back as the dawn of the present century, Lord Dundonald, ("the liberator of South America") struggled hard, fighting an "uphill battle with "the powers that be," to show the intimate connexion between chemistry and agriculture. And how was he met? When intimating to one of the farmers of that day, who could see nothing good beyond the muck heap, that he looked forward to the time when an acre of ground would be manured effectively with a bag of artificial manure, 'Yes,' was the quaint and sneering rejoinder, 'and the produce carried to the stack-yard in your waistcoat pocket.' But the march of progress in agricultural science carried all before it. Sir Humphrey Davy gave a powerful impetus to calm investigation, and dozens of others have followed in his wake." In the first place, too much was expected from analysis of soils; and it was supposed that a farmer had only to take a small parcel of the land of his farm to the analyzer, and at once know what was wanted, and doubtless in most cases he received the most valuable information, and sound advice; but receiving alone is one thing and carrying such advice into operation is another. Many, if not most, of the farmers of that early day had not knowledge enough to enable them to carry out the advice given, and the consequence was that they blamed the analyzer and the system on which he acted, naturally enough not blaming themselves.

Lord Dundonald was far too wise a man to sneer at the "muck heap." All our trouble in Canada is, that we have not enough of it, and so if we cannot find some substitute we must go without, for our labour is so dear, and our prices so low, that artificial manures are (or are believed to be, which comes to much the same thing), beyond the reach of our ordinary farmers. We must therefore turn to what we have, and what all see they can afford, and in clover they have not only the "muck heap," but the muck heap and the bag of guano combined; for Voelcker says that a good crop of clover which has produced one heavy crop of hay, "and which has been allowed to stand for seed," (for this he insists on), will add to the land a fertility for wheat which could not be attained with the heaviest practical dressing of guano But to do this in the best possible manner the clover must be allowed to come to perfection; must be treated so that it will produce, and leave on the ground the greatest possible amount of root and leaf, for in those two portions of the plant consists the virtue of the clover crop. How much superior, therefore, must be the method, which has been advocated so often in these pages, to grow the clover in the greatest perfection by letting it grow during the entire year, and untouched by the eating down of cattle, and by the scythe. Let the entire proceeds of leaves and stems go to the soil, instead of leaving merely what leaf matter falls off in the growing and harvesting of a crop of seed. Encourage the root to make the greatest possible growth by leaving the stems to flourish and come to perfection. Allow the seed to fall on the ground to form the future plant, (for clover seed, when it remains in the original pod or seed case, will keep its vitality for a considerable period of time, certainly more than one year), then the following season allow the roots again to throw up the herbage and flower stems, and as soon as the plant is well in flower, plough all under together, and fallow for the wheat crop. We shall thus combine the "muck heap" and the "guano bag," and the proceeds will be, in all likelihood, a splendid crop of wheat, attained at the mere loss of one year's rent (or its equivalent), over and above the ordinary course of cutting the hay crop and feeding down the aftergrass. In the latter case you have the *seeming* profit of the hay, and the sheep and cattle, but you have also the expense of haying and carriage of manure back to the field, and after all attain only an inferior crop of wheat, instead of having a first-rate one. The ordinary system certainly in time runs the land down; by the other a heavy crop of wheat is attainable every third year, with only one ploughing, and the cultivatings and harrowings necessary to keep the weeds down, and any one can see that under such treatment the land would attain a richness and heart, so much wanted, and so seldom found under present management.

VECTIS.

Should Stubble be Burned or Ploughed Under?

This is a question which we often hear discussed with considerable earnestness, and so far as we have observed, the disputants are pretty equally divided. A superficial consideration of the subject would certainly lead one to believe that ploughing stubble under is greatly to be preferred to burning it. It seems natural to suppose that by the first plan we restore to the soil a much greater amount of material out of which to form other crops, than we can do by simply burning it. But do we restore to the soil the material in a form that can be assimilated by the next crop? Can we make this stubble instrumental in increasing the fertility of land, either by itself or by its action on other substances contained in the soil? These are questions which it is well carefully to consider.

That any considerable quantity of the stubble of ripe grain finds its way into the next crop that is raised on the field, no one will pretend to argue. Thoroughly riponed straw undergoes a vety slow decomposition, unless it is exposed to the combined action of heat and moisture; and experience demonstrates that straw—particularly wheat straw—will often remain in the soil for a whole season with its form preserved entire, and its appearance scarcely changed except by the absorption of water. Finally, it is true that the fibre of the straw becomes disintegrated, and the carbon is left on the land instead of being consumed. But we must remember that, chemically, carbon is of no use to the soil, though mechanically it may be, as an absorber of moisture and gases. It is from carbonic acid, and not from charcoal, that plants derive their supply of carbon. This inert carbon, if we except about one per cent. of nitrogen, is all that is saved to the soil by ploughing the stubble under, and that would not be returned to it if the same were burned.

Now let us consider briefly the disadvantageous form in which the mineral salts are returned to the soil in the process of turning under. They are in the form of organized matter, and must wait until this organism is entirely destroyed before they can be resuscitated into living forms. The potash, phosphorus, soda, lime and silica, separate or in combination, must remain encased in carbon, which is one of the most indestructible substances, until that is slowly wasted away by the action of oxygen. Years might elapse before the silica, which is so necessary to give strength to the stalk of the grain, would be made available. Now, in all our prairie soils there is a great deficiency of this substance, and consequently the grain grown here is much more liable to lodge than that grown farther north or east. It is plain then that we should manage our stubble so that this silica will not become fixed, but will be in a condition to be used over and over again as often as possible. The same thing is true of all the other mineral substances contained in the straw; they are not impoverished by use nor enteebled by constant employment.

Now let us see how burning affects the stubble with a view of making it available as manure for a future crop. The popular idea is that substances are destroyed by the action of flame, but such is not the case. Rot and fire accomplish exactly the same end in changing vegetable substances; but the one effects in a moment what it will require the other years to perform. Each decomposes, neither can destroy; we have before shown that the sooner this decomposition is effected in the stubble of the grain the better will be the results. Straw, from the fact that it contains so little nitrogen, and so large an amount of mineral substance, should be burned; but the same process would be very disadvantageous as regards stable manure, or other substances which are rich in nitrogen. These require to be slowly decomposed, and it is preferable that it be done beneath the surface of the ground, in order that all the ammonia which is formed by the disengaged nitrogen and hydrogen may be saved. Carbon here is necessary to absorb this gas, and that which is produced from the slow rotting of vegetable matter, is very suitable for this purpose. But the same need does not exist in the case of the lower part of grain