

Relationship between air pollution and amount of antibacterial consistent of lichens

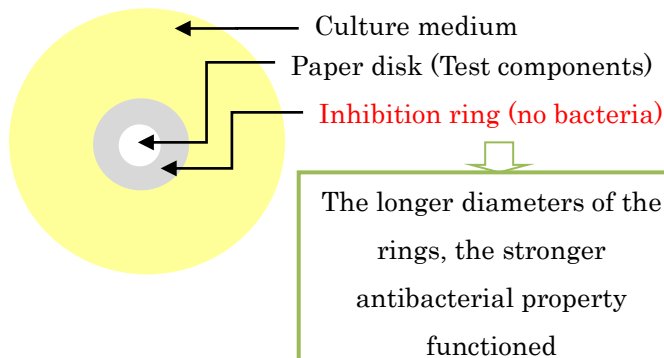
Kobe High school 2nd year

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Background and Purpose

It was confirmed that lichens contain some antibacterial ingredients the year before last, and the identification of it in lichens were held in last year. Also, lichens are treated as environmental index from sensitivity toward the environment. So we assumed that there is a connection between the amount of their antibiotics and air pollution in the habitat. Then we picked them from five different concentration of NO₂ places and experimented based on the size of their inhibition rings. We used *Parmotrema tinctorum*.

Inhibition ring and *Parmotrema tinctorum*



← *Parmotrema tinctorum*.

This lichen lives over a wide area of Japan. There are particular on older cherries or pines.

Pre-experiment

We investigated sensitivity of test bacteria (*Bacillus subtilis*, *Micrococcus luteus*) .

Bacteria	<i>B. subtilis</i>	<i>M. luteus</i>
Diameter(mm)	25.2	28.0

As a result, we come to use *M. luteus*.

Experiment · Method

1. We picked lichens from 5 places of which the atmospheric pollution level are different one after another, Ashiya, Kobe City Kitaku, Shukugawa, Sakura tunnel and Mt. Maya.
2. We made lichens dried and blended them with extracting agent (Ethylacetate:Ethanol=1:1) at a rate of 10mg:1ml and left it for 3 days. And we regarded it as extraction liquid.
3. We put extraction liquid on the paper discs and put them on the center of the culture mediums. And left them for a day.
4. We measured the diameters of inhibition rings and considered the relationship between concentration of NO₂ and the antibacterial property of lichens, with between concentration of NO₂.

Experiment · Result

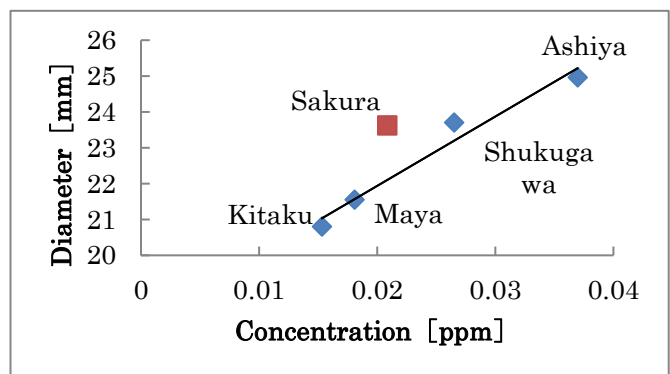
Diameter of inhibition ring (n=12)

Place	Ashiya	Shukugawa	Sakura	Kitaku	Maya
Diameter (mm)	25.0	23.7	23.6	21.6	20.8

Concentration of NO₂(ppb)

Place	Ashiya	Shukugawa	Sakura	Kitaku	Maya
Concentration (ppb)	37.0	26.5	20.8	18.1	15.3

Consideration



We could find a correlation in 4 places excluding Sakura tunnel.

Sakura tunnel doesn't have a correlation because there is a gap of environment between point we collected the lichens and measurement point of NO₂ concentration.

Future prospects

- Inspection by other substances which cause air pollution (SO₂, NO, SPM etc)
- Collection of lichens at points which are near the measurement points of NO₂ concentration
- Identification of ingredients which show antibacterial properties by HPLC

References

- ・山本好和 地衣類初級編 第2版 三恵社
- ・山本好和 近畿の地衣類 三恵社