

A study of adsorption and absorption of ammonia by moss

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Abstract

This study focuses on the deodorizing potential of moss which has the ability to reduce unpleasant odors. Unpleasant odors can lead to physical stress in various environments. At our school, the foul smell caused by ammonia in toilets has become a serious issue. Two hypotheses were tested; surface adsorption and inner absorption of ammonia by moss. Experiments confirmed both hypotheses, suggesting moss can reduce unpleasant odors in toilets effectively. These results highlighting moss's application in sustainable odor free toilets align with SDGs six "CLEAN AND SANITATION" and ten "REDUCED INEQUALITIES" and 11 "SUSTAINABLE CITIES AND COMMUNICATION".

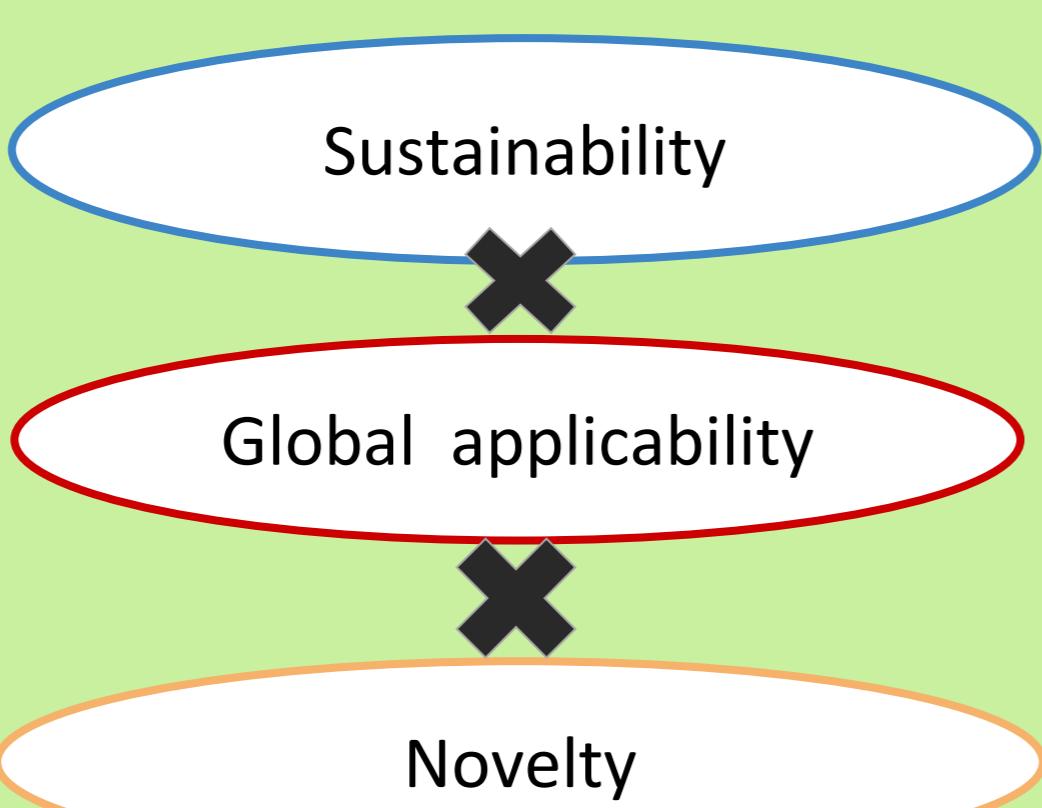
1 Background and purpose

Background

Unpleasant odors in the Miyazaki Omiya H.S. toilets



Can moss Improve the odors?



Purpose

Clarify the mechanism by which moss removes NH_3

Significance



Untreated was most effective

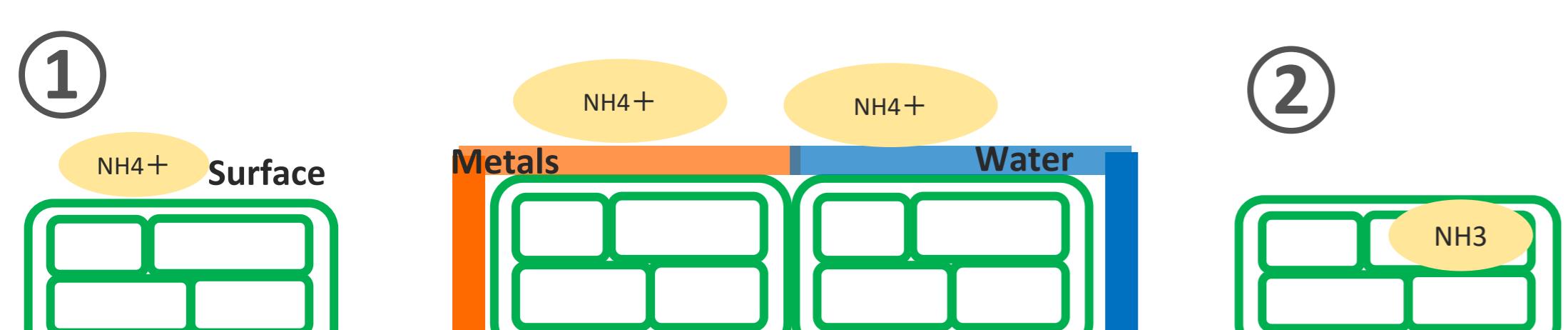
Proof of Concept

- 1 Untreated
- 2 Squeezed
- 3 Mixed
- 4 Crushed

Compare

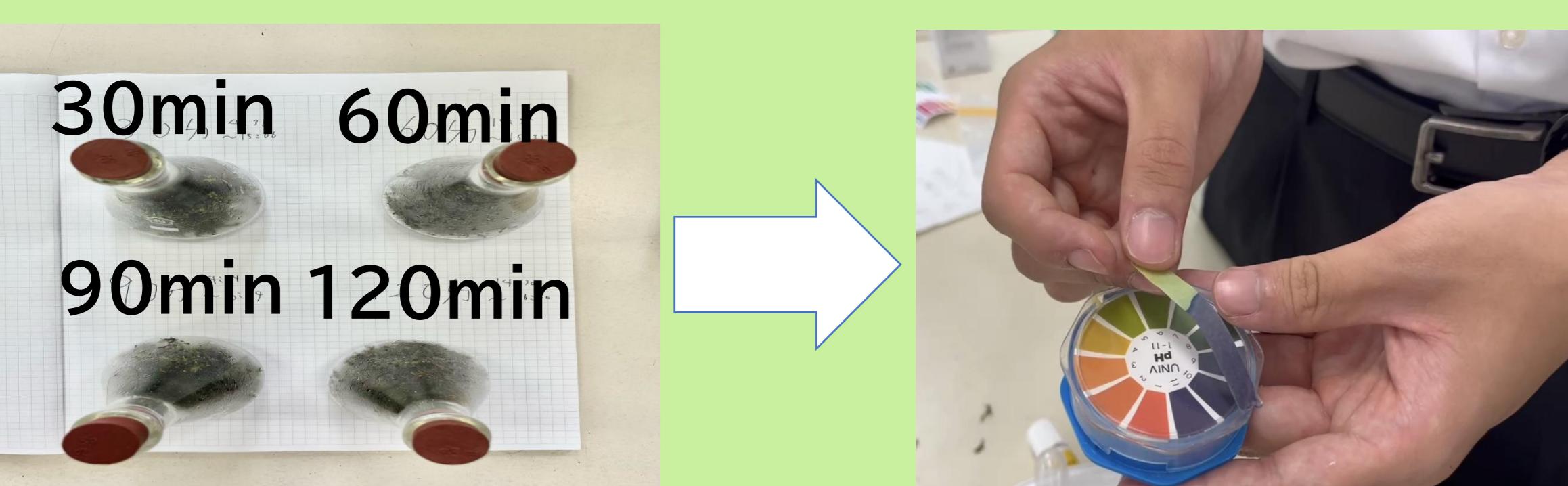
Hypothesis

- ① Surface Adsorption
- ② Internal Absorption



2 Experiment1

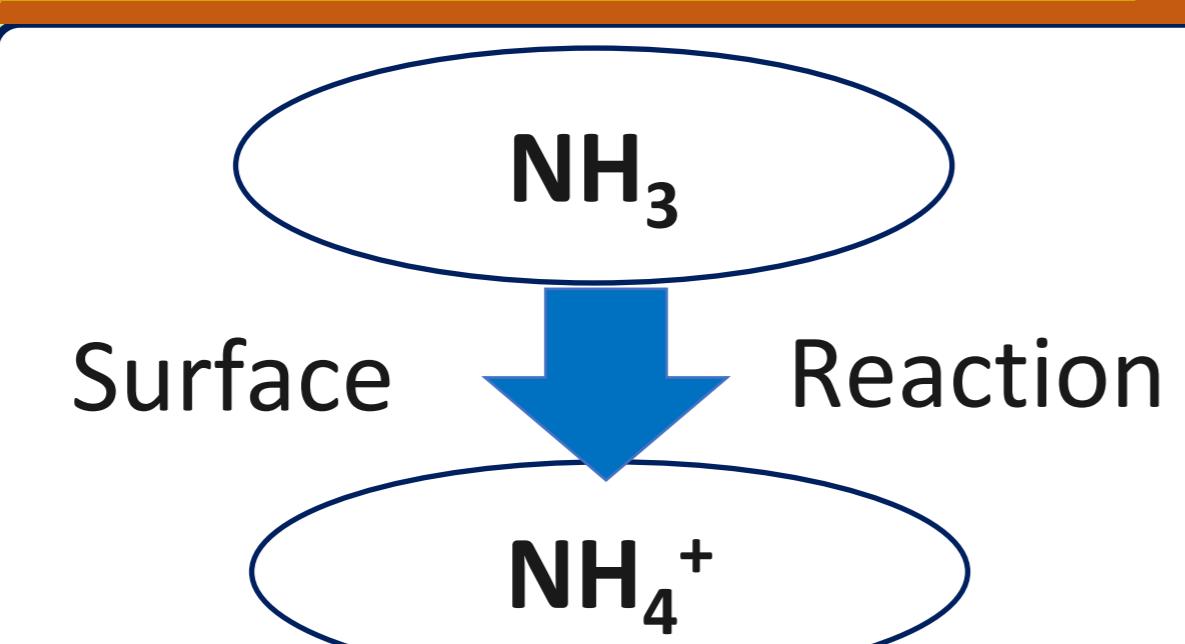
Object: To test the adsorption hypothesis by monitoring changes in pH over time.



Result1

Time	pH
0	7.0
30	9.5
60	8.0
90	10.0
120	11.0

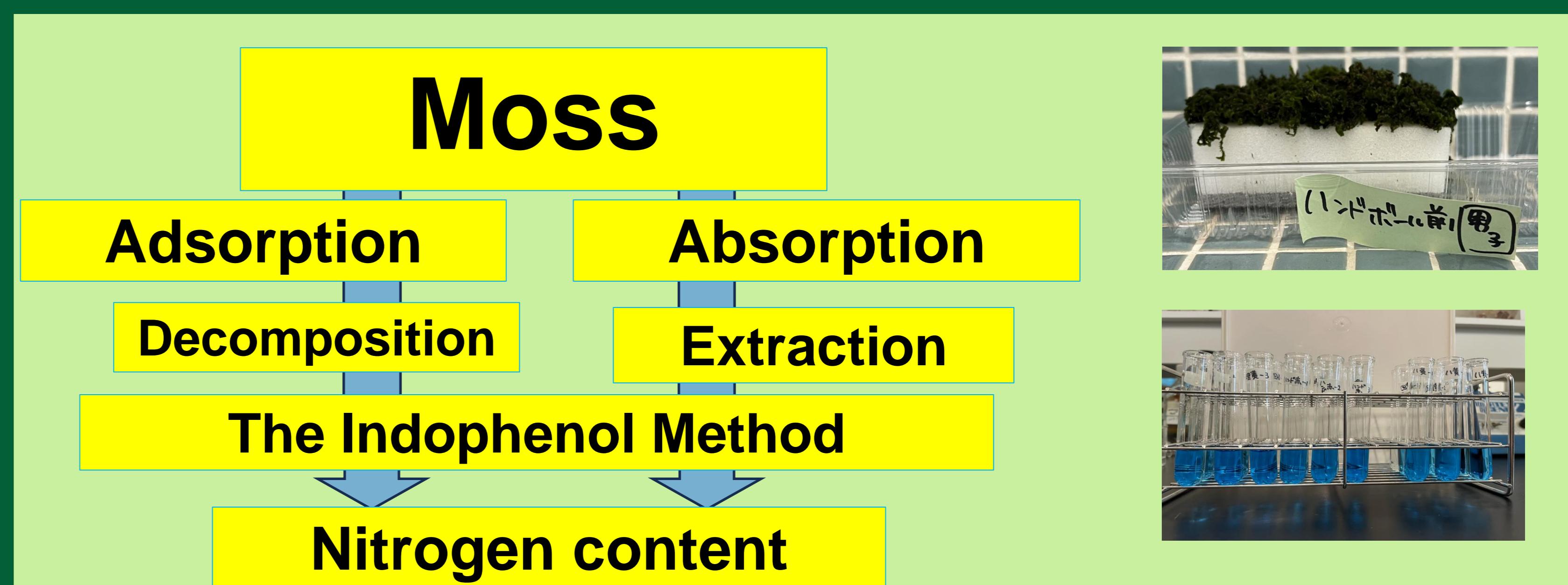
Interpretation 1



3 Experiment2 (in toilets)

Point of view to evaluate

States Ex.	Natural	Placed in the toilet
adsorption	A	B
absorption	C	D



Result 2

Change in the amount of adsorbed nitrogen

A	ave	SD	B	ave	SD
			Samples' name	ppm	
			Library A	1.4	0.0
			Library B	39.1	0.6
ppm			Science building A	1.8	0.0
Natural moss	0.0399	0.0299	Science building B	2.0	0.0
			Playground A	1.0	0.0
			Playground B	2.6	0.1

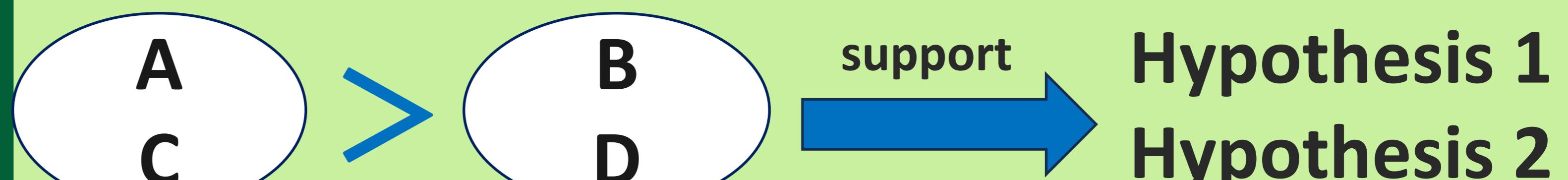
$\times 2.7$

Interpretation 2

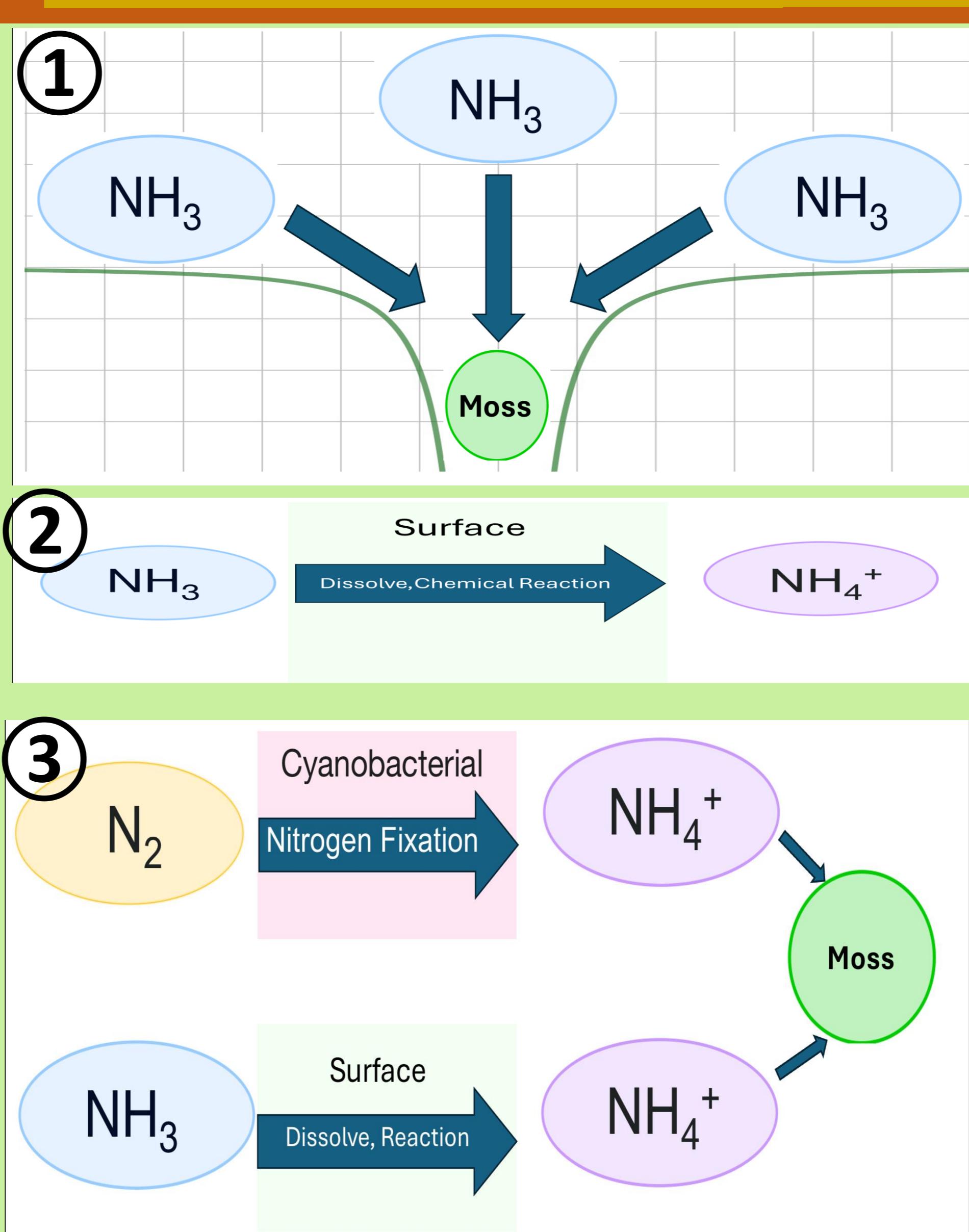
Change in the amount of absorbed nitrogen

C	ave	SD	D	ave	SD
			Samples' name	mg/gDW	
			Library A	24.5	1.5
			Library B	22.7	0.8
mg/gDW			Science building A	23.0	1.5
Natural moss	9.3	0.1	Science building B	24.4	1.5
			Playground A	22.6	2.0
			Playground B	25.8	1.1

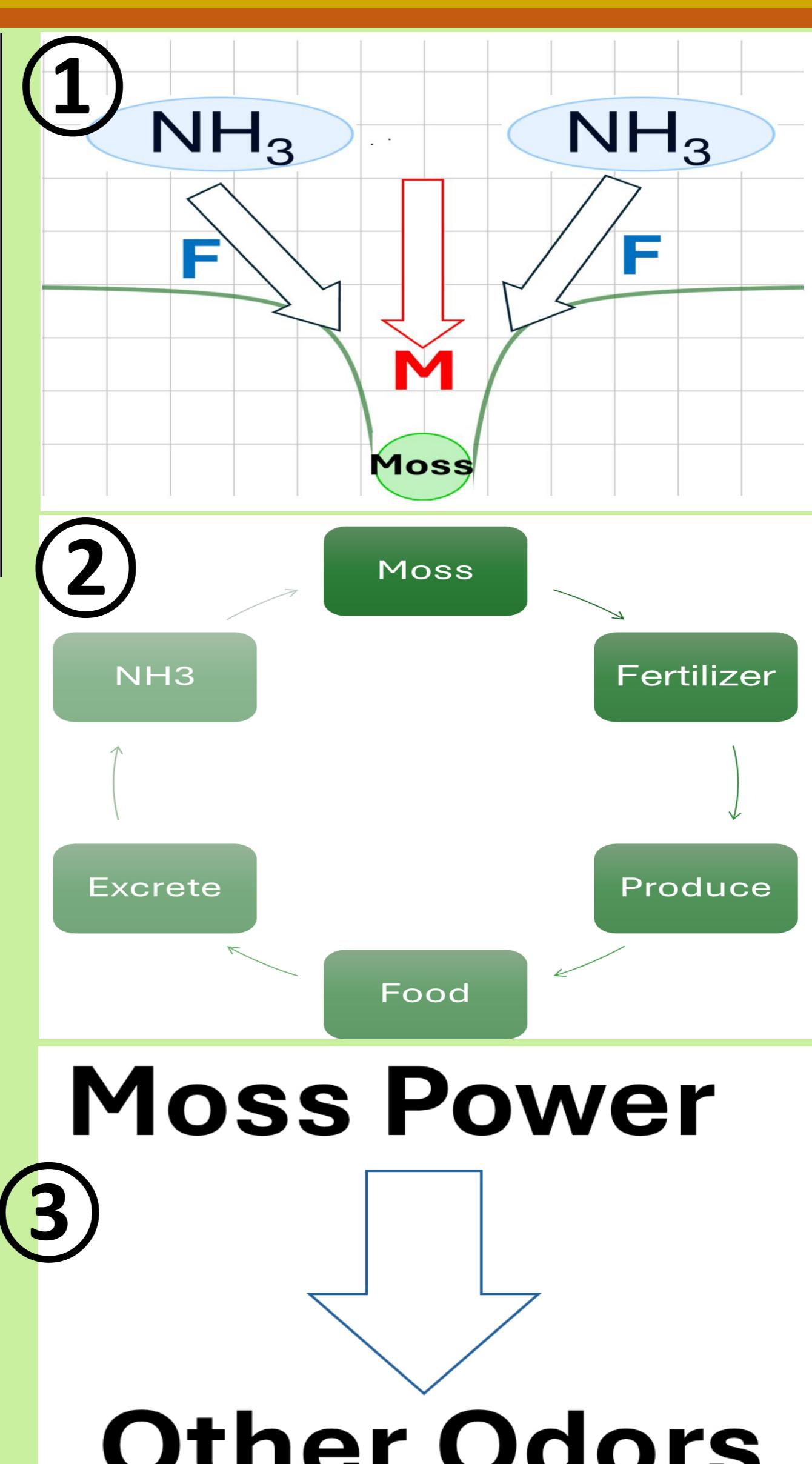
$\times 44$



4 Conclusion



Future perspective



Moss Power

Other Odors

5 Acknowledgement · Citation

[Acknowledge] We would like to express our science appreciation to Dr Yamamoto Yoshiyoshi of the faculty agriculture, University of Miyazaki, as well as to all those who assisted us in our research. Thanks [References]

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