

thickness, must increase annually in a compound ratio. But although such a rate of increase may well be supposed to be carried on during the early years of its growth, there is every reason to believe, as was observed of the diminished thickness of the last fifty outside rings of the before mentioned English oak, in the two hundred of them which were counted from its centre to its surface, that the concentric layers become thinner and less distinguishable as the tree grows older; and in proportion as its roots find it difficult to draw an increased supply from the soil in which it stands. These concentric layers, as they are successively laid on, not only prevent the previous ones from thickening, or enlarging in any way, except by rising upward, which it is said they do not do; but as it is thought the continually increasing pressure, produced by the laying on of new layers, becomes so great as in many instances to occasion decay and a hollowness of the tree. (*m*)

(*m*) Roget Anim. and Veget. Physi. pt. 1, c. 1, s. 3.

'That the upward growth of the stem takes place altogether in the green shoot of each year, whilst the older portions of the stem undergo no change in dimensions, is proved by the following fact, known, I presume to all. When a name is cut upon the bark of the beech tree, (*fagus sylvatica*,) the tree may continue to grow until it has doubled its original height, but the name will never be raised further from the ground than the point at which it was originally cut. This process is the same, both in exogens and endogens.'

'Concerning the growth of the fibro-vascular system, *i. e.* the vascular tissue and woody fibre, there has been a great diversity of opinion among botanists. By far the greater part of the observations which have been made for the purpose of examining into this matter, have been made on exogenous plants; to these, therefore, our attention must be principally directed. But yet it should be remarked, we can admit no explanation which does not apply to endogens, as well as to exogens. The origin of the fibro-vascular system is presumed to be the same in both cases; and so also its development, except in the single particular of its arrangement.'

'There are certain facts respecting the production of the wood, which have been established by careful and oft repeated experiments. To these we will first attend. The *first* of these is, that the wood, or at least the material of which the wood is formed, is elaborated in the upper part of the plant, and sent downward; and not in the root, and sent upward. This has been established by such experiments as the following; early in the spring a light ligature was tied around a young branch, and in this condition the branch was suffered to remain for the season. On examining it, towards autumn, the part above the ligature, was found to have increased in size, whilst that below had remained unaltered. A ring of bark was removed from a growing stem of a young tree, when the wound commenced healing, the new woody matter was formed on the upper lip of the wound, and not on the lower. *Second*, the new wood is produced, either from the bark, or between the bark, and the wood of the last year, and not by that wood. This was proved by Du Hamel, in the following manner: having carefully introduced plates of tin foil, between the bark and wood of a growing tree, he suffered it to remain undisturbed for several years. On cutting across the stem, at the end of this time, he found, that the new layers of wood had been deposited on the outside of the tin foil, without in the least