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EDITORIAL

Biophysical Reviews' "Meet the Editors Series": a profile of Damien Hall

Damien Hall[1]

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Abstract
This piece introduces Damien Hall, Chief Editor of the *Biophysical Reviews* journal since 2019. Currently working as an Assistant Professor at Kanazawa University, the author describes his association with the journal along with some parts of his family history and academic journey.

The *Biophysical Reviews* 'Meet the Editors Series' started in 2020, and since then the journal has published a series of interesting mini-biographies contributed by members of the *Biophysical Reviews* Editorial Board (Olson 2020; Jagannathan 2020; Itri 2020; Harding 2022; Rivas 2023; Nagayama 2020; Tame 2021; Ehler 2021; Shonhai 2021; Ho 2020; Vassalli 2021; Leslie 2022). These pieces have provided both a summary of the scientific background and expertise of those contributing editors along with affording an interesting window for peering into the human side of the people working in support of the journal. After 5 years of badgering members of the editorial board to write these pieces, I thought I would take this opportunity to contribute one myself. In what follows, I first describe some of my personal and work history before concluding with a brief description of my association with the journal.

Early childhood

I was born in Brisbane, Queensland, in the mid-1970s to English parents who had participated in the '10 £ tourist' immigration scheme aimed at recruiting skilled citizens from the UK to settle in Australia as permanent residents (Fig. 1). This scheme, a lingering remnant of the famous 'White Australia Policy' which lasted in diminishing form up until the early eighties, was an attempt by the various national governments of the time to maintain the 'Europeanness' of the Australian immigrant population. My tall and blonde Anglo-Saxon father and mother were obviously deemed to constitute the right stuff, and together with their two English daughters, they took the plunge to relocate to the other side of the world. My father, a career policeman with stints as a metropolitan London constable and specialist protection officer, was recruited in the UK by a Queensland Police Service looking to expand and deepen its ranks. Prior to meeting my father, my mother had worked in a London zoo—a situation that most likely prepared her well for an outback life full of beautiful and dangerous animals that she would later come to experience in Australia.

Policemen are often required to move around a lot, and as a result of my father's frequent work transfers and some various interesting family developments, I grew up in a number of places in Queensland, the most north-eastern of the six Australian states. Although my family led a somewhat nomadic life, my parents invested early on in a large plot of land in the south east of Queensland, and that small 'farm' was where we would always return to. The family property very much became the anchor point of my childhood, and it was there that we had numerous vegetable and fruit gardens and kept a large number of animals that included cows, horses, goats, chickens, geese, ducks, cats, and dogs. As a young child, I got to enjoy the wonder of seeing multiple litters of puppies and kittens being born and also experienced the sadness of seeing favorite animals die (with these experiences commemorated with family gatherings and tasteful funerals somewhere down one of the back paddocks). Interspersed within our time at the property, we lived in various parts of Queensland including a number of years in the beautiful far north city of Cairns. As a counterpoint to a childhood growing up in the Australian bushlands, my family returned to England for a year, and during that time,

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Fig. 1 Damien Hall on a visit to the Great Wall of China

I got to enjoy living in inner city London, directly adjacent to the wonderful Battersea park where my sister and I built snowmen in winter and fed the ducks and squirrels with 20 pence bags of nuts. Pre-internet, within our home in Australia, my mother had created a significant library with one whole wall devoted to encyclopedias and reference material. Upon receiving difficult questions from my sisters and I, she would direct us to consult these books and do some research for ourselves. Discussions of what we had learned would continue afterwards, often at the evening dinner table, and my parents always seemed to be interested in our explanations of what we had found out. My mother took note of the progress of my sisters and my schoolwork, and if we were tight with a homework deadline, she would often sit down to help as required with our school assignments (thank you Mum). Despite my parents emphasizing the importance of schoolwork and general learning,[1] I also grew up with lots of time to play, riding horses and motorbikes, milking cows, chopping down trees, and, due to my parent's interest in creating ornate gardens, lifting a lot of rocks and digging numerous holes. With a variety of animals to observe and care for, sisters and parents to talk to and play with, life at home was fun and interesting and quite self-contained. Recreation involved exploring the bushland with my sisters and faraway neighbors, building forts and secret bases, fishing for yabbies in the billabongs at the corner of our property, watching the stars on clear nights, and marveling at the thunderstorms that would inevitably arrive at the end of particularly hot afternoons. Life was made special by the occasional treat of having a game of chess or going fishing with my father or having an extra serving of my mother's wonderful cooking. I think I was spoiled as a child—life was definitely filled with nice things and nice people.

Each year, all three children would get a present for our birthdays and one for Christmas. Although I think the motorbike I got when I was eight was the clear favorite, looking back on it, most of the presents I received were of the type you might give a child if you were trying to fashion a scientist. My parents bought me a chemistry set for Christmas when I was nine. It had 40 different chemicals, a methylated spirits burner, and a book full of experiments. I worked through the set examples in that guide and then started experimenting by myself and recording my findings in the provided formatted journal. When I was 10, I received a 100 × magnification microscope that also had a projection capability for showing the image directly onto a wall and a fairly extensive set of already-made slides and sample preparation kits involving clear slides, cover slips, oils, waxes, and scalpels. I was amazed by that microscope and sketched many of the things I saw in the prepared cell slides, but I only really fully understood what I was seeing much later after learning more about them in high school and university. When I was 11, personal computers started to become accessible, and I taught myself to program in GW BASIC using an early home Commodore computer after receiving two volumes of the Rigby and Usborne 'Guide to computers' and 'Guide to Video Games' books. My neighbor and I would play simple computer games that I had written. I think my children (who are all scarily good at Xbox games like Witcher, Battlefront, and Apex Legends) would laugh at how much Cameron and I enjoyed moving an asterix man around the screen using the up/down left/right keys to avoid colliding with some randomly moving letters. That same year, my Christmas present was a hobby electronics board with an accompanying 'Guide to building your own electronic devices' book. Working through the set examples in the book provided some familiarity with electrical current, voltage, and resistance and the role of certain electrical components such as switches, diodes, transistors, capacitors, resistors, and transformers. Although interesting at the time, this was also great preparation for later life when wrestling with concepts in physics courses on electrostatics and electrodynamics. It

[1] As a young boy, I fondly recall my father encouraging me to read his collection of Shakespeare, made all the more exciting by him conducting the occassional reading in his deep base baritone voice.

is indeed interesting how your brain constructs models with different levels of formal knowledge.[2] Around my thirteenth birthday, my parents bought me a telescope and some books on astronomy to coincide with the arrival of Halley's comet. Having the opportunity to experience this once-in-a-lifetime event was truly amazing, and my refracting telescope was put to work observing the comet, along with the stars and especially the moon. Due to the circumstances under which I grew up, I think learning and study came quite naturally as a way of making sense of self-made observations and personal experiences. It was not a chore because it was interesting, and the desire to know/find out came from being able to directly encounter the world, being outside and interacting with it. Articulation of your observations and understanding was encouraged by having a family interested in hearing what you thought about a topic. Although I do not think that they did it intentionally, looking back on it, I think it was my parents who were the most responsible for setting me the course to become a scientist.

High school and university (1988–1994)

I attended Mansfield High School in the city of Brisbane from year 10 till year 12. I think that it appealed to my father as, at that time, the school defended the use of corporal punishment on students and the uniform required leather shoes and a button up shirt. To be fair, it was a good school, and I had a number of great and inspiring teachers (thank you Mrs Brown and Mrs Barestow). In the Queensland system of that time, you were required to commit to one of three strands of study in years 11 and 12, with these three strands being Science/Mathematics, Humanities/Sociology, and General Studies. So, at the age of 15, I started my specialist science training that proceeded with the exclusion of languages, civics, economics, art, and history (but true to form in Australia, sports education was still a compulsory requirement). Specializing so soon has the advantage of giving you a head start on university, but it also robs you of some balance to your development as a citizen—I am still of two minds whether this is a good thing for child development or not. School was mostly fun and interesting, and I was voted to be one of the 10 prefects in year 12. I had a nice set of friends who helped me through the awkward teenage years by making me laugh and helping me get into a respectable amount of trouble together. School flashed by. I got to take a pretty girl to prom, and I finished school with a TE (tertiary entrance) score that allowed me to have my choice of things to study at university. Starting in 1991, I chose to study science at the state university, University of Queensland, as it was the major university in the state and not so far away (by Australian standards) from my family. Also, the course was for three years only, and I did not want to spend my life at university.

I turned 17 soon after finishing high school and then got my license 2 months later (after receiving some driving lessons from my father). My Christmas present that year was an old Toyota Corolla, and my family waved goodbye to me from the door as I drove off to live in a shared house close to the university. In high school, I had started a job at a bakery and I continued with this job all the way through college. I worked two or three days a week during term time while studying a general science degree that ended with a final year specialization in chemistry and biochemistry. Bakery work started at either 1 am, 3 am, or 6 am, and depending on the day, I would sometimes race straight to my lectures/exams covered in flour or with dough caked over my skin. During my undergraduate degree, I developed an interest in biological chemistry. One assignment in a chemistry class was concerned with autocatalytic synthesis, and this served as a particularly cogent demonstration of the underlying chemical basis of life (e.g. see Nowick et al. 1991; Conn and Rebek Jr 1994). That example concerned self-templated replication. Under defined solvent conditions, mixtures of differently substituted benzoic acid and phenol components could be made to react slowly to form an ester. However, once formed, the ester could preferentially catalyze the formation of new ester products via pi-pi stacking between the aromatic groups of the original ester and those of unreacted benzoic acid and phenol components by helping to place them in a likely reaction geometry. Inclusion within the original mixture of phenols and benzoic acids with others having different substitutions on the aromatic ring would lead to the formation of different ester products with different tendencies to catalyze new types of ester reactions. For me, these self-replicating ester systems exhibited some interesting properties such as spontaneous formation, reproduction, mutation, speciation, competition for resources, and even 'death', and it became possible to glean how upon starting with such a system, after a few billions of years of interregnum, one might eventually arrive at a chemistry student handing in an assignments replete with magnetic coupling constants. At this stage, I was hooked. In the final year of my degree, I got an additional part-time job as a laboratory technician washing glassware and performing assays, and this helped out a great deal with money which was always tight, and let me spend less time at the bakery. I started to do quite well, and after graduating with a sufficiently high grade point average, I was admitted directly into the University

[2] This electronics kit largely inspired a primary school science assignment. Using my father's power tools, I built a 6 foot wooden model of a house with trip circuits that connected to an electromagnet controlled switch that, in true burglar alarm fashion, would ring a bell and shine a light at a nearby police box if the doors or windows were opened. Mrs Wong loved it.

Honours program. Within the Australian system, the Honours year is an intensive one-year course of study that may follow on from a first degree and which involves taking specialist classes and tests, submitting assignments, acting as a tutor, and performing a six-month research project judged on the basis of a graded thesis. I graduated second overall in my class of 27 after which I commenced a PhD within the laboratory of Prof. Donald J. Winzor.

Postgraduate studies in physical biochemistry at the University of Queensland (1995–1999)

Prof. Donald J. Winzor was one of the two chaired professors working within the biochemistry department. As a physical chemist, he was originally employed to teach the quantitive subjects, and during my undergraduate studies, I had taken (and enjoyed) both his and Prof. Ron Duggleby's courses on enzyme kinetics and physical biochemistry. Don had a genuine interest in sustainable science practices, and due to this, he only took one PhD student at a time. The plus side of this philosophy was that Don took science training quite seriously. Although he was far from a micromanager (Don spent more time traveling overseas working with collaborators than he spent in the country), there was a lot of critiquing, and he often asked me to prepare written summaries (or sometimes even taking additional courses) on areas he thought I needed strengthening in, and every written draft I produced had more red pen corrections than original text. The downside of Don's one student at a time approach was that it meant that life in the laboratory could be a little lonely[3]; however, I had many good friends in the chemistry and biochemistry departments when I needed a chat. Don was 60 years old when I started my PhD with him, and I was his last student prior to his official retirement in 2001. Don's scientific interests were quite wide and covered the areas of analytical ultracentrifugation, chromatography and electrophoresis, the quantitative characterization of ligand binding, and general solution thermodynamics and chemical kinetics[4] (Hall and Harding 2016; Winzor 2016).

My dissertation topic, titled 'Optical biosensor studies of protein adsorption: measurement and theory', was concerned with the quantitative use of reflectometric methods that measured the time-dependent changes in refractive index at surfaces—a property that changed in a defined fashion with protein adsorption at an interface. This project was quite wide in scope, and it allowed me to both conduct biochemical experiments involving the purification of antibodies from mouse ascites fluid (Hall and Winzor 1997, 1998) and various types of enzyme assays (Hall et al. 1995), and also perform quite complex (at that time) numerical simulations of processes such as chromatographic separation (Hall et al. 1996) and protein adsorption/lateral dispersion at an adlayer (Hall 1999; Hall 2001). As I was one of the few people able to operate the analytical ultracentrifuge, I provided technical assistance in a number of investigations (I was thanked in a lot of acknowledgements) as well as participating in some original research in this area myself (Hall et al. 1999; Wills et al. 2000; see also Hall 2017). Perhaps, the most intellectually interesting problem I worked on during that time involved simulating how an initially packed surface (such as might be achieved by rapid adsorption of proteins to a membrane surface) could slowly re-equilibrate to allow a second type of jamming limit to be reached (Hall 1999). This simulation would both start an argument and get me my first job.

A John E. Fogarty fellow in the section on physical biochemistry at the NIDDK (1999–2003)

During my postgraduate studies, I had read and cited papers by Dr. Allen Minton who is perhaps most famous for coining the term 'macromolecular crowding' to describe the effect of concentrated and complex solution environments on biochemical reactions occurring within the cell (Minton 1977; Zhou et al. 2008; Rivas and Minton 2020). The papers of Allen's that I had focused on described kinetic models for protein adsorption (Chatelier and Minton 1996; Minton 1999). However, these models did not accommodate the concept of any slow kinetic transition between a random sequential adsorption (RSA)–based packing limit and an equilibrium packing limit which, at that stage, was shaping up to be the last chapter of my thesis. This same topic was also the subject of a poster I was presenting at two back-to-back science conferences in Melbourne, at which Allen

[3] Each Professor was assigned a room capable of sitting up to 12 students; however, due to being Don's only student, I inherited this room to myself. The Head of Department, Prof. John de Jersey, would often stop for a chat and tell me that I had the largest office in the building.

[4] Don was a one of a kind and a genuinely great supervisor. When he was in Australia, our laboratory meetings consisted of he and I going for a 2-h discussion at the local pub. There, we would go through raw data or manuscript drafts as required in a serious fashion. These meetings would end on a light note with Don's famous 'one more for good luck?' always making me laugh. During my time in Don's laboratory, I got to meet many of the remarkable people he had trained. Of the three former students I met, all became good friends over time (Mike Jacobsen, Peter Munro and Keith Shearwin).

Minton was the invited keynote speaker.[5] I was genuinely looking forward to meeting Allen whose work I had come to admire for the cleverness and clarity of its development. However, our first chat at my poster presentation became quite confrontational with some heated comments. Feeling a little dejected at this outcome after meeting a scientific hero, I was pleasantly surprised when Allen came up to me the next day with two pages of handwritten statistical mechanics derivations explaining why I was wrong. This I could work with. The next day, I gave Allen a few pages of my own derivations explaining why I was right. This back and to continued on to the next meeting. I found I was engaged in true academic argument with someone whom, although I had technically only just met, I felt I knew via their published works, and I very much enjoyed it. At the end of this to and fro, Allen remarked that I was not so bad and mentioned the possibility of a postdoctoral opportunity at the NIH. I made an application to work with him via the John E. Fogarty scheme—starting at the end of that same year after the award of my PhD.

When I joined Allen's laboratory, he offered me a choice of projects to work on with the advice that for my first postdoctoral position, I should pick a project with a long history of previously performed quality research so that I could learn how to become a research scholar and not just a researcher.[6] Taking Allen's advice seriously, I chose to study how concentrated solution environments would affect the assembly of cytoskeletal proteins to form the micro-trabecular lattice structures providing the firmanent to nearly all eukaryotic cells. Concentrating in particular on the assembly of the protein tubulin to form microtubules (Borisy and Taylor 1967; Wells 2005), I went on to learn how to purify tubulin from cow and mouse brain, use a range of drugs (such as colchicine and taxol) to direct its assembly/disassembly, quantify its associated nucleotide composition and rate of usage, record its rate of assembly using turbidity, centrifugation, and various forms of laser light scattering assays, and also image the structure of the assembly product using transmission electron microscopy. Allen and I published a few papers developing a theoretical framework for the general problem of crowding effects on linear polymerization events (Hall and Minton 2002; 2004). However, although I performed a lot of experiments examining the effect of concentrated solution environments of dextran, ficoll, and serum albumin on tubulin self-assembly, I had a hard time getting reproducible results. There was a lot of variability in both the nature of the polymer product and the kinetic and thermodynamic measurements of the monomer to polymer transition. At the time, I actually felt that I may not be such a good researcher, but Allen suggested that I take a different look at the problem and perhaps concentrate on the cause of the variability. This bucked up my spirits a little, and I wrote and published two papers. The first examined the crowding problem from the inverse perspective where the concentrated crowding component was itself the soluble form of the cytoskeletal protein[7] (Hall 2002) and the second looked at the effect of tubulin denaturation on the rate of its polymerization (Hall 2003). At the time I wrote these articles, I included Allen's name on the drafts. After reading through them and providing substantial comments for their improvement, he suggested that I publish them on my own. At first, I half-suspected that this meant the articles were not good, but I came to learn that Allen was an extremely principled person. If you had the ability, he enjoyed mentoring and encouraging those capable of performing independent science and not those who depended on the resources of others whom he called 'science managers'. Allen and I collaborated on two other major works while I was in his laboratory—an analysis of the physical basis of the microtubule turbidity assay (Hall and Minton 2005) and a well-received review article on the topic of macromolecular crowding that has since gone on to be my most cited paper (Hall and Minton 2003). More can be read about Allen's life and research at the following (Hall and dos Remedios 2013; Minton 2013).

That time spent working at the NIH is still, to this day, the most fun I have had in science. I received my PhD when I was 25 years old and actually started working at the NIH at that same age. Looking back on it, I was just a kid and possessed all the energy and passion of youth. During my time with Allen, I enjoyed getting to know him and the other remarkable people working in Building 8 and the nearby surrounds. Within Allen's laboratory, there was Harry Sarroff, Allen's former boss who retired at 65 to become Allen's 'postdoctoral fellow'. When I met Harry, he was 84 years old. There was Peter McPhie an English émigré and an expert in many biophysical techniques including circular dichroism spectropolarimetry. At that time I also overlapped

[5] These conferences were the 1999 RASMB (Reversible Associations in Structural and Molecular Biology) Meeting and the 1999 Lorne Protein Structural Biology Meeting.

[6] The difference between the two as described to me then was that a research scholar was someone who performs interesting research aware of what other researchers in the field had previously done and who had the capacity to weigh and judge the value of that previous research.

[7] I called this phenomenon an 'entropy buffer', but it may also be described as a macromolecular crowding buffer (Hall 2002). In both cases, the precipitating component has the capacity to act as a buffer by minimizing any changes in the extent of macromolecular crowding. Later, I would explore another aspect of this situation in which driven changes in the structural state of the crowding component would allow it to act as a transducer element to regulate other biochemical phenomenon sensitive to the levels of crowding (see Hall 2006; Hall and Dobson 2006).

with some of Allen's current and former research fellows including Peter Schuck, Germàn Rivas, Kenji Sasahara, Arun Attri, Amanda Nourse, and Jose González. All were quite remarkable and genuinely interested in performing quantitative biophysical research. We would have tea in Allen's room on a Monday and Friday afternoon at 4 pm. Half of this time was spent on serious discussion, and half was spent telling jokes. At that stage, Allen and Peter were both over 65 and Harry was over 80, but I fit in well and can honestly say these chats were a highlight of my week. Outside of Allen's group but located within the same building were some giants of biochemistry. Directly opposite my laboratory module was the office of Herbert Tabor—the long-time chief editor of *The Journal of Biological Chemistry*. Like Harry, Herb was in his mid 80 s, but he and I used to swap stories daily while sharing a cup of tea standing in the corridor. Also included in this pantheon were Reed Wickner, Jan Wolfe, Edith Miles, Simon Black, and William Jacoby. During my time there, three seminars were arranged each week, a guest speaker on the Monday, a literature review on the Wednesday, and a research presentation on the Friday. With so many mature scientists and academic heavyweights, these seminars were literally cauldrons of boiling intellectual endeavor. There were no students at the NIH, and as a result, punches were not pulled. I thought it was truly fantastic. Included in the presentation pool were, like me, young research fellows from all over the world. To be honest, I think that half of the time we were all slightly terrified of making a presentation due to the high caliber of the questioning. Within this group of fellows, I made many good friends, with one in particular, Dr. Herman Edskes, playing the determining role in my next research move.

A Human Frontier Science Program fellow at the University of Cambridge (2003–2006)

Dr. Herman Edskes was another of my corridor tea drinking and yarn spinning partners at the NIH with the added plus that he actually had a functioning kettle and so did not have to resort to using a laboratory heater to boil his water. Together with the head of the institute Reed Wickner, Herman worked on the topic of amyloid 'prions' (protein only infective particles) that occurred in yeast (Wickner 1994; Edskes et al. 1999). Although he studied them in yeast, Herman (along with all the other members of the Wickner and Masison laboratories) was intensely interested in the wider dynamics of amyloid prion occurrence in infective diseases such as Scrapie in sheep, Kuru in human cannibals, and variant Creutzfeldt-Jakob disease (variant CJD) which involved people developing a brain wasting disease after eating prion-tainted cattle products (Prusiner 1982; Liberski 2012; Zabel and Reid 2015). After talking together for three years (and listening to an internal seminar program heavily weighted towards the prion topic in terms of scientist numbers), Herman and I postulated that all the disparate prion diseases and their complicating factors (such as the species barrier to infection) might be explainable in terms of a simple polymer model of amyloid fiber growth and breakage in which amyloid fiber fragmentation was made a joint function of both intrinsic amyloid properties (related to the particular protein component and fiber structure) and extrinsic properties defined by the basal and/or modified state of the host[8] (Hall and Edskes 2004). As our model suggested that amyloid prion disease might not be a simple case of infection/non-infection but rather a more sophisticated situation involving chronic infection with episodic manifestations of the disease, we called our paper 'Silent Prions Lying in Wait – A Two Hit Model of Prion/Amyloid Formation and Infection' (Hall and Edskes 2004). As I was becoming formally interested in the prion/amyloid topic, I submitted some applications for fellowships in 2002 to work in biophysics groups concentrating on that topic and was lucky enough to receive a HFSP Fellowship to work in the laboratory of Prof. Christopher M. Dobson.[9] I said a somewhat sad goodbye to Allen and the Building 8 gang in January of 2003. After a short holiday back in Australia to say hello to my family, I started at the University of Cambridge in March of 2003.

Trent Munro, a friend from Australia, was already living and working at Cambridge, and he helped me arrange three months of rented accommodation in the house of one of his laboratory mates (Isabella Palacios). Isabella kindly lent me an old rusty pink bike after arriving, and I rode this into the Department of Chemistry on my first day. Christopher Dobson,[10] the newly appointed 'John Humphrey Plummer Professor of Chemical and Structural Biology', had just moved his group from Oxford to Cambridge. I received a quick hello and a tour of facilities from Chris. He mentioned that things were a bit hectic (in all there were about 50 people spread between the chemistry, physics, and biochemistry departments), and he hoped that I could put my best foot forward to make a start of things but to make sure I would come to see him for regular chats. My fellowship application was actually in two parts, one concerned with protein folding in crowded solution environments and one concerned with diffusion in complex fluids. I set to task and got to

[8] Related to both specific and non-specific amyloid-related factors such as might be constituted by their chaperone complement or induced periods of high liquid shear stress induced by changes in blood pressure or arterial/veinous occlusions.

[9] Prior to applying I had received a visit at the NIH from an Australian colleague Cait Macphee who was working in Chris's laboratory. She mentioned nice things about him and encouraged me to visit with him and make an application.

[10] Later knighted to be become Sir Christopher Dobson.

work creating models and having some equipment built in the excellent chemistry department workshop.[11]

The first paper I published was the work I had started in the USA with Herman Edskes on the simulation of amyloid formation kinetics using models based on nucleated polymerization and fiber fragmentation, and this received a positive reception within the group at that time (Hall and Edskes 2004). While the group was large in size, it was nevertheless quite young in the age and the related work experience of its members. Despite only being 29 at the time, I was one of the more experienced members of the group. As I had previously completed a research fellowship Chris asked me, soon after starting, to work with two postdoctoral fellows who had already been with him for a year and a half but had not yet produced a paper. One of these two fellows, Natalia Carulla, had performed interesting experiments measuring the rate of SH3 monomer dissociation from amyloid fibers using either the appearance of proton signal intensity in 1D HNMR experiments or the recorded change in mass to charge signal intensity from a series of mass spectrometry time point assays in which amyloid fibers were dissolved in mixtures of dimethylsulfoxide and heavy water. Together, we developed a 'molecular recycling model' that quite well described the observed kinetics of monomer release and rejoining and which had general importance in understanding how equilibrium solutions of reversibly forming linear polymers might turn over their polymerized complement of monomers (Carulla et al. 2005). The second fellow, Nami Hirota, had invested significant time in producing a relational database of factors that affected a protein's propensity to form amyloid. In discussing the basic problem, we concentrated on a minimal amyloid forming sequence and found that there was an interesting length and position dependence when this minimal sequence was included within a longer unfolded polypeptide. Using theoretical arguments based on statistics of simple polymer chains, we developed a model able to both rationalize previous results and semi-quantitatively predict positional sequence effects on the kinetics of amyloid formation (Hall et al. 2005). Outside of these collaborative works, I also worked on my own research and published a number of papers on the topic of macromolecular crowding buffers and transducers which posited new mechanisms for the control of enzyme function within the cell (e.g. see Hall 2006; Hall and Dobson 2006). Outside of science, my time at Cambridge was fun. I got married and had my first daughter Lily who was born at the Rosie Maternity Hospital in 2005. With Lily in a baby harness, I used to take one day off a week to explore the museums and history of Cambridge (who would have thought babies loved punting on the River Cam). My wife and I did our very best to use weekends, and we drove all around England, Wales, Scotland, and Ireland with baby in the small back seat of the car. We signed up for famous battle re-enactments[12] and castle tours and took every chance possible to visit the European continent. My friend Trent and I used to regularly meet up at the Eagle pub to drink beer and discuss science in the hope that such proximity would enhance our future chances at winning a Nobel prize. So far no luck.

I met with Christopher Dobson[13] about once a month to talk about projects and discuss manuscripts and came to appreciate his kindness and political savvy in roughly equal parts. That time in Chris's group was the first time I had worked with someone who substantially leveraged the political side of science. One day during our monthly meeting, Chris was complaining about the large number of papers he was sent and asked to coauthor. I asked Chris how he could rationalize having his name on more than thirty papers a year. As always, Chris gave an honest and considered reply, and said that although obviously such a situation was not ideal, the reality was that inclusion of his name on a manuscript was always requested by the authors and that by agreeing to this all involved knew that the paper would be more likely to be accepted and also have greater impact. Such thoughts on authorship were quite common within the group but did not always sit quite right with me, and this conversation was actually a defining moment in my decision-making. Although I genuinely learnt a lot from Chris, I came to realize that such executive style science was not for me and that I preferred working in smaller groups with less of the political dynamic. Despite Chris's very kind offer to me of further financial support to stay in his group, I started to set my eyes towards my next research position. As I had married a Japanese citizen, this manifested with a move further to the east.

A JST Wakate Fellow at the University of Tsukuba (2008–2013)

After I scouted out some research possibilities, we moved to Japan at the end of 2006. I spent 2007 bouncing around the country working at three different institutes located within some of Japan's best universities—Institute for Frontier

[11] I bought a relatively cheap second hand sports car from one of the workshop staff and had inordinate amounts of fun driving around the UK over that four year period.

[12] I will never forget the unleashing of the battle hound at the Battle of Hastings re-enactment (who looked surpisingly like a labrador with a studded collar!).

[13] Sadly Christopher Dobson passed away in 2019 (Dumolin 2020). A great person in both stature and character and a gentleman of science.

Medical Science[14] (Kyoto University), Institute for Protein Research (Osaka University), and Graduate School of Bioengineering and Biomolecular Science (Tokyo Institute of Technology). At the end of this hectic first year in Japan, two wonderful things happened. The first was that my second daughter Monet was born during the falling of the Autumn leaves at the Kyoto Baptist Hospital.[15] The second was that I was awarded a Japan Science and Technology Agency (JST) Wakate Fellowship that I undertook within the Institute of Basic Medical Sciences at the University of Tsukuba. This new job involved my family moving to the other side of Japan.

One of Japan's top 10 universities, the University of Tsukuba, is located in the specially designed 'science city' of Tsukuba situated about 100 km north east of Tokyo. Literally translating as Young (WAKAI) Hand (TE), the Wakate Fellowship was, at that time, a new Japanese government program meant to provide young scientists (I was 34 years old) with their own independent laboratory and supporting research funds for a five-year period. My fellowship application was built around the theme of 'The Physical Biochemistry of Disease', and I set out trying to develop experimental and computational models capable of quantitatively linking biochemical events to disease aetiology. The three diseases I concentrated on were those relating to amyloidosis, viral infection, and cancer. About 1 km from the university hospital, my laboratory was located in Advanced Building D—a quite beautiful structure resembling a giant lemon slice placed on its side. Although the city is famous in Japan for being a little boring, I enjoyed life in Tsukuba and my home situation and research progressed on multiple fronts. My third daughter Iris was born in 2010 at the Tsukuba Nanairo Maternity Hospital located right next to where I lived. Each room of the hospital (the name of which in English translates as 'Rainbow') had curtains of a different color, and I would walk past the hospital with my other children in tow waving at the room with the yellow windows where my wife and Iris were staying. With regard to scientific research, things were going great; I had my first independent position. Due to the five-year block nature of the grant, I was (relatively) comfortably funded—a situation that allowed me to approach my research with gusto. As an independent Assistant Professor, I was permitted to supervise a single student in my laboratory, Mr. Nam Nguyen and Nam graduated right on time with a Master's Degree in Medical Science in 2013. Grant funding permitted me to employ a postdoctoral fellow for four years, and during this time, I had the privilege to work with three scientists Dr. Nami Hirota, Dr. Mai Nemoto, and Dr. Li Huang. On the amyloidosis topic, I published a series of papers that described multiscale models of fiber kinetics (that extended earlier work performed at Cambridge) (Hall and Hirota 2009), what I thought was (and still think is) the first fully consistent model relating amyloid fiber formation to amyloidosis disease aetiology (Hall and Edskes 2009; Hall and Edskes 2012), and three practical tools for investigating amyloid experimentally that related to its analysis by transmission electron microscopy (Hall 2012), its purification by size-exclusion chromatography (Hall and Huang 2012), and its participation in lipid membrane interactions (Sasahara et al. 2010). For the cancer topic, I was interested in exploring situations leading to the physical disruption of cellular signaling pathways, and this required generating a better understanding of factors affecting diffusional transport within the membrane and cytosol of the cell (Hall 2008a, b; Hall 2010, Hall and Hoshino 2010). Reminiscent of early cytology studies, this work sought to employ a mixture of experiment and computation to shine light on some of the 'black box' aspects of the cell (Hall and Hoshino 2010; Ross 2016). My studies in the area of viral infection involved light microscopy–based observations of the adsorption of virus-like particles to prepared membrane-like surfaces. Soon after starting, I published the underlying theoretical basis to this work as an invited book chapter (Hall 2008a, b), but my experimental studies were disrupted somewhat upon having microscopes thrown from the bench by the Great Eastern Earthquake that hit the area on March 11th of 2011. That earthquake and the tsunami that accompanied it were genuine tragedies for Japan with over 20,000 people killed or injured and many more made homeless in that particularly cold month of March. Even more people were made homeless by the nuclear accident that occurred a few days later and which sent many people fleeing from the neighboring prefecture of Fukushima into Ibaraki, the state where I lived. Uncertainty over what would happen next caused a lot of people stress. My wife, with new baby at hip, requested a change of location. This provided me with the necessary encouragement to start writing some new fellowship applications.

An ANU Senior Research Fellow at the Australian National University (2013–2018)

I was lucky enough to next secure a five-year ANU Senior Research Fellowship to work at the Australian National University, Research School of Chemistry (RSC), located in

[14] In the laboratory next to mine, a friendly young professor would frequently say good morning to me. When I asked the members of my group who he was, they advised me that we do not talk to that group. From the occasional chatting over cups of tea in a shared space, I found out that some members of that neighboring group liked wine and they would occassionaly come to my house for a wine tasting. Although I only worked there for a short period, I later laughed when I saw that my friendly neighbor Shinya Yamanaka was awarded the 2013 Nobel Prize for the discovery of induced pluripotent stem cells.

[15] Named after my favorite painter Monet was indeed a very beautiful baby with the bright colors of her character reminiscent of his early period.

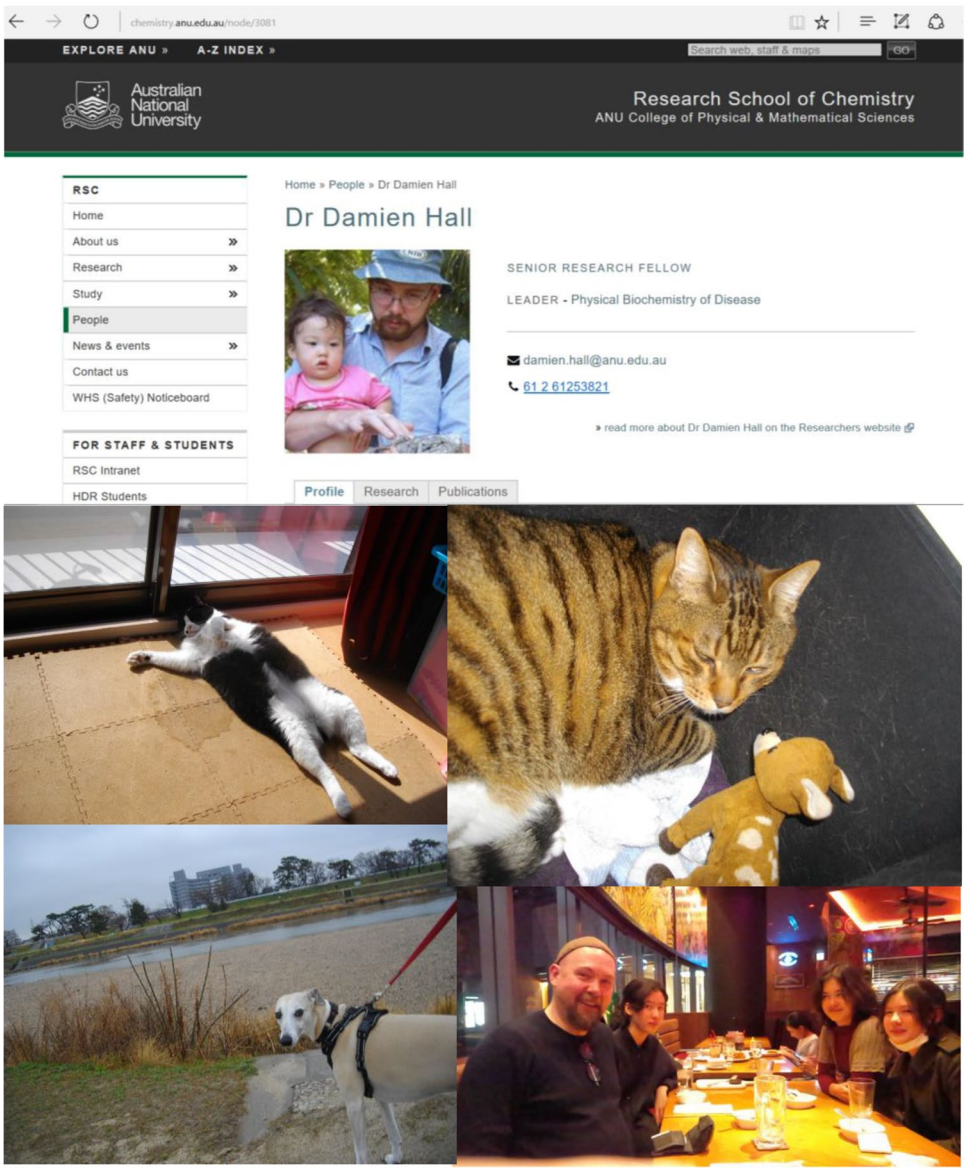

Fig. 2 (Top) Time at the ANU. (Middle) Pets [Neko (relaxing), Merlin the Wonder Dog (walking by the river), and Foundit (talking with sketchy characters)]. (Bottom right) Dinner with nearly grown-up children in Japan

Australia's capital city of Canberra. Australia designates its academics from A (postdoctoral fellow) to E (Professor). I was somewhere in between as a level C which was sufficient to make me Leader of the Laboratory for the Physical Biochemistry of Disease (Fig. 2). Being back in Australia was surprisingly great after being away for so long. I had always been a little afraid for my wife and children that Australia still retained the anti-Asian sentiment that was frequently on display during my youth. However, in the interim of my 15 years away from the country, Australia had encouraged a lot of immigration from neighboring Asian countries, and a new equilibrium seemed to have been established. I rented a house in the 'China town' region of Canberra known as Dickson. My half-Japanese family fit in without problem, and my daughters got to enjoy the low-pressure environment of Australian primary school where there is a strong emphasis on play. We brought our two cats with us from Japan and soon after arriving acquired the fastest whippet puppy in Australia, Merlin the wonder dog (Fig. 2). Canberra, a small regional city that by historical accident became the compromise location as the Australian capital, was a very easy place to live. Designed by the renowned architect Walter Burley Griffin, Canberra was surrounded by lots of natural bushland and small mountains, with a large lake (Lake Burley Griffin) located at its center. Decorated by the national museums and galleries, the children and I spent a lot of our weekends walking around this lake, exploring the sites, and occasionally sharing ice creams with Merlin (often these periods of sharing were instigated by the dog). We enjoyed numerous family holidays around Australia visiting nearby cities of Melbourne, Sydney, Wollongong, Adelaide, and Brisbane. On our trips to Queensland, I would take my

children to my parent's small farm. As Mum and Dad had fully retired, they really enjoyed these chances to meet their grandchildren.

The last time I was part of Australian academia was when I was a carefree student. Going back, it was interesting to observe and experience it from the other side, and I was surprised at how very serious it had become. In terms of gross domestic product, one of Australia's top four industries is education. Universities directly charge foreign students fees, while domestic students' fees are paid initially by the Australian government with these fees later recouped via graded taxation. For some of the top universities, like the ANU, these costs can be quite substantial and they constitute the major source of revenue generation. As such, Australian universities' success tends to linearly scale with student numbers, and they necessarily take on a student as customer mentality. A lot of my time at the RSC was spent supervising students at the undergraduate and postgraduate stages and preparing and teaching classes. Some of the practicums I developed were quite fun. On one occasion, I drove 200 km with my father (on one of his visits with my mother) to buy 1000 cow eyeballs from the closest commercial abattoir located in the aptly named town of 'Cowra'. These eyeballs served as the starting tissue for a student protein purification project, although I suspect that the students enjoyed playing with the eyeballs as much as they did isolating the crystallin proteins from the eye lens. Of the many students I worked with, I mention Nicholas Ray (Ray 2015), Ryota Wakayama (Wakayama et al. 2019), Ran Zhao, and Ian Dehlsen (Zhao et al. 2016; Hall et al. 2016)—thank you for your collective efforts and enjoyable company. Almost immediately after starting in Australia, I received an appointment as an Associate Professor at Osaka University under a newly founded 'International Cross Appointment Scheme' meant to help facilitate cooperation between Osaka University and other leading national universities. The major requirement of this award was that I spend three to six months of each year in Japan teaching classes and conducting research. The classes I taught to the Masters and PhD students were relatively popular, and I got to both lead and engage in a lot of collaborative research (e.g. see Furukawa et al. 2014; Hall et al. 2014; Hall et al. 2015a; Hall et al. 2015b; Zhao et al. 2016; Hall et al. 2018a). In the final year of my ANU Fellowship, my family relocated to Japan so that my children could re-enter the Japanese school system before things started getting tougher in middle school. We moved back at the end of 2017, and I spent that final year shuttling between Japan and Australia while my children knuckled down to a schooling system in which every day was not kodomonohi (ganbatte children). In that final year, I achieved two major things. The first involved preparing a special issue in honor of Fumio Arisaka, one of the research supervisors that had helped me tremendously during my first year in Japan (Hall et al. 2018b; Arisaka 2018). The second involved organizing my next research appointment as an ORISE Established Scientist in the USA. As the children were trying their very best to re-assimilate into Japan, I left on this next adventure by myself.

An ORISE established scientist at the National Institutes of Health (2019–2020)

With the strong support of prior collaborators (thank you Reed and Herman), I received three years of funding in the form of an ORISE Established Scientist position[16] taken at the National Institutes of Health. The lofty goal of my research application was to mathematically model the life cycle of the yeast amyloid [PSI+] prion formed from the Sup35 protein and to solve its three-dimensional structure by cryo-electron microscopy methods. After arriving in the USA, I rented a basement apartment in Washington DC from a retired government worker/professional poet who lived in the same apartment complex on the top floor. My 85-year-old landlady Bonnie provided excellent company, and we frequently shared our mutual interest in wine by meeting up for a glass from an interesting bottle on the weekend. Although not that young herself, Bonnie helped out at a nearby aged care facility and taught basic reading and writing skills (along with a poetry class) once a week at a DC homeless shelter. A female Harvard graduate from the 1960s, Bonnie was (still is) a remarkable person, and she got to meet my wife and children upon their visits. She really made my stay in DC a memorable one.

Once again living by myself (and with no family members to play with), I spent most of my time at work. I started off my research project by first preparing and purifying a histidine-tagged Sup35 fusion protein using bacterial expression methods and then developed reproducible assays for making [PSI+] amyloid fibers. Located in a core electron microscope facility, I received expert training in cryogenic sample preparation techniques from the professional staff and started the process of accumulating the hundreds of thousands of images necessary to solve a macromolecular structure using tomographic reconstruction procedures. Parallel to my practical work, I started simulating the formation and transfer of prions in yeast cells. A major determinant of prion growth in yeast cells involves the interaction of the protein components with chaperones—a class of proteins

[16] ORISE – Oakland Institute for Science and Engineering was the funding front of the US Department of Energy. They offer junior and senior fellowship opportuntities for scientiststs having a science, technology, and engineering background.

named after their ability to stop single proteins from getting into unwanted hetero and homo-interactions. My first big publication at the NIH involved simulating optimal chaperone distributions in basal and stressed cellular states (Hall 2020a). This was followed up by the extension of an approach that I had developed previously during my time in Cambridge for including internal position dependence of fiber fragmentation when simulating the kinetics of amyloid fiber growth (Hirota et al. 2019; Hall 2020b). With a penchant for working through problems myself, I was, in late 2019, writing software to create computer models to simulate both the amyloid fiber structure and the cryoelectron scattering experiment. Late evenings in the stacks of the NIH library in Building 10 were yielding improvements in my understanding of the problem, and generally, things were progressing. Around this time, I started reading of citywide lockdowns in China due to a viral outbreak. The situation developed rapidly, and my wife and children felt very far away. We were furloughed from the NIH in February, and everyone began to learn the art of virtual work and zoom calls. I scheduled a trip to Japan, but my ticket was canceled by the airline company, and so I bought another ticket. The situation repeated another three times. As countries started to lockdown, I inquired as to Japan's situation and learnt that the border would likely shut to foreigners in April. I decided to take a chance and make a return after quickly organizing a short-term position at the Nagoya Institute of Technology (thank you Prof. Kandori). The ORISE group and NIH staff were quite understanding and I think a lot of people were having similar thoughts at this time about where they wanted to be during an imminent extended period of lockdown. After my fourth ticket cancelation, I went to the airport with a suitcase and waited at the counter. About 12 h later, I bought a ticket from the desk and was then on a very expensive JAL flight returning to Japan.

A WPI Tokunin Assistant Professor at Kanazawa University (2021–present)

Like the rest of the world, Japan locked down and life was experienced via Skype and Zoom. I spent a lot of my first six months doing computer simulations on a PC in my study at home and walking Merlin the wonder dog beside the river where we lived. These activities were interspersed with the occasional trip to Nagoya. Together with colleagues from Australia and the USA, I was kept busy preparing a special issue on the biophysics of human anatomy and physiology made in honor of friend and colleague Cristobal dos Remedios (Hall et al. 2020; dos Remedios 2020). Another interesting and quite timely research excursion was provided by colleagues in Tokyo who asked me to participate in some COVID-19 pandemic modeling. Through this collaboration, I got to join in on Zoom calls with some of the virologists contributing to Japan's response to the pandemic (Ando et al. 2021). Their prognostications about the future were not so promising, but with hindsight, they were nearly 100% correct about how the pandemic would play out. During time spent computer coding, paper writing, and taking lunchtime walks with my dog, I interviewed for a longer-term position at Kanazawa University within a World Premiere Institute (WPI) for Nano-Life Science, dedicated to the application of various forms of scanning probe microscopy to the study of biomolecular phenomenon. I got that job, and the last three years have whizzed by. While not particularly knowledgeable about scanning probe microscopy when I started, I enjoyed the opportunity to work on something new and have managed to make a few contributions to date on the topic of high-speed atomic force microscopy experiments conducted on dynamic biological surfaces (Hall and Foster 2022; Hall 2023a, b). During my time here, I have also got to help produce another special issue on the topic of computational and structural biology that was made in honor of another long-time mentor and friend Haruki Nakamura (Hall et al. 2022; Nakamura 2022). Very recently, I have managed to publish the work simulating the growth and transfer of amyloid prions in yeast that I first started at the NIH before the world went crazy with the pandemic (Hall 2023c). This work (Hall 2023c) describes the formation of amyloids (a form of self-replicating molecules) within cells, which are themselves self-replicating, and therefore is not too dissimilar from the self-templated synthesis practical I encountered during my undergraduate studies that got me interested in biological chemistry in the first instance.

Association with Biophysical Reviews

I have been associated with the *Biophysical Reviews* journal in one way or another since 2010, one year after its first volume was published in 2009. I became a member of the editorial board in 2011, the deputy editor in 2015, and the chief editor in 2019. I would like to thank the various IUPAB Executive Council Members for giving me the opportunity of leading the *Biophysical Reviews* journal during this time. I would also like to thank the Springer-Nature professional journal staff for all their help along the way. A special thank you Jean Garnier (the first chief editor) and Cristobal dos Remedios (the second chief editor) who respectively invited me to join the editorial board and trained me to do this job. Finally, I would like to remark upon the extraordinary nature of the members of the *Biophysical Reviews* editorial board—a group of people with a genuine interest in performing service to advance the discipline of biophysics. It has been a tremendous pleasure and honor to lead the journal for this last five years.

Concluding remarks

I have often requested the authors of these 'Meet the Editors' pieces to make them interesting by describing both their research background and their life history/personal philosophy so that they might be enjoyed by readers from both a scientific and human perspective. I hope that this piece has provided some interest and a possible laugh or two. After re-reading this hurriedly written to deadline draft, I was struck by how a career in science can provide an incredibly interesting canvas on which to paint the story of one's life. Mine has been quite interesting. I have left out a lot that may not be in good taste or might seem overly incredulous to the reader. I think I will save that for later in a part 2;)

Data availability This work is an an Editorial with no original data.

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