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THE PHYSICAL CHEMISTRY OF BREAD MAKING¹

THE art of making leavened bread has been so long perfected that the experience upon which present practise rests is now forgotten. Meanwhile the science of bread making, involving physical, chemical and physiological problems of a certain complexity, and only recently promoted by a great organized industry, has hardly kept pace with the advance of biological chemistry. But at length war time necessity has imposed new conditions, and the use of flours other than wheat has brought about changes from the best practise of the past.

It seems desirable, therefore, to review the physical and chemical processes involved in the fermentation of dough and the baking of bread, and make suggestions which may facilitate the use of wheat substitutes.

GLUTEN

When wheat flour is made into dough the proteins, after absorbing water, hold together to a much greater extent than do the proteins of any other grain. This property makes it possible to separate from the other constituents of wheat flour the two proteins, gliadin and glutenin,² which are insoluble in water. The material which can in this way be washed free contains about ten per cent. of the flour³ and includes about nine tenths of all the protein material.⁴ It is called gluten.

¹ From the Wolcott Gibbs Memorial Laboratory of Harvard University, in collaboration with the Division of Food and Nutrition, Medical Department, U. S. Army.

² Osborn, T. B., "The Proteins of the Wheat Kernel." Washington, 1907.

³ Bulletin 13, part 9, Division of Chemistry, United States Department of Agriculture.

⁴ Jago, William, "Science and Art of Bread-making," pp. 288-303, London, 1895.