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The Field.

The Seed of Plants.

THE seed is at once the starting point and the end of plant-life, and in its earliest development we may trace the whole history of the plant, the completed circle of the course, all subsequent stages of growth being simple repetitions of the first. For we may observe in the largest tree that each fresh addition to its bulk results from the development of a tiny bud, and we shall see, as we examine further, that the analogies between the seed and the bud are of the very closest character, and that if they are not almost identical in their nature, they are each, at least, simple modifications of the germ. In the leaf-bud, which is often large, easily taken to pieces with a little careful manipulation, and readily examined with the unassisted eye, we shall find, outside of all, a covering of scales enveloping other foliations, which, as we approach the centre, assume the appearance of minute but extremely perfect and beautiful leaves, the whole enfolding a soft spongy mass, the growing point, and presenting the type of a plant in miniature. In this condition the bud may remain dormant for a considerable time; but when at length started into activity, the central point shoots forward, developing as it advances the tiny leaves, which also simultaneously enlarge, and are separated from each other by the elongation and growth of the intervening stem. Just in proportion as this movement of the growing point advances in one direction, a corresponding production of plant tissue is going on in another; for from the base of the growing point, as its summit shoots forward into a stem, an opposite development of fibres, or rootlets, is sent back into the parent stock. By a repetition of similar processes, completed either in one year or extended and multiplied over many, the whole plant is constructed. While thus the leaf bud propagates the individual plant, provision is made for the continuance and diffusion of the species by the formation of another sort of bud, capable of retaining a separate vitality, and under favorable conditions of resuming an independent life and growth. These modified buds are the seeds. Proofs of the analogy in structure and development are numerous and conclusive, but would occupy too much space to discuss here. It may be mentioned, in passing, that the flower itself is in truth but a modified stem, compressed and compacted, and beautifully adorned indeed, but still a stem, with petals and analogous parts for leaves, and seeds for buds. It may be mentioned further, as an illustration of the analogy between buds and seeds, that in some plants of the lily tribe, the buds drop off into the ground, take root, and grow into a new individual, while in some other plants, as, for example, in the mangrove, the seeds commence to germinate while still attached to the tree, and send down their delicate rootlets into the soft mud below, where they ramify and take firm hold before the new plant is finally detached from the parent stock.

With this analogy to guide us, let us now examine the structure of the seed. This in some instances can be readily done with the unassisted eye. In other cases the use of the microscope is necessary. By softening for a short time in water, the decomposition of the seed, or the separation of its component parts, is greatly facilitated. It will thus be seen that the seed consists of a covering more or less hardened, corresponding to the outer scales of the leaf bud, and an internal germ or embryo. This last again consists of three portions—the central growing point, called here the *plumule*, one or two minute expansions, or seed leaves, named by botanists the *cotyledons*, and opposite to the growing point, the base or *radicle*. These two portions of the embryo, the radicle and the plumule, have an inherent and irreversible tendency, when forced into activity, to shoot, the one upwards towards the light, and the other in the opposite direction, away from the light. No matter in what position the seed may lie in the ground, or what obstacles may be in the way, the appropriate direction is sure to be assumed by the opposite portions of the germ. This polarity of the embryo cannot be explained, but it is essential and unalterable. Besides the parts of the seed already mentioned, and which are present in all instances, there is sometimes another substance introduced between the germ and the seed-coats, and which occasionally forms the larger portion of the seed. Botanists call this substance *albumen*, from its supposed analogy to the white of egg. When present it is found under a great variety of conditions, being sometimes pulpy or mucilaginous, and sometimes almost stony in hardness. Between these extremes, it possesses in different species various degrees of firmness and texture, being, for example, mealy, leathery, or horny. In the first condition, it forms the bulk of the seed in wheat, barley, maize and other cereals. In another form it constitutes the edible portion of the cocoa-nut, and in still another variety it furnishes the hard and durable substance known under the name of vegetable ivory, which admits of being delicately carved, and is manufactured into a variety of useful and elegant articles. The use of this component part of the seed is to furnish the earliest nourishment to the young plantlet when it first germinates. When the albumen is absent, its place is usually supplied by the seed leaves, which in these cases are commonly large, and stored with an abundance of nutritious material: examples of this may be noted in the apple, almond, bean, pea, oat, and many other seeds, in some of which the cotyledons are so thickened as to lose all resemblance to leaves, and to be incapable of performing the office of leaves. They consequently remain under ground, instead of being elevated on the growing stem and expanding into the first pair of green leaves. Such is the case with the pea, the oak, &c.

The presence, in some seeds, of but one cotyledon, as in corn, &c., and in others, as in the maple, of two, though apparently a trifling circumstance, is at the foundation of some important differences in the mode of growth and general characters of plants, a subject to which we shall have occasion to revert again, and will not therefore dwell on here.

Such, then, is a brief outline of the structure of seeds, when examined in a dormant state. When growth is started, that is, when germination takes place, important changes occur, to the consideration of which we will devote another article.

Familiar Talks on Agricultural Principles.

TURNIP AND OTHER ROOT CROPS.

THE cultivation of the turnip, carrot, and mangold, cannot be too highly recommended. They cleanse and mellow the soil. They feed on a different class of substances from most other crops, and if the soil in which they grow has been well manured, they leave it rich, and in the best order for other products. Beside these advantages, they form valuable articles of food for stock. Though they contain a large percentage of water, they are also made up of such nutritive elements as albumen, sugar, gum, (pectin), and starch. These constituents vary in proportion according to the character of the soil in which the roots are grown, and the description of manure applied to them. Well-rotted composts, bone dust, superphosphate of lime, and guano, are the best fertilizers for crops of this sort. They require potash, soda, lime, bone-earth, gypsum, and some vegetable matter, and hence the manures that supply these are best for roots. Manures rich in nitrogen and comparatively poor in phosphates promote the growth of the leaf rather than that of the bulb, and the heaviest crops will not be obtained by such treatment. Land enriched by previous high culture, or dressed with well-rotted manures or concentrated fertilizers, are those in which roots yield the most satisfactory returns, and farmers who have had no experience on the subject will be astonished to find what results may be obtained from this kind of husbandry, when properly performed. The culture of turnips and other roots is largely on the increase in this country, but as yet it is only to a very small extent that their beneficial effect on our agriculture has come to be felt. When a system of rotation shall be established on every farm, and root crops take their proper place in that rotation, a revolution of the most pleasing kind will have been brought about. We shall hear no more complaints about worn-out soils, want of manure, scarcity of money, or farming being a bad