Whether the presence or absence of oxygen makes a difference in the proliferation of lactic acid bacteria

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《Research Objectives》

To determine whether the presence or absence of oxygen in the environment lactic acid bacteria are grown alters their growth in the environment where they are subsequently cultured.

《Hypothesis》

We consider that lactic acid bacteria in the same environment reproduces largely. Because we expect that the lactic acid bacteria are affected by the environment they are grown in.

《Experimental Methods》

1. Lactic acid bacteria are isolated directly from yogurt containing lactic acid bacteria.
2. Staphylococci and bacilli are obtained by streak culture .
3. Cultivate cocci and bacilli with and without oxygen.
4. Combine and experiment with those lactobacilli in oxygenated and non-oxygenated environments.

《Consideration》

In experiment ①, lactic acid bacteria, regardless of whether they were cocci or rods, multiplied better in an oxygen-free environment. The same is true for experiment ②. This negates the hypothesis and suggests that lactobacilli are more likely to proliferate in an oxygen-free environment. However, since Experiments ① and ② are the results of Gram staining of lactobacilli on agar medium and observation of them was done using an optical microscope, it cannot be determined that the amount of growth changed depending on the environment.
In addition to that, in experiment ②, colonies were produced on rod-only media with or without oxygen. In contrast, the cocci-only medium did not produce colonies, and cocci adhered throughout. These findings suggest that the bacilli used in experiment ② may have been difficult to grow. This suggests that cocci and bacilli have different characteristics in growth.

《Future prospects》

《Improvement of experimental methods》
First, we have found it difficult to recognize the difference between cocci and bacilli by observation with an optical microscope. We would like to identify cocci and bacilli using an electron microscope.
In addition, because the current method of judging only by visual observation is subjective, it is necessary to reconsider the experimental method so that it results in objective data.
《Experimental plan》
Since lactic acid bacterium are facultative anaerobes, they can grow in both oxygenated and non-oxygenated conditions, but from the above consideration, it is expected that lactic acid bacterium will grow more easily in non-oxygenated conditions. We would like to conduct additional experiments on the relationship between oxygen concentration and growth.
In this experiment, we assumed that cocci and bacilli have the same characteristics. However, as indicated in the consideration, cocci and bacilli may have different properties. Therefore, additional research additional research should be conducted on the differences between cocci and bacilli.

《Result》

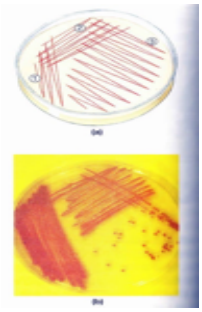
Experiment 1

	with oxygen	without oxygen
bacillus ×	Not seen.	Failure of Gram staining
coccus○	Not seen.	Not much was seen.
bacillus × &coccus○	Not seen.	Failure of Gram staining

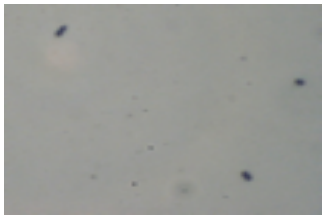
Experiment 2

	with oxygen	without oxygen
bacillus○	Not much was seen.	Not much was seen.
coccus ×	Not seen.	Not much was seen.
bacillus○coccus ×	Not much was seen.	Many were seen.

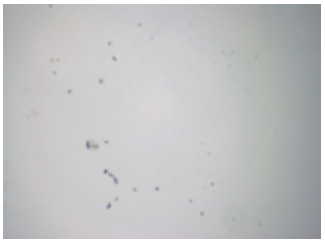
＊○...growing environment : with oxygen
×...growing environment : without oxygen



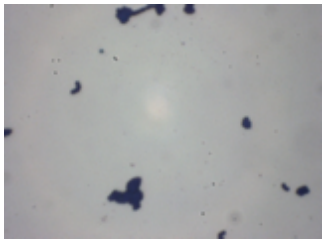
Streak culture



Coccus without oxygen
(Growing environment—without oxygen)



Bacillus＆Coccus—without oxygen
(Growing environment
・Coccus—without oxygen
・Bacillus—with oxygen)



Bacillus—with oxygen
(Growing environment—with oxygen)

《Conclusion》

・Lactobacilli in an oxygen-free environment are thought to proliferate more. ・Cocci and bacilli are considered to have different properties in growth rates.

《References》

・Basics for separating lactic acid bacteria
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・Operation related to the separation and simpleisation of lactic acid bacteria from food　heisei20
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