

of the pea fields at the time of my visit (the first week in July), may be briefly summed up as follows:—

The early varieties were all ripe and nothing could be seen except that the crop was thin. The late varieties were just beginning to produce their fruit, the peas in the primary pods being well formed, but for the most part few others. The fields presented the following aspect. In low spots the vines, although somewhat faded from the great heat and want of rain, were healthy and well-grown, but on gravelly knolls or in sandy uplands were in some places quite dead, or were in such a state that recovery was considered impossible.

The plants themselves over large areas were found to have been injured at the collar, immediately on the level of the soil, and consisted in fact of an apparently healthy top and root, but having these two portions separated by a short piece of dead stem at the collar. This injury I attribute almost wholly to the heat of the sun. As the plants faded for want of moisture, they drooped and left their bases exposed to the direct rays of the sun as well as the heat refracted from the parched earth. Upon the roots of the leguminosæ, the natural order to which the pea belongs, are found tuber-like organs the nature of which until lately has not been understood. Upon the pea-plants in question these were found to be particularly well developed, but in many instances were in a state of partial decay. One of the theories prevalent in the district was that the trouble was due to a fungous disease, and there were certainly indications that this view might be correct. Upon the roots bearing decayed tubers, many showed a fungous mycelium emanating from those bodies and running along the adjacent roots. Another feature was the patchy nature of the fields, and further, most of the farmers stated that this "disease" showed itself first in small spots which then increased in an ever-widening circle; or again, that it would run in a straight line along the side of a fence. Now all of these would point to the ravages of a parasitic fungus. A microscopic examination of the tubers on the roots did not, as might have been expected, give an easy solution to the mystery, for the organization of these bodies is exceptional in vegetable morphology, and they contain bodies known as "bacteroids" which much resemble the reproductive organs of some fungi. In discussing the matter with Dr. Platt we came to the conclusion that these bodies might be normal structures of the plant, as, although disproportionately larger and of quite a different configuration, they bore a close resemblance to the tubers upon the roots of other leguminosæ. There were, however, several points which seemed to indicate that something more than drought was affecting the crops, such as the occurrence of a few dead plants together, amongst other healthy vines, and the reiteration by farmers of the fact that when once the disease showed itself in a field it spread rapidly from a given centre.

The nature of the information gathered from pea-growers in this instance was very contradictory.

Upon my return to Ottawa I despatched a series of specimens to my friend, Prof. W. G. Farlow, the eminent American authority of Harvard University, who upon this, as on many previous occasions, rendered me great assistance and kindly forwarded me an article detailing the recent discovery of the nature of the tubers referred to.

He writes: "I have examined your specimens; they are such as are found in a large number of leguminosæ. They have generally been supposed to be due to bacteria, but within six months or a year, papers have been published which throw new light on the subject, and seem to show conclusively that the tubers are not due to bacteria but are normal structures containing reserve material. With this I send by mail a copy of the 'Berichte der Deutschen Botanischen Gesellschaft' for January, 1887, which contains a good paper by A. Tschirch, with a plate. This will give you the information you need." This article shows that these bodies are reservoirs for nitrogenous materials which are laid up during the active growth of the plant previous to the formation of seed. When, however, these latter are formed, a transfer takes place and the nitrogenous matter collected in the root tubers is drawn off and provides the large supply which is found in the seeds of