

Form B-2
(FY2022)
Must be typed

Date (日付)
25/10/2022 (Date/Month/Year: 日/月/年)

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): Ping Kao (ID No. P21379)

- Name and title of the lecture assistant (講義補助者の職・氏名)

- Participating school (学校名): Kamaishi High School

- Date (実施日時): 21/10/2022 (Date/Month/Year: 日/月/年)

- Lecture title (講義題目):
Plant Biology and Developmental Dynamics

- Lecture format (講義形式):

◆ Onsite ・ Online (Please choose one.) (対面 ・ オンライン (どちらか選択ください。)

◆ Lecture time (講義時間) 85 min (分), Q&A time (質疑応答時間) 15 min (分)

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

(講義方法 (例: プロジェクター使用による講義、実験・実習の有無など))

Slide presentaiton with a projector, and observation on the plants I brought

- Lecture summary (講義概要): Please summarize your lecture within 200-500 words.

Plants have been tightly connected to human civilization since the beginning of history. Learning more about plants will eventually benefit the welfare of mankind in terms of food, energy, medicatio, materials etc.. In Dr. Udea's group at Tohoku University, we study the reproduction of flowering plants, or more specifically focusing on the embryogenesis in model organism *Arabidopsis thaliana* (*Arabidopsis*). In *Arabidopsis*, the fertilized eggs, or zygotes, follow a series of asymmetric and symmetric cell divisions, forming stereotypic cell patterns, specifying cell identities and eventually forming complex embryos that can grow into new plants after germination. One of our reseach goal is to understand how the complexity is created and specified during embryogenesis. I presented two of our published works as examples. In the first example, we developed a live-cell imaging system and utilized it to observed the cytoskeleton dynamics in the developing zygotes. Cytoskeletons include microtubules and microfilaments, and they are related to cell shape formation and intracellular transportation, both of which are important for establishing polarity in cells. We showed that the two cytoskeletons have different patterns in developing zygotes and the inhibitor experiments suggested that they served different

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functions in developing zygotes. In the second example, we adapted a single cell RNA sequencing (scRNA-seq) system on developing embryos to assess the pattern formation mechanisms globally. We overcame the technical difficulties presented in Arabidopsis embryos, constructed the first ever cell-type specific transcriptomes for Arabidopsis embryos, and discovered some cell-type specific features and functions. This greatly improved our ability to reveal the regulatory networks in developing embryos. With these examples, I showed how we can conduct focused studies, such as tracing the spatial-temporal dynamics of a single gene, as well as extended studies, such as analyzing cell-type specific transcriptomes and assessing gene networks globally.

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

The school buildings and students were impressive. The students were kind of shy but I guess that's normal, but it's good to know that the students do their own scientific projects at school. The teachers and the vice principal I met were very kind and friendly. Also, the scenery in the Kamaishi area was great.

- Impressions and comments from the lecture assistant (講義補助者の方から、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。):