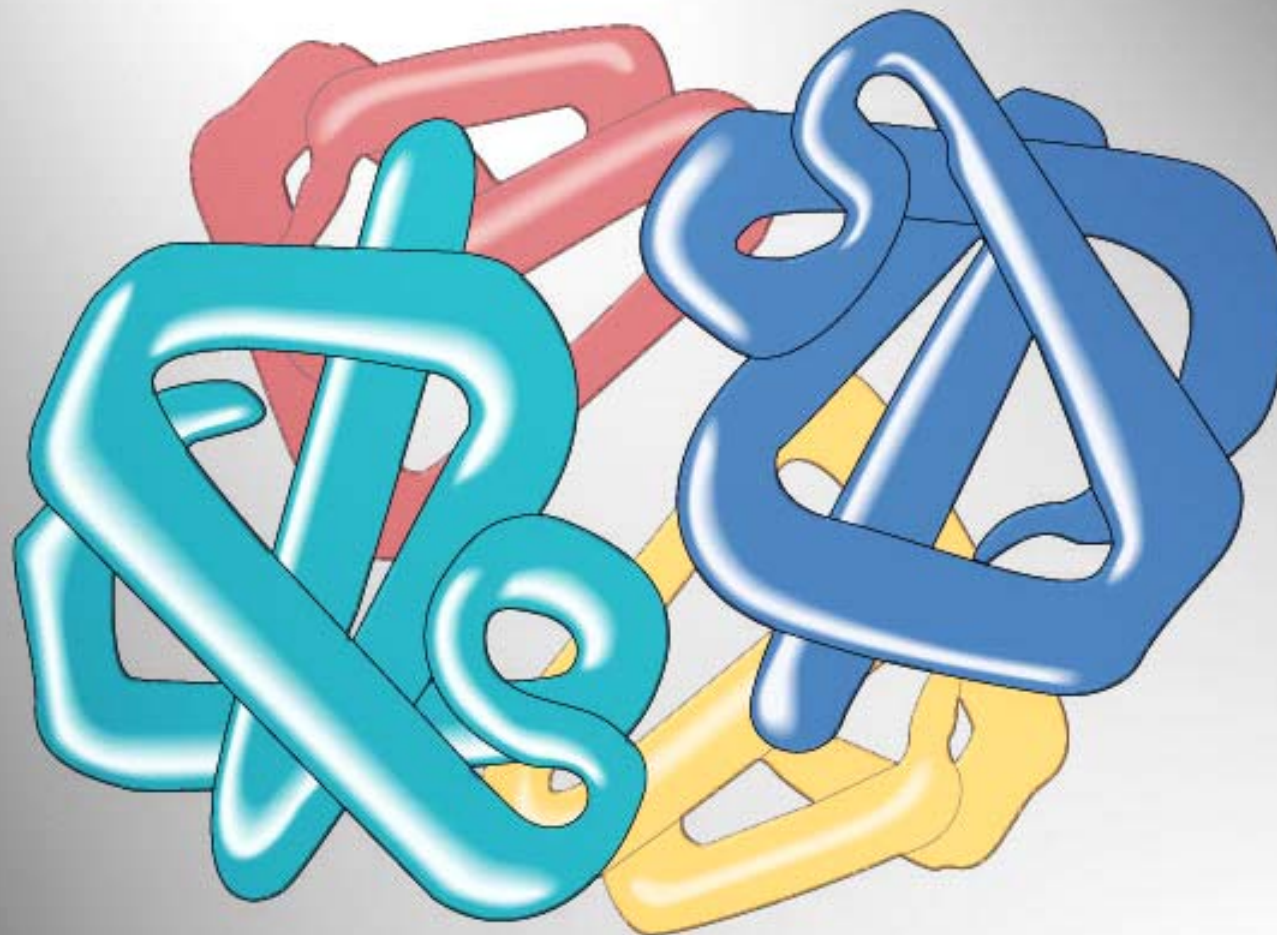
Tertiary structure

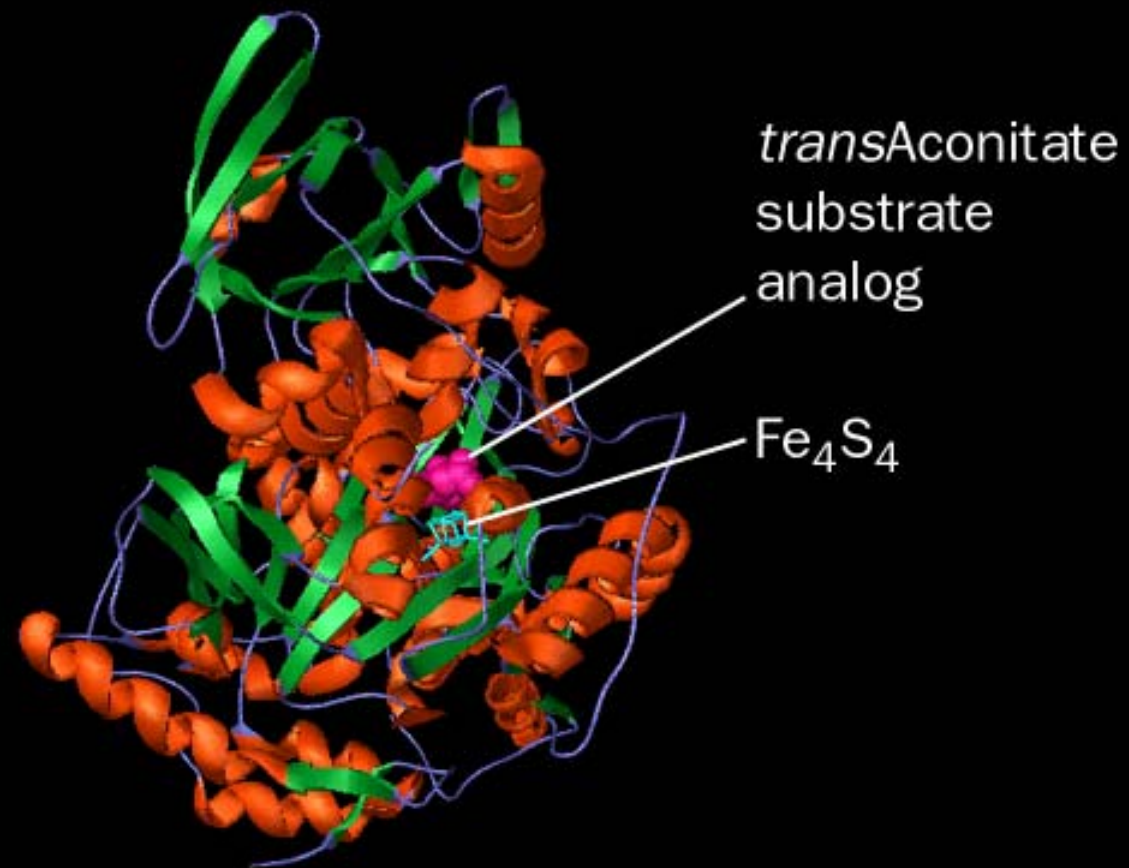




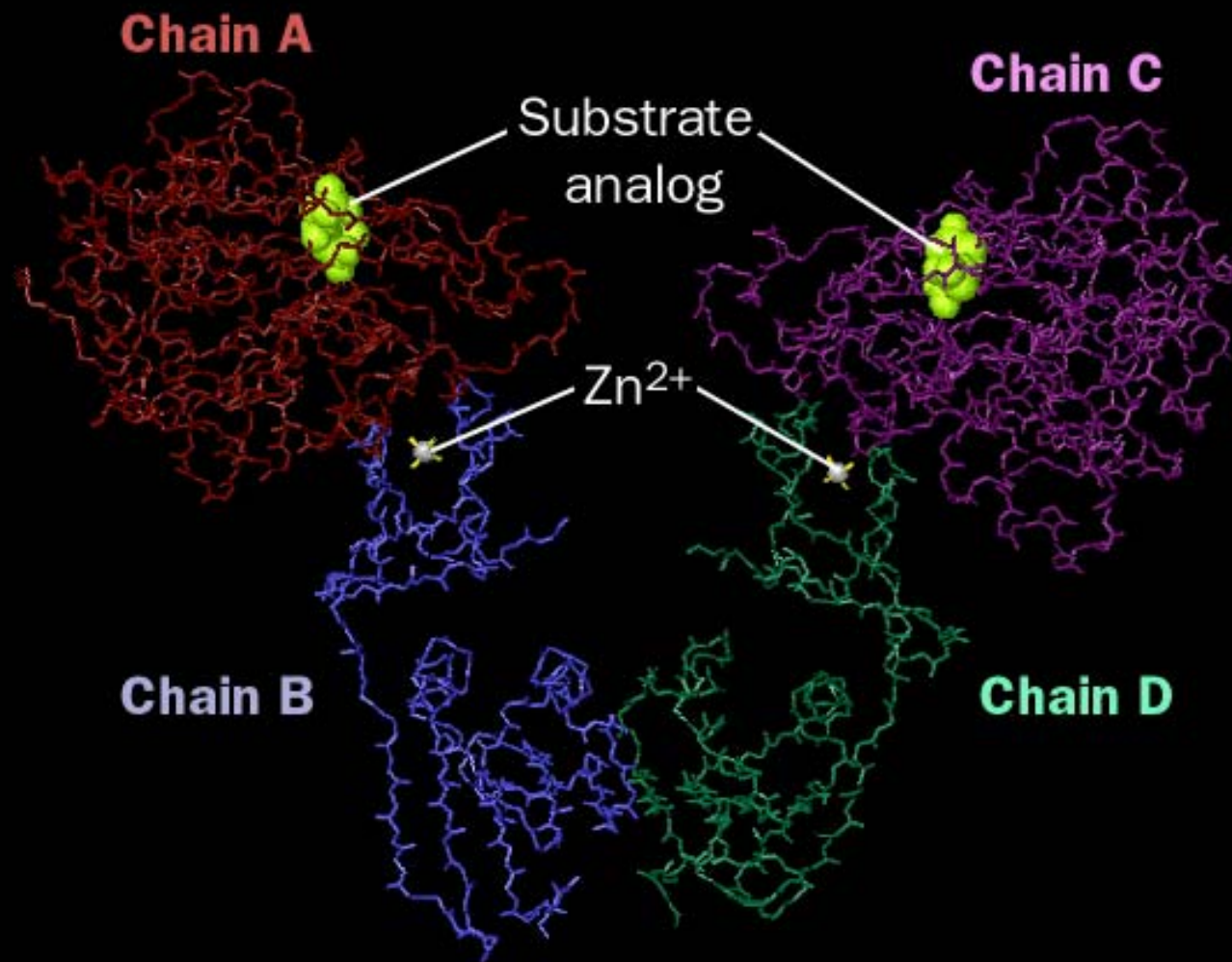


Quaternary structure





Aconitase



Aspartate Transcarbamoylase

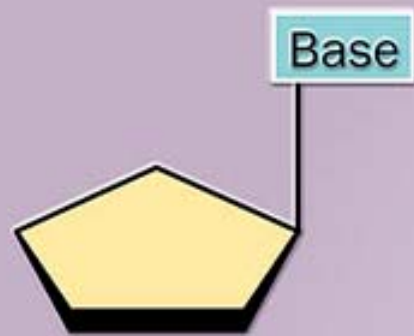
ACIDOS NUCLEICOS

CONTIENEN : C,H,O,N,P

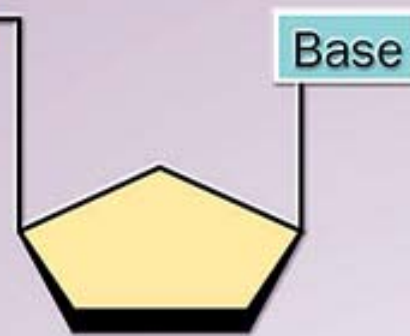
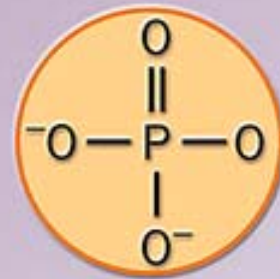
FORMADOS POR NUCLEOTIDOS

NUCLEOTIDO:

BASE N + AZÚCAR 5 C + FOSFATO



Nucleoside



Nucleotide

NOMENCLATURE

The names can be confusing, but the abbreviations are clear.

BASE	NUCLEOSIDE	ABBR.
adenine	adenosine	A
guanine	guanosine	G
cytosine	cytidine	C
uracil	uridine	U
thymine	thymidine	T

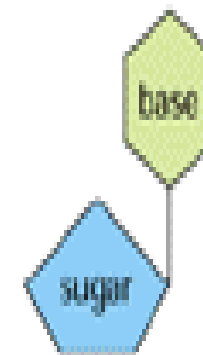
Nucleotides are abbreviated by three capital letters. Some examples follow:

AMP = adenosine monophosphate

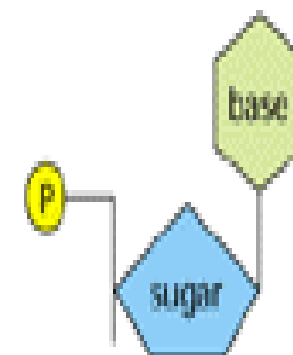
dAMP = deoxyadenosine monophosphate

UDP = uridine diphosphate

ATP = adenosine triphosphate



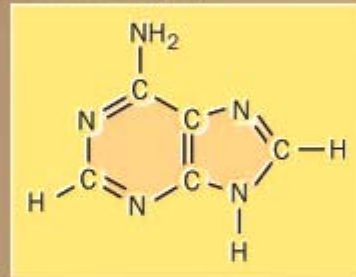
BASE + SUGAR = **NUCLEOSIDE**



BASE + SUGAR + PHOSPHATE = **NUCLEOTIDE**

BASES Nitrogenadas

Adenine (A)

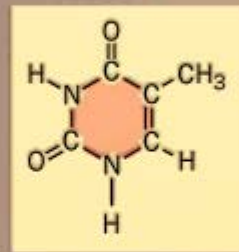


Guanine (G)

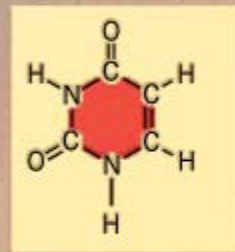


Purines

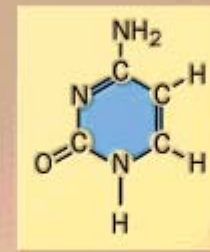
BASES Nitrogenadas



Thymine (T)



Uracil (U)



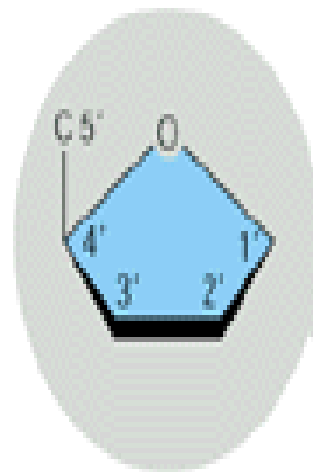
Cytosine (C)

Pyrimidines

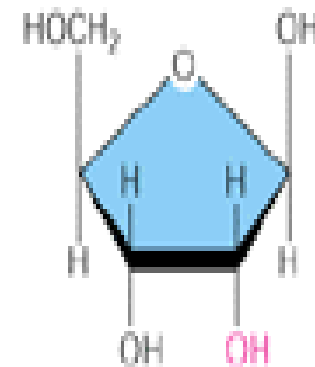
SUGARS

PENTOSE

a 5-carbon sugar

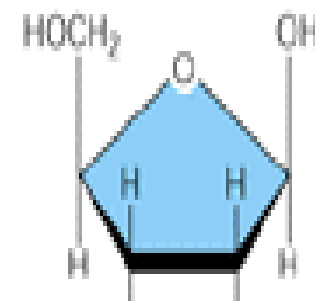


two kinds are used



β -D-RIBOSE

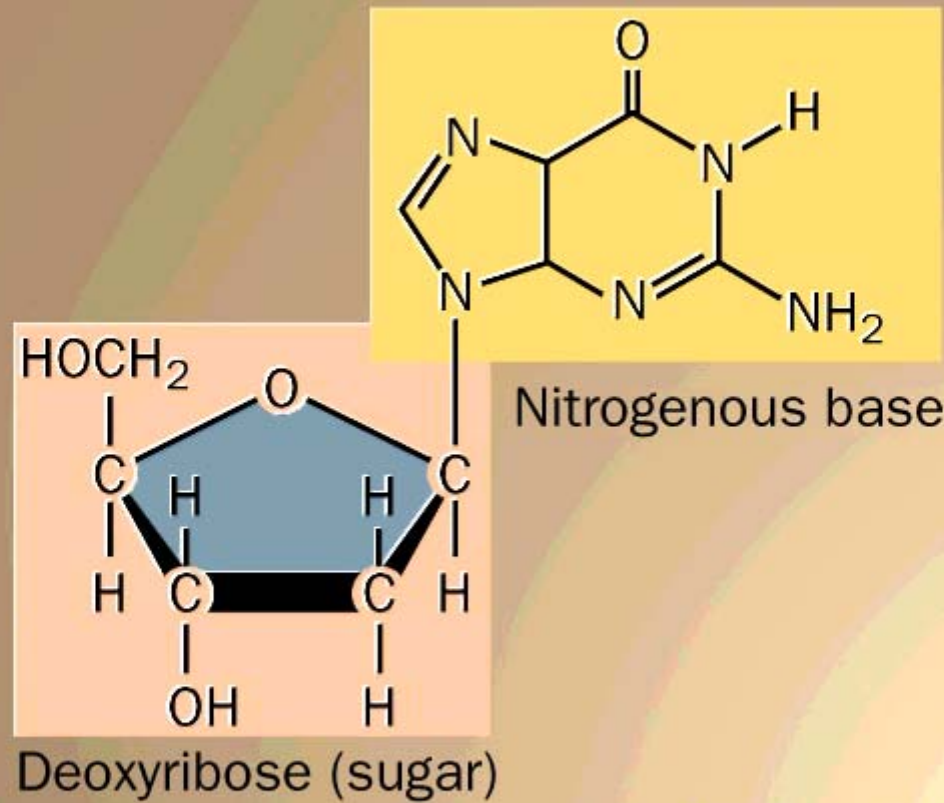
used in ribonucleic acid



β -D-2-DEOXYRIBOSE

used in deoxyribonucleic acid

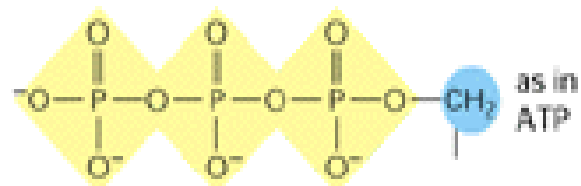
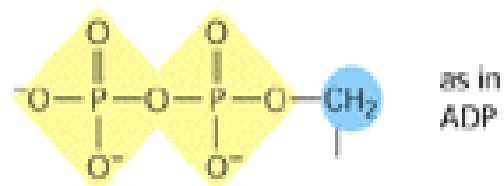
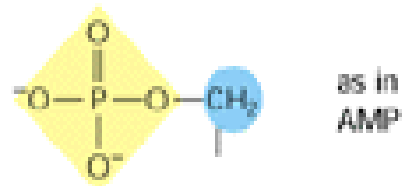
Each numbered carbon on the sugar of a nucleotide is followed by a prime mark; therefore, one speaks of the 5' carbon of the sugar.



Nucleoside

PHOSPHATES

The phosphates are normally joined to the C5 hydroxyl of the ribose or deoxyribose sugar. Mono-, di-, and triphosphates are common.

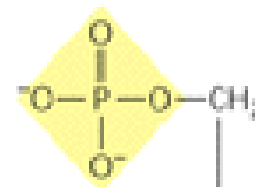


The phosphate makes a nucleotide negatively charged.

NUCLEOTIDES

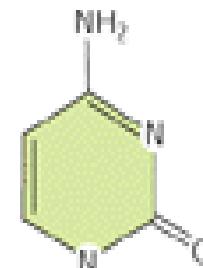
A nucleotide consists of a nitrogen-containing base, a 5-carbon sugar, and one or more phosphate groups.

PHOSPHATE

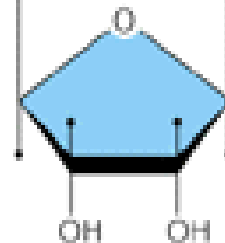


They are the subunits of the **nucleic acids**.

BASE

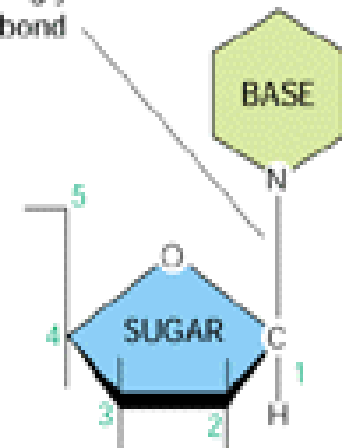


SUGAR

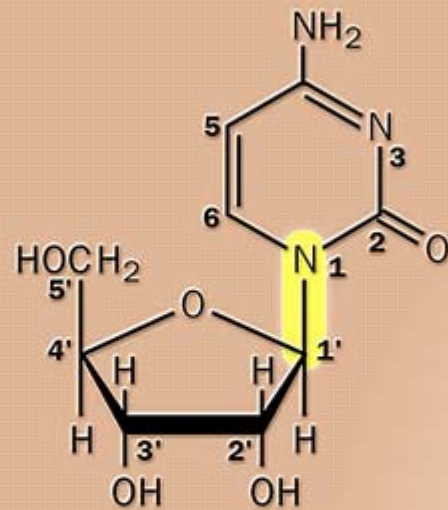


BASIC SUGAR LINKAGE

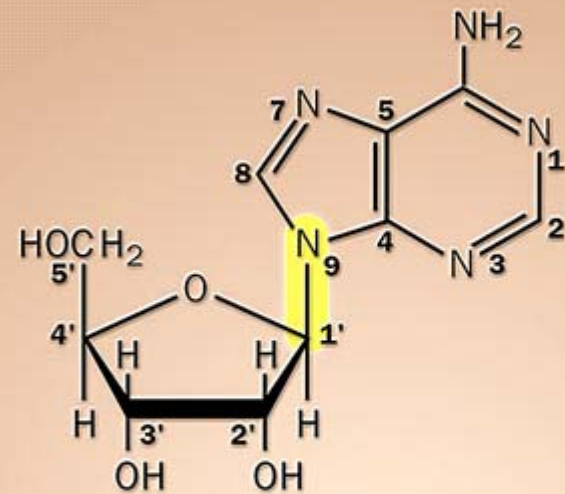
N-glycosidic bond



The base is linked to the same carbon (C1) used in sugar-sugar bonds.



**β -N₁-glycosidic bond in
pyrimidine ribonucleosides**



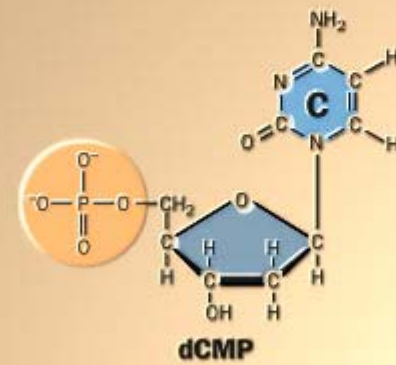
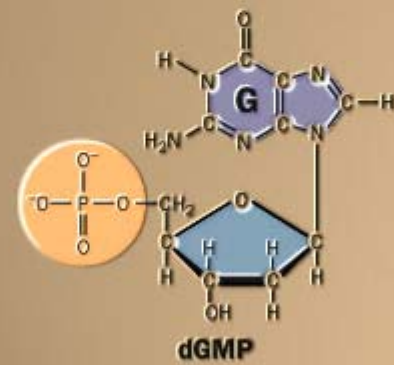
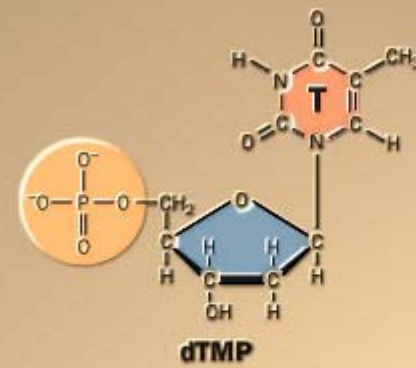
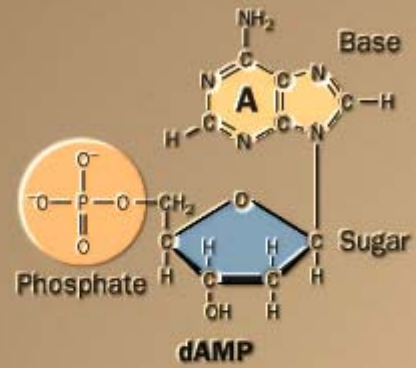
**β -N₉-glycosidic bond in
purine ribonucleosides**

DIFERENCIAS ENTRE DNA Y RNA

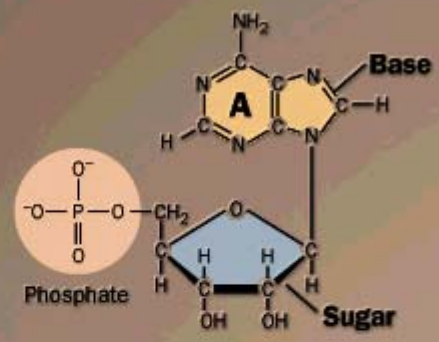
DNA

RNA

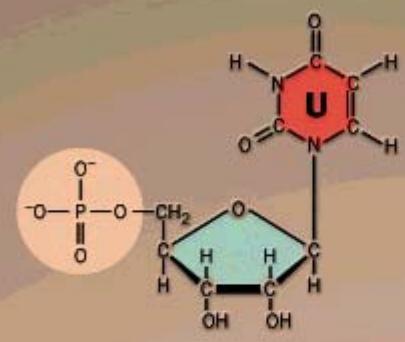
Doble hebra	Una hebra
Azúcar: deoxiribosa	Ribosa
Timina	Uracilo
Núcleo	Sale al citoplasma



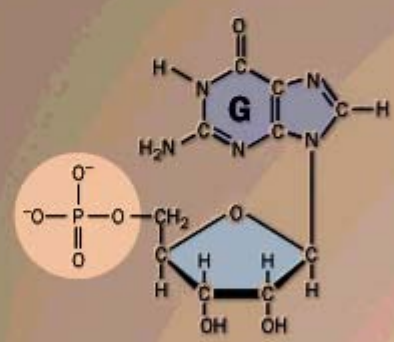
Deoxyribonucleotides



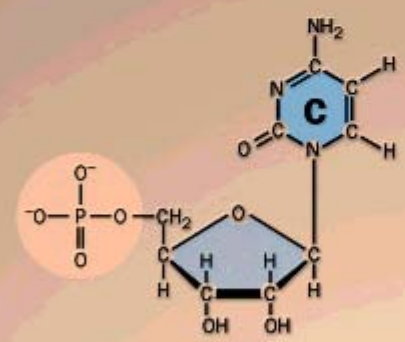
AMP



UMP



GMP



CMP

Ribonucleotide

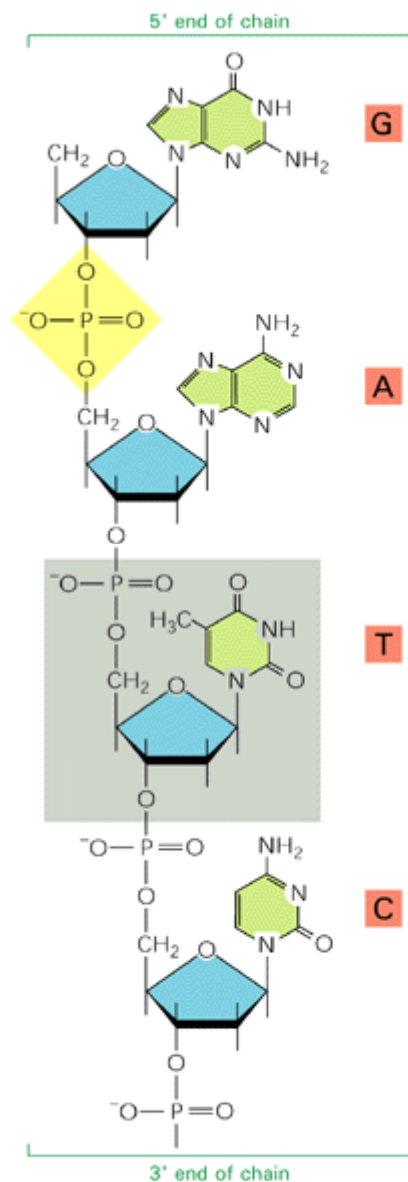
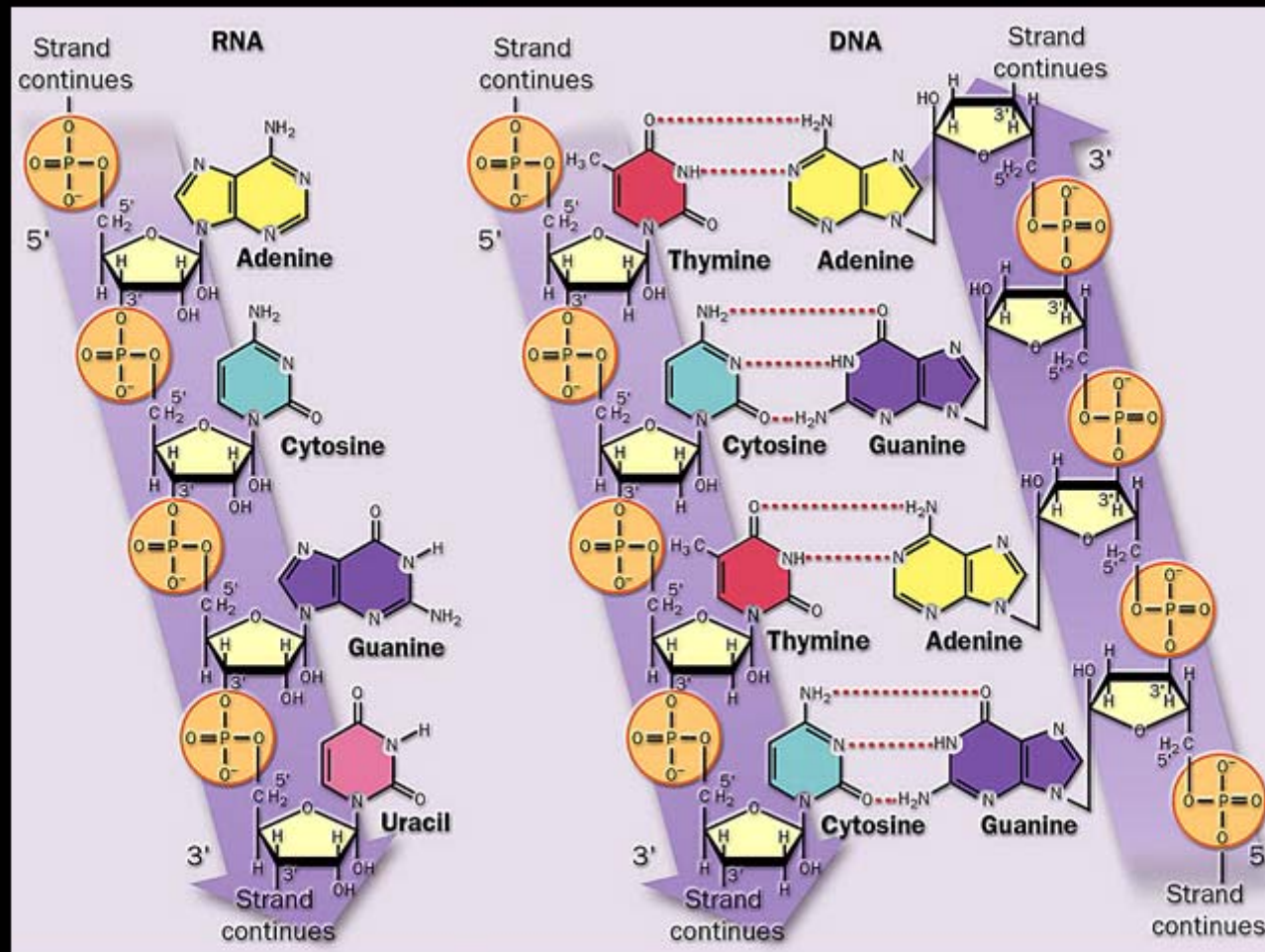
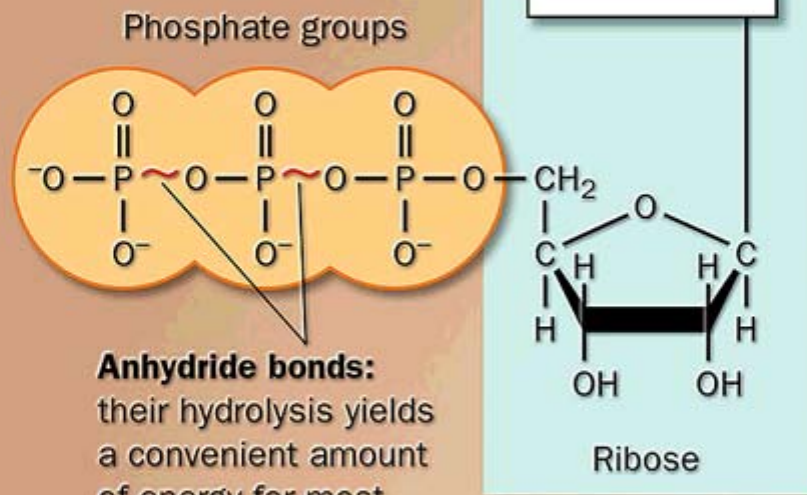
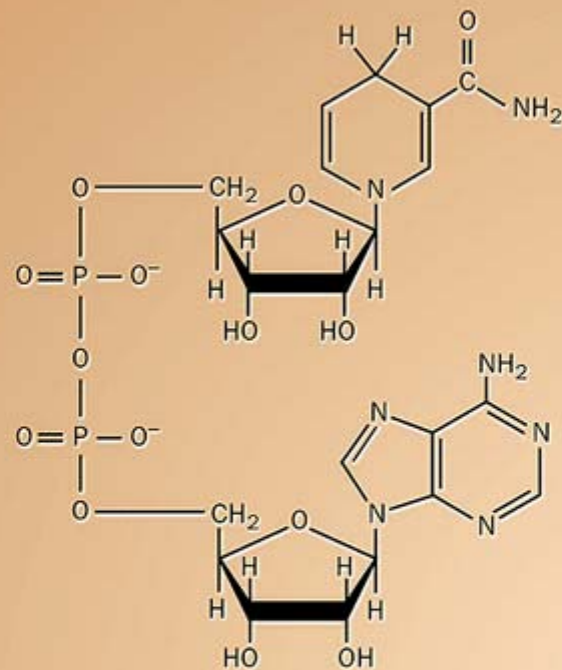


Figure 2-10. A short length of deoxyribonucleic acid (DNA), showing four nucleotides. One of the phosphodiester bonds that link adjacent nucleotides is shaded *yellow*, and one of the nucleotides is enclosed in a *gray box*. DNA and its close relative RNA are the nucleic acids of the cell.





ATP as Energy Currency



**Nicotinamide adenine dinucleotide
(NADH)**