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The research on control of Euglena' increase

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Abstract

We carried out research on factors affecting the increase of Euglena. As a result of the research, we found that the longer Euglena was exposed to light for, the more active Euglena's division got. Also, we found that addition of kinetin promoted the division of Euglena.

1. The motive and the purpose

Euglena has abundant nutrition and the efficiency of photosynthesis, so more attention has been paid to Euglena in recent years. Particularly, paramylum, which Euglena synthesizes, is a unique substance and it is believed to remove toxins from our body and help prevent the cancer.

We set a goal to establish an efficient way of increasing Euglena glacilis. So, we added kinetin, promoting cell division in Euglena.

Also, Euglena is found in ponds or rice fields around May, we thought Euglena's increase was related to the condition of the light during those days.

2. Method

(1) Addition of kinetin

We used two bottles of Knop's solution as culture solution and we added Euglena to this. We added kinetin to one of them at a concentration of 2mg/l. We cultivated those two culture solutions under the conditions given in the table below. We counted the number of Euglena with a microscope.

Temperature	25℃
Illumination	4000Lux
Day-night cycle	12L12D
Amount of solution	2000ml
Concentration at the start	4.36×10^4 cells/ml

(2) Development of new counting method with spectrometer

We had counted the number of Euglena with a microscope but this task had taken much time and had been tough. So we determined to use a spectrometer.

First, we counted the number of Euglena with a microscope as acccurately as possible. Second, we gradually diluted the culture solution. Third, we measured the ABS of those solutions with a spectrometer. We used the ray whose wavelength was 590nm. Last we drew a graph which showed the relationship

between the concentration of Euglena and ABS.

（3） The effect of the early concentration on the multiplication of Euglena

First, we made various concentrations of Euglena's culture solution. Second, we added three grains of rice and Hyponex at a concentration of 0.1% at the volume there. Then we cultivated them under the conditions given in the table below. We recorded the number of Euglena with a spectrometer every two days.

Temperature	25℃
Illumination	2500Lux
Day-night cycle	12L12D
The amount of solution	300ml

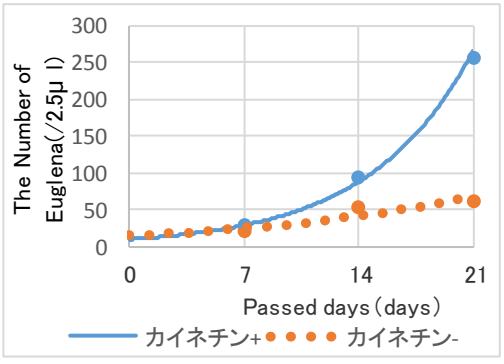
（4） The effect of the day-night cycle on the multiplication of Euglena

We made a culture solution which contains Hyponex at a concentration of 0.1% at the volume and three grains of rice. Then we cultivated them under the conditions of given in the table below and recorded the number of Euglena with a spectrometer every day.

Temperature	25℃
Illumination	2500Lux
Day-night cycle	16L8D, 12L12D, 8L16D, 24D
The amount of solution	300ml
Concentration at the start	25cells/2.5μl

3．Result and observation

（1） Addition of kinetin

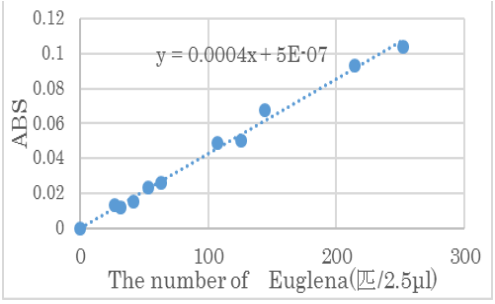


According to this graph, the efficiency of Euglena with kinetin added to the culture solution is higher. It follows from that Euglena has a sensitivity to kinetin and it promotes the division in Euglena.

Also, when we started the experiments, the concentration of Euglena was too low, so it was difficult for us to count the number of Euglena, so the concentration on day 0 was the same though the value in graph was estimated.

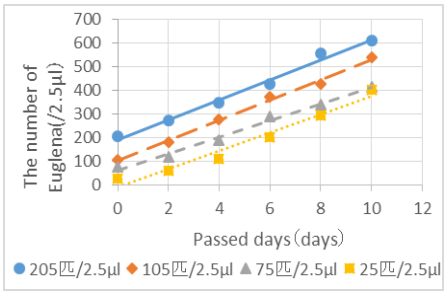
（2） Development of new counting method with spectrometer

This graph shows that the density of Euglena is proportional to ABS. So we decided to observe their density by substituting ABS for the parameter in this equation. When we made the equation, we used the number of Euglena in 2.5μl, so we used the value after we started using this way.



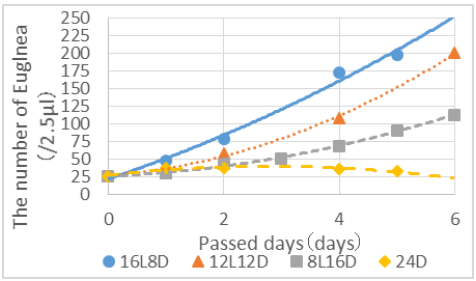
（3） The effect of the starting concentration on the multiplication of Euglena

Comparing the first day to the 10th day, the lower the starting density, the faster they increase. The result suggests that the lower density gives them more room. After this experiment, we decided to start experiments with the concentration of 25 cells per 2.5μl.



（4） The effect of the day-night cycle on the multiplication of Euglena

16L8D's (a group of Euglena which we gave light for 16 straight hours and didn't for the remaining 8 hours) increased the best. The second position was 12L12D's, the third was 8L16D's, and the last was 24D's. 24D's increased slightly at first, but it decreased later.



16L8D is the closest condition to spring or summer, when wild Euglena increase more than in any other seasons. Also 16L8D's have the longest time to photosynthesize of all, so in our opinion, they had the largest amount of energy for multiplication. These two things may be the reasons for 16L8D's success.

On the other hand, we believe that 24D's increase at first was done by using stocked sugar—palamylon—which only Euglena can produce from glucose, but then they decreased because of the lack of that.

4. Future prospects

The first and the forth experiments don`t have enough data. So we want to take more data and make the results more reliable. We would also like to experiment again with the addition of glucose because Euglena sometimes be a heterotrophic organism. In our experiments, we did not specifically consider this because we can expect Hyponex has a certain buffering capacity, but we want to investigate the influence of the pH of the culture solution on the proliferation of Euglena.

5. References

Increase Speed of Euglenophyceae in an outdoor culture Naohiro NAKATA

6. Key words

Euglena, Kinetin, Photosynthesis