between March and October, advantage being taken of the spring tides during these months. The new warp is allowed to lie fallow during the winter after being laid out in four-yard “ lands ” and becomes dry enough to be sown with oats and grass and clover seeds in the following spring. The clover-grass ley is then grazed for a year or two with sheep, after which wheat and potatoes are the chief crops grown on the land.

Green manures are crops which are grown especially for the purpose of ploughing into the land in a green or actively growing state. The crop during its growth obtains a considerable amount of carbon from the carbon dioxide of the air, and builds it up into compounds which when ploughed into the land become humus. The carbon compounds of the latter are of no direct nutritive value to the succeeding crop, but the decaying vegetable tissues very greatly assist in retaining moisture in light sandy soils, and in clay soils also have a beneficial effect in rendering them more open and allowing of better drainage of superfluous water and good circulation of fresh air within them. The ploughing-in of green crops is in many respects like the addition of farm-yard manure. Their growth makes no new addition of mineral food-constituents to the land, but they bring useful substances from the subsoil nearer to the surface, and after the decay of the buried vegetation these become available to succeeding crops of wheat or other plants. Moreover, where deep-rooting plants are grown the subsoil is aerated and rendered more open and suitable for the development of future crops.

The plants most frequently used are white mustard, rape, buck­wheat, spurry, rye, and several kinds of leguminous plants, especially vetches, lupins and Serradella. By far the most satisfactory crops as green manures are those of the leguminous class, since they add to the land considerable amounts of the valuable fertilizing con­stituent, nitrogen, which is obtained from the atmosphere. By nitrification this substance rapidly becomes available to succeeding crops. On the light, poor sands of Saxony Herr Schultz, of Lupitz, made use of Serradella, yellow lupins and vetches as green manures for enriching the land in humus and nitrogen, and found the addition of potash salts and phosphates very profitable for the subsequent growth of potatoes and wheat. He estimated that by using leguminous crops in this manner for the purpose of obtaining cheap nitrogen he reduced the cost of production of wheat more than 50 %.

The growing crops should be ploughed in before flowering occurs; they should not be buried deeply, since decay and nitrification take place most rapidly and satisfactorily when there is free access of air to the decaying material. When the crop is luxuriant it is necessary to put a roller over it first, to facilitate proper burial by the plough. The best time for the operation appears to be late summer and autumn. (J. Pé.)

*Soil and Disease.—*The influence of different kinds of soil as a factor in the production of disease requires to be considered, in regard not only to the nature and number of the micro­organisms they contain, but also to the amount of moisture and air in them and their capacity for heat. The moisture in soil is derived from two sources—the rain and the ground-water. Above the level of the ground-water the soil is kept moist by capillary attraction and by evaporation of the water below, by rainfall, and by movements of the ground-water; on the other hand, the upper layers are constantly losing moisture by evapo­ration from the surface and through vegetation. When the ground-water rises it forces air out of the soil; when it falls again it leaves the soil moist and full of air. The nature of the soil will largely influence the amount of moisture which it will take up or retain. In regard to water, all soils have two actions —namely, permeability and absorbability. Permeability is practically identical with the speed at which percolation takes place; through clay it is slow, but increases in rapidity through marls, loams, limestones, chalks, coarse gravels and fine sands, reaching a maximum in soil saturated with moisture. The amount of moisture retained depends mainly upon the absorb­ability of the soil, and as it depends largely on capillary action it varies with the coarseness or fineness of the pores of the soil, being greater for soils which consist of fine particles. The results of many analyses show that the capacity of soils for moisture increases with the amount of organic substances present; decomposition appears to be most active when the moisture is about 4%, but can continue when it is as low as 2%, while it appears to be retarded by any excess over 4%. Above the level of the ground-water all soils contain air, varying in amount with the degree of looseness of the soil. Some sands contain as much as 50% of air of nearly the same composition as atmospheric air. The oxygen, however, decreases with the depth, while the carbon dioxide increases.

Among the most noteworthy workers at the problems involved in the question of the influence of soil in the production of disease we find von Foder, Pettenkofer, Levy, Fleck, von Naegeli, Schleesing, Muntz and Warrington. The study of epidemic and endemic diseases generally has brought to light an array of facts which very strongly suggest that an intimate association exists between the soil and the appearance and propagation of certain diseases; but although experiments and observations allow this view to be looked upon as well established, still the precise rôle played by the soil in an aetiological respect is by no means so well understood as to make it possible to separate the factors and dogmatize on their effects. The earliest writers upon cholera emphasized its remark­able preference for particular places ; and the history of each succes­sive epidemic implies, besides an importation of the contagion, certain local conditions which may be either general sanitary defects or peculiarities of climate and soil. The general evidence indicates that the specific bacteria of cholera discharges are capable of a much longer existence in the. superficial soil layers than was formerly supposed; consequently it is specially necessary to guard against pollution of the soil, and through it against the probable contamina­tion of both water and air. The evidence, however, is not suffi­ciently strong to warrant a universal conclusion, the diffusion of cholera appearing to be largely dependent upon other factors than soil states. Again, all accounts of diphtheria show a tendency on the part of the disease to recur in the same districts year after year. The questions naturally suggest themselves—Are the reappearances due to a revival of the contagion derived from previous outbreaks in the same place, or to some favouring condition which the place offers for the development of infection derived from some other quarter; and have favouring conditions any dependence upon the character and state of the soil? Greenhow in 1858 stated that diphtheria was especially prevalent on cold, wet soils, and Airy in 1881 described the localities affected as "for the most part cold, wet, clay lands.” An analysis of the innumerable outbreaks in various parts of Europe indicates that the geological features of the affected districts play a less important part in the incidence of the disease than soil dampness. In this connexion it is interesting to note the behaviour of the diphtheritic contagion in soil. Experi­ments show that pure cultures, when mixed with garden soil con­stantly moistened short of saturation and kept in the dark at a temperature of 14° C., will retain their vitality for more than ten months; from moist soil kept at 26° C. they die out in about two months; from moist soil at 30° C. in seventeen days; and in dry soil at the same temperature within a week. In the laboratory absolute soil dryness is as distinctly antagonistic to the vitality of the diphtheria bacillus as soil dampness is favourable. Both statisti­cally and experimentally we find that a damp soil favours its life and development, while prolonged submersion and drought kill it. We may consider that, in country districts, constant soil moisture is one of the chief factors ; while in the case of urban outbreaks mere soil moisture is subsidiary to other more potent causes.

Again, many facts in the occurrence and diffusion of enteric fever point to an intimate connexion between its origin and certain con­ditions of locality. Epidemics rarely spread over any considerable tract of country, but are nearly always confined within local limits. Observations made at the most diverse parts of the globe, and the general distribution area of the disease, show that mere questions of elevation, or even configuration of the ground, have little or no influence. On the other hand, the same observations go to show that the disease is met with oftener on the more recent formations than the older, and this fact, so far as concerns the physical characters of the soil, is identical with the questions of permeability to air and water. Robertson has shown that the typhoid bacillus can grow very easily in certain soils, can persist in soils through the winter months, and when the soil is artificially fed, as may be done by a leaky drain or by access of filthy water from the surface, the micro­organism will take on a fresh growth in the warm season. The destructive power of sunlight is only exercised on those organisms actually at the surface. Cultures of the typhoid organism planted at a depth of 18 in. were found to have grown to the surface. In the winter months the deeper layers of the soil act as a shelter to the organism, which again grows towards the surface during the summer. The typhoid organism was not found to be taken off from the decomposing masses of semi-liquid filth largely contaminated with a culture of *bacillus typhosus;* but, on the other hand, it was abundantly proved that it could grow over moist surfaces of stones, &c. Certain disease-producing organisms, such as the bacillus of tetanus and malignant oedema, appear to be universally distributed in soil, while others, as the *bacillus typhosus* and *spirillum cholerae,* appear to have only a local distribution. The conditions which favour the vitality, growth and multiplication of the. typhoid bacillus are the following: the soil should be pervious; it should be permeated with a sufficiency of decaying—preferably animal- organic matters; it should possess a certain amount of moisture, and be subject to a certain temperature. Depriving the organism of any of these essential conditions for its existence in the soil will secure our best weapon for defence. The optimum temperature adapted to its growth and extension is 37° C. = 98°∙4 F. Sir Charles Cameron attributes the prevalence of typhoid in certain areas in