500 cc of liquid air are required to grind one gram of streptococci. Approximately 85 per cent. of the bacteria are broken up by this process. After the bacteria and the mortar come to a temperature above 0° C., water or saline can be added in sufficient quantity to dissolve the contents of the bacterial cells, and the few whole bacteria can be removed by means of a filter.

It is to be noted that the bacteria are subjected to a freezing temperature during most of the process, thus preventing destruction of any labile material present. This method has been used in obtaining the extremely labile antigen of the hemolytic streptococcus by Mudd, Czarnetzky, Pettit and Lackman.[3]

Wool, cotton, defibrinated silk, rubber and many other substances can be ground to a very fine powder by the use of this method.

As the concentration of oxygen increases with the evaporation of nitrogen from the liquid air, it is very important to use only small quantities of material at a time, and to avoid the presence of fats or other easily oxidizable substances. It is not advisable to use liquid air without previous knowledge of its characteristics, as explosions can occur when care is not used.

After completion of our experiments it was brought to our attention that Macfayden and Rowland[4] were able to disrupt the cells of the typhoid bacillus by grinding them in a conical mortar chilled by the use of liquid air externally. They used moist bacteria in the form of a paste, but were only able to disrupt about 10 per cent. of the cells. Although their method was published in 1903, it seems to have been generally overlooked, as the interest in soluble bacterial antigens was not so intense at that time.

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[3] Stuart Mudd, E. J. Czarnetzky, Horace Pettit and David Lackman, *Jour. Bact.*, 31: 571, 1936.

[4] Allan Macfayden und Sydney Rowland, *Centr. Bakt.*, Orig., 34: 765, 1903.

SODIUM ETHYL XANTHATE AS A PLANT POISON

SODIUM ethyl xanthate, the sodium salt of ethyl xanthic acid, has a pronounced toxic effect on the aerial parts of herbaceous plants. Applications of the salt in water solution at the rate of one pound per square rod were found to be effective. Sodium ethyl xanthate is very soluble in water and does not have an appreciable corrosive effect on spray equipment. In all tests made so far there has been no indication that its use creates a fire hazard.

The alkali metal ethyl xanthates are produced by the reaction of carbon bisulfide with a mixture of alcohol and caustic alkali. The reactions may be represented by the following equations:

$$(1)\quad C_2H_5OH + NaOH \longrightarrow C_2H_5ONa + H_2O$$
$$(2)\quad C_2H_5ONa + CS_2 \longrightarrow OC_2H_5CS_2Na.$$

Ethyl xanthates are unstable in water solution. They hydrolyze autocatalytically to form principally sulfides and thiocarbonates. It may be that these decomposition products are the cause of the toxicity of sodium ethyl xanthate. While the xanthates of other metals have not been investigated, they very likely are also toxic to plants.

The above results were obtained in cooperative investigations with the Division of Cereal Crops and Diseases, U. S. Department of Agriculture.

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PHYSIOLOGICAL APPARATUS

BEARING in mind the recent article by Marsh[1] on the continuous renewal of culture solutions, the writer rather questions the simplicity of construction and practicability of the apparatus. Conclusions from laboratory experiments should be based upon results from a large number of cultures in a series which have been maintained for a period of time to insure safe analyses. As I have previously pointed out,[2] individual nutrient reservoirs are to be avoided, since they cause a serious loss of time and labor when used for complicated and extended investigations. Secondly, open nutrient systems of the type cited are hardly practical in most laboratories, due to contamination of the solutions by algae, etc.

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[1] R. P. Marsh, SCIENCE, 84: 163–164, 1936.

[2] Robert E. Wean, SCIENCE, 82: 336, 1935.

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