and the distance such as will produce uniformity of dryness over the entire surface. In compact clays, where the thickness of bed is considerable, and consequently where only the stagnation of the rain water has to be prevented, a depth of 3 feet, with a distance between the drains of from 16 to 21 feet, according to the retentiveness of the clay, will be effective. If the subsoil contains a greater proportion of sand, and the bed of clay is not so thick, it is more than probable that bottom water will be found, which must be carried off, and in this case the depth must be such as to pass through the clay, and the interval of drains may be extended to 21, 24, and up to 38 feet, as may be considered requisite. In sandy and gravelly subsoils, it is always necessary to cut the drains a sufficient depth to reach the source of the soil, and at distances from 38 to 60 feet, and even up to 150 yards apart, as circumstances may warrant. These subsoils usually exist in districts either of an undulating contour, or on the flat; if in the former, the depth of the drain must be such, as it proceeds up the rise, to reach the spring which will issue from the highest ground; and in the latter, it will frequently occur that the porous strata lies in a dish-like form, surrounded by a clay bed which holds in the water, and through which the outfalls being made, at once converts almost the entire area into an effective natural drain. With regard to the most suitable material and its form, there cannot longer be a doubt but that the plain cylindrical pipe-tile is the best that can be used. For the strong-lands, where the drains are more frequent, a size of 2 inches internal diameter for the parallel, and about 4 to 6 inches for the main drains, will be requisite; whilst in the more open subsoils, with deeper and more distant drains, 3 to 3½ inches, and 6 inch mains, may be necessary. Where the length of either the parallel or the main drains is considerable, the size of the pipes may be increased by degrees, as the drains descend to the outfall, so as to allow of an increasing volume of water passing off. This is a much more efficient and economical plan than putting in a main drain at the half-way length, as many too often think it necessary to do. In all cases where much fine sand prevails with springs, it will be necessary that the pipes should be collared, and not unfrequently to lay two pipes one within the other cross-jointed, to ensure safety. Where the foundation is good, and no necessity exists for such precautions, I am of opinion that a little non-adhesive material, as straw, &c., is desirable immediately over the pipe; in the first instance, to prevent any particles of earth from getting between the joints when filling up the drain, and subsequently to prevent too quick and close a cohesion of the earth over the pipes. A very slight covering is sufficient, and I am decidedly of opinion that it is a safe and good practice.

THE SUBSOIL.

We give the following from an article by J. Towers, in the Journal of Agriculture of the Highland and Agricultural Society of Scotland:—

In substance, temperament, and combination, it is extremely various: that of the worst quality consists of an indurated *pan*, impenetrable by air, by water in any available quantity, and, as in the case of the natural concrete gravel—known as "plum pudding stone"—by the common implements of agriculture. *Chalk* is a good subsoil, if not too deeply seated, effecting perfect drainage, and, by its retentive power, holding fast a quantity of water sufficient to maintain verdure during arid seasons, where clay-lands crack into open fissures. *Sandy* and *gravelly* subsoils are poor; but those which consist of *strong* clay may easily be converted into valuable and fertile land, by gradual laboration. To enable the reader to appreciate facts which are but little understood, and still less practically applied, I refer to, and shall extract somewhat freely from, a valuable letter from C. Wren Hoskyns, Esq., addressed to the farmers of Herefordshire, in 1847. The writer alludes in no measured terms to the sort of prejudice which is too far entertained against *subsoils*—as substances inert, void of nutriment, incapable of sustaining a healthy vegetation, but frequently, on the contrary, promoting cancer in trees, and discoloration in vegetables. "The notions," he says, "entertained about that mysteriously calumniated, ill-used, down-trodden thing—the *subsoil*—amount, in truth, almost to a national prejudice. So many causes have conspired to produce it—so many writers and speakers have increased it—that any one might justly fear to attack it, who had not proved it to be as utterly unsupported by experiment, as it is erroneous in theory."

The subsoil cannot, indeed, be neglected with impunity, if *de facto* it is the *repository—the storehouse*—of those salts, with alkaline or earthy bases, which lie unseen until disturbed by tillage. *Loams* are stated to contain *potash*; *green-sand*, coprolyths, and those *phosphoric* acid. Farmers cannot analyse subsoils: they are not in possession of available means of research; but if scientific chemistry be deserving of credence, such stores, of inappreciable value, now lie buried in the subsoils of their arable staple. In proof of what may be effected by deep tillage alone, Mr. Hoskyns adduces the fact, that "in the island of Madeira the vine is not a native plant, and, after growing well for a few years, the fruit begins to degenerate, and makes inferior wine. The expense of new stock, usually brought from the Hock vineyards of Germany, being very great, every expedient has been tried in order to postpone the evil as long as possible; but no *manuring*, or pruning, or attention, is of much avail; and the *only* remedy is found in extremely *deep cultivation*. I once saw the process. Nearly a score of labourers, hard at work, were standing in a long trench, deep as they were tall, stocking the earth from one side and throwing it on the other. On inquiry, they told me they were trenching an *old vineyard* for fresh planting; *trenching nearly six feet deep!*

As deep tillage, by bringing up potash from beneath the exhausted surface soil, restores the grape, so, by analogy, we claim the necessity of deep tillage everywhere. We read that the Flemings, those skilful and industrious men who have converted a sandy waste into rich and fertile land, "dig trenches about a foot deep over the field, from the bottom of which, assuming the soil to be ten inches deep, and they have therefore dug up two inches of subsoil; and, as they proceed, they fling the whole over each land on which the seed has been previously sown, which they thus cover. The trench being shifted sideways each year, and the process renewed at the end of a certain number of years, two inches of the whole subsoil will have been mixed with the upper surface, and the soil deepened to that amount. The same process is then repeated two inches deeper. In this way, after four or five courses of trenching, the soil is brought to a depth of 18 or 20 inches of uniform quality. On one Flemish farm, of about 140 acres, the whole of one field of 106 acres has been repeatedly trenched to the depth of 2 or 3 feet." Our "skimming" operations defeat our best processes, and clearly prove (as has been elsewhere asserted) that however we may flatter ourselves as first-rate cultivators of