Insects, animals, and humans have innate and learned preferences for certain foods, and aversions to poor food choices. These preferences and aversions, associated with taste and smell, are intimately linked to the nutritional and/or the health value of a food. Flavor perception is directly linked to the behavioral feeding responses that drive consumption. Food crops produce a number of volatile chemicals from primary and secondary metabolism, and a fraction of these compounds make up the distinct food flavors. Volatile compounds perceived as preferred flavors are biochemically derived from a broad range of nutrients, including amino acids, fatty acids and carotenoids. Taste, smell, and related sensory perception of food therefore provides important information about the nutritional and health value associated with that food; this helps shape feeding behavior as well as food preferences and aversions. Various lines of evidence in support of this connection between health values and flavor preferences will be presented.