continue to be so obtained I am very sure. Will not the experience at Whitfield Farm, which I have described, be admitted as proof of this? Some of the land is a deep gritty sand; much of it a stiff clay soil; in many places a peaty loam. On some fields we have a shallow limestone soil on rock; on others a deep vegetable mould resting on magnesian clay and stone: on *all*, when grassland after drainage has been broken up, the scanty produce of cheese and butter, characteristic of its former condition, has been exchanged for bulky crops of roots and grain, a large produce of food for man and for beast; and on *all*, without the use of bought manure of any kind, these crops, so far from diminishing as years pass by, rather exhibit an increasing fertility in the land which yields them. Is there not variety enough of soil and uniformity enough of result here, to justify general confidence? The fact is, that our crops of straw have latterly been so bulky as seriously to interfere with the produce of grain; the wheat has been laid and its yield injured in consequence of the luxuriance of its growth. This has been a growing evil, but it is certainly no sign of diminishing fertility.

Now, I am perfectly aware of the extreme changeableness of farm experience, arising doubtless from the many uncontrollable and variable causes on which that depends; but it is impossible to disregard the *uniform* evidence of an experience extending over eight years; and I certainly think that the results of farm practice at Whitfield may well convince any landowner that the breaking up of his grass-lands, if profitable to him the first year, may easily be made so during every succeeding year of their cultivation, whether he grows wheat only, as we do, or introduces other grain crops.

From the Farmers' Gazette.

THEORY OF VEGETATION—DEEP DRAINING.

The quantity of rain which falls at any particular place is determined or measured by a machine or instrument called the rain guage: that portion of this rain which is evaporated, as also the part which would filter through a perfectly drained soil, are measured by an instrument called from its inventor the Dalton guage. Thus these three important items, the quantity of rain which falls, the portion of that rain which is removed by evaporation, and the part of that rain which should filter through the soil are determined by these two instruments, the construction of which is deferred to preserve the uniformity of this article. Thus we learn that the mean annual rain in Paris is 20 inches, the mean annual rain in London is 23 inches, and the mean annual rain in Dublin is 30 inches. That Ireland therefore from the peculiar position, receives a much larger amount of rain, than an equal surface of countries in the same latitude, or even in a more southern latitude, is manifest by experience; as is also the fact of her superior fertility; and as heat, rain and vegetation, were shewn to accompany each other in the same proportion and degree, so that any increase or diminution of the one, was always accompanied with a corresponding increase or diminution of the others, may it not, according to the laws of probability, be fairly and legitimately inferred, that the superior fertility of Ireland is owing to the greater amount of rain which she receives, connected with the additional heat, with which in her case that rain is accompanied? Undoubtedly it may, until a case be shown of a country, which with a less amount of rain, shows an equal degree of fertility as that of Ireland.

This position will become more evident, by contrasting the state of two tracts in the same immediate neighbourhood, which are differently circumstanced with regard to rain. Thus the eastern side of the Andes within the Tropics, receiving the entire moisture wafted by the trade winds, has vegetation the most luxuriant; whilst the western side of the same acclivity, being thus debarred from any moisture, is destitute of vegetation, and a barren desert. The position will become still more apparent, when we investigate the properties which rain-water possesses, and the influences which it exerts on vegetation. The vegetable we know supports the animal kingdom, the several constituents of which, after decomposition, eventually find their way either as gases into the air, or are carried by rivers into the sea, whence, after the regular cycle of new combinations, they are again evolved by evaporation, and descending in rain, bring along with them these kindred substances which are held in solution in the atmosphere. Potass, salt, sulphur, carbonic acid, and ammonia are known to be indispensable and essential elements in vegetable production. Now in the decomposition both of vegetable and animal substances ammonia is evolved, and being one of our lightest substances it mounts into the upper region of the air: but as it possesses a capability of being absorbed in a considerable degree by water, it is therefore brought down by rain and deposited on plants, promoting their growth and giving that impulse to vegetation which after dry weather invariably produces. It is believed that the nitrogen or flesh producing principles of vegetables derived or assimilated by plants from this substance, and it is calculated that conderably more than one cwt. of this ammonia is deposited on each acre of land during a year in this country by rain-water.

Again carbonic acid is essentially necessary to the life of plants, and constitutes the chief nutriment of vegetable matter; now rain-water, says Dumas, falls loaded with this carbonic acid, which gives stability to the texture and protects all the vegetable tissues. This carbonic acid is also the agent, which by dissolving the phosphates, gradually disaggregates the skeleton elements of the superior animals, and transforms the final vestiges of animal life into the incipient production of vegetable matter.

Sulphur, salt, and potass are equally indispensable to the wants of the vegetable kingdom. The quantity of sulphur requisite to supply the wants of the population of this point on the ocean is estimated at 554,428,575 lbs. (avoirdupois) and 2,772,142,875 lbs. are necessary to supply the necessities of our irrational brethren on the same spot, all of which is derived from the soil through vegetables. The absolute necessity for an adequate supply of salt need not be insisted on, being manifest to everybody; a considerable portion for domestic purposes is extracted by artificial means from sea water, but the main supply necessary for vegetation is derived naturally through the agency of evaporation and rain from the ocean. The essential necessity for a supply of potass has been demonstrated by that proprietor of Gottengen, who having occasion for potass planted his land with wormwood, which extracting the potass from the soil, the land, from the deficiency of potass thus created, became incapable of producing grain for many years after. These being all soluble are borne along by rivers into that great laboratory the ocean, whence after the usual routine they are again similarly extracted by evaporation, carried along by those wing-footed messengers the winds, and finally sown by the rains in the bosom of the soil, to carry on their life supporting ministrations.

Thus to rain are we indebted for ammonia the flesh producing principle; to rain are we indebted for carbonic acid the pioneer of the bone or skeleton-producing principle; and to rain we are indebted for the alkalies or fat producing principle; so that in fact and reality the bone, fat, and muscle of society are required and sustained through the intervention and agency of rain-water: to it also are we indebted, as already shown, for a considerable supply of heat, the source of vegetation. Farmers therefore need not dread a copious supply of it; nor are they at all justified in considering any quantity of it to be an enemy, as many well intentioned but short-sighted advisers would lead them to imagine.

The plain object of the farmer is to abstract from this rain-water the heat, ammonia, carbonic acid, sulphur, salt, potass, and such other valuable ingredients as it holds in solution, and then as we do in the ordinary operations of life, get rid of this water after it has performed the functions for which it is intended, that we may be again ready for a supply—to extract and preserve the ore and remove and expel the dross, a proceeding which, as shall be shown in a future