

be estimated by the respective thickness of the rings of timber." *Darwin's Phytologia*, 476.

The Linnæan hypothesis was, that the pith added a layer every year to the wood internally. But on its being observed, that many trees grew vigorously, the pith or a part of which had rotted so as to leave them almost entirely hollow, that hypothesis was abandoned as totally erroneous. And on its being discovered that the food of a tree, after having been taken in by the root, and, somehow, carried up and digested into sap by the leaves, was assimilated and added to the bulk of its trunk and limbs in layers immediately under its bark, the opposite hypothesis was adopted, that trees were increased in size by those external additions alone.

Hence it was, perhaps, that upon a more careful examination of the organs of vegetables, they were classed, in reference to the visible arrangement of those organs, into two great groups, the first called exogenous, because of their having the vascular tissue arranged in concentric cylinders around a common axis, the pith; and the second, endogenous, having this tissue disposed in bundles, and not in cylinders. In the first class, the tubes and woody fibre are arranged in concentric bands, having the cellular tissue, in part, packed in between them; and in part forming lines, called the medullary rays, cutting them at right angles, and radiating from the axis of the stem. Such stems increase by the regular addition of new layers on the outside of the old wood; and are thence termed exogenous stems, or growers outwardly, as the name imports. This is the structure of almost all the forest trees of our Union. In the second class, the tubes and woody fibre are disposed in bundles throughout the stem; the interstices being filled up with cellular tissue. The stems having this structure do not increase in diameter after they are once fairly formed, but only in solidity. This they do by the addition of new bundles of tubes and woody fibre internally. Hence, they have received the name of endogenous or growers inwardly. (b) Again it was observed, on the first appearance above ground of the nascent plant, that it in many cases exhibited a pair of thick fleshy lobes of the seed,

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(b) "The wood, which exists more or less abundantly, even in herbaceous stems, and which forms so large a portion of those trees and shrubs, in the stem which we have selected for examination, consists of a single zone or layer, composed of tubes and woody fibre, disposed without any regular order, except that the latter is the most abundant on the outside, next the bark. The second year of a plant's growth, a new layer is formed outside of the first, and similar to it in every respect. The third year this process is repeated; and thus the stem increases in size, a new layer being formed annually, as long as the plant lives. The wood of an exogen, of one year's growth, may be viewed as an elongated hollow cone, extending from the base to the summit of the stem, and enclosing the pith. This cone does not extend further, nor does it enlarge in any way; but is surrounded the next year by another cone, which, like the first, after being formed, undergoes