

to agriculturists, both in America and Europe. In 1845 the United States Patent Office published various communications, letters, extracts, &c., upon the potato disease. The first scientific examination in the United States was made in the State of New-York in 1844. The publication of this investigation induced many persons in this country to form opinions that fungi caused the disease. The same opinion also prevailed in Europe. Atmospheric influence was another theory. Insects upon the vines and leaves another.

My microscopic examination and experiments commenced at Waltham, Mass. in 1851. In June of that year, I found the under leaves on my potato stalks turning yellow—some quite dead—while the tops and leaves also the leaves and stalks of other hills continued quite thrifty and green. This peculiar circumstance, thus early in the season, induced close observation and careful examination into the phenomenon. A query naturally arose—can fungus or atmosphere act thus partially upon the plant? Is there not some other predisposing cause prevailing? From this investigation I felt confident that insects or worms had attacked those plants at the roots.

Acting from this impression I examined the roots, but with the natural vision no insects were found. The microscope, however, revealed myriads of insects on the seed tubers, roots and stalks *under ground*. The attack upon the latter, at the lower joint, was visible in spots or marks resembling *iron-rust*.

Potatoes which I had in jars and flower-pots in my shed, covered from any exposure, (experiment tubers) exhibited, under the microscope, similar insects—and tubers taken from my cellar, at this time, had insects on those which were sprouted. Thus in *three separate and entirely dissimilar positions*, insects, similar in every respect, were found, evidently subsisting upon the sap of the sprouts and vines. This revealed to me unquestionable evidence, that, during the early growth of the plant, insects' ravages produced deterioration by the draining of the sap from the vital part—thus causing the disease. The insects, being only microscopic, rendered it extremely difficult to discover the nidus or hibernating spot of their eggs.

Early in my researches, however, I became satisfied, from the position of the *young* insects, that the eggs would be found near or under the eyebrows of the potatoes. This proved to be correct. It was not until 1856 that I *first* found the eggs. They are found imbedded in the very sprouts and in the skin near the eyes, but only with a powerful microscope and by the light of the unclouded sun can they be found. During the period 1851 to 1856 my experiments in cultivation and otherwise were continued. Since the latter date I have watched as before, (sealed in glass jars and otherwise,) the development of the tubers, and embryo progress of the eggs to the first animate motion of the tiny insects, and their attack upon the tender sprouts; the effects of their ravages, and the progress of their poison infused into the vines, causing the malady. This insect is the *Aphis*.

The particulars of my discoveries and my opinion on this subject were communicated to the Governor and Council of Massachusetts in August, 1851, answering a resolution of the Legislature, passed that year, soliciting information on this subject. And the fact is a matter of record in the State Department. For reasons of my own, my communication was to remain with the seal unbroken, unless at my request, until 1856.

I have thus placed before the reader the time, original circumstances of discovery, as also the final development showing the *cause* of the potato disease.

The facts and authenticated proofs attached thereto, and a multiplicity of other similar evidence, has been placed before the United States Patent Office, there to remain. They are deemed adequate to settle the question, positively,