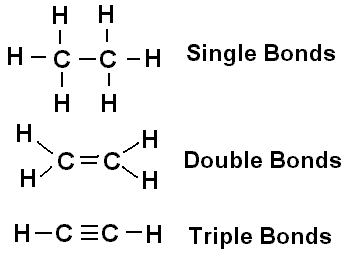
Chapter 3:

Basic Biochemistry of the Molecules of Life

I. Organic Molecules

1. Life’s molecular diversity is based on the properties of \_\_\_\_\_\_\_\_\_\_\_\_.
2. Almost all the molecules a cell makes are composed of \_\_\_\_\_\_\_\_\_ bonded to
   1. Other carbons
   2. \_\_\_\_\_\_\_\_\_\_\_\_\_, oxygen, nitrogen
3. Carbon-based molecules (when combined with hydrogen or possessing a long carbon chain including oxygen or nitrogen) are called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

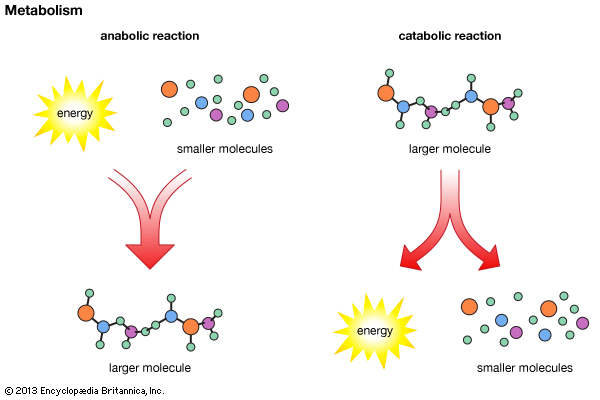
II. Carbon Atom

* 1. Carbon is essential for life: “the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ of life”; “\_\_\_\_\_\_\_\_\_-based lifeforms”

1. Carbon contains \_\_\_\_\_\_\_ in its outer shell (for bonding).
2. Each carbon atom creates 4 bonds: \_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_, or \_\_\_\_\_\_\_\_\_\_\_\_\_ bonds
3. It is the “\_\_\_\_\_\_\_ \_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_ of Chemistry.”
   1. Macromolecules or \_\_\_\_\_\_\_\_\_\_\_\_\_
      1. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (larger) are built from smaller molecules called \_\_\_\_\_\_\_\_\_\_\_\_.
      2. Organic Monomers Organic Polymers
4. Simple sugars (monosaccharides) 🡪 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
5. Fatty acids & glycerol 🡪 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
6. amino acids 🡪 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
7. Nucleotides 🡪 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

III. Organic Reactions

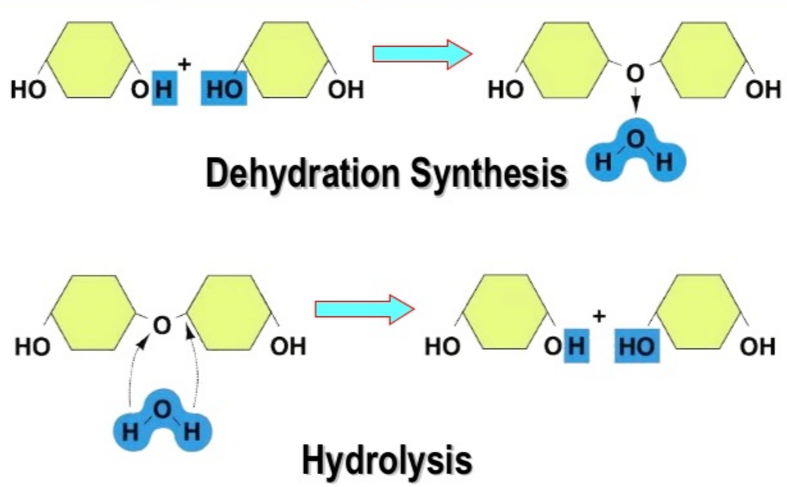
* 1. A\_\_\_\_\_\_\_\_\_\_\_\_\_ Reactions: \_\_\_\_\_\_\_\_\_\_\_ macromolecules from monomers.



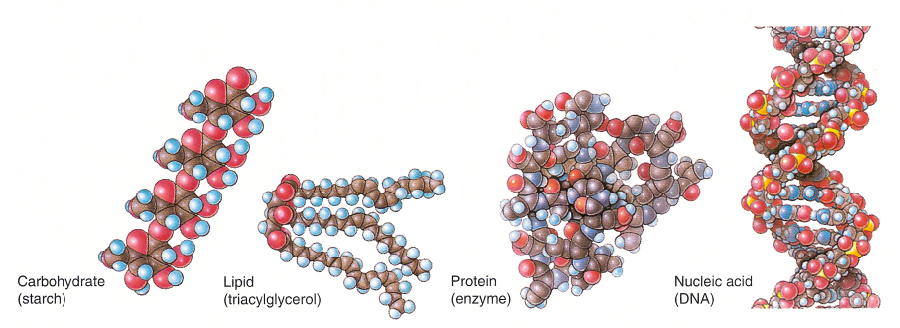
* 1. C\_\_\_\_\_\_\_\_\_\_\_\_\_ Reactions: \_\_\_\_\_\_\_\_\_\_\_\_ macromolecules into its components (monomers)
  2. D\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Synthesis (C\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Reaction)

1. A\_\_\_\_\_\_\_\_\_\_\_ reactions which form macromolecules by combining \_\_\_\_\_\_\_\_\_ by “removing \_\_\_\_\_\_\_\_\_\_\_.”

* 1. H\_\_\_\_\_\_\_\_\_\_\_\_\_ Reactions
     1. C\_\_\_\_\_\_\_\_\_\_\_\_ Reactions which break down \_\_\_\_\_\_\_\_\_\_\_\_\_ by removing monomers one at a time. [Opposite of \_\_\_\_\_\_\_\_\_\_\_\_\_\_ reaction]
     2. Separates monomers by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

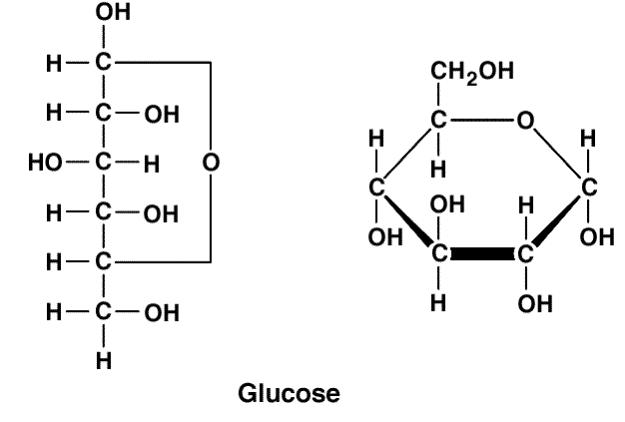


|  |  |  |
| --- | --- | --- |
| Biochemical Molecules | | |
| Category | Monomer | Polymer |
| Carbohydrates |  |  |
|  | Amino acids |  |
|  |  | Lipid |
|  |  | Nucleic acid |



IV. Carbohydrates

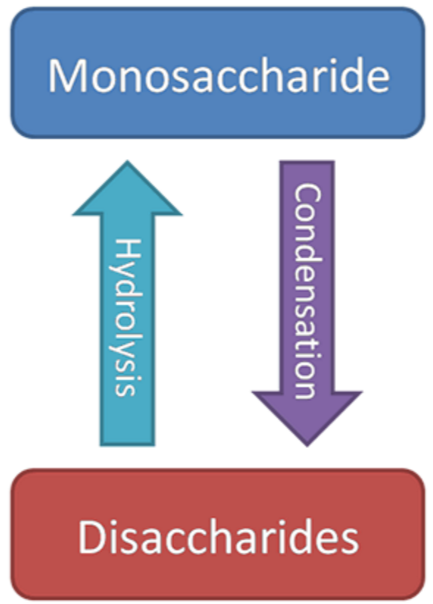
* 1. Carbohydrates are an important source of \_\_\_\_\_\_\_\_\_\_ for all life forms.
  2. Carbohydrates are made of only \_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_ in a \_\_\_\_\_\_\_ Ratio.
     1. CH2O
     2. Includes \_\_\_\_\_\_\_\_\_ sugars and \_\_\_\_\_\_\_\_\_\_\_\_\_ (complex sugars)
     3. Classified according to the number of\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_ they contain.
     4. Monomer: \_\_\_\_\_\_\_\_saccharides



Cyclic

Straight

* + 1. Called \_\_\_\_\_\_\_\_\_\_\_\_\_
  1. Exist in the following forms
     1. C\_\_\_\_\_\_\_\_\_
        1. Occurring in aqueous solutions in life environments
     2. S\_\_\_\_\_\_\_\_\_\_ Chain:
  2. Carbohydrate Synthesis

1. Cells link monosaccharides by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to form more complex sugars and polysaccharides.
2. \_\_\_\_saccharides (Double Sugar):
3. Formed by joining \_\_\_\_\_\_ monosaccharides by dehydration synthesis
4. Forms a bond called a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
5. Examples are \_\_\_\_\_\_\_\_\_\_\_\_\_\_ (table sugar), \_\_\_\_\_\_\_\_\_\_\_\_(milk sugar), \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_(grain sugar).
6. Cells break down disaccharides by \_\_\_\_\_\_\_\_\_\_\_\_\_ (adding a molecule of water)

3. Polysaccharides (\_\_\_\_\_\_\_\_ Sugars):

1. Chains of thousands of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
2. Also called \_\_\_\_\_\_\_\_\_\_ carbohydrates
3. They function as

\_\_\_\_\_\_\_\_\_\_\_\_\_ Storage Molecules

\_\_\_\_\_\_\_\_\_\_\_\_\_ molecules

S\_\_\_\_\_\_\_\_ (Energy \_\_\_\_\_\_\_\_\_ molecule)

* Chain of molecules of \_\_\_\_\_\_\_\_\_\_\_ formed by \_\_\_\_\_\_\_\_\_\_
* This is the way \_\_\_\_\_\_\_\_\_\_\_ store excess \_\_\_\_\_\_\_\_\_
* We consume it in products like potatoes and carrots.

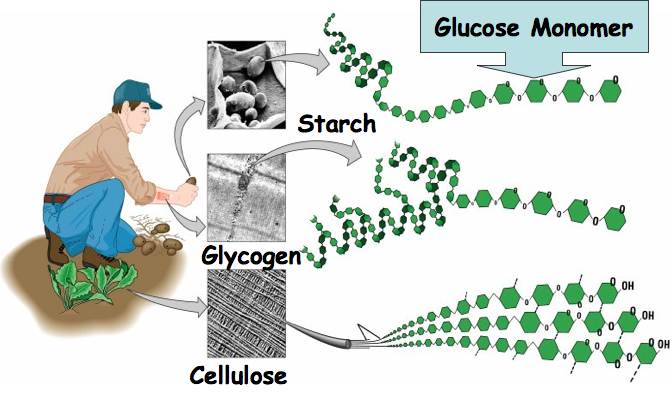
G\_\_\_\_\_\_\_\_\_\_\_\_ (Energy storage molecule)

* Chain of molecules of \_\_\_\_\_\_\_\_\_\_\_ formed by \_\_\_\_\_\_\_\_\_\_
* This is the way \_\_\_\_\_\_\_\_\_\_ store excess \_\_\_\_\_\_\_\_\_.
* Stored in the \_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_

Structural Molecule:

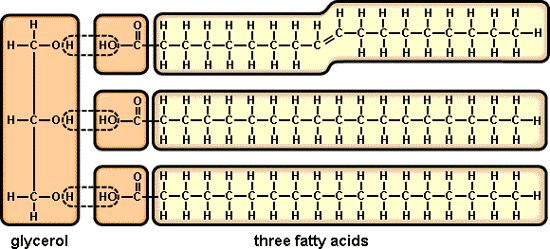
C\_\_\_\_\_\_\_\_\_\_\_

* Chain of \_\_\_\_\_\_\_\_\_\_\_
* Primary constituent of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Major component of wood and paper
* \_\_\_\_\_\_\_\_\_\_\_\_\_\_ by most animals.



V. L\_\_\_\_\_\_\_\_\_\_\_

* 1. Contain C\_\_\_\_\_\_\_\_, H\_\_\_\_\_\_\_\_\_\_, and O\_\_\_\_\_\_\_\_\_
  2. They are \_\_\_\_\_\_\_\_\_\_\_\_ which means that they are “water fearing” or \_\_\_\_\_\_\_\_\_\_ in water.



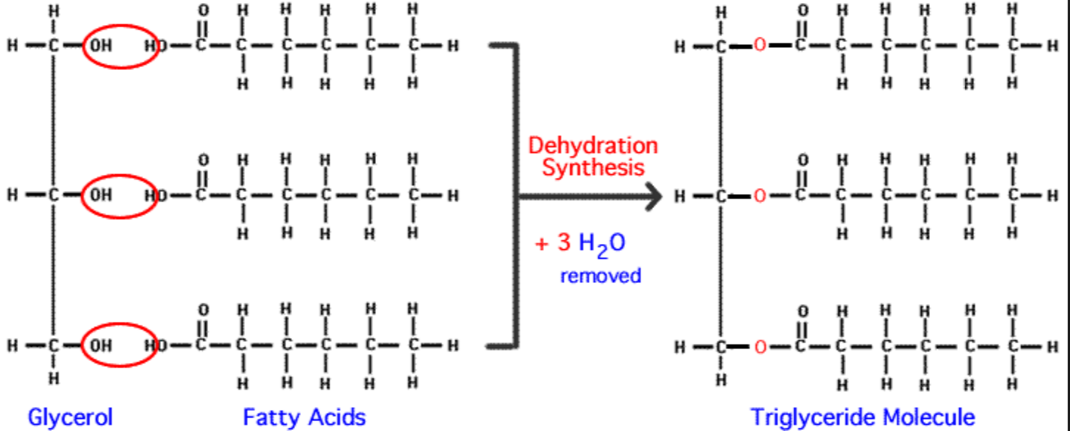
* 1. Protects and \_\_\_\_\_\_\_\_\_\_\_\_ body organs.
  2. Mostly \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Molecules.
  3. Type of lipid we will consider: Fats (Triglycerides)
  4. Lipids are composed of \_\_\_\_\_\_ monomers: \_\_\_\_\_\_\_\_\_\_\_\_\_ (1 molecule) + \_\_\_\_\_\_\_\_ acid tails (3)
     1. Types of Fatty Acid tails:

S\_\_\_\_\_\_\_\_\_\_\_\_\_ fatty acids have the maximum number of hydrogens bonded to the carbons (all \_\_\_\_\_\_\_\_\_ covalent bonds between carbons); Animal \_\_\_\_\_\_\_\_\_

U\_\_\_\_\_\_\_\_\_\_\_\_ fatty acids contain one or more \_\_\_\_\_\_\_\_ bonds; \_\_\_\_\_\_\_\_\_

1. Saturated fatty acids are \_\_\_\_\_\_\_\_\_\_\_\_\_\_ at room temperature (butter, margarine, peanuts, fried foods, whole milk)
2. Unsaturated fatty acids are \_\_\_\_\_\_\_\_\_\_\_ at room temperature (avocado, oils, red meats, flax)

G. T\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ are made from the Dehydration Synthesis of \_\_\_\_\_\_\_\_\_\_\_+ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ forming E\_\_\_\_\_\_\_ bonds.



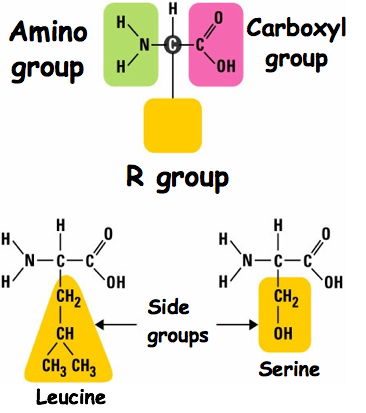
VI. P\_\_\_\_\_\_\_\_\_\_\_\_\_

* 1. Proteins account for over half of the body’s \_\_\_\_\_\_\_\_\_\_\_ matter.
  2. Main Functions:

1. Provide \_\_\_\_\_\_\_\_\_\_\_\_\_\_ for body tissues.

2. Play a vital role in \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

3. Act as \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_.

* 1. Contain: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_ and sometimes ,\_\_\_\_\_\_\_\_\_\_\_\_
  2. Monomers: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (\_\_\_\_ types in humans)
  3. Amino Acids have a central carbon with \_\_\_ groups attached
  4. Dehydration Synthesis
     1. Cells link \_\_\_\_\_\_\_\_\_\_\_ together to make \_\_\_\_\_\_\_\_\_ by dehydration synthesis.
     2. P\_\_\_\_\_\_\_\_\_\_ Bonds: form to hold the amino acids together.
  5. Protein Structure:
     1. The functions of different types of proteins depend on their individual \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
     2. A P\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ chain contains hundreds or thousands of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_linked by peptide bonds. Name the 4 levels of protein structure:
        1. \_\_\_\_\_\_\_\_\_\_\_\_\_, b. \_\_\_\_\_\_\_\_\_\_\_\_\_\_, c. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, d. \_\_\_\_\_\_\_\_\_\_\_\_\_\_
     3. The amino acid \_\_\_\_\_\_\_\_\_\_\_\_ causes the polypeptide to assume a particular shape.
     4. If a protein’s shape is \_\_\_\_\_\_\_\_\_\_\_\_\_\_, it can no longer function
     5. In the process of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, a protein
        1. Unravels
        2. Loses its specific shape
        3. Loses its \_\_\_\_\_\_\_\_\_\_\_
     6. Proteins can be denatured by changes in \_\_\_\_\_\_\_\_\_\_\_ concentration, changes in \_\_\_\_, or high \_\_\_\_\_\_\_\_\_.

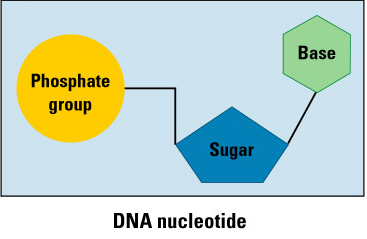
VII. Nucleic Acids

* 1. Make up the \_\_\_\_\_\_\_\_\_\_\_\_ or units of inheritance.

1. Determine the type of organism you will be.

2. Controls \_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_ by dictating protein structure.

* 1. They are composed of \_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  2. Two Types exist:

 1. D\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Acid (\_\_\_\_\_\_\_)

2. R\_\_\_\_\_\_\_\_\_\_\_\_\_ Acid (\_\_\_\_\_\_)

* 1. Nucleic Acids are built from \_\_\_\_\_\_\_\_\_\_\_\_\_ (monomers):

1. Pentose: 5 carbon \_\_\_\_\_\_\_\_\_\_

-\_\_\_\_\_\_\_\_\_\_\_\_\_\_ in RNA

 -Deoxyribose in \_\_\_\_\_\_\_\_.

2. P\_\_\_\_\_\_\_\_\_\_\_\_ Group

3. Nitrogenous \_\_\_\_\_\_\_\_\_\_:

- A = \_\_\_\_\_\_\_\_\_\_\_\_\_

- G = \_\_\_\_\_\_\_\_\_\_\_\_\_

- C = \_\_\_\_\_\_\_\_\_\_\_\_\_

- T = \_\_\_\_\_\_\_\_\_\_\_\_\_ (only in DNA)

- U = \_\_\_\_\_\_\_\_\_\_\_\_\_ (only in RNA)

* 1. Deoxyribonucleic Acid (DNA)

1. The genetic material found within the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

2. Provides instructions for every \_\_\_\_\_\_\_\_\_\_\_ in the body.

3. Organized by complimentary bases to form a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

4. Contains the sugar deoxyribose and the bases \_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_.

5. Replicates before \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

* 1. Ribonucleic Acid (RNA)

1. Carries out \_\_\_\_\_\_\_ instructions for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (translation) in the cytoplasm.

2. Created from a template of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (Transcription) in the nucleus.

3. Organized by complimentary bases to form a \_\_\_\_\_\_\_\_ stranded helix.

4. Contains the sugar \_\_\_\_\_\_\_\_\_\_\_ and the nitrogenous bases \_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_, \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

* 1. Bonding in Nucleic Acids

1. H\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Bonds

-Hydrogen bonds form between 2 nucleic acid strands in \_\_\_\_\_\_\_

-\_\_\_\_ :: \_\_\_\_ with two hydrogen bonds

-\_\_\_\_ ::: \_\_\_\_ with three hydrogen bonds

2. Sugar-Phosphate Backbone: \_\_\_\_\_\_\_\_\_\_ of one nucleotide subunit is connected to \_\_\_\_\_\_\_\_\_\_\_\_ of the next nucleotide (\_\_\_\_\_\_\_\_\_\_\_\_\_\_ synthesis).

