

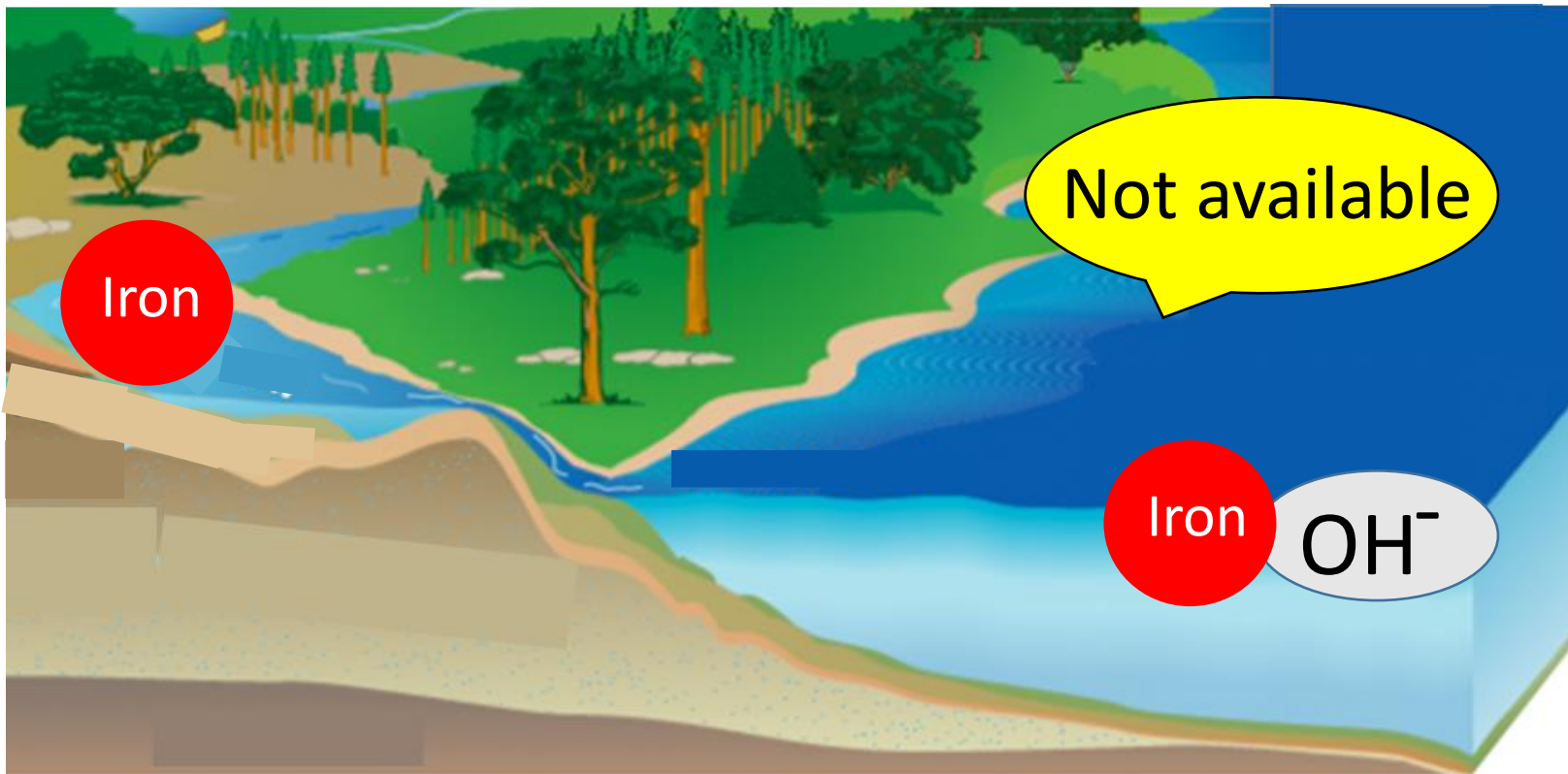
The ability of freshwater cyanobacteria to contribute to the supply of dissolved iron in the sea

Team No.5

Background of Research

There is a lack of dissolved iron, which is essential to living things, in the sea.

< Mechanism of the supply of dissolved iron >





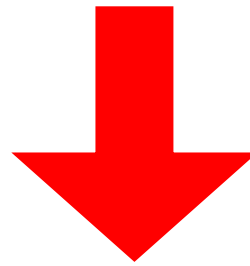
If there are organic ligands in freshwater, the supply of dissolved iron is increased.

< Previous Research >

Produced **by cyanobacteria living in the sea**

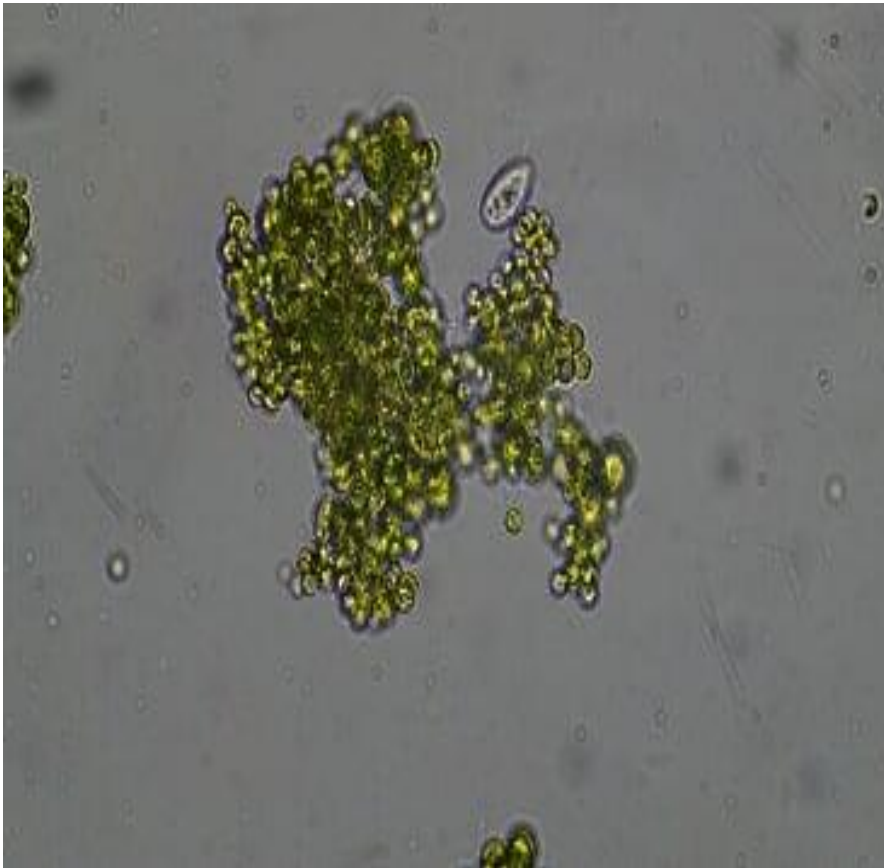
If there are **organic ligands** in the land water,
the supply of dissolved iron is increased.

It is not known whether cyanobacteria in freshwater make organic ligands or not.



Cyanobacteria in freshwater may make organic ligands like those in the sea.

Cyanobacteria



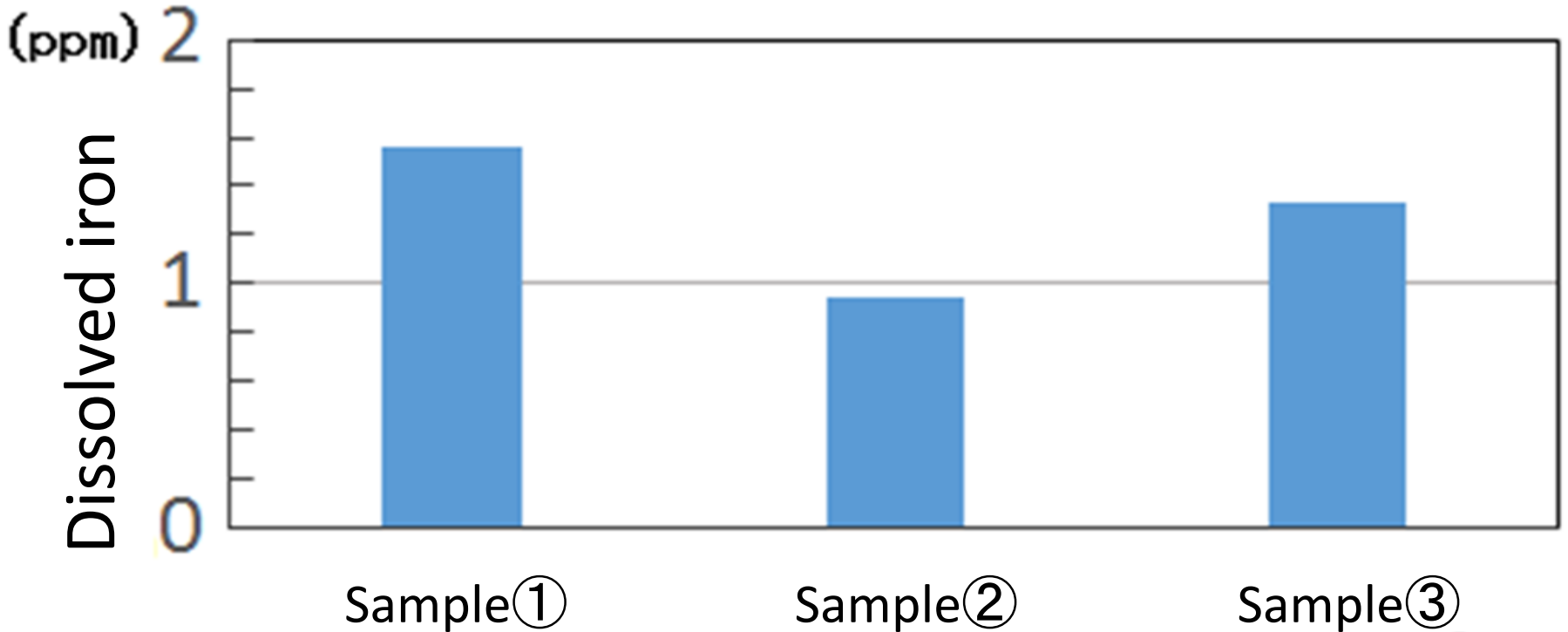
〈Hypothesis〉

Cyanobacteria which lives in freshwater decrease the insoluble iron in seawater.

<Experiment>

Last year's research

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- ① iron + deionized water ② iron + artificial seawater (pH8) ③ iron + artificial seawater (pH8) + cyanobacteria

Substances produced by cyanobacteria form complexes with iron when put into seawater.

<The problem>

The concentration of iron was too high to compare the results with nature.

This year's research

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< Purpose >

To see whether freshwater cyanobacteria also form complexes with iron in their natural environments.

① Measuring dissolved iron
in nature

② Verifying the effects
of cyanobacteria

< Purpose >

To know the dissolved iron levels
in a natural pond

→ How different last year's research
was from nature.

① measuring iron in nature

<Experimental methods>

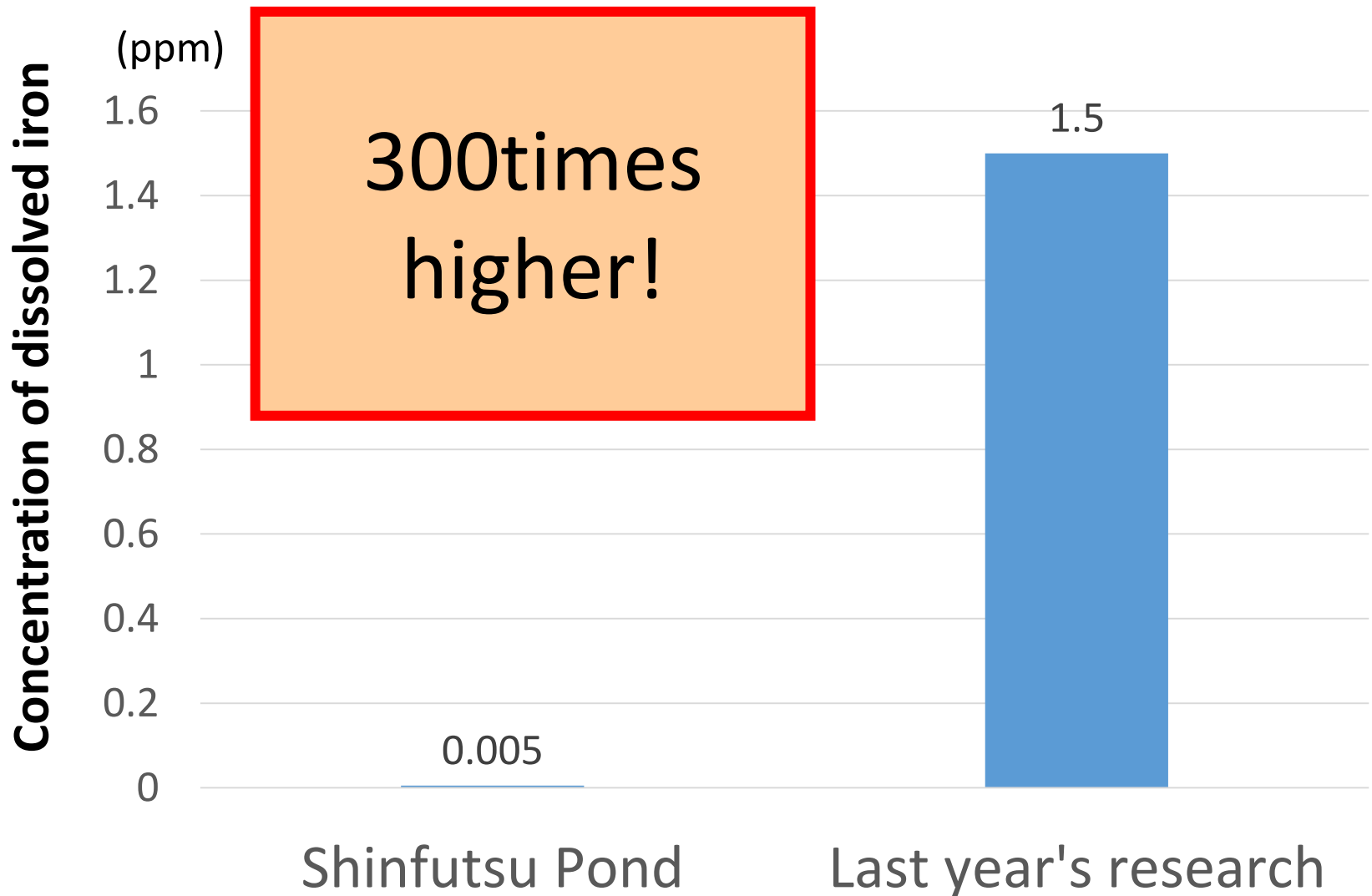
Shinfutsu Pond (Inami town)



<Result>

① measuring iron in nature

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Story of study

① Measuring dissolved iron in nature

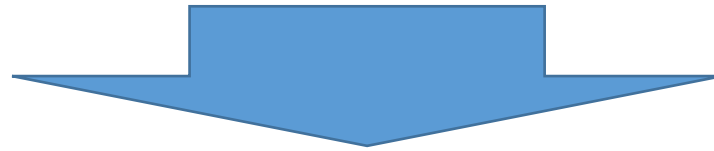
② Verifying the effects of cyanobacteria

< Difference >

	Last year	This year
Iron	1.5ppm	0.005ppm

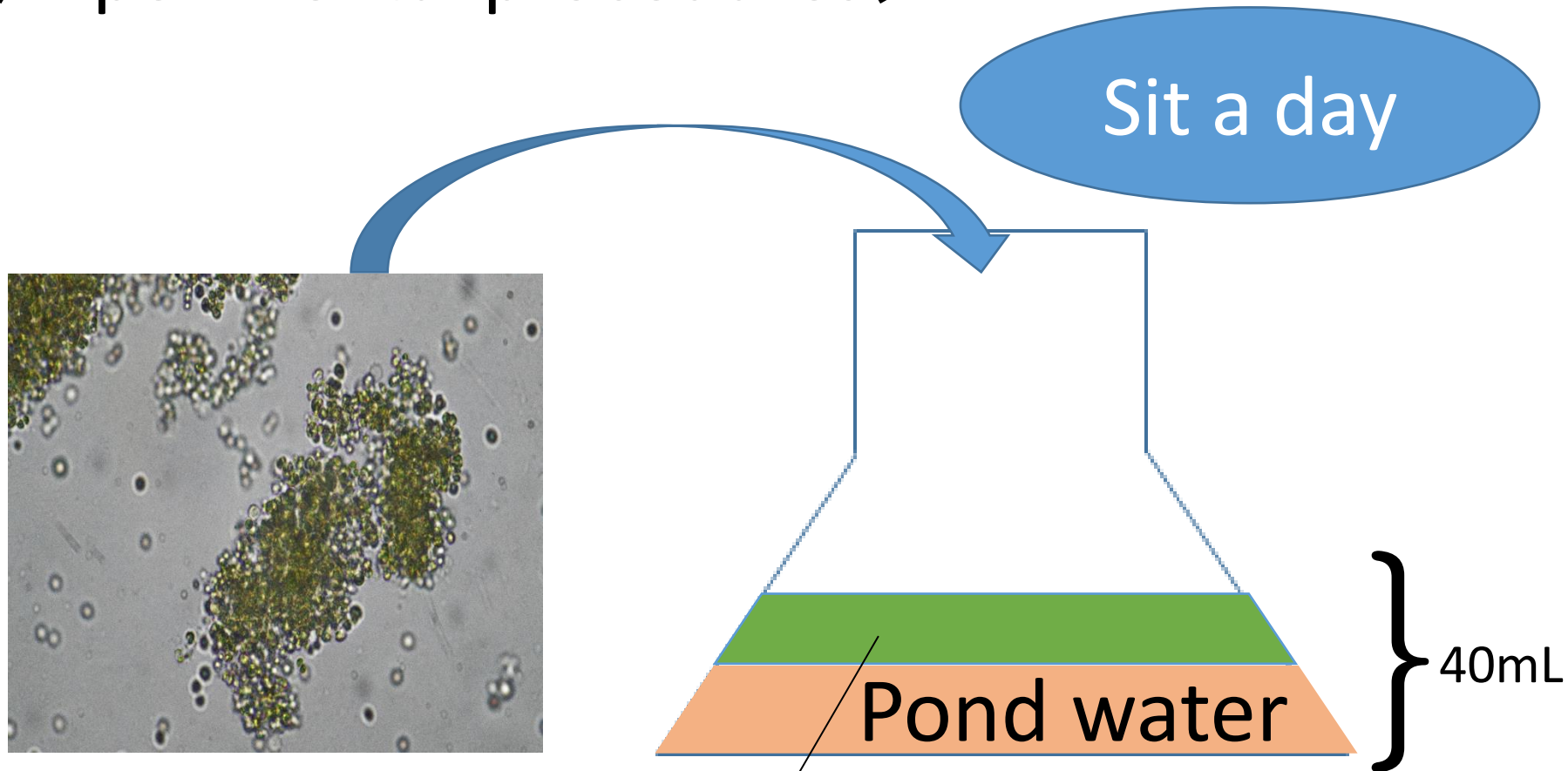
< Check point >

The more cyanobacteria there are, the higher the concentration of dissolved iron is.



They contribute to the concentration of dissolved iron in the seawater.

< Experimental procedures >



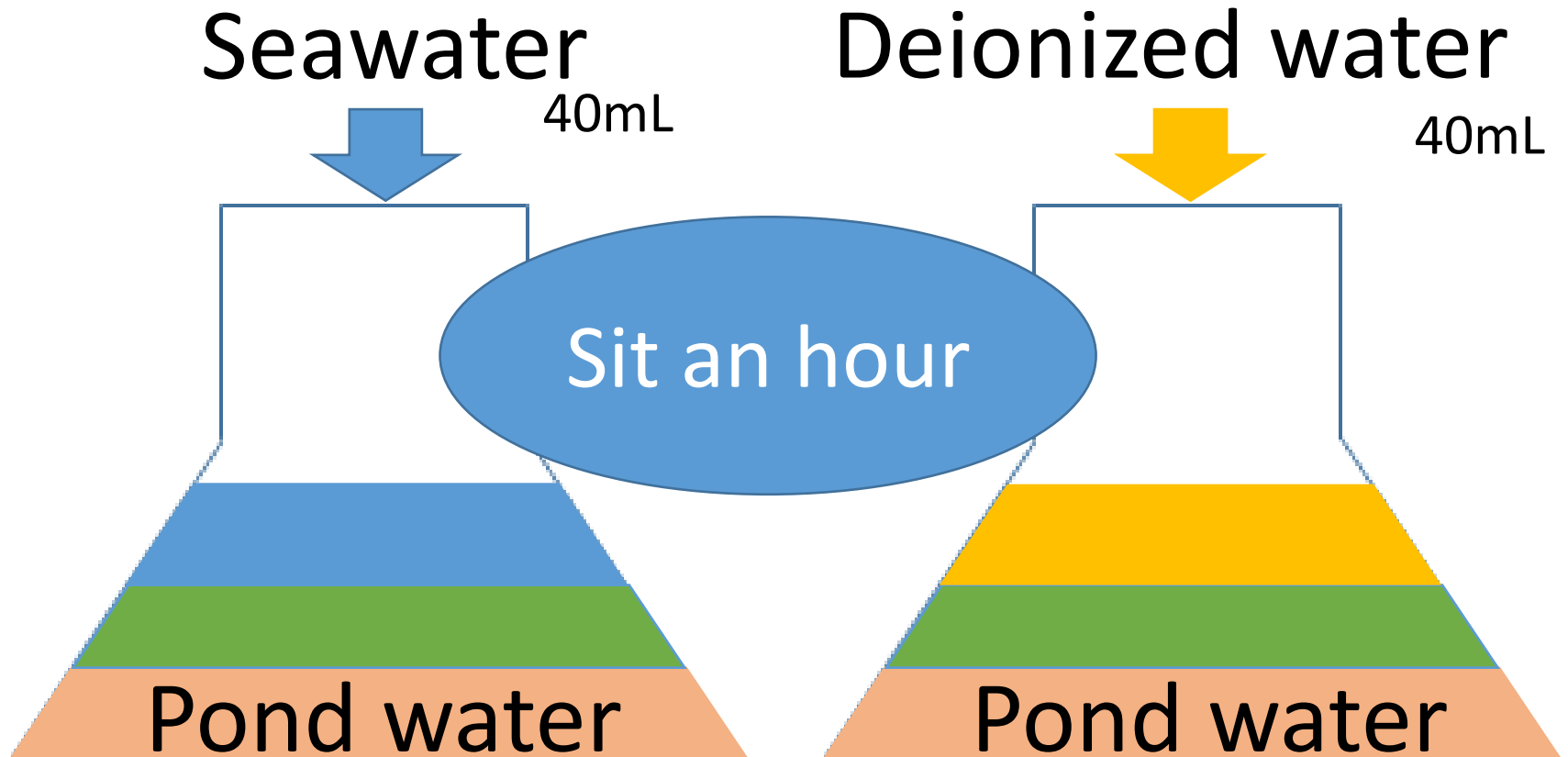
Cyanobacteria + Solution

< Experimental procedures >

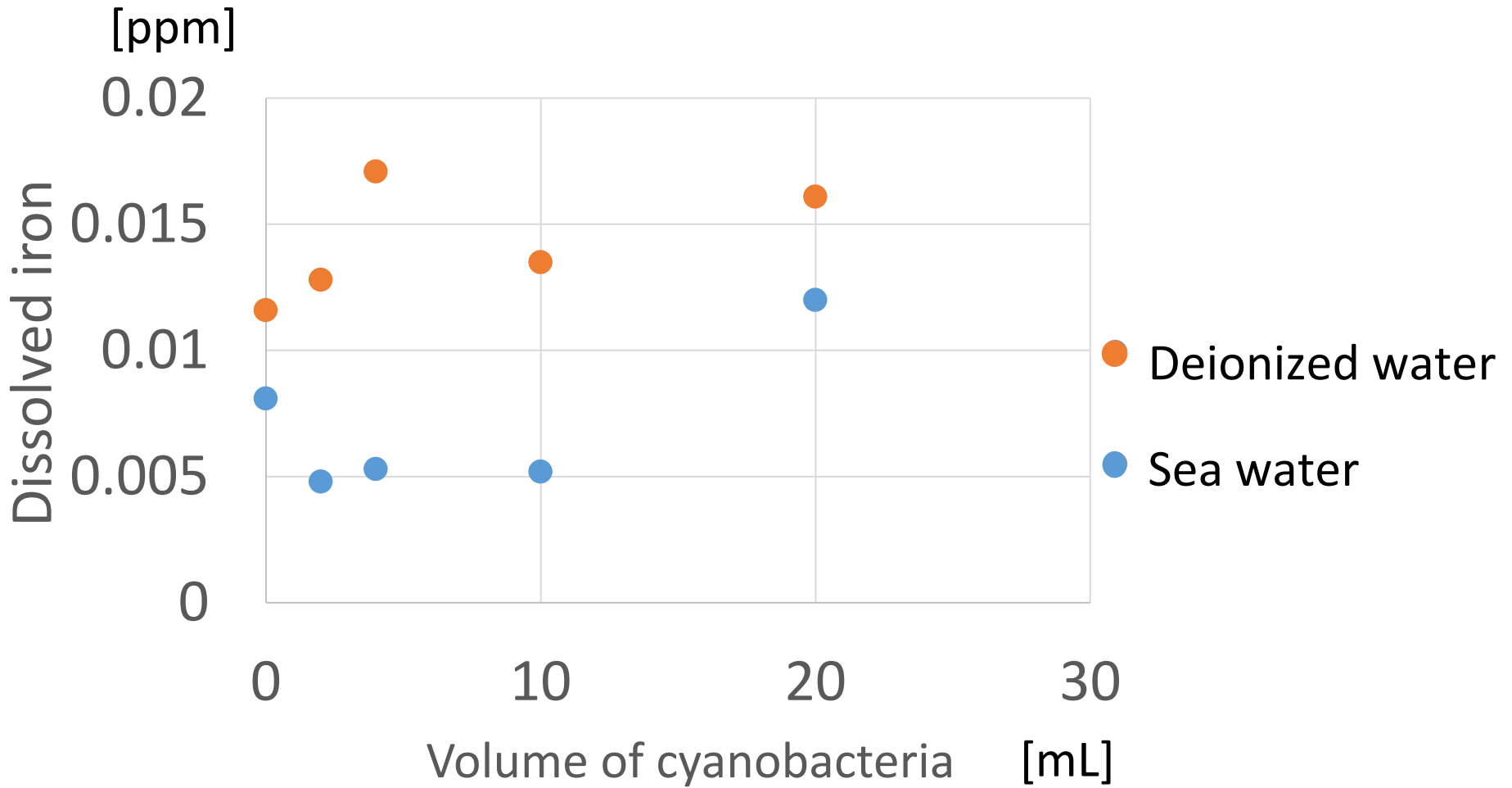


	A	B	C	D	E
The amount of cyanobacteria	No cyano bacteria	20mL	10mL	5mL	2mL

< Experimental procedures >



< Results >



〈Analysis〉

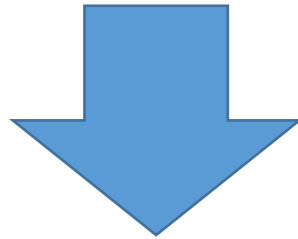
- We could accurately model the natural process of land water carrying dissolved iron to the sea.
- We could not verify the effects of cyanobacteria on this process.

Conclusion

We couldn't conclude that cyanobacteria suppresses the precipitation of iron in nature.

Future prospects

We did experiment only once.



We want to try again and confirm the effects of cyanobacteria.

References

- 1) Masashi Natsuike, Tetsuroh Kikuchi, Lee Ying Ping, Hiroaki Ito, Manabu Fujii, Tihiro Yoshimura, Tohru Watabe. *Iron's scientific forms and available for species in natural water*. vol 3, No.2, pp-197-210.
- 2) Shun Kinoshita, Shuuma Takahashi, Yusuke Tamenori, Ayuka Maeda, Mayuko Yamabata. *A supply of iron dissolved in the sea by Cyanobacteria living in fresh water*. Kakogawa Higashi High School Student's Research Proceedings: vol.11, pp.19-22, 2018.
- 3) Masayuki Watanabe. *Japanese Algae Illustrated Book*. Seibundoshinkohsha, 2007
- 4) National institute of environment, *microbial preserving facility list of Pei-land*, <http://mcc.nies.go.jp/02medium.html>.
- 5) Yosuke Yoshimura. *Measurement of iron with phenanthroline absorbance*. <http://kuchem.kyoto-u.ac.jp/ubung/yyousuke/uebung/chemusb/chemusb2.htm>, 2013.

Thanks

We were helped with our experiments

by **Prof. Fujitake and Prof. Suzuki**

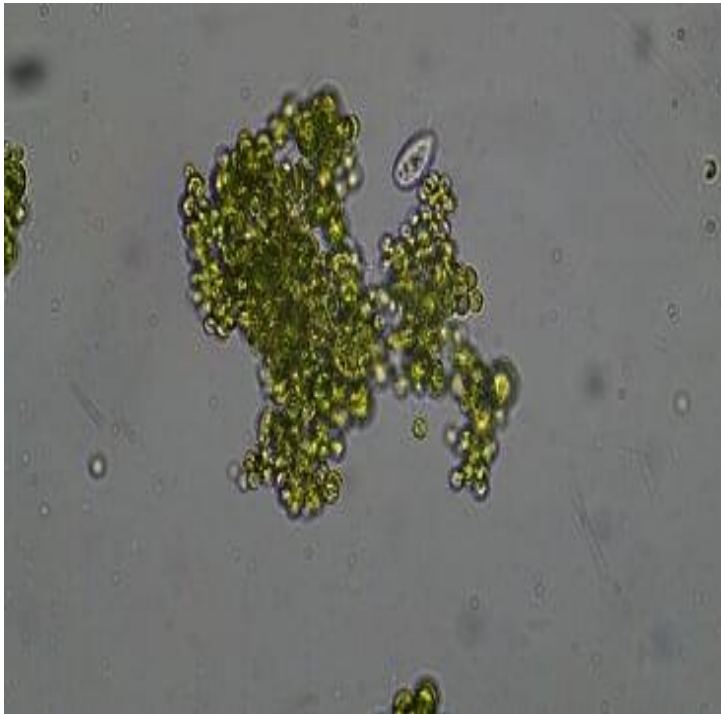
Thank you very much.

Thank you for listening!!

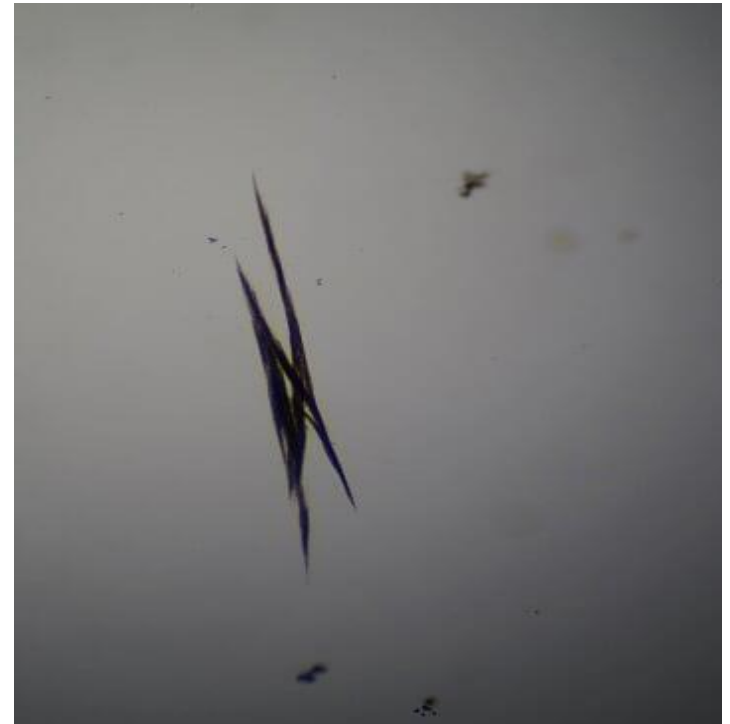




Cyanobacteria



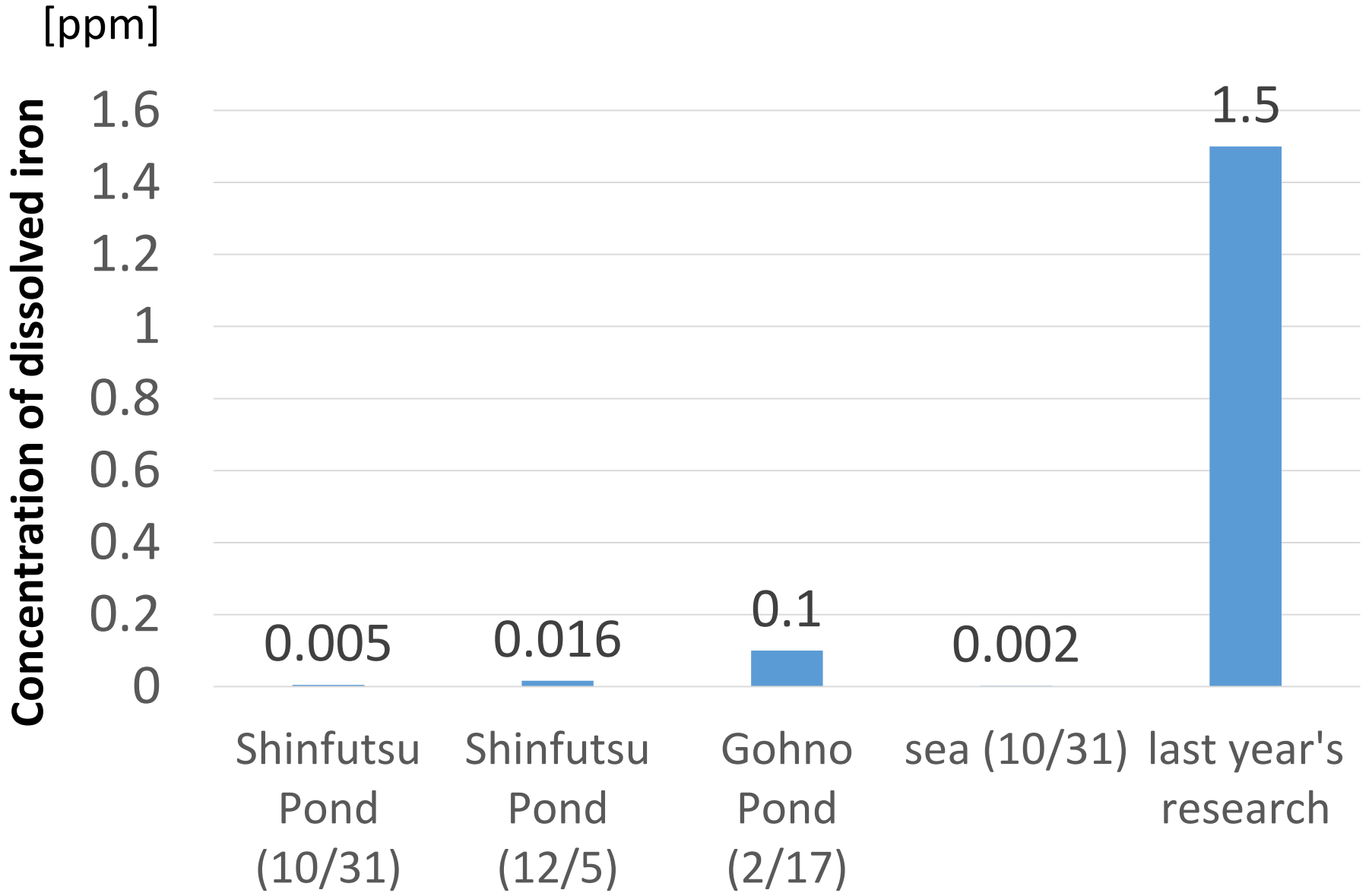
Microcystis (400 times)



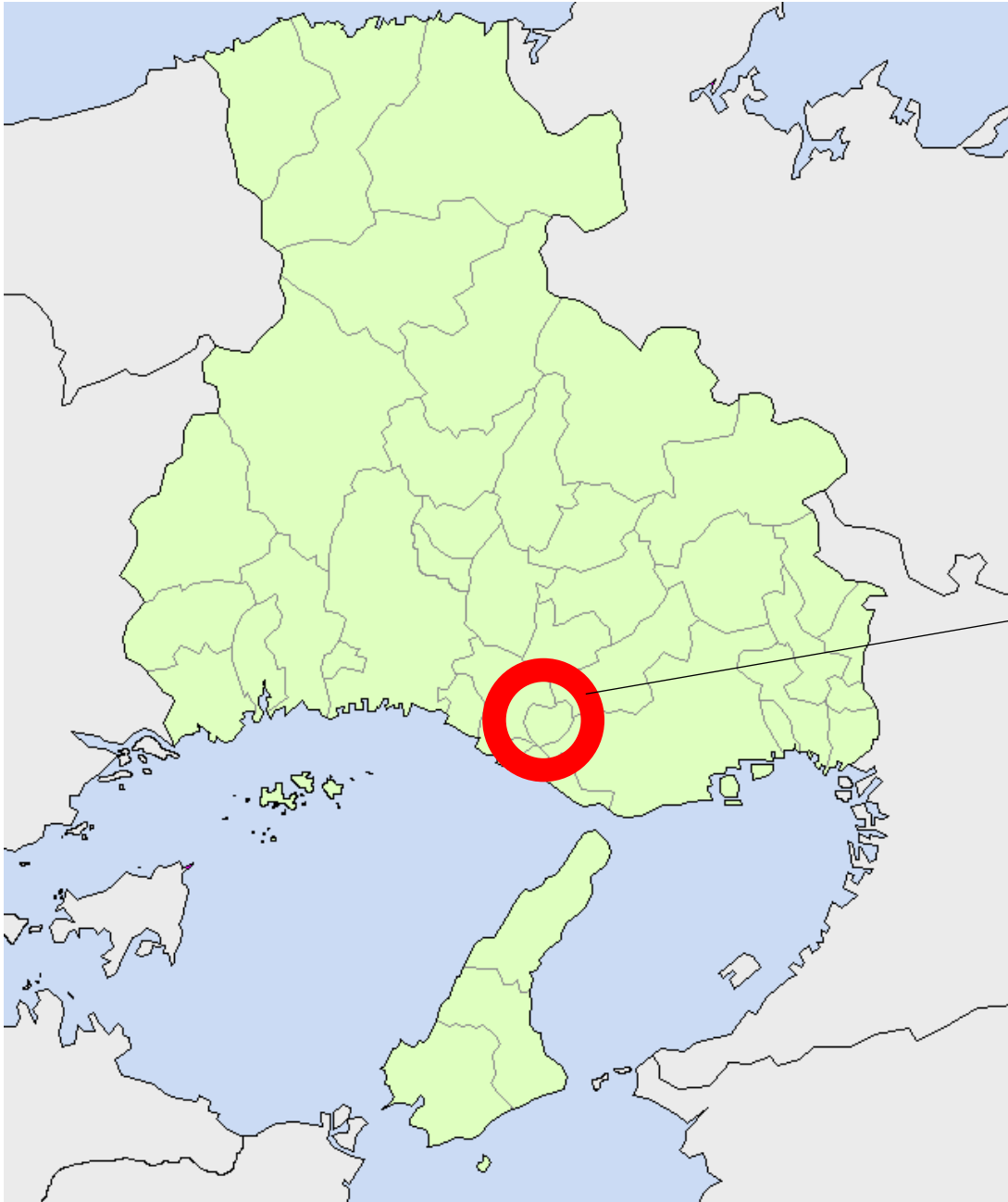
Aphanizomenon (400 times)

① measuring iron in nature

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① measuring iron in nature



Inami
Town

✓ Phenanthroline

Phenanthroline reacts with Fe^{2+}



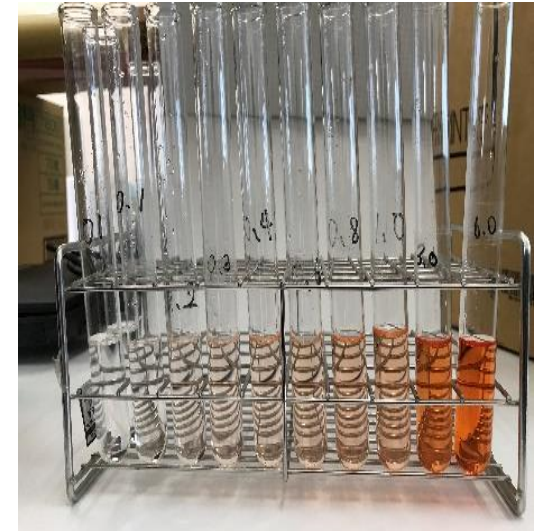
Orange



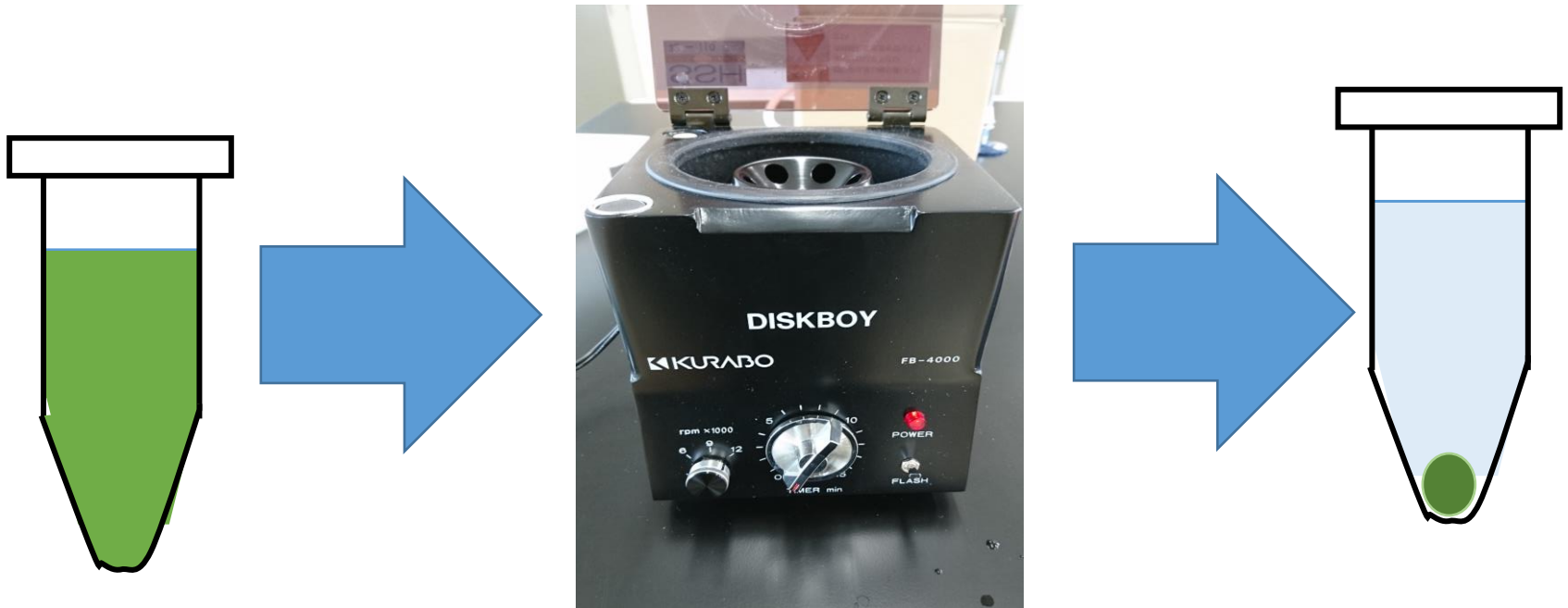
Measure color depth



Get the concentration of Fe^{2+}

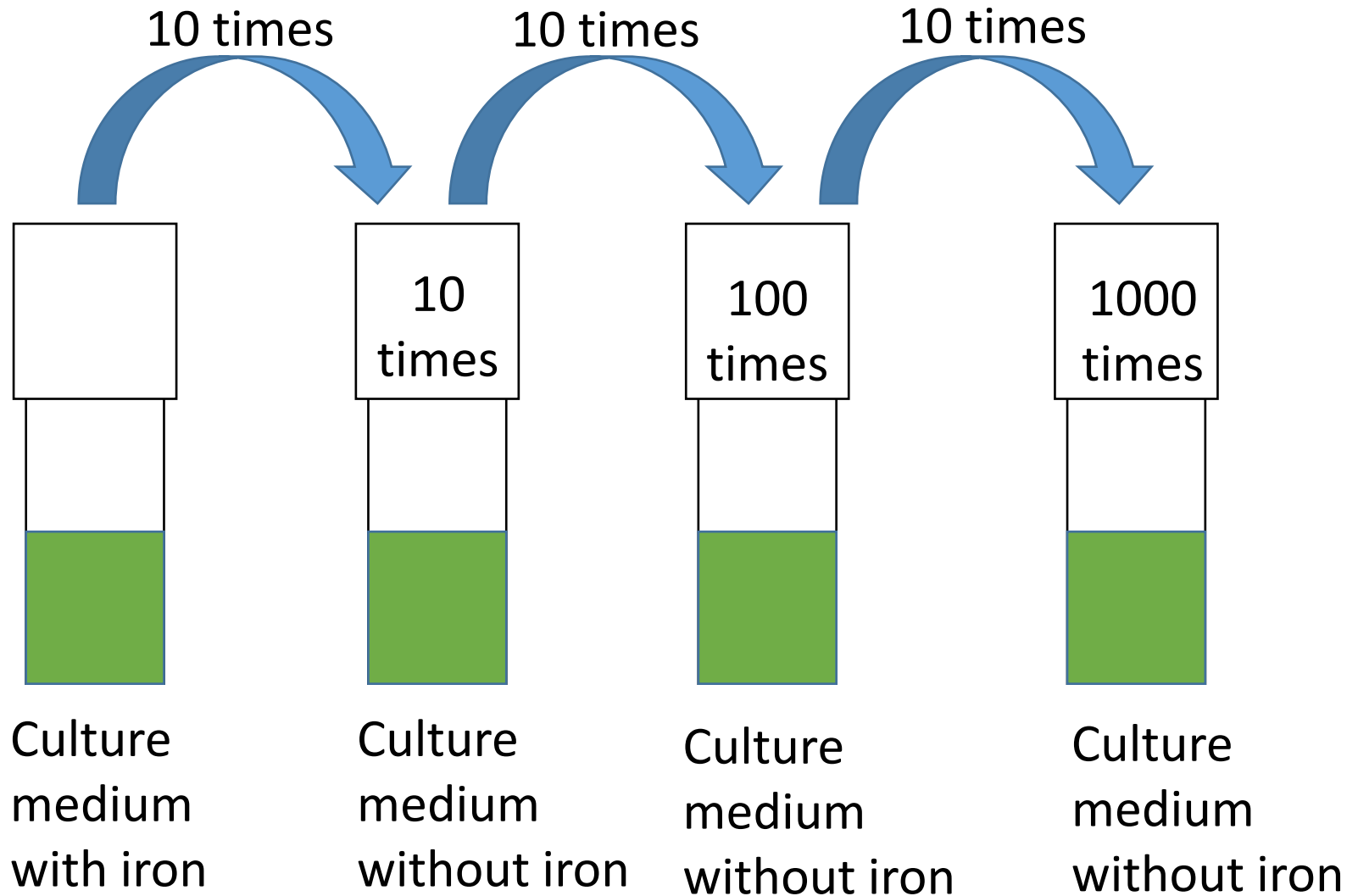


Cyclone separator (6000rpm) (3minutes)





Filtration with sterilization filter



< Difference >

	Last year	This year
Iron	1.5ppm	0.005ppm
Sea water	Artificial	Natural

< Experimental procedures >

ICP-MS (the university of Kobe)

