sucrose in soils, without which levan and dextran formation cannot proceed. Extracellular synthesizing enzymes under appropriate conditions can function in the soil at distances remote from the microbial cell, and build up complex hydrated polysaccharide structures from sucrose and the hexose phosphates. It is hoped to continue and extend these investigations.

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Influence of Bacterial Polysaccharides on Aggregate Formation in Soils

IT has long been assumed that micro-organisms play an important part in producing a crumb or aggregate structure in soil, and it is known that following the addition of sucrose to soil there is a marked development of water-stable aggregates.

At Jealott's Hill, we have been studying the effect of bacterial polysaccharides of the levan and dextran types on the binding of soil particles. While this investigation was in progress, we became aware of work going on along similar lines at the University of Birmingham (see preceding letter) and in the United States[1].

We have studied the aggregation of soil by the wet sieving technique and were able to show that the addition of washed bacterial cells, for example, those of *B. subtilis*, had very little aggregating effect.

When *B. subtilis* was cultured in a sucrose medium there was gum production ; and following dialysis, removal of the cells, and concentration of the solution, etc., alcoholic precipitation gave a white product which was a levan (nitrogen content, 0·2–0·3 per cent ; 97–98 per cent fructose after hydrolysis (cf. Martin[1])). By using different culture media and methods of extraction, levans having varying nitrogen contents could be obtained from *B. subtilis*, and the significant discovery was made that whereas those products containing 0·2–0·3 per cent nitrogen had a marked aggregating effect on soil, those with a nitrogen content of less than 0·1 per cent had but little action. Further, it was observed that both the nitrogen content and the aggregating effects were related to the relative viscosity of the levan solution.

The polysaccharides capable of aggregating soil appear to be very similar to, or identical with, those polysaccharides which show antigenic activity. Thus it will be recalled that polysaccharides appear to owe certain of their immunological properties to the presence in them of a nitrogenous constituent ; for example, Fitzgerald[2] from serological studies found that the antigenic activity of a polysaccharide produced by *L. mesenteroides* disappeared when its nitrogen content was reduced to less than 0·2 per cent. In this connexion Stacey[3] has suggested that dextrans and other polysaccharides in their most natural state consist of polyglucose chains 'cemented' together by units of the synthesizing enzyme which remains as an integral part of the complex mucopolysaccharide. The levans we have examined may possibly consist of polyfructose chains held together in a similar way.

Microbial polysaccharides are probably only one of the groups of metabolic products having an ameliorative effect on soil structure. However, since the diverse microflora of soil may synthesize many types of polysaccharides from the constituents of vegetable remains, we wish to point out the importance to soil of this group and to emphasize that a knowledge of the chemistry of microbial products would do much to elucidate the composition and functions of humus in the soil.

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Role of Sulphydril Groups in the Action of Acetylcholine and Inhibition of the Vagus Nerve

WORK on the chemical constitution and fine molecular structure of protein bodies has appreciably advanced our knowledge of the nature of the process of the reversible denaturation of protein bodies, which underlies a number of fundamental biological phenomena, including those of muscular contraction.

In particular, the work done in this domain has demonstrated the important part played in the processes of denaturation of protein bodies by the sulphydril groups. As the chemical groups of side-chains of protein bodies, endowed with particular activity, the sulphydril groups are not only likely to participate in processes of direct structural alterations of certain protein bodies, probably including myosin[1,2], but also, as active groups of the protein component of definite enzymes, they participate in a number of fermentative processes invariably attending the complex phenomena of reversible denaturation of protein structures under the conditions prevailing in a live cell. Among the enzymes the activity of which is dependent upon the sulphydril groups we find more than one playing a most important part in carbohydrate metabolism, in particular in that accompanying the enzymic transformations of pyruvic acid[3], and also in cholinesterase[4].

On account of the paramount importance of the enzymes of carbohydrate metabolism and of the enzyme cholinesterase in the course of synthesis and breakdown of acetylcholine, and accordingly that of the relation between the 'acetylcholine cycle', and the 'adenyl cycle'[5], which is intimately connected with the reversible denaturation of the contractile protein of myosin and the general chemodynamics of the muscle in the process of excitation, we endeavoured to find out the role of the sulphydril groups in the action of acetylcholine and nerve stimulation upon the cardiac muscle.

To examine the possible role of the sulphydril groups in nerve stimulation and of physiological doses of acetylcholine, we have tested the effect of stimulation of the vagus nerve and that of acetylcholine upon the cardiac muscle of the frog when the sulphydril groups are bound, followed by the introduction of these groups. As a substance likely to bind the sulphydril groups, use was made of a solution of mercury bichloride (1×10^{-3}, 1×10^{-4}), which is known to form with the sulphydril groups a mercap-