The impact of repetitive DNA and its guardian proteins on the evolution of neuronal gene regulatory networks

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Nederlands samenvatting

About the Author

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About the author

Grace Farmiloe (1992) obtained her bachelor’s degree in Archaeology and Anthropology (specialisation: Biological Anthropology) at the University of Cambridge in 2014. During this time she discovered a keen interest for human evolution and was given a brief introduction into genomics which sparked her interest in the genome.

After gaining a 1st class degree, Grace moved to London, working as a bike mechanic and surveying the spread of the oak processioanny moth in the oak trees of London for the Forestry Commission. A year later she moved to Oxford for a job at White Space Analysis, a strategy consultancy firm.

In October 2016 Grace started her Master’s at Imperial College London, in part funded by the School of Public Health Masters Scholarship which she was awarded. During her masters she completed an internship under Kirsten McEwan, investigating the function of a novel, bivalent epigenetic signature in the mouse genome. During this internship she investigated DNA methylation and Histone modifications, with a focus on imprinted regions. She was awarded her Master’s degree with a distinction.

Grace moved to Amsterdam and joined the Frank Jacobs’ lab in 2017. Her initial research project investigated the effect that emergent KRAB zinc finger proteins (KZNFs) have had upon gene regulatory networks. Her research into these networks and proteins spawned a couple of side projects, investigating the relationship between KZNFs and simple repeats in the genome and hunting for the causal factor behind the methylation of the expanded CGG repeat associated with Fragile X syndrome. For her research Grace has collaborated with researchers from the Erasmus MC, Rotterdam; the Catholic University, Rome and the NIH in Bethesda USA.

Alongside her research, Grace has supervised three master’s students and has been involved in teaching activities for the Human genome biology and evolution master’s course.

In September 2022, Grace re-joined the Jacobs’ lab to continue her research on Fragile X syndrome.
Acknowledgements

Completing a PhD is no easy endeavour and the emergence of a global pandemic at the start of my third year did not make it any easier! Nonetheless I was able to make it to the finish line, thanks to the help and support of an extensive network of mentors, friends and family.

Of course my PhD would have been impossible without my supervisor Frank. When looking for positions, I stumbled across a project that felt as though it had been tailor-made to my research interests and even though I had minimal lab experience under my belt, Frank took a chance on me. I am very lucky that he thought I was worth the risk. Frank has fully supported me in my training to become a scientist and I am very proud of the relationship we have built over the last five years. Frank’s enthusiasm is infectious and it has been very exciting sharing the journey of scientific discovery with him. I hope he can share my pride in this thesis and the progress I’ve made as a scientist which would not have been possible without him.

I’d also like to thank Marten, my co-promoter, for his valuable feedback during the various presentations I have given over the course of my PhD and his gruff advice over beers in the SILS common room.

I owe my scientific peers a lot, they have given me invaluable emotional and scientific support over the years, individually and during presentations and meetings. I wish to thank all those who have influenced me over the course of my PhD, within this extensive group, there are ‘quite some’ special mentions:

I was very sad when Swip completed his PhD and left our hallowed halls for Erasmus MC. We bonded at our first ONWAR conference where we discovered that working together as a Space team was slightly more engaging than the many talks on synaptic plasticity. From that point we became firm friends. Our daily inspiration walks were a great help during stressful times. I’ll never forget the time I was contemplating quitting my PhD: Swip’s sage advice really put things into perspective for me which was a real turning point in my PhD, and attitude towards my scientific career. I will always be grateful for his input and support. A special thanks also for his translation services on my Nederlands samenvatting.

My desk neighbour Judith has played an invaluable role as friend and colleague. The ability to discuss ideas and get frequent input on plans for experiments and analyses has drastically improved my scientific output and thought processes. Sitting next to a like-minded individual for three years has also led to some very
fun conversations. These chats have resulted in some interesting developments, including our fictional 70s TV show ‘Roels and Farms’ featuring a pair of sexy crime fighting scientists. Her absence will be strongly felt as a great loss to my working day.

My other office mate from c3.269a, Diana has always been available to offer help and advice, be it new analytical techniques or invaluable feedback on results. She has had a particularly strong influence upon my well being, offering many different types of emotional and academic support. My favourite of her methods involves the liberal application of cocktails. :)

Sadly the other members of the lab didn’t get a desk in the ‘cool’ office but have still managed to have a positive impact on my life. The veteran Jacobs’ lab crew who were around when I started – Gerrald, Nina, Elise and Elias helped me get on my feet when I arrived. I remember Elias in particular taking the time to walk me through the protocol for a luciferase assay. As a nervous PhD starter this meant a lot to me. I’m so grateful to the members of the lab who joined after I started, Gonzalo, Sanaz, Colette, Jimi, and Angelica for all the fun times we’ve been able to hang out (pandemic permitting) and for making such a lovely, smooth running and supportive working environment, you make it hard to leave! A special shout out goes to Gonzalo for putting up with my experiments and his support on my projects.

We cannot forget Rita: the portugese fiend. Unfortunately she missed out on being my office mate but that has not stopped us getting up to all sorts of mischief, our trips to Canada and Portugal were an absolute dream. Thank you for all the fun evenings and shenanigans...

My students Loet, Ilan and Mike taught me so much about supervising – I only hope they weren’t too traumatised after their time with me and have some fond memories of the Jacobs’ lab. The other Jacobs’ lab students who have done their projects in the lab have always brought variety to our work and fun conversations over lunch and Friday beers.

On the topic of Friday beers, I would amiss if I did not mention Lars and Marco, always ready for a drink and a chat about work and life along with the other members of the MNS group, past and present. I was grateful to have Cindy and Lars von Oethel around to show me the ropes when I started. The protein boys, Jesse and Eric and the later addition to the protein lab, Reinofke have always been around for a beer and a chat.
I’ve had many a fun chat with **Joost** (Swip’s replacement) since he joined and owe him a big thanks for the composition of the theme song for ‘Roels and Farms’.

I’d also like to thank **Jeroen**, although we met at science park most of our time together has been spent playing extremely nerdy board games. I was very happy to find someone to help me with my hobby (with a healthy dose of PhD advice on the side).

I have also been supported by many people outside science park. During the course of my PhD I met and fell in love with **Anton** who has supported me no end through this journey. Along the way become quite knowledgeable about genomic theory and experimentation. He has looked after me when things haven’t gone well and never stops making me laugh. I look forward to him being by my side as I take the next steps in my career. He also reminded me to thank him for my wonderful cover design, thanks Anton!

My friends in the Netherlands have given me plenty of support and fun times to negate the PhD stress. When I first moved to Amsterdam, I spent lots of time with **George**, he gave me a curated experience of the best music on the Amsterdam night scene and I still enjoy torturing him with yellow minions. **Philipp** also gave me plenty of opportunities to blow off steam and enjoy the Amsterdam night life and has continued to support me during my PhD from Berlin, not limited to but including sending me a steady stream of great song recommendations.

**Mary Ann**, an original BioAnth babe, has been by my side for the past 10 years and I have been very lucky to have had such an old friend so close to me. From hosting great parties alongside the lovely **Liam** and being an integral part of our murder mystery dinner (we’ll never forget Dickie Fandango) to taking me on important vitamin D walks, Mary Ann has been an integral part of my life and support system.

I have also known **Sam** since my days at Cambridge. He has been a solid friend ever since, getting me one of my first (and favourite jobs) after I finished my bachelor’s, taking me to crazy parties, picking up the pieces after break ups and in general, being an all round gremlin. I am especially grateful for his support when I first moved to Amsterdam by myself, having someone to share my inane daily thoughts with was such a help. We haven’t managed to meet up too often but when we do, it’s worth the wait: I’ll never forget our day in Paris together and my amazing trip to Switzerland. I also owe him thanks for creating the RBC (Real Book Club) founded in April 2020 and over the next few months, whittled down to three core members (Sam, **Will** and me). The bimonthly meetings
and biannual presentationathons with Sam and Will kept me going through the tough times whilst simultaneously allowing me to hone my presentations skills. I look forward to continuing our meetings that have endured despite the pandemic and Sam’s emigration to the USA.

**Marios** has also been a great friend over the past years, especially as an integral member of the Friday night dinner club during lock down, he has been missed since he moved back to London.

I’d also like to give an honourable mention to my other close friends who it has been hard to see during the pandemic. **Claudia** another OG BioAnth babe, Homerton gals **Harrie** and **Ainslie**, who have helped with support and career advice. My oldest friend **Rob** with whom I’ve shared many important life events and my friend **Harry Cusworth**, who (amongst other things) introduced me to bouldering which has been a great way to escape the stress of PhD life. In general, a huge thanks to all who have all been there over the years giving me support and fun times.

Last but not least I’d like to acknowledge my family, obviously **Mum** and **Dad** for my existence and also for coaching me through my various career choices. Even though they haven’t always had a firm grasp of my research subject they’ve still managed to support and encourage me (sorry Mum but my PhD does not cover ‘self-repeating proteins’). My siblings **Alice, Izzy, Max** and **Harry** have helped shape me into the person I am today, **Alice** and **Jack** (and **Bramble**) have especially helped in the course of my PhD, supporting me in Amsterdam when they lived here. A final mention goes to baby **Theo**, the newest and cutest addition to the family who can’t yet read but will maybe see this at some point in the future...
How often people speak of art and science as though they were two entirely different things, with no interconnection. An artist is emotional, they think, and uses only his intuition; he sees all at once and has no need of reason. A scientist is cold, they think, and uses only his reason; he argues carefully step by step, and needs no imagination. That is all wrong. The true artist is quite rational as well as imaginative and knows what he is doing; if he does not, his art suffers. The true scientist is quite imaginative as well as rational, and sometimes leaps to solutions where reason can follow only slowly; if he does not, his science suffers.

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Grace Farmiloe

Thursday 12th January 2023

To attend the public defence of my PhD thesis

Invitation

Agnietenkapel
Universiteit van Amsterdam
Oudezijds Voorburgwal 229-231
Amsterdam

Swip Draijer
Judith Roels
Paranymphs