any large body of water. In other words, much heat drives away water, and much water prevents warmth. To have plenty of moisture a plant must be surrounded by water. To have plenty of light and heat it must be out of water. How can these contradictory needs be properly met?

Simple green plants of only one or a few cells might float on the surface of a body of water, enjoying plenty of light and water, but the temperature would be lower than that which is most stimulating to their life-processes. If they drift ashore the heat of the sun will soon remove the water necessary to their life, in spite of the wall of cellulose they construct about themselves. Some new arrangement is necessary. Protoplasm responds to this challenge by keeping the offspring close together, until a mass is formed. The inner ones are kept from the drying air by the outer ones, which are soon destroyed, becoming empty cells, but forming a more or less waterproof and non-conducting coating. This method is another permanent victory over threatening conditions because we find that every kind of creature living in air has adopted this plan of an *epidermis*.

But in this mass of cells, each one demands an equality in exposure to light, warmth and moisture if all have the same work to do, so we find that they have gradually adopted some definite arrangement, regular and symmetrical. It is quite evident that if every cell is to be independent of every other cell, it must be equally exposed to beneficial conditions. This perfect socialistic condition is consummated in Volox—a symmetrical sphere which rotates slowly in the water. It is evident that a small sphere is the climax in this 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 *Riccia*, 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 aside 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.