

Form B-5

Date (日付)
2012 年 02 月 28 日

Activity Report -Science Dialogue Program-
(サイエンス・ダイアログ事業 実施報告書)

- Fellow's name (講師氏名):Kulichikhin Konstantin (ID No. P11082)
- Participating school (学校名) Aichi Prefectural Kasugai High School, Kasugai city, Aichi Prefecture
- Date (実施日時): 2012 年 02 月 20 日
- Lecture title (講演題目):(in English) Modern methods of biochemical analysis in plant science
(in Japanese) 植物科学における生化学的解析の最新手法

- Lecture summary (講演概要): Please summary your lecture 200-500 words.

First part (50 min, oral presentation: review of the project and the methods we are going to apply).

Global task of science for today is to provide World population with adequate resources of food, fresh water, and energy. Plant physiology, biochemistry and molecular biology are scientific basis of agriculture. The task of plant science is to provide knowledge for agriculture to maximize the productivity of plants.

Environmental stresses can substantially decrease plant productivity. Submergence and flooding stress is one of the most important factor affecting agriculture all around the World. Almost all plants can respond to flooding by formation of aerenhyma from shoot to root to provide adequate oxygen supply to flooded roots. Tolerant species develops the barrier to radial oxygen loss (ROL barrier) in periferial layers of root tissues. The barrier prevent radial difusion of oxygen from the root to anaerobic soil and together with aerenhyma provides oxygen to root tips allowing further growth and nutrient uptake under anoxic condition. The mechanism of ROL barrier formation is not completely understood at the moment. The task of our project is biochemical analysis of barrier formation. ROL barrier is suberin deposition in outer part of root, this is why we are planning to analyse suberin precursors in different root tissues at different stages of ROL barrier formation.

A review of three methods we are going to apply for sample preparation and analysis – laser microdissection (LMD), nuclear magnetic resonance spectroscopy (NMR), and chromatography – has been provided. The principle of each method, as well as the history of discovering of NMR and chromatography have been reviewed.

Second part (50 min, demonstration experiment: Paper chromatography of plant pigments).

Paper chromatography of pigments extracted from marple leaves at different stages of senescence was performed. In autumn, marple leaves change the color from green to yellow, and then to red. Leaves of different color (green, yellowish green, yellow, red) were collected, and pigments were extracted with ethanol:acetone:water (6:3:1) mixture. The extracts has been

applied to the chromatographic paper by the students. Chromatographic separation has been performed using petroleum ether:acetone (9:1) mixture as chromatographic solvent. Six separate spots were found on chromatogram of green leaves extract (carotene, pheophytine, xanthophyll, chlorophyll a and b, and antocyanine). The amount of pheophytine and both chlorophylls was substantially lower in yellowish green leaves, whereas antocyanin amount increased slightly. Chlorophylls and pheophytine disappeared completely in yellow leaves, but substantial amount of yellow pigments carotene and xanthophyll was still present together with a little quantity of antocyanine. In red leaves, substantial accumulation of antocyanin accompanied with the decrease in carotene and xanthophyll was found. Change in leaves color was discussed in terms of degradation/accumulation of different fractions of pigments. Students also characterised each spot of chromatogram by calculating R_f value.

After the lecture we got the feedback from the students.

- Language used (使用言語): *English, with the summary made by interpreter in Japanese.*

- Lecture format (講演形式):

◆Lecture time (講演時間) *100 min (lecture+demonstration) (分),*

Q&A time (質疑応答時間) *10-15 min (分)*

◆Lecture style (ex.: used projector, conducted experiments)

(講演方法 (例: プロジェクター使用による講演、実験・実習の有無など))

Projector has been used for the first part of the lecture, demonstration experiment has been conducted at the second part of the presentation

◆ Interpretation (ex.: assistance by accompanied person, provided Japanese explanation by yourself) (通訳 (例: 同行者によるサポート、講師本人による日本語説明))

Interpretation has been provided by accompanied person

◆Name and title of accompanied person (同行者 職・氏名)

Professor Nakazono Mikio, Nagoya University

◆Other note worthy information (その他特筆すべき事項):

- Impressions and opinions from accompanied person (同行者の方から、本事業に対する意見・感想等がありましたら、お願いいたします。): 本サイエンスダイアログ事業は、高校生が科学の最先端で研究をしている外国人研究者と交流する非常に貴重な機会であると思います。受講した高校生の感想文を読むと、良い刺激を受けた生徒が多く、概ねポジティブな感想でした。したがって、これからもこの事業を継続していただきたいと思います。