The importance of carbohydrates to living things can hardly be overemphasized.The overall structure of glycogen, which is a highly branched molecule consisting of glucose units, has a superficial resemblance to that of the amylopectin component of starch, although the structural details of glycogen are significantly different.Role in the biosphere Discover how glucose and oxygen produced during photosynthesis in plants helps during respiration in animals Discover how glucose and oxygen produced during photosynthesis in plants helps during respiration in animalsSee all videos for this article The essential process in the biosphere, the portion of Earth in which life can occur, that has permitted the evolution of life as it now exists is the conversion by green plants of carbon dioxide from the atmosphere into carbohydrates, using light energy from the Sun.Formula for 3-phosphoglyceric acid, a chemical created during photosynthesis in plants This compound then is transformed into cell wall components such as cellulose, varying amounts of sucrose, and starch--depending on the plant type--and a wide variety of polysaccharides, other than cellulose and starch, that function as essential structural components.Approximately half (i.e., 17 to 25 percent) is represented by starch; another third by table sugar (sucrose) and milk sugar (lactose); and smaller percentages by monosaccharides such as glucose and fructose, which are common in fruits, honey, syrups, and certain vegetables such as artichokes, onions, and sugar beets.Role in human nutrition carbohydrate; human nutrition carbohydrate; human nutrition The total caloric, or energy, requirement for an individual depends on age, occupation, and other factors but generally ranges between 2,000 and 4,000 calories per 24-hour period (one calorie, as this term is used in nutrition, is the amount of heat necessary to raise the temperature of 1,000 grams of water from 15 to 16 ?C [59 to 61 ?F]; in other contexts this amount of heat is called the kilocalorie).In areas of the world where nutrition is marginal, a high proportion (approximately one to two pounds) of an individual's daily energy requirement may be supplied by carbohydrate, with most of the remainder coming from a variety of fat sources.The small remainder consists of bulk, or indigestible carbohydrate, which comprises primarily the cellulosic outer covering of seeds and the stalks and leaves of vegetables.Although carbohydrates may compose as much as 80 percent of the total caloric intake in the human diet, for a given diet, the proportion of starch to total carbohydrate is quite variable, depending upon the prevailing customs.(See also nutrition.) Role in energy storage Starches, the major plant-energy-reserve polysaccharides used by humans, are stored in plants in the form of nearly spherical granules that vary in diameter from about three to 100 micrometres (about 0.0001 to 0.004 inch).The starch content of plants varies considerably; the highest concentrations are found in seeds and in cereal grains, which contain up to 80 percent of their total carbohydrate as starch.The energy stores of most animals and plants are both carbohydrate and lipid in nature; carbohydrates are generally available as an immediate energy source, whereas lipids act as a long-term energy resource and tend to be utilized at a slower rate.This proportion can be altered, however, by selective-breeding techniques, and some varieties of corn have been developed that produce up to 70 percent of their starch as amylose, which is more easily digested by humans than is amylopectin.In addition to the starches, some plants (e.g., the Jerusalem artichoke and the leaves of certain grasses, particularly rye grass) form storage polysaccharides composed of fructose units rather than glucose.The amylose and amylopectin components of starch occur in variable proportions; most plant species store approximately 25 percent of

their starch as amylose and 75 percent as amylopectin. Carbohydrates.