

BACTERIA IN MILK SUGAR.

BY ALBERT R. LEEDS.

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CERTAIN phases of bacteriological investigations command universal and profound popular interest, and any publication relating to the connection of a specific organism with a zymotic disease, elicits general attention and discussion. This intimate connection of bacteriology with questions of life and death, has led many to regard the study as the proper province of medical specialists, despite the first uses made of bacteriological methods by Pasteur and his followers and to neglect them as instruments of chemical research. But the morphology, the classification, the physiology, and the botany of the bacteria are in such a rudimentary and unsatisfactory condition that the most valuable methods of bacteriological investigation are still of a chemical nature. The preparation of the culture fluids, the application of the tests, and the isolation of the products are chemical operations, and the advances to be made in the near future are to be looked for mainly on the chemical side of the subject. For this reason the absence from the columns of this Journal of papers resting upon the bacteriological questions, has been a matter of surprise to the writer, and the important contributions which have been herein recently made by Dr. Schweinitz, Dorsett, Bennett, Pammel, and Mason, a source of congratulation. Their results foretell the rich harvest of the future when the complete quantitative value of the chemical actions involved are known, and the different views which they may be expected to inaugurate as to the nature of many bodies now grouped closely together, but which deport themselves very differently when bacteria are the reagents made use of.

It is for these reasons that the writer desires to put on record the slight observations which he has made during the course of ordinary chemical work. They spring out of some anomalous behavior of specimens of milk sugar, which were being examined for purity. All the samples of pulverized milk sugar coming from the drug stores, which he examined, proved to contain a ferment when their solutions were kept at the optimum tempera-

ture for a sufficient length of time. The lactic acid produced was isolated in the form of calcium lactate. This was not the case with some lactose crystallized in nodular masses of prismatic crystals which had been obtained originally from Kahlbaum, and had been standing for twenty-five years in a stoppered jar. It was sterile. With the exception of this specimen, all the others gave an abundant crop of bacteria when definite weights dissolved in sterilized water were submitted to ordinary gelatin-peptone culture. The maximum number obtained in this medium was 1400 colonies per gram of milk sugar. In studying these colonies I looked more particularly for the bacillus *acidi lactici* and the other ten or twelve species, which are at the present time classified as the specific milk bacteria, but without success. With a lactose-litmus gelatin solution a still larger number of colonies was obtained and possibly larger search in this medium, might have revealed the specific milk bacteria of lactic acid fermentation. But my immediate object had been attained, and the presence of bacteria as a common impurity in lactose, to be looked for and avoided by the chemist and the druggist, sufficiently demonstrated.

THE QUANTITATIVE DETERMINATION OF THE THREE HALOGENS, CHLORINE, BROMINE AND IODINE, IN MIXTURES OF THEIR BINARY COM- POUNDS.

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CHEMICAL literature contains many records of methods for the quantitative estimation of the halogen elements, and for any one of these elements in the absence of the others they are as satisfactory as may be required. There are also, it is true, many suggestions and several proposed methods for the separation and estimation of these elements when present together or when some two are found in the same mixture, although they are generally unsatisfactory for one reason or another. The methods for qualitative determinations as given by Hart and by Kebler, in the *Journal of Analytical Chemistry*, are thoroughly satisfactory. A very convenient qualitative method that is in use