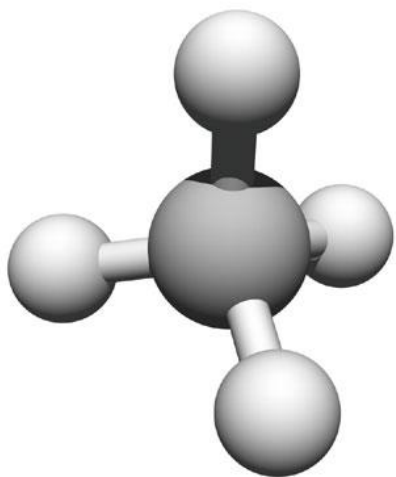
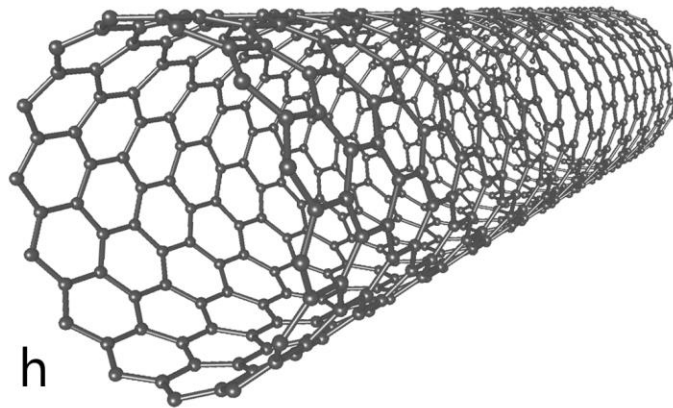
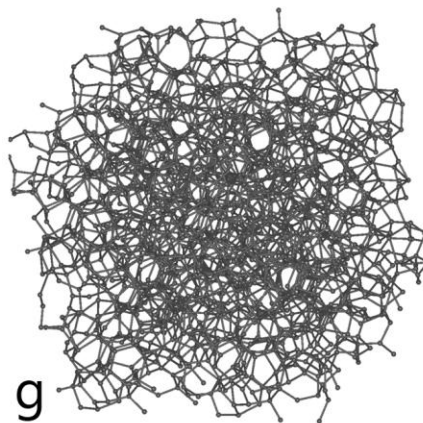
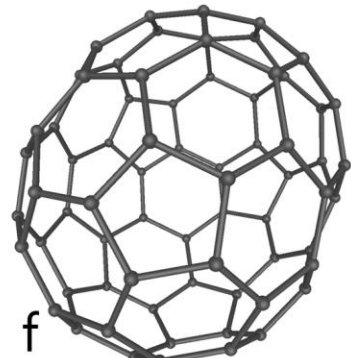
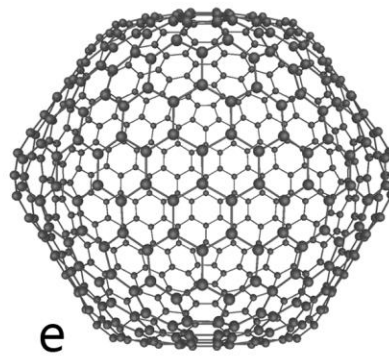
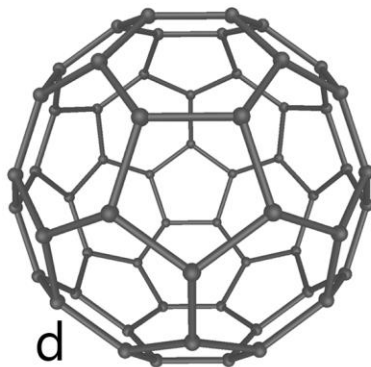
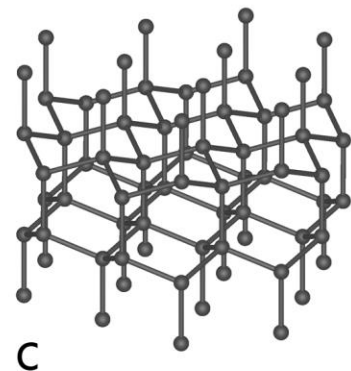
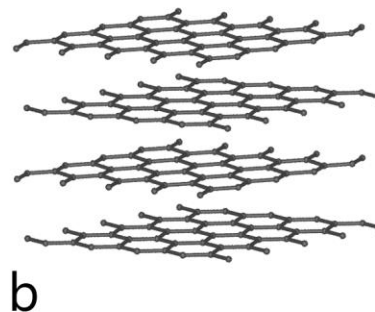
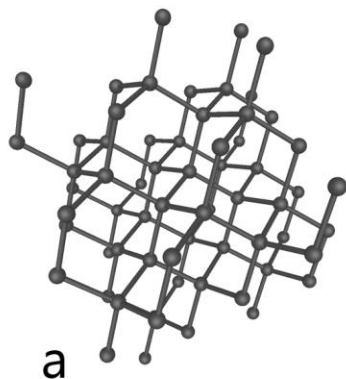


The Star of The Show:

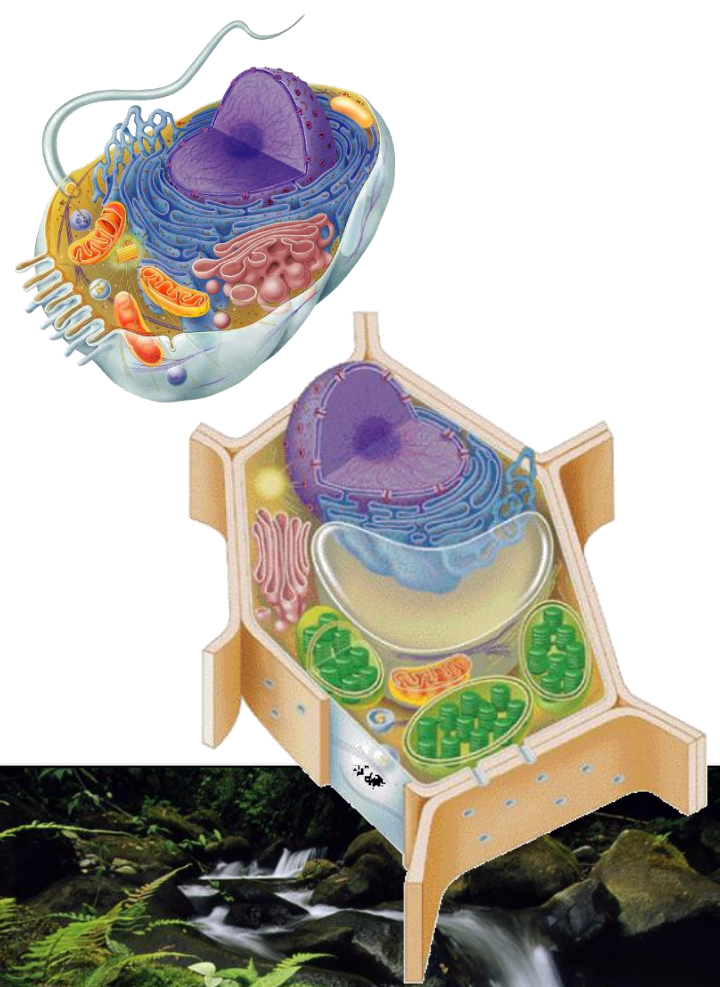


CARBON



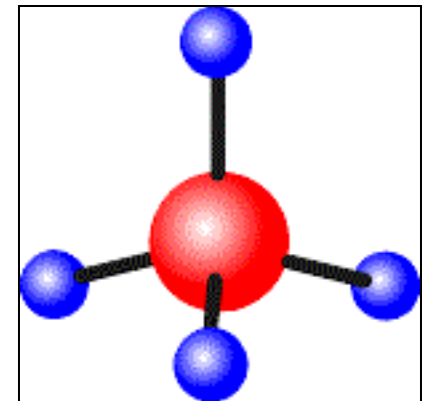
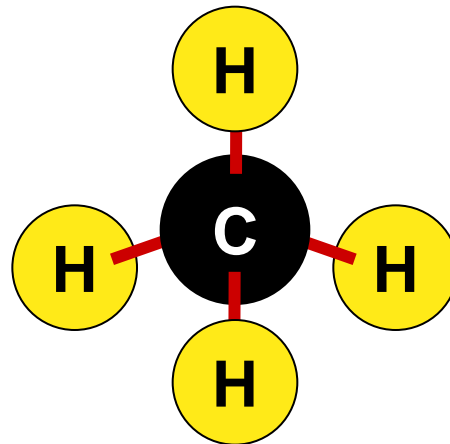
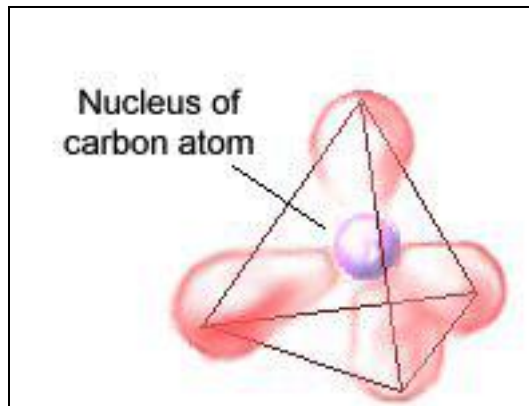
Why study Carbon?

- **Life is built of carbon**
- Cells are:
 - ~72% H₂O
 - ~25% carbon compounds
 - carbohydrates
 - lipids
 - proteins
 - nucleic acids
 - ~3% salts
 - Na, Cl, K...



Chemistry of Life

- Carbon atoms are versatile building blocks
 - Can form 4 stable non-polar covalent bonds

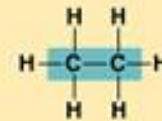
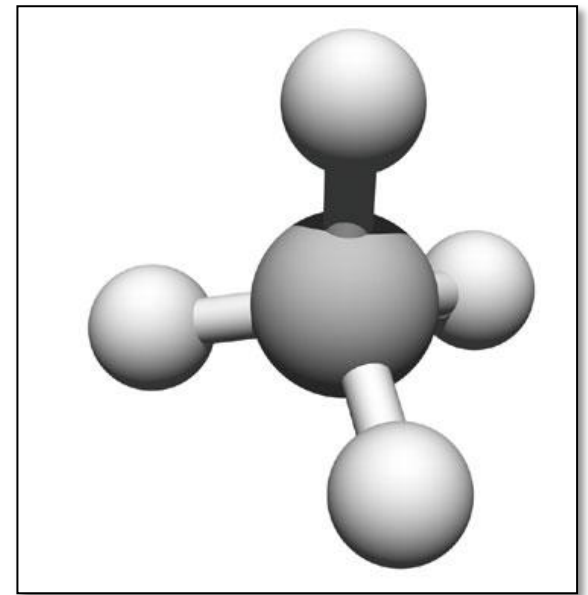


Why Is Carbon So Important?

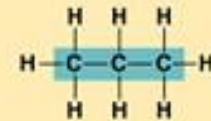
- Organic vs. Inorganic in Chemistry
 - **Organic** refers to molecules containing a carbon skeleton
 - **Inorganic** refers to carbon dioxide and all molecules without carbon

Hydrocarbons

- Combinations of C & H
 - Non-polar covalent bond between the C and the H
 - not soluble in H₂O
 - hydrophobic
 - stable
 - very little attraction between molecules

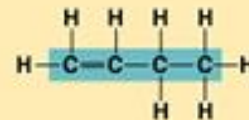


Ethane

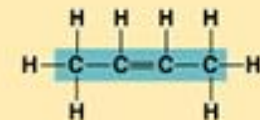


Propane

(a) Length



1-Butene



2-Butene

(c) Double bonds

Functional groups

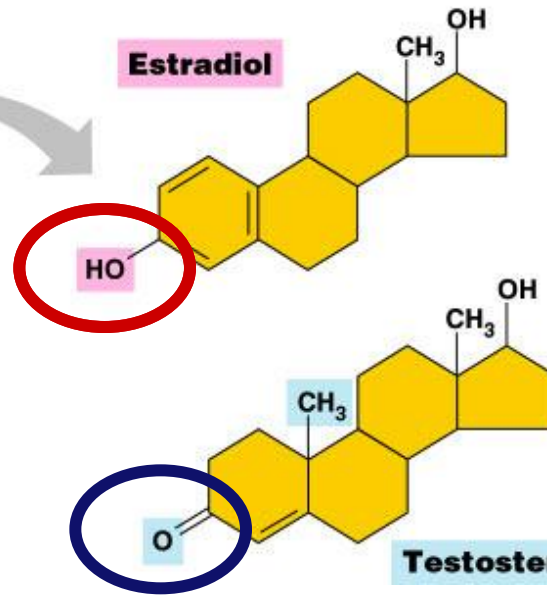
- Parts of organic molecules that are involved in chemical reactions
 - give organic molecules distinctive properties
 - hydroxyl amino
 - carbonyl carboxyl
 - phosphate
- Affect reactivity
 - makes hydrocarbons hydrophilic
 - increase solubility in water

For Example:

- Basic structure of male & female hormones is identical except for one functional group
 - identical carbon skeleton
 - attachment of different functional groups
 - interact with different targets in the body



Female lion



Male lion

Hydroxyl



Table 4.1 Functional Groups of Organic Compounds			
Functional Group	Formula	Name of Compounds	Example
Hydroxyl	—OH	Alcohols	$\begin{array}{c} \text{H} \quad \text{H} \\ \quad \\ \text{H}-\text{C}-\text{C}-\text{OH} \\ \quad \\ \text{H} \quad \text{H} \end{array}$ <p>Ethanol (the drug of alcoholic beverages)</p>

Carbonyl

– O double bonded to C

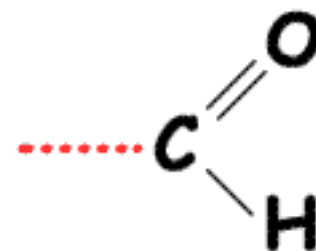
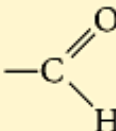
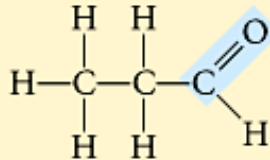
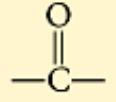
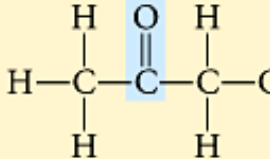
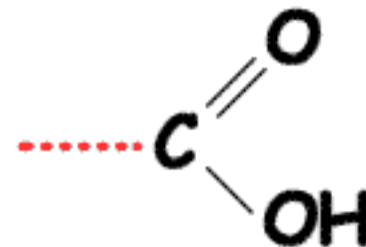


Table 4.1 Functional Groups of Organic Compounds

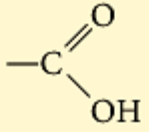
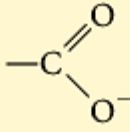
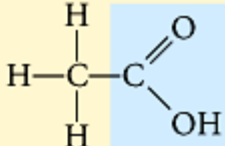
Functional Group	Formula	Name of Compounds	Example
Carbonyl		Aldehydes	 Propanal
		Ketones	 Acetone

Carboxyl



- C double bonded to O & single bonded to OH group
 - compounds with COOH = acids
 - fatty acids
 - amino acids

Table 4.1 Functional Groups of Organic Compounds

Functional Group	Formula	Name of Compounds	Example
Carboxyl	 (non-ionized)	 (ionized)	Carboxylic acids  Acetic acid* (the acid of vinegar)

Amine

– N attached to 2 H

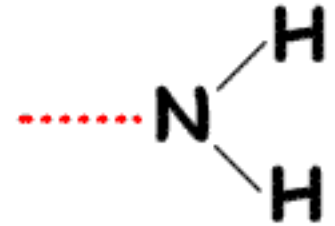
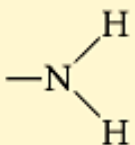
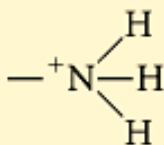
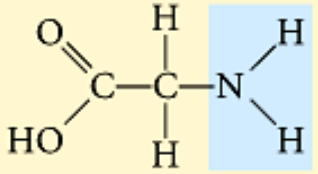
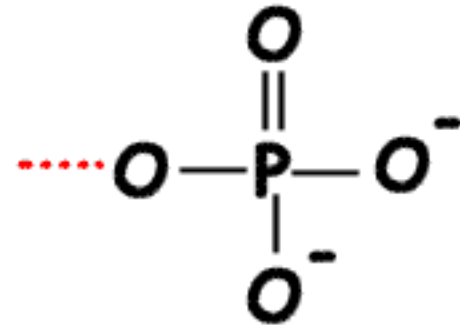


Table 4.1 Functional Groups of Organic Compounds

Functional Group	Formula	Name of Compounds	Example
Amino	 (non-ionized)	 (ionized)	Amines
			 Glycine*

Phosphate



- P bound to 4 O
 - connects to C through an O
 - lots of O = lots of negative charge
 - highly reactive
 - Soluble in water
 - transfers energy between organic molecules
 - ATP, GTP, etc.

Table 4.1 Functional Groups of Organic Compounds			
Functional Group	Formula	Name of Compounds	Example
Phosphate		Organic phosphates	