A microscopic image showing several large, dense, greenish-brown clusters of cyanobacteria. Each cluster is composed of many small, spherical cells. The background is a light gray, showing numerous smaller, individual cells and some faint, elongated structures.

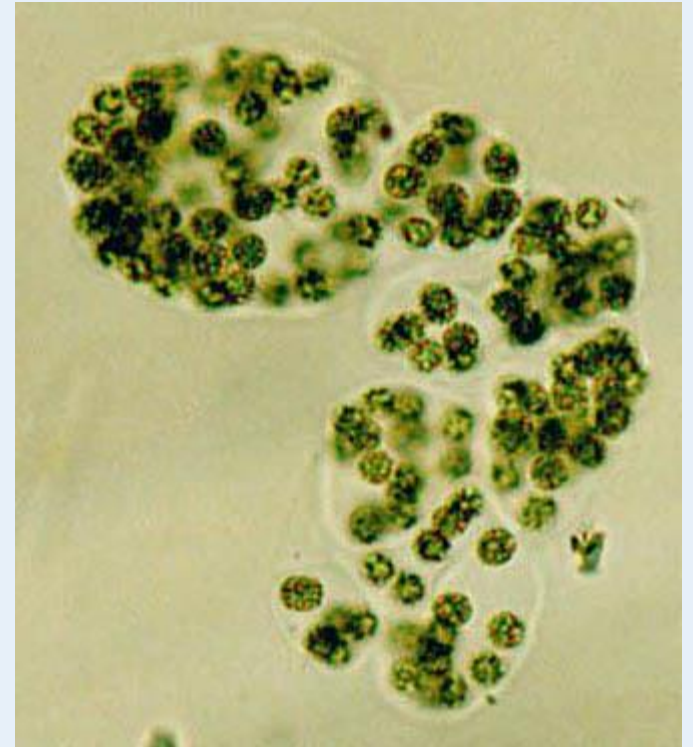
The supply of iron to the sea by fresh water cyanobacteria

Group NO.5

Keyword

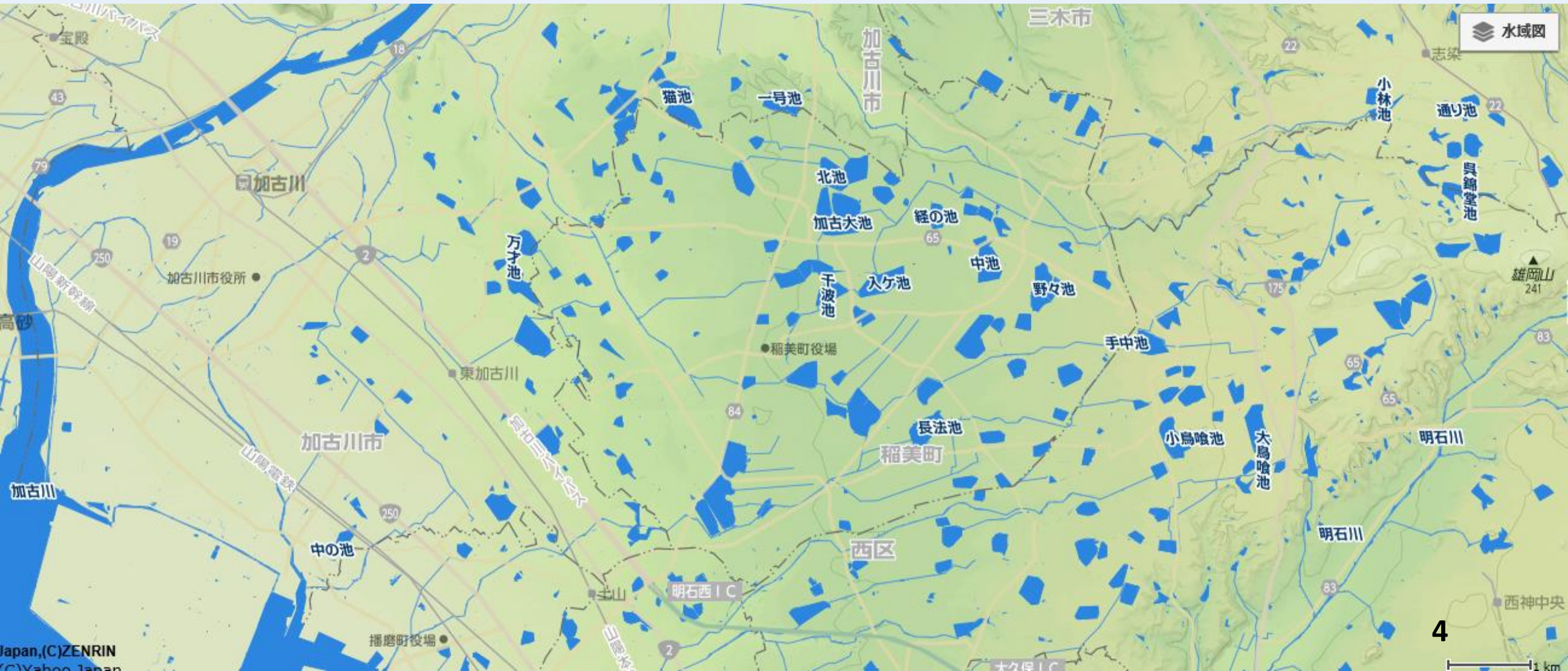
Cyano-bacteria

- prokaryotic organisms which produce energy with sunlight
- have blue-green(cyanic)color



To solve this problem...

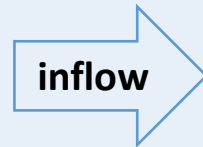
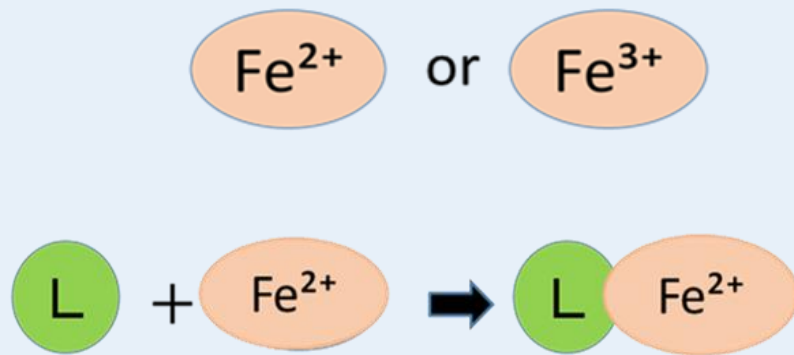
We looked at the many ponds in the Harima area



Mechanism of supplying of iron

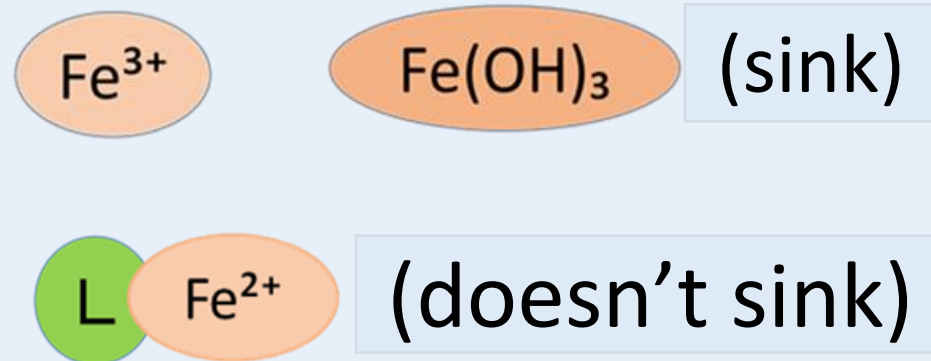
Fresh Water

{supply source of iron}



Sea Water

{weak basic (pH8.0)}



Organisms

CAN'T use

CAN use

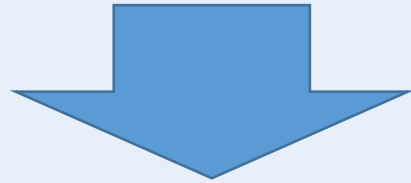


...

Organic ligands which can make a unique complex by combining with iron

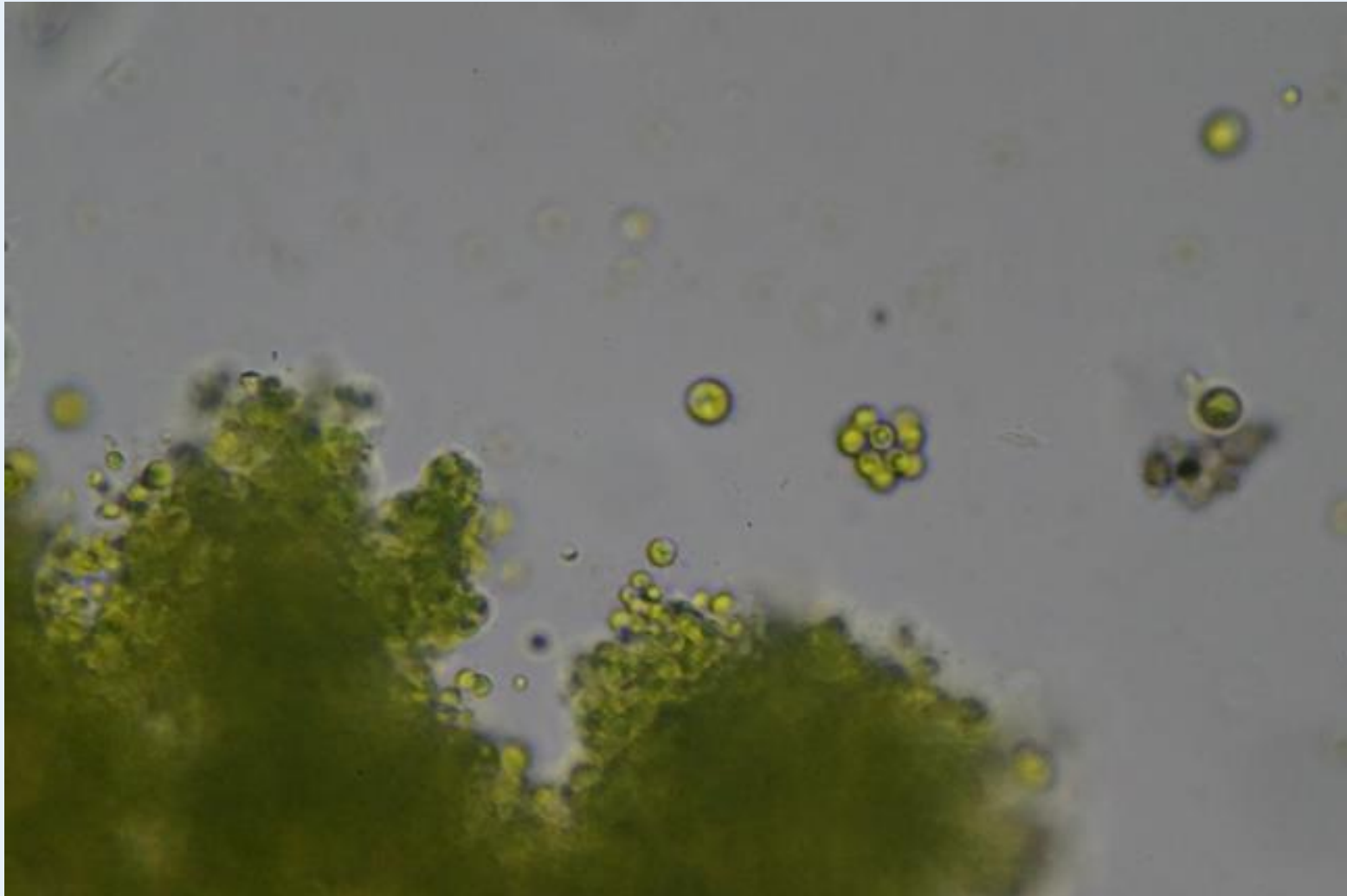
Hypothesis

Bonding between iron and the substances produced by cyano-bacteria



increasing the supply of dissolved iron in the sea

Experiment I Collecting cyano-bacteria



- ① Took water from Simonoike Pond in Inami
- ② Confirmed there was cyano-bacteria with a microscope



③ Grew it in a liquid with Hyponex



Experiment II The extraction of substances



- ① Separate cyano-bacteria and the substances with ultrasound
- ② Centrifuge at very high speeds

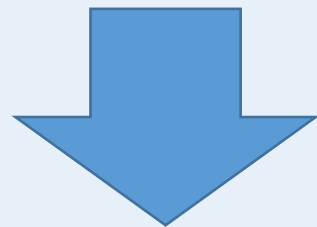


Experiment III Concentration of Iron



Phenanthroline

Makes complexes with
divalent iron



Becomes **brown**



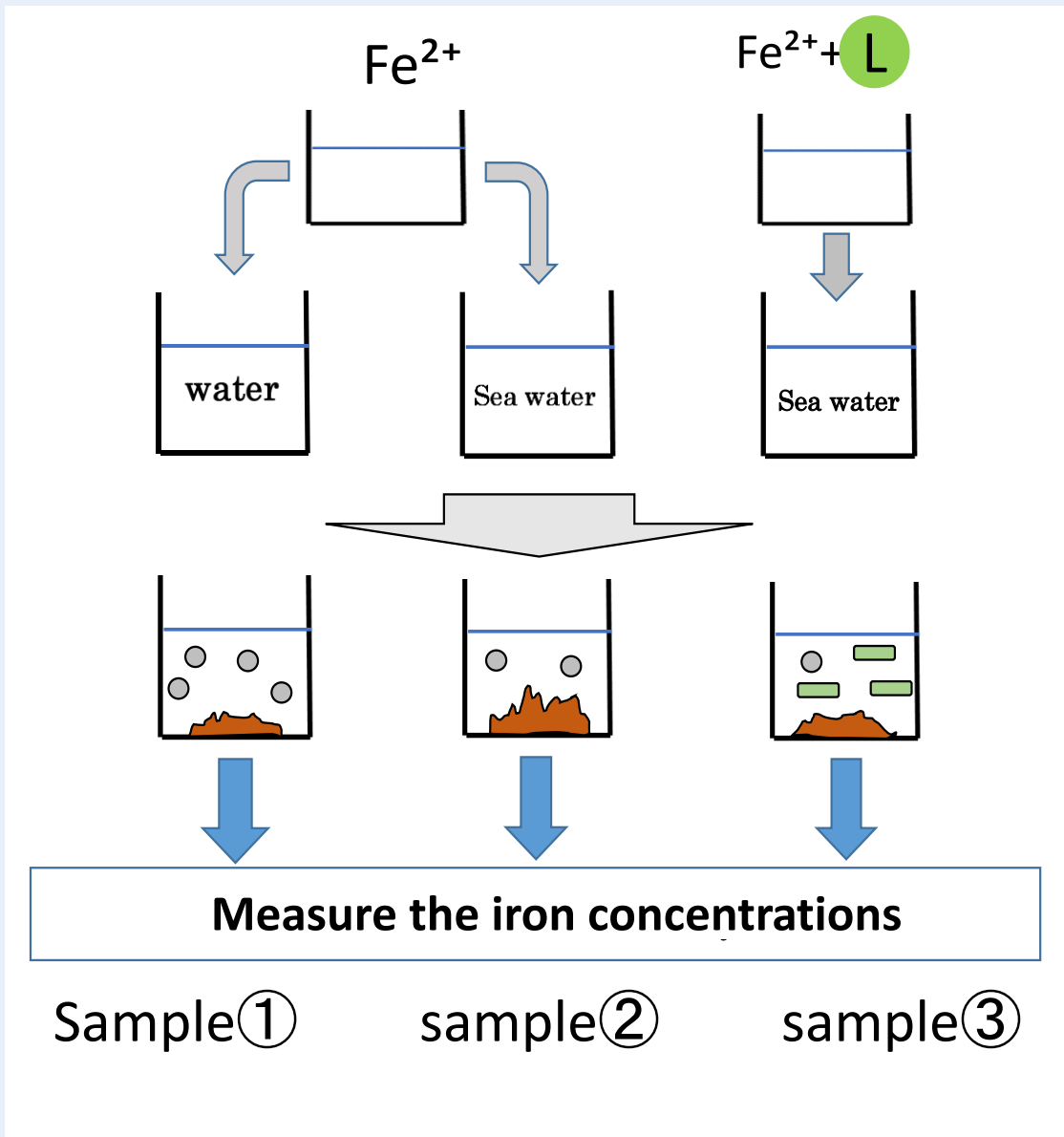
Absorption spectrophotometer



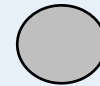
Inspection experiment

- ① Is the amount of dissolved iron
Sea water < fresh water ?
- ② In the sea,
**Do substances produced
by cyano-bacteria allow
iron to be dissolved ?**

Inspection experiment



Substances produced by cyano-bacteria



Fe^{2+}

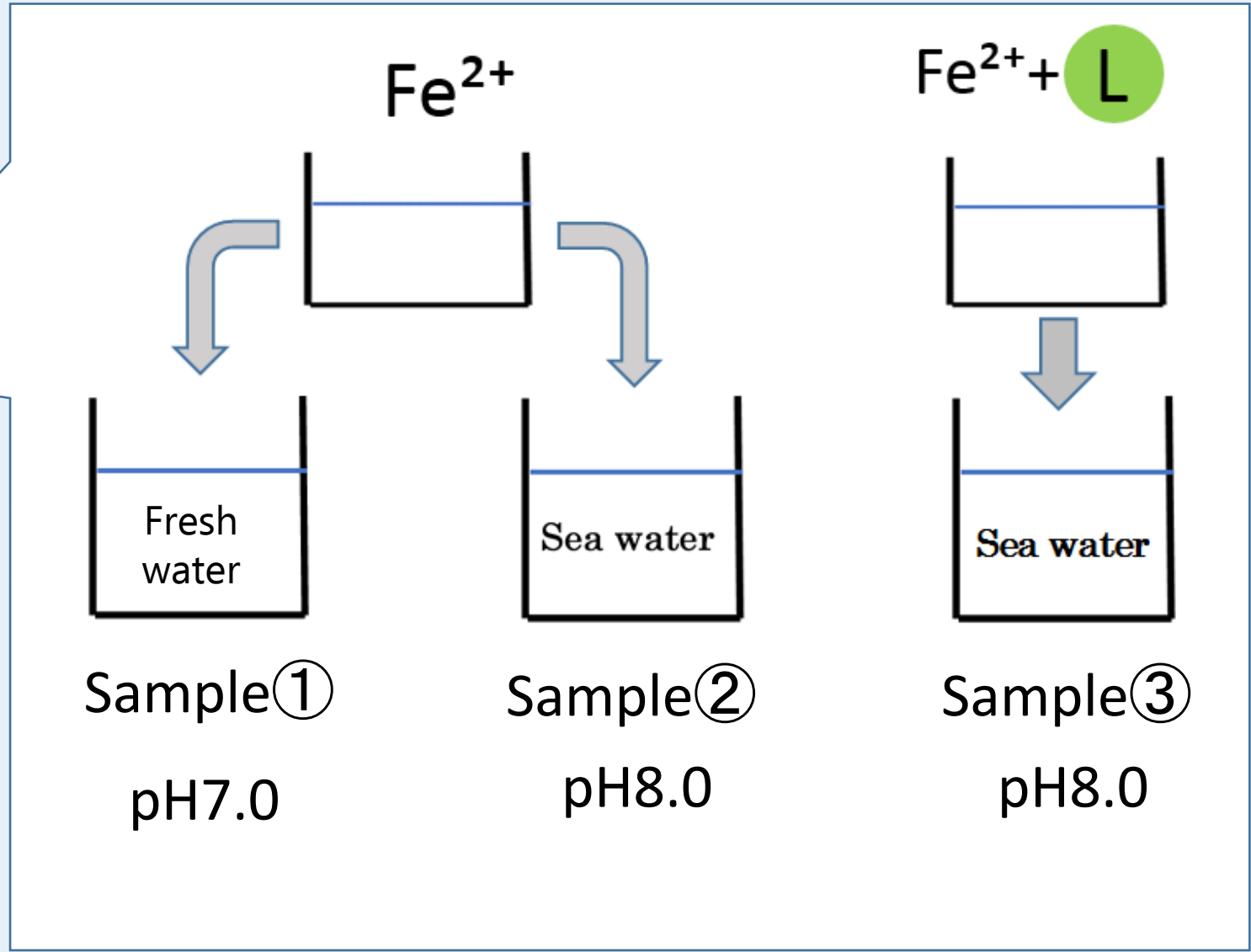
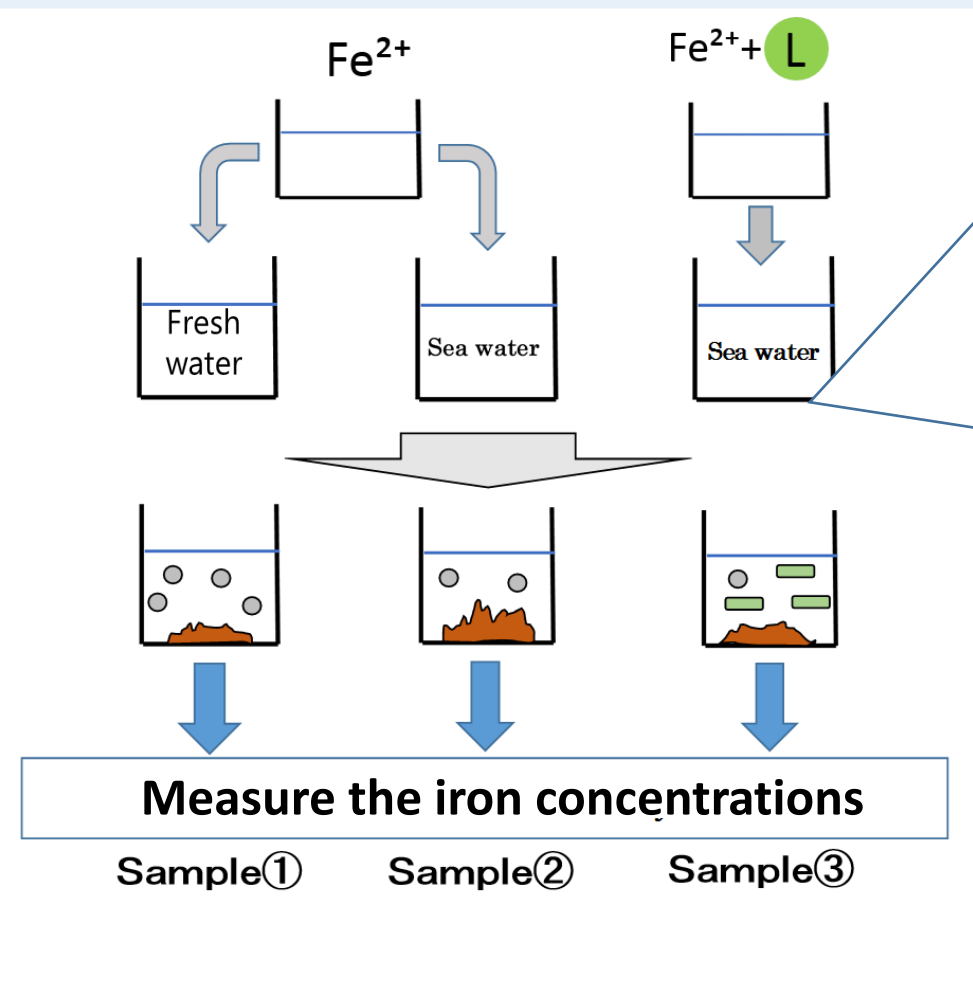


$\text{Fe}(\text{OH})_3$

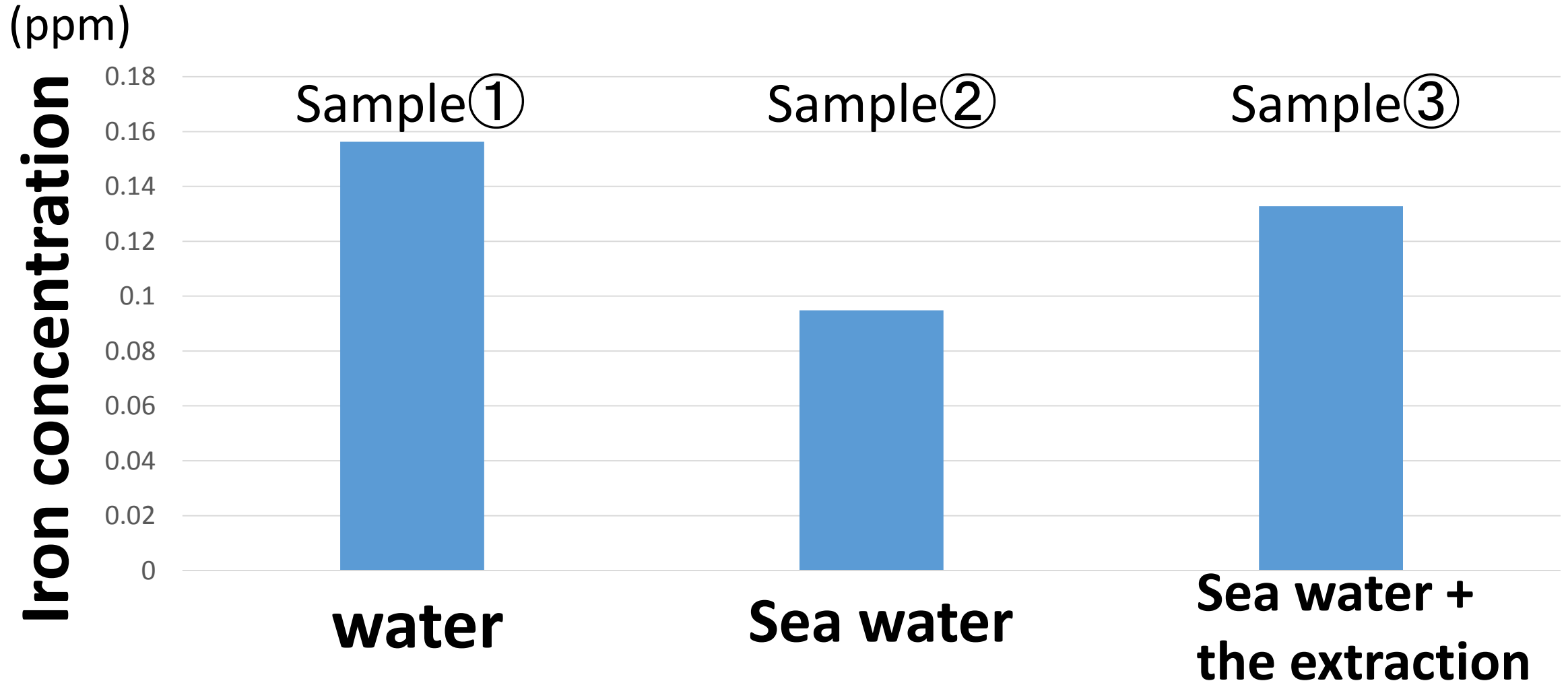


Ligand Fe^{2+} &



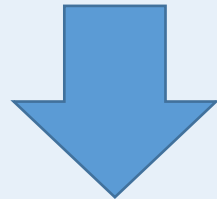


Result Dissolved iron graph



Analysis

Substances combine with iron and
contribute to the supply of dissolved iron



Substances can improve the color of NORI

Future prospective

To investigate the real impacts of the problem in natural environments

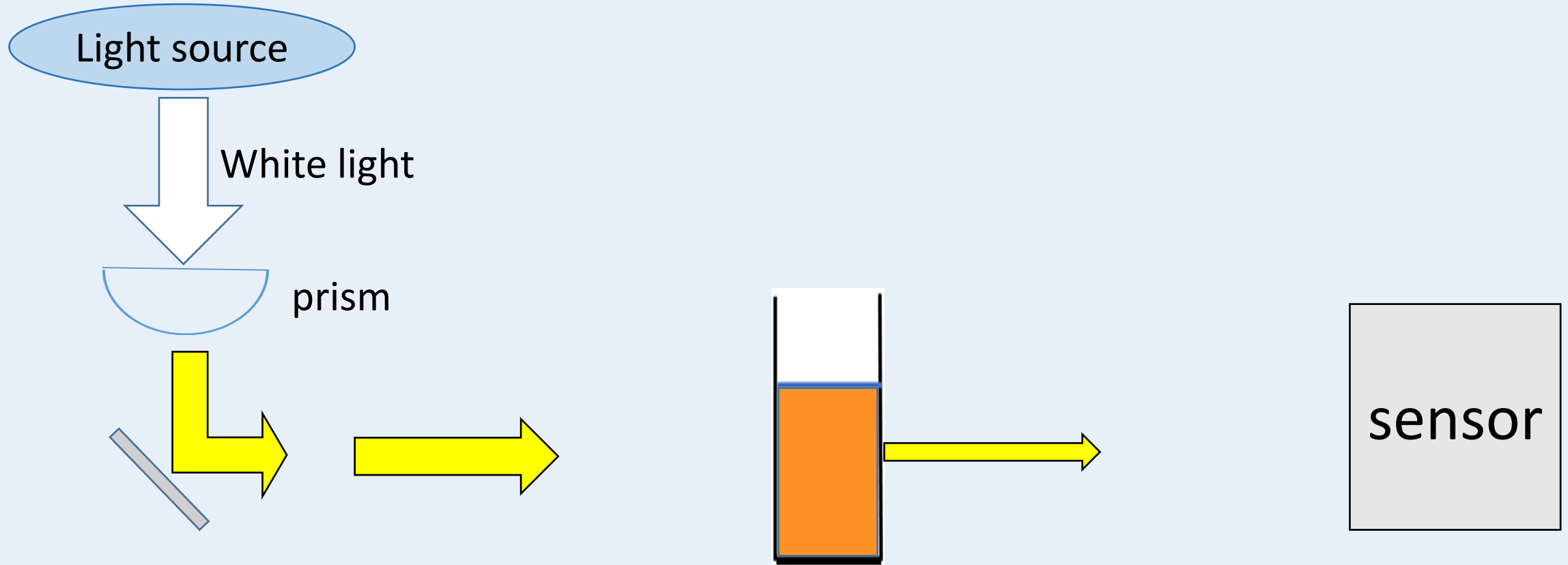
Literature

- 1) Chemical kind of iron and use in natural water, Masafumi Natuike, Journal of Water Environment Society, journal of japan society on Water Environment vol.39、 No.6、 pp.197-210(2016)**
- 2) Fixed quantity of iron by phenanthroline, Yousuke Yoshimura**
- 3) concentration of iron in a drink calculation by an absorption spectrophotometer, Kazuhito Yamada**

A microscopic image showing several clusters of small, green, spherical cells. The cells are arranged in dense, irregular groups of varying sizes. The background is a light gray, and there are some smaller, individual cells scattered around the main clusters. A semi-transparent light blue rectangular box is overlaid in the center of the image, containing the text "Thank you for your kind attention".

Thank you for your kind attention

Spectrophotometer



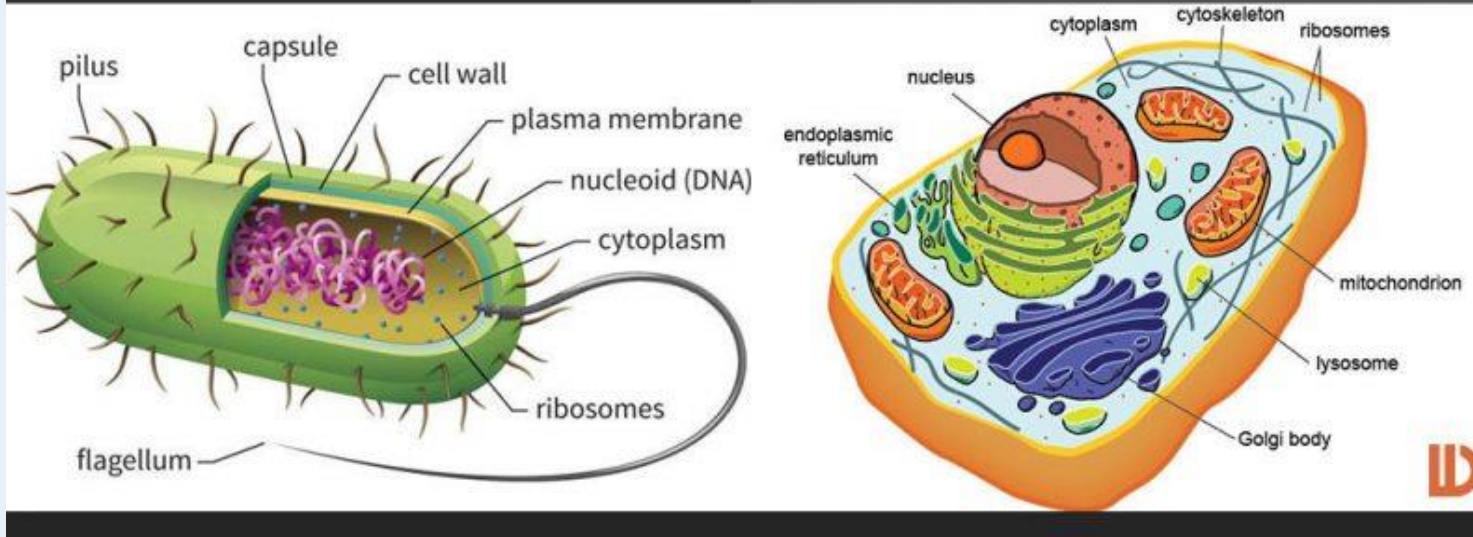
→ : particular wavelength lights

measure the decrease of the lights

PROKARYOTIC CELL

VS

EUKARYOTIC CELL



Prokaryotic organisms

- **DO NOT have** membrane-bound organelles

Ex) bacterias

Eukaryotic organisms

- **Have** membrane-bound organelles, such as the nucleus

Ex) humans, plants