


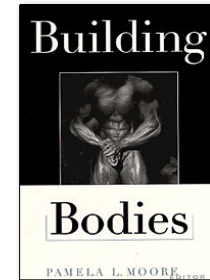
## Structure & Function of Large Biological Molecules

“One block at a time”



## Large Molecules of Life

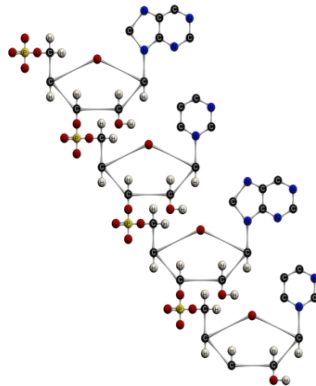
- Involve smaller organic molecules joining together to form larger molecules
  - 4 major classes of large biomolecules:
    - carbohydrates
    - lipids
    - proteins
    - nucleic acids
- Carbohydrates, proteins, and nucleic acids are so large, they are referred to as macromolecules
  - These three are polymers as you will soon learn.



AP Biology

## Macromolecules are Polymers

- Polymers (Greek *polys* = many and *meris* = part) are long molecules built by linking similar building blocks repeatedly to form a chain.
  - monomers
    - Generic term for the building blocks
    - Repeated small units
  - Polymers involve covalent bonds
  - A large variety of polymers can be built from a small set of monomers



AP Biology

## How to build a polymer

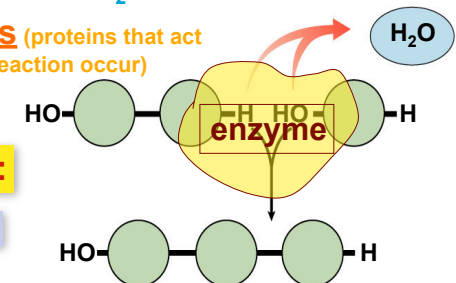
### Synthesis

- joins monomers covalently by “taking”  $H_2O$  out
  - one monomer donates OH
  - other monomer donates H
    - together these form  $H_2O$
- requires enzymes (proteins that act as catalysts, helping the reaction occur)
- requires energy



### Dehydration synthesis:

A Type of Condensation reaction



AP Biology

# Breaking down a polymer

Breaking up  
is hard to do!



## ■ **Hydrolysis** (from Greek *hydro* = water and *lysis* = break)

### ◆ use $H_2O$ to breakdown polymers

- reverse of dehydration synthesis
- cleaves off one monomer at a time
- $H_2O$  is split into H and OH

◆ H & OH attach to adjacent monomers after the covalent bond holding the monomers together is broken

### ◆ requires **enzymes** (proteins that act as catalysts, helping the reaction occur)

### ◆ releases **energy**

## Hydrolysis

Ex: Digestion. Enzymes break down polymers that are too big to be absorbed into the blood stream

