

The Origin and Formation of Soil with Special Reference to Ontario.

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If we examine a vertical section of soil in any part of the province of Ontario we shall find that in all likelihood it will present the following characters:—

I. An ideal section of Ontario soil.

1. Certain large stones, hard, and more or less crystalline; some of a salmon color, some greenish, others spotted white and black, and in most the material arranged in layers. If quarries are near the rock is not at all of the same nature as the large, hard, rounded stones already referred to, and which for convenience we call *foreign boulders*. These, in a subsequent part of our paper, we shall show have been brought here in ages long receded into the past, and now lie by our roadsides and in our fence corners silent monuments of the thrilling scenes that happened in the so-called Ice Age of Geological History.

2. Other large, loose stones of a much softer nature occur, but they are precisely the same as the rocks of the quarries, if such are in the vicinity. These not so much rounded we shall call *local boulders*, for they have not been transported so far.

3. Scattered throughout the loose earth we observe the remains of decomposed plants that have flourished from time to time upon the soil in which they are now found. These form the so called *humus* of the soil.

4. Our ideal section will also show ground-up rock, or what is usually called soil, for soil is really rock that has been broken up by the action of weather, etc.

5. Beneath all is a floor of solid rock.

Thus we have in our ideal vertical section of Ontario soil these five constituents: *Foreign boulders*, *local boulders*, *humus*, (organic matter), *soil*, (ground-up rock), and a *solid floor of rock*. From this it is readily seen that the composition of a soil depends largely upon the nature of the rocks below it, and upon those at a distance—in Ontario those lying to the north, because, as we shall see later on, material was transported from the north to the south during the "Ice Age." We shall now consider the nature of the rock that underlies our province and the regions north of it.

II. The rocky floor of Ontario:

1. A district embracing that portion of the province extending from near where the rivers St. Lawrence and Ottawa join to Brockville, and north to the Ottawa. This is largely underlined by rock belonging to the Cambrian system. We might remark here that geologists have for convenience grouped the layers of which the earth's crust is composed into sixteen systems, some named after places, and others from the nature of the rocks in them. These sixteen systems follow in regular order, 1, 2, 3, 4, etc. The Cambrian is No. 3, and contains a good deal of sandstone.

2. This area extends from Brockville to Kingston, and continues in a north-westerly direction beyond the limits of the province, widening as it passes north. This is the Laurentian system (No. 1), and is the great mineral area of Canada. In many parts the rock is without a covering of soil, yet this district possesses rocks which disintegrated supply some of the most valuable constituents of soil. Here

we find great quantities of Feldspar, which, through the action of the weather, breaks up and supplies clay, sand and potash to the soil. Apatite, the phosphate of lime, becomes a source of phosphoric acid. Iron beds and other deposits in the area afford useful elements. Thus, in this apparently barren area, we have rocks which, in time, disintegrate and yield valuable constituents to the soil, such as phosphoric acid, potash, iron, sulphur, clay and sand.

3. The area from Kingston to a little west of Toronto, Cambro-Silurian, (No. 4), contains vast beds of limestone, which adds another very important constituent.

4. A district from west of Toronto to Baden, a station on the G. T. R., consists of Silurian (No. 5), rocks largely made up of magnesian limestone (Dolomite), and supplies lime and magnesia.

5. From Baden to the western boundary of the province we have the Devonian system (No. 6), largely made up of limestone and clay deposits.

Thus, we have six systems represented in our province: 1, Laurentian; 2, Huronian, (around the upper lakes, and much the same in character as No. 1); 3, Cambrian; 4, Cambro-Silurian; 5, Silurian; 6, Devonian. The geological records seem to have closed at No. 6, as far as Ontario was concerned, until it reopened with large additions of 15 (Pleistocene) and 16 (Recent). It is remarkable that as far as deposits are concerned we received none from the 6th to the 15th system, but were at a geological standstill. Other places received great additions, such as the coal beds, chalk, and other deposits of immense thickness, while our province received none. As nearly all rocks are found under water, it is likely our country was high and dry, and thus beyond the influence of the sea, while others were receiving large additions to their deposits.

[TO BE CONTINUED.]

Thoroughness.

The too general complaint that farming is not paying is not confined to Canada or the United States, but in Great Britain it has become an established fact that the profits of the farm have been very much curtailed. The position of the Canadian farmer is decidedly different from the latter. What about prices? It is true that wheat has been for several years cheaper than it pays to produce it, except where heavy yields are obtained, or where cheap lands are employed for its production. In almost every other farm product prices are higher than they were when the farmers of the country accumulated wealth fastest. Farmers were then not only adding fast to their wealth by the increase of the value of their land, but they were also saving money by adding to their bank accounts, as well as by increasing the value of farm stock. Doubtless the falling away of farm values has come about through lessened receipts. Prices in a few lines of farm products certainly declined for a few years from the higher current prices of exceptional years. But to-day no one can attribute dulness of trade to low prices of farm produce in comparison with what the farmer buys, for never were the bulk of articles of prime necessity as cheap as they are now. Certainly they are one-third less than the period before spoken of when farmers were most prosperous. Again, money is cheaper perhaps than we ever knew it, and that because there is no great encouragement for investment in any line of business or manufacture, and there is also no great disposi-

tion to invest in farm lands because of the decline that has taken place, and the consequent fear of a further lowering of value. It is observed by dealers in farm produce that when grain of any kind is rising in price a very small quantity of that article is offered, while directly the price recedes large quantities are rushed into the market. In the same way farm lands have been neglected, while there is a strong disposition to sell by those holding these, therefore the number of farms changing hands is small. How are farmers to help themselves and their business? We must endeavor to find the cause of the trouble, then to prescribe the remedy. Farming is said not to pay. Why? Are the farms less productive, or is a less average under crop, or are other departments neglected? We think the answer must be that there is a want of thoroughness in the manner the work is performed. Farms are growing up with weeds. Farmers are frequently heavily stocked with implements that might be done without, which are not cared for and are, therefore, short-lived. Neither winter nor summer feed for cattle has received sufficient attention, therefore the farm is not sufficiently stocked, and in consequence the stock is not well enough cared for, hence the returns from this department are small. The winter season is spent in comparative idleness, therefore six months' work has to provide for a year's wants. Labor is too dear and too unsatisfactory, so it is done without. The laboring man cannot earn enough during the summer to keep his family summer and winter, which obliges the best men to leave the farm and seek employment where they can work the year round. The necessity of every farmer entering on a method by which more winter labor can be employed is what the country wants. In our climate there are months that ordinary farm work is either impossible or is so disagreeable that many shrink from attempting to do more than is absolutely necessary. The short days of winter go by, no one knows how, and work that could be done, and materially help the busy days of summer, is neglected. When seed time and the general rush of spring and summer work comes such neglected work must again, be left or less crop cultivated, and less profits be the result of the year's work. Thus dilatory habits are engendered and happy-go-easy methods begun that are too apt to be carried through the busy months. Again, for want of a systematic laying out of work not only is less performed, but the result in dollars is nothing like what might be obtained if better laid plans were adopted. The busy season is well nigh over; let each one now see to it that a better system be followed, and better plans arranged for another year's work. Want of time is the excuse pleaded for a weedy field, or a crop not early enough cut or housed, by which half the yield and all the profits are lost. Contrast this with the well-arranged farm where the work is done in time, the weeds are kept down while they are yet young and tender, and, therefore, easily destroyed. A field cultivated at the right time needs only half the work it will require if left too long. The hay, the straw, the roots should all be made the most of. More and better stock can thus be kept, which brings better prices; work is done systematically, a regular routine of crops can be arranged, and each field, therefore, has its crop laid out for several years in advance. In such a case there is no hesitating as to what should be done next.