

are chilled by the land, and part with that vapor in rain. If they strike a hilly land (and our western coast is almost mountainous) the air is driven up from the level of the sea to a higher and colder region, and parts with yet more rain. Accordingly, taking 29 places on the east side of the island, we find the yearly downfall to be 25½ inches; and at 29 places on the west side to be 49 inches, all but double; while, on the Cumberland mountains, it reaches the enormous amount of 121 and 147 inches. In Northumberland, when a south-wester blows, they know, I was told, that it is raining torrents in Cumberland, 50 miles off, but they get none themselves, because the air has been dried in rising over the mountain tops.

What, then, is the practical inference for agricultural from these undoubted facts, established by science? Caution in laying down general rules. We now see why a Scotch farmer often fails in England, or a Suffolk farmer even in Cheshire. Again, if a landowner desire to improve his estate in the West Highlands or Galway, he must look, we see, not to Lincolnshire or Aberdeenshire, but to some district of kindred moisture. There is, however, a more definite inference to be drawn even than these. How can a fixed rule be laid down for the depth or the distance of drains, or the size of the pipes, when one county has 25 inches of rain and another has 50 inches to be carried off by those drains? The difference is, in fact, more than this; for a large part of the downfall returns to the air from the surface. According to the most recent and trustworthy experiments, published in this journal, by Mr. Charnock, out of 33½ inches of rain, no less than 25 inches are evaporated, 8½ inches only reach a depth of 3 feet, and therefore pass through a drain. This was in Yorkshire. But at Kendal there fall 54 inches of rain. The evaporation there, however, would be not more, but less, because the air being moister must dry what is exposed to it more slowly, and the evaporation would not exceed, probably fall short of 21 inches. There remain, therefore, for the drains, 33 inches depth of water in this case, 8½ inches only in the other—four times as much in Cumberland as in Yorkshire. Yet, hitherto, if a man living in Oxfordshire said that inch pipes would drain his land well, a voice from Ayrsh' might exclaim that it was absurd to use less than 1½ pipes, which he found far the best. Yet the smaller pipe might be more competent to its duty in one place than the larger one in the other. The same thing may be said of farm-yards. Living in one of the driest counties of England, I adhere to the old fashion of making muck in farm-yards. This was somewhat blamed by a northern writer, whose talents I sincerely respect. At the very time, however, we were obliged to use a fire-engine

to moisten the litter, which was growing white and mouldy for want of moisture. When it rains here in winter our laborers say, "This is fine weather for making dung." Henceforth, in speculations on the agriculture of the country, we must never lose sight of our material variations in climate.—*Jour. of Agri. Soc. of Eng.*

(To be continued.)

#### ON THE PROGRESS OF AGRICULTURAL KNOWLEDGE DURING THE LAST EIGHT YEARS.

Animals seem to know, by instinct, that food which abounds in fibrine, will lay on meat in greater proportion than any other, for my shepherd tells me, it is useless to give the sheep chaff in their troughs until cold weather comes on. As the winter deepens they eat more chaff; but in spring gradually leave it off, till in May they refuse it, as we light our fires at Michaelmas and leave our grates empty in May. So far, all is clear; but an unfortunate doubt remains on a point, all-important, too, in feeding cattle—namely, the source of fat. According to Liebig it is the surplus of the starchy matter in food, which, not being wanted for fuel, is not consumed, but deposited in the body, ready for future use. Dr. Playfair compares it to the consumption of coal in a gas retort, where, if there be not air enough present, a part of the coal, instead of passing off as gas, is left behind as coal-tar. The tar formed in this case, says that agreeable writer, represents the fat of animals. If this be so, we have only to supply our fattening hogs with food full of starch, like potatoes. But the greatest agricultural chemist, Bous-singault, takes a different view altogether. He denies that fat is ever produced in the animal frame from starch. He shows that the food of cattle contains a third substance—vegetable fat—and is positive that as the flesh of animals exists ready formed in their provender, so does also their fat, and so also does the butter contained in their milk. On the latter point he brings this proof, that a cow, namely, being fed on mangel-wurzel alone, which contains little fat, gave but little milk, and that milk poor, but recovered her milk on receiving straw in addition, which, little as we would suppose it, contains vegetable fat. Since fat is the object principally aimed at in preparing stock for the market, the muscle or flesh having often, I suppose, attained their full size when the beast is put up to feed, it is evident that, until the source of fat be determined, organic chemistry being undetermined itself, can give a certain judgment on the final feeding of stock. I mean that we can have no reliable tables of the comparative virtue of different kinds of food, because, if Liebig be right, there must be two columns of figures, 1, for the ingredients of flesh, 2, for those of fuel and