Can Nostoc Commune photosynthesize under crogenic?

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Abstract

Nostoc commune, a type of cyanobacteria, is known to be resistant to drought. As a result of experimenting by comparing frozen Nostoc commune with raw Nostoc commune, it was discovered that it has low temperature tolerance and allows light-dependent gas in and out.

Introduction

From the drought resistance of Nostoc commune, we focused on the possibility of low temperature resistance. Looking ahead to terraforming We conducted an experiment to investigate life activity after treating Nostoc commune at an extremely low temperature.

Theory and Experiment

Experiment I Measure the respiratory quotient of Nostoc commune using a soothing as shown in the figure.

Experiment II Investigate the color change of the BTB solution using Nostoc commune in the frozen boiled, and normal temperature conditions. Check the generated gas.

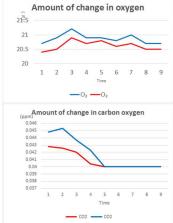
Experiment III Cultivate Nostoc commune using an oxygen meter and a carbon dioxide meter in a closed container and check the concentration change.

Results

Experiment I No respiratory quotient was required. The generation of gases other than CO2 was confirmed.

Experiment II It was confirmed that gas was generated from Nostoc commune. CO2 is absorbed because the BTB solution becomes transparent I couldn't judge whether it was collected.

Experiment Frozen Nostoc commune also absorbs carbon dioxide and emits oxygen when given light.



Consideration

When light is given to frozen Nostoc commune, it absorbs carbon dioxide and emits oxygen. We are doing photosynthesis.

Conclusion

Nostoc commune frozen at -80°C for about 1 day can be photosynthesized by returning it to room temperature and giving it light and water.

References

From Ena High School "Effective Use of Nostoc Commune"

https://school.gifu-net.ed.jp/ena-hs/ssh/H29ssh/sc3/31717.pdf

Shizuoka Prefectural Shizuoka Agricultural High School

From "Photosynthesis and respiration of various photosynthetic organisms"

https://gakusyu.shizuoka-c.ed.jp/science/sonota/ronnbunshu/103116.pdf

Acid-base indicator Bromothymol blue color and molecular structure

https://www.oceanochemistry.org/publications/TRIOC/PDF/trioc 2019 32 65.pdf

Keywords

Nostoc commune, Terraforming, Cyanobacteria, Photosynthesis