FARM.

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At the rate of an increase of 1° temperature for every 60 feet descent, a temperature sufficient to fuse metals would be reached in about 30 miles. This is allowing the increase to be uniform; but such may not strictly be the case. However, the crust of the earth must be comparatively thin, compared with the rest of the material of which it is composed. There can be no question but vast masses of molten material exist in the interior, ready to escape when communication is made with it. With this eruption of molten material, volcanoes and earthquakes are associated. The origin of volcanoes is accounted for as follows:—

1. The union of chemical elements in the interior of the earth, which lead to a rupturing of the earth's crust and the ejection of so-called lava.

2. Settling of the earth's crust, causing cracks and the generation of intense heat.

3. The accession of water to the heated interior, its sudden change to steam, and a rupture of the earth's crust. This last theory has much in its favor, when we consider the location of volcanoes near the sea and the volumes of steam they emit during action. Earthquakes are closely connected with volcanoes.

The result of volcanic eruptions is the formation of mountains of *eruption*, which are simply deposits from the *crater* or mouth of the volcano. Great internal force is followed by upheavals, sometimes extending long distances, and giving rise to mountains of *elevation*.

Most mountain chains have been developed in this way; in other words, they result from a crumpling and elevation of the earth's crust, and afterwards become worn by the action of the atmosphere into the variety of forms we see them assume. There is another kind of mountain we may mention here, viz., mountain of *circumdenudation*, which results from the material once around it all being removed, so as to leave the mountain only.

We have, therefore, three forms of mountains:—I. *Eruption*, chiefly volcanoes. 2. *Elevation*, mountain chains. 3. *Circumdenudation*, single forms.

II. Aqueous rocks, also called sedimentary and stratified.—These have been deposited in water as sediment, and afterwards solidified by agencies to be referred to afterwards. They are not so hard as the igneous; are in layers, showing a sedimentary structure, and usually contain fossils. Lake Winnipeg affords us a good illustration of how this sediment may collect. The Red River contains very muddy water by the time it reaches the lake into which it empties—so muddy that the water of the lake is muddy for 200 miles. It then appears clear, and passes out into the river at the north as clear water. What has become of the mud? It has settled in the lower end of the lake, so that vast deposits are collecting there, which in time will no doubt become solidified and add something to the earth's crust for future geologists to examine. Lake Geneva, in Switzerland, also furnishes an example of a lake into which muddy water is emptied and clear issues from the other side, leaving the deposits in the lake bottom. Most of our great lakes illustrate how aqueous or sedimentary may be formed. Aqueous rocks occur over wide areas in thick masses, and very little disturbed from their original position. They embrace our limestones, sandstones and clay beds. Some have estimated that the earth's crust is made up of 50 miles igneous and crystalline rocks, and three miles aqueous.

The following belong to this division:—

Chalk, largely formed from the decomposition of shells and corals; marl, a lime deposit in places once covered with water. This is very common in many parts of Ontario. It, too, is largely formed from shells. Stalactites, formed on the roofs of caves, and stalagmites, upon the floor, together with gypsum, coal and salt, are placed among aqueous rocks

III. Metamorphic rocks include rocks which seem to have undergone great changes since they were first deposited, as many suppose, like aqueous rocks, They are very hard, bearing a close resemblance to igneous rocks. They occur in layers, and usually have no fossils.

From their stratified structure, it is inferred that they have been originally deposited as aqueous rocks and afterwards changed.

These rocks occur in large masses throughout Muskoka, Quebec, east side of Lake Winnipeg, and scattered over our fields as *boulders*, often called *hard heads*. They were likely derived from the first rocks that came into existence, and hence we might naturally expect to find them of much the same composition.

Examples of them are seen in our beds of *slate*, *mica*, *talc marble*, *graphite*, *apatite*, *quartzite*, *iron ores* and *gniess*. This last is a very common rock, made up of feldspar, mica and quartz, the same composition as granite; but in gniess these minerals are in layers, while in granite they are mixed together in a confused mass. Most of the boulders in our fields are gniess. It has been observed that, where a stream of lava flows over beds of clay, coal or chalk, they have a tendency to change to slate, graphite and marble.

Hence the conclusion regarding the origin of metamorphic rocks is, that, after their deposition as ordinary aqueous rocks, they were submitted to the action of *heat* in conjunction with *moisture*, under great pressure.

How Best to Keep Up and Increase the Fertility of Our Soil.

This is a question of paramount importance to every tiller of the soil, be he gardener or farmer. The importance of this will be more readily seen when we remember that it costs just as much in labor and expense to raise twenty bushels per acre on poor land as it does to raise forty bushels per acre on good land. In the former case we may pay expenses; in the latter case there is room for a handsome profit. One of the first steps to be taken is to increase the amount of stock kept on our land. I believe that system of farming is nearest perfection in which the greatest amount of the farm produce is consumed on the spot, and the revenue is derived almost wholly from animal products. The class of stock to be kept will, of course, depend very much on the natural tastes of the farmer, for, while one man can make a success of dairying, another would make a failure of it, simply because his tastes did not lie in that direction, consequently he lacked the ability to apply himself so closely to detail as is necessary for ultimate success. The adaptability of the farm should also be considered, for while one farm may be of little use to the cattleman, it may be the very thing that the shepherd would delight in. So, in deciding the class of stock to be kept, the tastes of the farmer and adaptability of the farm must alike be consulted. But it may be urged that most farmers are carrying more stock now than they are able to feed and care for properly. Then, I say, increase the stock-carrying capacity of your farm by raising such crops as will supply feed in greater abundance than those you have been accustomed to raise—such as turnips and corn, or roots of any kind.

It may be said that few farmers have a root-house or a silo. Well, build a root-house—a very good one can be built for a mere trifle, and as for the silo, I am not inclined to look upon it as a necessity by any means, but rather as a convenience. I have been very diligent in reading up all the best authorities on the silo question that I could get my hands on, and I have arrived at the following conclusion: First, that the feeding value of the article placed in the silo is not increased in any way, excepting the advantage of feeding it in a succulent state; second, there is considerable risk of waste, even in the best managed silos, for while a man may be able to feed his ensilage without wasting a pound one year, the next he may not be so successful, and will find his ensilage spoiled around the sides and in the corners, resulting in a serious waste. But then it must be admitted that the silo is the most convenient way in which a large quantity of bulky fodder can be preserved, both as to economy of space and labor. By its use the corn can be hauled in and placed in the silo as soon as cut, and you get it off your hands in a very short time; whereas with the fodder, it has to be bound and shocked and then hauled in, and the greatest care taken to keep it standing straight in the barn. Then it can be run through the cutting-box only in small quantities at a time, for fear of it moulding. The farmer who has not a silo, and does not feel able to afford the outlay necessary in building one, will be making a long stride in the right direction who raises a goodly quantity of fodder corn, and a good supply of roots to feed with it. One acre of corn, if it is a fairly good crop, will produce as much winter feed as five acres of hay, and, if properly handled, it will be fully equal to, if not better, than the best timothy hay.

Another good fodder crop for cattle or horses is peas and oats, sown very thickly and cut green. On fairly good land it will produce three tons of excellent hay per acre, fully better than timothy. Moreover, it is an excellent crop for cleaning the land, especially of Canada thistles. The land for this crop need not be plowed until after the thistles get a good start in the spring; this of itself gives them a check, and then the crop grows so thickly that it fairly smothers them out, so that when you cut it you will find only a few yellow, sickly-looking thistles among it, and cutting them at this stage materially weakens them again, so that by proper fall cultivation they will be so thinned out as to give little trouble the next year.

Another good way of increasing the stock-carrying capacity of our farms is by decreasing the amount devoted to pasture and sowing a few acres of soiling crops, to come in at different times and furnish a succession of green feed for the summer. Ten acres of soiling crops will keep as much stock as thirty acres of pasture. So if it required fifty acres of pasture to carry your stock over the summer, you might decrease it to twenty-five, and sow say ten acres of soiling crop. This would carry over the same stock as the fifty acres did before, and leave fifteen acres more to raise winter feed on. Of course, all this means work, but it must be remembered that no good thing can be had without work.

Another way of keeping up the fertility of our farms is by a proper rotation of crops. While I do not say that the fertility can be increased by this means, I do say that soil exhaustion is very materially diminished. There is a wonderful analogy between the animal and vegetable world. Now any farmer knows that all classes of farm stock are not nourished by the same kind of food, and the same is true of the vegetable world. For instance, wheat requires a large amount of nitrogen for its growth, and is therefore a nitrogen consumer. Clover or peas, on the other hand, are nitrogen collectors, and leave the soil richer in this important element than they find it. It is evident, then, that by judiciously alternating a nitrogen consumer with a nitrogen collector, better results will be obtained than if each were grown on separate fields year after year. No fixed rotation can be given that would give equally good results on all soils. In this the farmer must be guided by his own judgment. For instance, a rotation that would suit a dairyman might not do for a man who followed a different line of husbandry, so that not only the soil but the requirements of the farmer must be taken into consideration in mapping out a rotation. Then, again, the market must be considered. For instance, a few years ago barley was the most profitable crop of grain we could grow, but since the bottom went out of the barley market we were compelled to change our rotation so as to devote a smaller area to barley and increase the acreage of some of the other crops. I do not recommend the adoption of a certain rotation and then sticking to that through thick and thin and trying to adjust the circumstances to the rotation, but rather the adjusting of the rotation to the circumstances.

Still another way of maintaining the fertility of the soil is by drainage. Not only can the fertility be maintained by this means, but it can be considerably increased. This last statement sounds a little strong, and perhaps I had better take it back and modify it a little, for drainage adds nothing to the soil, and therefore, strictly speaking, cannot add to its fertility; but it renders available the plant food already in the soil, and so increases the production, so it amounts to the same thing in the end, for plant food in the soil is of no use to the farmer unless he is able to convert it into a marketable product. Drainage makes this plant food available by removing the surplus water, and as all nature abhors a vacuum, when the water is taken out the air gets in, and, by its chemical action, so changes the composition of the soil that elements of plant food that were before of no value are now in a condition to be utilized by the growing crop. Draining also raises the temperature of the soil, so that vegetation is much earlier than before. There are other ways by which draining helps to improve the productive ability of the soil.

A. P. K.

Improvements in Farm Machinery.

Many implement manufacturers at one time well known to the farmers of Western Ontario have, owing to keen competition, quietly dropped out of the race.

We will not stop to inquire the cause of these changes, but will briefly review the history of one of the most pushing and energetic implement concerns in the Western Peninsula. We refer to the Thom's Implement Works, of Watford, Ont. This factory has been in operation about nineteen years; for the past fourteen it has been under the direct control of Mr. D. Thom, to whose practical knowledge, business ability and careful supervision the success of this firm is largely due. Being of an inventive turn of mind, Mr. Thom soon began making improvements in farm machinery. His early farm training taught the needs of the farmers.

The fruit of his efforts can be seen in the many valuable improvements in farm machinery which this firm have made. Many of these improvements are covered by both Canadian and American patents.

Among the inventions which this firm has been the first to manufacture are the following:—That notable improvement in corn and root cultivators, the lever extension movement; the Watford Riding Plow, the only one having an adjustable draft clevis and gang wheel movement, regulating the width of the furrow from the driver's seat. Next came the Ripper Feed Cutter, a machine entirely new in principle and construction. Nearly one hundred machines have been already sold in Ontario, the most of which are in the hands of prominent stockmen, who claim that the Ripper has no equal in preparing cornstalks for food for live stock of all kinds.

To supply the ever increasing demand for their machines, this firm has found it necessary to put in a new engine and boiler, and to extend their premises by building a large brick addition. We would advise our readers to send for descriptive circulars. Address Thom's Implement Works, Watford, Ont.