Nutrients are the building blocks of the human body. Nutrients are needed for growth, to maintain and repair the body tissues, to regulate body processes, and to furnish energy for the body's functions. The nutrients that must be supplied daily to keep man in good health are the macronutrients: proteins, fats, carbohydrates, and water; and the micronutrients: vitamins and minerals.

More than 50 essential nutrients have been identified, and the identification of other nutrients is not yet complete. All essential nutrients must be present in appropriate quantities to provide balanced nutrition. Thus, the nutrient composition of a food is described in terms of its content of all the macro- and micronutrients.

Man acquires his nutrients from foods of plant and animal origin. The biochemistry of plants, animals, and man have much in common; therefore, man requires essentially the same nutritional building blocks as do plants and animals.

THE MAJOR FOOD GROUPS AND THEIR NUTRIENT CONTENT

Both the growing and gathering of foods belong in the realm of the agricultural sciences and technology. Figure 2.1 illustrates the biochemical cycle of man's basic foods. The sun's energy combines carbon dioxide, water, and nutrients from the soil to produce the foods of plant origin: vegetables, fruits, grains, tubers, and others. Foods of animal origin are derived ultimately from herbivorous animals. Finally, animals produce foods, such as milk and eggs. It is noteworthy that proteins increase in nutritive value as the amino acids from the proteins of plant origin are converted to the various proteins of animal origin (National Academy of Sciences, National Research Council 1963).

Raw foods are biological systems that spoil rapidly. Since man needs food daily and food is harvested seasonally, foods must be preserved by
various methods to provide food in off-seasons. This means that the biochemical cycle, pictured in Fig. 2.1, is temporarily arrested by food processing. During times of hunger, however, man consumes his preserved food and starts the reverse of photosynthesis, the metabolism, to release free energy and obtain essential nutrients for his metabolic needs. According to Nobel laureate Albert Szent-Györgyi (1966), one of the basic principles of life is that free energy can be preserved and stored in food molecules and utilized when necessary.

Detailed data on food consumption in the United States are available from government sources [U.S. Department of Agriculture (USDA) 1984A]. Table 2.1 summarizes the per capita consumption of major food commodities in 1983. Foods of animal origin and foods of plant origin share about equally in the American diet, totaling about 85% of all food consumed by weight. The total average per capita consumption of food in 1983 was 617 kg, which is equal to about nine times the weight of an average man.

Percentages of nutrients contributed by major food groups in the United States food supply in 1983 are presented in Table 2.2 (USDA 1984B). An essential part of the food energy, protein, vitamin A, niacin, vitamin B₆, vitamin B₁₂, iron, and zinc comes from the meat–poultry–fish group. Dairy products provide most of the riboflavin, calcium, phosphorus, and magnesium. Vegetables and fruits are rich in ascorbic acid, but also in vitamin A, folacin, and fiber. Flour and cereal products contain a plentiful supply of a wide variety of nutrients. Besides carbohydrates (food energy), they provide not only considerable amounts of the enrichment nutrients thiamin, riboflavin, niacin, and iron, but also plant protein, fiber, magnesium, phosphorus, and zinc.