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The Roundabout Club Concluded.

ciety as a great economy. It increases both the skill of the individual and the efficiency of the whole body. This principle is brought to a high degree of perfection in a tree. The leaves require much air and light for the work they have to do. They are therefore very large and thin in the majority of trees. Being light in weight, the tree can easily support a large number of them. The little rootlets and root hairs have extremely thin and delicate walls. They must absorb water and soluble foods from the soil, and at the same time keep back impurities. The tip, or cap of the root, on the other hand, is hard and thick. It has to force its way through the earth as the root becomes The stem, or trunk, is very stiff, hard, and strong, but at the same time, porous. It supports the upper organs of the tree, and forms a conduit by which food may pass from the roots upward, and from the leaves downward. Of course, not one of these could possibly do the work of another.

When the seed of any of our trees falls into suitable soil and germinates, two distinct parts may be observed, one growing upward, the future trunk and branches, and the root pushing its way deeper down into the soil. Under all conditions, whether light be present or not, this relation will be preserved. What is the stimulus that regulates these phenomena, and how does it act? The most careful microscopic analysis has utterly failed to give a satisfactory an-

swer to these questions. The effect of light on our trees, and indeed on all plants, is very marked. The leaves are usually set so as to receive the maximum of light, and if for any reason the light should be shut off on one side, the leaves on that side will very soon change their position to suit altered conditions. In time, the whole tree will be affected, causing a lean to one side. For this reason, trees which grow close together have long, straight, bare trunks. The light comes chiefly from above. Here again, in the relation of plants to light, lies a problem which the most learned scientist has

not adequately solved. These are unexplained physical facts in connection with a common tree. In its life activities are even more abstruse problems in chemistry. When we think of the science of chemistry, we are apt to see in imagination a druggist's shop with its rows of bottles, acids, and all kinds of evil-tasting salts. In other words, we think of inorganic chemistry, or that which is not related to life processes. We would class such substances as wood, seeds, foods of all kinds, as of an entirely different order, are, but for one reason only - their extraordinary complexity. It is only in recent years that science has applied itself to the study of these compounds.

Only in the intricate laboratory of living things can the majority of these substances be produced. The delicate odors of flowers, the flavor of the nectar, the coloring of the flowers, and of the leaves in autumn-all these are chemical compounds, so extremely elusive that they have been isolated.

The essential constituent of all living cells is the remarkable substance called protoplasm. It has been analyzed, but little is gained by this means, .or, it must be remembered that it is not living, but dead protoplasm which undergoes the analysis. It is the mysterious quantity called life which is the governing and selective power by which all the activities of a living tree are carried on.

It is not necessary to go to the fullgrown tree to find the seat of this power, and the qualities which determine the individuality of a tree, or species of trees. In the ripened seed lie dormant all the characteristics of the parent plant, which are transmitted to the next generation. Indeed, if we examine this seed, we can eliminate a large part of merely a store of food, and again we can eliminate till we get down to the protoplasm of a few cells, and their governing nuclei. In one of these nuclei, itself of microscopic size, lie the powers and promise of the future giant of the forest. These determinative qualities are called rudiments. Their nature, however, can only be surmised.
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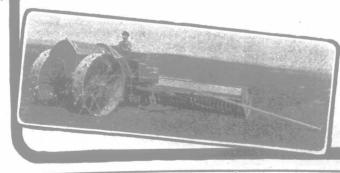
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about a plant are the cells. A tree is the intricate processes of reproduction; bear the closest scrutiny, there is still an aggregate of millions of them, yet still others in the collection and manueach one has its special place in the facture of food; yet, in spite of the economy of the tree. Some, with their greatest diversity of form and function, thickened walls, form strengthening all these cells are blended into one beautissue; some form various kinds of contiful and harmonious whole. ductive tubes; others are concerned in Although the economy of the tree will not in these things an indication of a

visible a different purpose, illustrative of the truth, that the earth was made for man. The forms of the leaves, the brilliant autumnal color effects, the quiet beauty of the whole tree-is there

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