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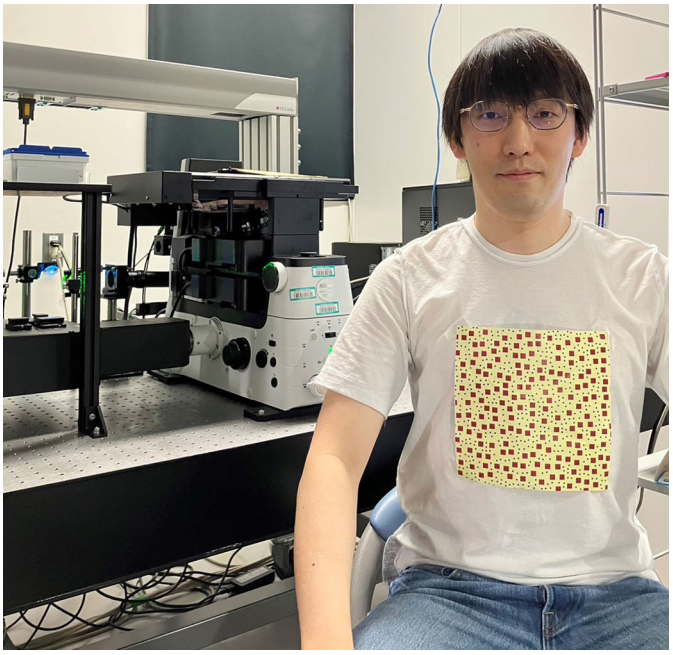
FIRST PERSON

# First person – Kazutoshi Takebayashi

First Person is a series of interviews with the first authors of a selection of papers published in Journal of Cell Science, helping researchers promote themselves alongside their papers. Kazutoshi Takebayashi is first author on 'Field model for multistate lateral diffusion of various transmembrane proteins observed in living *Dictyostelium* cells', published in JCS. Kazutoshi is a research associate in the lab of Masahiro Ueda at the BioSystems Building, Osaka University, Japan, focusing on diffusion analysis and modelling of transmembrane proteins in living cell membranes.



Kazutoshi Takebayashi

**How would you explain the main findings of your paper in lay terms?**

Transmembrane proteins are found in cell membranes and are constantly diffusing. I measured the diffusion of various types of transmembrane proteins in living *Dictyostelium* cells. The measurements revealed that all transmembrane proteins have similar diffusion kinetics. When drugs were added that inhibited elements that are thought to affect diffusion, such as the cytoskeleton, the diffusion kinetics of all types of molecules changed uniformly. This indicates that the diffusion of transmembrane proteins is largely determined by the plasma membrane rather than by species. I created a model in which diffusion is determined only by the cell membrane, which has a simple structure, and obtained diffusion that reproduces the measured data.

**Were there any specific challenges associated with this project? If so, how did you overcome them?**

It was difficult to measure a large number of cells under various conditions and analyze the large amount of data produced. In addition, there were many times when I could not reproduce the measurement data when creating the model. I had to understand the characteristics of the measurement data, which I had not paid any attention to before, and it was difficult. Thanks to the support of the people around me and a little luck, I was able to overcome these difficulties.

**When doing the research, did you have a particular result or 'eureka' moment that has stuck with you?**

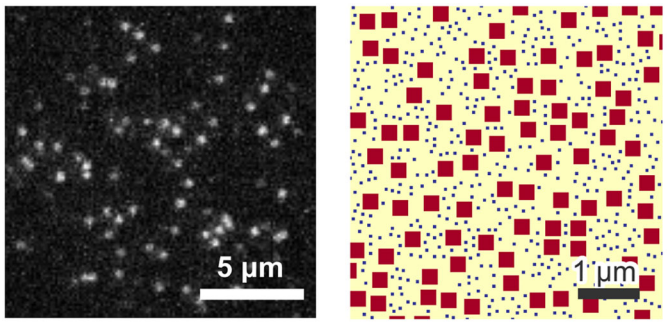
It is a little embarrassing compared to other people's eureka moments, but I had two eureka moments in my research. The first time was when I was watching the anime 'Hunter × Hunter' and saw a character talking about constraints that would enhance his own abilities; I realized that there were not enough constraints to create the model, and I was able to determine the basic setup of the model. The second time, while watching the anime 'Steins;Gate', I saw the main character repeatedly time leap and became aware of the characteristics of the time series of the measured data that caused discrepancies with the model. I was lucky because both realizations were essential to the creation of the model.

**Why did you choose Journal of Cell Science for your paper?**

The most important factor was that two of my respected seniors and friends who were in my research group had previously published papers in Journal of Cell Science.

**Have you had any significant mentors who have helped you beyond supervision in the lab? How was their guidance special?**

The most important mentor for me was my co-author, Dr Masahiro Ueda. He understood the importance of my ideas best, took the time to discuss them with me enthusiastically and was patient until the very end. He was the one who gave shape to my dim fantasies. I am truly grateful to him.




**Bright spots of diffusing molecules (left) and a model of a cell membrane in which molecules diffuse (right).** The visible colored dots on the model represent regions on the cell membrane, not molecules.

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**What motivated you to pursue a career in science, and what have been the most interesting moments on the path that led you to where you are now?**

I love the feeling of my perspective opening up when I understand something. Even though I often feel overwhelmed when I don't know what to do, I can't help but be drawn to it. When I was conducting this research, there were many such moments and it was truly enjoyable.

**Tell us something interesting about yourself that wouldn't be on your CV**

On my days off, I do data analysis and programming that have nothing to do with my research. The technical and mental learning I have gained there has been useful for my research.

**Reference**

**Takebayashi, K., Kamimura, Y. and Ueda, M**. (2023). Field model for multistate lateral diffusion of various transmembrane proteins observed in living *Dictyostelium* cells. *J. Cell Sci.* **4**, jcs.260280. doi:10.1242/jcs.260280