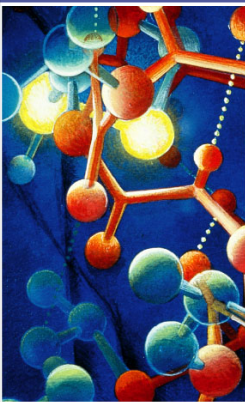


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The Chemistry of Life

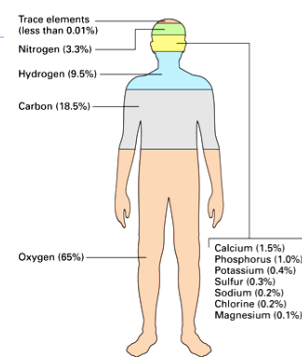
What are living creatures made of?

Why do we have to eat?

2006-2007

Elements of Life

- 96% of living organisms is made of:
 - carbon (C)
 - oxygen (O)
 - hydrogen (H)
 - nitrogen (N)




Trace elements (less than 0.01%)
 Nitrogen (3.3%)
 Hydrogen (9.5%)
 Carbon (18.5%)
 Oxygen (65%)

Calcium (1.5%)
 Phosphorus (1.0%)
 Potassium (0.4%)
 Sulfur (0.3%)
 Sodium (0.2%)
 Chlorine (0.2%)
 Magnesium (0.1%)

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Molecules of Life

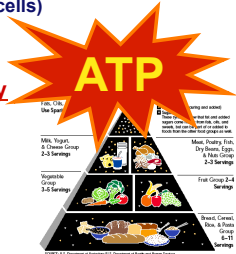
- Put C, H, O, N together in different ways to build living organisms
- What are bodies made of?
 - carbohydrates
 - sugars & starches
 - proteins
 - fats (lipids)
 - nucleic acids
 - DNA, RNA



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Why do we eat?

- We eat to take in more of these chemicals
 - Food for building materials
 - to make more of us (cells)
 - for growth
 - for repair
 - Food to make energy
 - calories
 - to make ATP



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What do we need to eat?

- Foods to give you more building blocks & more energy
 - for building & running bodies
 - carbohydrates
 - proteins
 - fats
 - nucleic acids
 - vitamins
 - minerals, salts
 - water



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Don't forget water

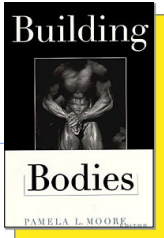
- Water
 - 65% of your body is H₂O
 - water is inorganic
 - doesn't contain carbon
- Rest of you is made of carbon molecules
 - organic molecules
 - carbohydrates
 - proteins
 - fats
 - nucleic acids

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How do we make these molecules?

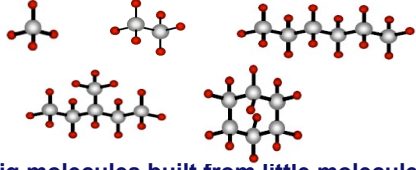
We build them!



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Building large molecules of life

- Chain together smaller molecules
 - building block molecules = **monomers**




- Big molecules built from little molecules
 - polymers**


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Macromolecules = large molecules that are formed from smaller organic molecules

- Small molecules = **building blocks**



- Bond them together = **polymers**



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Building important polymers

Carbohydrates = built from sugars

sugar – sugar – sugar – sugar – sugar – sugar

Proteins = built from amino acids

amino acid – amino acid – amino acid – amino acid – amino acid – amino acid

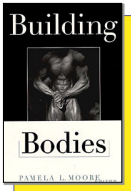
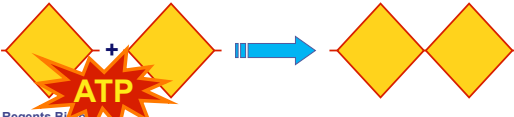
Nucleic acids (DNA) = built from nucleotides

nucleotide – nucleotide – nucleotide – nucleotide

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How to build large molecules

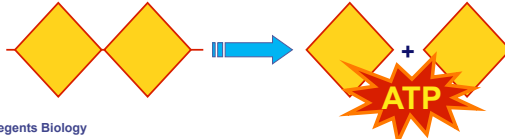
- Synthesis**
 - building bigger molecules from smaller molecules
 - building cells & bodies
 - repair
 - growth
 - reproduction

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How to take large molecules apart

- Decomposition (Digestion)**
 - taking big molecules apart
 - getting raw materials
 - for synthesis & growth
 - making energy (ATP)
 - for synthesis, growth & everyday functions



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