by far the most important contribution of a non-systematic nature that has appeared in its field in America.

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SPECIAL ARTICLES

THE SUBSTITUTION OF SACCHARIN FOR SUGAR

IF saccharin can be substituted for sugar, it is evident that it must fulfill the functions of sugar and at the same time not produce harmful effects. As a sweetening agent, to be oxidized thereby furnishing energy and to increase oxidation in the body are three functions of sugar. It would seem that saccharin should fulfill admirably the function of sugar as a sweetening agent since it is about 500 times sweeter than sugar. There are some who think that the use of saccharin as a sweetening agent is harmful. The extensive investigations of Herter and Folin[1] for the referee board on the effect of saccharin on the nutrition and health of man show that the amount of saccharin that would ordinarily be used has no deleterious effect. Herter found, in fact, that such enormous doses as 4 grams of saccharin per kilogram of body weight could be given to rabbits without injury. It is recognized that saccharin can not fulfill the second function of sugar named, for it is not oxidized to give rise to energy, but passes through the body almost quantitatively unchanged. The object of the present investigation was to determine if it could fulfill the third function of sugar named, that is, does the ingestion of saccharin increase oxidation in the body. We[2] had already found that the ingestion of sugar, as well as the ingestion of the other food materials, produced an increase in catalase, an enzyme possessing the property of liberating oxygen from hydrogen peroxide, parallel with the increase produced in oxidation, by stimulating the digestive glands, particularly the liver to an increased output of this enzyme. Hence, the conclusion was drawn that the increase in oxidation following the ingestion of food was brought about by the increase in catalase. Our contention that catalase is the enzyme in the body principally responsible for oxidation is further supported by the fact, that by whatever means oxidation is increased in the body, there always results a corresponding increase in catalase, and by whatever means oxidation is decreased, there

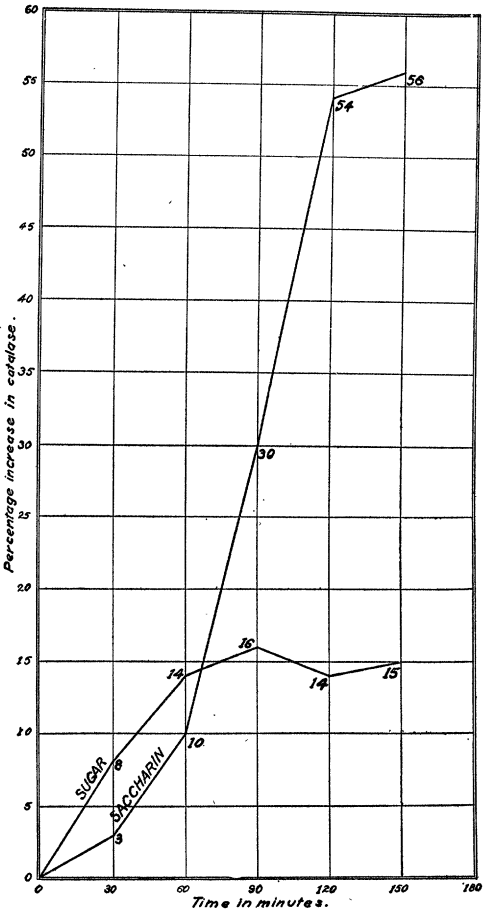

FIG. 1. Curves showing the increase produced in the catalase of the blood by the ingestion of saccharin and of sugar. The figures (0–180) along the abscissa indicate time in minutes; the figures (0–60) along the ordinate, percentage increase in catalase.

[1] Herter and Folin, United States Department of Agriculture, Report 94, 1911.

[2] Burge and Neill, *The American Journal of Physiology*, Vol. 47, No. 1.

results a corresponding decrease in catalase. Stated more specifically, the present investigation was begun to determine if the ingestion of saccharin would produce an increase in catalase, and hence an increase in oxidation in the body just as sugar and the other food materials do.

The animals used were dogs. The sugar used was dextrose, and the saccharin "soluble saccharin," prepared by the addition of a solution of sodium carbonate to saccharin. The amounts of these substances used were 4 grams per kilogram of body weight of the animal. They were introduced into the stomach of the animal by means of a stomach tube. Determinations of the catalase of the blood from the jugular vein were made before as well as at thirty minute intervals after the introduction of the materials. The determinations of catalase were made by the addition of 0.5 c.c. of blood to 50 c.c. of hydrogen peroxide in a bottle at approximately 32° C., and the amount of oxygen gas liberated in ten minutes was taken as a measure of the amount of catalase in the 0.5 c.c. of blood.

The curve marked "sugar" in Fig. 1, was constructed from data obtained before, as well as at thirty minute intervals after, the introduction into the stomach of a dog of 4 grams of dextrose per kilogram of body weight of the animal. It may be seen that the sugar produced 8 per cent. increase in catalase during the first 30-minute interval; 14 per cent. increase during the 60-minute interval; and 16, 14 and 15 per cent. increase during the succeeding intervals. Two days later, five grams of "soluble saccharin" per kilogram of body weight were introduced into the stomach of the same dog. The curve marked "saccharin" in Fig. 1, shows the results. It may be seen that the introduction of the "soluble saccharin" increased the catalase of the blood 3 per cent. during the first 30-minute interval; 10 per cent. during the 60-minute interval; 30 per cent. in 90 minutes; 54 per cent. in 120 minutes, and 56 per cent. in 150 minutes. By comparing the effect of the sugar and of the saccharin on the production of catalase, it may be seen that the saccharin produced a much more extensive increase in catalase than did the sugar.

The conclusion is drawn that in addition to being a sweetening agent, saccharin, although not oxidized itself, serves to facilitate the oxidation of the other food materials by stimulating the liver to an increased output of catalase, the enzyme in the body principally responsible for oxidation. Hence, it would seem that saccharin should be positively helpful in the diet, instead of harmful, as some have claimed, particularly in a disease such as diabetes where the principal trouble is defective oxidation.

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THE twenty-second meeting of the society was held August 20 to 22, 1918, at the Harvard Observatory. Before the gathering it had been expected by many that war conditions would make the attendance so small that it would be scarcely worth while to hold the sessions. As might have been anticipated, however, the number of members of the society residing near Cambridge, together with the staff of the observatory, would make a respectably sized company at any time, and these with the few who were able to attend from a distance made a number which was well up to the average of previous meetings of the society. Although many astronomers about the country are actively engaged in war work, the number of papers presented showed no tendency to decrease, in fact there were the greatest number of communications ever presented at a meeting of the society. This was due primarily to two astronomical occurrences which were not affected by the war, the solar eclipse of June 8, and the appearance of the new star in Aquila. Each of these events was the occasion of about a dozen papers.

In welcoming the society in his double capacity as host and president, Professor Pickering referred to the last previous meetings at Harvard in 1910, when so many foreign astronomers were present, and he expressed the hope that it would not be too long before similar international meetings of men of science could be held again.

In the intervals between sessions the members were afforded the opportunity to inspect the instruments and work of the Harvard Observatory,