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The effect of grinding upon starch and starch pastes.

By C. L. ALSBERG and E. E. PERRY.

[*From the Food Research Institute, Stanford University, San Francisco, Calif.*]

Several investigators have studied the effect of grinding upon raw starch. Schleiden[1] reported that grinding starch with twice its weight of water gave the mass a salve-like consistency. Kraemer[2] found that grinding with sand and Sponsler[3] that grinding dry in a pebble mill rendered part of the starch soluble in cold water. These observations were verified by the writers. Grinding potato starch for 74 hours with flints in a pebble mill and wheat starch for 122 hours injures all the grains, as may be noted with the microscope. About 60 per cent of each of the starches was then soluble in cold water. The solution could be filtered quite clear with paper pulp, was not viscous, and gave a characteristic blue iodine reaction. Apparently the starch grain is protected by a membrane or membrane network impermeable to the soluble substance. When the membrane structure is injured, the contents may be leached out with the greatest ease. Ground starches suspended in water and heated do not gelatinize, and no paste can be obtained. The viscosity of suspensions of ground starch determined between 20° and 95° by means of a Stormer viscosimeter was relatively little more than that of water.

Stiff starch pastes made by boiling 5 per cent of untreated wheat starch in water were ground cold in a pebble mill from 13 to 16 hours and their viscosity tested before and after grinding over a range of temperature from 50° to 90°. After grinding the viscosity was reduced to about one-fourth of its initial value.

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[1] Schleiden, J. M., *Principles of Scientific Botany*, p. 13. Translated by E. Lankester. London, 1849.

[2] Kraemer, H., Further observations on the structure of the starch grain. *Botanical Gazette*, 1905, xl, 305.

[3] Sponsler, O. L., The structure of the starch grain, *Am. J. of Botany*, 1922, ix, 471.

Beijerinck[4] ground boiled potato starch with sand, thus rupturing the membranes. He found that this treatment rendered the starch in part soluble, 60 per cent passing into solution. This agrees very well with the observation above reported in regard to the solubility in cold water of ground unheated starch. The solubility of raw starch in cold water when ground indicates that the observation of Beijerinck does not depend upon depolymerization by heat and water but that soluble starch as such is present in considerable amount in the natural untreated starch grain.

The observations herein recorded offer, it is believed, a key to an explanation of some of the physical properties of gelatinized starch and starch paste as well as of some of the phenomena observed in the gelatinization of starch granules. They must be taken into consideration in future studies on the structure and composition of the starch grain. These and other implications of the observations are still under investigation.

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Further evidence of the role of hepatic internal secretions in canine anaphylaxis.

By W. H. MANWARING, J. R. ENRIGHT, DOROTHY F. PORTER and H. BING MOY.

[*From the Laboratory of Bacteriology and Experimental Pathology, Stanford University, San Francisco, Calif.*]

All parts of the gastro-intestinal tract except the oesophagus are thrown into contraction, during typical anaphylactic shock in dogs. These contractions usually begin after a latent period of about forty-five seconds. They usually reach their maximum by the end of two and a half minutes.

The contractions vary in intensity in different parts of the gastro-intestinal tract. In the stomach, they usually increase the

[4] Beijerinck, M. W., Structure of the starch grain. *Koninglijke Akademie van Wetenschappen te Amsterdam.* Proceedings of the Section of Sciences, 1912, xiv, 1107.