Interview with Dr. Maria Abou Chakra, Research Associate in the Donnelly Centre for Cellular and Biomolecular Research at the University of Toronto.

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Could you tell us about your research background, and how you arrived in your current position?

I am a trained biologist with a PhD from McMaster University. For my PhD thesis I was trained in theoretical morphology, in the lab of Jon Stone. I developed a mathematical model that explores both growth and form of sea urchin skeletons. After graduating I moved to Germany to work at the Max Planck Institute for Evolutionary Biology, where I was trained under the supervision of Arne Traulsen in evolutionary game theory. I developed models that capture and predict behaviors in complex social dilemmas such as Climate Change negotiations and Host parasite interactions. Since 2016 I have been working as research associate, in the lab of Gary Bader, creating 3D mathematical models that explore cell development. In my work I am trying to understand how cell decisions happens and how that affects cell fates during development.

What attracted you to mathematical biology?

Combining my programming and coding skills that I have gained over the years with my biology background, allows my creativity to express freely and to design models that stay true to the biology and capture what we don’t know using the mathematical and computational power. With the integration and collaboration of different disciplines, modeling can become a very powerful tool that helps in visualizing and understanding complex ideas better and easier and expands the opportunities for interpretation and widens the range of questions in respect to the finding.

What do you foresee as the biggest challenges in mathematical biology?

I think accepting models as predictive tools that can work alongside of experiments is still a challenge. Currently there is a growing acceptance of models that support experiments, but I hope for a time where models are strong predictors and experimental studies are used to support these predictions.

What is something exciting that you are currently working on?

I am currently creating a 3D cell model to capture how cells diversify and grow in early development. While defining the mathematical model many questions rose quickly and we discovered that we have a gap in our understanding of how cell cycle affects development. Our model aims to explore the effects of cell cycle duration on cell fate. We predict that cell cycle duration not only affects cell number but it also controls cell number, cell proportion and gene expression. Understanding how cell cycle duration guides cell fate may become a fundamental process for both regenerative and developmental research.
What is the best piece of advice you have received?
My dad told me “Maintain your bar high no matter what others around you are doing.”

Where is the best place you have travelled for work? And why?
After I graduated, I spent 5 years in Plön Germany, which is a small charming town surrounded by lakes and beautiful landscape. For me it was a combination of small town charm and Arne Traulsen’s group dynamics that made it a wonderful place.

What was your favorite part of the eSMB meeting?
The atmosphere between colleagues is my favorite part of SMB. The SMB hosts meetings that feel collegiate and friendly, while maintaining high scientific exposure and quality.

Your sci-sketchnotes stood out on Twitter during the eSMB meeting, can you tell us about how long you have been creating them and how you got started?
Art has always been part of my life, as long as I can remember I used to sit and sketch next to my dad. As an undergrad sketching my notes helped me retain information longer. This later translated into electronic versions during symposiums and talks.

What is your favorite way to spend a Saturday?
Currently it is creating art or going to the driving range with my kids.