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THE CHEMICAL AND PHYSICAL COMPOSITION OF PROTOPLASM[1]

IT is a very great pleasure for me to take part in such a joyful event as the dedication of a new institution devoted to the botanical study and researches. Botany is only a part of biology, and I should like to speak, in my address, on one of the most important problems not only of botany but of biology in general, on the chemical and physical composition of protoplasm.

It is known that life is concentrated in the living contents of cells. The most important part of these contents is protoplasm. It represents the medium in which all other organs of the cell perform their functions. If protoplasm dies no phenomena of life can occur, and the organism becomes a sacrifice of death. It is therefore necessary for all biologists and physicians to know the properties of living protoplasm, its chemical and physical composition. This composition plays a very important part in life and death.

But how can we investigate the chemical composition of protoplasm if at the first touch of our chemical reagents living matter dies? How can we define this composition if we can investigate only the products of destruction of protoplasm?

In order to answer this question we must remember the procedure employed by chemists in their investigations of the chemical composition of new substances. They endeavor first of all to decompose the unknown substance and to determine the chemical composition of products of its destruction. From this chemical composition they arrive at the conclusion concerning the chemical structure of the unknown substance. Then they try to obtain this substance synthetically.

Therefore, in order to determine the chemical composition of living protoplasm, we must first of all investigate the chemical composition of the products of its destruction. Then we must endeavor to form a scheme of the chemical structure of the principal compounds composing living protoplasm. Finally, we must try to obtain these principal compounds artificially.

It is evident that the substances of dead protoplasm we can investigate chemically in our laboratories arise from the substances of living protoplasm. They

[1] Address delivered at the dedication of the new botany building of Wellesley College, Wellesley, Mass., November, 1927.