## THE ROYAL SOCIETY OF CANADA

I must refrain from further details of this interesting story, but I would impress upon you the important results that have accrued therefrom to our farmers. Our Canadian work has shown that from 75 to 150 pounds of nitrogen may be stored up in a season, per acre, by the more commonly used legumes, and that, if the crop is nodule-bearing, a verp large part of this is from the atmosphere. This nitrogen, if the legume is ploughed under, or that part of it in the root system if the crop is removed, becomes available through nitrification for future crops of grain, etc. Out of all this has come the adoption of a rotation in which a legunie forms a part and the practice of sowing clover with the cereal crop of the rotation, a plan now common, more especially in the older parts of the Dominion, one that is proving most economic and most valuable for the up-keep of the fertility of our soils. Our average acreage yields have been steadily improving in recent years, more especially in the cereals, and I attribute this fact in a large measure to the increased growing of clover and alfalfa throughout the Dominion, a natural result from our teachings and advice on this subject.

Closely related to the above are the recent studies of the microscopic life of the soil and the relation of this life to soil fertility. This is perhaps the latest phase of agricultural research, but already most valuable results to practical farming have been obtained. Soil bacteriologists, aided by chemistry, have established that the preparation of available food—and particularly of nitrogen—from the inert, insoluble stores of the soil is the life function of bacteria. Other things being equal, we may perhaps say that the number of these useful micro-organisms per unit of soil is a measure of the soil's productiveness. It is obvious that the working out of the ciemical and mechanical treatments of the soil, which will encourage the development of these organisms, is an important and valuable research.

Further, it has been lately shown from a number of carefully conducted and most thorough investigations on the life of the soil. carried out at Rothamsted, that in addition to the nitrogen-fixing and other useful bacteria there are always present other forms of life, certain protozoa, that prey on these bacteria, checking their development and hence affecting soil fertility. The valuable part of this discovery, from the practical standpoint, has been the establishment of the fact that these predatory protozoa can be kept in check by processes of "partial sterilization" of the soil, as by moderately high temperatures or the use of live steam, toluene, formaldehyde or other chemicals and thus, without any addition of plant food, fertility of the soil increased. This is an eminently practical discovery. Though as yet methods of partial sterilization are not in use on the farms,