But, sir, deeply as I have deplored this unfortunate propensity of the Canadian Esau, to sell his birthright to the American Jacob for a very insufficient mess of pottage, I have hitherto refrained from giving vent to my feelings through the press; but as the last straw is said by the Eastern moralist to break the camel's back, the lavish manner in which our national stores of mineral manure is being "extradited" to enrich the soil of foreign lands has overcome my reluctance to appear in print, and impelled me to enter my humble but earnest protest against the indifference with which our farmers view the removal and probable exhaustion of this valuable fertilizer, which Providence stored up countless ages ago for their benefit, but the value and the certainly approaching want of which they seem neither to appreciate nor to recognize.

The substance to which I allude, and to which I wish particularly to call attention is the mineral phosphate of lime, or "Apatite," as it is called by the mineralogists, which, when pure, contains 54 per cent, of lime and 46 per cent. of phosphoric acid, being of the same chemical composition as bone-earth, fresh bone containing in addition a certain amount of nitrogenous matter. Now the phosphoric acid in combination with lime is an exceedingly valuable ingredient in the composition of our arable soils, as though it enters only in small proportions into the substance of the plants, it seems to be a most important promoter of their healthy growth, and an essential element of their food value. It exists in greater or smaller proportion in all soils capable of supporting vegetable life, and is one of the substances which are soonest exhausted, and of which the smallest quantity is returned to the soil in our ordinary manures, at the same time that it is one of the most efficient agents in maintaining the fertility of the soil, or of restoring it when diminished or exhausted by overcropping.

When the value of phosphoric acid as a manurial substance was first recognized, the only substance in which it was known to exist in an available form was bone, and a large industry sprang up in the collecting and crushing or grinding bones for agricultural purposes Now the phosphate of lime, whether in the shape of bone or rock, when in mass is very slow to decompose under the ordinary atmospheric influences of sun, rain, dew and frost, and is almost totally insoluble in water, and therefore unavailable for plant-food, and it is therefore necessary, before applying it to the growing crops, to reduce it to a soluble condition. This has been mostly done in the case of bones by breaking them down into quarter-inch, half-inch or inch bones, and treating them with sulphuric acid (oil of vitriol) so as to convert the insoluble phosphate into a soluable superphosphate; the sulphuric acid taking a portion of the lime from the grasp of the weaker acid, and converting it into sulphate of lime, *i. e.* plaster, while the phosphoric acid thus set free attaches itself to the remaining phosphate and forms the superphosphate. This substance being soluble in water is consequently immediately available as food for the plants; but as they require but a very small quantity of it, its very solubility renders its effect transitory, as much of it is leached out by the rain and melting snow, and carried off by the drains, or washed down into the subsoil, below the reach of the roots, while the surplus acid of the remainder combines with the lime of the soil to assume again the insoluble state from which it was formerly reduced, and hence it is that in many cases the superphosphate produces but little effect, and its application is neither economical nor profitable. Modern experience, however, has shown that it is by no means necessary to use the expensive and dangerous sulphuric acid, but that if finely ground, and applied to grass land broadcast as a top-dressing, or drilled in with the seed for other crops, its effect will be both immediate and lasting. Some persons indeed doubt whether it is a direct article of plant food; but it certainly acts as a wonderful stimulant to growth, and seems to act upon the plants as salt, pepper, and other condiments do in the human stomach, which they aid in the performance of its functions of digestion and assimilation.

As I have already stated, this valuable fertilizer exists in small proportion in the generality of our soils, and is constantly being abstracted from them in the crops we gather. It enters into the composition of the milk, and builds up the bony framework of the animals which feed and fatten on our pastures and meadows, and is consequently largely exported in the cheese, and live and dead meat, no less than in the wheat and other grains which we send to feed the millions of Europe. The principal, I might almost say the only manure in use among our farmers are barn-yard and stable manure, and gypsum, or in ordinary farm language, plaster. The sole elements supplied by the latter substance are lime, sulphur and oxygen, while those derived from the former are chiefly nitrogenous, carbonaceous, siliceous, and alkaline matters, with perhaps a very minute portion of phosphorus. It is clear then that if the fertility of the soil is to be maintained at a profitable pitch, the phosphoric element must be supplied from time to time as it becomes exhausted. We are now exporting our animal products to such an extent that in a few years the supply of bones will run short; but happily there has been stored up for myriads of ages in the recesses of our Laurentian hills an ample supply of this precious mineral, sufficient, if utilized along with our other manurial and mechanical resources, to maintain the agricultural productive power of the Dominion at its pristine pitch of luxuriance till time itself shall be no more.

Let us hope then that the farmers of Canada will avail themselves of the rich inheritance which Providence has placed within their reach, reflecting that if this mineral will bear its cost at the mine besides freight, insurance, commission, and merchants' profits wholesale and retail, and still be found profitable by their European brethren, its use must be much more beneficial to themselves, who have only to pay the first cost and the expense of crushing.

Canada's Great North-west.

Canadians hardly, even yet, comprehend the immense extent and unequalled fertility of their inheritance in the North-west. It has been generally supposed that the greater part of that vast area was a snow-covered wilderness, and inhospitable mountains unfit to be the home of civilized man. Those mistaken ideas have ceased to exist, but the great extent of those unpeopled territories, that are more than sufficient to produce food for the whole population of Europe, is as yet known to few. Even land that had a short time since been pronounced worthless is now known to be of surprising fertility. The hills were a light and sand-coloured sandy loam, with numerous boulders and great quantities of gravel, and the flats were of cretaceous clay, and so acid that grass could not form a sod. The vegetation in the flats was sage-brush and cactus, and every thing betokened confirmed acidity. This was at the time of Professor Macoun's first visit. A second visit opened his eyes. The hard acid soil had been broken. The cactus and sage buried by the ploughshare had given way to a crop of wheat. The grain was about ripe at the time of his second visit. The ground had only been broken for an inch or two in depth, but the change was astonishing. Close to the ploughing the unbroken soil was so hard that it could not be penetrated. Not a yard away it could be dug to any depth. The apparent acid land is not really so, and will, the Professor says, blossom like the rose.

Mr. LaTouche Tupper, who lately travelled through the North-west as far as Battleford, furnishes very interesting notes of his trip, from which we take the following extracts:—

Manitoba—or rather old Manitoba, for the borders are now enlarged—is low, flat, alluvial soil, very rich but the characteristics of the country are unattractive; the soil, though, is practically exhaustless and when a proper system of drainage is carried out must always rema n a very rich and profitable country; as, however, it is pretty well all taken up, we will on west. Take a map and draw a line north and slightly west from the eastern side of the Pembina Mountains; then continue the line in the same direction and you keep the eastern slope of the Duck Mountains, Porcupine Mountains and the Basquia Hills. This line is the first step to the Mountains—rising about three hundred feet along the hills—you never go down again nor do you again see the dead flat so objectionable in Dakota, Minnesota and Manitoba—nor do you get the storms of these so often storm and flood swept States. At the sea the storms are resistless because there is nothing to break the wind, so Dakota and Minnesota's immense flat, treeless plains are storm swept, while our North-west with its frequent ranges of wooden hills such as Cypress Hills, three thousand eight hundred feet above the sea, and Wood Mountains, three thousand four hundred feet high, which stand on our southern border as giant sentinels to challenge and throw back the bitter storms which sweep northwards from the immense sterile plain which occupies so much territory in the heart of the United States, commencing near the border of Mexico.

In Minnesota, Dakota and Montana hundreds of lives were lost, tens of thousands of cattle perished and buildings were submerged and swept away, while I was crossing

OUR BEAUTIFUL PLAINS

with horses, they feeding on the rich grasses of the plains, being turned loose noon and night, I being comfortable in my tent, and actually travelled from Winnipeg to Edmonton and return, a distance of over eighteen hundred miles by trail being out 120 days in the depth of winter and never was stopped an hour by storm—the deepest snow anywhere being 18 inches while at Battleford and in that section the deepest snow was six inches all winter!—as I neared the Rocky Mountains it got as deep as 18 inches!—coming back I took carts at Victoria on the 15th of March, the most northern points of the Great Saskatchewan River!

I think there are two great currents of air or winds which affect our North-west. Taking the great trail from

WINNIPEG TO EDMONTON,

the widest prairie is but thirty miles from wood to wood, and I never camped away from wood in eighteen hundred miles travel, so you can see our west is not a treeless waste of dead flat, but is, after rising on the first steppe, a rolling country, well drained, the streams all carrying large valleys, well wooded, free from stumps as we are here, and free from the dreaded grasshopper. There is but a small percentage of waste land and the soil is rich and quick, you can have your choice of subsoil from heavy clay to light sand or gravel, while your topsoil will be all the way from heavy clay loam to light sand loam. Water is good everywhere; there are many salt lakes, but fresh water can always be had near them, often within 100 feet. The country improves as you go west, and I think the richest and most attractive country I ever saw is Edmonton district (a little larger than Nova Scotia)—here is abundance of coal; gold is taken out of the river for the distance of 200 miles and yield is over 35 bushels of wheat per acre; oats, 70 bushels, while root crops are immense both as to yield and size. There are some fine farms here, and although it is under the shadow of the Rocky Mountains, there are three grist mills, three sawmills, two steam threshers and improved machinery everywhere.

I have seen a great many Nova Scotians in the west, particularly about Fort Ellice and Birtle, and wish more of them would go west; those there are doing well and are more than satisfied with their prospects; they make the very best of settlers and are sure of a warm welcome there, and every assistance in getting on their land; health and wealth await every settler. A great deal has been said about the railway; I would say that after travelling through all the settlements since the Syndicate bargain has been made, and after meeting most of the best men of the west, that the bargain is for the best interests of the intending immigrant; the bargain is such that they say that in order to make it pay, the Syndicate must settle up the country; there you have it in a nutshell—to get business for the line they must have their land tilled, to get the land tilled they must promote settlement, to promote settlement they must sell their lands cheap, and give cheap transportation and prevent speculators tying up land.

Berberry Hedges.

Attention is called to a letter from J. S. M., in the usual department on "Berberry Hedges and Rust." Our subscribers who have had any experience with berberry hedges will do a great service by communicating their views on this important subject. In our next issue some articles from leading authorities are expected.