

FIRST PERSON

SPECIAL ISSUE: CELL BIOLOGY OF LIPIDS

First person – Melanie Ridgway

First Person is a series of interviews with the first authors of a selection of papers published in Journal of Cell Science, helping early-career researchers promote themselves alongside their papers. Melanie Ridgway is first author on 'Analysis of sex-specific lipid metabolism in *Plasmodium falciparum* points to importance of sphingomyelin for gametocytogenesis', published in JCS. Melanie conducted the research described in this article while a PhD candidate in Alexander Maier's lab at Biomedical Science and Biochemistry, Research School of Biology, Australian National University, Australia. She is now a postdoc in the lab of David Horn at Wellcome Centre for Anti-Infectives Research, Biological Chemistry and Drug Discovery, University of Dundee, Dundee, UK, investigating the cell biology of unicellular parasites.

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

The moon landing may have been a giant leap for mankind, but malaria parasites have long thrived on the transition between radically different environments. Malaria is caused by *Plasmodium falciparum* parasites replicating in their human host's red blood cells. In order to infect another human host, the parasite hitches a ride in mosquitos that feed on human blood. Surviving the transition between the different environment of the human host and mosquito vector requires the parasite to undergo a developmental metamorphosis known as gametocytogenesis. In this paper, we show that the fat content of parasites is different between male and female parasites following gametocytogenesis. Sphingomyelins, a type of fat important for cell membrane structure and signaling within cells, have a sex-specific function in these parasites. This sex-specific trait could be exploited to disrupt gametocytogenesis and ultimately block transmission of malaria.

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

Gametocytes are a challenging parasite lifecycle stage to collect in large numbers because they do not replicate and are highly sensitive to environmental changes. Only a small fraction of routinely cultured blood stage parasites undergo gametocytogenesis, and this sexual differentiation takes over a week. Afterwards, the mature gametocytes stall their development until they perceive environmental cues indicative of mosquito ingestion, such as a drop in temperature. For this study, the precious gametocytes, poised for ingestion by a mosquito, were collected by fluorescence-activated cell sorting. Transporting the cells from the incubator across campus to the cell sorter was straightforward in the heat of the Australian summer, but come winter we soon discovered that a heated container was a must!

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

Although the paper relates to malaria parasites, the results are not only relevant to parasitology and infectious diseases. We chose to publish in JCS to reach a broader cell biology audience and

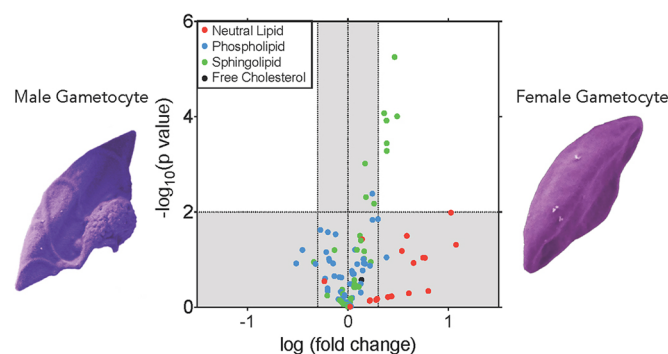


Melanie Ridgway

demonstrate that research on non-model organisms can advance our understanding of fundamental biology. I hope readers of the JCS special issue on 'Cell biology of lipids' can appreciate and perhaps draw inspiration from the lipid biology of malaria parasites presented in the paper, especially if they work with other models of cell biology.

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 remember watching a video of actin polymerization in a cell and realizing for the first time that cells are dynamic. I was so curious to



The lipid composition of the malaria parasite *Plasmodium falciparum* is sex specific. Malaria parasites differentiate into male and female gametocytes in human host red blood cells prior to ingestion by the mosquito vector. Female gametocytes accumulate sphingolipids in preparation for this transition. Images of gametocytes courtesy of Melanie Rug.

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know how that was possible and became fascinated by cell biology. In my PhD, I studied the ultimate cell biology puzzle – a cell living inside another cell. There is still much to discover, and as a scientist, it's a thrill to know what no one else has ever known before... At least until you excitedly share it with others in the lab!

What's next for you?

I'm now a postdoc in David Horn's lab in the Wellcome Centre for Anti-Infectives Research. I work with a highly tractable parasite,

Trypanosoma brucei and related parasites of clinical importance, such as *Trypanosoma cruzi* and *Leishmania donovani*. I use genetic screens to study cell cycle regulation and resistance to new drug candidates.

Reference

Ridgway, M. C., Cihlova, D., Brown, S. H. J., Tran, P., Mitchell, T. W. and Maier, A. G. (2022). Analysis of sex-specific lipid metabolism of *Plasmodium falciparum* points to importance of sphingomyelin for gametocytogenesis. *J. Cell Sci.* **135**, jcs259592. doi:10.1242/jcs.259592