



Máquinas Moleculares (Las Moléculas de la Vida)

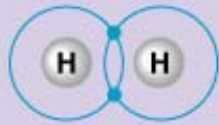
Ricardo Silva

Los Elementos de la Vida

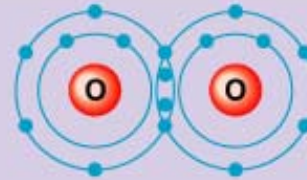


1	H																		2	He	
2	Li	Be										5	B	C	N	O	F		10	Ne	
3	Na	Mg										13	Al	Si	P	S	Cl		18	Ar	
4	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br		36	Kr	
5	Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I		54	Xe	
6	Cs	Ba	L	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At		86	Rn	
7	Fr	Ra	A																		
	L	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71					
		La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu					
	A	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103					
		Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr					

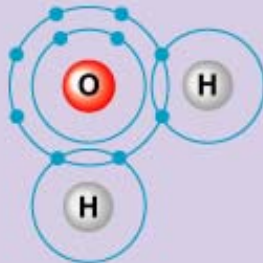
Enlaces Covalentes



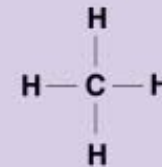
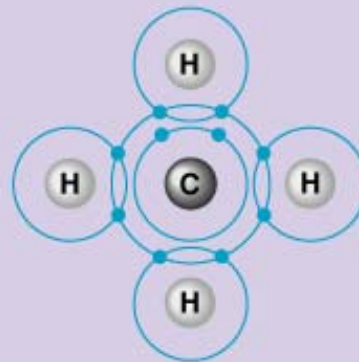
(a) H_2



(b) O_2

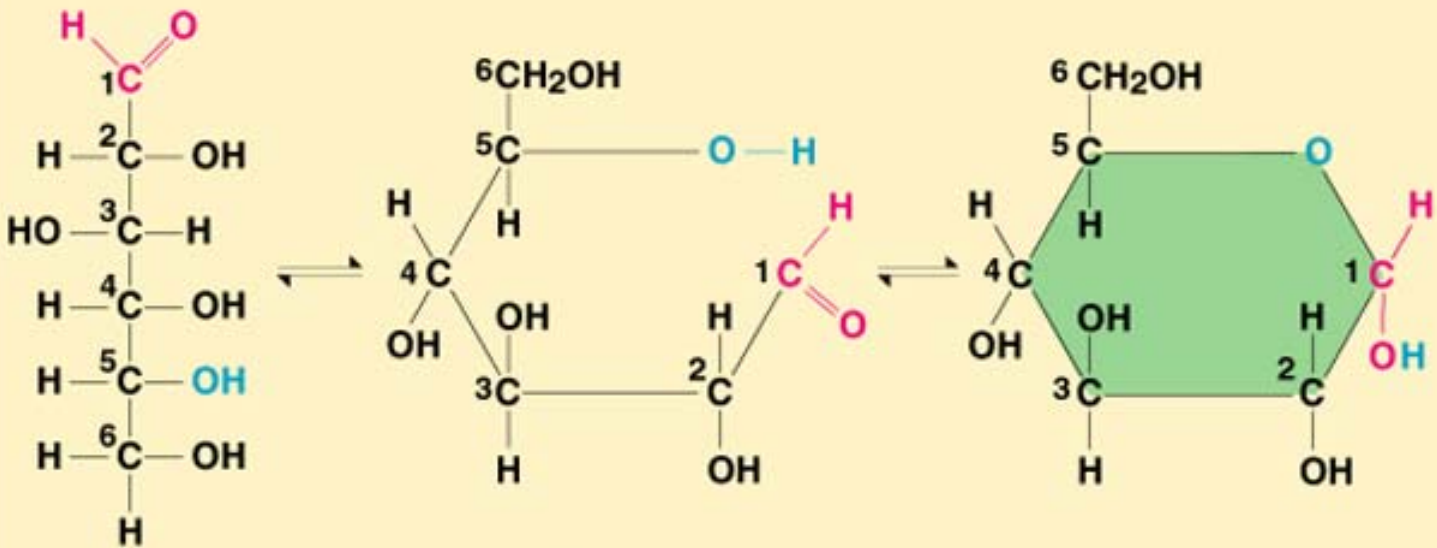


(c) H_2O



(d) CH_4

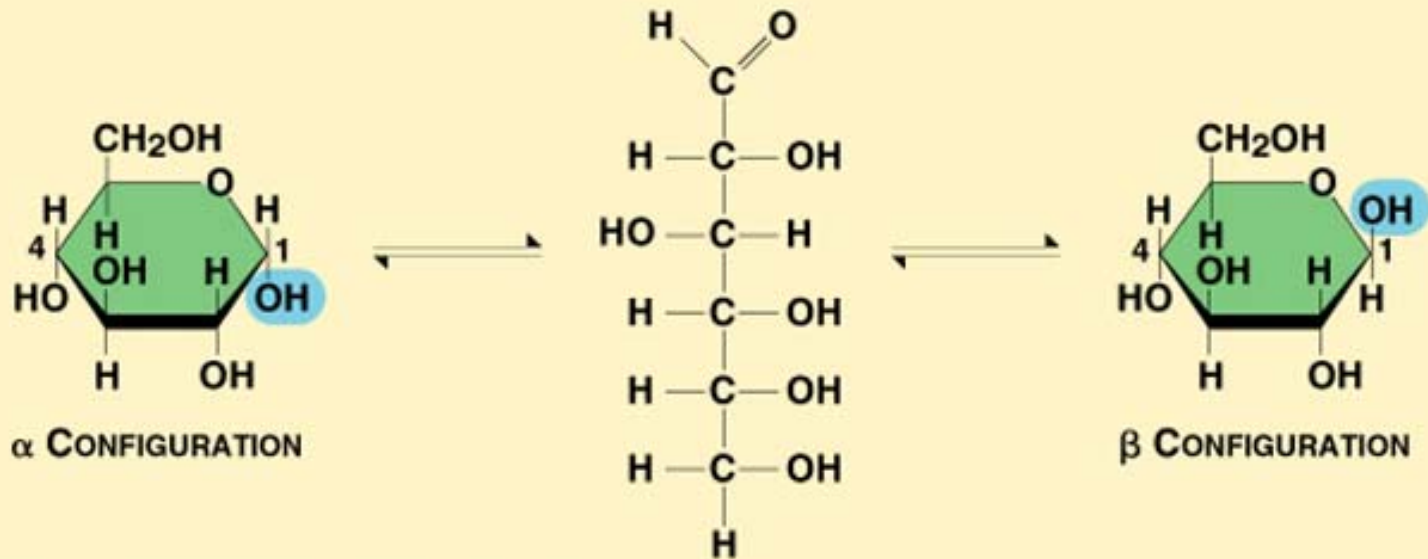
Carbohidratos (Azúcares)



(a) Linear and ring forms

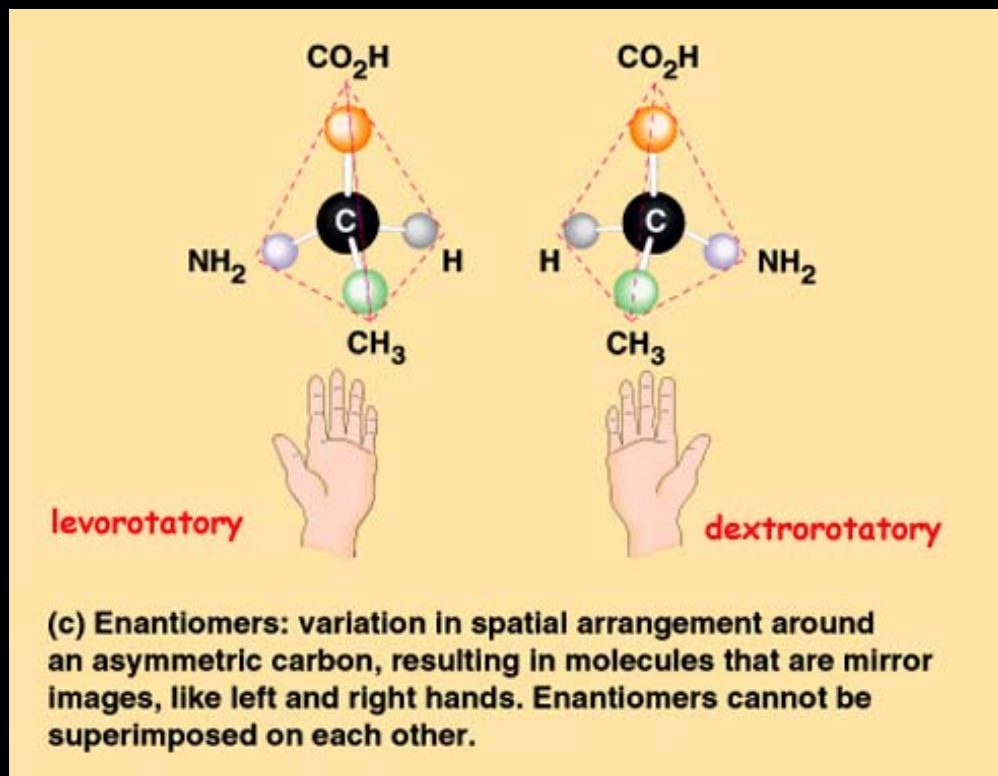


Isómeros

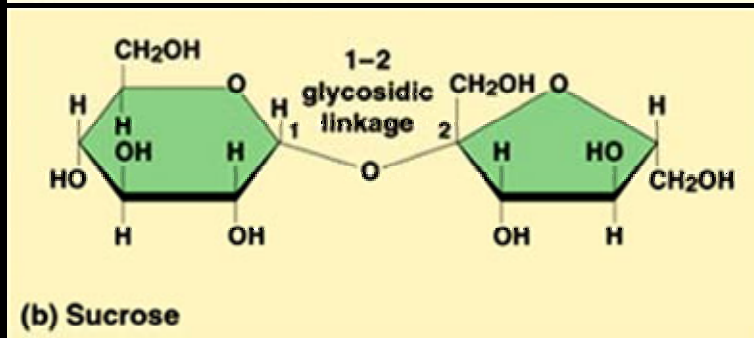
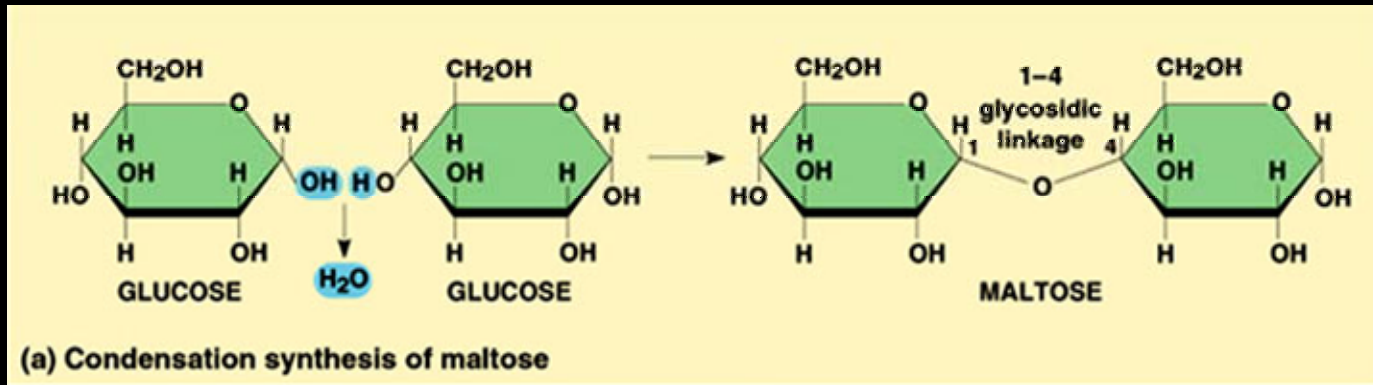


(a) α and β glucose ring structures

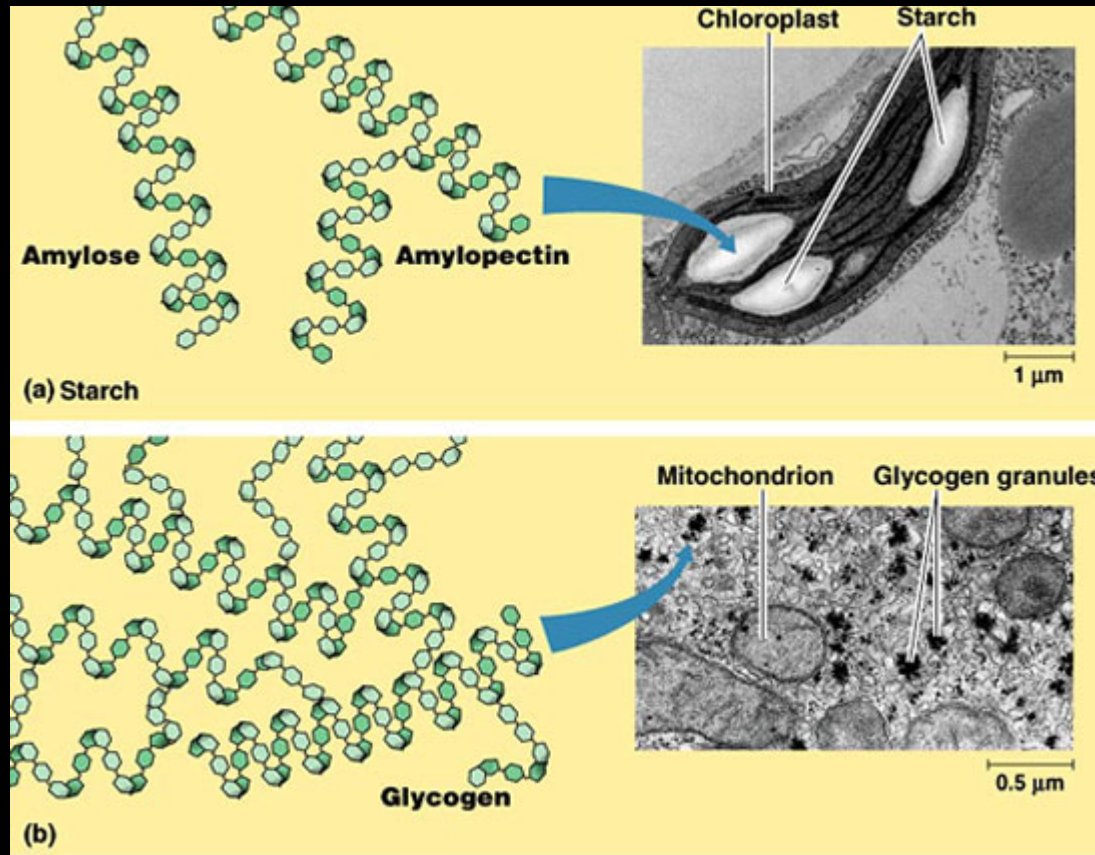
Estereo Isómeros



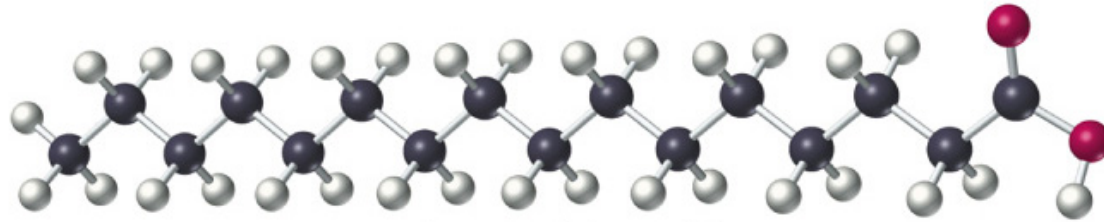
Disacáridos



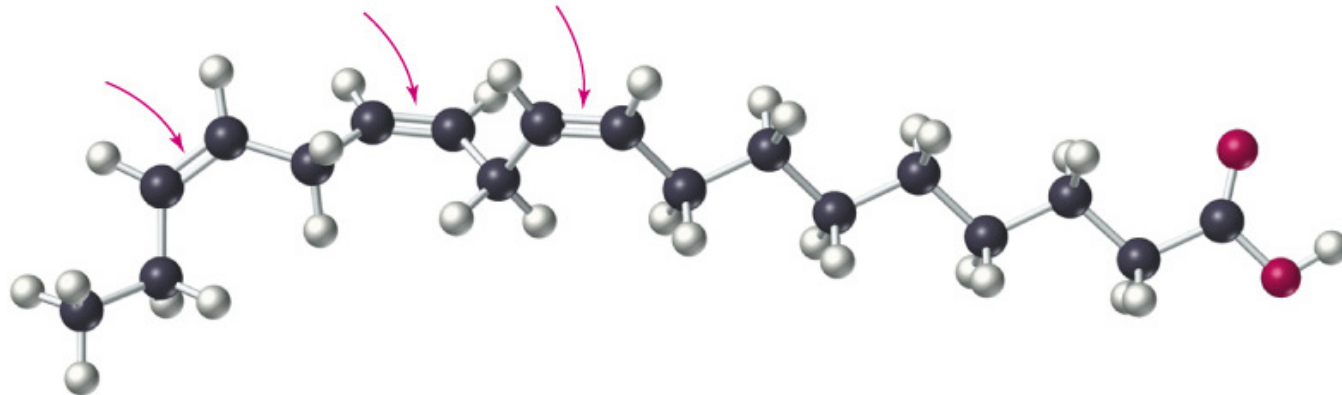
Polisacáridos



Ácidos Grasos

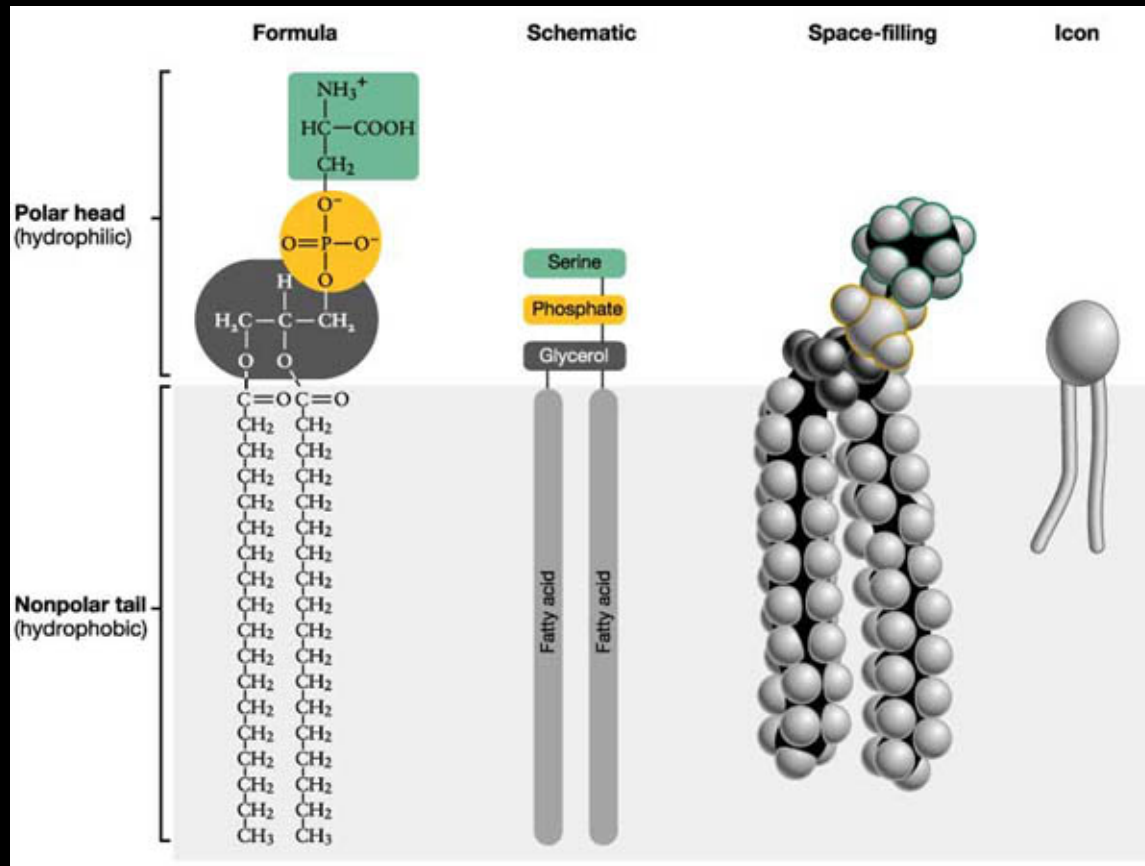


A saturated fatty acid
(palmitic acid)



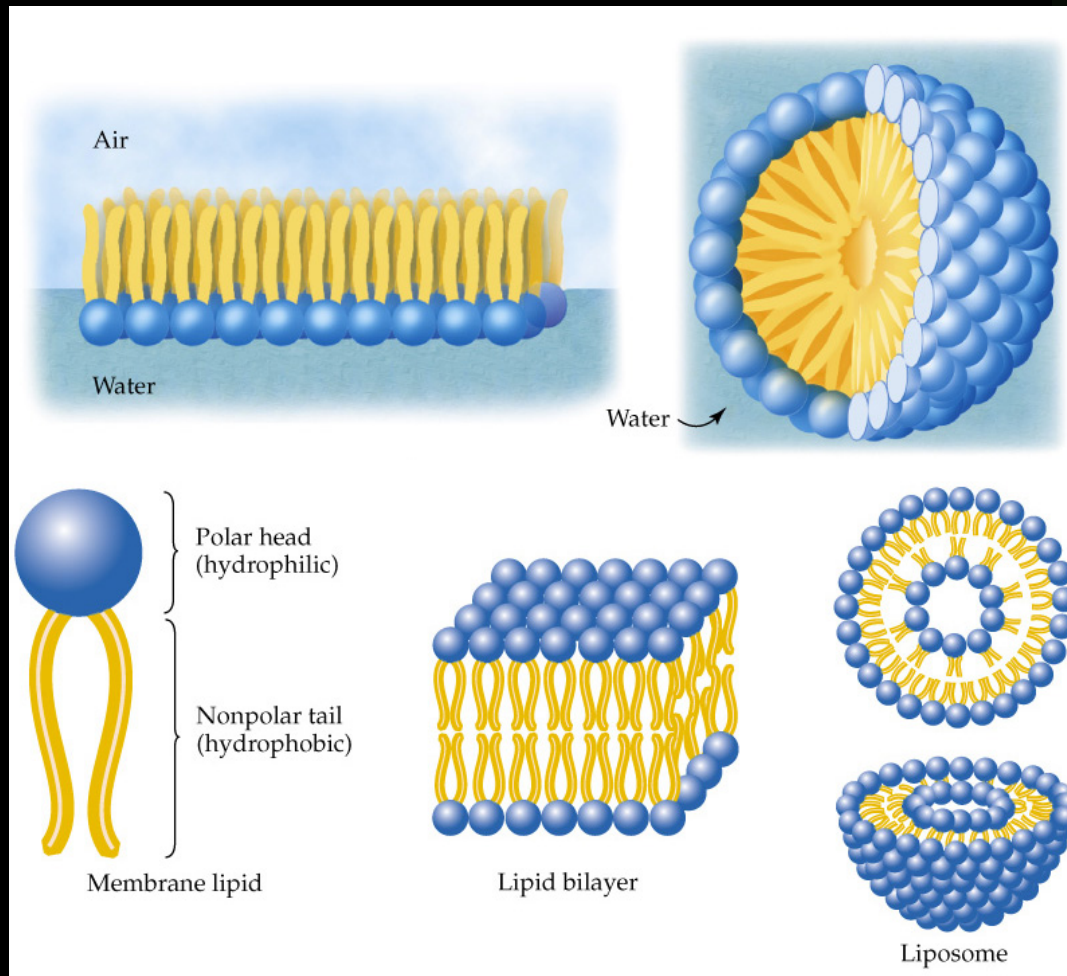
A *cis* unsaturated fatty acid
(linolenic acid)

Fosfolípidos

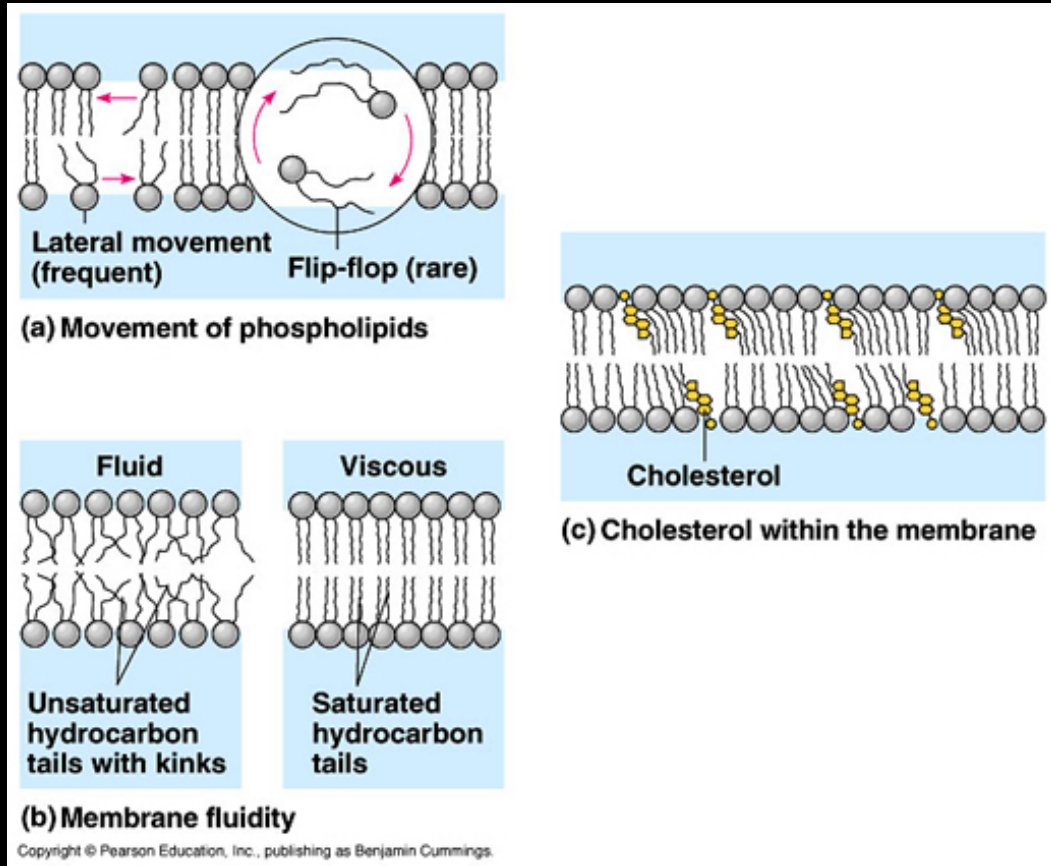




Interacción con el Agua



Mosaico Fluido

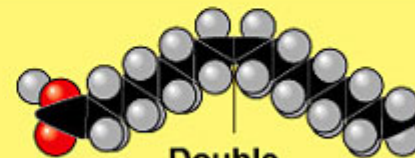


Saturadas-Insaturadas



Stearic acid

(a) Saturated fat and fatty acid

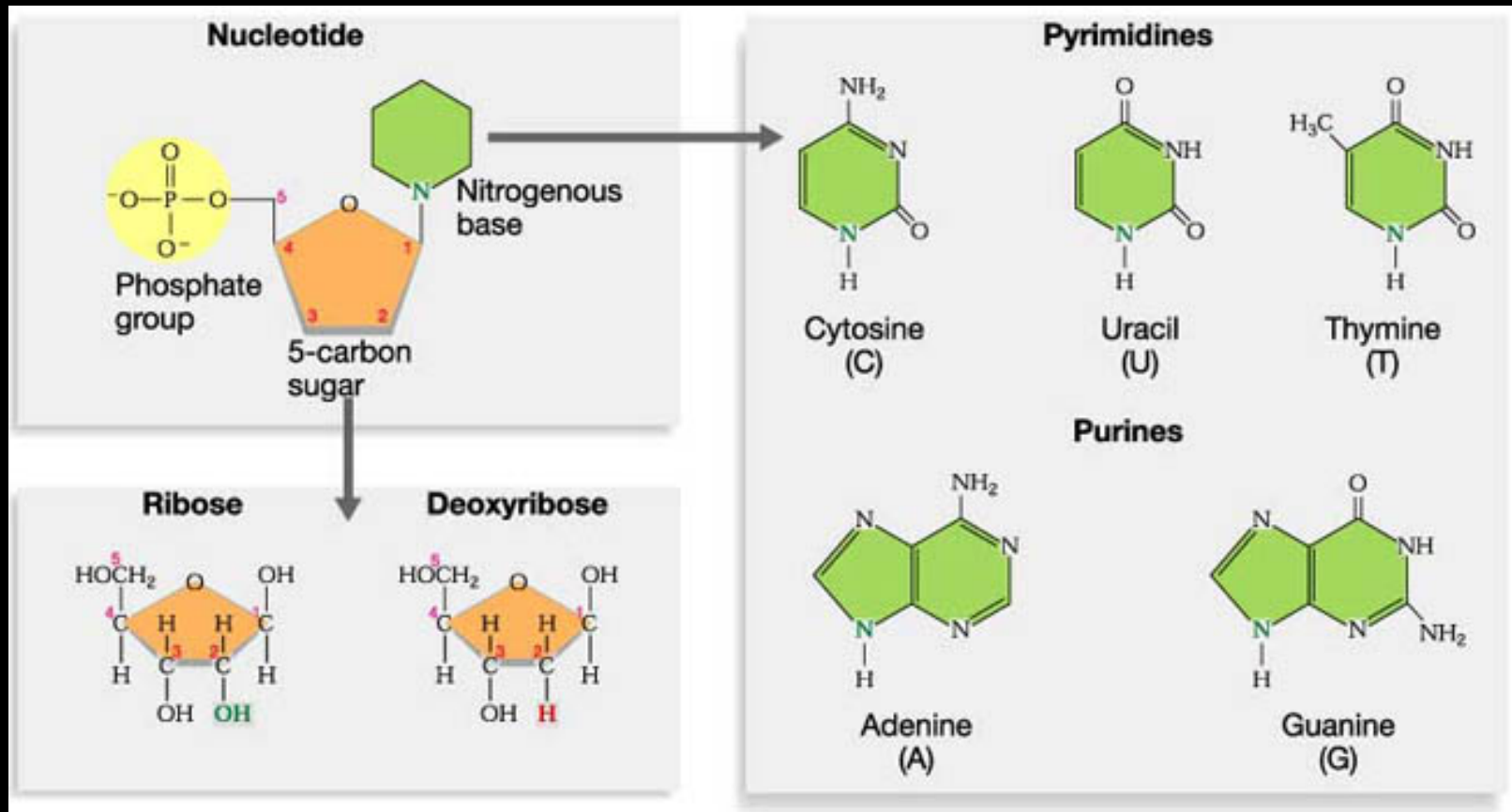


Oleic acid

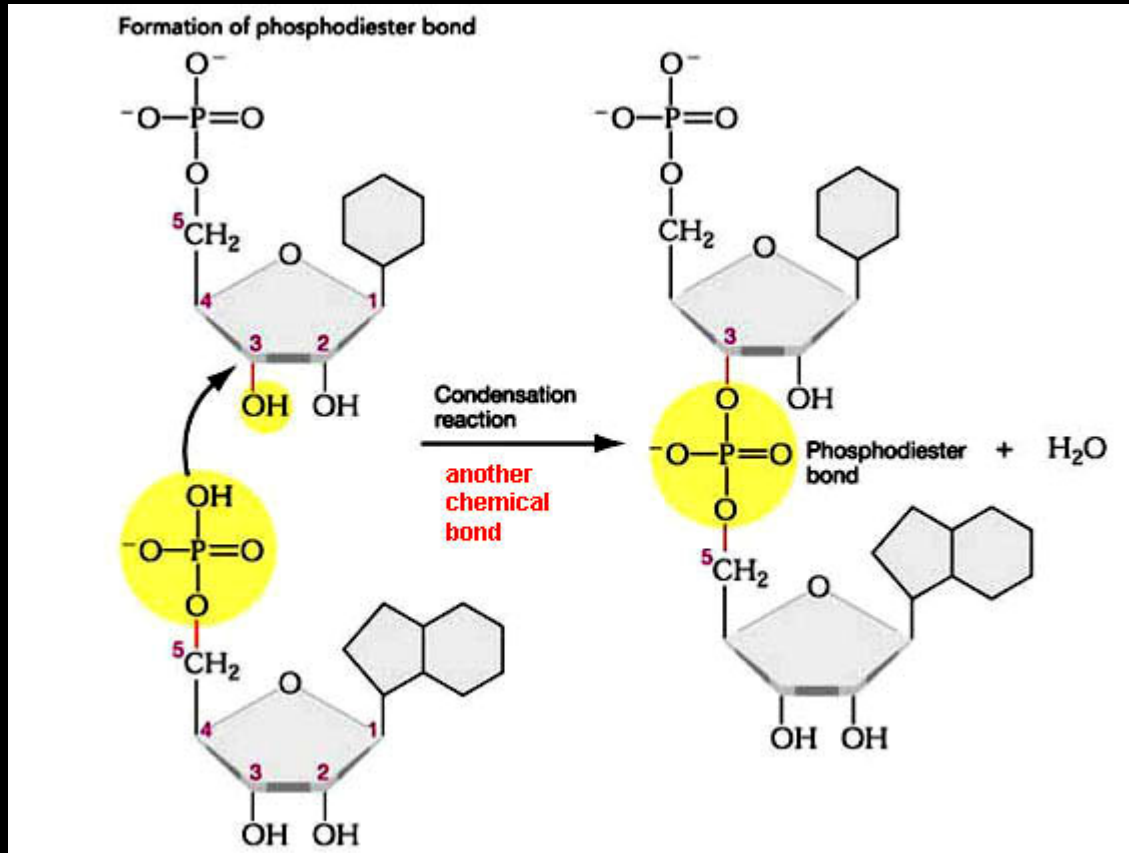
Double bond causes bending

(b) Unsaturated fat and fatty acid

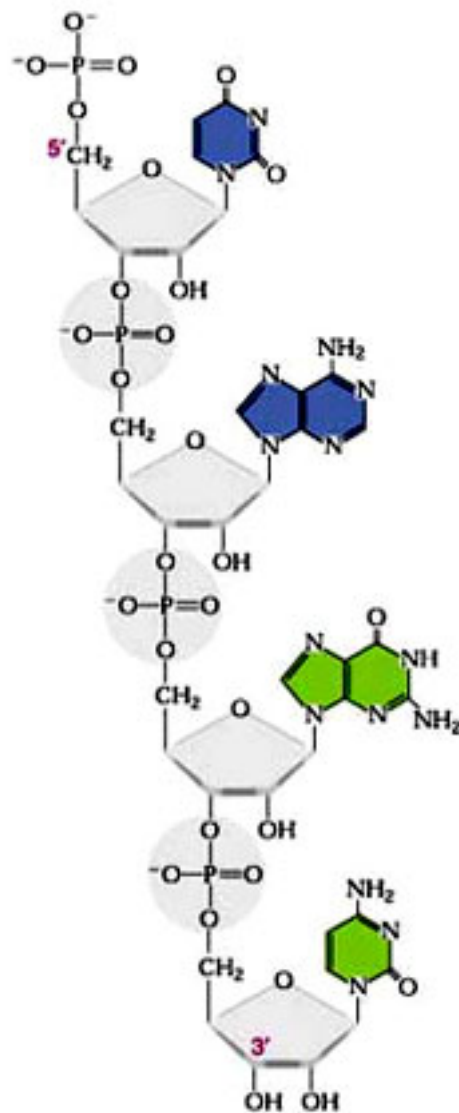
Nucleótidos



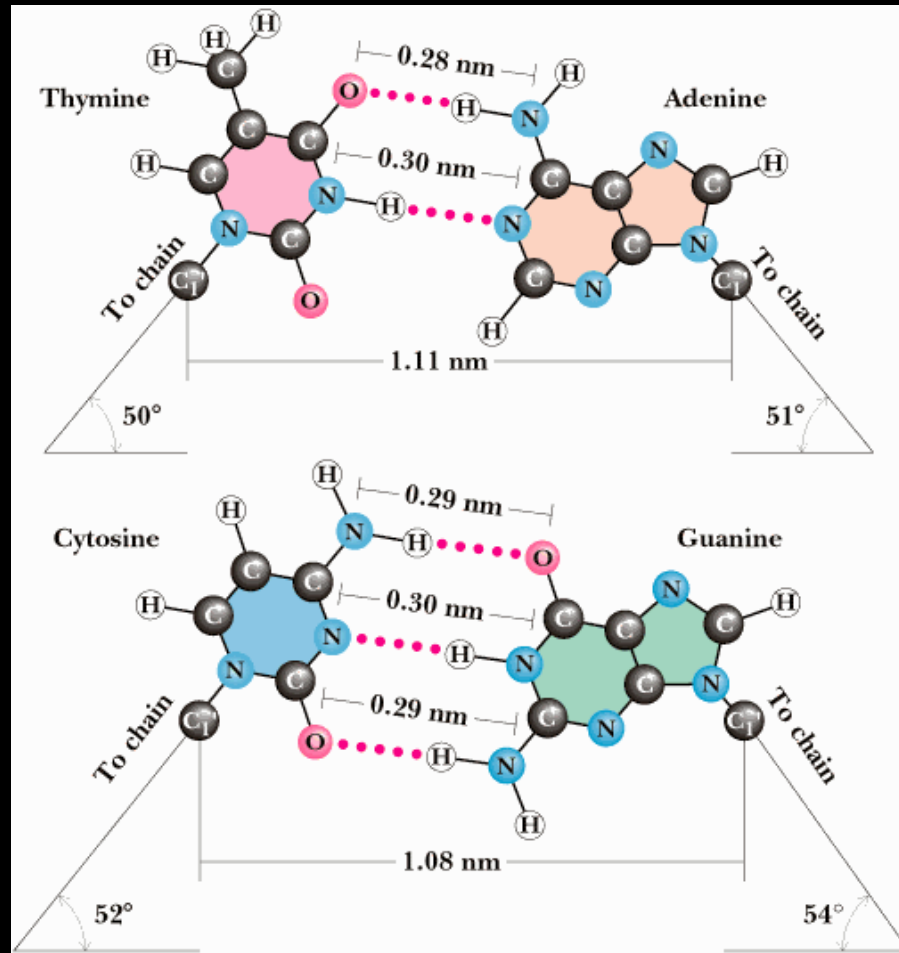
Polinucleótidos



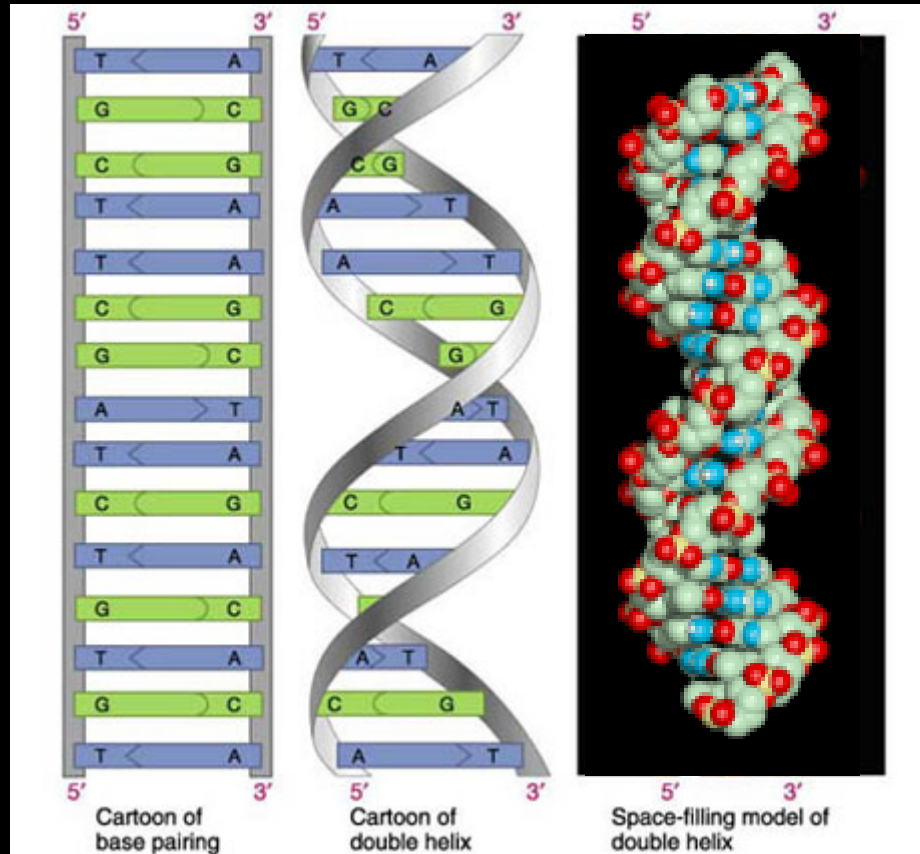
The sequence of bases found in an RNA strand is written in the 5' → 3' direction:



Pares de Bases



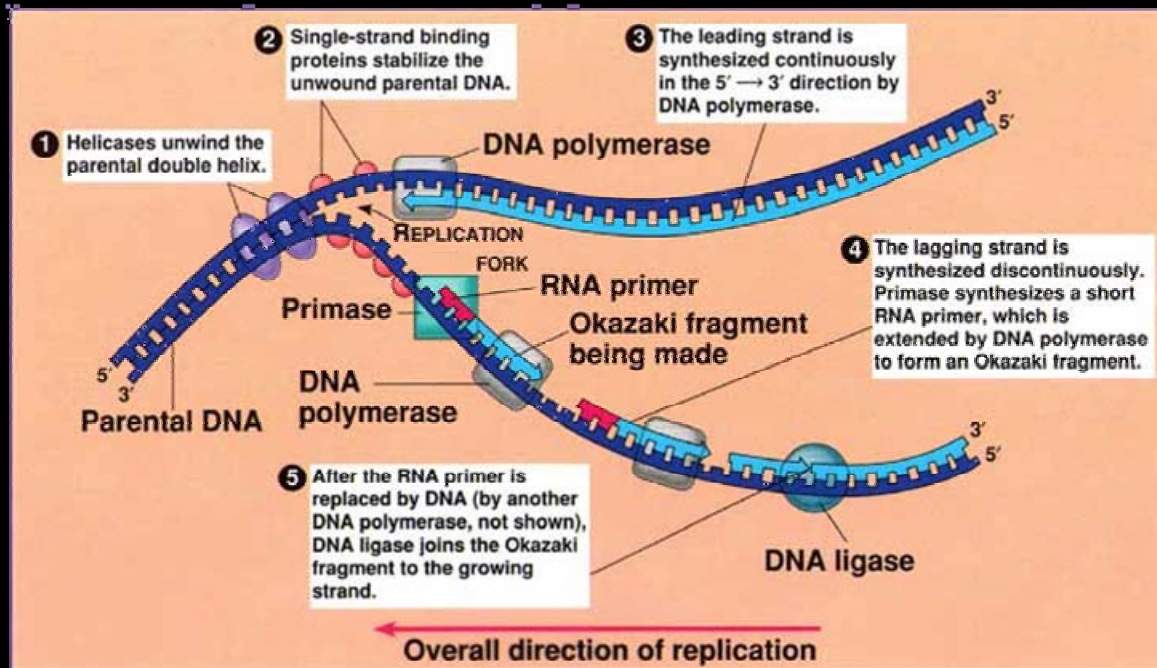
ADN



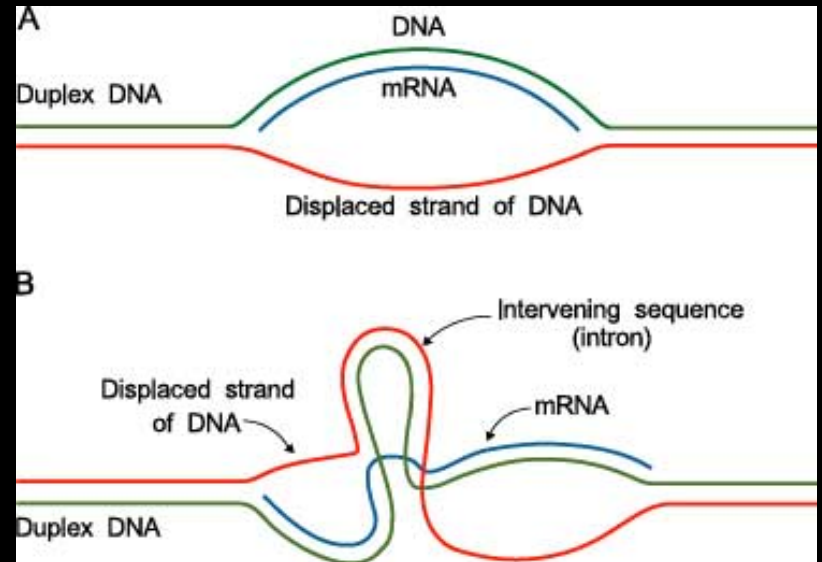
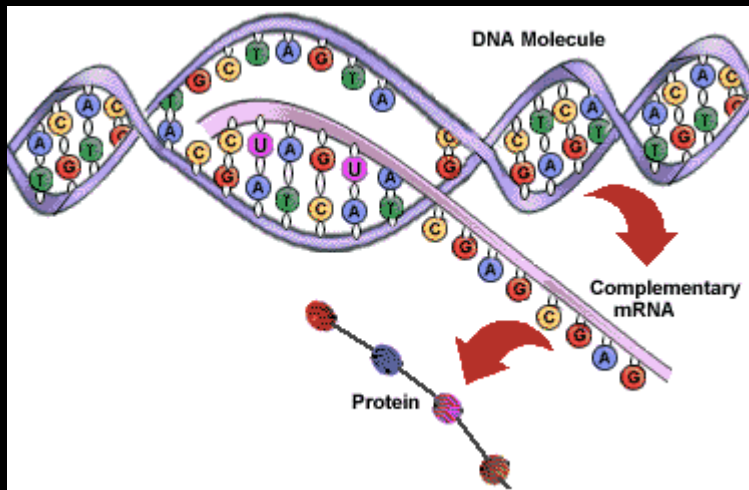
Replicación



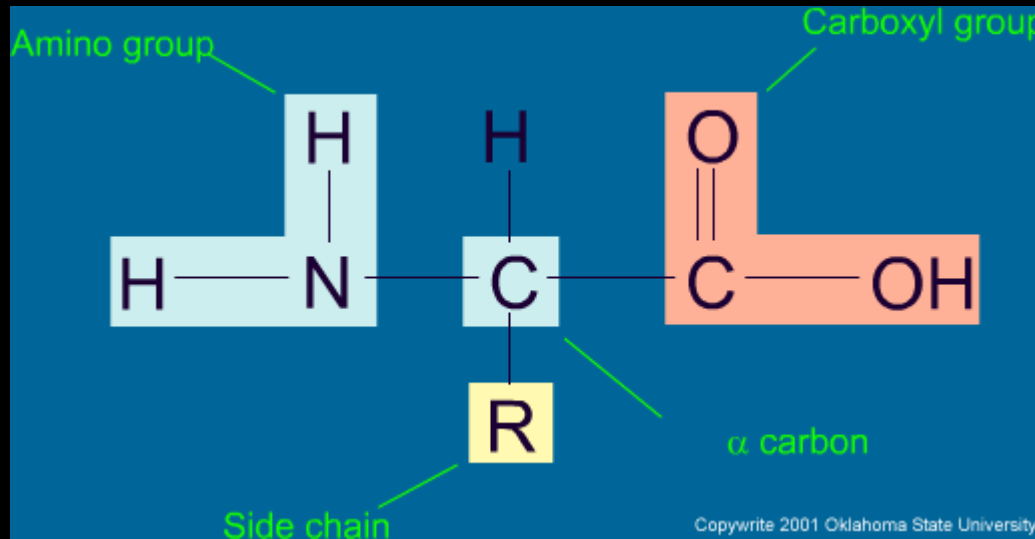
A SUMMARY OF DNA REPLICATION



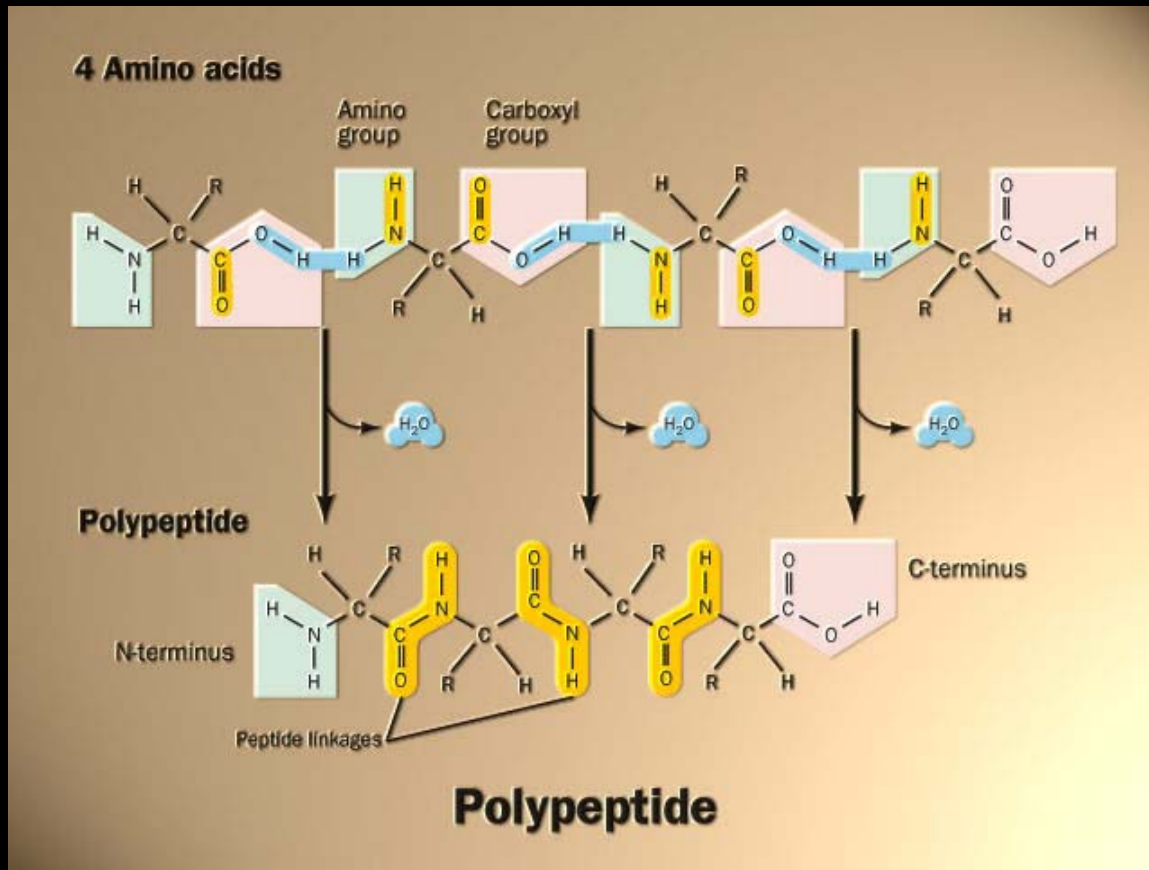
Transcripción



Aminoácidos

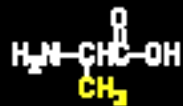


Polipéptido

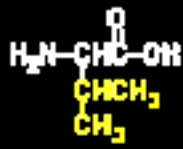




Glycine



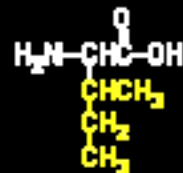
Alanine



Valine



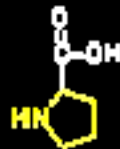
Leucine



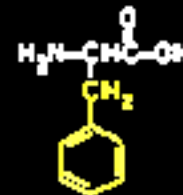
Isoleucine



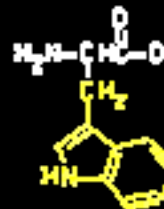
Methionine



Proline



Phenylalanine



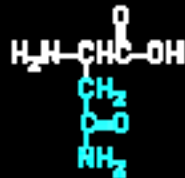
Tryptophan



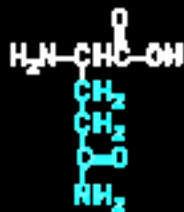
Serine



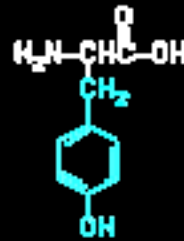
Threonine



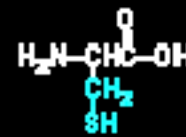
Asparagine



Glutamine



Tyrosine



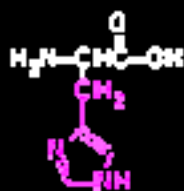
Cysteine



Lysine



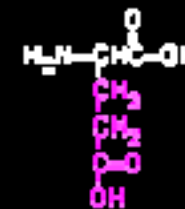
Arginine



Histidine

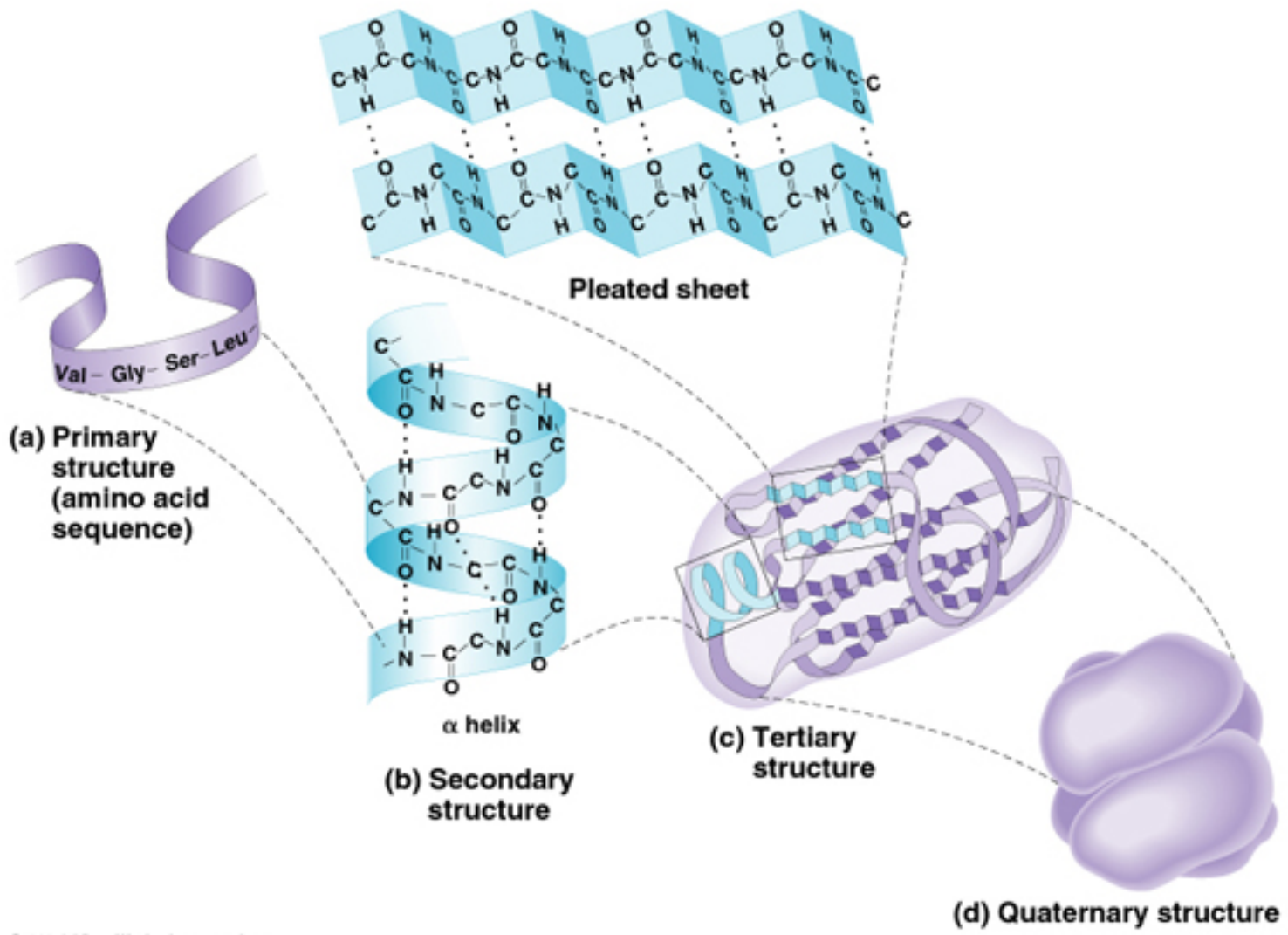


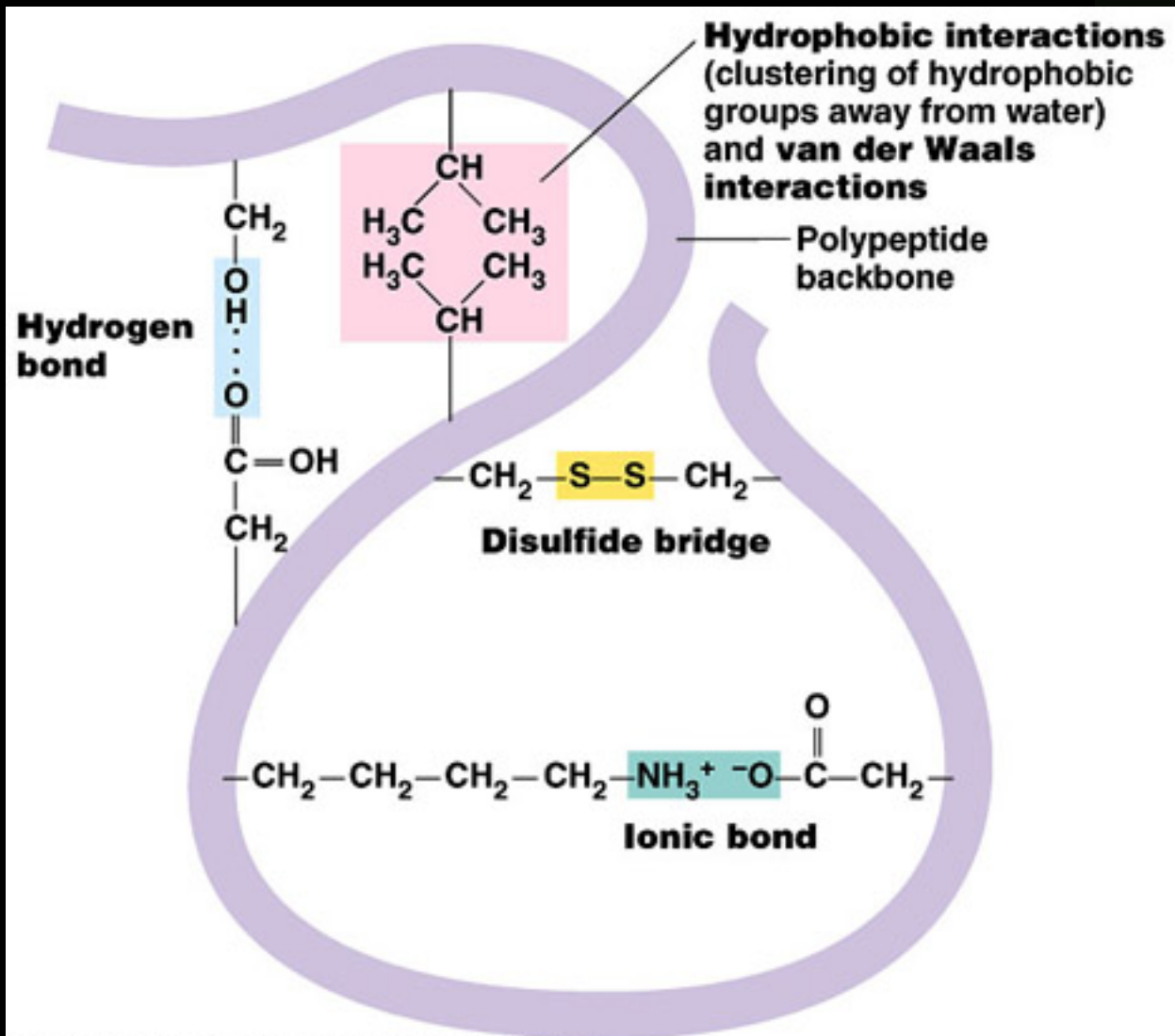
Aspartic acid



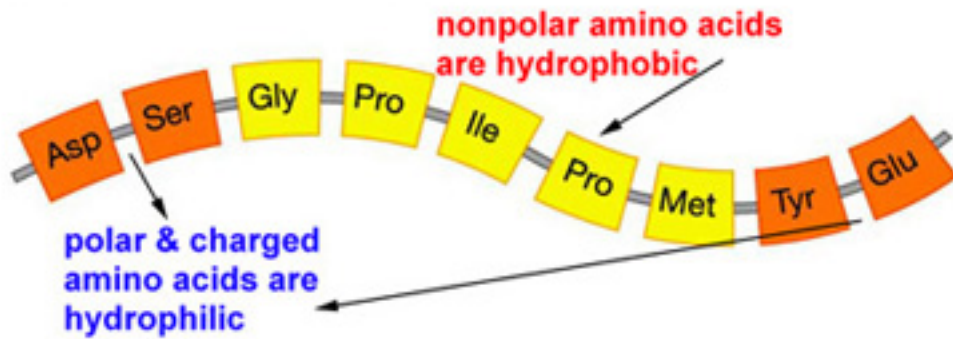
Glutamic acid



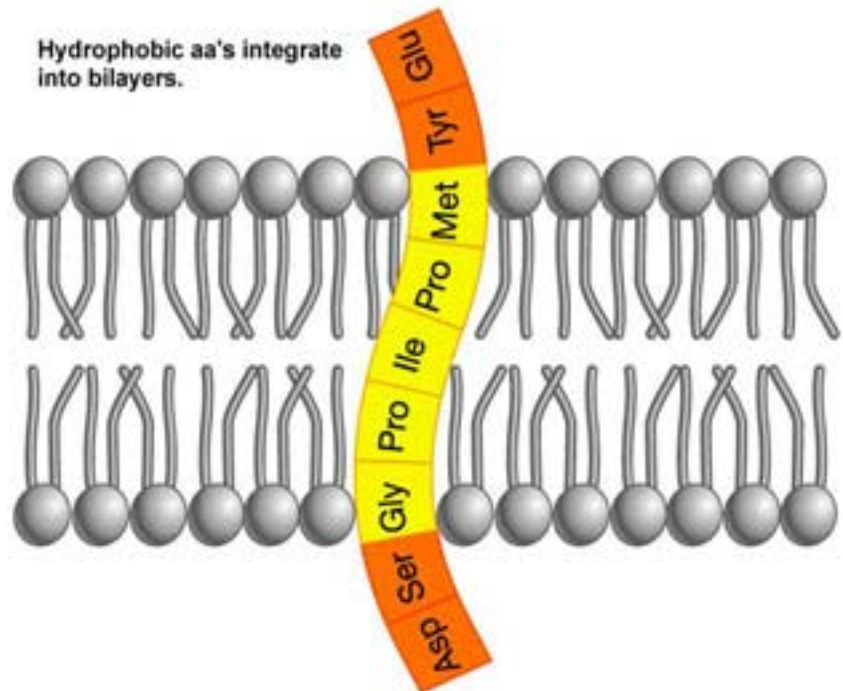


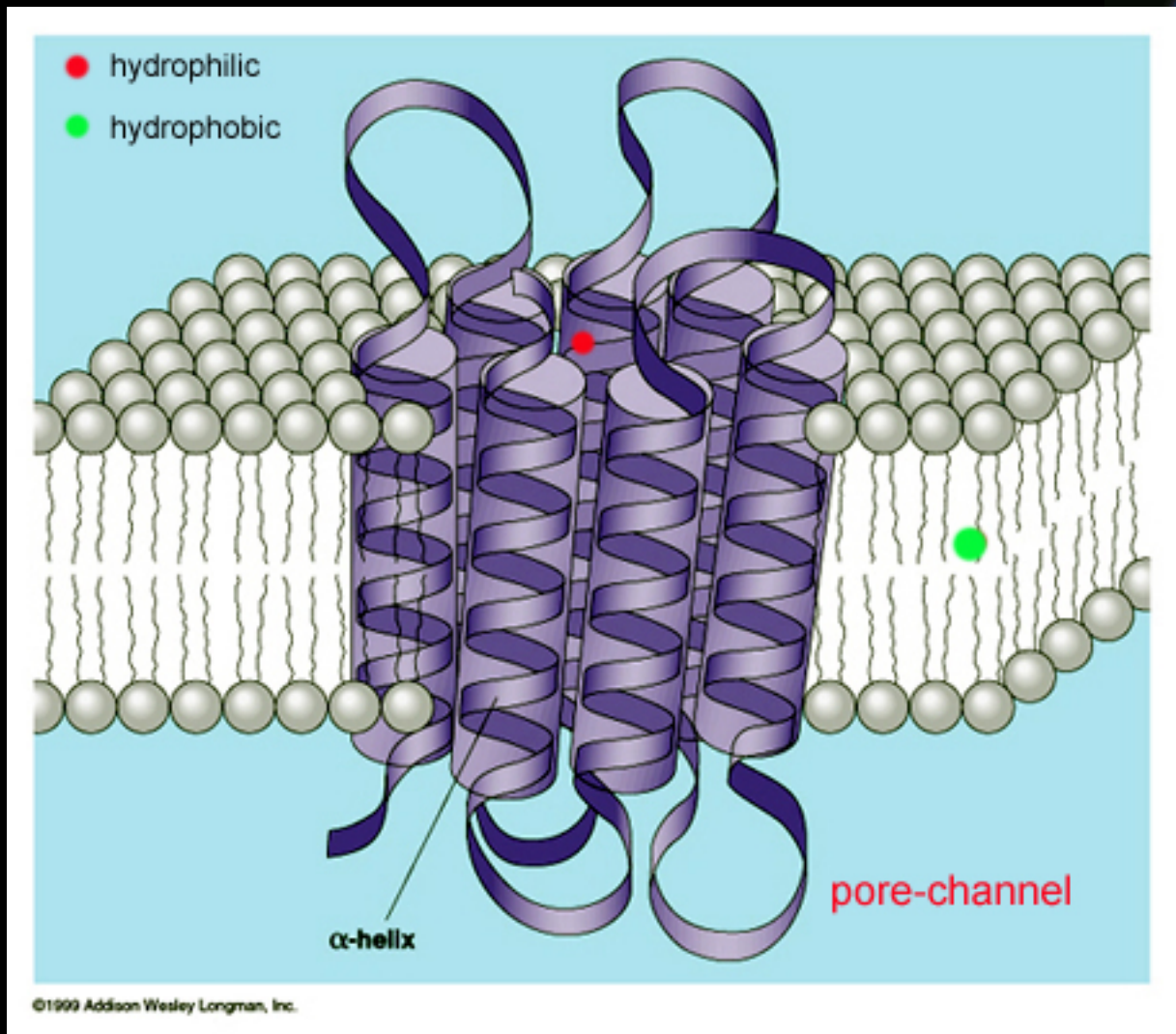


Protein can be amphipathic:
contain both hydrophobic & hydrophilic amino acids.

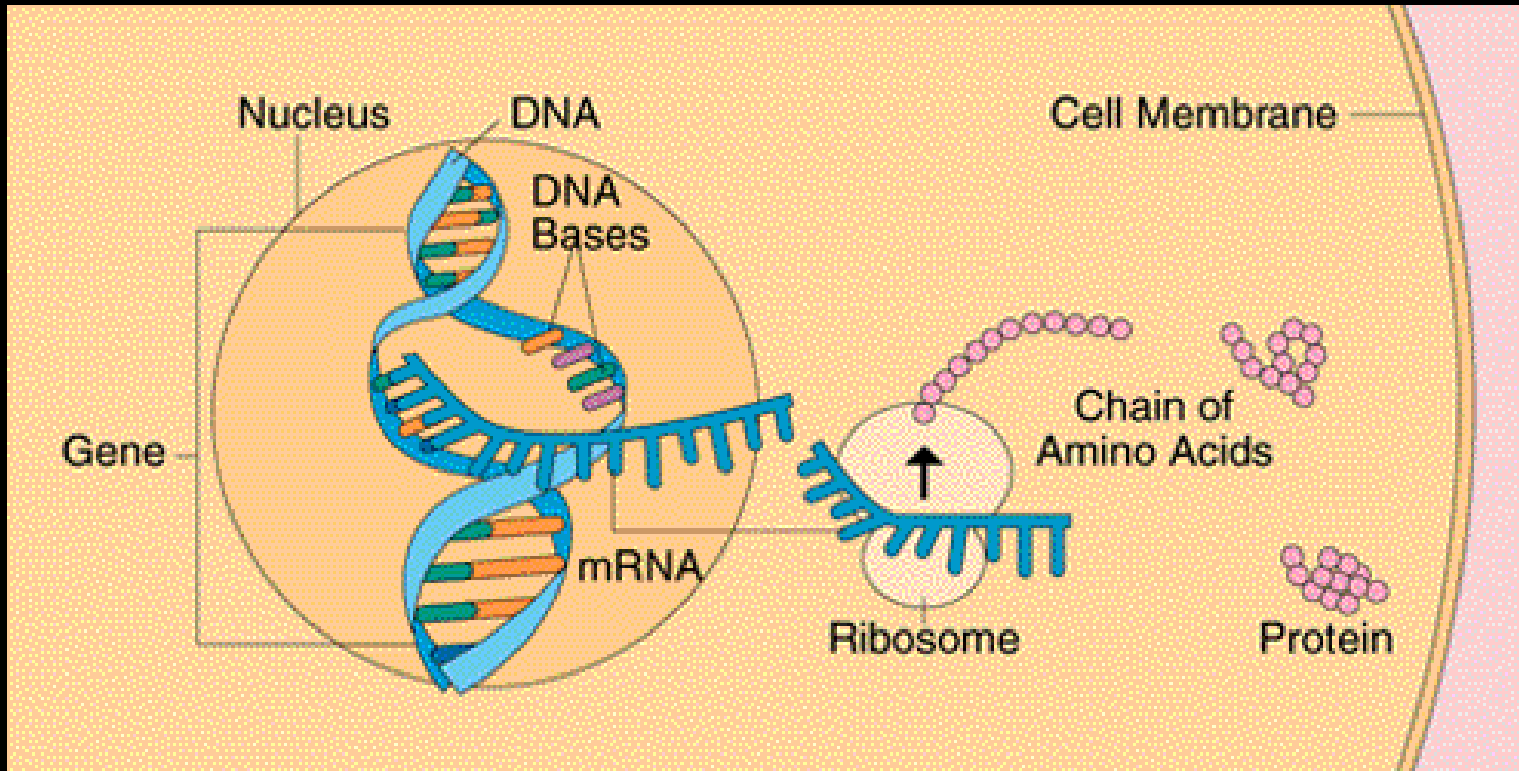


Hydrophobic aa's integrate
into bilayers.





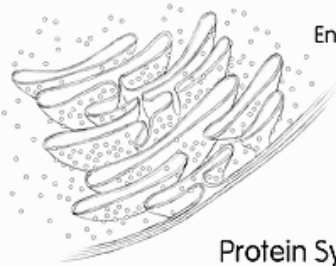
Síntesis de proteínas



Traducción



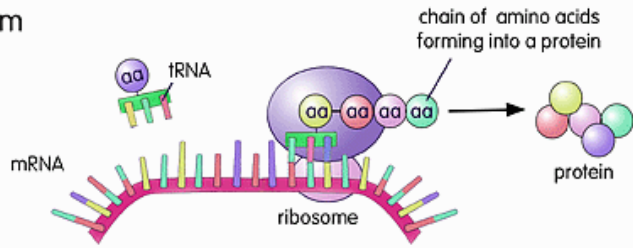
		Second letter					
		U	C	A	G		
First letter	U	UUU UUC	UCU UCC UCA UCG	UAU UAC	UGU UGC	U C A G	
		UUA UUG		UAA UAG			UGA UGG
	C	CUU CUC CUA CUG	CCU CCC CCA CCG	CAU CAC	CGU CGC CGA CGG		
		CAA CAG					
A	AUU AUC AUA	ACU ACC ACA ACG	AAU AAC	AGU AGC			
	AUG		AAA AAG		AGA AGG		
G	GUU GUC GUA GUG	GCU GCC GCA GCG	GAU GAC	GGU GGC CGA CGG	U C A G		
			GAA GAG				



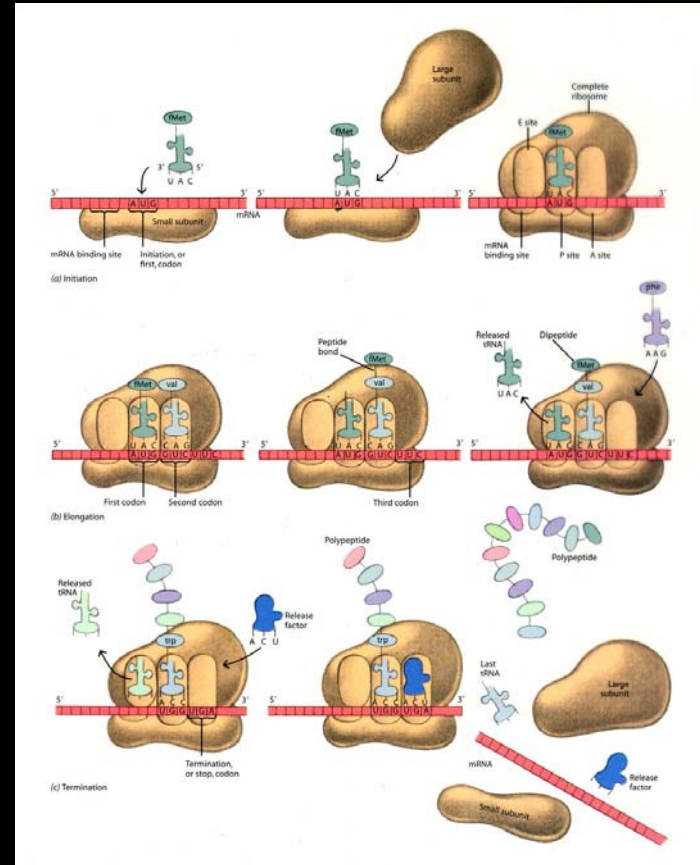
Endoplasmic Reticulum

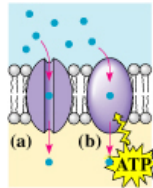
Protein Synthesis

cytoplasm

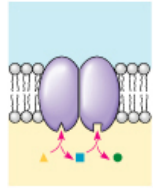


chain of amino acids forming into a protein

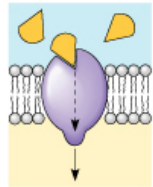




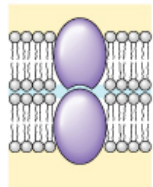
Transport (a) A protein that spans the membrane may provide a hydrophilic channel across the membrane that is selective for a particular solute. (b) Some transport proteins hydrolyze ATP as an energy source to actively pump substances across the membrane.



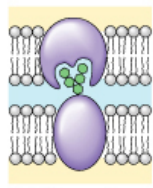
Enzymatic activity A protein built into the membrane may be an enzyme with its active site exposed to substances in the adjacent solution. In some cases, several enzymes in a membrane are ordered as a team that carries out sequential steps of a metabolic pathway.



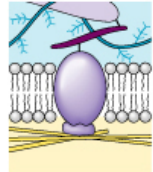
Signal transduction A membrane protein may have a binding site with a specific shape that fits the shape of a chemical messenger, such as a hormone. The external messenger (signal) may cause a conformational change in the protein that relays the message to the inside of the cell.



Intercellular joining Membrane proteins of adjacent cells may be hooked together in various kinds of junctions (see Figure 7.30).

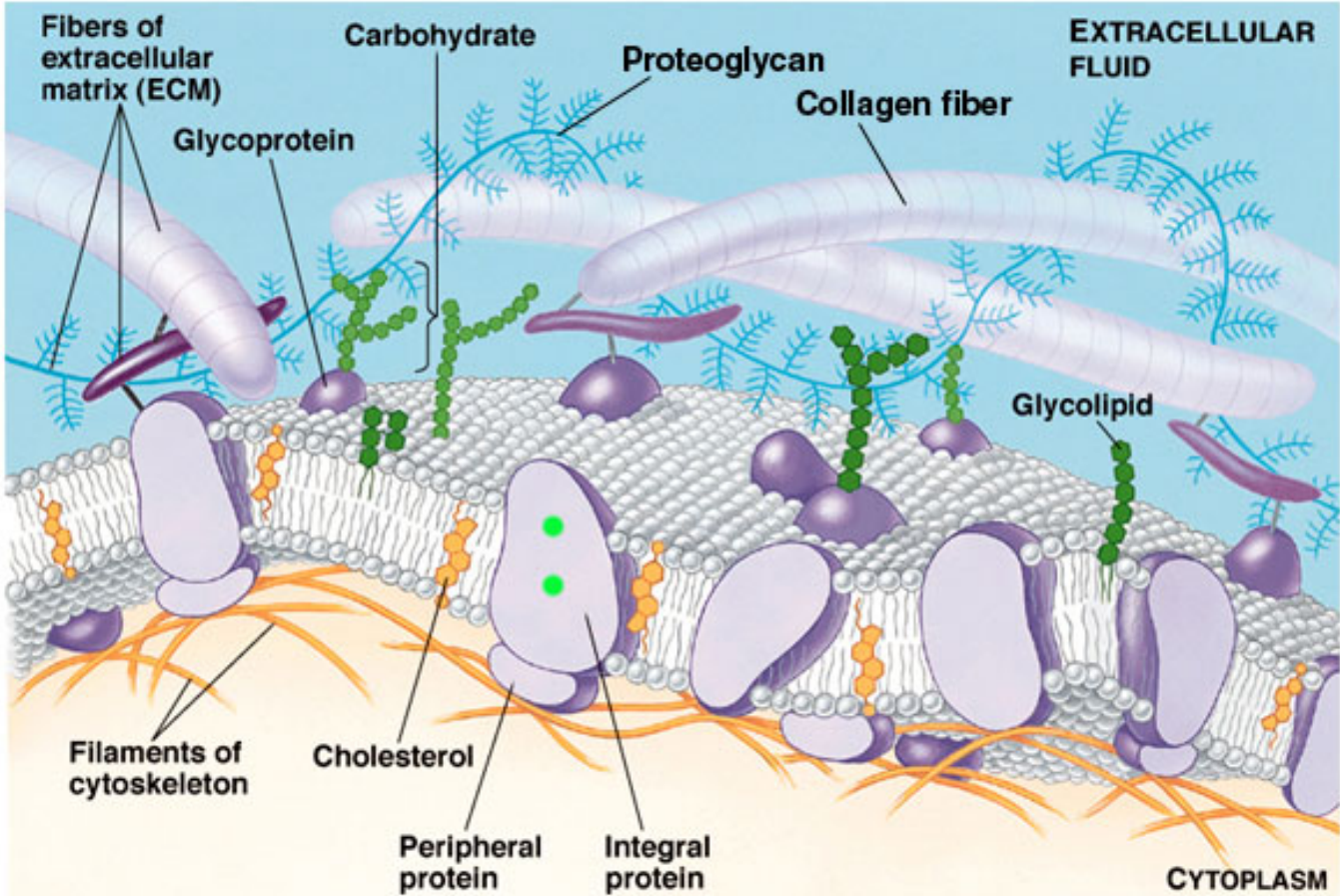


Cell-cell recognition Some glycoproteins (proteins with short chains of sugars) serve as identification tags that are specifically recognized by other cells.



Attachment to the cytoskeleton and extracellular matrix (ECM) Microfilaments or other elements of the cytoskeleton may be bonded to membrane proteins, a function that helps maintain cell shape and fixes the location of certain membrane proteins. Proteins that adhere to the ECM can coordinate extracellular and intracellular changes.



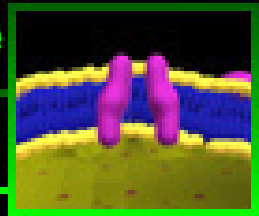


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Centrioles



Cell Membrane



Smooth E.R.

Nucleus

Mitochondrion

Rough E.R.

Lysosome

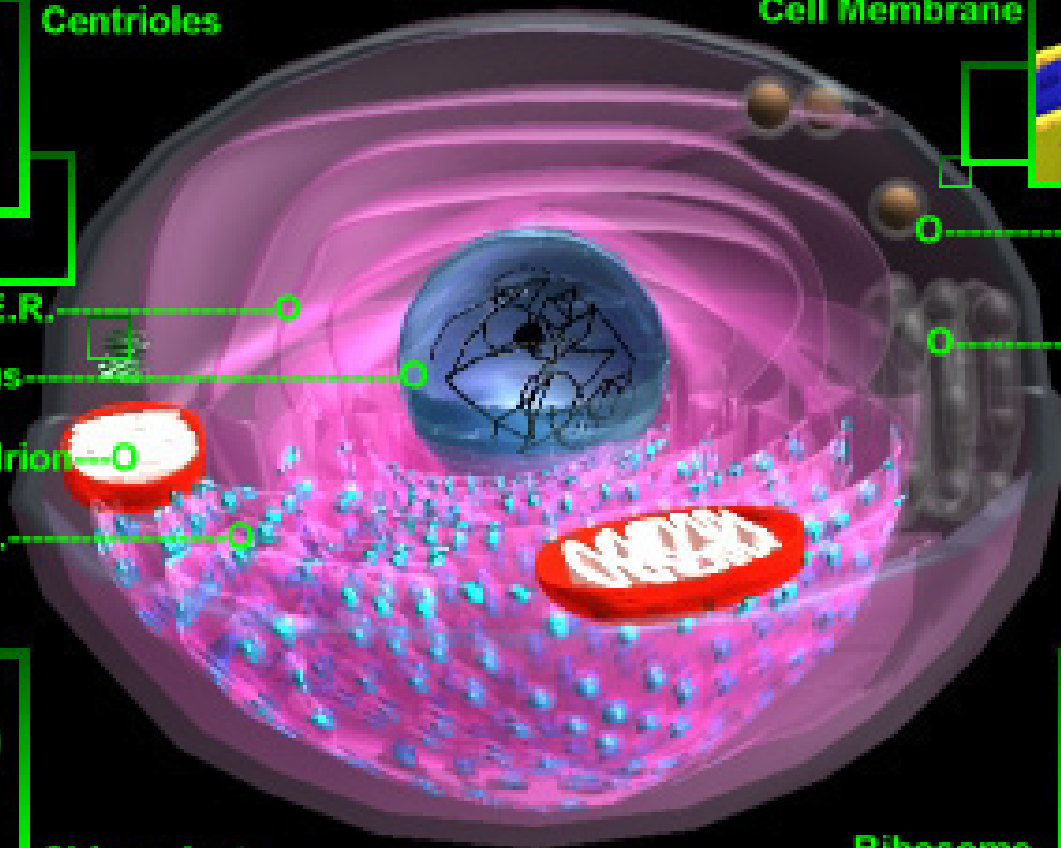
Golgi Body



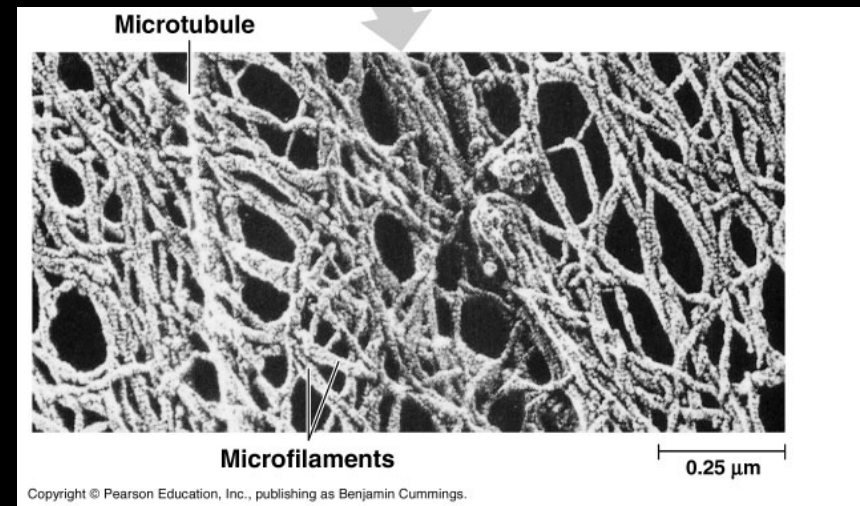
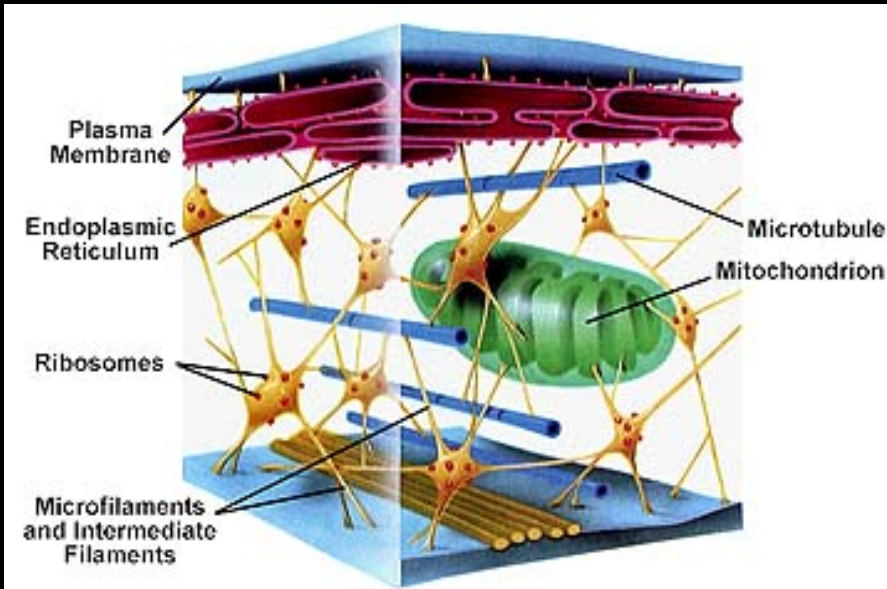
Chloroplast



Ribosome



Citoesqueleto



Matriz Extracelular

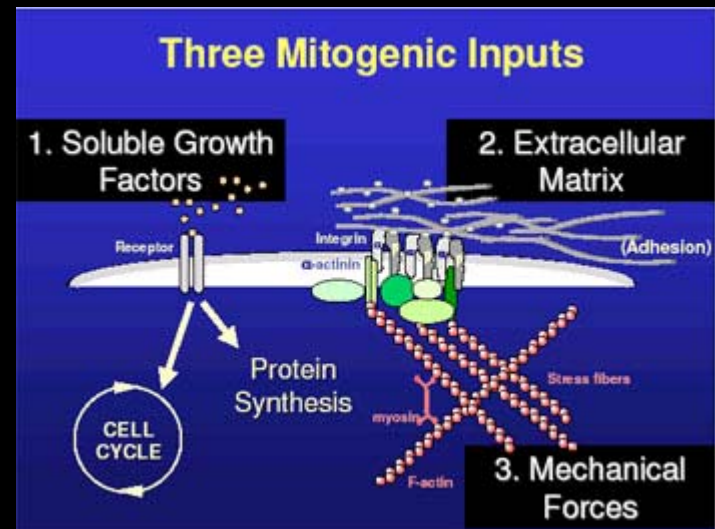
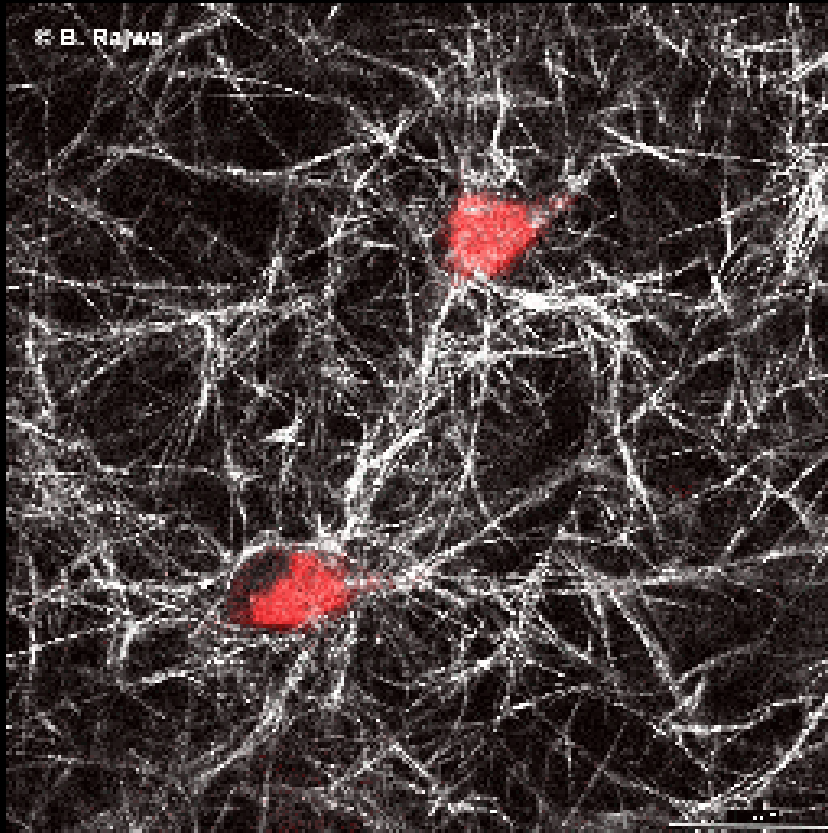
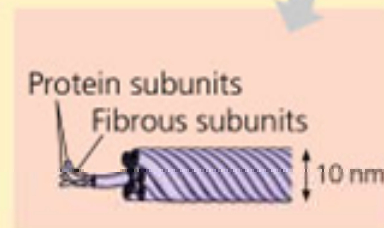
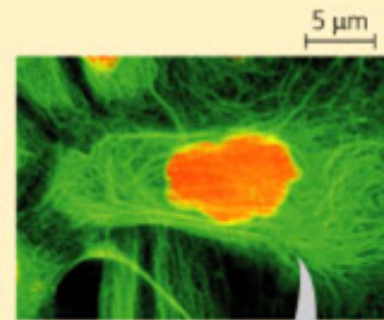
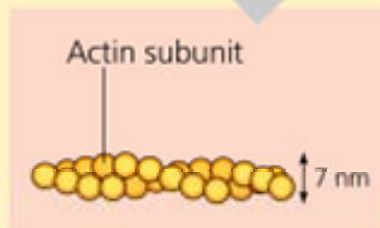
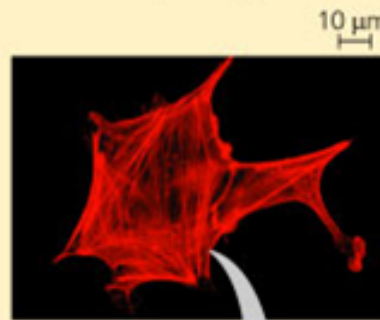
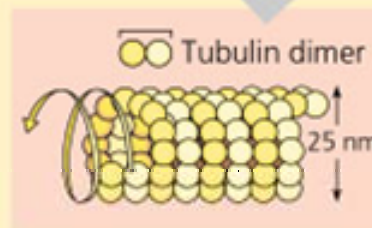
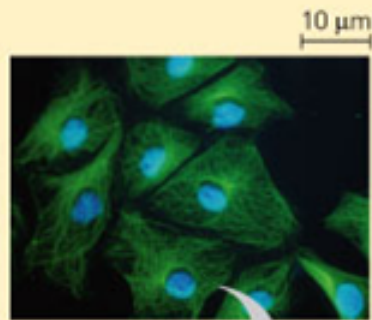


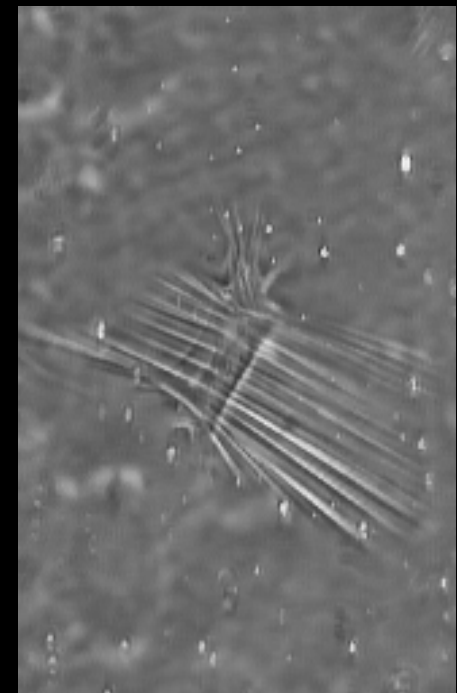
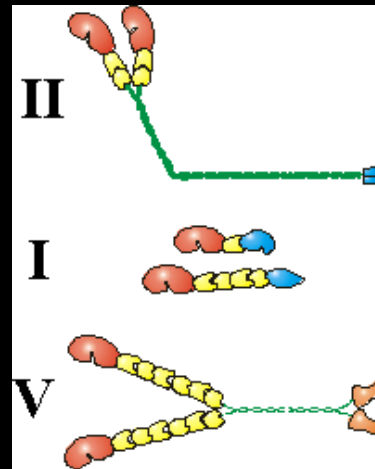
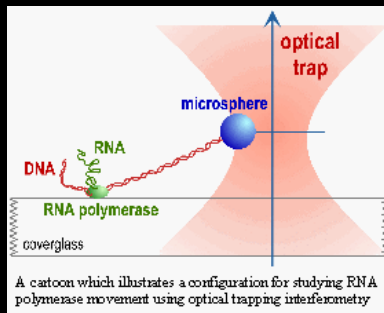
Table 7.2 The Structure and Function of the Cytoskeleton

Property	Microtubules	Microfilaments (Actin Filaments)	Intermediate Filaments
Structure	Hollow tubes; wall consists of 13 columns of tubulin molecules	Two intertwined strands of actin	Fibrous proteins supercoiled into thicker cables
Diameter	25 nm with 15-nm lumen	7 nm	8–12 nm
Protein subunits	Tubulin, consisting of α -tubulin and β -tubulin	Actin	One of several different proteins of the keratin family, depending on cell type
Main functions	Maintenance of cell shape (compression-resisting "girders") Cell motility (as in cilia or flagella) Chromosome movements in cell division Organelle movements	Maintenance of cell shape (tension-bearing elements) Changes in cell shape Muscle contraction Cytoplasmic streaming Cell motility (as in pseudopodia) Cell division (cleavage furrow formation)	Maintenance of cell shape (tension-bearing elements) Anchorage of nucleus and certain other organelles Formation of nuclear lamina

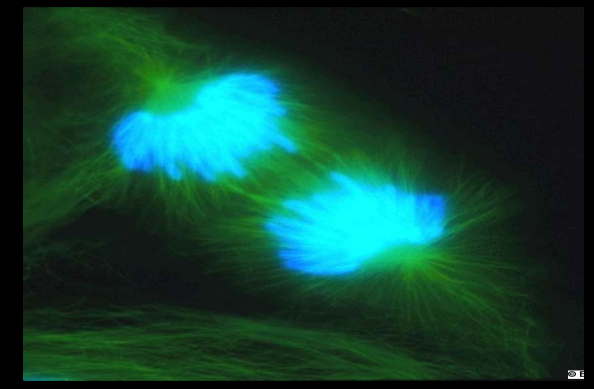
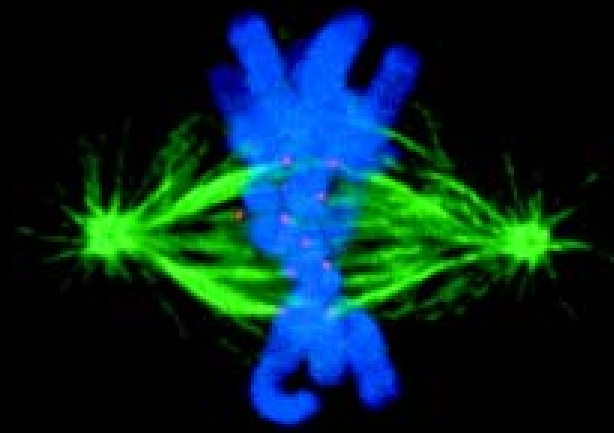
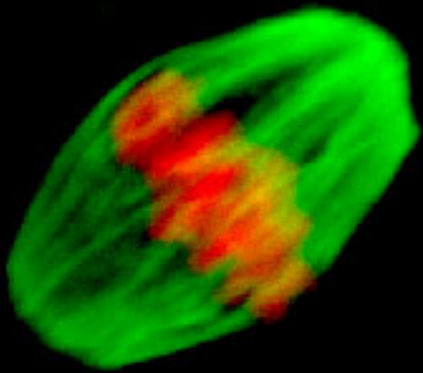
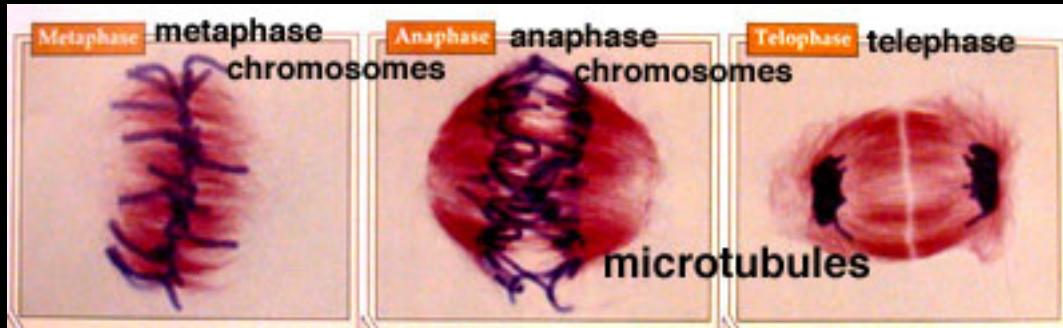


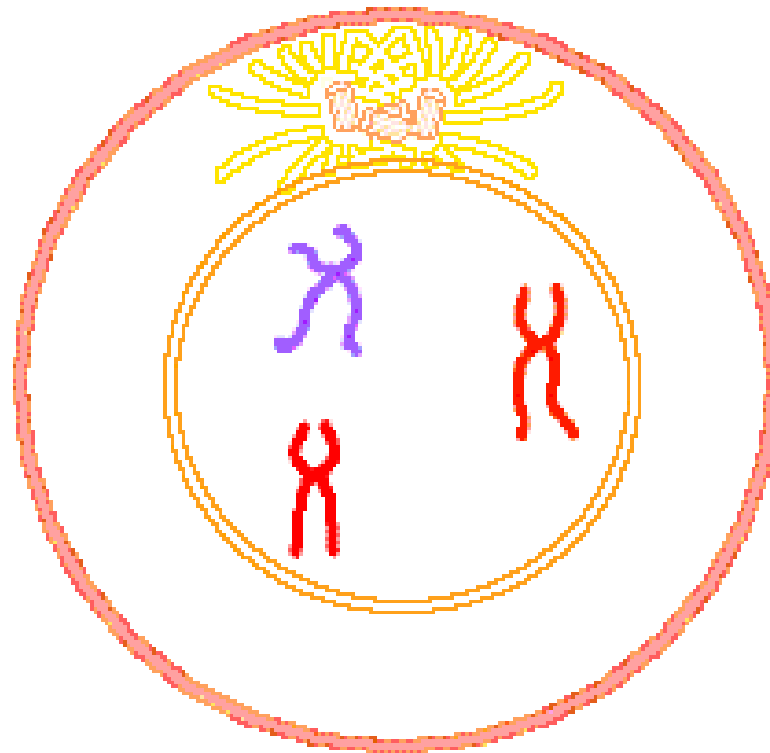
SOURCE: Adapted from W. M. Becker, L. J. Kleinsmith, and J. Hardin, *The World of the Cell*, 4th ed. (San Francisco, CA: Benjamin Cummings, 2000), p. 753.

Motores Moleculares



Mitosis





Prophase:

- condensation of chromosomes
- disappearance of nucleoli and nuclear envelope

