in every case there is a common principle exemplified, one which is very observable in more ways than one: for the crops grow faster and heavier, thus extracting a much larger quantity of water from the soil, while the soil nevertheless continues to contain more water.

This greater affinity for water is partly accounted for by the soil containing a larger percentage of decaying vegetable and mineral matters, and partly from its mechanical sub-division; while these differences give rise to others, relative to temperature, electricity, aeration, &c., that must of necessity affect the chemical phenomena that take place in the soil. It is a well-known fact that decaying vegetable matter—such as the roots of plants, when they undergo what may be termed a healthy state of decomposition the process being attended with the proper supply of air and moisture—have a great affinity for water, drinking it up and retaining it in its pores like a sponge; and that the soil, when in a certain state of pulverization, also holds more water, on the same principle, than when it is otherwise cultivated.

Of the chemical changes that take place in the fertilization of the soil, as when it is under a naked fallow, and of the products formed which constitute the food of growing crops, very little is yet known that can be relied upon as matter of established fact. That the process in the case of fallow, or land without a crop, is different from the process that takes place in the formation of food for growing plants, is more than probable; and that the several processes must differ widely from each other in their chemical characters in different kinds of soil, in different climates, and in different temperatures, is equally manifest. Indeed, the different species of plants that spring up naturally under such a diversity of circumstances may be accepted as practical evidence in support of these conclusions. Moreover it naturally follows as a corollary, that the fertilization of different kinds of land for the growth of any individual crop, or the enriching of any one quality of soil for the growth of different kinds of plants, involves just as many chemical processes. But, although general conclusions of this kind may be safely drawn, from their having the sanction of practical illustration, yet of the innumerable chemical details which they must of necessity involve in the soil, as a laboratory, nothing is definitely known, comparatively speaking.

The facts just noticed require a twofold illustration, thus: In the popular phraseology of the farm, we limit fertility to that condition of the soil conducive to the growth of wheat, barley and the other cultivated crops. We cultivate the land for the production of these crops, and, consequently adopt those means calculated to supply them with the food which they respectively require. Hence the familiar doctrine of different kinds of manure for different kinds of crops—one kind to wheat, for example and another to turnips, &c.

This limited sense, however, of the expression "fertility," is not altogether a correct one, when practically examined at the bar of experience, either according to the current testimony of things, or in the more definite language of science. Thus the soil of the good farmer is rich for the produce of corn and turnips: that of the bad farmer is rich for the growth of weeds. The former is the more fertile soil of the two for the growth of corn and turnips; the latter the more fertile of the two for the growth of a different class of plants, yclept "weeds" In the one case, the manure undergoes certain chemical changes, to prepare it for the peculiar vegetable organization exemplified in wheat, &c; but in the other case, it passes through a very different process, in the laboratory of the soil before it appears in the form of weeds.

The soil is thus a laboratory in both cases, exemplifying not only the apparatus of Nature—whom we may here compare to a working chemist—but the raw materials, agents, &c, used in the process of enriching the land, and and feeding our crops with the food they require. It is when we thus enter Nature's workshop, so to speak, that we lose ourselves in the mysteries of her handicraft, being unable as yet to follow her throughout her various manipulations. Discoveries are much wanted in this department of chemical science; and from the peculiar character of the processes, as regards the preparation of the raw materials, their organization, and the agents necessary, in both cases the most persevering research will be found necessary to obtain success.

One fatal mistake, or fallacious course, we must guard the reader against; and that is, to trust too much to the laboratories of our agricultural chemists, as affording a faithful reading of Nature's chemistry in the soil, and the vegetable economy of plants; for the discoveries above referred to have first to be made, before they can be explicitly relied upon. But to this we shall return, when we have examined the other two cases formerly designated the two extremes—*land containing too much water, and land deficient of water.*

The former of these involves the chemistry of manure in undrained lands, or the decomposition of animal, vegetable, and mineral matters in a soil where the atmosphere is excluded, by its pores being filled with water. Bogs, swamps, and marshy lands are familiar examples of this kind, as are also badly-drained and ill-cultivated clay soil, in wet seasons. From time immemorial, it has been a by-word amongst farmers—"Just as well throw the manure into the river, as place it in such lands." That this old saying involves a most important chemical truth, is fully borne out by the experience of all who have manured such soils. It, therefore, only