the action of these organisms no fermentation or putrefaction could take place.

The fermentation of carbohydrates due to the action of yeast does not concern us specially this evening. The resulting products of yeast fermentation are chiefly carbondioxide and alcohol, with traces of other bodies; but this is not the fermentation which ordinarily occurs in the mouth cavity, and it is that which we have specially to consider. This fermentation in the mouth is chiefly due to the action of bacteria.

Bacterial fermentation of carbohydrates varies very considerably in its character, according to the carbohydrate which is fermented or decomposed, and the organism which is causing the decomposition.

Most of the carbohydrates must undergo change before they can be fermented. Starch, for instance, must be converted into glucose, cane sugar inverted, cellulose changed in some way, before decomposition can take place. This change is brought about by the so-called unorganized ferments or enzymes which are secreted either by animal cells or by the bacteria themselves. That is, the process is begun by a simplification of the carbohydrate before ever any decomposition takes place. The nature of this simplification is one of the obscure points in physiological chemistry about which we have many theories, but no one of them satisfactory. The extent to which this simplification takes place frequently determines the results of the fermentation.

I have here two tubes containing beef broth infected with the same organism. The one contains a certain amount of glucose, a simple sugar; the other, the same amount of lactose.. You will perceive that the tube containing glucose has undergone more rapid fermentation than the one containing lactose. This is shown by the amount of gas in the closed arm of the tube, which, being a product of the fermentation, is an indication of the extent to which it has taken place. This particular bacillus is more capable of decomposing glucose than lactose. Similarly, if a material contains starch, many bacteria might go on living in it indefinitely without touching the starch; but as soon as we introduce a little saliva, which contains the enzyme ptyalin, immediately fermentation begins, as the ptyalin converts the starch into glucose, a carbohydrate which these bacteria can use.

The chemical nature of the carbohydrate has a very curious bearing upon the whole question of fermentation, as it has been but recently discovered that only those sugars with three, six, nine, or some multiple of three atoms of carbon in the molecule can undergo fermentation. This is something which we do not as yet understand, but indeed the whole question of the chemistry of the carbohydrates is still in its infancy.