Ruth Bowness talks with our new Newsletter Editor, Sara Loo.

Sara just finished up a postdoc position at the University of New South Wales, Sydney and moved to John Hopkins University in Maryland.

1. Tell us a bit about your research area

I've been at the intersection of mathematics and evolutionary biology for most of my short career. My doctoral research focussed on human life-history and building models of fitness costs and benefits to male reproductive strategies. More recently I've been thinking about the evolution of infectious diseases. One part of this has been thinking about how different selective forces at the within and between host scale can help or hinder the evolution of pathogens. Another aspect of my research in this has been thinking about diseases across history and the human factors that have lead to their emergence – really fascinating reading about all of these!

This brought me to my current role – a more public health facing role, looking at scenario modelling of things like Covid and flu. Quite different, and still learning what this looks like, but I'm excited to see where my research goes next!

2. How did you arrive in your current position?

Surprisingly, I actually just found the position on LinkedIn, and it fit with my family circumstances, as my husband and I were planning an overseas move. Coming from a more theoretical background, I've wanted to find something more data-driven, and try and learn more in the area of public health modelling, and this role really caught my attention.

3. Describe some exciting research you are currently working on

It's a bit of a strange time to try and answer this question – trying to wrap up some projects and just starting in a new position. But the project I am finishing up at UNSW with Mark Tanaka has been really exciting. We've been analysing a dataset of over 50 diseases and trying to identify patterns regarding their origins, in terms of human factors of their emergence and their modes of transmission. Whether or not certain types of diseases are affected by similar human factors of emergence or whether it is completely random are interesting questions to think about. Otherwise, the new job is overall very exciting! Though exactly what that entails is yet to be seen!

4. Have you encountered any surprising results in your research?

I feel like I'm just starting my research career so every result feels like a surprise! Recently it has been surprising to see how diseases across history cluster together. Even if we ignore

pathogenic properties and taxonomy, similar diseases tend to group together, based on their human factors of emergence and modes of transmission.

5. What advice would you give to a junior mathematical biologist?

As I said, I feel like I am one – someone please give me some advice!

If I were to give some though, I would say to not be afraid to stretch yourself, but also to reach out for as much advice as possible when you are at a crossroads, and to weigh up all that advice for yourself. When I first finished my PhD I had heard that it was *necessary* for me to go overseas or at least to leave Sydney (I did my PhD at Sydney Uni, and moved across the highway to UNSW), but my personal circumstances meant that I couldn't leave. Even though moving overseas was something I really wanted to do, the timing wasn't right, and I'm so glad I didn't chase that at the time. My postdoc was such a great experience, and I feel like I've learnt so much, gained confidence, and am in a much more comfortable position to move overseas for work now.

6. How do you find working across disciplines? What are the challenges?

There are so many challenges to this, but overall I find it so rewarding. Not only do we get to interact with people who have different perspectives, but we get to constantly practice how to best communicate our work. I think this is the most challenging aspect of interdisciplinary work – learning to distil information we may get from anthropologists or biologists, to learn how to translate that into a model we can learn from and convey any results back clearly.

7. What is the best part of being a mathematical biologist?

The above! The working across disciplines. Because of this, I get to read widely and listen to talks across so many fields. This helps keep an open mind, and as a result I think I'm always seeing ways in which I could apply mathematical techniques to different questions in biology, genetics, anthropology, palaeontology, ecology… everywhere!

8. Finally, how do you spend your weekends?

I am known to frequent a brewery on the weekends with friends, just hanging out and enjoying sunshine when there is any (there's been a recent onslaught of rain sadly).