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BOX 1 FOLDER 17

with Elizabeth
Mason

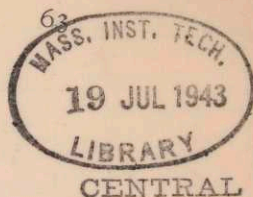
"The effect of heat upon the
digestibility of gluten"

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The Effect of Heat upon the Digestibility of Gluten.

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*THE EFFECT OF HEAT UPON THE DIGESTIBILITY
OF GLUTEN.*

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THE following short series of experiments was suggested by the statement of A. Stutzer, in an article on the digestibility of albuminoids,¹ that cooking lessened the digestibility of vegetable albuminoids. A "purified gluten," prepared by the New York Health Food Company and containing 9.05 per cent. of nitrogen, was the substance selected for the experiments, which were carried on in the following way:

An artificial gastric juice was first prepared with five grams of pepsin (marked A) and two tenths of 1 per cent. of hydrochloric acid to a liter of water. This solution was used in the proportion of one hundred cubic centimeters to every gram of the material to be digested.

Flasks containing the mixture were tightly corked to prevent loss by evaporation and allowed to remain for four hours in a water bath kept at blood heat. They were frequently shaken to insure as complete action as possible, and at the end of that time the solution was filtered and ten cubic centimeters of the filtrate subjected to the Kjeldahl process for the determination of nitrogen.

Fresh samples of gluten were next treated in a similar way with water containing two tenths of 1 per cent. of hydrochloric acid, in order to compare the action of acidulated water with that of acid solution of pepsin. The latter was found to be the more effective, as it dissolved nearly 7 per cent. of nitrogen, while the former dissolved but 5.

Further experiments also showed that fifteen minutes' digestion gave as satisfactory results with this pepsin solution as four hours'.

¹ In abstract in Vierteljahresschrift der Chemie der Nahrungs-u. Genussmittel, 1891, p. 87.

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A second sample of pepsin (marked B) was soluble in acidulated water, and proved to be more active than the first. A solution containing $\frac{1}{2}$ gram per liter dissolved 8 per cent. of nitrogen in the same time that 5 grams per liter of sample A dissolved 7 per cent.

Wafers were then made of gluten and cream, baked till brown, ground to a fine meal, and portions of the meal were subjected to artificial digestion for fifteen and thirty minutes, and four hours, respectively. The longest treatment failed to dissolve as large a proportion of nitrogen as had been obtained from the raw material in fifteen minutes.

Lastly a gruel was made by taking one gram of gluten, mixing it with five cubic centimeters of cold water, adding fifty cubic centimeters of boiling water, and allowing the whole to simmer for half an hour. Acid solution of pepsin was then added and the gruel allowed to digest in the same flask for fifteen minutes.

Similar experiments were then made in which the time of digestion was prolonged to thirty minutes and four hours, respectively. From these it was found that, although in four hours nearly all the available nitrogen was dissolved, in fifteen minutes only five eighths of that amount was made available.

The accompanying tables give the results obtained, all tending to confirm Stutzer's statement as to the effect of heat on the digestibility of the vegetable albuminoids.

PURIFIED GLUTEN. RAW MATERIAL.

Total nitrogen	9.05 per cent.
Moisture	9.42 per cent.

EFFECT OF TREATMENT WITH HYDROCHLORIC ACID AND PEPSIN.

Solution used.	Time of treatment.	Per cent. of nitrogen dissolved.
Acidulated pepsin "A," 5 grams to the liter	4 hours.	6.91
Acidulated pepsin "A," 5 grams to the liter	15 minutes.	6.95
Acidulated pepsin "B," $\frac{1}{2}$ gram to the liter	15 minutes.	8.00
Dilute hydrochloric acid	4 hours.	4.64

GLUTEN COOKED.

Wafers.

Total nitrogen, 7.28 per cent.

Solution used.	Time of treatment.	Per cent. of nitrogen dissolved.
Acidulated pepsin "B," $\frac{1}{2}$ gram to the liter	15 minutes.	2.98
Acidulated pepsin "B," $\frac{1}{2}$ gram to the liter	30 minutes.	4.23
Acidulated pepsin "B," $\frac{1}{2}$ gram to the liter	4 hours.	5.63

Gruel.

Solution used.	Time of treatment.	Per cent. of nitrogen dissolved.
Acidulated pepsin "B," $\frac{1}{2}$ gram to the liter	15 minutes.	5.05
Acidulated pepsin "B," $\frac{1}{2}$ gram to the liter	30 minutes.	6.22
Acidulated pepsin "B," $\frac{1}{2}$ gram to the liter	4 hours.	8.06

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