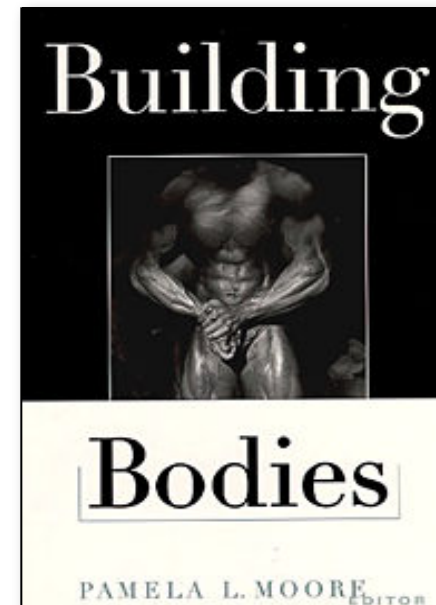




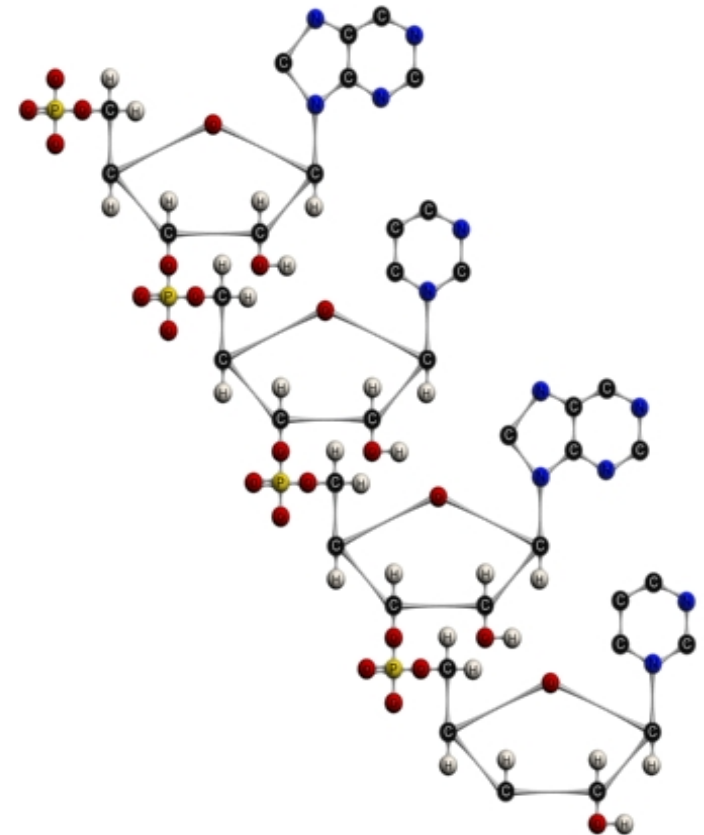
# Large Molecules of Life

- Involve smaller organic molecules joining together to form larger molecules
  - ◆ 4 major classes of large biomolecules:
    1. carbohydrates
    2. lipids
    3. proteins
    4. 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.



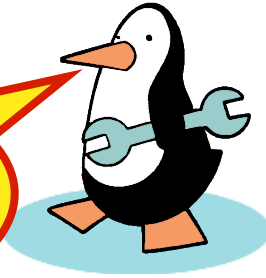
# Macromolecules are Polymers

- **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



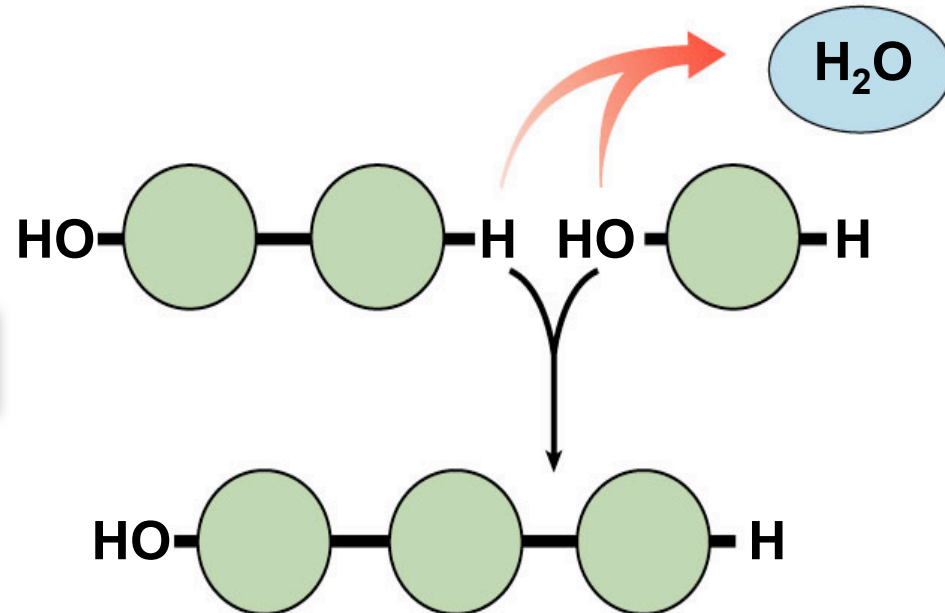
# How to build a polymer

You gotta  
be open to  
"bonding!"



## ■ Synthesis

- ◆ joins monomers covalently by "taking"  $H_2O$  out
  - one monomer donates  $OH^-$
  - other monomer donates  $H^+$ 
    - ◆ together these form  $H_2O$

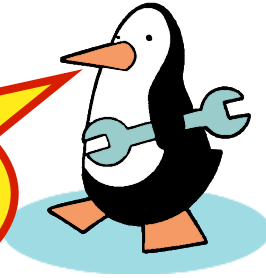


**Dehydration synthesis:**

A Type of Condensation reaction

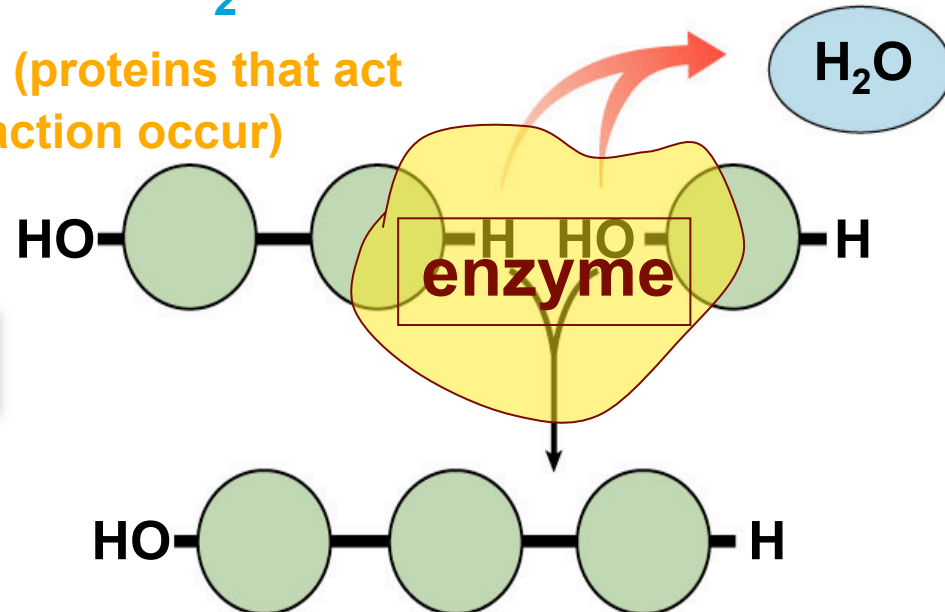
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- ◆ requires enzymes (proteins that act as catalysts, helping the reaction occur)
- ◆ requires energy

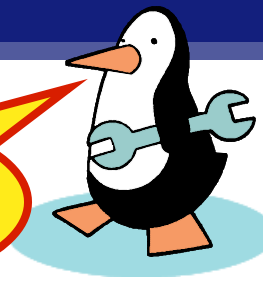


**Dehydration synthesis:**

A Type of Condensation reaction

# Breaking down a polymer

Breaking up  
is hard to do!



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

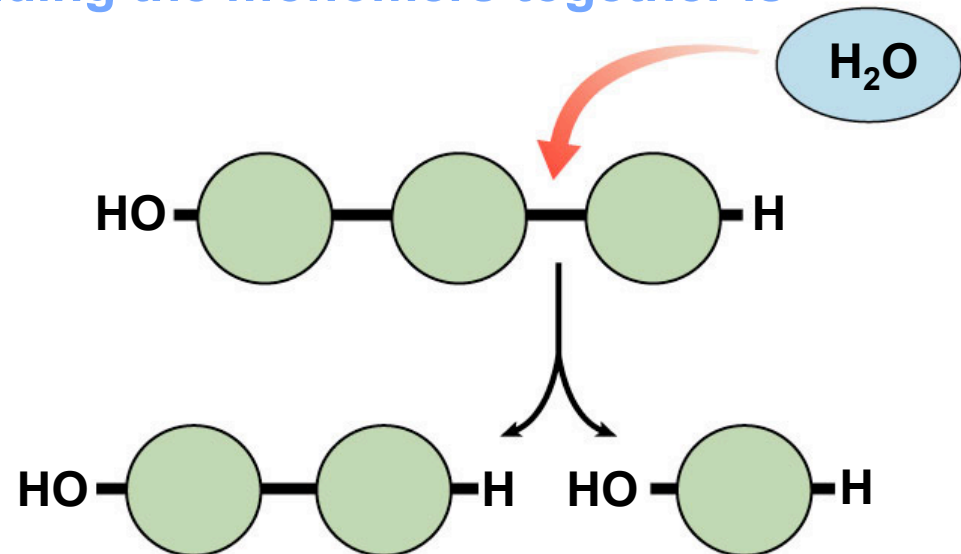
### ◆ use $H_2O$ to breakdown polymers

- 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

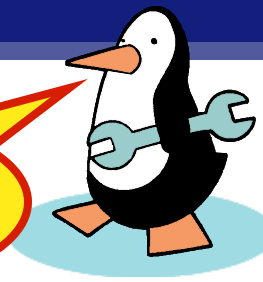
## Hydrolysis

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



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  - ◆ 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

