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## NOTES.

*Cereal Foods.*—The examination of a large number of cereal foods, representing the products of forty-three manufacturers, has shown that the foods differed only from the grains from which

they were prepared by a lower content of ash, fiber and fat, and a proportionately higher percentage of protein and carbohydrates, this difference being due to the grains having been decorticated or degerminated or generally both, cereals made from untreated whole grain being identical in composition with the grain.

The difference among the various cereals themselves was found to consist only in the percentages of soluble and insoluble carbohydrates. The cereal foods can be divided into two main classes:

- I. Cereals made from the whole grain.
- II. Cereals made from prepared grains (decorticated and degerminated). Each of these classes again subdivided into:

1. Raw cereal products.
2. Prepared cereal products—cooked or roasted.
3. Medicated cereal products—containing foreign substances.

The prepared and the medicated products are again divided into:

- a.* Prepared cereal products.
- b.* Prepared malted cereal products.

The so-called medicated cereal products, containing spices, sugars, gluten, flours, salt, flavoring extracts, etc., have not been considered, as they only differ from the others by the foreign non-cereal substances added.

It will be seen from this division that the raw cereal can be changed to the prepared product by simply cooking or roasting, and into the third class by treatment with malt or its extract. As malt will not act on raw starch directly, this part of the process generally precedes the other, and often the malting, cooking and roasting are done in one step. The starch is changed into a soluble form by the heat, and into sugar by the malt, and the resulting soluble extract determines the whole difference between different cereal foods. The so-called digestibility of these foods depends on the amount of these soluble carbohydrates, and the same can easily be determined by the action of saliva and pancreatin on the materials. The raw cereal to be fit for human consumption should be boiled for at least one hour. If this is done, the mass will show more soluble carbohydrates than any of the prepared or malted cereals I have examined, two samples excepted. In making comparative tests this must be done. The digestion

tests with the saliva and pancreatin were made at temperatures of 36° to 38° C., the original solutions containing 10 per cent. of the cereals. Soluble substance in solution was determined, then the saliva and pancreatin added. Samples were withdrawn at stated intervals, filtered and the extract in the filtrate determined by direct evaporation on the water-bath.

It was found that the raw cereals, if sufficiently cooked, were as quickly digested as the best malted cereals, more quickly than the prepared cereals and a large majority of the so-called malted cereals.

The physical condition of the cereals being flaked, rolled, granulated, shredded or as flour, had a material effect on the time of digestion, but this was overcome by grinding so as to pass through a 60-mesh sieve. The amount of soluble material before digestion varied:

	Per cent.
Raw cereals .....	2-8
Prepared cereals .....	4-23
Malted cereals.....	4-60

Average analysis of the cereals:

	Raw cereals. Per cent.	Prepared cereals. Per cent.	Malted cereals. Per cent.
Ash.....	1.3	1.3	1.3
Fiber .....	0.5	0.5	0.6
Fat .....	0.7	0.7	0.7
Protein.....	10.5	10.5	10.4
Carbohydrates, insoluble .	82.0	72.0	52.0
"    soluble ...	5.0	15.0	35.0
"    "    af-			
ter boiling.....	38.0	36.0	45.0

It was found that the only advantage the prepared and malted cereals have over the raw cereals is that they come to the consumer ready for immediate consumption, and the preliminary preparation of boiling for one hour or so is not required. The claim that the prepared cereals are pre-digested food applied only to the malted cereals and only so far as part of the starch has been converted. After boiling, the raw cereals are just as digestible as the others. The differences in the time of digestion, with saliva and pancreatin, between a well-boiled raw cereal and a fully malted prepared cereal is so small that the same can be

ignored when determining the relative nutritive ratio and factor of digestibility.

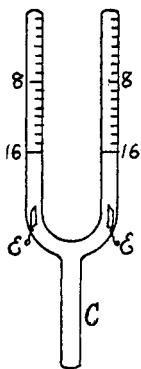
EDWARD GUDEMAN.

CHICAGO, ILL.

*A Simple and Inexpensive Apparatus for the Electrolysis of Water.*—There is need for an inexpensive, yet reliable piece of apparatus for the electrolysis of water, especially for use in the smaller colleges and high schools. The apparatus, described below, I had made two years ago, and find it the most convenient apparatus for the purpose of any I have seen in the market.

It consists of a U-shaped tube about  $\frac{3}{4}$  inch in diameter, with each arm graduated to 16 cc., and a tube *C* of the same bore and about 4 inches long is fused in at the bend. A platinum electrode *E*, connected to a platinum wire, is fused into each arm of the tube near the bottom.

To operate: The apparatus is inverted and filled with acidulated water, and a piece of wet filter-paper is placed over the end



of the tube *C*, being careful to exclude any bubble of air. Then it is inverted and placed in a vessel of acidulated water. The apparatus may be either clamped in an upright position before attaching the electric wires; or the tube *C* may be thrust through a hole made in a wood cover which fits the tube tight enough to prevent slipping; fill, invert, and place over a beaker of acidulated water with the mouth of the tube below the surface. The wood cover resting on the beaker will hold the apparatus in position. Any glass-blower can make the apparatus.

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