Keio SFC Academic Society Results Reports

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I gave a poster presentation at The International Symposium on Plasmid Biology (ISPB), a prestigious conference dedicated to advancing research in plasmid biology. Scheduled for 2024 in Hamamatsu City, Japan, it marks the first ISPB event in Asia. The symposium gathers experts to share cutting-edge research on plasmids, drug resistance, microbial control, and related applications. My research on the evolutionary dynamics of the tfd gene in IncP-1 plasmids is impactful because it addresses the complex mechanisms behind gene dissemination in environmental biodegradation. By investigating how the tfd gene, crucial for degrading the harmful herbicide 2,4-D, is gained and lost among different plasmid lineages, this study provides novel insights into microbial adaptability and resilience. The findings enhance our understanding of genetic exchange in microbial communities, which can inform strategies to mitigate environmental pollution and improve bioremediation efforts. During the meeting, I presented this research to experts worldwide in the plasmids field and networked with them. As an undergraduate student, presenting at an international conference enhanced my presentation skills, boosted my research ambition, and resulted in valuable feedback and comments from the experts.

I recalled the main questions/comments from the poster presentation session. They are raised by researchers, including University Professors, PhD students, and institution researchers, all of which are interesting, inspired, and meaningful to my current studies. I will follow some of their questions/comments as my future research target.

1. How prevalent is the 2,4-Dichlorophenol hydroxylase gene within plasmids? Additionally, is this gene more frequently located on plasmids or chromosomal DNA?
2. The majority of plasmids have been characterized, with the exceptions of pAKD25, unnamed5, and pRK1-5. It would be prudent to conduct a more detailed analysis of these three plasmids.
3. Given the existence of additional subgroups within the IncP-1 plasmid family, expanding the sample size might reveal a higher frequency of gene acquisition events related to the tfd genes. Could you consider increasing the sample size for a more comprehensive analysis?
4. Examine the genomic organization of the tfd gene cluster, particularly focusing on specific genes like tfdB, to determine whether there is a more defined cluster.
5. From your search, 395 plasmids were identified as containing sequences homologous to the gene encoding 2,4-Dichlorophenol hydroxylase. Beyond

the 10 plasmids known to harbor tfd genes, what other plasmids are included in this set? Analyzing these additional plasmids could provide insights into the evolutionary history and origin of the tfd genes.

6. Why have you chosen to focus on IncP-1 plasmids? Would it be beneficial to consider other plasmids that also carry the 2,4-Dichlorophenol hydroxylase gene for a broader perspective?
7. Construct a gene tree to determine whether the phylogenetic relationships of the tfd genes correspond with the broader phylogenetic tree of the host organisms.
8. Have you thoroughly investigated the tfd gene cluster, including tfdA, tfdB, tfdC, and other associated genes, to understand their arrangement and potential functional relationships?
9. Is your analysis solely based on database-derived data? If so, it might be worth considering complementing the theoretical findings with experimental work, such as isolating relevant plasmids from soil samples collected globally, to validate your hypotheses.

Here are some photos of me at ISPB, 2024.