

(For JSPS Fellow)

Form B-5

Date (日付)2013-10-8

(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): Atmika Paudel (ID No. P13093)

- Participating school (学校名): Ichikawa Gakuen Ichikawa senior high school

- Date (実施日時): 2013-10-04 (Date/Month/Year: 日/月/年)

- Lecture title (講演題目): (in English) Discovery of novel antibiotics using silkworm infection model

(in Japanese)

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

Antibiotic resistance is a growing problem worldwide that makes treatment of infectious diseases difficult. In order to overcome this problem, one of the approaches is to find novel antibiotics effective against resistant pathogens. Using appropriate methods, we can search antibiotics in the nature and one of the natural sources is soil; soil has many microorganisms that are capable of producing antibiotics against other microorganisms. We extract antibiotics from these microorganisms and test if they are effective against resistant pathogens. In our laboratory, we use silkworm to test whether antibiotics can treat infection or not. Silkworms are easy and economical to use in a small space compared to mammals. Most importantly, they do not have the ethical issues regarding their use which mammals have. Sample injection into silkworm is easy which gives a quantitative measure of the administered dose. Injection by two routes is possible in silkworms: Intra-hemolymph (equivalent to intravenous in mammals) and intra-midgut (equivalent to oral in mammals). The injection technique is easy to perform. While injecting intra-hemolymph, the inclination of syringe should be around 30-45 °C and while injecting intra-midgut, about 60-70 °C. Silkworm is an insect and has open vascular system, i.e. body fluid flows inside body freely unlike blood in mammals which flows inside blood vessels. The body

fluid of silkworm is called hemolymph and has no color. When red colored solution is injected into the hemolymph, the color is distributed in the hemolymph and the color can be observed visually, body of silkworm will have color. When the colored solution is injected into the midgut, the color is not changed as colored solution cannot come outside the midgut to impart color to silkworm body. We established a silkworm *Staphylococcus aureus* infection model and compared the results with mammals. The 50% effective doses (ED₅₀) of clinically used antibiotics in silkworm model were consistent with those in mammalian model. Therefore, silkworm model is suitable for screening of therapeutically effective antibiotics. Silkworm system has advantage over *in-vitro* systems in that we can evaluate therapeutic effectiveness of compounds at the early stage of development. We used this model and screened antibiotics from soil bacteria. We found a novel antibiotic "kaikosin E" from soil of Okinawa. Kaikosin E is a cyclic lipopeptide and effective against pathogenic bacteria including methicillin-resistant *S. aureus* (MRSA). Hence, we propose that silkworm infection model can be applied to discover novel therapeutically effective antibiotics.

- Language used (使用言語): English

- Lecture format (講演形式):

◆Lecture time (講演時間) 70 min (分), Q&A time (質疑応答時間) 20 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))

Used projector, conducted experiments

◆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 by accompanied person

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

Dr. Hiroshi Hamamoto, Assistant professor

◆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。):

本事業により、高校生に科学への興味を引き起こすという点で、大変意義がある事業であると感じた。高校生も大変熱心に英語の授業を聴き、慣れない英語ではあるが、積極的に質問をしている姿勢に大変感銘を受けた。本事業は、今後も継続的に実ることが、科学に対する若者の理解を深める上で重要であると思われる。