

having some resemblance to leaves; these were called cotyledons. The common garden bean, the peach, the oak, and a great variety

---

no change in dimensions. Hence, as the necessary result of this mode of growth, the stem of an exogen is more or less conical."

"Each layer, or to speak more accurately, each hollow cone of wood, is the result of a single year's growth; it is evident, that the age of an exogen may be ascertained by counting the number of rings presented on a transverse section of the stem, made near its base. This may be done with great accuracy, in most trees of the temperate and cold climates, in which, in consequence of the periodical suspension of vegetation, the annual layers are distinctly marked; but in the case of trees of the torrid zone, where vegetation goes on throughout the year, this cannot be so readily done. In old trees, the rate of increase being very uniform, their age may be determined with considerable accuracy, by the inspection of a mere fragment of the stem, the diameter of the whole stem from which it was taken being known. A rough estimate of the age of a tree, is sometimes made by dividing the semi-diameter of its base by the average increase of the species to which it belongs, that average being determined by previous observation. In these several ways, the ages of numerous very old trees have been determined. It should be remarked, however, that these determinations, except where they are based upon an actual counting of the rings presented by a transverse section of the trunk, cannot be regarded as any thing more than approximations to true age. A tree growing in peculiarly fertile ground, will enlarge much more rapidly than most other trees of the same species; and of course, with a given diameter, will have a less number of zones than the average. In the case of a tree growing in peculiarly barren ground, just the opposite effect would ensue. An estimate of the age of the first, made by dividing its semi-diameter by the average thickness of the zones of that particular species, would give too great an age. An estimate of the age of the last, made by this same method, would give an age less than the true one."

"There is almost always a marked difference in color and density, between old and recent wood. The outer and more recent portions of the stem, have been called, in allusion to their color, *alburnum*; and in allusion to their office, sap wood; the inner and older portions are termed the heart wood. After a few years, the color of a layer of wood is changed, its density is increased, and it takes thereafter little part in the transmission of the sap. During the winter, it is true, it generally contains sap, but then this sap is rather deposited in it, than circulating through it. The change in color and density, by which sap wood is converted into heart wood, is caused by the deposition of a solid matter, peculiar to each species, in the tissues of that part. This matter is, in most cases, soluble in nitric acid, and hence it is, that if a piece of heart wood be immersed in that acid, the color is discharged, and the piece again assumes the appearance of sap wood. Where the matter deposited is of a resinous character as in the pines, it adds very much to the durability, and consequently, to the value of the heart wood. On this account, as well as on account of its greater solidity and strength, the heart wood is universally preferred to the sap wood, for use in the arts. As the layers of wood, in the course of a few years after their formation, cease to take any active part in the circulation of the sap, and, in time, become to all intents and purposes dead matter, it would naturally follow, that the central part of the stem would be first to decay. Where the matter deposited in those parts is not of such a character as to protect them from