

GREAT EXPECTATIONS



Diane Webster.

Our series continues in which Australian scientists describe their journeys of professional and personal development. Diane Webster describes her journey from a New Zealand farm to molecular farming in Melbourne, along with juggling a 1 year old son.

When I Grow Up...

Two things stand out for me when I look back over the path that leads to today. Firstly, the value of collaborations and mentors, and secondly, balancing the importance of personal and professional choices. Scientific culture may try to dictate that we work 24/7 at 110%, but it is possible to give personal choices priority sometimes and still be a research scientist.

The First Sparks

I'm from a rural farming community in Central Otago, New Zealand. My recollections from growing up on a sheep farm are many and varied, including ice skating and snowmen, tree huts, sand pits and sewing. For as long as I can remember, I've wanted to be a scientist. Quite when or how I settled on this I don't know, but Mum likes to tell of an early experiment involving a butter knife and the wood veneer on her china cabinet!

Education Milestones

My formal scientific education started at high school. This was followed by a BSc Honours degree at the University of Otago. During my first year, I was utterly blown away by the plant science paper taught by Dr Paula Jameson and this in combination with discovering how much dissection was involved in Zoology made majoring in Botany an easy choice. As my degree progressed, I discovered that what I enjoyed most was the inner workings of plants and cells. At that time, the botany courses were more focused on physiology than biochemistry, and the courses run by the biochemistry department were almost exclusively animal based. Fortunately, I was able to blend third and fourth year courses to take advantage of a new degree course in molecular physiology and plant biology (MPPB), which was introduced in my fourth year. The MPPB course was run by the biochemistry and botany departments.

Getting Started on Research

In the New Zealand system, fourth year was also my Honours year. Formally, the year was made up of six units: four units of course work (two per semester) and two units of research. In practice, we spent around 50% of our time in the lab or on related thesis work and 50% on coursework. The result blends deeper knowledge from course work with a taste of research. However, I found the taste of research was quite different from being a full-time researcher. As a result, it took me a few

months at the start of my PhD to align expectation with reality.

I started my PhD the February after my Honours year. It was a collaborative project between Hort Research in Auckland, at the Mount Albert Research Center (MARC), and the Botany Department at Otago University. My project was to work with Dr Richard Forster and Dr Paul Guy to study ryegrass mosaic virus (RgMV) in New Zealand. In addition to the usual 'rites of passage' that a PhD student must pass through, there were a number of notable experiences from this time, both personal and professional.

Due to the molecular biology planned for my PhD, it was agreed that I would undertake the first two years of my PhD in Auckland before transferring back to Otago. This presented two challenges: living in a BIG city and living away from Merlin. As an undergrad, I'd met and started dating Merlin Thomas, the man I was later to marry. Merlin had recently completed his medical degree and was unable to leave his current position to move to Auckland. So, with the end date firmly fixed in our minds, we embarked on a successful long-distance relationship. My first experience living in a BIG city also worked out well and although I'll never be a fan of Auckland, I did fall in love with Rangitoto Island and learn how to live with a few million neighbours.

Professionally, I discovered the delights of molecular biology, including a protracted (character building?) exercise in troubleshooting some failed cloning, only to find that the problem was the water – most likely residual heavy metal ions in the ultrapure water inhibiting the ligase. Molecular biology also provided me with the biggest buzz, scientifically speaking. One aspect of my thesis was to sequence the coat protein gene of RgMV from different regions of New Zealand to characterise strain variation. I collected ryegrass samples from the field, extracted the viral RNA, then cloned and sequenced the coat protein. I'm probably the last of the generation that ran their own sequencing gels and manually recorded the ACTG sequence from the 4-lane ladder. Although automated sequencing was available, it was relatively new and still quite expensive. My supervisor believed that we should have a thorough understanding of how sequencing worked, so we mostly did our own. I'll never forget developing those autoradiographs and piecing the fragments of sequence together like a jigsaw to get the coat protein sequence. It came from a blade of grass I'd collected myself in a paddock north of Kaikohe (far north New Zealand). For a farmer's daughter, it encapsulated the power of molecular biology and is still one of the biggest personal moments of my professional career.

Taking the Next Step

After two years in Auckland, I moved back to Otago to complete my PhD. From there, I moved to Adelaide, Australia. This time, Merlin and I moved together. We both needed to move for work and, with the exception of Auckland, New Zealand wasn't likely to be able to offer us the job and training opportunities we needed next.

Merlin had a job at the Queen Elizabeth Hospital and I started door-knocking and passing out copies of my CV. Our timing was good (February 1999) and I secured a postdoc position on an NHMRC-funded project to develop a plant-made vaccine for measles. The project was with Dr Ian Dry at CSIRO Plant Industry on the Waite campus, and involved a close collaboration with Professor Steve Wesselingh, who had recently moved his research group to Melbourne. My role in the project was to produce plant-made antigens for evaluation in mice, which was done by Steve's group in Melbourne. I loved it. Adelaide was a fabulous place to live and to discover red wine. I also thoroughly enjoyed the new respect that seemed to come with being a postdoc rather than a student – not to mention the salary. Scientifically, it was a good blending of old and new skills, including making my first transgenic plants.



A feeding trial with fresh lettuce containing recombinant measles virus antigen.

Close Encounters of the Regulatory Kind

Two years after we moved to Adelaide, Merlin expressed a desire to do a PhD, so we were on the move again – interstate this time. Steve and Ian were happy to transfer the plant section of the vaccine project to Melbourne, so my cultures and I moved to Monash University. The move also signalled a change in role for me as I took on greater responsibility in running the project. One of my first tasks was to obtain regulatory approval for my plants. It was just as the Genetic Manipulation Advisory Committee was being phased out and my plant applications were among the first to be processed by the Monash Institutional Biosafety Committee (IBC) under the new Office of the Gene Technology Regulator (OGTR) regulations. I recall it taking a couple of months and many revisions to get

the applications approved. A side benefit of the process was getting to know the IBC secretary well and subsequently receiving an invitation to join the IBC. I've been on the IBC for a number of years now and have really enjoyed the work and the association with the OGTR. I like knowing that I've got some non-lab based experience as a back-up in case my grant funding runs out and I need to look for alternative career paths.

Opportunities for Growth

My first three years in Melbourne were an interesting time and included moving the lab to the Burnet Institute when Steve took over as the new director. This proved to be an excellent move for the group. Previously, we had struggled to reach critical mass and generate an intellectually active culture. When we moved to the Burnet, we had to squeeze into a smaller space, but we were working alongside a large number of other scientists who were working in related areas. It proved to be a productive environment.

With the move to the Burnet Institute, I also assumed most of the responsibility for running the plant-vaccine research group. My ability to multi-task, a strong lab skill, worked against me in the paperwork game. I just ended up with lots of half-finished tasks. Mixing lab work with paperwork didn't work that well for me either. Generally, I'd get sucked into some really interesting lab work and the paperwork wouldn't get done. Alternatively, I'd tackle the most urgent paperwork only to find that once that was done, there were more urgent tasks to do and I hadn't been near the lab in a fortnight. Looking back, I see that I learnt a lot, but that I really only had two to three years as a dedicated postdoc. It would have been more sensible to focus on lab work and publications for a few more years to give myself a solid publication base from which to apply for funding. However, staying with the same project for around 10 years has off-set the slow start and there have been definite advantages to staying with the same project, specifically, building strong, productive collaborations.

Paris, Arizona and a Cosmetics Company

When Merlin finished his PhD, we decided it was time to get some overseas experience. However, we were feeling quite settled in Australia, so we looked for travel funding rather than jobs. The advantage was that it enabled us to remain inside our existing Australian networks, in my case to continue to work with Steve on the plant vaccine projects. I applied for and was awarded a UNESCO-L'Oreal Fellowship for Women in the Life Sciences. The sniggers from my colleagues about being the recipient of a L'Oreal award stopped when they realised that the award was worth US\$10,000 plus an all expenses paid trip to Paris for the awards ceremony. Paris was the trip of a lifetime. It included accommodation next door to the Eiffel tower and attending lectures from the 2004 Laureates at the French Academy of Science. I was also able to link the trip with a conference, so in addition to a week meeting obligations with L'Oreal, I had a week of sightseeing in Paris before attending a plant vaccine conference in Annecy.

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The UNESCO-L'Oreal award paid for me to spend the second half of 2004 in Arizona with two plant vaccine labs, those of Hugh Mason and Amanda Walmsley. I planned and executed two small projects, which allowed me to update some aspects of our research and to add some state-of-the-art expression vectors to the repertoire of tools that we use for expressing proteins in plants. Most notable was getting access to a deconstructed viral vector system (ICON Genetics, Bayer), which has revolutionised both the measles and the malaria vaccine projects. In addition, I visited labs in Atlanta, New Orleans, South Carolina and Baltimore. There was also time for trips to Washington, San Francisco for Independence Day, Sedona and the Grand Canyon (Arizona), Rocky Mountain National Park (Colorado) and Escalante (Utah).



On-stage during the UNESCO-L'Oreal award ceremony in Paris, 2004. From left: Ines Atmosukarto (Indonesia), Diane Webster (New Zealand) and Naheed Zeba (Bangladesh).

Returning Home

After all the travel and excitement of 2004, the focus of the following year was to secure competitive grant funding. We had two successes: an ARC-linkage grant to make a bird flu vaccine in plants and a Juvenile Diabetes Research Foundation grant to produce a target protein to treat/prevent complications of diabetes. I also spent a lot of time working on time-management with my mentor, Steve Wesselingh. The result has been a very productive few years of research. I hope to consolidate this with our recent move back to Monash University. I accepted a part-time position as a Research Fellow in the School of Biological Sciences as a joint Science/Medical Faculty appointment at the beginning of 2008. It's an exciting move, as Monash is committed to developing a strong research program in the area of molecular farming (recombinant plant-made proteins for human health and wellbeing). Personally, Merlin and I have also embarked on a new set of challenges. We bought a house in 2005, got married in 2006 and I gave birth to a baby boy, Philip, in 2007.

Combining Motherhood and Science

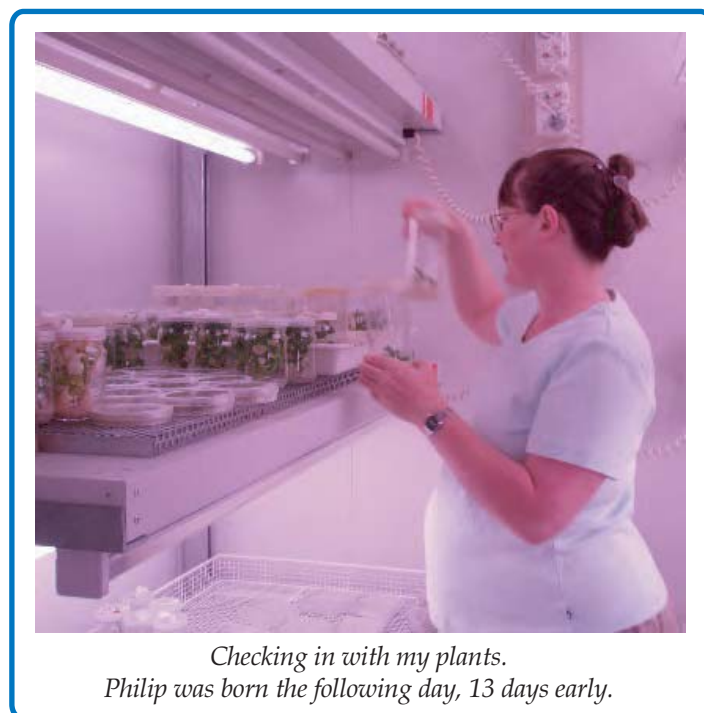
Over the years, there have been times when I could easily have opted for an alternative career path. Organisations like WISENet (Women in Science Enquiry Network) have been an invaluable network of support, mentoring and understanding, and are one of the reasons I'm still a research

scientist. I've also been fortunate to have a supportive partner and husband, and supervisors and mentors, like Steve Wesselingh, Richard Strugnell, Ian Dry and John Hamill, who have valued my work and created opportunities for me. My current position at Monash is one of those opportunities and has allowed me to achieve a blend of work and family life that feels right for me.

Officially, I took four months of maternity leave when Philip was born (from May to August), then returned to work part time, working around one day per week from home (September to December). At the beginning, I really missed work, so I was back pestering my students about four weeks after Philip was born. It took around three months to adjust to the change of lifestyle and discover that there is life outside the lab. Philip started in day-care two days a week when he was five months old. He was still exclusively breast-fed at that stage, so I worked from home in two-hour blocks and drove into the centre for his mid-session feed. It was disruptive, but worth it, as I was able to achieve the current WHO guidelines of exclusive breast feeding for at least six months.

My position at Monash has been structured to allow me to run my research group and remain Philip's primary care-giver. I work three days a week while Philip is in day-care. I have the flexibility to work slightly shorter days and make up the difference with an extra half-day every few weeks while Philip plays with his Dad. It helps that Merlin is also a scientist and has the flexibility to play a large role in Philip's care, too.

Adjusting my mind-set to a three-day working week has taken some time, but it has also made me very focused on goals and outcomes. I've hired postdocs rather than RAs and I've dusted off my multi-tasking skills to blend paper writing, lab planning and research. My current goal is to establish a productive research lab at Monash. Then we'll focus on the 2009 funding rounds. I don't know how sustainable a three-day working week will be. Time will tell, along with the phrase 'relative-to-opportunity'. In the meantime, I'm having fun and I still get a buzz out of the fact that I really did grow up to be a research scientist.



*Checking in with my plants.
Philip was born the following day, 13 days early.*