京都大学
KYOTO UNIVERSITY

2024 年度 SP+ Fund 報告書（ECR）

Project Report: SP+ Fund 2024 (ECR Program)

研究課題名（英語）／Name of research project (in English)
Multi-omic approaches for brain pathogenesis studies and mRNA vaccine development for avian bornaviruses

申請者（京都大学）／Applicant (Kyoto University)	
姓／Family name	牧野
名／Given name	晶子
職名／Position	准教授
所属部局 Faculty/dept. of affiliation	医生物学研究所

支援対象者（若手研究者）／Support recipient (early-career researcher)	
派遣・招へい期間 Period of visit	From 2025/01/06 Until 2025/01/17
主な研究分野 Main research fields	Virology, epidemiology, immunology, and vaccinology
姓／Family name	Chen
名／Given name	Jing-Yuan
職名／Position	Postdoctoral fellow
所属大学 Institution	☐ 京都大学／Kyoto University ☐ ボルドー大学／University of Bordeaux ☐ ウィーン大学／University of Vienna ☐ チューリヒ大学／University of Zurich ☐ ハンブルク大学／University of Hamburg ☑ 国立台湾大学／National Taiwan University
所属部局 Faculty/dept. of affiliation	Department of Veterinary Medicine, School of Veterinary Medicine

受入研究者（申請者と同一の場合は記入不要）／Hosting researcher (not required if it is the applicant)	
姓／Family name	
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職名／Position	
所属大学 Institution	☐ 京都大学／Kyoto University ☐ ボルドー大学／University of Bordeaux

受入研究者（申請者と同一の場合は記入不要）／Hosting researcher (not required if it is the applicant)	
	☐ ウィーン大学／University of Vienna ☐ チューリヒ大学／University of Zurich ☐ ハンブルク大学／University of Hamburg ☐ 国立台湾大学／National Taiwan University ☐ その他／Other （機関名／name of institution：　　）
所属部局 Faculty/dept. of affiliation	

研究課題の実施内容／Summary of research project

受入大学にて何を行ったのか、それが自身の研究にどのような効果をもたらしたのか等記載してください。／ Please describe what you did at the host university, how it benefited your research project, etc.

During my short-term visit to the laboratory, I conducted two primary lines of investigation with guidance from local collaborators. The first involved reverse genetic techniques and mini-genome experiments. The second focused on utilizing plasmids for mammalian expression and exploring any relevant regulatory considerations. This report summarizes the aims, methodology, and preliminary outcomes of these projects.

1. Reverse Genetic Techniques and Mini-Genome Experiments
In collaboration with Meng-Chi, I employed reverse genetic strategies to investigate key aspects of viral genome replication and gene function. Our work involved designing constructs to introduce specific mutations into viral genomic segments, which allowed us to observe how these alterations affected viral phenotypes. The mini-genome system proved especially advantageous, as it enabled us to assess replication efficiency and protein expression profiles without working with a fully infectious virus. By evaluating how certain genomic sequences influence replication kinetics, we aim to gain insights into the viral life cycle, ultimately informing potential therapeutic strategies. Meng-Chi is coordinating the broader experimental schedule, and we plan to refine our protocols based on these initial observations.

2. Utilization of Plasmids for Mammalian Expression
The second project centered on leveraging plasmids extracted in Taiwan for mammalian expression studies. These plasmids contained specific gene sequences that could be valuable for investigating the roles of targeted proteins in cultured cells. Before commencing experiments, I consulted with the laboratory's regulatory team to determine whether formal approval or documentation was required. Depending on the origin and nature of these sequences, there may be guidelines or restrictions governing the transfer and use of genetic materials. To ensure full compliance, I plan to discuss the details in person with the appropriate institutional contacts. Once proper authorization is obtained, the plasmids will be introduced into mammalian cell lines to evaluate protein expression levels, functionality, and potential effects on cellular processes.

今後の展望／Prospects for future research collaboration

Overall, these short-term projects have laid the groundwork for more extensive investigations into viral replication mechanisms and protein function within mammalian cells. After finalizing any required applications for regulatory approval, I will proceed with the plasmid-based expression experiments. Concurrently, further optimization of the mini-genome systems will strengthen our ability to dissect viral replication features and devise novel strategies for controlling viral spread. Going forward, continued collaboration with the host laboratory and regular discussions with Dr. Makino will help ensure that both projects progress smoothly and yield meaningful results.