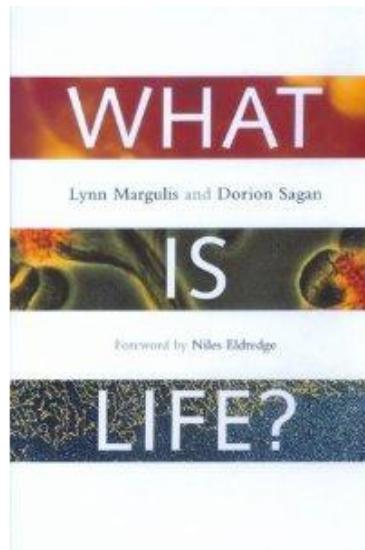
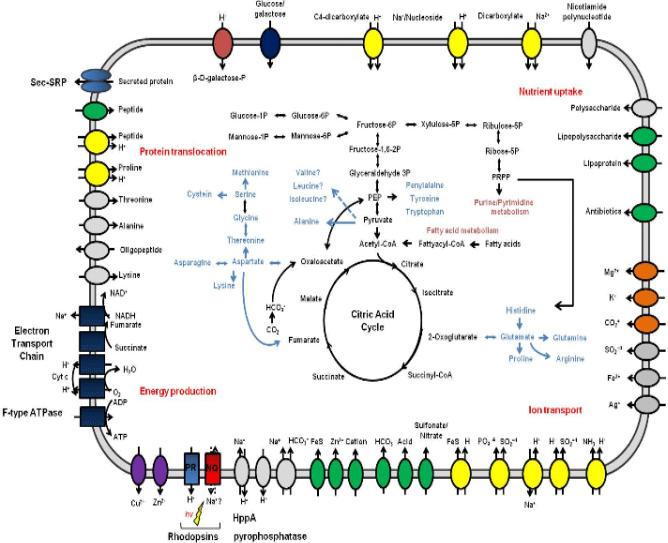


Microbiology



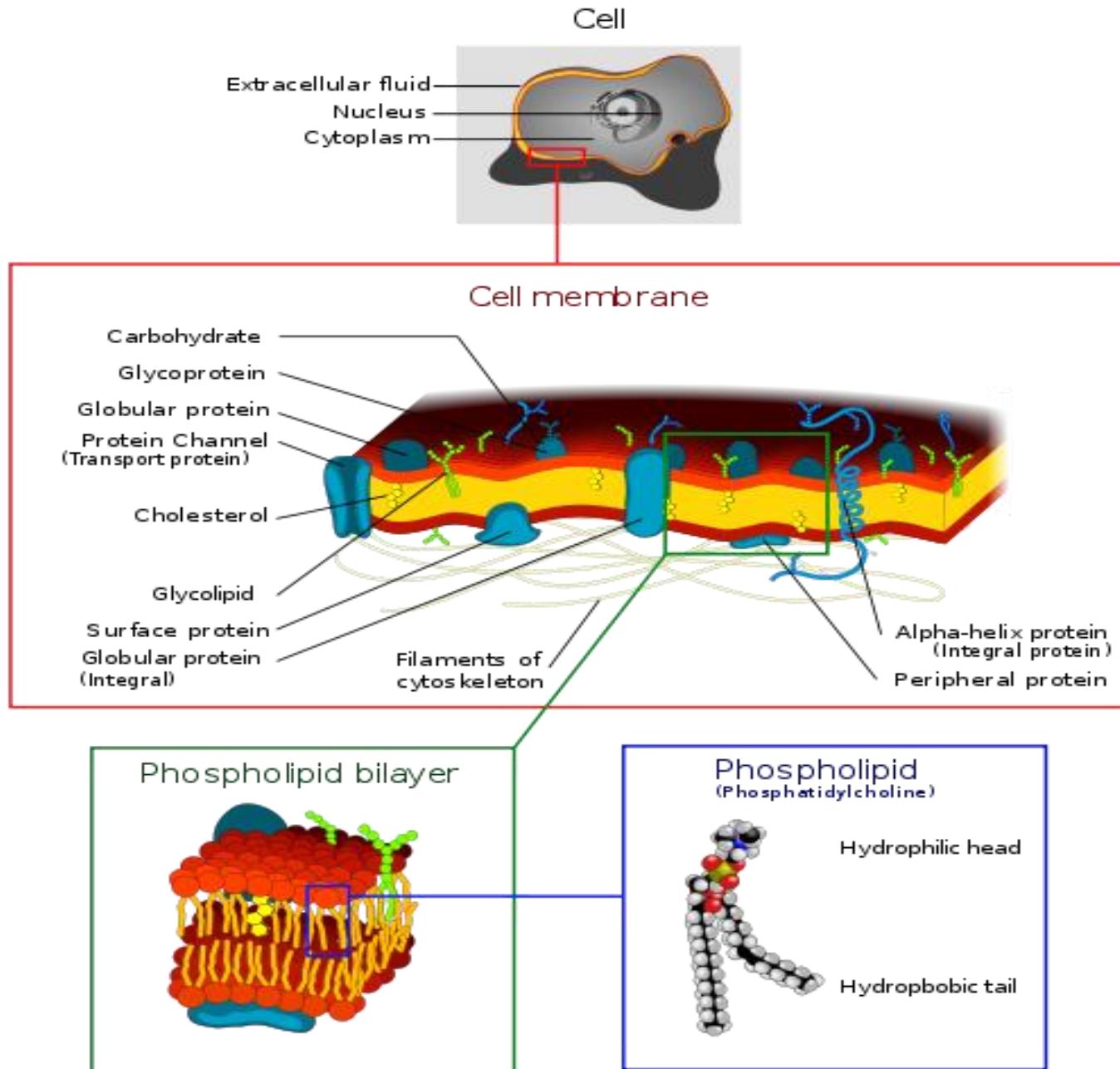
Synthetic biologists hope to treat disease in the gut by making *Lactobacillus* bacteria (pictured) that are dependent on an artificial amino acid.



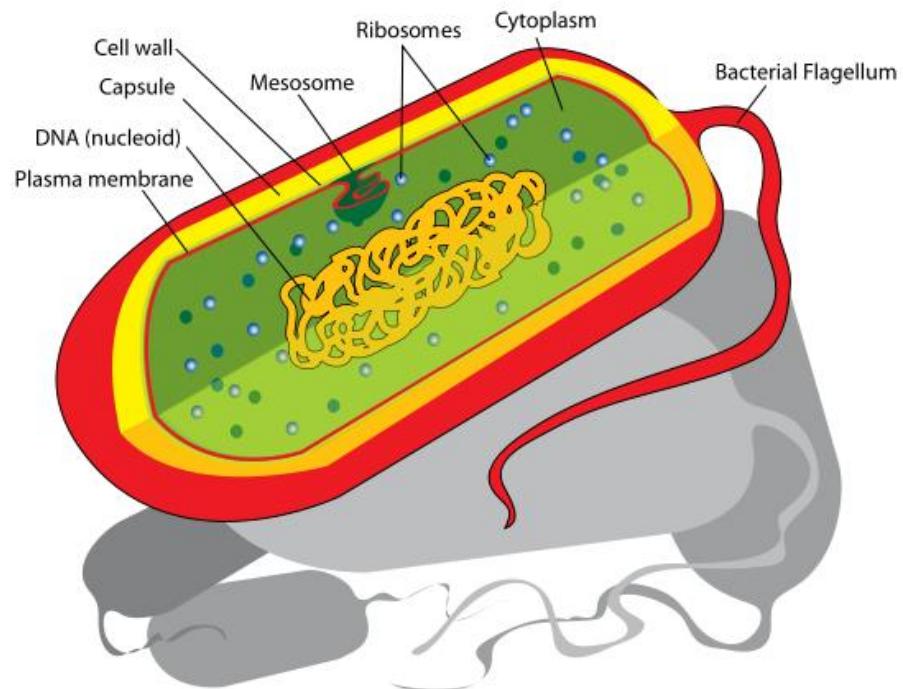
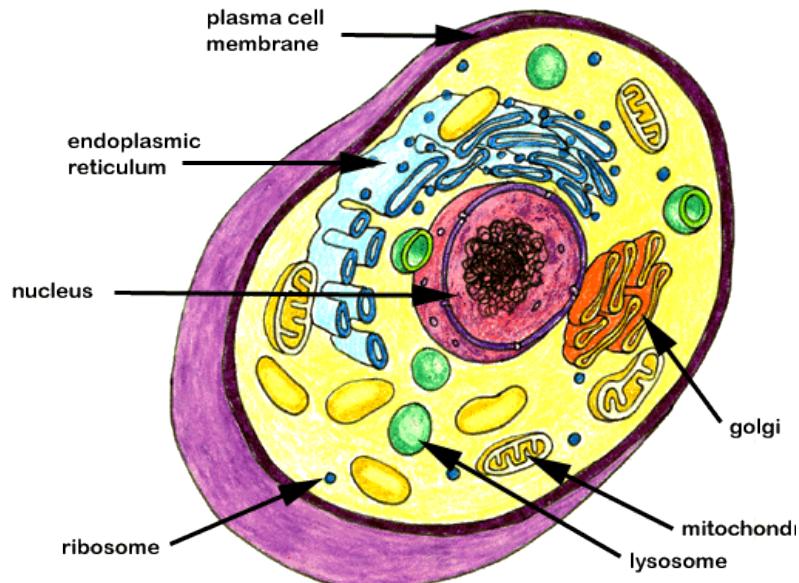
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Sangji University, Department of Pharmaceutical Engineering

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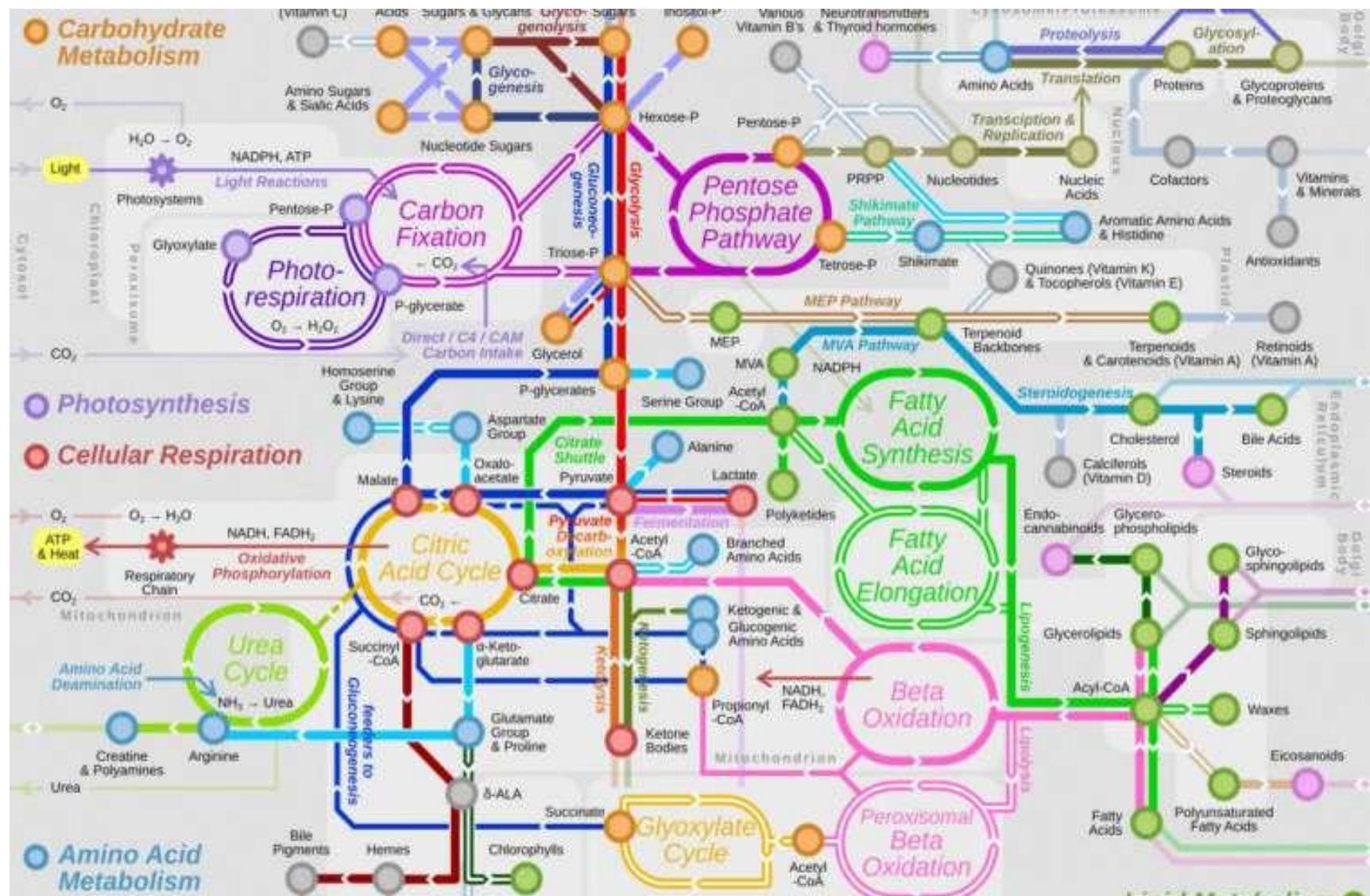
Cell



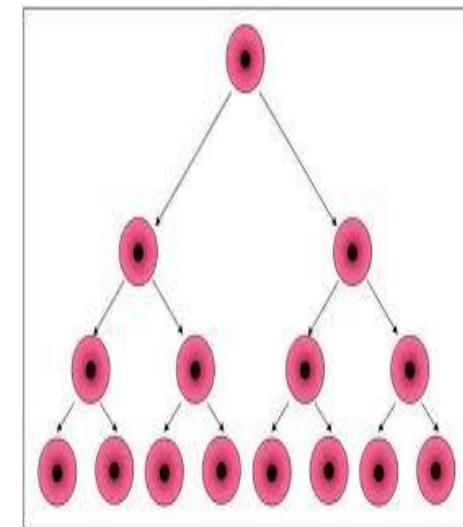
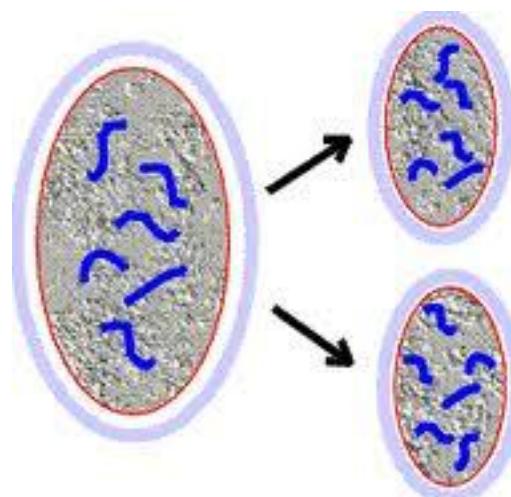
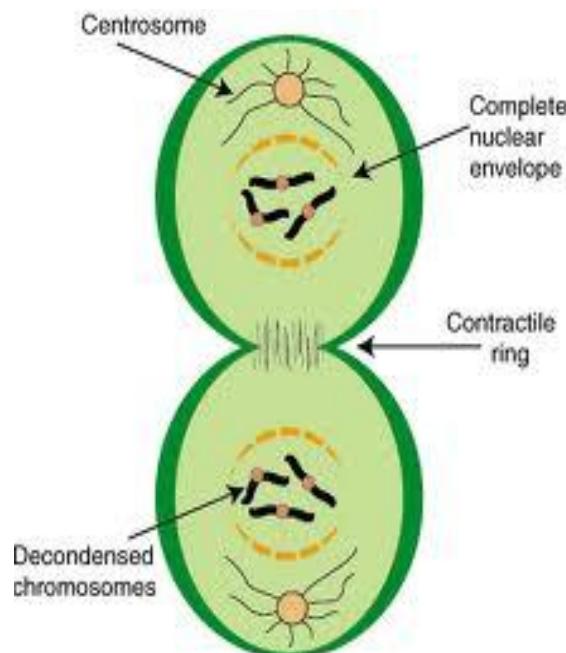
Cell



Metabolism

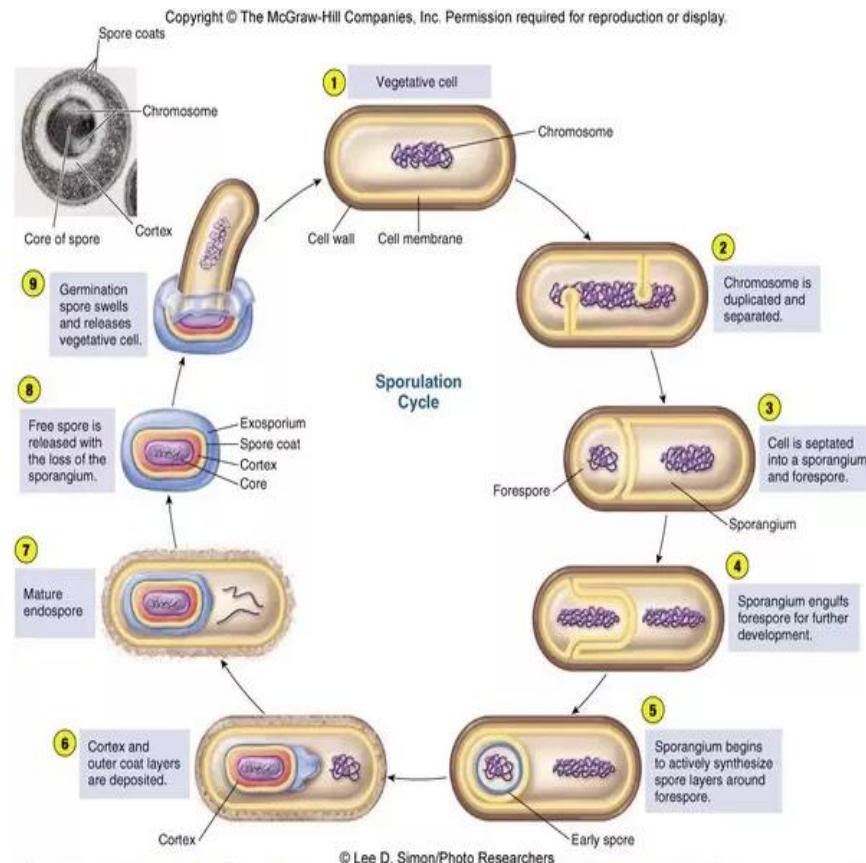
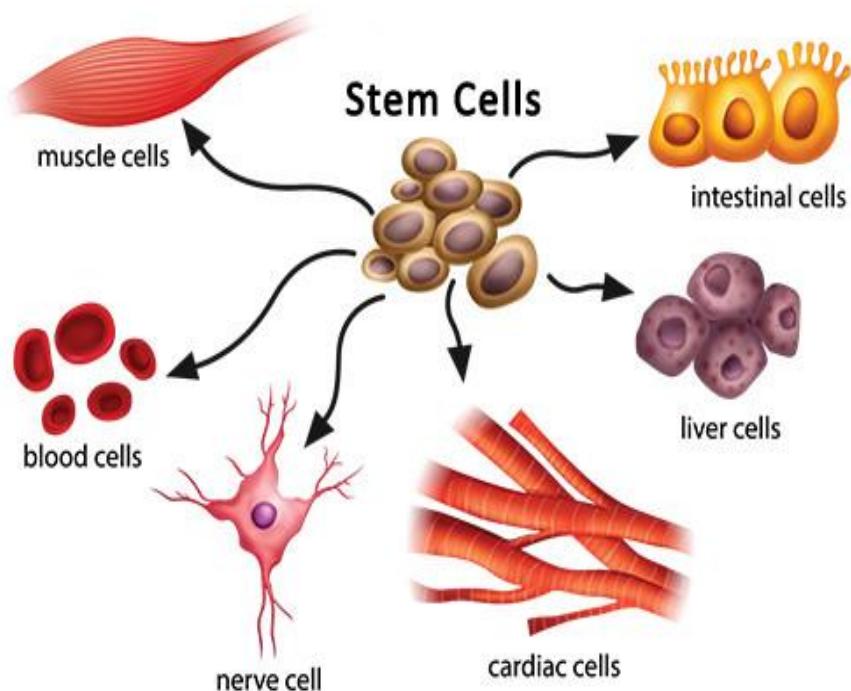


Reproduction (Growth)

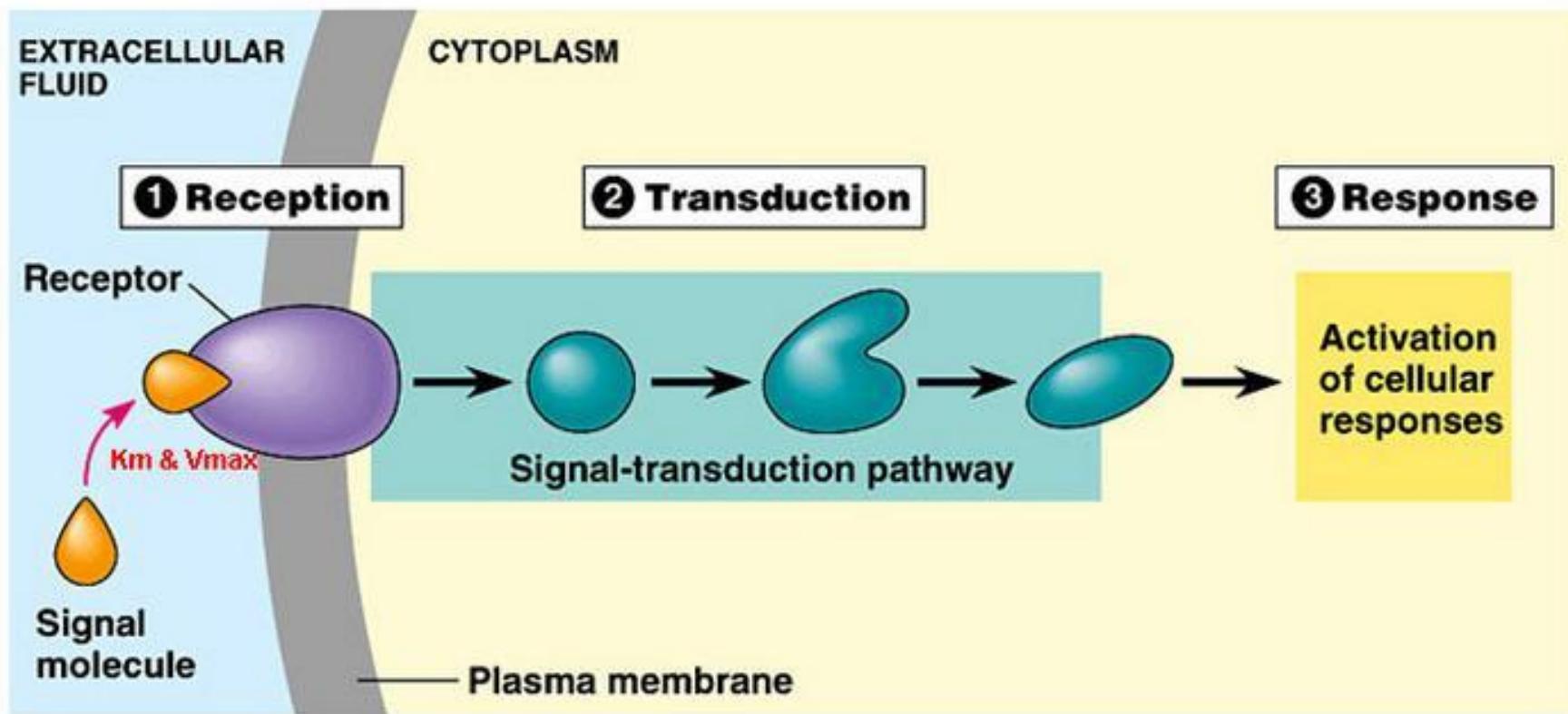


Differentiation

Cell Differentiation

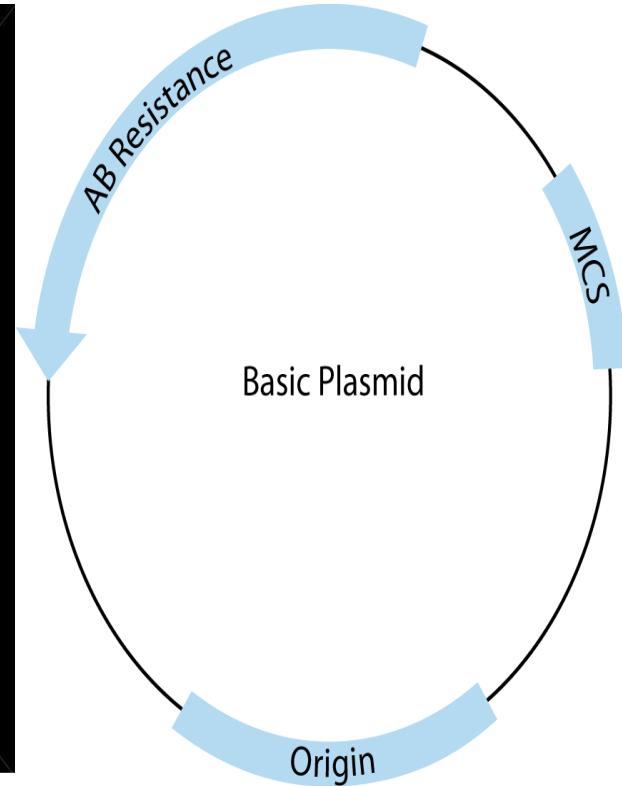
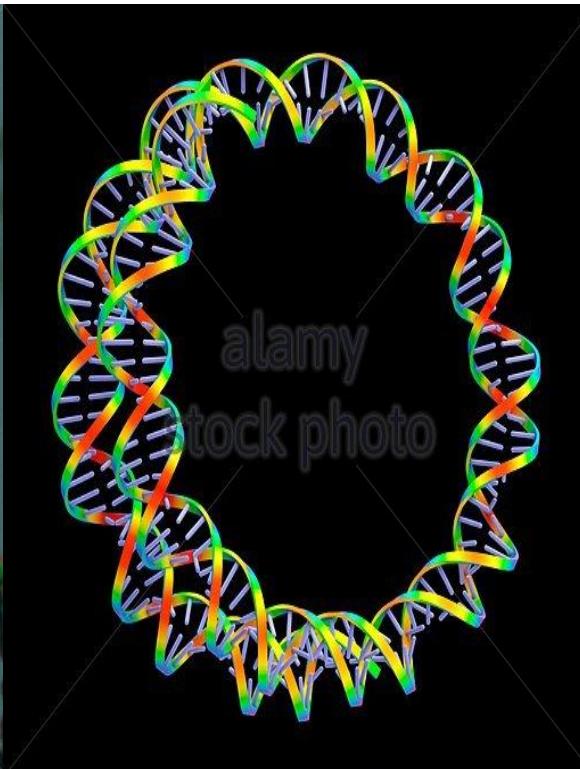
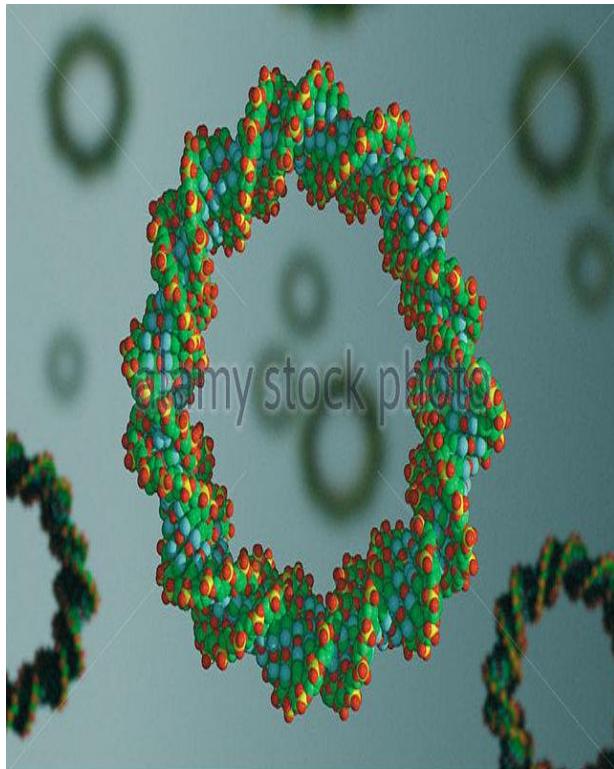


communication

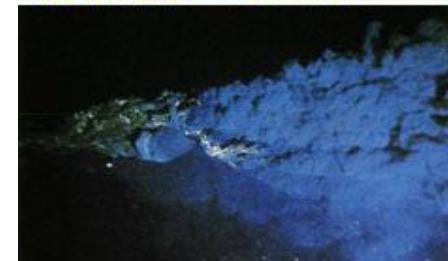
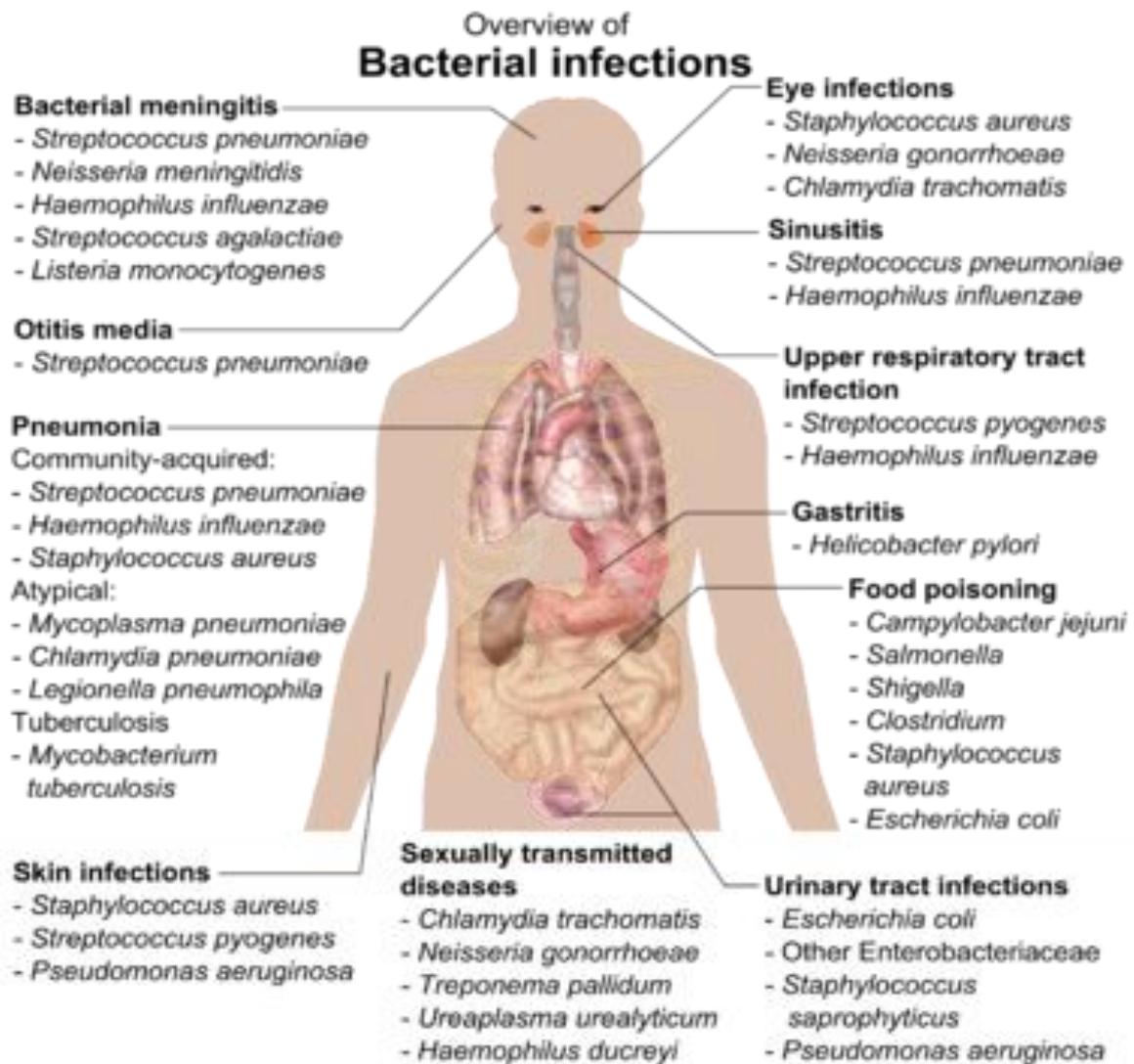


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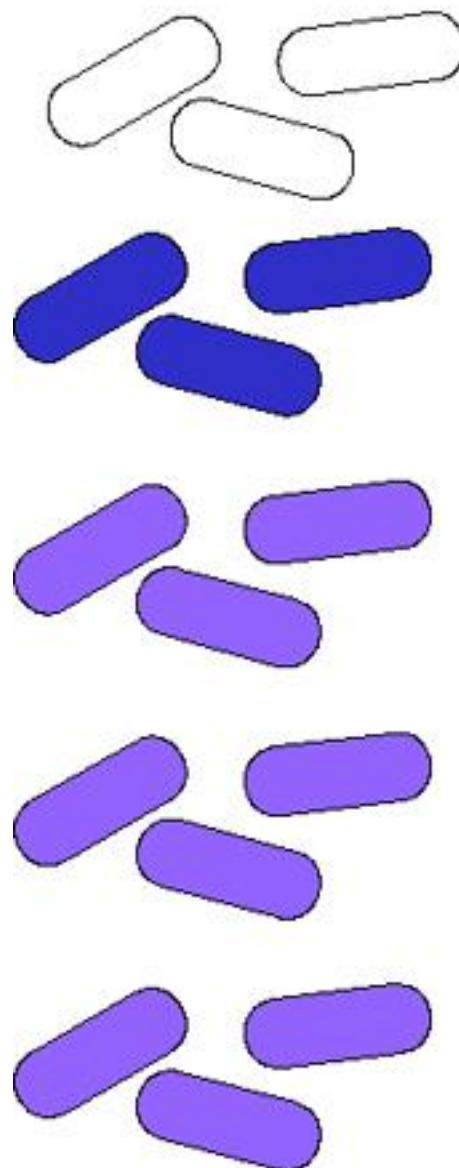
Circular DNA



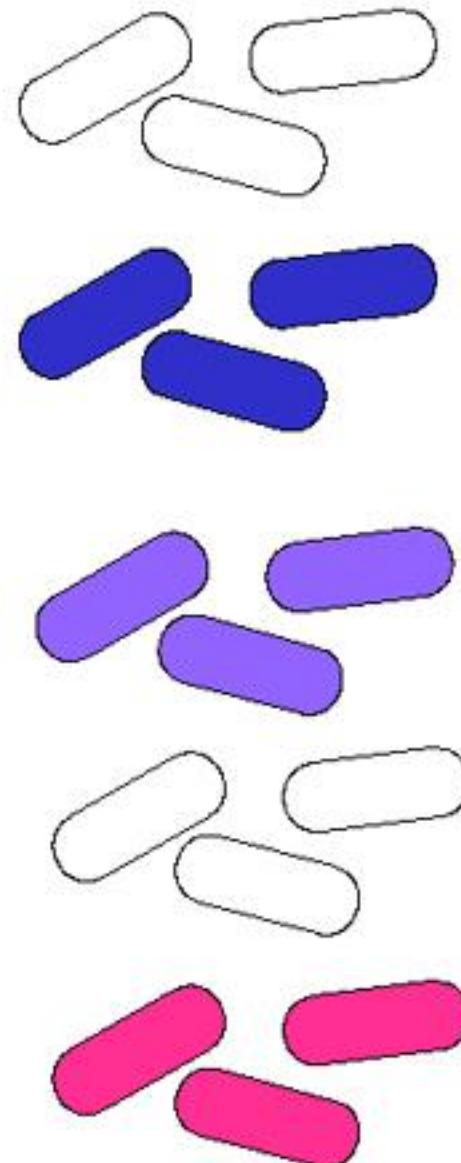
Where cells live

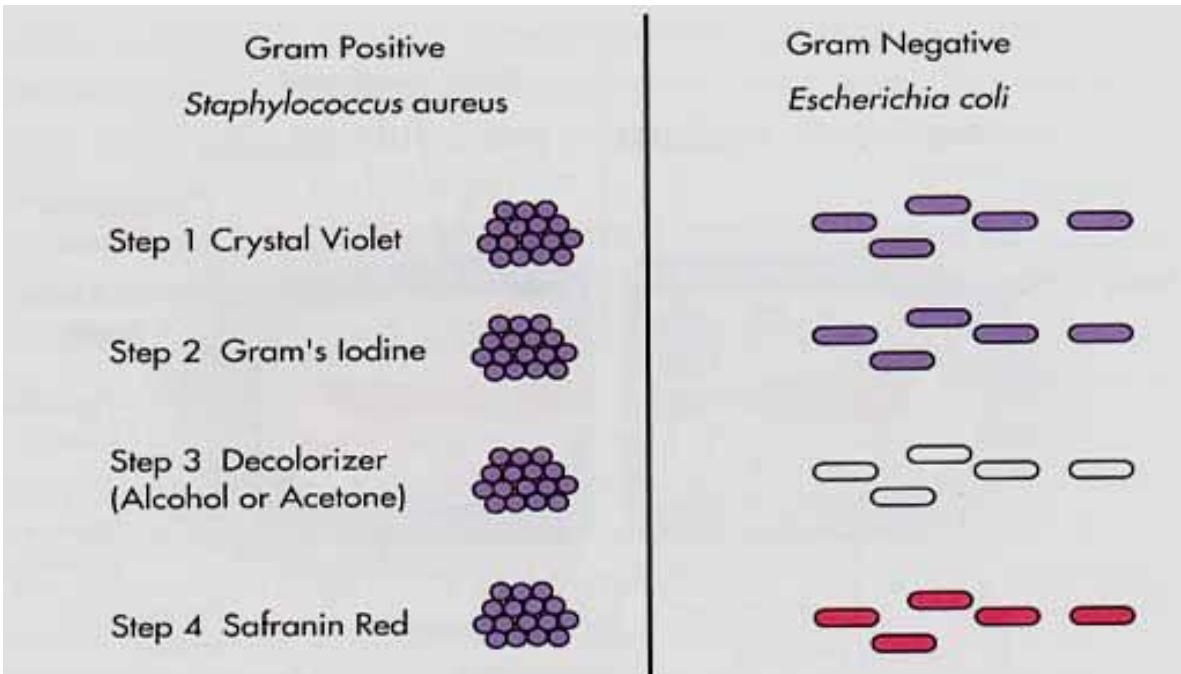


Gram Positive



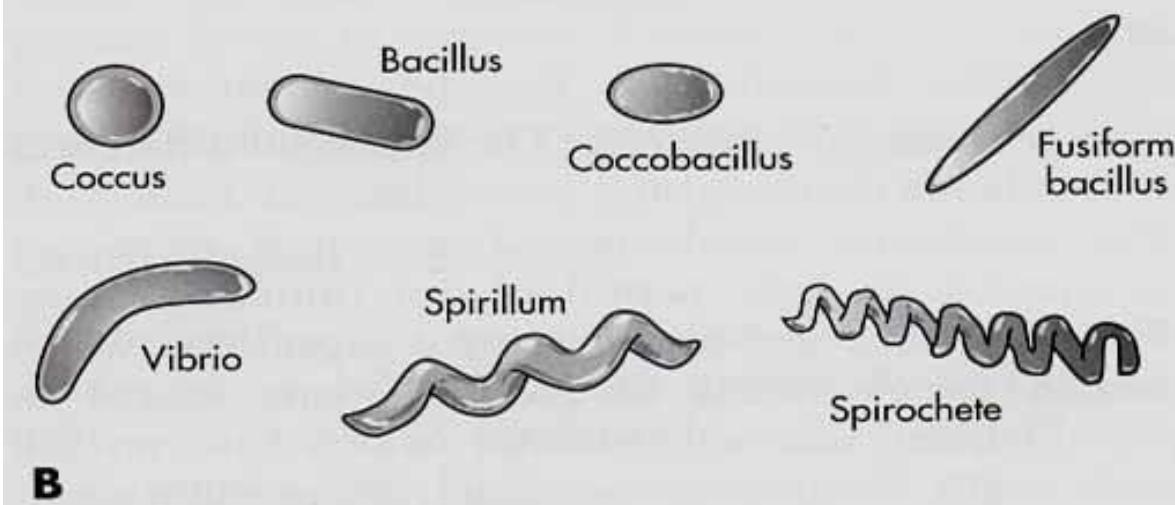
Gram Negative





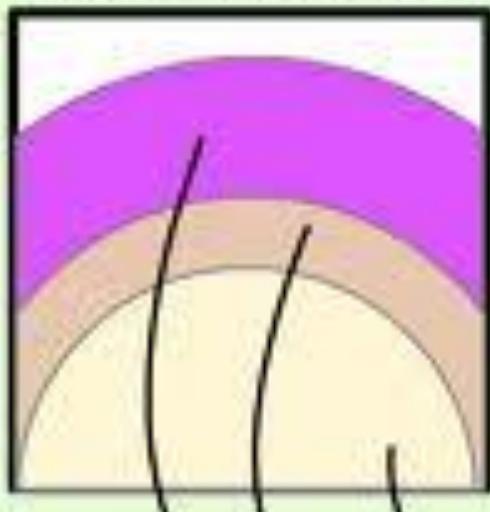
A

Bacterial Morphology Shapes

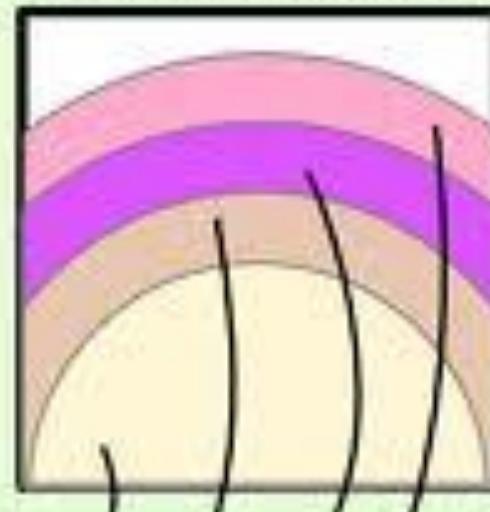


B

Gram Positive



Gram Negative



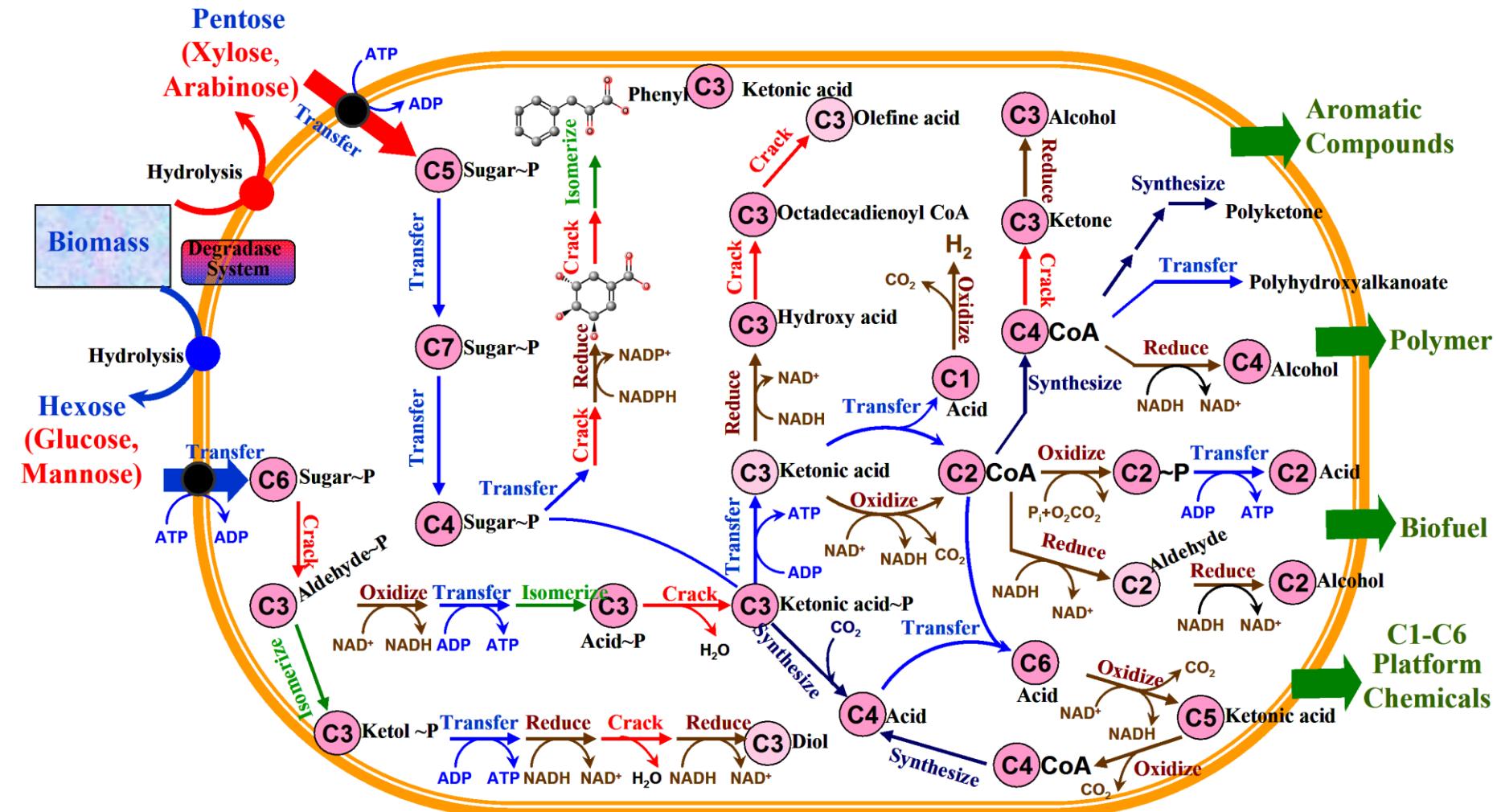
Cytoplasm

Cell Membrane

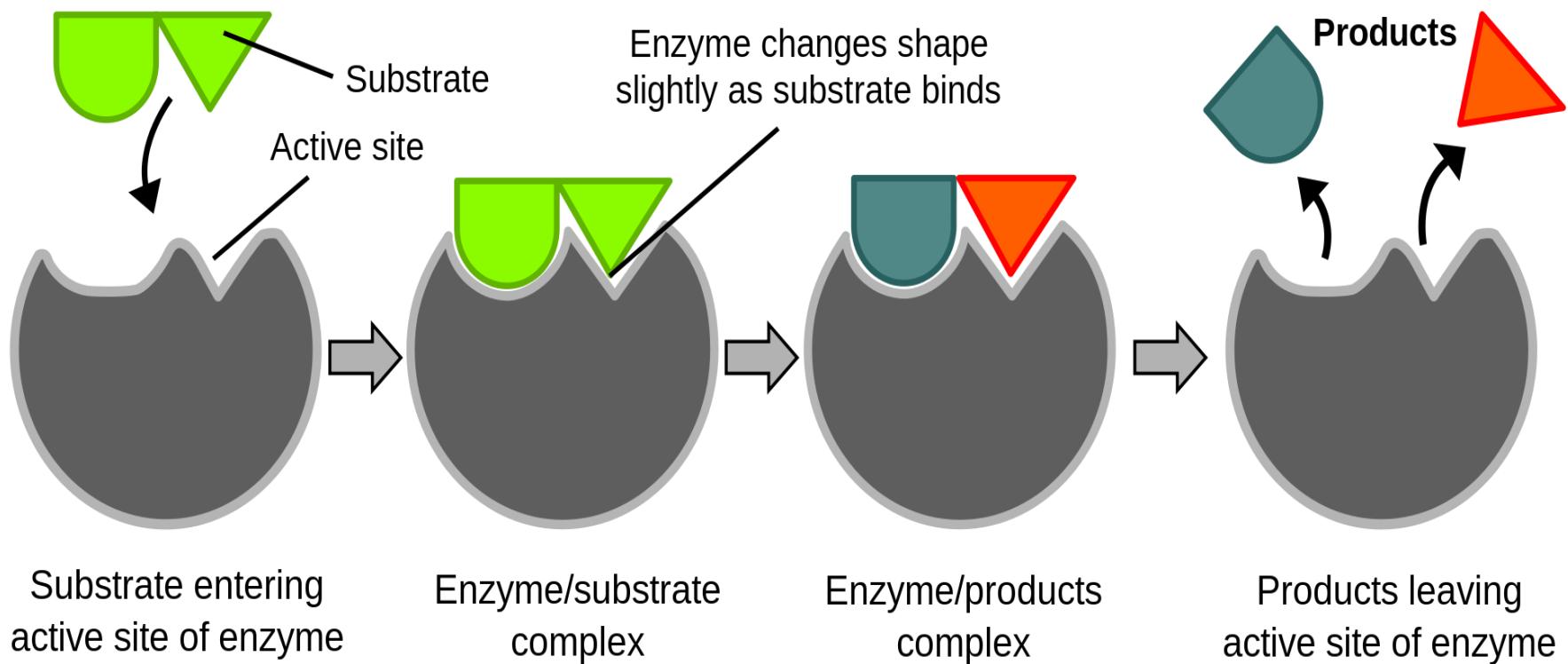
Peptidoglycan

Lipopolysaccharide

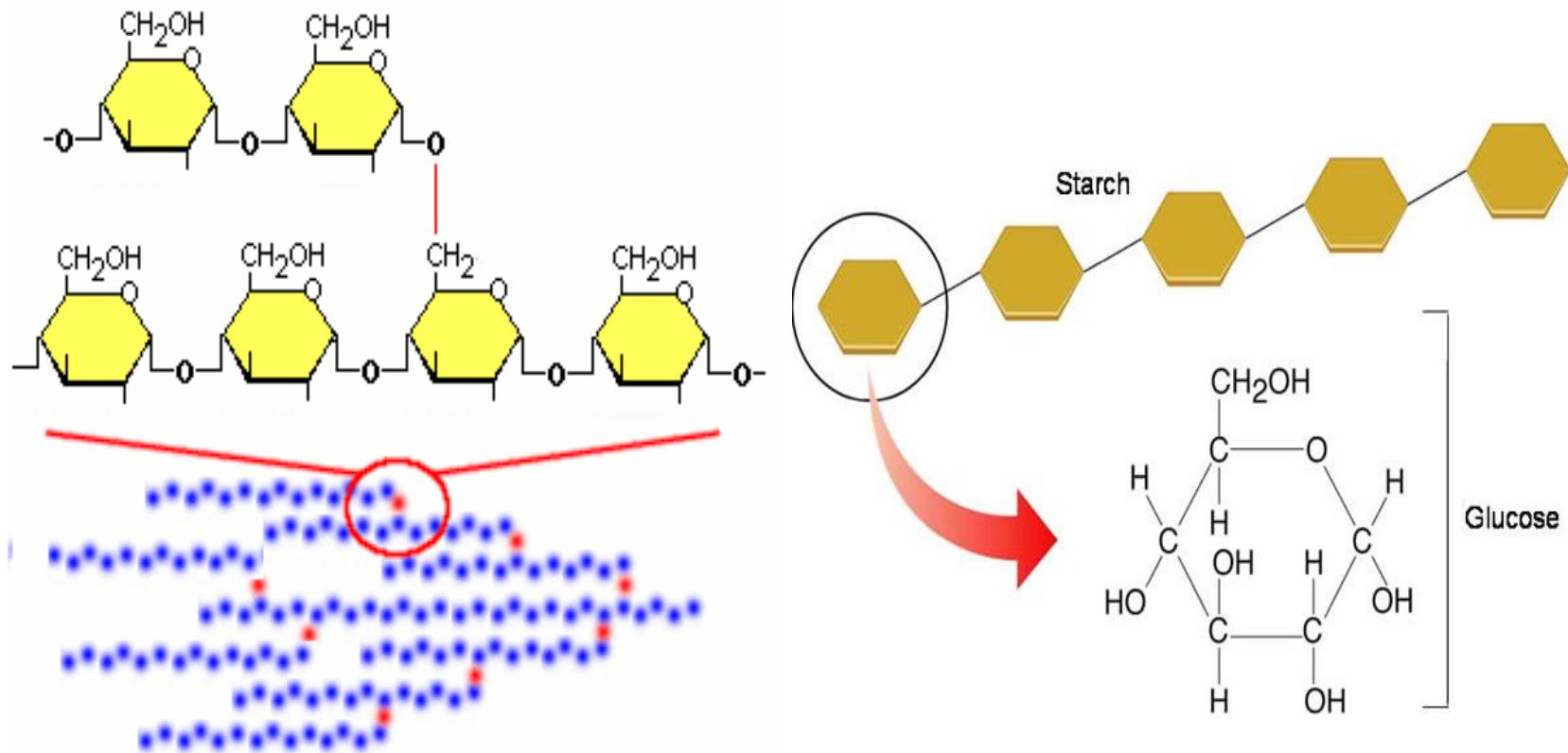
Chemical machine



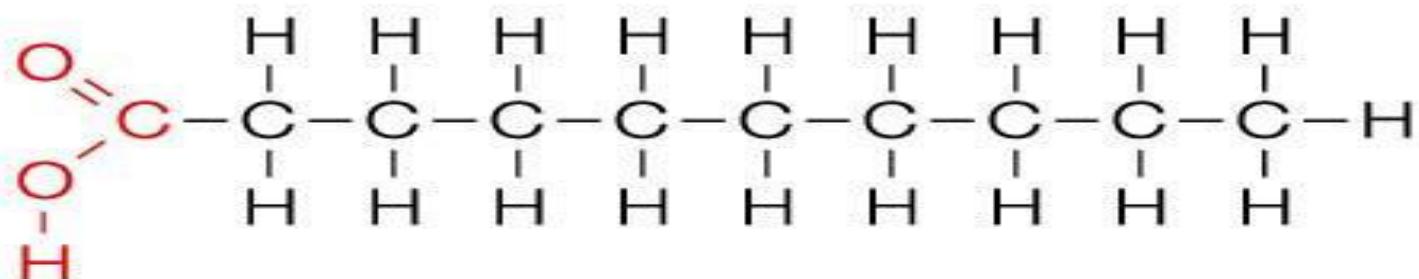
Chemical reaction



Polysaccharide



Saturated



Unsaturated

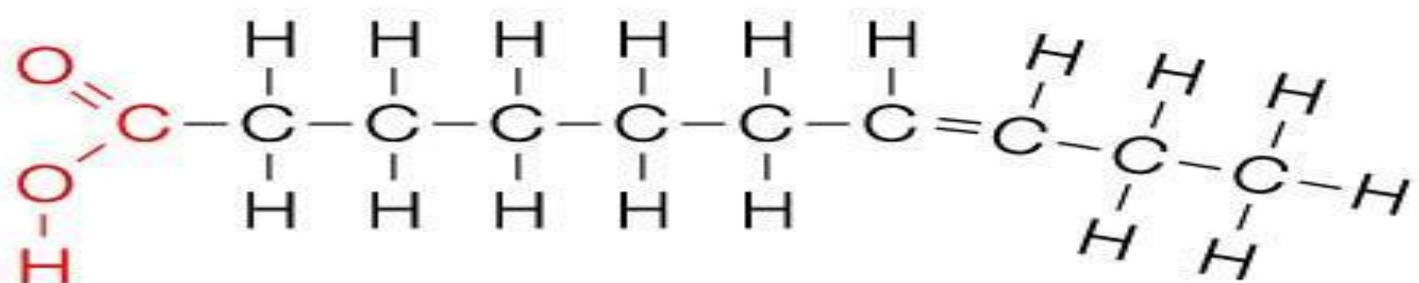
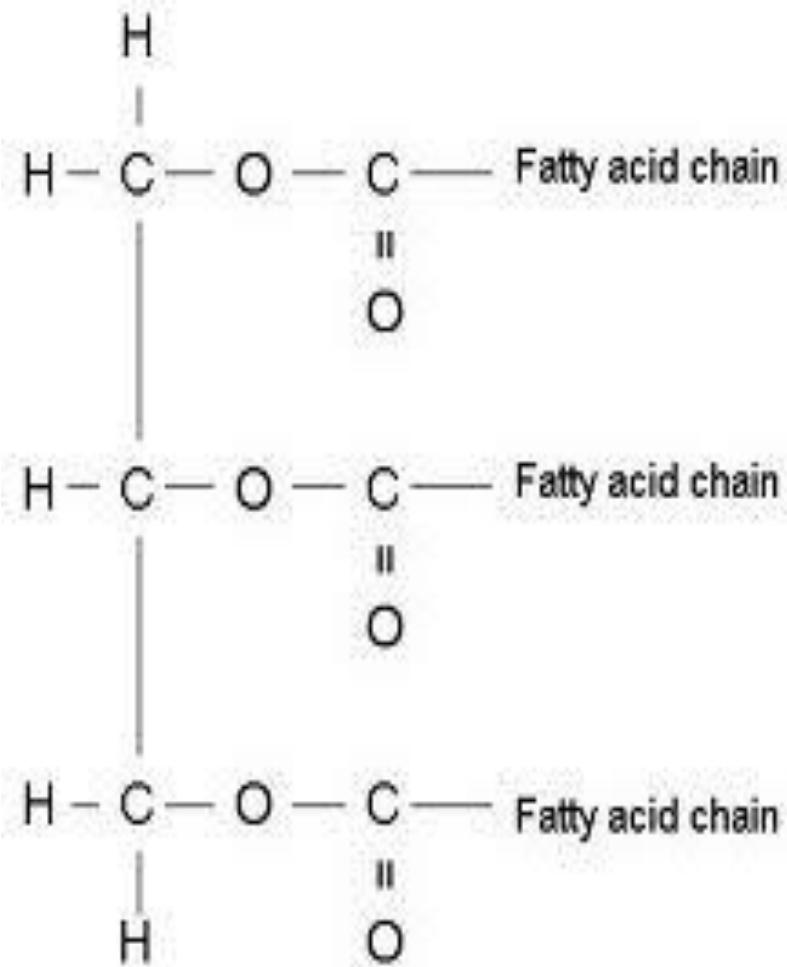
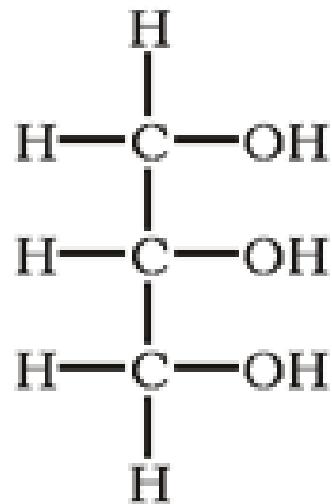
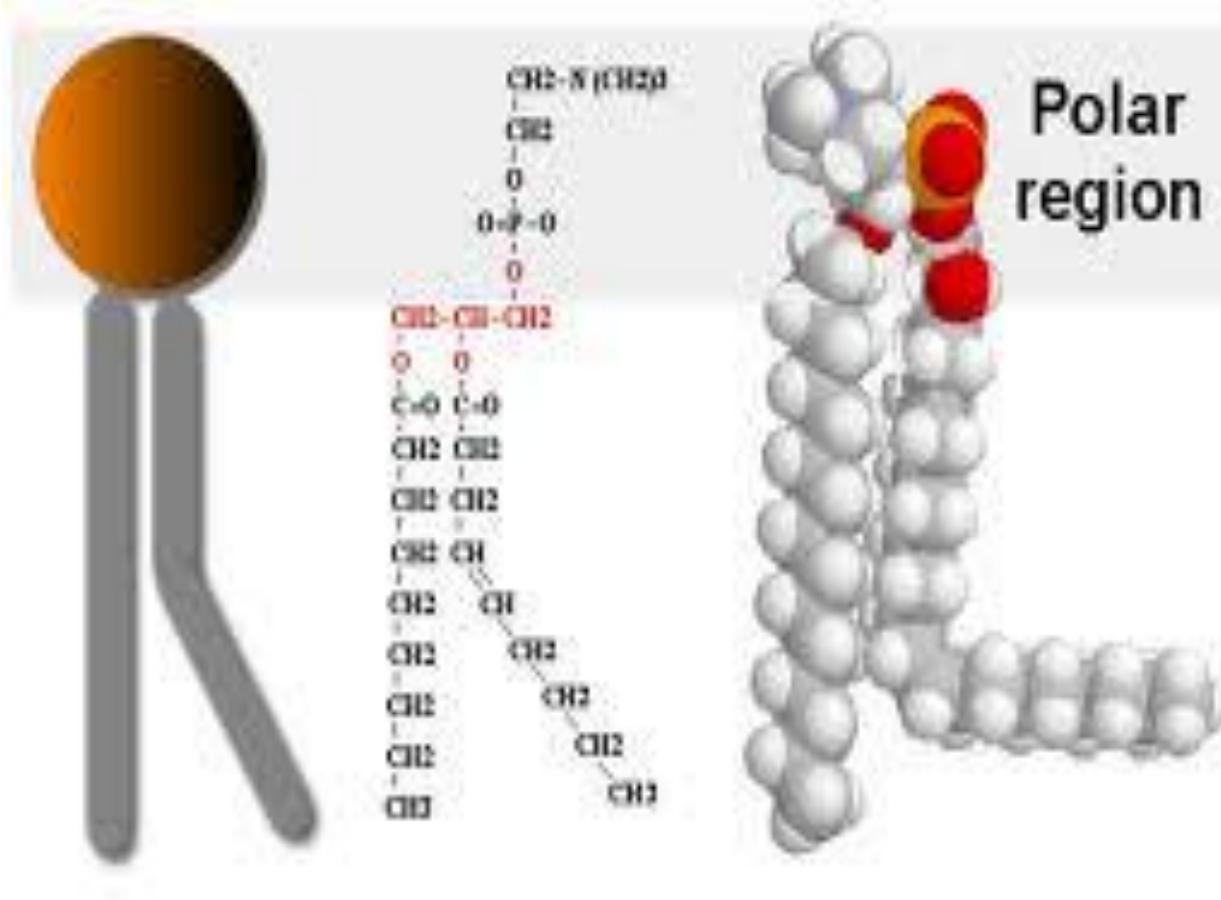


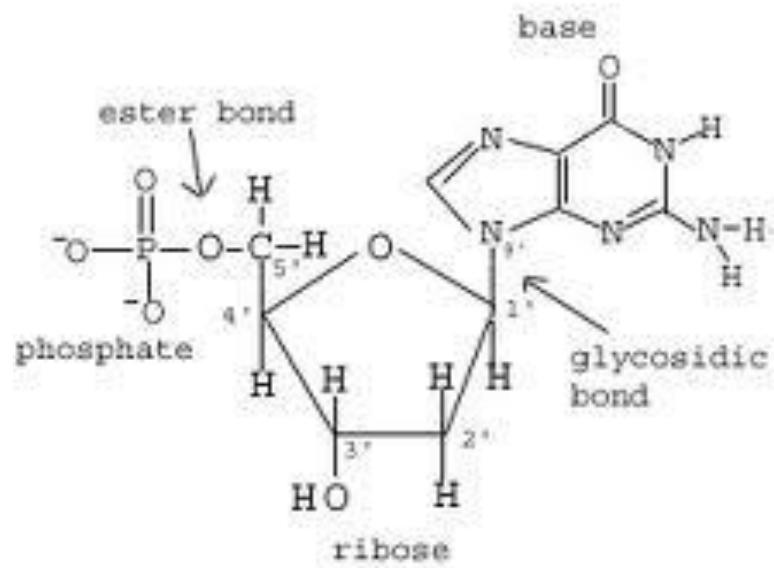
Figure 1. Structure of Glycerol



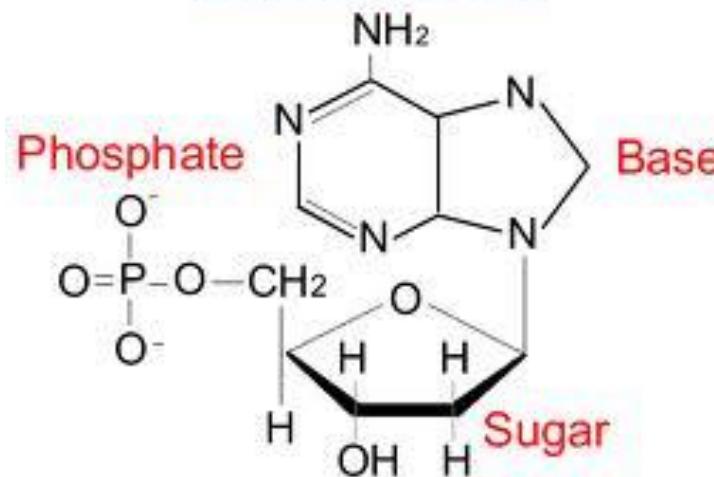
triglyceride

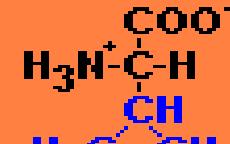
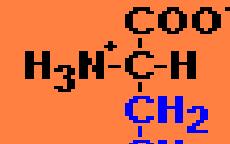
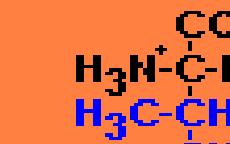
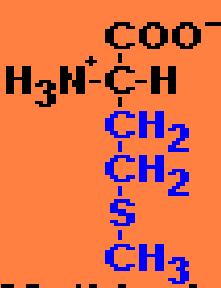
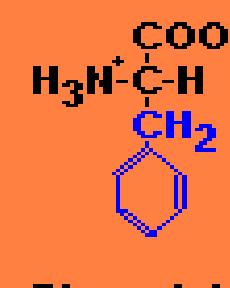
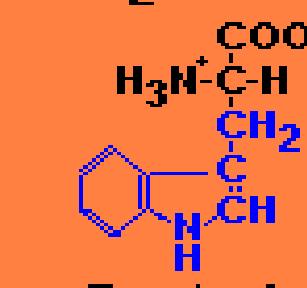
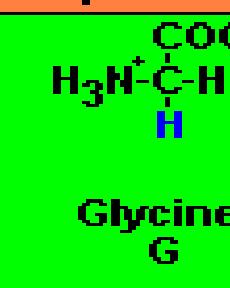
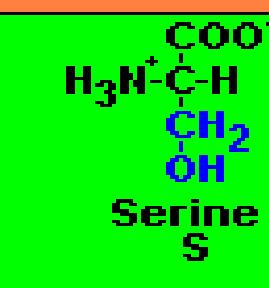
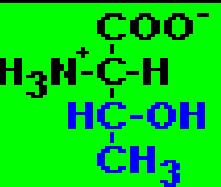
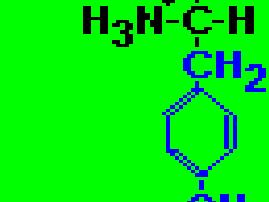
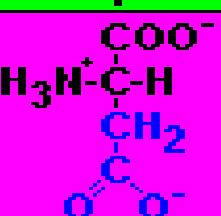
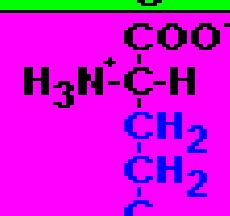
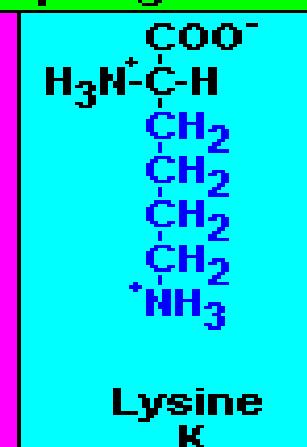
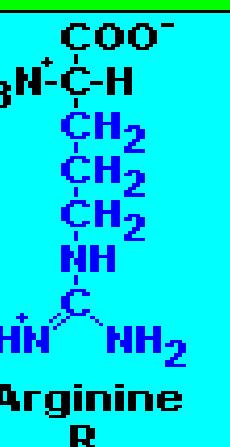
Phospholipids



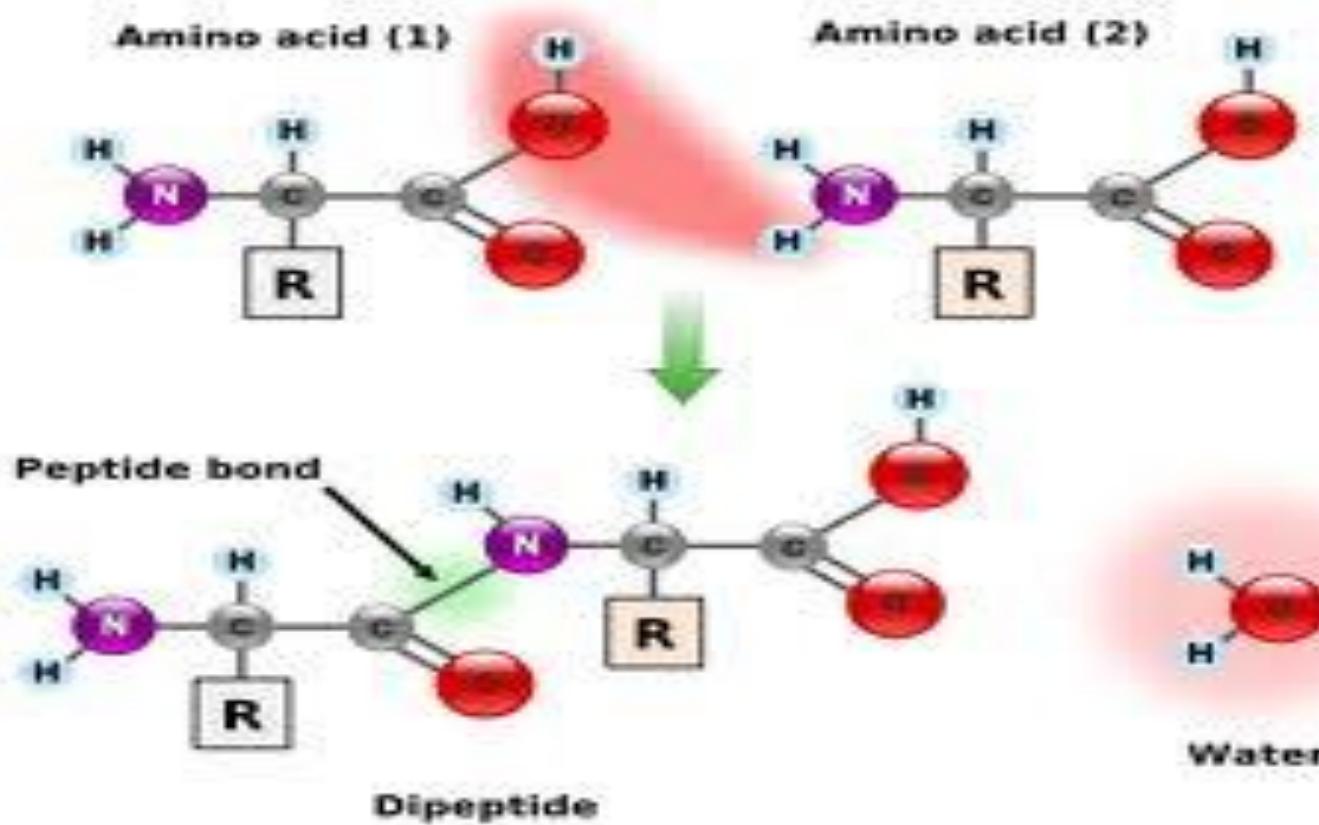
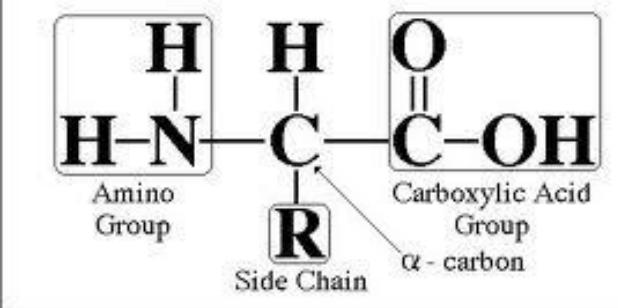


Nucleotide structure

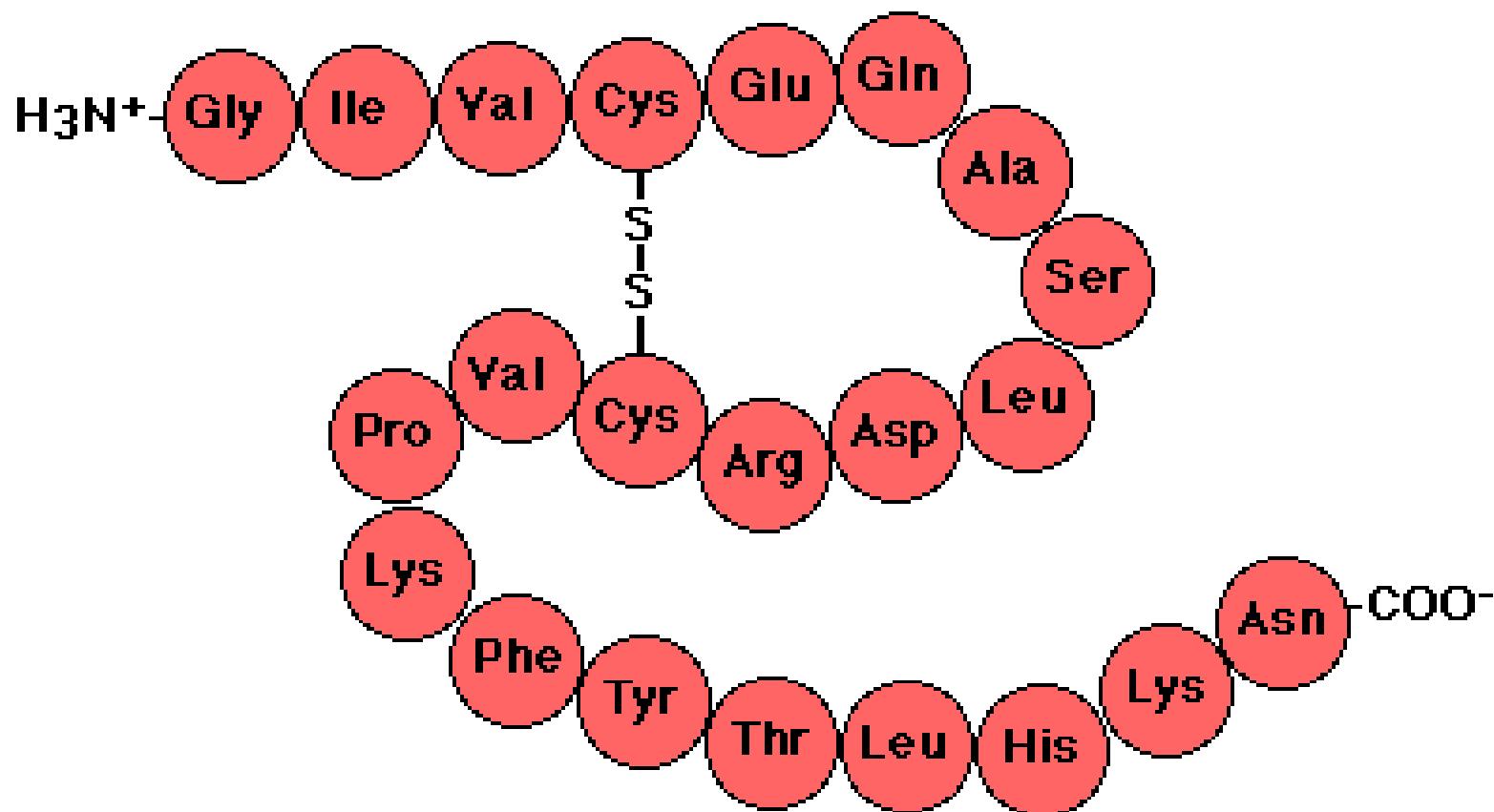


 Alanine A	 Valine V	 Leucine L	 Isoleucine I	 Proline P
 Methionine M	 Phenylalanine F	 Tryptophan W	 Glycine G	 Serine S
 Threonine T	 Cysteine C	 Asparagine N	 Glutamine Q	 Tyrosine Y
 Aspartic Acid D	 Glutamic Acid E	 Lysine K	 Arginine R	 Histidine H

Amino Acid Structure



Protein structure

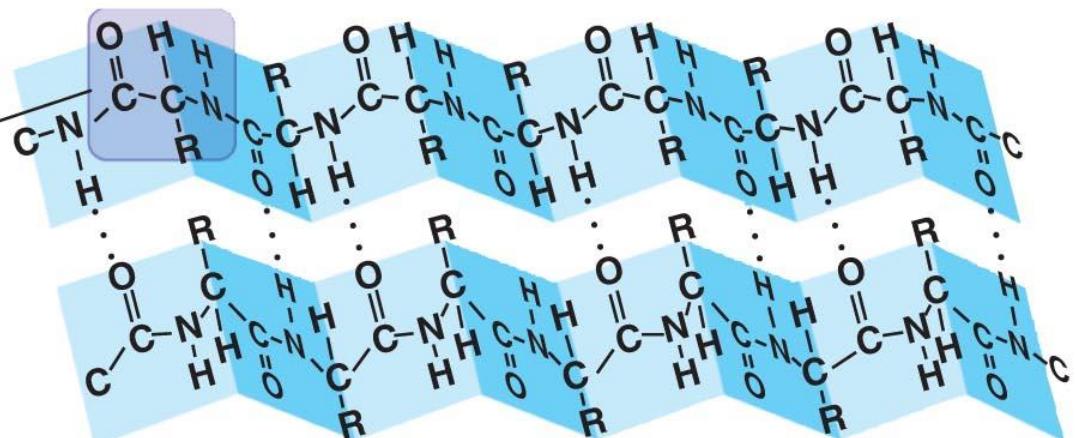


Protein structure

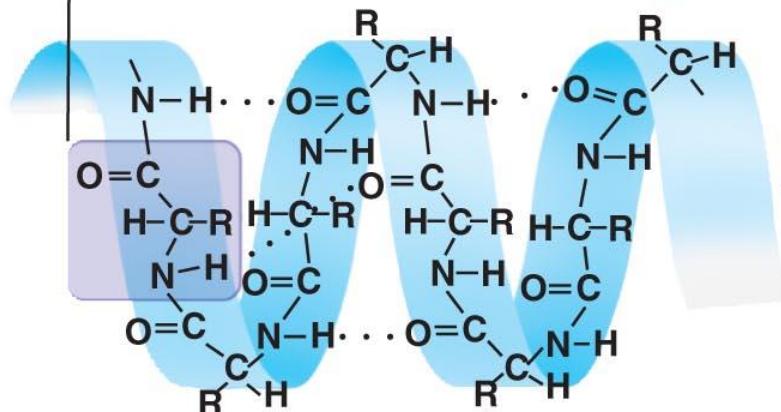
Secondary Structure

β pleated sheet

Examples of
amino acid
subunits



α helix

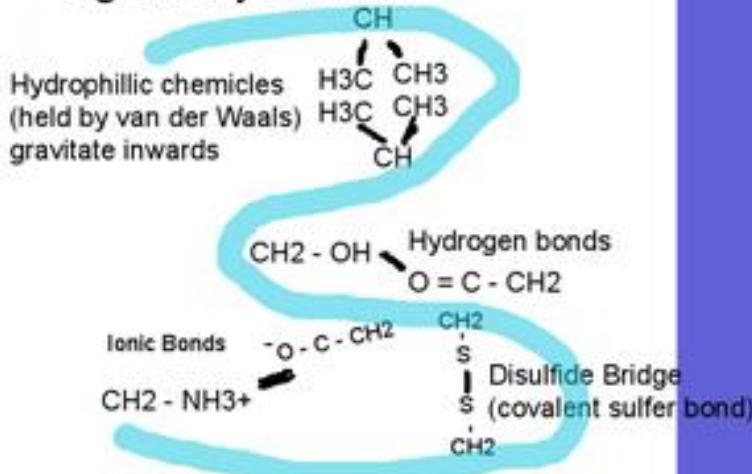


Protein structure

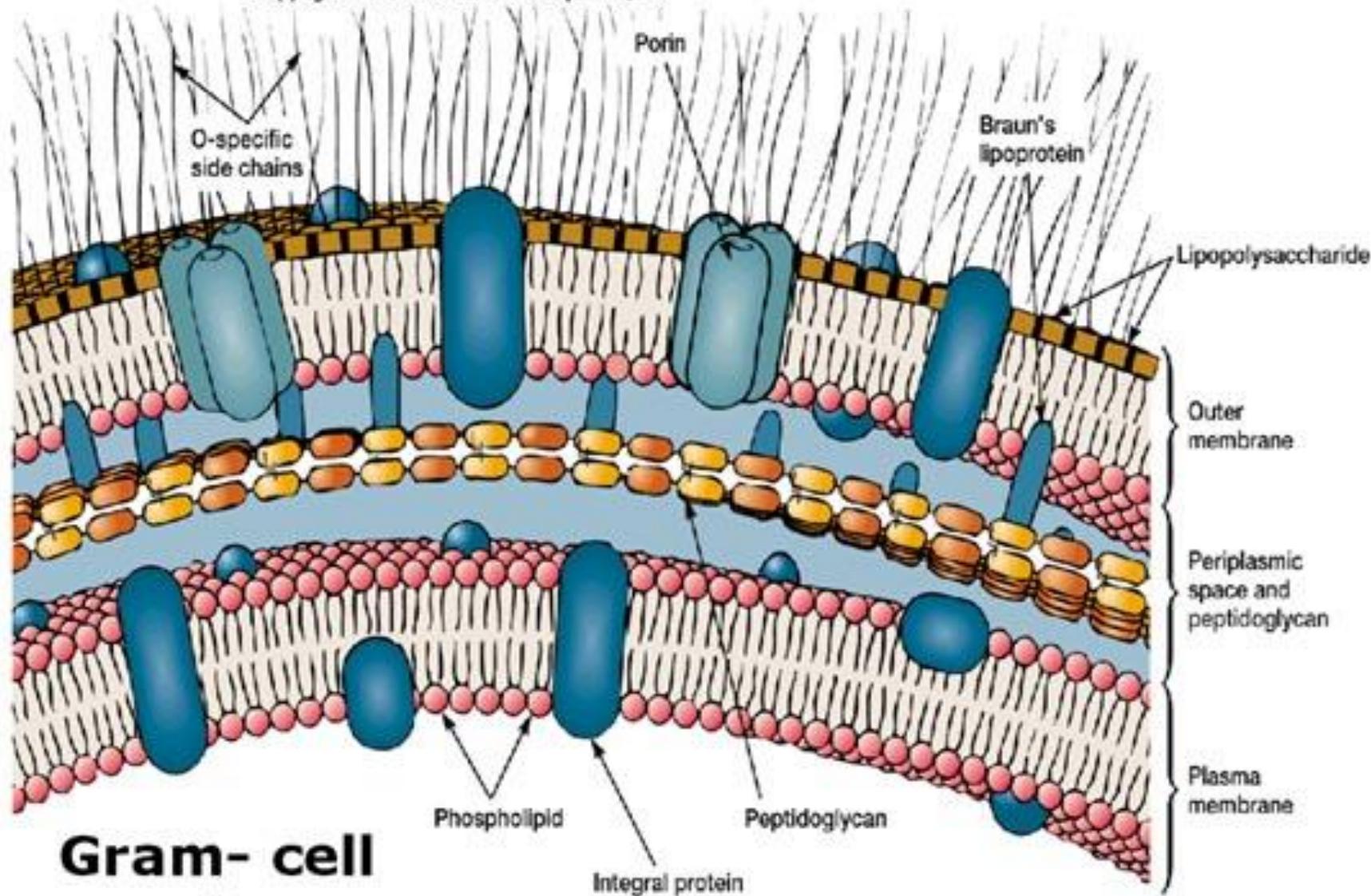
Tertiary Structure :)



When the α helices and the β pleated sheets combin they form the tertiary structure, What holds them together you ask?



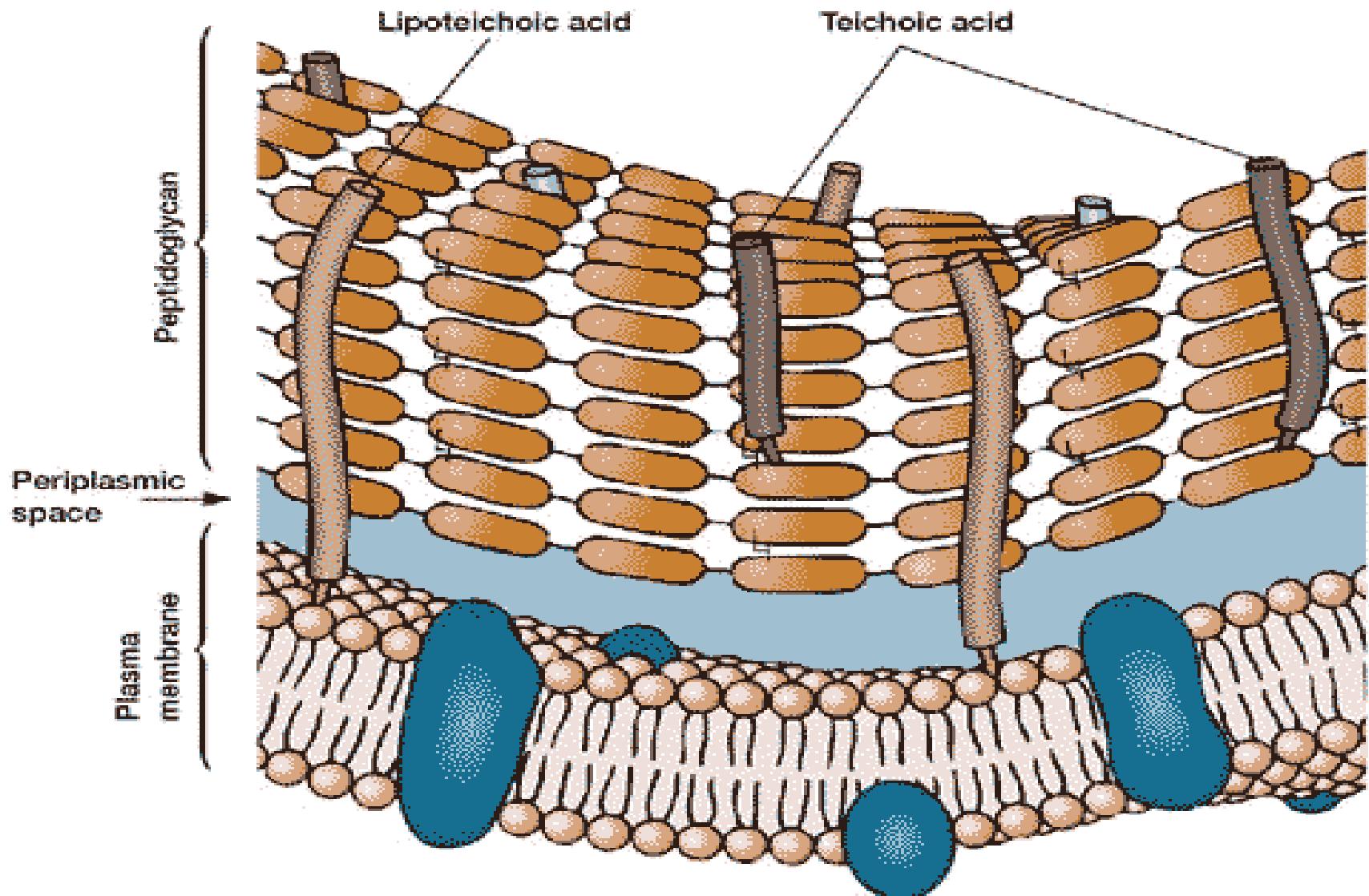
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Gram- cell envelope

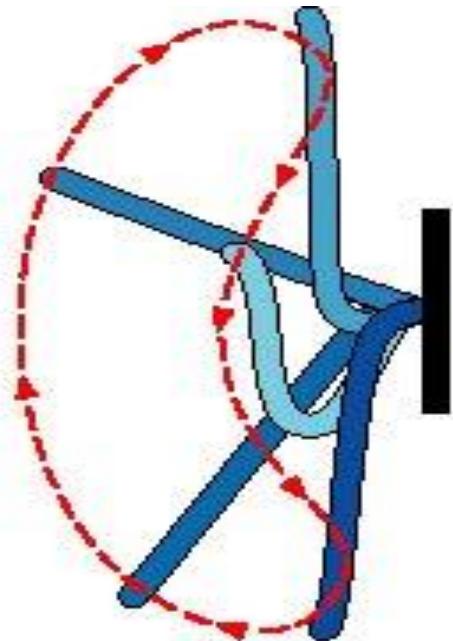
Gram +

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Direction of Force



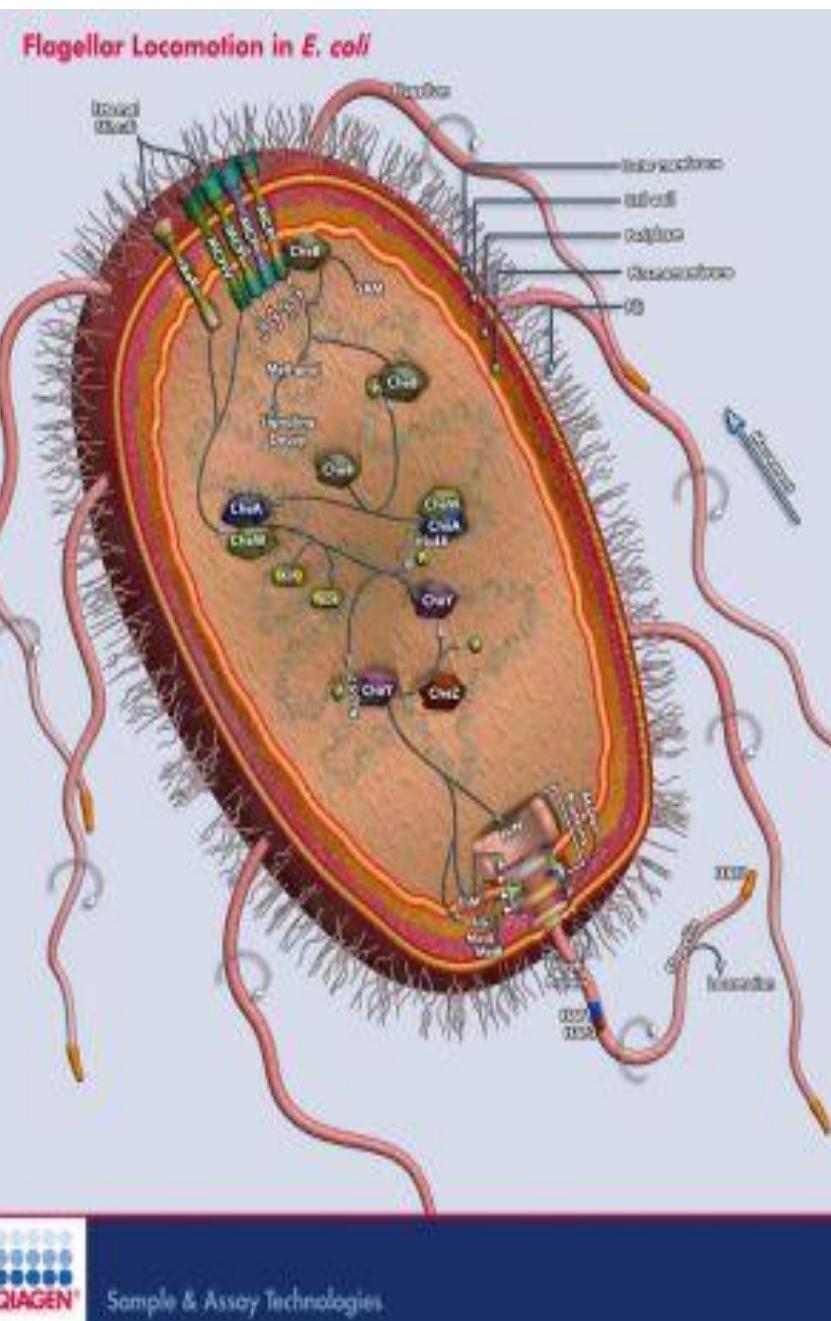
Flagella



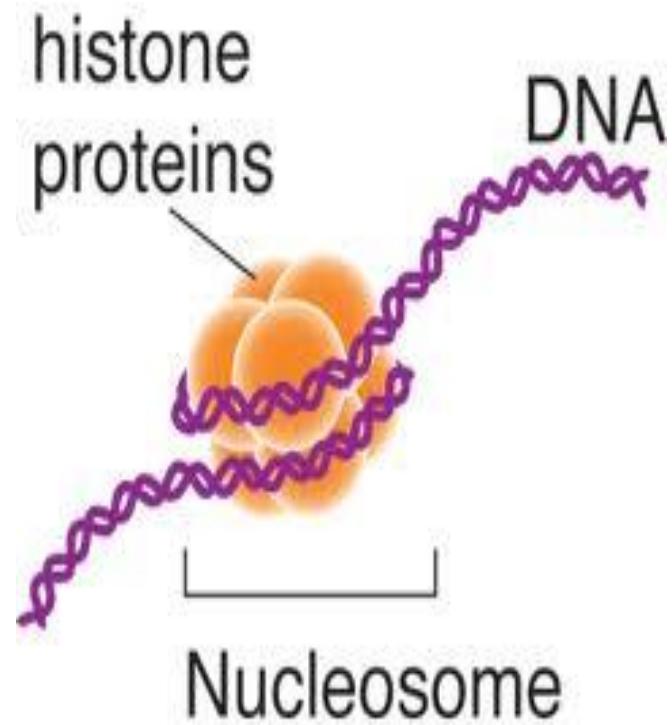
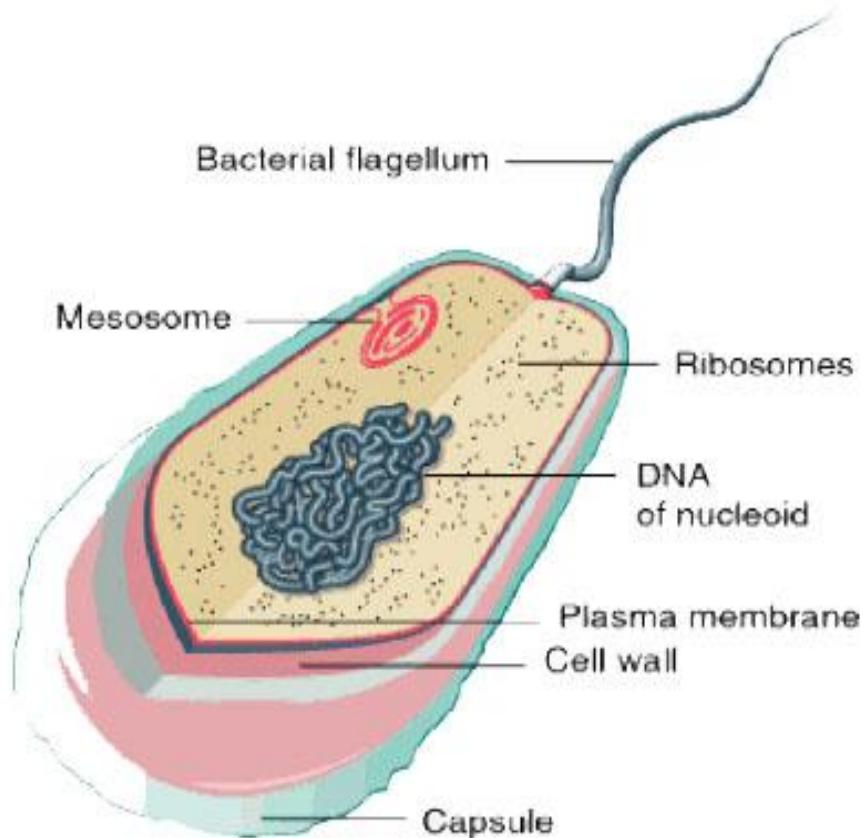
Direction of Force



Cilia

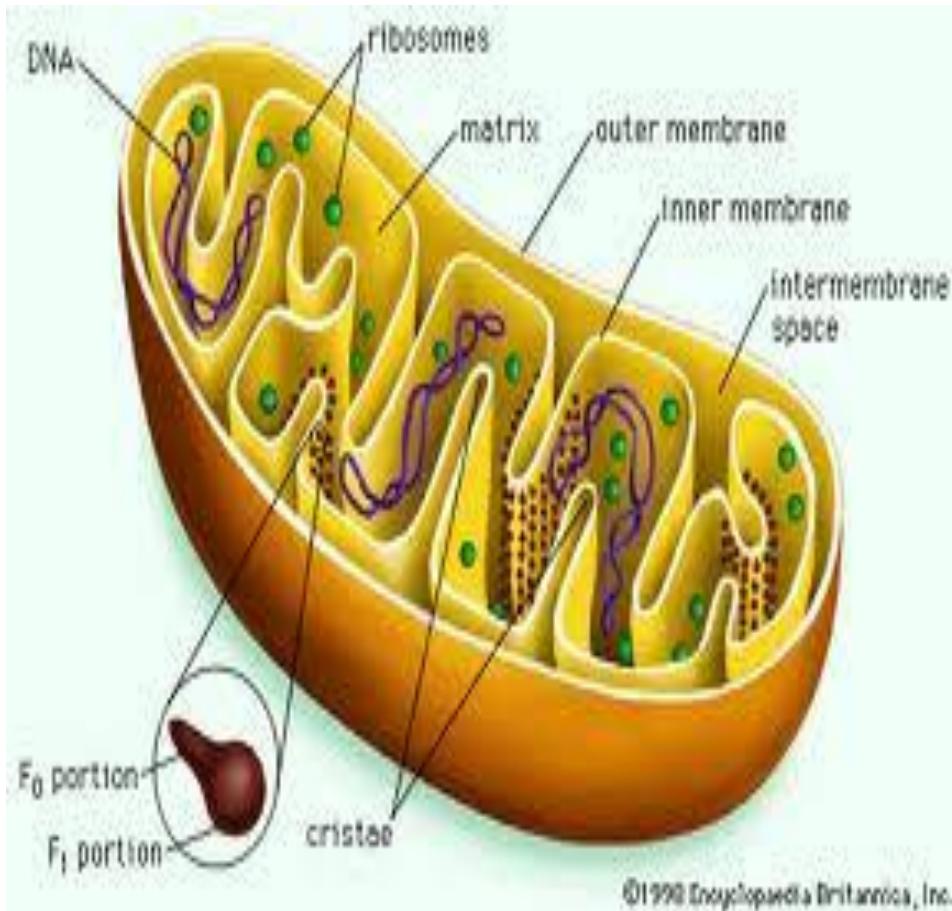
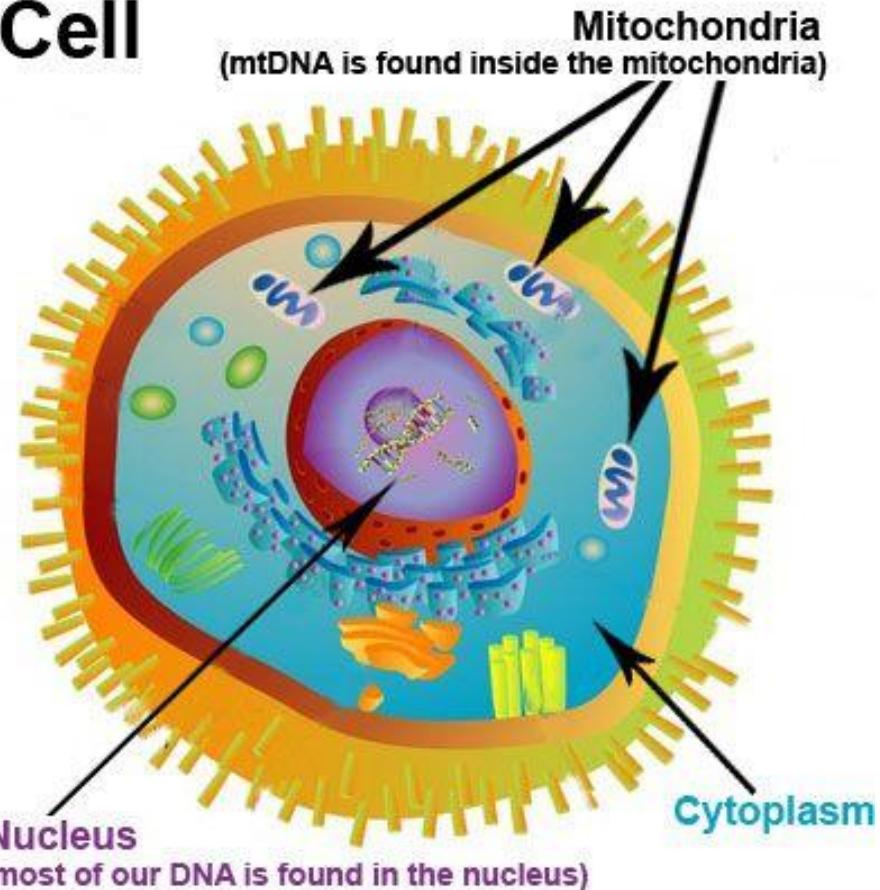


Nucleoid and nucleosome



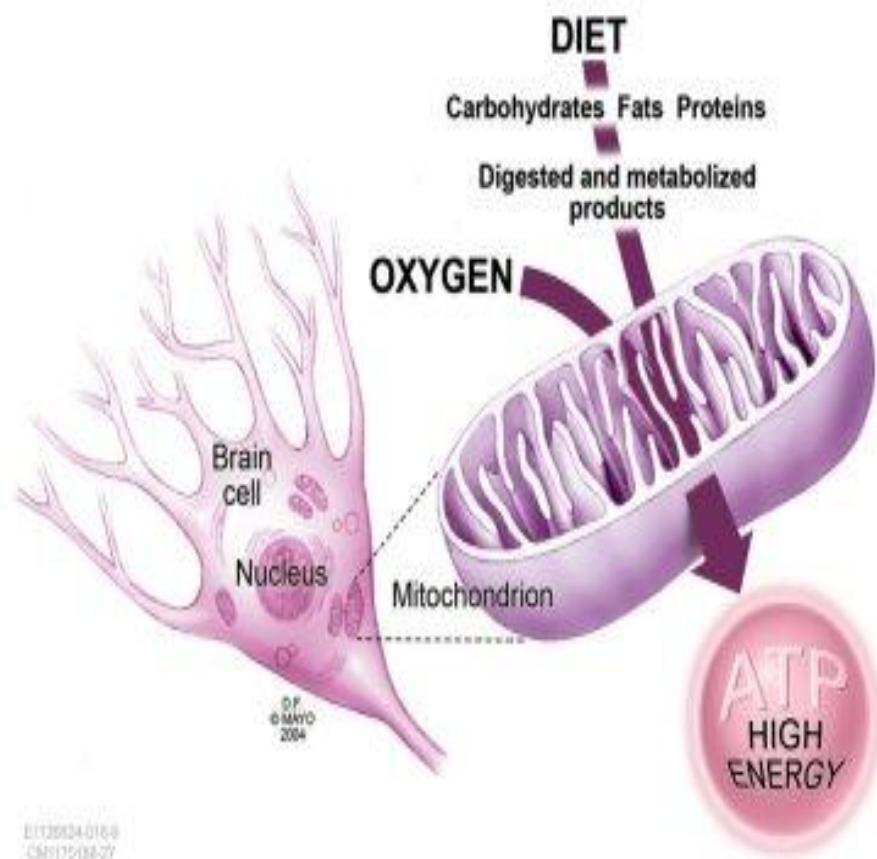
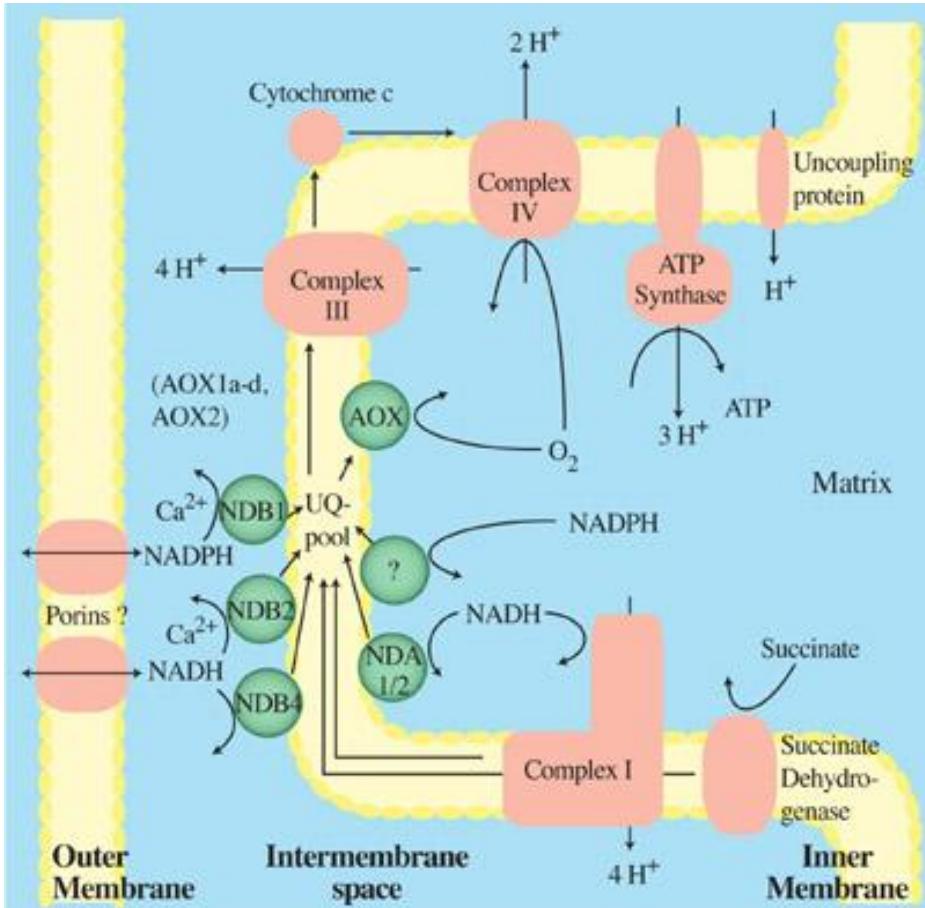
Mitochondria

Cell

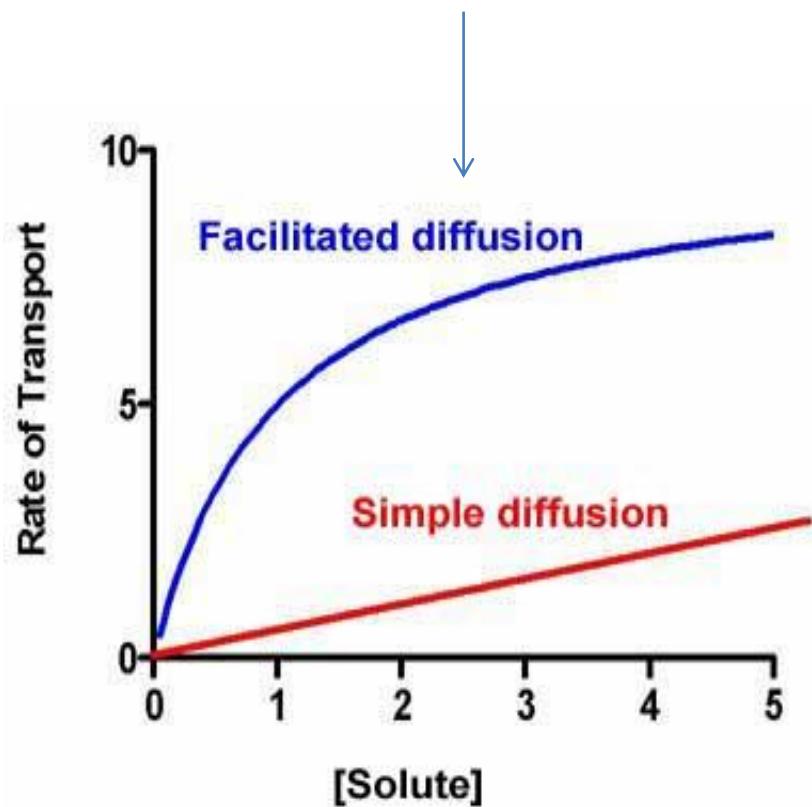
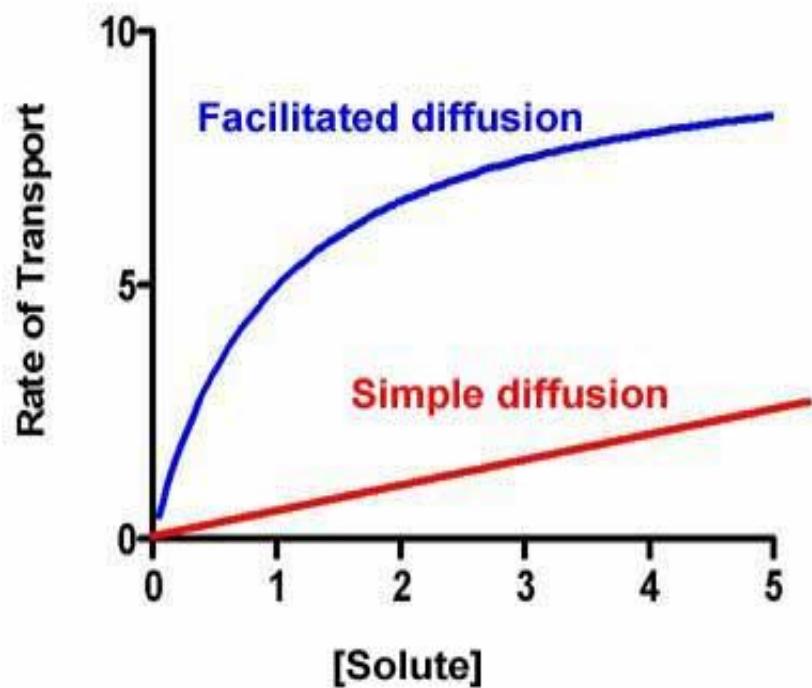


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Respiration (호흡)

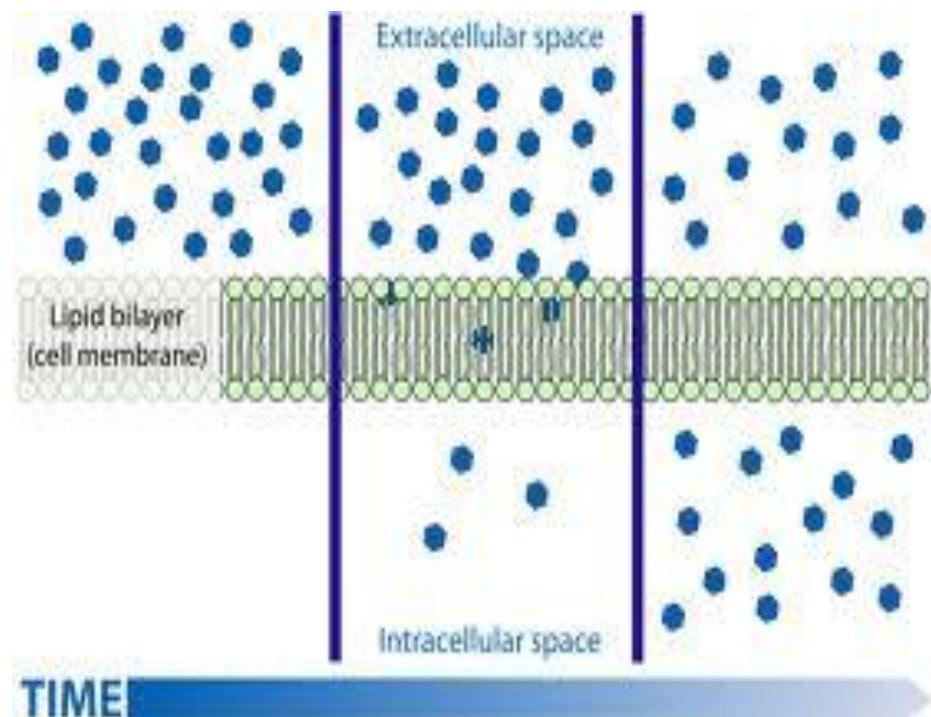
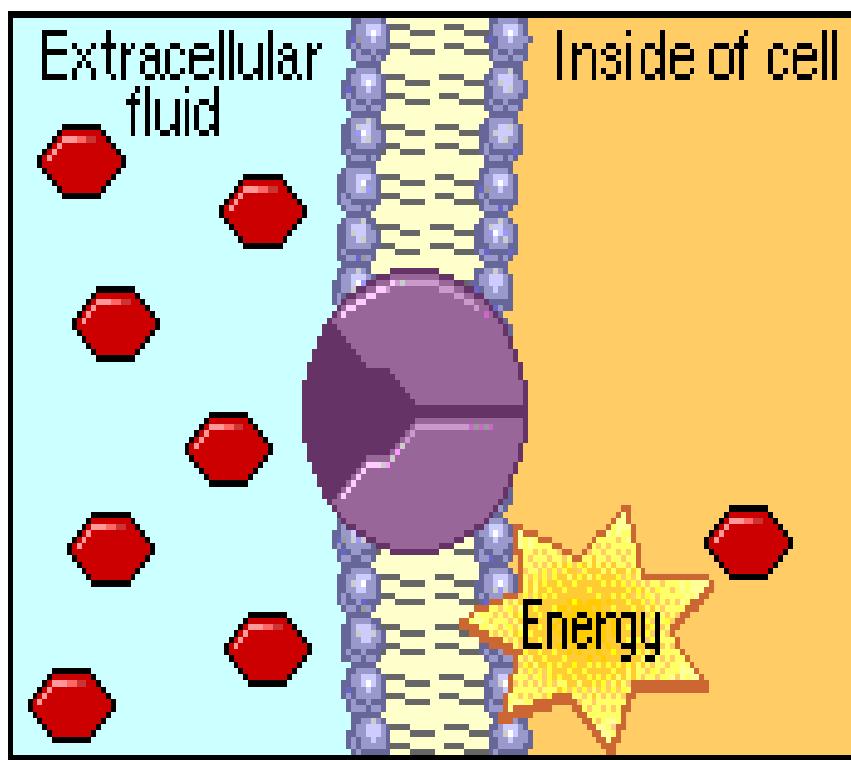


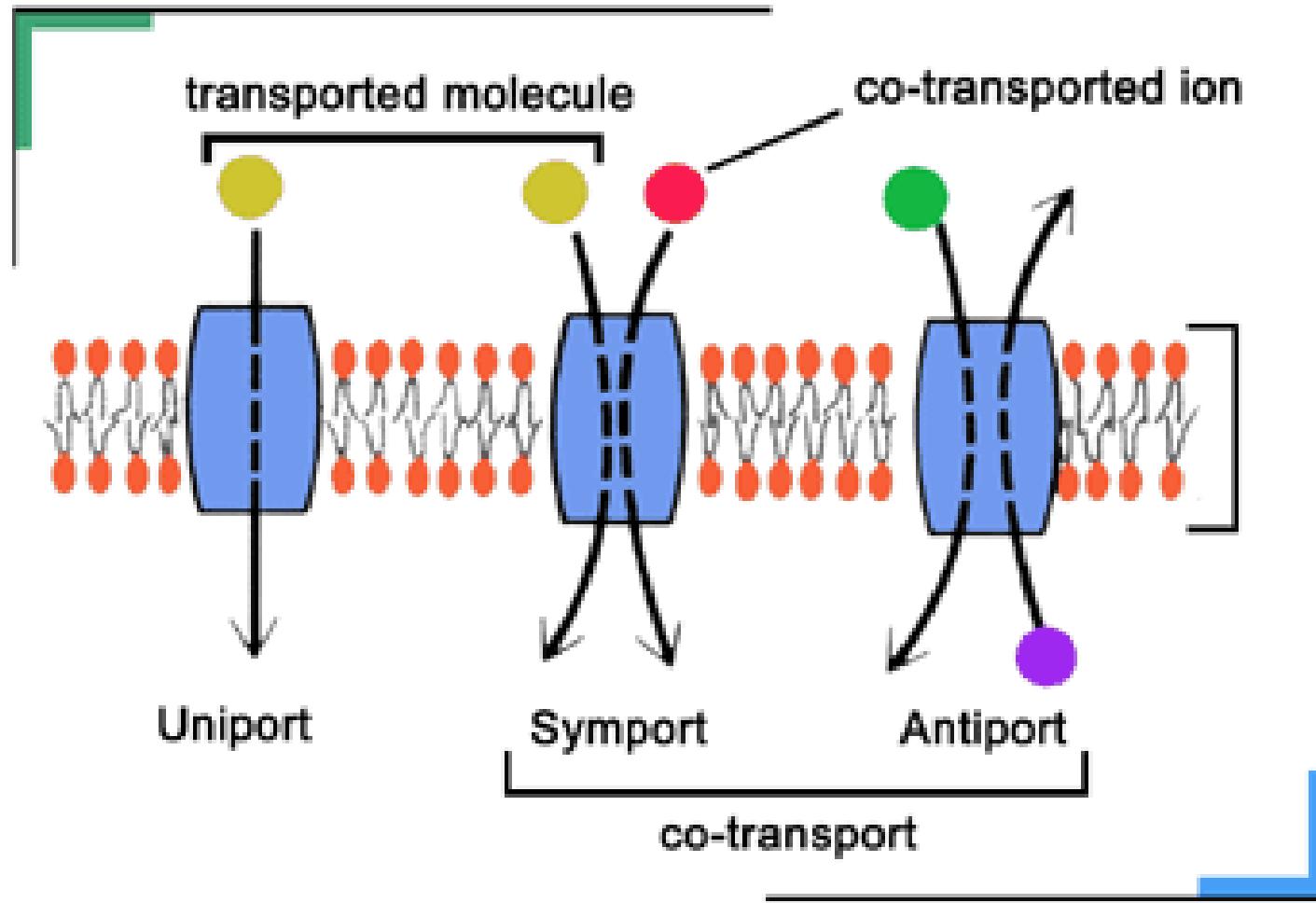
What if equilibration occurs at this point?



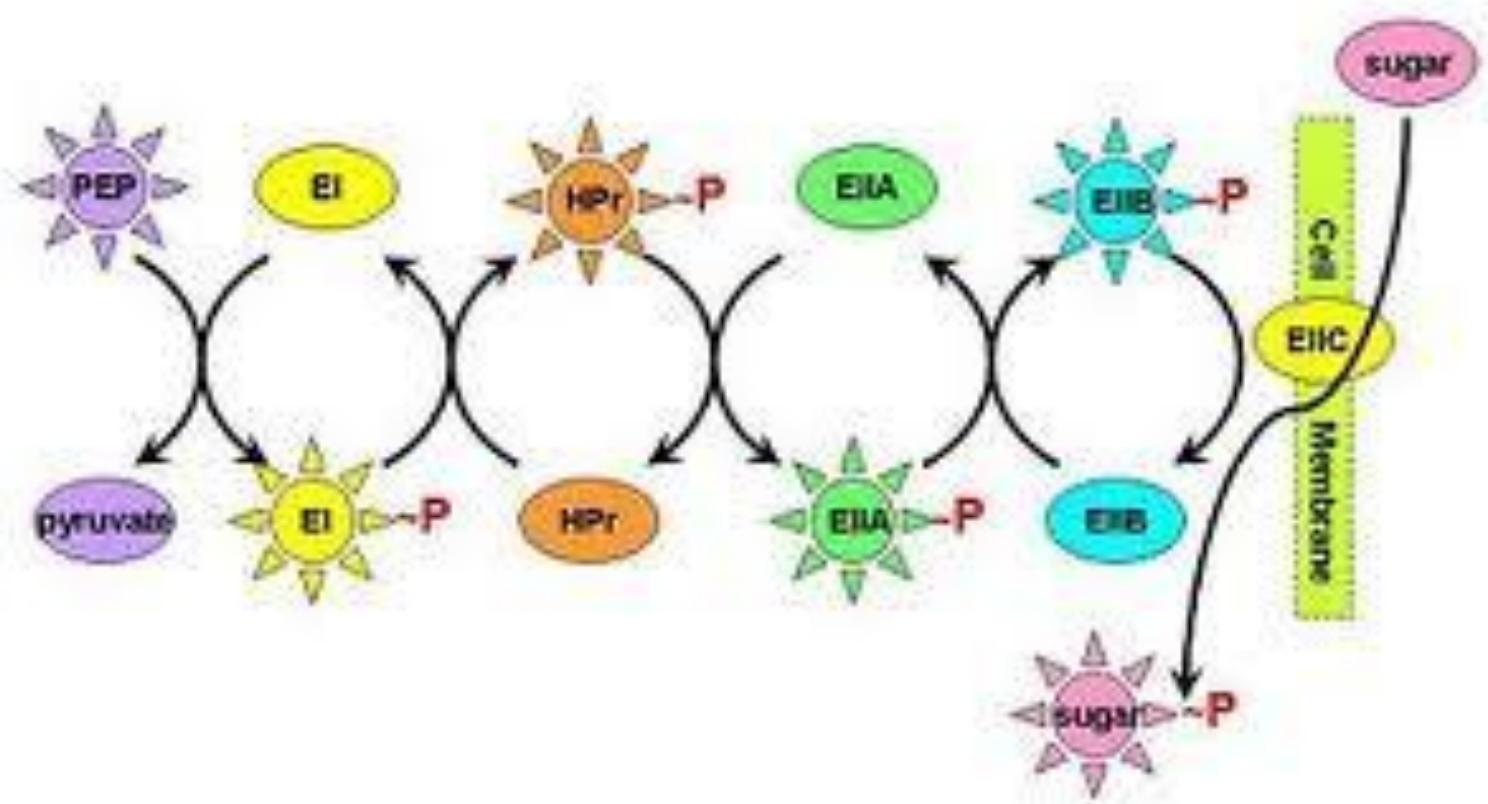
Carrier-mediated transport vs. simple diffusion

Active Transport

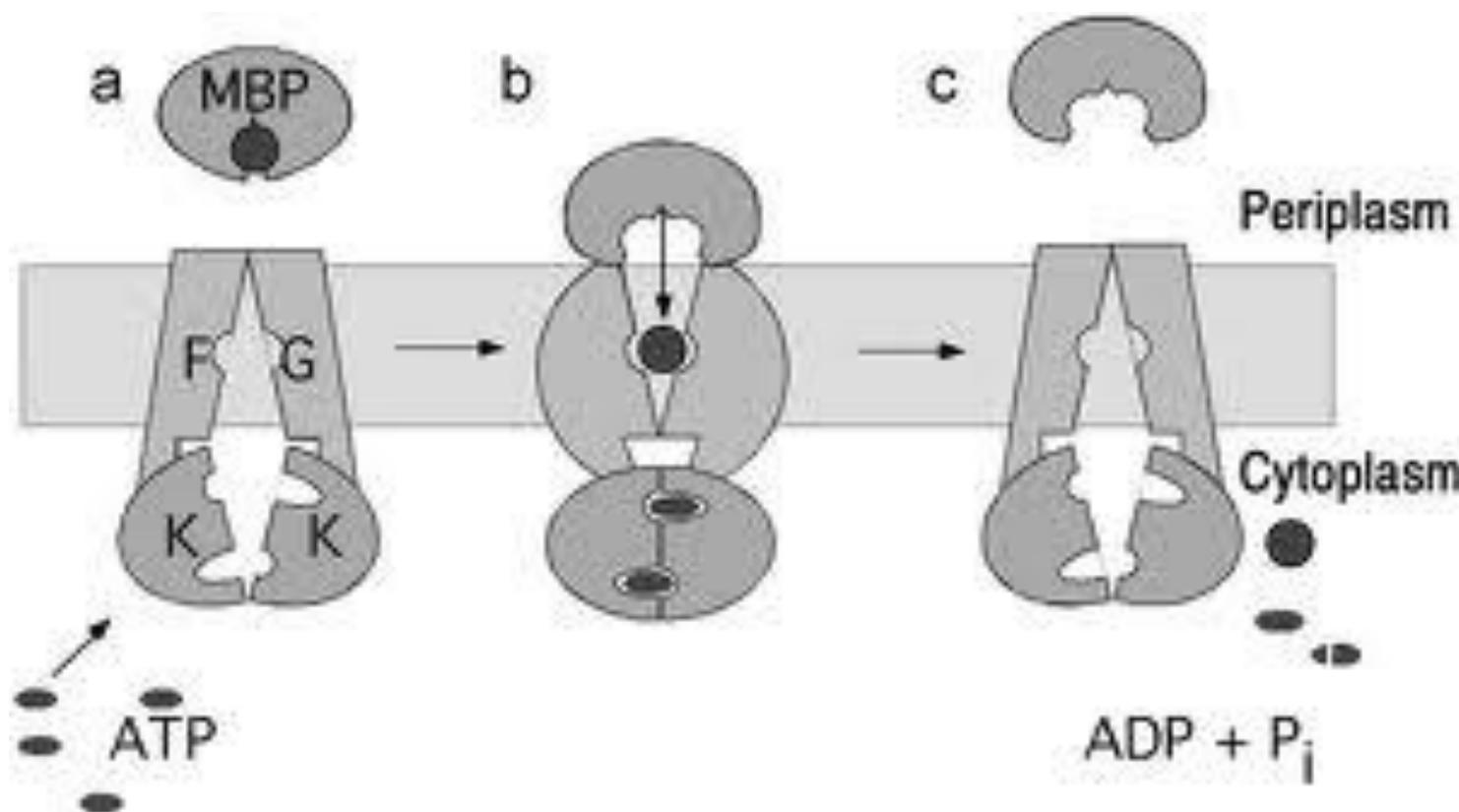




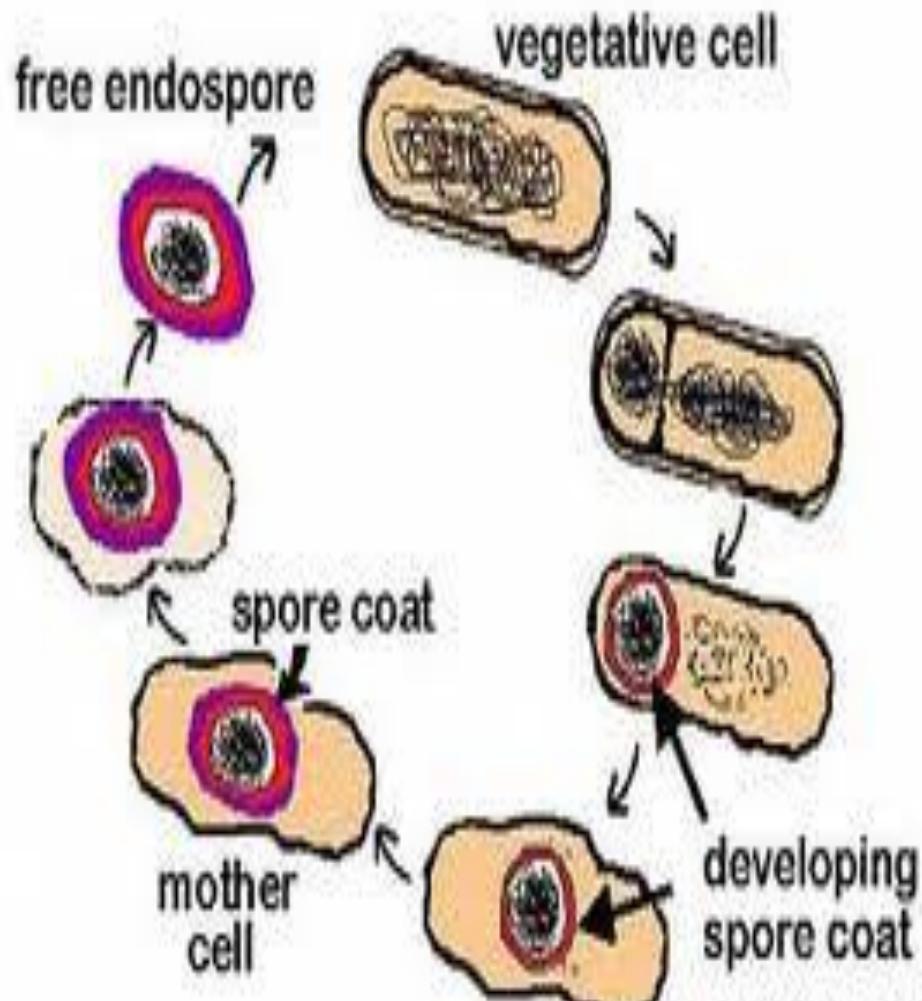
Group translocation (PTS)



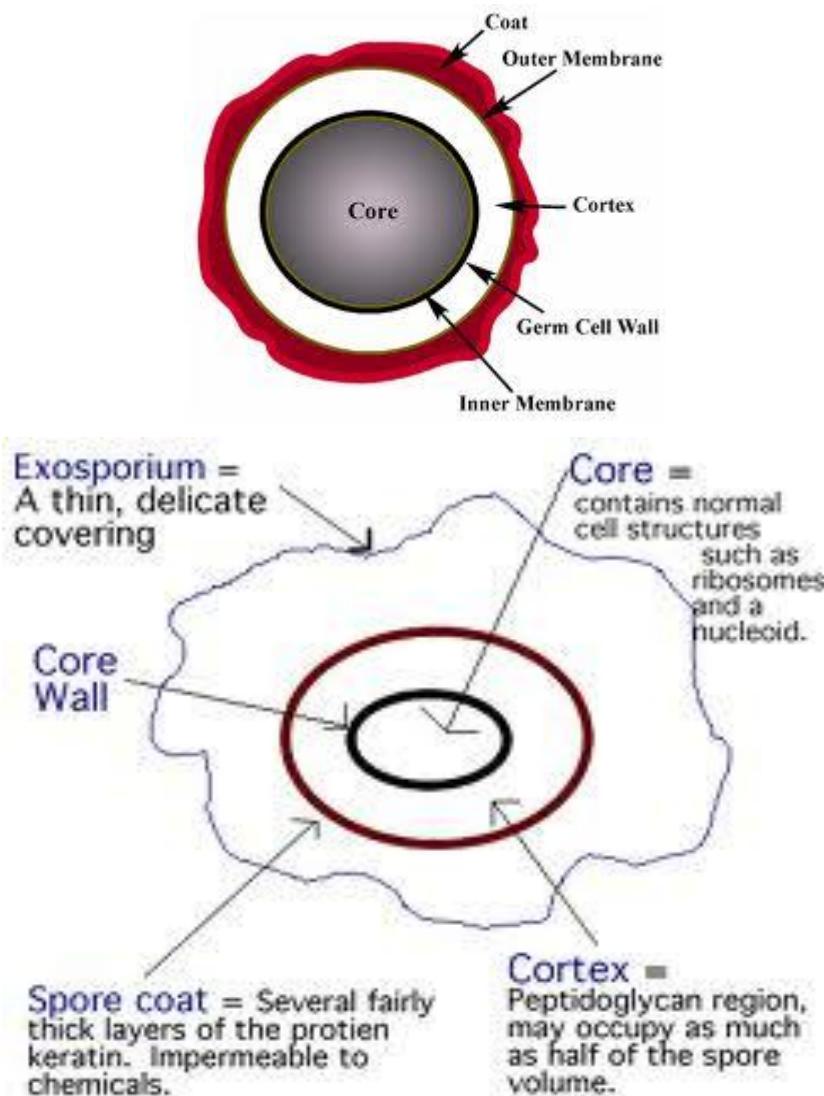
ATP-binding cassette transport

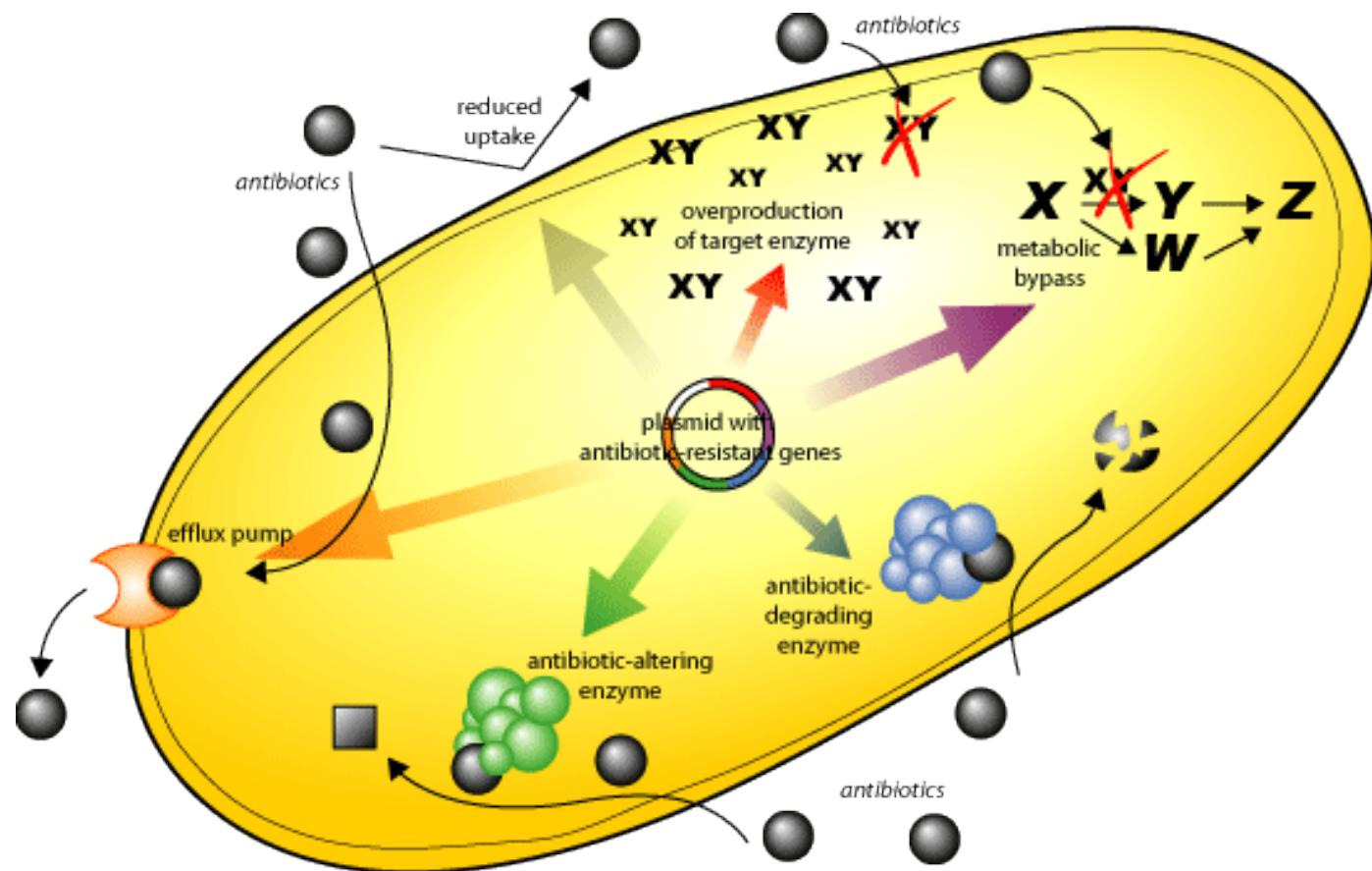


Endospores

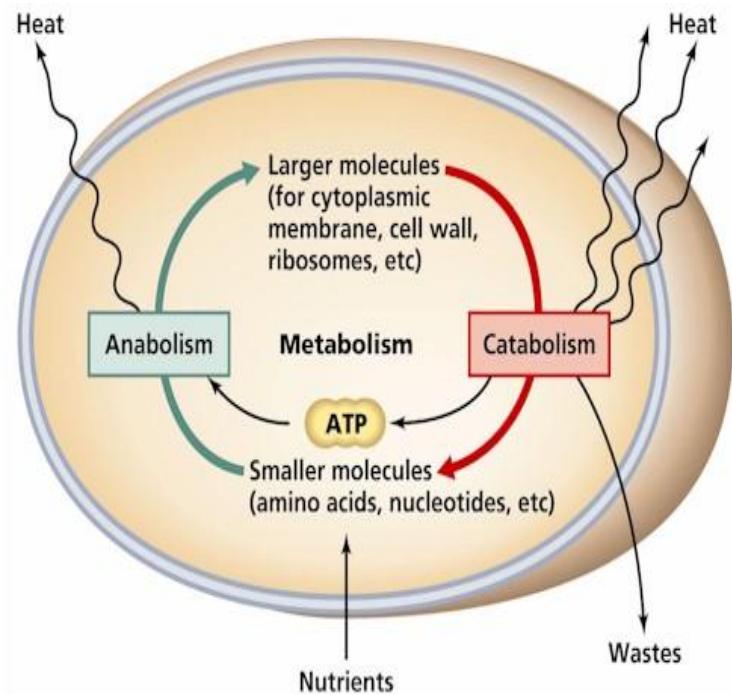
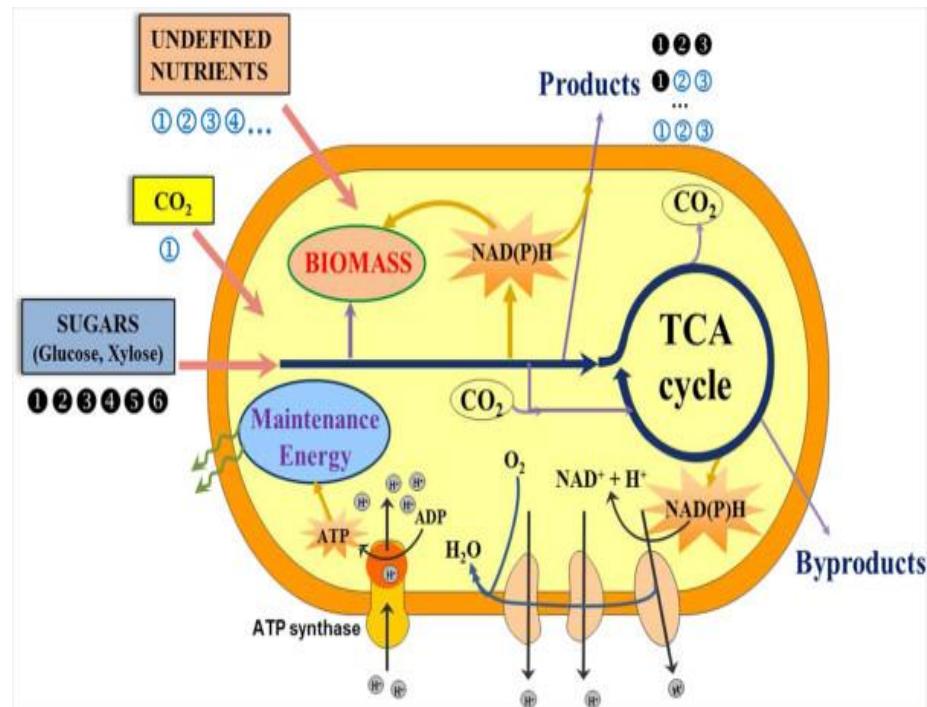


ASM Digital Image Collection, Merkel

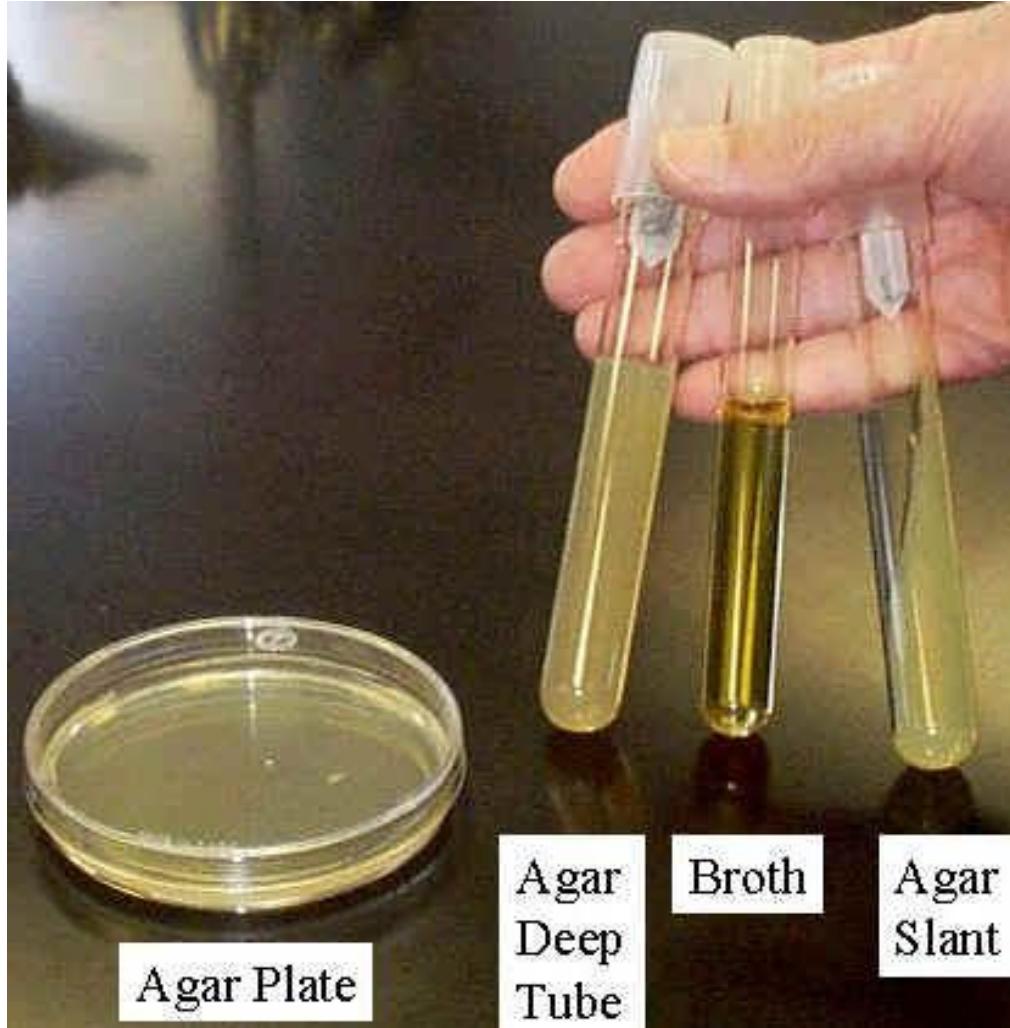




Metabolism



Culture media

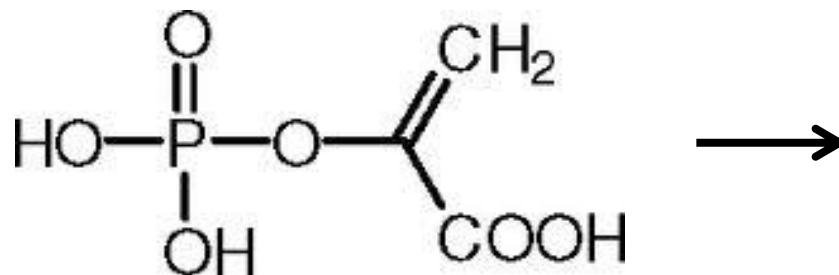


Single colony

Sterilization by
autoclave



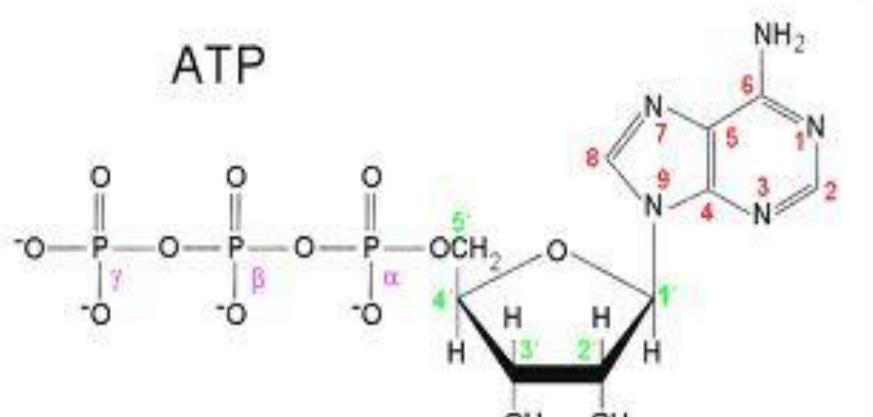
Phosphoenolpyruvate



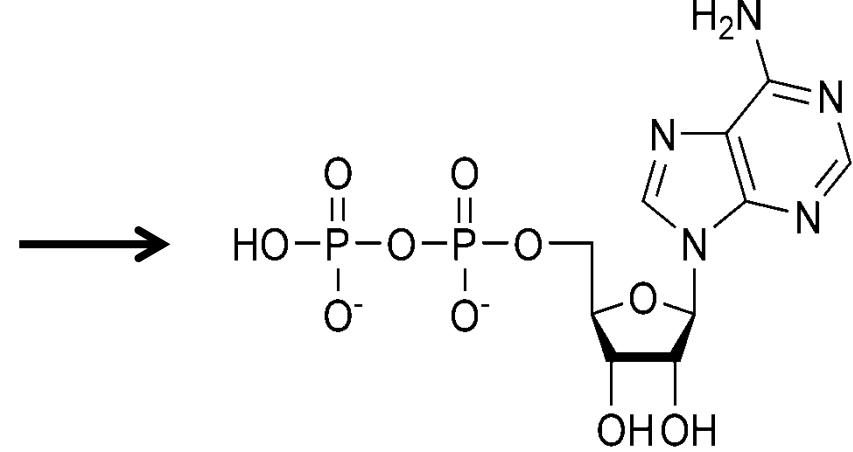
pyruvate

ATP

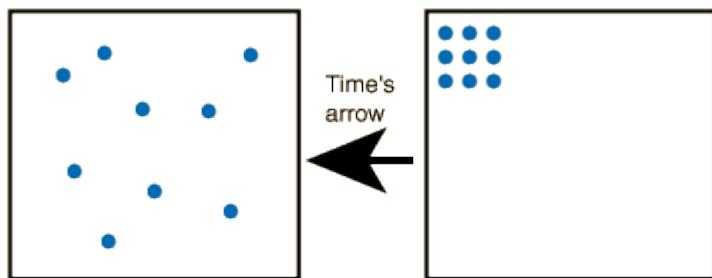
ATP



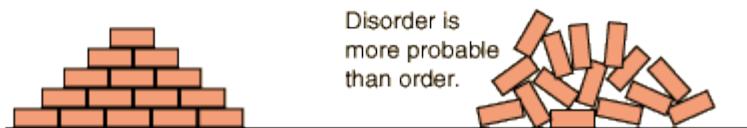
ADP



If the particles represent gas molecules at normal temperatures inside a closed container, which of the illustrated configurations came first?



If you tossed bricks off a truck, which kind of pile of bricks would you more likely produce?

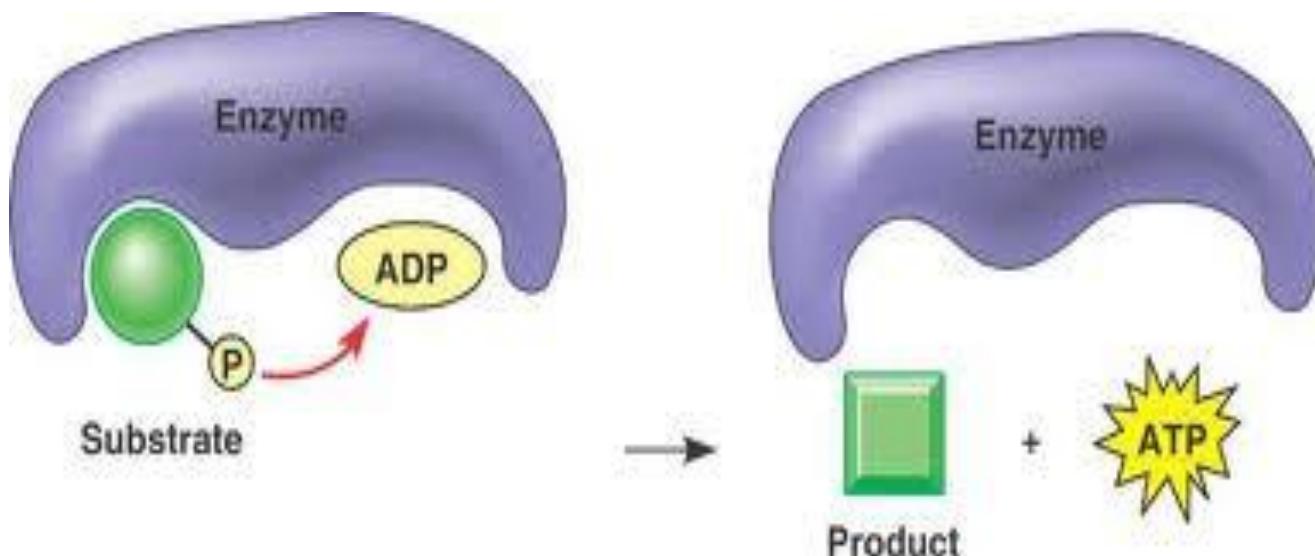
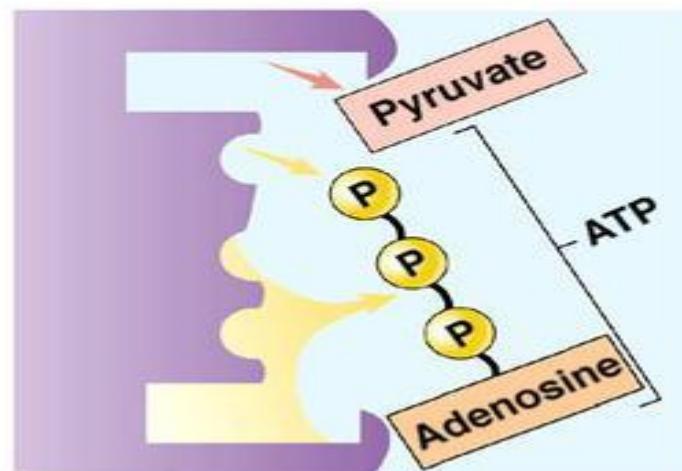
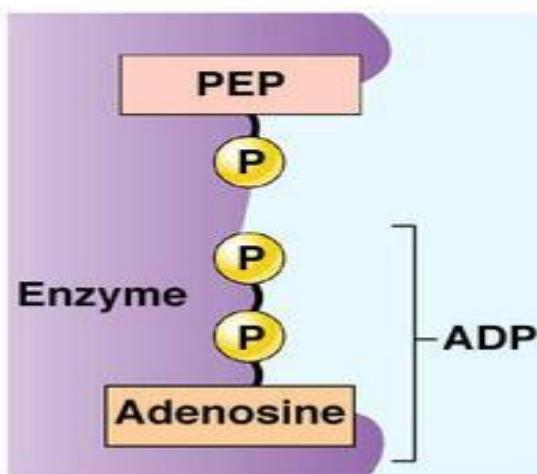


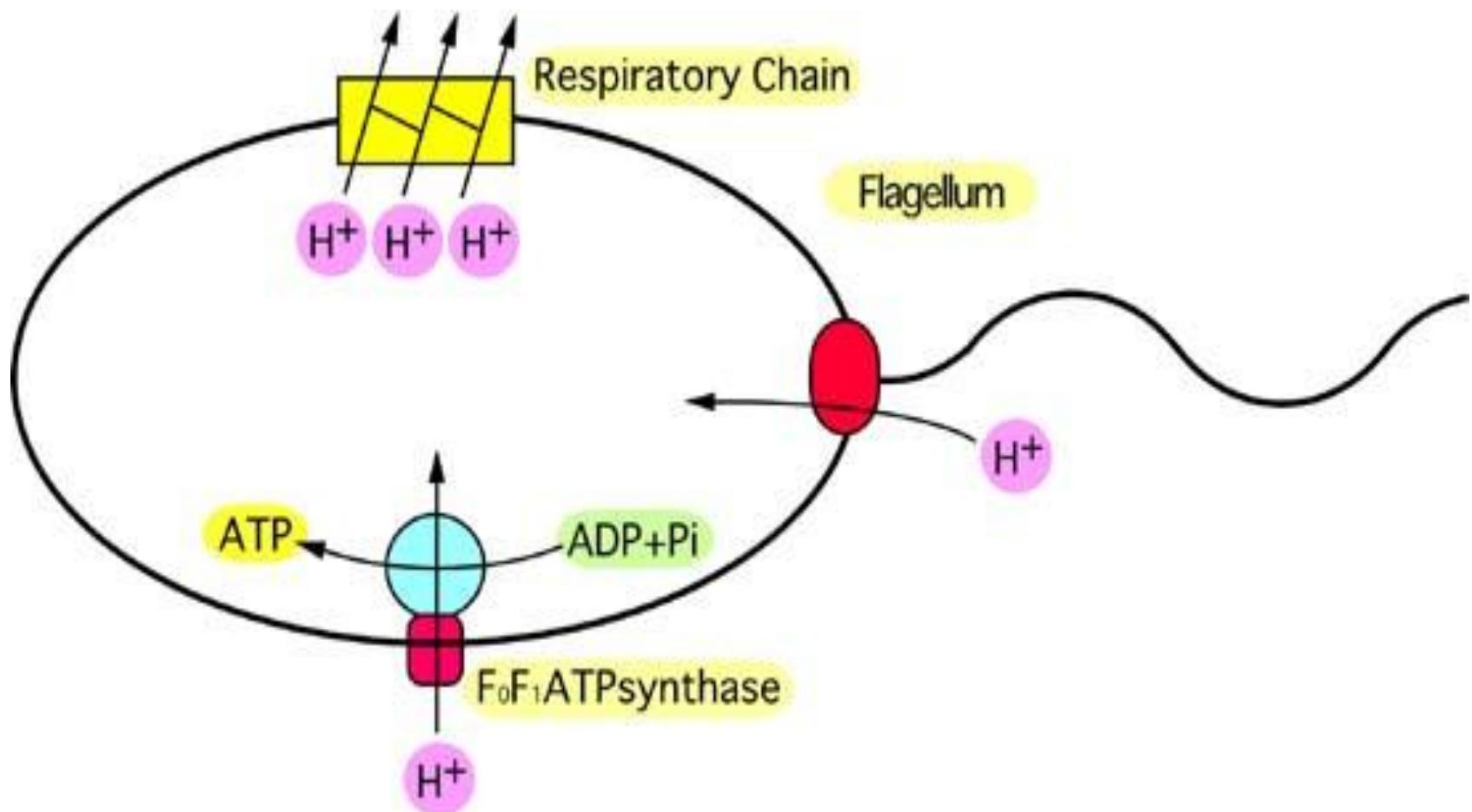
"SPONTANEOUS" REACTION
as time elapses



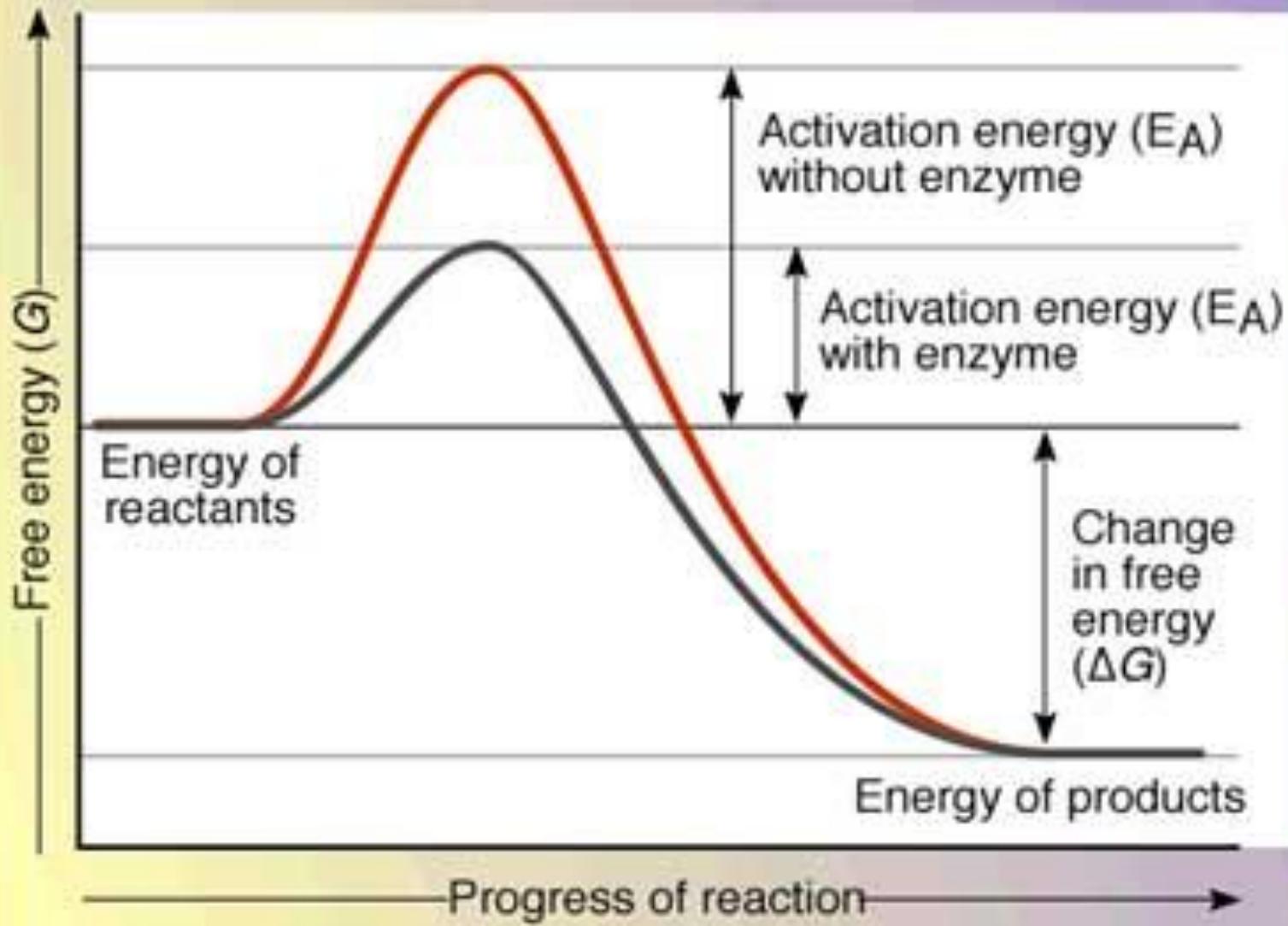
ORGANIZED EFFORT REQUIRING ENERGY INPUT

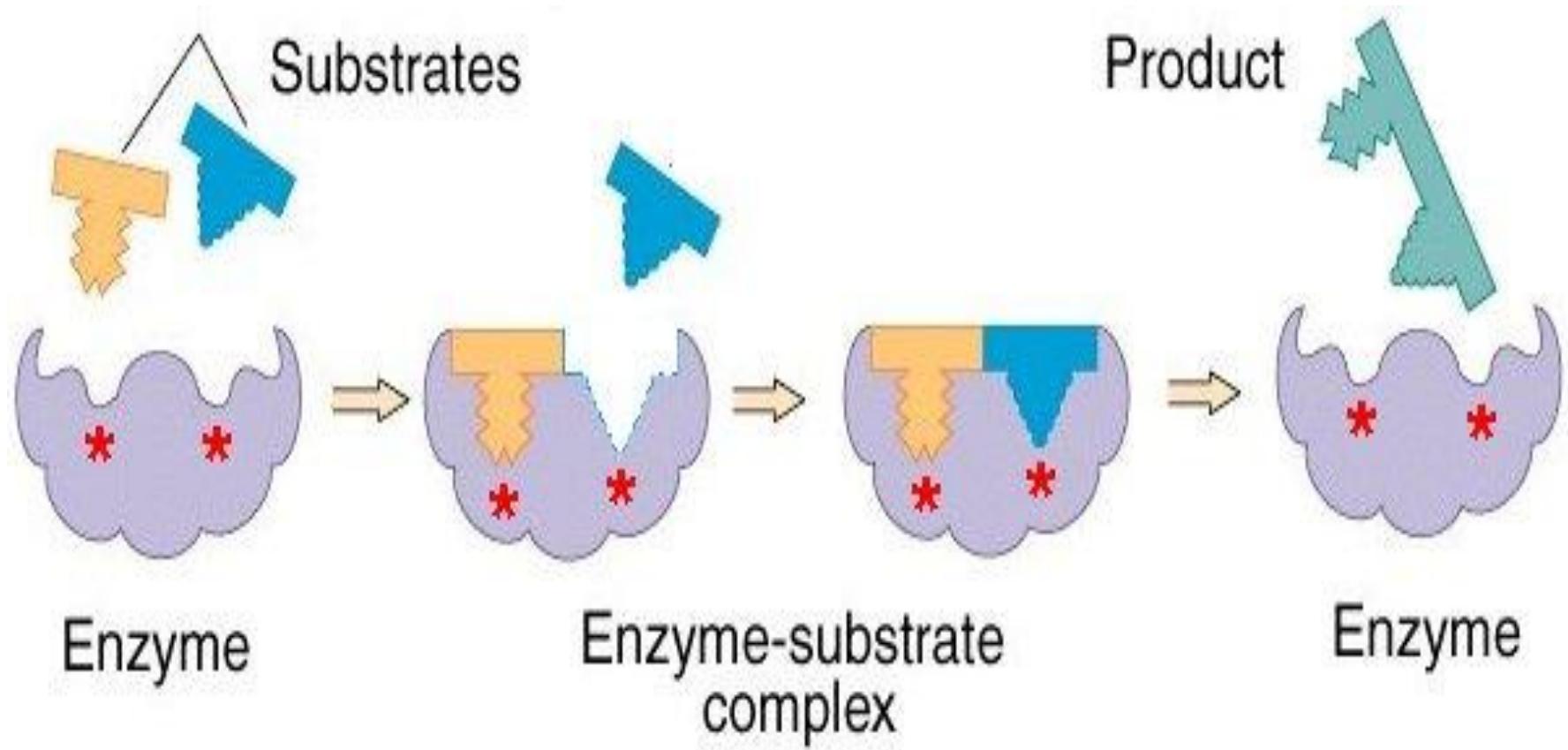
Substrate-Level Phosphorylation



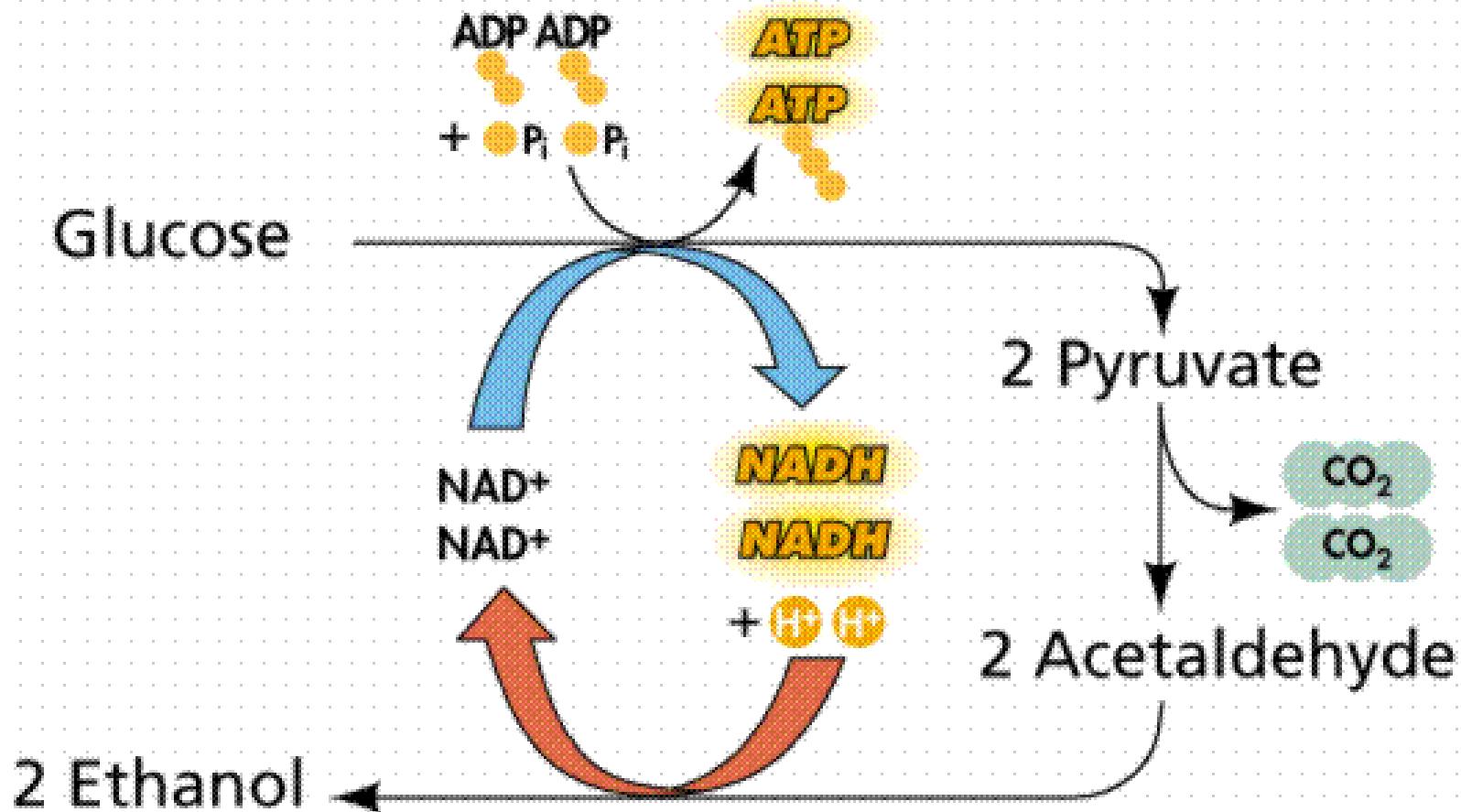


Flagellar motor is powered by the proton motive force
just as $F_0F_1ATPsynthase$





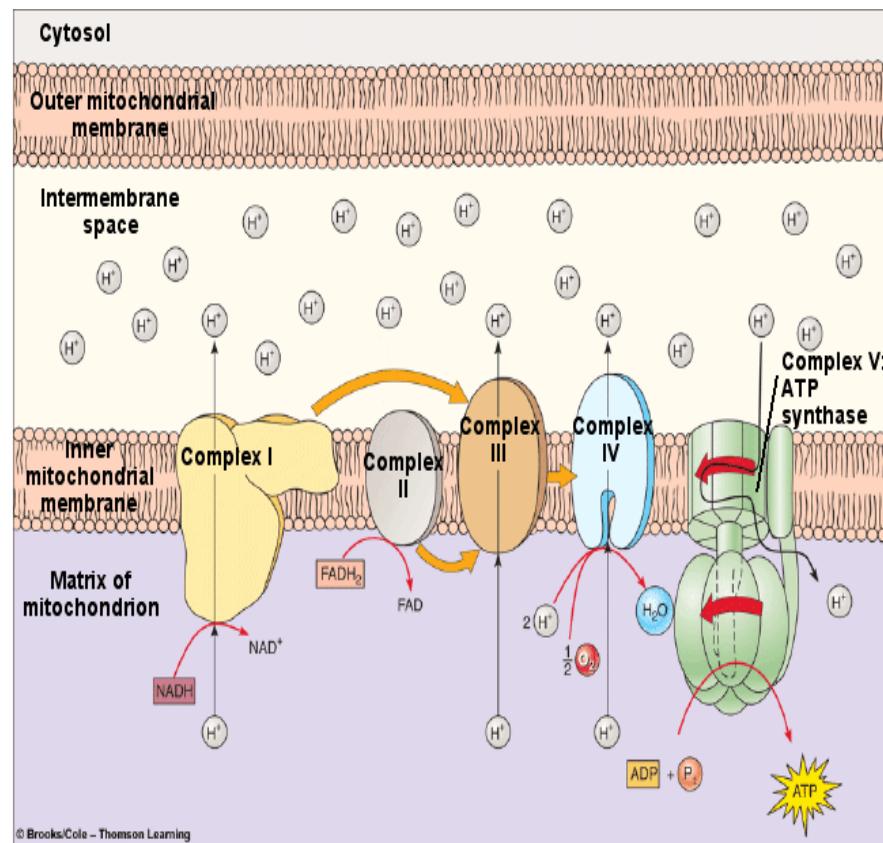
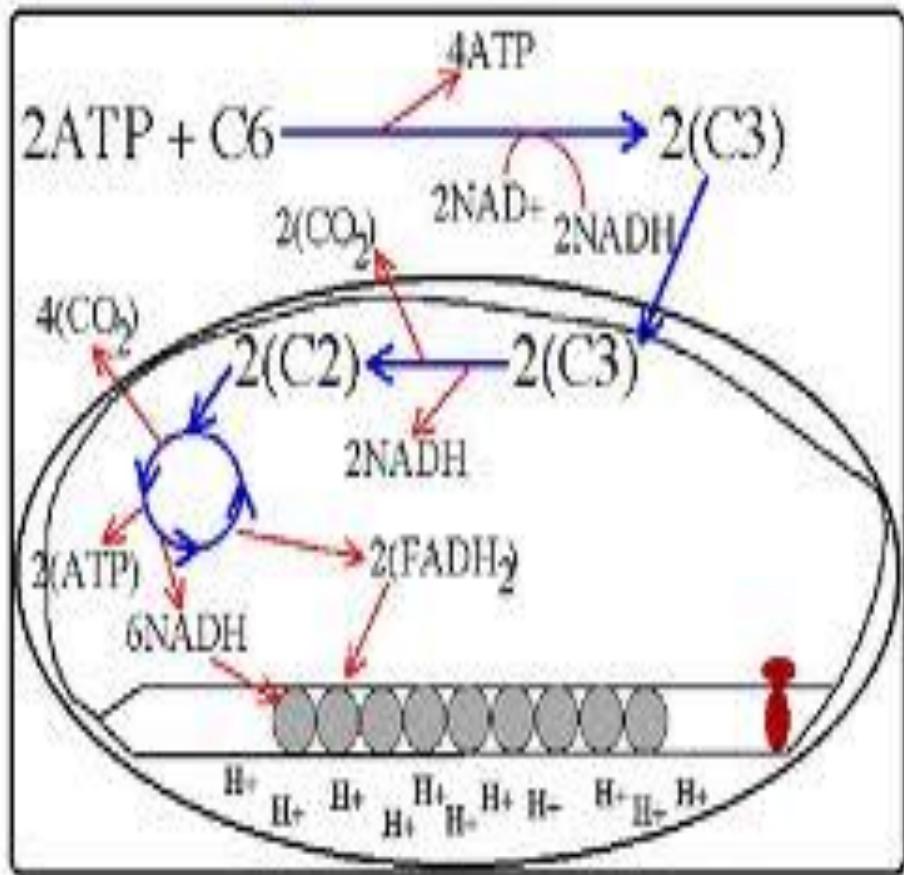
Fermentation





Respiration

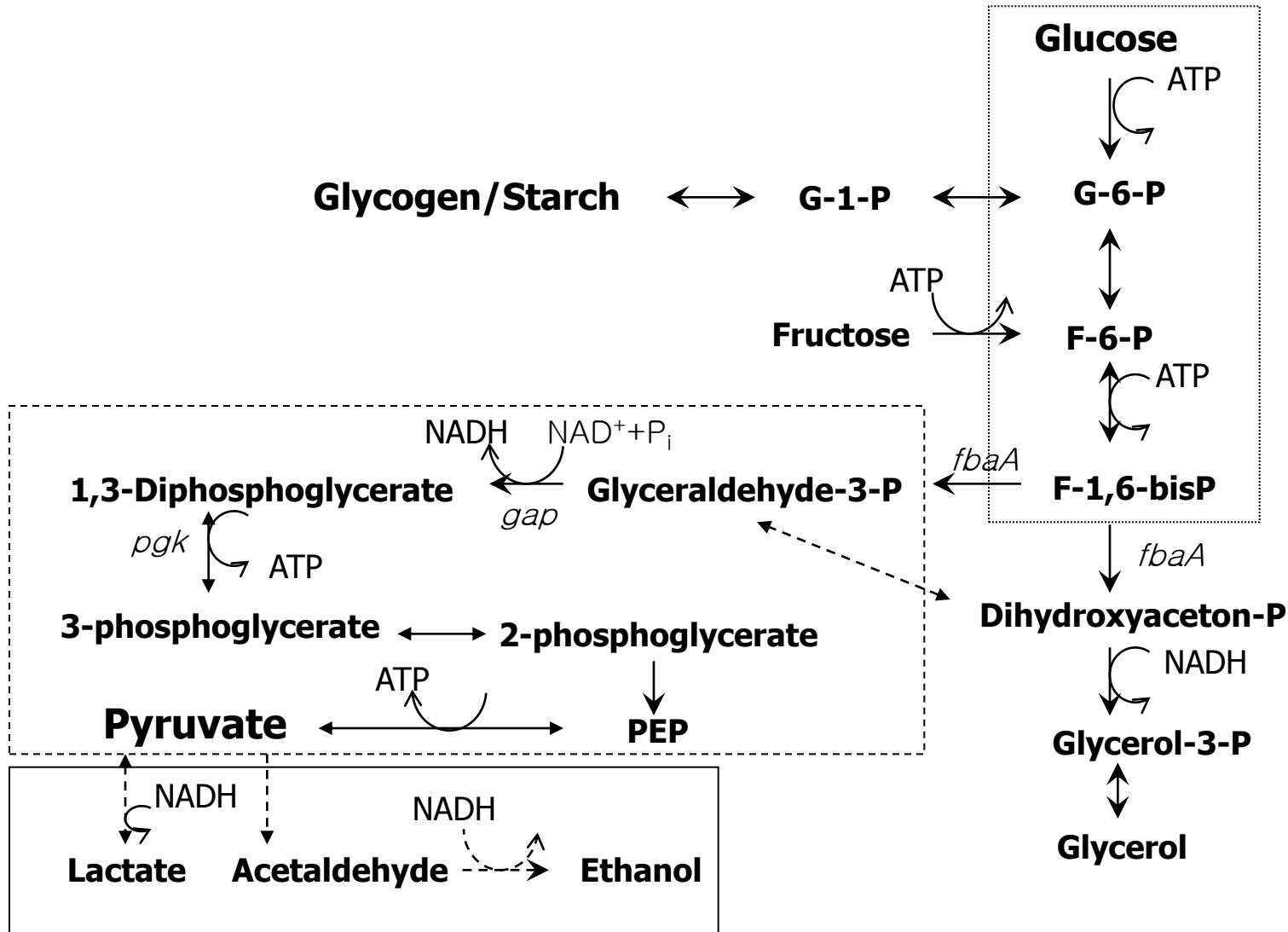
Cellular Respiration

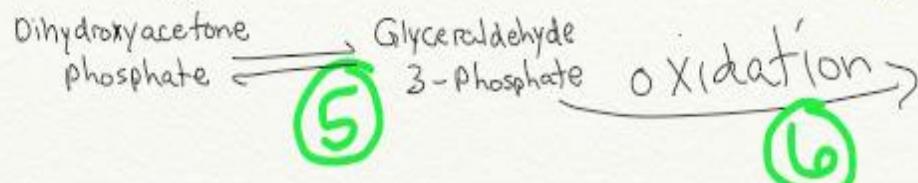
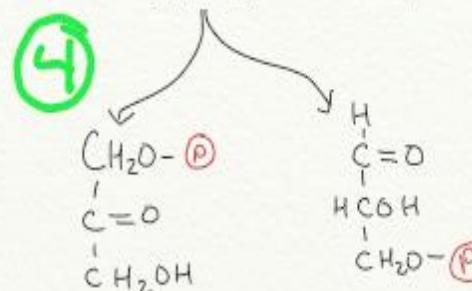
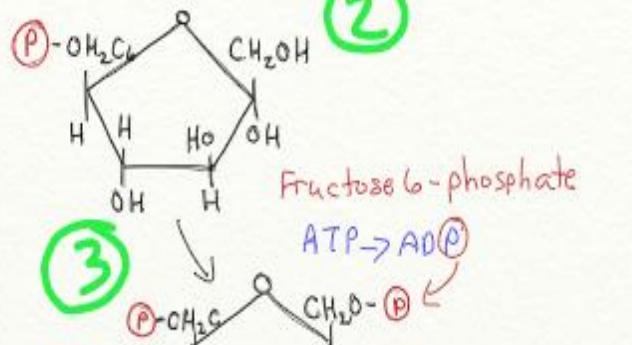
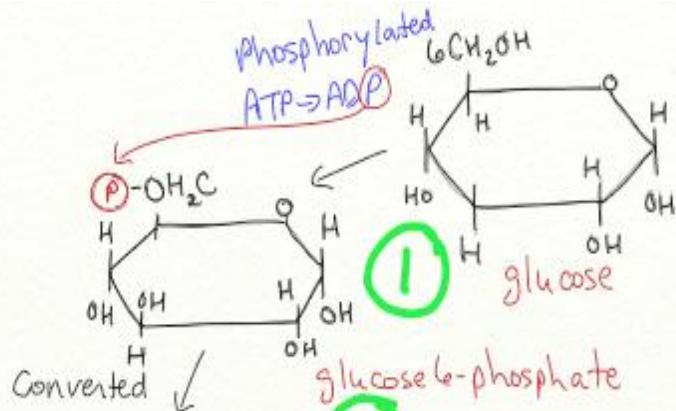


(a)

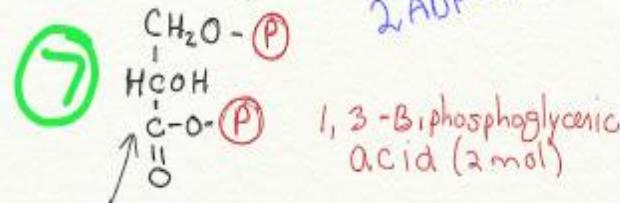
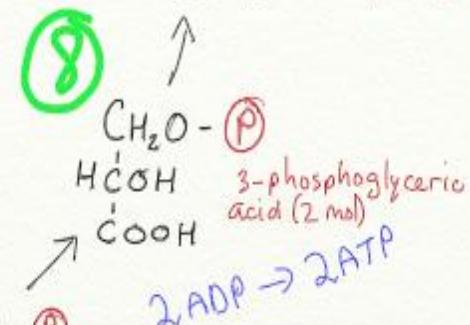
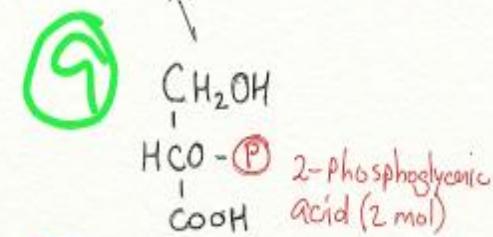
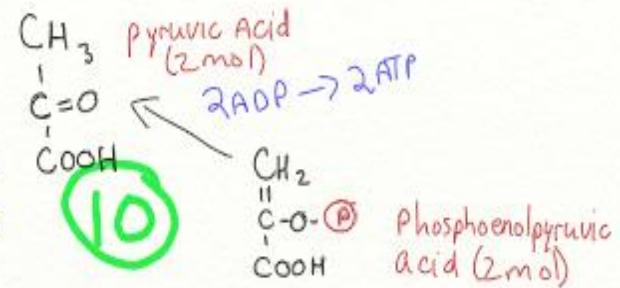
Fig. 7-10a(2)
Page 149

Glycolysis



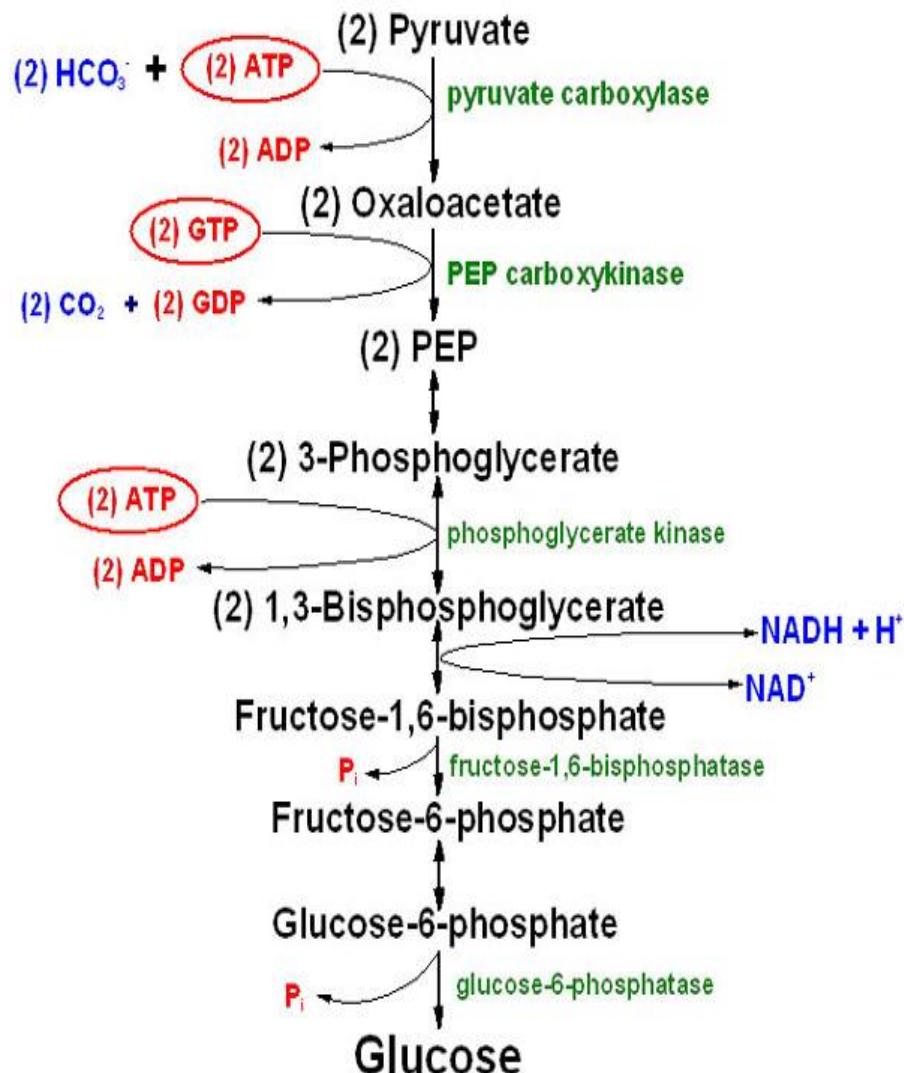
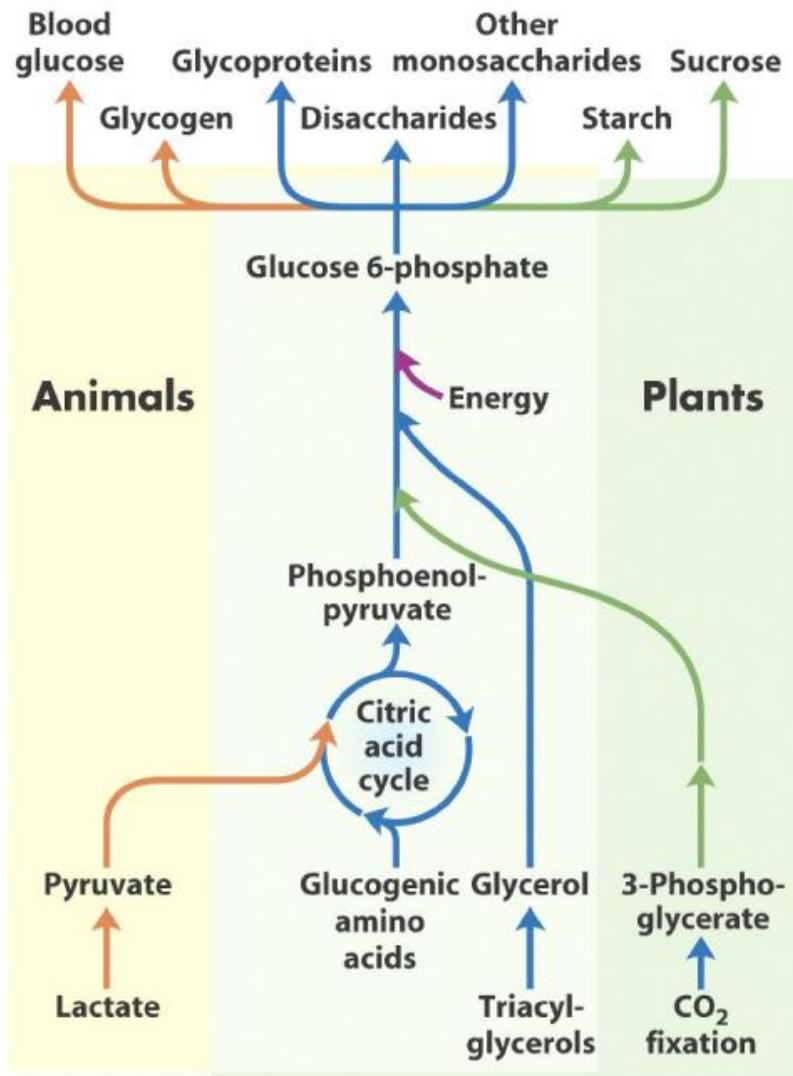


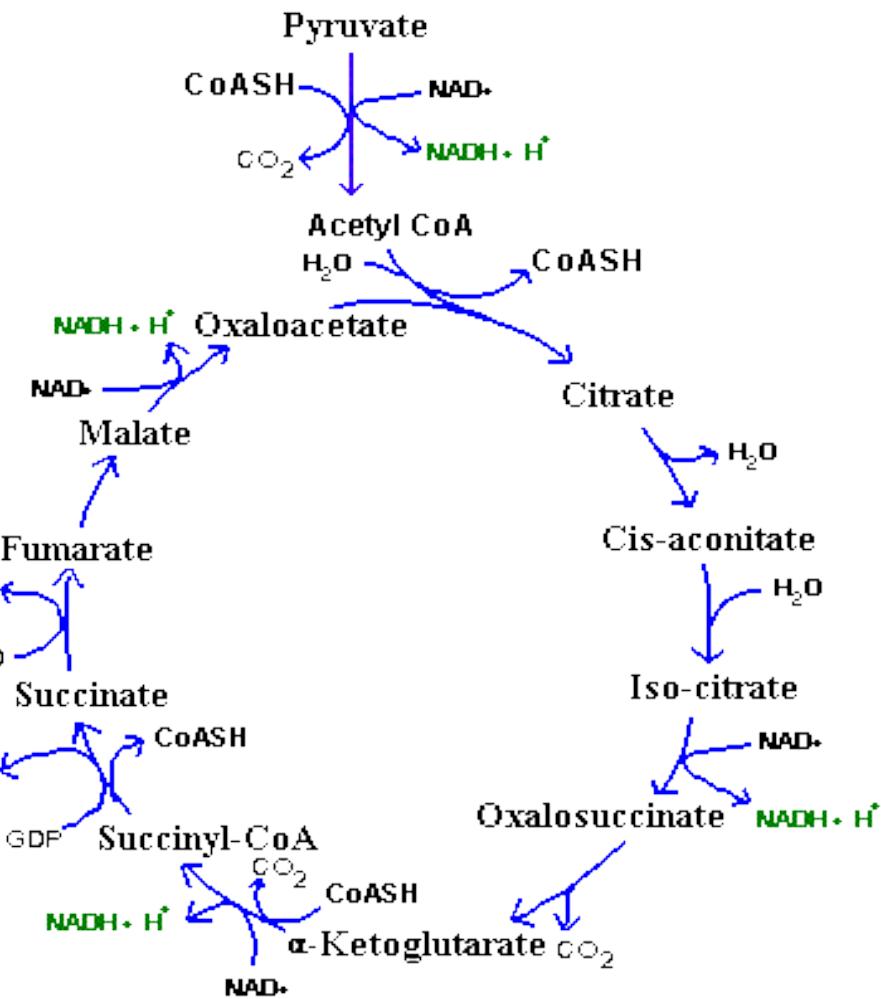
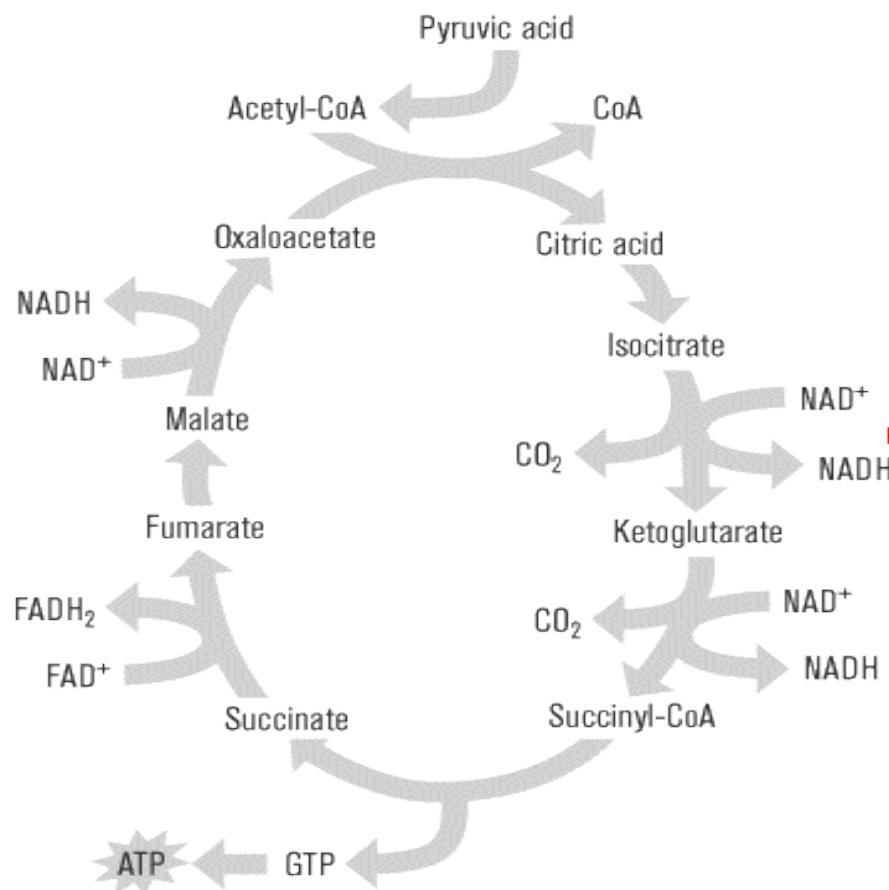
1 glucose → 2 pyruvic acids



(6)

Gluconeogenesis





Anaplerotic function

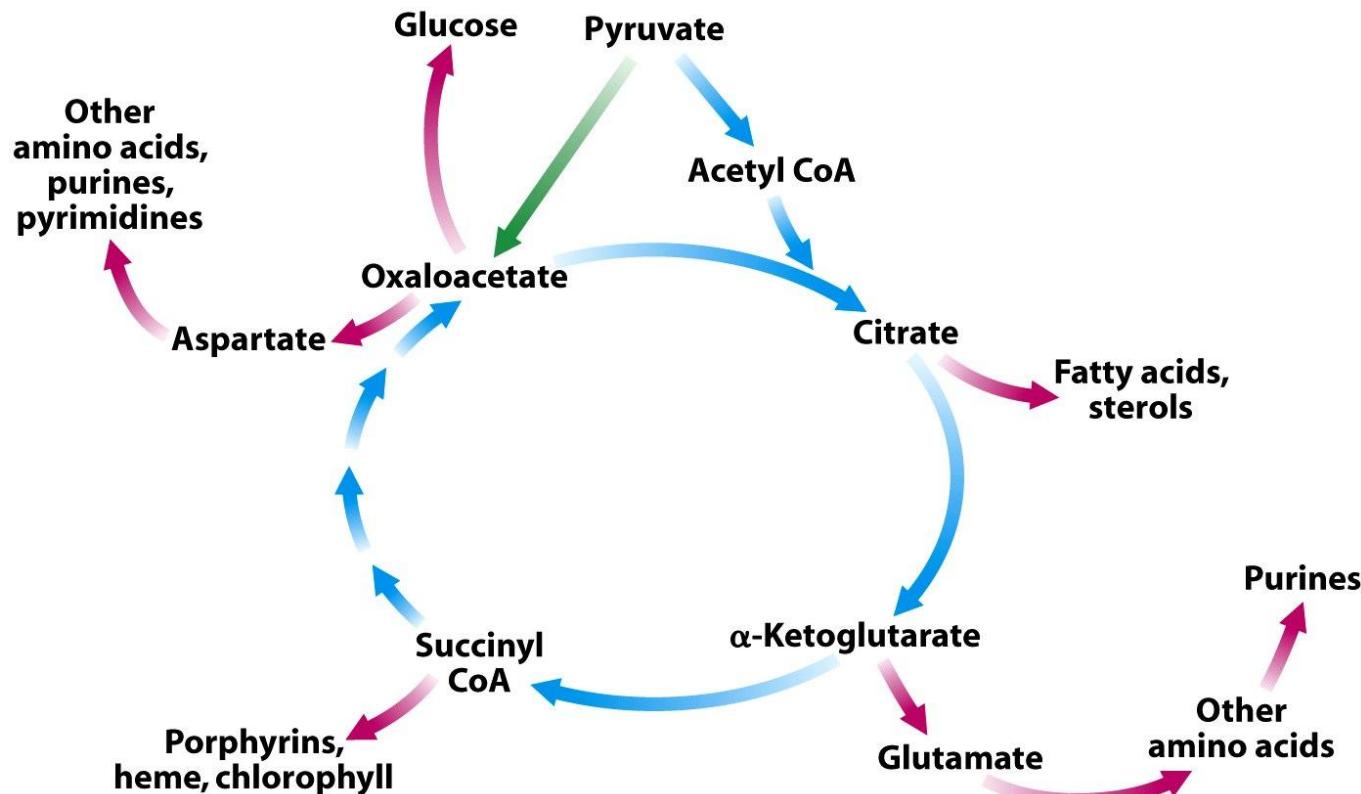
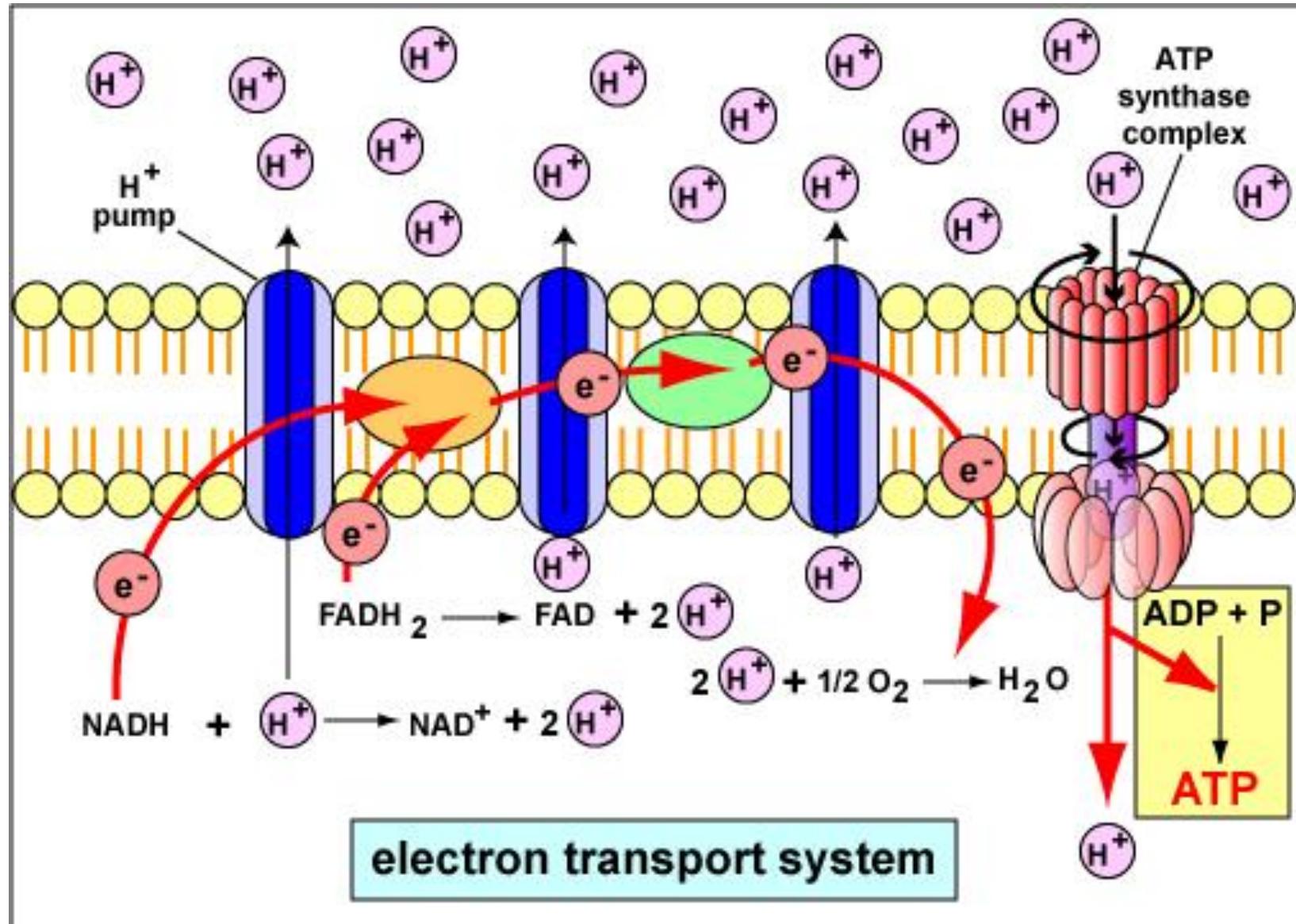
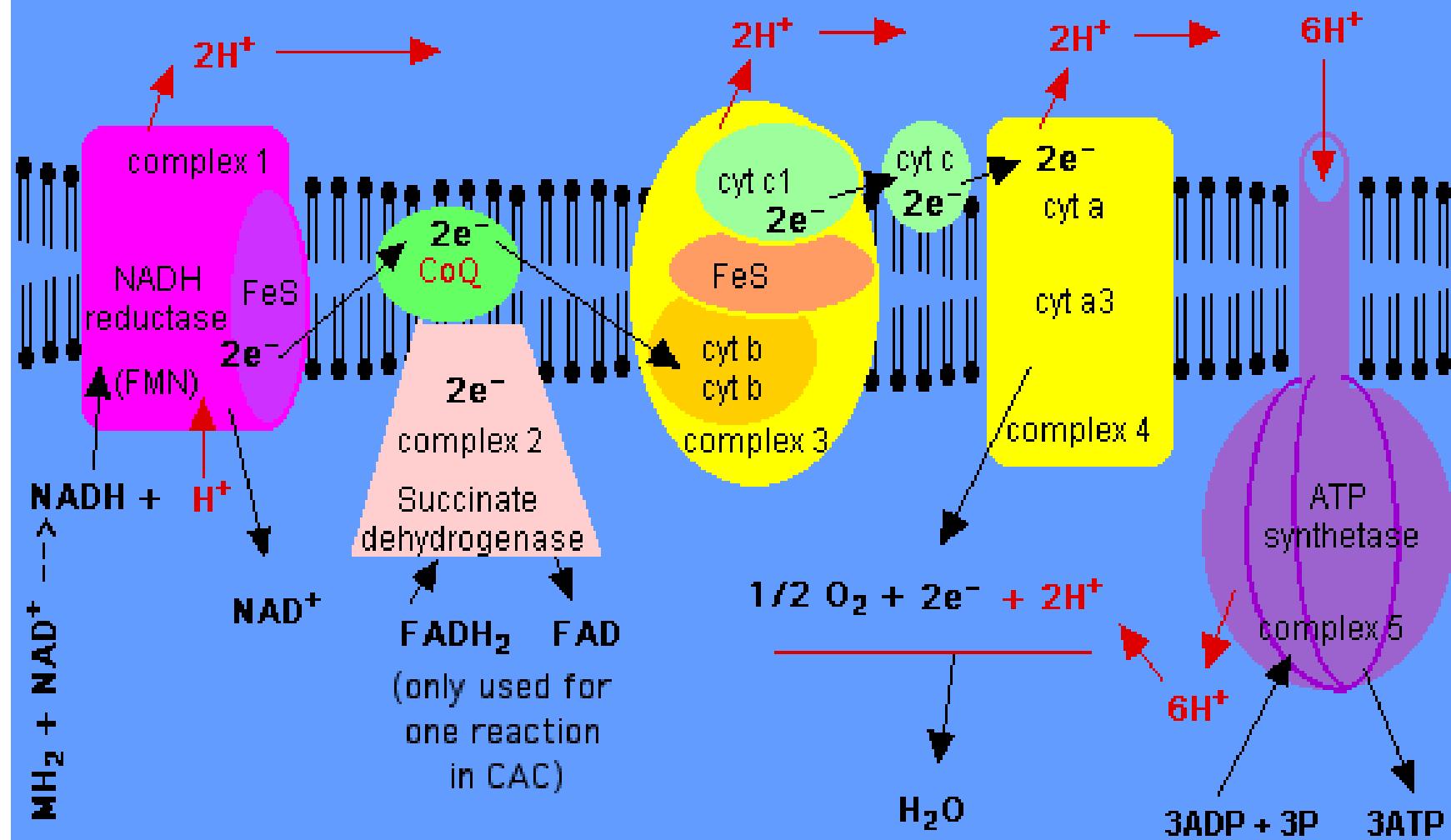


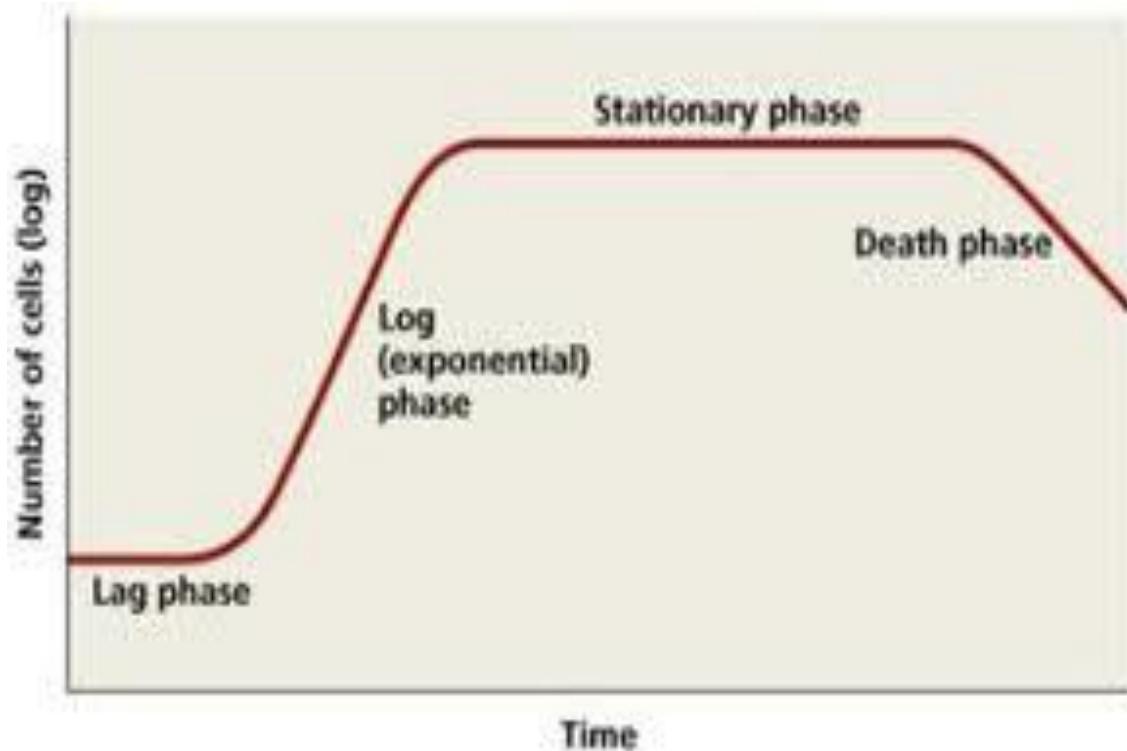
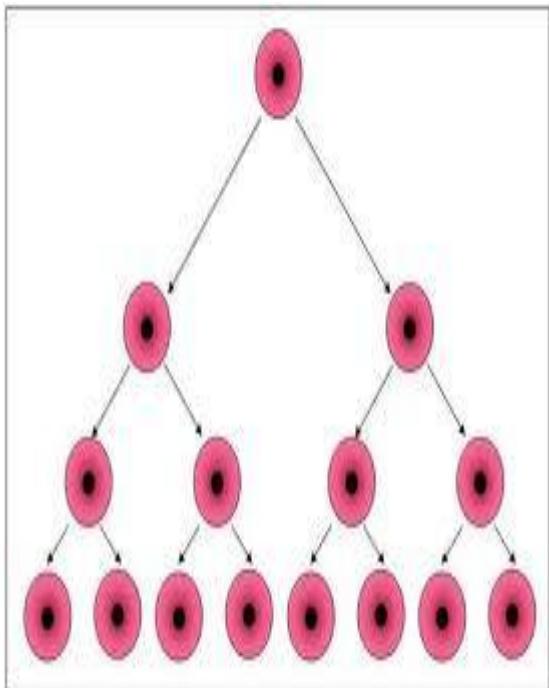
Figure 17-20
Biochemistry, Sixth Edition
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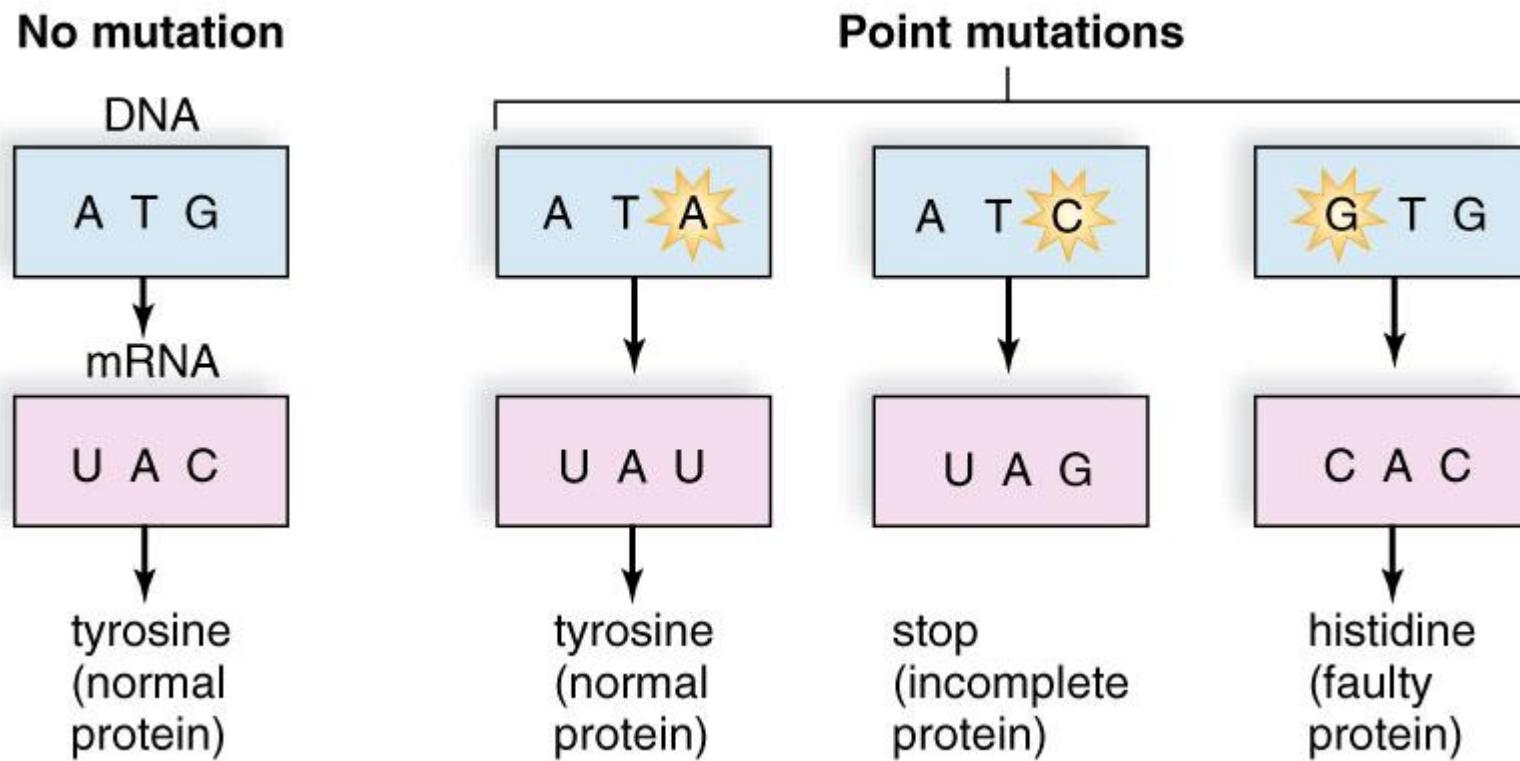
Electron Transport Chain inside Mitochondria



Cell growth



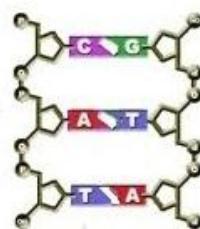
Mutation (silence, nonsense, missense)



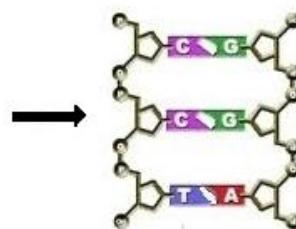
Mutation (point, deletion, insertion)

Types of Mutations

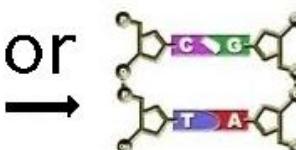
Original
DNA



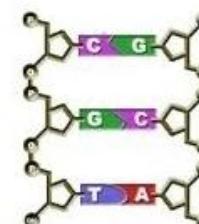
Mutated
DNA



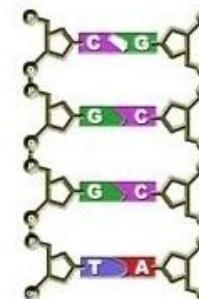
or



or



or



A deletion

An insertion