

A NEW AND RESISTIVE METHOD OF SEPARATING THE EFFECTS OF VARIOUS
ENVIRONMENTAL FACTORS ON THE ESTIMATE OF NUMBERS OF BACTERIA IN SOIL.

By Marjorie L. Sutherland, B. Sc.

The University of Manitoba

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INTRODUCTION

In the fall of 1936 a series of studies on the plate count method as applied to soil was begun at The University of Manitoba. The method, as used then, was simple. However, it yielded estimated numbers of bacteria which were highly variable and almost incapable of logical interpretation. Most disconcerting of all was the finding in this laboratory that estimates based on four plates from each of 36 subsamples of one soil sample were as variable as estimates obtained from 36 different plots. It seemed clear that the plate count method had to be revised, or discarded as a tool in serious soil microbiological studies.

The counts obtained on replicate plates from one dilution were highly variable. This would contribute to the instability of the average. Fisher, Thornton and MacKenzie (1) suggested the χ^2 (Chi square) test to determine whether the variation in a series of replicate plates from one dilution may be attributed to random sampling. A χ^2 value is calculated for each set of replicate plates. When a large number of such values is available from one source they are distributed into classes of equal probability based on the theoretical χ^2 distribution. The actual and theoretical distributions are then compared by means of a goodness of fit test. A close agreement with the theoretical is accepted as indicating that the data give no reason for questioning the hypothesis of random sampling and that the means of the series are reliable. In general, counts of soil bacteria have been found to be more variable than the χ^2