in subsequent crops grown on fields on which they have been blown in thick clouds issuing from a thresher. Other information collected on that point confirms this opinion. We have prepared plots on the Experimental Farm in Ottawa by mixing viable spores with soil before the beginning of winter. In spring, grain was sown thereon, but no smut was noticed. But then we failed to produce stinking smut in other ways. This very curious difference of behaviour was made the subject of some experiments at Ottawa which we consider throw some light on the subject. We consider this difference mainly due to unsuitable climatic conditions which exert an injurious action on the smut spore in the East, while in the West these conditions may not exist. It is not due to frost alone. During the winter we exposed smut balls of stinking smut to freezing by enclosing a small stoppered glass tube containing the spores in a vessel filled with water and allowing this to freeze solid, the temperature falling to 20° below zero more than once. After being enclosed in a lump of ice for fully three months the spores on examination were found to be perfectly normal, though, of course, they showed then no signs of germination. The germination was then tested in artificial cultures and gave fully 100 per cent living spores. In a similar experiment dry smut spores were exposed to frost. These, too, showed no decrease in germination. Thus it was shown that the action of even severe low temperatures does not affect the life of the resting smut spores either in a dry or a wet condition.

Series of smut spores were germinated in small culture chambers and then exposed to frost for short periods and at various stages of development. The cultures were then continued under the usual conditions, but it was found that the frost had destroyed the life of the spores as soon as germination had taken place. Evidently the smut spore in its resting condition is well protected against frost, the action of which, however, becomes destructive once the protective spore wall has been ruptured by the germ tube. This experiment seems to indicate that smut spores germinating in the autumn and then experiencing low temperatures, are killed, and convey no infection. But when spores freeze, without thawing long enough to start into active life—we must remember that for this purpose a temperature of at least 41° F. is required—they may retain their vitality under such conditions unimpaired. Hence it will also be reasonable to conclude from these experiments that intermittent temperatures—at one time encouraging the germination of spores, while at others arresting further progress—afford some clue towards the solution of the phenomenon referred to.

As far as the Western grain provinces are concerned, soil infection appears to be an important matter to remember when threshing smut-infected wheat. It would be advisable under such conditions to thresh as soon after harvest as possible so as to afford the spores time for germination before the frosty weather sets in.

Grain smut causes great losses to the grower and to the country.—It is not a difficult matter to realize that a large amount of damage must be done by smut fungi throughout a great country like Canada.

The collection of reliable data for all Canada of the damage due to smut in any one year would no doubt show a very large sum of money lost to the country—and which might be saved if every grain grower would co-operate in an effort to cut off all means of dissemination of these parasitic fungi.

Many investigators have tried to estimate the damage caused by smut in other countries, and their estimates are most significant.

Oat smut, it has been estimated, causes a loss of $18,000,000 per annum in the United States. This estimate is based on an average loss of 8 per cent of the total oat crop during the years from 1890–1893. The State of Wisconsin estimates its loss due to oat smut at 17 per cent of the total harvest, or five million dollars for the year 1902. Later figures (1907) show a loss of the wheat harvest estimated at 7 per cent or two and one-half million dollars. The official reports for the State of Wash-