

Sugar and Sugar Products—Their Use and Abuse*

By ROYAL LEE, D.D.S.

SUGAR is useful as a flavoring or sweetening agent in food. That is its primary function. While it is a relatively pure carbohydrate in its natural forms, it ranks secondary to starchy foods as a source of energy or calories. We customarily look to starch carrying foods for our sustaining foods, foods necessary in larger amounts by those who use their muscles in manual labor or other exercise, for it is a first principle of nutrition that the only increased requirement in food by those who burn up more energy is a greater need for carbohydrates and the carbohydrate metabolizing fats and vitamins, the requirement for other foods being relatively constant.

There is a very good reason why starches are better than sugars as energy foods. It is because they are assimilated slower than the sugars, and thereby fail to overload our pancreatic function of supplying insulin. Sugars are absorbed at varying rates, glucose being the quickest to diffuse through the intestinal wall, levulose the slowest. All sugars are converted into glucose after absorption into the body, that is again apparently because glucose is the most diffusible sugar, as once in the blood stream, it is the quickest to pass through the tissues and arrive at the muscle cell, where it is converted into energy. That same diffusibility, however, is the reason that it is the least desirable of sugars to eat. It is the only sugar that has been definitely found to cause diabetes, by its effect of overloading the pancreas, at least in test animals.

After the blood sugar (glucose) reaches its destination at the liver of muscle cell it is then converted into a non-diffusible form, glycogen or phosphagen, two large molecular assemblies that will not leak or diffuse out of the cell. The glucose stage is only temporary, and insulin is the enzymatic conversion agent that eliminates the glucose from the blood and stows it away in the tissues. If the insulin is not available to do this job, the blood glucose rises to higher levels and the kidneys then begin to throw it out, and the patient who suffers from this condition is lucky if he finds it out before his pancreas has been too badly damaged by the overwork. For if the mild case of diabetes then adopts a rigid schedule to avoid glucose, refined sugar in all its forms, and refined cereals, he often has little further trouble.

Glucose has another serious drawback, it has very little sweetness, and it is the sweet taste that we are after in our use of sugar as a flavoring agent.

That is why it is a very dangerous form of sugar, and it happens to be the cheapest sugar, and therefore it is used universally as a filler or adulterant in foods. Dried fruits are often saturated with glucose to increase their weight, so the producer can sell four cent a pound glucose at sixty cents or so as a part of the finished product. Candy, except the highest grade, is commonly diluted with glucose, which reduces the sweetness and causes the eater to eat more before becoming satiated, again increasing his tendency to depart from his proper balances between fats, carbohydrates and proteins.

In practically all canned fruits, glucose is used as a filler and adulterant where the home canner would use cane sugar. The result is that the consumer takes into his system entirely unsuspected quantities of a sugar that is not sweet, that is sold him purely as a swindle, as an adulterating filler to cheapen the product, a substitute for the more expensive cane sugar.

McLeod's Physiology tells us that four ounces of glucose are found in the blood stream fifteen minutes after we eat it. The same amount of levulose requires four hours, in fact, by lasting until the next meal, eliminates the need for the insulin that must be secreted to take care of the shock dose of glucose. The levulose in this quantity has the same sweetening power as seven ounces of cane sugar, while the glucose flavor would only warn our sense of taste that it was equivalent to about one ounce of cane sugar. It is evident that glucose in an insidious form of carbohydrate, that we eat it without knowing that we are getting a dangerous sugar in dangerous quantities.

Soft drinks are another insidious source of glucose, as again, the sugar content is purely present as a flavoring factor. Much more glucose is required than cane sugar. By loading us up with glucose, we have no appetite to demand the wholesome foods that carry proteins, minerals and vitamins. One bottle of a well-known soft drink will give our pancreas a worse jolt than drinking the same amount of honey.

We drink soft drinks in hot weather to quench our thirst, and find that we have no appetite, or a reduced appetite for the foods that give us our vitamins, minerals and proteins. The result is that we become inevitably scheduled for some physical breakdown, as our body can no more tolerate the continual stoking up with pure fuel foods, without building elements, than our automobile can tolerate continual filling of the gas tank without maintenance of the oil level in the crankcase.

It is a common claim of sellers of such devitalized foods that a little milk, a little meat or a little fresh vegetable or orange juice will compensate for the shortcomings of their obviously denatured product. But that is a sales argument, pure and simple. Our best natural foods very seldom contain any excess of any vital element. Milk is looked to as a great source of calcium. Pasteurized milk has lost so much of its assimilable calcium that it will cause rickets if fed alone as the complete dietary regimen. One of the biggest problems in medical and dental practice today is how to get more calcium into the dietary schedules of the patient. The problem exists because so many people unconsciously satiate themselves on these refined sugar products, soft drinks, ice cream, pastry made from white flour and sugar, white bread, toast, doughnuts, pie and candy. They are constantly trying to defeat one of the fundamental laws of the physical world. They are trying to make something out of nothing. You can no more build or repair your body with white flour, white sugar, glucose or corn syrup, than you can repair your automobile with gasoline, or build a locomotive out of coal.

We can conclude our comment on glucose by summarizing its status as it appears to us as a cheap, fraudulent, synthetic filler used solely in foods as an adulterant to increase its weight, or to add body to syrups in which the real flavor is obtained by cane sugar. It can have no possible nutritional value to people already overloaded with calories, for it carries no trace of vitamins or minerals. On the contrary, it can, and unquestionably does, put such unnatural loads on our pancreatic function of insulin secretion that it aggravates diabetic tendencies even if it may not be

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a direct cause of diabetes in the human subject, as it has been proven to be in test animals.

Cane and beet sugar rank a degree higher in the food status. Cane sugar contains a sufficient trace of vitamins and minerals as to enable it to support the life of the honey bee, when fed as a substitute for honey in the winter months. Beet sugar, however, must be more completely refined by reason of the bad flavor of beet molasses, and it cannot support bee life. Beekeepers are always careful to get cane sugar for their bee feeding, for bees quickly die on beet sugar.

This fact illustrates the extreme importance of using natural foods in their unrefined natural state. Children who eat raw sugar cane are outstanding for their perfect teeth. Children who eat candy and soft drinks are celebrated for the opposite condition. One of the reasons has been found, as discussed in Science of June 10, 1942, page 45. The fact is set forth that vitamin K inhibits the breakdown of hexose phosphate in the mouth fluids, and inhibits tooth decay, for the bacteria causing decay are thereby deprived of the free sugar they need to live. Now it happens that sugar cane, like all growing plants, contains in its natural state the vitamin K here shown to protect the teeth against decay.

We have here a parallel situation to many others in the nutritional field. Refining a product has destroyed its natural balanced nutritive values, so some of its functions as a food have been lost, and thousands—rather millions—of victims have paid a terrible price for our ignorance.

The price paid cannot be reckoned in dollars, even though that bill is in the billions. It must be reckoned in the years of productive, of vigorous life lost to the victims and to the nation.

For the ravages of refined sugar cannot be limited to dental disease alone. Arthritis is now recognized as a disease that may owe its prevalence in this country to a vitamin lost in sugar refining, a factor known as the anti-stiffness vitamin or the Wulzen factor. In test animals, a deficiency causes joint stiffness resembling arthritis in the human subject. Unpasteurized milk and raw sugar cane juice, or black strap molasses, are the only good sources yet found in common foods. With twenty-two million arthritics in the United States, the reason must be something peculiar to commercially refined foods, for in countries like China, where these foods are not used, arthritis is hard to find.

It is interesting that while some authorities have attributed arthritis to constipation and consequent degenerative changes in the colon, the vitamins and minerals in sugar

cane as concentrated in the molasses residue of sugar refining seems to be the best known remedy for constipation among food sources.

The celebrated "Medical Testament" of the Doctors of Cheshire affords some light on this matter, as reprinted in the last Academy News Letter:

Our daily work brings us repeatedly to the same point: "This illness results from a lifetime of wrong nutrition. . . . The final item of our indictment is constipation. . . . the cause in every case—apart from rare abnormalities—is the ill choice or the ill preparation of food. It is true that we are consulted on these conditions when they are established and have to deal with the effects—gall stones, appendicitis, gastric ulcer, duodenal ulcer, colitis and diverticulitis—of years in which the body has been denied its due of this constituent of food or burdened with an excess of that. Other means of cure than proper feeding are called for at this late stage; but the primary cause none the less was wrong nutrition."

What can we do, as individuals, to get better food and avoid these dire consequences?

Here is a true story that will illuminate this question. Thirty or so years ago, Dr. Fred Miller began the practice of dentistry in Altoona, Pennsylvania. He was convinced at that early date that refined foods were the cause of dental diseases. He advised his patients to avoid candy, sugar, and sugar products in every form, use no soft drinks or ice cream unless home-made with real cream and honey, use as sweets only natural unrefined forms such as maple syrup, honey or molasses, avoid all white flour products, all commercial breakfast foods made from degerminated grains, use only fresh whole grain products for flour or breakfast cereal.

A very simple set of rules. One of his patients, a young woman with two sons, followed these principles in feeding her family. When these sons were 17 and 18 years of age they were students at the University of Pennsylvania, and in their freshman year the University operated a contest to give certificates of merit to the most physically perfect specimens in their student body. The two top places were taken by these two boys; they were found to be the most perfect in physical development of the many thousands of young people in the University. Do you think that was a coincidence? I think it was planned that way. And the same opportunity is open to everybody who has the inclination.

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