2. "Some New Carboniferous Plants, and how they contributed to the Formation of Coal-Seams." By W. S. Gresley, Esq., F.G.S.

The author, in a paper published in abstract in the Society's Quarterly Journal for May, 1897 (vol. liii, p. 245), argued that certain brilliant black laminæ in coal, and similar materials found among some mechanical sediments of the Coal-measures, pointed to the former existence of an aquatic plant. In the present communication he describes structures in the pitch-coal laminæ of bituminous coal and in the glossy black layers of anthracite which he believes to be indications of two other kinds of plants, and states that he has examined structures which may be due to some other kinds of vegetation.

CORRESPONDENCE.

THE FORMATION OF SOIL.

Sir,—That the mode of formation of surface-soil is generally supposed to be due chiefly to the accumulation of the dust and ashes of dead vegetable matter and of animals, and their ceaseless action while alive within and upon it, and to the decomposition of the subsoil or of the rocks immediately below the soil, brought about and ever going on by atmospheric agencies and changes, rain being the principal agent, seems a correct statement to make. But as to *how* and *why* this soil came into existence and grows, those who have studied the matter do not appear to be agreed or to have found a fully satisfactory answer: for instance, one student would attribute the phenomena chiefly to the action of worms; another, to ants, beetles, etc.; a third, to plant-decayed vegetation; a fourth, to rock-weathering; a fifth, to rain. Without doubt, all of these have been more or less instrumental in soil-making, while the last —rain—would seem to be the *one thing needful*—the essential agent.

Now it seems to me that additional light may be obtained on this interesting subject if we consider it as follows:—

(1) I postulate that for every soaking or even moistening of the surface by a shower of rain or snow, etc., which is followed by a spell (whether short or long) of bright and warm weather, *evaporation* is caused.

(2) That such periods of evaporation imply *a rising upwards of a portion of the water through the soil*, to escape as vapour.

(3) That if such evaporation goes on after each shower or storm, there is ever going on in the soil a downward and upward gentle and invisible flow or movement of moisture, which pervades every particle of the soil-forming materials, in manner somewhat analogous to the flow of sap in a tree.

(4) That water flowing or soaking among rock-particles and remains of animal and vegetable substances must ever be changing its chemical composition, and also that of the ingredients of the soil; therefore, the constant up-and-down creep or pulsative action of the moisture through the solids of the soil must be working a gradual change in the chemical and the physical condition of

the soil, no matter how slowly or feebly the process operates or proceeds.

(5) That such implied decomposition, deformation, destruction, reunion, and new combinations of particles and substances of the soil explain why some soils are more fertile than others where science fails to find any difference in them; while others prove less fertile than experiment would indicate or suggest.

(6) That the almost daily recurring changes of weather and less frequent seasonal changes, both as to temperature and humidity, with the help of animals, decay and finally crumble and disperse exposed wood, etc., until it is gone, and suggests how thoroughly the same repetition of precipitation and evaporation is also working, though unseen, just below the grass.

If this incessant oscillating or slow-motion progress of the water through the soil be a fact, then I should suppose that where it has operated with greatest vigour, there, other things being equal, would the soil be thickest and most productive; and *vice versâ*, where the surface evaporation was most sluggish. Possibly the heavy rains and intervals of high temperature of the tropics account for the great fertility of their soils as much or more than for their richness as regards composition.

It will thus be seen that the leading idea in these propositions is *evaporation*—the upward motion (capillary attraction) of the contained-water of the soil working upon the inorganic and organic solid constituents of it, *in conjunction with the descent of moisture* in the forms of rain, snow, fog, etc.

W. S. Gresley.

P.O. Box 437,
Erie, Pennsylvania, U.S.A.

SECTION EXPOSED AT THE DRY DOCK, TROON, AYRSHIRE.

Sir,—The section of rocks exposed in the Dry Dock being constructed at Troon, Ayrshire, may be worthy of preservation in the Geological Magazine. It is as follows:—

	Feet.
A. "Forced" or Artificial material	8
B. Bedded, coarse-grained trap	8
C. Volcanic dust	7
D. ,, ,, bluish	1
E. Grey, fine-grained, banded rock	1½
F. Water of Ayr Hone stone (seen)	8

A. Consisted of general rubbish, with fragments of pottery, etc., but not very old.

B. Towards the north end of the dock works this bed was much thicker, having apparently at that point *cut out* the beds below it to some depth, the "bedding" of the *upper* part of *the trap* being quite regular.

C. This bed had at one time been worked in a pit, the dock works having cut through the old workings. Six feet was the depth of the bed taken out by the pit, the working places being about fifteen feet wide. Nothing historical is preserved as to this pit, but there is a tradition that contraband goods were hid in the workings, and the material from the mine—which has been called "china