2024年10月31日

## サイエンス・ダイアログ 実施報告書

1.	学校名•実施責任者氏名:広島県立広島国泰寺高等学校•上元真弓
2	講師氏名· 大阪大学 微生物病研究所 Dr HASSAN ↓(Mr)
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3.	講義補助者氏名: なし
4.	実施日時: 2024 年 10 月 25 日 (金) 13:40 ~ 15:30
5.	参加生徒: <u>2</u> 年生 <u>77</u> 人、 <u></u> 年生 <u></u> 人、 <u></u> 年生 <u></u> 人(合計 <u></u> 人) 備考: <u>普通科理数コースの生徒</u>

6. 講義題目: <u>Me and My Research</u>

## 7. 講義概要:

Dr. Jayedul Hassan, an accomplished microbiologist from Bangladesh, has devoted his career to the study of bacterial pathogens, focusing on their isolation, molecular characterization, and the elucidation of their virulence mechanisms and antimicrobial resistance. After completing his DVM and MS in Veterinary Public Health and Food Hygiene from Bangladesh Agricultural University, Dr. Hassan pursued his PhD in Veterinary Science at Osaka Metropolitan University, Japan. Currently serving as a Professor at Bangladesh Agricultural University and a Visiting Researcher at Osaka University, Japan, under a JSPS research grant, Dr. Hassan's work spans a diverse range of bacterial species, including Bacillus anthracis, Escherichia coli, Streptococcus spp., Staphylococcus aureus, Mycobacterium tuberculosis, and Providencia spp.

One of Dr. Hassan's radical contributions is the identification of Providencia rustigianii strain JH-1 as a novel pathogen associated with diarrhea in a child in Japan. Previously considered a commensal organism, P. rustigianii had not been linked to any specific disease conditions. Through meticulous research, Dr. Hassan and his team isolated this strain and, using advanced molecular techniques, discovered the presence of the cytolethal distending toxin (CDT) gene on a plasmid within the bacterium. More significantly, they identified a complete Type Three Secretion System (T3SS) gene cluster on the same plasmid—an unprecedented finding in the context of this bacterium.

The presence of T3SS, a molecular apparatus used by certain Gram-negative bacteria to inject effector proteins into host cells, was found to be pivotal in the invasiveness and diarrheagenicity of P. rustigianii strain JH-1. Through a series of in vitro and in vivo experiments, Dr. Hassan demonstrated that the T3SS was responsible for the strain's ability to invade host cells and induce diarrhea, thus establishing a direct link between T3SS and the pathogenicity of P. rustigianii. This discovery not only challenges the existing understanding of Providencia spp. but also highlights the role of plasmid-borne gene clusters in the evolution of bacterial virulence.

Dr. Hassan's research is a testament to the power of genomic tools in uncovering the hidden pathogenic potential of seemingly benign bacteria. His work continues to contribute to the global understanding of bacterial diseases, with implications for public health, particularly in the context of emerging pathogens and the spread of antimicrobial resistance. Through his ongoing studies, Dr. Hassan aims to further explore the molecular

mechanisms that underlie bacterial infections, with the goal of developing new strategies to combat these formidable pathogens.

8. 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 実験はなし。動画を使って細菌の観察映像を視聴
- 3) 事前学習

有 · 無 (どちらかにO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

9. 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。

Date (日付)

## 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): <u>Hassan Jayedul</u> (ID No. P23109 )

- Name and title of the lecture assistant(講義補助者の職・氏名) Not applicable

- Participating school (学校名): Hiroshima Kokutaiji Senior High School

- Date (実施日時): <u>25/10/2024</u>

(Date/Month/Year:日/月/年)

- Lecture title (講義題目): Science in Action: How Teamwork, Research, and English Can Shape Your Future

- 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) <u>10 min (分)</u>

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))

Power point presentation

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

Dr. Jayedul Hassan is a passionate microbiologist from Bangladesh who has dedicated his career to understanding how bacteria cause diseases and finding ways to combat them. After completing his degrees in veterinary science and public health at Bangladesh Agricultural University, Dr. Hassan pursued advanced research in Japan, where he made a significant discovery. He identified a new bacterial strain that can cause severe diarrhea, a finding that challenges previous beliefs about this bacterium.

Dr. Hassan's work focuses on isolating harmful bacteria, studying their genetic makeup, and uncovering how they become dangerous. One of his most significant discoveries involved a bacterium called Providencia rustigianii, which was not previously known to cause disease. Through careful research, Dr. Hassan found that this bacterium carries special genes on a small piece of DNA called a plasmid. These genes allow the bacterium to invade human cells and cause illness, making it much more dangerous than scientists had thought.

This discovery was made possible through teamwork and collaboration with other scientists, both in Bangladesh and around the world. By working together, they were able to combine their expertise and use advanced technologies to reveal new insights into bacterial diseases. Throughout his career, English has played a crucial role for Dr. Hassan, enabling him to communicate his findings to the global scientific community, publish his research in international

journals, and collaborate with researchers from different countries.

Dr. Hassan's journey is an inspiring example of how science can be used to solve real-world problems and make a difference in people's lives. It also shows how important it is to work together and use tools like English to connect with others and share knowledge. His story demonstrates that with curiosity, dedication, and the ability to collaborate, anyone can contribute to important scientific discoveries that can change the world.

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

- 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。): Not applicable

