

the light reaches it only on one side, it will always, by degrees, turn itself to that side, as if eagerly pressing forward to obtain the beneficial action of that agent. The leaves, whose functions in a more especial manner require its operation, will always be found turned towards the light. The branches of a tree, which have naturally a tendency to rise vertically, have this tendency modified by the superior attraction of the light, when it can reach them only laterally. Thus, while those on the upper part spread out in full luxuriance in all directions, those below them are obliged to expand more in a lateral direction: and this is still more the case with the lowest branches, which shoot out horizontally to a considerable distance before they turn upwards, and present their leaves to the light. Often, however, from the deficiency of this necessary agent, their growth is much stunted, or entirely prevented. The operation of this cause is extensively seen in the interior of a dense forest.

It may be objected to the theory of the spiral growth being the result of the sun's motion, that were it so, the direction of the spiral would always be the same, that is, ascending from left to right with reference to the axis. But this is not found to be the case, for the direction of the turns, though generally constant in the same plant, is far from being the same in all. Dr. Wollaston ingeniously suggested that a verification of the theory would be obtained, were it found that plants transported from the southern to the northern hemispheres, would have this direction reversed; for it is evident that the motion of the sun's light in the two hemispheres is in opposite directions; being, in the southern hemisphere, from right to left, to a spectator facing the meridian position of the sun, which in those regions is to the north. But the facts are not in accordance with this view of the subject; so that we may consider the hypothesis as untenable.

The roots differ considerably from the stems both in their structure, and in their mode of growth. They exhibit, indeed, the appearance of medullary rays and of concentric layers, but they are destitute of any central pith, and they have no tracheæ; neither does their surface present any ap-