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RESEARCH

## Report for 1931

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## General Microbiology

### Rothamsted Research

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Somewhat different methods are used in the United States.

In order to make a careful study of these, one of their leading soil surveyors, L. L. Lee of the New Jersey Experimental Station, was invited to visit Rothamsted for a year during which time he made two typical surveys: a detailed survey of the Rothamsted farm, showing how the methods are used in making an intensive survey of a small area, and a more general survey of Kent, showing how they deal with a large area in a limited space of time. A number of meetings took place with soil surveyors in this country, out of which emerged agreements as to procedure which will prove of great value for future work. One of the German "Kulturtechniker" Dr. Janert, was also invited here for a year to apply his heat of wetting and other methods to the study of British soils.

#### GENERAL MICROBIOLOGY

Much of the earlier work of the Station was concerned with the effects of partial sterilisation of soil, and the view was expressed that the increased numbers of bacteria following on the partial sterilisation treatment resulted from the suppression of soil protozoa. This has been confirmed by much subsequent work and regular relationships have been traced between the numbers of bacteria and those of protozoa; when one is high the other is low, and *vice versa*.

The further deduction was made that these higher numbers of bacteria produced a larger amount of ammonia in the soil and therefore increased the total amount of plant food. It now appears that this requires important qualification; the amount of ammonia and carbon dioxide produced does not increase proportionately to the numbers of bacteria, but much less. As the bacterial numbers increase so their individual efficiency decreases. In experiments with cultures of bacteria in artificial media it was shown that additions of the protozoa *Colpidia* reduced the bacterial numbers, and increased the individual efficiency. The relationships between numbers and efficiency could be expressed by a straight line, but the actual line for the protozoa-free cultures differed from that expressing the results for the cultures containing protozoa in a way suggesting that *Colpidium* stimulated ammonia production by the bacteria quite apart from its effect in reducing numbers of bacteria.

This work on the interaction of the various groups of the soil organisms is being continued.

The work on nitrification described in the last Report is being continued.

#### EFFLUENT FROM SUGAR BEET FACTORIES

The study of the purification of effluents from sugar beet factories has been continued, and useful information has been obtained in regard to the possibility of inoculating filters with particular strains of bacteria.

#### SOIL BACTERIA

##### *Bacterial Numbers in Field Soils*

An essential part of the work of the Bacteriological Department is to form estimates of the numbers of bacteria in the soil. The plating method was used at Rothamsted for many years, and it