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Some Conditions Affecting Organic Progress.

(Continued from last issue).

The protoplasm of which we are made, develops in our surface layers when exposed to light, a protective pigment, usually not green, but brown or black. The presence of this permits of human life in intensely lighted regions. **Those who do not develop it readily, retreat from the tropics or die.**

Having marked the victory of protoplasm over one enemy we may proceed to see how it meets another. We have seen that the presence of warmth and moisture are the prime conditions essential to the life of protoplasm. It should now be noted that these are incompatible conditions, inasmuch as warmth implies the evaporation of moisture, and on the other hand the high specific heat of water keeps at a comparatively low temperature 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 of green plants close together, until a mass is formed. Then 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 a mass of cells, each one demands an equality in exposure to light, warmth and moisture, because 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 *Valvox*,—a sphere which rotates slowly in the water. It is evident that a small sphere is the climax in this