

Now, if we apply these facts in regard to the bacterial fermentation of carbohydrates to the changes which take place in the mouth cavity, we see at once that these may have a very important bearing upon dental caries. For if we should have there a fermentable carbohydrate and a bacillus which can cause it to ferment, we must necessarily have the production of a free organic acid, and if there is present a lime salt with which this organic acid may combine, we must expect a solution of this lime salt by the acid and a continuation of the process.

Quite a large percentage of the food material which enters the mouth consists of starch; this starch is acted upon by the enzyme of the saliva ptyalin and converted into glucose, and we have our fermentable sugar.

The question now arises, have we present these micro-organisms, which may cause fermentation with the production of acid. This can only be answered experimentally. I have in these flasks small quantities of a mixture of bread and water which have been colored blue by litmus solution and sterilized; as long as they remain uninfected they will remain unchanged, but certain of them I have infected with a small quantity of my own saliva, and have placed in an oven kept at blood heat. These, you see, have become bright red, showing that fermentation has taken place and an acid has been produced. I may say that I have frequently seen this change take place within five hours after the infection of the mixture. This shows very plainly that there are in ordinary saliva organisms, which may cause the fermentation of carbohydrates with the production of acid. But this can be shown more conclusively in other ways, viz., by bacteriological methods. We may isolate the different species of bacteria which are present in the mouth cavity and study their relationship to the fermentation of carbohydrates. My own researches along this line have not been very extensive, but I have found no difficulty in isolating bacteria which can cause fermentation of carbohydrates.

Miller, to whom we owe most of our knowledge upon the subject of the bacteriology of dental caries, found at one time of twenty-two different kinds of bacteria isolated from the mouth cavity, sixteen which caused an acid fermentation of sugar. At another time, out of twenty-five, sixteen were acid producers. Other observers have confirmed his results, and apparently a larger percentage of the mouth bacteria are acid producers than those of the stomach or intestines.

As to the acids which are produced by mouth bacteria, the greater majority produce lactic acid, a few acetic and a few butyric, whilst other acids are produced in smaller quantities.

The highest percentage of free acid which Miller found at any time was 0.75, and it is probable that this is about the limit of concentration.