Carbohydrates

- Simple
  - sugars
- Complex
  - starch and fiber
- Made of
  - Carbon (C)
  - Hydrogen (H)
  - Oxygen (O)
  - One molecule of H_2O for each atom of carbon

Browning of Foods

- Carmelization
  - Heating of sugars above melting point
- Maillard Reaction
  - Involves carbohydrate
  - Carbonyl group of sugar combines with amino group of a protein with removal of water. After additional reactions brown pigments are formed
    - i.e. browning of bread during baking

Lipids or Fats

- Insoluble in water
- Feel “greasy”
- Three major groups
  - Triglycerides
  - Phospholipids
  - Sterols

Triglycerides

- Account for 90-95 percent of fatty substances in food.
- Composed of
  - 3 fatty acids
    - linked atoms of carbon with organic acid group
  - One molecule glycerol
    - 3 carbon atoms and three hydroxyl groups

Types of Fatty Acids

- Saturated fats
  - No double bonds between carbon atoms, so no more hydrogen can be added
- Unsaturated
  - Double bonds between some of the carbon atoms that can be broken to add hydrogen
- Monounsaturated
  - One double bond

Omega 3 fatty acids

- Polyunsaturated fatty acids with double bond between 3^{rd} and 4^{th} carbon from the left on the structure.
- Found in fatty fish
- Protective for heart disease

Linoleic Acid

- An essential fatty acid
- Cannot be made by the body – must be consumed in food

Cis – Trans Configuration

- Cis
  - Hydrogen atom on both sides of bond
- Trans
  - Hydrogen atoms on opposite sides of bond

- Which fatty acids are better ? Cis or trans?

Sterols

- Cholesterol
  - Widely known sterol
  - Found ONLY in animal foods
  - Is associated with coronary heart disease
  - Our bodies also make cholesterol

- Plant sterols
  - Phytosterols
  - Interfere with absorption of cholesterol

Fat in Food Preparation

- Tenderizing in baked foods
- Contribute to leavening
  - Creaming of fat and sugar
- Promote moistness
- Major components of salad dressings
- May be heated to high temperatures
  - Frying of foods
- Contribute flavor
  - Butter

Proteins

- Essential nutrient
- In food preparation several important roles
  - Binding water
  - Forming gels
  - Thickening
  - Producing foams
  - Aiding browning

Protein

- Contain
  - Carbon
  - Hydrogen
  - Oxygen
  - Nitrogen
  - Potentially also sulfur, phosphorus, iron
- Large molecules
  - Hundreds or thousands of amino acids joined with *peptide linkage*

Protein Structure

- Primary
  - Long chains
- Secondary
  - Springlike coiling - Alpha helix
- Tertiary
  - Folding of coils forming globular shape
- Quaternary
  - Combining of globular proteins

Protein Quality

- Amino acids used as building blocks for proteins
- Nine amino acids are essential for adult human nutrition
- Complete proteins include essential amino acids

- Isoleucine
- Leucine
- Lysine
- Methionine
- Phenylalanine
- Threonine
- Tryptophan
- Valine
- Histidine

Food Sources

- Meats, Fish, and Poultry
- Eggs and Dairy
- Nuts
- Dry legumes
- Cereal grains – in lesser amounts

Properties and Reactions

- Buffering
- Denaturation and Coagulation
- Enzymes

Protein Deficiency

The Chemical Senses

- Specialized to detect chemicals dissolved in a fluid
- The fluid may be saliva, mucous, or blood plasma
- Rely on receptors that interact with specific molecules to generate an action potential
- Receptors are integrated with two or more tissue types making them fit the definition of “organ”

TABLE 8.1 Classification of Sensory Systems

TYPE OF SENSORY SYSTEM	MODALITY	ADEQUATE STIMULI
Mechanical	Touch	Contact with or deformation of body surface
	Pain	Tissue damage
	Hearing	Sound vibrations in air or water
	Vestibular	Head movement and orientation
	Joint	Position and movement
	Muscle	Tension
Visual	Seeing	Visible radiant energy
Thermal	Cold	Decrease in skin temperature
	Warmth	Increase in skin temperature
Chemical	Smell	Odorous substances dissolved in air or water in the nasal cavity
	Taste	Substances in contact with the tongue or
	Common chemical	Changes in CO_2, pH, osmotic pressure
	Vomeronasal	Pheromones in air or water
Electrical	Electroreception	Differences in density of electrical currents

***BIOLOGICAL PSYCHOLOGY 7e*, Table 8.1**