The instability of glucose and of all the simple sugars is indeed exceptional in character, and the resulting processes are perhaps far more intricate and numerous than in any other similar case. However, this very case is of exceptional physiological importance, because carbohydrates are the direct result of that synthetic action of chlorophyll,

$$6\,CO_2 + 6\,H_2O = C_6H_{12}O_6 + 6\,O_2,$$

which is the source of all organic substances and of all the energy of the organic cycle in plants and animals. Carbohydrates, moreover, are the chief constituents of plants and the chief food of animals.

Turning to this synthesis of carbohydrate in the plant, we find much that is important in the present study. The details of the chemical transformation by which water and carbonic acid and solar energy are changed to sugars and oxygen still remain unknown, in spite of many careful investigations. But, at all events, it is possible to see that two things must somehow be done in order to accomplish the synthesis: —

(1) Carbonic acid and water must be reduced. That is to say, oxygen must be separated from both of these compounds so that free valences may exist to unite carbon and