

called "a frost;" it was not a clear cold state of the air, but a chilling vapoury fog, dragging over the face of the country;⁶ a state of the atmosphere in which Saussure as well as Crosse found that the electricity of the atmosphere is strongest, appearing usually at the end of May or beginning of June, and shewing itself before sunrise; and Saussure observed, electricity began to appear at sunrise. At the time spoken of, it was the custom for some one or other of the villagers to watch for the appearance of this visitation; and when it occurred, as it was graphically described by an intelligent inhabitant, the whole population instantly were alarmed by the watcher, and young and old rose from their beds. Some covered up their little patches with straw, or any thing they could interpose over their potatoes, and some even used part of their bedding. But those who had large portions, and could not, of course, resort to this method of security,—these, therefore, resorted to the very expedient already named; and by judiciously lighting small fires of straw, wood, or any rubbish, at proper intervals from the plots, threw off to leeward sufficiently large rolling volumes of smoke, which, dragging also over the surface of the potatoes along with the fog, neutralized it, so to say, and almost always, if applied in time, saved the crop.

Now, that the calamity befalling the potatoes grown at that time at Scotchby, was not owing to the mere negative article of cold, (see note ²) *ex sese*, in itself, is very probable from the following fact: The very respectable gentleman who communicated these facts, long since in his grave, mentioned the plan he pursued in his own garden to save his own crop, and which, besides being effectual, had the advantage of being always interposed and ready; and that was, old fishing-nets stretched horizontally just over the tops of his potato crop, secured to low, upright stakes, placed in proper situations; and it

⁶ At Geneva, the fogs are a pretty certain sign of good weather. They often do not rise to a great height above the surface of the earth: and when the low grounds are completely obscured, the sky is clear on the mountains. In these cases the fogs conduct to the earth the electricity of the serene air which reigns above them.—*Saussure*. But the most recent experiments on the electricity of the atmosphere have been made by Andrew Crosse, Esq., of Broomfield, near Taunton. His was a very extensive atmospheric conductor, consisting of an insulated copper wire, 1/10 of an inch thick, extending between two vertical masts from 100 to 110 feet high. It was no less than a mile and a quarter in length, afterwards shortened to 1800 feet. It is remarkable that Mr C. could not in any way preserve the insulation during a dense fog or a driving snow. Fogs, rain, snow, and sleet produce changes in the electrical state of the wire. The electricity is negative when they first appear. It frequently changes to positive, gradually increasing, and then decreasing and changing from positive to negative every three or four minutes. These phenomena have been so constantly observed, that whenever the wire appears negative, it is considered as a certain indication that either rain, snow, hail, mist, or a thunder cloud, is in the neighbourhood.

may be that the netting was also supported by ropes or rails, placed here and there, on which the netting reposed, and thus did not come in contact with the potato tops.

Now, it is evident, that the matter of cold air, and even the vapour, could easily and readily, and did in fact, circulate through the meshes of the netting; but the netting was invariably found a *perfect protection*; and this may be readily conceived, because the netting acted as a conductor to the electric particles,⁷ agreeably to Beccaria's experiments, they settling with the vapoury particles upon the netting, in preference to settling in any prejudicial quantity on the potato tops.⁸

Of these facts, as here related, there can be no doubt. They were communicated in such a way, and from such parties, as to preclude any mistake. The inferences, however, are matter for discussion, and might suggest similar experiments, applicable to the morbid influence for so many seasons affecting the potato crop.

That there is some reason to expect that electricity, in some such way as here described, or, for instance, more intelligibly, by the development of heat on the delicate leaves after the adhesion of the vapoury particles, is connected with the destruction of the potato crop, seems very probable from the known extreme susceptibility of the leaves of the potato plant to the morbid influence of peculiar cold; and that what we term frost, in all its various phases and effects, snow and hail, even that sensation which we term frosty air, or the peculiar sensation produced by

⁷ By insulating strings, extended in the open air, Beccari observed they acquired a degree of electricity which increased with the length. Having extended across the river Po a cord 1000 Paris feet in length, he found it as strongly electrified during a shower unattended with thunder, as a rod of metal had been during a thunder storm.

⁸ Such phenomena, from some such cause, are not unusual in summer. The phenomena of blight attended with frost, is not unusual in some districts in New Brunswick in the summer season, as well as in this country. Something analogous, as to the existence of frost, even in the tropical climate of India, is a well known fact. "When ice is produced in temperatures above the freezing point, a plentiful deposition of dew is always going on, which seems to be altogether inconsistent with the idea (of evaporation being at the bottom of the process of congelation.) of air being in a state capable of receiving fresh accessions of moisture. On one occasion, while Mr. Scott, in India, was repeating some of Dr. Well's experiments, a turban being suspended across the pit, three feet above the pans, it, as it always does, prevented the formation of ice in those immediately under it; and in several which it only partially covered, ice was formed on the half of the water out of the perpendicular line, while that under the turban was fluid. Two strings crossing each other, and placed at a less height above a pan, will also divide the ice into four quarters; but it is obvious that these results will not always be obtained; for if the temperature be rather lower than would be necessary to freeze the water, supposing no impediment to exist, the whole may be frozen, although partially covered; and on the other hand, if just sufficient to freeze the water under the most favorable circumstances, the contents of a vessel not freely exposed to the influence of the sky may remain fluid throughout."—(*British India*, Edin. Cab. Lib., vol. iii., pp. 232-3.)

the north-east wind,⁹ is no other than some peculiar action or modification of the electric fluid during certain states of the earth and atmosphere.

It may be objected, that the potato disease is altogether different from any effect produced by ordinary frost; that potatoes have recovered in former years when the tops have been cut down by frost in a similar way to that already described. There is some force in this, but it is more apparent than real. The effects produced by frost, and by the potato disease, as considered distinct from frost, it is granted, may not be always to the same extent; one day or night of frost differs from another in intensity, so will the effects be different. Again, frost united to vapour is different from a dry frost; so must also the result be different. Besides it must not be forgotten, that the potato seed itself is not always equally vigorous; neither is the growing crop produced even from the same seed alike healthy at all stages and under all circumstances; so also is it then less capable of resisting any morbid influence. This is also not unfrequently the case with man and beast; and they are said then to be predisposed to disease. Add to this, that a poison introduced into the system, may be arrested by a speedy antidote. A morbid influence is sometimes only fatal to life when applied in large doses. Opium is a poison; arsenic is a poison; but judiciously applied they are healing remedies in the animal economy. So also in the vegetable economy, the small doses of ammonia, conveyed to the roots of plants with the genial rain, produce active and healthy vegetation; while a soot heap, however wet, for a time banishes all vegetation whatever. Again heat, dry or moist, immoderately applied, is injurious. Thus it is with electricity. No doubt it performs a wonderful part in the growth of vegetables,—exciting the action of the fluids in the capillary tubes of plants,¹⁰ assisting in promoting fermentation, and in the dissolution of manure introduced into the soil.¹¹

⁹ Mr. Crosse ascertained the states of the air in which electricity appears; among them he mentions a fall of snow, or a brisk hail storm, clear frosty weather, a peculiar state of the atmosphere which occurs during north-east winds considered peculiarly unhealthy, and producing a sense of dryness and extreme cold, which is not indicated by a depression of the thermometer.

¹⁰ M. Boze having informed the Abbé Nollet that capillary tubes, which discharged water only by drops, afforded a constant stream when electrified, he made numerous experiments on that subject.—He found that the stream of water was never sensibly accelerated or retarded when the bore was above a line in diameter; when it was a line in diameter the fluid experienced a small acceleration; and when it was capillary the electrified jet not only became a continued stream, and divided into several streams, but was also considerably accelerated, and this in proportion to the smallness of the bore.

¹¹ Archard, of Berlin, made several experiments on the effects of electricity in the fermentation of vegetables. He took a small quantity of rye, in which the process of fermentation had been commenced for the purpose of distillation, and electrified