

important advantage, but probably there are many others yet to be learned. But mark, that by acquiring adaptability, Protoplasm has secured the power to live under all sorts of conditions, and this is no small advantage.

Let us now turn to the ability of many plants to live in the light. They must in some way prevent the actinic rays from penetrating them through and through. We find that protoplasm has responded to the danger of destruction by light, by the extremely wise method of changing a deadly enemy into a friend and even into a valuable servant. The change, however, is not in the light, but in the protoplasm. In a part of its own substance it develops a green coloring matter—chlorophyll—which it places near the surface, and this absorbs the energy of the light, preventing its destroying the inner protoplasm, and also enabling it, through the energy thus captured, to accomplish some most astounding chemical changes. There are certain substances so stable that when man in his chemical operations forms these substances, he lets them go as waste products. Among these are prominently carbon dioxide and water. The energy required to decompose these substances is so great that under no ordinary conditions of manufacture can we undertake it. But protoplasm, with the energy absorbed from sunlight, quietly takes apart these refractory materials, and builds up their separated elements into such complex substances as starch, fats, and proteids, and as if in derision of man's efforts, gives these to man to be his foods. Man, if properly informed, reverently accepts them, confessing his ignorance and inability to make them for himself. It is suggested—in view of this power of green protoplasm, that greenness is an important stage or condition of progress. Plants lacking greenness have to live as man and the other animals do, on the products of the energy and ability of the green plants. It is because of this power of green plants to manufacture an abundance of food for themselves that large and enduring plant structures and all kinds of animal life become possible. 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