First Person – Mana Masui

First Person is a series of interviews with the first authors of a selection of papers published in Biology Open, helping researchers promote themselves alongside their papers. Mana Masui is first author on ‘Allorecognition behaviors in Myxomycetes respond to intraspecies factors’, published in BIO. Mana is a Masters’ Student in the lab of Dr Nobuaki Kono at Graduate School of Media and Governance, Keio University, Fujisawa, Japan, investigating the mechanisms and significance of self- non-self-recognition in slime molds (Myxomycetes). Ultimately aiming to explore the evolution of the concept of ‘self’ in organisms.

Describe your scientific journey and your current research focus
I have loved Slime Mold (Myxomycetes) since I was five years old and, now at the age of 23, have lived with many plasmodia of Myxomycetes at home to this day. During my life with them, I began experimenting to observe the differences in their movement patterns when I was seven. By the age of nine, I noticed their ability to distinguish between ‘self’ and non-self’, and I was captivated by their beauty and mystery. Since then, elucidating the allorecognition behavior of Myxomycetes has remained my research theme.

Who or what inspired you to become a scientist?
Looking back, I realize that I was already a ‘researcher’ during my childhood, as I discovered the theme of my current research, allorecognition in Myxomycetes, and observed their fascinating behaviors. I repeatedly conducted experiments to deeply observe these behaviors. Plasmodia have the ability to survive even when divided into multiple individuals, and they can also fuse together to form a single individual.

The allorecognition behavior between individuals of the same species was particularly striking. It was fascinating to watch as they would sometimes stop moving for hours, seemingly assessing the encountered individual, only to suddenly turn away and avoid it, or, as if making a decisive move, approach, touch, and fuse. The coexistence of individuals from different origins, keeping a respectful distance from each other as if they were considerate, was beautiful to behold.

These experiences have strengthened my desire to fully understand the concept of ‘self’ in Myxomycetes, which is difficult for us humans to imagine, and to reach for answers to the question: what does ‘self’ mean for living organisms? Therefore, throughout the journey to this point, thinking of myself as ‘aiming to be a scientist’ or ‘living as a scientist’ has been as natural as breathing.

How would you explain the main finding of your paper?
The plasmodium of Myxomycetes is amoeboid, moves freely, and can accurately determine whether it can fuse with other individuals it encounters, deciding its course of action accordingly. Despite the intriguing nature of this inter-individual communication, known as allorecognition behavior in Myxomycetes, knowledge about its actual mechanisms, particularly at the molecular level, has been very limited. There had been no substantial consideration regarding the purpose of allorecognition behavior in Myxomycetes. In our recent study, we discovered that Myxomycetes do not exhibit known allorecognition behaviors towards closely related species, completely ignoring the encountered individual. This finding indicates that the purpose of allorecognition behavior in Myxomycetes is to search for individuals that can become ‘self’. In other words, Myxomycetes’ allorecognition acts as a system not for excluding foreign entities, like the immune system, but rather for the opposite purpose, which is highly intriguing.

What are the potential implications of this finding for your field of research?
The ability to consider the significance of allorecognition behavior is a major breakthrough. This may also be attributed to species-specific recognition mechanisms, which would provide crucial information

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for identifying the molecular mechanisms. Unlike many other organisms, such as insects, Myxomycetes do not react at all to individuals of different species, even if they are closely related. This characteristic is particularly intriguing. Moreover, Myxomycetes are situated in the evolutionary process of the transition from unicellular to multicellular organisms. Understanding allorecognition in such organisms could provide insights into the evolution of self-recognition in living organisms. I am convinced that this knowledge will contribute to our understanding of the evolution of allorecognition in biology.

Recording, observing, and analyzing hundreds of behaviors was challenging, but it was enjoyable to uncover new aspects of Myxomycetes’ nature as I progressed. To make the claims in the paper more robust, I focused on accurate species identification. In addition to traditional morphological methods, I also employed DNA barcoding and constructed phylogenetic trees based on molecular phylogenetics. This aspect was strengthened based on feedback from reviewers, for which I am grateful, and I am very satisfied with the final outcome.

What piece of advice would you give to the next generation of researchers?
I’m not sure if this will be advice for the next generation of researchers, but I’d like to write down what I have been mindful of as a researcher – advice to myself.
I believe that approaching everything with love is the most important thing. This includes the research itself, the organisms being studied, collaborators, and everyone in the world who shares research knowledge. I love Myxomycetes and the plasmodia I live with. Having love means striving to understand the subject and thinking deeply about it. By approaching everything and everyone involved in research with this attitude, everything will move in a positive direction, as I have felt from my relatively short research career. It’s the same for people outside of research; sharing our work with love means even discussing research findings can be enjoyable for everyone. This experience has been crucial for me.

What’s next for you?
My ultimate goal is to elucidate the concept of ‘self’ in organisms. To achieve this, I first aim to understand the mechanisms and significance of allorecognition in Myxomycetes. In this paper, I have explored the behavior of plasmodia, and for the next step, I intend to delve into the molecular mechanisms underlying this behavior. There is very little known about the factors controlling these behaviors and the substances used for recognition, which makes the task of unraveling them exciting. Currently, I am conducting experiments to determine the foundational genome and identify the genes that govern these behaviors. Additionally, I am working on developing new methods to successfully carry out these analyses. We are already seeing promising new results from these efforts, so please look forward to our next paper!

Reference