

The character of the micro-organism causing the fermentation also plays an important part in the products of fermentation. This at one time was thought to be of so specific a character that certain bacteria were named according to these products, *e.g.*, bacillus acidi lactici, bacillus butyricus, etc., but we now know that in the case of the production of lactic acid, for instance, quite a number of different micro-organisms may cause it.

As a rule, we may state that where carbohydrates are decomposed by bacteria, one of the most important products is an acid. I do not mean by this that only one acid is formed, as a whole series of acids may be produced during the fermentation, but usually one predominates so as to give character to the process.

When we examine these acids produced, we find that they all belong to that group which we call organic acids, and if we study them we find that perhaps the three commonest are lactic, acetic and butyric acid. Formic and propionic acid may perhaps be added; other organic acids also occur, but in extremely small quantities.

Mineral acids are not found as a result of the fermentation of carbohydrates; in fact, the only mineral acid which we know of as a result of bacterial activity at all is nitric acid, which is the result of the so-called nitrifying organisms, and this formation of nitric acid only takes place under those very special conditions in the soil which results in the process of nitrification. No trace of nitric acid has been found as a result of the processes which we ordinarily understand as fermentation or putrefaction.

These organic acids which are produced during carbohydrate fermentation are naturally not as strong as the mineral acids, but yet they have the same character that mineral acids have of entering into combination with other elements to form salts. They are therefore capable of acting upon such a substance as carbonate of lime and by combining with the lime to dissolve it.

Ordinarily the process of fermentation is self-limited, just as in the yeast fermentation of sugar. When a certain percentage of alcohol is reached the process stops owing to the injurious effect of the alcohol upon the yeast; so in the lactic acid fermentation, when a certain percentage of acid is reached the fermentation ceases and the micro-organism may even be killed by the lactic acid which has been formed.

But if we add something to the fermenting mass which will combine with the lactic acid as it is formed, such a substance, for instance, as carbonate of lime, we may have the process continue as long as the fermentable substance (sugar) holds out, or until all the lime has combined with the acid. If we watch this process in a test-tube we find that the calcium carbonate gradually disappears, that it is dissolved by the acid set free during the fermentation.