direction, as in a larger one the inner cells would be beyond the reach of light, and possibly of moisture, and even such a sphere must remain in water in order to rotate.

There seems no further progress possible in the face of these opposing conditions. How can anything better be produced? Here protoplasm had to strike out a new line of progress. We describe it briefly as Division of Labor. The first evidence we have of this is in such small plants as Ricia, floating on still water or living on damp soil. Their mass of cells may be compared to the spherical Volvox, but instead of rotating and exposing every surface to light, one side of Riccia is permanently set apart to absorb light and air, while the other is devoted to the absorption of water. This division of labor may seem a small advance, but it contains a prophecy of everything we find in the structure of the tallest tree.

The dorsiventral arrangement proved itself a success, and larger land plants of similar arrangement and structure were produced, with an elaborate epidermis and ventilating system. These were merely flat masses of cells, spread on moist soil. Now came another ministry of progress. Neighboring plants occupying the surrounding territory grow over the flat mass and cut off its supply of light. Protoplasm responds to this danger by breaking the flat expanse into irregular parts attached to a central axis, and this axis soon rises slightly from the soil. This is the condition we find in the mosses. But another danger is at once encountered. Such elevated parts are removed from the necessary water supply, although favorably placed for light and air.

So if elevation of parts is necessary there must be devised a combusting system, and a strengthening system also, to enable the erect plant to resist wind currents. Protoplasm recognizes and meets this difficulty. Among the mosses we find a suggestion of a stem—the green surface is divided into somewhat regular little leaflike parts, and these are placed radially on a short, central axis, which is strong enough to hold them erect a fraction of an inch. But no true conducting structures are met in plants lower than the ferns. In forming vessels for conducting water ordinary short roundish cells become immensely elongated, and their side walls strengthened. The presence of these tubes, which permit a ready passage of liquid from the soil to the uppermost parts, makes possible what we have in our most complex groups of plants—roots for absorption deep in the soil, stems and leaves reaching many yards above the soil. These tubes must be held erect against gravity and the destructive rush of the wind. So wood is developed—a mass of cells part of which are modified into tubes and another part into fibres,—slender, strong and elastic.

In plants lasting but one year and reaching no great height, the conducting and strengthening cells are gathered into strands, while in plants enduring for many years the wood forms a continuous cylinder in the stem. The laws of mechanics demand that the strong parts of an upright cylinder shall be at the surface in order to give it rigidity. But these highways for