fallen under my notice. The hazel leaves, a week or two back, were very generally spotted with dark patches of green. On examination, it was found that the reverse of such patches was covered with *erysiphe guttata*, which had been living at the expense of the paler portions of the leaf, while in the subjacent part the *chlorophyl* had become of a deeper green." The *chlorophyl* is the term applied by botanists and vegetable physiologists to the green colouring matter of leaves.

The question whether the fine contents of the spores of bunt, *uredo fœtida*, as well as those of smut, or *uredo segetum*, enter by the roots and circulate in the plant, has already been glanced at. This has been the surmise of most observers, but no one has yet seen them grow; nor would this, as is stated in the first chapter, be the normal mode of growth. The spores themselves are undoubtedly too large to enter either by the stomata of the leaves, or the spongioles of the roots. Some ingenious experiments have been recently made by Mr. Berkeley, which he most kindly communicated to the author, that appear to establish the theory that these contents of the spores do enter the plant in the way suspected, and grow. The mode of proceeding was to immerse some seeds of wheat in water containing bunt. One of the first appearances was a curious mould with peculiar spores that sprung up on the spores of bunt. The plants which came up from these seeds were evidently affected; but no communication whatever could be traced between the cells of these plants and the shoots thrown out by the spores. No intrusion whatever of the mycelium developed by the bunt spores into the wheat could be discovered. This looks, therefore, as if the fine contents of the spores do certainly propagate the fungus. Some writers have called these kinds of fungi growing in the interior of plants *entophyta*, or plants within living substances, as *entozoa* is made to designate animals living within them. Fries says, these entophyta never grow in living animals, but this is clearly a mistake, as several kinds of moulds have been found in various parts of them. The whole subject is one of the most curious that can be conceived.

To return to the bunt: we may observe as before, that of the multitude of its sporules or fine contents no adequate conception can be formed. One grain of wheat is capable of containing four millions of spores; it is therefore beyond all calculation what quantity of sporules these may send forth. Care of the seed is the only way to prevent the encroachments of this pest, which will otherwise appear in almost every field of wheat. The way in which this happens, is by most writers on the subject considered to be, that when the grain is threshed, or from other causes, the bunted seeds are ruptured, and the cloud of sporules then escapes. They are of a greasy, oily nature, and consequently adhere to the skin of the sound grains. It is quite certain that the disease may be at any time propagated by rubbing sound wheat against that which is infested, by the fungus. If, then the seed be sown in this condition, the result may be easily predicted. The method also of counteracting the evil at once suggests itself. It is merely to cleanse the wheat which is about to be sown, from all the bunt which may have attached itself to it by reason of its unctuous character. The principle of effecting this object clearly must be, to use means to convert the oily matter which causes it to stick obstinately, into a sponaceous, or soapy matter, which will allow it to be readily washed off. Chemistry here comes to our aid. An alkali will convert oil into soap; and this is the basis of all effectual *dressing*, as it is called, of the seed-corn. Almost every district has its peculiar dressing, but the best are merely modifications of this principle. Whatever other ingredients may be used, the effective constituent is some alkaline matter in the form of a ley. Lime, which possesses alkaline properties, has accordingly been not unfrequently resorted to: it must not however be too much slaked in mixing, or it loses these properties, and thus often fails. Common potash, and substances containing ammonia, as for example, the liquid excrements of animals, have been adopted for remedies. Some persons employ brine, sulphate of copper, arsenic, and other things not possessing alkaline qualities. Whenever these methods succeed it cannot be for the reasons advanced, but it may happen that they destroy the vegetative powers of the fungi, though they still remain fixed to the grain. It would be well to follow the advice given by professor Henslow, and to institute a set of experiments on these points. They are curious and interesting questions; and indeed many things relating to these fungi still require minute and accurate investigation. It is unquestionable, however, that a good dressing of an alkaline ley thoroughly applied, completely arrests the evil. Whatever may be the views of some as to the value of sulphate of copper, it is obvious that the application of arsenic is undesirable, and indeed improper, from the dangers attendant on the use of so violent a poison. Nor are such things necessary, on account of the efficacy of the dressings upon the principle before mentioned. Indeed, in the fields of careful farmers, bunt has happily become rare.

It is difficult to apply the same precaution against the smut, or *uredo segetum*, with equally good effect, because the scattering of the spores at an earlier season diffuses them extensively. But barley fields, where they often adhere longer than in wheat, ought to be more attended to than they are; for a great quantity of this grain is almost every year destroyed by it. As knowledge advances, it is to be hoped the prejudice which leads some to regard the appearance of this fungus with the complacency before mentioned, will be removed. It may happen that the state of the atmosphere which is favourable to its development, tends to a good yield of barley; but it should be remembered that every ear so destroyed is a loss of superior corn. By all means dress barley where there has been much smut the previous year. In this year, 1846, it is most lamentably prevalent.

With regard to the *uredo fœtida*, although judicious dressing has been found to check it to such a beneficial degree that it is considered to be bad management to have much of it on any farm, it still abounds in districts where the agriculture is of an inferior kind. It is also found to prevail more in the spring than in the autumn sown wheats. The safeguard is the perfect purity and cleanliness of the seed. When mixed with the flour it is excessively disagreeable; but whether it is injurious to health is not quite decided, though it probably does produce ill effects on the constitution.

No other corn plant but wheat is affected by bunt in this country, but there are several fungi in existence attacking seeds of cultivated plants in the same way. Wheat does not afford a solitary instance of this kind of disease. Lately, in Africa, near Algiers, there has been found a uredo, which destroys the seeds of a species of Lucerne just as bunt does wheat. We might also enumerate eight or nine other kinds of vegetables which have their parts of fructification utterly ruined by different uredines, analogous to those producing smut and bunt in corn. The maize is subject to a large uredo; the *panicum* of Egypt has its parasite also in the shape of uredo; while another kind enters grasses, and is propagated within the sheaths.

Almost every farmer will say, that wherever the berberry-tree grows it produces fungal diseases in corn. The common fungus on the leaves of this shrub is the *æcidium*, and it looks, at a casual glance, very much like the rust, or uredo, of the rose, when it comes in large patches; but examine it with a good microscope, and the form is quite different. It has nothing in common with any uredo, except that it belongs to the same order. If the contents of its spores do affect corn, the fungi must be altered by being transferred to a new place of growth. It will be well worth the while of the scientific reader to examine Corda's exquisite drawing of the æcidium, in his "Icones Fungorum, or Figures of Fungi;" he will gain more by this means at a glance, than he could from pages of description. The berberry also is attacked by *erysiphe*, but no uredo can be conceived to arise out of the sporules of a fungus so entirely distinct from it in every point of view.

SIGISMUNDI, Emperor of Germany, being one day asked what was the most sure method of remaining happy in this world, replied, "Only do always in health what you have often promised to do when you are sick."