



The Field.

Familiar Talks on Agricultural Principles.

THE SOIL.

MENTION has been already made in the course of these "Talks," of the mode in which the soil on the earth's crust has been formed. In our issue of February 15, a brief account was given of the natural processes by which rocks of various kinds are gradually dissolved and disintegrated. It will be interesting and instructive to notice more in detail the steps by which nature prepares the surface of the earth for vegetable growth, and preserves the fertility of the soil when plants are established in it. In many respects the most skilful farming is but a distant imitation of nature, and we are too many of us at an almost immeasurable distance from our teacher. The landscape about us is an open volume, which we have only to study, to understand the great principles of scientific agriculture. People who are prejudiced against "book-farming," forget that nature is a great book,—that whatever any good farmer knows about his business has been derived from the study of that book,—and that if the printed wisdom of agricultural publications be the record of what is taught in nature, he is a fool who undervalues and despises it.

Besides the forces by which rocks have been crumbled and changed into soil, there are certain processes of growth which have a most important influence. Not only do sun and air, cold and moisture, act upon rocky formations, but plant life may be said to make an attack upon them. Thus lichens will fasten upon the exposed surface of rock. These plants derive most of their food from the air. Generations of them grow, die, and decay. A kind of mould is thus formed. Mosses take the place of the lichens. In the course of a few years, various natural grasses establish themselves as the successors of the mosses. By and by, the seeds of shrubs and trees are wafted by the winds or deposited by birds upon the once bare and barren rock. Larger forms of vegetable growth take root, and these too draw a large proportion of their food from the atmosphere. Year after year, crops of leaves are borne. These fall to the ground, decay there, and add to the bulk of the soil. For countless centuries, this kind of process has been going on. By the decay of leaves, fruit, roots, and trunks, the ground has become covered with a coating of vegetable mould, and there are many localities where the solid rock still underlies, at no great depth, the tillable surface soil. In other places, the rocky foundation has gradually crumbled or been dissolved; while on the great fertile plains, and in the rich valleys, the soil has been washed by streams, drifted, or been deposited by the action of a deluge. It is from this last-named circumstance, that some soils are called *diluvial*.

A striking illustration of the process just described is furnished by the fact that the very lavas ejected from Vesuvius, Etna, and other volcanoes, become, in an exceedingly short space of time, coated with soil, and covered with vegetation. These lavas come out of the mountain craters molten and red-hot. It is plain that they can contain no vegetable matter. Yet they have not been long cooled, before the wild fig-tree and other plants, fasten upon them, send their roots and fibres into the interstices, grow and produce woody matter, which decays, and in process of time forms a coating of mould. The material of which this woody matter is formed, must evidently have been obtained from the air, since it did not exist in the soil.

When the native forests of a new country are cut down, and the land is cleared up for cultivation, the soil is almost uniformly found to be fertile. In most parts of Canada, this virgin soil will bear large crops of wheat and other grains, for many years in succession, without manure. This is owing to the wealth of productive material treasured up in the way above described. Nature is frugal and saving. She does not go on the "hand-to-mouth" principle of living, but always takes care to keep her expenditure so far within her income, that she is constantly laying up. Our bad system of farming is very like the course of a spendthrift, prodigal son,—who having inherited the wealth an industrious careful father has been patiently saving for many years, very soon runs through the property to which he has fallen heir. Thus do our settlers quickly use up the store of precious fertilizing matter, which has been slowly accumulating in the soil, and having wasted their substance in riotous farming, begin to be in want. They can't raise the crops they once did. And the parallel often goes farther. They are unable to make a living on their exhausted farms, and so they sell out, and go to a "far country," there to pursue the same wasteful system, upon another piece of new land. Now we have only to farm as nature farms,—to see to it that we return to the soil each season a little more than we take from it,—and we shall preserve our land in a condition of improving fertility. Nature consumes on the soil what is yielded by it, and constantly adds to this, valuable substances drawn out of the atmosphere by the leaves, which are as it were, continually sucking nourishment from the air. It is impossible to farm successfully and profitably except on this principle. By consuming what is produced by the land in such a way, that it shall be returned to the land from which it grew, we can preserve its fertility. This is done by stock-feeding and manure-making. If produce be sold off the farm, fertilizing material must be got from some other source, to make up for what is removed, or plainly, *the soil will grow poorer*. Is it not strange that people cannot see this? How stupid it is to expect in some way or other to circumvent and cheat nature. Like dishonesty of every kind, this dishonest treatment of the ground we till, brings in the long

run a punishment with it. It will be one of the main objects of these "Talks" to impress this lesson, and to urge the faithful application of those principles which are acted on by nature, and must rule in art, if our efforts are to be rewarded with success.

Causes of Unproductiveness in Soils.

(Concluded from page 66.)

4. Soils are unproductive when a thin layer rests on a bare rock.

"I am acquainted with several localities where the soil is of excellent quality, but too near the rock to be productive. We should bear in mind in discussing the state of agriculture, in different countries, or districts, that this obstacle will baffle the utmost skill of the agriculturist, though he might fertilize the barren sand, or reclaim the unhealthy swamp."

5. Soils are unproductive when they rest on impervious or excessive dry subsoils, which are not easily drained efficiently.

What renders many dry soils difficult to change their chemical and mechanical character, so as to render them in a higher degree productive and profitable, is the thick and tenacious subsoil on which they rest. "Clay soils of that description occur in the lias formation, where they are known as scourery land, on account of the tendency of the herbage to scour sheep and cattle. Some time ago I made an analysis of notoriously bad land, from Shepton-Mallet, Somersetshire. The soil contained in 100 parts:—

Moisture.....	4.64
Organic matter and water of combination.....	14.40
Oxides of iron and alumina and phosphoric acid.....	14.45
Sulphate of lime.....	28
Carbonate of lime.....	14.80
Magnesia.....	98
Potash and Soda.....	93
Insoluble siliceous matter (chiefly clay).....	49.96
	100.0.

"This soil had rather a dark colour, which was due partly to protoxide of iron, partly to the large proportion of organic matter, which enters into its composition. Although not injurious in itself, an excess of organic matter, as well as protoxide of iron, indicates a condition of the land which is unfavourable to the healthy growth of plants. In a porous, well cultivated soil, freely penetrated by the atmosphere, the accumulation of organic matter never becomes excessive, nor does such a soil contain much protoxide of iron. The presence of the latter, in considerable proportions, always shows that the soil is not sufficiently aerated to produce a healthy and nutritious herbage."

The chemical composition of this soil is by no means seriously defective; it contains all the elements of plant food: The great drawback of the lias soils is their thinness, and the deep stratum of indurated clay on which they rest. The only remedy seems to be thorough underdrainage, and subsoiling, so as to