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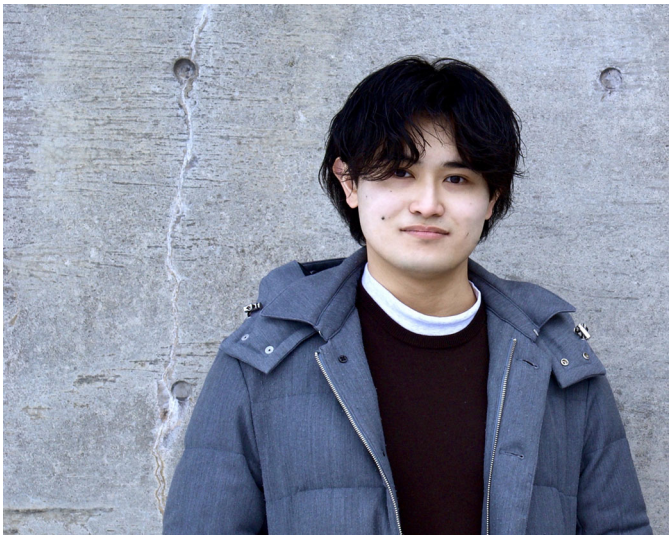
FIRST PERSON

First person – Yu Kurihara

First Person is a series of interviews with the first authors of a selection of papers published in Biology Open, helping early-career researchers promote themselves alongside their papers. Yu Kurihara is first author on 'Initial parasitic behaviour of the temporary social parasitic ant *Polyrhachis lamellidens* can be induced by host-like cuticles in laboratory environment', published in BiO. Yu is a master's student in the lab of Kazuharu Arakawa at the Institute for Advanced Biosciences, Keio University, Japan, investigating host or non-host: the mechanisms of host ant recognition in social parasitic species.



Yu Kurihara

What is your scientific background and the general focus of your lab?

I hold a bachelor's degree of arts in policy management, and I am currently a master's course student. My research focuses on the understanding of host/non-host discrimination systems in social parasitic species. I have belonged to Dr Kazuharu Arakawa's lab at the Institute for Advanced Biosciences (IAB), Keio University from my second year of undergraduate studies until now. Our group aims to understand the mechanisms and design principles of interesting biological phenomena through multi-omics and bioinformatics analysis. Some of the studies are mainly focused on ants with complex social systems, tardigrades with their ability to shift back and forth between living and inanimate states, and spiders with the ability to create various silk.

How would you explain the main findings of your paper to non-scientific family and friends?

Ants are insects that usually create a colony composed of the queen, her workers and males, forming a complex insect society. Among the various ant species, there are unique species called 'social parasitic species', which establish their colony by parasitizing the colonies of other ant species. Social parasitic species are known to only select specific species as their hosts and are thought to have the ability to sense and discriminate between hosts and non-hosts. However, the detailed biological mechanisms are yet unknown. *Polyrhachis lamellidens*, a temporary social parasitic species is known to perform what is called a 'rubbing behaviour' to the host workers in the early stages of parasitism. In our study, the trigger of this behavior was explored using contacting tests and chemical analysis. As a result, we discovered that a mixture of cuticular compounds extracted from host workers and chitin (the main component of the exoskeleton of arthropods) can trigger the rubbing behavior in newly mated *P. lamellidens* queens. These results suggest that not only the host epicuticle but also the procuticle may be involved in host identification of newly mated *P. lamellidens* queens.

What are the potential implications of these results for your field of research?

Since the factors used for host recognition in myrmecophiles, including social parasitic species, have been almost unknown, we believe that these results will support further research for host/non-host discrimination systems. In addition, the new behavior induction method using chitin may become an innovative tool for reproducing insect behaviour in laboratory environments.

"…the new behavior induction method using chitin may become an innovative tool for reproducing insect behaviour in laboratory environments."

What has surprised you the most while conducting your research?

I was very surprised when I observed a newly mated *P. lamellidens* queen misrecognize a glass bead for their host, and intently perform a parasitic behavior. It was also unexpected that chitin was required for the triggering of rubbing behavior, and glass beads coated only with cuticular compounds had no effect. Since previous studies had not reported the importance of chitin in the recognition mechanism in ants, it was interesting that such a large difference was observed. It also surprised me that the same results were obtained when chitin was replaced with a chemical analogue, chitosan.

What, in your opinion, are some of the greatest achievements in your field and how has this influenced your research?

Ecological studies by various pioneering researchers are important in our field. Their research revealed the existence of social parasitic

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Rubbing behaviour of the newly mated *P. lamellidens* queen to glass beads mimicking host cuticles.

species, their parasitic behavior, and their host selectivity, which greatly contributed to my research. Insights obtained from natural environments are invaluable for understanding biological phenomena, even for lab-conducted studies.

What changes do you think could improve the professional lives of early-career scientists?

I think low salaries and competition for limited funding are causing early-career scientists to lose their passion for science. I also think that these problems have prevented 'scientist' from being a dream job for the younger generation. I think it is important to support early-career scientists by creating an environment where they can concentrate solely on their research through further financial support. From a longer-term perspective, it is important to spread interest and the excitement of becoming scientists among youths through this approach.

Also, I think that basic science is like a queen ant. It can lay eggs called applied science. Therefore, I hope to see more original and interesting basic research, which may not always be immediately helpful for humans but what I believe is important.

What's next for you?

I hope to identify the host cuticular compound that induces rubbing behaviour, and finally elucidate the molecular mechanisms of the host recognition system. It would be nice if our research contributes to understanding the parasitic systems and evolutionary backgrounds of social parasitic species.

Reference

Kurihara, Y., Iwai, H., Kono, N., Tomita, M. and Arakawa, K. (2022). Initial parasitic behaviour of the temporary social parasitic ant *Polyrhachis lamellidens* can be induced by host-like cuticles in laboratory environment. *Bio. Open.* **11**, bio.058956. doi:10.1242/bio.058956