Web 掲載用

SD4681

※弊会記入欄

様式 A-1
(FY2025)

2025 年　11 月　　日

サイエンス・ダイアログ　実施報告書

1. 学校名:　　広島県立広島国泰寺高等学校

2. 講師氏名:　　広島大学大学院統合生命科学研究科 Dr. Philipp Schlarmann
   講義補助者氏名: 広島大学大学院統合生命科学研究科博士課程2年 花岡 和樹

3. 実施日時:　　2025 年　11 月　14 日 （金）　　13:40 ～ 15:30

4. 参加生徒:　　2 年生 77 人、　　年生　　人、　　年生　　人 （合計　　人）
   備考:（例:普通科理数コースの生徒）

5. 講義題目: Learning How Cells Work by Changing their Genes

6. 講義概要:

This lecture explains the fundamental research approaches used to elucidate protein function. It will cover the principles and applications of gene deletion as a primary method for determining the function of diverse cellular proteins. This technique involves manipulating a specific gene to prevent protein production, allowing for the analysis of the resulting cellular changes. The lecture will also discuss the reasons yeast is widely used as a model organism, noting its high similarity to human cells and the ease of its genetic manipulation. The research process using gene deletion strains will be detailed, covering several specific experimental techniques. These include:

・Creation of gene deletion strains: A technique where a selection marker (amplified by PCR) replaces the target gene through homologous recombination.

・Selection: The process of isolating cells in which the gene replacement has successfully occurred by growing them under specific conditions.

・Genetic analysis: The creation of new genotypes using yeast mating and the use of PCR for genotyping (verifying the genetic makeup).

・Experimental analysis: The principles and practical application of agarose gel electrophoresis for analyzing the size of DNA fragments.

7. 講義形式:
   ☑対面 ・ □オンライン （どちらか選択ください。）
   1) 講義時間　　90 分　　質疑応答時間　　10 分
   2) 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）
      プロジェクター使用による講義 実験あり（アガロースゲル電気泳動） 適宜動画も視聴
   3) 事前学習
      有 ・ 無 （どちらかに〇をしてください。）
      使用教材　　講師の先生から事前にいただいた研究の概要・キーワードリスト，学校作成のスプレッドシート

8. その他特筆すべき事項:
   特にありません。英語の苦手な生徒でも興味を持って学んでいました。貴重な機会をいただきありがとうございました。

SD4681

Form B-2
(FY2025)
Must be typed

Date（日付）2025/11/25
（Date/Month/Year：日/月/年）

Activity Report -Science Dialogue Program-

（サイエンス・ダイアログ 実施報告書）

- Fellow's name（講師氏名）: Philipp Christoph Joseph Schlarmann
（ID No. P25102 ）

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

- Participating school（学校名）: Hiroshima Kokutaiji High School 広島県立広島国泰寺高等学校

- Date（実施日時）: 14.11.2025
（Date/Month/Year:日/月/年）

- Lecture title（講義題目）:
Learning How Cells Work by Changing Their Genes

- 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） 75 min（分）, Q&A time（質疑応答時間） 10 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））
10min interactive quiz; 45 min powerpoint presentation; 20min experiment (agarose gel electrophoresis)

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

Learning How Cells Work by Changing Their Genes
Presentation by Dr. Philipp Schlarmann – Hiroshima University

Human cells can produce about 20,000 different proteins, each having a unique function — such as breaking down nutrients or replicating DNA — and a unique form, with a size of only a few nanometers. This small size is one of the biggest hurdles in studying what a protein does. However, there is one quite easy way to study the function of a protein: to take away the gene that encodes the protein of interest. Without the gene, the cell can no longer produce the protein. The effects of this so-called gene deletion can then be analyzed and can give us clues about the protein's function.

In my talk, I showed how a scientific discovery is made using gene deletion in yeast cells — from creating a deletion strain to testing its effects. A main focus of the talk was to explain the method of polymerase chain reaction (PCR), which is necessary in two steps for gene deletion: to produce a DNA sequence of a selection marker, which replaces the target gene and thereby deletes it, and to produce a colony PCR product that can confirm whether a deletion was successful when subjected to agarose gel electrophoresis.

We brought tubes containing colony PCR products of different strains with us, and the students who performed best in the introductory quiz were asked to perform agarose gel electrophoresis, which separates the DNA pieces by size. By staining the DNA, the students were able to see the DNA PCR products with their own eyes and were able to conclude, based on the size of the DNA, which gene deletion was successful. At the end, we did a Q and A session and discussed among other things, how DNA editing technologies will be applied in the future and what problems need to be solved for the safe use of DNA editing technologies in medicine and agriculture.

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

This was the first time for me to hold a 90-minute lecture. Although the preparation for this lecture took a long time, I am glad that I joined the science dialogue program at Kakutaiji High School. Breaking down complex biological techniques to a simple level that students with limited English knowledge would understand was challenging but rewarding, as the students seemed to understand much more than I had expected.

- Impressions and comments from the lecture assistant（講義補助者の方から、本プログラムに対する意見・感想等がありましたら、お願いいたします。）: