When, in similar experiments, enzyme concentration is varied within limits suitable for such quantitative study, the rate of maltose formation is found to be directly proportional to the enzyme concentration, provided comparison is made at a point not beyond that corresponding to a yield of about half the theoretical amount of maltose. This indicates the range within which diastatic activities may be compared quantitatively.

In the action of malt amylase upon soluble starch, we find no distinct "region of linear relationship" in which the yield of reducing sugar is directly proportional to time.

Experiments with widely varied enzyme concentration show that there is no cessation of hydrolysis nor true equilibrium at a point corresponding to 80 per cent. of the theoretical yield of maltose as claimed by some previous investigators.

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The effect of coagulation of the pancreas in situ.

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By injecting 10–15 c.c. of 85–95 per cent. alcohol, usually with 0.7 per cent. glacial acetic acid, into the main pancreatic duct of dogs, we coagulated at least 95 per cent. of this organ in successful experiments. The extent of this coagulation was determined by a careful inspection at the time of injection, by reoperation after a number of weeks, and by autopsy and microscopical examination. The external secretion of the gland was abolished in all experiments.

Our material is formed by 19 dogs, of which six lived four weeks and longer; one of the four dogs still living is in excellent condition 104 days after the operation. The blood and urine were examined at frequent intervals, daily when necessary. The dogs were fed a regular mixed diet composed of about 100 grams of cooked meat scraps, 4–500 grams of bread-meat broth mush, 50 grams ground bone and occasionally 10–60 grams of lard. Water was given freely.

Our results are briefly as follows: in spite of the fact that at least 95 per cent. of the pancreas was *immediately* killed by the alcohol-acid mixture, and that the dogs were fed on a diet rich in carbohydrate, yet the great majority of our animals showed no glycosuria or hyperglycemia. Occasionally a faint trace of sugar appeared in the urine. The blood sugar varied in general between 0.10 and 0.15 per cent.; in some nervous dogs, which required considerable handling, the blood sugar at times reached 0.20 per cent.

There were two striking exceptions to this general course; two dogs developed a severe diabetes immediately after the operation. In dog 28, which died after 28 days, the urinary sugar varied between 3 and 6 per cent., and the blood sugar from 0.27 to 0.40 per cent. This dog showed a gangrenous pancreatitis. The second dog, no. 32, showed a severe diabetes for seven days after the operation, with a glycosuria of 2–5 per cent. and hyperglycemia which reached 0.32 per cent. From the 9th day, the urine was sugar free, though the blood then showed 0.23 per cent. sugar. Within a week the glycemia had fallen to 0.12 per cent. This animal is still alive after 36 days; moreover, this dog showed a complete tolerance for 10 grams dextrose per kilo when fed this amount 21 days after the operation.

It is important to add that both dogs, but especially the fatal case, were subjected to considerable traumatism during the operation, due to technical difficulties.

The tolerance for 10 grams of dextrose per kilo when fed with the ordinary mixed diet, was good when tested in five of our dogs 21 to 90 days after the operation. One dog excreted no sugar whatsoever; three excreted 0.3–0.7 gram per kilo; the remaining dog excreted 1.5 grams per kilo.

The feces of all dogs examined for a longer period were large, voluminous and often greasy. Microscopical examination always showed enormous numbers of undigested muscle fibers, the cross striations being clearly visible as a rule. Starch granules varied in quantity, often large amounts were present, at other times the iodine test showed relatively few. Fat also varied considerably; after feeding 50 grams of lard fat drops were abundant; after smaller amounts often no fat drops were seen. Such variations

have also been noted by other observers after excluding the pancreatic juice from the gut.

None of our dogs showed polyuria; 580 c.c. was the largest recorded daily output. Acetone was seen only exceptionally.

All of the dogs showed an initially rapid and then slowly progressive loss of weight. Thus No. 5 lost 3.25 kilos in 12 days, but during the next 90 days lost only a little more than one kilo.

The experiments are being continued.

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Does a fatigue toxin exist?

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In 1904 Weichardt claimed to have found a specific substance, a fatigue toxin, as the chief agent in the production of fatigue. When present it was capable of forming in the tissues its own antidote, an antitoxin. A substance identical with fatigue toxin, named "kenotoxin," was obtained in vitro by treating proteins in various ways. However obtained, the substance, when injected into animals in small quantity, resulted in the production of antitoxin; when in larger quantity, it caused a great reduction in bodily temperature, slowing of respiration, sleep, and ultimately death.

In the present experiments animals, such as rabbits or cats, were fatigued by running in a revolving wheel. After fatigue was pronounced the animals were killed by decapitation, and the muscles of the hind legs were stimulated directly by the faradic current until they ceased to contract. Soon after death, in some cases within six to eight minutes, marked rigor was observed in the skeletal musculature. Immediately after the cessation of response to faradic stimulation the muscles of the hind legs were removed, cut to pieces and ground thoroughly with sand, and the muscle juice was squeezed out by a powerful press, all procedures being carried on with aseptic precautions. The juice was found markedly acid to litmus. When this juice was injected into the