

is a constant succession or interchange of place among plants on uncultivated lands. Take for example a field set in timothy. If the soil be very rich, and the crop has been properly put in, we shall have a most luxuriant growth, consisting almost wholly of the timothy, during several years, after which, other grasses or plants appear, and if the field be pastured pretty freely the timothy will soon be entirely eradicated. In our climate and soils, if the pasturing be continued, the whole field, unless it be very poor, will be mainly occupied with white clover and green grass, (*poa pratensis*,) improperly called by some "blue grass," which is a different plant. When we mark the boundaries of some adjacent little patches of each of the two plants by placing sticks around them, we find in the course of a year or two a complete interchange of place between the grass and the clover. If the land be limed every eight or ten years and top dressed heavily every four years, with stable manure or city street dirt, it will produce rich pasture for many years. There are fields of this kind in the south-eastern parts of Pennsylvania, from which for 20 years or more large crops of hay have been annually gathered in June, and which afford afterwards rich pasturage until covered by snow during the winter.

If instead in a rich soil, the timothy had been sown in one deficient in one or more of the constituents required by this grass, other plants or weeds which can find all their elements in such a soil, will soon spring up among the timothy. This grass sometimes will share the field with the intruders for a time, but as the soil is more and more exhausted, the timothy will finally disappear. And although it would be labor lost to sow timothy in the field again without supplying appropriate manures, yet in many cases some other crops will succeed tolerably well.

Other illustrations of nature's principles of rotation may be drawn from forests. In most of these we find a great variety of trees and shrubs intermixed; some of which derive their mineral constituents from near the surface, whilst the roots of others penetrate frequently many feet beneath. The necessary mineral matters are thus taken up by each kind of tree or shrub, and portions of them are annually distributed as a top dressing, in the leaves, flowers, fruit, &c. The trees and shrubs themselves (if left to nature) die after completing their growth; and in their decay leave upon the surface their stores of plant-food for the use of their successors.

If only a single species, or at most one or two, had existed in a forest, we may be certain that they would, after one or two generations of the trees, dwindle and finally give place